



Technische Informationen für den Betrieb
und die Wartung und Reparatur der Marke
Mercedes Benz Type 404,0 & 404,1 UNIMOG
Jahre 1955 –1980

Technical information for the operation, service
and repair of the Mercedes Benz Type 404.0 &
404.1 UNIMOG for years 1955-1980.



ORIS **TECH** ELECTROGRAPHICS

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- Section 1 - Unimog Type 404 Glove Box Manual
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- Section 6– Unimog Type 404 Parts Film
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This technical data file contains operations, service and repair information for the Mercedes Benz Unimog type 404 built from 1955 to 1980 in the following types:

1972-1980

- 404.010 / U82 / M180.958 / Open Cab
- 404.011 / U82 / M180.958 / Closed Cab
- 404.012 / U110 / M130.925 / Open Cab
- 404.013 / U110 / M130.925 / Closed Cab

1955-1977

- 404.111 / U80 / M180 / Open Cab
- 404.112 / U80 / M180 / Closed Cab
- 404.113 / U82 / M180 / Open Cab/Closed Cab
- 404.114 / U82 / M180 / Open Cab/Closed Cab
- 404.115 / U82 / M180 / Open Cab/Closed Cab
- 404.117 / U60 / OM615 / Open Cab

Thank you for downloading the Ars Technica Electrographics Technical Data File for the Mercedes Benz Unimog Type 404. A lot of care has gone into formatting this document to provide the highest possible ease of use, readability and portability. Much of the information provided herein has been available from other sources but not as a packaged and printable PDF file.

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Section 1 - Unimog Type 404 Glove Box Manual

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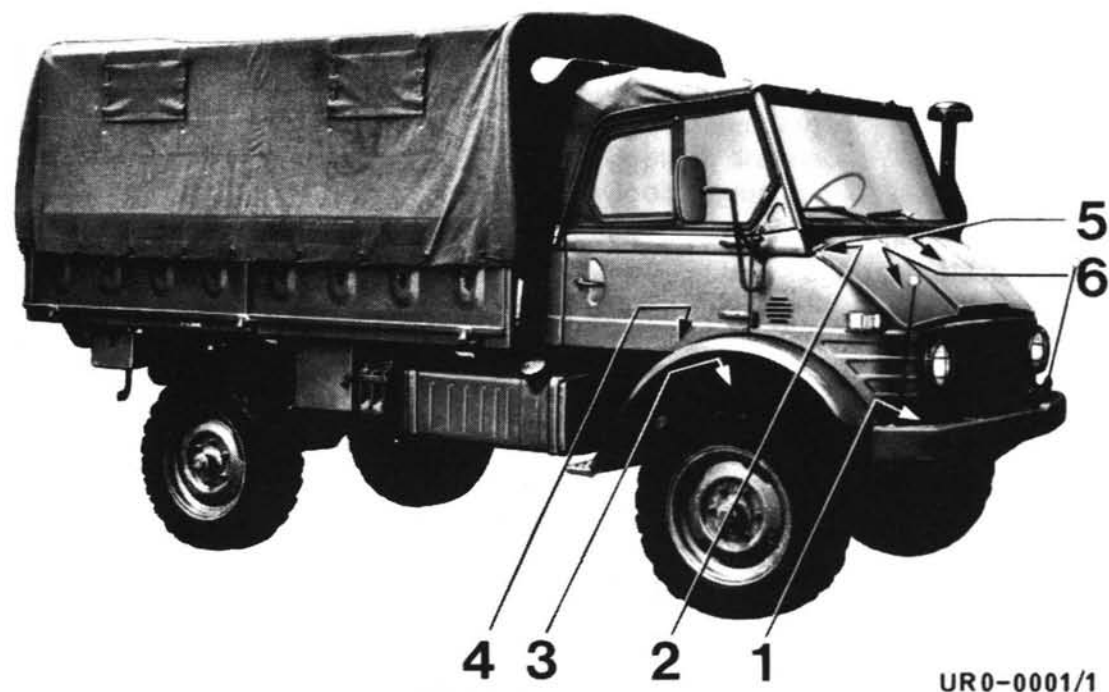
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- 1 Chassis number**
on frame
- 2 Type plate**
under engine hood
- 3 Axle number**
on top of axle center housing
- 4 Transmission number**
at top left of transmission housing
- 5 Cab number**
on left door pillar
- 6 Engine number**
on left side of engine block

UR0-0001/1

Figure 1 Location of type plates and numbers, type 404.0

- 1 Chassis number**
on frame
- 2 Type plate and cab number**
under engine hood
- 3 Axle number**
on top of axle center housing
- 4 Transmission number**
at top left of transmission housing
- 5 Engine number**
on left side of engine block

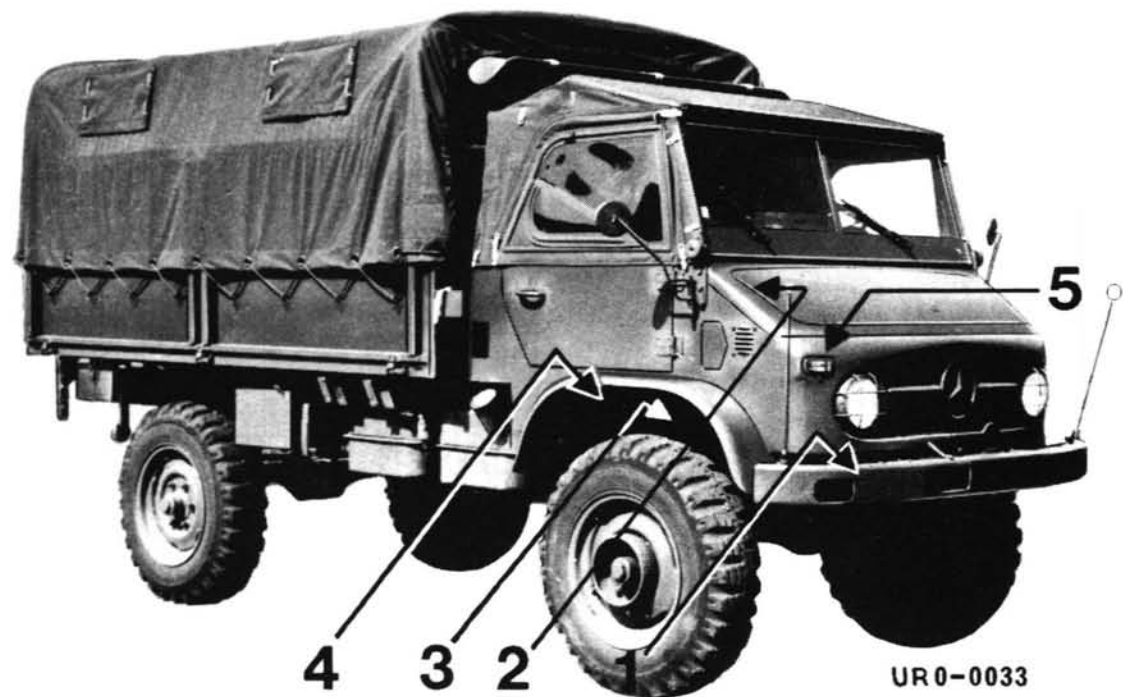


Figure 2 Location of type plates and numbers, type 404.1

1 General Information

1.1 Explanation of Contents

All 404 vehicle types are included in this instruction manual. The basic components of all models are identical. Major differences and design variations of type 404, 113/114 are dealt with under abbreviated type code **404.1** immediately following the description of the respective item.

Section **1 General Information** contains explanations as well as important information regarding warranty, numbers, keys and special equipment of the vehicle.

A careful study of the section **2 Operating Instructions**, particularly prior to the initial operation, is one of the prerequisites to troublefree operation of the vehicle.

In addition, relevant job instructions given in section **3 Maintenance Instructions** are intended to insure that the UNIMOG remains efficient and is constantly operational.

Use only Daimler-Benz recommended grades of fuels, coolants, lubricants, etc. described in section **4 Fuels, Coolants, Lubricants** in the quantities specified.

In the following section **5 Troubleshooting** we are providing information as to what causes may be applicable in case of possible trouble as well as recommendations for their elimination.

For immediate information, all significant data concerning the vehicle are summarized in section **6 Technical Data**.

1.2 Warranty

Warranty claims will only be successful if the warranty terms – contained in the general terms of sale – are observed.

1.3 Type Plate and Numbers

In all inquiries concerning the UNIMOG, and when ordering spare parts and special equipment, be sure to list the type and model designation, the chassis and engine number, or other unit numbers. Figure 1 and 2.

The designations "right-hand" and "left-hand" apply as seen in driving direction. The statements 1st, 2nd cylinder, etc. are always as seen from the direction of the radiator.

1.4 Doors and Engine Hood

1.4.1 Locks

The door key will only lock the left door.

However, both doors can be latched from inside.

The door locks of the folding top cab must be latched from the inside while driving.

In order to lock the door from outside place the inside handle in the "latched" position.

The **square hood key** is located in the left-hand door box.

To open the outside engine hood unlatch at the bottom and prop up.

To remove the hood unlatch at the upper bore with the same key.

Unlatching at the upper bore is eased after the hood is raised somewhat from below.

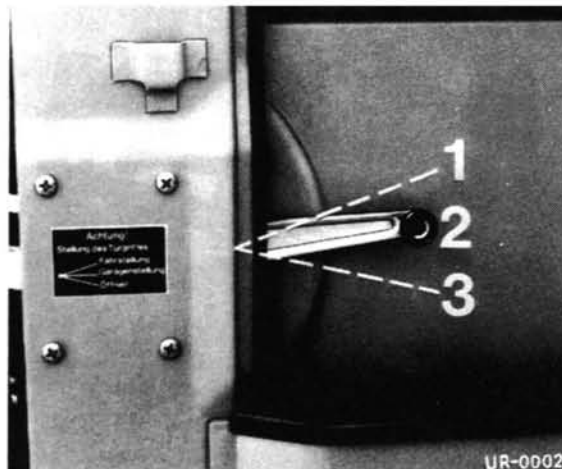


Figure 3 Door locks, RH side

- 1 Driving position (latched)
- 2 Neutral
- 3 Open

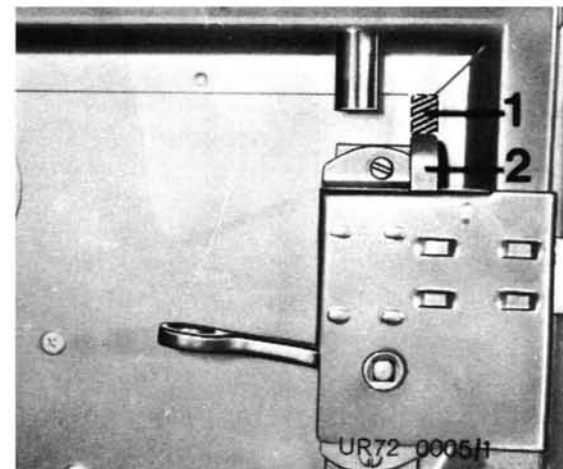


Figure 5 Door locks
Folding top cab, 404.1

- 1 Open
- 2 Latched



Figure 4 Door locks, RH side
(all-steel cab)

- 1 Open
- 2 Neutral
- 3 Latched

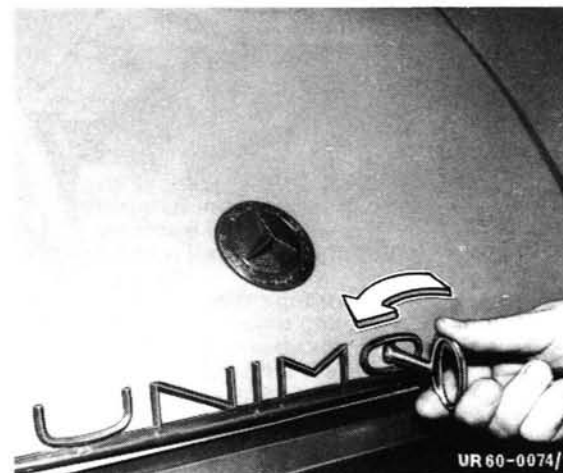


Figure 6 Opening engine hood

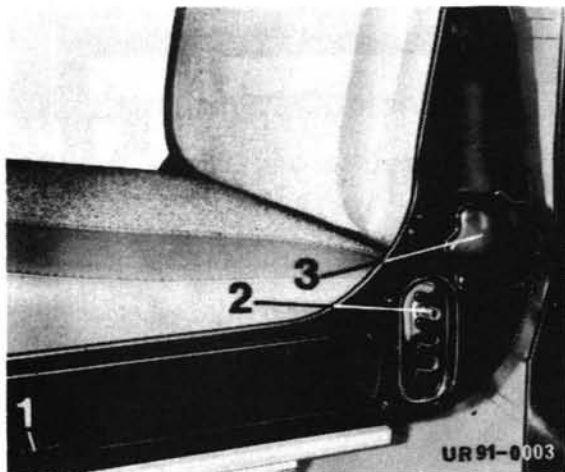


Figure 7 Seat adjustment

- 1 Longitudinal adjustment
- 2 Tilt of seat cushion
- 3 Tilt of backrest

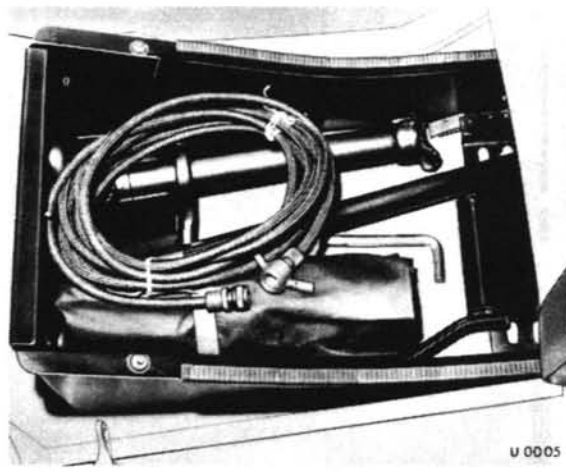


Figure 9 Vehicle tool box under asst. driver's seat



Figure 8 Seat adjustment, 404.1

- 1 Longitudinal adjustment
- 2 Tilt of backrest

1.5 Seats, Vehicle Tools

The **driver's seat** has three modes of adjustment, figure 7.

404.1

For longitudinal adjustment press seat forward and lift out in upward direction.

To adjust backrest press button (2), figure 8.

The **chock**, located in vicinity of fuel tank, is fastened with a spring hook.

The **vehicle tools** are located below the asst. driver's seat. Disengage rubber tensioning band and remove seat cushion.

1.6 Special Equipment

These operating instructions apply to the standard vehicle and to some special equipment. Please refer to the instructions concerning operation, maintenance and technical data applicable to your vehicle.

2 Operating Instructions

2.1 Instruments and Controls

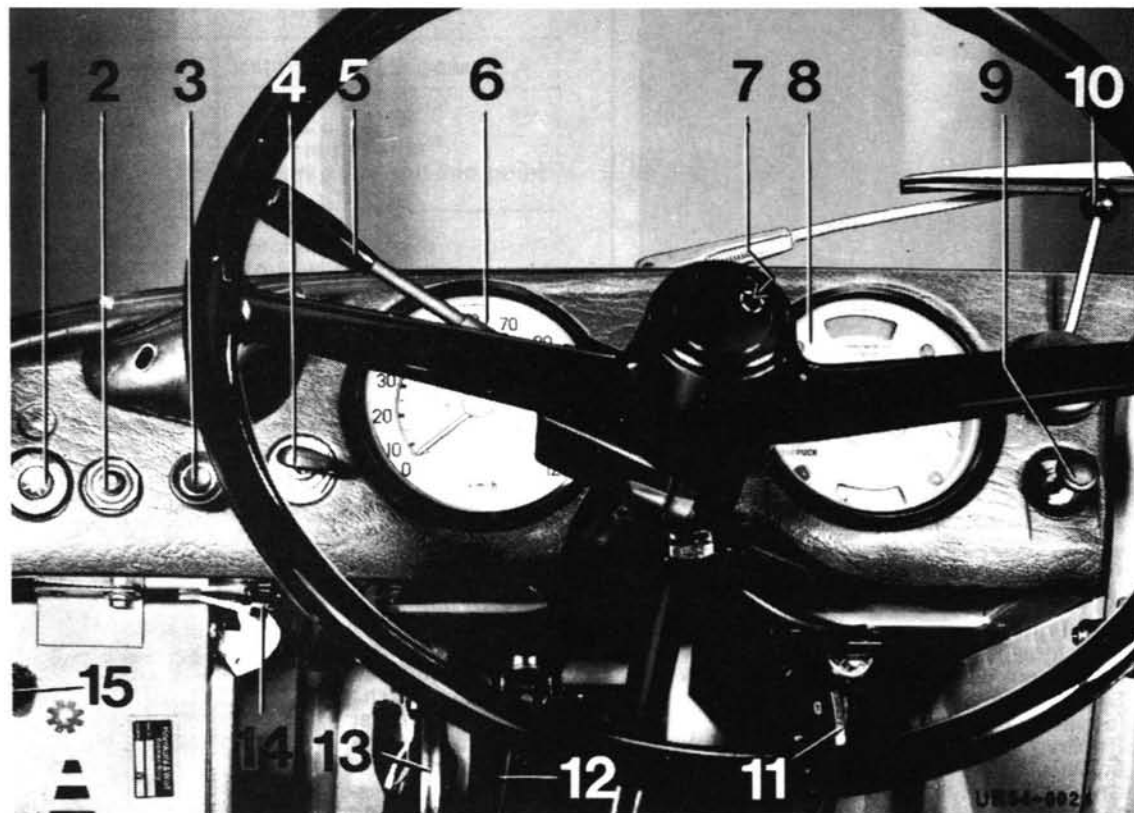


Figure 10 Location of instruments and control levers, 404.0

- | | |
|--|---|
| 1 Switch for hazard warning flasher system | 9 Choke control cable |
| 2 Starter switch | 10 Hand throttle |
| 3 Pull switch for windshield wiper/washer system | 11 Brake pedal |
| 4 Switch box | 12 Clutch pedal |
| 5 Turn signal/horn/dimmer switch | 13 Parking brake lever |
| 6 Speedometer or tachograph | 14 Socket (1-pin) |
| 7 Turn signal indicator light for the trailer | 15 Switch for heating and ventilation equipment |
| 8 Instrument cluster | |

2.1.1 Instruments

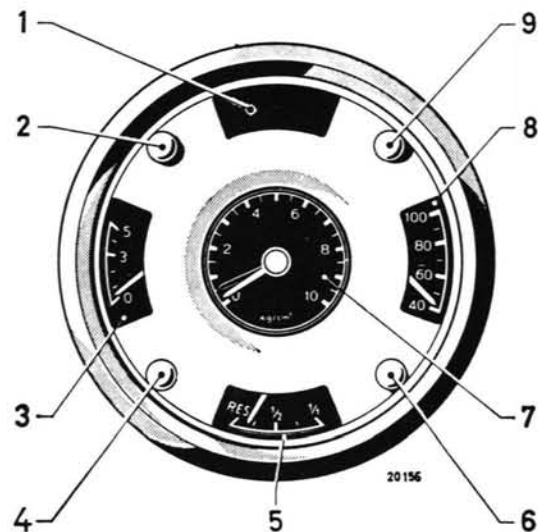


Figure 11 Instrument cluster

- 1 Brake system warning light (red)
- 2 Turn signal indicator light (green)
- 3 Oil pressure indicator
- 4 High beam indicator light (blue)
- 5 Fuel gauge
- 6 Charge indicator light (red)
- 7 Dual brake pressure gauge
White needle = reservoir pressure
Red needle = brake pressure
- 8 Coolant temperature gauge
- 9 Turn signal indicator light for 2nd trailer (green)

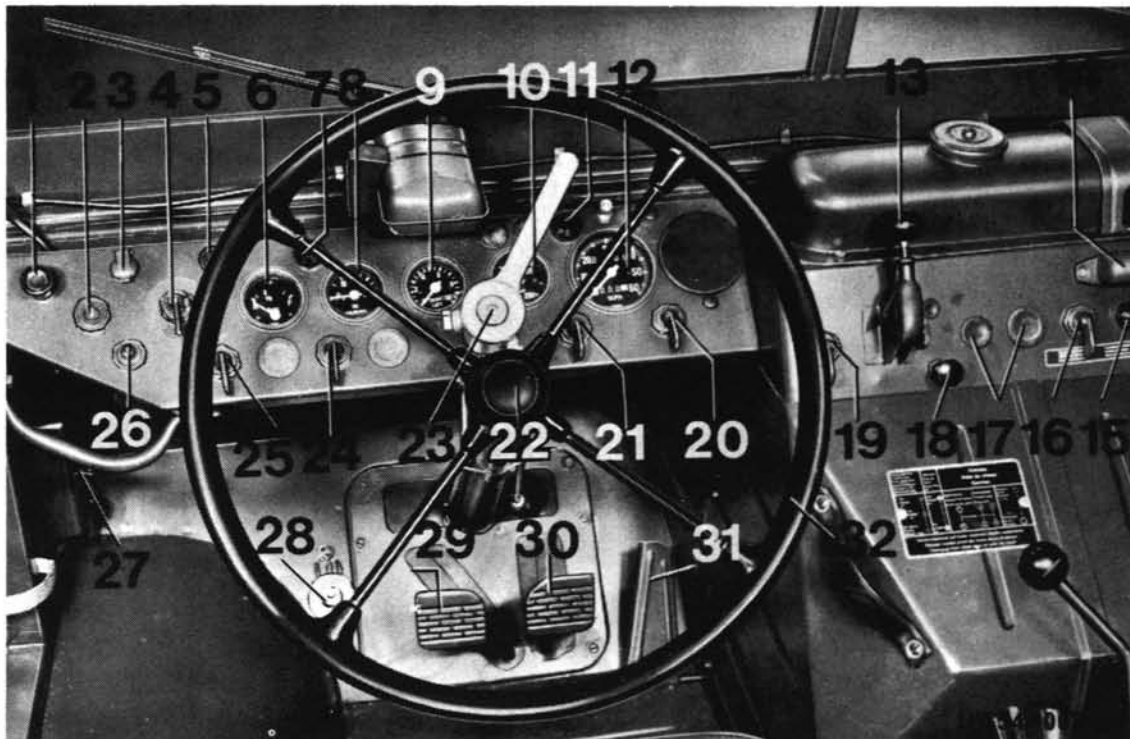


Figure 12 Location of instruments and control levers, 404.1

- | | | | | | |
|----|-------------------------------------|----|---|----|------------------------------|
| 1 | Access to hood latch | 13 | Hand throttle | 22 | Horn button |
| 2 | Starter switch | 14 | Map light | 23 | Hand brake valve |
| 3 | Socket | 15 | Indicator light for supplementary equipment (supplementary fuel pump) | 24 | Socket switch |
| 4 | Master light switch | 16 | Switch for supplementary equipment (supplementary fuel pump) | 25 | Switch for instrument lights |
| 5 | Charge indicator light | 17 | Reserved for switches for supplementary equipment | 26 | Starter switch |
| 6 | Fuel gauge (rear fuel tank) | 18 | Choke control cable | 27 | Ventilation flap |
| 7 | High beam indicator light | 19 | Turn signal switch | 28 | Dimmer switch |
| 8 | Oil pressure gauge | 20 | Switch for windshield wiper, right | 29 | Clutch pedal |
| 9 | Dual brake pressure gauge | 21 | Switch for windshield wiper, left | 30 | Brake pedal |
| 10 | Coolant temperature gauge | | | 31 | Accelerator pedal |
| 11 | Turn signal indicator light | | | 32 | Steering wheel |
| 12 | Speedometer with reset for odometer | | | | |

2.1.2 Shifting Levers

Transmission

Shift lever	Shifting positions	
1	1st—6th	1st through 6th gear
2	V O R	Forward Neutral position Reverse (1st and 2nd gear)
3	O VA VA+AS	Rear-wheel drive Four-wheel drive Four-wheel drive and differential locks
4	O E	Pto disengaged Pto engaged

Explanation of figure 13 and 16

Supplementary crawler gear set

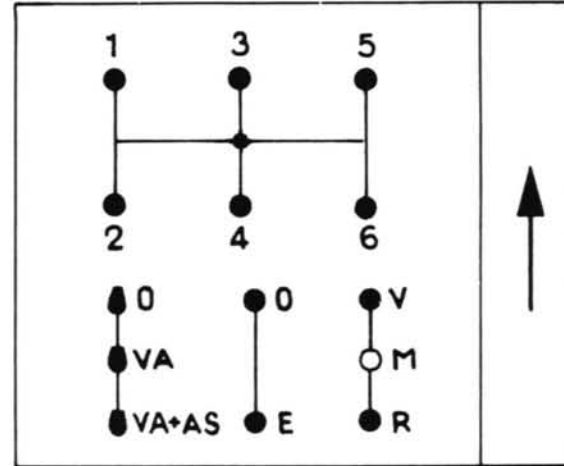
I Crawler gear shifting lever

E Engaged
A Disengaged

II Forward/reverse shifting lever

V Forward
M Neutral position
R Reverse

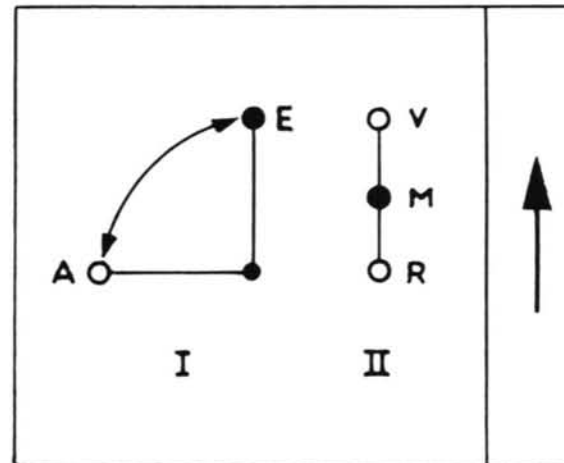
Transmission



UZ 26 - 0114

Figure 13 Shifting positions

Supplementary crawler gear set



UZ 26 - 0115

Figure 14 Shifting positions

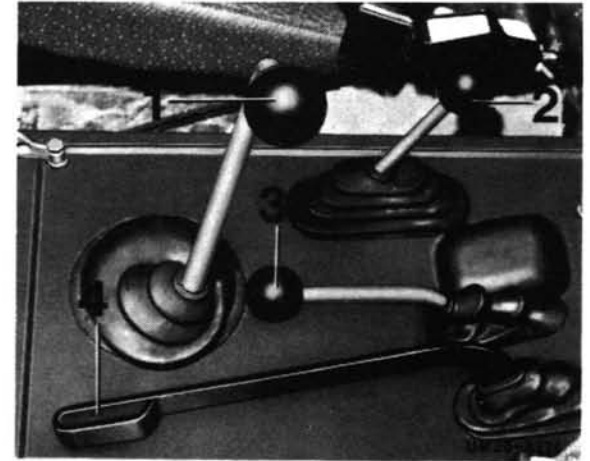


Figure 15 Shifting levers

- 1 Main shifting lever
- 2 Forward/reverse shifting lever
- 3 Pto shifting lever
- 4 Four-wheel drive/differential lock shifting lever

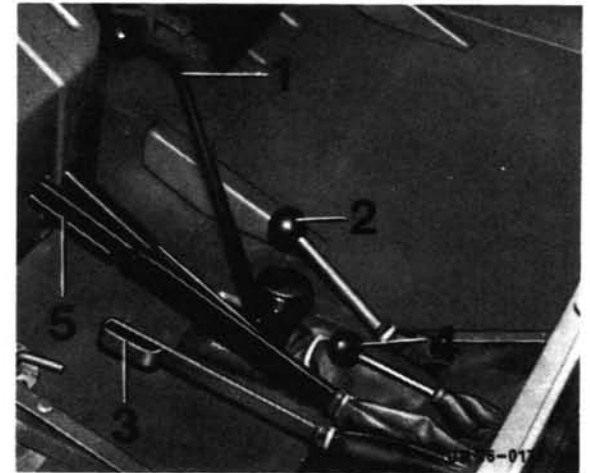


Figure 16 Shifting levers, 404.1

- 1 Main shifting lever
- 2 Forward/reverse shifting lever
- 3 Four-wheel drive/differential lock shifting lever
- 4 Pto shifting lever
- 5 Parking brake lever

2.1.3 Switches

1 Switch box, starter switch and battery master switch.



Figure 17 Switch box, 404.0

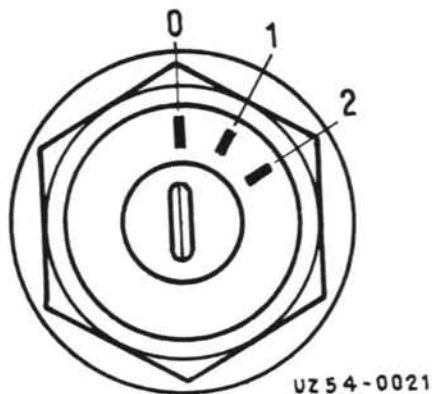


Figure 18 Switch box, 404.1

- 0 Off
- 1 Charge indicator light
- 2 Starting and driving position

Switch box – explanation of figure 17

Switch position	Current consuming units
0 *	Off Socket, interior light Hazard warning flasher system
P	Parking position Parking light, clearance lights Instrument lighting Hazard warning flasher system Interior light Socket in cab
1	Driving position Charge indicator light Starter switch Horn, socket, interior light Turn signal and stop lights Windshield wipers Heating and ventilation system Instrument activation Hazard warning flasher system Back-up lights
2	As position 1 plus: Parking light, clearance lights (also with supplementary headlights) Instrument lighting Working light, rear
3 *	As position 1 and 2 plus: Low and high beam High beam indicator light

* Depress switch box key when switching from position "0" to "P" and from "3" to "2"

The switch box key can only be inserted and removed when in position "0" and "P" – figure 17.

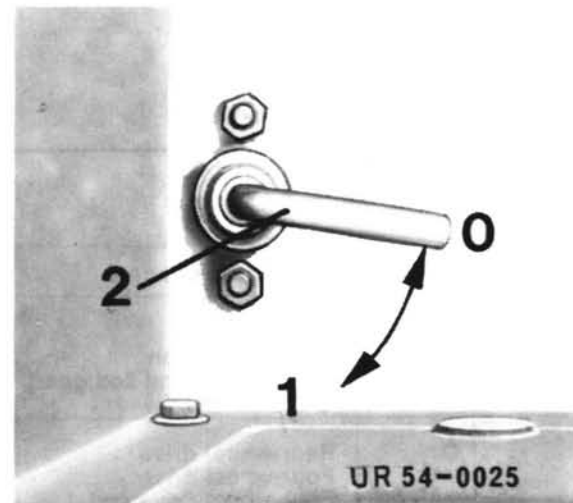


Figure 19 Battery master switch under driver's seat 404.1

- 0 Off
- 1 On
- 2 Switch key

404.1

The switch box key can only be inserted and removed when in position "0".

With a **battery master switch** (cutout switch) installed the negative cable from battery to frame can be disconnected and the entire vehicle network can thus be switched off.

The switch box key can be removed when in "Off" position.

2 The main light switch permits various switch positions for lighting the vehicle.

To switch from the main light circuit to the black-out light circuit, the arresting pin (1) is depressed with the switch-box key point and the locking bolt (2) is pushed to the left.

When switching back from the black-out circuit to the main light circuit (from 0 to day) press switch lever downwards.

Switch positions

Explanation of figure 20

Main light circuit

- Position "Day" = switched off
- Position "1" = parking light, clearance lights and instrument lighting.
- Position "2" = high/low beam in addition

Black-out circuit

- Position 0 = turned off
- Position 1 S = convoy light and black-out brake light, rear
- Position 2 S = black-out light, front only
- Position 3 S = black-out light, front and rear

Note:

The brake lights of the main and black-out light circuits only light up with the ignition turned on.

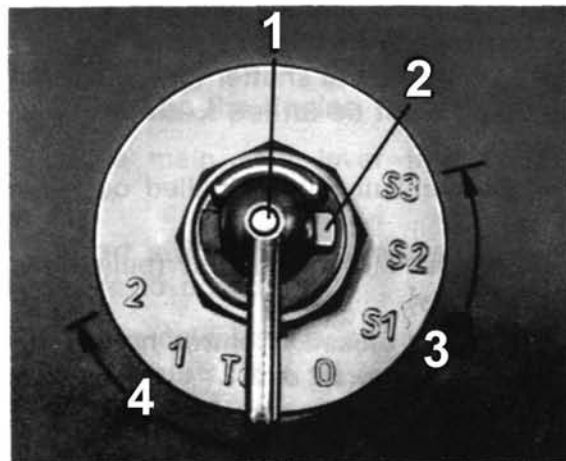


Figure 20 Main light switch

- 1 Arresting pin
- 2 Locking bolt
- 3 Black-out circuit
- 4 Main light circuit

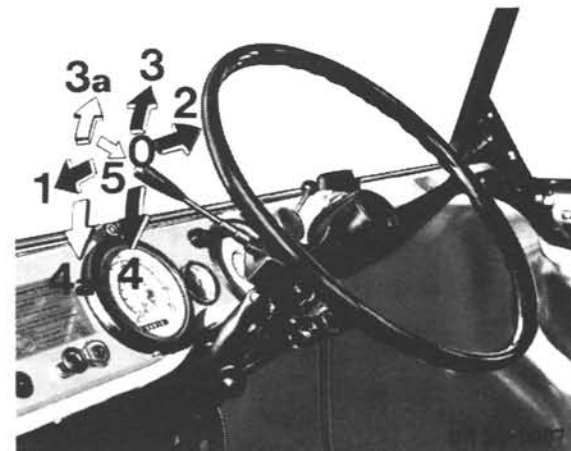


Figure 21 Turn signal, horn and dimmer switch

- 0 Low beam
- 1 High beam
- 2 Headlight flasher (optional)
- 3 or 3a Turn signal right
- 4 or 4a Turn signal left
- 5 Horn

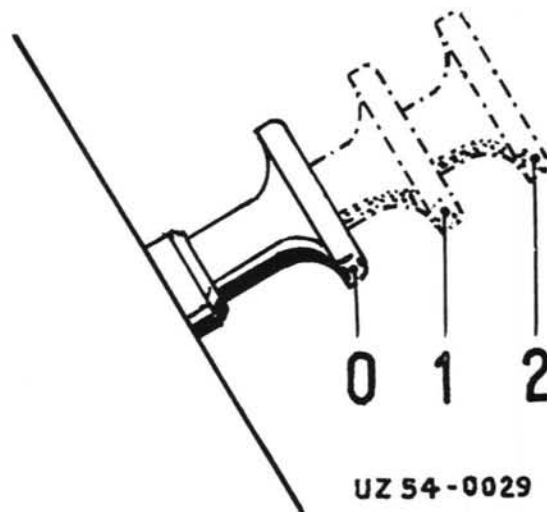


Figure 22 Switch for windshield wiper and washing system

- 0 Off
- 1 Windshield wiper
- 2 Windshield wiper and washing system

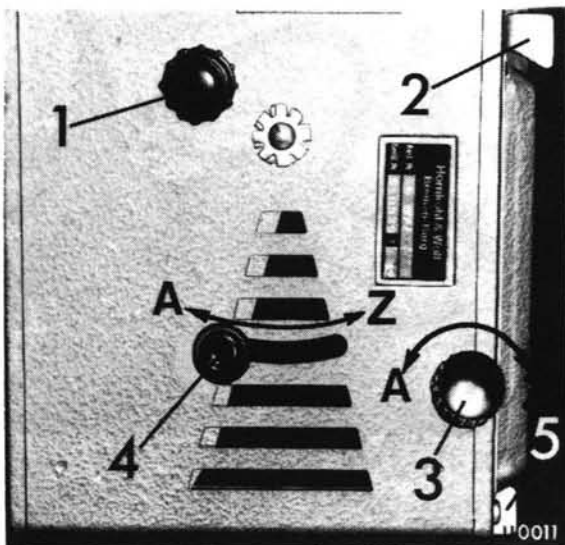


Figure 23 Heater (front view)

Explanation of figure 23 und 24

- 1 Blower pull switch (2 stages)
 - 2 Lateral shutter for heated air control in the driver's foot well
 - 3 Knob for cooling control
 - 4 Rear shutter for heated air control in cab
 - 5 Lateral shutter for direct fresh air inlet into driver's foot well
- A Open
Z Closed

2.1.4 Heating and Ventilation System

Heating

The heated coolant is controlled with knob 3. The heated air is controlled with the 2-stage blower pull switch 1.

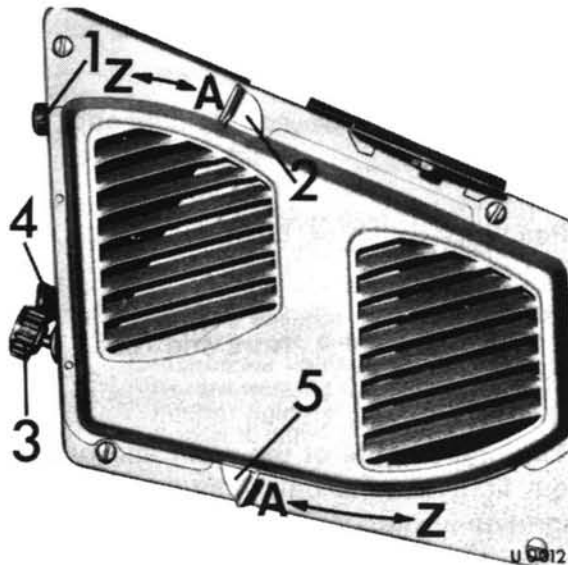


Figure 24 Heater (side view)

Ventilation

In the summer months the fresh air flow is controlled with the 2-stage blower pull switch (1) and the shutter (5). To do this knob (3) must be turned to closed position.

1st Stage: Full output (pulled out half-way).

2nd Stage: Medium output (pulled out completely).

Shutter (5) closed. Control heated air flow with shutters 2 and 4.

For faster windshield defrosting close shutters 2 and 4 until adequate visibility is obtained.

In addition the foot well on the assistant driver's side can be heated or ventilated with the control knob.



Figure 25 Heating and ventilation system 404.1

- 1 Blower
- 2 Lever for fresh air flap
- 3 Heat exchanger
- 4 Switch for blower

404.1

Heating

Open both shut-off cocks in the engine compartment. Blower can be turned on in addition.

Ventilation

During the summer close both shut-off cocks.

Open fresh air flap.

Turn on blower.

2.2 Putting the Vehicle into Operation

2.2.1 Preparations Before Starting

1 Check coolant level in compensation tank. Prior to opening compensation tank cap, press button of safety valve in order to release any excess pressure.

404.1

Not applicable to this vehicle.

The coolant in a cold engine should reach up to 30 mm below the upper edge of the compensation tank filler opening. **When replenishing the tank with water** be sure to add 10 cm³/lit. of anti-corrosion agent.

During winter operation make sure that a sufficient quantity of antifreeze is in the coolant.

Open knob of heating system all the way when providing tank **with a new fill**. Refer to 2.1 to 2.1.4.

Run engine at increased idling speed until the thermostat opens at approximately 78° to 80° C and the coolant level remains constant in the compensation tank thereafter. For filling capacity refer to 4.2.

Check **engine oil level** only when vehicle is positioned on level ground. If possible the oil level should be at the maximum mark. This is necessary particularly

during extended operation at extreme tilt as well as when operating implements.

Do not fill beyond the maximum mark!

Check **tire pressure**.

Check **lighting system**.

Check **brake system**.

Important!

Put vehicle into operation only after red warning light in the instrument cluster has gone out or an air pressure of 5.2 bar (kp/cm²) is registered on the dual pressure gauge.

For trailer operation adhere to instructions listed under 2.2.13.

For winter operation refer to instructions listed under 2.3.

2.2.2 Starting the Engine

1 Move main shift lever into center position.

2 Insert switchbox key into switchbox and turn to position 1:

3 With a cold engine, pull out throttle control cable all the way.

Note: With the engine at operating temperature **do not** pull out starter control cable. This is particularly the case while driving.

With high ambient temperatures, high tractive load and implements mounted

in front, switch on supplementary fuel pump if available, in order to counteract any possible fuel evaporation.

404.1

During operation with supplementary fuel pump turn fuel switch-over cock to reserve (front tank) since the pump will only supply fuel from this tank.

4 Declutch and **do not** immediately operate accelerator pedal.

5 Operate starter switch. Engine starts. Release starter switch immediately after engine has started since the starter can otherwise be damaged.

If the engine does not start, repeat starting procedure after engine and starter have come to a stop. During repeated starting attempts, allow for recovery intervals to protect the battery.

Note:

404.1

Pay attention to fuel cock and switch to reserve if necessary. Figure 26.

6 After the engine has started completely depress accelerator pedal and at the same time watch the oil pressure gauge.

If no oil pressure can be noted with the engine running, turn off the engine immediately and determine the cause.

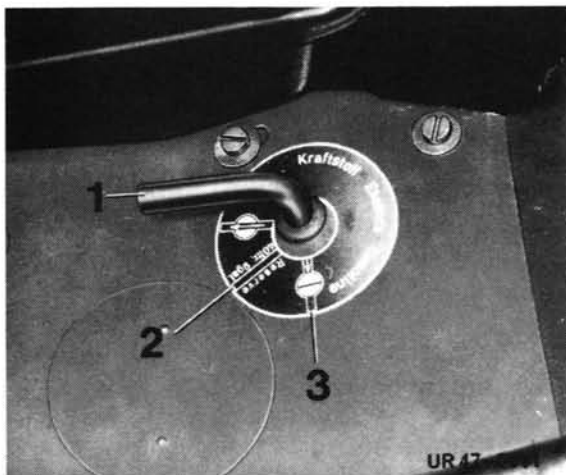


Figure 26 Fuel cock 404.1

- 1 Open
- 2 Reserve (front tank)
- 3 Closed

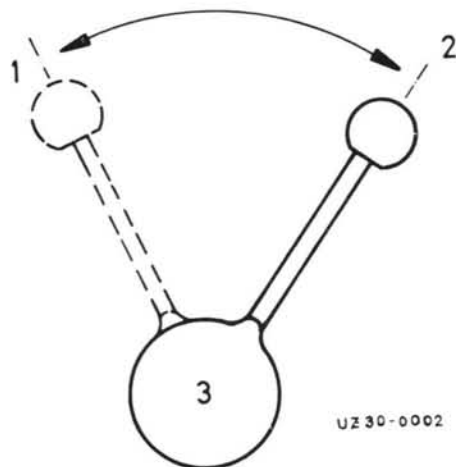


Figure 27 Hand throttle

- 1 Full load position
- 2 Idle position
- 3 Locking disc

404.1

Pull hand throttle lever to the rear. Slowly push the starter control cable back as far as the engine will permit while still running true.

Push the starter control cable back all the way as soon as possible. At the latest when the engine is running true and smooth. When the coolant temperature of approximately 60°C has been reached the starter control cable should be pushed all the way in.

2.2.3 Running-in

It is decisively important for the service life and operational safety that the engine and drive train of a new vehicle, an exchange engine or reconditioned engine **are not run at full load during the first 1500 km.**

Complete the specified service work according to schedule E once during the run-in period after 300 to 1000 km.

2.2.4 Stationary Operation

For operation with the PTO as well as for operation at low speed, the desired engine speed can be set with the hand throttle. To do so tighten locking disc.

When operating the stationary vehicle with PTO engaged be sure that the main shift lever is positioned between the 5th and 6th gear in order to ensure the oil supply to all rotating members of the transmission.

2.2.5 Stopping the Engine

Place switchbox key in 0 position. Do not stop the engine immediately if the coolant temperature is above 90°C but keep it running for another one or two minutes at an increased idling speed so that the coolant remains in circulation and is not ejected by the reheating effect of the engine.

2.2.6 Transmission shifting

The synchromesh transmission has 6 forward and 2 reverse speeds. For **road operation** the speeds 3, 4, 5 and 6 are sufficient, i. e. the vehicle can be started in 3rd gear. 1st and 2nd gear are intended for **higher tractive efforts** and low speeds. These ratios are obtained by a prestage in the transmission. The prestage is engaged by moving the main shift lever transversely from the idling speed position between the 3rd/4th gear to the idling speed position between 1st/2nd gear. Moving the lever transversely is a shifting operation similar to shifting a gear step and is permitted only while the clutch is disengaged with the engine running.

For **reverse driving** with the main shift lever in position 1 or 2 shift the short forward/reverse shift lever into reverse **with the vehicle stopped** after having previously declutched.

During repeated forward and reverse driving leave the main shift lever in position 1 or 2 and only shift into forward and reverse with the short forward/reverse lever.

In gear position 3 through 6 forward/reverse shift lever cannot be shifted into reverse.

Visaversa the position 3 through 6 cannot be shifted while in reverse position.

The **gear shift block in the 3rd gear** prevents an accidental shifting from 1st to 2nd gear into 5th and 6th gear.

Only after shifting into 3rd gear can the following gears 4 to 6 be shifted.

2.2.7 Supplementary Crawler Gear Shifting

Crawler gears can only be operated in 1st and 2nd forward speed. The shifting operation should only be carried out with the engine at idle speed and while declutching. To do so place the forward/reverse shift lever in center position. Figure 14.

2.2.8 Shifting of PTO, PTO Operation

Shifting the PTO may be accomplished with the vehicle stopped and while the clutch is disengaged. The PTO may be engaged and disengaged with the PTO shift lever.

Due to the type of drive in connection with the single-plate clutch the PTO drive becomes known as the **transmission driven PTO**.

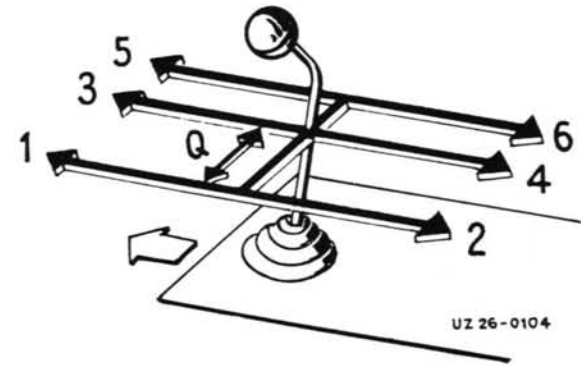


Figure 28 Gear shift pattern

Q Transverse shifting

2.2.9 Four-Wheel Drive, Differential Locks

If, under difficult ground conditions or with a high total towed weight, the ground adhesion of the rear wheels is no longer sufficient, engage the four-wheel drive or the four-wheel drive **with differential locks**. This will provide high tractive power for the vehicle in spite of its low vehicle weight. Placing an additional load on the platform will further improve the ground adhesion.

The four-wheel drive and the differential locks can be engaged while driving without declutching but only as long as the wheels are not spinning, i. e. as long as the wheels are rotating with traction.

The four-wheel drive/differential lock lever has two positions. The first position = four-wheel drive, second position = differential locks.

The operation is mechanically controlled.

If a wheel spins when the four-wheel drive or the differential locks are engaged, declutching is required, so that all wheels turn at a uniform speed or the vehicle comes to a stop.

The differential locks and the four-wheel drive can also be disengaged while driving without declutching. Briefly release accelerator pedal when disengaging the four-wheel drive.

Try not to engage the differential locks when cornering on roads so as to avoid any additional loads.

With the differential locks engaged the turning circle increases as a result of the forced wheel slippage.

For special information concerning cross-country operation refer to 3.7.4.

2.2.10 Instruments, Indicator Lights

Check instruments and indicator lights occasionally while driving. The most favorable coolant operating temperature is approximately 80° C and can be monitored on the coolant temperature gauge. At this temperature the engine wear and the fuel consumption are lowest. If at all possible the operating temperature should not exceed 90° C.

2.2.11 Brake System

Set off with the vehicle only after the red warning light in the instrument cluster has gone out or at least 5.2 bar (kp/cm²) are indicated on the dual pressure gauge. Warning light and compressed air pressure gauge are omitted on a vehicle **without** compressed-air system.

The service brake system is a single or dual-circuit system and acts hydraulically on all four wheels.

404.1

Fitted only with a single circuit brake system.

With a **compressed-air brake assistance system** installed the pedal pressure during a braking operation is assisted in a given ratio with the aid of the compressed-air brake booster.

On vehicles with a single-circuit brake a **vacuum brake** may also be installed which will take over a portion of the available brake force during a braking operation only with the engine running.

The **parking brake system** serves as an auxiliary brake. It acts mechanically on the rear wheels. With a trailer coupled, which has a compressed-air trailer brake system installed, a graduated braking action is initiated when operating the parking brake system.

404.1

With the parking brake valve on the steering column graduated compressed air braking action can be applied to the trailer independent of the tractor unit. This is necessary particularly when driving downhill and with heavy trailer loads.

2.2.12 Not Applicable to this Vehicle.

2.2.13 Trailer Operation

Coupling trailer.

For trailer loads refer to 6.10.2.

In order to prevent damage to the trailer coupling which might impair safety, only trailers with towing eyelets corresponding to DIN 74051 or the military towing eyelet may be used. Refer to 6.10.

Be careful when coupling a trailer, particularly when inexperienced people are assisting!

1 Prior to coupling, brake trailer by means of its parking brake and if necessary secure with wheel chocks. If on trailers with overruning brake, the tow-bar is raised without securing the trailer by means of wheel chocks the trailer may start to move immediately and cause serious accidents.

2 Adjust tow-bar of trailer to height of coupling!

3 Be careful when backing up the UNIMOG. **The assistant driver must never stand between UNIMOG and trailer when coupling.** While standing beside the vehicle he should give the driver agreed signals as to how and in which direction to drive.

4 **Check for proper engagement of coupling pin each time trailer is coupled.**

5 Connect **trailer supply hose** to palm coupling. This will automatically open a valve which switches the brake booster to trailer operation with the aid of the 3/2-way valve. This will reduce the brake assistance of the vehicle and the obtainable decelerations of the UNIMOG and the trailer are matched.

6 Connect **trailer brake hose**.

7 Plug **electric line plug** into appropriate trailer socket and secure with hinged cover.

Note: With two sockets (12 V and 24 V) only the standard plug according to DIN 72577 = 12 V or DIN 72579 = 24 V can be inserted into the appropriate socket.

8 Adjust **brake power control valve** of trailer according to load carried.

9 Loosen trailer **parking brake** and remove wheel chocks.

10 Watch **dual brake pressure gauge** and do not set off until the red warning light goes out.

404.1

To Item 5.

Connect supply hose to palm coupling (red), then connect brake hose to palm coupling (yellow). Open both shut off cocks.

The automatic palm couplings as well as the switch-over device of the compressed air brake booster are not applicable to this vehicle.

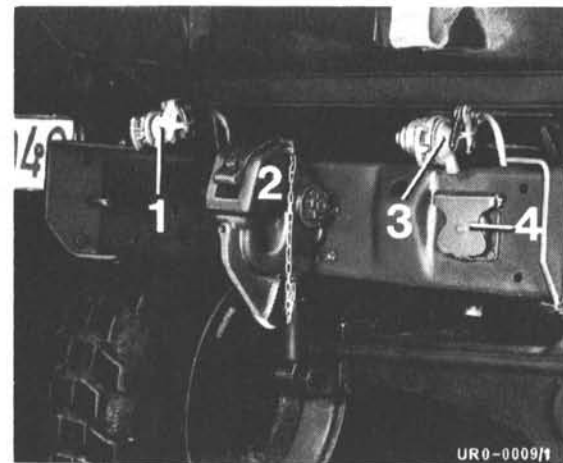


Figure 29 Trailer connections

- 1 Palm coupling (brake line)
- 2 Trailer coupling
- 3 Palm coupling (supply line)
- 4 Socket (24 V)

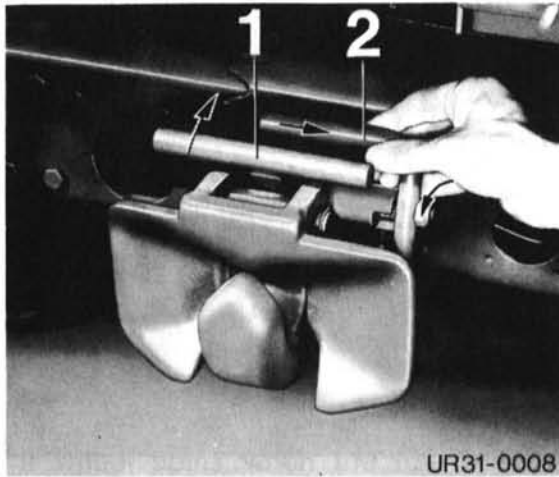


Figure 30 Opening trailer coupling

- 1 Hand lever
- 2 Securing bolt

Trailer operation

For safe trailer operation while driving it is important that the ratchet rod of the parking brake is released all the way up to the stop.

When stopping and parking on a gradient while carrying a heavy trailer load, engage four-wheel drive and first gear to support the parking brake system, which acts only on the rear wheels of the UNIMOG.

With compressed-air control for the trailer brake system installed, the parking brake system will also act upon the trailer brake system.

404.1

During prolonged downhill driving with trailer, operate the hand brake valve at the steering column. Graduated braking independent of the tractor vehicle prevents a possible "pushing" of the trailer.

When carrying trailer loads, also always load the auxiliary platform up to its permissible payload in order to improve the operational safety in general.

Uncoupling trailer

- 1 Engage trailer parking brake.
- 2 Secure trailer by means of wheel chocks.
- 3 Pull electric line plug out of trailer's socket.
- 4 Uncouple **trailer supply hose** from palm coupling (red) and then uncouple **trailer brake hose** from palm coupling (yellow) or from single-line palm coupling (black).
- 5 Pull safety button and open trailer coupling by means of hand lever.

Note: Seal off palm couplings immediately after uncoupling in order to prevent dirt from reaching the gaskets.

2.3 Winter Operation

The constant operational readiness of the vehicle is also assured when the following items are adhered to.

2.3.1 Engine Oil

During constant ambient temperatures below -0°C change oil in the engine from heavy summer oil to light winter oil SAE 10 W at the **proper time**. The light winter oil facilitates starting and ensures adequate lubrication even at low ambient temperatures. Refer to 4.5.

2.3.2 Coolant

The cooling system has been filled with antifreeze to -25°C (-13°F) by the plant.

The antifreeze concentration must be checked several times during the cold season.

When adding coolant observe the mixing ratios set forth under 4.5!

Vehicles without antifreeze

If no antifreeze is available, the coolant must be drained at an ambient temperature of 0°C . To do so open **drain valve** or **drain plug of engine and radiator**. Refer to 3.4.



Figure 31 Antifreeze filling to -25°C or -13°F

404.1

With engine and battery preheating, additionally open drain plug at heat exchanger (water bushing) below the radiator.

With heating and ventilation system open shut off valves and drain cock of heating circuit in the engine compartment.

To drain coolant, unscrew cap of the coolant expansion tank. Also refer to 3.4.

2.3.3 Not Applicable to this Vehicle.

2.3.4 Batteries

Keep batteries fully charged by careful servicing and low current consumption. The efficiency of batteries exposed to the cold is reduced. Recharge battery after prolonged storage. For freezing points of battery electrolyte refer to table under 3.10.6.

404.1

On vehicles with engine and battery preheating:

Open battery box.

The battery preheater must only be switched on at temperatures below 0°C .

Important information:

However, it is imperative to pay attention that the system is switched off again at an ambient temperature above 0°C , since otherwise the battery electrolyte is heated excessively and increased evaporation of same occurs.

2.3.5 Starting at Low Temperatures

Starting in cold weather requires a full battery capacity. Therefore, switch off any unnecessary power consumers. De-clutch, completely depress accelerator pedal and start. Also refer to 2.3.8.

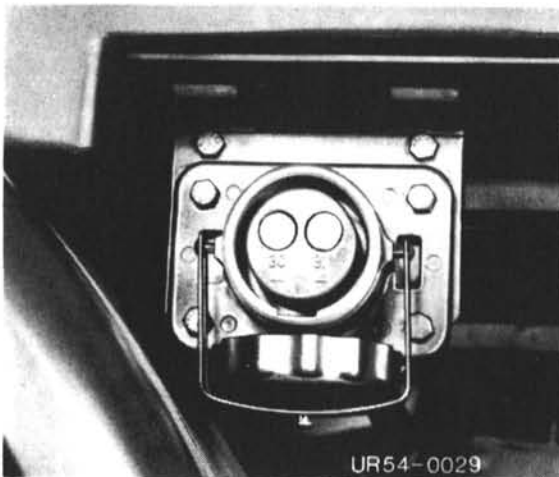


Figure 32 Auxiliary power receptacle 404.1

2.3.6 Not Applicable to this Vehicle

2.3.7 Engine and Battery Preheating System

At extremely low ambient temperatures, the battery and the coolant in the engine circuit can be preheated by installing a preheating system.

The heater is electrically ignited and is operated with the fuel in the vehicle fuel tank.

Be sure to follow heater operating instructions.

404.1

2.3.8 Auxiliary Power Receptacle

Via the auxiliary power receptacle, the vehicle can be connected to an auxiliary power source.

It is thus possible to start the vehicle via an auxiliary power source, or to charge the battery if there is a battery failure or if it is insufficiently charged. Vice versa, starting aid can be given another vehicle with a 24 V system.

When starting pay attention to the same starting aids as described under 2.3.5.

2.3.9 Tire Chains

If required place tire chains on all four wheels if at all possible.

By engaging the four-wheel drive, the driving safety is increased on roads and off roads as well as on ice and snow.

After installation check turning angle of the wheels.

2.3.10 Compressed-Air System, Antifreeze Unit

To protect the entire compressed-air system against freezing fill up antifreeze unit with **ethyl alcohol** (fuel alcohol) antifreeze.

With ambient temperatures from $+5^{\circ}\text{C}$ to -3°C the danger of ice formation in pipes and brake valves is greatest.

Vehicle without antifreeze unit

- 1 Drain condensate.
- 2 Loosen screw connection behind pressure regulator, fill about $\frac{1}{4}$ liter antifreeze into pipe and reconnect again. **Be sure** to check that screwed connection is tightened leak proof.
- 3 Start engine and after obtaining the operating pressure, depress and release brake pedal several times so that the injected antifreeze is distributed onto the frost sensitive areas and the excess antifreeze can collect in the compressed-air tank.
- 4 After two weeks – in the meantime do not drain liquid from the compressed-air tank – add another $\frac{1}{4}$ liter of antifreeze as described above.
- 5 Add antifreeze every two weeks.

Vehicle with antifreeze unit

When operating the antifreeze unit during the winter a wick is pulled into the top position with the adjusting lever, and thus into the air stream. The air flowing past is thus enriched with ethyl alcohol, which then reaches the entire compressed-air system.

To operate the antifreeze unit, set adjusting lever to winter position. To do so, turn adjusting lever until it is automatically pushed upwards. Also refer to 3.9.8.

404.1

Antifreeze unit pump

Operate antifreeze unit pump several times with the engine running. Prior to this, lower tank pressure to approximately 3 bar (kp/cm²) by operating the brake pedal. The injected antifreeze agent is then immediately distributed evenly by the air stream.

During damp cold operate three or four times daily.

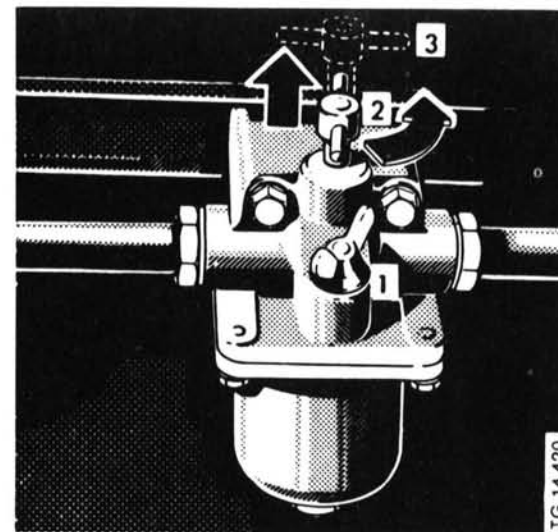


Figure 33 Antifreeze unit

- 1 Filler neck and dipstick
- 2 Adjusting lever (summer position)
- 3 Adjusting lever (winter position)



Figure 34 Antifreeze unit pump 404.1

- 1 Operating button

3 Maintenance Instructions

3.1 Maintenance Summary

3.1.1 General

The maintenance work specified for the vehicle is set down in the Service Booklet.

The maintenance intervals are based on Kilometers (km).

The maintenance work is to be completely carried out after the specified maintenance intervals.

Thoroughly clean grease nipples, oil filler and oil drain plugs prior to lubricating.

3.1.2 Maintenance Schedule

Maintenance interval	km	Work schedule	Work to be carried out
Normal operating conditions	300 to 1 000	E	refer to 3.1.4
	4 000	A	
	8 000	B	
	12 000	A	
	16 000	B	
	20 000	A	
	24 000	B	
	28 000	A	
	etc.	etc.	
Aggravated operating conditions	2 000	—	engine oil change
Vehicles on stand-by only	twice * yearly	—	engine oil change
	every two years	—	transmission and axle oil change

* Spring and fall inspection

3.1.3 Extent of Maintenance Work

1 Minimum maintenance required

This category includes maintenance

work specified in the maintenance work survey (refer to 3.1.4) and such work

which must be performed at shorter or longer intervals:

Maintenance intervals	Maintenance work	Instructions under
After one hour of operation after changing a V-belt	Check V-belt and retighten if required	3.4, 3.6, 3.9 3.10
	50 km after a wheel or tire change	Retighten wheel nuts
Every three months	Clean filter element of pressure regulator	3.9.3
Twice yearly (Spring and fall inspection)	Change engine oil	3.2.2
	Check chassis for paint damage, touch up paint if required. Treat chassis with protective wax.	3.12.3, 4.13
Spring inspection	Change engine oil viscosity class during an oil change (not required with multi-grade oil)	3.2.2
	Change break fluid	3.8.2
	Check brake hoses and lines	3.4.8, 3.8.9
Fall inspection	Change engine oil viscosity class during an oil change (not required with multi-grade oil)	3.2.2
	Replace summer coolant by winter coolant or check proportional antifreeze content, replenish	3.4.1 4.5
	Change antifreeze in antifreeze unit or in the antifreeze pump	2.3.10
	Once a year	Clean oil bath air cleaner housing
Change oil in power steering system		3.6.2
Replace wiper blades		3.12.1
Every two years	Replace coolant hoses	3.4.6
	Change oil in transmission and axles	3.5
	Change antifreeze	4.5

2 Maintenance work as required

Maintenance interval	Maintenance work	Instructions under
Depending upon the operating conditions of the vehicle between maintenance intervals specified in the maintenance schedule	Check oil level in engine oil pan and in oil bath air cleaner, readjust if required	3.2.2, 3.2.10
	Check coolant level, readjust if required	3.4.1
	Check coolant hoses	3.4.6
	Check clutch adjustment, readjust if required	3.5.1
	Check brake hoses and lines	
	Drain condensate from compressed-air tank	3.8.9
	Check tire pressures, readjust if required	3.9.4
	Interchange wheels diagonally	3.7.5
	Retighten control arm screws, power plant mounting and connecting screws	3.7.1
Depending upon the amount of soiling between the maintenance intervals specified in the maintenance schedule	Oil change in oil bath air cleaner and clean oil bath air cleaner housing and cyclone	3.11.1, 6.13
	Clean fuel prefilter and strainer of fuel pump	3.2.10
	Clean and check spark plugs	
	Clean fuel idle jets	3.6.2, 3.13.1
	Clean wheel brakes, check thickness of brake linings	3.8.4

3.1.4 Maintenance Work Survey

Lube work (The numbers in paranthesis indicate the number of lube points)	Refer to	Fig. 35 Item	Work schedule			Inspection and cleaning work	Refer to	Fig. no.	Work schedule		
			E	A	B				E	A	B
Change engine oil, service oil filter	3.2.2	1	■	■	■	Retighten cylinder head bolts	3.2.5	40	x		
Replace oil filter element 00 184 43 25	3.2.3	1, 3	f	f		Check valve clearance, adjust	3.2.7	41, 42	x	x	x
Check oil level in air compressor, correct 404.1	3.9.2			■	■	Service fuel prefilter	3.3.3	55	x	x	x
Change oil in oil bath air cleaner	3.2.10	14		■	■	Service strainer of fuel pump	3.3.5	56	x		x
Check oil level in coolant pump, correct	3.4.2	1			⊘	Retighten intake and exhaust line connections as well as oil pan bolts			x		x
Check oil level in visco fan system, correct (2)	3.4.9	15			⊘	Clean distributor, check contact breaker points	3.2.12	44			x
Distributor, grease felt wick and oil nipple	3.2.12	1, 2			■	Check spark plugs ¹⁾)	3.2.11			x	x
Distributor, check grease wedge on rubbing block, grease		1, 2			▲	Clean carburetor	3.2.14				x
Distributor, insert cable ends with silicon paste					g	Check V-belts, retighten	¹⁾)		x		x
Oil choke cable	3.2.18				■	Check clutch adjustment, readjust	3.5.1	65, 66	x	x	x
Grease governor and linkage joints	3.14.10				■	Check functioning of differential locks	3.5.8	72, 73	x	x	x
Check oil level in transmission, correct	3.5.2	5		⊘		Retighten control arm and power plant mounting screws	3.11.1		x	x	x
Check oil level in differential (2) and hub reduction (4) of front and rear axles, correct	3.5.4	9, 12		⊘		Retighten connecting screws between hub reduction gear and steering knuckle, between axle housing and intermediate housing as well as spring mountings (front and rear)	3.11.1		x		x
Change transmission oil	3.5.2	5	●		●	Check shock absorbers for leaks, retighten mounting screws	3.11.2				x
Change oil in differential (2) and hub reduction (4) of front and rear axle	3.5.2	9, 12	●		●	Check pitman arm and steering mounting as well as steering for free travel, correct	3.6.1		x		x
Check oil level in steering gear, correct	3.6.2	10			⊘	Check tow-in	3.7.2			x	x
Check oil in power steering system, correct ¹⁾)	3.6.2	11	⊘	⊘	⊘	Interchange wheels diagonally	3.7.1				x
Check brake fluid level, correct	3.8.2	16	ⓘ	ⓘ	ⓘ	Retighten wheel nuts	3.7.1		x		x
Grease thrust ball (2)	3.5.3	7	▲	▲	▲	Check brake system	3.8.4		x	x	x
Grease steering knuckle bearings (4)	3.5.6	8	▲	▲	▲	Clean brake shoes, adjust brakes	3.8.4	81—85			x
Grease steering knuckle pins of front axle		12	▲	▲	▲	Check compressed-air system for functioning and leaks	3.9.5				x
Grease clutch release shaft	3.5.1	4	▲	▲	▲	Drain condensate from compressed-air tank	3.9.4	93			
Grease steering linkage (6) 404.1	3.6.1	13	▲	▲	▲	Check fluid level in antifreeze unit, fill up	3.9.8	33, 34		x	x
Grease PTO shaft joints	3.14.8	15	▲	▲	▲	Check functioning of all current consumers, check fuses and line connections	3.10.1				x
Grease joints and nipples of parking brake and pedal linkage	3.8.8	6	▲	▲	▲	Check level and specific gravity of battery electrolyte, correct; clean and grease battery terminal clamps	3.10.6			x	x
Grease trailer coupling			▲	▲	▲	Check headlight alignment, correct	3.10.8				x
Grease body joints and hinges	3.11.2		▲	▲	▲	Check windshield washing system, add detergent	3.10.12		x	x	x
Grease stabiliser	3.11	18	▲	▲	▲	Check screws of cab and mountings for tight seating, retighten	3.11.1	102, 103			x
			▲	▲	▲	Check all lines for chafed spots					x

¹⁾ Change oil and replace paper oil filter element 000 466 04 04 after the first 84,000 km and every 56,000 thereafter.

²⁾ Replace spark plugs at least every 16,000 km
³⁾ Refer to information under 3.4.7, 3.4.8, 3.6.4, 3.9.2, and 3.10.11

3.1.5 Lubrication Points Survey

The numbers correspond to item references under lube work of the maintenance work survey.

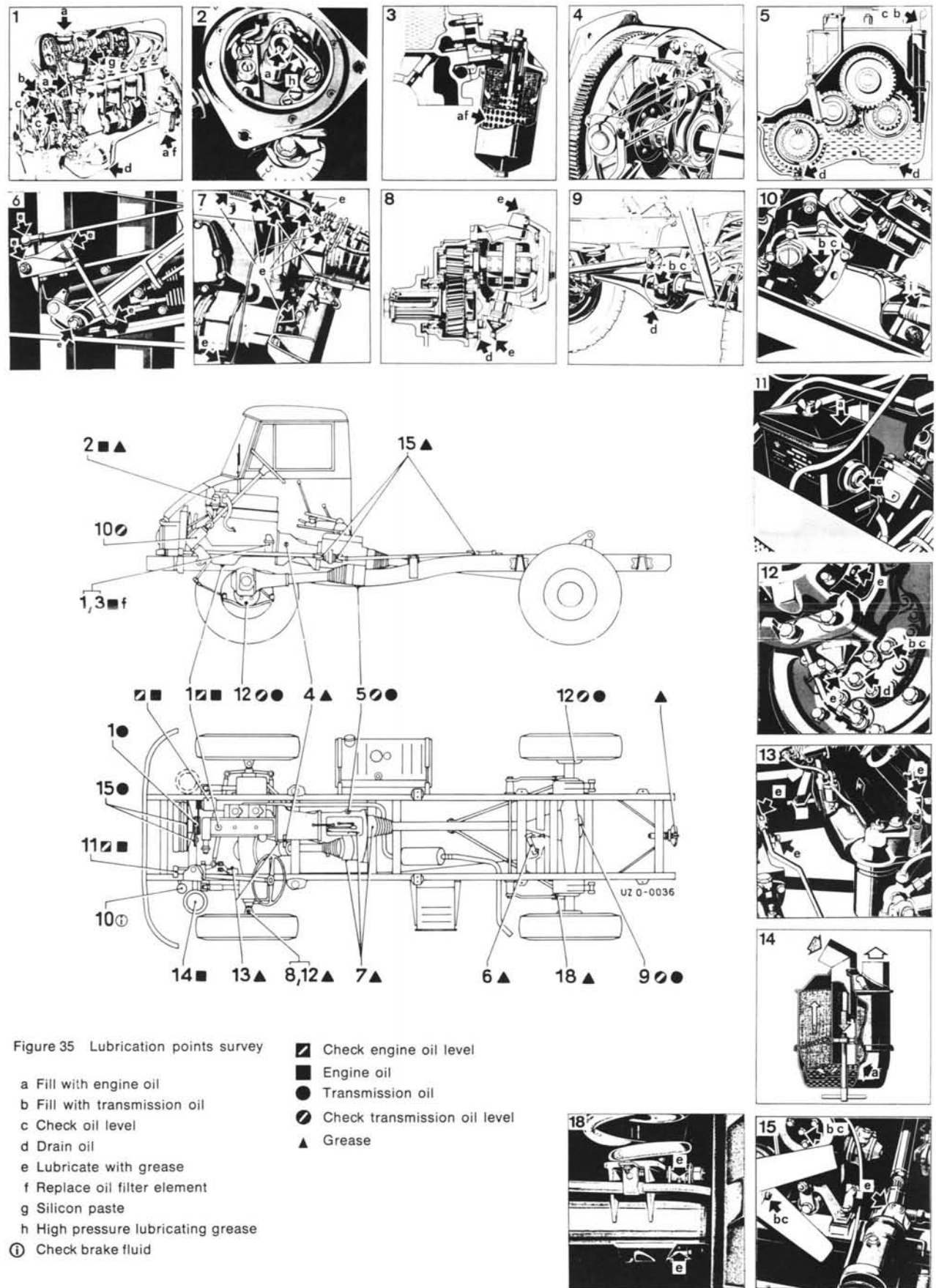


Figure 35 Lubrication points survey

- a Fill with engine oil
- b Fill with transmission oil
- c Check oil level
- d Drain oil
- e Lubricate with grease
- f Replace oil filter element
- g Silicon paste
- h High pressure lubricating grease
- ⓐ Check brake fluid

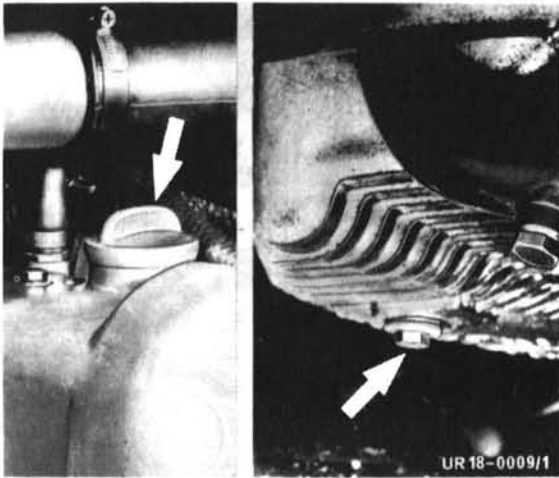


Figure 36 Oil filler neck and oil drain plug

3.2 Engine Group

3.2.1 Filling Engine with Oil

The oil filler neck is located in the front section of the cylinder head cover and can be reached after removal of the external engine hood.

For reasons of operational safety and economy, only use DB recommended engine oils.

Engines in new vehicles, exchange engines and fully reconditioned engines are filled with an initial operation oil for the first 300 to 1000 km. Refer to 4.6.1.

Afterwards only use heavy duty (HD) engine oil grades of the specified viscosity class.

Change the HD engine oil brand only during the next oil change.

3.2.2 Oil level and Oil Change

Check oil level regularly depending upon the operating conditions of the vehicle and adjust if required.

Check oil level in oil pan with the vehicle on level ground and with the oil dipstick wiped off.

The oil level should be between the minimum and maximum mark.

Complete oil change according to the maintenance schedule but at least twice a year. If aggravated operating conditions prevail, e.g. extreme short distance driving with the engine not at all or only rarely attaining the required operating temperature, we recommend changing oil at shorter intervals.

Replace oil filter element during every second oil change.

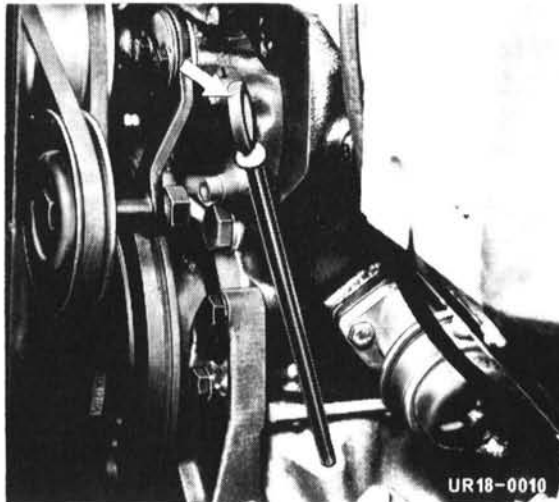


Figure 37 Engine oil dipstick

3.2.3 Oil Filter

Replace oil filter element according to maintenance schedule.

Have a collecting vessel ready!

Unscrew mounting screw (5) and drain oil from filter bowl. Remove filter bowl. Replace filter element. Prior to assembly clean filter bowl and inspect gaskets. The sealing ring (3) is located in the top ring groove of the filter bowl.

The tightening torque of the mounting screw is 40 Nm (4.0 kpm).

Fill up with engine oil.

Crank engine at starter speed (without ignition) until oil pressure is indicated.

For engine oil refer to 4.6.

For filling capacity refer to 4.2.

3.2.4 Oil Pressure

Under normal operating conditions and when using engine oil of the viscosity class SAE 30 the oil pressure is at least **2.5 bar (kp/cm²)** at rated speed. It may drop to **0.6 bar (kp/cm²)**, at idling speed without in any way endangering the operational safety of the engine.

3.2.5 Retightening Cylinder Head Bolts

This maintenance work is performed only once according to work schedule E.

Remove cylinder head cover.

Loosen each bolt slightly prior to re-tightening. Uniformly retighten cylinder head bolts on the **warm engine** according to the tightening pattern with the torque wrench to the specified torque. Check valve clearance, adjust if necessary. Refer to 3.2.7.

Tightening torques:

Engine with one carburetor (M 180)
90 Nm (9.0 kpm).

Engine with two carburetors (M 130)
110 Nm (11.0 kpm).

Tighten the four hex. socket screws (15) (two inside and two outside) of the cylinder head by hand.

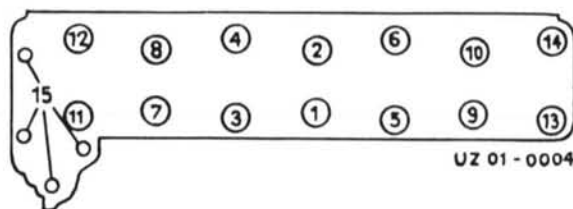


Figure 39 Tightening pattern of the cylinder head bolts

1 to 14 Cylinder head bolt SW 10
15 Hex. socket screws SW 6

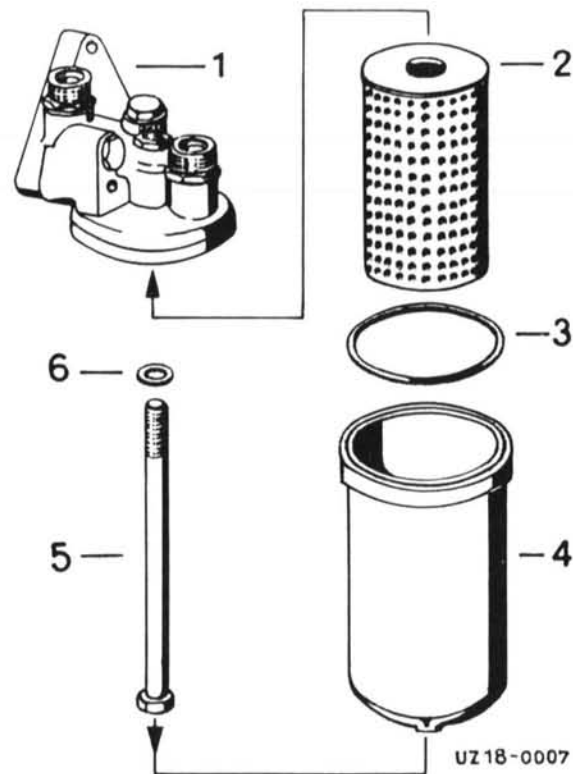


Figure 38 Oil filter

- 1 Oil filter bracket
- 2 Oil filter element
- 3 Sealing ring
- 4 Filter bowl
- 5 Mounting screw
- 6 Gasket

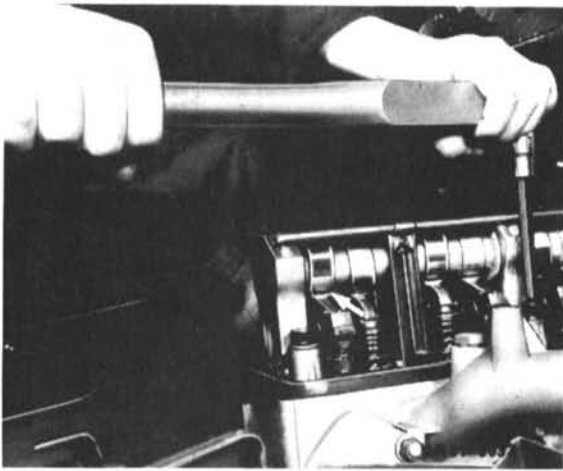


Figure 40 Retightening cylinder head bolts

3.2.7 Adjusting Valve Clearance

Check and adjust valve clearance according to maintenance schedule.

Let engine cool to below 50° C. Crank the engine with starter until the respective cam is at the top.

Measure gap between the cam base circle and the rocker arm with the feeler gauge.

For valve clearance refer to 6.2.

When the valve clearance is properly adjusted the Feeler gauge can be pulled through smoothly.

3.2.6 Not Applicable to this Vehicle.

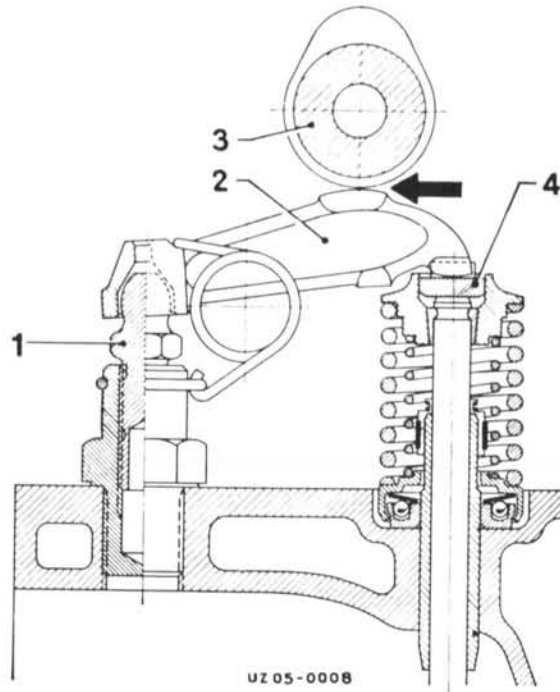


Figure 41 Valve adjustment

- 1 Adjustment screw
- 2 Rocker arm
- 3 Cam shaft
- 4 Valve with thrust block

For adjustment use the specified adjustment wrench and torque wrench.

The adjustment screw has a self-locking thread which must be counteracted by a displacement torque of at least 20 Nm (2.0 kpm), if necessary, replace adjustment screw and threaded bushing.

404.1

On engines without self-locking adjustment, the valve clearance is measured between valve and adjustment screw of the rocker arm.

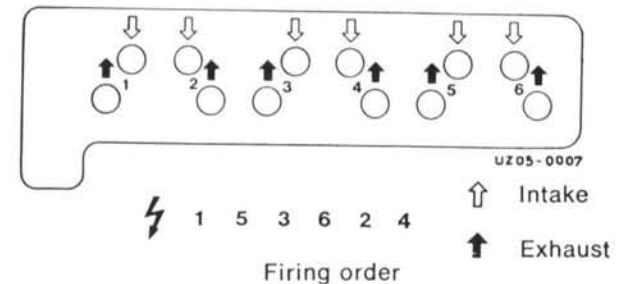


Figure 42 Valve locations

3.2.8 Checking Compression Pressure

When the engine output drops, measure compression pressure in each cylinder with a compression pressure gauge. Carry out measurement at starter speed and with the engine at operating temperature. Crank engine with starter for at least 8 rotations.

If the minimum value is not attained (refer to 6.2) check valve clearance. If required, remove cylinder head and check valves for leaks, condition of cylinder head gasket, cylinder wear and piston ring contact pattern in the cylinders.

If required remachine valve seats. Have engine reconditioned in case of cylinder or piston ring damage.

3.2.9 Not Applicable to this Vehicle

3.2.10 Air Cleaner

Change oil according to operating conditions and maintenance schedule.

The careful cleaning of the air cleaner is absolutely necessary in order to protect the piston and cylinder running surfaces and to prevent damage.

Disengage quick release lock to remove cleaner bowl at front folding part of

fender. Unscrew clamping screw of cleaner bowl and remove cleaner bowl with cleaner element.

The oil level must be at the level mark.

Remove oil, wash the cleaner element and cleaner bowl with cleaning gasoline and refill with fresh engine oil.

Dust deposits at the clean air end and in the intake manifold are a sure sign that the oil bath air cleaner must be serviced more often than specified in the maintenance schedule.

Service cleaner housing depending upon degree of soiling of cleaner element, however, at least once a year.

3.2.11 Intake Duct with Cyclone Filter

Under extremely dusty operating conditions, the intake air is precleaned with an additional intake duct with cyclone filter.

The air entry is located higher, causing a cleaner more dust free air intake and additionally achieves an optimum dirt and water separation via the cyclone filter with prefilter.

The cyclone prefilter normally requires no maintenance. Depending upon the type of dust accumulated (such as lime) remove cyclone prefilter and rinse.

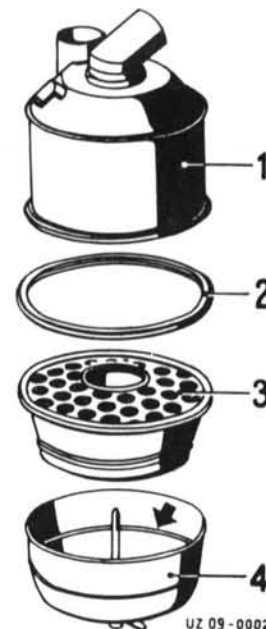


Figure 43 Oil bath air cleaner

- 1 Cleaner housing
- 2 Sealing ring
- 3 Cleaner element
- 4 Cleaner bowl with oil level mark (arrow)

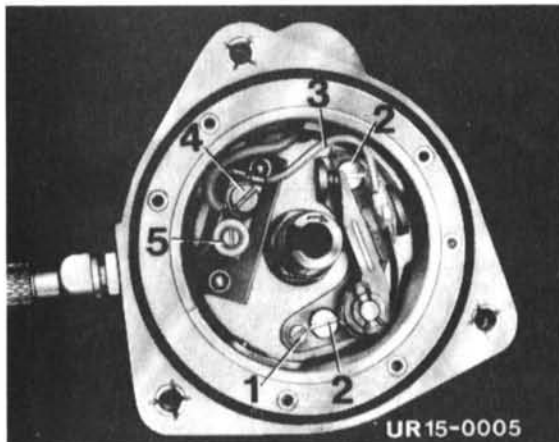


Figure 44 Contact Breaker

- 1 Eccentric adjustment screw
- 2 Locking screw
- 3 Contact gap
- 4 Terminal (condensor)
- 5 Terminal 1

3.2.12 Spark Plugs

Check spark plugs in accordance with maintenance schedule. However, renew at least every 16,000 km.

Only use spark plugs with prescribed heat value. Note length of spark plug thread.

To a great extent the faultless running of the engine is dependent upon the condition of the spark plugs.

Note: The higher the heat value of a spark plug is, the higher its resistance against incandescent ignition is and the lower its resistance is against fouling.

The lower the heat value of a spark plug is, the lower its resistance against incandescent ignition is and the higher its resistance is against fouling.

If possible, test and clean spark plugs with a testing set.

Be sure to adhere to the specified electrode gap of $0.5^{+0.1}$ mm.

When installing the spark plugs do not interchange the ignition cables! Apply silicon paste to cable connections.

For heat value refer to table 6.2.2 and 6.13.

3.2.13 Ignition Distributor and Contact Breaker Points

Check point gap and condition of contact breaker and rotor according to maintenance schedule.

Check condition of distributor cap after removing (contact point fouling), clean or replace if necessary.

To remove contact breaker, remove locking clamp and screw (4) and pull out breaker arm.

Unscrew mounting screw (2), remove part while paying attention that eccentric set screw (1) is not dropped!

After installation apply some Bosch grease between cams and fiber blocks. Set point gap to 0.4 mm.

Carry out exact setting with the dwell angle tester.

Dwell angle at starter speed $38^{\circ} +3$
-1

3.2.14 Checking and Adjusting Ignition Timing

Check and adjust ignition timing according to maintenance schedule.

If possible, use optical measuring instruments (stroboscope) to check the correct firing point timing.

For measurement values refer to 6.2.1.

Manual setting of firing point timing.

Mark the firing point 2° bTDC (1st cylinder) (basic setting) on the graduated scale on the bottom of the counterweight with chalk. Approximately between 0 and first graduation line.

Observe sense of rotation!

Note: 2° bTDC is **not** marked.

The numbers 10, 20, 30, etc. are the respective degrees ($^{\circ}$) for measurements with the stroboscope.

404.1

The numbers 0, 1, 2, 3, 4 and 5 represent 0° , 10° , 20° , 30° , 40° and 50° respectively.

Pull off rotor and connect testing lamp (24 V) to terminal (4) and ground.

Turn the crankshaft via one rear wheel.

Secure vehicle against rolling (chocks). Release parking brake, differential lock disengaged.

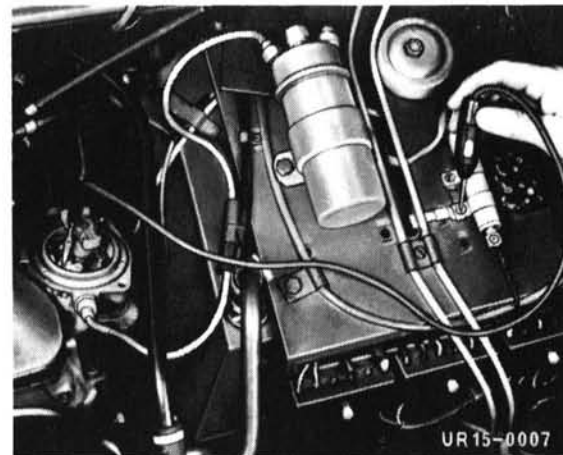


Figure 46 Check firing point with test lamp 404.1



Figure 45 Mark firing point 2° bTDC at basic setting 404.1

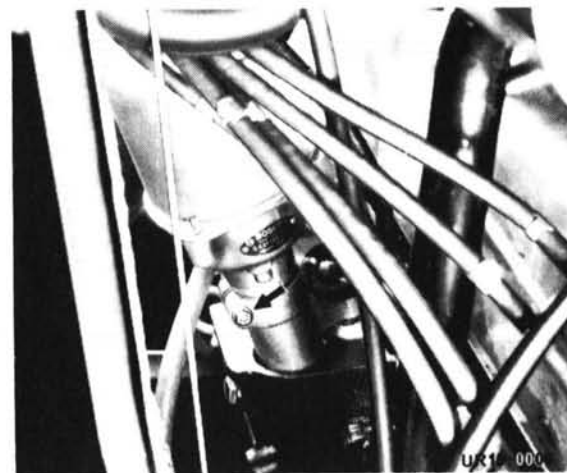


Figure 47 Clamping screw of ignition distributor

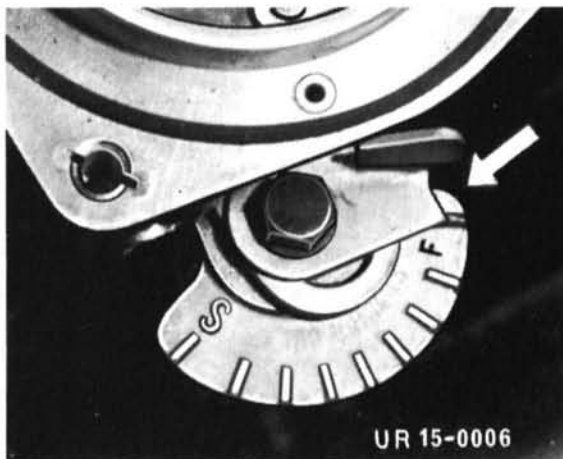


Figure 48 Advance/retard scale of ignition distributor 404.1

F Advance
S Retard

Lift one side of rear axle. Switch ignition on. Engage 6th gear and turn wheel by hand in driving direction until 2° bTDC of 1st cylinder is reached.

Check: Rotor in direction of groove on distributor housing.

With proper adjustment the test lamp must light up exactly at the marking point (2° bTDC).

In case of not noticing or passing the mark, repeat procedure again by turning further (2 rotations) or turning back (approx. 1/4 rotation).

The correct timing is set by turning the distributor to the exact setting.

Prior to turning loosen the clamping screw on the side. Figure 47.

Rotate distributor:

clockwise = retard
counter clockwise = advance

Check test by rotating crankshaft backward approximately 90° and forward again until the breaker point lifts off or test lamp lights up, then check position of graduated scale in relation to pointer.

404.1

On vehicles with an advance/retard scale the pointer position "F" (advance) must be maintained. Figure 48.

The distributor adjustment is also only accomplished via the clamping screw. Figure 47.

The adjustment pointer permits a limited adjustment toward retard (octane number adaptation for fuels of lower quality) only when required.

3.2.15 Cleaning Carburetor

Clean carburetor according to maintenance schedule.

Cleaning of the carburetor is generally limited to blowing out the main and idle speed jets as well as cleaning the float housing.

Cleaning float housing

Unscrew fuel line (1) and carburetor housing. Disengage pump rod at the bottom. Remove carburetor cover.

Pull out double float at joint bearing. Thereafter open cover (2) of nozzle chamber. The fuel may now run off via the nozzle housing. Clean float and nozzle housing with a small brush.

Screw out **main and idle speed nozzles**, check for free passage and blow out.

During assembly check float for leaks. There must be no fuel in the float, replace if necessary. Check gaskets, fully tighten screws.

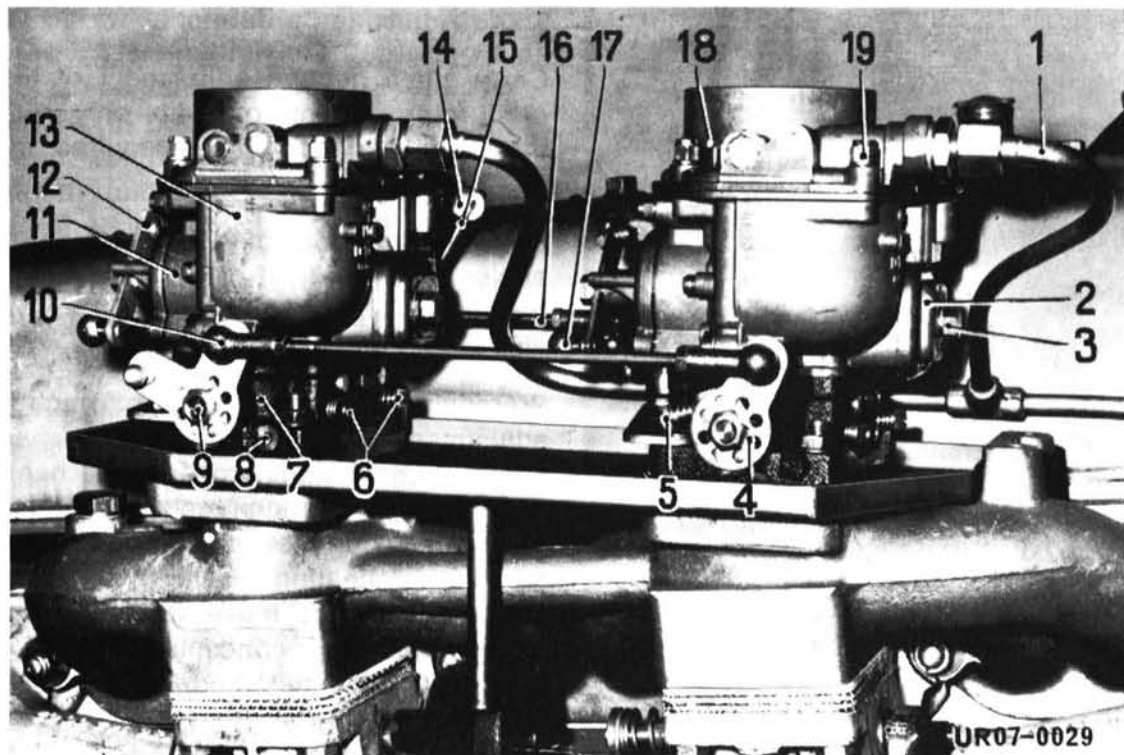


Figure 49 Carburetor system of M 130 engine

- | | |
|--|-------------------------------------|
| 1 Fuel line connection | 11 Choke |
| 2 Cover for main and idle speed nozzles | 12 Choke lever |
| 3 Cover screw | 13 Float housing |
| 4 Throttle valve | 14 Pump lever, top |
| 5 Idle speed adjusting screw | 15 Pump rod (to pump lever, bottom) |
| 6 Idle mixture adjusting screws | 16 Connecting rod (choke) |
| 7 Throttle valve assembly | 17 Gate lever |
| 8 Vacuum connection | 18 Carburetor cover |
| 9 Throttle valve shaft | 19 Cover screw |
| 10 Connecting rod (throttle valve shaft) | |

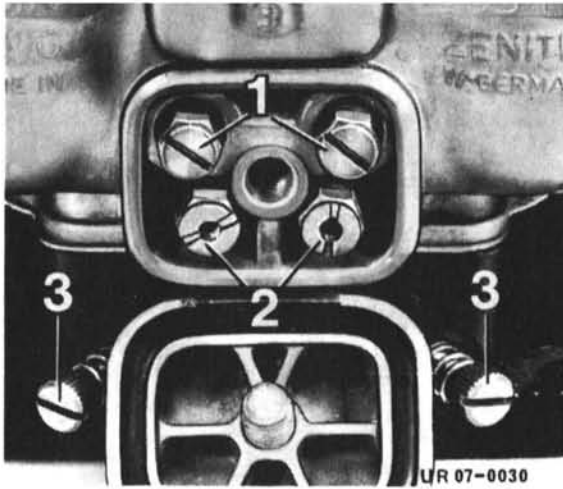


Figure 50 Nozzle housing

- 1 Idle nozzle
- 2 Main nozzle
- 3 Idle mixture control screw

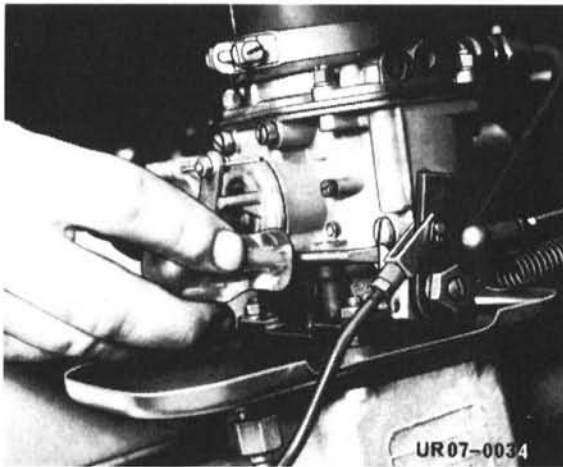


Figure 51 Adjusting idle speed adjustment screw

3.2.16 Adjusting Carburetor

Carry out a general adjustment of the carburetor system forthwith only with the usual test equipment required for this purpose.

Thus the provisions of § 47, Sec. 1 and 2 enclosure XI and XII of the road traffic registration regulation (StVZO) have also been complied with.

Prerequisites for an effective carburetor adjustment are an exact timing, an engine functioning properly mechanically (valves, spark plugs) and a leak proof intake and exhaust system. The mixture preheating valve below the intake pipe must move freely. Check functioning of thermospiral. Replace damaged or lame thermospiral. The engine should be at operating temperature.

Basic setting, mechanical

1 Remove intake manifold. Disengage accelerator pedal control linkage. In case of two carburetors, disengage connection linkage (10) figure 49.

2 Connect speed counter to engine.

3 Turn back idle adjustment screw until both throttle valves are closed. Then turn the screw back in again until the throttle valves start to open.

4 Unscrew and check idle mixture control screws (3) figure 50. Both must not show either annular grooves or other signs of wear.

5 Screw in control screws – **but only tighten lightly** – and turn back three half turns.

6 Start engine, set an idle speed of 800 to 850/min on the idle adjusting screw.

7 Very carefully turn in or out idle mixture control screw, until the speed begins to drop. Aim for smooth running.

Synchronising carburetor

In order to achieve an even transition in all engine speed ranges with **two carburetors**, they must be synchronised with each other.

Complete items 1 through 3.

8 Start engine.

9 Place synchronisation tester on carburetor. Place glass tube in vertical position. Adjust control screw of unit in such a manner that the test insert in the glass tube will remain approximately in the center at idle speed.

10 Now screw the idle speed adjustment screw of **both** carburetors in and out in turn until an equally high reading in the vacuum tester is achieved. Both carburetors must show the **same** value, recorrect if necessary.

11 Adjust length of connecting rod (10), figure 49 and reengage again.

Complete item 4 and 5.

12 **Screwing in idle mixture control screw = leaning mixture. Screwing out idle speed control screw = enriching mixture.** In both cases a slight drop in speed will become noticeable. Aim for smooth running.

While doing so an even vacuum on both carburetors must also be achieved with the aid of the synchronisation tester.

13 Now only reregulate the constant idle speed via the adjusting screw of the throttle valve shaft.

The exhaust emission valve can only be measured with a tester.

For exhaust emission values refer to 6.2.1.

3.2.17 Choke Control Cable

Regularly lubricate choke control cable with a few drops of oil. Pay attention that with the choke not in operation there is a distance of approximately 2 mm between control cable button and retaining bracket. While pushing cable in this distance serves as a check that the choke is not engaged.

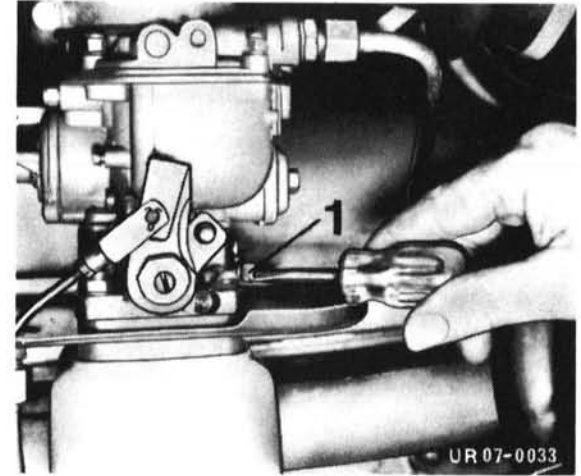


Figure 52 Adjusting idle mixture

1 Idle mixture control screw (2 each)

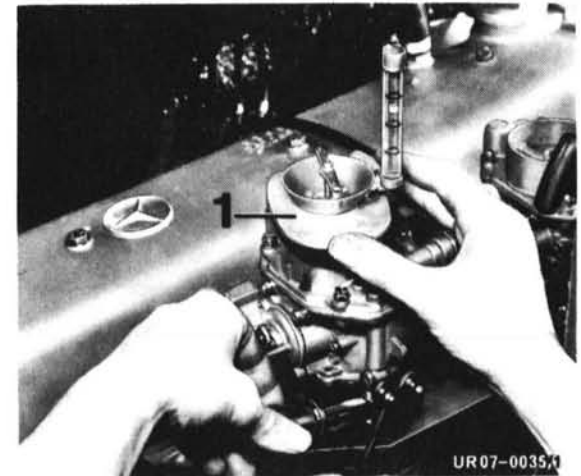
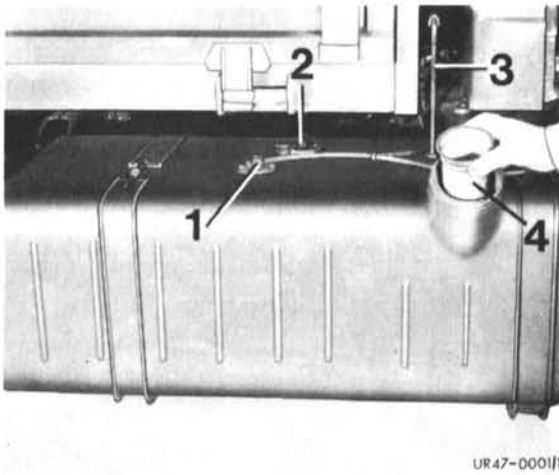


Figure 53 Synchronising carburetor

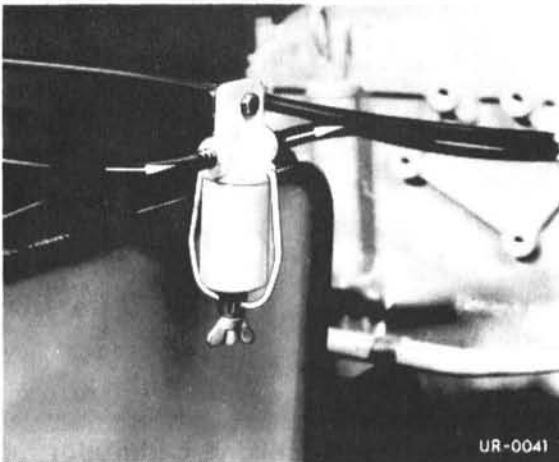
1 Vacuum tester (synchronisation tester)



UR47-00011

Figure 54 Fuel tank

- 1 Suction tube
- 2 Fuel gauge sending unit
- 3 Venting pipe
- 4 Fuel strainer



UR-0041

Figure 55 Fuel prefilter

3.3 Fuel System

3.3.1 Filling Up with Fuel

When filling fuel into the fuel tank take care that impurities and water cannot enter the tank.

When refueling with a suction pump from containers always use a strainer.

To prevent possible condensate or dirt from entering the tank maintain an appropriate distance between pipe end of suction pump and bottom of container.

3.3.2 Cleaning Fuel Tank

Clean fuel strainers and fuel tanks regularly.

If installed, remove filler strainer after unscrewing the cap and wash out in fuel with a brush.

Always be sure to remove and clean suction pipe with intake strainer in order to clean the fuel tank.

404.1

The fuel tank **in front with** filler pipe is the reserve tank.

The fuel tank **in the rear without** filler pipe is the main tank. This one is filled via the overflow pipe but only after the front tank has been filled.

3.3.3 Cleaning Fuel Prefilter

Clean prefilter according to maintenance schedule. Loosen wing nut, push clip aside and remove bowl. Unscrew strainer body. Carefully wash bowl and strainer in clean gasoline or diesel fuel, and blow out with compressed air.

Inspect gaskets during reinstallation, and replace if necessary since air can otherwise enter the fuel system after which the engine will no longer start.

Note: During assembly be sure to pay attention to proper seating of filter bowl.

404.1

The fuel prefilter is located on the engine immediately in front of the fuel pump.

3.3.4 Not Applicable to this Vehicle.

3.3.5 Fuel Pump and Supplementary Fuel Pump

1 Cleaning filter in fuel pump:

Unscrew locking screw of pump cover and remove cover. Remove strainer and wash in fuel. Spray out separation chamber with fuel, or wipe out with a rag soaked in fuel.

During assembly be sure to watch for proper sealing. Completely tighten locking screw in order that pump will not suck in secondary air.

2 Supplementary fuel pump:

When switching on the supplementary fuel pump, fuel in an increased quantity and flow speed is pumped into the carburetor via the suction line and feed pump. The solenoid valve connected parallel to the pump opens a return line to the fuel tank.

With this arrangement a rinsing action in the fuel system is maintained particularly during high ambient and/or engine temperatures.

Version I

Supplementary fuel pump **in** fuel tank

Version II

Supplementary fuel pump **laterally** on the fuel tank

During pump malfunctions (Version I) check suction pipe and strainer. Replace gasket between fuel tank and supplementary pump.



Figure 56 Fuel pump

- 1 Fuel pump
- 2 Strainer
- 3 Gasket

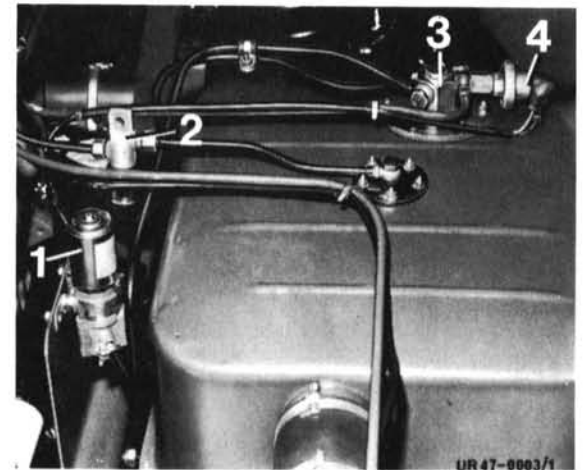


Figure 57 Supplementary fuel pump

- 1 Supplementary fuel pump
- 2 Fuel filter
- 3 Suction pipe
- 4 Pressure switch

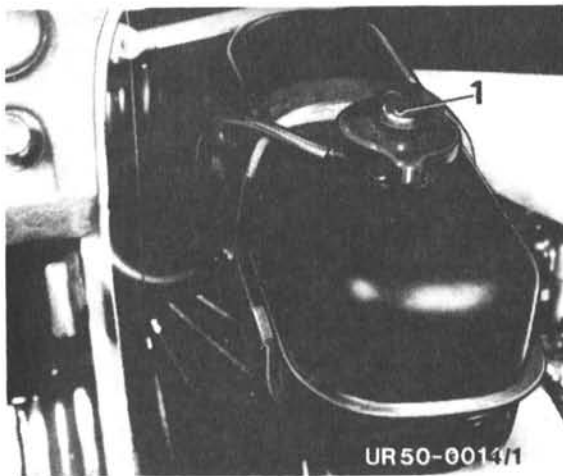


Figure 58 Coolant expansion tank

- 1 Filler cap with push button for pressure valve

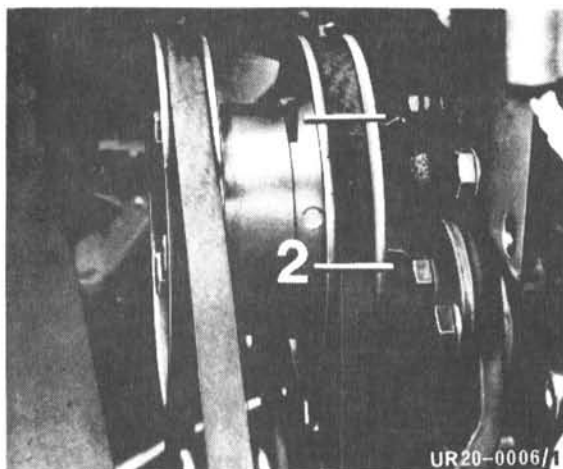


Figure 59 Coolant pump

- 1 Oil filler plug
- 2 Inspection plug

3.4 Cooling System

3.4.1 Filling Up with Coolant

Regularly check coolant level in expansion tank. Prior to opening turn filler cap to the first notch or press safety valve in order to relieve any possible excess pressure.

Coolant level of the cold engine should not be more than 30 mm below the upper edge of the filler opening of the expansion tank. Add coolant if necessary. Refer to 4.5.

When adding or changing coolant **be sure** to add 10 cc of corrosion inhibitor per liter of coolant for summer and winter operation, as well as antifreeze for winter operation (for mixing ratio refer to 4.5).

Turn knob of heater open all the way when changing coolant. Refer to 2.1.4.

404.1

Open heater valves in engine compartment in order that coolant can reach the heat exchanger of the heating and ventilating unit.

Let engine run several minutes at an increased idle speed. If necessary, fill up with coolant with engine running.

3.4.2 Coolant Pump

Check oil filling according to maintenance schedule.

Open oil filler plug (1) as well as inspection plug (2) on the side. Fill in transmission oil SAE 80 until it runs out at the bore (2).

3.4.3 Thermostat

The thermostat operates without any maintenance. During normal operation, it will open the coolant circuit via the radiator at approximately 80° C. Have damaged thermostat replaced immediately since the engine can otherwise overheat.

3.4.4 Draining Coolant

Prior to draining coolant, open filler cap of expansion tank. Open drain plug of radiator at drain fitting.

In order to completely empty the entire cooling system, open drain plug at the side of engine (for instance, during removal of engine).

404.1

With engine and battery prewarming additionally open drain plug of heat exchanger (water container) below the radiator.

With heating and ventilation system, open shut off valves and drain cock of heating circuit in engine compartment.

In order to drain coolant unscrew filler cap of coolant expansion tank.

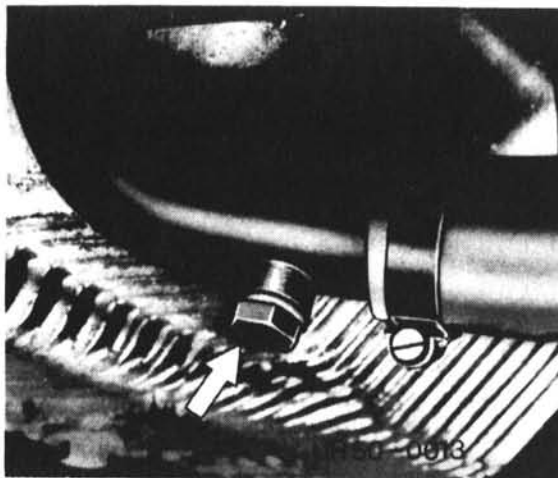


Figure 60 Drain plug of radiator



Figure 61 Drain plug on engine

3.4.5 Cleaning Cooling System

If the coolant temperature increases gradually above the specified value, this indicates a fault in the cooling system. For example, not enough coolant, dirty radiator, incorrectly tensioned V-belts or improperly operating thermostat.

Clean cooling system if it is dirty.

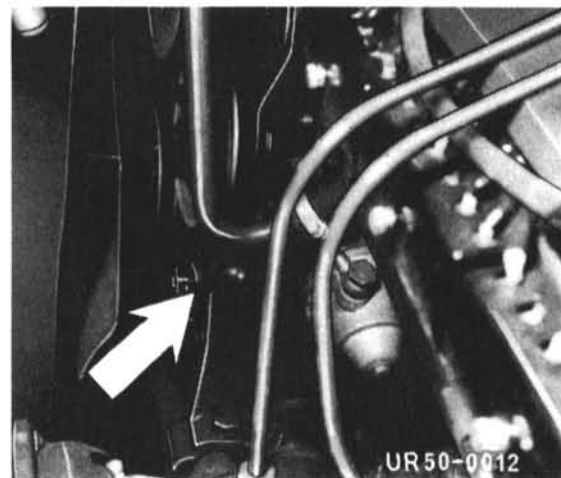


Figure 62 Drain cock on feed line of heating system 404.1

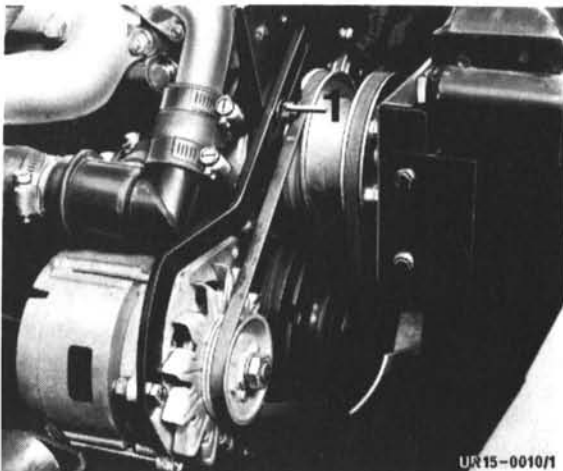


Figure 63 Tensioning V-belts

1 Tensioning screw on generator

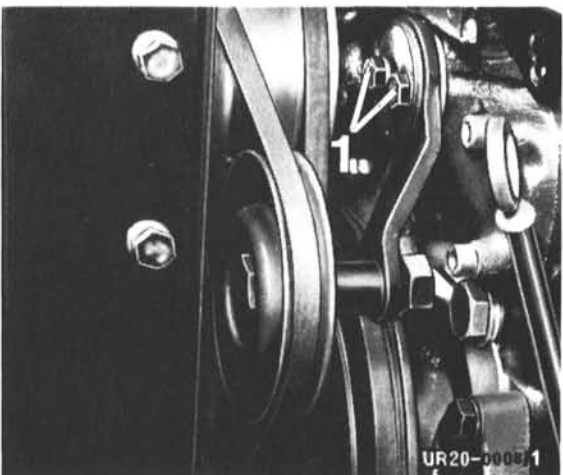


Figure 64 Tensioning V-belts

1 Idler pulley support

External cleaning

Blow out radiator from engine side with compressed air or spray out with water so that all foreign matter is removed from the radiator fins.

Internal cleaning

Unscrew filler cap of expansion tank. Fill in two handfulls of soda or special agent. Drive for one day with this additive and then drain all of the coolant. Flush cooling system thoroughly with fresh running water.

3.4.6 Coolant Hoses

Regularly check hoses of cooling and heating system for leaks, cracks and breakage. Replace damaged hoses immediately, otherwise approximately every two years.

3.4.7 Coolant Pump and Generator V-belt

Check V-belts according to maintenance schedule.

The V-belt should be tensioned in such a manner that it will deflect only approximately 10 mm from the straight line under thumb pressure.

To retension, adjust via tensioning screw of generator.

A V-belt which is too tight or too loose becomes worn prematurely and causes faulty power supply and engine cooling.

3.4.8 Fan V-belt

Adjust V-belt tension via idler pulley bearing. To do so, loosen the two hex. head screws and press support upwards.

V-belt tension approximately 5 to 10 mm.

3.4.9 Fan Bearing

Lubricate fan bearing according to maintenance schedule. Turn fan in such a manner that the filler plug can be loosened. Fill in transmission oil via oil can. Only moderately tighten plug with gasket.

3.4.10 Idler Pulley Bearing 404.1

Lubricate pulley bearing according to maintenance schedule.

Open plug and fill in transmission oil until it runs out at the same bore.

3.5 Clutch, Transmissions, Axles

3.5.1 Clutch

Grease clutch release shaft according to maintenance schedule. Check adjustment of the hydraulically operated clutch according to maintenance schedule and readjust if necessary. However, the maintenance intervals mainly depend on the operating conditions of the vehicle.

The free travel of the clutch pedal – measured at upper edge of pedal plate – must be at least 25 mm before de-clutching begins.

Adjust clutch pedal free travel on the slave cylinder. Adjust by rotating adjustment screws.

The free travel between adjusting screw and clutch lever is $3^{+0.5}$ mm.

404.1

The free travel of the clutch pedal is 30 to 35 mm.

To adjust free travel remove splined bolt at rear end of clutch rod and twist at forked head.

Note:

Shortening length of pull rod – clutch pedal free travel is reduced.

Increasing length of pull rod – clutch pedal free travel is increased.



Figure 65 Operation of clutch

- 1 Bleed screw
- 2 Adjusting screw

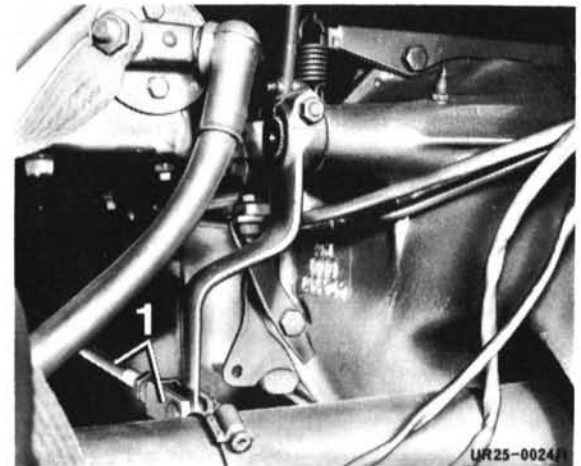


Figure 66 Operation of clutch 404.1

- 1 Clutch rod with forked head

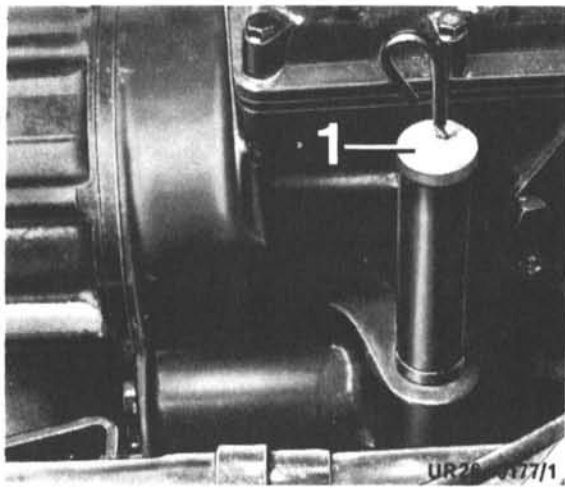


Figure 67 Transmission oil dipstick

1 Oil dipstick in filler neck

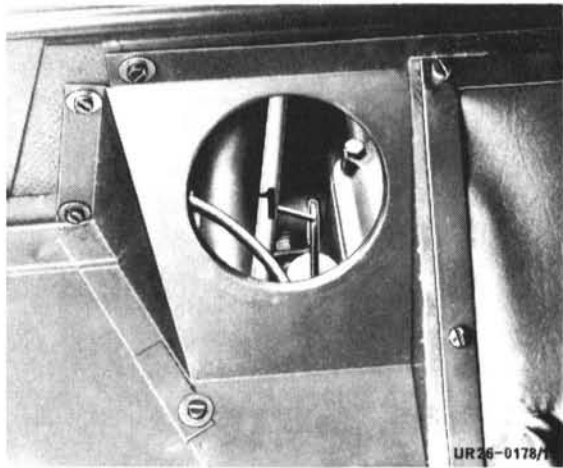


Figure 68 Transmission oil dipstick
404.1

1 Oil dipstick

Bleeding the hydraulic clutch system

The hydraulic clutch system is bled by means of the **bleeder screw of the slave cylinder**.

1 Fill brake fluid reservoir to upper mark.

Note: Always continuously refill brake fluid reservoir during bleeding process.

Never pump reservoir empty.

2 Fit bleeding hose over bleed screw and insert other end of hose in a transparent vessel, which is filled half way with brake fluid.

3 Unscrew bleed screw 1 to 2 turns, figure 65. Depress clutch pedal smoothly in one motion, tighten bleed screw and slowly release clutch pedal. Any trapped air will escape through the bleeding hose.

4 Repeat bleeding process until no further bubbles escape.

5 When depressing the clutch pedal for the last time, retain it in its lowest position until the bleed screw has been screwed down tight.

6 Remove bleeding hose and replace dust cap.

3.5.2 Transmission

Check oil level according to maintenance schedule. An exact oil level measurement can only be taken with the vehicle standing on level ground.

If the oil level is to be checked immediately after operating the vehicle, wait several minutes until the oil level has stabilised itself.

404.1

The oil dipstick in the filler neck is accessible through the opening next to the transmission cover.

During an oil change be sure to open both drain plugs.

With a supplementary crawler gear set, open drain plug on the side.

If possible drain transmission oil as long as it is **hot and thin**. The opening of the oil dipstick tube (filler neck) also serves for pouring in the transmission oil.

Do not fill above the maximum mark!

For filling capacity and transmission oil viscosity refer to 4.2 and 4.8.

3.5.3 Not Applicable to this Vehicle.

3.5.4 Differential

Check oil level and change oil according to maintenance schedule.

Prior to removing oil filler (oil level control) plug clean the differential housing in this area.

The oil level must reach the bottom edge of the filler hole with the vehicle standing on level ground.

For filling capacity and transmission oil viscosity refer to 4.2 and 4.8.

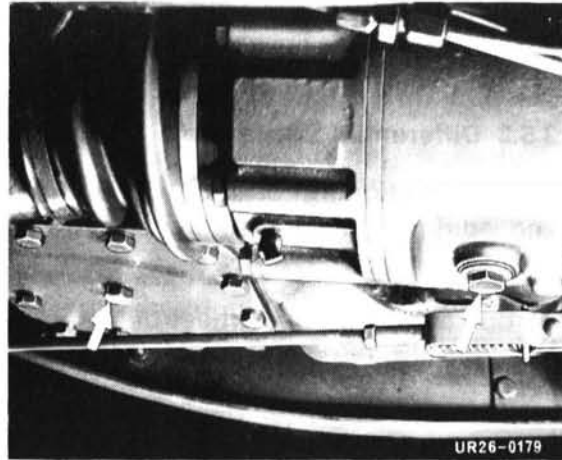


Figure 69 Transmission oil drain plugs

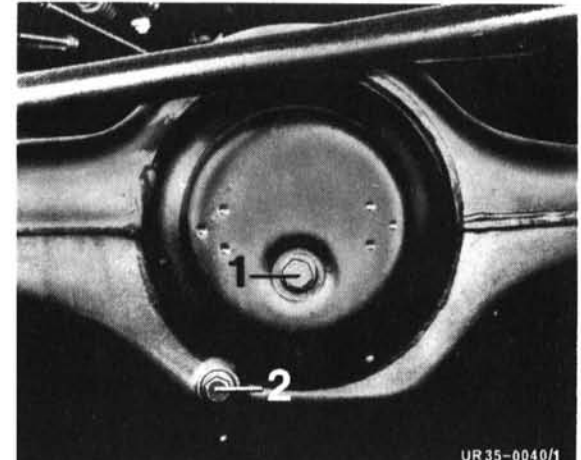


Figure 70 Differential

- 1 Oil filler plug
- 2 Oil drain plug

3.5.5 Hub Reduction Gears

Check oil level and change oil according to maintenance schedule.

Prior to removing the plugs, clean the housing in the areas around the plugs.

Unscrew oil filler plug (2) and oil level control plug (1) and pour in transmission oil. With the vehicle standing on level ground, the oil level must reach the bottom edge of the oil level inspection hole.

For filling capacity and transmission oil viscosity refer to 4.2 and 4.8.

3.5.6 Steering Knuckle Bearings

Lubricate steering knuckle bearings according to maintenance schedule.

Jack up axle.

Pay attention that grease emerges slightly between the king-pin and steering knuckle bearing during lubrication. If necessary, clean or replace grease nipple.

Note:

Lubricate top of steering knuckle bearings only with hand operated grease gun.



Figure 71 Hub reduction gear

- 1 Oil level control plug
- 2 Oil filler plug
- 3 Oil drain plug

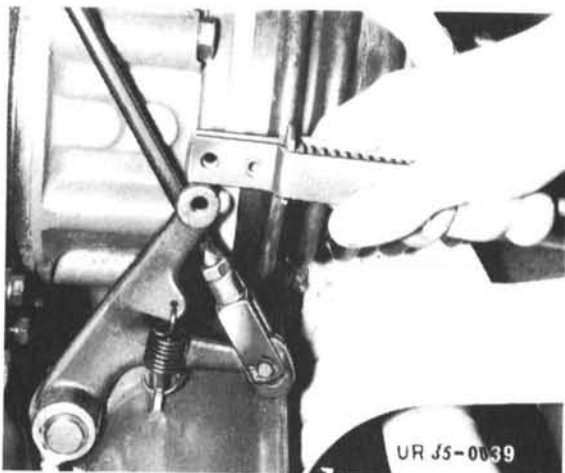


Figure 72 Checking rear axle differential lock

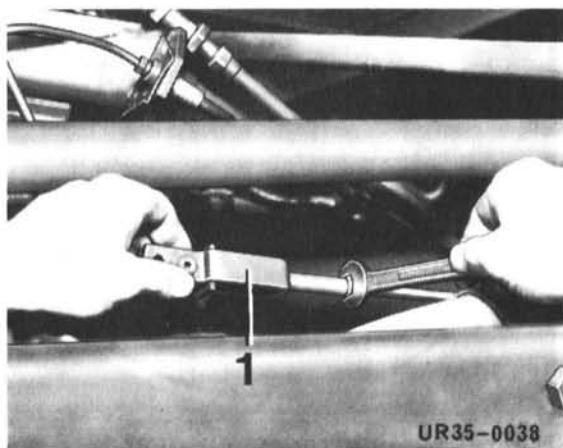


Figure 73 Adjusting differential lock

1 Spring element

3.5.7 Not Applicable to this Vehicle.

3.5.8 Differential Locks

Check **functioning** of four-wheel drive and differential locks according to maintenance schedule.

To do so, jack up one wheel of the front axle and the opposite wheel of the rear axle.

Four-wheel drive

Shift four-wheel drive / differential lock shifting lever into the **first position**. Turn one wheel, while doing so the wheel of the opposite axle must **turn as well**.

Differential lock

Shift the four-wheel drive / differential lock shifting lever into the **second position**.

Due to the locking of the differential both wheels must no longer turn.

Adjusting differential lock

Block up axle (do not suspend vehicle from crane!).

Remove splined bolt and disengage pull rod.

Check lock engagement by pulling the pull rod and simultaneously turning a wheel (second person). In pulled and/or engaged position, it must be possible to insert the splined bolt into the bore free of tension.

Compensate for deviations by screwing spring package of spring element in or out.

Thereafter screw the spring element onto the pull rod by an additional 3 turns = 3.8 mm to provide a preload in the event of vehicle distortion.

3.5.9 Propeller Shafts

Lubricate propeller shafts according to maintenance schedule.

3.6 Steering System

3.6.1 Checking Steering

Check pitman arm for tight seating and steering for proper functioning according to maintenance schedule.

Mechanical steering:

Check oil level in steering gear housing according to maintenance schedule and fill up if required.

The oil level must reach the lower edge of the filler neck.

For filler capacity and transmission oil viscosity refer to 4.2 and 4.8.

3.6.2 Oil Level, Oil Change, Oil Filter

Check oil level in steering oil reservoir according to maintenance schedule. The oil reservoir is located in front and on the left hand side in the engine compartment.

With the engine running, the oil level **must** be at the upper mark of the red ring on the inspection glass and **may** be somewhat higher with the engine turned off.

For an oil change according to maintenance schedule, detach return line at steering gear housing and drain oil. In doing so crank engine briefly with the starter and turn the steering wheel from stop to stop.

Unscrew oil reservoir cap and replace paper oil filter element.

Clean oil reservoir and fill up with HD engine oil. Refer to 4.9.

Clean bleeder slot of plug washer.

3.6.3 Bleeding Power Steering

Unscrew steering gear housing bleeding screws by 1 to 2 turns. Fill oil reservoir with HD engine oil SAE 10 W. In the meantime slowly turn steering wheel from stop to stop with no load on front axle or with steering rod disengaged, until the oil level reaches the upper edge of the red ring on the inspection glass. If necessary refill with oil. Then let the engine run at idle speed until the oil level has stabilized itself.

3.6.4 Power Steering Pump V-belt

Check V-belt according to maintenance schedule. Tension V-belt with tensioning screw in such a manner that it will deflect only approximately 10 mm from the straight line under thumb pressure.

Check a new V-belt several times during the first hour of operation for proper tension.

Important information

In case of a sudden hydraulic booster failure, e. g. when the pump drive fails, the vehicle continues to be steerable.

However, a considerably greater force must be exerted for steering.

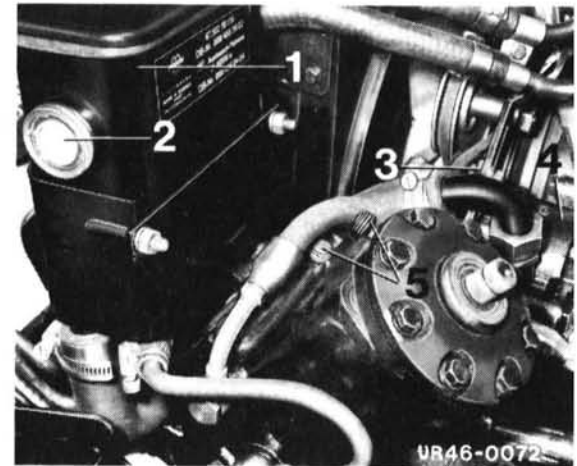


Figure 74 Power steering system

- 1 Oil reservoir
- 2 Oil level inspection glass
- 3 Steering pump tensioning screw
- 4 Steering pump
- 5 Power steering bleed screw



Figure 75 Mechanical steering

- 1 Oil filler plug
- 2 Adjusting screw

3.7 Wheels and Tires

3.7.1 Wheels

Interchange wheels including spare wheel according to maintenance schedule in order that tire wear is as even as possible. Rotate only between right front and left rear and/or left front and right rear.

After a wheel change retighten the wheel nuts again after driving approximately 50 km.

For tightening torque refer to 6.13.

3.7.2 Checking Tow-in

Measure tow-in of the front wheels at front of rim flange at wheel center level according to maintenance schedule. Repeat measurement after the respective front wheel has been rotated by 180°. Adjust tie-rod correspondingly, if necessary. For tow-in data refer to 6.3.3.

3.7.3 Not Applicable to this Vehicle.

3.7.4 Tire Treads

The corresponding tire treads for the various vehicle usages are given in the table in section 6.5.1.

If the vehicle is mainly **driven on the road** mount the tires in such a manner that the arrow tread on the ground points **forward** on the front wheels and to the **rear** on the rear wheels as viewed in driving direction. This causes the vehicle to run smoother at high speeds and reduces tire wear.

For **heavy traction** in terrain mount tires in such a manner that on the front and rear wheels the arrow tread on the ground points to the **rear** as viewed in driving direction. This is absolutely necessary in order to provide good grip and good self-cleaning action!

If necessary, interchange both front wheels.

3.7.5 Checking Tire Pressure

Prior to starting on a long drive, check tire pressure with a tire pressure gauge. Do not forget the spare wheel! For tire pressures refer to 6.5.2.

For a long service life of the tires be sure to always maintain the permissible loading capacity and the specified tire pressure.

On soft ground and on sand, the traction and performance can be increased considerably by reducing the tire pressure. A lower tire pressure also improves the self-cleaning action on a sticky, wet soil.

Be sure to inflate the tires to the normal tire pressure after the above operations have been completed.

3.8 Brake System

3.8.1 General

The **service brake system** is a hydraulic, two-circuit drum-type brake system with automatic wheel brake readjustment.

The **parking brake system** acts mechanically upon the rear wheel brake.

A compressed-air brake booster is installed in front of the master brake cylinder and serves as a **brake assistance** to take over part of the necessary pedal force during braking and thus relieving the driver.

For **compressed-air system** refer to 3.9.

The **brake system corresponds to the EC specifications** (EC = European Community).

404.1

The **service brake system** is a hydraulic, single-circuit drum-type brake system.

A two-circuit brake system can be installed as an optional extra (front axle and rear axle separate).

The **parking brake system** acts mechanically upon the rear axle.

A vacuum brake unit can be installed as a **brake assistance** in order to offer effective brake assistance with the aid of the engine vacuum.

For **compressed-air system** refer to 3.9.

3.8.2 Checking Brake Fluid Level

Check hydraulic brake system for leaks and contents of brake fluid reservoirs according to maintenance schedule.

Prior to opening, disconnect line connectors of warning device.

Fluid must be at upper level mark with the vehicle standing on level ground.

When the fluid level drops below the minimum mark the indicator light in the instrument cluster must light up with the ignition turned on.

This indication is activated via the float contacts in both reservoirs.

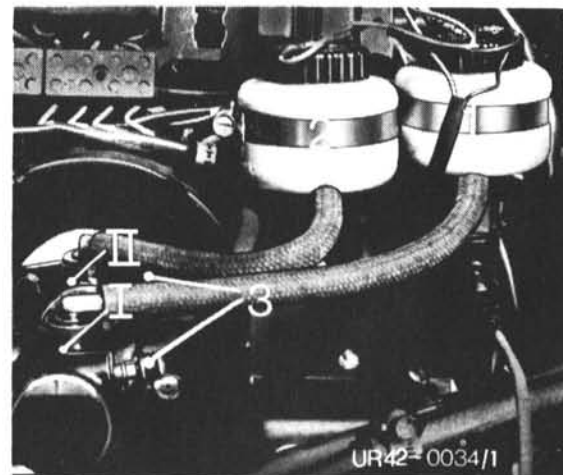


Figure 78 Brake fluid reservoirs

- 1 For hydraulic brake circuit I and hydraulic clutch
- 2 For hydraulic brake circuit II
- 3 Bleed screw

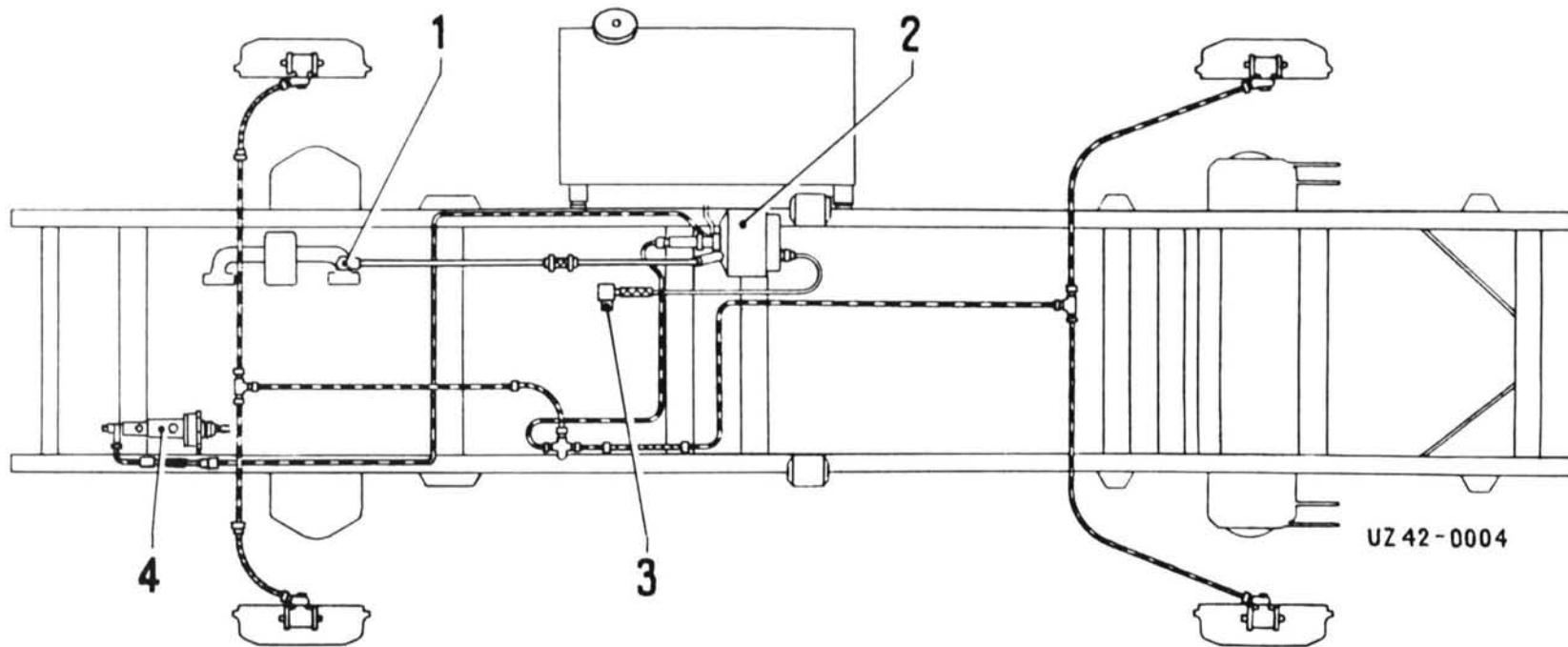


Figure 77 Schematic diagram of hydraulic brake system with vacuum brake assistance

1 Vacuum connection
2 Vacuum brake unit

3 Bleeding filter
4 Master brake cylinder

UZ 42-0004

Do not permit brake fluid to touch paint-work

If brake fluid needs to be added frequently the hydraulic brake or clutch systems are leaking.

Change brake fluid at least once a year (spring inspection).

Only use yellow brake fluid as of this date!

404.1

Only one brake fluid reservoir without warning device.

Observe max. and min. mark!

3.8.3 Bleeding Hydraulic Brake System

If no firm resistance is felt, when fully depressing the brake pedal, the hydraulic brake system is either leaking or there is air in the hydraulic system, which must be removed immediately.

Use bleeding equipment to bleed the entire brake system! Carry out this work with particular care.

When bleeding with bleeding equipment, the pressure of such equipment must not exceed 1.0 bar (kp/cm²). Pressure which is too high can cause heavy foaming of the brake fluid so that proper bleeding is not guaranteed.

Hydraulic brake circuit I

For complete bleeding proceed in the following sequence:

Bleed tandem master brake cylinder, hydropneumatic control valve and wheel brake cylinder, starting with right rear, left rear, right front (upper cylinder) and left front (upper cylinder).

Hydraulic brake circuit II

Circuit II of the hydraulic brake system only acts upon the front wheel brake. Connect **bottom** bleed screw of the large wheel brake cylinder (2) and bleed separately together with the expansion reservoir II. Figure 76.

404.1

On vehicles with single or two-circuit brake system carry out bleeding as follows:

Bleed master brake cylinder and wheel brake cylinder starting with right rear, left rear, right front and left front. With a brake assistance system installed also bleed the brake booster together with the master brake cylinder.

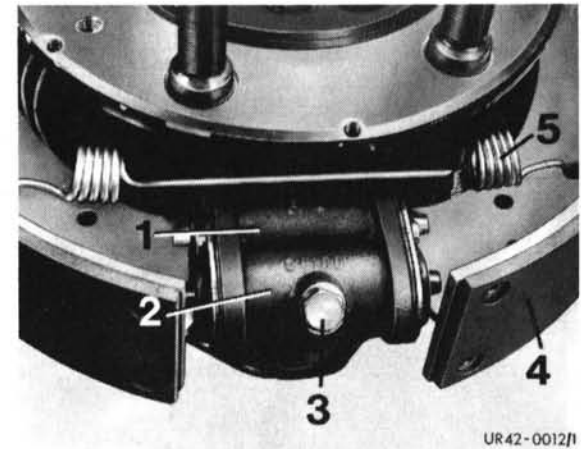


Figure 78 Front wheel brake with twin-wheel brake cylinder

- 1 Wheel brake cylinder circuit I
- 2 Wheel brake cylinder circuit II
- 3 Guide screw
- 4 Brake shoe
- 5 Return spring



Figure 79 Bleeding hydraulic brake system

- 1 Transparent vessel
- 2 Bleeding hose
- 3 Bleed screw

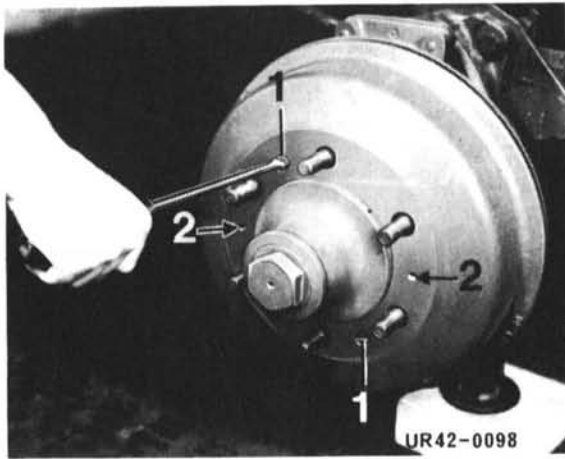


Figure 80 Brake drum

- 1 Mounting bolt
- 2 Bore for back-off bolt

During partial bleeding (e. g. after replacing a wheel brake cylinder) carry out the following work:

Remove respective dust cap. Connect bleeding hose and insert end of hose into transparent plastic vessel partly filled with brake fluid. Unscrew bleeding screw 1 to 2 turns. Depress brake pedal in one motion all the way. Tighten bleeding screw and **slowly** release brake pedal. Repeat this pumping action until no further air bubbles appear when the pedal is depressed. When depressing the brake pedal for the last time, retain it in its lowest position until the bleed screw has been screwed down. Remove bleeding hose and replace dust cap.

3.8.4 Checking and Cleaning Brakes

Clean wheel brake and check thickness of brake linings according to maintenance schedule. When using the vehicle jack make sure that it is applied as far to the outer end of the axle tubes as possible and never under the differential housing.

After removing the wheels unscrew the two countersunk head screws which become visible and press off the drum with two hex. head screws.

Due to uneven braking action as well as overheating due to dirt and mud which has penetrated the wheel brake it is absolutely necessary to clean them after a prolonged cross-country drive.

Check thickness and general condition of brake linings. Check wheel brake cylinder for leaks.

3.8.5 Brake Shoes

Check and clean brake shoes and linings according to maintenance schedule.

Shoe-to-lining clearance on both sides $1.8_{+0.1}^{-0.3}$ mm (automatic resetting after braking action).

With increasing wear of the brake linings an **automatic readjustment of the front and rear brake cylinders** takes place.

404.1

Readjusting brake shoes, service brake

With increasing wear of the brake linings, the operating travel of the brake pedal increases. This is a sign that the brake shoes have to be readjusted.

Raise axle.

Turn adjustable eccentric toward the outside until brake shoes rest against the brake drum and **only** then turn back so far that the wheel can still be turned freely.

After each adjustment the specified braking action delay must be achieved. If necessary replace brake linings and/or regrind brake drums.

3.8.6 Adjusting Brake Pedal

The free travel between piston rod and master brake cylinder or to the control piston of the brake booster must be approximately 1 mm in the resting position of the brake pedal. This corresponds to a free travel of approximately 6 to 7 mm at the pedal plate of the brake pedal. Adjust at the upper adjusting screw (eccentric) of the brake pedal and piston rod as required.

404.1

The plunger is adjusted at the forked head of the master brake cylinder below the cab. Figure 83.

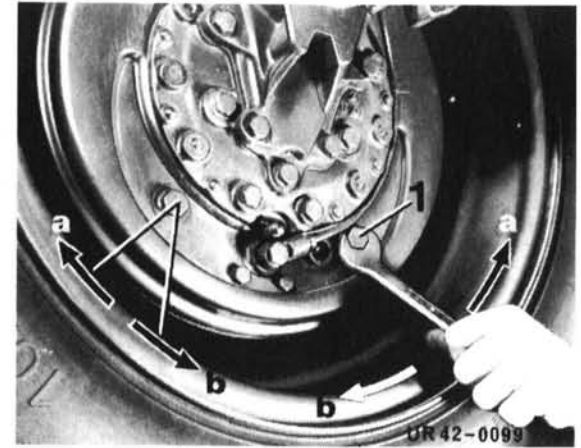


Figure 81 Adjusting brake shoes 404.1

- 1 Adjustable eccentric
- a engage
- b disengage

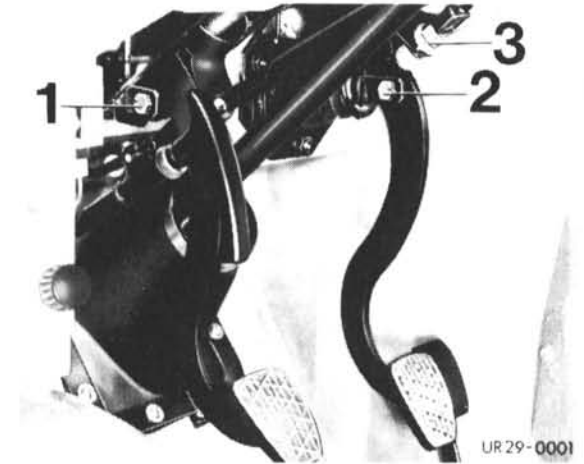


Figure 82 Adjusting pedals

- 1 Adjusting screw, clutch pedal
- 2 Adjusting screw, brake pedal
- 3 Stop light switch

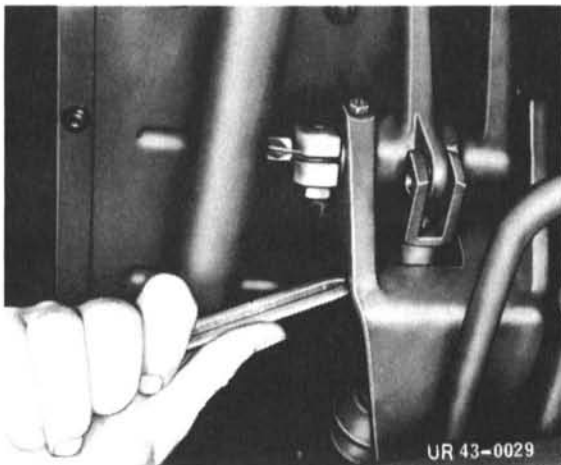


Figure 83 Adjusting plunger of master brake cylinder 404.1

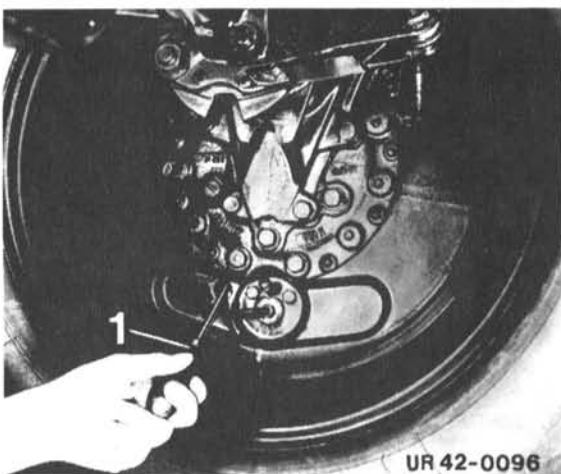


Figure 84 Adjusting parking brake

1 Screwdriver

3.8.7 Readjusting Parking Brake System

The ratchet rod must rest against the stop of the released position with the brake disengaged, i. e. the parking brake should only start engaging after reaching the second tooth.

If the free travel of the ratchet rod becomes too great, readjust parking brake system.

On the 404.1 First readjust service brake system and then disengage the pull rod to the hand brake lever on top at the cable support.

Unscrew the plunger via the notched wheel with a screwdriver until the brake shoes snugly fit against the brake drum. Then turn back until the wheel still can be turned freely. The plunger has a right-hand thread.

Tighten the ratchet rod up to the second tooth. In this position the hand brake valve must react. After tightening up to the third tooth, it must no longer be possible to turn the rear wheel by hand even with increased force. However, after the ratchet rod has been disengaged they must again turn freely.

The length of the brake cable is adjusted at the forked head or at the nut (4). To do so loosen counter nut and shorten or lengthen with the other hex. nut. Should differing braking action still be noted, the respective brake cable can be readjusted via the adjusting nuts (2).

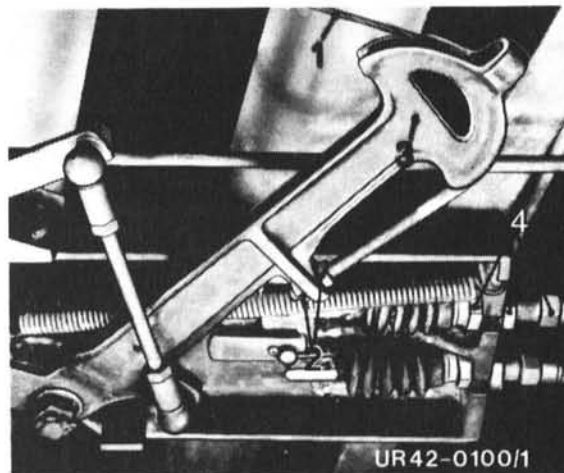


Figure 85 Parking brake readjustment

- 1 Brake cable
- 2 Brake cable with adjusting nuts
- 3 Linkage lever
- 4 Nut for brake cable adjustment

404.1

After adjusting the parking brake re-engage the pull rod of the parking brake lever again.

Then check if both wheels are evenly braked after the parking brake lever has been pulled to the first or second notch, and adjust **again** at the respective notched wheel if necessary.

Adjust or readjust the brake cables via the cable support only in case of new or old brake cables as means of length compensation. However, with every adjustment of the parking brake a correction of the brake cables may become necessary. While doing so, the balancing arm must always be horizontal.

3.8.8 Parking Brake and Pedal Linkage

Lubricate all joints of the parking brake and pedal linkage with an oil can according to maintenance schedule. Refer to 3.1.5.

404.1

Lubricate pedal linkage at frame and linkage lever at carrier tube.

3.8.9 Brake Hoses, Brake Lines

Replace leaking or externally damaged brake lines immediately. External damage comprises corrosion, chafing, pinching, etc.

Brake hoses must not be twisted when installed and must not bind or chafe when the wheels are turned. In addition, brake hoses must not **be painted or preserved with undercoating, etc. since rubber will become brittle and lose its elasticity.**

Brake hoses must only be cleaned with water.

3.8.10 Not Applicable to this Vehicle.

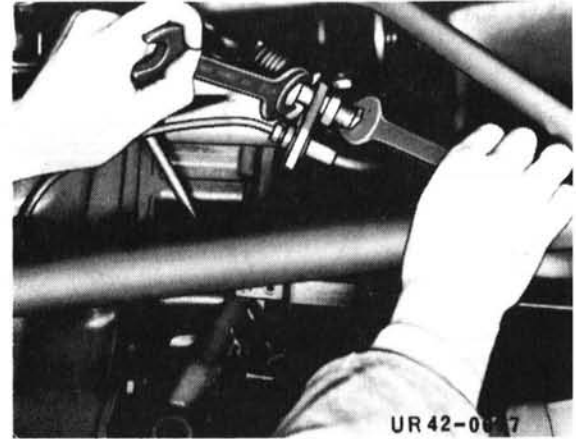
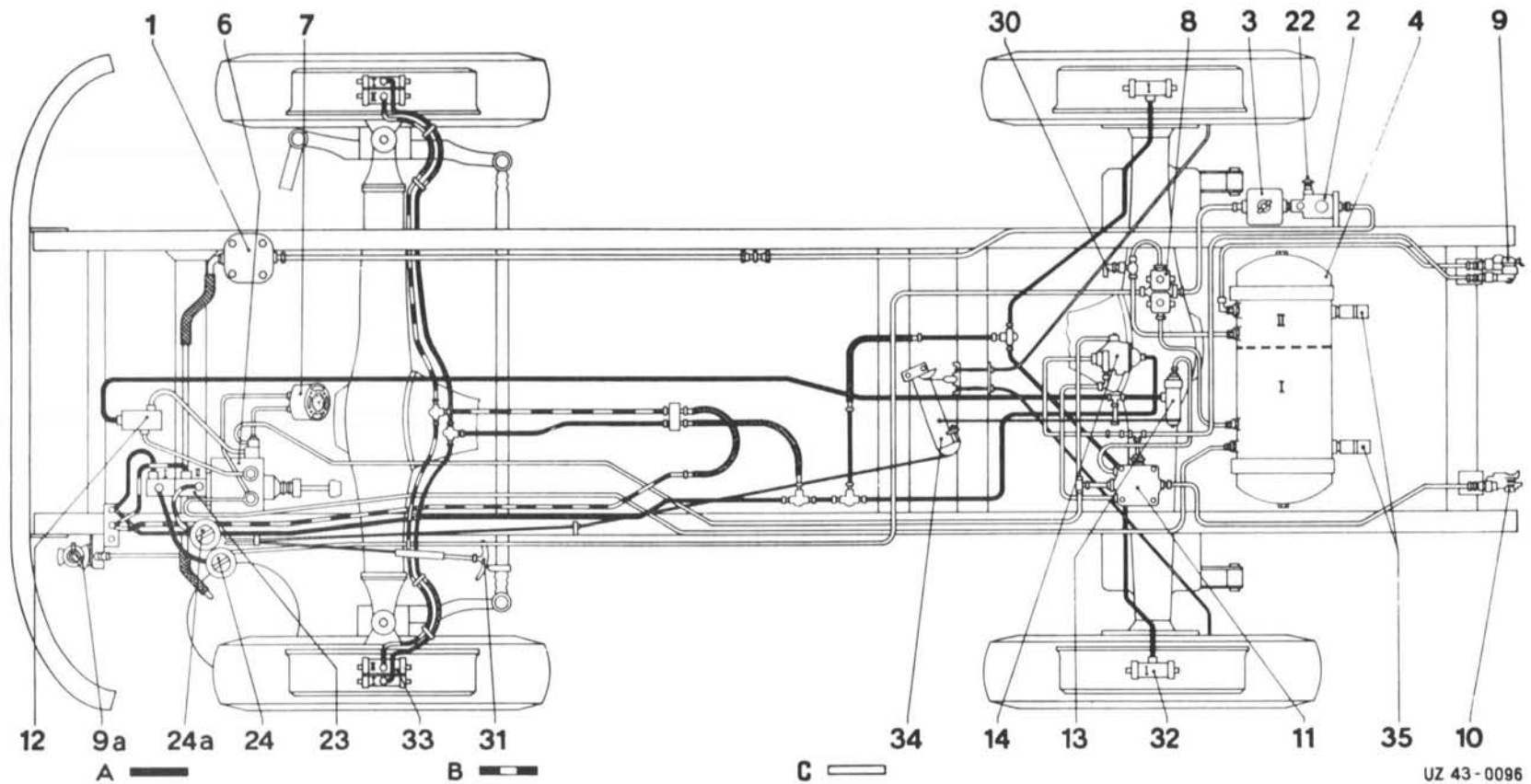


Figure 86 Readjusting brake cables 404.1

3.8.11 Vacuum Brake Booster

An irregularly working vacuum brake booster becomes noticeable because of partial or complete failure of the brake system. In case of trouble, check all vacuum connections (intake manifold, vacuum hose, ring fittings, etc.) for tight seating. If all above listed work brings no remedy replace check valve and air cleaner packing.

3.9 Compressed-Air System



UZ 43-0096

Figure 87 Diagram of compressed-air brake assistance system with compressed-air control for the two-line trailer brake system and hydraulic two-circuit brake system 404.0

A Hydraulic brake line circuit I

- 1 Air compressor
- 2 Pressure regulator
- 3 Antifreeze unit
- 4 Compressed-air reservoir (two-chamber)
- 6 Compressed-air brake booster
- 7 Brake dual pressure gauge
- 8 Three-circuit protective valve
- 9 Palm coupling for supply line

B Hydraulic brake line circuit II

- 9a Palm coupling for supply line (front)
- 10 Palm coupling for brake line
- 11 Trailer control valve
- 12 3/2-way valve
- 13 Hand brake valve
- 14 Hydropneumatic control valve
- 22 Tire inflator connection
- 23 Tandem master brake cylinder

C Compressed-air brake line

- 24 Brake fluid reservoir circuit I
- 24a Brake fluid reservoir circuit II
- 30 Warning pressure switch
- 31 Parking brake ratchet rod
- 32 Wheel brake cylinder
- 33 Twin-wheel brake cylinder
- 34 Parking brake linkage lever
- 35 Pressure relief valve

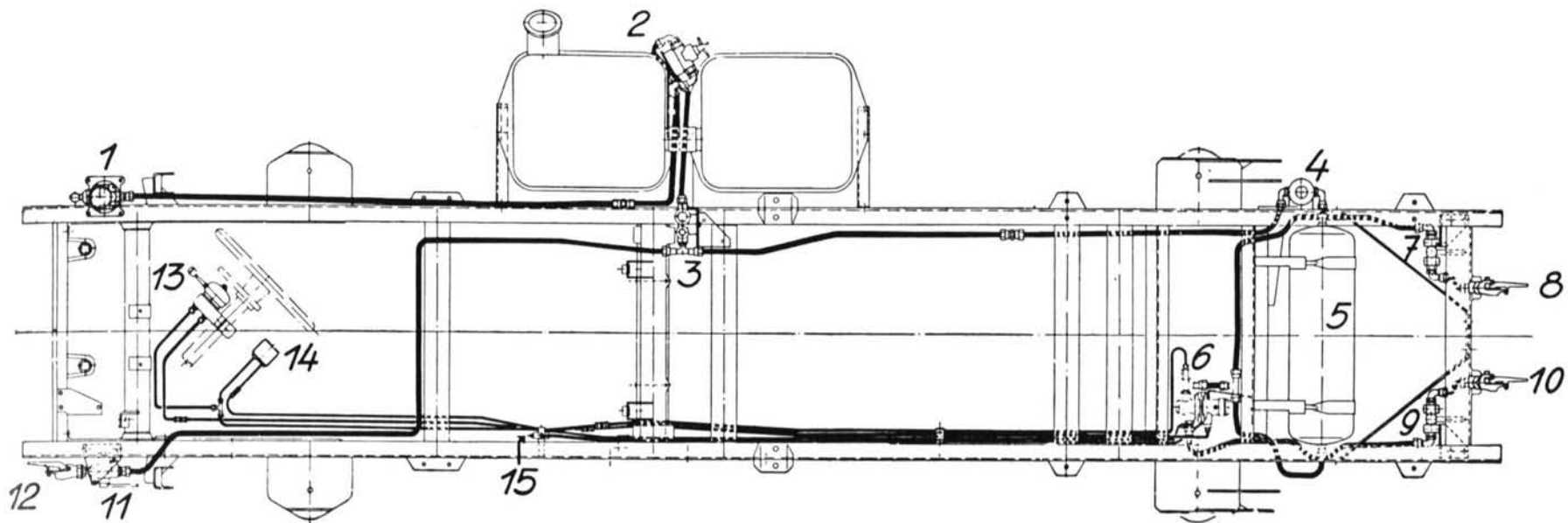


Figure 88 Diagram of the compressed-air control for the two-line trailer brake system 404.1

- | | | |
|--|---------------------------------|--|
| 1 Air compressor | 7 Shut-off cock | 12 Palm coupling for supply line (front) |
| 2 Filter with tire inflator connection | 8 Palm coupling for supply line | 13 Hand brake valve for trailer operation |
| 3 Pressure regulator | 9 Shut-off cock | 14 Dual pressure gauge |
| 4 Antifreeze pump | 10 Palm coupling for brake line | 15 Distributor, master brake cylinder to front and rear axle |
| 5 Compressed-air reservoir | 11 Shut-off cock | |
| 6 Trailer control valve | | |

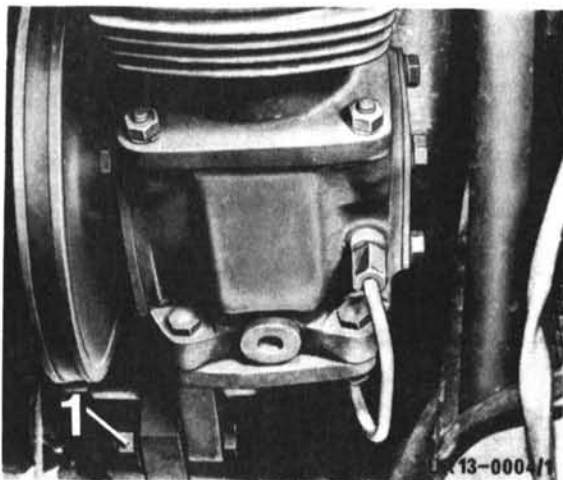


Figure 89 Tensioning V-belt

1 Tensioning screw

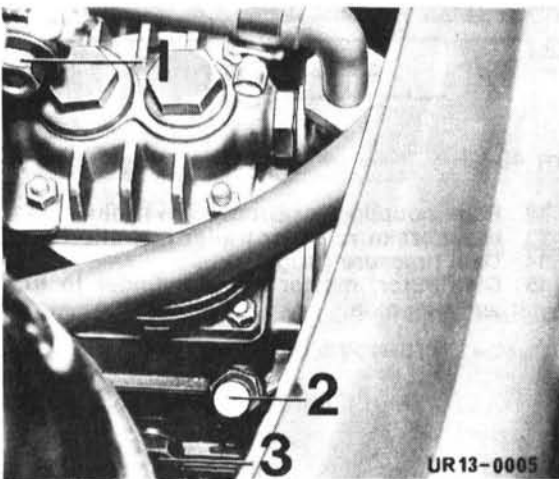


Figure 90 Air compressor 404.1

1 Tensioning nut
2 Oil dipstick
3 Oil drain plug

3.9.1 General

The compressed-air brake system consists of the compressed-air brake assistance system and the compressed-air control for the trailer brake system.

As an optional extra the compressed-air connection can be installed in front.

The system corresponds to the EC specifications (EC = European Community).

404.1

On this model a compressed-air control can be installed for a single or two-line trailer brake system with or without a compressed-air connection in front. An additional hand brake valve serves to brake the trailer during down-hill driving.

3.9.2 Air Compressor

Compressed air is produced by the air compressor.

The lubrication of the air compressor is connected to the engine oil circuit.

Thus the air compressor requires no maintenance.

404.1

Air compressor: Check oil level according to maintenance schedule.

Check V-belt according to maintenance schedule. Tension V-belt with tensioning screw in such a manner that it will give only approximately 10 mm from the straight line under thumb pressure. A V-belt which is too tight or too loose will be destroyed prematurely.

Check a new V-belt several times during the first hour of operation for proper tension and retension it if necessary, since it will stretch somewhat while running in.

3.9.3 Pressure Regulator Warning Device

The pressure regulator is set to a cut-off pressure of 7.35 bar (kp/cm²). With a pressure drop to below 5.2 bar (kp/cm²) a red warning light will light up in the instrument cluster.

Both brake fluid reservoirs are connected to the same warning light. If the brake fluid level drops below the minimum mark, the light will also light up in the instrument cluster.

404.1

The optical warning indicator for the compressed-air system and brake fluid reservoir are omitted on this type.

Remove filter element of pressure regulator approximately every three months and clean in nitro thinner or replace it if necessary. Install filter element in dry condition only.

If the pressure regulator cuts off at a pressure which is too low or too high readjust with the adjusting screw.

Pressure regulator with tire inflator connection

Inflating tires

In order to be able to **inflate tires** the compressed-air system may only have a pressure of at most 6.2 bar. Lower the pressure from 7.35 bar by operating the brake pedal several times. Thus the pressure regulator is switched over to air supply.

Loosen screw plug with the clamping handle on the pressure regulator. Screw tire inflator hose onto hose connection. To inflate tires let engine run.

For tire pressures refer to 6.5.2.

404.1

Filter with tire inflator connection

Drain filter weekly and daily during the winter as well as prior to every **tire inflation**. To do so press button. Dirt and condensate are then blown out via a safety valve on the bleed connection.

Prior to **filling tires** unscrew wing nut with push button and connect tire inflator hose. Clean filter element every three months.

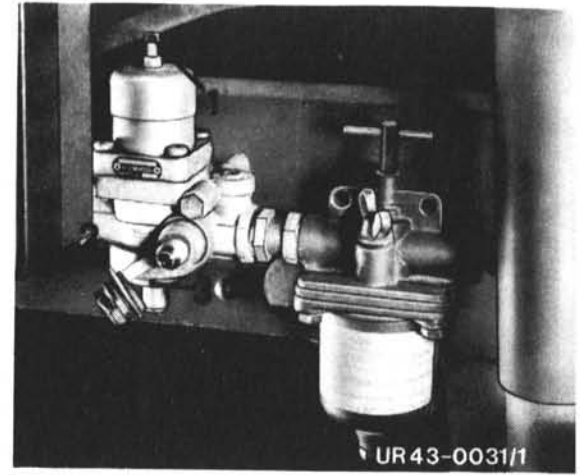


Figure 91 Pressure regulator and anti-freeze unit

- 1 Adjusting screw
- 2 Tire inflator connection
- 3 Filter housing

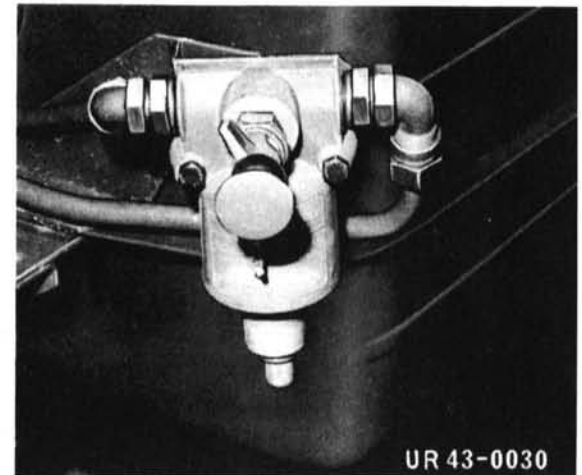


Figure 92 Filter with tire inflator connection 404.1

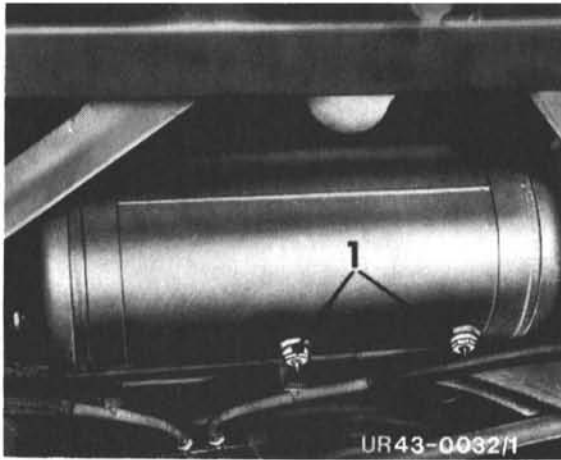


Figure 93 Compressed-air reservoir

1 Drain valve



Figure 94 Tandem master brake cylinder with compressed-air brake booster

- 1 Tandem master brake cylinder
- 2 3/2-way valve
- 3 Compressed-air brake booster
- 4 Brake fluid reservoir

3.9.4 Compressed-Air Tank

Regularly drain condensate from compressed-air tank. Operate drain valves if installed.

If the drain valves are plugged due to ice formation operate service brake pedal several times in order to release the pressure in the compressed-air system.

Unscrew and clean the drain valves.

404.1

Loosen plug on compressed-air tank two or three turns. Condensate is emitted via the venting bore of the plug.

3.9.5 Compressed-Air System

When operating the brake pedal the applied foot pressure is increased in a given ratio with the aid of the compressed-air brake assistance unit.

During a braking action depending upon the foot pressure and according to the respective vehicle operation an effective braking behaviour is thus achieved.

The unit requires no special maintenance.

3.9.6 Compressed-Air Control of Trailer Brake System

For increased safety the system is subdivided into two compressed-air circuits.

The compressed air produced by the air compressor is adjusted to the specified operating pressure of 7.35 bar (kp/cm²) by the pressure regulator and is stored in a two chamber compressed-air tank. A 3-circuit protective valve secures the pressure in both tank sections against each other.

A larger part of the compressed-air tank (20 lit. and 10 lit.) stores the compressed air during trouble free functioning with trailer operation (compressed-air circuit I).

In case of a failure of this compressed-air circuit the 3-circuit protective valve which maintains a safety pressure of 5.5 bar switches to the compressed-air tank portion (circuit II) which is still intact and ensures the continued functioning of the trailer brake with this compressed-air supply.

A valve in the palm coupling is automatically opened when the trailer is coupled to the supply palm coupling (red) and the supply air for the trailer control valve (2-line), hand brake valve and hydro-pneumatic control valve is released. Simultaneously the 3/2-way valve automatically switches the brake booster to trailer operation.

The trailer control valve (2-line) works in such a manner that the trailer is braked first in order to prevent it pushing up against the tractor. The braking action is initiated with the brake pedal or parking brake lever via the hand brake valve using control air.

The hydropneumatic control valve permits the 2-fold trailer control.

Pneumatic control if brake is intact and hydraulic control if the large compressed-air tank fails.

3.9.7 Not Applicable to this Vehicle.

3.9.8 Antifreeze Unit

Check fuel level of antifreeze unit according to maintenance schedule.

The fluid reservoir must remain filled up with antifreeze agent all year round.

Add antifreeze agent only in the summer position. To do so, unscrew filler screw with dipstick and pour in **ethyl alcohol** (fuel alcohol) with a small funnel. Maximum filling capacity 200 cc.

Minimum and maximum fluid levels are marked on the dipstick.

404.1

Remove cap in order to fill up. Pay attention that antifreeze is filled in all year round.

The antifreeze pump is only operational as long as the antifreeze is not filled above the marked edge.

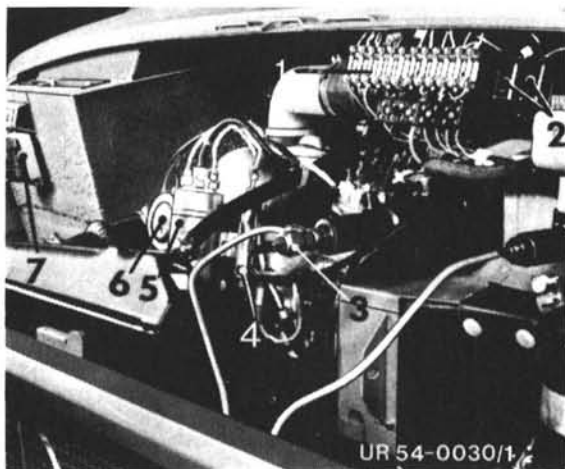


Figure 95 Electrical system

- 1 Fuse box
- 2 Plug connections
- 3 Stop light switch
- 4 Antiinterference condenser
- 5 Ignition coil
- 6 Series resistor
- 7 Turn signal transmitter

3.10 Electrical System

3.10.1 General

Check functioning of all consuming units according to maintenance schedule. Check fuses, line and ground connections.

Loose or oxidized cable connections cause contact resistance which can be damaging to the functioning of the regulator and the consuming units.

Also refer to engine ignition system.

3.10.2 Generator

The **3-phase alternator** supplies the power for the vehicle and any supplementary equipment.

3-phase alternators supply power already when the engine is running at idle speed. This is recognizable because the charge indicator light is extinguished immediately.

In case of 3-phase alternators observe the following important instructions:

- 1 Replace defective charge indicator light immediately.
- 2 As long as the engine is running, do not remove the line terminals of the battery, the alternator connections or the regulator plug since otherwise there is a danger of inductive voltage peaks destroying the diodes in the alternator.
- 3 For the same reason it is not permitted to tow-start the vehicle engine as long as the batteries are not connected.
- 4 Do not in any case confuse the plus or minus lines on the starter or on the battery.
- 5 **Be careful with rapid chargers!**

Remove the battery terminals when recharging the battery with a rapid charger in the vehicle.

On rapid chargers with a separate main switch first reduce the charging current and only then switch it off.

Poor contact between battery connector and battery terminal as well as wrong connection of a rapid charger or another power source may also result in damage in case a starting aid is used.

Refer to 2.3.8.

404.1

This vehicle is equipped with a DC generator which has 300 or 600 W real power.

3.10.3 Regulator, Charge Indicator Light

Preexcitation is assured if the charge indicator light (red) lights up after the switch key has been switched to position (1) as long as the engine is not running. Also refer to 2.1.3.

Replace damaged indicator lights immediately!

It is recommended that the regulator be replaced in case of defect.

404.1

The regulator is pressurized water proof. Under no circumstances must the regulator adjustment be altered.

3.10.4 Not Applicable to this Vehicle.

3.10.5 Wiring Diagram 404.0

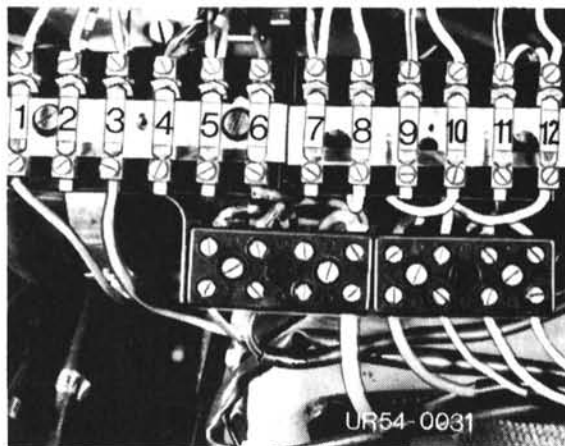


Figure 96 Fuse boxes

Key to wiring diagram 404.0

- 1 Socket, 1-pin
- 2 Horn
- 3a Turn signal/clearance light, left
- 3b Turn signal/clearance light, right
- 4a Main headlight, left
- 4b Main headlight, right
- 5 Windshield wiper
- 6a Fog light, left
- 6b Fog light, right
- 7 Indicator light for supplementary fuel pump
- 8 Switch for supplementary fuel pump
- 9 Interior light
- 10 Plug connection

- 11 Windshield wiper switch
- 12 Switch for fog lights
- 13 Blower for heater and ventilation
- 14 Indicator light for back-up light
- 15 Fuse boxes
- 16 Switch for back-up light
- 17 Line connector
- 18 Hazard warning flasher switch
- 19 Hazard warning flasher sending unit
- 19 Ignition distributor
- 21 Engine
- 21a Oil pressure sending unit
- 21b Coolant temperature sending unit
- 22 Switch box
- 23 Speedometer
- 24 Instrument cluster
- 25 Suppressor
- 26 Ignition coil
- 27 Regulator
- 28 3-phase alternator
- 29 Series resistor
- 30 Push button starter switch
- 31 Switch for back-up light indicator light
- 32 Stop light switch
- 33 Plug connections
- 34 Turn signal/horn/dimmer switch

- 35 Solenoid valve
- 36 Fuel gauge sending unit
- 37 Supplementary fuel pump
- 38 Starter
- 39 Battery
- 40a Turn signal/tail light/stop light, left
- 40b Turn signal/tail light/ stop light, right
- 41 Back-up light
- 42 Trailer socket

—— Series

---- Optional equipment

⊥ Ground

Color code of lines:

- bl = blue
- br = brown
- ge = yellow
- gn = green
- gr = grey
- li = lilac
- rt = red
- sw = black
- ws = white

FUSE & LAMP CODE KEYS

404.0

Fuse No.	Power consuming units	Amperage
1	Socket, hazard warning flasher system indicator light	4/8
2	Tail light, left, instrument cluster	4
3	Tail light, right, speedometer	4
4	Turn signal, hazard warning flasher switch, back-up light	4
5	Horn, windshield wiper	4
6	Stop light, heater, supplementary fuel pump	4
7	High beam, left	4
8	High beam, right	4
9	Low beam, right	4
10	Low beam, left, fog light	4
11	Clearance light, parking light, left	4
12	Clearance light, parking light, right	4

Fuses according to DIN 72 581

Wiring Diagram Item No.	Power consuming units/lamps	Output W	Lamp Type
3a, 3b	Turn signal, front	21	RL
3a, 3b	Clearance light	4	HL
4a, 4b	Main headlights	45/40	A
4a, 4b	Parking light	4	HL
6a, 6b	Fog light	20	R
7	Indicator light, supplementary fuel pump	2	H
9	Interior light	10	K
14	Indicator light for back-up light	2	H
23	Speedometer light	2	H
24	Instrument cluster light	2	H
40a, 40b	Turn signal, rear	21	RL
40a, 40b	Tail light, rear	10	G
40a, 40b	Stop light	21	RL
41	Back-up light	10	R

Lamps according to DIN 72 601

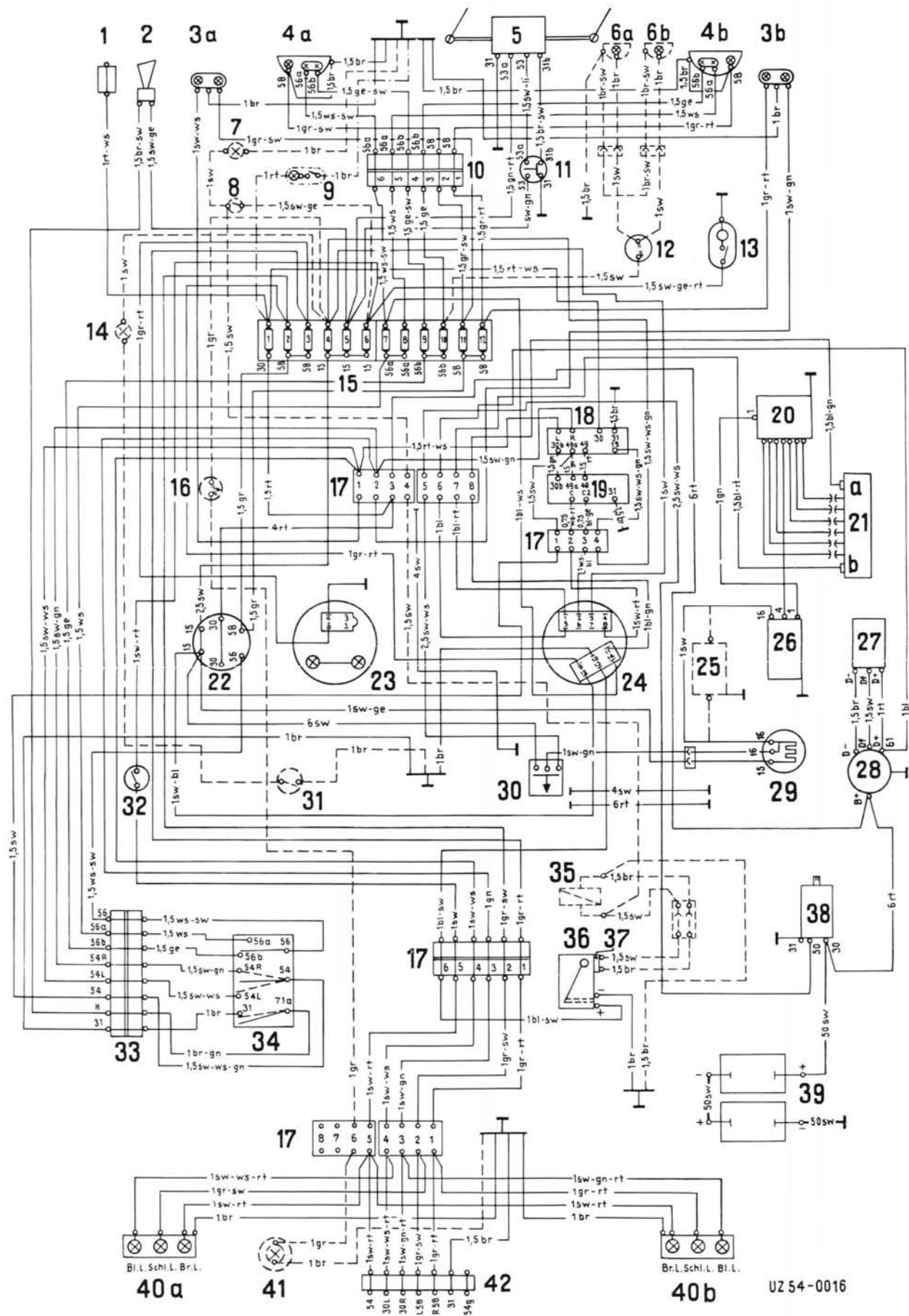


Figure 97 Wiring Diagram 404.0

Key to Supplementary Wiring Diagram for Signaling System 404.0

(Fire fighting and police vehicles)

- 1 High volume horn "low"
- 2 High volume horn "high"
- 3 Horn (standard version)
- 4 Switch for flashing blue light
- 5 Alarm switch
- 6 Multi-tone switch
- 7 Switch for continuous operation
- 8 Indicator light
- 9 Cable connector
- 10 Fuse box
- 11 Plug (8-pin)
- 12 Switch box
- 13 Rotating beacon
- 14 To fuse 1 (Terminal 30)

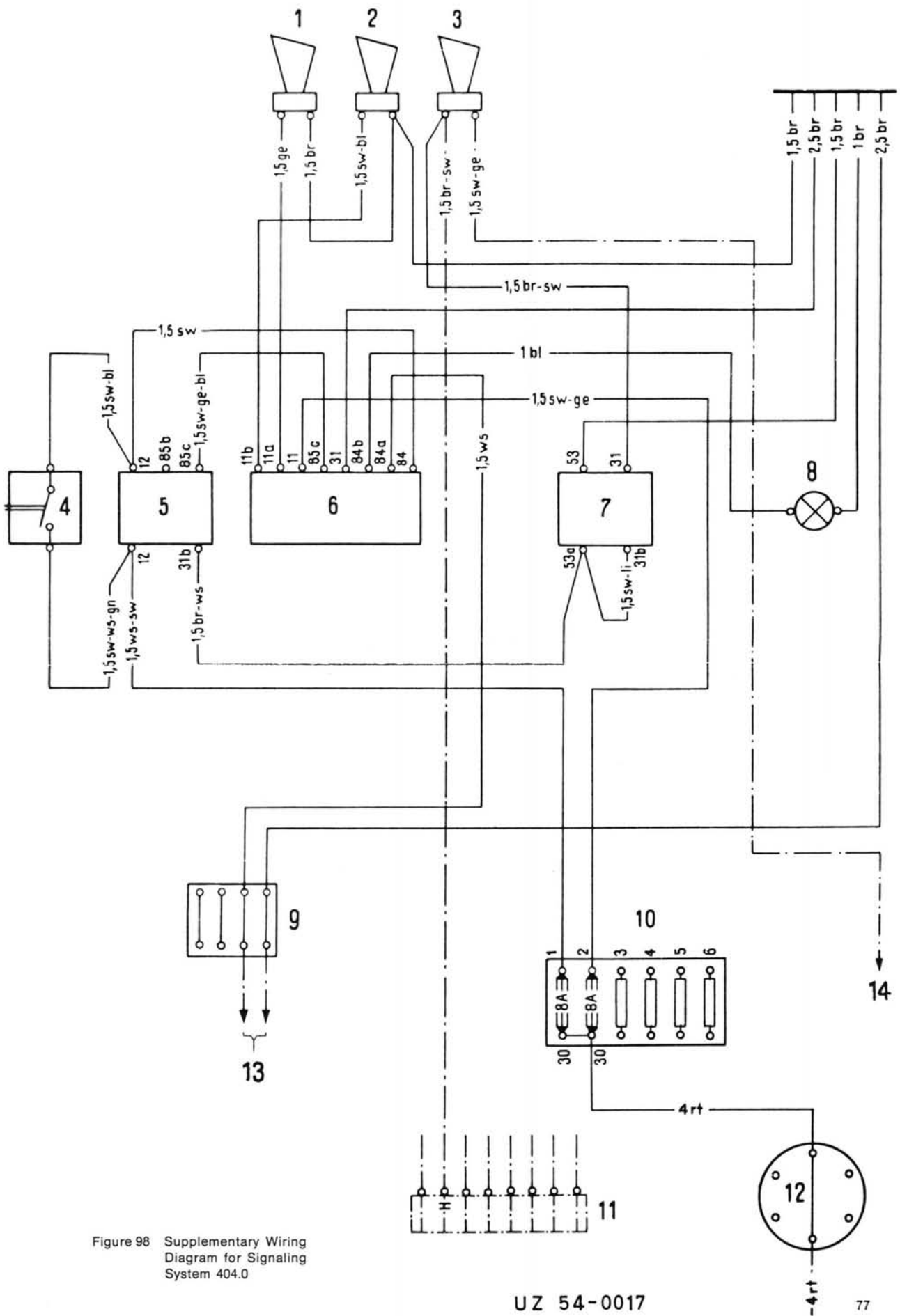
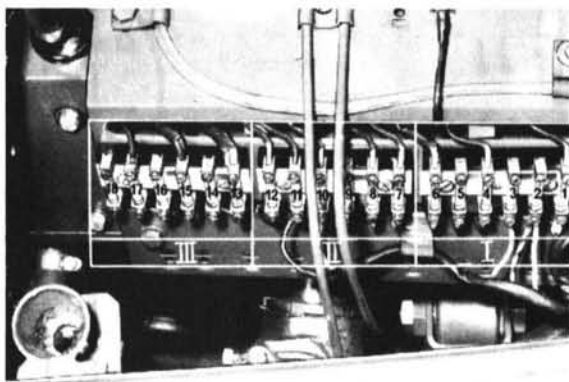


Figure 98 Supplementary Wiring Diagram for Signaling System 404.0

Wiring Diagram 404.1



UR 54-0026

Figure 99 Location of fuse boxes

Key to Wiring Diagram 404.1

- | | | | | | |
|----|-------------------------------------|----|-------------------------------------|----|---|
| 1 | Horn button | 15 | Alarm switching unit | 41 | Red cross light |
| 2 | High volume horn signaling system | 16 | Multi-tone switching unit | 41 | Cable connector |
| 3 | Signaling horn | 17 | Switch for alarm switching unit | 43 | Fuel gauge sending unit |
| 4 | Map light | 18 | Turn signal switch | 44 | Dimmer switch |
| 5 | Socket/hand light | 19 | Instrument illumination | 45 | Socket |
| 6 | Blackout light, left | 20 | Cable connector | 46 | Stop light switch |
| 7 | Turn signal/clearance light, left | 21 | Relay for multi-tone switching unit | 47 | Light switch |
| 8 | Headlights, left | 22 | Relay for multi-tone switching unit | 48 | Interior light |
| 9 | Headlights, right | 23 | Ignition distributor | 49 | Lever switch for interior light |
| 10 | Turn signal/clearance lights, right | 24 | Spark plugs | 50 | Rotating beacon |
| 11 | Blackout light, right | 25 | Turn signal indicator light | 51 | Ignition switch |
| 12 | Windshield wiper, left | 26 | Turn signal sending unit | 52 | External power socket |
| 13 | Windshield wiper, right | 27 | Switch for windshield wiper, left | 53 | Cable connector |
| 14 | Cable connector | 28 | Switch for windshield wiper, right | 54 | Charge indicator light |
| | | 29 | Alarm indicator light | 55 | Starter button |
| | | 30 | Ignition coil | 56 | Battery master switch |
| | | 31 | Switch for instrument illumination | 57 | Generator |
| | | 32 | Cable connector | 58 | Regulator |
| | | 33 | Buzzer (with special body) | 59 | Starter |
| | | 34 | Series resistor | 60 | Battery |
| | | 35 | High beam indicator light | 61 | Turn signal/stop light/tail light, left |
| | | 36 | Switch for heater | 62 | Blackout stop light |
| | | 37 | Heater | 63 | Trailer plug, 12-pin |
| | | 38 | Switch for buzzer | 64 | Cable connector |
| | | 39 | Switch for buzzer (trailer) | 65 | Convoy light |
| | | 40 | Fuse boxes | 66 | Turn signal/stop light/ tail light, right |

FUSE & LAMP CODE KEYS

404.1

Fuse box	Fuse No.	Power consuming units	Amperage
I	1	Turn signal/clearance light, right Turn signal/clearance light, left Trailer socket E (cable connector in special body)	8
	2	License plate light	4
	3	Tail light, right	4
	4	Dimmer light, left	4
	5	Dimmer light, right	4
	6	High beam, left	4
II	7	High beam, right High beam indicator light	4
	8	Blackout light, left	4
	9	Blackout light, right	4
	10	Blackout tail light, right and left Trailer socket A and C	4
	11	Convoy light, trailer socket	4
	12	Trailer socket K (buzzer)	4
III	13	Connection, relay for high volume horn	8
	14	Socket/hand light	8
	15	Signal horn, instrument illumination	8
	16	Windshield wiper, left and right Heater and ventilation	8
	17	Light switch	4
	18	—	4

Fuses according to DIN 72 581

Wiring Diagram Item No.	Power consuming units/lamps	Output W	Lamp Type
4	Map light	2	H
6, 11	Blackout light	20	R
7, 10	Turn signal light	20	R
7, 10	Clearance light	4	HL
8, 9	Headlight, high and low beam	45/40	B
19	Instrument illumination	2	H
25	Turn signal indicator light	2	H
29	Alarm indicator light	2	H
35	High beam indicator light	2	H
41	Red cross light	7	G
48	Interior light (body)	7	G
50	Rotating beacon	45	U
54	Charge indicator light	2	H
61, 66	Turn signal light, rear	20	R
61, 66	Stop light	20	R
61, 66	Tail light	5	G
61, 66	Blackout tail light	2	H
62	Blackout stop light	2	H
65	Convoy light	2	H

Lamps according to DIN 72 601

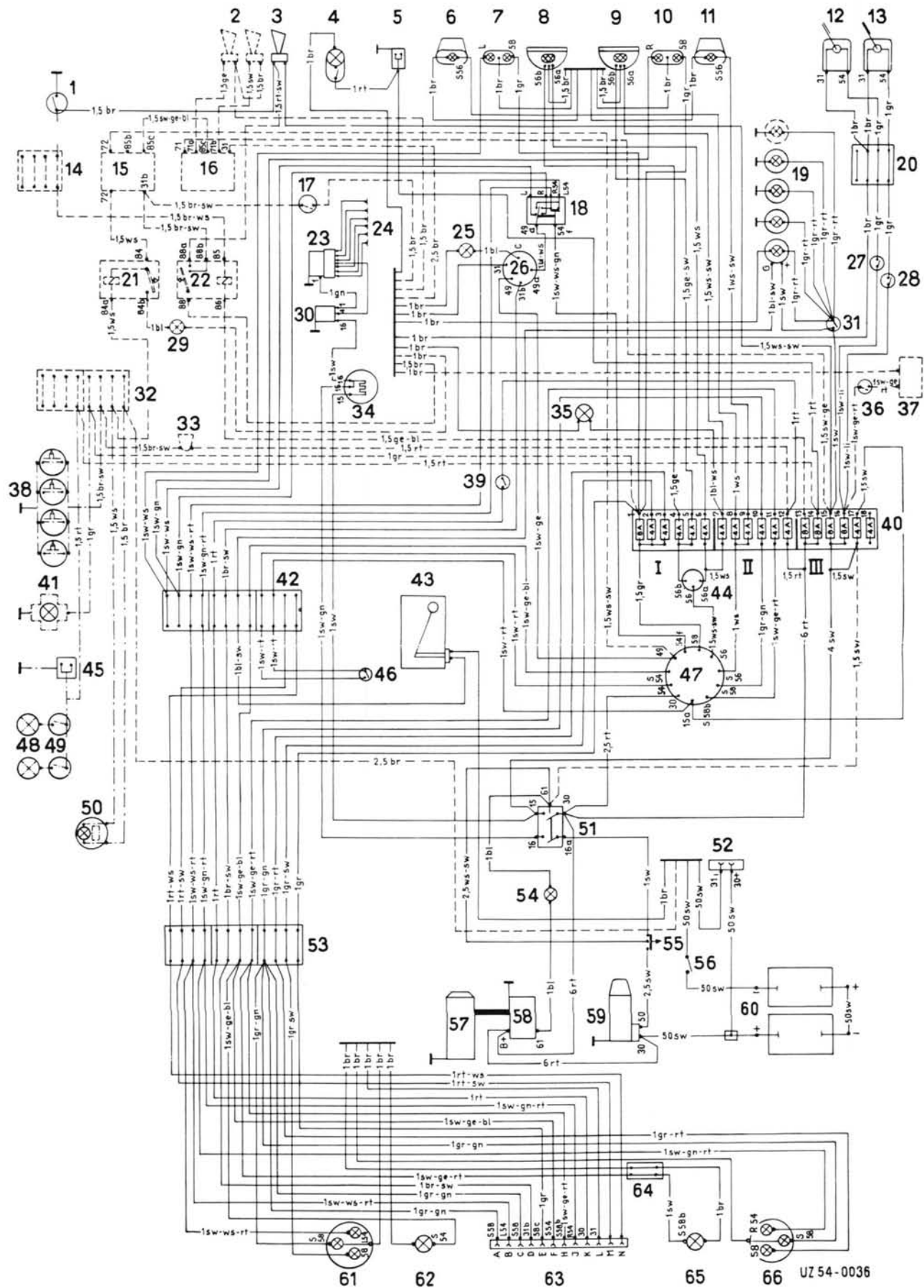
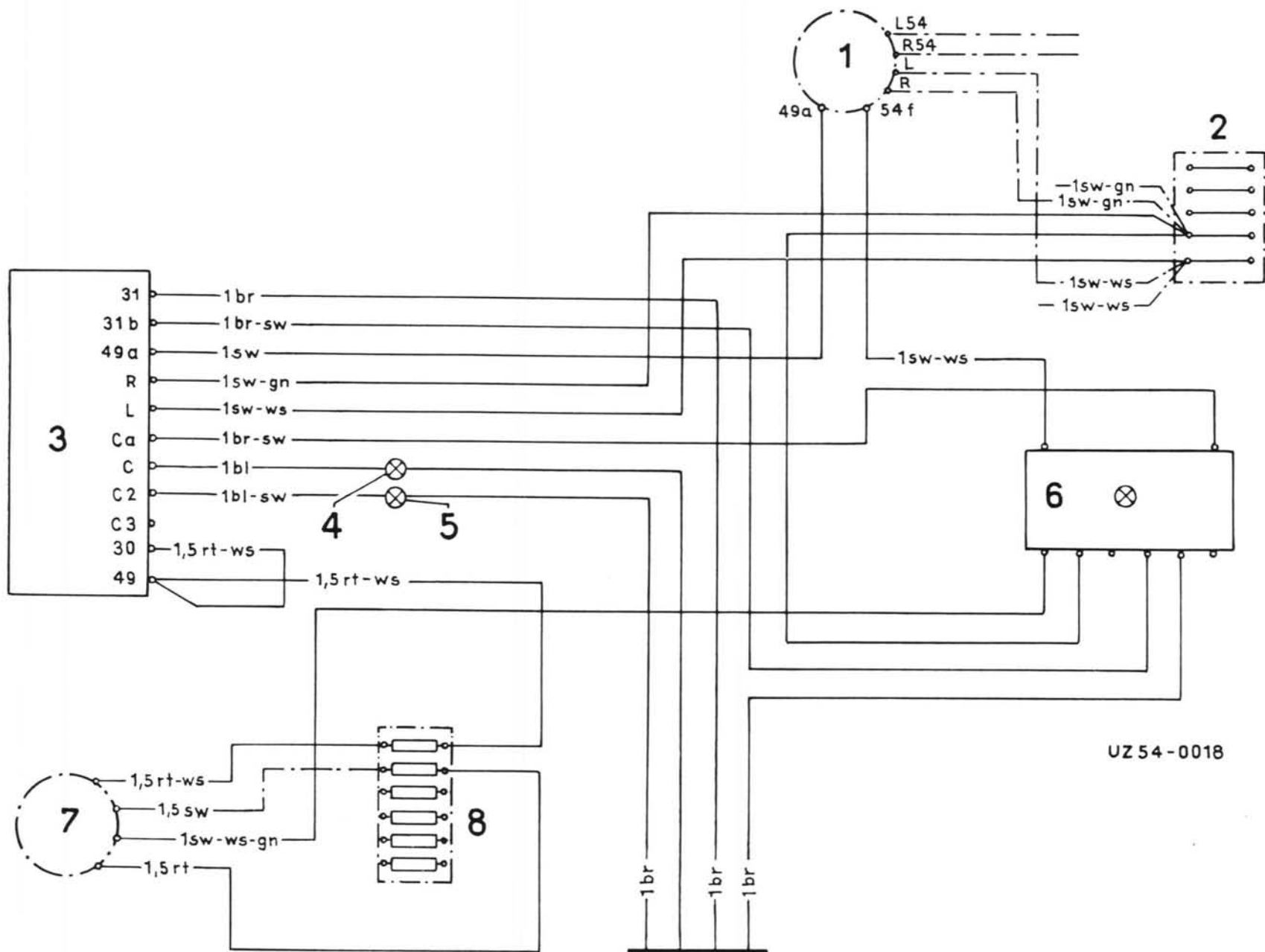


Figure 100 Wiring Diagram 404.1



Key to Supplementary Wiring Diagram

Hazard Warning Flasher System 404.1

- 1 Flasher switch
- 2 Cable connector
- 3 Hazard warning flasher sending unit
- 4 Turn signal indicator light
- 5 Turn signal indicator light, trailer
- 6 Hazard warning flasher switch
- 7 Light switch
- 8 Fuse box III

Note:

Hazard warning flasher sending unit (3)
in place of (standard) sending unit.

— . — . — available lines and equipment

3.10.6 Battery

Keep battery clean and dry. Check electrolyte level and specific gravity as well as cells according to maintenance schedule. Clean battery only with screw plugs screwed on so that no dirt can enter the battery.

The electrolyte level in each cell must be approximately 10 to 12 mm above the top edge of the plates. **Add distilled water only.**

We would like to caution you against using special electrolytes. They may reduce battery service life.

Battery state of charge can be measured either with a hydrometer or a cell tester.

3.10.7 Connecting Battery

Clean battery terminals prior to connecting the battery.

Connect the (+) terminal first and then the (–) terminal. The plus terminal has a larger diameter. Thoroughly tighten battery terminals. Afterwards grease with acidproof grease in order to prevent oxidation.

Avoid sparking when installing and removing batteries. Danger of oxyhydrogen gas explosion!

During electric welding work on the vehicle, and prior to any work on the electrical system disconnect the negative battery lead (–). Do not place any conductive objects (tools) on the battery in order to avoid the danger of short circuit.

Density of battery electrolyte kg/lit.		Battery state of charge	Freezing points of battery electrolyte ° C	
Basic version	Tropical		Basic	Tropical
1.285	1.23	Charged	– 68	– 40
1.20	1.16	Half charged	– 27	– 17
1.12	1.08	Discharged	– 11	– 6

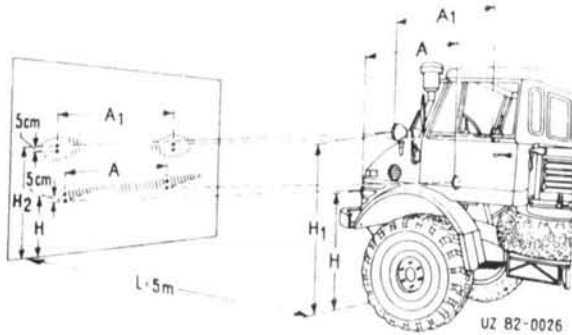


Figure 102 Aiming headlights

(Low beam of main headlights indicated. High beam of supplementary headlights indicated.)

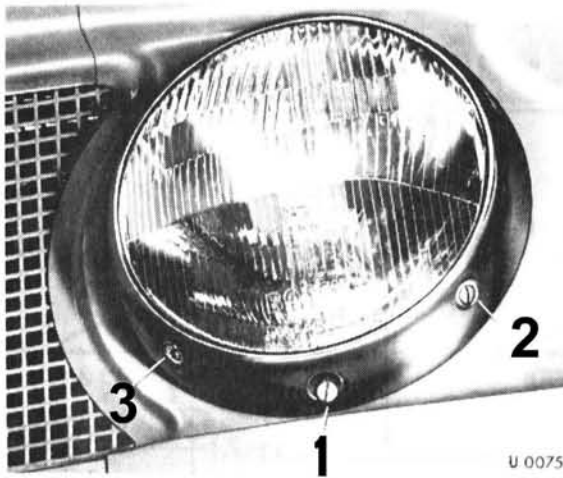


Figure 103 Main headlights

- 1 Mounting screw
- 2 Lateral aiming
- 3 Vertical aiming

3.10.8 Headlight Aiming

Check headlight aiming according to maintenance schedule, correct if necessary.

The following check or aiming according to figure 102 is a temporary expedient. Carry out exact aiming with optical equipment.

For a check of the aiming, place the unloaded vehicle on level ground approximately 5 m away from a wall which is vertical in relation to the longitudinal axis of the vehicle.

Make or affix marks as shown in Figure 102 to designate the center of the light beams.

All distances (A and H as well as A₁ and H₁) refer to center of headlight.

Switch on low beam and check whether the light/dark boundary is on the separating line 5 cm below the mark and the break (15°) on the vertical line of the mark. Reaim the headlight if necessary.

Switch on high beam

The center of the light beam, however, should cover the upper cross, distance H, on the test wall.

Check each headlight individually. While doing so, cover up the other headlight and the remaining lights. Reaim the headlight if necessary.

3.10.9 Supplementary Headlight, Blackout Light

Switch on the supplementary headlights. To do so, change over plug connections in engine compartment. Circuit remains unchanged.

Checking and aiming the supplementary headlights is carried out in a similar manner as on the main headlights. The light/dark boundary 15 m in front of the supplementary headlights should be only half as high as the headlight centers. At a distance of 5 m this corresponds to $\frac{5}{6}$ of the height H₁ on the vehicle.

E. g.:

Height of supplementary headlights
H₁ = 170 cm

Light/dark boundary at 5 m
H₂ = approximately 140 cm

A₁ = 165 cm

For aiming, loosen hex. nut at bottom of lamp housing.

Note: The supplementary headlights may only be switched on if the main headlights are concealed by front-mounted implements.

404.1

Aiming Blackout Lights

Aiming is accomplished in a similar manner as with the other headlights. At a distance of 2.5 m in front of the wall the light/dark boundary must be approximately 70 mm lower than the installed height of the blackout lights.

3.10.10 Replacing Headlight Bulb

Unscrew the headlight screw. Lightly tilt headlight insert and detach. Press bayonet socket downwards, turn to the left and take bulb out of headlight reflector. Pull plug from bulb.

When replacing a bulb do not work with dirty or oily fingers, since the oil will evaporate through the heat of the bulb and will settle on the headlight reflector, thus reducing the lighting power of the headlights considerably.

3.10.11 Generator and Coolant Pump V-Belts

Check V-belts according to maintenance schedule. Slightly loosen tensioning screw and push generator outward. After tensioning, it should still be possible to depress the V-belt approximately 10 mm from the straight line.

A V-belt which is tensioned too much or too little is subject to increased wear and will be destroyed prematurely. Figure 63.

404.1

Loosen counter nut and screw of clamping piece, rotate tensioning nut correspondingly.

3.10.12 Windshield Washing System

Regularly check condition of wiper blades. Replace as required.

Fill reservoir of windshield washing system with water. Add specified amount of MB-windshield detergent.

Observe the varied concentration ratios for summer and winter operation.

Check passage and spraying direction of nozzles. Spraying direction can be corrected at the nozzle head with a needle if necessary.

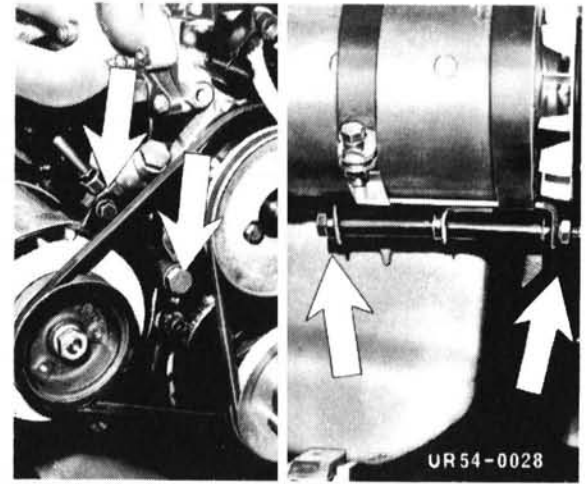


Figure 104 Generator 404.1

Tensioning V-belt,
Checking mounting screws.

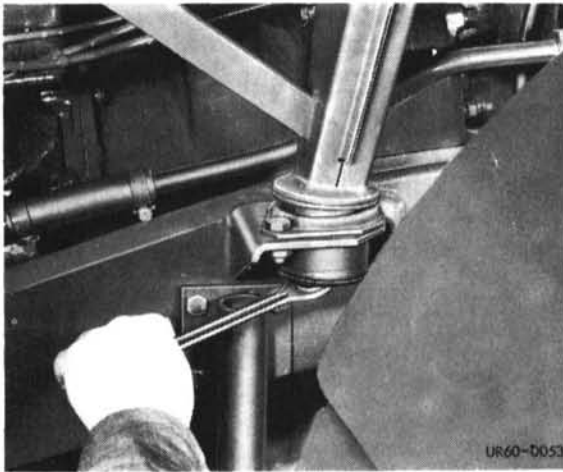


Figure 105 Loosening cab mounting in the rear

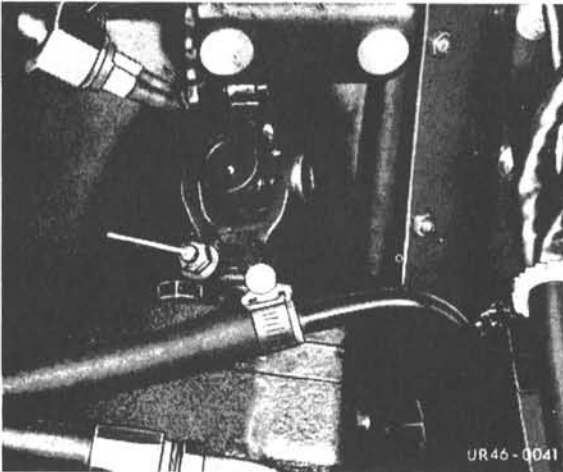


Figure 106 Loosening steering universal joint

3.11 Chassis, Body

3.11.1 Bolted Connections

Retighten control arm, engine mounting and connecting bolts according to maintenance schedule. Refer to 6.13.

3.11.2 Shock Absorber, Trailer Coupling, Stabilizer

Check **shock absorbers** according to maintenance schedule for leaks and retighten mounting bolts.

Replace any shock absorbers which no longer work properly or are damaged.

Grease **trailer coupling** according to maintenance schedule. Check for tight seating and locking. Refer to 6.13.

Stabilizer

For vehicles with a high center of gravity, the installation of a stabilizer on the rear axle is recommended. Due to the small spring travel of the rear axle with a stabilizer installed difficult cross country operations are not permitted.

Grease levers and pull rods of stabilizer according to maintenance schedule.

3.11.3 Tilting Cab

(Only possible on model 404.0)

Tilting the cab is a time-saving facility during maintenance and repair work. Tilting can be accomplished with the aid of a tilting device in the following order:

Note: With front mounted implements such as winch, these must be removed.

- 1 Remove outer engine hood.
- 2 Loosen and pull off rubber air intake manifold on carburetor.
- 3 With an air compressor installed, pull off intake hose.
- 4 Steering in center position, so that the front wheels are pointing straight ahead.
- 5 Remove fitted screws from the steering gear side of the universal joint. Pull off universal joint together with steering column and steering wheel in upward direction.
- 6 Open the four latches on the transmission cover in the cab and remove interior engine hood.
- 7 Loosen the two hex. nuts on the left and right of the front cab mounting only until the slotted retaining fork is released.
- 8 Unscrew the left and right rear cab mounting.

9 Unscrew left and right support at bottom of cab, fold over and screw to the frame. To do so, lift the cab in front with welded on strap of the 3-section support.

Caution! Do not damage radiator fins.

10 Remove loose parts from the cab and close the doors. Place door handles in "locked" position.

11 Attach hoisting equipment to the eyelet located in the rear wall of the cab. Lift cab. Four persons can tilt the cab by hand if required. Pull steel securing cable through the left cab support and engage both loops in the left step bracket.

12 Assemble the 3-section support, insert between the lower mounting point on the frame and the upper mounting point on the cab and fasten with the available screws. Remove hoisting equipment.

13 Lowering the cab takes place in reverse order.

14 Always use new self-locking nuts for the fitted screws on the steering universal joint.

Note:

After lowering the cab, press bottom of guide pulley housing for the hand brake cable upward until the leaf spring snaps into place.

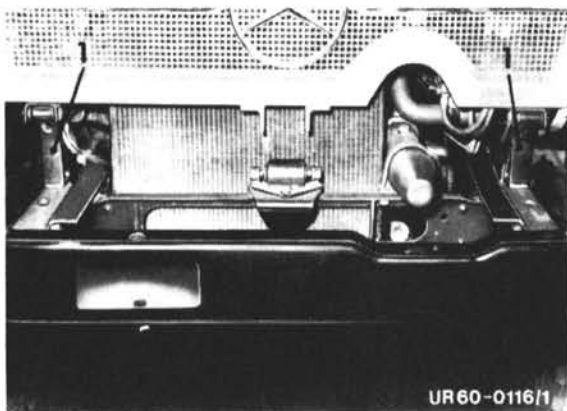


Figure 107 Cab supported in front

1 Support fastened to frame

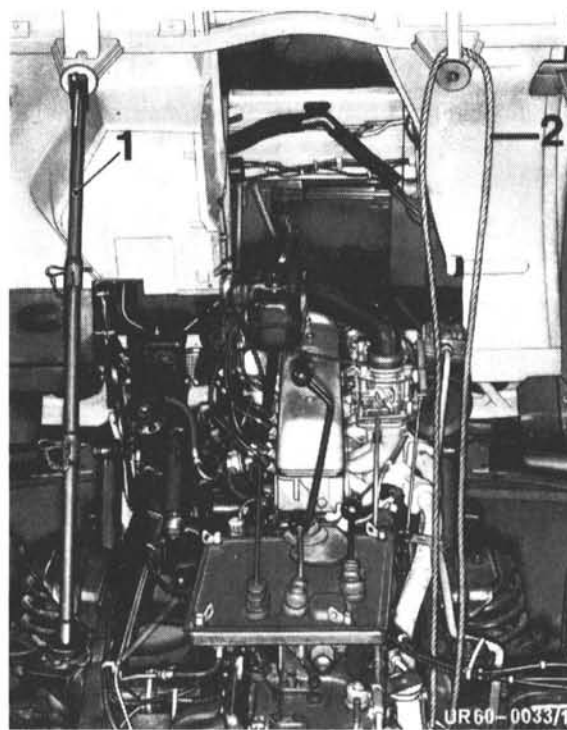


Figure 108 Cab tilted

1 3-Section cab support
2 Steel securing cable

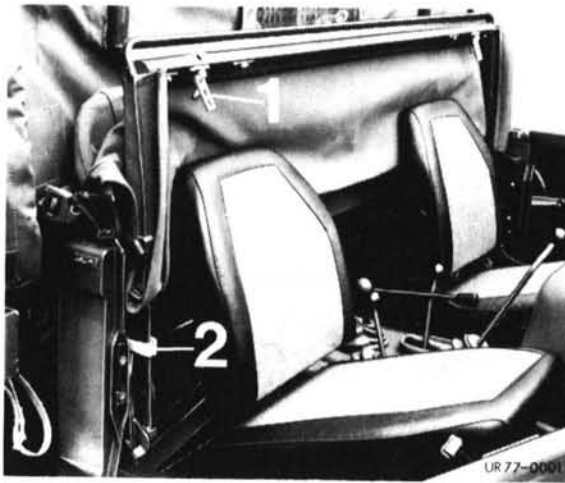


Figure 109 Folding top folded back

- 1 Snap lock
- 2 Fastening strap



Figure 110 Pull folding top scissors downward 404.1

3.11.4 Folding Top

The folding top is attached to the windshield frame with snap locks only and is not screwed down. It can be folded to the rear after opening the snap locks, or can be completely removed after removing the lateral fastening screws in the rear.

When folding the top back observe the following:

- 1 Open all strap buckles at the rear of top.
- 2 Open snap locks on the windshield and lift up top.



Figure 111 Fold top to the rear 404.1

3 Press left and right folding top joint outward out of notch.

Push top backward and at the same time fold it down behind the seats at the second joint.

4 Secure with the lateral fastening straps.

404.1

Remove driver's and assistant driver's seats. Open belt straps on left and right side of cab. Loosen and remove all strap crimps. Open fastening straps on the inside of the folding top scissors.

Loosen left and right mounting screws of the folding top frame at the top of the windshield. Lift out folding top frame.

Pull folding top scissors downward and fold together.

Fold together lower folding top support. Carefully fold folding top.

3.11.5 Folding Down Windshield

The windshield can be folded forward or can be completely removed.

Prior to folding windshield down swing both wiper arms outward toward engine hood.

Unscrew left and right retaining screws with hex. socket wrench.

Fold windshield down toward the front and fasten to radiator grille with rubber fastener. Fold both support angles toward inside.

If the windshield is to be removed, unscrew left or right hinge and remove toward the side where hinge has been detached.

404.1

Fold back folding top or remove. Refer to 3.11.4.

After removing the detachable side windows loosen the tensioning screws of the windshield until the mounting plate releases the retaining bolt.

3.11.6 Not Applicable to this Vehicle.

3.11.7 Platform Tarpaulin

The platform tarpaulin consists of tarpaulin bows, mounting parts and spars. The parts are interchangeable so that they can be used as desired during installation.

If the vehicle is to be operated without tarpaulin the bows are inserted at the platform front wall behind the cab.

The spars are inserted into the support below the platform.

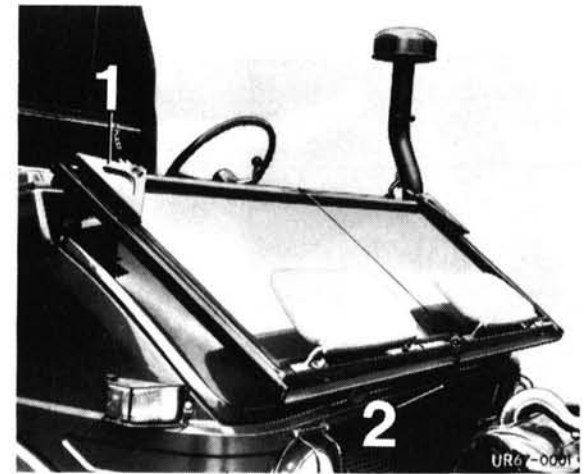


Figure 112 Windshield folded down

- 1 Support angles, folded down
- 2 Rubber fastener



Figure 113 Loosening tensioning screws 404.1



UR-0017

Figure 114 Opening spar lock

The retaining strap eases the installation and removal of the spars. Pay attention that the slot in the spar tube is always pointed downward during assembly.

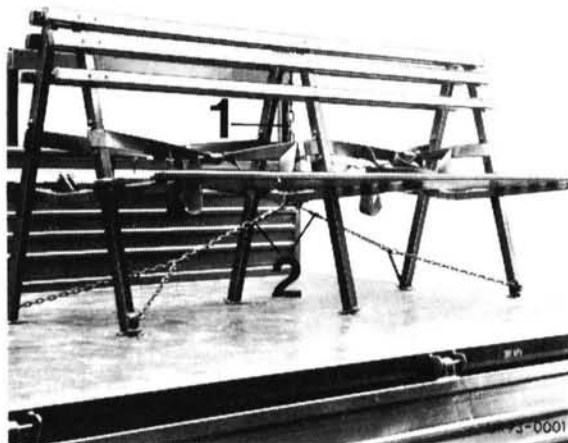
3.11.8 Center Bench

The tensioning chains of the center bench must be sufficiently tensioned with the bench mounted in order to ensure a firm position while driving.

Tighten turnbuckles if necessary.

Persons to be transported must engage the available safety belts in accordance with the applicable regulations. If the bench is fully occupied two persons can buckle up with one safety belt. The center bench offers seating space for eight persons.

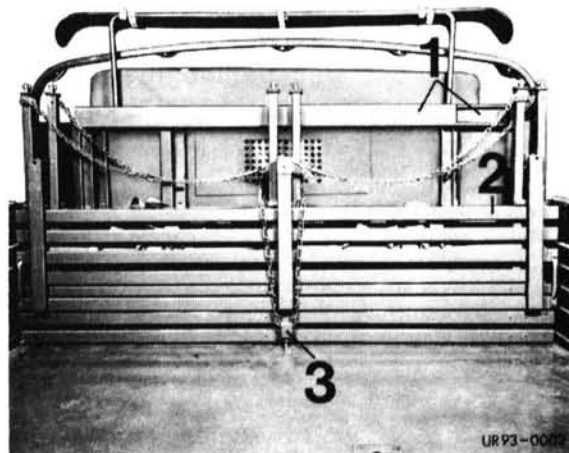
The center seat bench can be folded together when not in use and lashed down to the front wall of the platform together with the four mounting parts.



UR-0001

Figure 115 Center bench

- 1 Tensioning clamp
- 2 Turnbuckle



UR93-0002

Figure 116 Bench and side components lashed down

- 1 Side components
- 2 Bench
- 3 Chain with floor hook

3.12 Vehicle Care

3.12.1 Cleaning Windshield

When cleaning the windshield from the outside observe the following items:

- 1 Fold down wiper arm on one side of the windshield.
- 2 Completely open door on same side.
- 3 Stand on lower cab frame above mudguard.
- 4 Take a hold at top of cab with one hand.
- 5 With the other hand clean the windshield with cleaning equipment.
- 6 Fold wiper arm upward again after cleaning.
- 7 Clean other side of the windshield in the same manner.

3.12.2 Cleaning Canvas

Remove coarse dirt with a brush or with lukewarm water only. **Never use acid-containing or strong grease-dissolving compounds**, since they will deactivate the impregnation agents for waterproofing and durability contained in the fabric.

3.12.3 Cleaning and Preservation of Vehicle

Only clean vehicle with the engine stopped in order to prevent possible water intake.

In order to preserve the chassis we also recommend treatment with protective wax at hard to reach places. While doing so, always ensure that the brake hoses are covered up.



Figure 117 Cleaning windshield

3.12.4 Laying-up Vehicle

Note the following instructions for laying-up the vehicle for an extended period (cancelling the registration, winter storage, sale, etc.).

Place the washed vehicle in an airy and dry garage and carry out the preservation.

1 Laying-up for up to 3 Months:

Spray engine corrosion inhibiting oil into the engine intake pipe.

Drain coolant during the cold season or add antifreeze.

The coolant must contain a 1 % share of corrosion inhibitor.

Remove battery and store in a dry room. Check regularly and recharge if necessary.

Preform paintwork care.

Drain condensate from the compressed-air tank.

2 Laying-up for 3 to 6 Months:

Carry out the work listed under item 1.

Engine: Carry out preservation run. Refer to **Item 3**. Check oil level in all assemblies.

Lubricate **lubrication points** according to lubrication schedule.

3 Laying-up for more than 6 Months:

For the **preservation run** exchange engine oil for engine corrosion inhibiting oil (initial operation oil).

Oil filter: Replace filter element, clean housing and fill up with corrosion inhibiting oil.

Oil bath air cleaner: Clean and fill up with corrosion inhibiting oil.

Oil change: Carry out oil change in all remaining assemblies and fill up with corrosion inhibiting oil.

Attach notices!

Fuel system: Add 5 % of corrosion inhibiting oil to the fuel.

Compressed-air system: Fill antifreeze unit with antifreeze agent.

Let engine run for 5 minutes with heater open.

Electrical System

Cover generator with oil paper.

Thereafter, carry out the work listed under **item 1 and 2**.

Front and rear axle: rest on stands, release parking brake lever and deflate tires to a pressure of approximately **1 bar (kp/cm²)**.

Plug exhaust pipe.

3.12.5 Putting Vehicle into Operation after Laying-up Period

Check ignition and lighting system (fuses). Clean spark plugs. Check set of contacts in distributor housing.

Remove oil paper from generator. Unplug exhaust pipe.

Drain corrosion inhibiting oil from engine, oil bath air cleaner, transmission and axles and fill up again with oil of specified grades.

Inflate tires to specified pressure. Refer to 6.5.2.

Lower front and rear axle.

Install recharged or new battery.

Check V-belts for general condition and tension.

Operate starter. Crank engine until oil pressure is indicated.

Start as described under 2.2.2 and 2.3.5.

Check all hoses and lines for cracks and leaks.

Check brakes. Check compressed-air system for functioning and for overall leaks.

3.13 Not Applicable to this Vehicle

3.14 Vehicle Implements

3.14.1 General

For installation and operation of the implements note the installation and operation instructions supplied by the implement manufacturer as well as the Mercedes-Benz UNIMOG implement approval information which is also supplied with the vehicle.

The installation, mounting, attachment and operation of the implements also requires knowledge of the existing traffic regulations.

If implements are installed and operated for which neither a Mercedes-Benz UNIMOG approval certificate nor a written confirmation permitting their use with the vehicle have been issued the warranty entitlement may become forfeited in case of consequential damage.

3.14.2 Front-Mounted Implements

The implements are mounted to the front end of the frame or to the bumper by means of quick-hitch connections. Reposition bumper for installing implements if necessary. The winch is installed via the winch brackets which are mounted to the front end of the frame.

The winch is fitted on two guide bolts and thus also permits a fast removal.

The drive is via a front pto shaft with a $1\frac{3}{8}$ " connection.

Information concerning the operation and maintenance of front-mounted implements may be obtained from the respective operating instructions provided by the manufacturers.

3.14.3 = Not Applicable to this Vehicle.
3.14.4

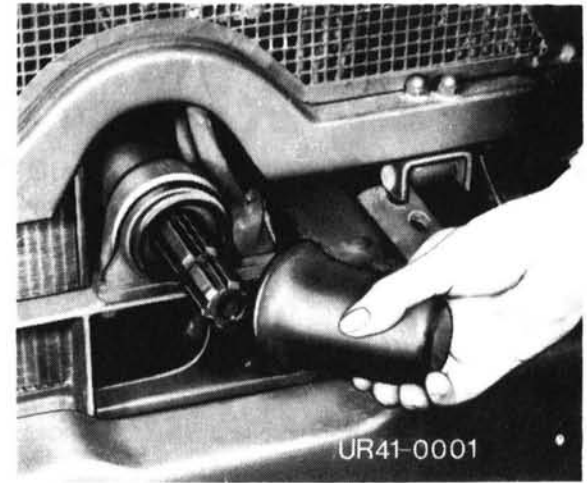


Figure 118 Front pto connection $1\frac{3}{8}$ "

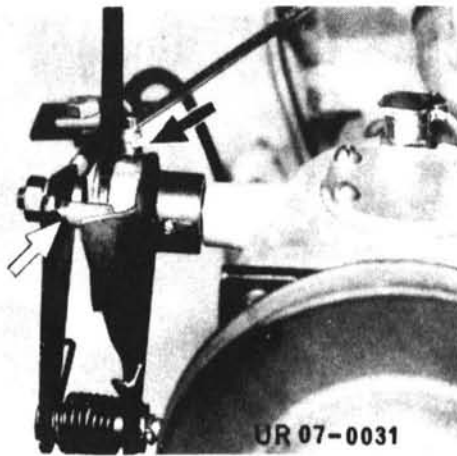


Figure 119 Governor with control linkage

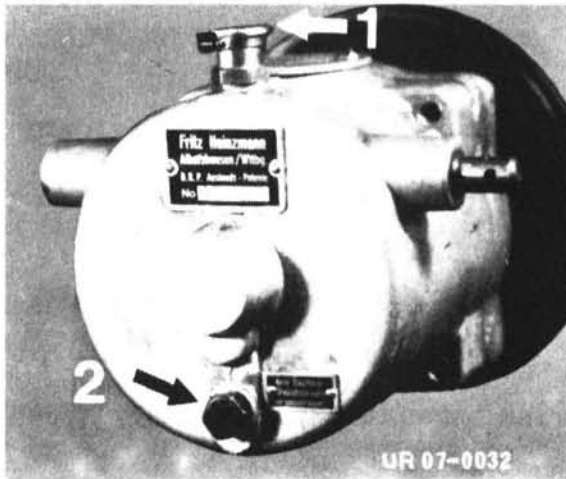


Figure 120 Governor

- 1 Oiler
- 2 Drain plug

3.14.5 Implements Mounted on Vehicle

On vehicles with a rear pto implements such as generator, compressor and fire pumps can be driven.

These implements can mainly be used for stationary operation in connection with an engine speed governor.

3.14.6 Drive of Implements

The implements are driven via the front and rear pto (transmission driven pto).

It is furthermore possible to install a center pto.

3.14.7 Not Applicable to this Vehicle.

3.14.8 Pto Shafts

Lubrication:

Lubricate the joints of the entire pto train according to maintenance schedule. The pto bearings are provided with a long term oil filling and require no maintenance.

For pto power output refer to 6.9.

3.14.9 Pto Shaft Protection

Clean and grease front and rear pto shafts after use and cover with the hood and pto shaft protection provided.

3.14.10 Not Applicable to this Vehicle.

3.14.11 Governor

Check oil level in governor according to maintenance schedule.

Fill governor via oiler with engine oil.

Unscrew drain plug and fill in oil until it runs out at the threaded bore.

Grease all connecting joints of the control and operating linkage according to the maintenance schedule. Refer to figure 119.

Use thin oil for this. It should be possible to depress the V-belt approximately 5 mm from the straight line.

Note:

In order to ensure perfect functioning of the governor it is mainly necessary to check the condition of the generator on the engine and the batteries. In case of batteries which are in poor condition or not charged the functioning of the generator on the engine is disturbed by increased power output which may also effect the governor as a result of an increased power requirement.

4 Fuels, Coolants, Lubricants

4.1 General

In order to safeguard the interests of our customers we are constantly testing commercially available fuels, coolants, lubricants, etc. for their suitability for

use in our vehicles. Therefore, only use one of the products recommended by Daimler-Benz. Pertinent information is available from every UNIMOG Service

Station based upon the **Specifications for Fuels, Coolants, Lubricants** on hand there.

4.2 Filling Capacities

Assemblies	Fuels, Coolants Lubricants	SAE Grade	Season/ Ambient Temperature	Capacity (lit.)	
				404.0	404.1
Engine	HD engine oil ¹⁾	5	Winter	max. 6	max. 6
Engine oil filter		10		min. 4	min. 3.5
Oil bath air cleaner		20	Summer	0.5	0.5
	30	1.8		1	
Air compressor	HD engine oil	10	All year round	— ⁴⁾	0.1
Governor	HD engine oil	10	All year round	as required	as required
Mechanical steering	Transmission oil	80	All year round	0.9	0.6
Power steering	HD engine oil Automatic transmission fluid (ATF) Type A	10	All year round Winter ³⁾	2.5	—
Transmission with and without special pto	Transmission oil	90	All year round	6	6
Transmission with and without special pto with supplementary crawler gear	Transmission oil	80	All year round	7	7
Front and rear axle differential housing	Transmission oil	80	All year round	3 each	3 each
Front and rear axle each hub reduction gear	Transmission oil	80	All year round	0.3 each	0.3 each
Fan and idler pulley	Transmission oil	80	All year round ²⁾	—	as required
Pto bearings	Transmission oil	80	All year round	0.1	0.1

Assemblies		Fuels, Coolants Lubricants	SAE Grade	Season	Capacity (lit.)	
					404.0	404.1
Hydraulic brake system		Brake fluid	Refer to 4.7	All year round	approx. 1	approx. 0.8
Hydraulic clutch control		Brake fluid	Refer to 4.7	All year round	approx. 0.2	—
Cooling system Engine, radiator and heater		Coolant — water — corrosion inhibitor — antifreeze depending upon ambient temperature	Refer to 4.5	Summer All year round Winter	16.5 approx. 1 % as required	18 ³⁾ approx. 1 % as required
Windshield washer system		Water or Water, MB Winshield washer detergent	—	Summer All year round	2 as required	0.6 as required
Fuel tank		Gasoline	Refer to 4.4		120	2 x 60
Compressed-air system		Ethyl/denatured alcohol	—	All year round	0.2	0.3
Coolant pump		Transmission oil	80	All year round	— ²⁾	as required
Grease nipples		Grease or multipurpose grease	—	All year round	as required	as required
Battery terminal clamps		Acidproof grease	—	All year round	as required	as required
Preservation (Laying-up)	Engine, transmission, axles	Initial operation oil Corrosion inhibiting oil	10	When laying-up	refer to 3.12.4	
	Fuel tank	Corrosion inhibiting oil		When laying-up	approx. 5 % of capacity	approx. 5 % of capacity
	Chassis, body	Protective wax	—	Spring and fall inspection	as required	as required

¹⁾ For multigrade oils refer to 4.6

²⁾ Permanent fill

³⁾ During extreme cold

⁴⁾ Engine lubrication

⁵⁾ with preheating system 20 lit.

4.3 Consumption Values

Standard fuel consumption
(according to DIN 70 030)

on level road

404.0

404.1

approx. 23.5/100 km

20.5/100 km

Engine oil consumption

depending upon operating conditions

approx. 1 % of actual fuel consumption

4.4 Fuel

4.4.1 Fuel for gasoline engines

First of all the fuel must meet the minimum demands required by the standards valid in the individual countries. In the Federal Republic of Germany the standard is DIN 51 600. If no national standards exist, the internationally known specifications and testing instructions of ASTM (American Society for Testing Materials) or IP (Institute of Petroleum, Great Britain) can be applied as a guide.

Two types of fuel are available in almost every country. They mainly differ in the antiknocking property (octane number).

The octane number, according to the research method, more closely corresponds to the octane number required under road conditions. The RON is therefore given in most countries to designate the antiknocking properties of the fuel.

The required octane number first of all depends upon the compression ratio of the engine. When using fuel with an octane number which is too low the engine performance will drop considerably.

We therefore recommend the use of fuels, particularly in non-European countries, which come closest to the octane number range according to the RON corresponding to the engine compression ratio.

Type/model	404.0		404.1	
Engine model	M 180.958	M 130.925	M 180.927 928 953 958	M 180.952
Compression	7.0	7.8	7.0	8.7
Octane number range	RON 91–93			RON 97–99
Fuel	Regular gasoline			Premium gasoline

4.5 Coolant

4.5.1 Coolant for Summer and Winter Operation

The coolant is composed of water, corrosion inhibitor and antifreeze.

Only use clean tap water!

(No distilled water!)

The corrosion inhibitor prevents scale and corrosion. It must be water-soluble and compatible with antifreeze. Adequate protection against corrosion is achieved by adding 10 cc of corrosion inhibitor to each liter of coolant.

The initial fill at the plant is sufficient for ambient temperatures down to -25°C according to the table. (Not for tropical countries)

The DB recommended antifreeze agents can be mixed with each other.

Do not add more than 60 % antifreeze to the coolant since a larger share will reduce the protection against freezing.

Coolant mixing ratios

Ambient temperatures to		404.0	404.1	All types		404.0	404.1
		Cooling system capacity		Corrosion inhibitor		Antifreeze	
$^{\circ}\text{C}$	$^{\circ}\text{F}$	liter		cc/lit.	Vol.%	liter	
-10	+14					3.5	3.75
-20	- 4					5.5	6.0
-25	-13	16.5	18 ¹⁾	10	1	6.5	7.0
-30	-22					7.5	8.0
-40	-40					8.5	9.25

¹⁾ With engine and battery preheating 20 lit.

Important Note:

The all year round coolant/antifreeze mixture does not mean that the anti-freeze ratio need not be checked or corrected prior to onset of the winter season!

Replace antifreeze mixture every two years.

4.6 Engine Oil

4.6.1 Initial Operation Oil (Anticorrosion Oil)

New, exchanged or completely reconditioned engines are filled with initial operation oil (anticorrosion oil) for the first 15 to 50 hours or 300 to 1000 km of operation.

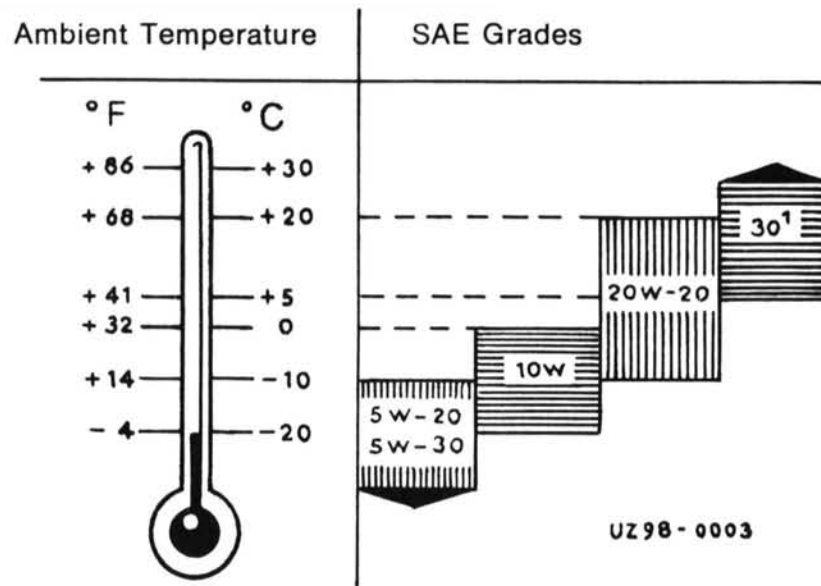
Initial operation oils have a favorable influence on the running-in process. They protect against corrosion and prevent undesirable wear, oil carbon deposits, the formation of sludge, etc. To meet all these demands, the initial operation oils also contain HD additives in addition to the anticorrosion additives. If oil needs to be added prior to the first service use initial operation oil or HD engine oil of the same viscosity grade.

Initial operation oils are subject to the same viscosity rules as are the HD engine oils. Refer to 4.6.2.

Due to their good anticorrosion characteristics initial operation oils are also used for preserving the engines of vehicles which are to be laid up.

Viscosity grades of HD Engine Oils

Single-grade oils



¹) With ambient temperature continuously above 25° C (77° F) SAE 40 oil may be used.

Multigrade oils in the following viscosity ranges may also be used:

Ambient Temperatures		SAE Grade
Celsius (° C)	Fahrenheit (° F)	Viscosity Range
above -15	above +5	10 W - 40, 10 W - 50
above -5	above +25	20 W - 40, 20 W - 50
-15 to +20	+5 to +68	10 W - 30

The strict use of the SAE grades according to the ambient temperatures would result in a frequent engine oil change. The temperature limits for the SAE

grades are therefore to be considered as guides, which may be exceeded upward or downward for brief periods.

4.6.2 Heavy Duty Oils

Engine oil is used in the engine, in the oil bath air cleaner and in the power steering.

HD-Engine oils in the engine will become darker in color faster than unblended engine oils, because the combustion residue entering the oil will not settle in the crankcase and moving parts, but will be kept suspended in the oil. For this reason do not change the HD engine oil prematurely because of its dark color.

The viscosity grades are determined according to the ambient temperature and have been established according to the specifications of the internationally recognised **Society of Automotive Engineers (SAE)**. Refer to table.

When strictly observing the specified SAE viscosity grades, an increased change of these SAE viscosity grades could result during Spring and Fall. We therefore recommend the use of

SAE 20 W – 20 starting early April

SAE 30

SAE 10 starting early October

or appropriate multigrade oils for Temperate Zones, e. g. Central Europe.

4.6.3 Multigrade Oils

Multigrade oils are engine oils which differ from single grade oils in their

lower temperature dependent viscosity change. Single grade oils correspond to one viscosity grade only, e. g. SAE 30. Multigrade oils such as SAE 10 W – 30 correspond to viscosity grade SAE 10 W at low ambient temperatures (cold start) and to viscosity grade SAE 30 at high ambient temperatures (operating temperature).

4.7 Brake Fluid

Only use yellow brake fluid for the hydraulic brake and clutch system as of this date. Refer to Specifications for Fuels, Coolants, Lubricants for other recommended brake fluids. Refer to 4.1.

4.8 Transmission Oil

The essential characteristics of transmission oil are reduction of friction, constancy of the viscosity, wear protection, ability to lubricate and compatibility with sealing materials. Only SAE 80 may be used.

4.9 Not Applicable
to this vehicle

4.10 Automatic Transmission Fluid

At very low ambient temperatures automatic transmission fluid (ATF) type A, suffix A can be used for the power steering system.

Ambient Temperatures		Viscosity Grade
Zone	Remarks	
Moderate Ambient Temperature	All year round	SAE 10 W
Low Ambient Temperature	Oil change for summer and winter operation absolutely necessary	SAE 5 W ¹⁾
High Ambient Temperature	Temperature in oil reservoir may not exceed 65° C	SAE 30

Viscosity grades of HD engine oils in the power steering system

¹⁾ Automatic transmission fluid (ATF) may also be used

4.11 Grease

Use lubricating grease or multipurpose grease for steering knuckle bearings, thrust ball, pto shaft joints, clutch release shaft, stabilizer as well as for the joints of the parking brake and pedal linkage. Hinges and joints on the chassis and body may also be lubricated with grease or with engine oil if necessary.

Do not use antifriction bearing grease!

4.11.1 Special Lubricants

Use acidproof grease (technical vaseline) for battery terminal clamps. **High pressure grease** (Bosch Ft 1 v 4) is suitable for ignition distributor contact breaker rubbing block.

For ignition cable connections to ignition distributor and spark plugs use **silicon paste** (Bosch VS 9350 Ft).

4.12 Antifreeze

The use of antifreeze for the **cooling system** is described in sections 2.3.2 and 4.5. Select the antifreeze mixing ratio in such a manner that absolute protection against freezing is assured for the respective ambient temperature range.

Use **ethyl alcohol** (fuel alcohol) for protecting the **compressed-air system** against freezing. Refer to 3.9.8.

4.13 Preservation Agents

For the **engine lubrication system:**

Initial operation oil (anticorrosion oil)

For the **fuel system:**

Anticorrosion oil as an additive (approximately 5 % of the filling capacity)

For the **chassis and body:**

Commercially available protective wax. Also refer to 3.12.

5 Troubleshooting

5.1 General

In the event of trouble, the following instructions are intended to assist you in restoring the vehicle to a condition which will enable you to visit a UNIMOG Service Station.

These instructions cannot be considered complete and are not meant to replace a thorough search for the cause of the

failure, as well as the expert repair at a UNIMOG Service Station.

5.2 Towing

If towing the UNIMOG should be necessary observe the following in order to prevent transmission damage due to a lack of oil at the bearings:

Shift **main shifting lever** into 2nd gear. Shift forward/reverse shift lever to neutral position. Maintain these shift lever positions during towing operation.

Towing speed must not exceed 40 km/h.

Only use towing bar!

5 Troubleshooting

Complaints	Possible causes	Remedies	Refer to
5.3 Engine Group			3.3
5.3.1 Engine fails to start	Fuel tank is almost or completely empty	Add fuel 404.1 Operate fuel changeover switch	
	Dirt in fuel lines, vent and intake strainer of fuel tank, fuel prefilter and in strainer of fuel pump	Clean	
	Ambient temperatures too low	Refer to instructions for winter operation	2.3
	Insufficient battery output	Check specific gravity of electrolyte, charge	3.10
	Ignition system damaged or improperly adjusted	Check ignition system	3.2
	Carburetor nozzle plugged	Clean nozzles	3.2

Complaints	Possible causes	Remedies	Refer to
5.3.2 Engine Misfires		Refer to 5.3.1	3.3
5.3.3 Engine runs erratically	Lack of fuel	Clean fuel prefilter Add fuel Leakproof fuel system if necessary	3.3
	Water in fuel	Drain water from fuel tank Filter fuel and fill into tank again	
	Engine sucks in leak air	Have intake system checked	
	Ignition system damaged or mal-adjusted	Have ignition system checked	3.2
	Spark plugs misfire (Oil dilution possible)	Check spark plugs	
	Carburetor dirty or maladjusted	Have carburetor cleaned and checked	
	Vapor bubbles in fuel (tropics, high altitudes, stationary operation)	Switch on supplementary fuel pump if installed	3.3
5.3.4 Engine does not idle (when at operating temperature)	Idle speed nozzle plugged	Clean nozzle	3.3
	Idle speed mixture adjustment screw maladjusted or damaged	Adjust idle speed. Replace idle speed mixture adjustment screw	

Complaints	Possible causes	Remedies	Refer to
5.3.5 Engine emits smoke	<p>Blue smoke: Oil level of engine too high Piston ring damaged</p> <p>White smoke: Cylinder head gasket damaged</p>	<p>Check oil level Measure compression pressure Overhaul engine or exchange</p> <p>Replace cylinder head gasket</p>	3.2
5.3.6 Poor engine performance			3.3
	Unsuitable fuel	Use specified fuel	4.4
	Fuel system dirty	Clean fuel system	3.3
	Carburetor dirty or maladjusted. Wrong main nozzle	Clean and check carburetor. Install specified nozzles	3.2
	Choke does not open all the way	Properly adjust linkage from accelerator pedal to carburetor	
	Oil bath air cleaner dirty	Clean oil bath air cleaner	
	Ignition system damaged or maladjusted	Check ignition system	
	Exhaust and intake valve leaks, piston wear	Adjust valve clearance, check compression pressure	
5.3.7 Excessively high coolant temperature	Coolant level too low	Check coolant level, add coolant if necessary	3.4
	Radiator dirty	Clean	

Complaints	Possible causes	Remedies	Refer to
	Cooling system leaks (loss of coolant)	Check radiator, hose connections, heater, expansion tank filler cap for leaks, seal if necessary, fill up with coolant	
	Insufficient tension on V-belt of coolant pump and fan	Check V-belt, retension	3.4
	Thermostate faulty	Replace	
	Coolant pump faulty	Replace	
	Cylinder head gasket leaks	Check cylinder head gasket, replace if necessary	3.2
	Unfavorable fan ratio (only on 404.1)	Alter fan ratio	6.14
5.3.8 Oil pressure too low	Dirty oil filter element	Carry out oil change together with filter service	3.2
	Almost no engine oil in oil pan	Correct oil level, remedy causes	
	Dirty oil pressure valve in filter carrier or in crankcase housing	Remove, check and clean	
	Oil pressure sending unit or oil pressure indicator damaged, electric line loose	Check, replace if necessary, connect line tightly	
	Engine damage indicated if above mentioned items are in order	Have this checked and engine overhauled or exchanged if necessary	
5.3.9 Explosions at engine overrun	Intake and exhaust system leaks	Seal, replace gaskets	
	Exhaust and intake valves leak, improper valve clearance	Measure compression pressure Adjust valve clearance	6.2

Complaints	Possible causes	Remedies	Refer to
5.4 Clutch			3.5
5.4.1 Clutch does not properly disengage	Clutch free play excessive	Adjust free travel on clutch slave cylinder or clutch linkage on 404.1	6.3
	Air in hydraulic clutch control	Bleed, add brake fluid	
5.4.2 Clutch slips	No or too little clutch free play	Adjust free travel on clutch slave cylinder or clutch linkage on 404.1	
	Release shaft hard to move or stuck	Lubricate, make operable	
	Linings grease or oil covered	Replace clutch disc	
	Lining worn, clutch damaged	Repair clutch, replace	
5.4.3 Throw-out bearing noisy	Throw-out bearing running dry, defective	Lubricate, replace	

Complaints	Possible causes	Remedies	Refer to
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5.5 Steering System

5.5.1 Intermittant steering wheel stiffness of power steering	<p>Insufficient oil delivery of power steering pump because V-belt of power steering pump slips</p> <p>Oil level too low, air in oil circuit</p>	<p>Retension V-belt</p> <p>Check system for leaks, fill up with oil, bleed</p>	3.6
5.5.2 Power steering stiff	<p>V-belt of power steering pump torn</p> <p>Power steering pump damaged</p>	<p>Replace and properly tension V-belt</p> <p>Have pump replaced</p>	

Complaints	Possible causes	Remedies	Refer to
5.5.3 Vehicle cannot be steered properly	Steering has too much free play	Have steering adjusted, replace if necessary	3.6
	Tire pressure too low, uneven	Correct	6.5
	Tow-in maladjusted	Adjust, check tie rods for damage	6.3
	Ball ends of drag link and tie rod worn	Replace	3.7
	Control arm loose	Tighten mounting screws, replace rubber bushings if necessary	
	Steering knuckle stiff	Lubricate with axle raised	3.5
	Vehicle overloaded Axle loads unevenly distributed	Adhere to specified weight limits!	6.10
	Unfavorable tire treads	Only drive at maximum speeds with regular tread	6.5

Complaints	Possible causes	Remedies	Refer to
5.6 Brake System			3.8
5.6.1 Drum-type Brake			
Insufficient braking effect	Brakes wet or dirty	Drive until dry, apply brakes slightly or clean	
	Brake linings oily	Reline	
Uneven braking effect	Poor tires	Replace bald tires	
	Uneven tire pressure	Correct tire pressure	6.5
	Brakes maladjusted	Adjust brakes, adjust wheel brakes on 404.1	
	Brakes wet on one side or dirty after driving through water	Drive until dry, apply brakes slightly or clean	
	Brake lining oily or unevenly worn on one side	Replace wheel brake cylinder Seal wheel hubs or steering knuckle, replace brake linings	
5.6.2 Hydraulic Brake System			3.8
No or insufficient braking effect	Air in system	Bleed system, add brake fluid	
	System leaks	Seal system, replace gaskets	
	Failure of hydraulic brake circuit I or II (404.0)	Driving capability limited with reduced braking effect! Check brake lines and wheel brake cylinders immediately, replace	
Warning light in instrument cluster lights up	Brake fluid level of reservoirs too low or reservoirs empty	Check brake fluid level. Correct, bleed	

Complaints	Possible causes	Remedies	Refer to
5.6.3 Compressed-air brake assistance system			3.9
No effect Braking requires increased foot pressure	<p>Insufficient tank pressure in compressed-air tank caused by:</p> <ol style="list-style-type: none"> 1 Required tank pressure not yet reached 2 Compressed-air system leaks 3 With trailer brake system: Failure of or leak in compressed-air circuit I (left hand section of compressed-air tank) 	<p>Wait until red warning light goes out or until a pressure of 5.2 to 7.35 bar (kp/cm²) is reached</p> <p>Check compressed-air system for leaks, have sealed or repaired if necessary</p>	
5.6.4 Not applicable to this vehicle			
5.6.5 Vacuum brake booster inoperative	<p>No vacuum because engine is not running</p> <p>Vacuum lines leak</p> <p>Check valve defective</p> <p>Air cleaner clogged</p>	<p>Complete brake assistance is only achieved with engine running</p> <p>Check connections for leaks</p> <p>Replace</p> <p>Service cleaner element, replace</p>	3.8

Complaints	Possible causes	Remedies	Refer to
5.7 Compressed-Air System			3.9
5.7.1 Warning light in instrument cluster lights up	No or too little tank pressure. Also refer to 5.6.2	Watch dual brake pressure gauge until the tank pressure is reached, check compressed-air system for leaks if necessary, seal. Filling time should not exceed 3 minutes	
5.7.2 Pressure build-up insufficient or too slow	Air compressor does not deliver enough air Pressure regulator blows off constantly	Have air compressor checked, overhauled or replaced if necessary Clean pressure regulator or replace if necessary	
5.7.3 Dual pressure gauge indicates incorrectly	Unit defective	During full brake application with the vehicle stationary both needles must be in alignment, replace unit if necessary	
5.7.4 Air compressor generates insufficient or no compressed air	V-belt torn or slipping Suction or pressure valves leak, piston and cylinder worn	Check V-belt, retension or replace if necessary Have air compressor overhauled or replaced	
5.7.5 Pressure regulator cuts out too early or too late	Improperly adjusted	Adjust to cut out pressure of 7.35 bar (kp/cm ²). Replace gasket, replace pressure regulator if necessary	6.6
5.7.6 Compressed-air control for trailer operation: Poor braking action of trailer	Brake pressure control valve of trailer not properly adjusted Brake hose couplings plugged or leaking	Set according to load condition Clean, replace gaskets if necessary	2.2

Complaints	Possible causes	Remedies	Refer to
5.8 Electrical System			
5.8.1 Charge indicator light does not light up when ignition key in position 1	Charge indicator light defective Lines loose or defective Regulator defective Battery discharged	Replace charge indicator light Tighten or replace Replace Check, charge	3.10
5.8.2 Charge indicator light lights up while driving	Loose generator V-belt Regulator defective Line between charge indicator light and generator has a short circuit, interrupted Generator defective	Check tension of V-belt, retension if necessary Have checked, replaced Look for chafed spot, replace line Have generator checked, overhauled or replaced if necessary	
5.8.3 Starter motor does not operate	Battery discharged, insufficiently charged	As a check: Switch on high beam and operate starter switch — a if lights go out slowly the battery is insufficiently charged Charge battery, replace b if the brightness of the lights remains unchanged there is a loose line or the starter is defective	
	Electric line of starter switch loose, interrupted	Tighten line	
	Magnetic switch of starter is de- fective	Check starter. Repair magnetic switch, replace	

Complaints	Possible causes	Remedies	Refer to
5.8.4 } 5.8.5 }	Not applicable to this vehicle		
5.8.6 Lighting system			3.10
Lamp does not light up	Filament of lamp burnt through	Replace lamp Note voltage and wattage information!	
	Fuse blown	Replace	
	Poor supply line and ground cable contact	Clean cable connections and contact points	
	Electric line chafed bare	Connect, change line routing	
	Light fitting oxidized	Clean, bare metal	
	Respective switch defective	Replace switch	
	Wrong lamp	Replace with proper lamp (refer to table)	
Light of headlights insufficient	Headlight reflector dull	Replace, aim headlights	
	Lamps have a blue coating	Replace	
5.8.7 Turn signal system			
Turn signal indicator light not working	Indicator light defective	Replace	
Turn signal indicator light constantly lit	Wrong turn signal lamps in trailer	Check trailer turn signal system (21-W lamps)	
Turn signals not working	Turn signal sending unit defective	Replace	
	Turn signal switch defective	Check system, repair	
	Turn signal sending unit failure Fuse blown	Replace	
	Short circuit in the electrical system of trailer	Check electrical system of trailer, particularly plugs and sockets	

Complaints	Possible causes	Remedies	Refer to
5.8.8 Ignition system			3.2
Engine does not start	Ignition key not in position 2	On 404.1 switch to starting position 2	2.1
	Spark plugs wet, dirty	Clean spark plugs Adjust electrode gap	6.2
	Ignition cable interchanged, plugged in or installed wrong	Attach ignition cable according to firing order while paying attention to good contact of cable ends	
	Firing too early or too late	Check ignition, adjust	3.2
	Ignition distributor damp inside	Clean out distributor housing with a dry rag, check for hair-line cracks	
	Contact breaker points badly burnt	Replace, adjust dwell angle	
	Rotor defective	Replace	
	Ignition coil defective	Replace	

6 Technical Data

6.1 Types and Models

Chassis			Engine			Cab		Platform
Type	Sales designation	Model	Model	Continuous output DIN 70 020		Model		Model
				kW	HP	Folding top	Steel	
404.0	U 082/404	404.010 404.011	180.958	60	82	416.810	406.821	404.642
		404.012 404.013						
404.1	U 082/404	404.113 404.114 404.115	180.928 180.953	60	82	404.510 404.511	404.520 404.521	404.632 404.641
		404.113 404.114 404.115	180.952			67	91	

none tilting

tiltable

not tiltable

6.2 Engine

Mercedes-Benz Type		M 130	M 180			
Model		130.925	180.958	180.928	180.953	180.952
Operating principle			4-stroke gasoline engine			
No of cylinders/cylinder arrangement			6/vertical in line			
Bore	mm dia.	86.5	80			
Stroke	mm	78.8	72.8			
Total piston displacement	cc	2748	2195			
Compression ratio		7.8	7.0		8.7	
Compression pressure at normal	bar (kp/cm ²)	8.6 to 9.6	8.5 to 9.5		10 to 11	
Starting speed at least	bar (kp/cm ²)	7.2	5.5 to 6.0		8.0 to 8.5	
Continuous output (effective output according to DIN) at rated speed		kW (HP)	81 (110)	60 (82)		67 (91)
Maximum torque at speed		l/min.	4800	4800		4800
Max. speed		Nm (kpm)	186 (19)	143 (14.6)		164 (16.7)
Idle speed		l/min.	3200	3200		3200
		l/min.	5500	5500		5500
		l/min.	800 to 850	800 to 850		800 to 850
Valve arrangement		overhead				
Valve clearance for intake cold/hot ¹⁾	mm	0.10/0.15	0.10/0.15			
Valve clearance for exhaust cold/hot ¹⁾	mm	0.20/0.25	0.20/0.25			
Coolant temperature	C°	75 to 95	75 to 95			
Oil pressure normal	bar (kp/cm ²)	2 to 5	2 to 5			
idle speed at least	bar (kp/cm ²)	0.6	0.6			
Weight dry	kg	210	182			
Firing order		1-5-3-6-2-4				
Ignition timing		° bTDC	2			
Ignition advance/retard		automatic through centrifical force				
Contact breaker point gap	mm	0.4	0,4			
Dwell angle at idle speed	°	38 ⁺³ ₋₁	38 ⁺³ ₋₁			

¹⁾ With engine hot = 60° C ± 15

6.2.1 Engine Adjustment Data

Ignition

Ignition timing adjustment
without vacuum

Engine speed

Degrees bTDC

At starting speed

2

idle speed

850 to 950/min

5 to 15 ¹⁾

high idle range

1500/min

20 to 27 ¹⁾

partial load range

3000/min

25 to 31 ¹⁾

full load range

4500/min

38 to 41 ¹⁾

¹⁾ With ignition distributor ZV/IFUR 6 BR 27 and ZV/IFUR 6 BR 47 2° less respectively

Carburetor

Exhaust emission values
without load

Engine speed

CO content in %

At idle speed

850 to 950/min

4.3 to 5.5

high idle range

1500/min

3.0 to 4.2

partial load range

3000/min

2.6 to 3.6

full load range

4500/min

0.5 to 2.0

6.2.2 Spark Plugs

Electrode gap 0.5 mm Spark plug thread length 19 mm ²⁾					
Ignition system: Standard version					
Compression ratio	Bosch	Beru	Champion ¹⁾	Driving	
				normal distances	short distances
7.0	W 175 T 30 (W 175 T 2)	D 175/14/3 A (D 175/14/3)	N-9 Y	x	
	W 145 T 30	145/14/3	N-14 Y		x
7.8 8.7	W 215 T 30 (WG 215 T 30)	D 215/14/3 A (G 215/14/2)	N-7 Y	x	
	W 200 T 30	D 200/14/3 A (D 200/14/3)	N-8 Y		x
Ignition system: Special version; short-range radio shielded and splash water protected					
7.0	WC 175 ERT 27	ED 175/14/3 m 5 E 175/14/3 m 5	XMN	x	
	WC 145 ERT 2	—	XMN 12		x
7.8 8.7	—	E 225/14/3 m 5 (ED 225/14/3 m 5)	—	x	
	WC 175 ERT 27	ED 175/14/3 m 5 (E 175/14/3 m 5)	XMN 12		x

Only use the spark plug types in parenthesis (), if the ones listed first are not available.

¹⁾ Use only if Bosch or Beru spark plugs are not available

²⁾ Maximum resistance 7 to 8 kΩ

6.2.3 Carburetor

Model	32 NDIX – DB 2
Carburetor Type	Pallas-Zenith dual downdraft carburetor (cross-country)

Carburetor Parts (valid to approx. 1,500 m above sea level)

Name	Jets/technical data	Type M 180 (one carburetor) Quantity	Type M 130 (two carburetors) Quantity
Venturi	32–36 (26 mm inside dia.)	2	4
Main metering jet	140 ¹⁾	2	4
Air correction jet	210	2	4
Main discharge jet well	4 N	2	4
Idle fuel jet	55	2	4
Idle air jet	140	2	4
Injection pump jet	55	2	4
Injection tube, long	3	2	4
Starter fuel jet	100	1	2
Starter air bore	5	—	—
Float needle valve	200	1	2
Pressure release valve, short	100	1	2
Idle mixture screws	3 half turns	2	4
Pump linkage	in outer bore		
Fuel level (measured at a test pressure of 1.8 m WC)	17.3 ± 1 mm ²⁾		
Accelerating pump, quantity injected	1.5 ± 0.2 cc/stroke		

¹⁾ From 1,500 m to 3,000 m (above sea level) main metering jet 132
From 3,000 m to 4,500 m (above sea level) main metering jet 125

²⁾ On M 130 engine 12.3 ± 1 mm

6.2.4 Governor

Type
Manufacturer
Governor speed
Use

1/min

Mechanical centrifical governor
Heinzmann
2850
Maintaining working speeds of imple-
ments which are driven via ptos.

6.3 Clutch, Transmission, Axles

6.3.1 Clutch

Manufacturer		Fichtel & Sachs
Model		Single-plate dry clutch
Type/designation	dia.	KS 225 Sph
Pressure applied	N(kp)	6100-6750 (610-675)
Clutch plate		225 GSD "CERAM"
Facing		Kerasinter
Clutch operation		
Type 404.0		mechanical/hydraulic
Type 404.1		mechanical
Clutch free play		
Type 404.0	mm	3 + 0.5 at slave cylinder
Vype 404.1	mm	30 to 35 at clutch pedal

6.3.2 Transmission

Transmission	Model		UG 1/11 – 2 + 4/14.93	
	Design		6-speed synchromesh transmission with rear axle drive, front axle drive which can be engaged and disengaged while driving and transmission driven pto.	
	Ratio	i	1st gear	= 14.93
			2nd gear	= 8.23
			3rd gear	= 4.47
			4th gear	= 2.47
			5th gear	= 1.53
			6th gear	= 1.00
			1st reverse gear	= 20.12
			2nd reverse gear	= 11.10
Supplementary crawler gear	Model		VOG 1/11 – 1/3.08	
	Ratio	i	1st gear	= 46.01
			2nd gear	= 25.34
Special pto	Speed (at 3000/min engine speed)	1/min	635	
	Ratio	i	4.7	
	Permissible power take off via pto	kW (HP)	37 (50)	

6.3.3 Front Axle

Model		Portal axle with thrust tube, differential lock and hub reduction gears	
		404.0	404.1
		AU 1/3 ES – 2.5	AU 1/3 E – 2.5
Model			
Ratio (refer to rear axle)			
Tow-in	mm		0 to 2
Camber	°min.		1° 45 min.
King pin inclination	°		10
Max. turning angle, inside wheel	°		40

6.3.4 Rear Axle

Design		Portal axle with thrust tube, differential lock and hub reduction gears	
		404.0	404.1
		HU 1/3 ES – 2.5	HU 1/3 E – 2.5
Model			
Axle drive ratio	i		39:11
Hub reduction ratio	i		32:15
Total axle ratio	i		7.56

6.4 Steering System

6.4.1 Mechanical Steering

Design	404.0	40.1
Manufacturer, Type	Recirculating ball-type steering	
Center position ratio	Daimler-Benz L 3.5 K	L 2
	34.2:1	29.7:1

6.4.2 Power Steering

Design	Ball-nut steering
Manufacturer, Type	ZF-Schwäb. Gmünd, ZF-8036
Center position ratio	18.85

Steering pump

Design	ZF vane-type pump
Manufacturer, Type	ZF-Schwäb. Gmünd ZF-7672
Delivery	approx. 4.5 at 500/min } at 50° C
	9.0 at 3060/min }
Pump pressure, max.	100, pressure limiting valve in the power steering

min. lit./min
governed lit./min
bar (kp/cm²)

6.5 Wheels and Tires

6.5.1 Tires

Application		Tread type	Tires			
			10,5-20		10-20	
Off road %	On road %		6 PR	8 PR	10 PR	Radial
			Rims 9 x 20"			
Tire tread						
60	40	Cleat tread		Metzeler U 1	Metzeler U 1	
40	60	Multipurpose tread	Dunlop 705	Conti E 4 Dunlop 705	Conti E 4 Semperit M 157	Michelin XL
20	80	Closed tread	Conti M Dunlop M Veith M Metzeler M Phönix M Fulda M Uniroyal M	Conti M Dunlop M Veith M	Conti M	
10	90				Conti Titan	

6.5.2 Tire Pressure in bar (kp/cm²)

	Wheels	Tires 10.5—20			10-20
		6 PR	8 PR	10 PR	Radial
Off road to 20 km/h					
Tire pressure in bar (kp/cm ²)					
	front	1.5	1.5	1.5	1.6
	rear	1.5	1.75	2.0	2.0
On road to max. speed					
	front	2.5	3.0	3.75	3.75
	rear	2.5	3.0	3.75	3.75

6.6 Brake System

6.6.1 Hydraulic Brake System

Design

On 404.0

Hydraulic 2-circuit brake system (EEC)

On 404.1

Hydraulic single-circuit brake system
(standard version)

On 404.1

Hydraulic 2-circuit brake system
(special version)

6.6.2 Parking Brake System

Design/mode of operation

Mechanical hand brake system acting on the rear wheels. With compressed-air control for trailer brake system, hand brake also acting on the trailer.

6.6.3 Brake Assistance System

Design

Manufacturer

Operating pressure

Mode of operation

bar (kp/cm²)

Compressed-air brake assistance

Westinghouse

7.35

2-stage, can be switched over via a 3/2-way valve during trailer operation.

Design

Manufacturer

Model

Brake assistance

Vacuum brake assistance

(as special version)

Teves, Frankfurt

T 50 / 26 / 3

1:40 at 0.8 bar vacuum

6.6.4 Compressed-Air Control for Trailer Brake System

	Type/Model		404.0	404.1
	Design		2-line compressed-air system (according to EEC)	2-line compressed-air system
Trailer control valve	Operating pressure	bar (kp/cm ²)	7.35	7.35
Pressure regulator	Cut-in pressure	bar (kp/cm ²)	6.6	6.2
	Cut-out pressure	bar (kp/cm ²)	7.3 ± 0.2	7.3
3-circuit protection valve	Safety pressure		6.0 – 0.3 (in case of pressure loss)	–
Pressure switch	Brake pressure	bar (kp/cm ²)	0 to 5.5 warning light lights up	–
Hydropneumatic control valve, 2-circuit	Mode of operation	1st circuit	pneumatic	–
		2nd circuit	hydraulic (in case of pressure loss)	–
Compressed-air tank	Contents	lit.	20 and 10 (2-chamber)	20
Air compressor	Displacement	cc	106	150
	No. of cylinders		1	1
	Lubrication		Force-feed lubrication via engine	Splash lubrication TH

6.7 Electrical System

	Type/Model		404.0	404.1
Generator	Rated voltage	V	24	24
	Design		3-phase alternator	3-phase alternator
	Model (Bosch)		K 1 – 28 V 27 A 23	K → 28 V 19 A 14
	Output	W	750	300
	Generator voltage	V	28	28
	Ampere	A	27	19
Generator, reinforced	Model (Bosch)		K 1 – 28 V 45 A 27	Q 28 V 38 A 14
	Output	W	1,250	600
	Generator voltage	V	28	28
	Ampere	A	45	38
Starter	Design		Screw-push drive	
	Model (Bosch)		GE 24 V 1 PS or	EGE 1/24 R 301
	Output	kW (HP)	0.7 (1)	0.7 (1)
Battery (2 each)	Rated voltage	V	2 x 12 (24)	2 x 12 (24)
	Capacity	Ah	55	45

6.8 Not applicable to this vehicle

6.9 Pto

Front and rear pto	Speed	1/min	540 at engine speed of 2,540/min.	
	Pto connection	inch	1 ³ / ₈	
	Permissible power take off	kW (HP)	37 (50) at pto shaft speed of 1,000/min.	

6.10 Weights and Trailer Loads

6.10.1 Weights

	Vehicle version	without brake assistance		with brake assistance		with brake assistance and reinforced springs	
		Type/Model		404.1		404.0 404.1	
		Tires/Ply Ratings		10.5-20	6 PR 8 PR	10.5-20	6 PR 8 PR
Permissible gross vehicle weight Payload	kg		4750 1900		5000 2150		5250 (5500 ¹⁾ 2400
Permissible front axle load	kg		2500		2500		2500
Permissible rear axle load	kg		2700		2600		2950 (3300 ¹⁾
Permissible front axle load	kg	With heavy front-mounted implements and speed limitation to 25 km/h ²⁾	2700		2700		2700
Permissible gross vehicle weight	kg	With heavy front-mounted rotating snow clearing implements and speed limitation to 25 km/h ²⁾	—		5500		5500
Permissible front axle load	kg		—		3300		3300
Permissible rear axle load	kg		—		3300		3300
Curb weight	kg	Chassis with cab and platform	2850		2850		2850
		Chassis with cab without platform	2300		2300		2300
Chassis load capacity	kg		2450		2700		2950 (3200 ¹⁾

¹⁾ Only for fire department and disaster vehicles

²⁾ May only be driven in 4-wheel drive

6.10.2 Permissible Trailer Loads

The trailer loads correspond to the German registration regulations in conjunction with the respective specified trailer couplings according to DIN 74051 as well as to trailers with a brake system

With permissible gross vehicle weight kg	4750 without brake assistance	5000 with brake assistance	5250 with brake assistance and reinforced springs	5500 ¹⁾ with brake assistance and reinforced springs
	Trailer load kg			
With 60 kW (82 HP) engine	4750	5000	5000	4750
With 81 kW (110 HP) engine	4750	5000	5000	5550
With 60 kW (82 HP) engine	—	5000	5000	4750
With 81 kW (110 HP) engine	—	7000	7350	7700

¹⁾ Only for fire department and disaster vehicles

6.10.3 Trailer coupling

Manufacturer	With type 404.0 / 404.1	404.1
Designation / Size	Rockinger / Ringfeder * 227 G 110 D / L 227 G 110 J * UNIMOG D	Ringfeder K 1 D
	} optional	
Tow bar load (DIN)	tons 6.5	4
Permissible support load	N (kp) 5000 (500)	4000 (400)

6.11 Dimensions

Wheel base	mm	2900
Track	mm	1630
Minimum track circle diameter	approx. m	11.9
Minimum turning circle diameter	approx. m	12.9
Maximum length	mm	5030
Maximum width	mm	2150
Maximum height of cab, unloaded	mm	2290
Maximum height of tarpaulin frame, unloaded	mm	2630
Ground clearance under axle housing, loaded	mm	400
Bulk clearance	approx. mm	585
Fording depth	approx. mm	800
Overhang, front	mm	930
Overhang, rear	mm	1200
Angle of approach	°	45
Angle of departure	°	46
Length of platform (inside dimension)	mm	3000
Width of platform (inside dimension)	mm	2000
Available loading platform space	m ²	6
Height of platform sides	mm	500
Loading height above ground, unloaded	approx. mm	1190
Number of seats in cab		2

6.12 Maximum Speeds

With engine speed of 4800/min
and overall axle ratio $i = 7.56$

Transmission

Supplementary crawler gear

Speed	Forward speeds						Reverse speeds	
	1	2	3	4	5	6	1	2
km/h	7.21	13.08	24.07	43.66	70.59	107.66	5.35	9.70
km/h	2.34	4.25	—	—	—	—	—	—

6.13 Tightening Torques

Designation	Nm		(Kpm)		Designation	Nm	(Kpm)	Designation	Nm	(Kpm)
	M 180	M 130	M 180	M 130						
Engine					Clutch — Transmission			Wheels		
Cylinder head bolts engine cold	80	100	(8)	(10)	Transmission housing to carrier tube	200	(20)	Wheel nuts	290	(29)
engine hot	90	110	(9)	(11)	Special pto to transmission housing	50	(5)			
Cylinder head cover	10		(1)		Axles			Chassis		
Rocker arm bearing brackets	80		(8)		Axle torque arm to support bearing	80	(8)	Shock absorber	120-140	(12-14)
Camshaft bearing bolts	25		(2.5)		Steering knuckle or intermediate housing to housing	240	(24)	Trailer coupling		
Oil pressure valve	40		(4)		Control arm	160-170	(16-17)	227 G 110 D	60	(6)
Oil filter bowl	40		(4)		Wheel locking bolt	750-1000	(75-100)	227 G 110 J	60	(6)
Spark plugs	30-40		(3-4)		Steering			227 G 110 L	60	(6)
Intermediate flange to rear of engine	50		(5)		Steering gear to steering gear bracket	95	—	UNIMOG D	50	(5)
Oil pan	13		(1.3)		Pitman arm	280	400	RU K 1 D	135	(13.5)
					Clamping screw to steering bracket	70	—			
					Steering gear to frame	550-600	(55-60)			
					Torque rod	140	(14)			
					Fitted screw to universal joint	25	(2.5)			

6.14 V-Belts

Engine Model	Chassis Type / Model	Drive	Dimension mm	DIN
130.925 180.958	404.0	Crankshaft – Generator – Coolant Pump	9.5 x 850	7753
		Fan – Coolant pump – Idler pulley	9.5 x 850	
		Crankshaft – Air compressor	9.5 x 1175	
		Crankshaft – Steering pump	9.5 x 775	
180.928 .952 .953	404.1	Crankshaft – Generator – Coolant pump	9.5 x 995 (9.5 x 900 ¹⁾)	7753
		Fan – Coolant pump – Idler pulley	9.5 x 875	
		Crankshaft – Air compressor	9.5 x 1175	
		Generator – Governor	8 x 710	2215

In order to reduce the fan speed during **continued low ambient temperatures** interchange the front pulley of the coolant pump against the idler pulley.

In order to increase the coolant pump speed during **continued high ambient temperatures** interchange the rear pulley (149 mm dia.) of the coolant pump against a new pulley (115 mm dia.). To do so, use V-belt 9.5 x 900 mm ¹⁾.

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Section 2- Unimog Type 404 Workshop Manual

ATS TECHNICA
ELECTROGRAPHICS

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Position of Model Name Plate, Engine No. and Chassis No.



Fig. 0-1/1 UNIMOG-S 404.1



Fig. 0-1/2 UNIMOG-S 404.0

- | | |
|--------------------|--------------------|
| 1 Model name plate | 3 Engine No. |
| 2 Chassis No. | 4 Transmission No. |

UR0-0001

Please indicate these data in all your inquiries and orders.

0-1 Model Designation

Explanation of Chassis and Engine No.

Technical publications, such as Service Informations and Spare Part Catalog, are containing instructions in connection with modifications or revisions made or still to be made as from a given Chassis or Engine No.

For proper definition of these numbers which have changed in significance in the course of time, the meaning of the individual digit groups is explained once again below.

1. Chassis No. (punched into model name plate and on frame side member in front of righthand front wheel)

Up to 1960

Example 1: 404.114–9501153

In which:

404	114	95	01153
—	—	—	—
UNIMOG Type	Chassis Design.	Year digits transposed (95 = 1959)	Chassis End No. 5 digits cons. year

Starting 1960

Example 2: 404.114–019385

In which:

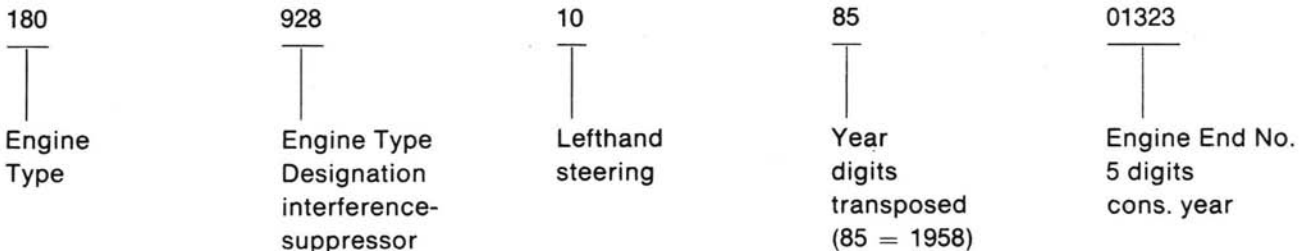
404	114	019385
—	—	—
UNIMOG Type	Chassis Design	Chassis End No. 6 digits cons. starting 1960 (year omitted)

2. Engine No. (punched into engine type name plate and into crankcase rear left top)

Up to 1960

Example 3: 180.928-10-85 01323

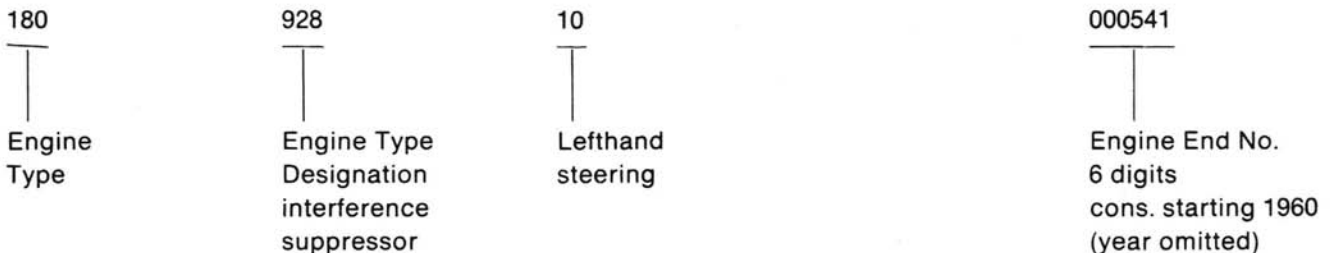
In which:



Starting 1960

Example 4: 180.928-10-000541

In wich:



Vehicles and engines with 6-digit End Nos. (here 019385 or 000541) are therefore always of a more recent date than vehicles or engines with 7-digit End Nos. (here 95 01153 or 85 01323).

The designations "righthand" and "lefthand" apply as seen in driving direction. The indication "first", "second" e.g. crankshaft bearing, cylinder etc., always applies starting at radiator end.

Engine			M 130	M 180
Make			Mercedes Benz	
Type Designation			M 130.925	M 180.928 M 180.953 M 180.958
Design			in line/vertical	
Operation			four-stroke gasoline engine	
No. of cylinders			6	6
Bore		mm	86.5	80
Stroke		mm	78.8	72.8
Total displacement (tax formula)		cc	2,748	2,181
(effective)		cc	2,778	2,196
Compression ratio			7.8	7.0 ¹⁾
Compression pressure at	normal	bar (kp/cm ²)	8.6 to 9.6	8.5 to 9.5
speed 150 to 200/min	min.	bar (kp/cm ²)	7.2	5.5 to 6.0
Continuous output (eff. output acc. to DIN)		kW (HP)	81 (110)	60 (82) ²⁾
at nominal speed		1/min	4,800	4,800
Max. torque		Nm (kpm)	186 (19)	143 (14.6)
at speed		1/min	3,200	3,200
Max. speed ³⁾		1/min	5,500	5,500
Idle speed		1/min	800 to 850	800 to 850
Valve arrangement			overhead	
Valve clearance for intake	cold ⁵⁾	mm	0.10	0.10 ⁴⁾
Valve clearance for exhaust	cold	mm	0.20	0.20 ⁴⁾
Valve clearance for intake	warm ⁵⁾	mm	0.15	0.15
Valve clearance for exhaust	warm	mm	0.25	0.25
Coolant temperature ⁶⁾		°C	75 to 95	
Oil gauge pressure	normal	bar (kp/cm ²)	2 to 5	
	idle min.	bar (kp/cm ²)	0.6	
Weight	dry	kg	210	182
Firing order (cylinder 1 at radiator)			1-5-3-6-2-4	
Firing point basic adjustment		°BTDC	2	2
Firing point adjustment			automatic by centrifugal force or vacuum	

¹⁾ In addition, engines with a compression ratio of 6.5:1; 6.8:1; 7.6:1 and 8.7:1 were also delivered.

²⁾ The output indicated is effectively available at clutch for driving the vehicle after the deduction of all auxiliary requirements.

³⁾ The max. number of revolutions does not indicate max. speed, but that the engine can be temporarily run up to the specified number of revolutions without suffering damage. The number of revolutions at max. speed is correspondingly less (approx. 4,600).

⁴⁾ For the old valve timing, the valve clearance for intake is 0.12 mm and for exhaust 0.20 mm.

⁵⁾ Cold engine: temperature below 30° C
Warm engine: temperature 60 °C ± 15° C

⁶⁾ A relief valve (0.4 bar kg/cm²) installed in radiator screw cap keeps the cooling water under pressure. In extreme cases, the temperature can go as high as 105° C without impairing the engine.

Wheel base	2,900 mm
Track, front	1,630 mm
Track, rear	1,630 mm
Min. turning circle dia.	15.5 m
Track circle dia.	12.1 m
Max. length	5,000 mm
Max. width	2,050 mm
Max. height with top, unloaded	2,740 mm
Ground clearance under differential	400 mm
Ground clearance under axle	470 mm
Bulk clearance (ride clearance)	410 mm
Fording depth	approx. 800 mm
Driving across step	approx. 400 mm
Platform length (inside clearance)	3,000 mm
Platform width (inside clearance)	2,000 mm
Height of side boards	500 mm
Platform height (ins. cl. with top)	1,440 mm
Loading height above ground	1,045 mm
Height of trailer	unloaded approx. 820 mm
coupling above ground	loaded approx. 730 mm
Seats in cab	1/1
Angle of approach front/rear	45°/46°
Lateral tipping angle max.	42°

Weights

Dead weight of vehicle acc. to DIN 70020	2,700–2,910 kg depending on version
Perm. GVW	4,750 kg without brake booster
Perm. GVW for special bodies	5,000 kg with brake booster
Payload	1,840–2,050 kg without brake booster
	2,300 kg with brake booster
	} depending on dead weight
Perm. front axle load max.	2,500 kg
Perm. rear axle load max.	2,500 kg
Weight of front axle (dry)	approx. 240 kg
Weight of rear axle (dry)	approx. 220 kg
Drawbar pull (constant pull)	2,800 kg (max. 3,500 kg)

Vehicle Speeds and Climbing Ability

Max. speeds in the individual gears (round numbers)	1st gear 7.13 km/h
	2nd gear 13.28 km/h
	3rd gear 24.474 km/h
	4th gear 44.40 km/h
	5th gear 72.03 km/h
	6th gear 95.00 km/h
	1st rev. gear 5.44 km/h
	2nd rev. gear 9.87 km/h

0-3 Chassis 404.1

Wheels

Type of rim	Disc wheels with wide rim bed
Size of rim	9 x 20 (press-in depth 58 mm)
Tire size	10 x 20 (standard) reinforced version optional depending on GVW of vehicle

Tire Pressures in bar (kp/cm²)

Tires	Cross country		Highway	
	front	rear	front	rear
10.5 x 20 6 PR	1.5	1.5	2.5	2.5
10.5 x 20 8 PR	1.5	1.75	2.5	3.0
10 x 20 radial tires (belted)	1.75	2.0	2.8	3.5

In very difficult terrain, at speeds below 25 km/h, the tire pressure can be reduced to 1.0 bar (kp/cm²) for all tire versions.

Normally, UNIMOG tires are not balanced, but tire manufacturers are marking the tires according to two unbalance classes, acc. to which on tires with 1 red dot the unbalance is higher than on tires with 2 red dots. Whenever possible, use tires with 2 red dots only, on front axle.

Pto Shafts

Speed from	650/min at engine speed of 2,850/min and approx. 27 kW (35 HP) output
to	1,000/min at engine speed of 4,700/min and approx. 38 kW (50 HP) output
Pto connection	1 ³ / ₈

Filling Capacities of Fluids

Fuel	Fuel tank	approx. 120	l
Coolant	Cooling system (engine, radiator and heater)	approx. 18	l

of which anti-corrosion compound for summer or winter operation

of which anti-freeze for winter operation, depending on outside temperature

Engine Oil	Engine oil pan	max. 6	l
		min. 3.5	l
with oil filter cleaning plus		approx. 0.5	l
	Oil bath air filter	approx. 1	l
	Air compressor	approx. 0.1	l

Brake Fluid	Hydraulic brake system	approx. 0.75	l
--------------------	------------------------	--------------	---

Gear Oil	Transmission basic version	approx. 6	l
	Transmission with crawler auxiliary transmission	approx. 7	l
	Front and rear axle transmission housing	each approx. 3	l
	Wheel hub drive (4)	each approx. 0.3	l
	Steering gear	approx. 0.55	l
	Pto shaft bearing	each approx. 0.1	l
	Coolant pump	approx. 0.01	l

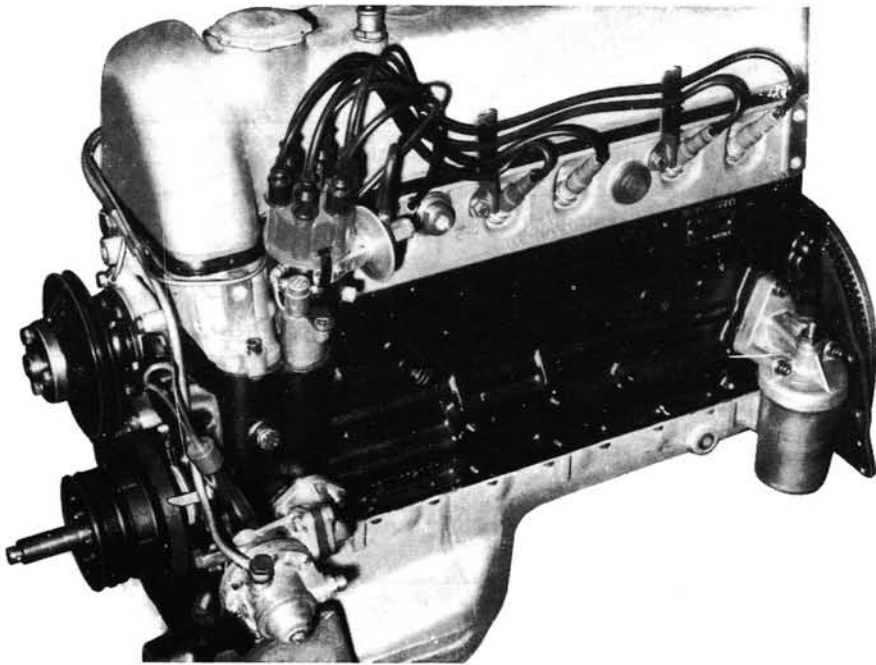


Fig. 00-0/1

View of engine M 180, long-distance radio shielding

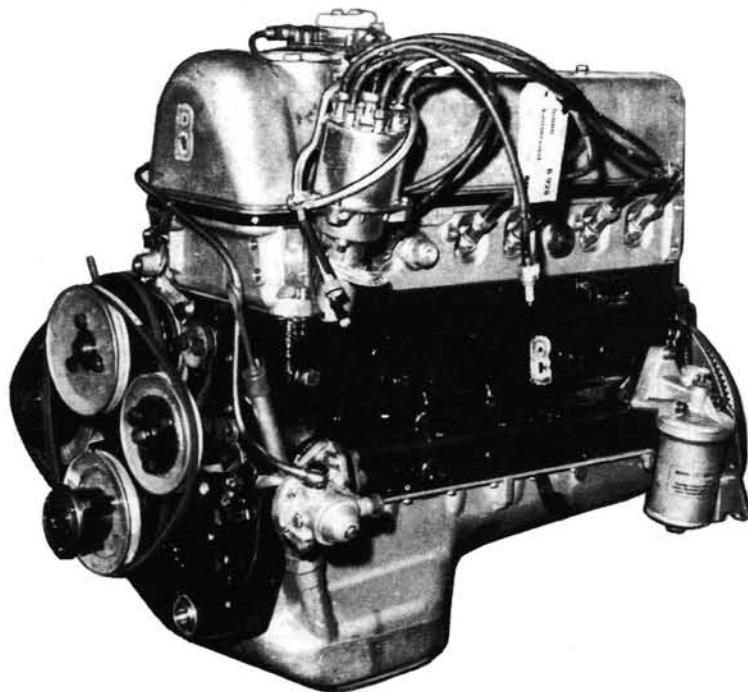


Fig. 00-0/2

View of engine M 180, short-distance radio shielding

Repair data (Dimensions in mm)**Cylinder head repair dimensions**

Table 1

Total height of cylinder head, new		84.8–85.0
Min. height of cylinder head, refinished		84.0
Perm. stock removal on	parting surface to cylinder crankcase	0.5
	parting surface-cyl. hd. cover	0.3
Perm. unevenness of parting surface	longitudinal	0.1
	crosswise	0.0
Perm. deviation of parallelism of upper parting surface to lower parting surface		0.1
Total compression space (cm ³) when cylinder head is mounted, valves and plugs installed	7.0:1	48.2–50.2
	8.7:1	36.4–37.4
Pressure testing with air in hot water 70° C kp/cm ²		2.0

Note: Refinishing of cylinder head parting surface also requires refinishing of valve seats to the extent of providing the specified distance between valve disk and cylinder head surface.

Refinishing of valve seat

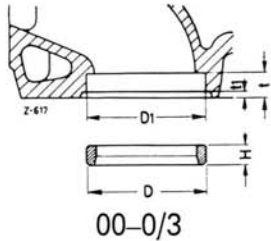
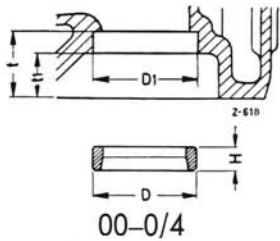
Table 2

Valve seat angle in cylinder head	90° minus 30'	
Valve seat width for inlet-outlet valve	1.25–2.0	
Perm. unevenness of valve seat in cylinder head	0.05	
Perm. depth (–) of valve disk compared to cylinder head parting surface	Inlet	Outlet
Min. distance on new valve and valve seats	– 0.4	– 15.0
Max. distance on refinished valve seats and reground valves	– 1.9	– 17.0
Relief of valve seats (120°) at least	0.1	

Note: The lower edge of the valve seat of the valve should never abut against valve seat ring, since the edge would work into seat, the valve would leak and tend to burn out. The valve seat should be relieved or cut free at this point so that the bottom edge of the valve would be unobstructed.

Valve seat rings

Table 3

Valve seat ring		Inlet	Outlet
Outer dia. "D" of valve seat ring	Standard	40.800	39.100
		40.790	39.090
	1st rep.stage	41.300	39.600
		41.290	39.590
	2nd rep.stage	41.800	40.100
		41.790	40.090
Basic bore "D ₁ " in cylinder head	Standard	40.700	39.000
		40.716	39.016
	1st rep.stage	41.200	39.500
		41.216	39.516
	2nd rep.stage	41.700	40.000
		41.716	40.016
Necessary overlapping of valve seat ring in cylinder head		0.074–0.100	
Height "H" of valve seat ring	Standard	10.500	9.000
		10.390	8.910
	1st rep.stage	10.500	9.000
		10.390	8.910
Depth "t" of bore of cylinder head		12.500	27.000
		12.600	27.100
Distance "t ₁ " between cylinder head and valve seat		2.0–2.2	18.0–18.2
			

Note: After pressing-in of the valve seat ring, secure ring by 3 punch marks.

Valve Guide

Table 4

Standard and rep.stage	Colour code	Outer dia. "D"	Valve guide				Bore in cylinder head
			ID		OD		
			Inl.	Outl.	Inl.	Outl.	
Standard	Colour-less*	14.013	9.000	10.000	67 N	57.0	14.000
		14.007					14.006
	Red*	14.019					14.006
		14.013					14.012
	White*	14.025					14.012
		14.019					14.018
Inter-mediate stage	Gray Green*	14.031	9.015	10.015	65.5	57.0	14.024
		14.025					14.024
	Gray*	14.037					14.030
		14.031					14.030
Gray* Brown	14.043	14.036					
	14.037	14.200					
1st rep.stage	Red	14.225	9.015	10.015	65.5	57.0	14.218
		14.207					14.400
2nd rep.stage	White	14.425	9.015	10.015	65.5	57.0	14.418
		14.407					14.418

* On engine with old type valve timing also green, brown, yellow, blue, or brown.

N On engine with new type valve timing only.

Cylinder Crankcase Machining Dimensions

Table 5

Total height (finished dimension)	213.1–213.2 213.6–213.7*	
Permissible unevenness of parting surface	lengthwise	0.05
	crosswise	0.0
Permissible difference of parallelism between upper and lower parting surface in longitudinal direction	0.1	
Piston crown above parting surface	0.035	
Minimum height of crankcase after required surface grinding	213.8	
Pressure testing with air under hot water at 70 degrees C in kp/cm ²	2.0**	

* Machine housings with a measurement of 213.6–213.7 down to 213.1–213.2 and use the latest cylinder head gasket (only on crankcases with sheetmetal covers).

** On crankcases with both side walls closed 3 kp/cm².

Cylinder Crankcase Dimensions of Piston Bores

Table 6

Normal	Interm. Stage	1st Rep. Stage	2nd Rep. Stage	3rd Rep. Stage
$\frac{80.000}{80.019}$	$\frac{80.250}{80.272}$	$\frac{80.500}{80.522}$	$\frac{81.000}{81.022}$	$\frac{81.500}{81.522}$

Machining Dimension of Cylinder Bores

	New	Wear limit for repairs
Max. out-of-round of cylinder bore	0.013	up to 0.05
Max. conicity of cylinder bore	0.013	up to 0.05
Perm. tolerance of cylinder bore at right angle to crankshaft axis relative to height of cylinder		0.05
Perm. roughness of cylinder bores		0.005
Perm. undulation of cylinder bores		0.0025
Max. wear limit (length-and crosswise)		0.10

Crankshaft Grinding Stage Table

Table 7

Standard and Rep. Stages	Crankshaft bearing journal		Crankpin	
	Dia. of journal	Width of journal on fitted bearing	Dia. of crankpin	Width of crankpin
Standard	$\frac{59.965}{59.955}$	$\frac{30.000}{30.021}$	$\frac{47.965}{47.955}$	$\frac{30.000}{30.084}$
	$\frac{59.715}{59.705}$	30.000*	$\frac{47.715}{47.705}$	30.000
2nd Rep. Stage	$\frac{59.465}{59.455}$		$\frac{47.465}{47.455}$	
	3rd Rep. Stage	$\frac{59.215}{59.205}$	up to	$\frac{47.215}{47.205}$
4th Rep. Stage		$\frac{58.965}{58.955}$	$\frac{30.700^*}{30.725}$	$\frac{46.965}{46.955}$

* For repairs, the fitted crankshaft bearing is supplied in oversize and has to be ground down to correct dimension of reground crankshaft bearing journal.

Note: Max. wear of crankshaft is 0.02 mm. The dimensions of above table must be accurately maintained, with all the journals and pins obviously ground to the same repair stage. In addition, the fillets on the crankshaft journals and crankpins must be accurately maintained at 2.5–3 mm.

Dimensions for Crankshaft Journals and Crankpins

Table 8

Max. out-of-round of crankshaft journals and crankpins		0.005*
Max. conicity of crankshaft journals and crankpins		0.01**
Perm. deviation from alignment of crankpins in relation to crankshaft journals with reference to length of bearing		0.02
Max. out-of-round of center crankshaft journal with crankshaft supported in outer journal		0.02
Max. lateral wobble of fitted bearing journal		0.015
Max. vertical wobble for fly wheel flange with reference to the crankshaft bearing journals		0.02
Max. lateral wobble for fly wheel flange with reference to crankshaft bearing journals meas. on outer dia.		0.012
Filleis for crankshaft journals and crankpins		2.5–3
Hardness of crankshaft journals and crankpins	Sklerograph hardness	68–74
	Rockwell RC	55–61
Perm. out-of-round for crankshaft Crankshaft balanced together with fly wheel		15 cmg
Counter weight basic bore		36 dia. R 6
Overlap basic bore counterweight in relation to crankshaft journal		0.0016 min.
Perm. vertical wobble crankshaft journal front, max.		0.03

* For broken-in crankshaft journals and crankpins 0.01 mm

** For broken-in crankshaft journals and crankpins 0.015 mm

Bearing Play of Crankshaft

Table 9

	Radial	Axial lapped bearing*
Crankshaft bearing journal	0.045–0.060**	0.100–0.175
Conrod bearing	0.045–0.060**	new 0.11–0.26 in case of rep. up to 0.5

* Max. axial play in case of repair with no score marks on thrust flange 0.3 mm

** Radial play should be in medium range of 0.050 mm

Crankshaft Bearing – Basic Bore

Table 10

Standard bore in cylinder housing		67.000 up to 67.019
Max. out-of-round in cylinder housing bore		0.01
Max. conicity of bore in cylinder housing bore		0.01
Overlapping of a crankshaft bearing half in basic bore		+ 0.02 up to + 0.05
ID of crankshaft bearing with inserted bearing halves	Standard	59.99–60.02
	1st Rep. Stage	59.74–59.77
	2nd Rep. Stage	59.49–59.52
	3rd Rep. Stage	59.24–59.27
	4th Rep. Stage	58.99–59.02

Dimensions of Conrod

Table 11

Basic bore of conrod		<u>54.000</u> 54.019
Basic bore dia. of small end bushing (piston pin bushing)	Standard	<u>27.000</u> 27.021
	Rep. Stage	<u>27.500</u> 27.521
Perm. out-of-round for basic bore of conrod bearing and small end bushing		0.01
Overlapping of conrod bearing half in basic bore		+ 0.02 up to + 0.04
Perm. conicity basic bore of conrod bearing and small end bushing		0.01
Distance center of conrod bearing bore to piston pin center		<u>134.95</u> 135.05
Width of conrod on boss of conrod bearing		<u>29.890</u> 29.857
Perm. weight difference of complete conrods for one and the same engine		5 g
Perm. deviation of parallelism of basic bore in relation to piston pin bore with reference to 100 mm length		0.03
Perm. offset of basic bore in relation to piston pin bore with reference to 100 mm length		0.1

Conrod Bearings

Table 12

ID of conrod bearing with inserted bearing shell halves	Standard	Rep. Stage			
		1	2	3	4
	<u>47.99</u> 48.02	<u>47.74</u> 47.77	<u>47.49</u> 47.52	<u>47.24</u> 47.27	<u>46.99</u> 47.02

Conrod Bushing (small end bushings)

Table 13

OD of conrod bushing	old	Normal size	Rep. Stage
		<u>25.048</u> 25.035	<u>25.548</u> 25.535
	new	<u>27.048</u> 27.035 27.090 27.050	<u>27.548</u> 27.535
		ID of conrod bushing	Rough-and final measurement
old		<u>22.007</u> 22.013	
	new	<u>23.500</u> 23.552	<u>24.007</u> 24.013 24.012 24.018

Overlapping of conrod bushing in conrod
earlier version
rolled version

min. + 0.03
+ 0.05 up to
+ 0.08

Pistons

Table 14

Dia. of available pistons				
Standard	Intermed. stage	1st rep. stage	2nd rep. stage	3rd rep. stage
<u>79.98</u> 79.96	<u>80.23</u> 80.21	<u>80.48</u> 80.46	<u>80.98</u> 80.96	<u>81.48</u> 81.46
Piston play 0.03–0.04				
Perm. weight difference of pistons within one and the same engine = 4 grams				
Clearance between piston head and parting surface of crankcase at TDC position of piston				old max. up to 0.35 new 0.2–0.6

Piston Pins

Table 15

Diameter	old	new
	22.000	24.000
	21.994	23.994
Running clearance in connecting rod bushing	0.012 to 0.018	0.012 to 0.023
Clearance (–) or overlap (+) in piston	– 0.003 to + 0.003	

Piston Rings

Table 16

Groove I	Groove II	Groove III	Groove IV
old Rectangular ring 80/73 x 2 f Cr. S. St. 12 DIN 24910	Tapered compression ring 80/73 x 2.5 f DIN 24911	Tapered compression ring 80/73 x 3 f DIN 24911	Slotted oil ring with expanding spring, optional Götze-/Teves 80/73.4 x 5
new Rectangular ring 80/73 x 1.5 ZR 10–80/33 St-MoB	Tapered compression ring 80/73 x 2.5 ZR 11–80/8 JF-Mo	Tapered compression ring 80/73 x 3 f DIN 24911	Slotted oil ring with expanding spring, optional Götze-/Teves 80/73.4 x 5 ZR 41–80/1

old: up to model designation 180.944

new: starting model designation 180.925 and 180.953

Note: Insert piston rings with designation "top" or "oben" into piston in such a manner that the designation at gap end faces piston head.

Side clearance of piston rings on Mahle pistons 0.035 to 0.062 mm

Side clearance of piston rings on Nüral pistons 0.030 to 0.057 mm

Gap clearance of 1st to 3rd piston ring I. 0.55 to 0.70 mm

II. 0.45 to 0.60 mm

III. 0.30 to 0.45 mm

Gap clearance of oil scraper ring (Novix slotted ring) 0.30 to 0.45 mm

Note: Side and gap clearance apply to normal stage and to all repair stages of pistons.

Flywheel and Starter Ring Gear

Table 17

Flange thickness	old *)	new *)
	7.5 mm	10.5 mm
Height of flywheel from crankshaft flange end to clutch surface new	32.9 to 33.1	35.9 to 36.1
Min. height during repairs by grinding	32.0 **)	34.0 **)
Perm. vertical runout of flywheel flange, with reference to four crankshaft journals	0.02 mm	
Perm. lateral runout of flywheel flange, with reference to four crankshaft journals, measured at OD	0.012 mm	
Mounting temperature of starter ring gear	approx. 200° C	
Perm. lateral runout of mounted starter ring gear	0.4 mm	

*) Old version with 7.5 mm flange thickness is standard up to engine No. 180.928-017 124 or 180.927-008796.

New version with 10.5 mm flange thickness is standard starting engine No. 180.928-017 125 or 180.927-008797.

Starting type designation 180.953, flange thickness is 20.5 mm.

**) Dimensions may not be less than specified. For this reason, machine same amount from contact surface of clutch pressure plate as from clutch surface.

Valves
Table 18

Valve for	Valve disc dia.	Stem dia.	Length	Height of valve disc	Valve seat angle
Intake	39.30	8.970	128	when new 1.5 rep. end dimension 1.0	90° + 30'
	39.10	8.948			
Exhaust	35.25	9.950	112.7	when new 2.4–2.6 rep. end dimension 1.5	90° + 30'
	34.95	9.928			

Note: Perm. runout between valve stem and valve cone max. 0.03 mm.

Perm. clearance between valve stem and bore

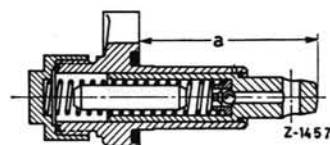
Intake 0.03–0.065

Exhaust 0.05–0.085

Valve Springs
Table 19

Daimler-Benz Spare Part No.	OD mm	Wire dia. mm	Spring length relaxed	Test length mm	Test pressure kg
180 053 06 22 (internal spring)	20.5	2.5	42.5	25.7 34.2	18 to 21 8.6 to 10.1
180 053 06 20 (external spring)	30.2	3.8	50.5	29.9 38.4	46.3 to 53.0 23.0 to 26.4
180 053 03 22 (internal spring)	20.7	2.6	42.0	25.7 34.2	17.6 to 20.6 8.9 ± 0
180 053 03 20 (external spring)	30.6	4.0	47.0	29.9 38.4	43.7 to 50.4 23.1 ± 0

Note: Install closer coils of progressive springs in downward direction (toward cylinder head end).


Fig. 00-0/5
Chain Tensioner
Table 20

Compression Spring							Chain Tensioner	
OD	Wire dia.	Unloaded length	Length under load preload		Length under load final load		Dimension "a"	DB Spare Part No.
			mm	kp	mm	kp		
11.5	1.0	124	50	1.85	44	1.9–2.5	52	180 050 05 11
11.3	1.3	89.5	50	4.2	44	4.5–5.3	50–50.5	180 050 06 11
							51	180 050 07 11

Tensioning Wheel and Bearing

Table 21

Dia. of mounting pin in cylinder head	$\frac{9.995}{9.986}$
Bore in chain sprocket bearing	$\frac{10.000}{10.015}$
Dia. of shaft in chain sprocket	$\frac{19.980}{19.959}$
Bore in sprocket	$\frac{24.000}{24.021}$
OD of bearing bushing in chain sprocket	$\frac{24.035}{24.048}$
Overlap of bushing in chain sprocket	$\frac{0.014}{0.048}$
Bore in bushing (finish size)	$\frac{20.000}{20.021}$
Radial play of chain sprocket on mount. shaft in cylinder head	0.005–0.029
Radial play of chain sprocket	0.020–0.062

Compression spring for chain sprocket bearing

OD mm	Wire size mm	Length untensioned mm	Length under load end-tensioned	
			mm	kp
11.6–12.2	1.4	17.75	9	6.06

Table 22

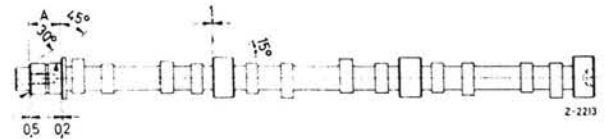
List of camshafts installed in Engine M 180/BM 927/928 with timing periods										Check-valve play 0.40 mm	
Camshaft					Timing						
DB-Part. No.	Drawings No.	Marking	In operation Type 927 Type 928	Inlet before TDC	after BDC	Outlet after BDC	before TDC	Exchangeable	Without Limitation	With Limitation	
180 050 03 01	180 051 14 01	14	Mixed up to 007 300	9°	41°	51°	15°	180 050 06 06	x	-	
180 050 03 01	180 051 14 01	14/1		12°	44°	51°	15°	180 050 06 01	x	-	
180 050 06 01	180 051 33 01	33	Mixed up to 001 450	10°	46°	42°	10°	last camshaft with internal lubrication for old type timing			
180 050 09 01 (Internal lubrication)	180 051 61 01	61	as of 007 301- 008 778	10°	46°	44°	12°	180 051 93 01	-	x	
180 051 70 01 (External lubrication)	180 051 70 01	70	as of 008 779- 008 806	10°	46°	44°	12°	180 051 93 01	-	x	
180 051 79 01 (External lubrication with sickle-shaped groove)	180 051 79 01	79	as of 011 284- 020 927	10°	46°	44°	12°	180 051 93 01	x	-	
180 051 82 01 (Similar to 79 01, but galvanized)	180 051 22 01	82	as of 008 807- 008 889	10°	46°	44°	12°	180 051 93 01	x	-	
180 051 93 01	180 051 93 01	93	as of 020 928- 038 933	10°	46°	44°	12°	180 051 93 01	x	-	
			as of 008 890	10°	57°	52°	17°	Series			
			as of 038 934								

Camshaft and Camshaft Bearings

Table 23

Design color code	1st bearing drive side		2nd and 3rd bearing		4th bearing	
	Shaft dia.	Bearing dia.	Shaft dia.	Bearing dia.	Shaft dia.	Bearing dia.
Standard	34.975	35.000	47.975	48.000	48.975	49.000
	34.959	35.016	47.959	48.016	48.959	49.016
Intermediate stage (grey)	34.875	34.900	47.875	47.900	48.875	48.900
	34.859	34.916	47.859	47.916	48.859	48.916
1st rep. stage (red)	34.725	34.750	47.725	47.750	48.725	48.750
	34.709	34.766	47.709	47.766	48.709	48.766
Max. out-of-round of middle bearing basic cam circle and camshaft gear seat when supported in outer bearings				0.025		
Hardness of cam bearings and cam basic circles				Hardness of at least HB 500 Hardness of Sklerograph 36–40		
Hardness of cam tip and rise				Hardness of at least HB 500 Hardness of Sklerograph at least 64		
Width (A) of 1st bearing pin (fitted bearing)				34.000 34.039		
Width of fitted bearing				33.950 33.911		
Camshaft bearing play				radial 0.025–0.057 axial 0.050–0.128		

Fig. 00-0/6



Fuel Delivery Pump

Table 24

Designation of pump		DVG-Diaphragm-pump
Delivery Pressure	Measuring point	after pump outlet
	starting speed kp/cm ²	0.12–0.16 0.15–0.20
Suction pressure	idling speed kp/cm ²	before pump inlet
	starting speed kp/cm ² mm Hg	0.3–0.4 230–320
Play between operating cam and pump plunger	mm	0.4–0.5
Suction height	m	0.9

Drive for Oil Pump and Distributor

Table 25

Intermediate gear shaft	Shaft dia. (bearing point)	Front 19.980 <hr/> 19.959	Rear 17.960 <hr/> 17.940
	Bore of front bearing bushing	20.020 <hr/> 20.033	
	Bore of rear bearing bushing	18.000 <hr/> 18.018	
Helical gear	Shaft dia.	13.968 <hr/> 13.950	
	ID of bearing bushing in pressure piece resp. in bearing body	14.000 <hr/> 14.018	
Play Intermediate gear shaft	Radial	front <hr/> rear	0.040–0.074 <hr/> 0.040–0.078
	Axial	0.05–0.12	
Helical gear	Radial	0.032–0.068	
Tooth flanks		0.12–0.22	
Max. misalignment of all chain sprockets, beginning at sprocket gear of intermediate gear shaft		0.1 mm	

Engine Lubrication

Table 26

ID of bearing bushings in upper and lower half	12.000	
	12.018	
Dia. of drive shaft	11.984	
	11.973	
Dia. of gear wheel shaft	11.973	
	11.964	
Radial play of drive shaft	0.016–0.045	
Radial play of gear wheel shaft	0.027 - 0.054	
Dia. of oil pump gear wheels	36.450	
	36.411	
Dia. of bore in housing upper or lower half	36.500	
	36.525	
Clearance between oil pump gear wheels and pump housing	radial	0.025–0.057
	axial	0.050–0.092
Gear wheel height	22	
Backlash	0.05–0.15	

Delivery capacity of oil pump at:

Pump speed 1/min	Oil temperature °C	Vacuum (suction end) mm Hg	Gauge pressure (pressure end)	Delivery qty. kg/min
2500	100	400	5	26.5–33.0
345–350 (at engine idle speed n = 700 mm	100–105	*)	**)	3.0–4.62

Springs for Oil Pressure Relief Valves

*) Pressure from pump = 0 bar (kp/cm²)

***) Counterpressure = 2.0–2.1 bar (kp/cm²)

Note: For test purposes, use engine oil SAE 10.

Table 27

	OD	Wire dia.	Length unloaded	Length under load				Opening pressure bar (kp/cm ²)
				preload		final load		
				mm	kp	mm	kp	
In cylinder crankcase	old 9.1–9.4	1.4	43.6	39	2.4	30.5	6.45–7.15	5.5–6.5
	new 8,7–9	1.3	43.6	39	2.0	30.5	5.25–5.95	4.5–5.5
In oil filter old and new	12.25	1.25	49	32	2.26	24	3.0 –3.6	2.2–2.5*

*) For oil filters with a wire coil and paper filter element, the specified opening pressure applies to the oil pressure relief valve of the wire coil insert. The second oil pressure relief valve for the paper filter will open here at 1 to 1.4 bar (kp/cm²).

Electrical Equipment

Starting Motor

Table 28

Bosch Designation	Idle speed test		Speed 1/min	Min. draw-in voltage (Volts) magnetic switch	Adjusting dimension "a" mm
	Current Amps.	Voltage Volts			
0 001 308 001 GE (R) 24 V 1 PS	20–30	23	5000–7000	15	32.2 ± 0.1
0 001 306 013 GE (R) 12 V 1 PS	40–60	11.5	5500–7500	8	32.2 ± 0.1

"a" = Adjusting dimension for starting magnetic switch with fork-type joint pulled-in

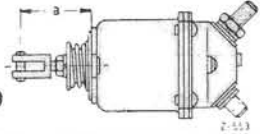


Fig. 00–0/9

Short-circuit test		Load test		Speed 1/min	System (Volts)
Current Amps.	Voltage Volts	Current Amps.	Voltage Volts		
230–260	19.5	120–140	22	1050–1250	24
400–450	8	200–240	9	1100–1300	12

Generator

Table 29

Bosch Designation	Type designation Output designation	Generator voltage without load 1/min	Output test		Resistance		Load current (Amps.)
			cold 1/min	warm 1/min	Exciter winding Ohm + 10 %	Damping resistance Ohm	
0 101 402 013	LJ/KG 200/24 1200 R 25	1200	1300	1400	22	60 ± 2	9
0 101 402 010	K (R) 28 V 13 A 13	1200	1300	1400	18	—	9
0 101 402 061	K (R) 28 V 19 A 14	1200	1350	1450	22	—	13
0 101 404 019	K (R) 14 V 38 A 14	1000	1350	1450	4,8	—	25
0 101 500 008	Q (R) 28 V 25 A 13	1050	1300	1350	19,5	—	17
0 101 500 013	Q (R) 28 V 38 A 14	1050	1350	1450	19,5	—	25
0 101 404 018	K (L) 28 V 13 A 13	1200	1300	1400	18	—	9

Regulator

Table 30

Bosch Order No.	Type	Switch adjusting data		Regulating voltage idle (Volts)	Load at double nominal speed of generator Current regulator element (Amps.)	
		Cut-in voltage (Volts)	Return current (Amps.)		cold	warm
0 190 112 006	WEM 28 V 38 A	26.4–27.1	9.5–14.5	27.4–28.6	34–40	
0 190 117 004	UE 28 V 19 A	26.9–28.1	2–7.5	27.1–28.4	18–21.5	17–20.5
0 190 112 007	WEM 28 V 38 A	26.4–27.1	9.5–14.5	27.4–28.6	34–40	
0 190 102 004	UEM 28 V 13 A	26.9–28.1	2–7.5	27.1–28.4	12–14.5	11–13.5
0 190 301 014	RS/UAM 300/12 A 1	12.6–13.5	4.5–9.5	13.7–14.7	38–42	35–39
0 190 309 005	UA 14 V 38 A	12.5–13.2	5–11.5	13.5–14.5	37–41	35.5–40

Flasher Transmitter

of 12-Volt system: **Bosch SH 49 / 8 A 52**

of 24-Volt system: **Bosch SH 49 / 8 A 75a**
Hella 91/23 N 2/3 x 20 W–24 V
Hella 91 PMK 2 + 1 x 20 W 24 V
SWF BGC 179/1 24 V (2 + 1) x 20 W

Battery

Table 31

Voltage / capacity	of 12-Volt system	2 x 12 V 56 Ah 2 x 12 V 45 Ah	connected in parallel = 12 V
	of 24-Volt system	2 x 12 V 56 Ah 2 x 12 V 45 Ah	connected in series = 24 V
Acid level above plate upper edge mm			10–12
Charging current	during first charge		max. 5 %
	normal when recharging		**)) max. 10 % of Battery capacity
	during rapid charging		up to 75 %
Max. temperature			40° C
Max. temperature		tropics	50° C
Freezing point	well-charged		–70° C (for tropics –40° C)
	half-charged		–25° C (for tropics –13° C)
	discharged		– 8° C (for tropics – 6° C)

**)) dropping to 5 % at begin of gasing

Acid Density (normal)

The operating capacity of battery is approximately indicated by acid density.

Acid density acc. to Beaumé *)	Specific weight *)	Charged condition of batterie
32° Bé	1.285	well-charged
24° Bé	1.20	half-charged
16° Bé	1.12	empty, charge immediately

*) at an acid temperature of + 20° C

Acid Density (tropics)

At 20° C		At 30° C		At 40° C		Charged condition
Acid density	Specific weight	Acid density	Specific weight	Acid density	Specific weight	
27° Bé	1.23	26.9° Bé	1.23	26° Bé	1.22	well-charged
23°– 21° Bé	1.19– 1.17	22°– 20° Bé	1.18– 1.16	21°– 19° Bé	1.17– 1.15	half-charged
13° Bé	1.10–	13°– 9.40° Bé	1.10 1.07	11.2°– 8.0° Bé	1.09 1.06	empty, charge immediately

Reconditioning Data (dimensions in mm)**Repair Stages of Cylinder Bores**

Standard dimension	$\frac{86.500}{86.522}$
Intermediate stage	$\frac{86.750}{86.772}$
1st repair stage	$\frac{87.000}{87.022}$
2nd repair stage	$\frac{87.500}{87.522}$

Machining Tolerances of Cylinder Bores

Perm. out-of-round and perm. conicity of cylinder bores	When new, 0.013 wear limit For repairs up to 0.05
Perm. deviation of cylinder bores vertically in relation to crankshaft axis, with reference to cylinder height	0.05
Perm. roughness of cylinder bores	0.002 to 0.004
Perm. waviness of cylinder bores	50% of roughness

Max. wear limit of cylinder bores in driving direction or transverse direction 0.10 mm

Cylinder Crankcase

Total height of cylinder crankcase when new	231.1 to 213.2	
Min. height following a required material removal	212.8	
Perm. unevenness of parting surfaces	in longitudinal direction	0.10
	in transverse direction	0.05
Perm. roughness	0.012–0.020	
Perm. deviation in parallel of upper parting surface in relation to lower surface in longitudinal direction	0.1	
Test pressure with air under water in bar (kp/cm ²)	3	

00-0.1 Engine M 130

Repair Stages of Crankshaft

Repair stage	Crankshaft bearing journals		Fitted bearing shells			Crankpins	
	Dia. of journals	Width of journal on fitted bearing	Identification	Wall thickness	Width	Dia. of pins	Width of pins
Standard	59.965	29.000	blue	3.495 to 3.502	28.780	47.965	28.000
	59.955	29.021	red	3.498 to 3.505	28.900	47.955	28.084
1st repair stage	59.715 59.705	29.200	blue	3.620 to 3.627	28.980	47.715 47.705	to 28.300
		29.221	red	3.623 to 3.630	29.100		
		29.400 29.421	blue	3.615 to 3.622	29.180		
			red	3.618 to 3.625			
	59.465 59.455	to 29.600	blue	3.745 to 3.752	29.400		
			red	3.748 to 3.755			
	59.215 59.205		blue	3.860 to 3.867	29.600		
			red	3.863 to 3.870			
58.965 58.955	blue		3.995 to 4.002	46.965			
	red		3.998 to 4.005		46.955		

Note: For the first repair stage, there are tolerated fitted bearing shells which are 0.2 and 0.4 mm wider than those for standard dimensions (refer to Table). The fitted bearing shells (1st to 4th rep.-stage) are 0.7 mm wider; these are rough dimensions only and must be refinished to the newly ground journal or pin dimensions. Max. wear limit of crankshaft journals and crankpins 0.02 mm. When regrinding fillets on crankshaft journals and crankpins, be sure to maintain a radius of 2.5 to 3 mm.

Crankshaft Bearing Basic Bore

Basic bore dia. for crankshaft journals in cylinder crankcase	67.000 67.019
Perm. out-of-round of basic bore	0.01
Perm. conicity of basic bore	0.01

Machining Tolerances of Crankshaft

Perm. out-of-true of crankshaft journals and crankpins		0.005 ¹⁾
Perm. conicity of crankshaft journals and crankpins		0.01 ²⁾
Perm. misalignment of crankpins in relation to crankshaft journals with reference to bearing length		0.01
Perm. radial runout of basic journals with crankshaft supported at outer crankshaft journals	Journals	II and VI 0.07
	Journals	III, IV, V 0.1
Perm. radial runout of flywheel flange with reference to crankshaft journals		0.02
Perm. axial runout of fitted bearing		0.015
Perm. axial runout of flywheel flange with reference to crankshaft journals		0.012 at 90 mm dia.
Fillets at crankshaft journals and crankpins		2.5 to 3
Hardness of crankshaft journals and crankpins, Rockwell hardness		55 to 61
Perm. unbalance of crankshaft		15 cmp

Note: When changing the flywheel and the balancing disc, rebalancing instructions should be accurately observed and completed. The crankshaft is balanced together with balancing disc and flywheel.

¹⁾ With used crankshaft journals and crankpins 0.01 mm

²⁾ With used crankshaft journals and crankpins 0.015 mm

Crankshaft and Connecting Rod Bearing Play

Crankshaft bearing play		Connecting rod bearing play		
Radial ¹⁾	Axial ²⁾ fitted bearing	Radial ¹⁾	Axial	
			when new	during repairs
0.045 to 0.065	0.100 to 0.240	0.035 to 0.055	0.110 to 0.260	up to 0.5

¹⁾ When setting radial play, try for mean value.

²⁾ In the event of repairs, axial play up to 0.30 is permitted.

Connecting Rod Bushing (Small End)

OD		ID		Overlap of connecting rod bushing
Standard dimension	Repair stage	Rough dimension	Finished dimension	
28.090	—	—	25.012	Removing force min. 250 kp

Connecting Rods

Basic bore dia. for connecting rod bearing		<u>51.600</u> 51.619
Basic bore dia. for connecting rod bushing (piston pin bushing)	Standard dimension	<u>28.000</u> 28.021
	Rep.stage	—
Perm. out-of-true and perm. conicity of basic bore for connecting rod bearings and connecting rod bushing		0.01
Overlap of one connecting rod bearing shell half in basic bore		+ 0.02 to + 0.04
Distance from center of connecting rod bearing bore to center of piston pin bore		<u>124.95</u> 125.05
		<u>27.890</u> 27.857
Width of connecting rod at connecting rod bearing eye		5 gr.
Perm. difference in weight of complete connecting rod within one engine		0.03
Perm. deviation from parallel of basic bores in relation to piston pin bore with reference to a length of 100 mm		0.1
Perm. offset of basic bore in relation to piston pin bore with reference to a length of 100 mm		

Pistons

Dia. of available pistons ¹⁾		
Standard dimension		<u>86.50</u> 86.48
	Rep.stages	<u>87.00</u> 86.98
Piston play		<u>87.50</u> 87.48
		0.02 + 0.01
Piston pin	Dia.	<u>25.000</u> 24.995
	Clearance in connecting rod bushing	0.012 to 0.023
	Play (–) or overlap (+) in piston	– 0.007 to + 0.003

¹⁾ Perm. difference in weight of pistons within one engine for all types = 4 grams

Piston Spacing

Distance between piston head and cylinder crankcase parting surface				
Standing-out		Standing-back		Engine Type Designation 130.925
max.	min.	max.	min.	
0.70	0.20	—	—	

Cylinder Head

Total height of cylinder head when new	84.8 to 85.0	
Minimum height following required material removal	84.0	
Perm. unevenness of parting surface	in longitudinal direction	0.1
	in transverse direction	0.0
Perm. roughness	0.006 to 0.014	
Perm. deviation in parallel of upper parting surface in relation to lower surface in longitudinal direction	0.1	
Test pressure with air under water in atü (bar)	2	

Note: When refinishing cylinder head parting surface, refinish valve seats to the extent that the permissible distance between the valve disc and the cylinder head parting surface is established. Also correct depth of compression chamber when refinishing cylinder head parting surface.

Refinishing Valve Seat

Valve seat width	Intake	1.3 to 2.0
	Exhaust	1.5 to 2.0
Adjusting angle for refinishing valve seat		45°
Perm. runout of valve seat		0.05
Relief of valve seat		with a relieving cutter min. 0.1

Valve Guides

Valve guide	Rep.stage	Color code	OD	Bore in cylinder head	Overlap	Valve guide	
						ID	Length
Intake	Standard dimension	green	14.021	14.000	+ 0.012	9.000	55.0
			14.012	14.009			
		brown	14.030	14.009			
			14.021	14.018			
	1st rep.stage	grey-green	14.039	14.018			
			14.030	14.027			
		grey-brown	14.048	14.027			
			14.039	14.038			
	2nd rep.stage	red	14.230	14.200			
			14.212	14.218			
	3rd rep.stage	white	14.430	14.400			
			14.412	14.418			
Exhaust	Standard dimension	green	15.021	15.000	+ 0.012	11.000	45.0
			15.012	15.009			
		brown	15.030	15.009			
			15.021	15.018			
	1st rep.stage	grey-green	15.039	15.018			
			15.030	15.027			
		grey-brown	15.048	15.027			
			15.039	15.036			
	2nd rep stage	red	15.230	15.200			
			15.212	15.218			
	3rd rep.stage	white	15.430	15.400			
			15.412	15.418			

Perm. Recess (---) or Elevation (+) of Valve Disc in Relation to Cylinder Head Parting Surface

Minimum distance with new valve seats and new valves	Intake	- 0.5
	Exhaust	- 15
Maximum distance with refinished valve seats and reground valves ¹⁾	Intake	- 2.0
	Exhaust	- 16.5

Note: Bottom edge of valve seat on valve should never rest against valve seat in cylinder head, since the edge would then work into seat, the valve would leak and develop a tendency toward burnout. This is why the valve seat must be relieved at this point.

¹⁾ The specified dimension at max. distance is reduced by the same amount by which the parting surface of the cylinder head is refinished.

Valve Seat Rings

Valve seat rings		Intake	Exhaust
Part No.	Standard dimension	108 053 00 31	129 053 00 32
	1st and 2nd rep.stage	108 053 01 31	129 053 01 32
Basic bore in cylinder head	Standard dimension	<u>42.700</u>	<u>41.000</u>
		42.716	41.016
	1st rep.stage	<u>43.200</u>	<u>41.500</u>
		43.216	41.516
	2nd rep.stage	<u>43.700</u>	<u>42.000</u>
		43.716	42.016
Required overlap of valve seat rings in cylinder head		+ 0.074 to + 0.100	
Dia. of valve seat rings	Standard dimension	<u>42.800</u>	<u>41.100</u>
		42.790	41.090
	Roughing dimension for rep.stages	44.000	42.300
Depth of bore in cylinder head		<u>13.300</u>	<u>27.600</u>
		13.400	27.400
Height of valve seat rings	Standard dimension	<u>11.400</u>	<u>9.500</u>
	1st rep.stage	<u>11.300</u>	<u>9.410</u>
	2nd rep.stage		
Distance between parting surface cylinder head and valve seat ring		2.3 to 2.5	18.0 to 18.15

Note: With a light alloy cylinder head,peen valve seat ring well at three points upon pressing-in.

Intake and Exhaust Valve

Intake and exhaust valve	Valve disc dia.	Valve seat plating	Height of valve disc, machining limit	Adjusting angle for machining valve	Valve stem dia.	Sodium charge	Valve length
Intake valve	<u>41.30</u>	with	1.0	45°	<u>8.970</u>	—	128.0
	41.10				8.955		
Exhaust valve	<u>37.25</u>	with	1.5	45°	<u>10.940</u>	with	113.2
	36,95				10.918		

Note: Perm. play between valve stem and valve cone max. 0.03 mm. All exhaust valves are provided with a Rotocap.

Valve Springs

Part No.	OD mm	Wire dia. mm	Length unloaded mm	Length under load preloaded		Length under load final load	
				mm	kp	mm	kp
Inner spring 108 053 00 22	22.2	2.5	45	31	12.8 to 15.2	21	22.8 to 25.2
Outer spring 129 053 02 20 ¹⁾	33.2	4.3	50	39	36	30	67.7 to 76.3

Note: Wear limit – 10 %

¹⁾ Mount valve spring in such a manner that the close coils are resting against cylinder head.

Valve Timing for Test Measurements

Intake opens BTDC	11°
Intake closes ABDC	47°
Exhaust opens BBDC	48°
Exhaust closes ATDC	16°
with camshaft code No.	0835

Measure valve timing at a valve lift of 0.4 mm valve play.

Camshaft Bearing

Camshaft bearing play	Radial	0.025 to 0.057
	Axial	0.050 to 0.128
Hardness of cams	Brinell hardness min.	HB 558 to 720
	Scleroscope hardness min.	77 to 90

Chain Tensioner

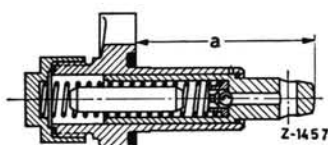


Fig. 00-0/5

With chain tensioner removed, dimension "a" is 51 mm.

I. Checking and Adjusting Engine

These jobs are required when the engine runs erratically at idle, when output is low or other irregular conditions prevail. The sequence of the jobs to be completed is not binding, neither is the number of the jobs shown. The need for any of these jobs is decided in accordance with condition of engine.

Note: For checking and adjusting carburetor, ignition and fuel system, refer to Group 07/47.

- 1 Check carburetor.
- 2 Check intake manifold, fiber flanges and throttle valve shaft for infiltrated air.
- 3 Clean fuel prefilter adjacent to fuel delivery pump, as well as the fine filter in the fuel delivery pump.
- 4 Check fuel delivery pump for capacity.
- 5 Clean air filter.
- 6 Check fuel intake and delivery lines, as well as changeover valve for leaks.
- 7 Check ignition coil, ignition distributor, ignition hardness and spark plugs for function.
- 8 Check cylinders for leaks.
- 9 Check camshaft adjustment. The line mark of compensating washer at front on camshaft must be in alignment with mark on first camshaft bearing, with crankshaft at TDC (refer to degree scale on counterweight).
- 10 Check and readjust valve clearance, if required.
- 11 Check/adjust firing point.
- 12 When compression pressure is very poor, refinish valves and valve seats, if required, insert new piston rings or refinish cylinder bores to next stage.

II. V-Belts

A. Removal and Installation of V-Belts

(Engine installed)

- 1 Loosen upper radiator support on radiator.
- 2 Loosen tensioning roller bracket of fan V-belt, swivel inwards and remove V-belt between fan blades and radiator.
- 3 If applicable, loosen tensioning device of compressor V-belt on compressor bracket and remove V-belts for compressor drive.
- 4 Loosen counter nut and tensioning bolt of adjusting device on generator.
Turn adjusting nut clockwise to swivel generator toward engine. V-belt will slacken and can be removed.
- 5 If installed, loosen clamping screw of speed limiter, swivel speed limiter downwards and remove narrow V-belt.
- 6 For re-installation, proceed vice versa.

B. Tensioning V-Belts

Designation	Dimensions in mm
V-belt tension crankshaft, generator, water pump	approx. 5 to 10
V-belt tension water pump, tensioning roller, fan	approx. 10 to 15
V-belt tension crankshaft, air compressor	approx. 5 to 10
V-belt tension generator, speed limiter	approx. up to 5

Tighten tensioning bolts and counter nuts well.

(without Transmission)

1. Remove cab (refer to Job No 60-2).
2. Loosen exhaust pipes on exhaust manifold.
3. Loosen speedometer drive shaft with pipe clip from engine block. Fig. 00-2/1.
4. Loosen hose clip on connecting hose cooling water line - water pump via generator and remove line.
5. Disconnect pull rod on clutch throwout lever.
6. Unflange pto shaft on transmission (if appl.).
7. Unscrew front engine bearing on frame cross beam.
8. Unscrew heat exchanger with lines from engine (if appl.).
9. Loosen air compressor support on engine (if appl.).
10. Remove V-belts and unscrew air compressor line.
11. Push air compressor in outward direction. Fig. 00-2/2.
12. Loosen ground strap between frame transmission.

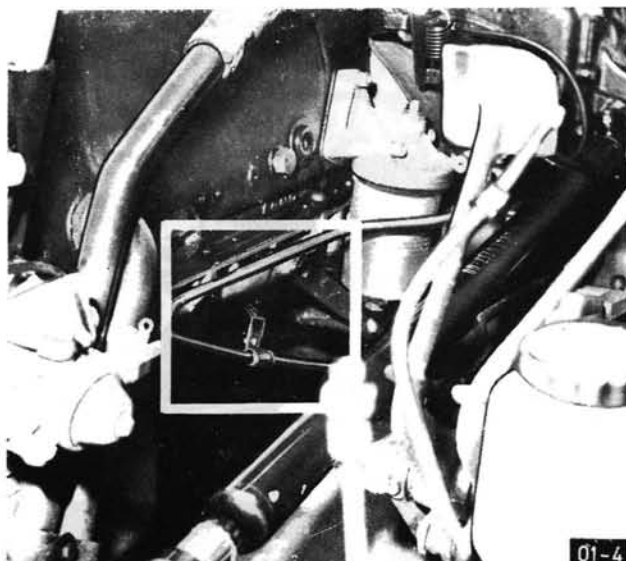


Fig. 00 2/1

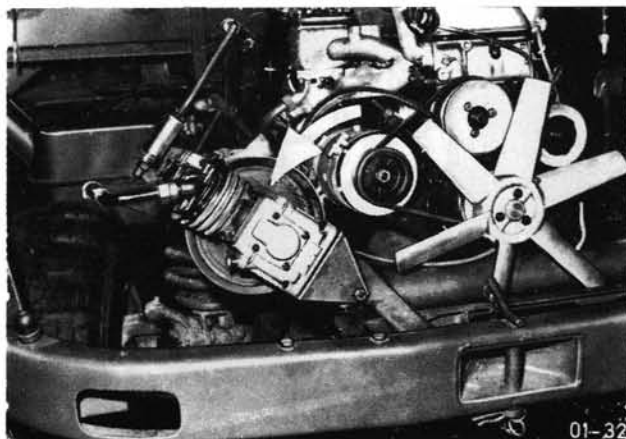


Fig. 00 2/2

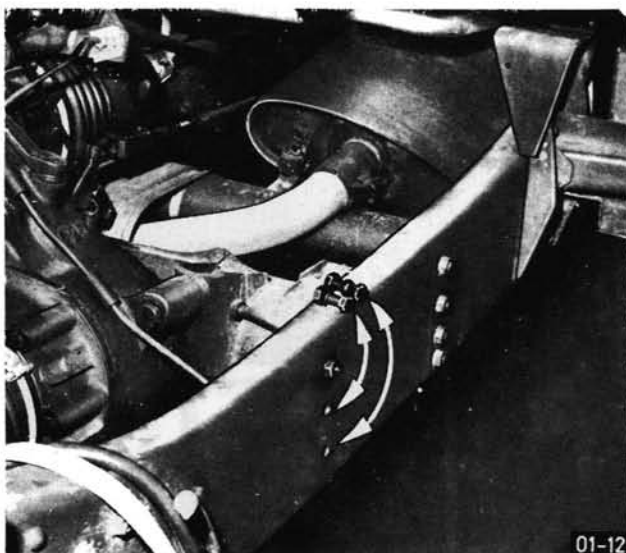


Fig. 00 2/3

(without Transmission)

1. Remove cab (refer to Job No 60-2).
2. Loosen exhaust pipes on exhaust manifold.
3. Loosen speedometer drive shaft with pipe clip from engine block. Fig. 00-2/1.
4. Loosen hose clip on connecting hose cooling water line - water pump via generator and remove line.
5. Disconnect pull rod on clutch throwout lever.
6. Unflange pto shaft on transmission (if appl.).
7. Unscrew front engine bearing on frame cross beam.
8. Unscrew heat exchanger with lines from engine (if appl.).
9. Loosen air compressor support on engine (if appl.).
10. Remove V-belts and unscrew air compressor line.
11. Push air compressor in outward direction. Fig. 00-2/2.
12. Loosen ground strap between frame transmission.

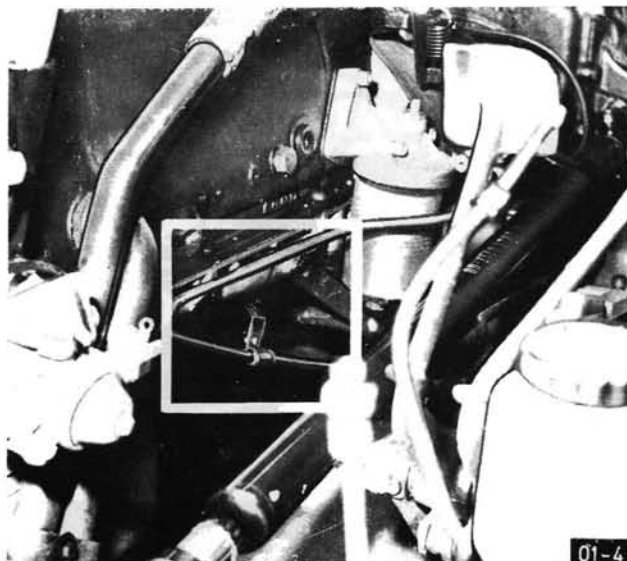


Fig. 00 2/1

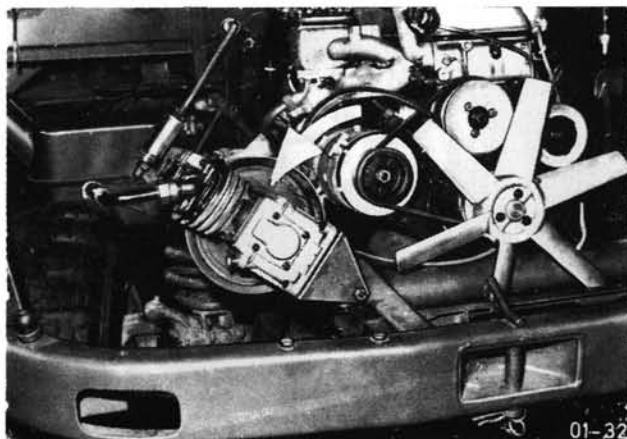


Fig. 00 2/2

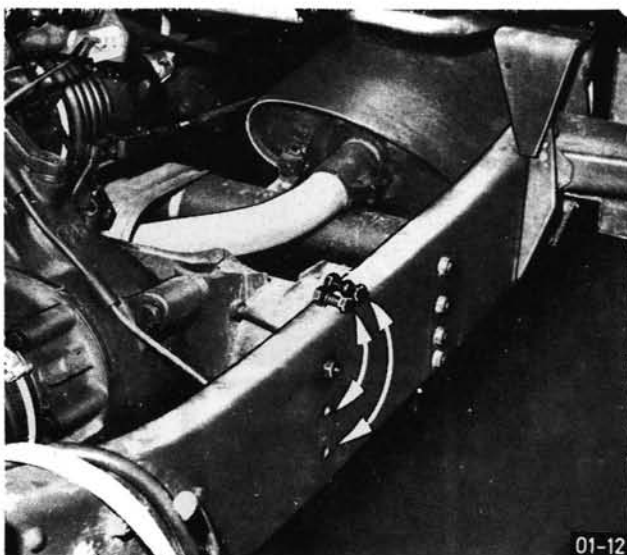


Fig. 00 2/3

21. Remove two pull rods between oil pan and clutch housing. Fig. 00-2/8.
22. Unscrew connecting screws between clutch housing and engine.
23. Remove cover plate on clutch housing bottom front.
24. Remove holder with starter line on intermediate plate.
25. Carefully pull out engine in forward direction.

Note: Watch out for transmission input shaft, which is approx. 150 mm in flywheel and clutch. Do not tilt, lift or lower engine as long as drive shaft is not released.

Watch out for centering pins (2 each).

26. When engine is completely freed, remove from chassis and place on engine stand.

Note: Provisional placing on wooden blocks is possible. Set down carefully, danger!

27. For reinstallation proceed vice versa.

Note: Upon installation, the engine and exhaust assembly should be able to swing smoothly and without distortion.

Engine can also be removed together with the flanged-on transmission. Refer to Job No. 26-1/1.

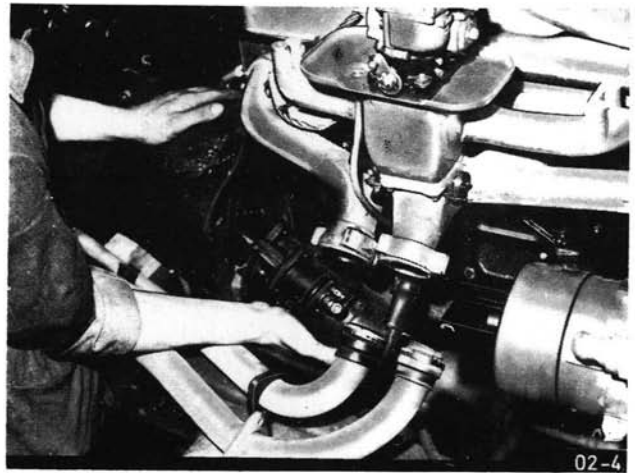


Fig. 00-2/7

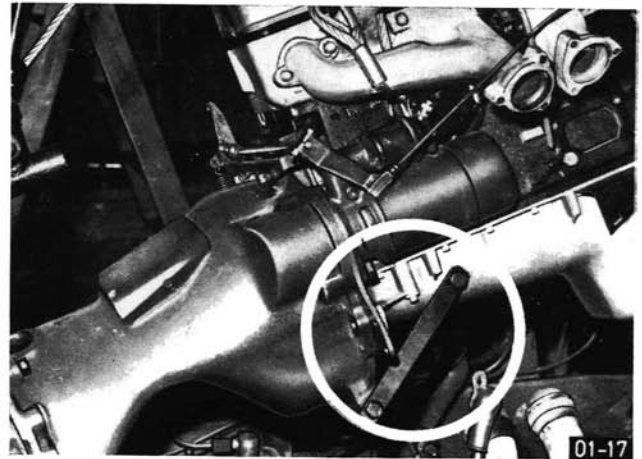


Fig. 00-2/8

I. Disassembly

1. Drain oil.
2. Remove clutch (Job No. 25-1).
3. Remove engine suspension front (bearing bracket).
4. Loosen V-belt tensioning device for fan (Fig. 00-3/1).
5. Unscrew fan.
6. Loosen V-belt tensioning device on generator and remove V-belt.
7. Unscrew fastening nut of fan V-belt pulley secured by two punch marks.
8. Remove V-belt pulley with puller 112 589 07 33 00. Fig. 00-3/2.
9. Remove crankshaft pulley after loosening hexagon socket screws.
10. Remove counter weight of crankshaft (if required) with puller 112 589 07 33 00.

Note: After pulling counter weight, the front engine seal of crankshaft (oil sealing ring) can be replaced by means of assembly sleeve 111 589 17 61 00.

11. Remove fan belt tensioning fixture (lever, clamping wheel and clamping plate). Fig. 00-3/3.

12. Unscrew water pump with housing.

Note: There are two versions of water pump housing and two versions of venting line for water pump. Fig. 00-3/4.

13. Remove generator with pulley tensioning device. Fig. 00-3/5.
14. Unscrew all fuel lines from engine.
15. Unscrew fuel filter.
16. Loosen and remove ignition timer with ignition harness and loosen protective tube, if installed.

With short-distance radio shielding installed, unscrew high-voltage cable on plug, with long-distance radio shielding pull off plug connection.

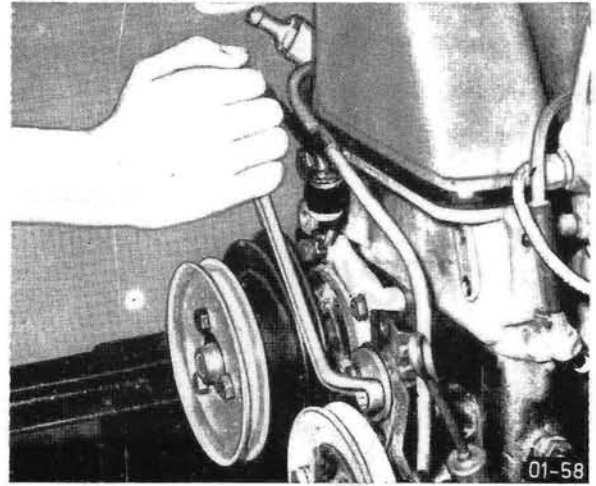


Fig. 00-3/1

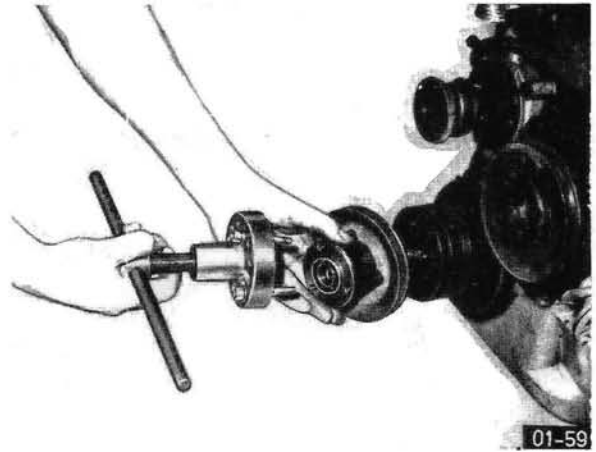


Fig. 00-3/2

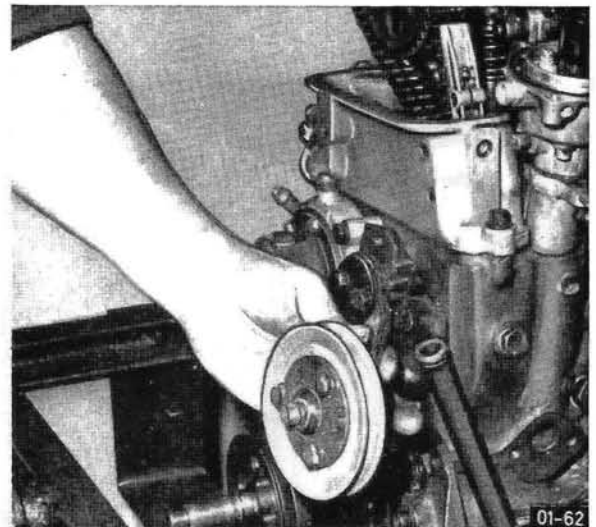


Fig. 00-3/3

17. Remove ignition timer bearing after loosening hexagon socket screw. Watch out for spacer ring under fastening eye of ignition distributor bearing.
18. Unscrew spark plugs.



05-29

Fig. 00-3/4

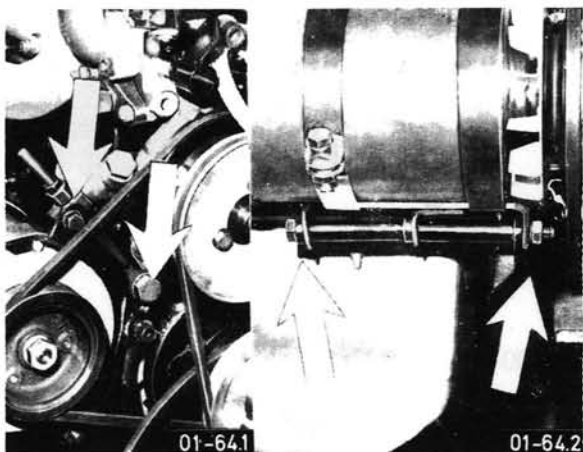


Fig. 00-3/5

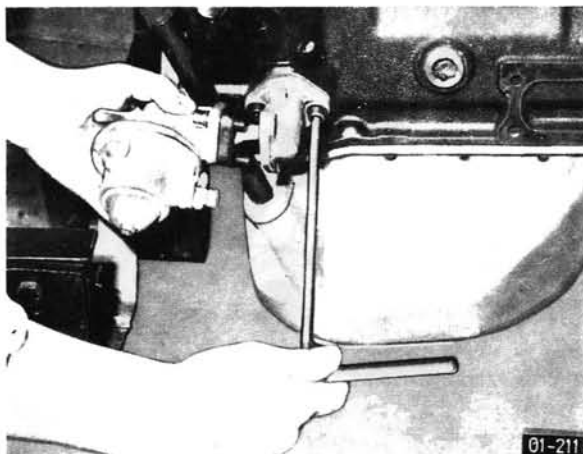


Fig. 00-3/6

19. Remove fuel delivery pump and intermediate flange. Fig. 00-3/6.
20. Unscrew oil pressure relief valve from crankcase.

Note: Two versions, old version, laterally left behind fuel delivery pump. Fig. 00-3/7. New version below lock screw on front face of engine in sprocket wheel case. Fig. 00 3/8.

For repair data refer to Job No. 00-0, Table 26.

21. If required, pull out grooved ball bearing and locking ring on flywheel end of crankshaft.
22. Remove cylinder head cover.
23. Loosen chain tensioner and remove.

Note: Two versions, refer to Fig. 00-3/9. Chain tensioners are fully exchangeable, individual parts are different.

24. Unscrew carburetor and remove together with insulating flange and shielding plate.
25. Unscrew intake pipe and exhaust manifold.
26. Pull off camshaft gear or loosen lock of timing chain (on repair chain).

Note: To be observed, when offset plate spring is installed. When installing a new timing chain, a new plate spring may be required. One chain link too much = tolerance dimension of chain.

27. Place removed chain into chain wheel box.

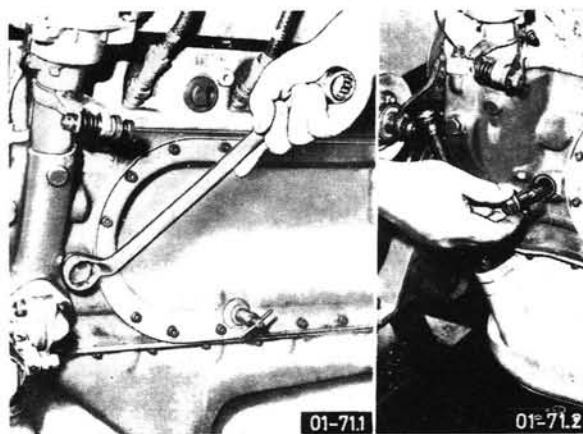


Fig. 00-3/7

28. Remove cylinder head by loosening hexagon socket screws and removing released clamps (3) of cylinder head cover attachment. Refer to Job No. 01-1.

Note: Observe two hexagon socket screws in gearbox, one of which is a screw under the tensioning wheel bearing.

REMOVE CYLINDER HEAD ONLY WHEN COLD!

When placing cylinder head on workbench, watch out for valves and don't put down too hard. Disassemble cylinder head. Refer to Job No. 01 and 05.

Remove cylinder head gasket and throw away. Use new gasket for reassembly. Identification: copperlined water holes. Fig. 00-3/10.

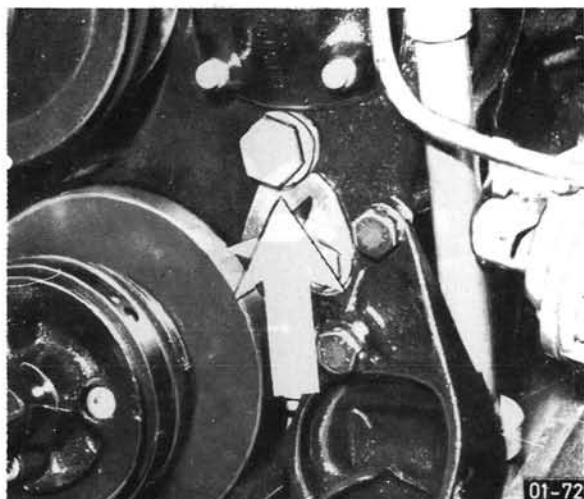
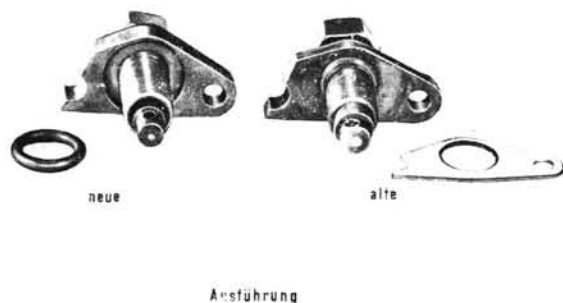


Fig. 00-3/8

29. Remove closing cover on chain wheel box, remove intermediate gear with shaft and bearing. Refer to Job No. 00-4.

30. Remove oil filter with oil filter housing top.

Note: There are two versions of filter and flange. Old version with wire screen and paper filter element which requires pressure relief valves on filter. New version comprises one filter element and one pressure relief valve. For checkup, refer to Job No. 00-0, Table 26.



01-294

Fig. 00-3/9

neue	new
alte	old
Ausführung	Version

31. Turn engine around by 180° and remove oil pan.

32. Remove crankcase acc. to Job No. 03-1.

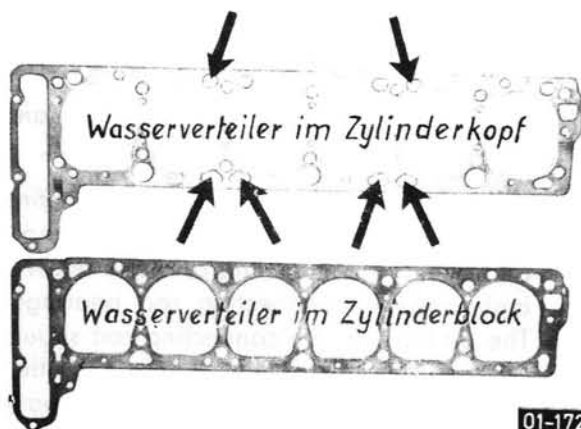
33. Remove piston with connecting rods acc. to Job No. 03-3.

34. Clean all parts and check. Clean oil ducts of cylinder crankcase and crankshaft particularly well.

35. Pressure-test cylinder crankcase acc. to findings and grind plane. Bore cylinders and hone acc. to Job No. 01-4.

36. Remove bearing bushing for ignition timer bearing, if required, with suitable mandrel, applying force from oil pump end. Fig. 00-3/11.

37. Unscrew intermediate plate on flywheel end.



01-172

Fig. 00-3/10

Wasserverteiler im Zylinderkopf = Water distributor in cylinder head
 Wasserverteiler im Zylinderblock = Water distributor in cylinder block

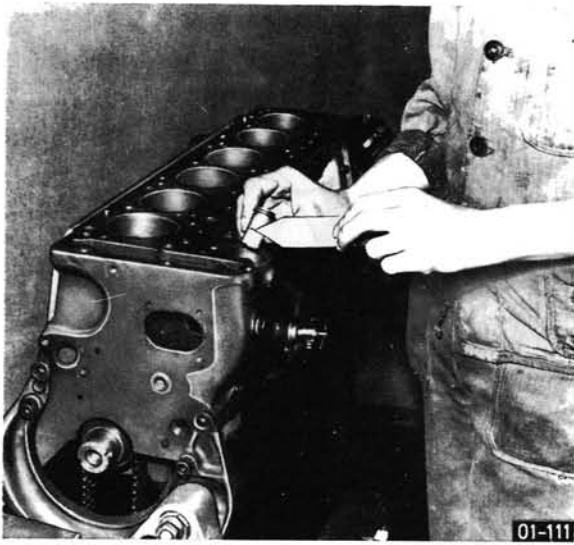


Fig. 00-3/11

II. Assembly

For assembly proceed vice versa.

1. Preassemble crankshaft (flywheel, compensating ring, crankshaft gear with plate spring, oil thrower ring, spacer wear ring and sealing ring).

Note: On type 180.952/953 install only crankshaft gear (wide gear, therefore no compensating ring), intermediate ring (wide ring, therefore no oil thrower ring) and sealing ring latest design (color code: white). New flywheel with flange 20.5 mm wide and with new fastening screws. Refer to Job No. 03-6 (balancing) (Part No. 180 032 05 71). This new version can also be subsequently installed on new types.

2. Screw on intermediate plate.
3. Install crankshaft acc. to Job No. 03-2.
4. Assemble and install connecting rod and piston. Refer to Job No. 03-3 and 03-4.

Note: On type 180.952/953 the connecting rods are provided with a lateral oil hole on big end of connecting rod (and accordingly changed connecting rod bearings). The oil hole on the connecting rod should face to the **right of the driving direction** upon installation. The pistons of the above type have new dimensions. Identification: thickness of compression ring 1.5 mm.

5. Install oil pump.

6. Install half of fabric sealing ring and screw down oil pan after applying sealing compound, Refer to Job No. 03-2, item 6.
7. Install intermediate gear shaft and intermediate gear acc. to Job No. 05-4.

Note: Measure alignment of sprocket wheel with the intermediate gear and crankshaft completely pushed back. A new spacing washer may be required behind crankshaft gear. (Not applicable on Type 952/953.)

8. Install counter weight.
Attach with collar screw and three plate springs, latest type, tightening torque 22 mkp.
9. Mount engine suspension front.
10. Attach double pulley.
11. Mount hub for fan drive (secure nut with two punch marks).
12. Mount preassembled cylinder head acc. to Job No. 01-1.
13. Install intake pipe and exhaust manifold, oil filter housing top with oil filter, oil pressure relief valve and carburetor.
14. Screw on fuel filter and fuel line.
15. Install water pump.
16. Install generator and tension V-belt.
Job No. 20-0/2.
17. Install helical gear, ignition timer bearing and ignition timer, time ignition, refer to Job No. 05-4, II, assembly item 11.
18. Measure chain alignment in relation to camshaft wheel, refer to Job No. 05-4, II, assembly item 8.
19. Adjust valves.
20. Screw in spark plugs and install ignition harness.
21. Screw on clutch. (Centering mandrel 401 589 136 100.)
Note: Check whether grooved ball bearing and closing ring are fitted to crankshaft.
22. Screw on cylinder head cover with new gasket.
23. Install fan and fill in oil.
24. Fill oil into engine.

Fluid Consumption

Fuel consumption acc. to DIN 70030 on a level road	20.5 lits/100 km
Oil consumption depending on operating conditions	approx. 1 % of actual fuel consumption

Adjusting and Installation Data

Camber	1°45'
Toe-in (try for 0)	- 1 to + 3 mm
Caster (medium value depending on load)	2° to 5°
KPI	10°
Adjustment of axle drive	refer to Group 33-3
Reduction of pinion-ring gear	25:7 (old version) 39:11 (new version)
Reduction in wheel hub	32:15
Perm. runout of differential housing	
Lateral runout at flange	0.005 mm
Vertical runout at flange	0.01 mm
Perm. runout of pinion shaft at ball bearing seat	0.005 mm
Backlash of bevel gear drive	0.08 to 0.15 mm
Backlash of differential pinions	0.15 to 0.20 mm
Perm. vertical runout of rear axle shaft at ball bearing seat	0.02 mm
End play of rear axle shaft in roller bearings	0.08 mm
Installation clearance of ball bearings or roller bearings	refer to Group 33
Installation clearance of double universal shaft (front axle)	0.08 mm
Perm. twist of axle housing	± 0° 15'
Max. deviation from parallel at hub drive flanges in installation position (in relation to center position)	
Horizontal left and right	0°15'
Vertical left and right	0°08'
Max. bending of axle center piece, measured on flange, long axle tube	horizontal ± 1.5 mm vertical ± 0.9 mm
flange, short axle tube	horizontal ± 1.0 mm vertical ± 0.5 mm
(refer to data sheet Group 33-5)	
Perm. distance center axle to axle drive flange area	63-0.1 mm
Offset angle of axle drive housing flange to wheel hub flange (caster)	7°
Perm. stock removal on flange wheel hub connection up to flange thickness	13.5 mm

Shock Absorbers

Manufacturer	Boge (formerly Stabilus)
Designation	Boge AIP 40/15-350 (formerly Teleskop T 50 x 240)
Special version for rear axle (reinf.)	Teleskop T 70 x 240

0-3 Chassis 404.1

Suspension

Front Springs

Unloaded length

Spring travel for each 100 kg load

2 Coil springs

282 ± 5 mm

12.0 mm

Rear Springs

Unloaded length of main spring

Spring travel per 100 kg load

Unloaded length of auxiliary spring

Spring travel per 10 kg load

2 Coil springs with
2 auxiliary springs

350 ± 5 mm

16.7 mm

210 ± 3 mm

7.65 mm

Brakes

Foot Brake

Eff. total brake area

Manufacturer

Master brake cylinder

Clearance between push rod and piston of master brake cylinder

Idle travel of brake pedal measured at pedal plate

Brake drum – standard dimension

Ist rep.stage

IInd rep.stage

IIIRD rep.stage

Hydr. brake acting on all 4 wheels

1,976 cm² (4 x 494 cm²)

Alfred Teves

A 74042–239

min. 1 mm

10 mm

349.2 + 0.3 mm lining 6.0 mm

350.0 + 0.3 mm lining 6.4 mm

351.0 + 0.3 mm lining 7.0 mm

352.0 + 0.3 mm lining 7.5 mm

Hand Brake

Adjustment

Vacuum Brake Booster

Air Pressure Brake Booster

Air Pressure Trailer Brake System

Mech. acting on rear wheels

refer to Group 42–6

Technical data refer
to Group 42

Steering

Recirculating ball-type steering

Play (slack) at steering wheel circumference

Steering wheel

Ratio

Steering shaft

Daimler-Benz Type L 2

20 to 30 mm

Petri 450 dia. – optional 500 dia.

1:29.7 resulting in a 75° lever
deflection at 5.75 steering wheel
turns

Lefthand,
pitch angle 5°39'

Clutch (single-plate dry clutch)

Adjustment of clutch

Clutch pedal travel (lash)

Additional technical data

Fichtel & Sachs

refer to Group 25—2

approx. 35 mm

refer to Group 25—0

Transmission

Daimler-Benz sixspeed transmission (synchromesh)

Backlash of gears

1st/3rd and 2nd/4th gear

0.10 to 0.16 mm

5th and 6th gear

0.06 to 0.12 mm

rev. gear

0.13 to 0.19 mm

End play of gears on countershaft

0.20 to 0.35 mm

Radial play of gears on countershaft

0.13 to 0.19 mm

End play of countershaft

0.30 to 0.35 mm

Travel of synchronized member up to contact against opposite cone of respective gear wheel of

1st/3rd and 2nd/4th gear

0.8 to 1.3 mm

5th and 6th gear

0.5 to 1.0 mm

Spring force of spring cup at 1.45 mm spring travel

Color codeyellow **19 to 23 kg**

bright 9 to 12 kg

End play between front transmission housing cover and ball bearing on drive shaft

0.0 to 0.05 mm

End play between rear transmission housing cover and ball bearing on main shaft

0.0 to 0.05 mm

Projection of synchronizing ring, inserted in 1st/3rd and/or 2nd/4th gear wheel

8.1 to 8.3 mm

Lengths of springs for locking

shifting tongue main/prestage shaft

19 mm

shifting tongue 5th and 6th gear

19 mm

shifting tongue 1st/3rd and 2nd/4th gear

21 mm

shifting tongue rev. gear

21 mm

Deadweight of transmission (dry) without special pto and without crawler gear

approx. 160 kg

Vehicle Dimensions in mm

Wheel base	2,900	
Track, front	1,630	
Track, rear	1,630	
Track circle dia.	11,900	
Turning circle dia.	12,900	
Overall length	5,030	(4,757)
Overall width	2,150	
Overall height, unloaded	2,630	with platform body
Vehicle height above cab unloaded	2,310	open cab
	2,290	closed cab
Length of overhang, front	930	
Length of overhang, rear	1,200	(927)
Angle of approach, front (degrees)	45	
Angle of approach, rear (degrees)	46	
Ground clearance front axle (loaded)	400	
Ground clearance rear axle (loaded)	400	
Fording depth	800	
Lateral tilting angle max. (degrees)	42	with platform body
Bulk clearance (ride clearance) (loaded)	585	
Climbability	400	

Cargo Space with Platform Body

Length	3,000
Width	2,000
Height of side gates	500
Height of front gate	500
Height of tailgate	500
Loading height above ground unloaded)	1,190
Loading height above ground (loaded)	1,100

Data in ()

apply to chassis without body

0-3:1 Chassis 404.0

Weights in kp

Chassis Model Designation	404.010	404.011	404.012	404.013
Cable winch	without	without	without	without
Perm. total weight of vehicle				
Vehicle version				
A) Hydraulic service brake	4750	4750	4750	4750
B) Hydraulic service brake with compressed air – or vacuum support	5000	5000	5000	5000
C) Hydraulic service brake with compressed air – or vacuum support and reinforced springs	5250	5250	5250	5250
D) Hydraulic service brake with compressed air – or vacuum support and reinforced springs (for fire-fighting, extinguishing and emergency vehicles only)	5500	5500	5500	5500
Payload				
Vehicle version				
A)	1700 to 1900	1700 to 1900	1700 to 1900	1700 to 1900
B)	1700 to 2150	1700 to 2150	1700 to 2150	1700 to 2150
C)	2100 to 2400	2100 to 2400	2100 to 2400	2100 to 2400
Deadweight				
Chassis with cab and platform body	2850	2850	2850	2850
Chassis with cab without platform body	2220	2220	2220	2220
Perm. axle load, front				
Vehicle version				
A)	2500	2500	2500	2500
B) C) D)	2500 to 3300	2500 to 3300	2500 to 3300	2500 to 3300

Chassis Model Designation		404.010	404.011	404.012	404.013
Rope winch		without	without	without	without
Perm. axle load, rear					
Vehicle version	A)	2600	2600	2600	2600
	B)	2600	2600	2600	2600
		to	to	to	to
		3300	3300	3300	3300
	C)	2950	2950	2950	2950
		to	to	to	to
		3300	3300	3300	3300
	D)	3300	3300	3300	3300
Perm. total weight of trailer with brake		4750	4750	4750	4750
Perm. total weight of trailer without brake		1425 ¹⁾	1425 ¹⁾	1425 ¹⁾	1425 ¹⁾
Perm. trailer load for trailer with brake system					
With non-continuous brake system					
Vehicle version	A)	4750	4750	4750	4750
Engine M 180	B)	5000	5000	5000	5000
	C)	5000	5000	5000	5000
	D)	4750	4750	4750	4750
Vehicle version	A)	4750	4750	4750	4750
Engine M 130	B)	5000	5000	5000	5000
	C)	5250	5250	5250	5250
	D)	5500	5500	5500	5500
With continuous brake system					
Vehicle version	B)	5000	5000	5000	5000
Engine M 180	C)	5000	5000	5000	5000
	D)	4750	4750	4750	4750
Vehicle version	B)	7000	7000	7000	7000
Engine M 130	C)	7350	7350	7350	7350
	D)	7700	7700	7700	7700

¹⁾ or half the respective deadweight

0-3.1 Chassis 404.0

Chassis Model Designation	404.010	404.011	404.012	404.013
Load-carrying capacity of chassis				
Vehicle version				
A)	2890	2890	2890	2890
B)	3140	3140	3140	3140
C)	3390	3390	3390	3390
D)	3640	3640	3640	3640

Max. Speed with Tires 10.5–20

	First	Second	Third	Fourth	Fifth	Sixth
Forward gears	7,21	13,08	24,07	43,66	70,59	107,66
Crawler gears	2,34	4,25				
Reverse gears	5,35	9,70				
Engine speed = 4,800/min						
Front – rear axle total = 7.56						

Governor for Implements and Attachments (Group 06)

Governor make and type	Mech. centrifugal governor with spring-loaded flyweights
Manufacturer	Heinzmann
Use	For operating implements and attachments governor speed 2,850/min
Purpose	Maintenance of working speeds for implements and attachments driven by engine via special pto

Electrical System (Group 54, 82)

Nominal voltage	24 V
Battery	2 x 12 V, 55 Ah
Alternator	24 V – 27 A (756 W)
Starting motor	24 V – 1 HP
Regulator switch	24 V – 27 A (756 W)

Cooling System (Group 20 and 50)

Type of cooling	Thermostatically controlled pump circulation cooling
Type of radiator	Finned radiator

Clutch (Group 25)

Design	Single-plate dry clutch	
Manufacturer	Fichtel & Sachs Engine M 180	Engine M 130
Type	KS 225 Sph	KS 225 Sph adj.
Contact force	610 – 675 kp	660 – 700 kp
Throwout force at 10 mm throwout path	160 – 190 kp	170 – 200 kp
Clutch clearance measured at slave cylinder	3 + 0.5 mm	3 + 0.5 mm

Transmission (Group 26)

Make	Daimler-Benz		
Design	6-speed mechanical synchromesh transmission with built-in transfer case without differential, with rear axle drive, with front axle power take-off shifted and released while driving, additional auxiliary crawler gear and special pto optional.		
Reductions	Gearbox	Aux. crawler gear	
	First	$i = 14.93$	$i = 46.01$
	Second	$i = 8.23$	$i = 25.34$
	Third	$i = 4.47$	$i = -$
	Fourth	$i = 2.47$	$i = -$
	Fifth	$i = 1.53$	$i = -$
	Sixth	$i = 1.00$	$i = -$
	First rev.	$i = 20.12$	$i = -$
	Second rev.	$i = 11.10$	$i = -$

0-3.1 Chassis 404.0

Special pto speed at 2,540/min engine speed 540/min

Reduction $i = 4.7$

For additional data refer to page 0–3/5

Frame (Group 31)

Design Side member frame (profilated)

Springs and Shock Absorbers (Group 32)

Suspension front Coil springs
Suspension rear Coil springs with auxiliary coil springs

Shock absorber front/rear Telescoping shock absorber, double-acting

Front Axle (Group 33)

Design Driven front axle (portal type) with torque tube and lateral spur gear hub drives, rigid axle housing, built-in differential and differential lock

Reduction – total $i = 7.56$
– axle drive $i = 3.55$ (39:11)
– spur gear hub drive $i = 2.13$ (32:15)

Power transmission Universal shaft with slide piece

For additional data refer to page 0–3/3

Rear Axle (Group 35)

Design Driven rear axle (portal type) with torque-axle housing, built-in differential and differential lock

Reduction – total $i = 7.56$
– axle drive $i = 3.55$ (39:11)
– hub drive $i = 2.13$ (32:15)

Power transmission Universal shaft with slide piece

For additional data refer to page 0–3/3

Wheels and Tires (Group 40)

Type of rim	Steel sheet wide rim bed
Size of rim	9,00–20
Wheel arrangement	Single front and rear
Tire size depending on axle load	10,5–20/6 PR normal 10,5–20/8 PR reinforced 10,5–20/10 PR Super 10,5–20 Michelin Radial

Tire Pressures**Front Axle**

Tire size	Axle load in kp	Air pressure in bar (kp/cm ²) Road/Off-the-road
10,5–20/6 PR	2,200 to 2,500	2.0 to 2.4
10,5–20/8 PR		
10,5–20/10 PR		

Rear Axle

Tire size	Axle load in kp	Air pressure in bar (kp/cm ²) Road/Off-the-road
10,5–20/6 PR	2,200 to 2,600	2.0 to 2.5
10,5–20/8 PR	2,600 to 2,950	2.5 to 3.0
10,5–20/10 PR	2,950 to 3,300	3.0 to 3.6

On slippery ground, at speeds up to 25 km/h, the tire pressure can be reduced to 1.0 bar (kp/cm²).

Brake System (Group 42 and 43)

Service brake (foot brake)	Hydraulic four-wheel expanding brake Single-circuit system
Optional	Additionally with compressed air or vacuum support
Parking brake (hand brake)	Mechanically lockable lever-type hand brake acting on rear wheels

Trailer Brake

Vehicles with compressed air support can be provided with a single-line brake system.

0-3.1 Chassis 404.0

Different data when equipped with	Hydraulic brake	Hydraulic brake with compr. air support	Hydraulic brake with vacuum support
Service Brake			
Reduction up to contact point on brake shoes	front 34,28 rear 16,45	50,41 24,19	52,45 25,17
Attained deceleration, loaded	62 %	80 %	68 %
Applied actuating force	80 kp	66 kp	80 kp
Attained deceleration, unloaded	58 %	56 %	58 %
Applied actuating force	54 kp	46 kp	51 kp
Parking Brake			
Attained deceleration, loaded	27 %	27 %	27 %
Applied actuating force	60 kp	60 kp	60 kp
Brake weight, loaded	4780 kp	5560 kp	5550 kp
Brake weight, unloaded	2860 kp	2900 kp	2860 kp

Steering (Group 46)

Design	Mech. recirculating ball steering
Type	L 3.5 K
Manufacturer	Daimler-Benz
Reduction in center	34.2 : 1
Optional	
Design	Ball nut power steering
Type	ZF – 8036
Manufacturer	Zahnrad-Fabrik Friedrichshafen

Exhaust System (Group 49)

System	Expansion damper	
Muffler type	Cyl. three-chamber muffler with perforated partitions and inside pipes	
Manufacturer	Eberspächer	
Sound level in Phon	Engine M 180	Engine M 130
Stationary noise at 3,600/min engine	82 dB (A)	82 dB (A)
Noise while driving	85 dB (A)	89 dB (A)

Cab (Group 60 to 97)

Design	Open military cab with folding top (model designation 416.810) Closed all-steel cab (model designation 406.821) Double cab optional
Platform	
Design	Loading platform, openable, with steel panels and bows with tarpaulin
Version	Platform 2,000 x 3,000 x 500 mm
Model designation	404.642

Cab Heater (Group 83)

Heater system and type	Warm water heater in coolant circuit bypass with electrical blower
Manufacturer	Hornkohl und Wolf

Capacities of Fluids

Fuel	Fuel tank	approx.	120	l
Coolant	Cooling system (engine, radiator and heater)	approx.	16.5	l
	of which, anti-corrosion compound for summer and winter operation	approx.	165	cc
	of which, anti-freeze for winter operation, depending on ambient temperature	approx.	3.3 to 8.4	l

Engine Oil

with oil filter cleaning in addition	Engine oil pan	max.	6	l
		approx.	0.5	l
		min.	4	l
	Oil bath air filter	approx.	1.8	l
	Power steering (SAE 10 W only)	approx.	2.5	l
	Air compressor	approx.	maintenance-free	

Brake Fluid

	Hydraulic brake system	approx.	0.8	l
	Clutch hydr. system	approx.	0.2	l

Transmission Oil

	Transmission basic version	approx.	6	l
	Transmission with crawler gear aux. gear unit	approx.	7	l
	Front and rear axle gear housing	each approx.	3	l
	Wheel hub drive (4)	each approx.	0.3	l
	Steering gear	approx.	0.9	l
	Pto shaft bearing	each approx.	0.1	l
	Coolant pump	approx.	0.01	l

Fluid Consumption

Fuel standard consumption acc. to DIN 70 030 on level road	23.5 l/100 km
Oil consumption depending on operating conditions	approx. 1 % of actual fuel consumption

Engine

Crankshaft bearing bolts	80 (8)
Connecting rod bearing bolts	37.5 (3.75) or 0.1 mm expansion
Cylinder head bolts with engine cold	80 (8)
Cylinder head bolts with engine warm	90 (9)
Rocker arm bearing bracket bolts (old valve assembly)	37.5 (3.75)
Studs for rocker arm bearing	100 (10)
Rocker arm ball head bolts (new valve assembly)	15 (1.5) min.
Spark plugs	35 to 40 (3.5 to 4)
Collar bolt for attaching counterweight to crankshaft with code No. „8 G“ *)	220 (22)
without code No *)	180 to 200 (18 to 20)
with small collar *)	160 (16)
with 3 plate springs and new collar bolt	220 (22)
Bolts for flywheel attachment (old version)	45 + 5 (4.5 + 0.5)
(expanding bolts only) (new version)	55 + 5 (5.5 + 0.5)
Clamping strap bolts for generator	22 (2.2)

*) During reconditioning or when working on counterweight, convert to latest version (3 plate springs).

Axles

Fastening nut for axle strut on supporting bearing	75 to 80 (7.5 to 8)
Fastening bolts of ring gear on differential housing	70 to 80 (7 to 8)
Nut on bevel gear shaft (axle drive)	140 to 160 (14 to 16)
Hex. bolts for steering knuckle or connecting housing to axle beam	240 (24)
Control arm fastening bolts	170 (17)
Wheel closing plug	750 to 1,000 (75 to 100)
Wheel nuts (max.)	290 (29)

Shock Absorber

Fastening bolts	120 to 140 (12 to 14)
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Steering

Bearing bolt (steering to frame side member)	550 ± 50 (55 ± 5)
Pitman arm to pitman shaft	250 to 280 (25 to 28)
Torque support (steering to control arm)	140 (14)
Clamping screw to pitman arm bracket (max.)	70 (7)

Engine		M 180	M 130
Cylinder head bolts	with engine cold	80 (8)	100 (10)
	with engine warm	90 (9)	110 (11)
Hex. bolt for attaching cylinder head cover		10 (1)	
Camshaft bearing bolts or nuts		25 (2.5)	
Studs in cylinder head for rocker arm bearing		80 (8)	
Adjusting torque of adjusting screw for valve adjustment (mounted with tallow)		20 to 40 (2 to 4)	
Spark plugs		30 to 40 (3 to 4)	
Fastening screw intermediate gear to intermediate gear shaft (timing chain)		70 (7)	
Connecting rod bearing bolts	initial torque angle of	40 to 50 (4 to 5)	
	rotation torque	90° + 10	
Crankshaft bearing bolts		80 (8)	
Hex. bolt on crankshaft front		210 to 220 (21 to 22)	
Expanding bolts for flywheel or driven plate on crankshaft	initial torque angle of	30 + 10 (3 + 1)	
	rotation torque	90° + 10°	
Fastening bolts for intermediate flange on cylinder crankcase		50 (5)	
Fastening bolts for oil pan on crankcase		13 (1.3)	
Oil drain plug on oil pan lower half		50 (5)	
Fastening bolt for oil filter lower half or oil cylinder on cylinder crankcase		40 (4)	
Oil pressure relief valve in cylinder crankcase and on oil pump		40 (4)	
Hex. nuts for attaching chain tensioner to cylinder head		25 (2.5)	

0-4.1 Tightening Torques in Nm (kpm)

Transmission

Fastening bolt transmission to supporting tube		200 (20)
Fastening bolt of bearing hub on main shaft		140 to 160 (14 to 16)
Springs/Shock Absorbers		
Fastening bolts at top and bottom on coil springs		140 (14)
Fastening nuts control arm bolts	inside nut counter nut	80 (8) 160 to 170 (16 to 17)
Shock absorber fastening bolts		120 to 140 (12 to 14)
Axles		
Fastening nut for axle strut on supporting bearing		75 to 80 (7.5 to 8)
Fastening bolts of ring gear on differential housing		70 to 80 (7 to 8)
Nut on bevel gear shaft (axle drive)		140 to 160 (14 to 16)
Hex. bolts for steering knuckle or connecting housing to axle beam		240 (24)
Wheel closing plug		750 to 1,000 (75 to 100)
Wheels and Tires		
Wheel fastening bolts		290 (29)
Steering		
Steering to steering bracket	M 12 x 1.5–8.8	95 (9.5)
Fastening nut of bearing bolt (steering bracket to frame)		600–50 (60–5)
Fastening nut pitman arm		350 to 400 (35 to 40)
Fastening nut steering wheel to steering shaft		70 to 80 (7 to 8)
Fastening nut fitted screw universal joint M 8		25 (2.5)
Fastening nut and clamping screw on steering bracket		70 (7)
Installation position of steering in Unimog		47°

I. Removal and Installation of Cylinder Head

1. Remove cylinder head cover (with breather filter or with connecting line to air filter, latest version).

Note: Breather filter in 4 versions:

- a) Dry filter with paper element (Micronic),
- b) Dry filter with steel netting insert,
- c) and d) Oil separator with two different versions of vapor pipes.

Fig. 01-1/1.

Note: In the event of major reconditioning, convert engine breather to latest design. Use conversion kit DB Part No. 180 586 0009 for this purpose.

2. Unscrew intake pipe and exhaust manifold including carburetor.
3. Loosen chain tensioner for timing chain and cooling water drain connections, and remove.
4. Loosen fastening screw, remove camshaft gear with plastic hammer. Fig. 01-1/2.

Note: Watch out for plate spring!

Mark offset, if required, and observe during installation, to prevent trouble when adjusting engine. The installation of a new timing chain may require a new plate spring.

5. Place unused timing chain into sprocket wheel box.
6. Remove ignition timer bearing with adjusting lever after loosening fastening screw with lugs as well as ground connection strap on hexagon socket screw (cylinder head screw).

7. Remove cylinder head by loosening hexagon socket screws vice versa to tightening torque diagram and remove released clamps (3) for cylinder head cover.

Note: In the sprocket box area of cylinder head are two bolts with 6 mm hexagon socket. On engines with old valve timing assembly, the rocker levers are mounted in rocker lever brackets on one shaft.

The new valve timing assembly uses rocker arms mounted on a ball head. The new valve timing assembly is recognized by a tensioning spring which abuts against the end of the rocker arm as well as against the floating bearing of the rocker arms. Fig. 01-1/3.

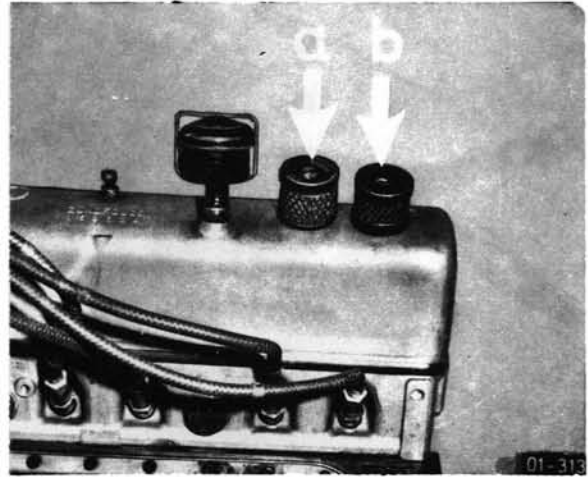


Fig. 01-1/1 01-313

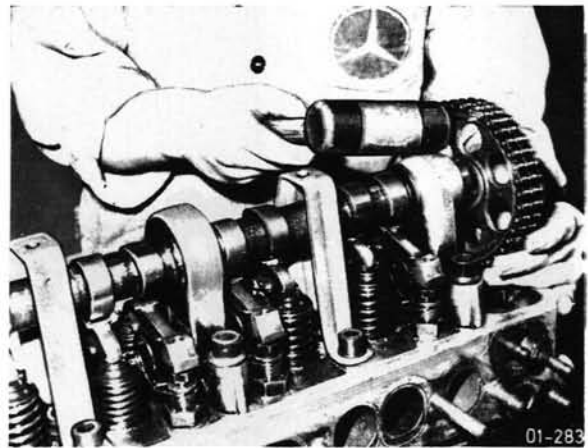


Fig. 01-1/2 01-283

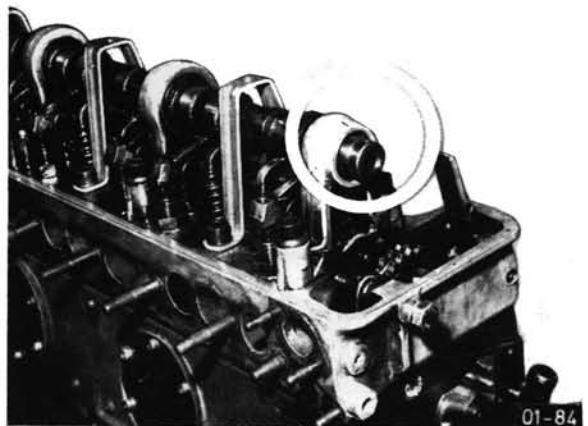


Fig. 01-1/3 01-84

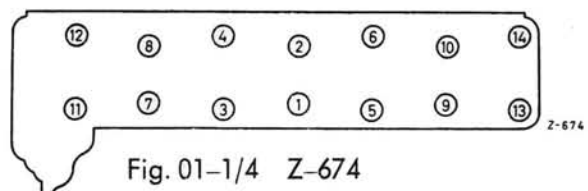


Fig. 01-1/4 Z-674

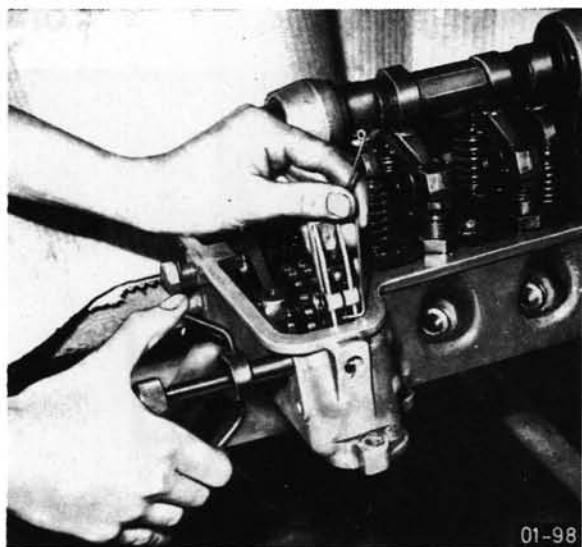


Fig. 01-1/5



Fig. 01-1/6

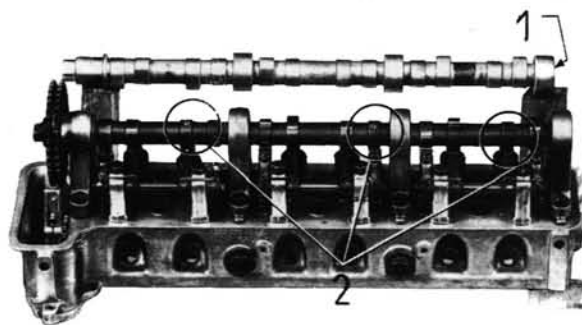


Fig. 01-1/7

- 1 Identification number punched here
- 2 Identification for inside lubrication

Remove cylinder head only when cold!

8. Remove cylinder head gasket and throw away. Use only new cylinder head gaskets during reinstallation.

Identification: Copper-lined water holes.

9. For reassembly proceed vice versa.
10. Tightening torque of cylinder head screws cold 8 mkp, warm 9 mkp. Tighten stepwise in correct sequence. Fig. 01-1/4.

11. Adjust valve clearance on cold engine (mm)
Intake 0.08 (0.12 old version)
Exhaust 0.15 (0.20 old version)

II. Disassembly and Assembly of Cylinder Head

1. Remove slide rail by pulling out slide rail bolts by means of puller 187 589 07 33 00. Raise securing wire with another piece of wire. Fig. 01-1/5.

2. Pull out chain tensioning wheel shaft with above puller and remove chain tensioner together with spring and lever.

Note: There are two lever versions of tensioning wheel.

3. Remove rocker arm with valve lifter 421 589 00 61 00. Fig. 01-1/6.

4. Remove valve springs with above valve lifter and assembly board 180 589 05 63 00.

Note: The closer coils of the valve springs are pointing downwards during reassembly (toward cylinder head).

5. Carefully remove camshaft toward the rear out of camshaft bearings.

Note: During reinstallation, watch out for camshaft identification number as well as outside and inside lubrication.

Figs. 01-1/7 and 01-1/8.

6. Remove assembly board and take out valves.

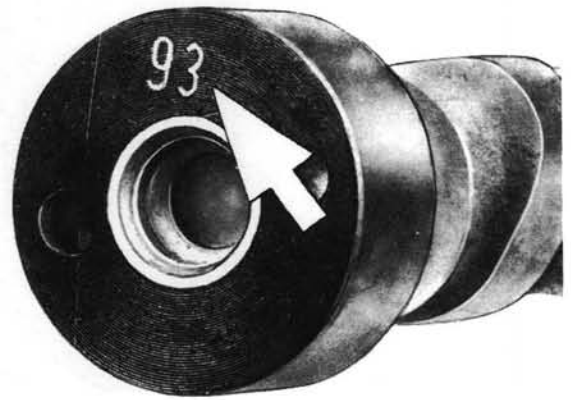
7. Unscrew camshaft bearing and remove.
8. If cylinder head is to be surface-ground, remove valve guides acc. to Job No. 01-2, Item 3.
9. Remove all set pins when surface-grinding cylinder head. For machining data refer to Job No. 00-0, Table 1, Fig. 01-1/9.
10. Check valve seat in cylinder head for concentricity and wobble using tester and dial gauge. Fig. 01-1/10.

Note: Remove as little material as possible when machining.

11. For reassembly proceed vice versa.

Note:

- a) Tightening torque for thread connection 10 mkp.
- b) Minimum tightening torque for ball bolt 1.5 mkp.
- c) After tightening camshaft bearings, the inserted camshaft should turn easily when rotated manually. Install rocker arms only after this test.
- d) For machining dimensions for valves refer to Job No. 00-0, Table 18.

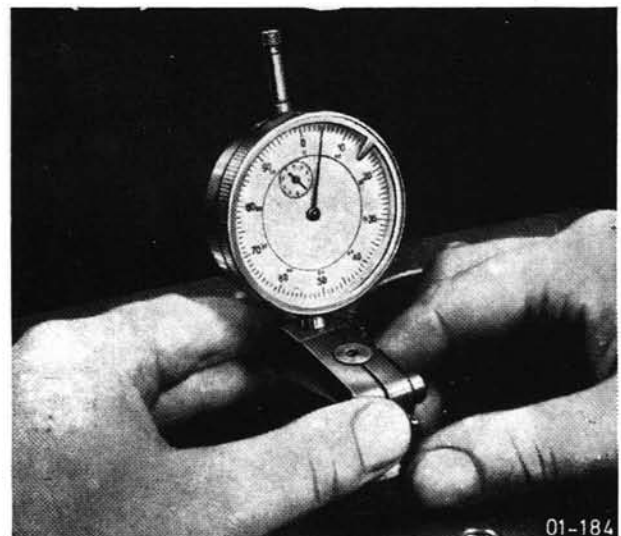


01-303

Fig. 01-1/8



Fig. 01-1/9



01-184

Fig. 01-1/10

1. Clean holes of valve guides. Fig. 01-2/1.
2. Check holes with plug gauge
636 589 00 21 00 (9 mm dia.)
or 187 589 01 21 00 (10 mm dia.).

The gauge should enter in a suction fit on the "go" end.

Remove deposits of hard oil carbon in valve guides with reamer 000 589 10 53 (8.99 mm dia.)

or 000 589 11 53 00 (9.99 mm dia.).

Then clean holes well.

Note: Use only perfect plug gauge for checking holes. Inspect gauges regularly for accuracy.

3. When replacing valve guides, knock out by placing mandrel 136 589 00 39 00 or 621 589 01 35 00 against bottom surface of head. Fig. 01-2/2.

Note: For reinstallation, use mandrel 121 589 00 43 00 or 187 589 10 39 00.

Refinish valve guide seats, if required, with adjustable reamer 000 589 04 53 00.

For closer details refer to Job No. 00-0, Table 4.

4. Upon assembly, check whether valve guides are well seated. If test blows (light hammer blows) will displace valve guide, install another guide with larger overlap.

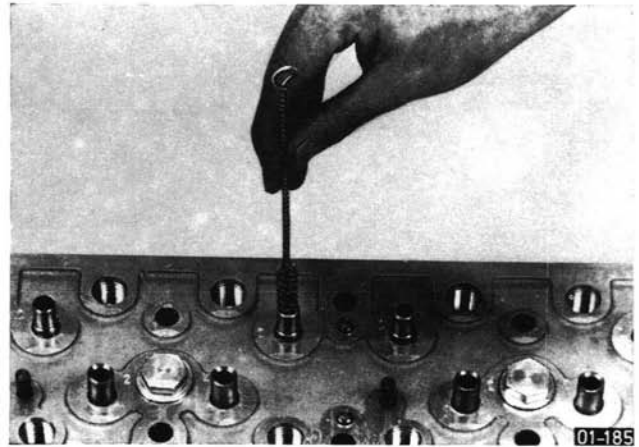


Fig. 01-2/1 01-185



Fig. 01-2/2

For a well-running engine a gas-tight seat of its valves is of decisive importance. Valve seats should therefore be refinished with pertinent care.

Obtaining an absolutely tight valve seat requires relieving the valve seat to the extent that a valve seat width "a" of 1.25 mm to 2.00 mm is obtained. The relief "b" should be at least 0.1 mm or at an angle of 120°.

The machining dimensions must be definitely maintained. Refer to Job No. 00-0, Table 2 and 3.

Prior to refinishing the valve seats, check valve guides first and replace, if required (refer to Job No. 01-2). A prerequisite for perfect machining of valve seats is the good condition of the valve guides. In addition, check valve seats for excessive previous refinishing. If so, replace valve seat rings.

If the minimum height of the cylinder head has been attained, replace cylinder head.

Concentricity and out-of-true of the seat are checked with a tester. Max. 0.05 mm are permissible. The holder of the tester will accept any standard dial gauge.

Check seat between valve and valve seat in cylinder head with reground or new valve and blue India ink. Coat surface on valve disc lightly and uniformly with India ink. Then insert valve and turn several times for approx. ¼ rotation toward the left and right.

If there are differences, fit the seat of the valve disc to the refinished valve seat in the cylinder head or fit the seat of the valve disc to the valve seat in the cylinder head while regrinding on valve grinding machine.

I. Refinishing with Hand Cutter

Tool No. 000 589 11 66 00.

1. Insert guide pin (1) into valve guide.
Fig. 01-3/1.
 2. Position cutter head (2) and adjust cutting blades acc. to seat diameter.
- Note:** On valve seats with 45° seat angle, the 45° end of cutter head is used for finishing seat, and the 30° end for relieving. On 30° valve seats, the situation is reverse.
3. Position T-handle (3) and rotate under **light pressure**.

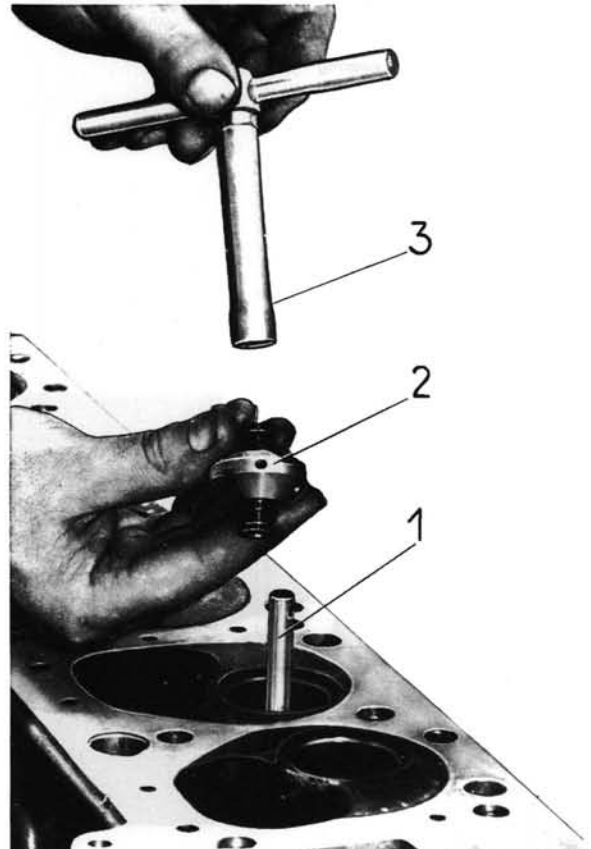


Fig. 01-3/1

- 1 Guide pin
- 2 Cutter head
- 3 T-handle

II. Machining with Turning Tool

When machining a cylinder head valve seat with the turning tool shown in Fig. 01-3/2, the following must be observed:

Guide turning tool along pilot (guide pin), loosen bottom nut of "rapid adjustment" and shift the carriage with the clamped, exchangeable "bit" by means of top nut in such a manner that it will come to rest approx. in the center of the valve seat. The drop pin of the "pilot rest" rests on the pilot and is locked with the "locking screw". Then the turning bit is positioned against the inner edge of the valve seat by the rapid adjustment and the small, bottom nut is tightened.

By holding the "feed actuation" (7) and turning the crank, the support is moved in a spiral motion by $\frac{1}{10}$ mm in outward direction during each crank rotation under the influence of a "built-in gearing". When the chip is too small, the bit is again brought back next to the inner seat edge by means of the rapid adjustment (8) or by turning the crank counter-clockwise, while lifting the tool slightly, followed by loosening the "locking screw" of chip feed, turning that screw to the left (one line = 0.1 mm), which will lift the pilot support and lower the tool. Then the screw is tightened again and the seat is machined. Usually, there is a finishing or fine-finishing step, after moving the bit again inwards. When badly worn valve seats are refinished or corrections are machined, the use of a "backrest" is recommended, which will guide the tool in upward direction. The backrest is screwed on and its arm is adjusted in such a manner that the ball will align itself prior to being locked.

III. Replacing Valve Seats

For repair dimensions refer to Job No. 00-0, Table 3.

1. Machine valve seat ring on pertinent drill press or by means of valve seat turning tool. Fig. 01-3/3 and 01-3/4.

Note: Find out whether ring is turning along when it is almost cut away. In such a case, remove remainder of ring while it is rotating.

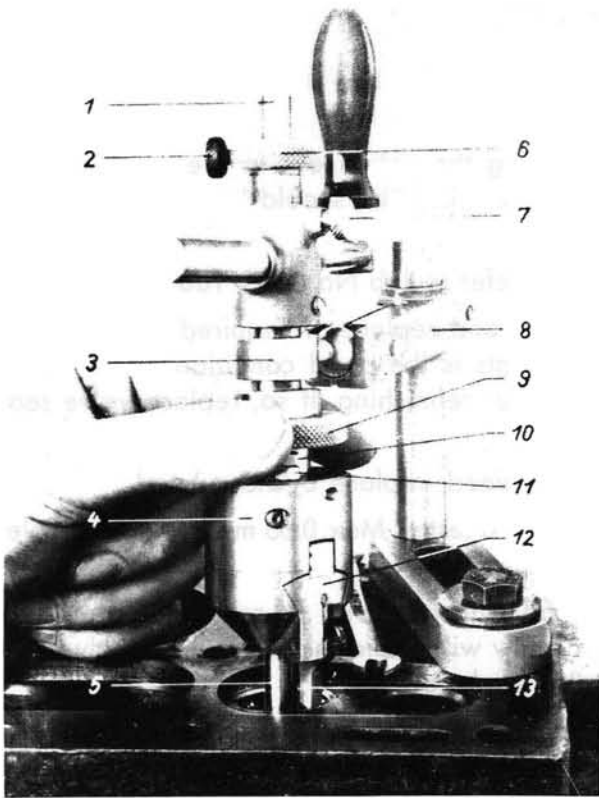


Fig. 01-3/2

- 1 Pilot rest (drop pin)
- 2 Locking screw for above
- 3 Backrest bearing with ball
- 4 Head with built-in gearing
- 5 Pilot
- 6 Chip feed
- 7 Locking screw for above
- 8 Backrest
- 9 Feed actuation
- 10 Rapid adjustment
- 11 Coupling nut
- 12 Carriage
- 13 Replaceable cutting bit

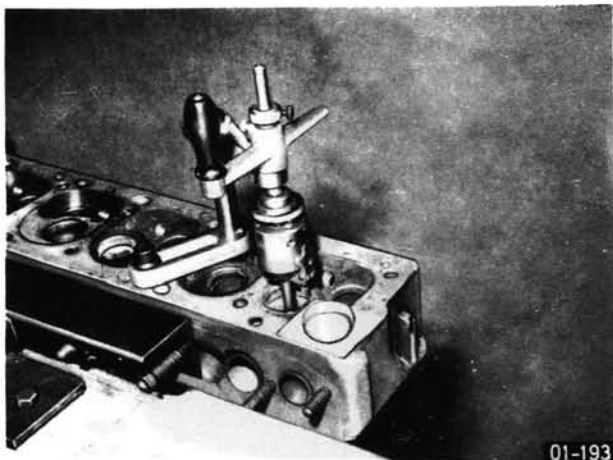


Fig. 01-3/3

2. Check base bore in cylinder head and refinish, if required.

Note: In the event of recutting to a repair stage, try and remove as little material as possible. The bore should be accurately square, so that the valve seat ring will be perfectly located.

3. Undercool new valve seat ring and knock into bore with a fitting mandrel (or a used valve), until ring is well seated.

Note: No hard blows. Danger of breaking! Use liquid air, carbon dioxide or oxygen for undercooling ring.

Undercool ring to approx. 180° C.

SAFETY RULES MUST BE STRICTLY OBSERVED!

4. For machining valve seats refer to Job No. 00-0, Table 2.

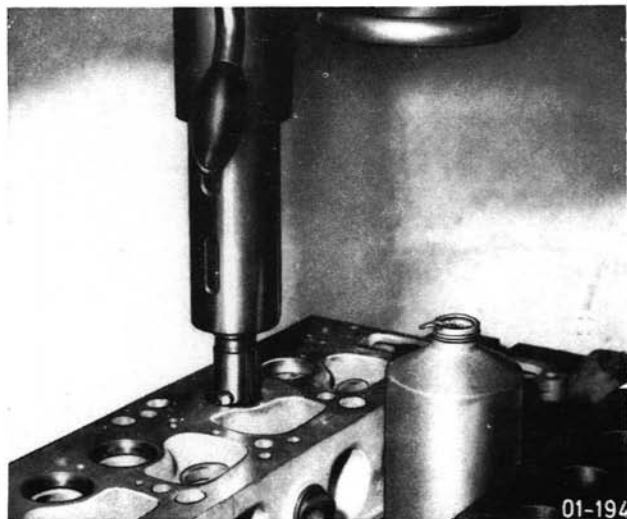


Fig. 01-3/4 01-194

Replace pistons and rings and fit. For dimensions of pistons and cylinder bores refer to repair data Job No. 00-0.

The permissible deviation of cylinder bores in vertical relation to crankshaft axis and with reference to cylinder height is 0.05 mm.

1. Clean cylinder bores and measure wear on three different spots with an internal measuring instrument. Fig. 01-4/1. Determine required repair stage from measured wear.

2. For cylinder bores up to 0.05 mm taper, honing the bore will be sufficient. In all other cases, the cylinder bore must be machined prior to honing. Out-of-round cylinder bores must be bored and then honed, since honing alone will cause the honing tool to follow the out-of-round shape of the bore.

3. Adjust stroke of honing tool in such a manner that the tool will project approx. 20-25 mm out of the bore at both ends during the honing. Apply kerosene generously. Clean cylinder bore several times during the honing and check at a number of spots crosswise by means of cylinder dial gauge for out-of-round or taper. Do not check piston/cylinder wall clearance with feeler gauge.

Permissible out-of-round 0.013 mm

Permissible taper 0.013 mm

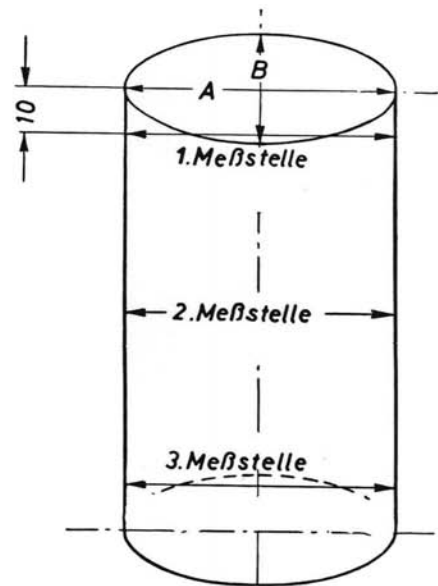


Fig. 01-4/1

- 1. Meßstelle = 1st Measuring point
- 2. Meßstelle = 2nd Measuring point
- 3. Meßstelle = 3rd Measuring point

I. Removal

1. Remove oil pan.
2. Unscrew hexagon fastening screw and pull oil pump out of fitted bore. Watch out for pipe clip on intake pipe.
3. Unless already identified, mark connecting rod and connecting rod cap with suitable means. Fig. 03-1/1.

4. Loosen connecting rod nuts.

Note: For reinstallation use original nuts only, so that special fine threads won't be damaged.

5. Remove connecting rod. Loosen cap by a light blow with plastic hammer.

Note: Handle bearing shells carefully, mark similar to Item 3, if required.

6. Mark crankshaft bearing cover as in Item 3. Fig. 03-1/2.

7. Loosen screws of crankshaft bearing cap and screw out.

8. Remove bearing cap.

9. Lift crankshaft with flywheel and counterweight carefully out of crankcase. Fig. 03-1/3.

10. Remove control chain.

11. Remove main bearing shell half from cylinder crankcase and bearing caps. Mark sequence of bearing shells.

12. Unscrew flywheel.

13. Pull off sprocket wheel of crankshaft.



Fig. 03-1/1

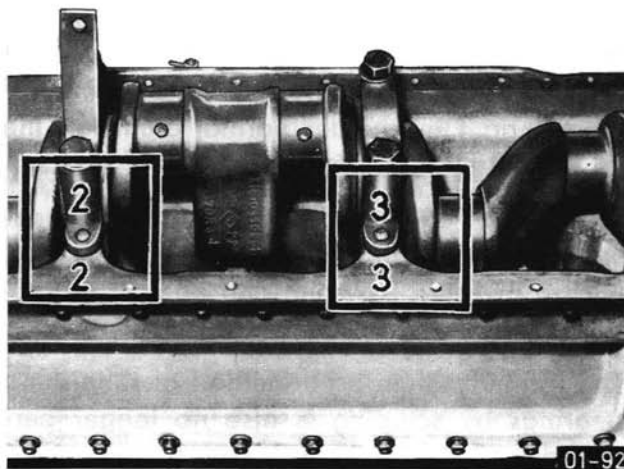


Fig. 03-1/2

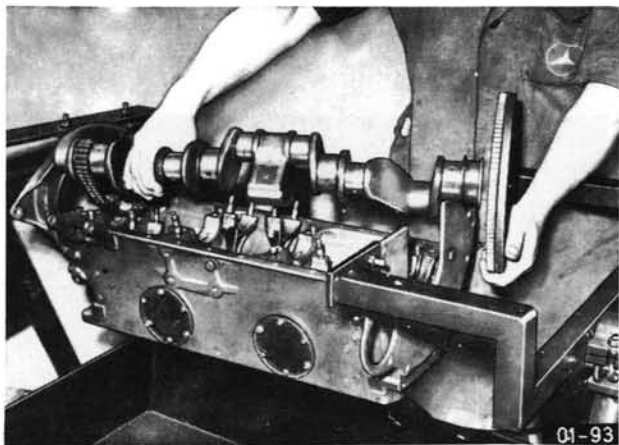


Fig. 03-1/3 01-93

II. Grinding

A crankshaft is considered ready for grinding upon disassembly, straightening and inspection. Following the grinding, the oil ducts must be cleaned particularly well. If the main bearing and crankpins are more than 0.02 mm out-of-round, grinding is required. If out-of-true conditions and score marks on main bearing and crank pins require grinding off more than 1 mm under normal diameter, the crankshaft must be replaced.

Never grind crankshaft acc. to random dimensions in accordance with the existing wear. Such a measure is wrong and against instructions.

The formerly often used method of refinishing bearings by scraping is also no longer permitted.

The max. permissible wobble of the crankshaft when mounted in the first and fourth main bearing journal is 0.02 mm.

If the max. permissible wobble is exceeded and cannot be held down by straightening, the crankshaft must be replaced.

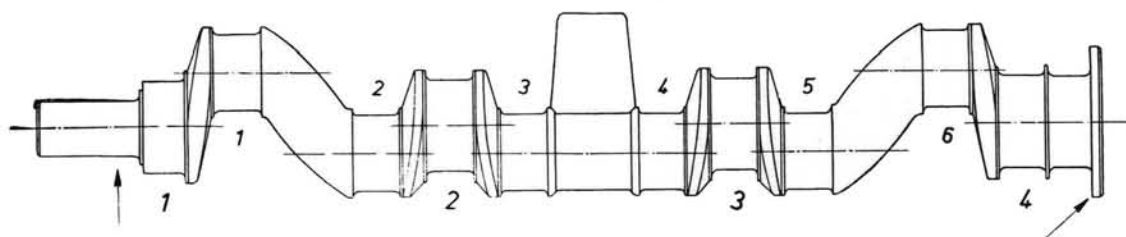


Fig. 03-1/4

For table on crankshaft grinding stages refer to Job No. 00-0, Table 7.

1. Clean crankshaft.
2. Check for distortion, out-of-true of pins, hardness and cracks of bearing points.
3. Carefully align bent shafts.
4. Center crankshaft again prior to grinding.

Note: For inspection and for re-centering, the crankshaft is mounted on the front pin for the crankshaft gear and on the collar of the flywheel flange (Fig. 03-1/4).

These points are never refinished.

5. Following the grinding, check hardness of crankshaft bearing journals and crank pins. Small, local deviations of up to 3 % below standard are permissible. Reharden, if higher.

Note: Prior to rehardening, normalize if a piston shows different degrees of hardness. For normalizing, heat pin to 400° C and permit to cool down. Keep bearings adjacent to pins cool.

6. Following the hardening, anneal for 2 hours at 180° C.
7. Following the annealing, check crankshaft once again for cracks, straighten and grind.

Note: Pin width, in particular of fitted bearing and of big end bearing points, must be accurately maintained. The radius of the fillets on the pins should be more in the direction of 3.0 mm than of 2.5 mm. Balance crankshaft dynamically with counterweight and flywheel.

For clearances between crankshaft bearing journals and crankshaft main bearing refer to Job No. 00-0, Tables 8, 9 and 10.

Bearing shells can be exchanged only as a complete set and are delivered ready for installation.

The required overlap is automatically provided by maintaining the specified diameter of the basic bore in crankcase.

1. Check crankshaft for reusability.
2. Clean crankcase thoroughly from dirt and foreign bodies. Remove protective coatings, if any, with suitable means.
3. Carefully clean contact surfaces of crankshaft bearings in crankcase and in bearing caps.
4. Clean bearing shells and check for shipping damage.
5. Insert bearing shells with guide lug first into bearings, then push down carefully. Fig. 03-2/1.
6. Insert sealing ring bearing half with fabric sealing ring on flywheel end into crankcase. Fig. 03-2/2.

Note: Max overlap is 0.5 mm. On the latest engines a wider fabric sealing ring is installed:

old: 68×60×6

new: 68×84×8 (since 1963).

7. Lubricate bearing shells lightly with engine oil.
8. Insert preassembled crankshaft with flywheel, spacer ring, sprocket wheel, oil thrower ring, wear ring, sealing ring with lip toward crankcase with timing chain attached into crankcase. Fig. 03-2/3.

Note: Timing chains in two versions:

old valve timing = 122 links

new valve timing = 124 links

On Type 180.952/953 there is no spacer ring and no oil thrower ring, while the sprocket wheel and the wear ring are wider. Watch out for 20.5 mm flange on flywheel.

9. Position bearing cap and tighten main bearing screws as specified. Fig. 03-2/4.

Note: Do not forget cylindrical pins and check for usability. Attach oil pump bracket to second main bearing.

10. Check crankshaft for easy running.

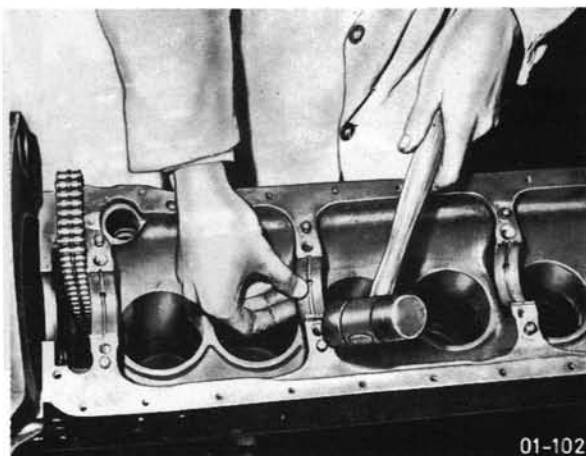


Fig. 03-2/1 01-102

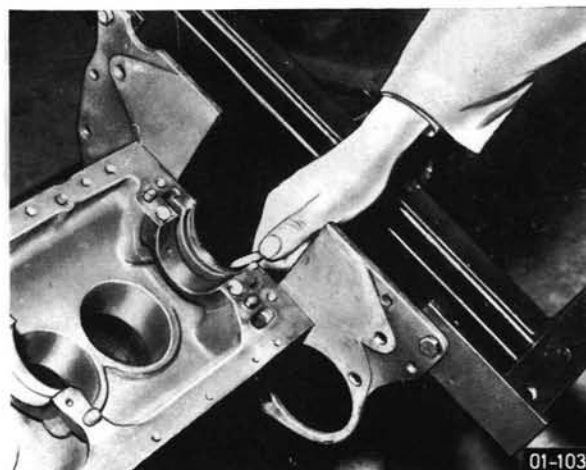


Fig. 03-2/2 01-103

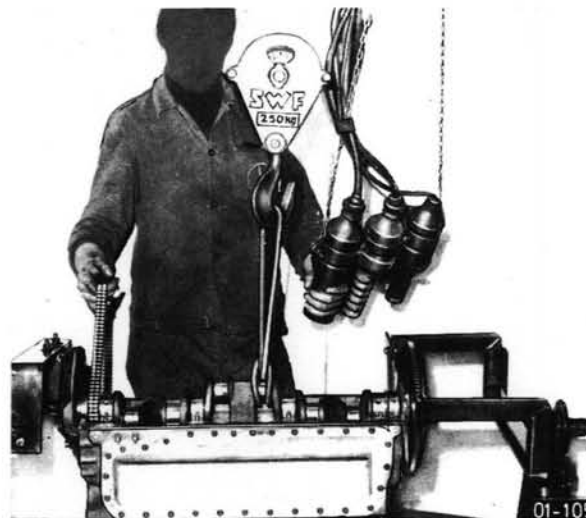


Fig. 03-2/3 01-105

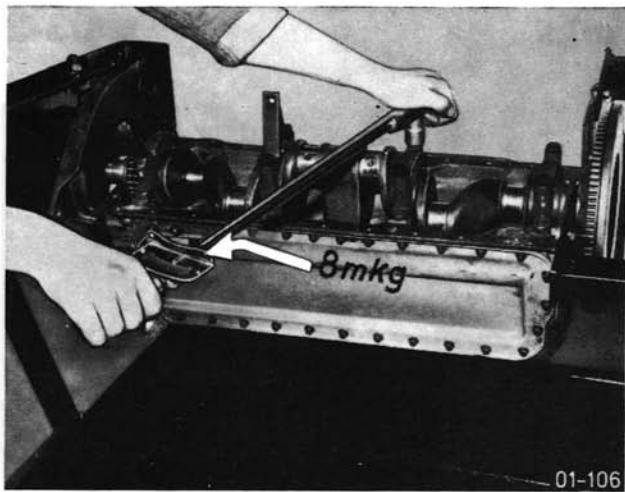


Fig. 03-2/4 01-106

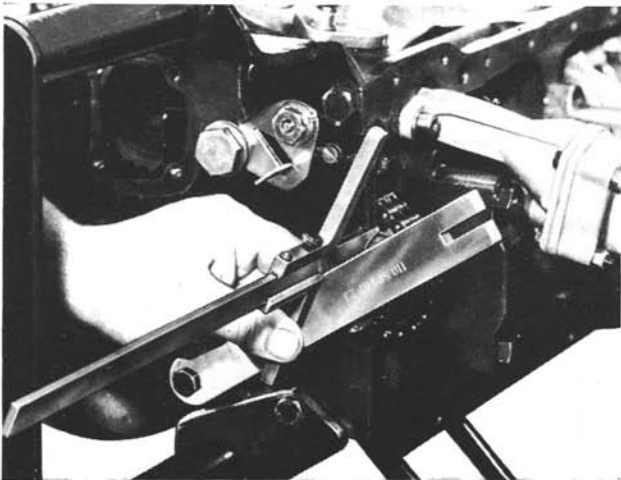


Fig. 03-2/5

11. Check axial play for crankshaft with feeler gauge or dial gauge.

Note:

- a) Use new version of fitted bearing, if axial play of old version is not within specified limits.
 - b) Do not forget cotter pins after changing thrust washers. When repairing crankshaft and bearings, change to new version of fitted bearing.
 - c) For the new versions as from October 1961 an axial play of 0.175 mm is permitted in the event of repairs. Replace fitted bearing, if play is higher. At a fitted bearing width of more than 30.70 mm, the crankshaft is used up beyond the fourth repair stage and must be replaced.
12. Screw on oil pan and check whether crankshaft turns easily. The fabric sealing ring should not exert too much pressure. If the crankshaft is hard to turn, remove pressure points on fabric sealing ring with suitable round material, but do not damage sealing ring.
 13. Use depth gauge and measuring device 110 589 07 23 00 to measure chain alignment and distance from crankshaft gear. Fig. 03-2/5.

I. Removal and Installation of Piston with Connecting Rods

The pistons can be removed in upward direction (in relation to cylinder head parting surface).

Removal:

1. Remove cylinder head and clean combustion remainders – oil carbon – from upper edge of cylinder bores. Fig. 03-3/1.
2. Remove oil pan.
3. Unscrew connecting rod nuts. Knock connecting rod bolts back slightly with a light hammer blow (plastic hammer), loosen bearing caps and remove. Then push connecting rod together with piston from crankshaft in **upward** direction. Fig. 03-3/2.
4. Remove circlips from grooves of piston pin bosses.
5. Remove piston pin with suitable mandrel or knock out.

Installation:

Also refer to Job No. 00-0, Tables 14, 15 and 16.

1. Place piston without piston pin on a hot plate and heat to approx. 60° C.
2. Clean piston pin boss of connecting rod and oil bore.
3. Place heated piston on piston rod and insert a guide mandrel through piston pin bore and connecting rod boss. Then lubricate piston pin and push down until it is exactly in the center and the grooves for inserting the circlips are exposed. Do not mix up the piston pins of the individual pistons. Watch color codes.

Note: Numbers 1-6 of connecting rods are installed toward oil pump end. On pistons with size 22 piston pins watch direction of installation (arrow). Fig. 03-3/3.

4. Insert circlips into grooves of piston pin bosses and check for perfect seat by turning in grooves.



Fig. 03-3/1 01-94

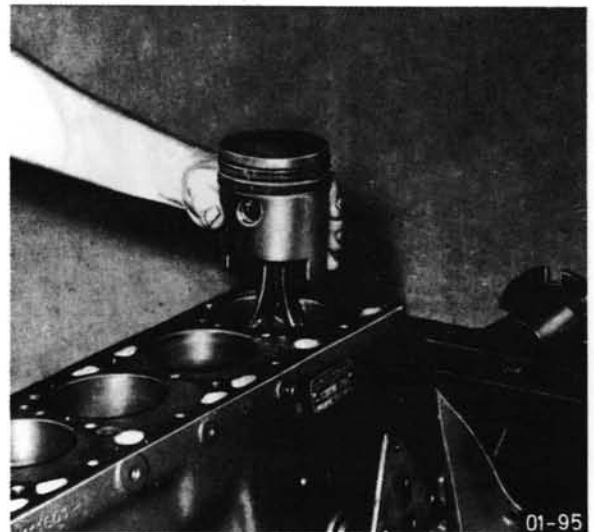


Fig. 03-3/2 01-95

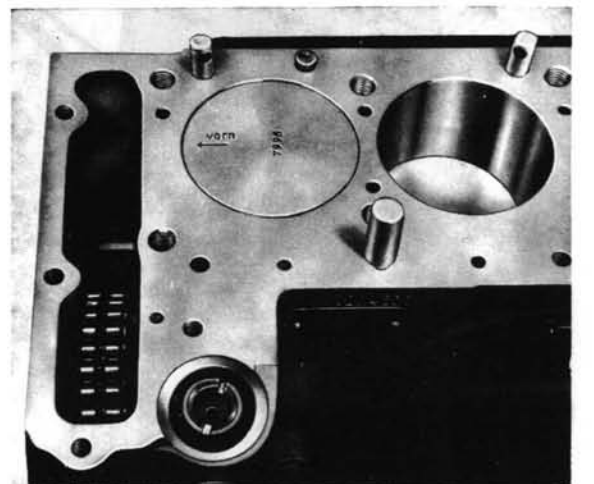


Fig. 03-3/3

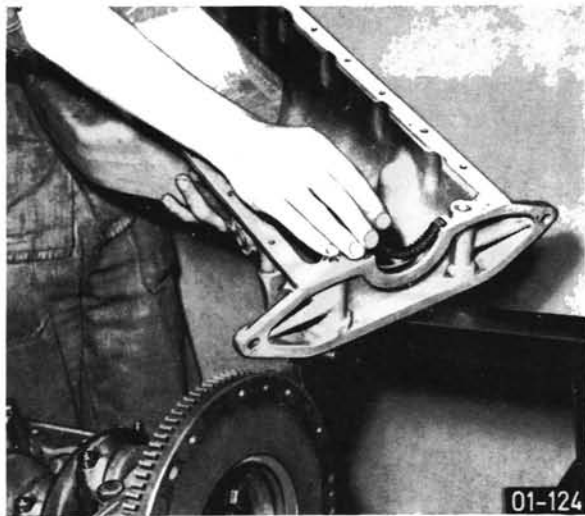


Fig. 03-3/4 01-124

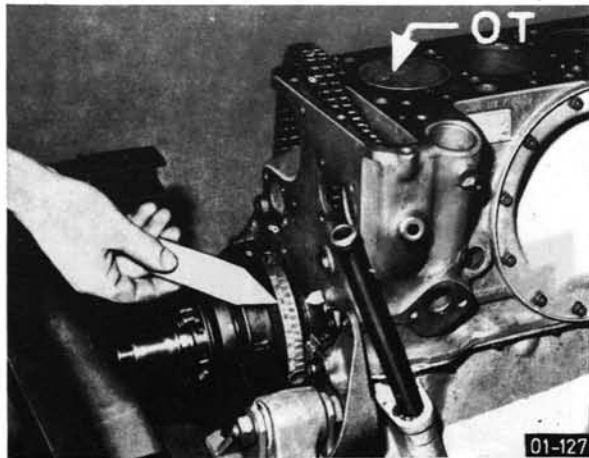


Fig. 03-3/5 01-127

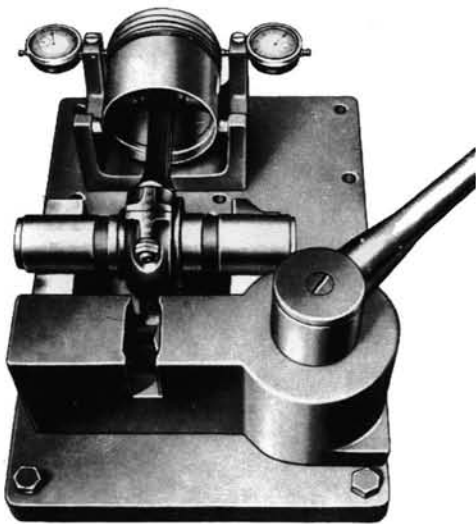


Fig. 03-3/6

5. Check connecting rods for axial parallelity and offset.

Note: Following repairs and prior to installation into engine, each connecting rod must be checked on a suitable inspection device to make sure that the two bores are in alignment.

The permissible deviation of axial parallelity is 0.03 mm and the permissible offset 0.1 mm. The permissible deviation in both cases is in relation to a length of 100 mm.

6. Turn piston rings in such a manner that their gaps are offset by 180° in relation to each other.
7. Insert the pistons coated with graphited oil together with piston ring sleeve 000 589 38 31 00 into cleaned cylinders. Insert connecting rod bearing shell halves, moisten with engine oil and attach connecting rod bearing cap.

Note: When inserting the piston rods with pistons, be sure that the connecting rod bolts will not damage the crankpins and piston rings, and that associated parts such as connecting rods and pistons are inserted and fitted in proper relation to cylinder bore.

On Type 180 952/953 the connecting rod bearings are provided with a special, second oil hole. Be sure that the holes in bearing shell and connecting rod are in alignment.

Installation direction of connecting rods with two oil holes seen in driving direction at the right.

8. Attach connecting rod bolts and nuts.
 9. Tighten connecting rod bolts with 0.1 mm expansion to approx. 3.75–3.80 mkp.
- Note:** Max. deviations in length of 0.01 mm after proper tightening are still permissible. If higher, replace bolt and nut.
- Be sure to lubricate threads of bolts with graphited lube oil.

10. Check play of connecting rods (max. play axially up to 0.5 mm, radially up to 0.075 mm). If there is no play, connecting rods or pistons may be held too tightly.
11. Coat oil pan on sealing surfaces with sealing compound. Insert fabric sealing ring and assemble. Fig. 03-3/4.
12. Set piston of cylinder No. 1 exactly to TDC and mount and align indicator for TDC position. Use dial gauge. Fig. 03-3/5.
13. Mount cylinder head.

II. Replacement of Connecting Rod Bushings and Connecting Rod Bearings

A. General

For repair data refer to Job No. 00-0, Tables 11, 12 and 13.

- a) Balance connecting rods in such a manner that the difference in weight between the individual, complete connecting rods within one engine does not exceed 5 g. For this reason, the connecting rods are divided into several weight groups and are colour-coded accordingly.
- b) The etched in numbers (1-6) on connecting rod and in bearing cap should match. The numbers indicate the respective cylinder, number 1 on timing housing (chain wheel box).

B. Fitting of Bearing Shell Halves

Connecting Rod Bearings

The bearing shell halves for the connecting rods are supplied ready for installation similar to the bearing shell halves for the crankshaft main bearing. The bearing shell halves are uniform and can be interchanged, if the bearings are new. For fitting the connecting rod bearing shells, the same instructions apply as for fitting the crankshaft. Refer to Job No. 03-2.

The lateral regrinding of the crankshaft bearings and the equalization of the connecting rods increases the axial play. An axial play up to max. 0.5 mm is permitted.

C. Replacement of Connecting Rod Bushings

Press out worn connecting rod bushings. The overlap of the connecting rod bushing in the bore should be at least 0.03 mm. For repair data refer to Job No. 00-0, Table 12.

D. Tightening of Connecting Rod Bolts

The connecting rod bolts are tightened without a lock washer to 0.1 mm expansion = a tightening torque of 3.75-3.80 mkp.

First coat threads of connecting rod bolt and contact surface of nut well with graphite and oil. The head of the connecting rod bolts should not project laterally in relation to connecting rod and should fit well in recess. The connecting rod bolt itself should be tight inside bore of connecting rod.

E. Alignment of Piston Rod

This job has already been described under Job No. 03-3 I, Installation Item 5. Refer to Fig. 03-3/6.

When the wear is above 0.05 mm or out-of-round is above 0.03 mm, machine cylinder bores to next repair stage.

For measuring, the temperature of the crankcase and the pistons should be as uniform as possible.

1. Clean piston and piston ring grooves and remove oil carbon. Clean oil flow holes in piston and in oil wiper rings from oil carbon.
2. Fit new oil wiper rings and compression rings for each piston individually into pertinent cylinder bore, insert ring into cylinder bore and check gap clearance with feeler gauge. Fig. 03-4/1.
3. Check oil wiper rings and compression rings for side clearance in piston ring grooves and insert. Fig. 03-4/2.

Note: On top rings "Top" mark up.
Fig. 03-4/3.

4. Align rings in such a manner that the gaps are offset by 180° in relation to each other.
5. Select pistons in accordance with cylinder bore to maintain a piston clearance of 0.03 to 0.04 mm.

Note: The weight difference of the pistons in one engine should not exceed 4 grams. The piston is slightly conical, with the diameter at the bottom of the piston skirt being the largest. The cross section at this point is not circular, but slightly elliptic.

Dimension A is smaller than dimension B. The piston diameter is measured at the bottom skirt end in direction B; this dimension is also in accordance with the dimension punched in piston ground. Fig. 03-4/4. For additional repair jobs refer to Job No. 00-0, Tables 14, 15 and 16.

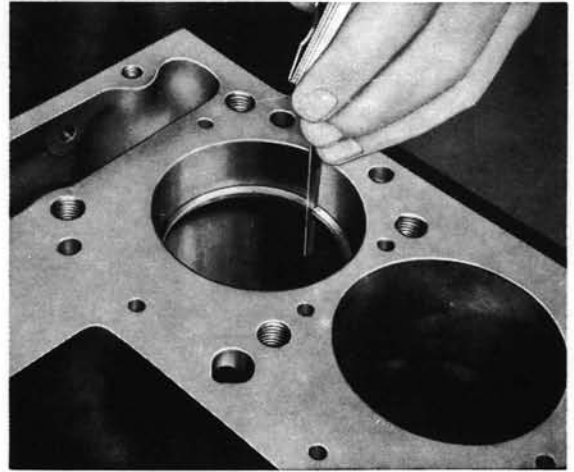


Fig. 03-4/1

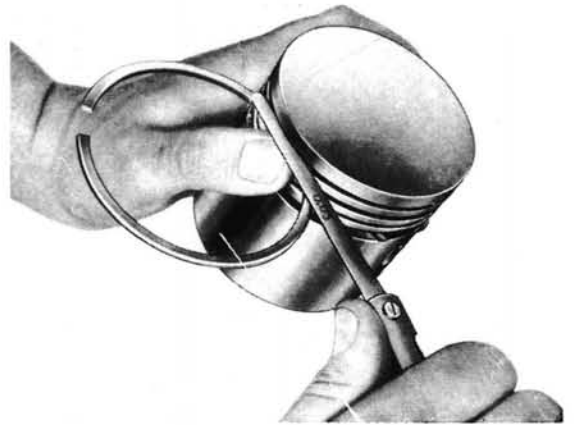


Fig. 03-4/2

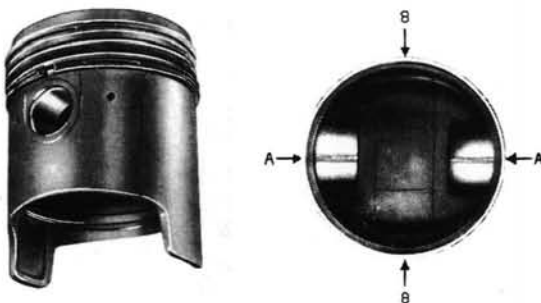


Fig. 03-4/4

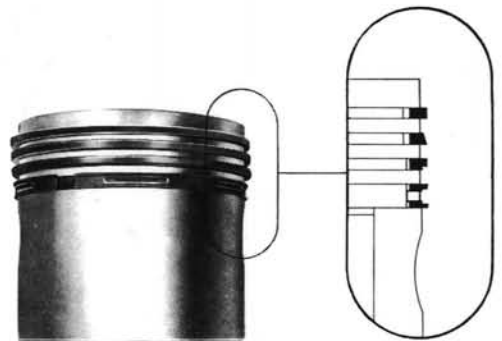


Fig. 03-4/3

I. Removal and Installation of Flywheel

(does not apply to Type 180.952/953)

1. Loosen expanding screws and remove flywheel.
2. If required, replace ring gear and/or grind clutch surface. (Section II.)

Note: Two flywheel versions are installed:

- a) old version = flange 7 mm thick
with fastening bolts
DB Part No. 180 032 03 71.
- b) new version = flange 10.5 mm thick
with fastening bolts
DB Part No. 621 032 00 71.

The latter are 3 mm longer and should not be used for the old flywheel. Fig. 03-5/1.

Tightening torques:

old version 4.5-5 mkp
new version 5.5-6 mkp

3. For reassembly proceed vice versa.

II. Replacement of Flywheel Ring Gear

1. Clean flywheel and starter ring gear thoroughly (dry cleaning gasoline).
2. Heat starter ring gear with welding flame.
3. Place flywheel with starter ring gear under press and remove starter ring gear with fitting pressing tools (max. required pressing-off pressure approx. 10 tons). Fig. 03-5/2.
4. Clean contact surface of starter ring gear on flywheel.
5. Heat new ring gear on electric hot plate to approx. 300° C (ring gear color will be a light straw yellow). Fig. 03-5/3.



01-248

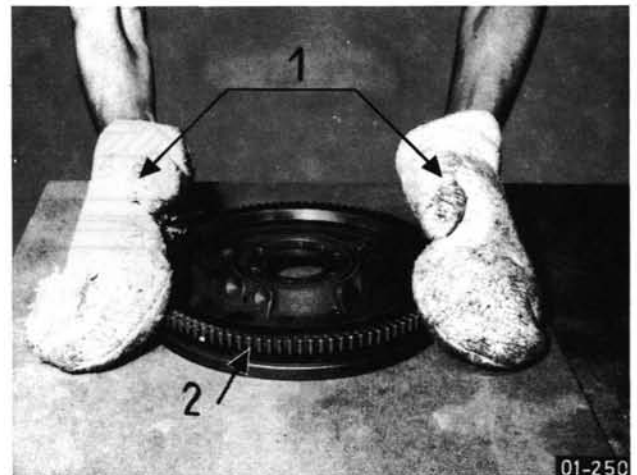
Fig. 03-5/1 01-248

1 Measure thickness of flange here



01-249

Fig. 03-5/2 01-249



01-250

Fig. 03-5/3 01-250

1 Asbestos gloves
2 Ring gear 300° C



Fig. 03-5/4 M 15/2

6. Fit heated ring gear quickly to flywheel.

Note:

- a) Ring gear will usually drop into place without pressing. If required, assist with wooden block and light hammer blows.
- b) The permissible lateral wobble of the fitted ring gear is max. 0.4 mm.
Fig. 05-5/4.
- c) The chamfered end of teeth should point toward starter installation end when fitting ring gear.
- d) For additional data refer to Job No. 00-0, Table 17.

III. Regrinding Clutch Surface of Flywheel

This job is always required when the clutch surface of the flywheel shows score marks, burned spots or burned cracks. The clutch surface is then surface-ground or machined to a fine finish on a suitable machine.

Refinishing should always be done with minimum material removal. If the cracks are deeper than the max. permissible allowance, replace flywheel.

Chuck flywheel well for refinishing and do not exceed permissible lateral wobble of 0.05 mm.

1. Clean flywheel.
2. Chuck flywheel free of wobble on suitable machine (lathe center height min. 200 mm).
3. Machine clutch surface to fine finish.

Flywheel = 2.100 rpm
 Grinding wheel = 1.500 rpm
 Grinding wheel dimensions 200 × 20 × 76 mm
 Grain = 80 ceramic bond
 Hardness = 7
 Grinding wheel feed = 250 mm/mm

Note: Dimension "a" should not be below 34 mm. On old flywheels use 32 mm for dimension "a". Also remove the same amount of material on clutch pressure plate as on face of clutch. Fig. 03-5/5.

For further data refer to Job No. 00-0, Table 17.



Fig. 03-5/5

I. Balancing of New Flywheel

Balancing of flywheel is only required when the flywheel has shown evidence of damage and must be replaced.

1. Thoroughly clean defective flywheel with dry-cleaning gasoline.
2. Position old and new flywheel on fixture Tool No. 180'589'00'27'00 in such a manner that the old flywheel is offset by 180° in relation to new flywheel. Fig. 03-6/1.

Note: Both flywheels should fit accurately in fixture, their recess should face in the same direction. Fig. 03-6/2.

3. Statically balance both flywheels with the aid of a mandrel and the specified fixture. Fig. 03-6/3.
4. When an unbalance is discovered, drill out enough material on heavy section of new flywheel until both flywheels are at rest in the fixture without swinging.

The fixture must be levelled. Fig. 03-6/4.

Note:

Drill dia. 14 mm

Drilling depth max. 8 mm

Drilling point: On flange of new flywheel.

5. Clean flywheel from drilling chips and install.

Note: Observe varying flange thickness (2 each) of flywheels and use respective fastening bolts. Type 180.952/953 flange thickness 20.5 mm.

6. During test run, observe engine for abnormal vibrations and noise.



Fig. 03-6/1 01-253

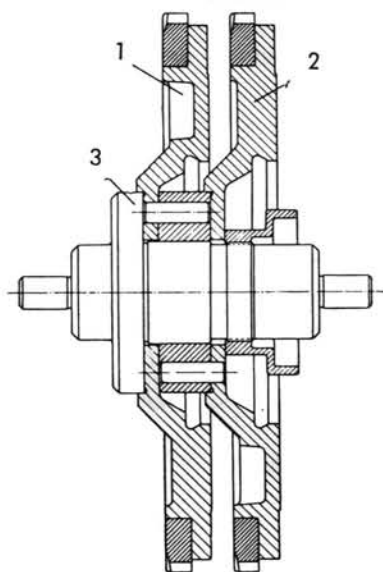


Fig. 03-6/2

- 1 Old flywheel
- 2 New flywheel
- 3 Balancing mandrel 180 589 00 27 00



Fig. 03-6/3 (basic illustration)

II. Balancing Crankshaft with Flywheel and Counterweight

The crankshaft is provided with 3 counterweights: at front end of flange receiving the pulley, in the center and on the flywheel. These three counterweights are used for the dynamic balancing of the crankshaft. Fig. 03-6/5. Each of the three counterweights has a given unbalance. When the crankshaft is installed with the front counterweight and the flywheel, these three unbalances will compensate each other.

The unbalance should not exceed 15 cmg.

Note: The light metal intermediate ring loosely installed between the flywheel and the clutch

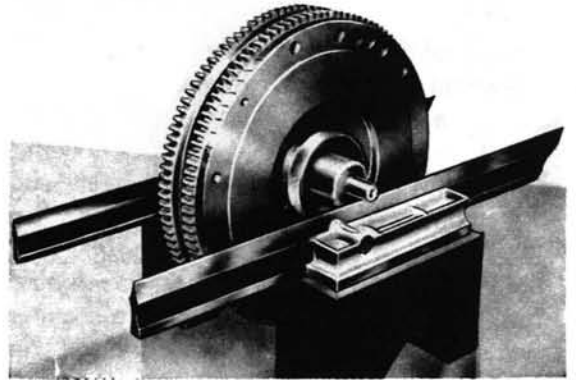


Fig. 03-6/4

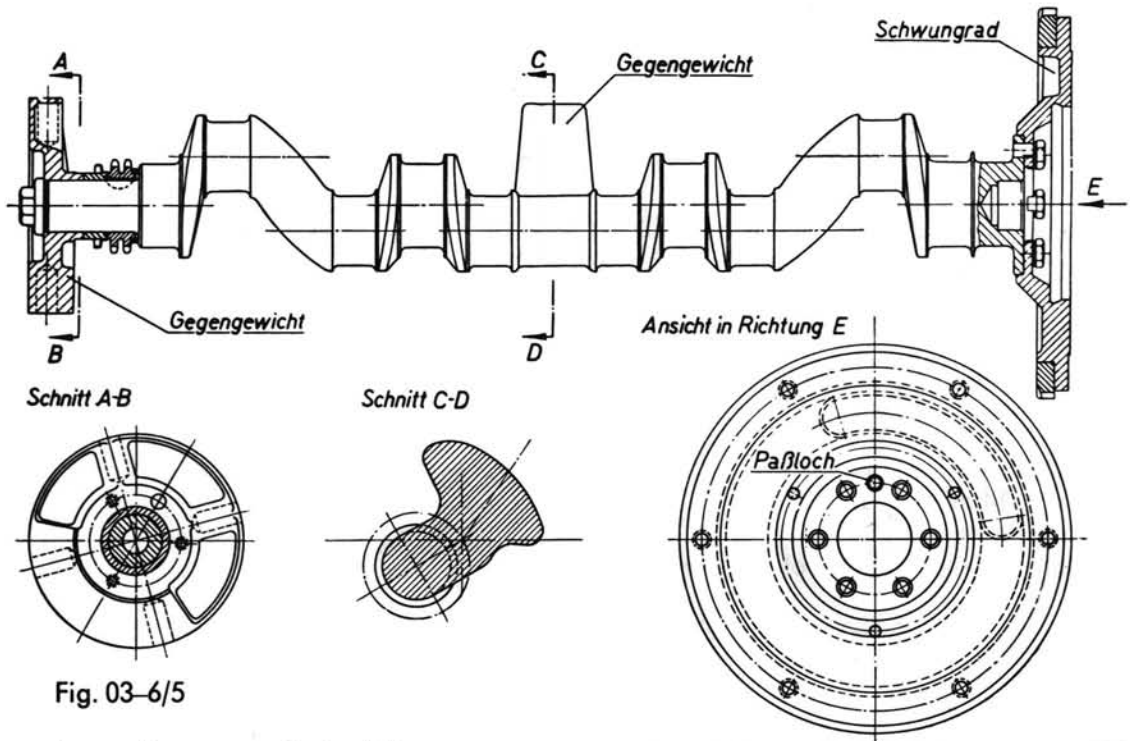


Fig. 03-6/5

- | | |
|-----------------------|-----------------------|
| Gegengewicht | = Counterweight |
| Schwungrad | = Flywheel |
| Ansicht in Richtung E | = View in direction E |
| Schnitt | = Section |

is independently balanced and is not included in the work described here. During assembly, be sure that the recesses of the ring for heat transfer and for throwing out oil which may have entered are located against the clutch surface of the flywheel. Normally, the flywheel should be balanced only together with the crankshaft and the mounted counterweight. The permissible dynamic unbalance is then max. 15 cmg at 800 rpm (critical speed).

If no balancing machine is available and there is reason for doubt, mount counterweight and flywheel in such a manner that the mass of the counterweight is always fitted opposite to the mass of the crankshaft. The flywheel can be attached to the crankshaft in one position only (set pin). If the flywheel alone is replaced, refer to data 03-6/1. Balancing of new flywheel.

III. Replacing Set Pin of Crankshaft Counterweight

If the set pins for front counterweight on crankshaft are getting loose, insert new set pins having a larger diameter.

If a counterweight must be exchanged, rebalance the new counterweight together with crankshaft and fly-wheel with crankshaft removed. (Refer to Job No. 03-6/2).

When exchanging counterweight on engine ready for operation, the same balancing bores as on the old counterweight may be applied.

1 After loosening collar bolts, pull-off counterweight and remove both set pins.

2 Slip counterweight to correct position on crankshaft and drill both bores to 10 x 9 mm dia. (9.930 to 9.966 mm dia.) and ream. Fig. 03-6/6.

The assembly is correct, when the degree scale on counterweight faces first throw of crankshaft. With the crankshaft installed, the first piston is at TDC when the degree scale is in field of indicator.

Note: Drill one hole first, knock-in set pin and then proceed likewise with second hole.

3 Knock-in new set pins 10h8 x 8 DIN 7 (9.978 to 10.000 mm dia.).

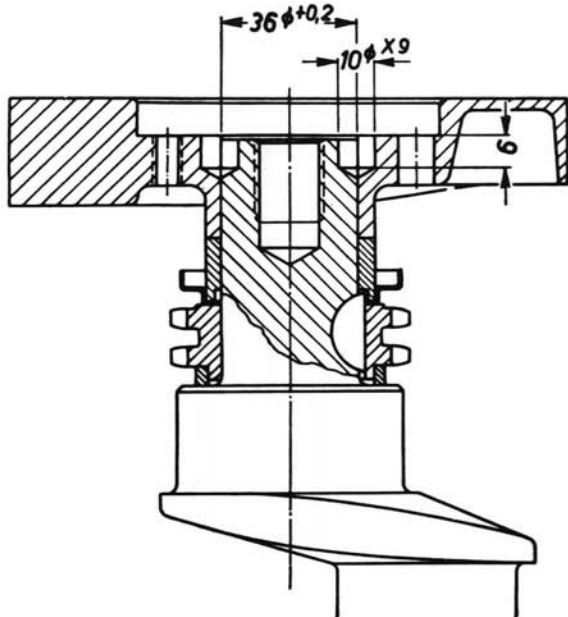


Fig. 03-6/6

I. Old Version

1. Remove cylinder head cover.
2. Adjust cams of one rocker arm group in such a manner that one of the valves is depressed by the four rocker arms (unscrew adjusting screw, if required).
3. Unscrew fastening screws of the two bearing brackets of one rocker arm shaft.
4. Pull both bearing brackets with rocker arms out of fitted sleeves in a sudden, jerking motion. Fig. 05-1/1.
5. Remove both springs. Fig. 05-1/2.
6. Replace damaged parts.

Note: Do not refinish rocker arm, but replace.
7. For reassembly proceed vice versa.

Note: Tightening torque for bearing brackets = 3.75 mkp.
8. Adjust valves with engine cold. Refer to Job No. 05-3.

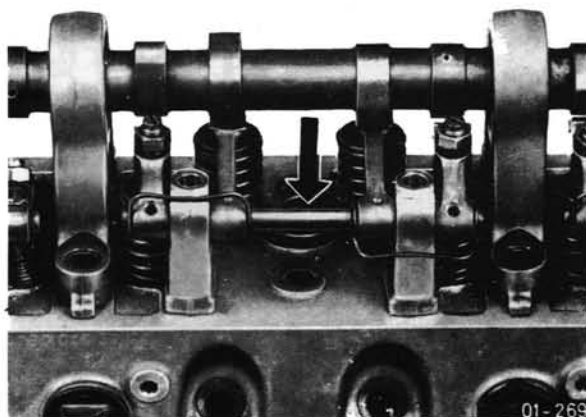


Fig. 05-1/1

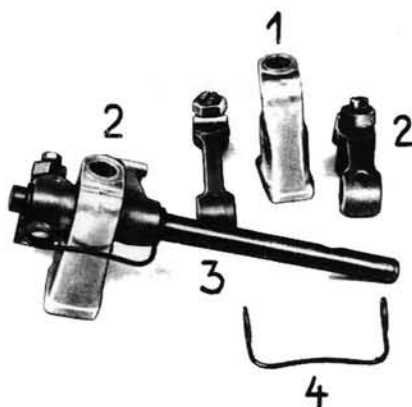


Fig. 05-1/2

- 1 Rocker arm bearing bracket
- 2 Rocker arm long (inlet)
Rocker arm short (outlet)
- 3 Rocker arm shaft
- 4 Spring

II. New Version

1. Remove cylinder head cover.
2. Take clamping spring out of groove of rocker arm, disconnect from annular spring and remove. Fig. 05-1/3.
3. With the camshaft in the pertinent position (cams not pushing against rocker arms) apply valve lifter 421 589 00 61 00 to depress the valves which are not under pressure and remove rocker arm. Fig. 05-1/4.
4. If required, replace ball pins of rocker arm bearings. Minimum torque of ball pin 1.5 mkp.
5. If the stud for the rocker arm bearing in the cylinder head is to be replaced, install coated with tallow and tighten to 10 mkp.
6. Replace damaged parts.

Note: Do not refinish rocker arms, but replace.

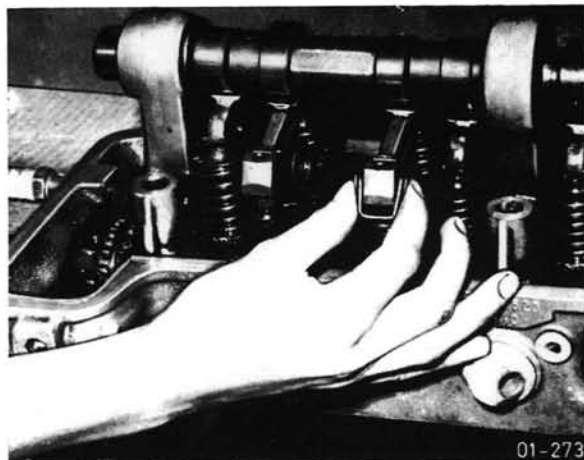
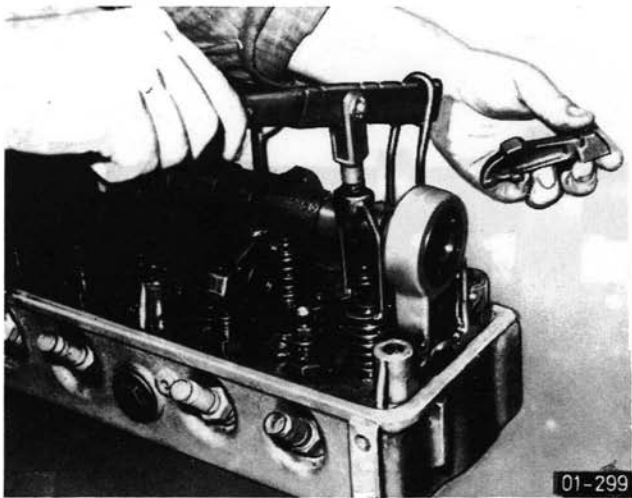


Fig. 05-1/3



7. For reassembly proceed vice versa.

8. Adjust valves with engine cold.
Refer to Job No. 05-3.

Fig. 05-1/4

I. Removal and Installation of Valves

1. Clean cylinder head.
2. Remove rocker arms acc. to Job No. 05-1.
3. Use four short cheesehead screws to attach assembly panel 180 589 05 63 00 to cylinder head bottom. Fig. 05-2/1.
4. Apply suitable tubing and light hammer blows to release valve disc from valve cone halves. (Often sticking to cone.)
5. Push spring disc down with valve lifter 421 589 00 61 00. Remove valve cone halves, valve discs, springs and spring supports. Fig. 05-2/2.

Note:

- a) All valve springs are progressive springs and are the same for inlet and outlet valves. The closer windings of all the springs should face downwards during reassembly (toward cylinder head).
 - b) The valve seal for the inlet valve is a conical, white plastic ring which rests on top of the valve guide cone and is compressed by the inner valve spring via a sealing ring holder. The outlet valve seal is a cylindrical black rubber ring in pipe section of outlet valve spring disc.
6. Remove assembly panel and carefully take out valves in numerical sequence (cylinder sequence) and put aside.
 7. For reassembly proceed vice versa, observing the above points.

Observe safety rules when scraping sodium-filled valves.

For better cooling, the M 180 engine is provided with sodium-filled outlet valves. Since there is an explosion hazard, these valves may not be melted down without first removing the sodium charge. It is just as dangerous to use sodium-filled valves for making tools such as punches, screw drivers, chisels, etc. without removing the sodium charge first.

Be careful when removing the sodium from valves, since sodium mixed with water and water resolutions will react extremely explosive and the resulting hydrogen gas may cause fires.

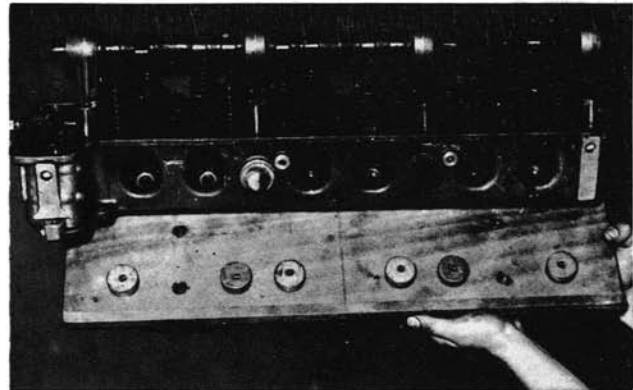


Fig. 05-2/1

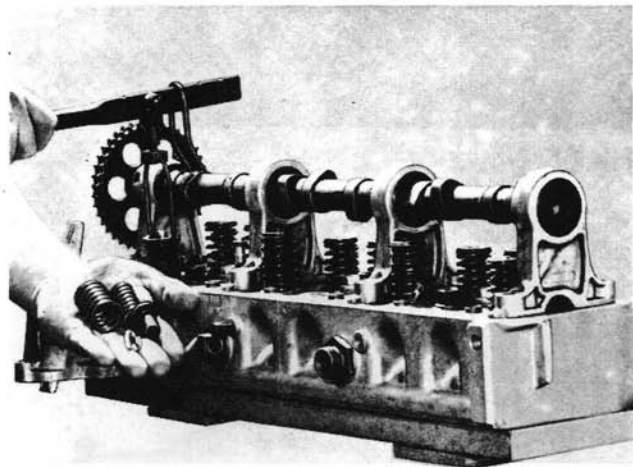


Fig. 05-2/2

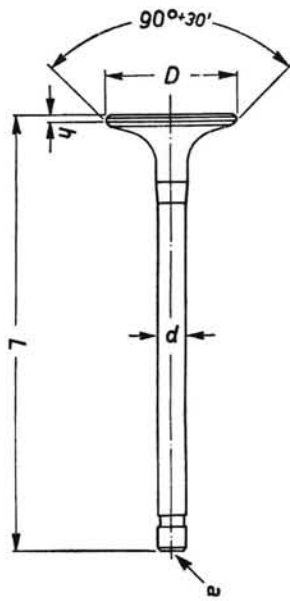


Fig. 05-2/3

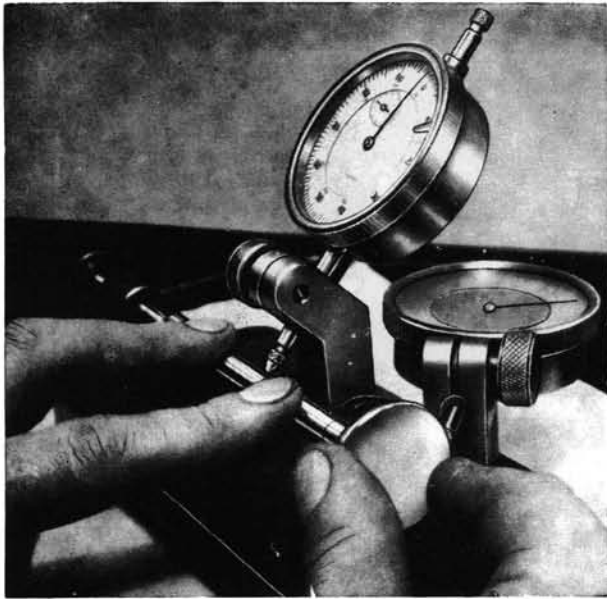


Fig. 05-2/4

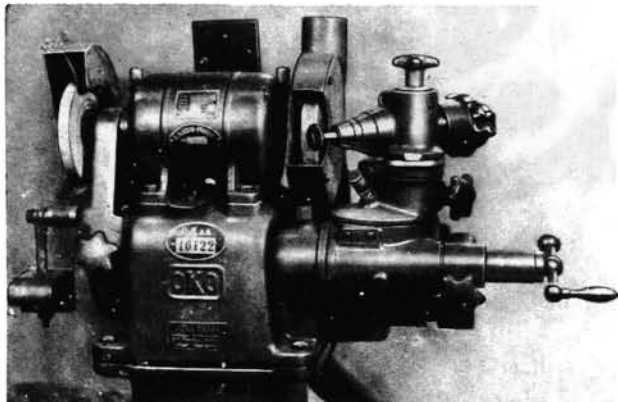


Fig. 05-2/5

II. Inspection and Grinding of Valves

Refer to Job No. 00-0, Table 18 as well as Fig. 05-2/3.

1. Check valves for wear and out-of-true on disc and stem.
2. For measuring, press valve tightly against contact surface of valve tester. The valve cone should run concentrically to valve stem within 0.02-0.03 mm. Fig. 05-2/4. Replace valves with worn stem.
(Refer to minimum values in above named table.)
3. Grind valve cone to $90^\circ \times 30'$ on valve cone grinding machine without wobble and chatter marks. Fig. 05-2/5.

Note: Valves in which the weight "h" of the valve disc of the intake valve is less than 1.0 mm, and on the outlet valve less than 1.5 mm, must be replaced. If the valve stem is worn out on valve foot "a", regrind on valve cone grinding machine. Rockwell hardness on surface "a" HRC = 55 to 61.

The outlet valves are cladded on seat. Designation and part number are shown on end of stem.

III. Inspection of Valve Springs

The perfect function of the valve closing times (timing) requires perfect valve springs. Whenever the valves are removed, it is recommended to check also the spring pressure of the valve springs.

For pertinent checkup refer to Job No. 00-0, Table 19.

I. Old Version (Engine M 180)

- 1 Remove cylinder head cover.
- 2 Place cam of valve to be adjusted upwards in such a manner that the base circle of the cam faces the sliding surface of the rocker arm.
- 3 Adjust valves with valve adjusting tool 000 589 64 09 00 (with engine cold)
 Intake = 0.12 mm
 Exhaust = 0.20 mm
Note: The valve clearance is measured between the valve stem and the rocker arm. Fig. 05-3/1. Tighten counter nut well.
- 4 Mount cylinder head cover, watch out for correct seat of rubber gasket.

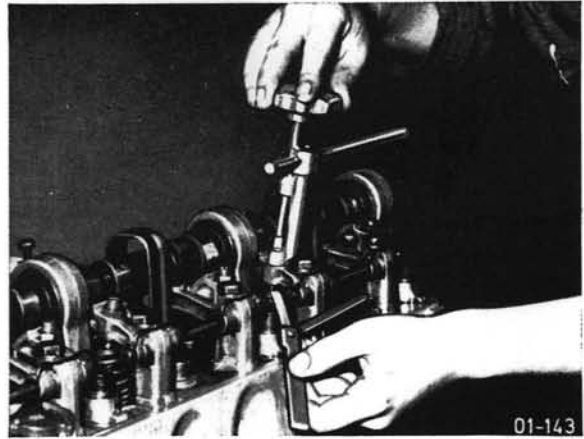


Fig. 05-3/1

II. New Version (Engine M 130 and M 180)

Item 1 and 2 refer to old version.

- 3 Adjust valves with valve adjusting tool 111 589 00 01 00.

Valve clearance mm	Cold below 30° C	Warm (approx. 60° C ± 15° C)
Intake	0.10	0.15
Exhaust	0.20	0.25

Note:

- a) The valve clearance is measured between the cam base circle and the rocker arm of the valve which is facing upwards. Fig. 05-3/2.
- b) If with the valve clearance too low, the ball pin top can no longer be adjusted (screwed down) in stud, a thinner thrust piece may be inserted in valve disc.
 Standard
 4.5 mm thrust = 9 mm total height
 1st rep.stage
 3.5 mm thrust = 8 mm total height
 2nd rep.stage
 2.5 mm thrust = 7 mm total height
- c) Min. torque of ball pin adjustment 1.5 mkp.

- 4 Mount cylinder head cover. Watch out for correct seat of rubber gasket.

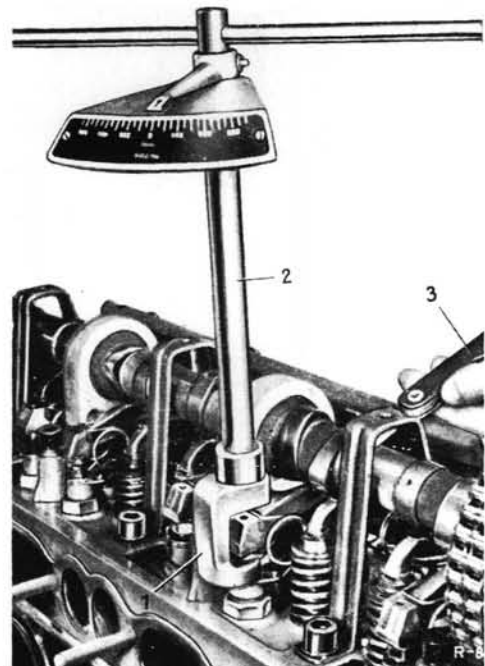


Fig. 05-3/2

- 1 Adapter 111 589 00 01-00
- 2 Torque wrench 0-13 mkp
- 3 Valve gauge 000 589 29 23-00

I. Removal

1. Remove cylinder head cover.
2. Position crankshaft in direction of rotation of engine to first cylinder TDC (working stroke). The notch of the compensating disc behind the sprocket wheel of the camshaft should be in alignment with the mark on the first camshaft bearing. Fig. 05-4/1.

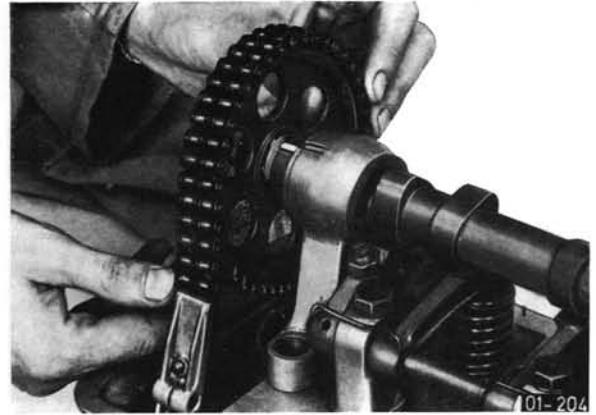


Fig. 05-4/1

3. Remove chain tensioner. Job No. 05-6.
4. Unscrew fastening screw for camshaft gear on camshaft. Fig. 05-4/2.

Note: Try not to turn camshaft and crankshaft anymore, since this would require a complete new adjustment of the engine.

5. Pull off camshaft gear with timing chain in position, assist with light hammer blows, if required. Fig. 05-4/3.
6. Put unused timing chain into sprocket wheel box.

Note: The removal and installation of the intermediate gear and the intermediate gear shaft described below can also be completed with the cylinder head in place.

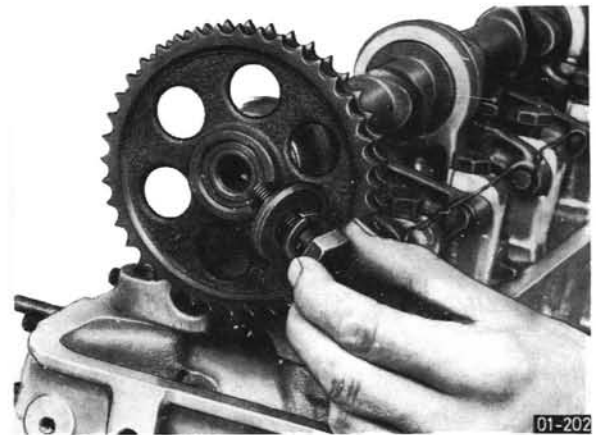


Fig. 05-4/2

7. Remove ignition timer.
8. Loosen fastening screw of ignition distributor bearing (cylinder head screw) and remove ignition distributor bearing with adjusting lever. Fig. 05-4/4.

Note: Make sure that the spacer ring between the fastening lug on the ignition distributor bearing and cylinder head does not drop into bearing bore of crankcase upon removal of ignition timer bearing.

9. Remove helical gear for ignition timer and oil pump drive by slightly turning clockwise (serves above oil pump drive cams simultaneously as a fuel delivery pump drive). Fig. 05-4/5.
10. Unscrew closing screw for bearing shaft of tensioning wheel bearing.

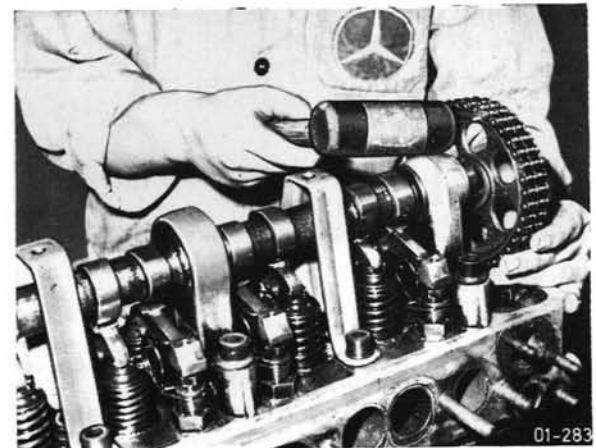


Fig. 05-4/3

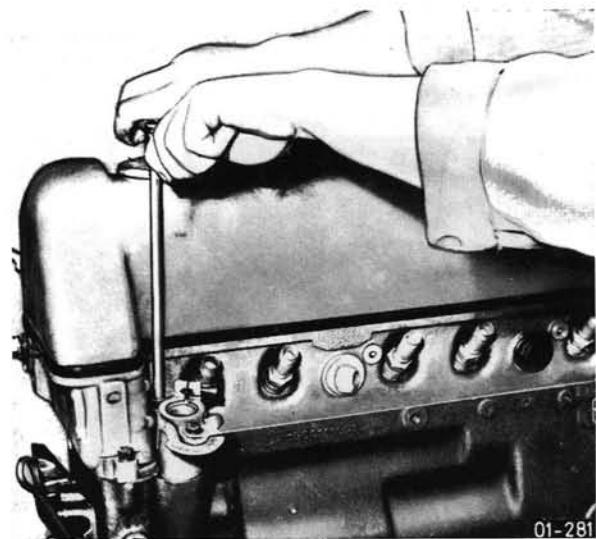


Fig. 05-4/4

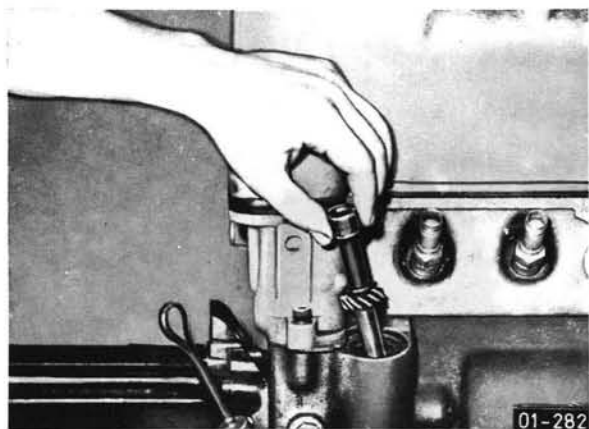


Fig. 05-4/5

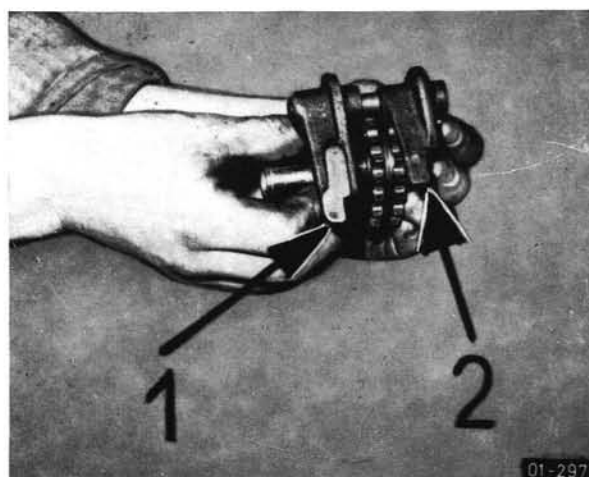


Fig. 05-4/6

1 new version
2 old version

11. Remove bearing shaft with puller 187 589 07 33 00 and take out tension wheel bearing with compression spring behind.

Note: There are two versions of tensioning wheel bearings.

Type old up to	new as from	} Engine end number
927-008824	008825	
928-025647	025648	
929-001170	001171	
942-000009	000010	
943-000610	000611	

Fig. 05-4/6

12. For repair data on tensioning wheel and tensioning wheel bearing refer to Job No. 00-0, Table 21.

a) Remove locking ring, washer and tensioning wheel from tensioning wheel bearing.

b) Clean single parts, blow out hole in bearing pin with compressed air.

c) If the nose of the tensioning wheel bearing on the seat of the chain tensioner pressure bolt is worn out, refinish this spot.

13. For reassembly of tensioning wheel and tensioning wheel bearing proceed vice versa.

Note: If the bearing pin of the tensioning wheel or the hole for the bearing shaft are worn out, replace tensioning wheel bearing. Lateral and vertical wobble of wheel when held in bore is max. 0.02 mm measured on circumference.

14. Loosen locking screw for intermediate wheel.

15. Remove closing cover on sprocket wheel box.

16. Unscrew fastening screw for intermediate wheel screw and pull wheel from intermediate shaft.

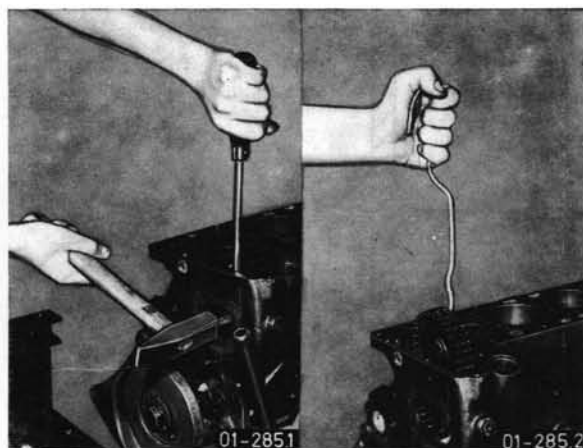
Note: There are two versions of intermediate wheel:

a) Sprocket wheel with two pull out holes M 6.

b) Sprocket wheel with two cast holes for commercial puller.

A screw M 6×50 can also be screwed into the intermediate wheel shaft for

disassembling the intermediate wheel. Knock back with light hammer blows against shaft, while simultaneously using a screw driver or the like to push the intermediate wheel forward. Pull intermediate wheel up with bent wire. Watch out for disc spring. Fig. 05-4/7.



17. Remove lock washer of front bearing bushing from intermediate gear shaft after loosening fastening screw.

Fig. 05-4/8, Item 9, 10 and 11.

18. Use screw M 6×50 to pull out intermediate wheel shaft with front bearing bushing. Fig. 05-4/9.

19. Pull rear bearing bushing with commercial internal puller.

Note: For data on reconditioning refer to Job No. 00-0, Table 24.

II. Assembly

1. Knock rear bearing bushing for intermediate wheel shaft with suitable mandrel (22 mm dia.) into assembly that the outer, continuous longitudinal groove points upwards and the open end of the longitudinal groove in the bore toward the rear. Fig. 05-4/10.

2. Install intermediate gear shaft with front bearing bushing and secure with lock washer.

Note: Push shaft back until the intermediate gear can be introduced in between the shaft and the housing.

3. Install disc spring and intermediate gear. Fig. 05-4/8.

Note:

Place timing chain for installation on sprocket wheel.

4. Pull shaft again forward until shaft end and wheel hub are on the same level, then tighten with fastening screw.

5. Check gears for easy operation.

6. Use depth gauge and chain alignment gauge 110 589 07 23 00 to check alignment of sprocket wheels on crankshaft and intermediate shaft. Fig. 05-4/11 and 05-4/12. Max. deviation of all sprocket wheels 0.1 mm.

Note: To obtain accurate values, push both gears or shafts toward the rear against stop.

7. Install chain tensioning wheel bearing with tensioning wheel and spring.

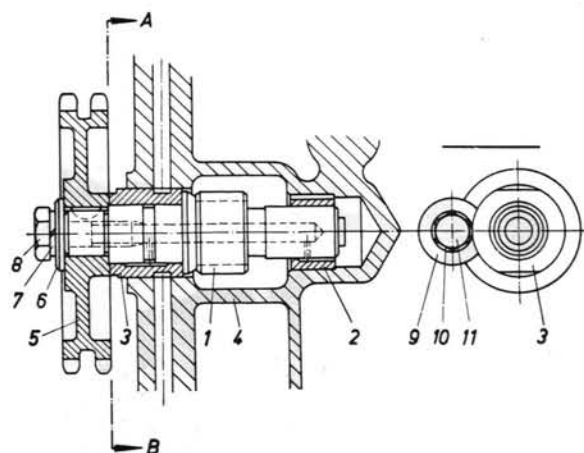


Fig. 05-4/8

- 1 Intermediate gear shaft with disc spring
- 2 Rear bearing bushing
- 3 Front bearing bushing
- 4 Crankcase
- 5 Intermediate gear
- 6 Washer
- 7 Circlip
- 8 Hex. screw
- 9 Lock washer
- 10 Circlip
- 11 Hex. screw



Fig. 05-4/9

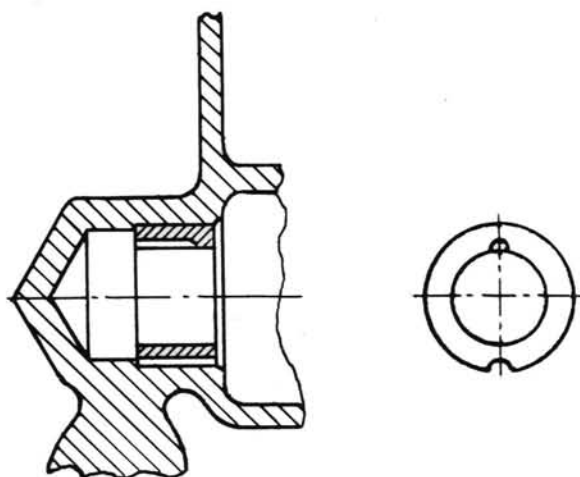


Fig. 05-4/10



Fig. 05-4/11



Fig. 05-4/12

8. Install camshaft gear with timing chain attached and tighten with screw. Use depth gauge and chain alignment gauge (Item 6) to measure alignment of camshaft gear. Fig. 05-4/13.

Note: Turn engine slightly back. When the adjusting finger on the counterweight of the crankshaft in the direction of rotation of the engine is accurately at TDC, the markings of the camshaft gear spacer washer and the first camshaft bearing should be in alignment. Fig. 05-4/1.

9. Insert helical gear. Make sure that the drive for the oil pump is correctly inserted.
10. Install ignition distributor bearing with adjusting lever.
11. Mount ignition distributor, without distributor disc (cap).

Note:

- a) When inserting the ignition distributor watch the installation position of the two drive lugs, since they are out of center and can be inserted in one position only. Do not use force, since for the reasons named above the lugs might be offset by 180° .
- b) Position crankshaft in direction of rotation (first cylinder in working position) to 2° before TDC. If the chain is not tight, turn intermediate gear in such a manner that the distributor finger points to the mark for the first cylinder.
- c) Tighten locking screw for intermediate sprocket wheel.
- d) Turn crankshaft slightly back and adjust first cylinder in direction of rotation again to 2° before TDC in working position.
- e) Loosen clamping screw (5 mm hexagon socket) on ignition distributor bearing, adjust ignition (make-and-break) with test lamp to make-and-break and tighten clamping screw again. Also refer to Job No. 00-0, Table 32.

12. Install chain tensioner.

Note:

- a) There are two versions of chain tensioners, refer to Fig. 05-4/14.

The two versions are completely interchangeable, but the individual parts are all different.

- b) Check chain tensioner for easy operation. Non-uniform tensioning may distort piston. When compressed in installed condition, the piston should push the tensioning wheel into correct installation position under spring pressure.
- c) Fill oil pocket for chain tensioner in cylinder head with engine oil.
- d) Vent chain tensioner with special spanner 187 589 02 63 00. Fig. 05-4/15.

For further reassembly proceed vice versa as described under I. Removal.

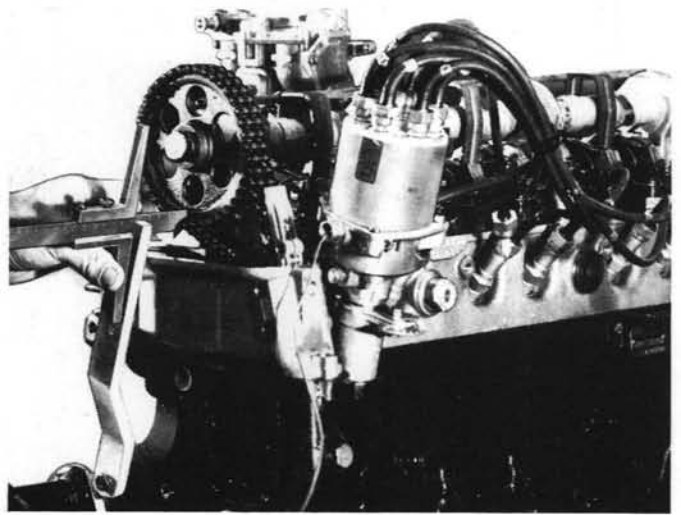
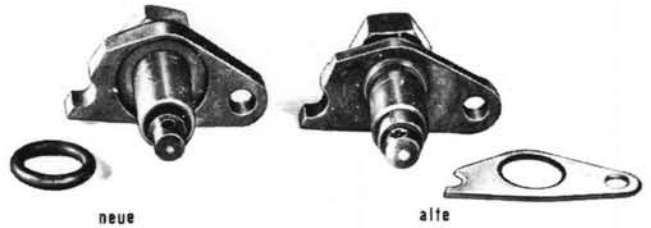


Fig. 05-4/13



Ausführung

01-294

Fig. 05-4/14

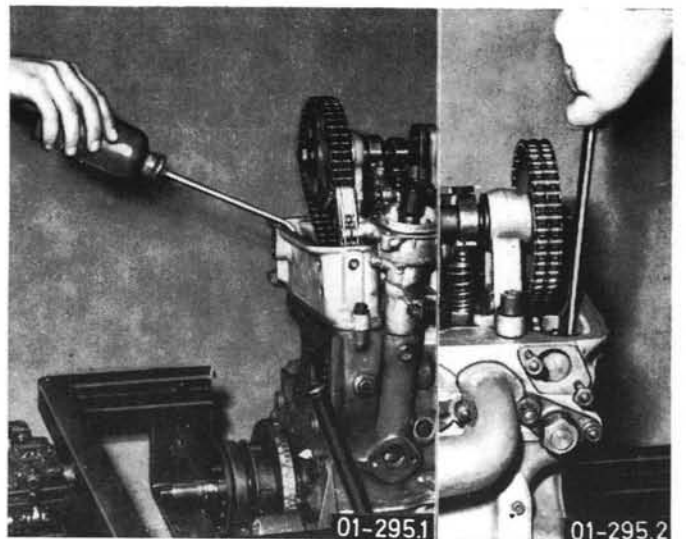


Fig. 05-4/15

I. Grinding and Inspection of Camshaft

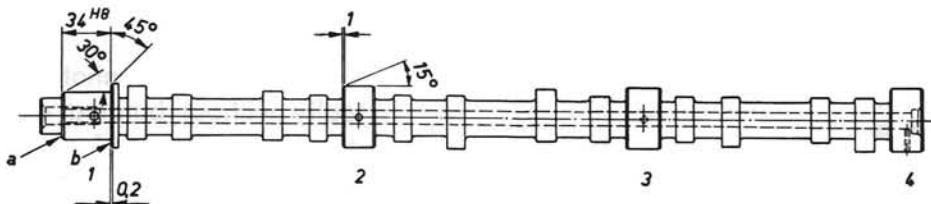


Fig. 05-5/1

The camshaft bearing journals are ground to the specified repair stage and the required bearing brackets with smaller bores are purchased ready for installation. Prior to grinding the camshaft, check camshaft accurately for concentricity. When the shaft is supported in the outer bearing points 1 and 4, the maximum out-of-true of the center bearings, the cam base circles and the camshaft gear seat should not exceed 0.025 mm. When the center is damaged at the front or at the rear on both sides, regrind on a center grinding machine or lathe.

Note: On camshafts with internal lubrication, remove closing washer in fourth bearing as well as oil distributing pipe. For repair data refer to Job No. 00-0, Table 22. To maintain the specified radial clearance of the camshaft, measure the bores of the camshaft bearings about to be installed first. Then check on basis of bearing play, within which tolerance range the journals require regrinding. When regrinding the first bearing journal, do not grind off more than max. 0.1 mm on lateral thrust surface of collar "b" (refer to Fig. 05-5/1). Grind surface "a" by the same dimension as on collar "b", so that the dimension 34 H 8 (34.000 to 34.039 mm) is absolutely maintained.

If not, the axial play of the camshaft and thereby the deviation from sprocket wheel alignment will become too large. The lateral wobble on surface "a" should not exceed 0.01 mm. After grinding the camshaft bearing journals, check camshaft for cracks and inspect individual bearing points for hardness.

II. Fitting new Camshaft Bearings

1. Disassemble cylinder head acc. to Job No. 05-1 (I old version, Item 1-4 or II new version, Item 1-3).
2. Remove camshaft gear.
3. Unscrew clamp holding cylinder head cover (cylinder head screws).
4. Remove camshaft toward the rear.
5. Loosen camshaft bearing screws (cylinder head screws).
6. Loosen hex. nut on lateral fastening lub of camshaft bearing. Fig. 05-5/2.

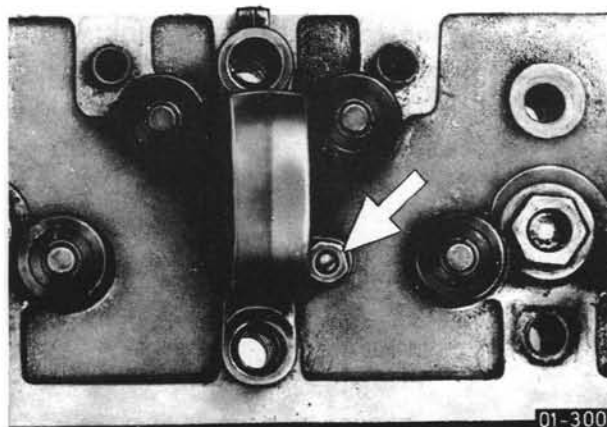
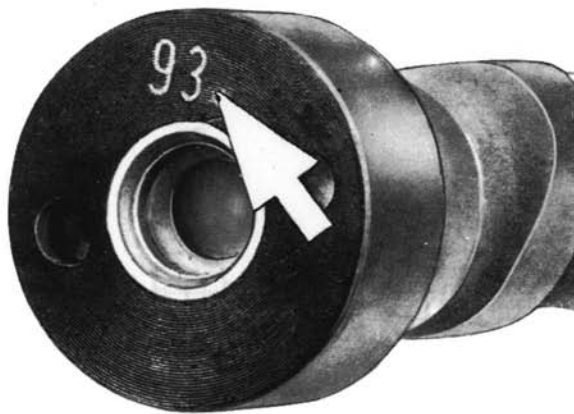


Fig. 05-5/2



01-303

Fig. 05-5/3

Note: Remove oil pipe on camshafts with outside lubrication, code number 70, 79, 82 and 93.

7. Remove camshaft bearing.

Note:

a) Since the fastening screws for the clamps and the camshaft bearings (Item 3 and 5) are cylinder head screws, they should be released only when the engine is cold. For tightening torque refer to Job No. 0-4.

b) Please note that when tightening cylinder head screws, the screws must first be slackened slightly, since otherwise the high tearing-off torque may show the wrong torque.

8. Check contact surfaces of bearing brackets for planeness. This applies particularly to first bearing bracket, since a leak would result in lube oil losses.

Note:

a) The permissible deviation of the unevenness on the top of the cylinder head should not exceed 0.1 mm in longitudinal direction and 0.01 mm in transverse direction.

b) If the camshaft cannot be turned manually without binding after tightening the cylinder head screws (bearing screws), equalize cylinder head again.

c) Observe camshaft code number.
Fig. 05-5/3.

9. Check set pins for camshaft bearing brackets and replace, if required.

10. Remove burr, if any, on cams or level uneven spots on cams with an oil stone.

11. Provide bearings with graphited oil.

Note: For replacement, use complete bearing sets only.

12. After inserting the camshaft and assembling the clamps for the cylinder head screw, check camshaft once again for easy running.

13. Slide compensating washer and camshaft gear **without** chain on camshaft and tighten fastening screw for camshaft gear.

14. Check axial play of camshaft. Refer to job number 00-0, Table 22.

If the axial play is high, grind again on face end (a) of first bearing journal. If the play is low, grind again on surface (0.2) of bearing journal collar. Fig. 05-5/1.

15. When installing a new camshaft or a new first camshaft bearing, check chain alignment. Max. deviation 0.1 mm. Refer to Job No. 05-4 II, Item 8.

16. If corrections are required, select pertinent compensating washers and install.

Note: Watch out for offset keys. For timing, refer to Job No. 00-0, Table 21.

17. Make basic adjustment of timing. In TDC position of the crankshaft, the two marks of the compensating washer on the camshaft gear and on first camshaft bearing should be in alignment. Fig. 05-4/1.

The timing chain must be tight on side turning in direction of rotation of engine.

18. Tighten fastening screw for camshaft gear.
19. Install chain tensioner. Refer to Job No. 05-4 II, Item 12.
20. Install rocker arm brackets or rocker arms. Refer to Job No. 05-1 I or II.
21. Check timing again and mount cylinder head cover.

Checking the chain tensioner for perfect function requires normally a special checking fixture. If no such fixture is available, a comparison test between the faulty and a new, perfect chain tensioner will be adequate. For this purpose, the chain tensioner is removed, filled up with engine oil in a vessel and vented. Following the venting, compressing the chain tensioner should be possible only very slowly, uniformly, and under considerable force.

Chain tensioners which are easily compressed will cause the chain to chatter. Chain tensioners which operate too tightly may cause the chain to whine.

Faulty chain tensioners are best replaced completely. To the extent, spare parts are available, the pressure bolt (9) and the housing (4) cannot be exchanged individually, since both parts must be selected accurately fitting to each other. Fig. 05-6/1.

- 1 Closing nut
- 2 Sealing ring
- 3 Compression spring
- 4 Housing
- 5 Pin
- 6 Ball cage
- 7 Circuit
- 8 Ball
- 9 Thrust bolt

a refer to Job No. 00-0, Table 20

Arrow Longitudinal groove in chain tensioner housing

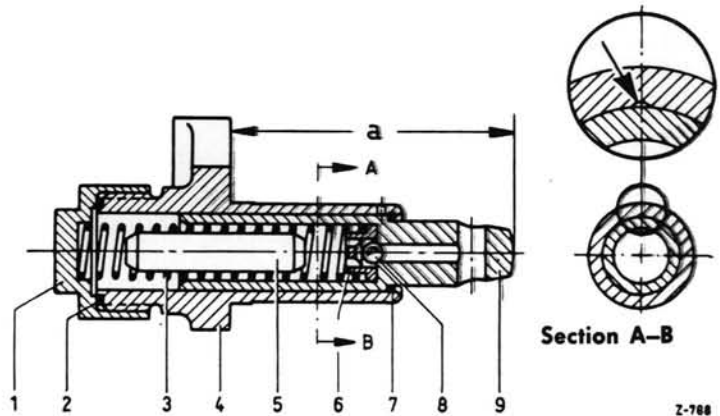


Fig. 05-6/1

Z-788

If a self-venting chain tensioner is installed, any air bubbles occurring during operation can escape through a small longitudinal groove, so that the chain tensioner is always well vented and will show a favorable behaviour in relation to chain noise.

1. Remove cylinder head cover.
2. Unscrew chain tensioner and remove together with sealing ring. Refer to Job No. 00-3, Item 23.
3. Check chain tensioner and repair.
 - a) Unscrew closing nut (1), making sure that the compression spring (3) presses on closing nut. Refer to Fig. 05-6/1.
 - b) Remove compression spring (3), pin (5), ball cage (6), ball (8) and thrust bolt (9) from housing.
 - c) Clean all parts thoroughly and check for wear, replace if required. For dimensions and tolerances refer to Job No. 00-0, Table 20.
 - d) Insert thrust bolt (9) into housing (4). Insert ball (8) with ball cage (6), pin (5) and compression spring (3) into pressure bolt (9). Screw on closing nut (1) with sealing ring (2) and tighten.
 - e) Fill chain tensioner with oil, vent and check.

4. Insert chain tensioner with new sealing ring and screw down uniformly.

Note: Install chain tensioner without oil charge, since otherwise the housing might be distorted when tightening the nut.

5. Vent chain tensioner.

- a) Fill oil pocket in cylinder head with engine oil.

- b) Push tensioning wheel bearing against stop with venting lever tool number

187 589 02 63 00, using a screw driver, if required.

- c) Move back with lever while constantly filling up with oil, so that the oil pocket is always filled and the chain tensioner cannot suck up any air. Repeat until no more air bubbles are seen in oil pocket.

Note: A perfectly vented chain tensioner has no idle stroke and can be compressed only from the start under maximum force.

6. Attach cylinder head cover.

I. Removal and Installation of Timing Chain

A. Chain Stretch and Measuring of Chain Tensioning Path

Normal wear may cause the timing chain of the engine to stretch, which will not only result in rattle, but will also change the timing.

This requires measuring of the tensioning path reserve "a" of the chain tensioner. It is done with a 2 mm gauge which is placed at the front in between the lever (2) of the tensioning wheel bearing and the web (3) of the cylinder head. Fig. 05-7/1.

If the gauge can be inserted between the lever and the web or if the distance is still larger, the chain stretch is still relatively short and a correction can be easily made by displacing a wedge.

A chain length of 1 mm corresponds to a change of the timing in the direction of "retarded" of approx. 1° crankshaft. If the gauge cannot be inserted between the lever and the web, replace chain.

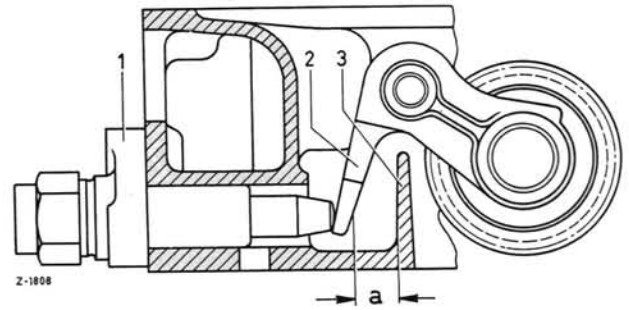


Fig. 05-7/1

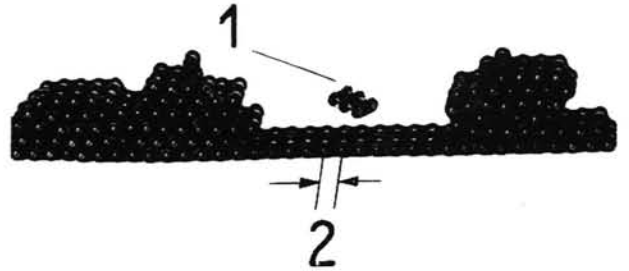


Fig. 05-7/2

- 1 Chain lock
- 2 1 Chain link

01-197

B. Removal and Installation of Timing Chain

The timing chain should be replaced only when the pertinent noise shows clearly that the fault is with the timing chain. Therefore, check camshaft and chain tensioner first.

As a result for the endless chain, a chain with a plug member (chain lock) may be used in the event of repairs. This will permit replacing a chain without disassembling the engine.

Fig. 05-7/2.

1. Open engine hood at the front, remove engine hood in cab, as well as cylinder head cover.

Note: For removal of the cylinder head in the vehicle disconnecting the starter cable control on carburetor and loosening or removal on top holder (pull knob) is required.

Watch out for crankcase breather.

2. Fetch new chain.
Old valve timing = 122 links
New valve timing = 124 links
3. Remove chain tensioner.
4. Find out whether endless chain is installed or repair chain.

Note: Repair chain has a chain lock.

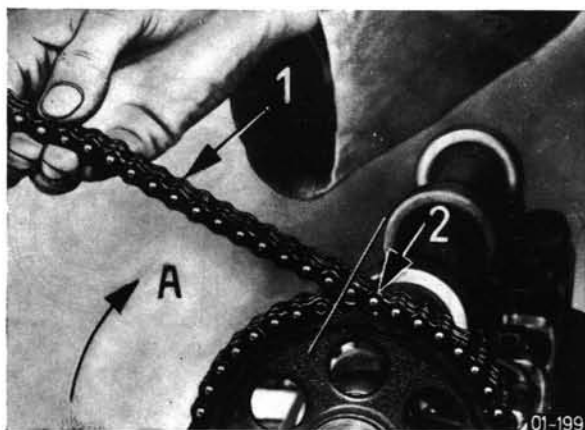


Fig. 05-7/3

- 1 New chain
- 2 Defective chain
- 3 Direction of rotation



Fig. 05-7/4

- A Direction of rotation

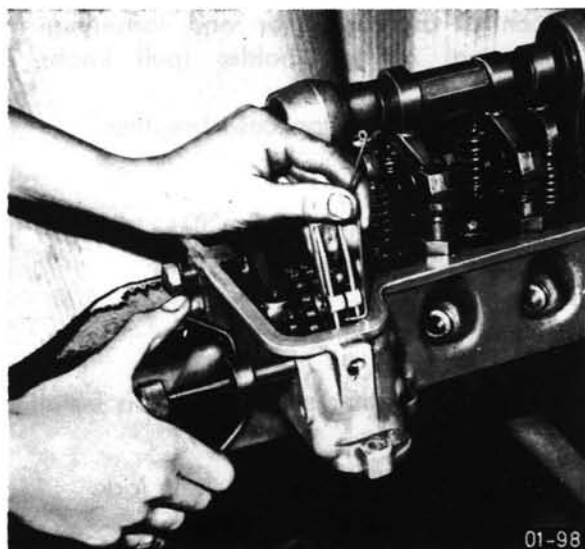


Fig. 05-7/5

5. If it is an endless chain, remove chain by grinding and removing two chain bolts.

Note. Do not permit chain ends to drop into timing housing.

6. Attach new chain with chain lock to old chain and insert chain lock spring closure (safety lock) correctly. Fig. 05-7/3.
7. Rotate engine carefully until the new chain is in the position of the old chain. Then pull old chain out just like the new chain has been pulled in.
8. Remove old chain and connect new chain well with chain lock.

Note: Push chain lock in from inside toward the outside and attach closing spring with closed end in direction of rotation of engine. Fig. 05-7/4.

If during the installation of the new chain the camshaft has been adjusted, the basic adjustment of the engine must be checked and readjusted, if required.

9. Install chain tensioner and vent. Refer to Job No. 05-6
10. Mount cylinder head cover.

Note: Attach cylinder head crankcase breather. Attach starter cable control.
11. Close engine cover and engine hood.

II. Removal and Installation of Slide Rails

Note that when pulling out the bearing bolts, the locking wire must be lifted with a wire hook, etc. up to the engine numbers (old version) named below, in order to prevent damage. Fig. 05-7/5.

Old version up to engine end number

922 850007

927 850119

928 850002

929 850063

New version as from engine end number

922 850008

927 850120

928 850003

929 850064

The bearing bolts of the new version are designed in such a manner that the locking wire will move upwards without assistance when the bolt is pulled out.

A. Cylinder Head

1. Remove cylinder head cover.
2. Slacken chain on pulling end by turning engine in reverse.
3. Pull both bearing bolts out by means of bolt puller 187 589 07 33 00.
4. Remove slide rail.
5. For reassembly proceed vice versa.

Note: Do not damage female threads of bearing bolt when knocking bolt in. Knock

bolt in up to stop. Watch out for length of bearing bolt.

B. Crankcase

Removing the short and long slide rail in the crankcase requires removal of the oil pan and the counterweight of the crankshaft, as well as of water pump. Removal and installation is as already described under A Cylinder Head. The adjusting finger for the graduation of the crankshaft counterweight is attached to the upper bearing bolt of the short slide rail (seen in driving direction at the left).

General Information

Experience has shown that the test instruments named below are particularly well-suited for their purpose which, however, does not exclude the fact that other test instruments made by the same manufacturers or test instruments made by other manufacturers are equally appropriate and are therefore also listed as examples. Test instruments operated with lighting current are provided for 220 V/50 Hz connections, the type of current normally available in Germany. When placing an order, the respective local voltages and frequencies should be noted and pertinent references should be given in order.

A special reason for the present selection is that the various engine type designations of the UNIMOG require the use of connections which were developed in cooperation with the respective manufacturers.

The test instruments should always be ready for use and calibrated, as required. (Observe data provided by manufacturer).

Individually, the following test instruments are used for the tests named below:

Tests	Test Instruments
Engine, Mechanical	
Intake and exhaust valves Piston rings Cylinder head gasket	} Cylinder leak test instruments
Carburetor System	
Adjustment double carburetor system	Synchronous tester
Mixture distribution Accelerating pump Leak test intake system	} Ignition oscillograph } Emission tester
Vacuum at starter speed and throttle valve closed Intake pipe	} Gauge pressure vacuum tester

07.0 Test Instruments

Tests	Test Instruments
Electrical System	
Battery capacity Starter current input Battery leakage current	} Battery starter tester (Volt-Ampere-meter)
Ignition System	
Cable resistance Resistance of ignition distributor rotor Spark plug resistance	} Volt-Ohm-meter
Contact resistance Timing angle	} Speed-timing angletester
Firing point Ignition distributor adjusting curve	} Firing point lamp (stroboscope)
Starting ignition voltage Ignition coil max. voltage Insulation Normal ignition voltage Resistances Spark plug load Contact breaker Ignition coil and capacitor Distributor, mechanical	} Ignition-oscillograph
Spark plugs, removed	Spark plug tester
Capacitor	Capacitor tester
Exhaust Gas (Emission) System	
Exhaust gas mixture idle speed range medium idle speed range high idle speed range	} Exhaust gas mixture (emission) tester or CO tester
Fuel Delivery System	
Fuel delivery pump	Gauge pressure – vacuum tester

Test Instruments – Survey

Test Instrument	Manufacturer	Manufacturer-Order Data Model	Order Data Order No.	Remarks	Supplier
Engine, Mechanical					
Cylinder leak tester	SUN	CLT-228	008 232		GATHER
tester	BOSCH	EFAW 210	0 681 001 900		BOSCH
Carburetor System					
Synchronous tester	MOTOMETER	ST 100	628 01 1000		MOTO-METER
	MOTOMETER	ST 100	000 589 12 23		ET-Wörth
Electrical System					
Volt-Ampere tester	BOSCH	EFAW 167	0 681 100 601	6 u. 12 V ¹⁾	BOSCH
Load-resistance	BOSCH	EFAW 107 A	0 681 100 101		BOSCH
Alternator diode tester	BOSCH	EFAW 192	0 681 101 403	220 V, 50 Hz ²⁾	BOSCH
Alternator tester	SUN	VAT-26	008 320	6, 12 u. 24 V	GATHER
Volt-Ohm tester	GALETT	VOT		24 V, 100 k Ω	GATHER
Ignition System					
Speed-timing angle tester	BOSCH	EFAW 166 C	0 681 100 503		BOSCH
Speed-timing angle tester	SUN	TDT-12	008 286	6, 12 u. 24 V ⁴⁾	GATHER
Firing point lamp (stroboscope)	BOSCH	EFAW 169 B	0 681 101 118	6, 12 u. 24 V ³⁾	BOSCH
Firing point lamp	BOSCH	EFAW 180	0 681 101 103	220 V, 50 Hz ²⁾	BOSCH
Firing point lamp	BOSCH	EFAW 185 A	0 681 101 125	6, 12 u. 24 V	BOSCH
Firing point lamp	SUN	RTL-55-3	008 264	220 V, 50 Hz ²⁾	GATHER
Firing point lamp	SUN	U-100-G	008 300	220 V, 50 Hz ^{2) 3)}	GATHER
Firing point lamp	GALETT	ZVT 24	—	12 u. 24 V ⁵⁾	GATHER

¹⁾ With starter ammeter, together with load resistance EFAW 107 A

²⁾ For other mains voltages and frequencies special order required

³⁾ With adjusting angle measuring device

⁴⁾ When ordering, state "For 24 V vehicle wiring system"

⁵⁾ With timing device and revolution counter installed

07.0 Test Instruments

Test Instruments – Survey (ctd.)

Test Instrument	Manufacturer	Manufacturer-Order Data Model	Order No.	Remarks	Supplier
Ignition System (ctd.)					
Spark plug tester	BOSCH	EFKE 2 K	0 681 124 013	220 V, 50 Hz ³⁾	BOSCH
Capacitor test lamp	BOSCH	EFAW 85	0 681 469 006		BOSCH
Ignition oscillograph	BOSCH	EFAW 206	0 681 102 100	∅ 13 cm	BOSCH
Ignition oscillograph	BOSCH	EFAW 213 B ¹⁾	0 681 102 111	∅ 18 cm	BOSCH
Ignition oscillograph	SUN	SS-85	008 272		GATHER
Ignition oscillograph	SUN	SS-95	008 528	(to SMT 89)	GATHER
Ignition oscillograph	SUN	SS-100	010 951		GATHER
Minitester	BOSCH	EFAW 226 ²⁾	0 681 102 800		BOSCH
Housing guard	BOSCH		1 681 109 021		BOSCH
Emission System					
Exhaust gas (emission) tester (heat toning method)	BOSCH	EFAW 173	0 681 000 200	6 u. 12 V	BOSCH
(infrared method)	BOSCH	EFAW 215	0 681 001 800	220 V, 50 Hz ³⁾	BOSCH
(infrared method)	H & B	GG COT 2		220 V, 50-60 Hz ³⁾	H & B
(heat toning method)	SUN	CCI-280/N	026 022	029 537 ⁴⁾	GATHER
Fuel Delivery System					
Gauge pressure – vacuum tester	BOSCH	EFAW 177	0 681 100 701		BOSCH
Gauge pressure – vacuum tester	SUN	VPT-212	006 328		GATHER
Gauge pressure tester	BOSCH	EFAW 138 A	0 681 100 301		BOSCH

¹⁾ With means for shorting individual cylinders

²⁾ Combination speed-timing angle-voltage-resistance tester

³⁾ For other mains voltages and frequencies special order required.

⁴⁾ CO-accessories compl.

Test Instruments – Survey (ctd.)

Test Instrument	Manufacturer	Manufacturer-Order Data Model	Order Data Order No.	Remarks	Supplier
Engine Test Instrument Kit with Cylinder leak tester Capacitor timing angle tester Firing point lamp, combined with electronic distributor tester Volt-Ohm-meter Ignition oscillograph SS 85 Exhaust gas (emission) tester and revolution counter Gauge pressure vacuum tester Power pack and lights for all instruments	SUN	745-CP- R/A/CO/TIC	010 769	220 V, 50 Hz ²⁾	GATHER
Engine Test Instrument Kit with Cylinder leak tester Timing angle tester Firing point lamp and timing angle tester Volt-Ohm capacity tester Ignition oscillograph SS 100 Ignition coil teter Electronic cylinder com- parator High tension tester Gauge pressure vacuum tester	SUN	SMT 89	027 107	220 V, 50 Hz ^{1) 2)}	GATHER
Engine Test Instrument Kit with Cylinder leak tester Timing angle tester Firing point lamp and timing angle tester Volt-Ohm capacity tester Ignition oscillograph SS 100 Ignition coil teter Electronic cylinder com- parator High tension tester Gauge pressure vacuum tester	SUN	1130-CP/ A/CO	026 937	220 V, 50 Hz ²⁾	GATHER
Engine Test Instrument Kit with Speed timing angle tester Firing point lamp and timing angle tester Volt-Ohm capacity tester Ignition oscillograph EFAW 213 B Exhaust gas (emission) tester EFAW 215 Gauge pressure vacuum tester	BOSCH	EFAW 214 BS 10	0 681 102 901	220 V, 50 Hz ²⁾	BOSCH

¹⁾ When ordering, state "For 24 V vehicle wiring system"

²⁾ For other mains voltages and frequencies special order required

07.0 Test Instruments

Test Instruments – Survey (ctd.)

Test Instrument	Manufacturer	Manufacturer-Order Data Model	Order No.	Remarks	Supplier
Engine Test Instrument Kit	BOSCH	EFAW 268	0 681 501 500	220 V, 50 Hz ¹⁾	BOSCH
Similar to EFAW 214 BS 10 but with ignition coil tester					
For all Engine Test Instrument Kits from:					BOSCH
Enclosed equipment trucks	BOSCH		0 681 501 000		BOSCH
Open equipment trucks	BOSCH		0 681 502 000		BOSCH
Suspension device with carriage	BOSCH		0 681 503 000	upon request	BOSCH

¹⁾ For other mains voltages and frequencies special order required.

Test Instruments – Spare Parts

Test Instrument	Manufacturer	Manufacturer-Order Data Model	Order No.	Remarks	Supplier
Gauge Pressure Vacuum Tester					
Connection	SOLEX	D 10-U 34	—	—	SOLEX
Firing point lamp	SUN	—	—	—	GATHER
Cathode lamp	SUN	1677-5 A	004 763	—	GATHER
Chopper	SUN	C-602/24	004 943	—	GATHER
Capacitor	SUN	679-137-1	004 482	—	GATHER
Firing point lamp	SUN	—	—	—	GATHER
Cathode lamp with socket	SUN	5927	004 857	—	GATHER
Flash lamp without socket	SUN	2440-5	004 795	—	GATHER
Firing point lamp	BOSCH	—	—	—	BOSCH
Flash tube (f EFAW 169 B, 180, 185)	BOSCH	—	1 687 310 016	—	BOSCH
Exhaust Gas (Emission) Tester	SUN	—	—	—	GATHER
Emission probe	SUN	AS-02	—	1)	GATHER
Connecting hose	SUN	669/14	—	—	GATHER
Condensate separator	MB	—	111 435 02 27	2)	ET-Wörth
	optional SUN	PAG	019 400	1) 2)	GATHER
Exhaust clamp	SUN	AK-01	008 398	1)	GATHER
Stand	SUN	GSA	024 977	1)	GATHER
	SUN	CO-Set	029 537	—	GATHER

1) CO-accessories compl.

2) Required 2 each

Type-Related Connections for Test Instruments on UNIMOG Model 404.1 and 404.0

This publication covers only possible connections on UNIMOG-S with short-distance radio-shielded, splash waterproof ignition system.

UNIMOG-S vehicles with long-distance radio-shielded, normal ignition system are covered by available pertinent connections made by the manufacturers of test instruments.

The following list covers preferably connections made by GATHER KG, 402 Mettman-Metzkausen near Düsseldorf, Germany, and can be obtained there.

Connections made by this company may in part also be used for test instruments of other manufacturers. Connections of additional manufacturers are tested right now and will be published upon approval.

Note:

The listed MB-numbers were published in the test folder UNIMOG-S (Mercedes-Benz Instructions and Test Sheets for Test Instruments UNIMOG). **Connections can no longer be supplied by MB.**

Cons. No.	Supplier	Former Part No.	Changed Part No.	Remarks
1	MB GATHER	404 589 05 21 AUN-05	— 008 448	Fig. 1 Fig. 1
2	MB	404 589 02 21	—	Fig. 2 No longer available
3	MB	404 589 03 21	—	Fig. 3 No longer available
4	MB GATHER	404 589 04 21 AUN-01	— 014 407	Fig. 4 Fig. 5 and 6 (2 functionally similar version)
5	MB	404 589 06 21	—	Fig. 7 No longer available
6	MB	404 589 07 21	—	Fig. 8 No longer available
7	MB GATHER	404 589 08 21 AUN-02	— 008 441 ¹⁾	Fig. 9 Fig. 10 and 12
8	MB GATHER	404 589 09 21 AUN-02	— 008 441 ²⁾	Fig. 11 Fig. 12

1) When replacing 404 589 08 21 with 008 441, include 014 407 in order

2) When replacing 404 589 09 21 with 008 441, include 014 407 in order

07.0 Test Instruments

Cons. No.	Supplier	Former Part No.	New Part No.	Remarks
9	MB	404 589 10 21	—	Fig. 13
	GATHER	AUN-03	008 444 ³⁾	Fig. 14
10	MB	404 589 11 21	—	Fig. 15
	GATHER	AUN-04	008 446 ⁴⁾	Fig. 16 (2 functionally similar versions)

³⁾ Two different versions are available. Refer to Fig. 14 and 17.

When delivered acc. to Fig. 14 and used on cabinets starting Type SUN 820 and up, or on stroboscopes with built-in timing angle measuring device, one intermediate connection must be additionally self-made acc. to Fig. 19.

(Required to avoid faulty measurements).

When delivered acc. to Fig. 17, no intermediate connection is required.

⁴⁾ Two difference versions are available. Refer to Fig. 16 and 18.

When delivered acc. to Fig. 16 and used on cabinets starting Type SUN 820 and up, or on stroboscopes with built-in timing angle measuring device, one intermediate connection must be additionally self-made acc. to Fig. 20.

(Required to avoid faulty measurements).

When delivered acc. to Fig. 18, no intermediate connection is required.

Notes concerning self-made intermediate connections for 9:

2 each Spark plug connecting nuts for plug connector acc. to SAE

Bosch Type KMU 1 W 3 x (brass or aluminum)

Bosch Order No. 1 243 345 001

1 each Hex. nut M 4 DIN 934-8

1 each Stud M 4 x 20 DIN 551

Notes concerning self-made intermediate connections for 10:

1 each Spark plug connecting nuts for plug connector acc. to SAE

Bosch Type KMU 1 W 3 x (brass or aluminum)

Bosch Order No. 1 243 345 001

2 each GATHER connection (Rajah-clip)

GATHER Order No. 014 041

2 each Slotted screws AM 4 x 6 DIN 17 672 MS

(reduced to 5.5–6 mm by refinishing dia. of screw head).



UR07-0043

Fig. 1



UR 07-0044

Fig. 2



UZ 07-0004

Fig. 3



UZ 07-0003

Fig. 4



UR07-0045

Fig. 5



UR07-0046

Fig. 6



UR07-0057

Fig. 7



UR 07-0058

Fig. 8



UR 07-0059

Fig. 9



UR07-0047

Fig. 10



UR 07-0060

Fig. 11



UR07-0048

Fig. 12



UR 07-0055

Fig. 13



UR07-0049

Fig. 14



UR07-0056

Fig. 15



UR07-0050

Fig. 16



UR07-0051

Fig. 17



UR07-0052

Fig. 18



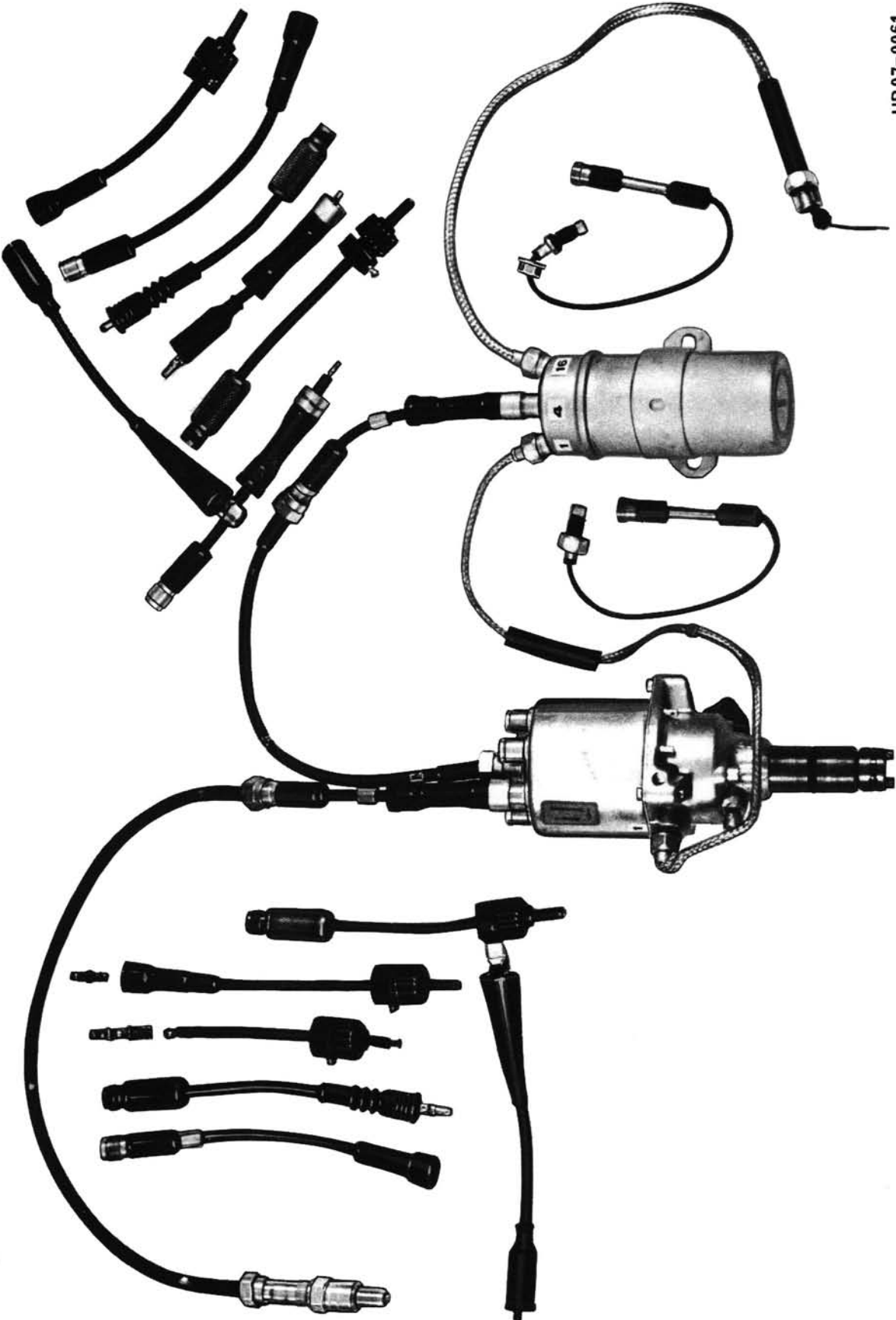
UR07-0053

Fig. 19



UR07-0054

Fig. 20



UR 07-0061

General Information

For testing the ignition system, the electrical system, the mixture preparation and the exhaust gases (emissions), a work sheet has been compiled which is restricted to the most important test items while simultaneously permitting a work sequence analogously to "Measuring and Adjusting Data" (refer to Group 07.0 Item 3). This work sheet permits tracing the type of faults occurring most often.

Depending on the available test instruments, the work sheet covers 2 test programs and can be ordered from UKD-TD in blocks of 30 sheets each under Order No. 30 400 73 01.

Operating instructions are supplied by the manufacturer with each test instrument describing the respective connection, calibration and handling.

If, while testing, a fault is not recognized from the start or if the assumption may be made that there are several faults, complete the respective jobs in the sequence of the work sheet. In the event of obvious faults, e.g. with regard to mixture preparation, it will often be sufficient to localize these faults by means of an abbreviated or individual test.

If the fault leading to the complaint is already found at the beginning of the test sequence, the remaining test jobs may be omitted.

However, the required tuning jobs and the acceptance run must be completed in each case.

If in the course of a test several faults or irregularities show up on an engine, be sure to complete the entire test program since any remaining residual faults may result in a continued impairment of output. If required, also include consumption measuring drive and spark plug assembly.

07.0 Testing

Test Instruments – Scope

Test Instruments – Minimum Scope

To complete the jobs listed in work sheet under Test 1, the following test instruments are required:

Cons. No.	Each	Designation	Remarks
1	1	Stroboscope	} suitably 1 unit
2	1	Revolution counter	
3	1	Timing angle measuring device	
4	1	Voltmeter 0-32 V	} suitably 1 unit
5	1	Ohmmeter	
6	1	Vacuum measuring instrument (0-600 mm Hg)	
7	1	Gauge pressure measuring instrument (0-500 mm Hg)	
8	1	Synchrotester made by Motometer	

The **complete scope of test instruments** required for completing the jobs named on work sheet under test 2, includes the following instruments in addition to minimum equipment:

9	1	Pressure loss tester
10	1	Oscillograph
11	1	CO-tester

Work Sheet for Engine Test

UNIMOG S, Model 404



Date _____

Customer _____ Representative _____ Order No. _____

License No. _____ Initial reg. _____ Chassis No. _____ Engine No. _____

Op. hours _____ Mileage _____ Last service _____ Completed by _____

Complaint _____

Test 1: Minimum scope test instruments Test 2: Full scope test instruments V = in order

Test		Extent of test	V	Remarks
1	2			
0	0	1 Engine oil level		
0	0	2 Coolant level		
0	0	3 Oil bath air filter, degree of contamination		
0	0	4 Engine basic adjustment (crankshaft-camshaft)		
0	0	5 Spark plugs (thermal value, threads, condition)		
0	0	6 Pressure loss, compression		
0	0	7 Valves		
0	0	8 Carburetor linkage, throttle valves, full throttle position		
0	0	9 Carburetor, nozzle line-up, basic adjustment		
0	0	10 Choke cable control		
0	0	11 Easy operation of heater flaps		
0	0	12 Battery		
0	0	13 Ignition coil, preresistance		
0	0	14 Suppressor, distributor finger, (code No.)		
0	0	15 Contact points		
0	0	16 Contact resistance		
0	0	17 Fuel pump filter, fuel prefilter		
0	0	18 Fuel pump suction end/pressure end		
0	0	19 Timing angle - timing angle change		
0	0	20 Synchronizing carburetor		
0	0	21 Idle speed		
0	0	22 Firing point	4,500/min	
			850/min	
0	0	23 Intake system, vacuum box	Total vacuum adjustment	
0	0	24 Oscillogram		
0	0	25 Electrical auxiliary fuel pump solenoid valve		
0	0	26 CO value in %		

Test completed by: _____

_____, Date _____

Rubber stamp/Signature

General Test Sequence

- 1 Run engine warm, stop vehicle and secure.
- 2 Fill-out head of work sheet.
- 3 Make test instruments available, connect and calibrate, if required. Connect to mains and run up to operating temperature. (Particularly important for CO-tester).
- 4 Check engine oil, coolant, fuel level and correct, if required.
- 5 Check oil bath air filter, clean if required and add fresh engine oil up to max. mark.
- 6 Check engine basic adjustment and correct, if required.
- 7 Check valve clearance, adjust.
- 8 Remove spark plugs, check, take driving style of customer into consideration.
- 9 Complete pressure loss test and/or check compression.
- 10 Check carburetor and clean, if required. Check nozzle line-up and correct, if required. Check accelerating pump – pump lever, check adjustment and correct, if required. Check carburetor linkage and return spring and replace, if required. Check throttle valve full throttle position and adjust, if required. Check starting carburetor for correct adjustment (On-Off) on choke pull knob and adjust, if required. (Approx. 2 mm clearance between knob and instrument panel in position "Off"). Check bowden wire for easy operation and bends and replace, if required.
- 11 Tighten all bolts of intake and exhaust system.
- 12 Check heating flap function and make shaft operable, if required, or replace bimetallic springs.
- 13 Connect test instruments (observe connecting instructions of manufacturers).
- 14 Check battery.
- 15 Check function of ignition coil and preresistance.
- 16 Check ignition coil, reserve voltage (secondary) on terminal 16 and replace ignition coil, if required.
- 17 Check suppressor primary and secondary and replace ignition cable, if required.
- 18 Fill cable connections with silicon paste.
- 19 Check ignition distributor finger for correct code No. and replace, if required. Check resistance.
- 20 Check contact resistance (primary resistance) with ohmmeter or timing angle speedometer. Replace capacitor, if required.
- 21 Check contact breaker points, replace, if required and adjust.
- 22 Clean fuel filter and replace, if required (pre-filter and fuel pump strainer).
- 23 Check function of fuel pump.
- 24 Check distributor mechanically across entire speed range, timing angle change max. 3°.
- 25 Synchronize carburetor.
- 26 Adjust idle speed.
- 27 Check firing point timing and correct, if required (on vehicles with vacuum adjustment, pull connecting hose from vacuum box and put back again. Observe firing point change).
- 28 Check delivery pump of electrical auxiliary fuel pump.
- 29 Check function of solenoid valve.
- 30 Evaluate oscillogram.
- 31 Check CO values and compare with item 30.
- 32 Test drive.

07.0 Testing

CO-Test

- 1 Switch-on CO-tester and calibrate. (Unit must be at operating temperature.)
- 2 For condensate separator, use only two condensate separators, Daimler-Benz No. 111 435 02 27 from now on.
- 3 Drain separator after each measurement.
- 4 Engine should be at operating temperature, oil temperature at least 60° C, spark plugs in order and run free, intake and exhaust system sealed.
- 5 Clean air filter (oil bath air filter).
- 6 Adjust idle speed to approx. 800/min.
- 7 Adjust timing angle to 34–37° (try for lower value).
- 8 Synchronize both carburetors of two-carburetor systems.
- 9 Tune idle speed in such a manner that an intake pipe vacuum of 360–375 mm Hg is available.
- 10 Measure CO-content. Introduce measuring probe at least 30 cm deep into exhaust pipe. Max. permissible value 4.5 % + 1 % Vol.
- 11 When this value is exceeded, make mixture leaner (change idle speed mixture control screws uniformly – screw down – engine should run smoothly).
- 12 If engine runs erratically, increase idle speed up to 950/min, if required. (Close to partial load range of carburetors.)

Checking Electrical System During Basic Engine Test

Note

If the basic engine test shows irregularities on electrical system, instruct skilled electrician to continue test. Below are only those tests which can be made during basic test by means of test instruments.

Carburetor Engines

Testing with Voltmeter

1 Battery rest voltage with consumers not switched on (including ignition) should be 24.5 Volts. If this is not attained, check battery charge. (Acid syphon)

2 Measure battery voltage drop during starting (but cable 4 on ignition coil pulled off). Voltage should not drop below 19.0 Volts.

3 Voltage difference between battery and terminal 15 (ignition coil) or input of preresistance with the ignition switched on and the contact breaker points closed should not exceed 0.5 Volts.

In systems with preresistance, the voltage following the resistor (terminal 16) should not drop below 16.0 Volts.

4 Connect voltmeter to battery and run engine at medium speed. Battery voltage should increase from rest voltage to 24–27.5 Volts (depending on type of regulator).

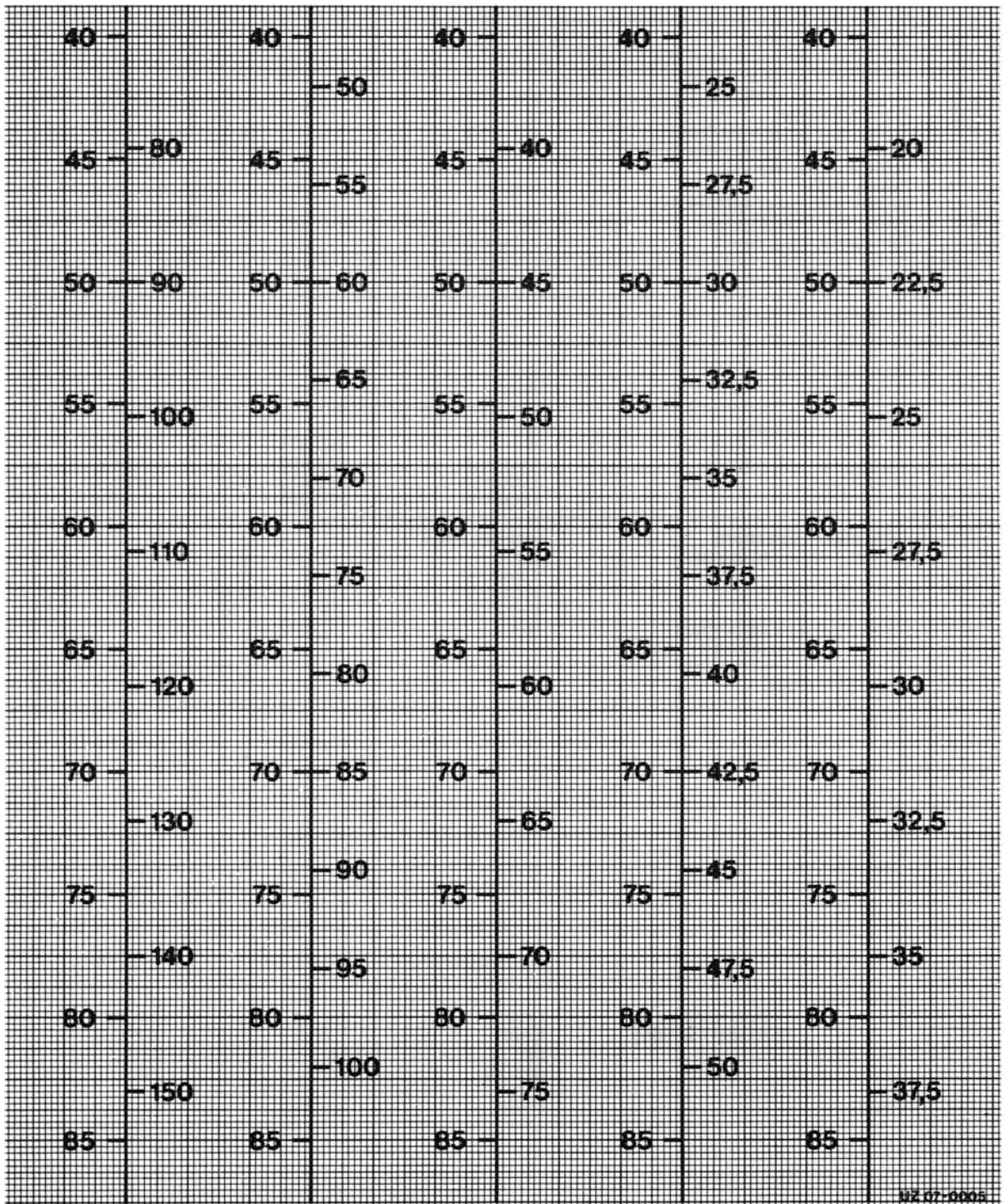
Testing with Ohmmeter

1 Measure all ignition cables including suppressor plug, spark plugs and distributor rotor, as well as high-voltage cable. Observe difference with regard to short-distance and long-distance suppressor.

2 On short-distance suppressor, the resistance of a high-voltage circuit (per cylinder from distributor rotor to spark plug incl.) should **not** exceed 8 kOhm.

Timing Angle – Conversion

Percentage values into degree values



UZ 07-0005

Computed acc. to the formula:

$$\text{Timing angle (degrees)} = \frac{3.6}{x} \cdot p$$

Note:

x = Number of cylinders

p = Timing angle in %

07.0 Measuring and Adjusting Values

Type			180.926	180.927
Compression			7.0:1 ¹⁾	7.0:1 ¹⁾
Ignition distributor			ZV/JFUR6 ²⁾³⁾	ZV/JFM6R2 ⁴⁾⁵⁾
			(0231 116048)	(0231 136002)
Test with engine stopped and ignition switched-on	Battery rest voltage	min. Volts	12.2 ⁶⁾ 24.5	12.2 ⁶⁾ 24.5
	Voltage difference between battery and term. 15, measured at ignition coil or at input of preresistance	max. Volts	0.4 ⁶⁾ 0.6	0.4 ⁶⁾ 0.6
	Primary voltage measured after preresistance	min. Volts	11.8 ⁶⁾ 16.0	11.8 ⁶⁾ 16.0
Test at starting speed	Voltage at battery	min. Volts	10 ⁶⁾	10 ⁶⁾
	Timing angle	Degrees	38 ⁺³ ₋₃	38 ⁺³ ₋₃
	Ignition voltage at ignition coil measured at oscillograph	min. kV	18	18
	Firing point adjustment	Degrees BTDC	2	2
Test with engine running	Timing angle drop (idle speed-4,500/min)	max. Degrees	3	3
	Regulating voltage of regulator		Refer to page 07.0 – 3.2/1	
	Generator	Volts		
	Alternator	Volts		
	Intake pipe vacuum (when adjusted to 4.5 % CO and deceleration without backfiring) ¹⁰⁾	mm Hg		
	Idle		360-375	360-375
	1,500/min		455-490	455-490
	3,000/min		440-470	440-470
	4,500/min		370-395	370-395
	Firing point adjustment without vacuum adjustment	Degrees BTDC	⁷⁾	⁹⁾
Idle		5-15 3-13	8-15 4-12	
1,500/min		20-27 18-25	22-27 18-23	
3,000/min		25-31 23-29	27-31 23-27	
4,500/min		38-41 > 35 ⁸⁾	38-41 >35 ⁸⁾¹²⁾	
Begin of vacuum adjustment	1/min	1800-2000	-	
Vacuum adjusting range at 4,500/min	Degrees	1 ⁺³ ₋₃	-	
Scope Evaluation				
Idle Speed	1/min	850-950 ¹⁰⁾	850-950 ¹⁰⁾	
CO-tester	in CO %			
Carburetor engines	(in % acc. to SUN)			
without load				
Idle		4.3-5.5	4.3-5.5.	
	¹⁰⁾	(76.5-78.5)	(76.5-78.5)	
1,500/min	% CO	3.0-4.2	3.0-4.2	
	% Combustion	(80.0-82.5)	(80.0-82.5)	
3,000/min	% CO	2.6-3.6	2.6-3.6	
	% Combustion	(81.0-83.5)	(81.0-83.5)	
	% CO	0.5-2.0	0.5-2.0	
	% Combustion	(85.0-90.0)	(85.0-90.0)	
Additional test jobs	Ignition coil			
	Resistance Primary winding	Ohm ¹¹⁾	1.2-1.4	1.2-1.4
	Secondary winding	Ohm	1.2-1.5	1.2-1.5
	Spark length	mm	18	18
	Reserve voltage (idle)	min. kV	18	18
Preresistance	Ohm	4.1-4.5	4.1-4.5	
		1.0-2.0 ⁶⁾	1.0-2.0 ⁶⁾	

1) Also 6.5:1, 6.8:1, 7.6:1 (manufactured up to 1960)

2) Replacement for ZV/VJUR 6 BR 47 mk

3) Replaced by ZV/JFM (and conversion parts)

4) Formerly ZV/JAM 6 AR 6 mk (metric thread connection, installed only on "old" valve timing)

5) Formerly ZF/JBM 6 R2 mk (inch threads connection, starting first engine with "new" valve timing)

6) 12-V system optional

7) For ZV/JFUR 6 BR 27 and ZF/JFUR 6 BR 47

8) Formerly 35° to 38°, refer to footnotes 7, 9 and 12

9) For ZV/JAM

10) Adjust accurately, otherwise backfiring during deceleration and under partial load

11) At 20°C, more at higher temperatures

12) Starting 1971 34° to 37° for all ZV

180.926 7.0:1	180.927 7.0:1		Type Compression
	LMKO 1Z 22z (1237 330049) 200 0.23-0.32	⁵⁾ min. kOhm μF	Capacitor Insulating resistance Capacity
5 1	5 1	kOhm kOhm	Suppressor Long-distance suppressor (specified) Ignition distributor rotor (code No. 191 ⁴⁾ or 200) Spark plug connector Short-distance suppressor
5 1	5 0	kOhm kOhm	Ignition distributor rotor (code No. 191 or 200) ⁴⁾ Plug on ignition distributor (including cable 4)
1 5 13-16	0 0 7-8	kOhm kOhm kOhm	Spark plug connector Spark plugs Total resistance per ignition circuit
			Spark plugs (refer to valid table)
8.5-10.0 5.5-6.0 1.5	8.5-10 5.5-6.0 1.5	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²)	Compression pressure Normal Min. Perm. difference of individual cylinders
5 20 4-8	5 20 4-8	drop in %	Cylinder leaks On valves and cylinder head gasket On pistons and piston rings Normal total drop per cylinder
0.12-0.16 0.12-0.18 0.3-0.4 230-320	0.12-0.16 0.12-0.18 0.3-0.4 230-320	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²) mm Hg	Fuel delivery pump Delivery pressure at starting speed Delivery pressure at idle Vacuum at starting speed
0.35 in min. 15 sec. ¹⁾ 0.5	0.35 in min. 15 sec. ¹⁾ 0.5	bar (kp/cm ²) Liter	Electr. auxiliary pump Delivery pressure Delivery capacity
Pallas Zenith double downdraft Typ 32 NDX-DB 21 Typ 32 NDX-DB 11 32-26 32-26 140 ²⁾ 140 ²⁾ 210 ²⁾ 210 ²⁾			Carburetors Venturi "K" Main nozzle "Gg" Air correction nozzle "a"
55 ²⁾ 140 4N	55 ²⁾ 140 4N		Idle fuel nozzle "g" Idle air nozzle "u" Mixing tube
1.5 ± 0.2 100 100 long ²⁾ 200 3 17.3 ± 1	1.5 ± 0.2 100 100 long ²⁾ 200 3 17.3 ± 1	Typ mm	Accelerating pump Injection rate cc/stroke Starter fuel nozzle "Gs" Pump pressure valve Float needle valve Pump spray tube, long Fuel level
³⁾	³⁾		Fuel return line – adjustment (solenoid valve)

1) With engine stopped and a voltage of at least 21.0 Volts in delivery pump

 2) Formerly 130, 170, 50 long
(change to new line-up)

 3) Open when operating pump
(electrical auxiliary pump optional)

4) Change code No. 155

 5) For type designation 180.926 and 180.929 up to engine No. 95000508
use Bosch No. ZKO 29Z 65z a. LMKO 1Z 25z

 for type designation 180.929 as from engine No. 95000509
and type designation 180.926/927/928/942/943/952/953
and type designation 130.922 use
Bosch No. LMKO 1Z 20z
LMKO 1Z 22z
LMKO 1Z 30z

07.0 Measuring and Adjusting Values

Type			180.928		180.929	
Compression			7.0:1 ¹⁾		7.0:1 ¹⁾ 2 ⁸⁾	
Ignition distributor			ZV/JFM6R2 ⁴⁾ 5)		refer to type rating plate	
			(0231 116002)			
Test with engine stopped and ignition switched-on	Battery rest voltage	min. Volts	12.2 ⁶⁾	24.5	12.2 ⁶⁾	24.5 38 ⁺³ ₋₃
	Voltage difference between battery and term. 15, measured at ignition coil or at input of preresistance	max. Volts	0.4 ⁶⁾	0.6	0.4 ⁶⁾	0.6
	Primary voltage measured after preresistance	min. Volts	11.8 ⁶⁾	16.0	11.8 ⁶⁾	16.0
Test at starting speed	Voltage at battery	min. Volts	10 ⁶⁾	21	10 ⁶⁾	21
	Timing angle	Degrees		38 ⁺³ ₋₃		38 ⁺³ ₋₃
	Ignition voltage at ignition coil measured at oscillograph	min. kV	18			
	Firing point adjustment	Degrees BTDC	2			
Test with engine running	Timing angle drop (idle speed 4,500/min)	max. Degrees	3		3	
	Regulating voltage of regulator		Refer to page 07.0-3.2/1			
	Generator	Volts				
	Alternator	Volts				
	Intake pipe vacuum (when adjusted to 4.5 % CO and deceleration without backfiring) ¹⁰⁾	mm Hg				
	Idle		360-375		360-375	
	1,500/min		455-490		455-490	
	3,000/min		440-470		440-470	
	4,500/min		370-395		370-395	
	Firing point adjustment without Vacuum adjustment	Degrees BTDC				
Idle		5-15	3-13		Use data in other columns depending on type rating plate	
1,500/min		20-27	18-25			
3,000/min		25-31	23-29			
4,500/min		38-41 ¹²⁾	>35 ⁸⁾			
Begin of vacuum adjustment	1/min	-				
Vacuum adjusting range at 4,500/min	Degrees	-				
Scope Evaluation						
Idle Speed		1/min	850-950 ¹⁰⁾		850-950 ¹⁰⁾	
CO-tester						
Carburetor engines		in CO %				
without load		(in % acc. to SUN)				
Idle			4.3-5.5		4.3-5.5	
			(76.5-78.5)		(76.5-78.5)	
1.500/min			3.0-4.2)		3.0-4.2	
			(80.0-82.5)		(80.0-82.5)	
3.000/min			2.6-3.6		2.6-3.6	
			(81.0-83.5)		(81.0-83.5)	
			0.5-2.0		0.5-2.0	
			(85.0-90.0)		(85.0-90.0)	
Additional test jobs	Ignition coil					
	Resistance	Primary winding	Ohm ¹¹⁾	1.2-1.4	1.2-1.4	
		Secondary winding	Ohm	1.2-1.5	1.2-1.5	
	Spark length		mm	18	18	
	Reserve voltage (idle)		min. kV	18	18	
Preresistance		Ohm	4.1-4.5		4.1-4.5	

1) Also 6.5:1, 6.8:1, 7.6:1 (manufactured up to 1960)

2) Replacement for ZV/VJUR 6 BR 47 mk

3) Replaced by ZV/JFM (and conversion parts)

4) Formerly ZV/JAM 6 AR 6 mk (metric thread connection, installed only on "old" valve timing)

5) Formerly ZF/JBM 6 R2 mk (inch threads connection, starting first engine with "new" valve timing)

6) 12-V system optional

7) For ZV/JFUR 6 BR 27 and ZF/JFUR 6 BR 47

8) Formerly 35° to 38°, refer to footnotes 7, 9 and 12

10) Adjust accurately, otherwise backfiring during deceleration and under partial load

11) At 20°C, more at higher temperatures

12) Starting 1971 34° to 37° for all ZV

180.928 7.0:1	180.929 7.0:1		Type Compression
200 0.23-0.32	LMKO 1Z 22z (1237 330 049) 200 0.23-0.32	⁵⁾ min. kOhm μF	Capacitor Insulating resistance Capacity
5 1	5 1	kOhm kOhm	Suppressor Long-distance suppressor (specified) Ignition distributor rotor (code No. 191 ⁴⁾ or 200) Spark plug connector Short-distance suppressor Ignition distributor rotor (code No. 191 or 200) ⁴⁾ Plug on ignition distributor (including cable 4) Spark plug connector Spark plugs Total resistance per ignition circuit
5 0	5 0	kOhm kOhm	
0 0	0 0	kOhm kOhm	
7-8	7-8	kOhm	
			Spark plugs (refer to valid table)
8.5-10.0 5.5-6.0 1.5	8.5-10 5.5-6.0 1.5	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²)	Compression pressure Normal Min. Perm. difference of individual cylinders
5 20 4-8	5 20 4-8	drop in %	Cylinder leaks On valves and cylinder head gasket On pistons and piston rings Normal total drop per cylinder
0.12-0.16 0.12-0.18 0.3-0.4 230-320	0.12-0.16 0.12-0.18 0.3-0.4 230-320	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²) mm Hg	Fuel delivery pump Delivery pressure at starting speed Delivery pressure at idle Vacuum at starting speed Electr. auxiliary pump Delivery pressure Delivery capacity
0.35 in min. 15 sec. 1) 0.5	0.35 in min. 15 sec. 1) 0.5	bar (kp/cm ²) Liter	
Pallas Zenith double downdraft Typ 32 NDX-DB11 26-32 140 ²⁾ 210 ²⁾	Typ 32 NDX-DB 11 26-32 140 ²⁾ 210 ²⁾		Carburetors Venturi "K" Main nozzle "Gg" Air correction nozzle "a"
55 ²⁾ 140 4N	55 ²⁾ 140 4N		Idle fuel nozzle "g" Idle air nozzle "u" Mixing tube
1.5 [±] 0.2 100 100 long ²⁾ 200 3 17.3 [±] 1	1.5 [±] 0.2 100 100 long ²⁾ 200 3 17.3 [±] 1	Typ mm	Accelerating pump Injection rate cc/stroke Starter fuel nozzle "Gs" Pump pressure valve Float needle valve Pump spray tube, long Fuel level
3)	3)		Fuel return line – adjustment (solenoid valve)

1) With engine stopped and a voltage of at least 21.0 Volts in delivery pump

 2) Formerly 130, 170, 50 long
(change to new line-up)

 3) Open when operating pump
(electrical auxiliary pump optional)

4) Change code No. 155

 5) For type designation 180.926 and 180.929 up to engine No. 95000508
use Bosch No. ZKO 29Z 65z a. LMKO 1Z 25z

 for type designation 180.929 as from engine No. 95000509
and type designation 180.926/927/928/942/943/952/953
and type designation 130.922 use
Bosch No. LMKO 1Z 20z
LMKO 1Z 22z
LMKO 1Z 30z

07.0 Measuring and Adjusting Values

Type			180.942		180.943	
Compression			8.7:1		6.5:1	
Ignition distributor			ZV/JFM6R2 ⁴⁾ ⁵⁾ (0231 136002)		ZV/JFM6R2 ⁴⁾ ⁵⁾ (0231 136002)	
Test with engine stopped and ignition switched-on	Battery rest voltage	min. Volts	12.2 ⁶⁾	24.5	12.2 ⁶⁾	24.5
	Voltage difference between battery and term. 15, measured at ignition coil or at input of preresistance	max. Volts	0.4 ⁶⁾	0.6	0.4 ⁶⁾	0.6
	Primary voltage measured after preresistance	min. Volts	11.8 ⁶⁾	16.0	11.8 ⁶⁾	16.0
Test at starting speed	Voltage at battery	min. Volts	10 ⁶⁾	21.0	10 ⁶⁾	21.0
	Timing angle Ignition voltage at ignition coil measured at oscillograph	Degrees	38 ⁺³ ₋₃	⁸⁾	38 ⁺³ ₋₃	⁸⁾
Test with engine running	Firing point adjustment	min. kV Degrees BTDC	18 2		18 2	
	Timing angle drop (idle speed 4,500/min)	max. Degrees				
	Regulating voltage of regulator		Refer to page 07.0-3.2/1			
	Generator Alternator	Volts Volts				
	Intake pipe vacuum (when adjusted to 4.5 % CO and deceleration without backfiring) ¹⁰⁾	mm Hg Idle 1,500/min 3,000/min 4,500/min	360-375 455-490 440-470 370-395			360-375 455-490 440-470 370-395
	Firing point adjustment without vacuum adjustment	Degrees BTDC Idle 1,500/min 3,000/min 4,500/min 1/min Degrees	⁷⁾ 5-15 20-27 25-31 38-41 ¹²⁾ -	3-13 18-25 23-29 > 35	⁷⁾ 5-15 20-27 25-31 38-41 ¹²⁾ -	3-13 18-25 23-29 > 35
	Begin of vacuum adjustment Vacuum adjusting range at 4,500/min					
	Scope Evaluation					
	Idle Speed	1/min	800-850 ¹⁰⁾			800-850 ¹⁰⁾
	CO-tester Carburetor engines without load Idle 1,500/min 3,000/min	in CO % (in % acc. to SUN) ¹⁰⁾	4.3-5.5 (76.5-78.5) 3.0-4.2 (80.0-82.5) 2.6-3.6 (81.0-83.5) 0.5-2.0 (85.0-90.0)			4.3-5.5 (76.5-78.5) 3.0-4.2 (80.0-82.5) 2.6-3.6 (81.0-83.5) 0.5-2.0 (85.0-90.0)
Additional test jobs	Ignition coil					
	Resistance Primary winding	Ohm ¹¹⁾	1.2-1.4		1.2-1.4	
	Secondary winding	Ohm	1.2-1.5		1.2-1.5	
	Spark length	mm	18		18	
	Reserve voltage (idle)	min. kV	18		18	
Preresistance	Ohm	4.1-4.5			4.1-4.5	

4) Formerly ZV/JAM 6 AR 6 mk (metric thread connection, installed only on "old" valve timing)

5) Formerly ZF/JBM 6 R2 mk (inch threads connection, starting first engine with "new" valve timing)

6) 12-V system optional

7) For ZV/JFUR 6 BR 27 and ZF/JFUR 6 BR 47

8) Formerly 35° to 38°, refer to footnotes 7, 9 and 12

10) Adjust accurately, otherwise backfiring during deceleration and under partial load

11) At 20°C, more at higher temperatures

12) Starting 1971 34° to 37° for all ZV

180.942 8.7:1	180.943 6.5:1		Type Compression
200 0.23-0.32	LMKO 1Z 22z (1237 330 049) 200 0.23-0.32	⁵⁾ min. kOhm μF	Capacitor Insulating resistance Capacity
5 1	5 1	kOhm kOhm	Suppressor Long-distance suppressor (specified) Ignition distributor rotor (code No. 191 ⁴⁾ or 200) Spark plug connector Short-distance suppressor Ignition distributor rotor (code No. 191 or 200) ⁴⁾ Plug on ignition distributor (including cable 4) Spark plug connector Spark plugs Total resistance per ignition circuit
5 0	5 0	kOhm kOhm	
0 0	0 0	kOhm kOhm	
7-8	7-8	kOhm	
Spark plugs (refer to valid table)			
10.0-11.0 8.0-8.5 1.5	7.5-8.5 6.0 1.5	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²)	Compression pressure Normal Min. Perm. difference of individual cylinders
5 20 4-8	5 20 4-8	drop in %	Cylinder leaks On valves and cylinder head gasket On pistons and piston rings Normal total drop per cylinder
0.12-0.16 0.12-0.18 0.3-0.4 230-320	0.12-0.16 0.12-0.18 0.3-0.4 230-320	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²) mm Hg	Fuel delivery pump Delivery pressure at starting speed Delivery pressure at idle Vacuum at starting speed
0.35 in min. 15 sec. 1) 0.5	0.35 in min. 15 sec. 1) 0.5	bar (kp/cm ²) Liter	Electr. auxiliary pump Delivery pressure Delivery capacity
Pallas Zenith double downdraft Typ 32 NDX-DB 11 26-32 140 ²⁾ 210 ²⁾	Typ 32 NDX-DB 11 26-32 140 ²⁾ 210 ²⁾		Carburetors Venturi "K" Main nozzle "Gg" Air correction nozzle "a"
55 ²⁾ 140 4N	55 ²⁾ 140 4N		Idle fuel nozzle "g" Idle air nozzle "u" Mixing tube
1.5 [±] 0.2 100 100 long ²⁾ 200 3 17.3 [±] 1	1.5 [±] 0.2 100 100 long ²⁾ 200 3 17.3 [±] 1	Typ mm	Accelerating pump Injection rate cc/stroke Starter fuel nozzle "Gs" Pump pressure valve Float needle valve Pump spray tube, long Fuel level
3)	3)		Fuel return line – adjustment (solenoid valve)

1) With engine stopped and a voltage of at least 21.0 Volts in delivery pump

 2) Formerly 130, 170, 50 long
(change to new line-up)

 3) Open when operating pump
(electrical auxiliary pump optional)

4) Change code No. 155

 5) For type designation 180.926 and 180.929 up to engine No. 95000508
use Bosch No. ZKO 29Z 65z a. LMKO 1Z 25z

 for type designation 180.929 as from engine No. 95000509
and type designation 180.926/927/928/942/943/952/953
and type designation 130.922 use
Bosch No. LMKO 1Z 20z
LMKO 1Z 22z
LMKO 1Z 30z

07.0 Measuring and Adjusting Values

Type			180.952	180.953
Compression			8,7:1	7,0:1
Ignition distributor			ZV/JFM6R2 (0231 136 002)	ZV/JFM6R2 (0231 136 002)
Test with engine stopped and ignition switched-on	Battery rest voltage	min. Volts	24.5	24.5
	Voltage difference between battery and term. 15, measured at ignition coil or at input of preresistance	max. Volts	0.6	0.6
	Primary voltage measured after preresistance	min. Volts	16.0	16.0
Test at starting speed	Voltage at battery	min. Volts	21	21
	Timing angle	Degrees	38 ⁺³ ₋₃	38 ⁺³ ₋₃
	Ignition voltage at ignition coil measured at oscillograph	min. kV	18	18
	Firing point adjustment	Degrees BTDC	2	2
Test with engine running	Timing angle drop (idle speed 4,500/min)	max. Degrees	3	3
	Regulating voltage of regulator		Refer to page 07.0-3.2/1	
	Generator	Volts		
	Alternator	Volts		
	Intake pipe vacuum (when adjusted to 4.5 % CO and deceleration without backfiring) ¹⁰⁾	mm Hg		
		Idle	360-375	360-375
		1,500/min	455-490	455-490
		3,000/min	440-470	440-470
		4,500/min	370-395	370-395
	Firing point adjustment without vacuum adjustment	Degrees BTDC		
	Idle	5-15	5-15	
	1,500/min	20-27	20-27	
	3,000/min	25-31	25-31	
	4,500/min	38-41	38-41	
	Begin of vacuum adjustment	1/min	-	-
	Vacuum adjusting range at 4,500/min	Degrees	-	-
Scope Evaluation				
Idle Speed		1/min	850-950 ¹⁰⁾	850-950 ¹⁰⁾
CO-tester Carburetor engines without load		in CO %		
		(in % acc. to SUN)		
			4.3-5.5	4.3-5.5
			(76.5-78.5)	(76.5-78.5)
			3.0-4.2	3.0-4.2
			(80.0-82.5)	(80.0-82.5)
			2.6-3.6	2.6-3.6
			(81.0-83.5)	(81.0-83.5)
			0.5-2.0	0.5-2.0
			(85.0-90.0)	(85.0-90.0)
Additional test jobs	Ignition coil			
	Resistance	Primary winding	Ohm ¹¹⁾	1.2-1.4
		Secondary winding	Ohm	1.2-1.5
	Spark length		mm	18
	Reserve voltage (idle)		min. kV	18
Preresistance		Ohm	4.1-4.5	4.1-4.5

10) Adjust accurately, otherwise backfiring during deceleration and under partial load

11) At 20°C, more at higher temperatures

180.952 8.7:1	180.953 7.0:1		Type Compression
LMKO 1Z 22z (1237 330 049) 200 0.23-0.32	LMKO 1Z 22z (1237 330 049) 200 0.23-0.32	⁵⁾ min. kOhm µF	Capacitor Insulating resistance Capacity
5 1	5 1	kOhm kOhm	Suppressor Long-distance suppressor (specified) Ignition distributor rotor (code No. 191 ⁴⁾ or 200) Spark plug connector Short-distance suppressor Ignition distributor rotor (code No. 191 or 200) ⁴⁾ Plug on ignition distributor (including cable 4) Spark plug connector Spark plugs Total resistance per ignition circuit
5 0	5 0	kOhm kOhm	
0 0	0 0	kOhm kOhm	
7-8	7-8	kOhm	
			Spark plugs (refer to valid table)
10-11.0 8.0-8.5 1.5	8.5-10 6.5 1.5	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²)	Compression pressure Normal Min. Perm. difference of individual cylinders
5 20 4-8	5 20 4-8	drop in %	Cylinder leaks On valves and cylinder head gasket On pistons and piston rings Normal total drop per cylinder
0.12-0.16 0.12-0.18 0.30-0.40 230-320	0.12-0.16 0.12-0.18 0.30-0.40 230-320	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²) mm Hg	Fuel delivery pump Delivery pressure at starting speed Delivery pressure at idle Vacuum at starting speed
0.35 in min. 15 sec. 1) 0.5	0.35 in min. 15 sec. 1) 0.5	bar (kp/cm ²) Liter	Electr. auxiliary pump Delivery pressure Delivery capacity
Pallas Zenith double downdraft Typ 32 NDX-DB11 26-32 140 ²⁾ 210 ²⁾	Typ 32 NDX-DB 11 26-32 140 ²⁾ 210 ²⁾		Carburetors Venturi "K" Main nozzle "Gg" Air correction nozzle "a"
55 ²⁾ 140 4N	55 ²⁾ 140 4N		Idle fuel nozzle "g" Idle air nozzle "u" Mixing tube
1.5 [±] 0.2 100 100 long ²⁾ 200 3 17.3 [±] 1	1.5 [±] 0,2 100 100 long ²⁾ 200 3 17.3 [±] 1	Typ mm	Accelerating pump Injection rate cc/stroke Starter fuel nozzle "Gs" Pump pressure valve Float needle valve Pump spray tube, long Fuel level
3)	3)		Fuel return line – adjustment (solenoid valve)

1) With engine stopped and a voltage of at least 21.0 Volts in delivery pump

 2) Formerly 130, 170, 50 long
(change to new line-up)

 3) Open when operating pump
(electrical auxiliary pump optional)

4) Change code No. 155

 5) For type designation 180.926 and 180.929 up to engine No. 95000508
use Bosch No. ZKO 29Z 65z a. LMKO 1Z 25z

 for type designation 180.929 as from engine No. 95000509
and type designation 180.926/927/928/942/943/952/953
and type designation 130.922 use
Bosch No. LMKO 1Z 20z
LMKO 1Z 22z
LMKO 1Z 30z

07.0 Measuring and Adjusting Values

Type			130.922 7,8:1 ZV/JFM6R2 (0231 136 002)	130.925 7,8:1 ZV/JFM6R2 (0231 136 002)
Test with engine stopped and ignition switched-on	Battery rest voltage	min. Volts	24.5	24.5
	Voltage difference between battery and term. 15, measured at ignition coil or at input of preresistance	max. Volts	0.6	0.6
	Primary voltage measured after preresistance	min. Volts	16.0	16.0
Test at starting speed	Voltage at battery	min. Volts	21	21
	Timing angle Ignition voltage at ignition coil measured at oscillograph	Degrees	38 ⁺³ ₋₃	38 ⁺³ ₋₃
Test with engine running	Firing point adjustment	min. kV Degrees BTDC	18 2	18 2
	Timing angle drop (idle speed 4,500/min)	max. Degrees	3	3
	Regulating voltage of regulator		Refer to page 07.0-3.2/1	
	Generator	Volts		
	Alternator	Volts		
	Intake pipe vacuum (when adjusted to 4.5 % CO and deceleration without backfiring) ¹⁰⁾	mm Hg Idle 1,500/min 3,000/min 4,500/min		
	Firing point adjustment without vacuum adjustment	Degrees BTDC Idle 1,500/min 3,000/min 4,500/min	5-15 20-27 25-31 38-41	5-15 20-27 25-31 38-41
	Begin of vacuum adjustment	1/min	-	-
	Vacuum adjusting range at 4,500/min	Degrees	-	-
	Scope Evaluation			
Idle Speed	1/min	800-850	800-850	
CO-tester Carburetor engines without load Idle ¹⁰⁾	in CO % (in % acc. to SUN)			
1,500/min				
3,000/min				
Additional test jobs	Ignition coil			
	Resistance Primary winding	Ohm ¹¹⁾	1.2-1.4	1.2-1.4
	Secondary winding	Ohm	1.2-1.5	1.2-1.5
	Spark length	mm	18	18
	Reserve voltage (idle)	min. kV	18	18
Preresistance	Ohm	4.1-4.5	4.1-4.5	

10) Adjust accurately, otherwise backfiring during deceleration and under partial load

11) At 20°C, more at higher temperatures

130.922 7.8:1	130.025 7.8:1	Type Compression	
LMKO 1Z 22z (1237 330 049) 200 0.23-0.32	LMKO 1Z 22z (1237 330 049) 200 0.23-0.32	5) min. kOhm μF	Capacitor Insulating resistance Capacity
5 1	5 1	kOhm kOhm	Suppressor Long-distance suppressor (specified) Ignition distributor rotor (code No. 191 ⁴⁾ or 200 Spark plug connector Short-distance suppressor
5 0	5 0	kOhm kOhm	Ignition distributor rotor (code No. 191 or 200) ⁴⁾ Plug on ignition distributor (including cable 4)
0 0 7-8	0 0 7-8	kOhm kOhm kOhm	Spark plug connector Spark plugs Total resistance per ignition circuit
Spark plugs (refer to valid table)			
8.6-9.6 7.2 1.5	8.6-9.6 7.2 1.5	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²)	Compression pressure Normal Min. Perm. difference of individual cylinders
5 20 4-8	5 20 4-8	drop in %	Cylinder leaks On valves and cylinder head gasket On pistons and piston rings Normal total drop per cylinder
0.25-0.35 0.12-0.18 0.30-0.40 250-350	0.25-0.35 - - 250-3.50	bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²) mm Hg	Fuel delivery pump Carburetor and diesel engines Delivery pressure at starting speed Delivery pressure at idle Vacuum at starting speed
0.35 in min. 15 sec. 1) 0.5	0.35 in min. 15 sec. 1) 0.5	bar (kp/cm ²) Liter	Electr. auxiliary pump Delivery pressure Delivery capacity
Double carburetor system Pallas Zenith double Typ 32 NDX-DB11 26-32 140 210	downdraft Typ 32 NDX-DB 11 26-32 140 ²⁾ 210 ²⁾		Carburetors Venturi "K" Main nozzle "Gg" Air correction nozzle "a"
55 ²⁾ 140 4N	55 ²⁾ 140 4N		Idle fuel nozzle "g" Idle air nozzle "u" Mixing tube
1.5±0.2 100 100 long ²⁾ 200 3 12.3±1	1.5±0.2 100 100 long ²⁾ 200 3 12.3±1	Typ mm	Accelerating pump Injection rate cc/stroke Starter fuel nozzle "Gs" Pump pressure valve Float needle valve Pump spray tube, long Fuel level
3)	3)		Fuel return line – adjustment (solenoid valve)

1) With engine stopped and a voltage of at least 21.0 Volts in delivery pump

2) Formerly 130, 170, 50 long
(change to new line-up)

3) Open when operating pump
(electrical auxiliary pump optional)

4) Change code No. 155

5) For type designation 180.926 and 180.929 up to engine No. 95000508
use Bosch No. ZKO 29Z 65z a. LMKO 1Z 25z

for type designation 180.929 as from engine No. 95000509
and type designation 180.926/927/928/942/943/952/953
and type designation 130.922 use
Bosch No. LMKO 1Z 20z
LMKO 1Z 22z
LMKO 1Z 30z

07.0 Measuring and Adjusting Values

Type	180.958		
Compression	7,0:1		
Ignition distributor	ZV/JFM6R2 (0231 136 002)		
Test with engine stopped and ignition switched-on	Battery rest voltage	min. Volts	24.5
	Voltage difference between battery and term. 15, measured at ignition coil or at input of preresistance	max. Volts	0.6
	Primary voltage measured after preresistance	min. Volts	16.0
Test at starting speed	Voltage at battery	min. Volts	21.0
	Timing angle	Degrees	38 \pm 3
	Ignition voltage at ignition coil measured at oscillograph	min. kV	18
	Firing point adjustment	Degrees BTDC	2
Test with engine running	Timing angle drop (idle speed 4,500/min)	max. Degrees	3
	Regulating voltage of regulator		Refer to page 07.0-3.2/1
	Generator Alternator	Volts Volts	
	Intake pipe vacuum (when adjusted to 4.5 % CO and deceleration without backfiring) ¹⁰⁾	mm Hg Idle 1,500/min 3,000/min 4,500/min	360-375 455-490 440-470 370-395
	Firing point adjustment without vacuum adjustment	Degrees BTDC Idle 1,500/min 3,000/min 4,500/min	5-15 20-27 25-31 38-41
	Begin of vacuum adjustment Vacuum adjusting range at 4,500/min	1/min Degrees	— —
	Scope Evaluation		
	Idle Speed	1/min	850-950 ¹⁰⁾
	CO-tester Carburetor engines without load Idle ¹⁰⁾	in CO % (in % acc. to SUN)	4.3-5.5 (76.5-78.5) 3.0-4.2 (80.0-82.5) 2.6-3.6 (81.0-83.5) 0.5-2.0 (85.0-90.0)
	1,500/min		
3,000/min			
Additional test jobs	Ignition coil Resistance	Primary winding Secondary winding	Ohm ¹¹⁾ Ohm
	Spark length		mm 18
	Reserve voltage (idle)		min. kV 18
	Preresistance		Ohm 4.1-4.5

10) Adjust accurately, otherwise backfiring during deceleration and under partial load

11) At 20°C, more at higher temperatures

180.958 7.0:1			Type Compression
		5) min. kOhm µF	Capacitor Insulating resistance Capacity
5 1		kOhm kOhm	Suppressor Long-distance suppressor (specified) Ignition distributor rotor (code No. 191 ⁴) or 200) Spark plug connector
5 1		kOhm kOhm	Short-distance suppressor Ignition distributor rotor (code No. 191 or 200) ⁴) Plug on ignition distributor (including cable 4)
1 5 13-16		kOhm kOhm kOhm	Spark plug connector Spark plugs Total resistance per ignition circuit
			Spark plugs (refer to valid table)
1.5		bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²)	Compression pressure Normal Min. Perm. difference of individual cylinders
5 20 4-8		drop in %	Cylinder leaks On valves and cylinder head gasket On pistons and piston rings Normal total drop per cylinder
0.35 in min. 15 sec. 1) 0.5		bar (kp/cm ²) bar (kp/cm ²) bar (kp/cm ²) mm Hg bar (kp/cm ²) Liter	Fuel delivery pump Delivery pressure at starting speed Delivery pressure at idle Vacuum at starting speed Electr. auxiliary pump Delivery pressure Delivery capacity
Pallas Zenith double downdraft Typ 32 NDX-DB 21 26-32 140 ²) 210 ²)			Carburetors Venturi "K" Main nozzle "Gg" Air correction nozzle "a"
55 ²) 140 4N			Idle fuel nozzle "g" Idle air nozzle "u" Mixing tube
1.5±0.2 100 100 long ²) 200 3 17.3± 1		Typ mm	Accelerating pump Injection rate cc/stroke Starter fuel nozzle "Gs" Pump pressure valve Float needle valve Pump spray tube, long Fuel level
3)	3)		Fuel return line – adjustment (solenoid valve)

1) With engine stopped and a voltage of at least 21.0 Volts in delivery pump

2) Formerly 130, 170, 50 long
(change to new line-up)

3) Open when operating pump
(electrical auxiliary pump optional)

4) Change code No. 155

5) For type designation 180.926 and 180.929 up to engine No. 95000508
use Bosch No. ZKO 29Z 65z a. LMKO 1Z 25z

for type designation 180.929 as from engine No. 95000509
and type designation 180.926/927/928/942/943/952/953
and type designation 130.922 use
Bosch No. LMKO 1Z 20z
LMKO 1Z 22z
LMKO 1Z 30z

07.0 Measuring and Adjusting Values

CO-Test

Combustion

n 1/min.	Vacuum mm Hg	Timing angle	Exhaust gas (emission) (%) acc. to SUN
850-950*	360-375	38^{+3}_{-3}	76.5-78.5
1500	455-490	38^{+3}_{-3}	80.0-82.5
3000	440-470	38^{+3}_{-3}	81.0-83.5
4500	370-395	38^{+3}_{-3}	85-90

* Idle speed

Note: Compressor runs idle (without backpressure) on vehicles with compressed air system

Generator (Alternator)

Designation (formerly)	Unit		LJ/GQ 600/24/ 1300 R 6 (24V-600W)	LJ/GK(M) 300/24/1300 (24V-300W)
Designation or legend (changed)			0 101 500010 Q(R)28V38A14	0 101 402061 K(R)28V19A14
Brush pressure (measured with Bosch EF 1244)	P		750 to 950	800 to 1100
Armature end play ¹⁾	mm		0.12 to 0.25	0.12 to 0.25
Collector runout max.	mm		0.03	0.03
Armature runout max. (measured at armature stampings)	mm		0.05	0.05
Cut-in voltage	V		<u>26.5-27.0</u> 26.4-27.1	26.9-28.1
Regulating voltage (without load)	V		27.5-28.5	27.1-28.4
Return current	A		<u>10.0-14.0</u> 9.5-14.0	2.0-7.5
Current regulator start (at 20°C)	A		<u>35-39</u> 34-40	18-21.5
Resistance of exciting winding	kOhm		19.5 + 10 %	22.0
Damping resistance	kOhm		60.0 ± 2	60.0 ± 2
Speed at cut-in voltage ³⁾	1/min		<u>1000</u> 1050	<u>900</u> 1200
Capacity test ³⁾ Machine cold 20°C	1/min		<u>1250</u> 1350	<u>1250</u> 1350
warm 60°C	1/min		<u>1350</u> 1450	<u>1350</u> 1450
Load current at capacity test ³⁾	A		17.0	<u>12.0</u> 13.0
Regulator ²⁾				
Designation			WCM 600/24/B1 0 190 112006 or WEM28V38A 0 190 112007	UEA 300/24/6 0 190 117004 or UE28V19A 0 190 117004

1) Do not measure armature end play on generators with radial ball bearings.

2) Note: When installing new regulator (designation) new values also apply!
Matching generators and regulators, old and new designation,
can be installed with components mixed.

3) If a column shows 2 values, the lower value applies to the new designation.

07.0 Measuring and Adjusting Values

Generator (Alternator)

Designation (formerly)	Unit		LJ/GK(M) 200/24/1200 R (24V-200W)	LJ/GK(M) 300/12/1400 (12V-300W)
Designation or legend (changed)			0 101 402 010 K(R)28V13A13	0 101 404 019 K(R)14V38A14
Brush pressure (measured with Bosch EF 1244)	P		800 to 1100	600 to 800
Armature end play ¹⁾	mm		0.12 to 0.25	0.12 to 0.25
Collector runout max.	mm		0.03	0.03
Armature runout max. (measured at armature stampings)	mm		0.05	0.05
Cut-in voltage	V		26.7-28.6	12.6-13.5
Regulating voltage (without load)	V		27.1-28.5	13.7-14.7
Return current	A		1.5-5.5	4.5-9.5
Current regulator start (at 20°C)	A		11.5-13.5	38.0-42.0
Resistance of exciting winding	kOhm		$\frac{22.0}{18.0}$	$\frac{5.2}{4.8}$
Damping resistance	kOhm		60.0 ± 2	
Speed at cut-in voltage ³⁾	1/min		$\frac{1050}{1200}$	$\frac{900}{1000}$
Capacity test ³⁾ Machine cold 20°C	1/min		$\frac{1250}{1300}$	$\frac{1250}{1350}$
warm 60°C	1/min		$\frac{1350}{1400}$	$\frac{1350}{1450}$
Load current at capacity test ³⁾	A		$\frac{12.0}{9.0}$	25.0
Regulator ²⁾				
Designation			RS/UEM200/24/1 0 190 102 002 or RS/UEM200/24/A1 0 190 102 004 RS/UEM 28V13A 0 190 102 004	RS/UAM300/12/A1 0 190 301 014 or RS/UAM300/12/34 0 190 104 014

- 1) Do not measure armature end play on generators with radial ball bearings.
 2) Note: When installing new regulator (designation) new values also apply!
 Matching generators and regulators, old and new designation, can be installed with components mixed.
 3) If a column shows 2 values, the lower value applies to the new designation.

Generator (Alternator)

Designation (formerly)	Unit		LJ/GQ 400/24/1200 R 5 (24V-400W)	LJ/GEQ 160/12/3500 R 10 (12V-160W)
Designation or legend (changed)			0 101 500 008 Q(R)28V25A13	0 101 206 012 EG(R)14V20A27
Brush pressure (measured with Bosch EF 1244)	P		750 to 950	450 to 600
Armature end play ¹⁾	mm		0.12 to 0.25	–
Collector runout max.	mm		0.03	0.03
Armature runout max. (measured at armature stampings)	mm		0.05	0.05
Cut-in voltage	V		26,5-27	12,5-13,2
Regulating voltage (without load)	V		27,5-28,5	13,5-14,5
Return current	A		10-14	5,0-11,5
Current regulator start (at 20°C)	A		22-26	19,0-23,0
Resistance of exciting winding	kOhm		$\frac{19,5}{19,5}$	4,8+0,5
Damping resistance	kOhm		60±2	–
Speed at cut-in voltage ³⁾	1/min		$\frac{1000}{1050}$	2050
Capacity test ³⁾			$\frac{1150}{1300}$	$\frac{1650}{2850}$
Machine cold 20°C	1/min			
warm 60°C	1/min		$\frac{1250}{1350}$	
Load current at capacity test ³⁾	A		17,0	13,5
Regulator ²⁾				
Designation			RS/WA400/24 B 1 0 190 104 046 or RS/WA400/24 B 1 or RS/WAK400/24/1 0 190 104 046	RS/UAA160/12/5 0 190 309 028 or RS/UA160/12/5 0 190 309 028

1) Do not measure armature end play on generators with radial ball bearings.

2) Note: When installing new regulator (designation) new values also apply!
Matching generators and regulators, old and new designation, can be installed with components mixed.

3) If a column shows 2 values, the lower value applies to the new designation.

07.0 Measuring and Adjusting Values

Generator (Alternator)

Designation (formerly)	Unit		LJ/GK 200/24/1200 R 25 (24V-200W)	LJ/GKM 200/24/1200 L 38 (24V-200W)
Designation or legend (changed)			0 101 402 013 (LJ/28/7 Q 47)	0 101 404 018
Brush pressure (measured with Bosch EF 1244)	P		800 to 1100	800 to 1100
Armature end play ¹⁾	mm		0.12 to 0.25	0.12 to 0.25
Collector runout max.	mm		0.03	0.03
Armature runout max. (measured at armature stampings)	mm		0.05	0.05
Cut-in voltage	V		<u>26.7-28.6</u> 26.9-28.1	<u>26.7-28.6</u> 26.5-28.1
Regulating voltage (without load)	V		<u>27.1-28.5</u> 27.1-28.4	<u>27.1-28.5</u> 27.1-28.4
Return current	A		<u>1.5-5.5</u> 2.0-7.5	<u>1.5-5.5</u> 2.0-7.5
Current regulator start (at 20°C)	A		<u>11.5-13.5</u> 12.0-14.5	<u>11.5-13.5</u> 12.0-14.5
Resistance of exciting winding	kOhm		18.0	18.0
Damping resistance	kOhm		60± 2	60± 2
Speed at cut-in voltage ³⁾	1/min		1200	1200
Capacity test ³⁾ Machine cold 20°C	1/min		1300	1300
warm 60°C	1/min		1400 9.0	1400 9.0
Load current at capacity test ³⁾	A			
Regulator ²⁾				
Designation			RS/UEM200/24/A1 0 190 102 004 or RS/UEM 28V 13A 0 190 102 004	RS/UEM200/24/A1 0 190 102 004 or RS/UEM 28V 13A 0 190 102 004

1) Do not measure armature end play on generators with radial ball bearings.

2) Note: When installing new regulator (designation) new values also apply!
Matching generators and regulators, old and new designation,
can be installed with components mixed.

3) If a column shows 2 values, the lower value applies to the new designation.

Exploded View

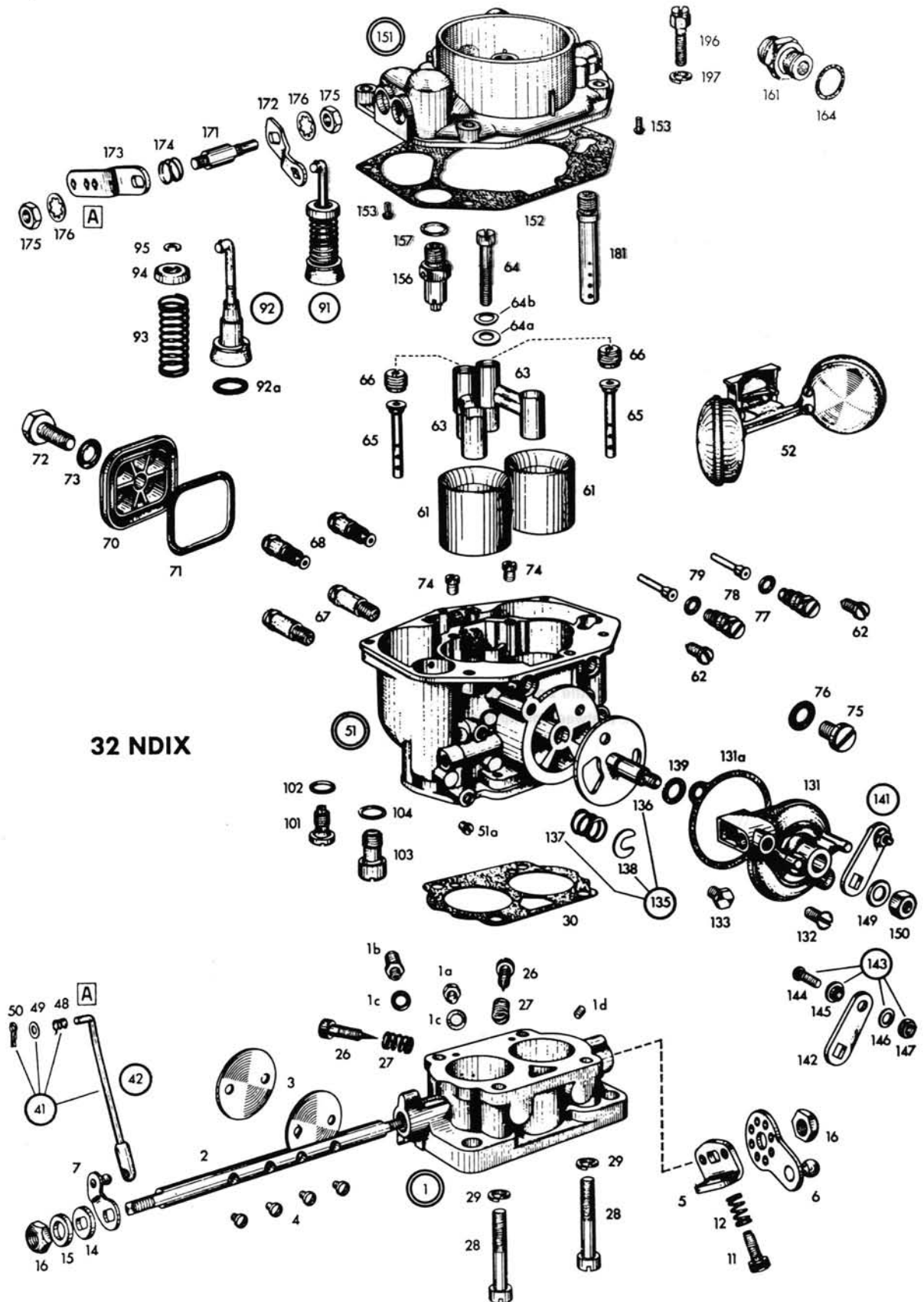


Fig. 1 Pallas-Zenith off-road double downdraft carburetor 32-NDIX.

Explanations re Fig. 1

No.	Designation	Each
—	Pallas-Zenith Off-Road Double Downdraft Carburetor 32-NDIX	1
1	Throttle body compl. with screw connection (for vacuum connection) and set screw (for test connection)	1
1a	Closing plug (for vacuum connection)	1
1b	Screw connection (for vacuum connection)	1
1c	Sealing ring (for screw or connection)	1
1d	Set screw (test connection)	1
2	Throttle valve shaft	1
3	Throttle valve	2
4	Oval head screw (for throttle valve)	4
5	Thrust bearing	1
6	Throttle valve lever	1
7	Pump lever (on throttle valve shaft)	1
11	Idle adjusting screw (on thrust bearing)	1
12	Compression spring (for idle adjusting screw)	1
14	Washer (for throttle valve shaft)	1
15	Supporting ring (for throttle valve shaft)	1
16	Hex. nut (for throttle valve shaft)	2
26	Idle mixture regulating screw	2
27	Compression spring (for idle mixture regulating screw)	2
28	Fillister head screw (for attaching float housing to throttle body)	4
29	Snap ring (for fillister head screw)	4
30	Gasket (between throttle body and float housing)	1
41	Pump rod compl. (between pump lever on throttle valve shaft and on pump shaft)	1
42	Pump rod	1
48	Spring	1
49	Washer	1
50	Locking spring	1
51	Float housing compl. with set screw (for pump duct)	1
51a	Set screw (for pump duct)	1
52	Double float with articulated bearing	1
61	Venturi	2
62	Holding screw (for venturi)	2
63	Mixing tube carrier with preatomizer	2
64	Holding screw (for mixing tube carrier)	1
64a	Washer (for holding screw)	1
64b	Spring washer (for holding screw)	1
65	Mixing tube	2
66	Air correction nozzle	2
67	Main nozzle	2
68	Idle fuel nozzle	2
70	Closing cover (for main and idle nozzles)	1
71	Rubber gasket (for closing cover)	1
72	Hex. screw (for closing cover)	1
73	Sealing ring (for hex. screw)	1

No.	Designation	Each
74	Idle air nozzle	2
75	Starting fuel nozzle	1
76	Sealing ring (for starting fuel nozzle)	1
77	Pump nozzle	2
78	Rubber sealing ring (for pump nozzle)	2
79	Injection pipe, long	2
91	Pump plunger compl.	1
92	Pump plunger with annular spring	1
92a	Annular spring (for plunger sleeve)	1
93	Plunger spring	1
94	Spring retainer (for plunger spring)	1
95	Lock washer (for spring retainer)	1
101	Pump suction valve	1
102	Sealing ring (for pump suction valve)	1
103	Pump delivery valve compl.	1
104	Sealing ring (for pump delivery valve)	1
131	Choke body	1
131a	Gasket (for choke body)	1
132	Oval head screw (for choke body)	2
133	Clamping screw (on choke body for choke cable control)	1
135	Rotary choke valve compl.	1
136	Choke disc with choke shaft	1
137	Compression spring (for choke disc)	1
138	Lock washer (for compression spring)	1
139	Sealing ring (for choke shaft in choke body)	1
141	Choke lever compl.	1
142	Choke lever	1
143	Clamping screw compl. (for choke cable control)	1
144	Clamping screw	1
145	Bushing	1
146	Washer	1
147	Hex. nut	1
149	Washer (for choke shaft)	1
150	Hex. nut (for choke shaft)	1
151	Carburetor cover	1
152	Gasket (for carburetor cover)	1
153	Round head notched pin (for cover gasket)	2
156	Float needle valve	1
157	Sealing ring (for float needle valve)	1
161	Screw connection (for fuel line)	1
164	Sealing ring (for screw connection)	1
171	Pump shaft	1
172	Pump lever, inside (on pump shaft)	1
173	Pump lever, outside (on pump shaft)	1
174	Compression spring (on pump lever, outside)	1
175	Hex. nut (on pump shaft)	2
176	Serrated washer (for hex. nut)	2
181	Choke immersion tube	1
196	Disassembly bolt	5
197	Snap ring (for disassembly bolt)	5

Technical Data

Carburetor Design: Pallas-Zenith off-road double downdraft carburetor NDIX-DB 2 with mechanical accelerating pump

Carburetor Version: DB-21 with vacuum connection
DB-11 without vacuum connection

Carburetor Line-up (valid up to approx. 1,500 m above sea level) and Data

No.	Designation	Size (Identification)	Each	
			M 180	M 130
61	Venturi	32–26 (26 mm ID)	2	4
67	Main nozzle	140	2	4
66	Air correction nozzle	210	2	4
65	Mixing pipe	4 N	2	4
68	Idle fuel nozzle	55	2	4
74	Idle air nozzle	140	2	4
77	Injection pump nozzle	55	2	4
79	Injection pipe, long	3	2	4
75	Choke fuel nozzle	100	1	2
—	Choke air hole	5	—	—
156	Float needle valve	200	1	2
103	Pressure relief valve, short	100	1	2
26	Idle mixture regulating screw	—	2	4

Carburetor Data

3	Throttle valve with hole 1.5 dia.	10°
—	Bypass bore	1.2/1.0
—	Fuel level (measured at 1.8 m WG test pressure)	17.3 + 1 mm
—	Pump capacity	1.5 ± 0.2 cc/stroke
—	Fuel filter	Arma No. 611/91
42	Pump linkage	at M 130 center bore at M 180 outmost bore

Prior to starting any jobs on carburetor, check spark plugs (electrode gap), distributor (contact breaker gap), ignition timing, valves (valve clearance, compression pressure) first, since prevailing faults are often wrongly suspected on carburetor instead of in connection with these components. Any trouble on carburetor during its service life is mainly caused by contamination, resinification, dried-out or damaged seals or gaskets. In such cases, a thorough cleaning of the float housing, of all nozzles, valves, injection pipes, bores and channels, blowing-out with compressed air and replacing unusable seals, gaskets and nozzles will be enough to reestablish perfect functioning of carburetor. If such troubles cannot be eliminated by normal cleaning, it is recommended to disassemble and clean the complete carburetor and to check all components (refer to Chapter 6). Often, the accurate cause of a malfunction cannot be accurately determined without checking all the respective components, since one and the same fault may be the result of quite different causes.

To facilitate a pertinent trouble diagnosis, a few complaints, their possible causes and respective remedies are shown below.

Complaints	Possible Causes	Remedies
High fuel consumption	Leaking float valve	Clean float needle valve or replace if required
	Seal of float needle valve damaged	Replace seal
	Fuel level too high	Correct fuel level
	Delivery pressure of fuel delivery pump too high	Correct delivery pressure
	Idle nozzle or main nozzle loose	Tighten nozzles
	Idle suction pipe or air correction nozzles clogged	Clean nozzles and idle suction pipes
	Mixing pipes clogged	Clean mixing pipe (also lateral bores)
	Rotary choke valve not quite closing	Check whether rotary choke valve binds Check choke housing for leaks Check lever linkage for easy operation
	Carburetor cover loose	Tighten carburetor cover, check gasket
Poor idle	Idle fuel nozzle or idle suction pipes clogged	Clean nozzles or idle suction pipes
Note: Judge idle speed only with engine at operating temperature		Carefully tin-plate mixing pipe bracket in recess and press-in again
	Idle bores, bypass bores clogged	Clean bores
	Induction ducts contaminated	Clean induction ducts
	Fuel level wrong	Correct fuel level
	Delivery pressure of fuel delivery pump too high	Correct delivery pressure

07.2 Trouble Diagnosis

Complaints	Possible Causes	Remedies
	Float needle valve leaking	Replace float needle valve or seal
	Idle mixture regulating screw damaged or broken	Replace idle mixture regulating screw
	Throttle valve shaft worn	Replace throttle valve shaft and throttle valve housing
	Injection pipes dripping	Set fuel level to lowest limit permitted
Idle mixture regulating screw provides no change	Leaks on throttle valve housing or intake pipe flange	Apply soap solution test to check for leaks
Increased idle	Choke not completely disengaged	Check choke as before
	Throttle valve shaft stuck	Check throttle valve shaft
Carburetor flooding	Leaking float needle valve	Replace float needle valve
	Leaking float	Replace float
	Seal toward float needle valve damaged	Replace seal
Bad transition	Clogged idle nozzle	Clean nozzle
	Bypass bores clogged	Clean bores
	Seal to injection pipes leaking	Replace seal
	Injection pipes clogged or leaking	Replace injection pipes
	Wrong quantity of fuel injected	Correct quantity
	Pump diaphragm damaged	Replace pump diaphragm
Engine fires poorly when cold	Rotary slide valve not in starting position	Check starting position as before
Engine runs poorly following cold start	Starting fuel nozzle clogged	Clean nozzle and ducts
Engine fires poorly when warmed up	Rotary slide valve not completely closed	Check choke as before Repair choke cable control obstruction
	Fuel level too high	Clean float needle valve or replace, replace sealing ring, check delivery pressure of fuel delivery pump or correct, correct fuel level
	Infiltrated air	Check similar to poor idle

Cleaning with Carburetor Installed

- 1 Open or remove inner and outer engine hood.
- 2 Clean carburetor externally.
- 3 Remove intake connection from oil bath air filter on carburetor.
- 4 Unscrew fuel feed line while applying counter-hold to screw connection.
- 5 Disconnect pump rod of accelerating pump on pump lever or on pump lever bottom at throttle valve.
- 6 Unscrew carburetor cover and remove carburetor cover from float housing.
- 7 Pull double float from float housing and check by shaking for fuel inside both floats. In such a case, replace double float.

Cleaning with Carburetor Removed

- 1 Clean carburetor externally.
- 2 Disconnect pump rod on pump lever.
- 3 Unscrew throttle valve section and carburetor cover from float housing.
- 4 Remove double float and all nozzles from float housing.
- 5 Clean float housing, carburetor cover, throttle valve section and all nozzles and screws with compressed air.
- 8 Unscrew closing cover for main and idle nozzles on float housing and screw-off main and idle nozzles.
- 9 Remove pump nozzles with injection pipes, remove mixing pipe bracket by unscrewing holding screws, unscrew choke fuel nozzle and idle mixture regulating screws from float housing.
- 10 Blow-out float housing and all removed parts with compressed air.
- 11 Screw-back all nozzles.
Note: Make sure that nozzles are not mixed up.
- 12 Insert double floats into float housing and mount carburetor cover.
- 13 Connect pump rod of accelerating pump on pump lever.
- 14 Mount fuel feed line and intake connection of oil bath air filter.
- 6 Reinstall nozzles. **Note:** make sure that nozzles are not mixed up.

Pay special attention to choke fuel nozzles and pump suction valve, since they are easily confused during installation.

7 Insert double float into float housing, screw carburetor cover and throttle valve section to float housing.

8 Attach pump rod to pump lever.

Engine M 180

- 1 Disconnect regulating linkage and starter cable control. Disconnect draw spring if a speed limiter is installed.
- 2 Unscrew fuel feed line while applying counter-hold to screw connection on carburetor cover.
- 3 Loosen clamping screw from tightening wheel on connecting cap.
- 4 Loosen nuts and remove carburetor together with asbestos seals and cover plate. Fig. 1.
- 5 For installation proceed vice versa.

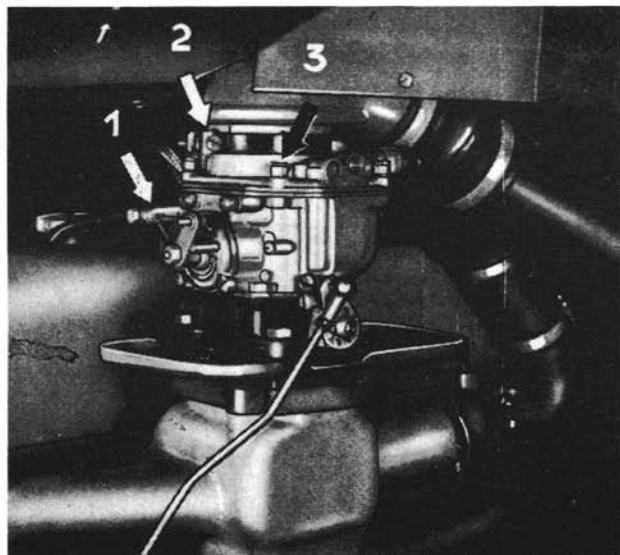


Fig. 1 Carburetor engine M 180

- 1 Choke cable control
- 2 Clamping screw
- 3 Cover screw

Engine M 130

- 1 Open or remove inner and outer engine hood.
- 2 Remove intake connection from oil bath air filter on carburetor.
- 3 Disconnect regulating linkage and screw-off choke cable control.
- 4 Unscrew fuel feed lines while applying counter-hold to screw connection on carburetor cover.
- 5 Loosen and unscrew fastening nuts of throttle valve section on intake manifold.

- 6 Remove carburetor with insulating flange, gasket and shielding plate from intake manifold.
- 7 Cover intake openings on intake manifold with clean cloth so that no foreign particles can enter intake ducts.
- 8 For installation proceed vice versa.

Note: Make sure that all sealing surfaces are flat and that all nuts and screws are tightly seated.

General Note:

For checking and adjusting with the assistance of test equipment refer to **07.0 Checkup Instructions**.

Engine M 180**1 Checking Delivery Pressure of Fuel Delivery Pump:**

Pressure should not exceed 0.2 bar (kp/cm²) or 152 mm Hg at an idle speed of approx. 600/min.

Note: Attach regulating linkage and check entire carburetor actuation for easy operation. Complete opening and closing of throttle valve must be assured.

With the button of the choke cable control completely pushed in, the clearance between the button and the instrument panel should amount to approx. 2 mm.

When the delivery pressure of the fuel delivery pump is too high, the float needle valve may be under excess pressure and the fuel level may then be too high.

Too much delivery pressure of fuel delivery pump is the result of an excessive pump stroke or hardening of pump diaphragm.

2 Prior to removing carburetor cover, the engine should run for approx. 15 s at idle speed, so that the fuel level can adjust as required.

3 Measuring the Fuel Level:

Switch-off ignition, disconnect fuel lines and check fuel level immediately upon removal of carburetor cover, since otherwise fuel will evaporate when the engine is hot.

Note: Check by means of a dipstick or depth gauge. Introduce dipstick at partition of float housing adjacent to air funnel slowly and uniformly until touching the fuel. The data concerning the fuel level

apply only to measurements made at this point. This includes the fact that the fuel will rise along wall by approx. 2 mm due to surface tension.

The fuel level should amount to **17.3 ± 1 mm**. Measure at 0.18 bar (kp/cm²) test pressure.

The fuel level can be lowered by adding a second sealing ring under float needle valve or by carefully bending float sheet metal as required.

An additional sealing ring 0.5 mm thick will lower the fuel level by approx. 1 mm.

4 Regulating Idle Speed:

Open throttle valves for a small gap by screwing idle speed adjusting screw (11) in inward direction.

Turn idle mixture regulating screws (26) completely inwards until a slight resistance is felt. Then screw-back both screws by two turns, start engine and warm-up until operating temperature is attained.

Uniformly turn idle mixture regulating screws inwards or outwards until max. speed at pertinent idle is attained and engine is running smoothly.

Note: Screwing idle mixture regulating screws inwards provides a leaner idle mixture, screwing outwards a richer idle mixture. Even a very slight turn of the idle mixture regulating screws will show an effect. Turning both screws uniformly is particularly important. Never tighten screws.

07.2 Adjustment of Carburetor

5 Normal Operation:

The main nozzles, the air correction nozzles and the venturis are adjusted at the factory to provide efficient output and favorable consumption.

For replacing nozzles, the following instructions apply:

Main nozzle (67) smaller	Consumption lower, output lower
Main nozzle larger	Output higher, consumption higher
Air correction nozzle (66) smaller	Peak output higher, consumption higher
Air correction nozzle larger	Consumption lower, peak output lower

Re-adjustment may be required when changing to a highly different type of fuel. In such a case, we recommend asking the customer service department of the respective fuel dealer for advice or consulting the Solex-Pallas Service Organization.

Engine M 130**General Note:**

For checking and adjusting with the assistance of test equipment refer to **07.0 Checkup Instructions**.

Coarse Adjustment

- 1 Remove inner engine hood.
- 2 Actuate accelerator pedal several times and check regulating linkage for easy operation.
- 3 Clean carburetor externally and unscrew intake connection (of oil bath air filter) on carburetor.
- 4 Disconnect regulating linkage on throttle valve lever and turn back idle adjusting screw until the throttle valves are barely closing.
- 5 Screw idle speed adjusting screw inwards by $\frac{1}{4}$ to $\frac{1}{2}$ turn so that the throttle valves are slightly opened.
- 6 Set throttle valve lever to full throttle and check whether throttle valves are uniformly and completely opening.
- 7 Attach regulating linkage to throttle valve lever and slowly actuate accelerator pedal in cab several times while checking whether the throttle valves of both carburetors are completely opening and closing

uniformly together. If required, readjust regulating linkage.

8 Unscrew idle speed mixture regulating screws from throttle valve section and check for damage (score marks) on cone tip.

9 Replace damaged screws.

10 Carefully screw idle speed mixture regulating screws into throttle valve section until they are resting slightly against stop. Then screw back for $\frac{3}{2}$ turns.

11 Check choke. Upon actuation of cable control, the levers of the choke on the carburetors should uniformly open and close and should arrive at stop on both sides. Readjust cable control or regulating linkage of second carburetor, if required.

12 Adjust choke cable control in such a manner that with the choke disconnected, the choke button cannot be completely pushed in (1 mm preload).

Nozzle Test

To guarantee accurate functioning of carburetor system, remove all nozzles and check for damage or their nominal value.

Pump Capacity of Accelerating Pump

- 1 The pump capacity of the accelerating pump amounts to 1.5 ± 0.2 cc/stroke with the pump rod attached to outermost hole at pump lever top.
- 2 If acceleration of vehicle is poor, do not attach

pump rod on pump lever to another hole, but check the sleeve of the pump plunger for damage.

3 Replace damaged pump plunger together with sleeve.

07.2 Adjustment of Carburetor

Checking and Adjusting Fuel Level

1 Too low a fuel level in the float chamber will cause poor transition during acceleration. Too high a fuel level will cause high consumption. The vehicle must be level for measuring.

2 Run engine for a short moment at idle.

3 Unscrew fuel feed line on carburetor cover and unscrew cover.

4 Remove gasket.

5 Measure fuel level with slide gauge at two points per carburetor.

6 Distance of fuel level from cover sealing surface 17.3 ± 1 mm.

7 If the fuel level must be changed, never change or bend float suspension. Compensate by changing gasket under float needle valve. When level is too low, use thinner gasket, when it is too high, use thicker gasket.

Fine Adjustment

General Note:

A prerequisite for effective carburetor adjustment is an accurate firing point adjustment, a mechanically perfect engine, a tightly sealed intake and

exhaust system and level positioning of vehicle. Both carburetors must be synchronized to guarantee uniform transition in all speed ranges of engine.

Scope:

1 Connect revolution counter on engine.

2 Check oil level in engine, correct if required.

3 Start engine and run up to operating temperature.

4 Connect vacuum tester to carburetor. The vacuum connection is between the idle speed regulating screws on throttle valve member.

5 On vacuum tester 000 589 12 23 00 the vacuum connection is not required; instead, the vacuum tester is placed on carburetor cover and the glass pipe is set vertically.

6 Turn regulating screw on tester in or out until cylinder element in glass pipe is moving approx. in center against a line mark.

7 Alternately **turn idle** speed mixture and idle speed adjusting screw in and out until the highest vacuum is indicated on tester. Shown by rising cylinder element in glass pipe of tester and slight drop in engine speed.

8 Regulate engine idle speed on idle speed adjusting screw to 800 to 850/min, in exceptional cases to 950/min, with the assistance of the revolution counter.

9 Continue on both carburetors until both carburetors indicate the same value.

General Note:

The numbers in parentheses refer to the numbers in Fig. 1.

Scope:

- 1 Clean carburetor externally (gasoline bath).
- 2 Loosen screw connection of fuel feed line.
- 3 Disconnect pump rod (42) on pump lever (7) at bottom. For this purpose, push spring-loaded counterweight on lever of throttle valve shaft (2) down, pull pump rod (42) up and push in direction of carburetor.
- 4 Disconnect pump rod (42) on pump lever (173) at top.
Remove locking spring, washer and spring.
- 5 Remove carburetor cover (151) after loosening the five slotted screws.

Note: On vehicles with speed limitation, a bracket for the return spring will be additionally freed at top.
- 6 Unscrew closing cover (7) for nozzle on float housing (51).
- 7 Unscrew main nozzles at bottom (67) and idle speed nozzles (68) at top.
- 8 Remove float (52).
- 9 Disconnect pump plunger (91) on pump lever (172) inside.
- 10 Remove cover gasket (152) by pulling out the two roundhead notched pins (153). Scrap both parts.
- 11 Remove choke immersion tube (181).
- 12 Remove float needle valve (156).
- 13 Remove pump nozzles (77).
- 14 Remove injection pipes (79).
- 15 Remove air correction nozzles (66).
- 16 Remove mixing pipes (65).
- 17 Loosen holding screw (64) for mixing pipe bracket and remove together with spring washer and washer.
- 18 Remove mixing pipe carrier (63).
- 19 Remove idle air nozzles (74).
- 20 Remove choke body (131) (starting carburetor).
- 21 Disassemble choke body.
- 22 Remove throttle valve section (1) from float housing.
- 24 Remove pump suction (101) and pump delivery valve (103) from float housing.
- 25 Loosen idle speed mixture regulating screws (26) and remove together with compression springs.

07.2 Disassembly of Carburetor

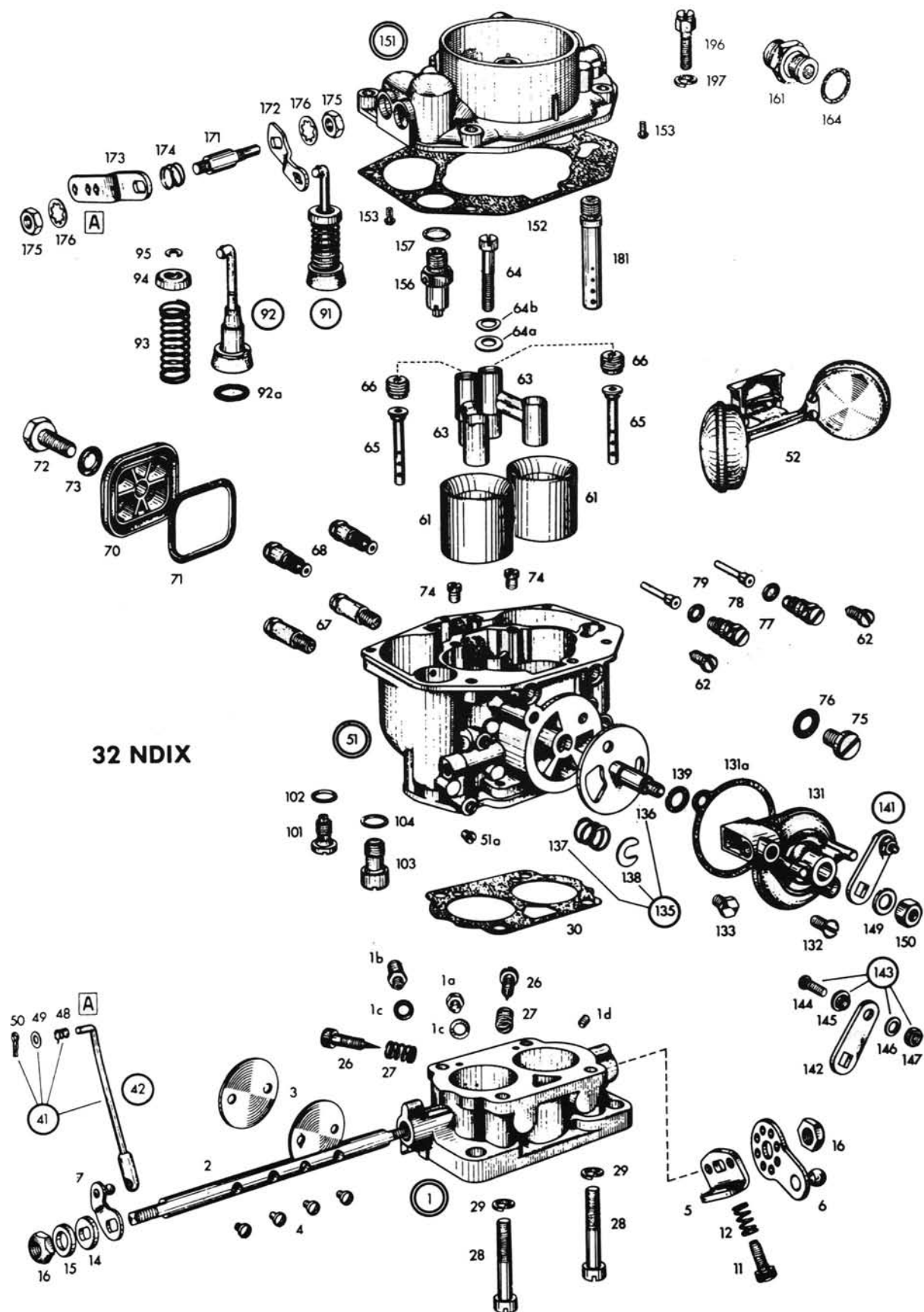


Fig. 1 Pallas-Zenith off-road double downdraft carburetor 32-NDIX

1 Clean all components in cleaning fluid "Speed-cleane" made by Solex, blow-out all ducts with compressed air and check components.

2 Smooth down all flange surfaces of throttle valves section, float housing and carburetor top where seals – not sealing rings – are used for sealing with fine emery cloth on a flat surface.
Fig. 1.

3 Then clean all components once again well from all metal dust.

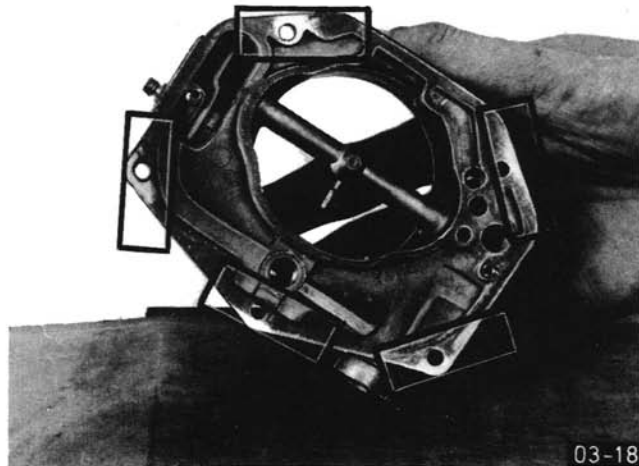


Fig. 1

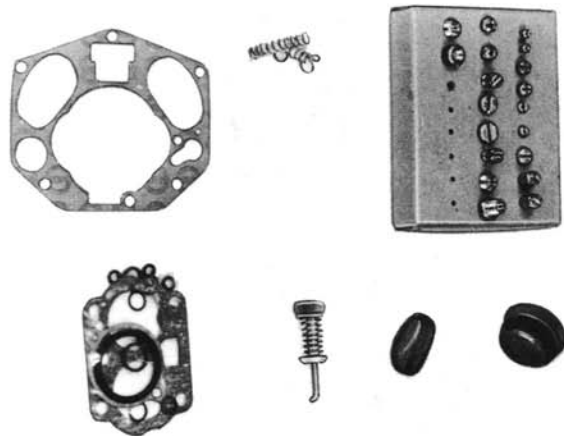
General Note:

For assembly, proceed vice versa to disassembly.

Scope:

Pay special attention to the following items:

- 1 Install all parts of repair kit. Fig. 1.
- 2 Use only latest nozzle components. Scrap old parts. Refer to **07.2 Technical Data**.
- 3 Check venturi for tight seat.
- 4 Do **not** tighten the idle speed mixture regulating screws, since this will damage the cones.



03-21

Fig. 1 Repair kit for carburetor

- 5 Attach pump rod (42) into outermost bore of pump lever (173) on carburetor cover.
- 6 Adjust carburetor. Refer to Chapter 5.

Technical Data

Design	Battery ignition system
Firing order	1-5-3-6-2-4
Firing point basic adjustment	2° BTDC at starting motor speed
Firing point adjustment	Centrifugal or vacuum
Timing angle	34° to 37°

Ignition Coil

Bosch Order No.	Type	Spark length mm	Primary current A	Primary resistance Ohm	Remarks
0 221 103 001	KW 24 V	14	1.1	4.8-5.8	(civilian)
0 221 108 003	KMW 24 V	14	1.1	4.8-5.8	
0 221 112 006	KCW 24 V	14	0.9	4.8-5.8	
0 221 115 002	KCW 12 V	14	1.7	1.9-2.3	
0 221 115 001	KCW 12 V	14	1.7	1.9-2.3	
0 221 112 002	KCW 24 V	14	0.9	4.8-5.8	Check without suppressor cable
0 221 112 004	KCW 24 V	14	0.9	4.8-5.8	Check without suppressor cable

Preresistance

Bosch Order No.	Bosch Designation	Resistance Ohm	System (voltage) V	Remarks
1 224 509 053	ZSWJ 3Z1Z 1.5 Ohm	1.5	12	Standard version
1 224 509 032	ZSWJ 2Z3Z 4.5 Ohm	4.5	24	Splash-water-protected
1 224 509 030	ZSWJ 2Z1Z 4.5 Ohm	4.5	24	Splash-water-protected

07.5 General

Ignition Distributor

Bosch Order No.	Contact pressure p	Contact gap mm	Timing angle degr.	Centrifugal adjustment					End of adjustment 1/min
				Adjusting range degr.	Begin of adjust- ment 1/min	Speed at distributor shaft at adjusting angle of			
						5° 1/min	10° 1/min	15° (20°) 1/min	
0 231 118 006	500— 630	0.3— 0.4	35— 41	14.5— 17.5	200— 300	350— 520	620— 880	1950— 2500	2100— *) 2500
0 231 116 048	500— 630	0.3— 0.4	36— 42	14.5— 17.5	200— 350	350— 520	600— 900	over 1900	over 2400
0 231 136 002	500— 630	0.3— 0.4	35— 41	14.5— 17.5	200— 380	330— 530	600— 900	1150— 1450	2200— 2500

*) Break at 1,000 and 1,750/min.

Ignition Timing

Speed 1/min	Ignition timing *) Crankshaft angle			Timing angle
	Ignition distributor type			
	ZV/JAM 6 AR ZV/JBM 6 R	VJUR 6 BR 24	VJUR 6 BR 38 VJUR 6 BR 47 (with vacuum adjustment)	
800	4—12°	4—12°	4—12°	38 ± 3°
1500	18—23°	38—43°	28—33°	38 ± 3°
3000	23—27°	43—47°	33—37°	38 ± 3°
4500	28—34°	48—54°	38—44°	38 ± 3°

*) Perm. tolerance ± 2°

Spark Plugs

Engine version	Com- pression ratio ε	Application	Manufacturer Order Data		
			BOSCH 1) 3)	BERU 1) 3)	CHAMPION 2) 3)

Long-range suppression

Engines with old valve timing	6.5 6.8	Standard	W 175 T 35 (W 175 T 7) (W 175 T 1)	175/14 A (D 175/14)	L-87 Y
		Short-distance	W 145 T 35 (W 145 T 1)	145/14	
Spark plug thread length 12.7 mm	8.7	Standard		225/14 A (225/14)	
		Short-distance	W 200 T 35	200/14 A (200/14)	L-87 Y
Engines with new valve timing	7.0	Standard	W 145 T 30 (W 175 T 27) (W 175 T 2)	D 175/14/3 A (D 175/14/3)	N-9 Y
		Short-distance	W 145 T 30		N-14 Y
Spark plug thread length 19.0 mm	7.8 8.7	Standard	W 215 T 30 (WG 215 T 30)	D 215/14/3 A (G 215/14/3)	N-7 Y
		Short-distance	W 200 T 27	200/14/3 A (D 200/14/3)	N-8

Short-range suppression and splash water protection

Engines with old valve timing	6.5 6.8 7.0	Standard	WC 175 ERT 7 WC 175 ERT 1	E 175/14 m ⁵	XML 12
		Short-distance	WC 145 ERT 7		
Spark plug thread length 12.7 mm	8.7	Standard	WC 225 ERT 7 WC 225 ERT 1	E 225/14 m ⁵	
		Short-distance	WC 175 ERT 7 WC 175 ERT 1	E 175/14 m ⁵	XML 12
Engines with new valve timing	7.0	Standard	WC 175 ERT 27	ED 175/14/3 m ⁵	XMN 12
		Short-distance	WC 145 ERT 27		XMN 12
Spark plug thread length 19.0 mm	7.8 8.7	Standard	WC 225 ERT 27	E 225/14/3 m ⁵	
		Short-distance	WC 175 ERT 27	ED 175/14/3 m ⁵	XMN 12

07.5 General

Explanations for preceding Table:

- 1) Use spark plugs shown in brackets only when those named first are not available.
- 2) Use these spark plugs only when those named under 1) are not available.
- 3) If the named spark plugs are not available, the following may be used:

Instead of W 175 T 30 spark plugs
W 200 T 27

MARELLI
AUTOLITE
AC

CW 78 LP
AG 32
43 XLS

Instead of W 215 T 30 spark plugs

AUTOLITE
AUTOLITE
AC

AG 22
AGR 22
42 XLS

Replace the last-named spark plugs as soon as possible by those named under 1).

General Note:

The formerly required differentiation of the spark plug cable dia. of 5 and 7 mm when selecting the spark plugs is no longer required as the result of converting the respective ignition systems to the latest version.

General Note:

Testing and adjustment by means of test instruments refer to **07.0 Test Instructions**.

Checking the Ignition Coil

To determine whether the ignition coil is still intact, take high-tension cable terminal 4 out of ignition distributor and hold approx. 10 to 12 mm away from a good grounding point. Ignition cable should be in good condition. When cranking the engine, a blueish ignition spark should jump accompanied by a detonating noise. If the ignition spark is weak or its color is already yellowish, the ignition coil is unfit for use as the result of an interturn short, moisture etc. and must be replaced.

Ignition Distributor Trouble Diagnosis

Complaints	Remedies
Contacts burned, scorched	Replace contact assembly
Suppression in distributor rotor burned	Renew distributor finger
Fitted seat of distributor rotor on distributor shaft worn out	Renew distributor finger
Carbon for distributor rotor broken	Replace carbon
Ignition adjustment (centrifugal governor) no longer operating	Make adjusting assembly operable, replace ignition distributor, if required
Capacitor damaged	Renew capacitor (on splash-water-protected ignition system installed in distributor housing)

07.5 Adjustment of Ignition System

Checking Spark Plugs

Check spark plug visually prior to electrical test. In the event of lead deposits on plug insulator, sand-blast plugs prior to test. Set electrode gap to nominal dimension. During electrical test, all sparks on plug electrodes, no more than individual sparks at parallel or control spark gap should jump over at the electrode gaps and pressures named below.

Electrode gap mm	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.4
Pressure bar (kp/cm ²)	3.5	4.0	5.0	5.5	6.0	6.5	7.5	9.5	11

Check electrode gap once again prior to installing tested plugs.

Exploded Views

Explanations covering Fig. 1

No.	Designation	Each
1	Pump top	1
3	Valve plate	2
4	Valve spring	2
5	Spring strainer	1
7	Valve plate	1
8	Gasket	1
9	Countersunk screw	3
10	Toothed washer	3
15	Fuel filter compl.	1
18	Cap	1
19	Sealing ring	1
20	Hex. screw	1
21	Sealing ring	1
23	Closing plug	1
24	Sealing ring	1
25	Closing plug	1
31	Screw connection	2
34	Sealing ring	2
42	Pump diaphragm compl.	1
43	Diaphragm spring	1
51	Oil guard plate	1
52	Spring	1
61	Pump bottom	1
71	Pump drive lever compl.	1
74	Shaft	1
76	Compression spring	1
81	Hand lever with shaft compl.	1
82	Locking ring	1
83	Return spring	1
91	Oval head screw	6
92	Snap ring	6

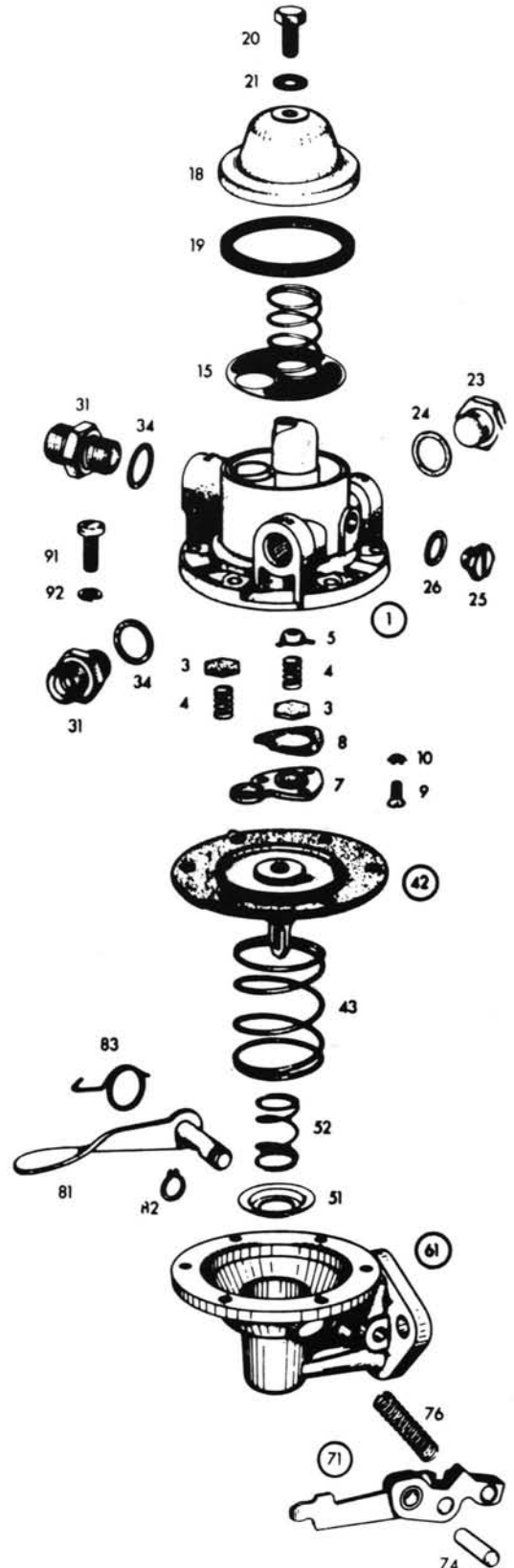


Fig. 1 Fuel delivery pump (diaphragm pump)

Technical Data**Fuel Delivery Pump Engine M 180**

Design	Diaphragm pump
Manufacturer, Type	Solex PE 10 284 d
Suction vacuum	230 to 305 mm Hg
Delivery pressure	0.12 to 0.16 bar (kp/cm ²)
Suction height	0.9 m

Fuel Delivery Pump Engine M 130

Type	Plunger pump
Manufacturer, Type	APG
Suction vacuum	250 to 350 mm Hg
Delivery pressure	0.25 to 0.35 bar (kp/cm ²)

Removal and Installation of Fuel Delivery Pump (Diaphragm Pump)

- 1 Loosen fuel intake and fuel delivery line.
- 2 Unscrew delivery pump from intermediate flange (5). Fig. 3.
- 3 Unscrew intermediate flange from cylinder crankcase.

4 For installation proceed vice versa.

Note: Adjust tappet clearance in accordance with Fig. 3.

Reconditioning Fuel Delivery Pump (Diaphragm Pump)

Note: The numbers in brackets refer to page 1.1/1.

- 1 Clean delivery pump externally (gasoline bath).
- 2 Unscrew screw connection (31) for fuel feed line.
- 3 On delivery pumps of the former version, unscrew water drain closing plug in pump top, unscrew 2 vents in pump bottom.
- 4 Loosen cap (18) from pump top (1).
- 5 Unscrew pump top from pump bottom (61) and remove.
- 6 Push exposed diaphragm (42) in bottom (61) downwards while simultaneously completing a jerky, clockwise motion. The diaphragm on pump drive lever (71) will become disconnected and can be removed.
- 7 Disconnect compression spring (76) on pump drive lever (71).
- 8 Force out shaft of pump drive lever and remove lever.
- 9 Remove locking ring of hand lever with shaft (81) and take-off parts.

Note: Watch-out for restoring spring (83).

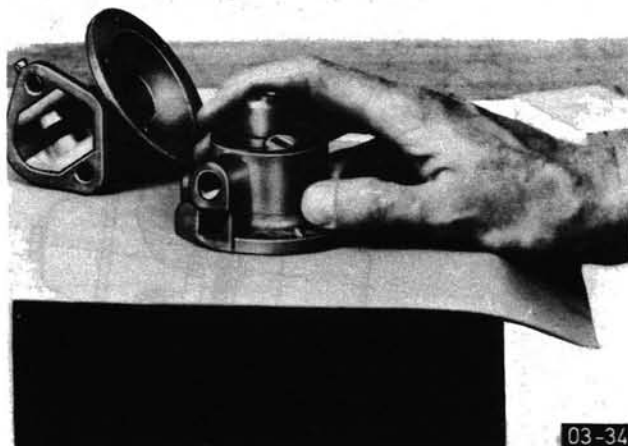


Fig. 1

- 1 Surface plate
- 2 Emery cloth

10 Unscrew valve plate (7) in pump top (1).

11 Remove exposed valve plates (3), valve springs (4) and spring strainer (5).

12 Clean all parts in cleaning fluid "Speedcleane" made by Solex, blow-out all ducts with compressed air and check particularly the following parts: All flange surfaces of pump top, pump bottom and connecting flange.

Smooth down all surfaces on which gaskets – not sealing rings – are used for sealing with fine emery cloth on a level surface. Fig. 1.

Then clean all parts once again thoroughly from natural dust.

09.1 Removal and Installation, Reconditioning of Fuel Delivery Pump (Diaphragm Pump)

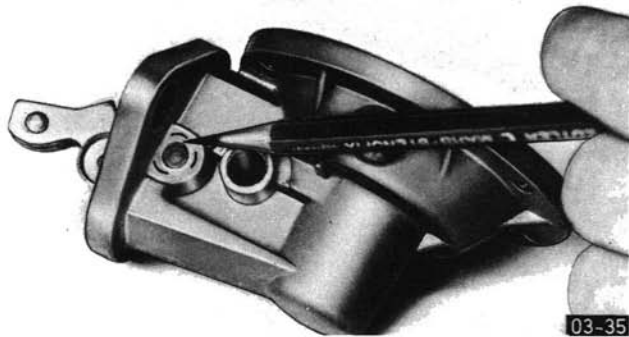


Fig. 2

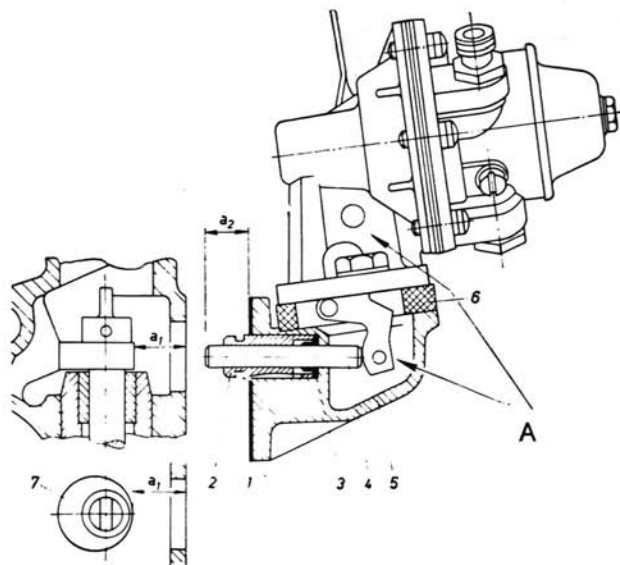


Fig. 3

- 1 Sealing flange
- 2 Bushing
- 3 Cap sleeve
- 4 Plunger
- 5 Intermediate flange
- 6 Insulating flange with gaskets
- 7 Cam on oil pump drive shaft
- A Fill intermediate space in fuel delivery pump and in intermediate flange with grease

13 For assembly proceed vice versa.

Pay special attention to the following items:

14 Exchange all parts contained in repair kit 180 586 02 90.

15 Keep all parts absolutely clean to avoid trouble later on.

16 Check valve cage, valve spring, valve reed and valve plate for good and correct seat.

17 Check diaphragm in pump drive lever for correct engagement.

18 Punch-mark shaft of pump drive lever lightly on both sides at least at three points. Fig. 2.

19 Correctly insert compression spring on drive lever. Also fill flange space with some grease.

20 Measure play between plunger and cam.

Fig. 3:

Screw fuel delivery pump to intermediate flange. Measure dimension a_2 from plunger to flange surface. Measure dimension a_1 from flange surface crankcase to cam. For cam position refer to Fig. 3. Distance $a_1 - a_2$ corresponds to play, which should amount to 0.4 to 0.5 mm. Compensate deviation by means of thicker or thinner seal (1).

Note: When measuring, be sure to include thickness of seal. Fig. 3.

Measuring Intake Vacuum

1 Unscrew both fuel lines on fuel delivery pump and connect vacuum pressure gauge to **delivery pump input**.

2 Short ignition system: Connect line from ground to terminal 1 (ignition coil, ignition distributor).

3 Crank engine with starting motor and read vacuum.

Measuring Delivery Gauge Pressure

4 Connect pressure gauge to delivery pump output.

5 Crank engine with starting motor and read gauge pressure.

Note: Gauge pressure remains approximately constant throughout entire speed range.

6 Replace delivery pump, if vacuum or gauge pressure are not attained.

Measuring Data

Designation of pump		DVG diaphragm pump
Intake vacuum	Measuring point	prior to pump input
	at starting speed bar (kp/cm ²)	0.3 to 0.4
	mm Hg	230 to 320
Delivery gauge pressure	Measuring point	following pump output
	at starting speed bar (kp/cm ²)	0.12 to 0.16
	at idle speed bar (kp/cm ²)	0.15 to 0.20

Removal and Installation of Fuel Delivery Pump (Plunger Pump)

Play between cam and plunger amounts to 0.4 to 0.5 mm.

Reconditioning Fuel Delivery Pump (Plunger Pump)

General Note:

This delivery pump can be disassembled only to the extent of replacing the fuel strainer. Replace fuel strainer (2), rubber sealing ring (1), aluminum sealing ring (4) and screw every 45,000 km.

Disassembly and Assembly:

- 1 The fuel strainer (2) is accessible upon removal of pump cover (3).
- 2 During assembly of pump cover, markings (arrow) must be in alignment.

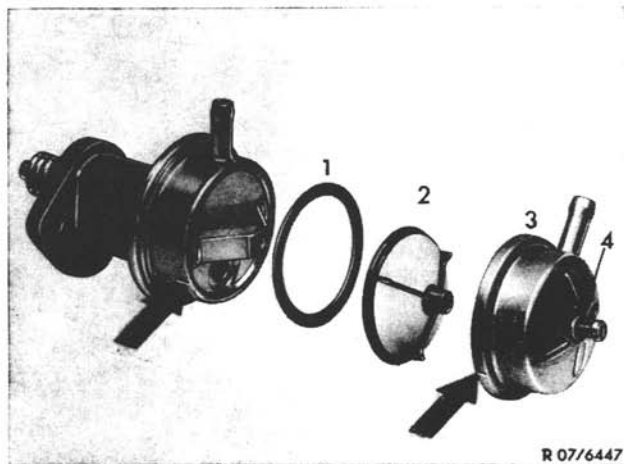


Fig. 1

- 1 Rubber sealing ring
- 2 Fuel strainer
- 3 Pump cover
- 4 Aluminum sealing ring

Measuring Intake Vacuum

- 1 Unscrew both fuel lines on fuel delivery pump and connect vacuum gauge to **delivery pump input**.
- 2 Short ignition system:
Connect line from ground to terminal 1 (ignition coil, ignition distributor).
- 3 Crank engine with starting motor and read vacuum.

Measuring Delivery Gauge Pressure

- 4 Connect pressure gauge to delivery pump output.
 - 5 Crank engine with starting motor and read gauge pressure.
- Note:** The gauge pressure remains approximately constant throughout entire speed range.
- 6 Replace delivery pump, if vacuum or gauge pressure are not attained.

Measuring Data

Designation of pump		APG plunger pump	
Intake vacuum	Measuring point	before pump input	
	at starting speed	bar (kp/cm ²)	—
		mm Hg	250 to 350
Delivery gauge pressure	Measuring point	following pump output	
	at starting speed bar (kp/cm ²)	0.25 to 0.35	
	at idle speed bar (kp/cm ²)	—	

Legend Main Wiring Diagram

Fig. 15/54—0/13

1	Socket 1-pole	24	Instrument cluster
2	Horn	25	Suppressor
3a	Blinker (flasher) clearance light left	26	Ignition coil
3b	Blinker (flasher) clearance light right	27	Regulator
4a	Main headlight left	28	Alternator
4b	Main headlight right	29	Preresistance
5	Windshield wiper	30	Push button starting switch
6a	Foglight left	31	Switch for warning light backup light switch
6b	Foglight right	32	Brake light switch
7	Indicator light for supplementary fuel pump	33	Plug connection
8	Switch for supplementary fuel pump	34	Flasher — horn — dimming switch
9	Interior light	35	Solenoid valve
10	Plug connection	36	Fuel gauge
11	Windshield wiper switch	37	Supplementary fuel pump
12	Switch for foglight	38	Starter
13	Blower for heating and venting	39	Battery (2 x 12 V, 5 Ah)
14	Indicator light for backup light	40a	Flasher connection — brake light left
15	Fuseboxes	40b	Flasher connection — brake light right
16	Switch for backup light	41	Backup light
17	Line connector	42	Trailer socket
18	Warning flasher switch		
19	Warning flasher transmitter		
20	Ignition distributor		
21	Engine		
21a	Oil pressure gauge		
22	Switchbox		
23	Tachometer		

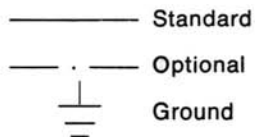
—————	Standard
-----	Optional
⊥	Ground

Legend for Supplementary Wiring Diagram of Signal System 404.0 for Fire Extinguishing and Police Vehicles

Legend for Supplementary Wiring Diagram of Signal System for Fire Extinguishing and Police Vehicles

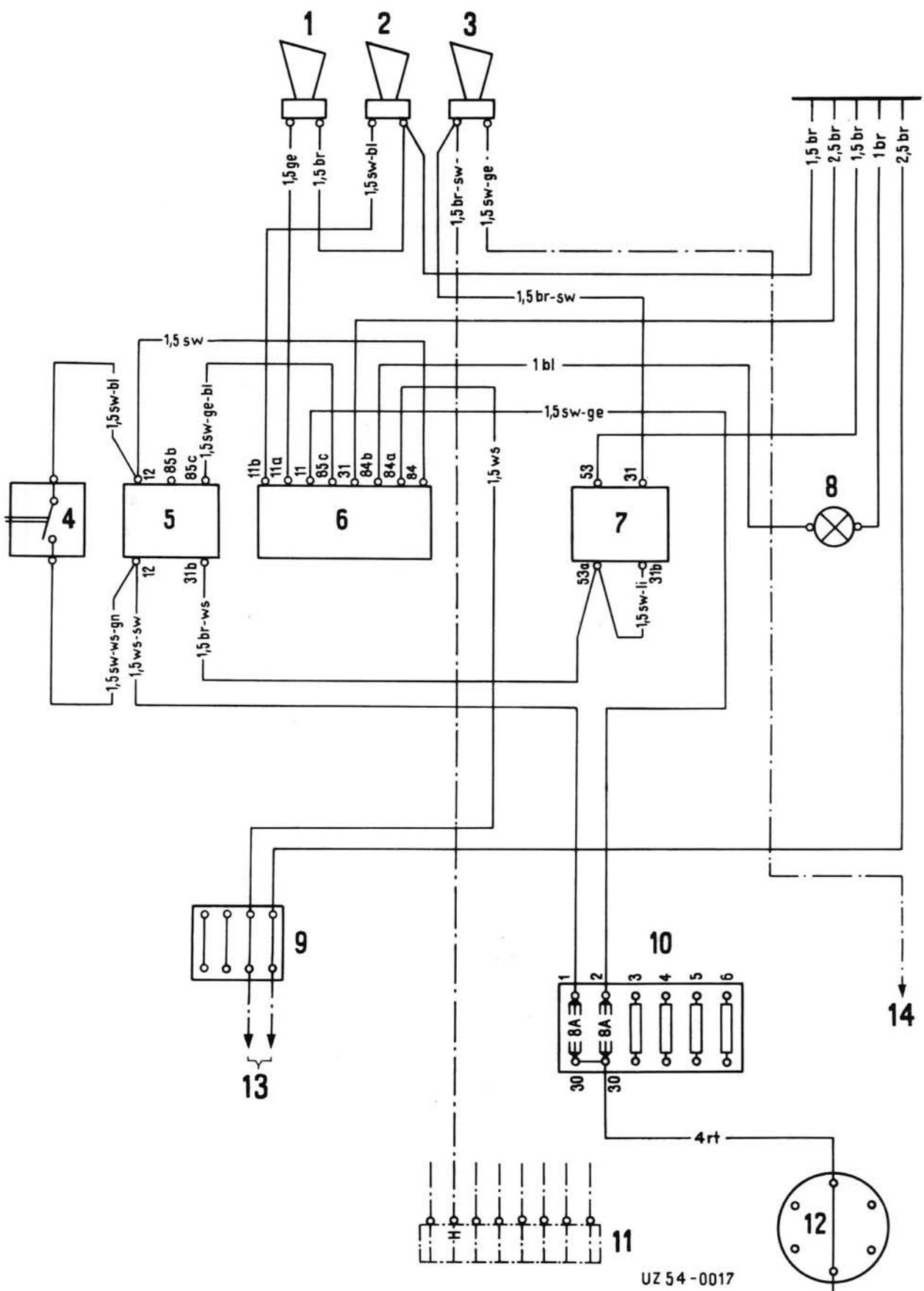
Fig. 15/54-0/14

- 1 Loud-tone horn "low"
- 2 Loud-tone horn "high"
- 3 Horn
- 4 Switch for blue light
- 5 Alarm switch
- 6 Tone sequence switch
- 7 Switch for continuous operation
- 8 Indicating light
- 9 Cable connector
- 10 Fusebox
- 11 8-Pole plug
- 12 Light and ignition switch
- 13 To rotating flasher
- 14 To fuse terminal 30



Wire Color Code:

- bl = blue
- br = brown
- ge = yellow
- gn = green
- gr = grey
- li = lilac
- rt = red
- sw = black
- ws = white



UZ 54-0017

Fig. 15/54-0/14

Supplementary Wiring Diagram of Signal System for Fire Extinguishing and Police Vehicles

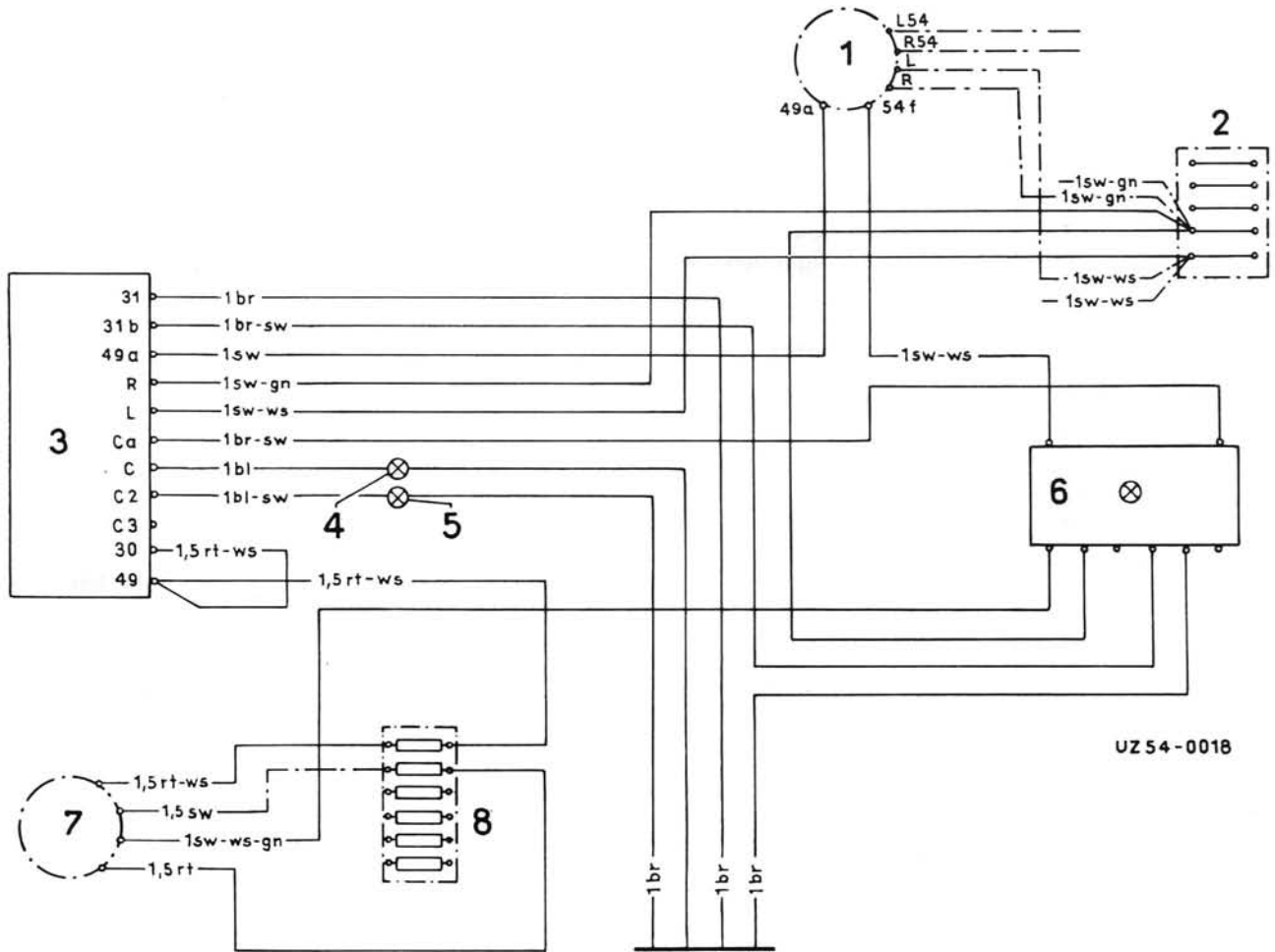


Fig. 15/54 - 0/0

Supplementary Wiring Diagram Hazard Warning Flasher System **404.1**

- 1 Flasher switch
- 2 Cable connector
- 3 Hazard warning flasher sending unit
- 4 Turn signal indicator light
- 5 Turn signal indicator light, trailer
- 6 Hazard warning flasher switch
- 7 Light switch
- 8 Fuse box III

Note:

Hazard warning flasher sending unit (3)
in place of (standard) sending unit.

- . - . - available lines and equipment

Explanation for Main Wiring Diagram 404.113

Fig. 15/54-0/1

1	Windshield wiper	29	Heater
2	Junction box	30	Buzzer for tire warning system
3	Signal button	31	Foot dimmer switch
4	Horn	32	Indicator light for high beam
5	Blinker switch	33	Junction box
6	Blinker transmitter	34	Transmitter for fuel gauge
7	Indicator light for blinker	35	Stop light switch
8	Blinker clearance light, left	36	Indicator light for generator
9	Headlamp, left	37	Switch box
10	Headlamp, right	38	Junction box
11	Headlamp light, right	39	Generator 300 W
12	Fog light, left	40	Regulator switch 300 W
13	Fog light, right	41	Starter
14	Spark plugs	42	Starter switch
15	Distributor	43	Battery main switch
16	Ignition coil	44a	Battery 12 V 56 Ah
17	Pre-resistance	44b	Battery 12 V 56 Ah
18	Speedometer	45	Back-up light
19	Telethermometer	46	Blinker-, stop-, tail-, license plate light, left
20	Double pressure gauge	47	Blinker-, stop-, tail-, license plate light, right
21	Oil pressure gauge	48	Trailer socket
22	Fuel gauge	49	Spark plugs
23	Dome light with switch	50	Distributor
24	Socket for hand lamp	51	Coil
25	Switch on transmission	52	Interference suppressor
26	Fuse box	53	Generator 600 W
27	Switch	54	Regulator switch 600 W
28	Switch	55	Starter

} Ignition
system short
distance radio
shielding

} 600-W-System

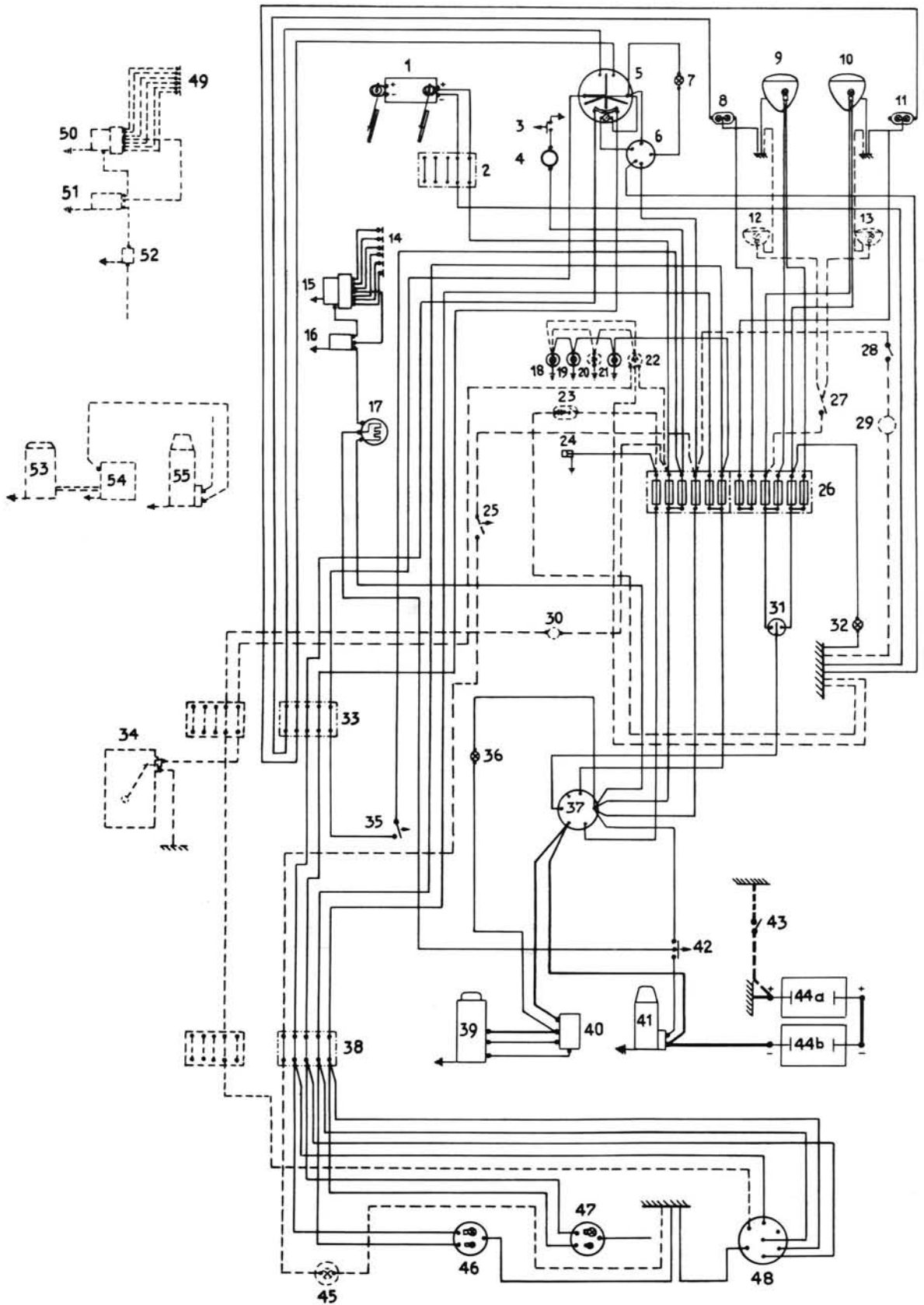


Fig. 15/54-0/1

Main Wiring Diagram 404.113

Explanation for Main Wiring Diagram 404.114/115

Fig. 15/54-02

1	Signal button	38	Red Cross light
2	Supertone horn	39	Cable connector
3	Horn	40	Lever switch
4	Map board light	41	Transmitter for fuel gauge
5	Socket for hand lamp	42	Foot switch for high/low beam
6	Camouflage light, left	43	Fuse box
7	Blinker clearance light, left	44	Socket for hand lamp
8	Headlamp, left	45	Interior light with switch
9	Headlamp, right	46	Beacon light
10	Blinker clearances light, right	47	Stop light switch
11	Camouflage light, right	48	Light switch
12	Wiper, left	49	Switch
13	Wiper, right	50	Cable connector
14	Cable connector	51	Indicator light for generator
15	Alarm switch	52	Socket for electric power connection
16	Sequence switch for horn	53	Generator 600 W 24 V
17	Current relay	54	Regulator switch 600 W 24 V
18	Relay	55	Starter
19	Pilot light	56	Push button starter switch
20	Switch	57	Battery main switch
21	Spark plugs	58a	Battery 12 V 45 Ah
22	Distributor	58b	Battery 12 V 45 Ah
23	Ignition coil	59	Cable connector
24	Pre-resistance	60	Blinker/stop-tail identification light with camouflage light
25	Indicator light for blinker	61	Camouflage stop light
26	Blinker transmitter	62	Trailer socket, 12-pole
27	Blinker switch	65	Blinker-, stop-, tail light with camouflage tail light
28	Instruments	64	Guide cross
29	Junction box	65	Blinker-, stop-, tail light with camouflage tail light
30	Lever switch		
31	Lever switch		
32	Lever switch		
33	Heater		
34	Cable connector		
35	Buzzer		
36	Indicator light for high beam		
37	Push button for driving signal		

○—————○	Standard equipment
○.....○	Additional special equipment
○—.—.—.—○	Scope of delivery van body

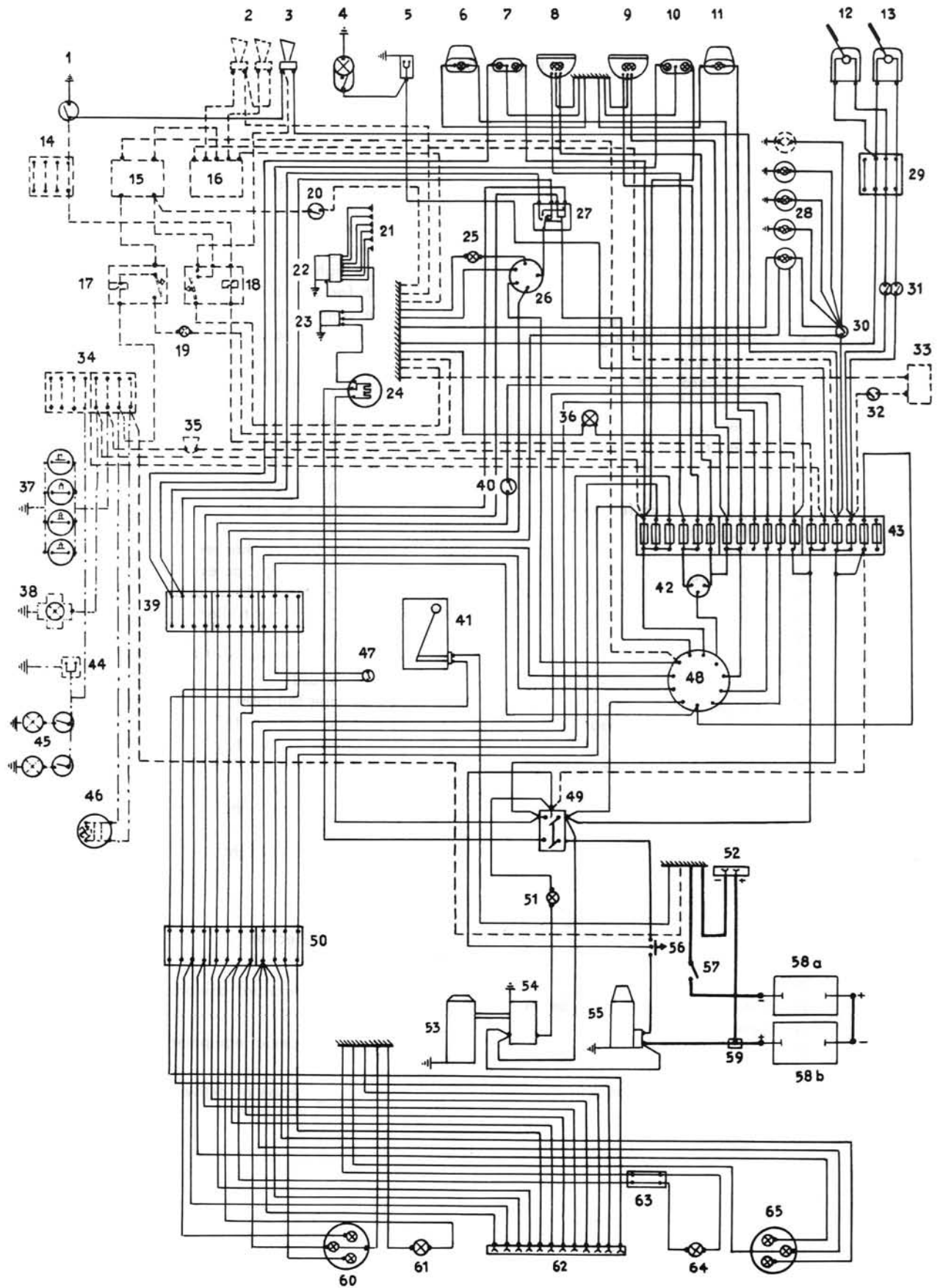


Fig. 15/54-0/2

Main Wiring Diagram 404.114.115

Explanation for Main Wiring Diagram 404.115

Fig. 15/54-0/3

1	Signal button	46	Stop light switch
2a	Supertone horn	47	Transmitter for fuel gauge
2b	Signal horn	48	Foot switch for dimmer light
3	Fog light, left	49	Light switch
4	Comouflage light, left	50	Fuse boxes
5	Blinker clearance light, left	51	Interior light
6	Headlamp, left	52	Beacon light
7	Headlamp, right	53	Switch for back-up light
8	Blinker clearance light, right	54	Cable connector
9	Camouflage light, right	55	Pilot light generator
10	Fog light, right	56	Switch
11	Map board light	57	Switch for pilot light/PTO
12	Socket for hand lamp	58	Starter
13	Wiper, left	59	Starter switch
14	Wiper, right	60	Socket for power connection
15	Cable connector	61	Battery main switch
16	Alarm switch	62	Cable connector
17	Sequence switch for horn	63a	Battery 12 V 45 Ah
18	Instruments	63b	Battery 12 V 45 Ah
19	Cable connector	64	Socket for battery charger
20	Current relais	65	Socket for trailer, 7 poles
21	Relais	66	Socket, 12-pole for body and tail lights
22	Pilot light	67	Socket, 12-pole for trailer
23	Switch	68	Cut-off relay
24	Distributor	69	Regulator switch 600 W / 24 V
25	Spark plugs	70	Generator 600 W / 24 V
26	Ignition coil	A	Camouflage tail light
27	Interference suppressor	B	Blinker stop light, left
28	Pre-resistance	C	Camouflage tail light
29	Pilot light for blinker	D	Tail light, right
30	Blinker switch	E	Tail light, left
31	Blinker transmitter	F	Camouflage stop light
32	Lever switch	H	Guide cross
33	Lever switch	J	Blinker-stop light, right
34	Lever switch	K	Interior light
35	Cable connector	L	Ground
36	Push button for driver signal	M	Back-up light
37	Buzzer	N	Without connection
38	Indicator light		
39	Lever switch		
40	Indicating light for high beam		
41	Lever switch		
42	Heater		
43	Red cross light		
44	Socket for hand lamp in van body		
45	Cable connector		

○————○	Standard equipment
○.....○	Special equipment
○.—.—.—○	Scope of delivery van body

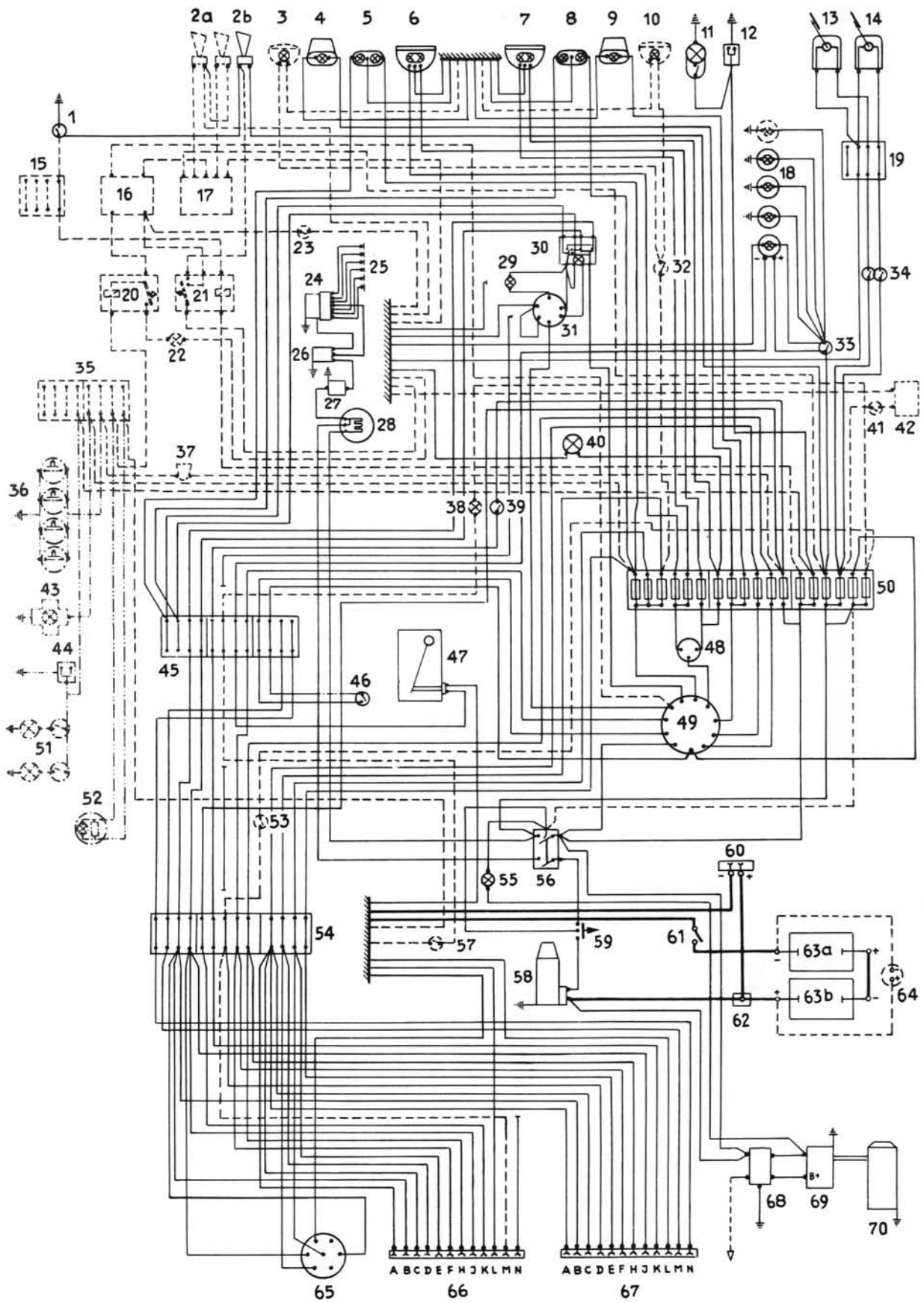


Fig. 15/54-0/3

Main Wiring Diagram 404.115

Explanation for Main Wiring Diagram 404.1 (Special Vehicles)

Fig. 15/54-0/4

1	Signal button	39	Socket for floodlights
2a	Supertone horn	40	Cable connector
2b	Signal horn	41	Stop light switch
3	Fog light, left	42	Transmitter for fuel gauge
4	Blinker clearance light, left	43	Cable connector
5	Headlamp, left	44	Magnetic valve
6	Headlamp, right	45	Fuse boxes
7	Blinker clearance light, right	46	Foot switch for dimmer light
8	Fog light, right	47	Interior light
9	Socket for hand lamp	48	Beacon light
10	Heater	49	Switch for back-up light
11	Wiper, left	50	Switch for PTO
12	Wiper, right	51	Switch box
13	Alarm switch	52	Starter switch
14	Sequence switch for horn	53	Starter
15	Current relais	54a	Battery 12 V 56 Ah
16	Relais	54b	Battery 12 V 56 Ah
17	Switch	55	Socket for battery charger
18	Blinker switch	56	Cable connector
19	Indicator light for blinker, tractor	57	Additional batteries 2×12 V connected in series for 24 V charger as well as for supply
20	Dome light with switch	58	Additional batteries 2×12 V connected in series for 24 V charger or connected parallel for 12 V supply
21	Lever switch	59	Relais Bosch SH/SE 22 A 2
22	Cable connector	60	Switch SH/UH 2/1 Bosch
23	Blinker transmitter	61	Wireless equipment 12 V
24	Lever switch	62	Indicator light generator
25	Lever switch, left	63	Regulator switch 600 W 24 V
26	Lever switch, right	64	Generator 600 W 24 V
27	Distributor	65	Cut-out relais
28	Spark plugs	66	Regulator switch 600 W 20 V
29	Ignition coil	67	Generator 600 W 20 V
30	Interference suppressor	68	Trailer plug 7 poles
31	Pre-resistance	69	Blinker-, stop-, and tail- and identification light
32	Indicator light for high beam	70	Back-up light
33	Cable connector	71	Blinker-stop-tail light
34	Pilot light		
35	Indicator light for additional fuel pump		
36	Lever switch		
37	Instruments		
38	Indicating lamp		

○————○ Standard equipment

○.....○ Special equipment

○—•—•—○ Scope of delivery
van body

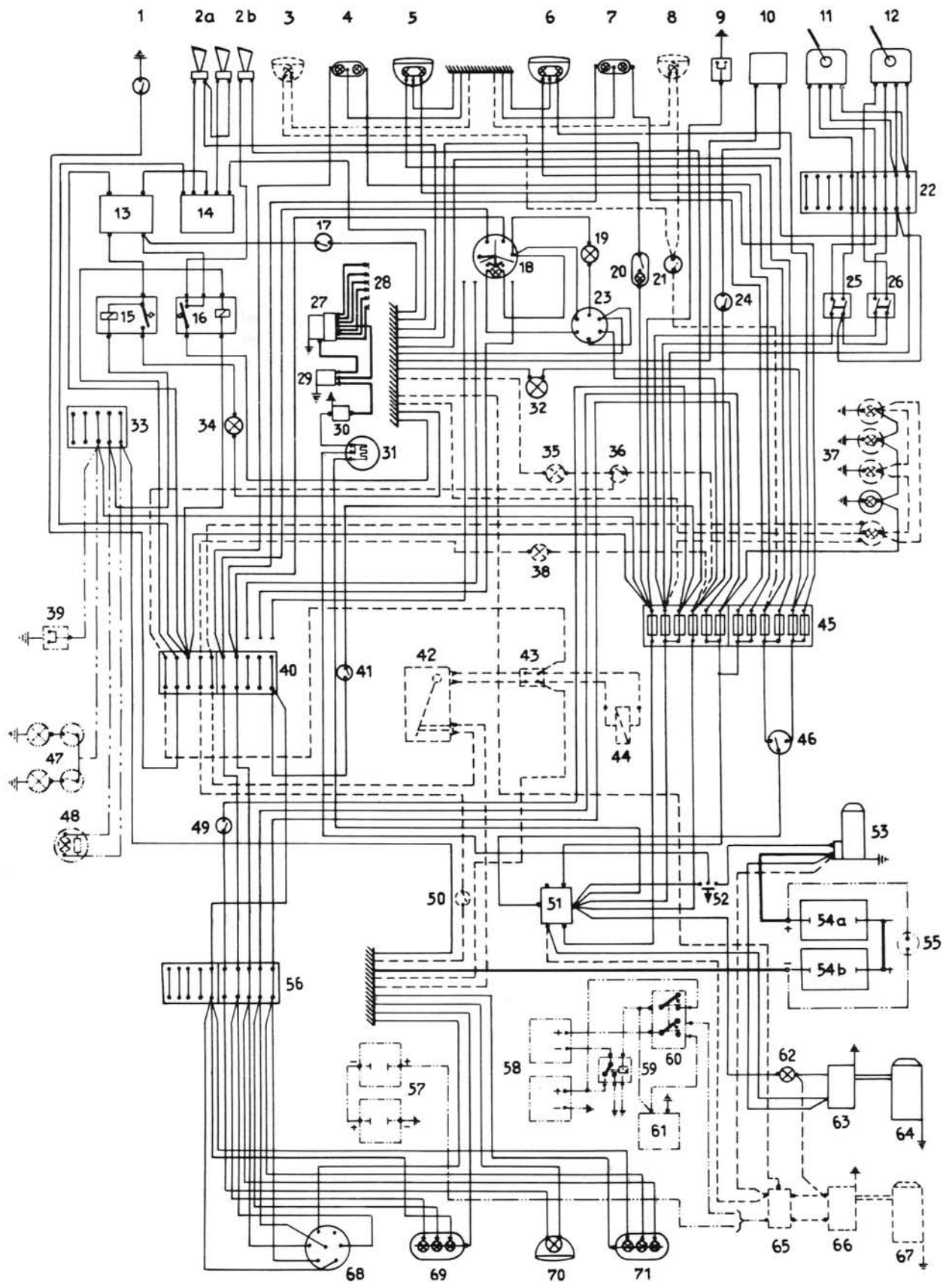


Fig. 15/54-0/4

Main Wiring Diagram 404.1 (Special vehicles)

Explanation for Main Wiring Diagram 404.114 (Switzerland)

Fig. 15/54-0/5

- | | | | |
|----|----------------------------------|----|--|
| 1 | Camouflage light | 26 | Lever switch |
| 2 | Socket | 27 | ETA Overload protection switch
no. 1-10 and 12 = 8 A
no. 11 = 4 A |
| 3 | Blinker clearance light, left | 28 | Heater |
| 4 | Headlamp, left | 29 | Cable connector |
| 5 | Headlamp, right | 30 | Stop light switch |
| 6 | Blinker clearance light, right | 31 | Transmitter for fuel gauge |
| 7 | Socket for hand lamp | 32 | Foot dimmer switch |
| 8 | Map board light | 33 | Camouflage light switch |
| 9 | Signal button | 34 | Light switch |
| 10 | Wiper, left, shielded | 35 | Cable connector |
| 11 | Wiper, right, shielded | 36 | Drive switch |
| 12 | Horn | 37 | Generator |
| 13 | Cable connector | 38 | Regulator switch |
| 14 | Instruments | 39 | Indicator light, generator |
| 15 | Lever switch | 40 | Starter |
| 16 | Lever switch | 41 | Starter switch |
| 17 | Distributor | 42 | Battery main switch |
| 18 | Ignition coil | 43 | Cable connector |
| 19 | Interference suppressor | 44 | Battery (2) 12 V 60 Ah |
| 20 | Pre-resistance | 45 | Blinker-, stop-, tail-, and license plate light with
camouflage light |
| 21 | Plugs | 46 | Socket 7-pole |
| 22 | Indicator light blinker, tractor | 47 | Blinker-, stop-, tail light with camouflage light |
| 23 | Blinker transmitter | | |
| 24 | Blinker switch | | |
| 25 | Indicator light for high beam | | |

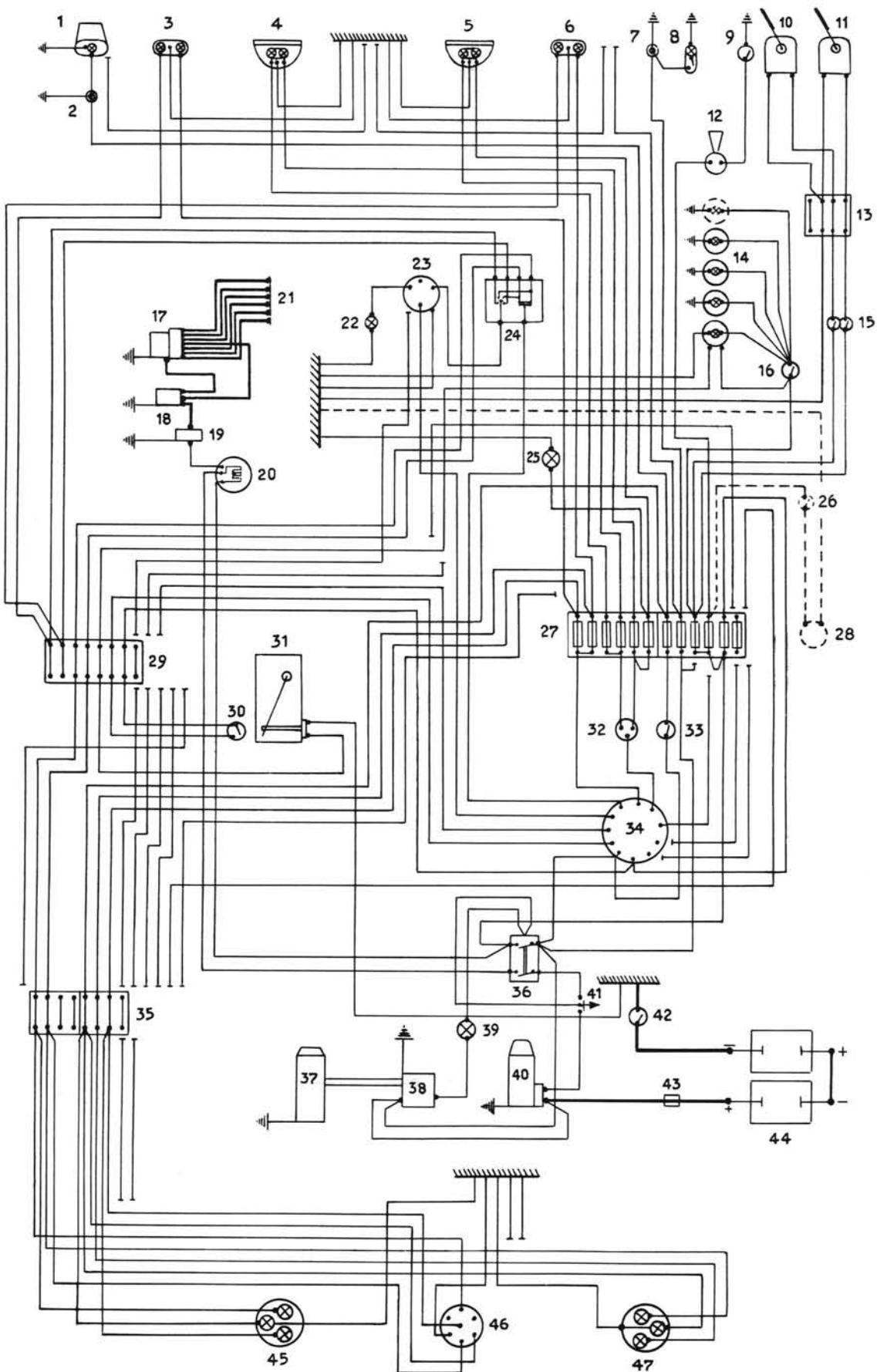


Fig. 15/54-0/5
Main Wiring Diagram 404.114 (Switzerland)

Explanation for Main Wiring Diagram 404.113 (Special Vehicles)

Fig. 15/54-0/6

- | | | | |
|----|--|---------------|---|
| 1 | Signal button | 45a | Additional electrical fuel pump |
| 2 | Supertone horn | 45b | Indicator for fuel gauge |
| 3 | Horn | 46 | Cable connector |
| 4 | Fog light, left | 47 | Magnetic valve |
| 5 | Blinker clearance light, left | 48 | Fuse boxes |
| 6 | Headlamp, left | 49 | Foot dimmer switch |
| 7 | Headlamp, right | 50 | Interior light |
| 8 | Blinker clearance light, right | 51 | Beacon light |
| 9 | Fog light, right | 52 | Buzzer |
| 10 | Socket for hand lamp | 53 | Switch for back-up light |
| 11 | Heater | 54 | Switch on transmission for PTO |
| 12 | Wiper, left | 55 | Switch box |
| 13 | Wiper, right | 56 | Starter switch |
| 14 | Alarm switch | 57 | Starter |
| 15 | Sequence switch for horn | 58a | Battery 12 V 56 Ah |
| 16 | Switch | 58b | Battery 12 V 56 Ah |
| 17 | Blinker switch | 59 | Socket for battery charger |
| 18 | Indicator light, blinker | 60 | Cable connector |
| 19 | Dome light with switch | 61 | Additional battery 2×12 V,
hooked-up in series for 24 V charger
and for supply |
| 20 | Lever switch | 62 | Additional battery 2×24 V,
hooked-up in series for 24 V charger
or hooked-up parallel for 12 V supply |
| 21 | Cable connector | 63 | Relais Bosch SH/SE 22 A 2 |
| 22 | Current relais | 64 | Change-over switch Bosch SH/UH 2/1 |
| 23 | Relais | 65 | Wireless equipment 12 V |
| 24 | Cable connector | 66 | Indicator light for generator |
| 25 | Pilot light | 67 | Regulator switch 600 W 24 V |
| 26 | Distributor | 68 | Generator 600 W 24 V |
| 27 | Plugs | 69 | Socket 7-pole |
| 28 | Ignition coil | 70 | Blinker-, stop-, tail light and license plate light |
| 29 | Interference suppressor | 71 | Back-up light |
| 30 | Pre-resistance | 72 | Blinker-, stop-, tail light |
| 31 | Indicator light, high beam | 73 | Cut-out relais |
| 32 | Blinker transmitter | 74 | Regulator switch 600 W 24 V |
| 33 | Lever switch | 75 | Generator 600 W 24 V |
| 34 | Lever switch, left | | |
| 35 | Lever switch, right | | |
| 36 | Push button for driver signal | | |
| 37 | Red Cross light | | |
| 38 | Socket for additional head light | | |
| 39 | Indicator light for additional fuel pump | o ————— o | Standard equipment |
| 40 | Lever switch | o o | Special equipment |
| 41 | Indicator light | | |
| 42 | Instruments | | |
| 43 | Cable connector | o — . — . — o | Scope of delivery
van body |
| 44 | Stop light switch | | |

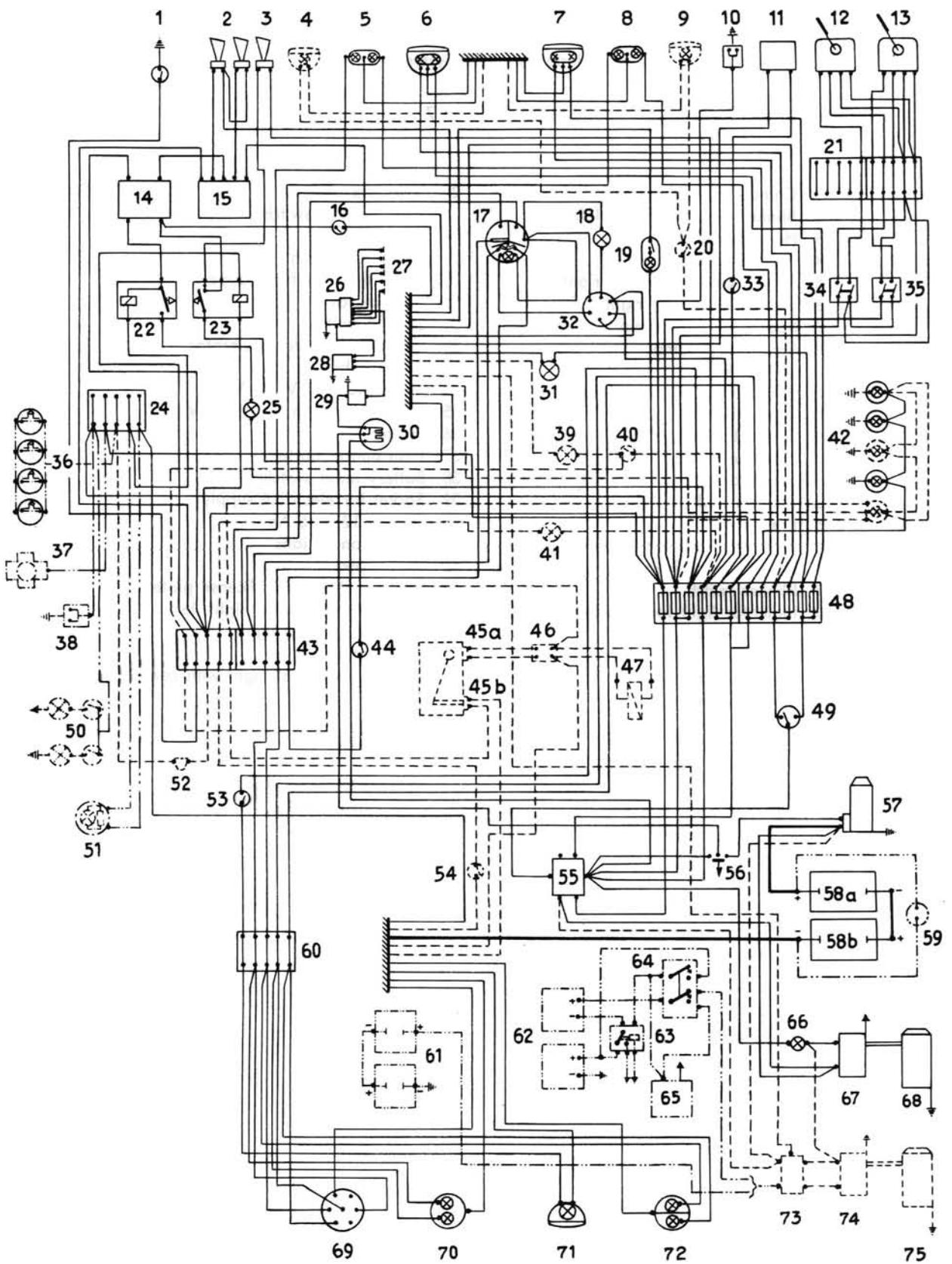


Fig. 15/54-0/6

Main Wiring Diagram 404.113 (Special vehicles)

Explanation for Main Wiring Diagram 404.114

(Indonesia 12-V-System)

Fig. 15/54-0/7

- | | | | |
|----|--------------------------------|----|---|
| 1 | Camouflage light, left | 25 | Fuse box |
| 2 | Blinker clearance light, left | 26 | Foot dimmer switch |
| 3 | Headlamp, left | 27 | Junction box |
| 4 | Headlamp, right | 28 | Stop light switch |
| 5 | Blinker clearance light, right | 29 | Transmitter for fuel gauge |
| 6 | Camouflage light, right | 30 | Light switch |
| 7 | Socket for hand lamp | 31 | Driving switch |
| 8 | Map board lamp | 32 | Indicator light for generator |
| 9 | Wiper, left | 33 | Junction box |
| 10 | Wiper, right | 34 | Generator 300 W 12 V |
| 11 | Signal horn | 35 | Regulator switch 300 W 12 V |
| 12 | Signal button | 36 | Starter |
| 13 | Distributor | 37 | Push button starter |
| 14 | Spark plugs | 38 | Battery main switch |
| 15 | Ignition coil | 39 | Socket for electrical supply |
| 16 | Pre-resistance | 40 | Battery 12 V 45 Ah |
| 17 | Indicator light for blinker | 41 | Cable connections |
| 18 | Blinker transmitter | 42 | Trailer socket |
| 19 | Blinker switch | 43 | Blinker-, stop-, tail-, license plate light
with camouflage tail light, left |
| 20 | Indicator light for high beam | 44 | Camouflage stop light |
| 21 | Lever switch | 45 | Guide cross |
| 22 | Instruments | 46 | Blinker-, stop-, tail light with camouflage tail light |
| 23 | Lever switch | | |
| 24 | Lever switch | | |

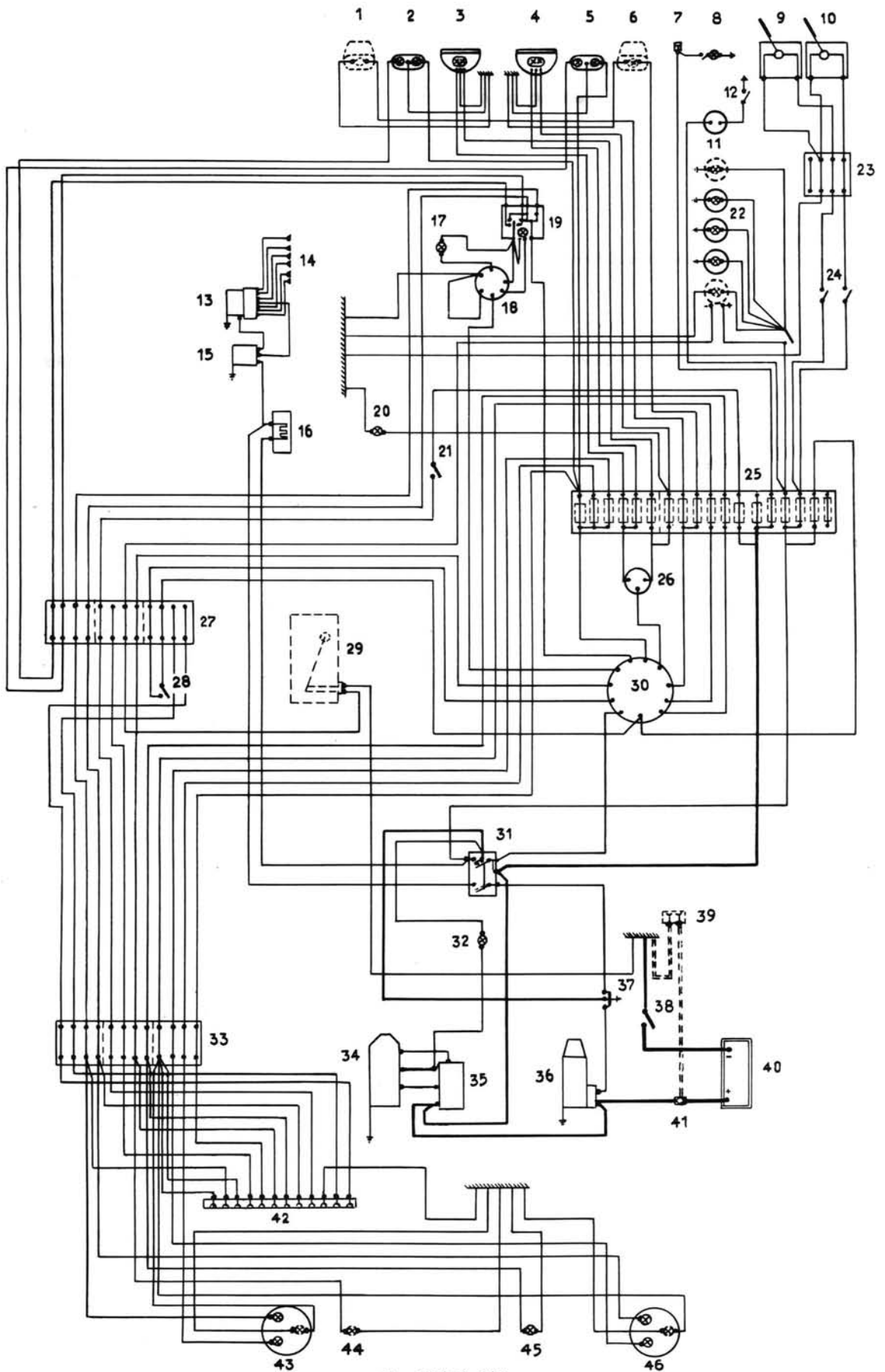


Fig. 15/54-0/7

Main Wiring Diagram 404.114 (Indonesia)

Explanation for Additional Wiring Diagram (Connection of Wireless Equipment)

Fig. 15/54-0/8

- 1 Generator
 - 2 Regulator switch
 - 3 Cut-out relais for additional batteries
 - 4 Starter
 - 5 Battery main switch
 - 6 Battery 2×12 V 45 Ah
 - 7 Additional batteries 2×12 V hooked-up in series for 24 V charger and supply (optional)
 - 8 Additional batteries 2×12 V hooked-up in series for 24 V charger or hooked-up parallel for 12 V supply (optional)
 - 8a Relais SH/SE 22 A 2 Bosch
 - 8b Change-over switch SH/UH 2/1 Bosch
 - 8c Wireless equipment 12 V
-
- A To indicator light
 - B To driving switch

Note: Positions of change-over switch

- 0 24 V charging of wireless equipment batteries
- 1 12 V supply for wireless equipment

—•—•—•—•—•— Special equipment

————— Standard equipment

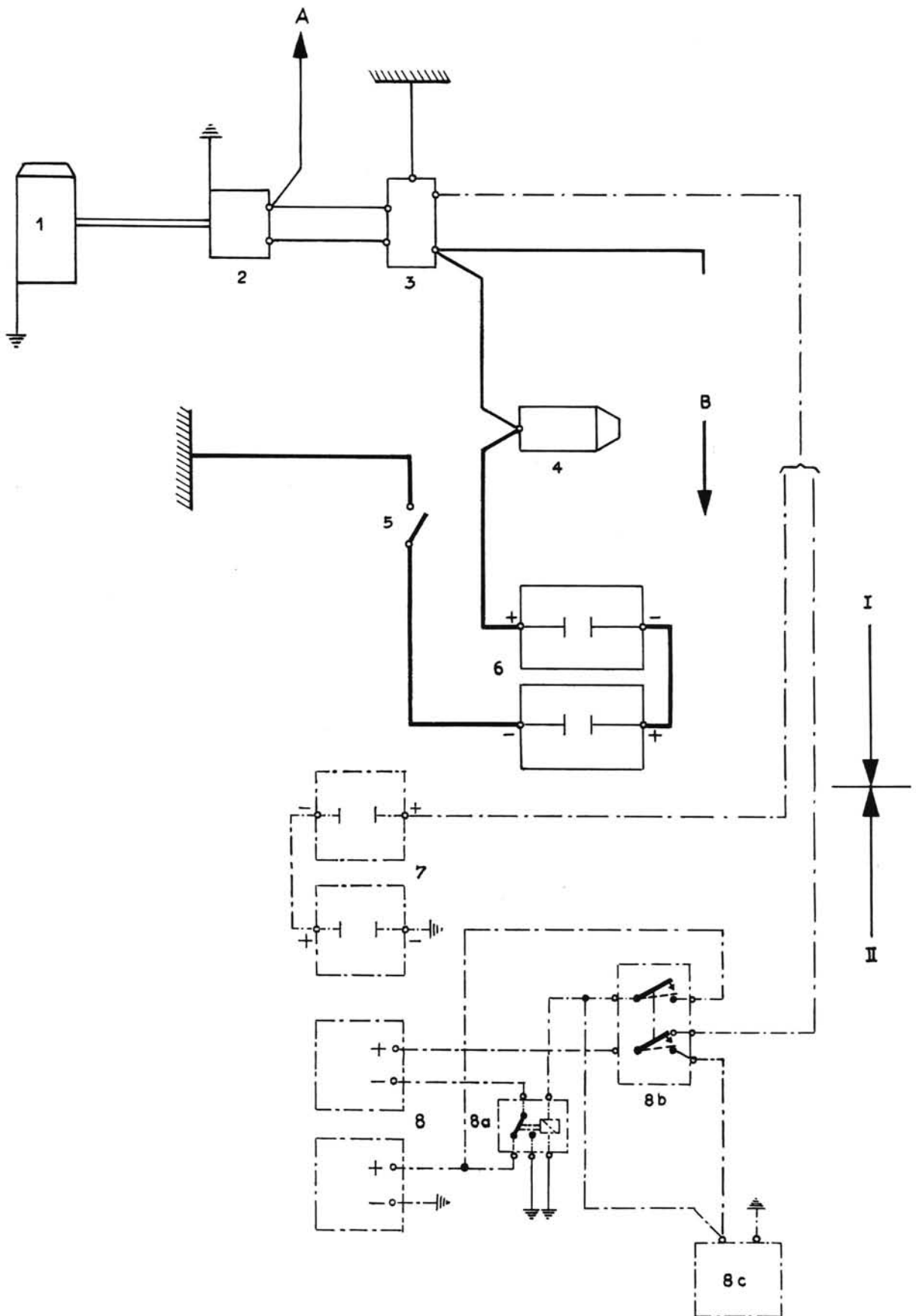


Fig. 15/54-0/8

Additional Wiring Diagram (Connection for wireless equipment)

Explanation for Wiring Diagram of Driving School Vehicle

Fig. 15/54-0/9

A. Additional wiring diagram for ignition cut-out

- 1 Ignition coil
- 2 Interference suppressor
- 3 Pre-resistance
- 4 Ignition cut-out switch (instrument panel)
- a } To switch box
- b }

B. Additional wiring diagram for stop light

- 1 Junction box
- 2 Stop light switch on master brake cylinder
- 3 Stop light switch on distributor

C. Additional wiring diagram for control light of pedal operation

- 1 Cable connector
- 2 Indicator light
- 3 Stop light switch
- 4 Clutch control switch
- 5 Fuse box 8 A/25 A

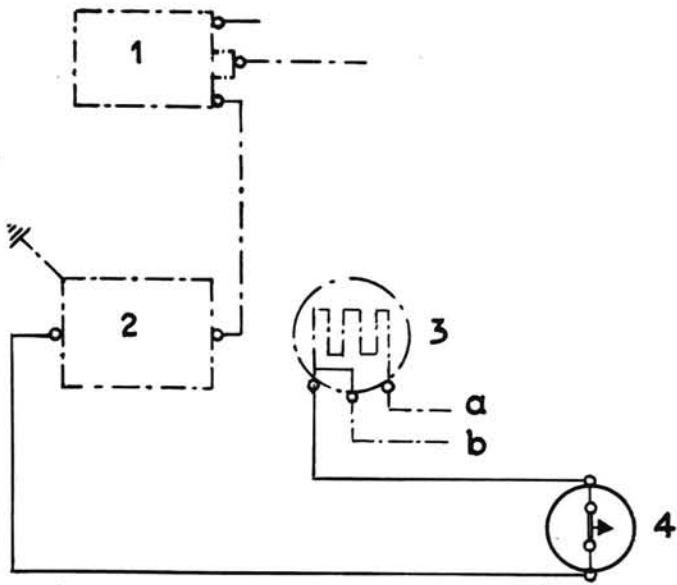
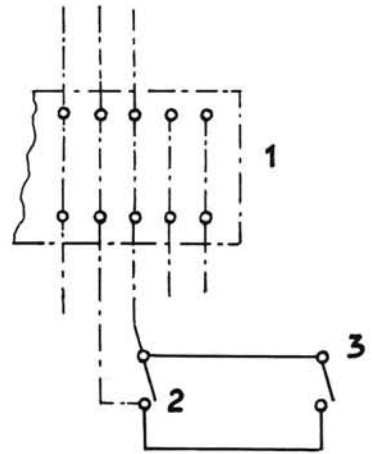
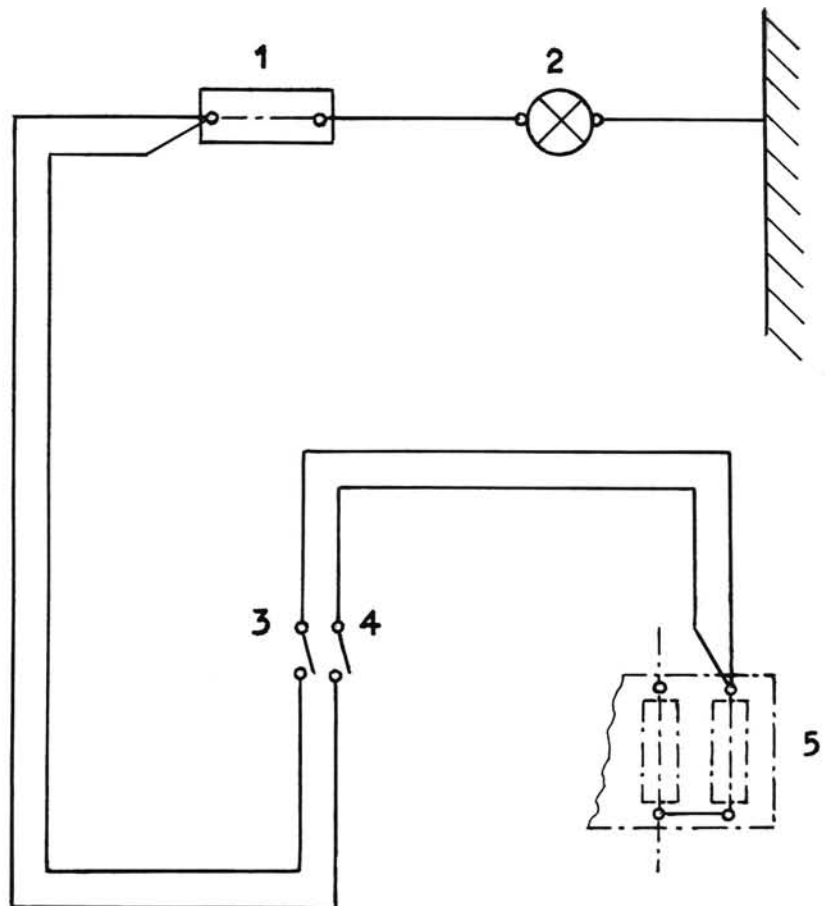
A**B****C**

Fig. 15/54-0/9

Additional Wiring Diagram (Driving school vehicle)

Explanation for Wiring Diagram of Ammeter and Electric operated Fuel Pump

Fig. 15/54-0/10

A. Additional wiring diagram for fuel pump

- 1 Indicator light red
- 2 On/off switch
- 3 Fuse
- 4 Cable connector
- 5 Magnetic valve
- 6 Cable connector
- 7 Additional fuel pump

B. Additional wiring diagram for Ammeter

- 1 Ammeter
- 2 Regulator switch
- 3 To generator
- 4 Starter
- 5 Fuel gauge
- 6 Oil pressure gauge
- 7 Cooling water thermometer
- 8 Speedometer

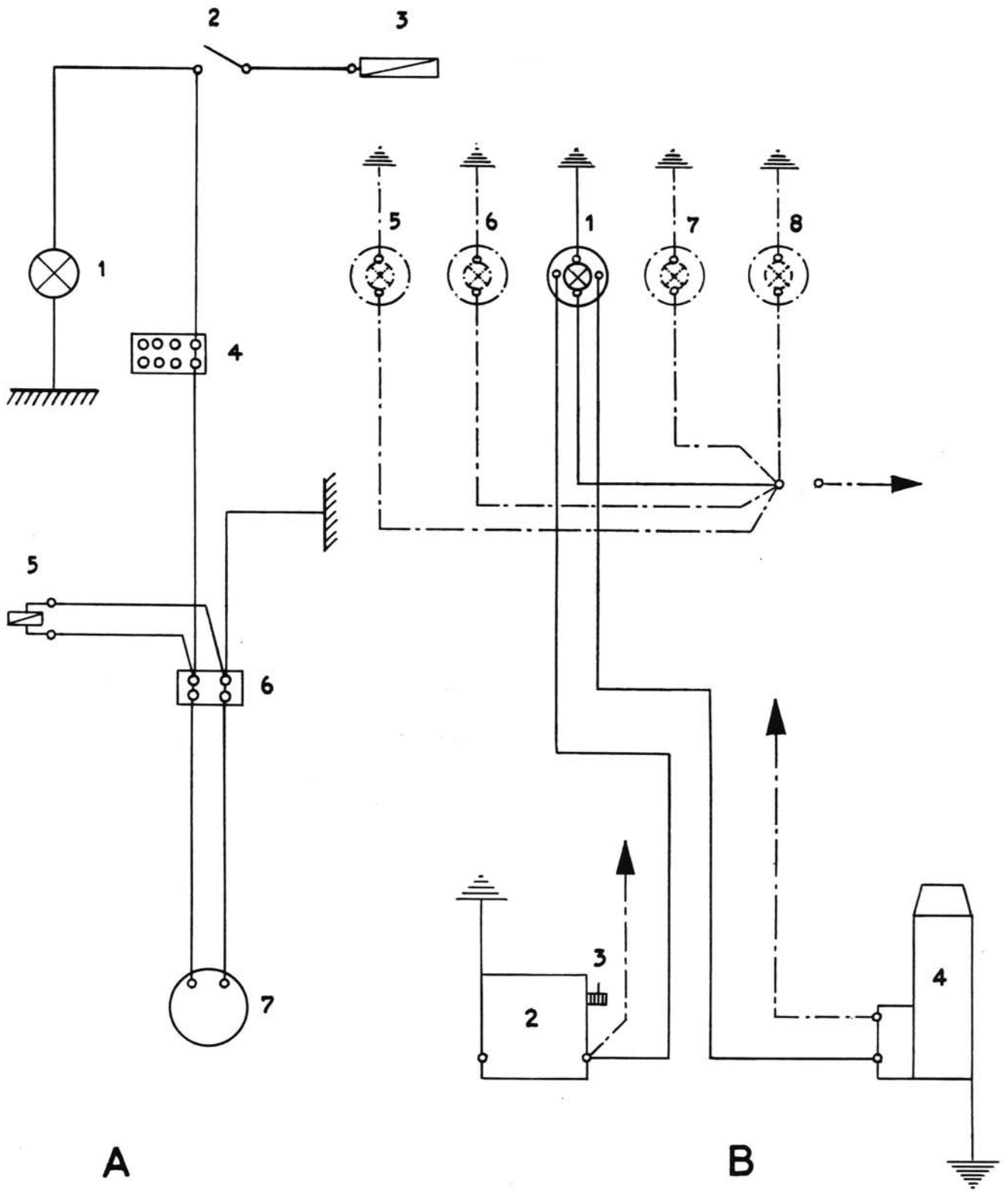


Fig. 15/54-0/10

Explanation for Additional Wiring Diagram (Connection of Wireless Equipment 24 V)

Fig. 15/54-0/11

- 1 Generator
- 2 Regulator switch
- 3 Cut-off relais for additional battery
- 4 Starter
- 5 Cable connector
- 6 Battery main switch
- 7 Battery 2×12 V 45 Ah
- 8 Cable connector on battery box
- 9 Battery 2×12 V 45 Ah
- A To indicator light
- B To driving switch (30) resp. switch box (30)
- C To electrical supply connection
- D To wireless equipment

—————

Special equipment

—•—•—•—•—

Standard equipment

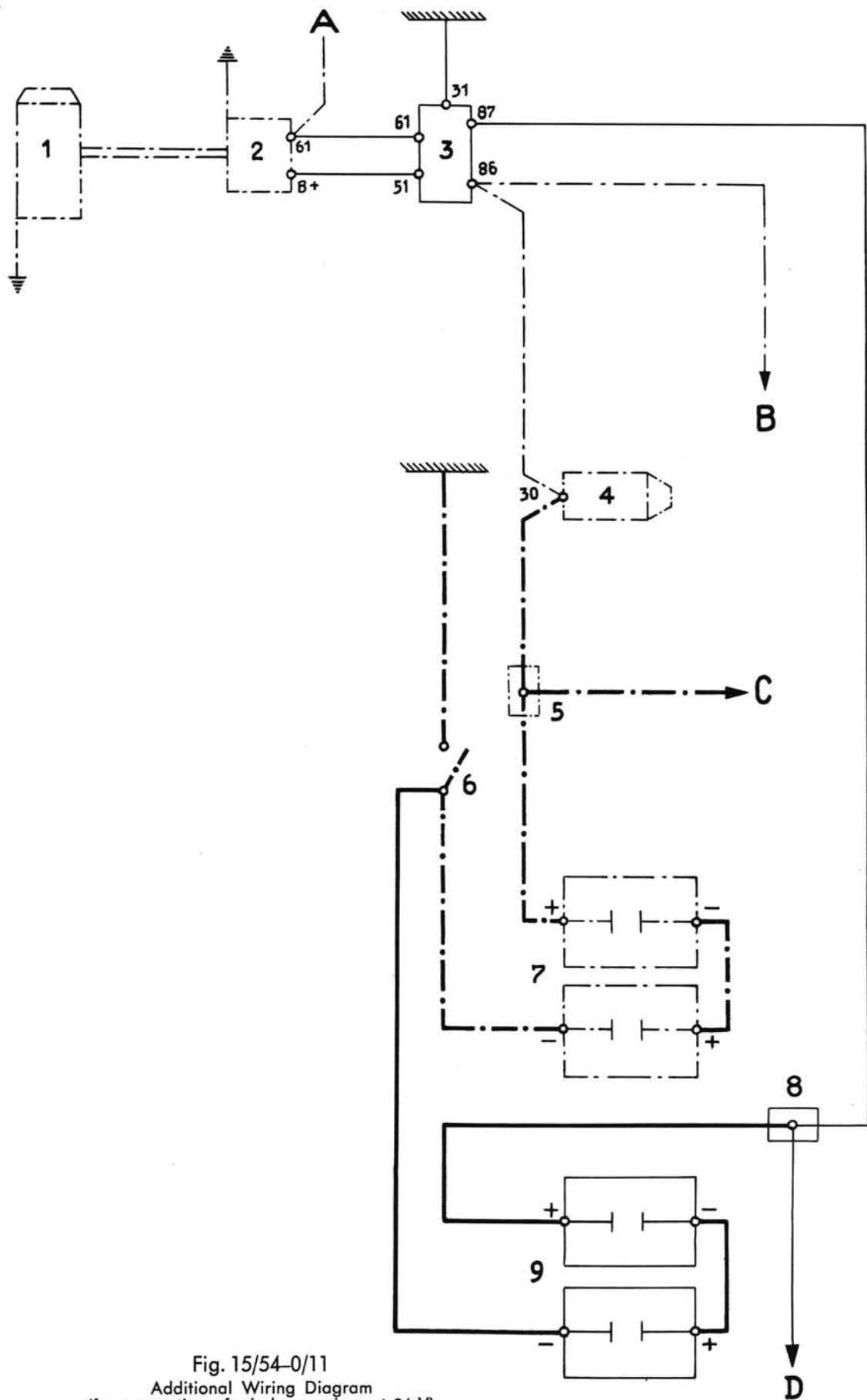


Fig. 15/54-0/11
 Additional Wiring Diagram
 (for connection of wireless equipment 24 V)

Explanation for Additional Wiring Diagram of Metz Body

Fig. 15/54-0/12

- A To terminal (49) on light switch
- B To terminal (30)
- C Single tone system
- D Two-tone system
- E Successive tone and beacon light
- F To pull stop switch for PTO pilot lamp
- I Electrical parts already installed by manufacturer
- II Electrical components in body
 - 1 Fuses
 - 2 Interference suppressor
 - 3 Sequence switch for horn
 - 4 City horn
 - 5 Interference suppressor
 - 6 Relais
 - 7 Switch
 - 8 Push button on steering wheel
 - 9 Continuous signal
 - 10 Indicator light
 - 11 Relais
 - 12 Socket
 - 13 Socket
 - 14 Cable connection
 - 15 Supertone horn (low tone)
 - 16 Supertone horn (high tone)
 - 17 Beacon light
 - 18 Operating hours counter
 - 19 Interior light
 - a) Pump room lamp
 - b) Lamp on water level gauge
 - c) High pressure reel compartment
 - d) Crew compartment
 - e) Hose compartment
 - 20 Identification lights on rear top of body
 - 21 Plug, 12-pole, with cable, on rear bottom of body

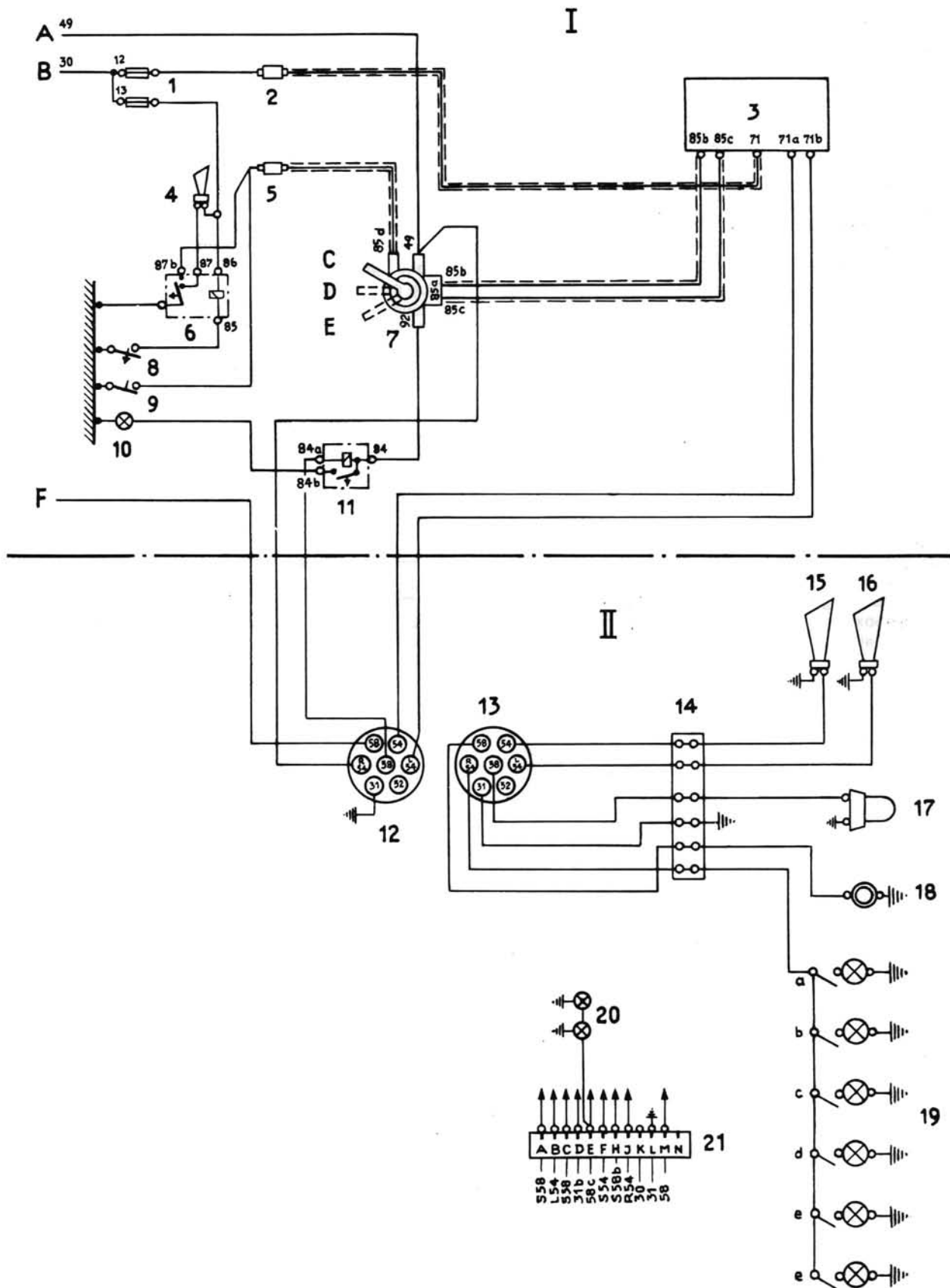


Fig. 15/54-0/12

Supplementary Wiring Diagram Metz Body

Tables

No.	Consumers	Amperage (A)
1	Socket 1-pole/warning flasher system	4/8
2	Tail light left	4
3	Tail light right	4
4	Flasher (blinker)	4
5	Horn and wiper	4
6	Brake light	4
7	High beam left	4
8	High beam right	4
9	Low beam right	4
10	Low beam left/fog light	4/8
11	Clearance light left	4
12	Clearance light right	4

Fuses acc. to DIN 72 581

Wiring Diagram Item	Consumers	Capacity at 24 V in Watts	Shape acc. to DIN 72 601
3a, 3b	Flasher (blinker) light front	21	RL
3a, 3b	Clearance light	4	HL
4a, 4b	Main headlight	45/40	A
4a, 4b	Parking light	4	HL
6a, 6b	Fog light	20	R
7	Indicating light supplementary fuel pump	2	H
9	Interior light	10	K
14	Indicating light for backup light	2	H
23	Tachometer light	2	H
24	Instrument cluster light	2	H
40a, 40b	Tail light rear	10	G
40a, 40b	Brake light	21	RL
41	Backup light	20	R

I. General

The starter is electrically actuated via the starter switch (push button) on instrument panel. Failure of the starter may be caused by faults in the electrical system or by the starter itself. In the first case, voltage losses from loose terminals and bad ground connections may be the reason. The permissible voltage drop in the starter lines should not exceed 4%.

The behaviour of the headlamps when switched on during the starting provides information on the condition of the battery and the starter.

- a) When all the lamps go out, bad connections on battery terminals, on cable connections of starter or on grounding connections may be the reason.
- b) When the lamps go out slowly, the fault is with the battery (badly charged, damaged or old).
- c) When the brightness of the lamps remains unchanged, the starter itself is at fault.

II. Removal and Installation

1. Disconnect main cutout switch or loosen positive cable of battery.
2. Loosen starter cable (30).
3. Loosen line on terminal (50).
4. Unscrew fastening screws of starter and remove starter.
5. For reinstallation proceed vice versa.



Fig. 15-1/1

- 1 Terminal 30
- 2 Terminal 50
- 3 Exciting current connection for starter motor

III. Partial Reconditioning

For test data, refer to Job No. 00-0, Table 28. With regard to Bosch Service, the data named already for generator, also apply to starter repairs. Repair descriptions comprise only the replacement of carbon brushes, springs and starter pinion.

1. Loosen collector cover and remove.
2. Loosen exciting current connection for starter motor.
3. Lift brush springs, pull up carbon brushes and support against springs.



Fig. 15-1/2

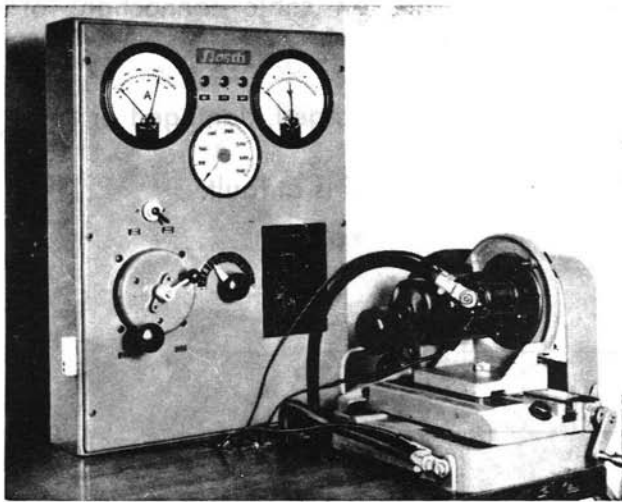


Fig. 15-1/3

4. Unscrew through-bolts and remove bearing cap including armature (identify).
5. For exchanging starter pinion, remove magnetic switch by releasing and removing the two upper countersunk screws and the lever bolt.
6. Uncotter castle nut of starter pinion, unscrew and remove locking ring.
7. Remove armature from front bearing housing.
8. Pull shift fork out in downward direction. This will release starter pinion (free wheel) which is then also removed.
9. Check collector and clean, polish with fine emery paper, clean grooves between collector plates (risk of short circuit).
10. Check starter pinion and renew, if required. Fig. 15-1/2.
11. Check brush springs and carbon brushes and replace, if required.
12. For reassembly proceed vice versa.
13. Check starter on starter test stand. Refer to Fig. 15-1/3.

I. General

The rated output of the generator is 200, 300, 400 or 600 Watts, depending on vehicle type designation. Continuous overloads up to 50 % are permitted.

In the event of generator trouble, it will be best to see a Bosch Service Station for repairs.

For this reason, only the following steps are described here.

II. Removal and Installation of Generator

1. Switch off main cutout or disconnect positive cable from battery.
2. Disconnect lines on generator (identify). On splashwater-protected systems, loosen screw connection and pull out cable assembly.
3. Loosen clamping fixture for generator and remove V-belt. Fig. 15-2/1.
4. Unscrew bottom fastening screws (pivot). Depending on type of generator, either a long or two short screws with spacing tube are used.
5. For reinstallation proceed vice versa.

Note: It will be of advantage to operate the generator for a short period as a motor prior to mounting V-belt. For this purpose, connect terminal 61 on regulator for a short moment with terminal 51. When the battery is correctly connected, the generator will rotate at motor speed and the direction of rotation and polarity of generator are then in order.

III. Partial Reconditioning of Generator

For test data, refer to Job No. 00-0, Table 29.

Disassemble and repair generator only when no Bosch Service is available.

1. Unscrew collector strap, remove and take off pulley.
2. Lift brush springs, pull up carbon brushes and position springs to support brushes.
3. Unscrew throughbolts for bearing cap and remove bearing cap on drive end including armature. (Identify installation position, if required.)

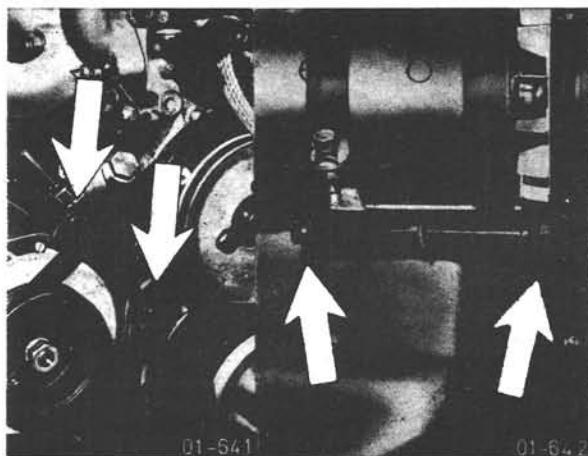


Fig. 15-2/1

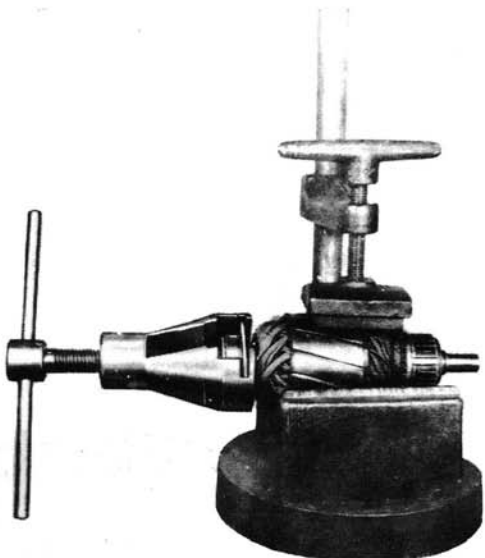


Fig. 15-2/2

4. Loosen fastening screw on cable guard of positive brush holder.
5. Remove bearing cap on collector end.
6. Check ball bearing by unscrewing the three screws in the bearing bracket. Pull off ball bearing.
Fig. 15-2/2.
7. Check collector and machine at minimum chip removal if worn and scored.

The insulation between the collector plates should be recessed in relation to the plates. If not, set back by sawing 0.6 mm by means of a collector saw. Clean collector.
8. Replace carbon brushes.

Carbon brushes should slide easily in brush holder. The pressure springs should force carbon brushes adequately against collector.
9. For reassembly of generator proceed vice versa.
10. Test generator on test stand or upon installation in vehicle.

I. General

The alternator supplies the required DC for the electrical system in vehicle by means of built-in silicon rectifiers (diodes in bridge position) for rectifying the AC. The operating voltage is regulated by means of a two-contact single-element regulator. The max. current is regulated by the alternator itself. The rectifiers are acting as return current switch. The alternator is preexcited by the battery, during operation the excitation proceeds via three built-in exciting diodes from three-phase winding in stator.

The alternator requires very little maintenance.

To avoid damage caused by negligence, the following instructions should be observed:

1 As long as the engine is running, do not remove neither the line terminals of the battery, the connections of the alternator, nor the plug of the regulator, since this may lead to the destruction of the diodes in alternator by inductive voltage peaks.

2 For the same reason, it is not permitted to tow-start the engine of the UNIMOG as long as the battery is not connected.

3 Pre-excitation is assured when the 2-Watts charging current warning light on instrument panel lights up.

4 Never mix-up the positive or negative line on alternator, regulator, starter or battery.

5 Be careful when using quick-charge units! When recharging the battery in UNIMOG with a quickcharge unit, remove battery terminals. **If, as an exception, the quick-charge unit also serves as a starting aid, during which the battery terminals are not removed, be sure to switch-off the quick-charging unit prior to disconnecting terminals.** Otherwise, the sudden load drop will result in voltage peaks which will destroy the diodes immediately.

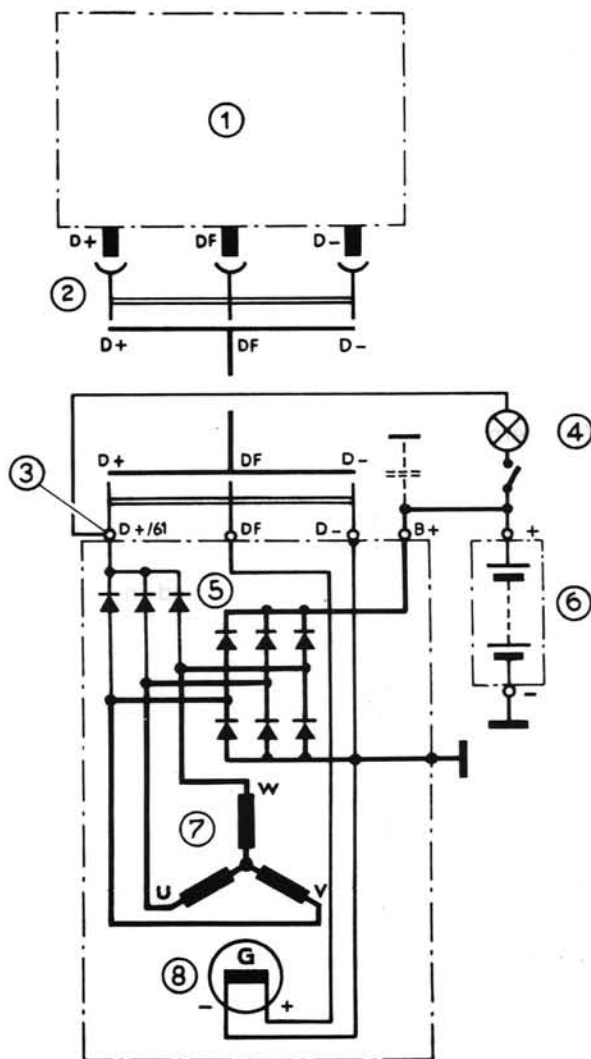


Fig. 15-2.1/2

15-2.1 Removal and Installation of Alternator on Model 404.0

Attention! On quick-charge units with separate main switch, set charging current first back to 0 A and then switch-off.

Poor contact between battery connection and battery terminal, as well as the wrong connection of a quick-charge unit or a supplementary battery may also result in destroying the diodes when used as a starting aid.

6 The regulator terminals or the alternator should never be shorted, and the positive cables should never be connected to ground.

7 Alternator trouble is generally indicated by a more or less bright lighting up of the charging control lamp. Accurate finding of the fault is only possible with the alternator removed and placed on a suitable test bench. On the other hand, the alternator with regulator can be checked in installed condition as follows:

a) Connect voltmeter to alternator D + and D -. With no consumer switched on, the regulating voltage for the various regulator types at an engine speed of approx. 1,500 rpm should amount to 13.9 to 14.8 Volts.

b) Switch-on consumers of approx. 200 W (headlights and wiper motor). At this load the regulating voltage should not be outside the specified value.

If the voltage is outside this value, stop the engine, pull-off regulator plug and repeat measurement with new regulator. If the regulating voltage is now within the specified value, install new regulator. If the regulating voltage is outside the specified value even with a new regulator, replace alternator.

Make sure of an ambient temperature of approx. 20° C or regulator and the battery charged to at least 60 %.

II. Removal and Installation

1 Disconnect battery.

2 Disconnect lines from alternator.

Note: Now, the cable shoe connection is replaced by a triple plug connection.

3 Unscrew set screw on alternator bracket and remove V-belt. Fig. 15-2.1/2.

4 Unscrew screw on support for alternator attachment and remove alternator.

5 For installation proceed vice versa. Connect cable.

6 Tension V-belt.

Note: Any repairs on alternator should be made by a Bosch Service Station only!

The bearings of the alternator require no special lubrication, since they are provided with a lasting grease charge. For this reason, they should never be cleaned with grease-dissolving cleaning agents.

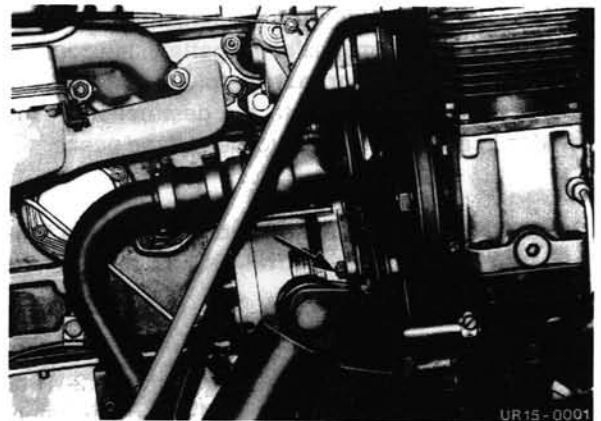


Fig. 15-2.1/2

Fastening screw for tensioning device

Replacement of Voltage Regulator

15-3

When the lamp lights up while driving, it is an indication that the generator is no longer charging. Repair cause immediately to prevent fast voltage drop in battery.

In most cases the fault is with the voltage regulator. But since the regulator should be opened and repaired only by a Bosch Service Station, the regulator must be replaced.

1. Engage main cutout or disconnect positive cables from battery.
2. On voltage regulator, disconnect cables of terminals 51 and 62 as well as of DF, D1 and B.
3. Unscrew voltage regulator.
4. For installation proceed vice versa. Be sure that the regulator is not distorted when screwed down.

loosen screw connection and pull out cable assembly.

Note: In splashwater-protected system,

For test data refer to Job No. 00-0, Table 30.

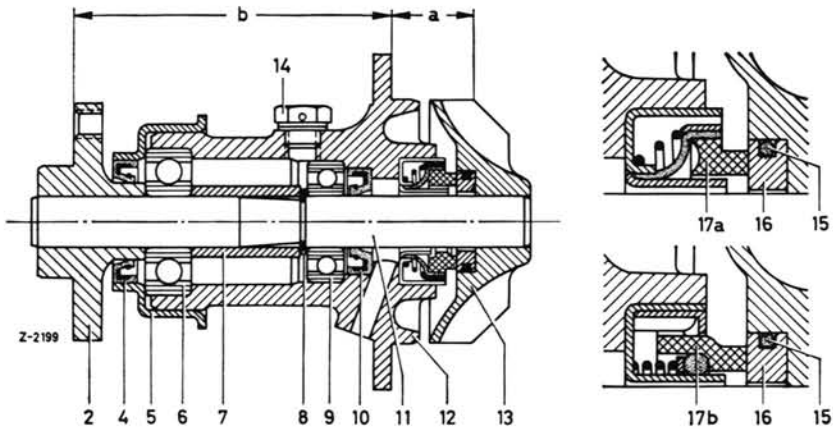


Fig. 20-0/1 (Coolant pump old version)

- | | | |
|-----------------------|-----------------------|----------------------------|
| 2 Hub | 8 Locking ring | 13 Impeller |
| 4 Sealing ring | 9 Radial ball bearing | 14 Oil filler-closing plug |
| 5 Sealing ring holder | 10 Sealing ring | 15 Round rubber ring |
| 6 Radial ball bearing | 11 Coolant pump shaft | 16 Counter ring |
| 7 Spacing sleeve | 12 Bearing housing | 17a Slide ring seal |
| | | 17b Optional version |

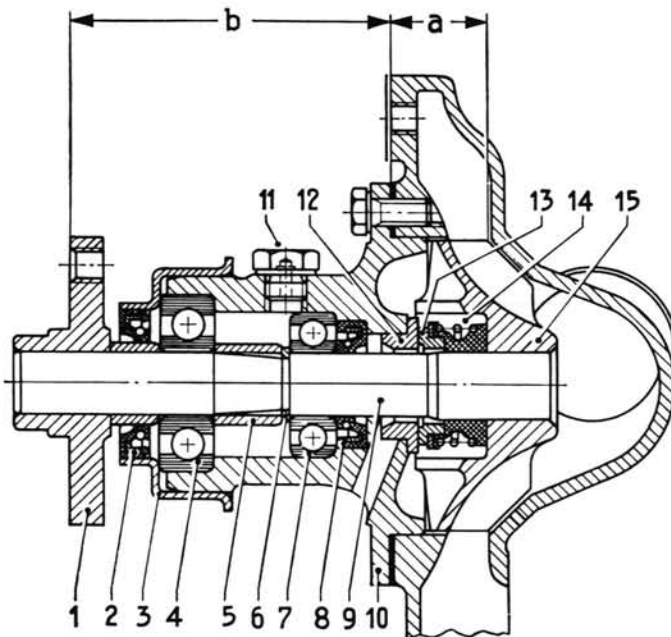


Fig. 20-0/2 (Coolant pump new version)

- | | | |
|-----------------------|-----------------------|---|
| 1 Hub | 6 Locking ring | 11 Oil filler-closing plug with vent bore |
| 2 Sealing ring | 7 Radial ball bearing | 12 Wear bushing |
| 3 Sealing ring holder | 8 Sealing ring | 13 Slide ring seal |
| 4 Radial ball bearing | 9 Coolant pump shaft | 14 Compression spring |
| 5 Spacing sleeve | 10 Bearing housing | 15 Impeller |

Reference dimension for above water pump: Dimension a = 22.8 to 23.2 mm

Dimension b = 75.4 to 75.6 mm

20-0 Coolant Pump General

Pulley Reduction Ratios:

From crankshaft to:	Coolant pump	Generator	Air compressor	Fan	Speed limiter	Remarks
Standard version	1 : 0.7	1 : 1	1 : 0.427	1 : 0.755	1 : 1	
Low reduction	1 : 0.7	1 : 1	1 : 0.427	1 : 0.66	1 : 1	For Nordic countries
KTA and tropic reduction	1 : 0.925	1 : 1	1 : 0.427	1 : 0.866	1 : 1	
Tropic reduction and high fan reduction	1 : 0.925	1 : 1	1 : 0.427	1 : 1	1 : 1	

Engine Cooling:

Designation	Dimensions
Parallel distance of fan from radiator block	17 + 2.0 mm – 2.5 mm
Distance from housing flange coolant pump to flange end fan	75.6 – 0.2 mm
Distance housing flange coolant pump to chamfer impeller	23 ± 0.2 mm
V-belt tension crankshaft, generator, coolant pump	approx. 5 – 10 mm
V-belt tension, coolant pump, fan	approx. 10 – 15 mm
V-belt tension, crankshaft, air compressor	approx. 5 – 10 mm
V-belt tension, generator speed limiter	up to 5 mm

Coolant Regulator

For normal cooling system:

Wahler K/2 (fluid thermostat)

For larger cooling system:

Behr-Thomson X 2.014 (wax thermostat)

Sealing the Water Pump

If traces of water are showing up near the water pump or if the level of the cooling fluid drops, first check whether with the engine at operating temperature and the cooling screw plug closed (cooling fluid circuit operates under pressure), leak losses occur at hose connections. Check water pump for leaks only when the above assumption can be reliably excluded.

Check in four directions:

1 External leaks.

- a) Damaged seals at connection to crankcase.
- b) Damaged gasket between pump and bearing housing.
In each case, replace the respective, damaged seal or gasket.
Refer to Fig. 20-0/3.

2 Internal leaks on pump.

- a) Seal fluid circuit.
- b) Gasket oil filler hole.
In the first case, fluid will come out of provided opening in bearing housing. In the second case, oil traces will show up at opening of bearing housing. In each case, exchange pump.

3 Forcible damage.

- a) On pump housing.
- b) On bearing housing.
This kind of damage, caused by external influences (knocks, blows, impacts), can be repaired by exchanging the damaged parts.

4 Mechanical damage.

- a) Abnormal noises.
- b) Seized pump shaft.
In this case, exchange pump.



Fig. 20-0/3

- 1 Open engine hood.
- 2 Partially (approx. 10–12 lits.) drain coolant and catch (anti-freeze).
- 3 Remove fan V-belt.
- 4 Remove generator V-belt.
- 5 Remove coolant supply line.
Fig. 20–1/1.

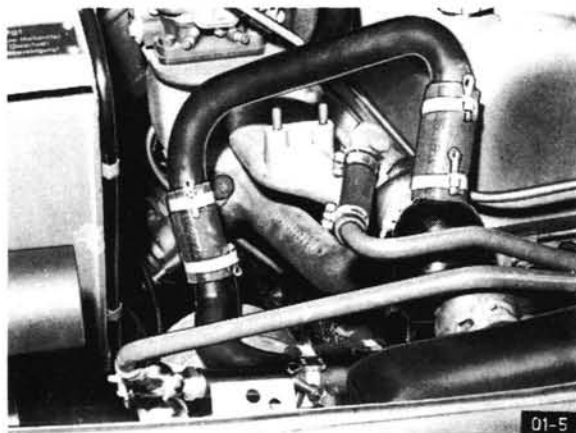


Fig. 20–1/1

Note: On vehicles with bypass thermostat, additionally remove bypass line on connection of coolant pump (installed up to chassis end No. 020 808). Fig. 20–1/2.

- 6 Remove venting line between coolant pump and cylinder head.
- 7 Remove coolant pump.

Note: Watch out for screw connection for bypass thermostat connection. Installed up to chassis end No. 020 807 (on vehicles **without** engine and battery preheating system). Fig. 20–1/3.

On vehicles starting with chassis end No. 020 808, exchange screw connection for 1 closing plug AM 16 x 1.5 DIN 7604 and 1 sealing ring A 16 x 20 DIN 7603–A1.



Fig. 20–1/2

- 8 For reinstallation proceed vice versa.

Installation Note: Clean sealing surface for coolant input into crankcase. Use only new seals, gaskets and sealing rings.

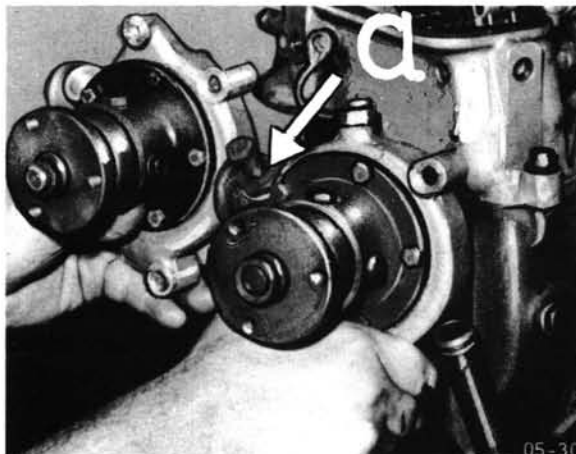


Fig. 20–1/3

a up to chassis end No. 020 807

Clutch Pressure Plate

Manufacturer	Fichtel & Sachs	
Designation	KS 225 Sph	
Adjusting dimension "a" new	31 (± 0.2 at pressure level)	
Adjusting dimension "a" worn	up to 43 mm	
Thickness of pressure plate when new	17.5 mm	
Regrinding allowance	1.00 mm	
Perm. unbalance of clutch	20 cmg	
Total spring pressure	650 kp $\begin{matrix} + 25 \\ - 40 \end{matrix}$	
Reference dimension for adjusting device "b"	23.7 ± 0.01	
Throwout force at 10 mm throwout path	160–190 kp	
Throwout force (pedal force)	10–15 kp	

Clutch Springs

Number of springs	9 (6 white and 3 yellow)	
OD of springs	white 29.1 mm	yellow 28.6 mm
Wire dia.	4.6 mm	4.1 mm
Length unloaded	50–2 mm	55.5–2 mm
Length loaded	37.2 mm	37.2 mm
Spring force	75.0 + 5 kp	61.5 ± 2.5 kp

25-0 General Data, Adjusting Dimensions and Tolerances

Driven Plate

The clutch driven plate serves the purpose of establishing a positive connection between the engine and the transmission. To dampen the torsional vibrations of the crankshaft occurring in critical speed range, the driven plate permits a given distortion between facing and hub. The respective torque is transmitted by the torsion springs, while a damping element consisting of friction plates serves for fast damping of the respective vibrations.

Manufacturer		Fichtel & Sachs
Designation		F + S 225 B/Z
Thickness of driven plate (incl. clutch facing) (dimension "c")		unloaded 9.8 + 0.3 mm loaded 9.3 + 0.3 mm
Thickness of facing (grade Rusco-Beral 1838 B)		2 x 3.5 mm
Perm. wear		1.5 mm each side
Perm. unbalance		5 cmg
Perm. lateral runout		0.5 mm
Torsion damping	Striking torque (damping)	16 mkp
	Striking angle	5° 15'
	Friction torque	1.5–2.0 mkp

Pressure Plate

Engine type designation	180.958
Chassis model designation	404.010/011
MB Part No.	000 250 20 04
Fichtel und Sachs designation	KS 225 Sph
Contact pressure kp	610–675
Max. perm. unbalance pcm	10
Throwout path on thrust ring mm	10 + 2
Path of thrust ring through permissible wear of driven plate mm	12
Reference dimension "a" Fig. 25–3/1	with new driven plate mm with max. worn driven plate mm
	31 ± 0.2
	43

Intermediate Ring

OD mm	270 – 0.1
ID mm	234 + 0.1
Thickness dimension b Fig. 25–3/1	33 ± 0.1

Driven Plate

Engine type designation	180.958
Chassis model designation	404.010/011
MB Part No.	000 250 15 03
Fichtel und Sachs designation	225 B/Z
Thickness of driven plate in mm, dimension c, Fig. 25–3/1	free of pressure under pressure of 480 kp
	10.6 + 0.3
	9.3 ± 0.3
Perm. wear on facings each side in mm	1.5
Perm. unbalance of driven plate pcm	10
Perm. lateral runout in mm	0.5

25-0.1 General Data, Adjusting Dimensions and Tolerances

Pressure Plate

Engine type designation			130.925
Chassis model designation			404.012/013
MB Part No.			001 250 54 04
Fichtel und Sachs designation			KS 225 Sph reinf.
Contact pressure kp			660–700
Max. perm. unbalance pcm			10
Throwout path on thrust ring mm			10 + 2
Path of thrust ring through permissible wear of driven plate mm			12
Reference dimension "a" Fig. 25–3/1	with new driven plate	mm	31 ± 0.4
	with max. worn driven plate	mm	43

Intermediate Ring

OD mm	270 – 0.1
ID mm	234 + 0.1
Thickness dimension "b" Fig. 25–3/1	33 ± 0.1

Driven Plate

Engine type designation			130.925
Chassis model designation			404.012/013
MB Part No.			001 250 93 03
Fichtel und Sachs designation			225 B/Z
Thickness of driven plate in mm, dimension c, Fig. 25–3/1	free of pressure		10.6 + 0.3
	under pressure 480 kp		9.3 ± 0.3
Perm. wear on facings each side in mm			1.5
Perm. unbalance of driven plate pcm			10
Perm. lateral runout in mm			0.5

Removal and Installation of Clutch Replacement of Driven Plate

25-1

1. Secure vehicle against rolling off.

2. Turn battery main switch to "off".
Fig. 25-1/1.

3. Fold top toward the rear.

4. Remove windshield.

Note: Disconnect electric line for windshield wiper in engine compartment and pull out of body.

5. Drain and collect cooling water.

6. Disconnect doors.

Note: On chassis with short range shielding, disconnect ground straps first.

7. Remove engine panelling and floor plates above clutch housing and transmission.

8. Remove throttle linkage from accelerator pedal and carburetor.

Note: On vehicles with speed governor, remove governor together with linkage.

9. Loosen bowden wire for hand throttle on bearing bracket, loosen foot throttle and remove bearing bracket.

10. Remove starter cable control from instrument panel.

11. Unscrew oil pressure control line from engine.

12. Unscrew oil filter housing bottom.

13. Remove electric cables from ignition coil, distributor, generator and starter.

14. Remove starter. Fig. 25-1/2.

15. Remove front engine hood. Loosen ground strap first and remove supply line for windshield washer. Fig. 25-1/3.

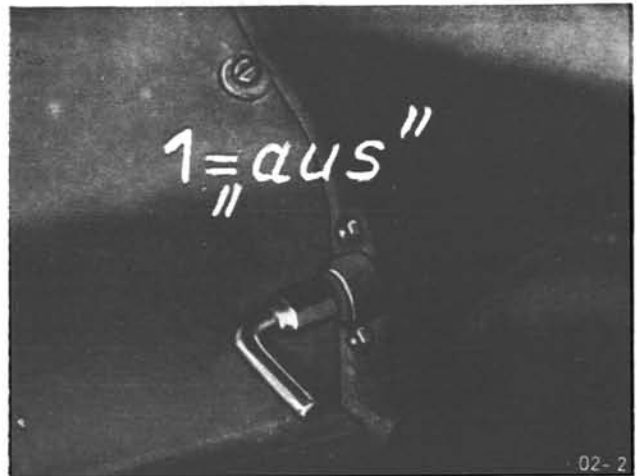


Fig. 25-1/1

1 off

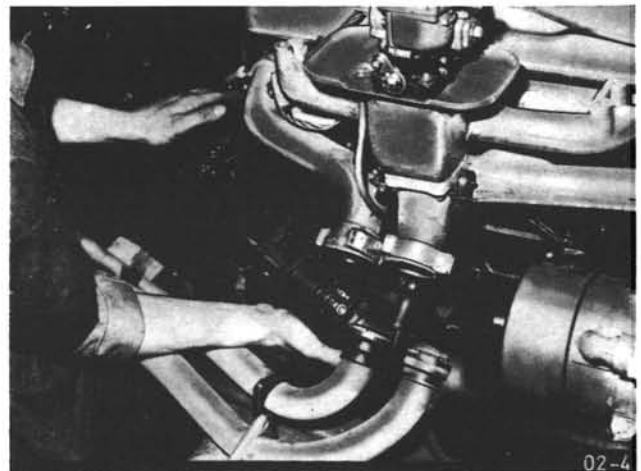


Fig. 25-1/2

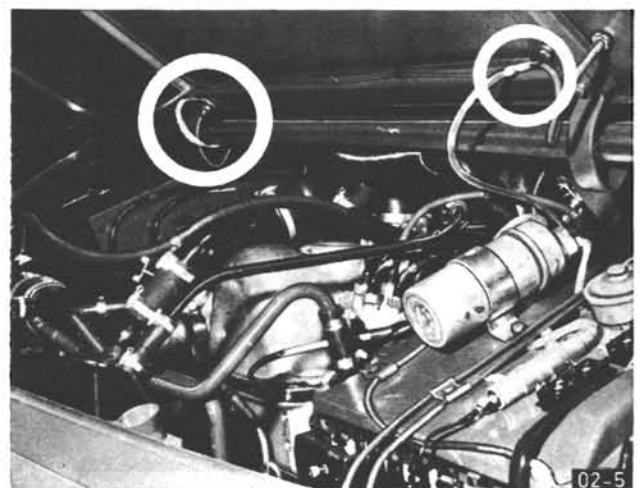


Fig. 25-1/3

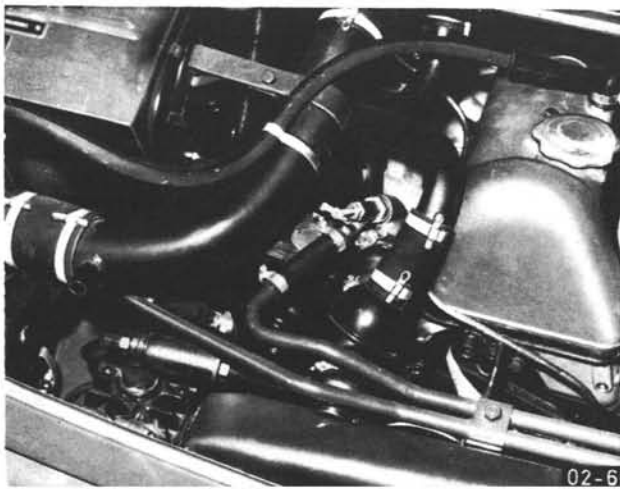


Fig. 25-1/4

16. Remove intake pipe with connection cap on carburetor and air filter.

Note: Remove rubber tube for engine venting system. Fig. 25-1/4.

17. Loosen front engine mounting.
Fig. 25-1/5.

18. Remove radiator.

19. Remove fan.

Note: Watch intermediate ring on vehicles with built-in preheater system or enlarged radiator.

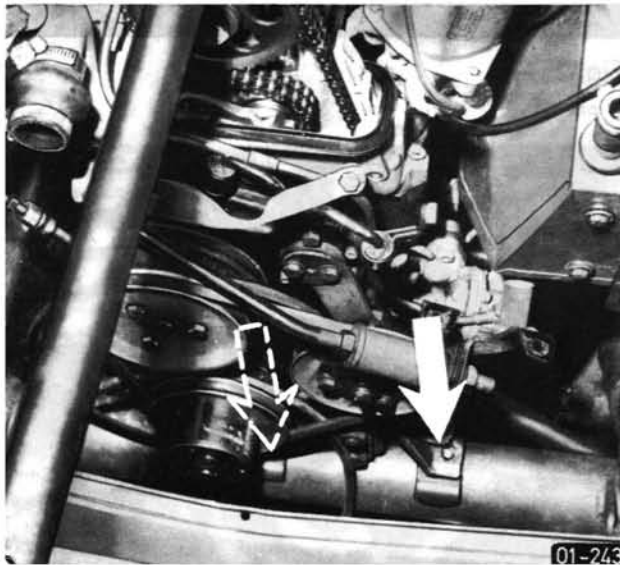


Fig. 25-1/5

20. Remove air compressor (if installed).

a) Remove air compressor from frame.

b) Fold air compressor bracket inwards toward engine.

Fig. 25-1/6

21. Pull out heater hose above cylinder head cover on distributor and put aside.
Fig. 25-1/7.

22. Unscrew exhaust pipe on exhaust manifolds.



Fig. 25-1/6

- 1 Connection air compressor pressure line
- 2 Adjusting device for air compressor
- 3 Bottom bracket for air compressor

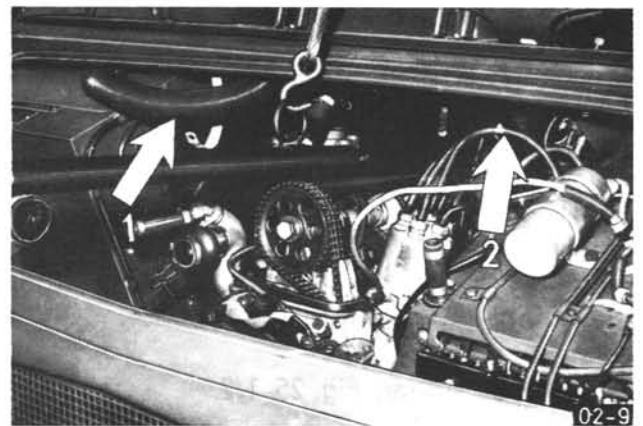


Fig. 25-1/7

23. Remove cylinder head cover.
24. Loosen speedometer drive shaft **with** miter gear from housing. Fig. 25-1/8.
25. Unscrew fuel delivery line to fuel pump on changeover valve. Fig. 25-1/9.
26. Screw special hoisting gear to engine, attach engine to hoist and pull. Place wooden supporting wedge in-between clutch housing cross member.

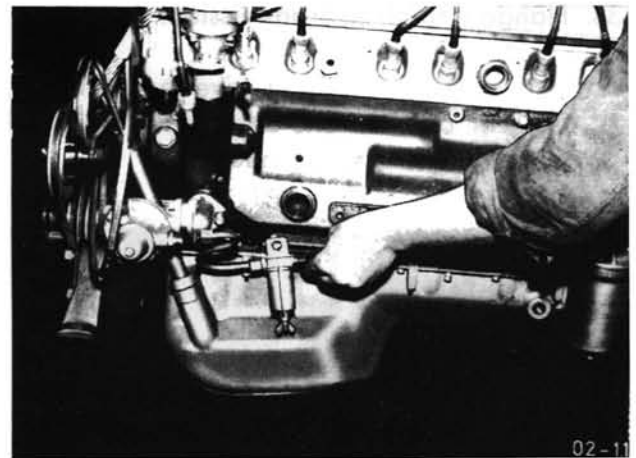


Fig. 25-1/9

27. Remove clutch cover plate at bottom of clutch housing.

28. Loosen connecting screws between clutch housing and engine.

Note: Do not forget struts. Fig. 25-1/12.

29. Push engine forward against ornamental grille of body by **careful** movements back and forth. Fig. 25-1/13.

30. Unscrew clutch.

31. Check grooved ball bearing in crankshaft.

32. During assembly, center clutch driven plate and throwout plate with centering arbor 401 589 13 61 00 in flywheel. First clean transmission drive shaft and coat with molycote.

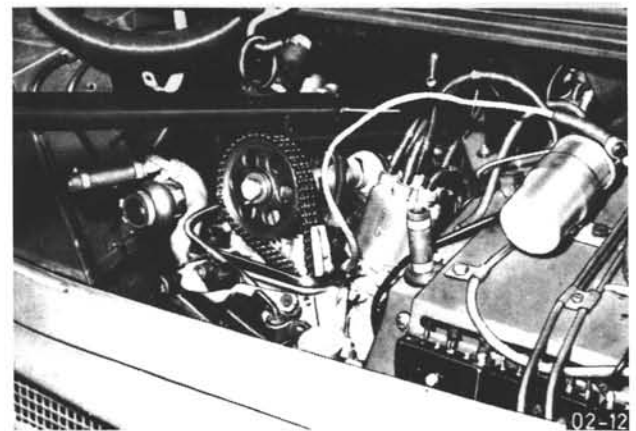


Fig. 25-1/10

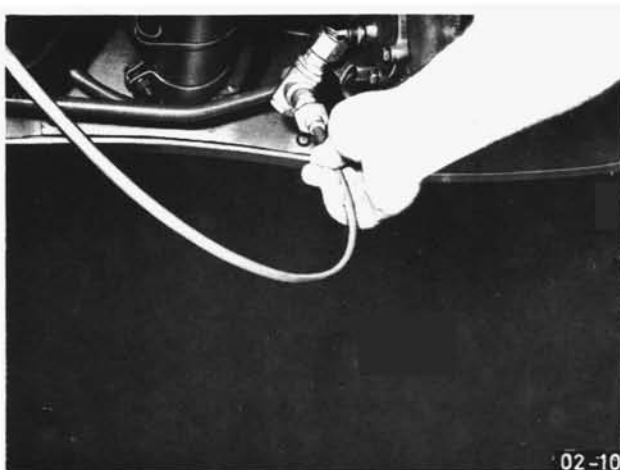


Fig. 25-1/8

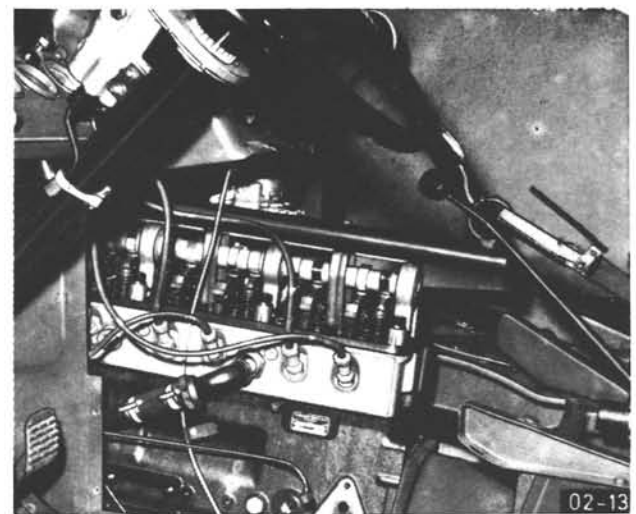


Fig. 25-1/11

33. Flange engine to transmission.

Note: For safe fitting of drive shaft splining, lift rear axle on one side and turn raised wheel with 6th gear engaged.

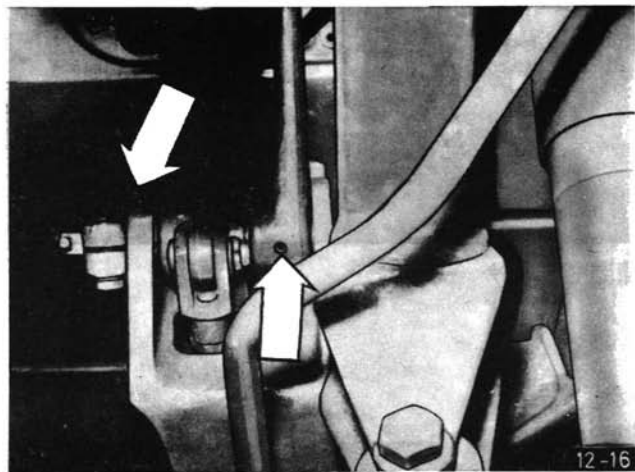


Fig. 25-1/12

34. For further assembly proceed vice versa.

Note: Adjust clutch play.

Fill up with cooling water. Check oil level in engine.

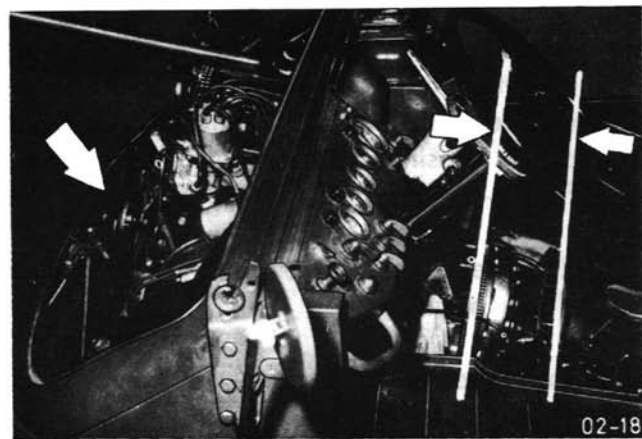


Fig. 25-1/13

Note: Adjust clutch play again after changing driven plate. New adjustments or readjustments are required at regular intervals as the result of normal wear of clutch lining, indicated by the reduction of the dead travel of the clutch pedal.

Note: The clutch play up to the beginning of the clutch pressure, measured on top edge of pedal plate, should cover a distance of at least 35 mm until the graphite slip ring makes contact with the throwout ring. The rest position of the clutch pedal is provided by a stop.

Fig. 25-2/1.

According to the latest knowledge, the true dead travel can be measured only when the engine is **running**, while the linkage is adjusted with the engine stopped. Then check again with the engine running.

Note: Remove cotter pin at rear or front end of clutch pull rod when making adjustments, loosen counter nut of fork head, change length of pull rod by turning rod as required, then attach again, apply counter nut and secure.

Fig. 25-2/2



Fig. 25-2/1

1 35 mm

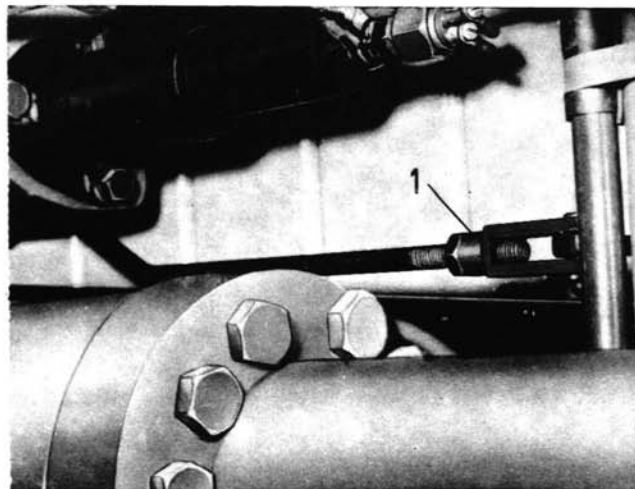


Fig. 25-2/2

1 Adjust here

Readjust clutch clearance following each removal and installation of single clutch or clutch slave cylinder. New adjustment or re-adjustment is required at certain intervals as the result of normal wear of clutch facing. These intervals depend on application of vehicle. The adjustment must be checked at the latest at intervals of 200 operating hours, since the clearance is reduced by wear. The more often the clutch is actuated, the more should this interval be reduced.

The clearance of the hydraulically operated clutch is adjusted on slave cylinder. The rest position of the clutch pedal is restricted by a stop.

- 1 Disconnect return spring on slave cylinder and clutch lever.
- 2 Push clutch lever upwards until adjusting screw and piston in slave cylinder are in stop position.
- 3 Measure distance from outer counter nut to clutch lever with slide gauge and record dimension.
- 4 Keep adjusting screw in this position. Then push clutch lever downwards until throwout bearing rests against throwout ring of clutch pressure plate.
- 5 Measure distance from outer counter nut to clutch pedal once again with slide gauge and record dimension.
- 6 Deduct measured dimension from position 5 and 3 from each other. The difference is the clutch clearance and should amount to $3 + 0.5$ mm.
- 7 If required, adjust clearance by means of adjusting screw. Fig. 25-2/3.

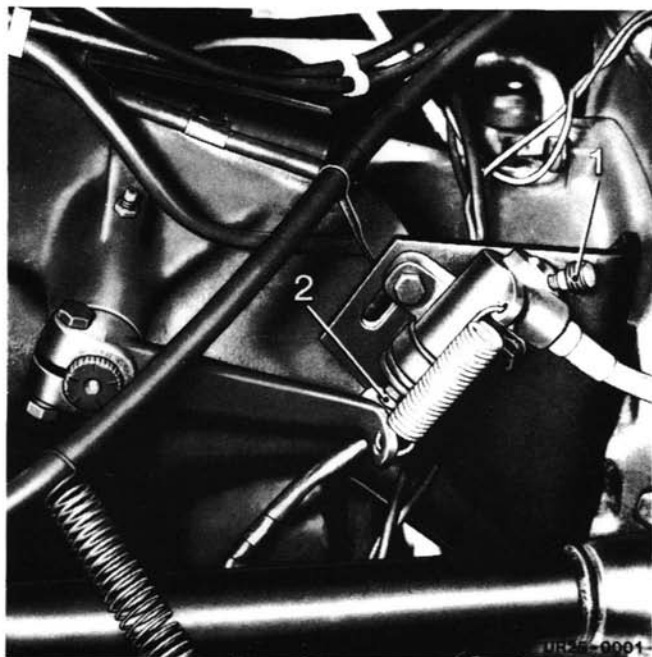


Fig. 25-2.1/1

Clutch slave cylinder on clutch housing

- 1 Venting screw
- 2 Adjusting screw with counter nut

- 8 Loosen counter nut of adjusting screw. Reduce clearance by screwing adjusting screw outwards or increase clearance by screwing inwards. Tighten counter nut.
- 9 Attach return spring to slave cylinder and clutch lever.

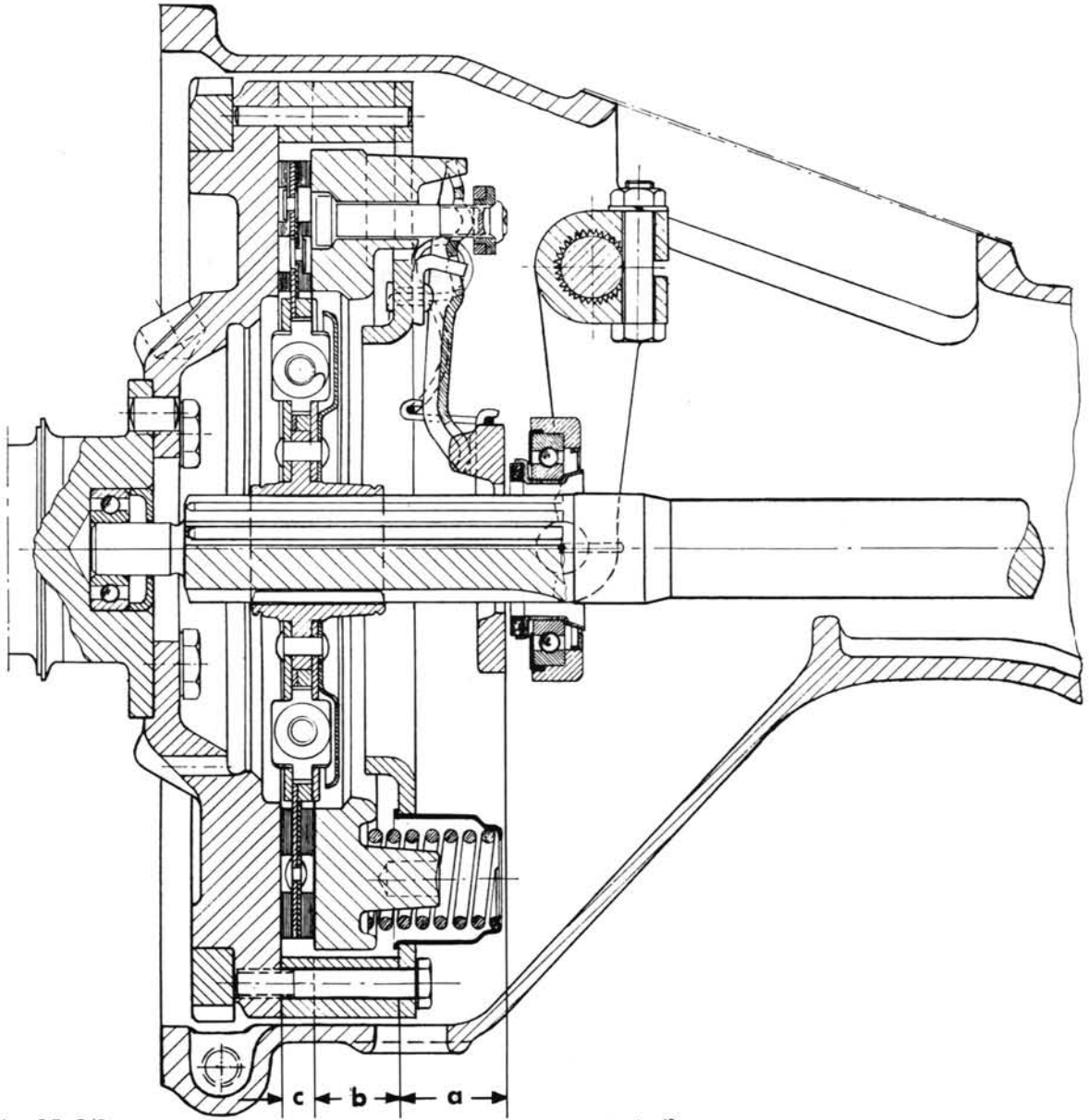


Fig. 25-3/1

a up to 43 mm
 b Reference dimension 23.7 ± 0.01 mm
 c $9.8 + 0.3$ mm (unpressed)

I. Disassembly and Inspection

1. Lift leg spring on throwout ring to release ring.
2. Unscrew adjusting nut (3 each).
3. Remove end plate from pressure plate, which will release springs and spring sleeve.
4. Clean all parts, check and replace worn parts.

5. If the face of the pressure plate shows score marks or burned spots or heat cracks, refinish on lathe or, even better, facegrind. Max. allowance for material removal on pressure plate is 1 mm.

II. Assembly

1. For reassembly proceed vice versa.
 2. Tighten adjusting nut until threads are flush.
- Note:** Always use new adjusting nuts for additional safety.

Adjustment of Clutch

1. Insert new clutch plate or, even better, an assembly ring of 9.3 mm thickness in flywheel.
2. Screw clutch to flywheel.
3. Adjust lever to adjusting dimension "a" by means of adjusting nut, refer to Fig. 25-3/1.

Note: After adjusting the three levers, check adjusting dimension once again in various diagonal directions.

4. Secure flange of adjusting nut on both sides by punch marks.
5. Remove clutch from flywheel after loosening fastening bolts crosswise.

The clutch system of the hydraulically operated clutch comprises the following components:

Clutch master cylinder with reservoir and venting screw.

Clutch slave cylinder with venting screw and adjusting screw.

Connecting line between clutch master and clutch slave cylinder.

Operation of Clutch System:

When the clutch pedal is depressed, the piston rod on pedal presses against piston in master cylinder. The pressure established by means of the brake fluid travels through the connecting line in the direction of the slave cylinder and forces the piston with the adjusting screw against the clutch lever which disengages the clutch.

A Removal and Installation

- 1 Disconnect return spring on slave cylinder and clutch lever.
- 2 Loosen fastening screws of slave cylinder on console and remove with nuts and snap rings.
- 3 If required, remove console for slave cylinder.
- 4 Remove hose from slave cylinder to line on frame and line, as well as fastening clip with shim and rubber insert from frame.
- 5 Remove hose clip and hose from line toward master cylinder.
- 6 Remove line from master cylinder.

Note: First, place vessel for flowing-out brake fluid in position.

- 7 Loosen fastening screws of master cylinder on console for clutch pedal in cab and remove together with nuts and snap rings.
- 8 For installation proceed vice versa.
- 9 Check all lines and connections for leaks. Replace parts, if required.
- 10 Adjust clutch clearance.
- 11 Vent clutch system.

B Venting

Venting is effected by means of venting screws on master and slave cylinder. The master cylinder must be vented **first**.

- 1 Open reservoir screw connection on master cylinder and add brake fluid up to max. mark, if required.
- 2 Remove dust cap from venting screw of slave cylinder.
- 3 Slip venting hose over screw and insert other end of hose into a glass vessel filled up to half with brake fluid.
- 4 Unscrew venting screw by one or two threads, step down quickly and jerk-like on clutch pedal, but let pedal return slowly. Any enclosed air will escape through venting hose.
- 5 Keep repeating venting operation until no more air bubbles are showing up.
- 6 When stepping down for the last time, keep clutch pedal in its low position until the venting screw is again tightened well.
- 7 Remove venting hose. Place dust cap on venting screw.
- 8 Add brake fluid up to max. mark, if required.

I. General

- 1 Shift lever for reverse
- 2 Transmission cover
- 3 Oil dipstick
- 4 Output gear, gear wheel VI
- 5 Main shaft
- 6 Gear wheel I and III
- 7 Countershaft
- 8 Shift gear (reverse)
- 9 Closing plug
- 10 Front axle output gear
- 11 Output shaft
- 12 Shift fork
- 13 Bearing bolt (intermediate gear)
- 14 Intermediate gear
- 15 Closing cover
- 16 Transmission housing
- 17 Shift crank for front wheel drive
- 18 Main shift lever
- 19 Tapered roller bearing
- 20 Gear wheel III (main shaft)
- 21 Rear axle drive
- 22 Bearing flange
- 23 Radial ball bearing
- 24 Shifting sleeve
- 25 Cover
- 26 Sealing ring

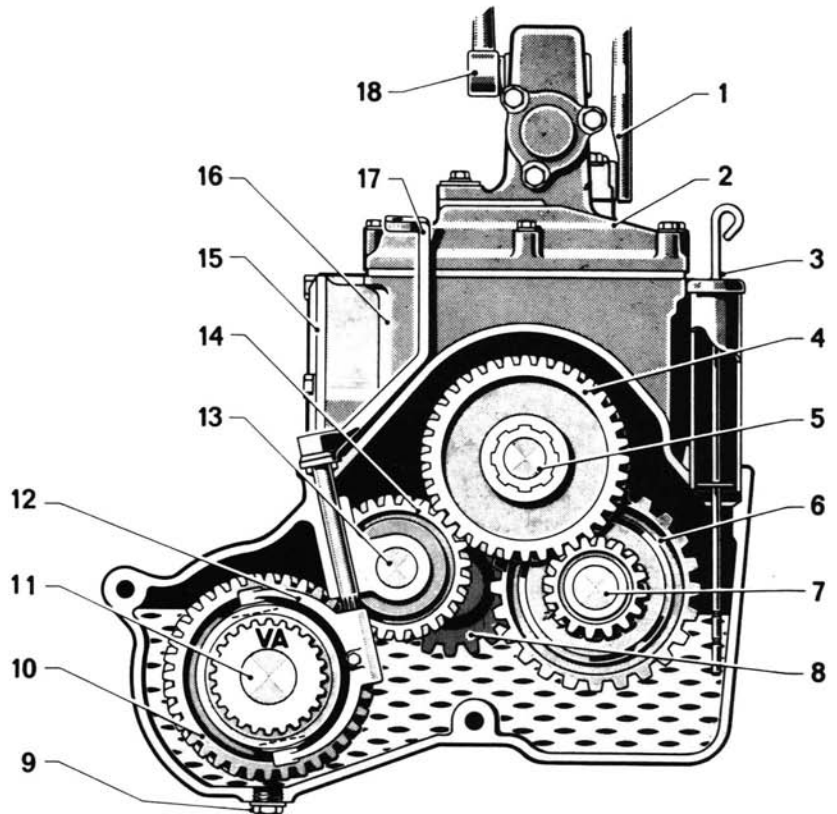


Fig. 26-0/1 Cross section

- 27 Front axle drive shaft
- 28 Drive gear for special pto
- 29 Shaft for prestage
- 30 Sliding sleeve
- 31 Gear wheel IV (main shaft)
- 32 Gear wheel reverse
- 33 Cover for prestage
- 34 Shifting sleeve
- 35 Synchronizing ring
- 36 Transmission input shaft
- 37 Gear wheel (reverse)
- 38 Gear wheel V (countershaft)
- 39 Tachometer drive
- 40 Gear wheel II and IV

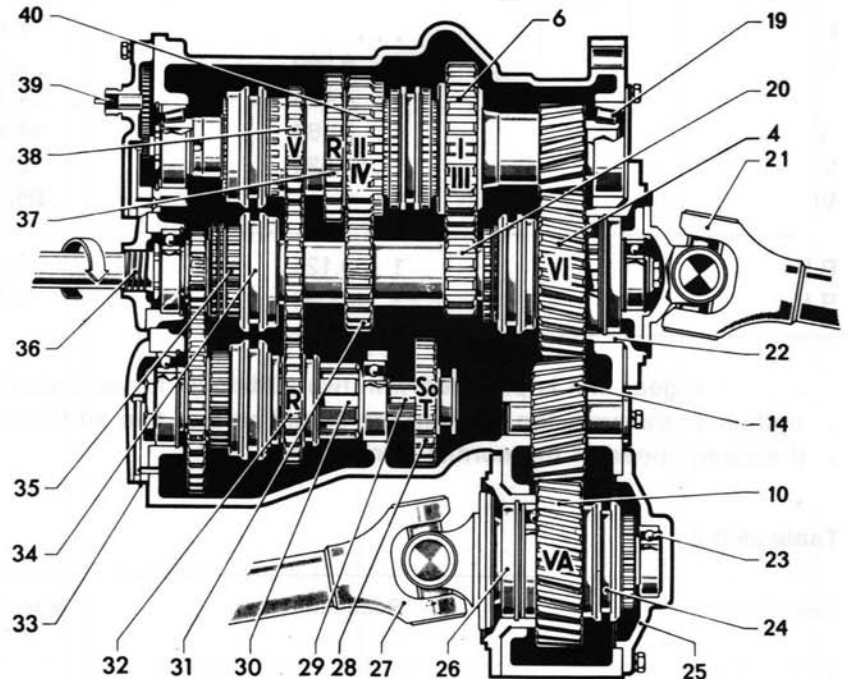
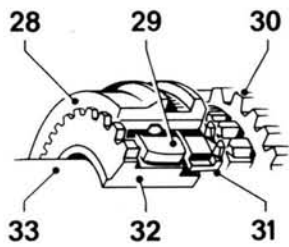
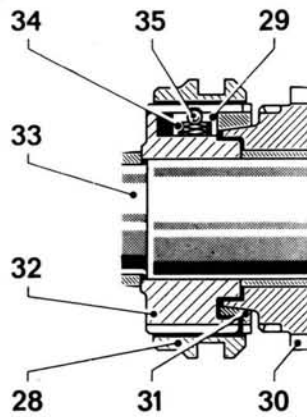


Fig. 26-0/2 Longitudinal section



Synchronization

Fig. 26-0/3



- 28 Shifting sleeve
- 29 Driver
- 30 Gear wheel
- 31 Synchronizing ring
- 32 Drive ring
- 33 Shaft
- 34 Spring cup
- 35 Steel ball

These vehicles are provided with a transmission in which all gear steps are fully synchronized (synchromesh), that is, a special device in transmission serves for smooth and positive meshing of gear wheels by means of pertinent couplings. The shifting itself is done by means of shifting sleeves, so that all gear wheels are always in mesh.

Table 26-0/1

Gear steps	Reduction	Max. speed km/h	Gear pairs in constant mesh
I	1 : 14.931	7.13	4
II	1 : 8.232	13.28	4
III	1 : 4.473	24.474	2
IV	1 : 2.466	44.40	2
V	1 : 1.525	72.03	2
VI	1 : 1	95.00	0
R I	1 : 20.124	5.44	5
R II	1 : 11.096	9.87	5

The crawler gear unit is provided with two additional forward speeds, for which the crawler gears attached to bottom of transmission housing are added so that two additional crawler speeds are obtained via first and second speed of the normal transmission.

Table 26-0/2

Gear steps	Reduction	Max. speed km/h	Gear pairs in constant mesh
Crawler speed I	1 : 46.01	2.88	8
Crawler speed II	1 : 25.343	4.30	8

In addition to versatile knowledge and experience, expert reconditioning of transmission also requires the special tools provided by us, as well as pertinent measuring devices for gear wheels, ball and roller bearings. If this type of equipment is not available, repairs should be made in emergencies only. For all other cases, complete exchange transmissions are available.

II. Power flow in various gears of the main transmission

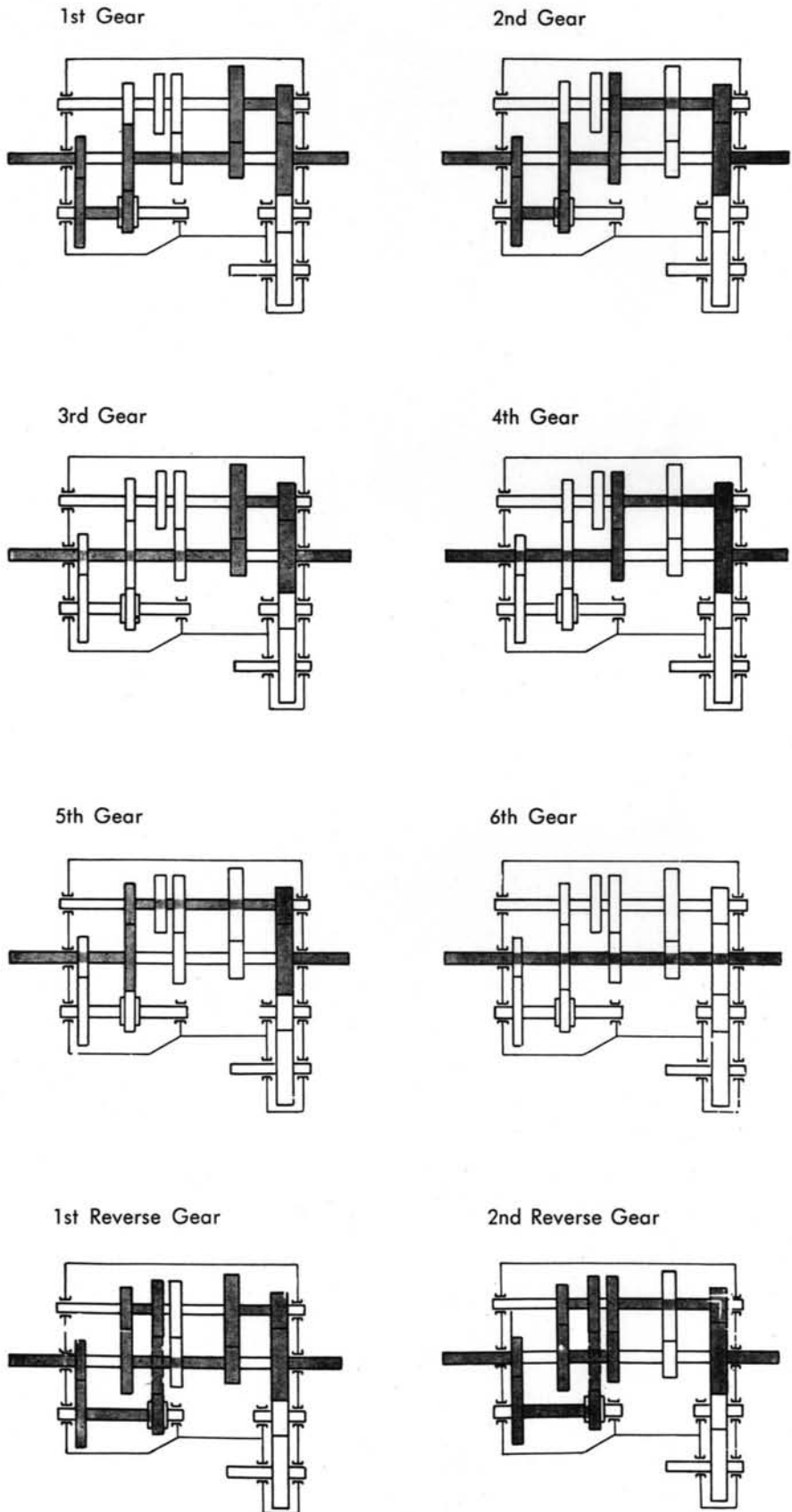


Fig. 26-0/4

(including engine)

Refer to removal and installation of engine without transmission, Job No. 00-2/1, Item 1 to 13, then:

1. Remove front axle. Refer to Job No. 33-1.
2. Remove axle drive shaft. Fig. 26-1/1.
3. Place assembly stand under front frame end, lower frame, remove hoist.
4. Unscrew speedometer coil from transmission.
5. Separate electric cables for fuelling unit. (Fig. 26-1/2.)

Note: Use 2 line connectors for assembly.

6. Unscrew fuel lines from tanks to fuel valve.
7. Attach crank assembly block with special hoisting equipment to hoist and apply slight tension. Fig. 26-1/3 and 26-1/4.

Note: If no special hoisting equipment is available, loop chain or wire ropes around crank assembly block. Protect sensitive spots by means of wooden bores.

8. Loosen transmission on rear crank assembly bearings.

Note: Observe thickness of washer!

As from Chassis

No. 404 114 01 71 77 (Transmission No. 01 71 73) the transmission housing is attached to supporting tube by means of 3 continuous bolts M 16 × 1.5 × 75, 90, 110 long, 3 circlips B 16, 3 hexagon bolts M 16 × 1.5.

Note: During installation, align rear crank assembly bearing by pertinent washers in such a manner that the front crank assembly bearing is in alignment with fastening holes. (Only for transmissions with blind holes on crank assembly mountings.)

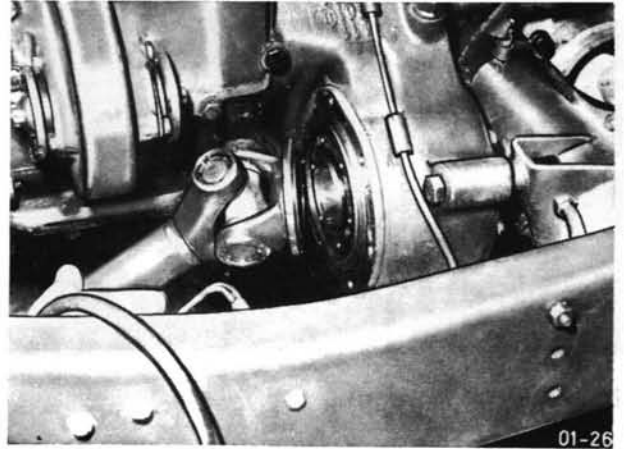


Fig. 26-1/1

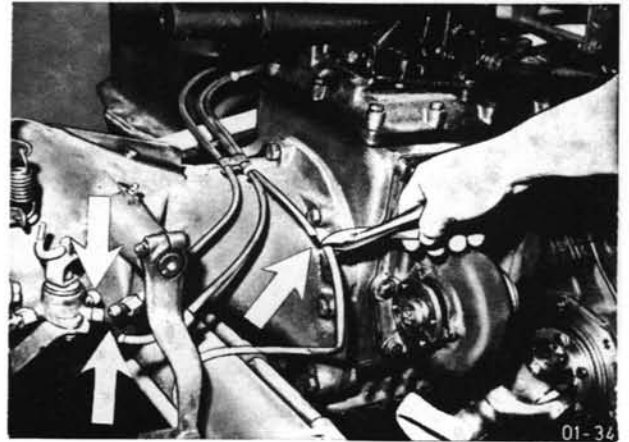


Fig. 26-1/2

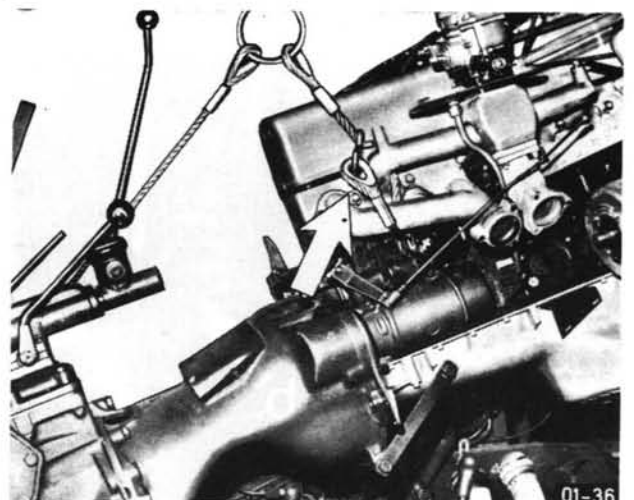


Fig. 26-1/3

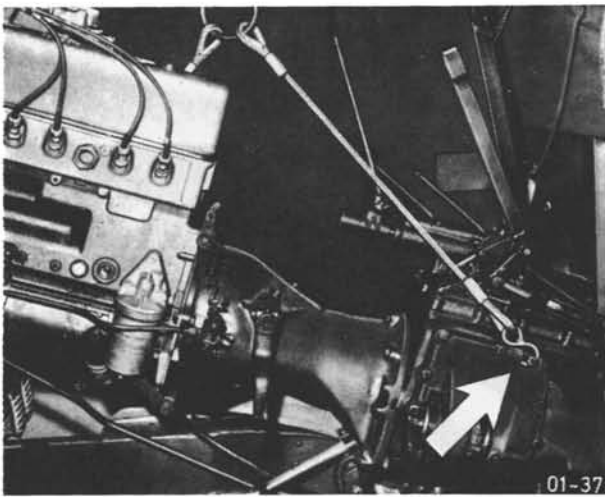


Fig. 26-1/4

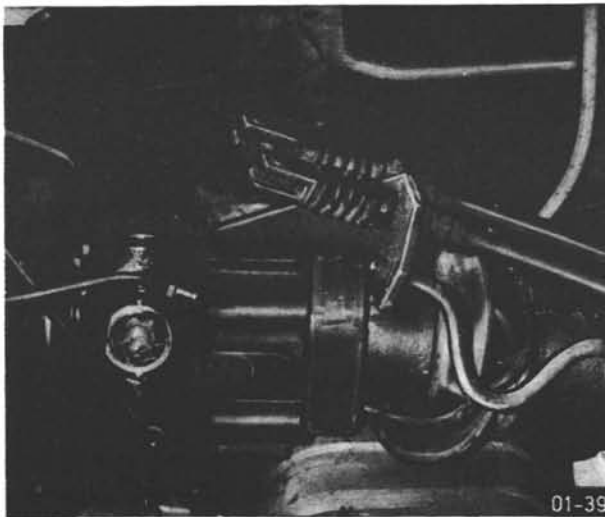


Fig. 26-1/5

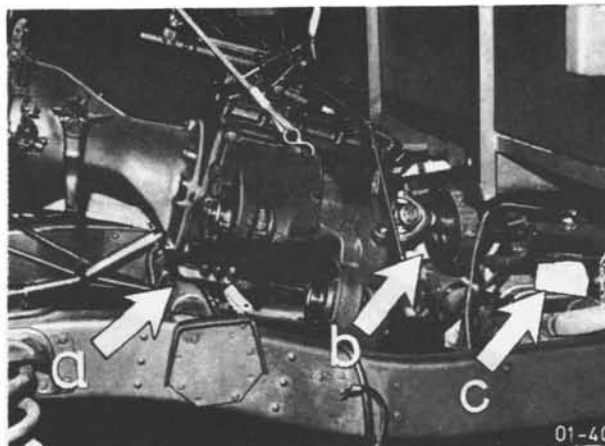


Fig. 26-1/6

9. Remove cotter pin from pull rod for differential lock on intermediate lever. Pull out bolt and disconnect pull rod.
10. Remove thrust ball housing of rear axle on transmission. First push back rubber sleeve after loosening hose strap. Fig. 26-1/5.
11. Raise crank assembly block carefully and remove in forward direction. Watch out for drive shaft of rear axle (which is also removed).
(a, b, c = points of special importance.)
Fig. 26-1/6.

12. Place crank assembly on assembly stand.

Note: Provisional placing on wooden wedges is possible, lower carefully.

Danger!

Front wedge 4 cm, rear wedge 16 cm high.

13. For reassembly proceed vice versa.
14. Bleed brakes acc. to Job No. 42-4/1.
15. Fill up with transmission fluid to reach up between the two dipstick marks (SAE 80).

Note: Upon installation, engine should swing freely and without distortions together with the exhaust system.

By adding shims to the rear crank assembly bearing, the crank assembly must be aligned in such a manner that the rocker in the front engine mount is accurately vertical.

As from Chassis No. 404 114 01 42 82, the new transmissions and exchange transmissions are provided with the same type of drive shaft for all engines. This shaft differs from the earlier version by a splining which is 25 mm longer (before 90, now 115 mm).

When installing exchange transmissions in vehicles, prior to the above named vehicle number, a fork lever with offset recess (Part No. 404 254 00 08) must be installed, because with increasing wear of the clutch driven plate the inside of the throwout ring presses against the shaft and may prevent complete declutching.

I. Disassembly

1. Drain oil
2. Remove transmission cover.
3. Remove shift plate.
4. Remove guide fork initial stage shaft – main shaft. Fig. 26-2/1.
5. Remove drive shafts for front and rear axle (unless already removed when removing transmission from vehicle).
6. Engage front wheel drive and block transmission by engaging two gears.
7. Unscrew slotted nut on output flange for front drive after unlocking with socket spanner No. 401 589 00 07 00.
8. Pull flange with puller No. 401 589 01 33 00. Fig. 26-2/2.
9. Remove bearing flange after loosening the two locking countersunk screws M 6.
10. Remove exposed spacer ring on output shaft. Fig. 26-2/3.
11. Remove all hex. screws M 10 on closing cover rear.
12. Remove cover with shaft and pressed-in grooved ball bearing toward the rear. Fig. 26-2/4.

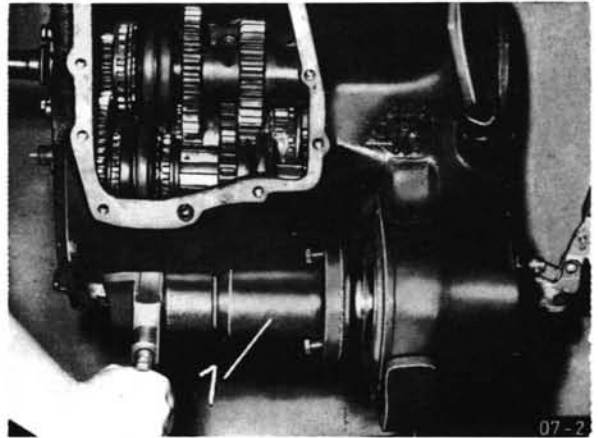


Fig. 26-2/2

1 401 589 01 33 00

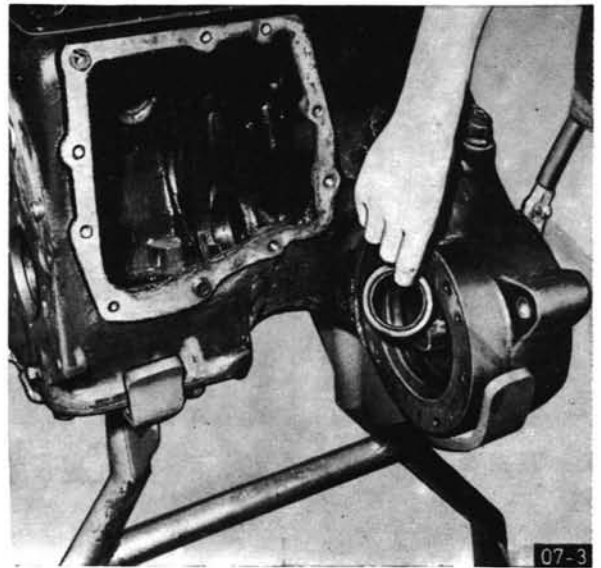


Fig. 26-2/3

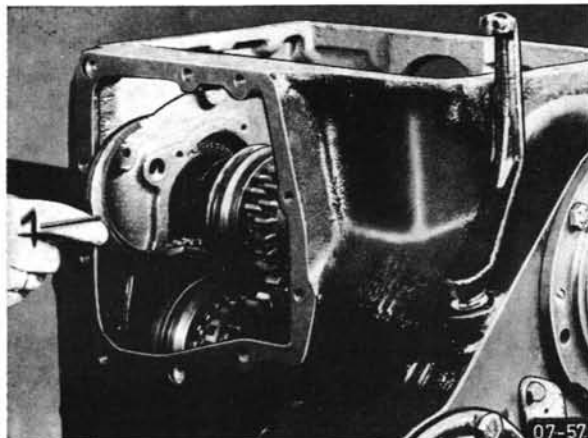


Fig. 26-2/1

1 Guide fork

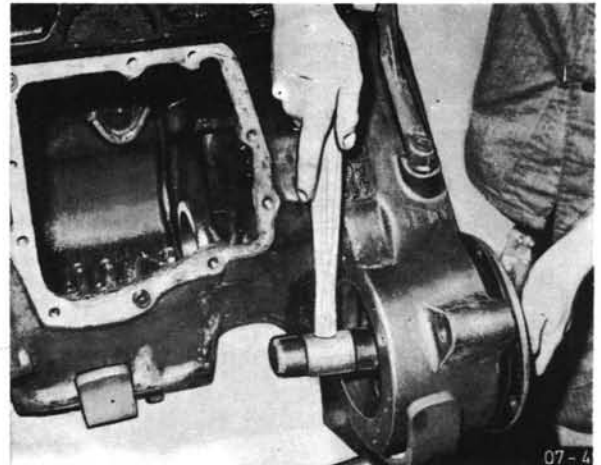


Fig. 26-2/4



Fig. 26-2/5



Fig. 26-2/6

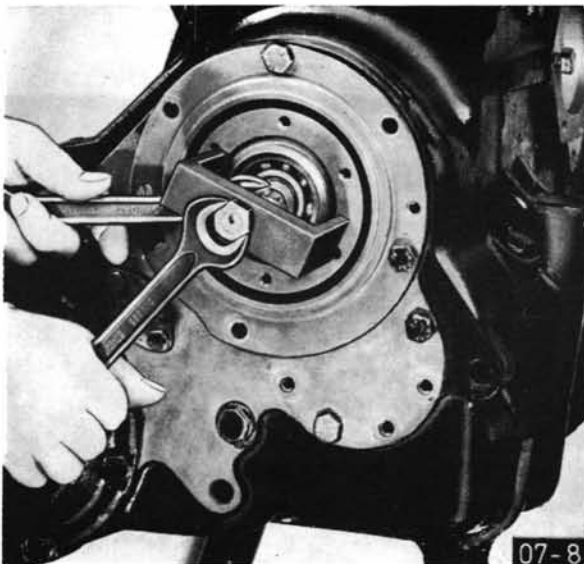


Fig. 26-2/7

13. Remove shift fork for all-wheel drive. For this purpose, remove locking screw M 6 in shift fork and pull actuating shaft out of tothing in upward direction. Watch out for top rubber sealing ring.

14. Replace top rubber sealing ring.

15. Remove shift fork with two slide pieces and shift rod. Fig. 26-2/5.

16. Remove output gear through transmission opening toward the rear. Fig. 26-2/6.

17. Unlock locking screw on rear axle drive flange and screw out.

18. Remove locking ring.

19. Pull grooved ball bearing from bearing hub with puller 401 589 00 33 00. Fig. 26-2/7.

20. Remove rear locking ring.

21. Unlock locking screw for output flange with socket spanner 401 589 00 07 00. Fig. 26-2/8.

22. Lock main shaft by engaging two gears.

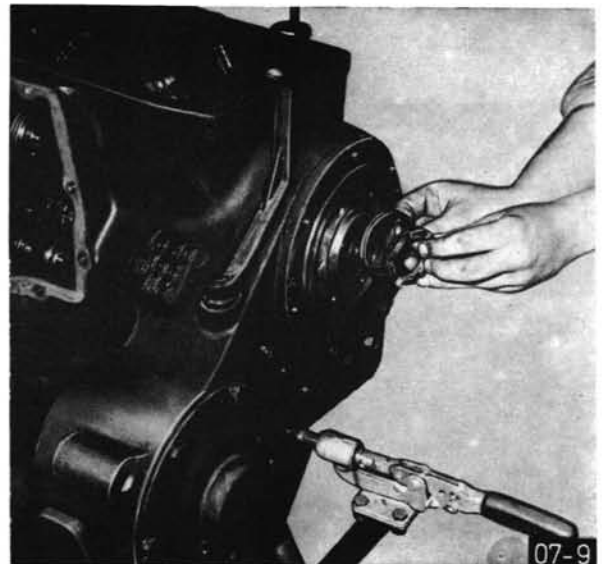


Fig. 26-2/8

23 Remove output flange with puller 401 589 01 33 00.

Fig. 26-2/9.

24 Unscrew cover of prestage shaft from housing front.

25 Unlock exposed hollow screw and unscrew with tool No. 401 589 01 09 00. Replace locking plate.

Fig. 26-2/10.

26 Unscrew both countersunk screws on outer bearing flange.

27 Remove exposed bearing flange including sealing ring and radial ball bearing.

28 Remove transmission input shaft. For this purpose, loosen hex. screws and pull shaft with bearing out of transmission housing.

29 Remove main shaft from housing.

Fig. 26-2/11.

30 Screw threaded bushing 401 589 08 33 00 on prestage shaft.

Fig. 26-2/12.

31 Push prestage shaft toward the rear by means of fixture 401 589 01 33 00 and threaded bushing 401 589 08 33 00 until the spacing ring at front and the rear bearing are free. Remove spacing ring.

Fig. 26-2/13.

32 Knock large drive gear from shaft by means of plastic hammer and remove. Apply counterhold to shaft. (Wheel is seated on shaft by means of 6 set pins.)

Fig. 26-2/14.

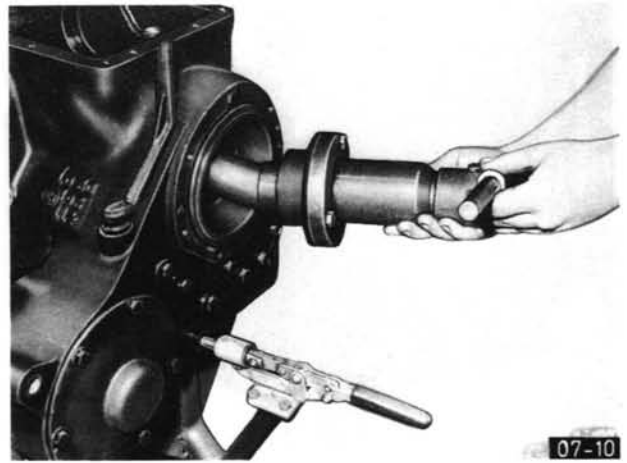


Fig. 26-2/9

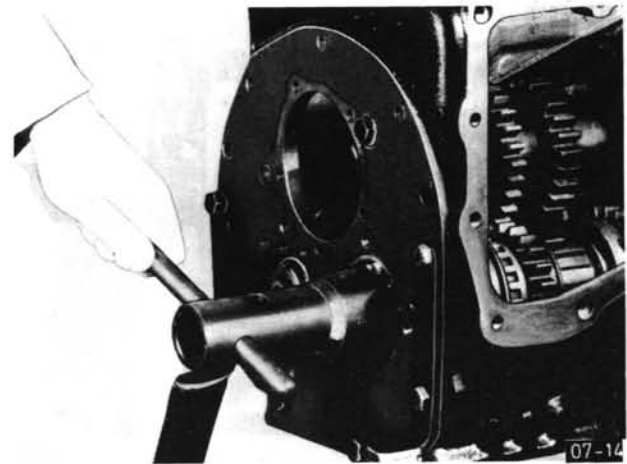


Fig. 26-2/10

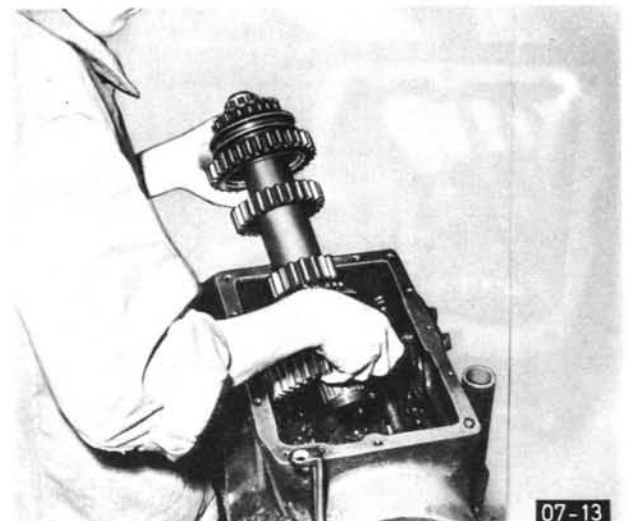


Fig. 26-2/11

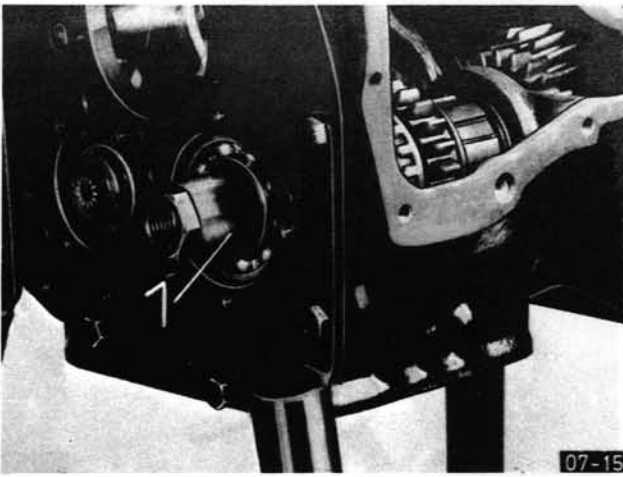


Fig. 26 - 2/12

1 401 589 08 33 00

33 Remove radial ball bearing in transmission housing in forward direction and take-off locking ring.

34 Remove rear locking ring on small bearing out of groove.

Fig. 26-2/15.

35 Slip assembly fork 401 589 01 23 00 in front of small radial ball bearing and pull shaft with fixture 401 489 01 33 00 and threaded bushing 401 589 08 33 00 forward until drive gear for special pto, intermediate ring and locking ring can be removed together with radial ball bearing.

Fig. 26-2/16.

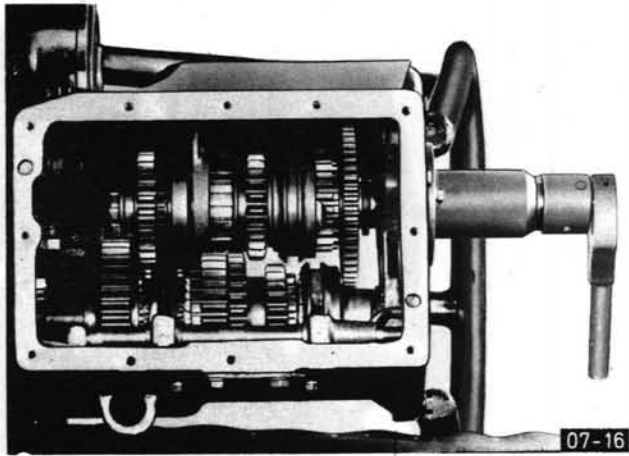


Fig. 26-2/13

36 Remove prestage shaft.

Fig. 26-2/17.

37 Remove bearing rod. For this purpose, remove locking screw. Remove shift forks 1-4 and 5th speed.

Fig. 26-2/18.

38 On righthand transmission housing longitudinal end, remove oil drip plates with rubber seal and oil pipe after loosening fastening screw with locking nut.

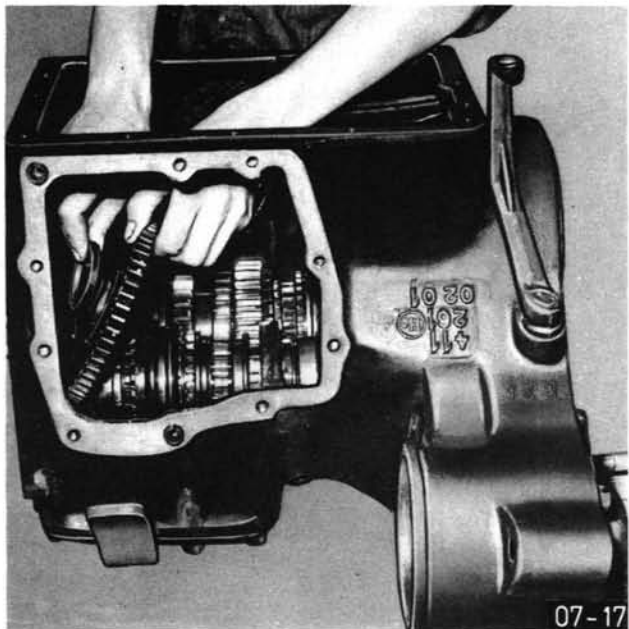


Fig. 26-2/14

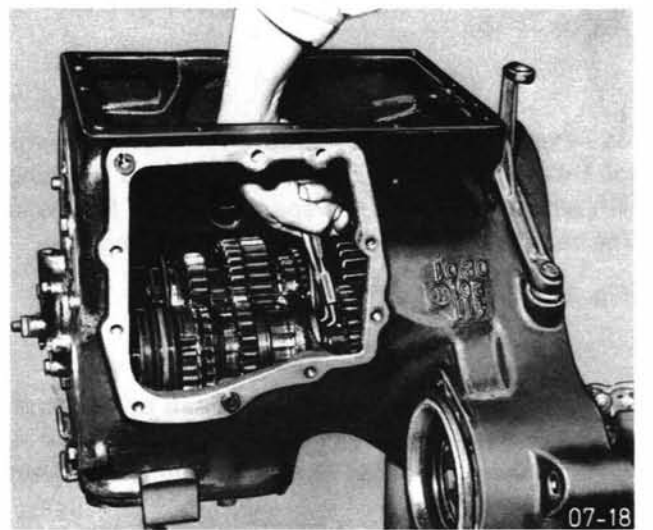


Fig. 26-2/15

39 To remove countershaft, remove cover for tachometer drive with drive pinion for tachometer shaft front.

Fig. 26-2/19.

40 Remove locking ring front.

41 Remove exposed spacing ring, 1 mm thick.

42 Remove rear cover on transmission housing rear upon removal of remaining hex. screws M 10.

43 Remove exposed spacing washer.

44 Knock shaft lightly in forward direction until outer race of front tapered roller bearing is free and can be removed.

45 Knock shaft lightly toward the rear until outer race of rear tapered roller bearing can be pushed slightly toward the rear.

46 Remove countershaft.

Fig. 26-2/20.

47 Remove intermediate gear for front drive. For this purpose and upon removal of the two fastening screws M 8 on flange of bearing bolt, remove bearing bolt toward the rear and remove intermediate gear in upward direction.

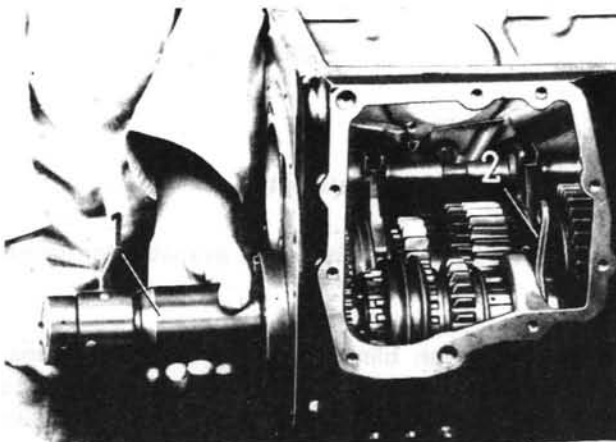


Fig. 26-2/16

- 1 Puller 401 589 01 33 00
- 2 Assembly fork 401 589 01 23 00

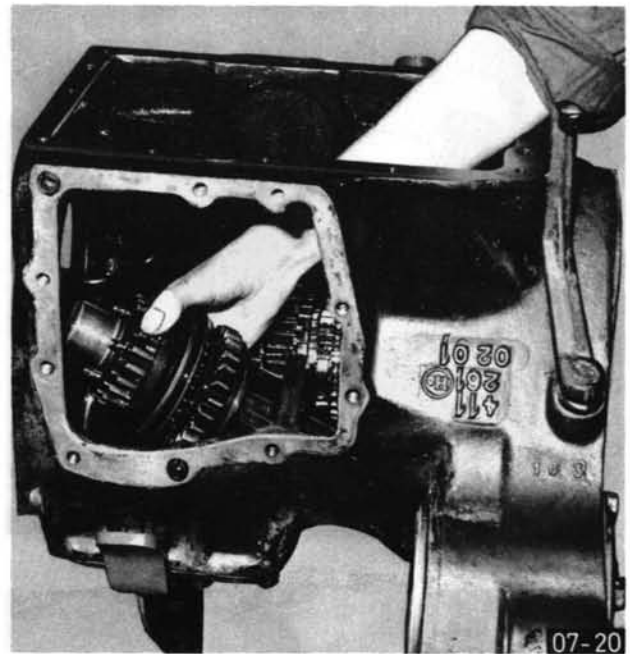


Fig. 26-2/17

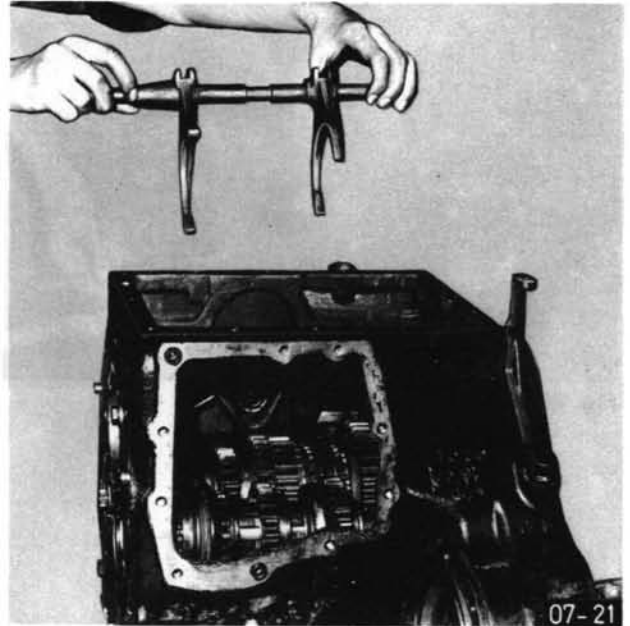


Fig. 26-2/18

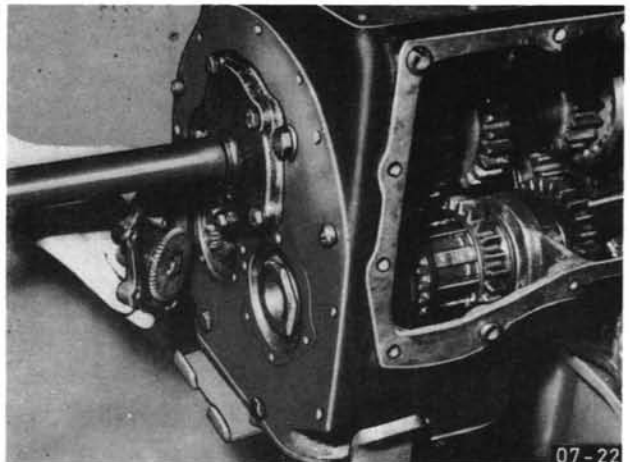


Fig. 26-2/19

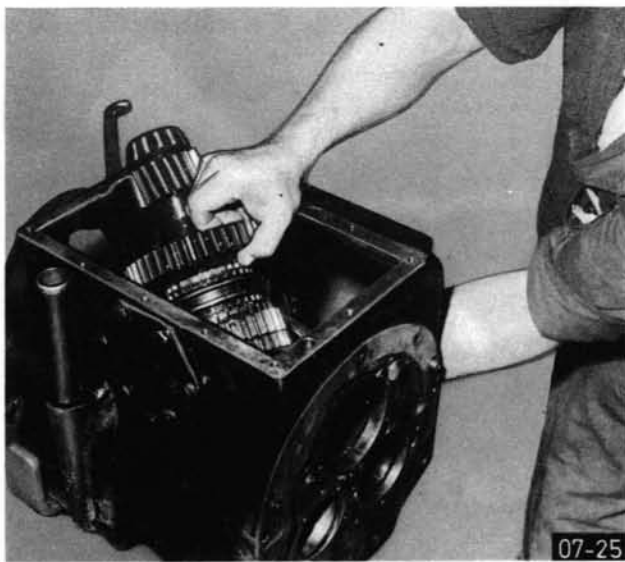


Fig. 26-2/20

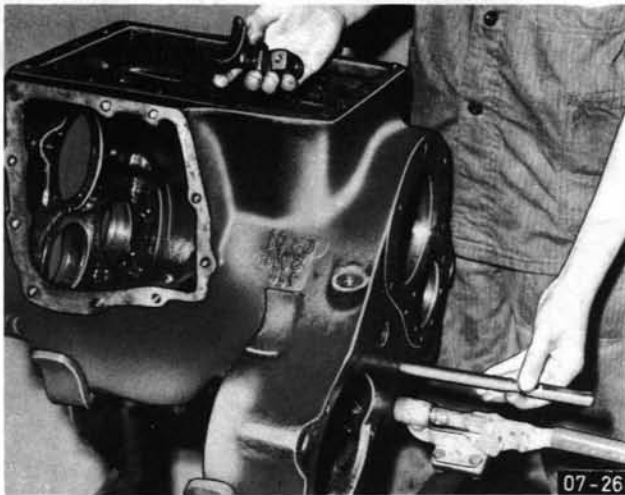


Fig. 26-2/21

48 After loosening closing plug on transmission housing rear and locking screw on driver, pull-out shift rod for reverse gear toward the rear. This will free shift fork and driver.

Fig. 26-2/21.

49 Remove oil filler pipe, if required (pipe wrench).

50 Force rear bearing outer race out of housing. **Refinish front bearing seat of countershaft in transmission housing.**

When outer race is rotating along, the resulting bearing damage may cause damage to bearing seat in housing.

51 Bore bearing seat in housing on boring machine to dimension 77 mm dia. and a depth of 26 mm.

Attention! Do not bore completely through seat.

52 Insert repair bushing DB-No. 411 264 10 50 acc. to Fig. 26-2/22.

53 Bore bushing to finish dimension 72 dia. M6 and face front surface.

Fig. 26-2/22.

54 Machine groove for locking ring.

Fig. 26-2/22.

55 Clean housing and install shaft.

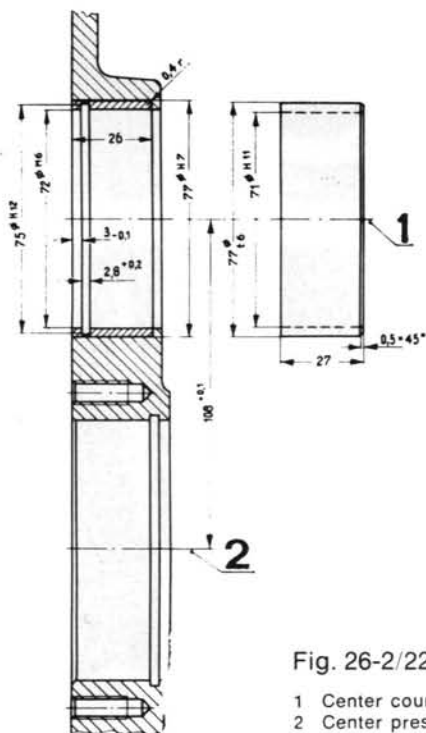


Fig. 26-2/22

1 Center countershaft
2 Center prestage shaft

II. Assembly and Adjustment

Note: Two types of housing are available for installation.

a) Housing with blind holes for mounting transmission at the rear. Standard installation up to chassis No. 404.114-017 176 in accordance with transmission end No. 017 171.

Fig. 26-2/23.

- b) Transmission with through-holes for mounting transmission at the rear as standard installation starting chassis No. 404.114-017 177 in accordance with transmission end No. 017 172.

Fig. 26-2/24.

Note the two different screw lengths used for installation.

- 1 Install shift rod, shift fork and driver for reverse gear.

Note: Shift fork and driver are locked with snap rings only. Replace formerly installed locking plates with snap rings. Shift fork should point in direction of installation position of prestage shaft, seal shift rod bore in transmission housing with threaded plug.

- 2 Insert front axle drive gear with **shifting sleeve attached** from the rear into housing and into slide pieces.

- 3 Install shift for all-wheel drive.

Note: Make sure of perfect sealing ring on shift crank. When installing shift fork into clamping teeth of shift crank, make particularly sure that in engaged position of shift crank (lever resting against transmission housing) the two bores for the slide pieces in the shift fork are visible at output bore rear for approximately half their size.

Fig. 26-2/25.

- 4 Locate clamping teeth with hex. screw M 6.

- 5 Insert slide pieces.

Note: Insert upper slide piece with grease to prevent dropping-down of sliding piece prior to installing shifting sleeve.

- 6 Place shifting sleeve on front axle drive gear.

Note: The wide collar of the shifting sleeve should face large gear wheel.

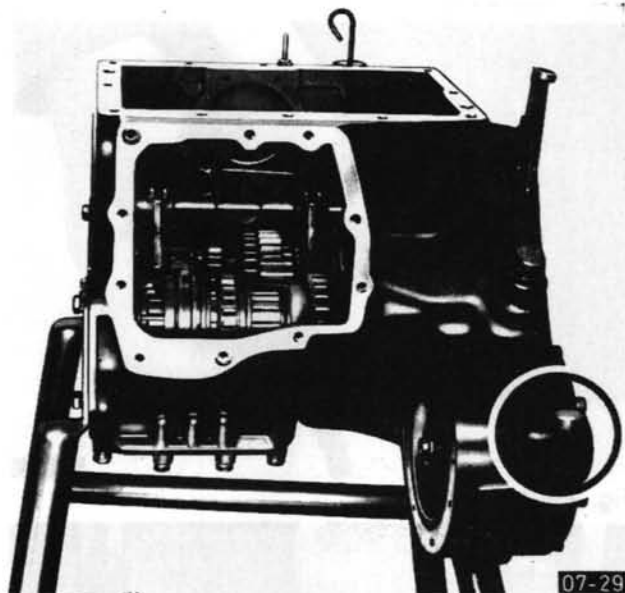


Fig. 26-2/23

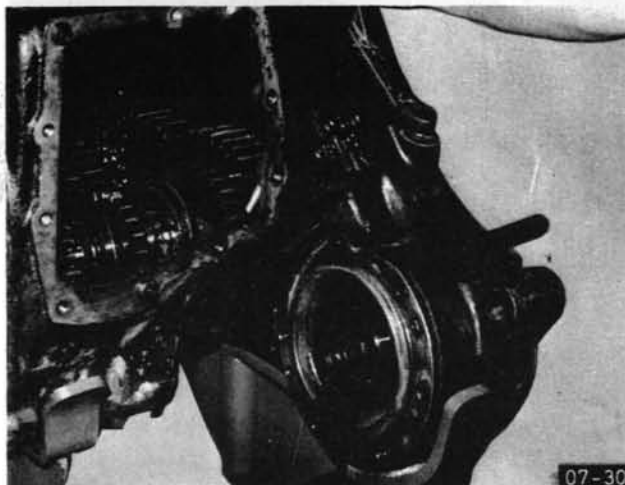


Fig. 26-2/24

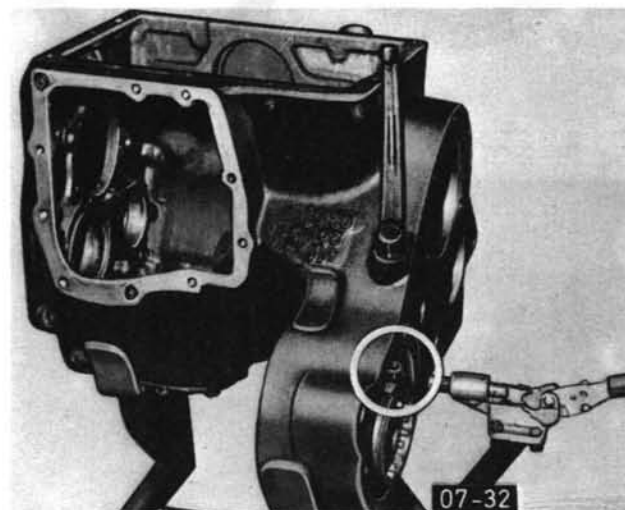


Fig. 26-2/25

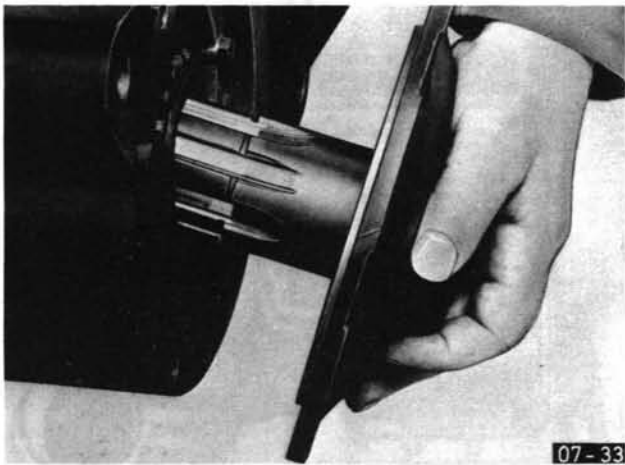


Fig. 26-2/26

07-33

7 Install shaft with rear cover and radial ball bearing from the rear.

Note: Always use new gasket between cover and housing. Do not forget filter wick and special screw in shaft.

Fig. 26-2/26.

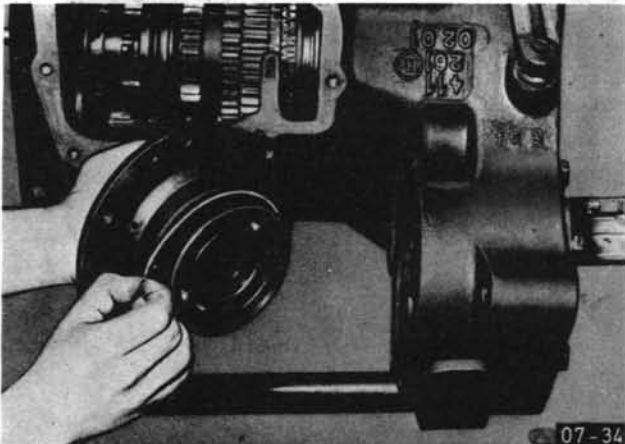


Fig. 26-2/27

07-34

8 Check spacing ring for parallel condition, replace part, if required, and install.

9 Install preassembled bearing flange with rubber ring on outside and **correct sealing ring** (different for front and rear axle).

Note: Caution, install red sealing rings only. Do not confuse sealing ring for **front axle output**, since otherwise transmission oil will flow into front axle. Check legend!

Fig. 26-2/27 and 26-2/28.

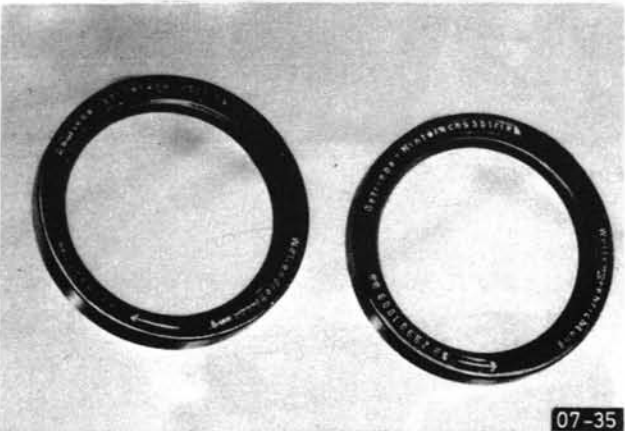


Fig. 26-2/28

07-35

10 Tighten bearing flange by means of the two countersunk screws M 6.

11 Install input flange with tool No. 401 589 01 33 00.

Note: Make sure that flange shows no burr and that the hole bored into flange is in alignment with bore in shaft.

Fig. 26-2/29.

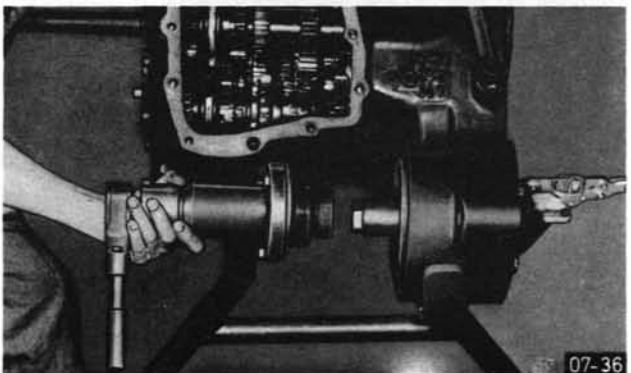


Fig. 26-2/29

07-36

12 Insert locking plate and slot pattern with some sealing compound and tighten with socket wrench 401 589 00 07 00 and secure.

Fig. 26-2/30.

13 Check installed front axle power take-off. Disconnect all-wheel drive by means of shift crank, that is, in this position the output flange should stop even though the output gear keeps rotating.

14 Install intermediate gear for front power take-off with shaft and tighten.

15 Introduce counter shaft completely pre-assembled without bearing rings and with tachometer pinion first into housing and install. Watch out for shifting sleeve front. Flange should face tachometer pinion.

Fig. 26-2/31.

16 Force-in front bearing outer race with Hollow Drift 401 589 05 61 00. Insert spacing ring and locking ring.

Fig. 26-2/32.

Note: Spacing ring front constant 1 mm.

17 Push counter shaft completely forward by means of hollow drift and force-in rear bearing outer race with Hollow Drift 401 589 06 61 00.

Fig. 26-2/33.

18 Measure distance between bearing outer race, tapered roller bearing rear and transmission housing rear wall with depth gauge.

Permissible end play of counter shaft $0.25 + 0.1$



Fig. 26-2/30

mm. Make up for difference with pertinent compensating washer.

Fig. 26-2/34.

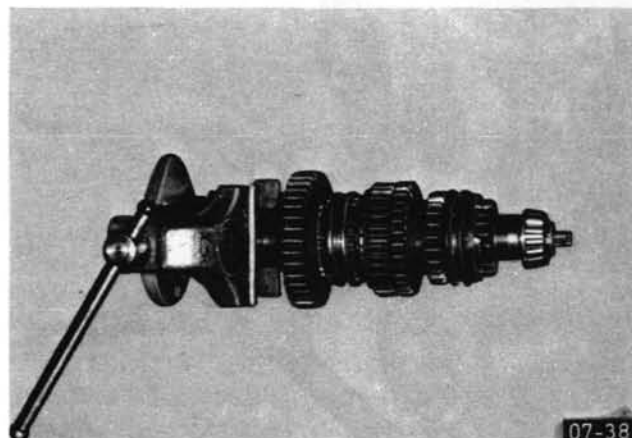


Fig. 26-2/31

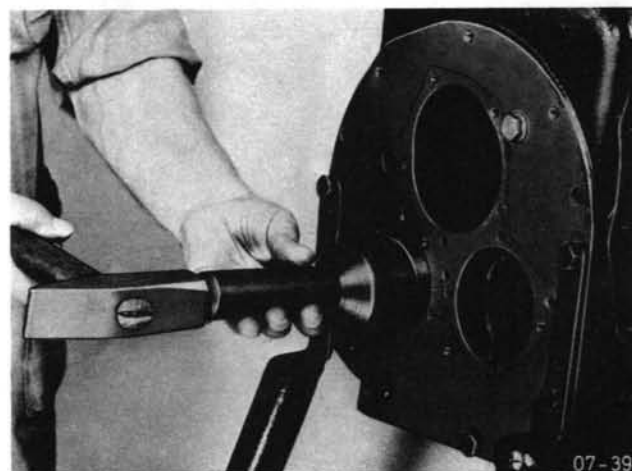


Fig. 26-2/32

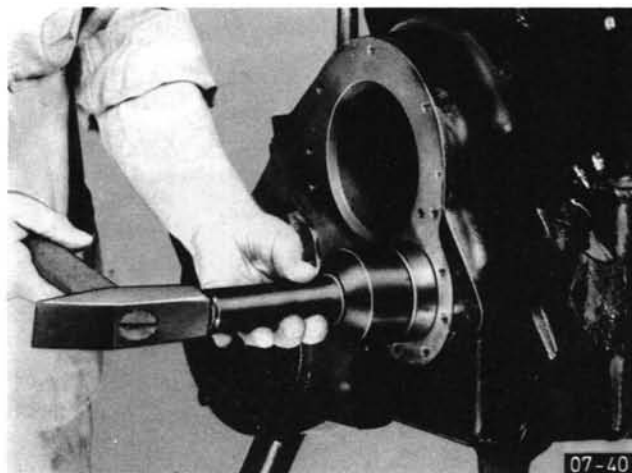


Fig. 26-2/33

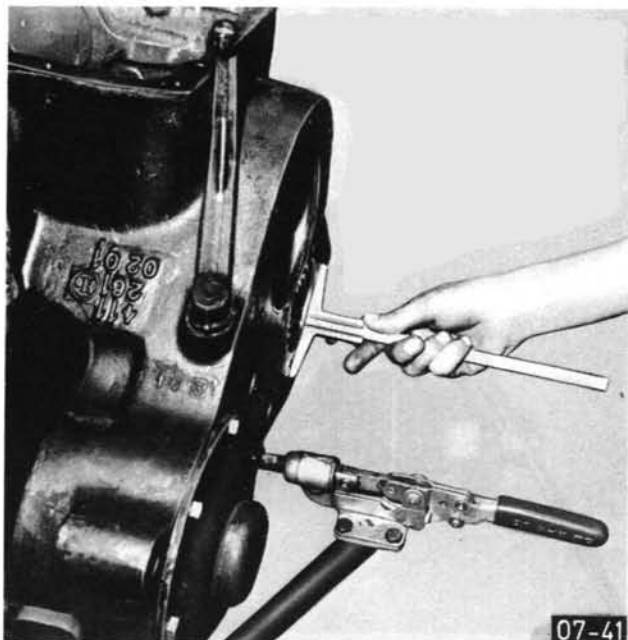


Fig. 26-2/34

19 Screw-on rear end cover.

Note: Coat all fastening screws and cover with sealing compound.

20 Mount front cover for counter shaft with drive gear for tachometer.

Note: Use new gasket!

21 Mount oil pipe, oil drip plate and rubber seal to right-hand housing wall.

Fig. 26-2/35.

22 Install bearing rod and shift forks 1, 2, 3, 4 and 5th speed.

Note: Shift rods should operate smoothly.

Fig. 26-2/18.

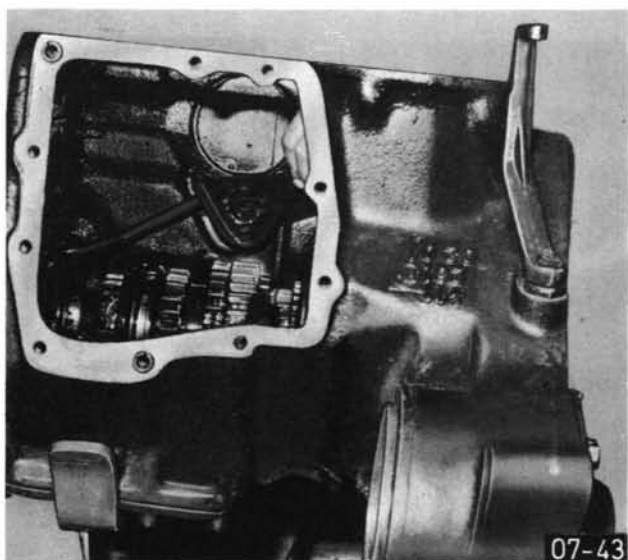


Fig. 26-2/35

23 Install preassembled pre-stage shaft into housing.

Fig. 26-2/17.

24 Slip radial ball bearing, spacing ring, locking ring and drive gear for special pto rear on pre-stage shaft. Locking ring should be seated well in groove.

Note: Make sure that the rear bearing has no clearance. This is done by inserting spacing rings of varying rings in-between radial ball bearing and locking ring.

However, always use **one** spacing ring only. Spacing rings are available 2.3 mm, 2.4 mm, 2.5 mm, 2.6 mm, 2.7 mm, 2.8 mm, 3.0 mm, 3.1 mm, 3.2 mm and 3.3 mm thick, depending on requirements during installation.

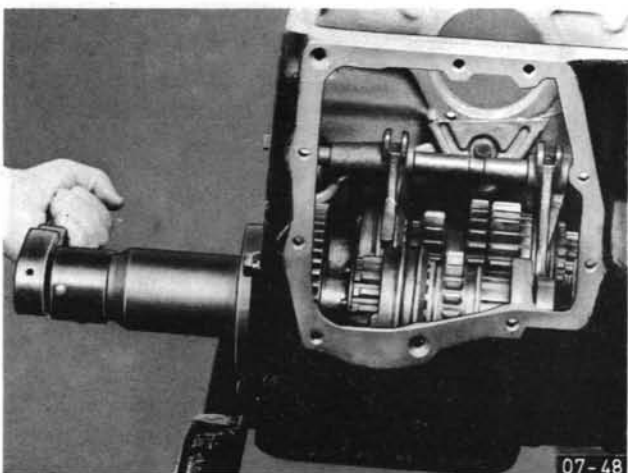


Fig. 26-2/36

25 Slip pre-stage shaft to rear and position drive gear.

26 Apply Tool No. 401 589 01 33 00 and threaded bushing 401 589 08 33 00 to pull pre-stage shaft forward until drive gear is completely seated on set pins and rear radial ball bearing in bearing eye.

Fig. 26-2/36.

27 Insert spacing ring and locking ring front and force-in front bearing by means of Hollow Drive 401 589 15 61 00.

Fig. 26-2/37.

28 Insert locking plate. Tighten hollow screw with Tool No. 401 589 01 09 00 and lock.

Fig. 26-2/38.

29 Screw down cover for pre-stage shaft together with sealing ring.

30 Insert preassembled main shaft.

31 Install preassembled transmission input shaft.
Fig. 26-2/42.

32 Insert preassembled rear bearing flange and screw down with two counter-sunk screws M 6. Do not forget paper gasket.

33 Mount input flange rear by means of Fixture 401 589 01 33 00.

Note: Oil bores of flange and 6th gear wheel should be in alignment.

Fig. 26-2/39.

34 Insert locking plate, tighten slot nut with Socket Wrench 401 589 00 07 00.

35 Install locking ring for ball bearing in output flange.

36 Insert bearing hub in cylindrical pin of main shaft.

37 Force-in ball bearing with Hollow Drift 401 589 14 61 00 and install 2nd locking ring into output flange.

Fig. 26-2/40.

Note: Install bearing hub with required flange thickness as required. The following sizes are available: 2.0 mm, 2.2 mm, 2.3 mm, 2.4 mm, 2.5 mm, 2.6 mm, 2.8 mm, 3.0 mm, 3.2 mm and 3.4 mm.

Fig. 26-2/41.

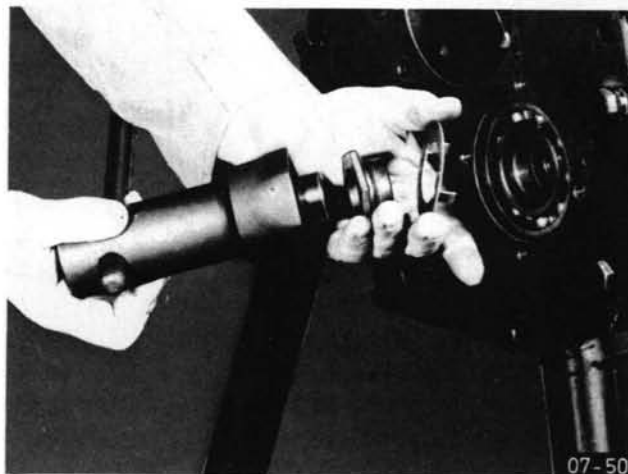


Fig. 26-2/38

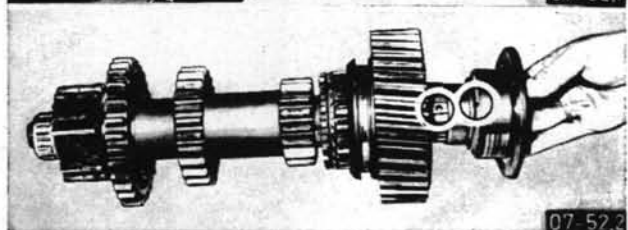
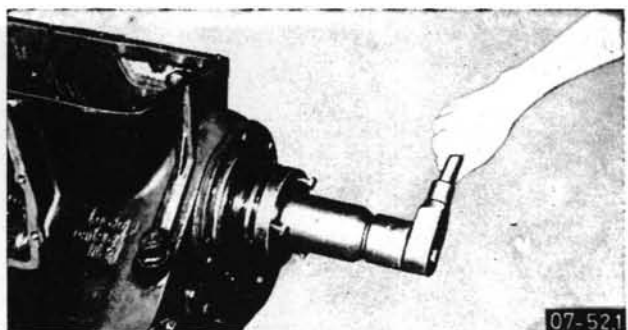


Fig. 26-2/39

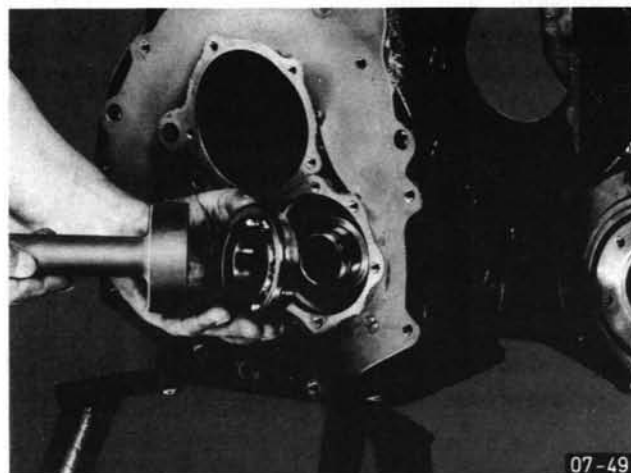


Fig. 26-2/37

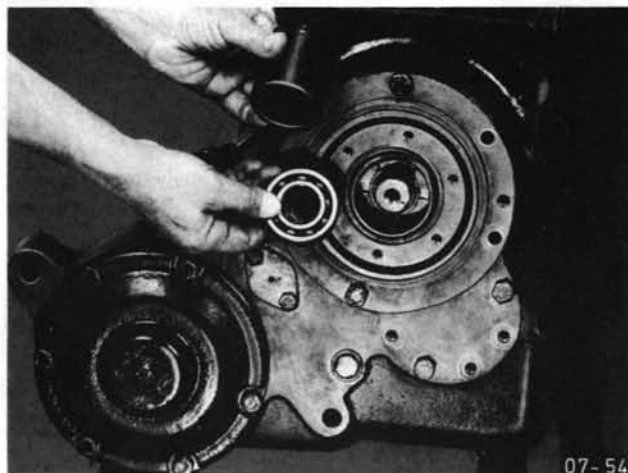


Fig. 26-2/40

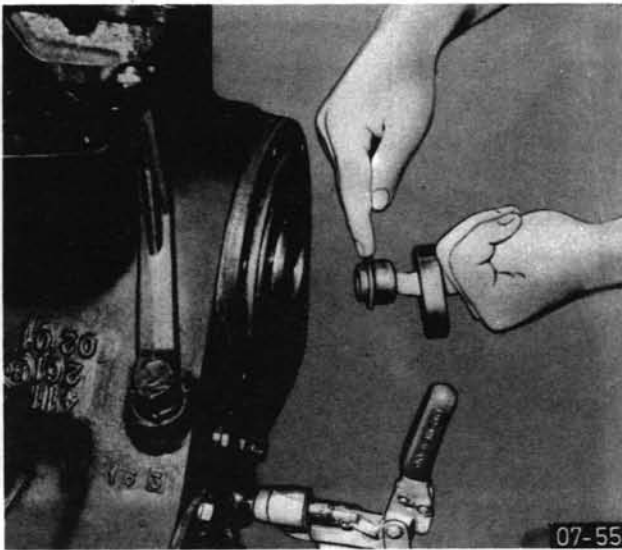


Fig. 26-2/41



Fig. 26-2/42

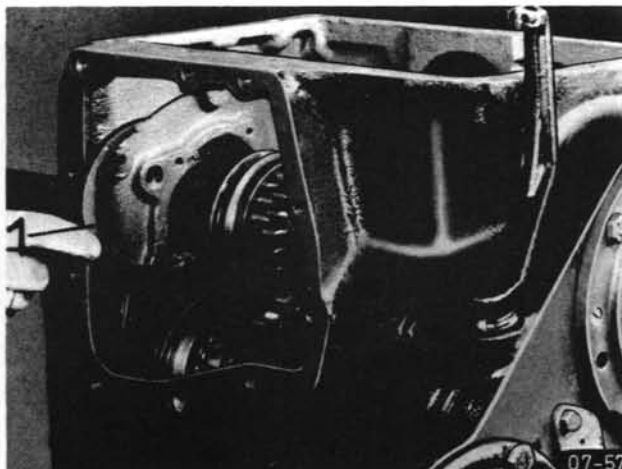


Fig. 26-2/43

1 Guide fork

Note: The play of the synchronizing ring between input shaft and main shaft should be 0.6 to 1.0 mm. This play is set by installing a pertinent compensating washer. However, always install one washer only.

Fig. 26-2/42.

38 Attach bearing hub rear on main shaft with washer, locking plate and hex. screw.

Note: Tightening torque 14-16 mkp.

39 Lock hex. screw.

40 Loosely insert guide fork between shifting sleeve pre-stage and shifting sleeve main shaft.

Fig. 26-2/43.

41 Install shift plate with the following positions of the shift tongues:

Shift tongue 1st-4th speed	idle position
Shift tongue 5th speed	idle position
Shift tongue 6th speed	idle position
Shift tongue pre-stage	pre-stage on
Shift tongue "forwards" - "reverse"	engaged "forward"

Set shifting sleeve in transmission accordingly.

With the shift plate correctly seated in transmission, the plate should have 2-3 mm clearance in circumference of fastening bolts.

42 Mount transmission cover and screw down.

Note: Make sure that the reverse lever is set to "forward" and that the shift finger is inserted in slot guide of shift plate. The shift lever for special pto (if installed) should be set to "on" and the shift gear for the special pto on pre-stage shaft should be pushed completely forward.

43 Screw-on special pto or crawler gear auxiliary unit (if installed).

44 Fill-in transmission oil only when vehicle is completely assembled (SAE 80).

45 Install transmission into vehicle.

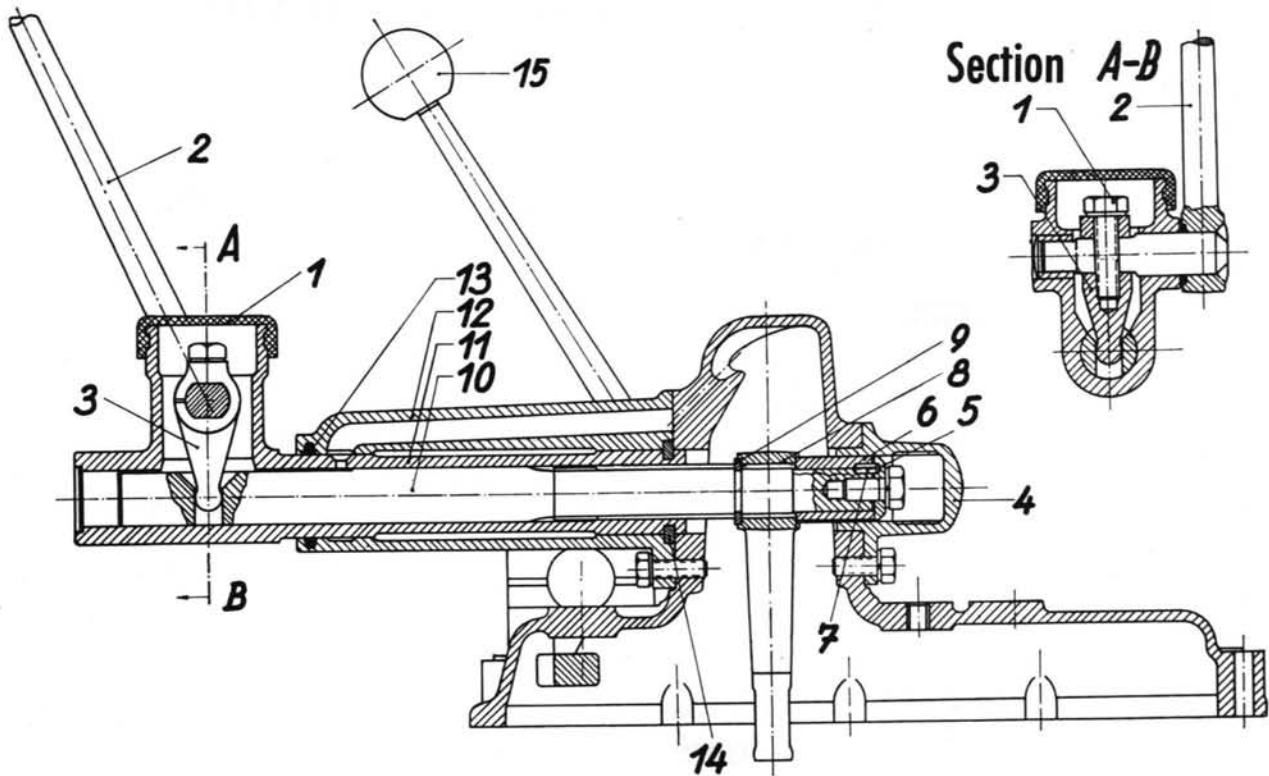


Fig. 26-3/1

- | | |
|-------------------|---------------------------------|
| 1 Cover | 9 Locking ring 2-part |
| 2 Shift lever | 10 Gear shifting shaft |
| 3 Shift finger | 11 Shift housing |
| 4 Rear cover | 12 Shift housing support |
| 5 Clamping washer | 13 Sealing ring |
| 6 Spacer sleeve | 14 Locking ring, 2-part |
| 7 Set pin | 15 Shift lever for reverse gear |
| 8 Shifting finger | |

I. Removal and Installation

- Remove driver and co-driver seat.
- Remove inside engine panels. Remove panelling of lever system and screw off floor plate between lever system and engine panelling inside.
- Remove cotter from pull rod for actuating hand brake on bowden wire connection and take out.
- Remove cotter pin on shift linkage for front axle drive and differential lock rear and disconnect.
- Unscrew support of hand lever assembly and remove together with lever for four-wheel drive and hand brake lever.
- Unscrew transmission cover and remove. Fig. 26-3/2.
- Check all parts and replace, if required.
- For installation proceed vice versa, making sure that the reversing lever is set on "forward" and the shifting finger is inserted in slot guide of shift plate. The shift lever for pto drive should be set to "On", if installed, and the slide gear for the special pto should be pushed completely forward on pre-stage shaft.
- Check gear shift upon installation.



Fig. 26-3/2

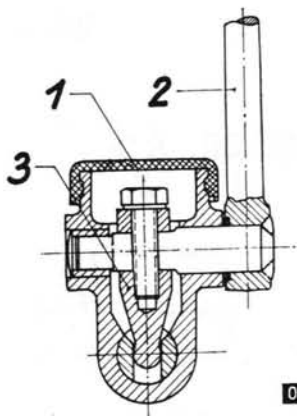


Fig. 26-3/3

- 1 Cover
- 2 Shift lever
- 3 Shift finger

07-103

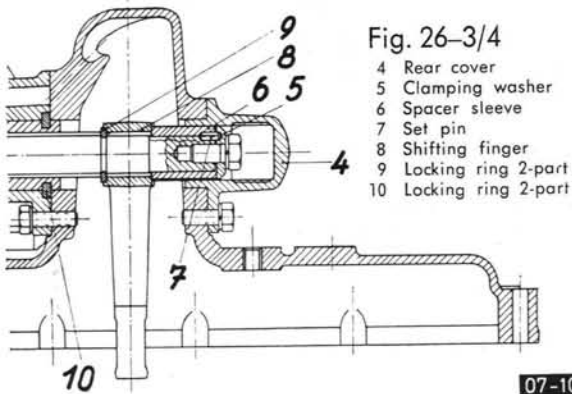


Fig. 26-3/4

- 4 Rear cover
- 5 Clamping washer
- 6 Spacer sleeve
- 7 Set pin
- 8 Shifting finger
- 9 Locking ring 2-part
- 10 Locking ring 2-part

07-104



Fig. 26-3/5

07-105

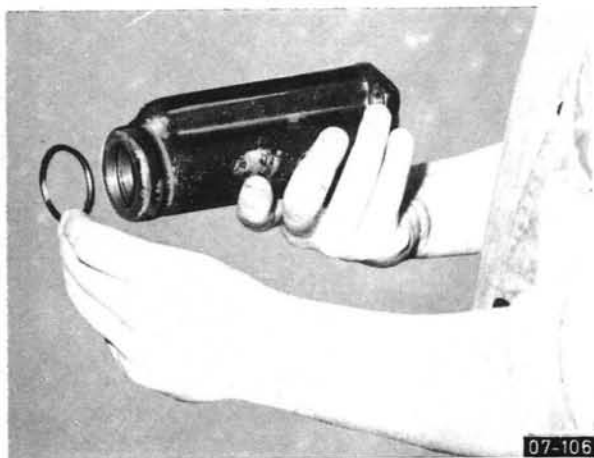


Fig. 26-3/6

07-106

II. Disassembly and Assembly

A. Main Shift Lever with Bearings

1. Remove rubber cap from shift housing.
2. Unscrew hex screw in shift lever bearings and remove together with circlip. Fig. 26-3/3.
3. Remove main shift lever in lateral direction.
4. Remove shifting finger in upward direction.
5. Unscrew rear cover from shift housing.
6. Unscrew hex bolt and remove clamping washer.
7. Remove cyl. notch pin and remove bearing tube.
8. Move shaft forward until shifting finger abuts. Move shaft further ahead with light blows until the two halves of the locking ring in front of the shifting finger become loose and can be removed. Fig. 26-3/4.
9. Unscrew the 3 hex bolts on shift housing support and remove together with shift housing.
10. Push shift housing toward the rear until the two halves of the locking ring can be removed. Fig. 26-3/5.
11. Remove shift housing from housing support.
12. Replace rubber seal. Fig. 26-3/6.
13. Remove gear shifting shaft in forward direction, which will release the shifting finger.

B. Shift Lever for Reverse Gear

14. Loosen the two hex bolts and remove shift lever for reverse gear together with cover.

15. Unscrew hex nut on transmission cover from outside.
Fig. 26-3/7.

16. Remove fork lever together with fitted screw in inward direction.

Installation Note:

The fitted screw is protected against turning by means of a cyl. notch pin. Grease fitted screw during installation.
Fig. 26-3/8.

C. Shift Tongue and Shift Lever for Special Pto

17. At rear shifting tongue, compress spring by pressing against spring retainer and remove 2-part locking ring.

18. Remove spring retainer.

19. Remove spring.

20. Remove roller guide cover.

21. Remove cyl. rollers, two each.
Fig. 26-3/9.

22. If required, knock rivet out of spring bolt and remove guide piece.

23. Remove spring bolt.

24. If required, punchmark rivet on shifting tongue front and drill. Knock rivet out with mandrel.

25. Remove guide piece and shifting tongue.

26. Loosen both hex bolts and remove lever together with bearing.

Note: No further disassembly is required. If a component should break, replace entire lever with bearing and shifting finger.

27. Replace breather screw on transmission cover.
Fig. 26-3/10.

28. Check all parts for wear and replace damaged parts.

29. For reassembly proceed vice versa.

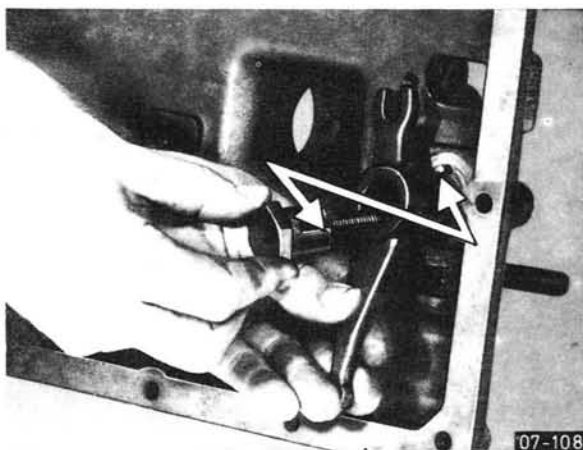


Fig. 26-3/8



Fig. 26-3/9

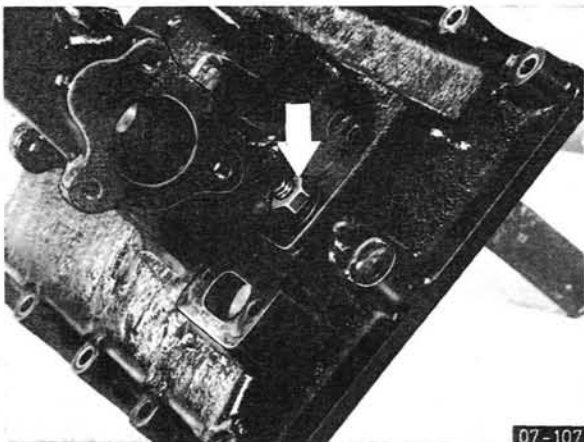


Fig. 26-3/7

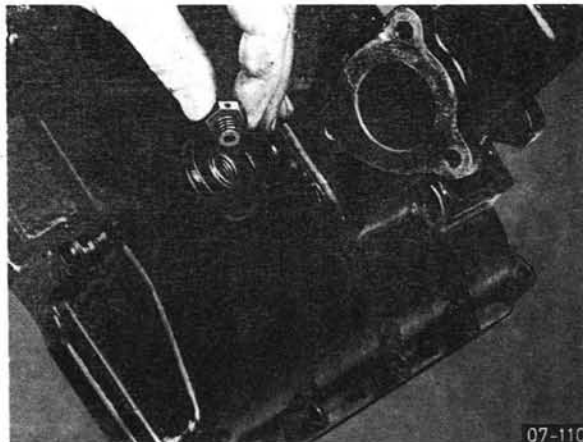


Fig. 26-3/10

1. Removal of Shift Plate

1. Remove shift plate.
2. Check removed shift plate for wear and replace defective parts, install new shift plate (exchange plate) if required.

Note: Wash new shift plate thoroughly with nitro solvent to remove preserving compound; then lubricate.

3. Installation is best at the following shifting sleeve positions, Fig. 26-4/1.

1st, 3rd and 2nd, 4th gear: shifting sleeve on main shaft = idling position

5th gear: shifting sleeve on countershaft = idling position

6th gear: shifting sleeve on main shaft = idling position

Pre-stage shift: shifting sleeve on main shaft = completely disengaged (stop against fixed wheel)

Shifting sleeve on pre-stage shaft = engaged

that is, accurately under above named sliding sleeve in alignment. The loose shifting claw between the main and pre-stage shaft must be installed.

Forward and Reverse Gear:

Follower of shift rod = forward gear engaged

Special Pto

Slide gear on pre-stage shaft = engaged that is, slide gear on bearing bracket against stop.

4. Set shifting tongues of shift plate accordingly:

Shifting tongue 1st, 2nd, 3rd and 4th gear = idling position

Shifting tongue 5th and 6th gear = idling position

Shifting tongue = Pre-stage shaft engaged (toward the rear)

Shifting tongue forward and reverse gear = forward gear engaged (in forward direction)

5. Insert shift plate. Fig. 26-4/3.

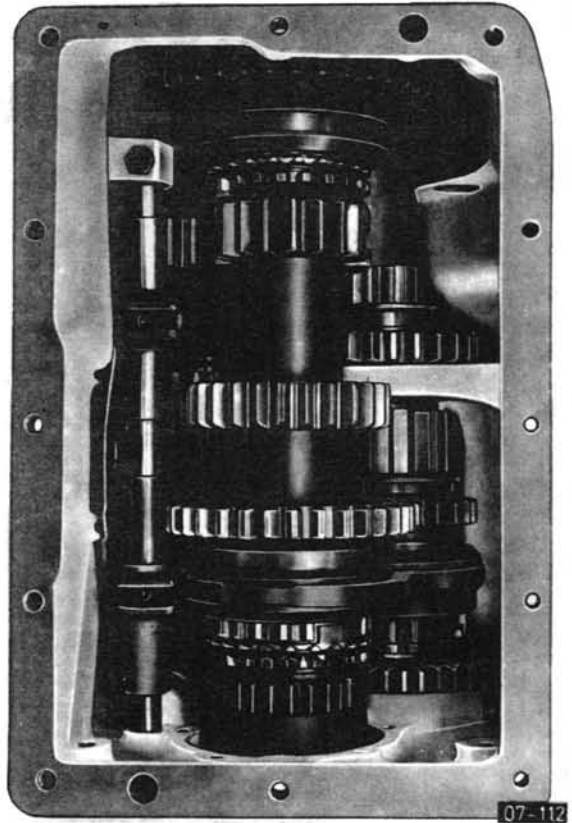


Fig. 26-4/1

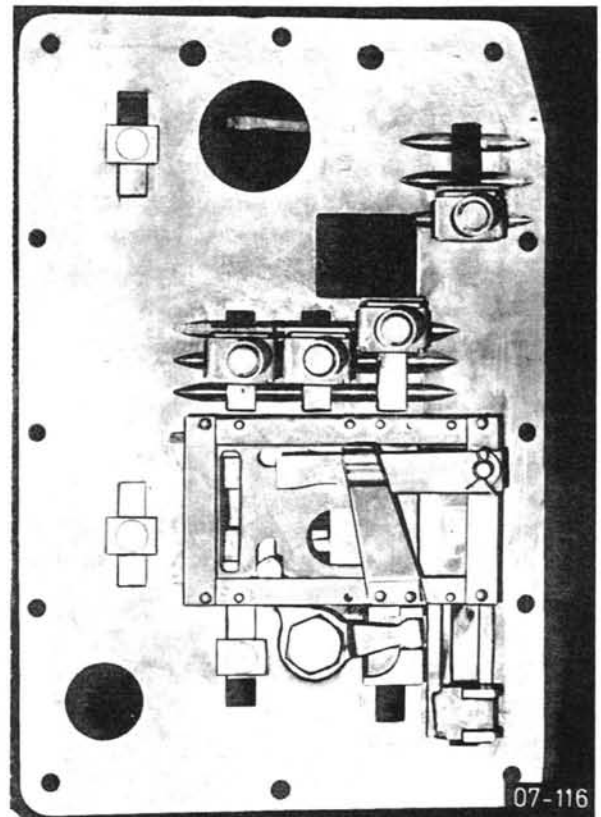


Fig. 26-4/2

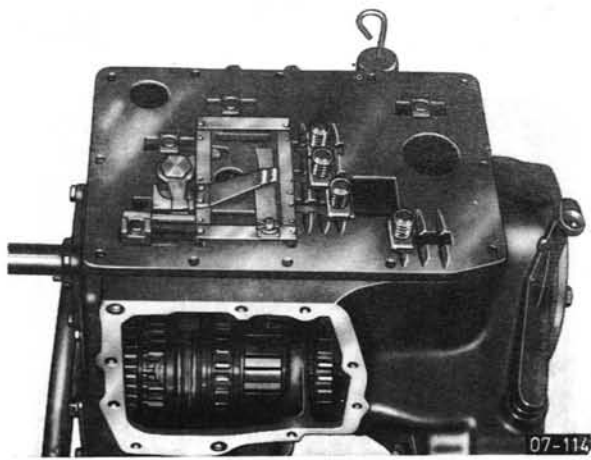


Fig. 26-4/3

II. Reconditioning of Shift Plate

A. Exchange Bell Crank Lever

1. Release punchmarks. Unscrew hex nut on bottom of shift plate and remove resilient serrated washer.
2. Remove cam bolt and bell crank lever.
3. Check cam bolt. Cam should be eccentric by 2 mm.
4. Check bell crank lever for distortion. The angle should be $115^{\circ} \pm 15'$.
5. Disengage pre-stage on shift plate. The rolls of the shifting tongues should be securely in the cut-in locks. For positions of shifting tongue refer to Fig. 26-4/2.
6. Disengage locking bolt for shift slide plate.
7. Clamp shift plate carefully into vise.
8. Insert crank bell lever with straight finger into shift slide plate and install cam bolt including the resilient serrated washer and nut.
9. Tighten nut on threads of cam bolt to the extent that the cam bolt can just be turned manually at its hexagon head.
10. Place head of offset crank bell lever finger against follower. Fig. 26-4/4.
11. Turn crank bell lever in direction of arrow until the **shift slide plate** has attained its end position by moving forward in direction of arrow.

Note: The drive gear for the pto drive is actuated by the shifting tongue on the transmission cover. Check whether shifting claw is correctly seated between pre-stages and main shaft.

With the shift plate properly seated, a play of 2-3 mm should be available within range of fastening bolts.

The engagement of the shifting tongue can also be checked by means of rod-type or tubular lamp inserted through the round or square hole of the shift plate.

Prior to mounting the transmission cover, pour some transmission oil on moving parts of shift plate.
12. The **follower** should now be able to move bell crank lever freely, with the air gap between the bell crank lever head and the edge on the **follower** amounting to approx. 0.5 mm. Fig. 26-4/4.
13. When the bell crank lever head knocks against the edge of the follower or when the gap is too large, correct by turning cam bolt, as required.
14. Reengage locking bolt.
15. In this position, there should still be a noticeable play in the longitudinal movement of the shift slide plate between the bell crank lever head of the bell crank and the pin of the locking bolt.
16. If not, the edge on the follower must be slightly refinished.
17. Also make sure that the bell crank lever moves freely after 25 mm travel. Fig. 26-4/4, dimension b.
18. Upon completion of the above steps, tighten nut on cam bolt, making sure that the bolt does not turn along. For this reason, hold cam bolt head in position with open end spanner.
19. Secure hex nut and bolt by means of two punchmarks against loosening.

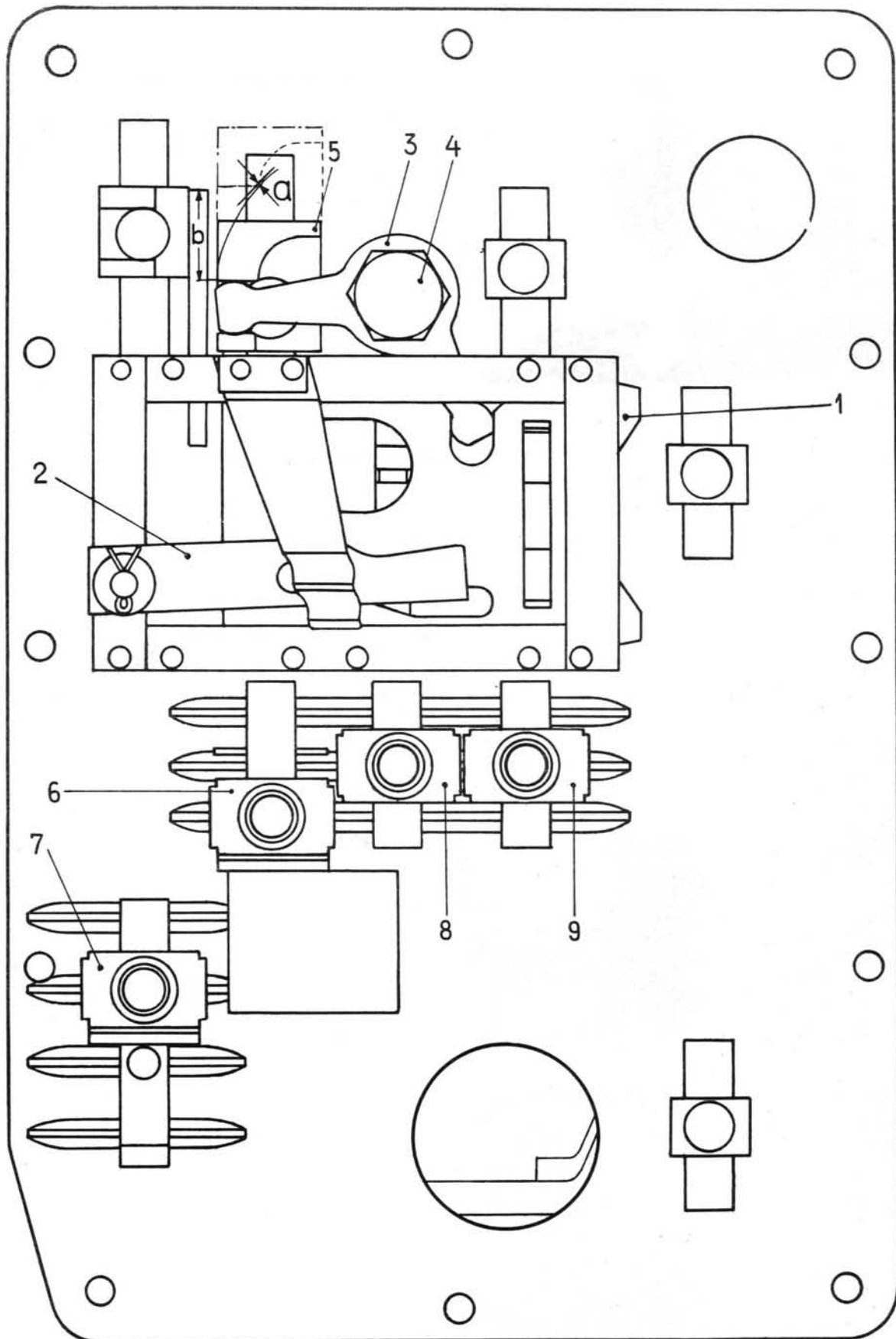


Fig. 26-4/4

- 1 Shift slide plate
- 2 Locking bolt
- 3 Bell crank lever
- 4 Cam bolt

- 5 Follower
- 6 Detent for pre-stage
- 7 Detent for forward and reverse
- 8 Detent for 5th and 6th gear

- 9 Detent for 1st/2nd or 3rd/4th gear
- Dimension a = approx. 0.5 mm
- Dimension b = 25 mm



Fig. 26-4/5

Installed at	Spring length mm
Shifting tongue of pre-stage shaft	19
Shifting tongue for 5th and 6th gear	19
Shifting tongue 1st, 2nd, 3rd, 4th gear	21
Shifting tongue for reverse gear	21

Fig. 26-4/6

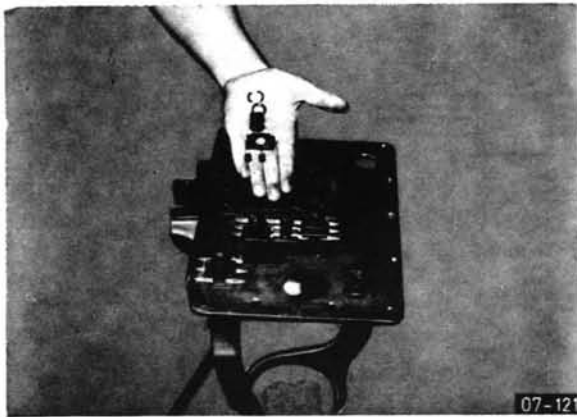


Fig. 26-4/7

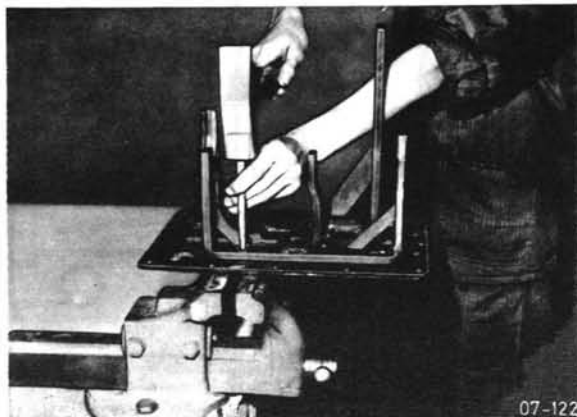


Fig. 26-4/8

B. Replacing Coil Spring of Detent

- Compress coil spring by pressing against spring retainer and remove 2-part safety ring.
Fig. 26-4/5.

- Remove spring retainer.

- Remove spring.

Caution! The four springs are of different length and therefore also of different pressure.

Refer to table Fig. 26-4/6.

C. Replacement of Shifting Tongues

- Remove coil spring of pertinent detent.

- Remove roller guide cover.

- Remove cyl. rollers.
Fig. 26-4/7.

- Punchmark and drill spring bolts and rivets of pertinent shifting tongue on bottom of shift plate. Knock out spring bolts and rivets with punch and remove shifting tongues including guide pieces and followers. Fig. 26-4/8.

Note: Always use new rivets and spring bolts!

D. Complete Replacement of Guide Rails for Shift Slide Plate

Note: Guide rails are removed only when shift plate is removed.

- Remove all parts described under item 1 to 27.

- Remove cotter pin from locking bolt, remove washer and locking bolt.
Fig. 26-4/4.

- Remove shift slide plate from guide rails.

- Carefully remove rivets from guide rails including detent spring.

- Check all parts for wear and replace defective parts.

- For reassembly proceed vice versa.

1. Wash and clean main shaft.
2. Remove front synchronizing ring.
3. Remove shifting sleeve front (before 5th gear wheel). This will release the 3 followers including balls and spring cups (bright spring housing).
4. Remove output gear with shifting sleeve. Fig. 26-5/1.

Note: Be sure that no rollers of cylindrical roller bearing are lost.

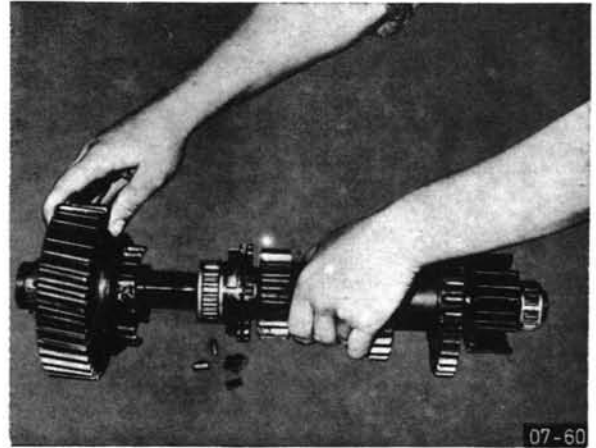


Fig. 26-5/1

5. Remove rollers from roller cage, remove cage.
6. Remove synchronizing ring.
7. Remove synchronizing sliding sleeve from output gear. This will release three followers, including balls and spring cups (black spring housing).
8. Clamp main shaft into vise, heat synchronizing cone and pull off with tool No. 000 589 89 33 00. Fig. 26-5/2.
9. Turn main shaft around in vise.
10. Remove locking ring and thrust ring.
11. Remove roller cage with rollers.
12. Remove locking ring in front of 5th gear wheel.
13. Pull off gear wheel for 5th gear and remove key. Fig. 26-5/3

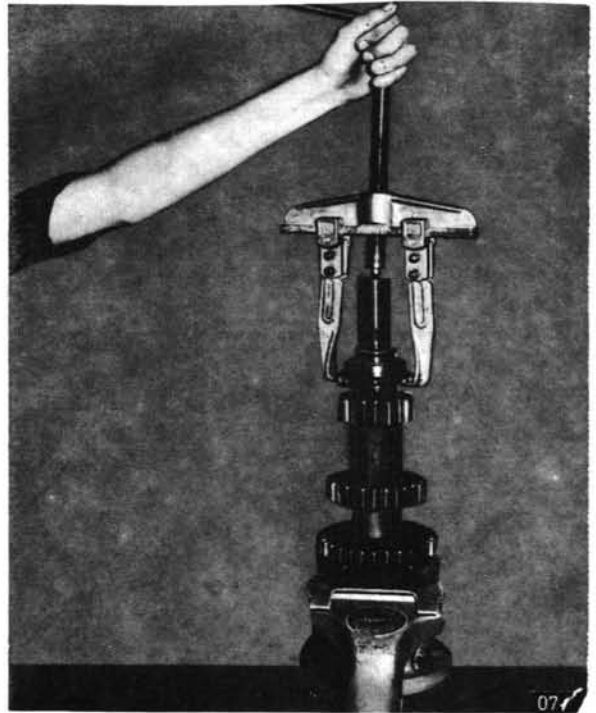


Fig. 26-5/2



Fig. 26-5/3

07-60

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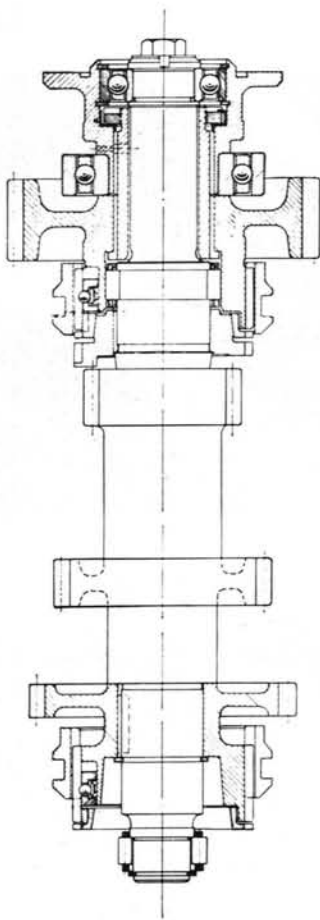
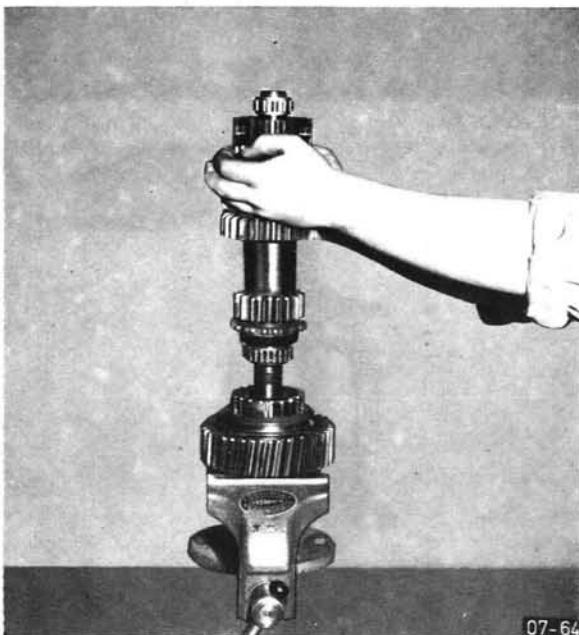


Fig. 26-5/4

07-63



07-64

Fig. 26-5/5

14. For reassembly proceed vice versa.
15. Clamp main shaft into vise.
16. Insert key and install 5th gear wheel with Installation Sleeve No. 401 589 11 61 00.
17. Install locking ring in front of 5th gear wheel.
18. Insert cylindrical rollers (10 each) with grease in cage and slide on main shaft.

Note: Do not use rollers with + tolerances.
19. Fit thrust ring and insert locking ring.
20. Turn main shaft in vise around. Heat synchronizing cone to 180°-200° C and mount quickly.
21. Insert the three followers with balls and spring cups (black housing) on output gear and position shift sleeve in such a manner that the three flats of the internal tooting are each located at the ball center of a follower.

Note: The wide flange of the shifting sleeve should face the **output gear**.

Fig. 26-5/4.
22. Slide on synchronizing ring.
23. Position roller cage and insert cyl. rollers (17 each) with grease. Slide on **output gear**.

Note: Watch out for uniform tolerance group. If the refitted output gear runs heavily or has too much play, exchange rollers against those of a thinner or thicker tolerance group.

The three tolerance groups are 0.-2 μ and -4 μ . When using new parts, be sure that the cage is behind edge of shaft, so that the output gear cannot collide.
24. Insert main shaft vertically from above into **output gear**.

Fig. 26-5/5.
25. Position the three followers with balls and spring cups (bright housing) on 5th gear wheel and fit shifting sleeve in such a manner that the wide collar faces the 5th gear wheel.
26. Insert front synchronizing ring.

1. Wash and clean pre-stage shaft.
2. Remove shifting sleeve in forward direction. This will release the three followers with balls and spring cups (blank housing).

Note: The wide flange of the shifting sleeve should face toward the front (in driving direction) during reassembly.

Fig. 26-6/1.

3. Remove shift gear for reverse speed.
4. Remove thrust washer.

Note: Install thrust washer with Installation Sleeve No. 401 589 01 39 00.

Fig. 26-6/2.

5. Pull off sliding sleeve.
6. Remove synchronizing ring.

Note: The play between the synchronizing ring and the follower should be 1.0 mm.

7. Replace set pins in pre-stage shaft front.

Note: When inserting the six set pins the slots should face in direction of rotation and the bevelled end forward.

Fig. 26-6/3.

8. Check all parts for wear and replace those which are defective.

9. For reassembly proceed vice versa.

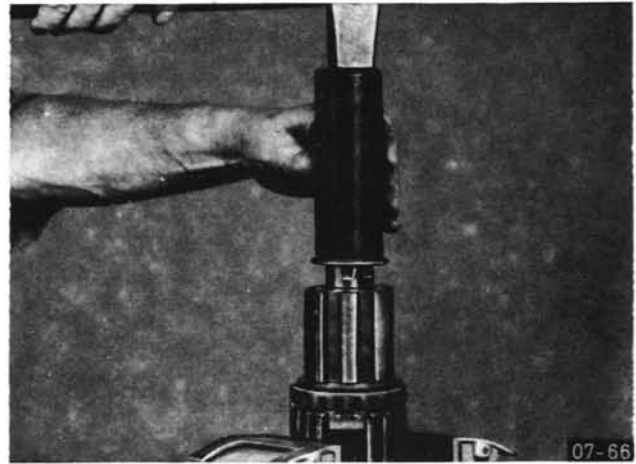


Fig. 26-6/2

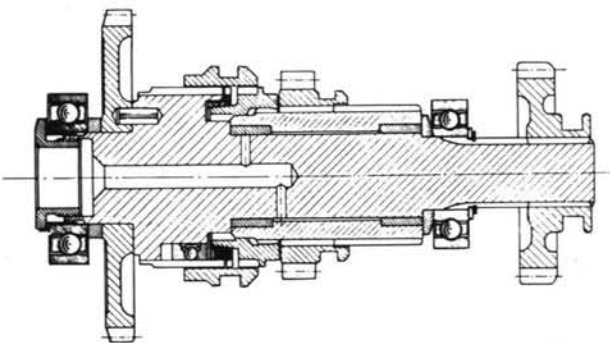


Fig. 26-6/1

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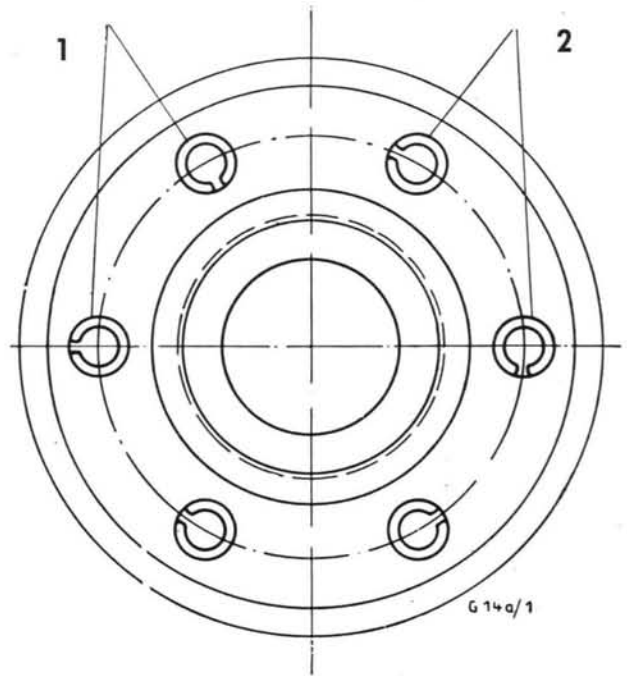


Fig. 26-6/3

1 wrong
2 right

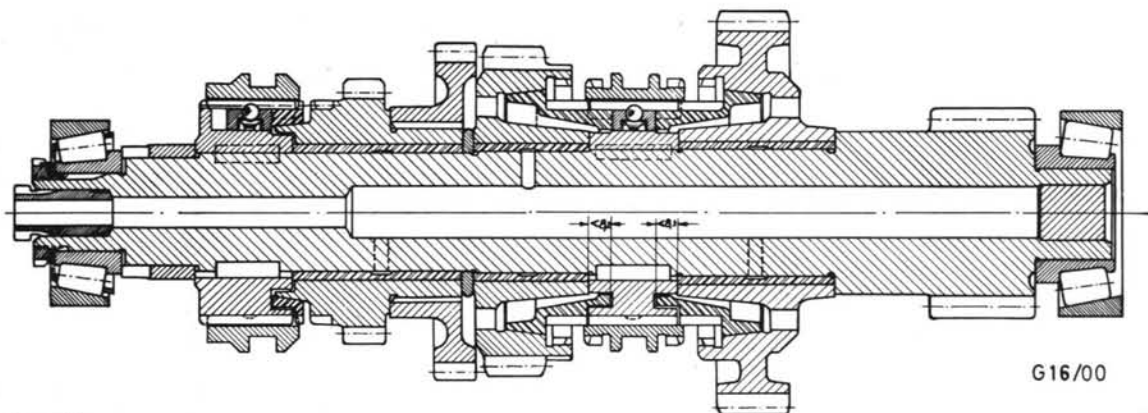


Fig. 26-7/1

Up to the end of 1970, the spring cups installed in drivers of shifting sleeves for 1st to 4th speed and 5th speed were **black**. Since early 1971, the spring cups installed in driver of shifting sleeve for 1st to 4th speed are **blank**, and the spring cups in driver for 5th speed are **yellow**.

1 Clamp counter shaft with 1st and 3rd gear wheel into vice and block shaft with shifting sleeve for 1st and 3rd speed.

2 Clean bore in output pinion for tachometer with twist drill 11 mm dia. from oil residue.

3 Pull pin of Tool 401 589 11 33 00 out of clamping sleeve and force clamping sleeve into drive pinion, so that the pinion front edge is approx. 5 mm away from threads of clamping sleeve.

Fig. 26-7/2.

4 Slip supporting bushing over clamping sleeve, screw-on hex. nut with washer and tighten slowly. Apply counter hold to clamping sleeve end.

Fig. 26-7/3.

5 Press pin into clamping sleeve until the knurled head projects still approx. 10 mm. The clamping sleeve will then expand and grip behind pinion end.

6 Clamp pulled out pinion into vise, knock out set pin, compress the expanded clamping sleeve with remover included in Tool 401 589 11 33 00 and take out of pinion.

Fig. 26-7/4.

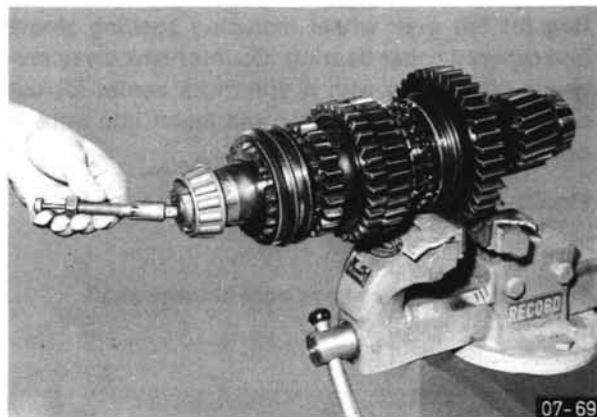


Fig. 26-7/2

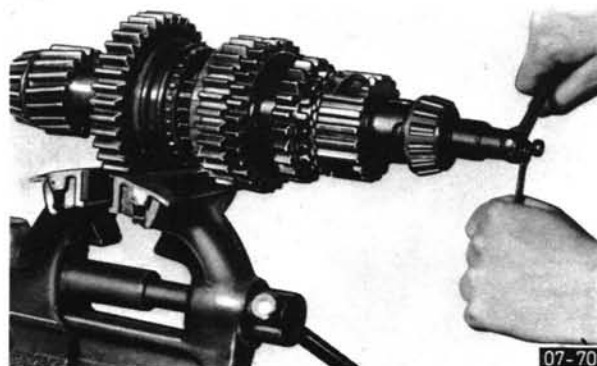


Fig. 26-7/3

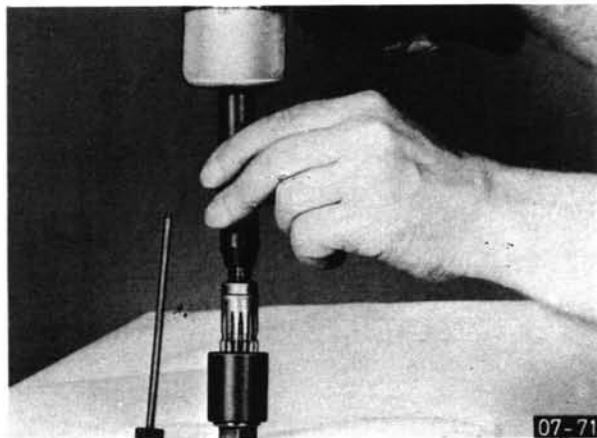


Fig. 26-7/4

7 Unlock slot nut and screw out with Slot Nut Wrench 406 589 02 07 00.

Fig. 26-7/5.

8 Remove locking plate and washer.

9 Pull off shifting sleeve. This will free the three drivers with balls and spring cups.

10 Apply a three-legged puller to pull the **driving ring** for 5th gear wheel including spacing sleeve and tapered roller bearing. Counter-sink an appropriate hex. screw with a drill in its center for use as a support for the puller and insert into bore of counter shaft.

Fig. 26-7/6.

11 Remove the two **keys** from counter shaft.

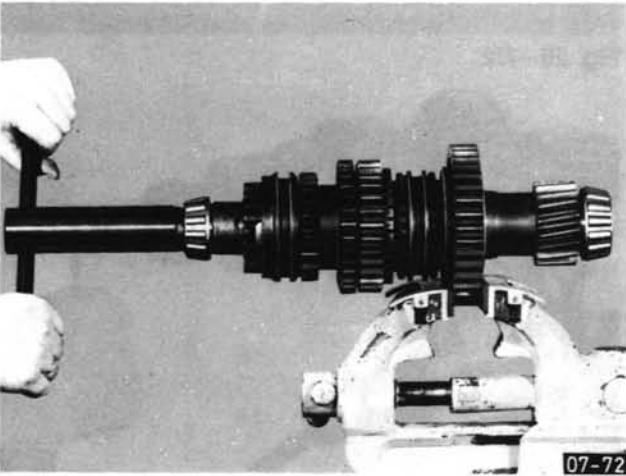


Fig. 26-7/5

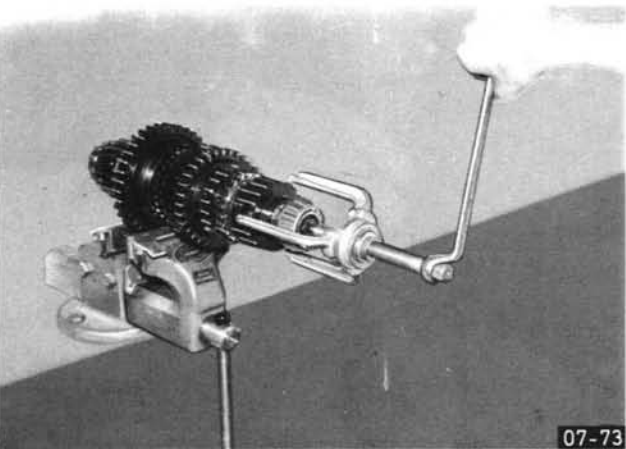


Fig. 26-7/6



Fig. 26-7/7

12 Clamp counter shaft vertically into vise and completely pull off the wheel block still remaining on shaft by means of Puller 000 589 89 33 00 and extended Legs 00 589 90 33 00.

Fig. 26-7/7.

13 Cut bushing of 1st and 3rd gear with a chisel, if required, and remove.

14 Pull-off tapered roller bearing at shaft end.

15 Drill closing plug out of counter shaft rear for cleaning oil bores in shaft, if required, and replace.

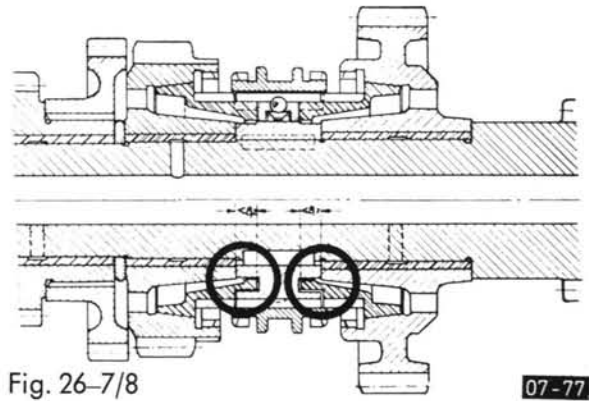
16 Check all parts for wear and replace defective parts.

17 For assembly proceed vice versa.

18 Clamp counter shaft vertically into vise.

20. Install 1st and 3rd gear wheel with shifting teeth up.

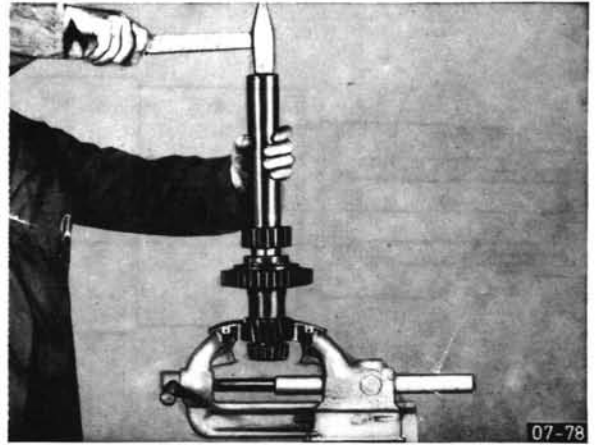
Note: The radial play between the bushing and the 1st/3rd gear wheel should be 0.13 to 0.19 mm. The axial play is approx. 0.3 mm (bushing should project).



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21. Insert synchronizing ring into 3rd gear wheel.

Note: The dimension from upper edge of synchronizing ring to upper edge 1st and 3rd gear wheel should not exceed 8.2 mm. Fig. 26-7/8.



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22. Insert the two **keys**.

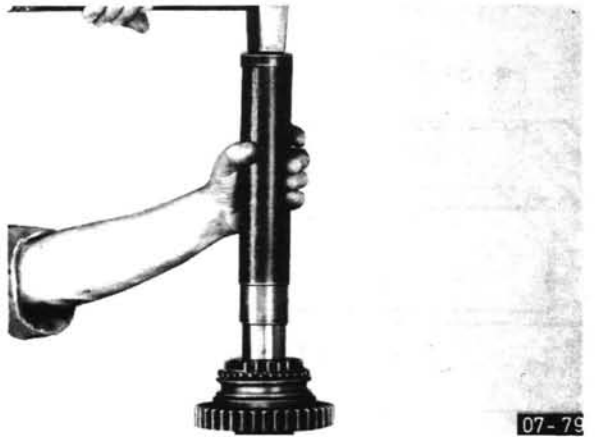
23. Force in follower ring for 1st to 4th gear with Installation Sleeve 401 589 11 61 00. Fig. 26-7/9.

Note: The teeth of the **follower ring** are each thicker in the center on one end. This thicker area should face toward the **right**, seen in driving direction, when installed.

24. Insert **follower** with balls and spring cups (black housing) and install shifting sleeve for 1st to 4th gear.

Note: These three followers are the only ones in the transmission which are of rectangular shape.

25. Install bushing for 2nd and 4th gear by means of Installing Sleeve 401 589 11 61 00. Remove burr, if any. Fig. 26-7/10.



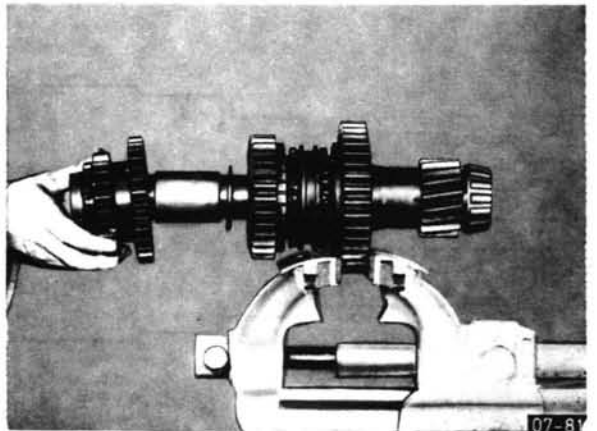
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26. Insert synchronizing ring in 2nd/4th gear wheel.

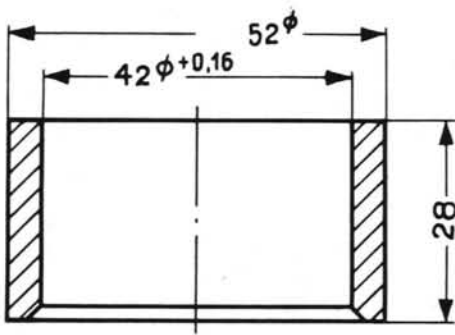
Note: The dimension from top edge of synchronizing ring to top edge of gear wheel should not exceed 8.2 mm. Fig. 26-7/8.

27. Install synchronizing ring and gear wheel for 2nd and 4th gear.

Note: Bushing should project approx. 0.30 mm.

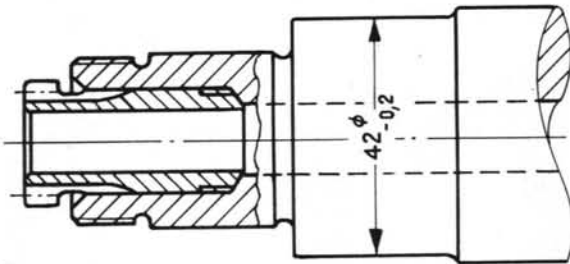


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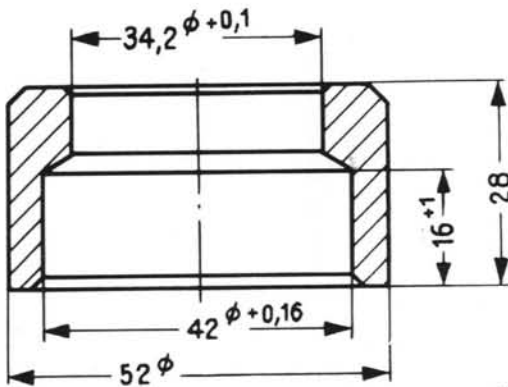
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Fig. 26-7/12



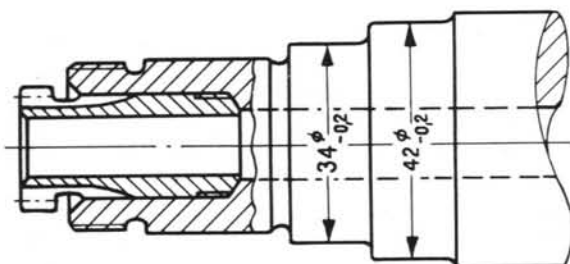
07-84

Fig. 26-7/13



07-85

Fig. 26-7/14



07-86

Fig. 26-7/15

28. Position thrust ring.
29. Install bushing for 5th and reverse gear by means of Installation Sleeve 401 589 11 61 00.
30. Install 5th and reverse gear wheel. Fig. 26-7/11.
Note: Bushing should project approx. 0.30 mm.
31. Insert the two **keys**.
32. Insert synchronizing ring for 5th gear wheel.
33. Install **follower ring** for 5th gear wheel by means of Installation Sleeve 401 589 11 61 00 in such a manner that the projecting hub points downward.
Note: The **follower ring** should project slightly opposite the shaft step.
34. Insert the three **followers** with balls and spring cups (black housing) and position sliding sleeve with wide flange up in such a manner that the three flats of the internal teething are each aligned to the ball center of the **followers**.
35. Install spacer sleeve.
Old version of spacer sleeve.
Fig. 26-7/12.
Pertinent countershaft
Fig. 26-7/13.
Note: If the countershaft of the old version is exchanged against a countershaft of the new version, also install a spacer sleeve of the new version. The spacer sleeve should project slightly across the front shaft step. If the countershaft need not be replaced and if a spacer sleeve with the four recesses is still installed, replace by version shown in Fig. 26-7/12.
New version of spacer sleeve
Fig. 26-8/14.
Pertinent countershaft
Fig. 26-7/15.
36. Install front tapered roller bearing by means of Installation Sleeve 401 589 12 61 00.

37. Mount shim and lock washer.
38. Tighten grooved nut with Pin Spanner 401 589 05 07 00 and secure.
Fig. 26-7/16.

Tightening torque max. 8-10 mkp.

39. Install rear tapered roller bearing by means of Installation Sleeve 401 589 04 61 00.
Fig. 26-7/17.
40. Force in drive pinion for speedometer.

Note:

With shaft removed or installed, undercool pinion and force in. The pinion should be inserted up to shoulder of countershaft and for this reason the hold depth up to shoulder should first be measured, followed by checking the dimension of the projecting part of the pinion. Pinion should project 7.3-0.7 mm.

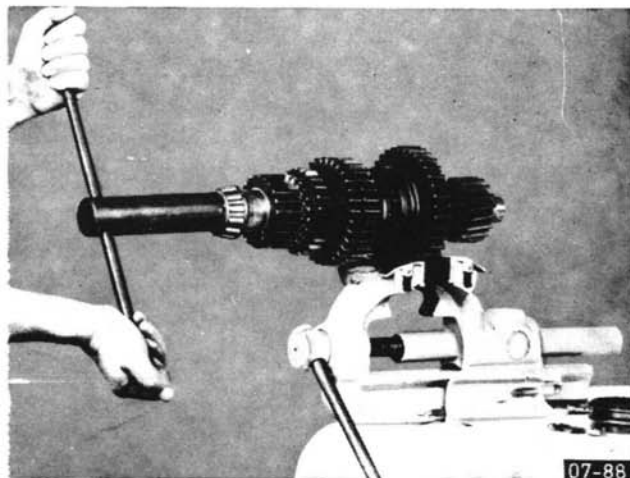


Fig. 26-7/16

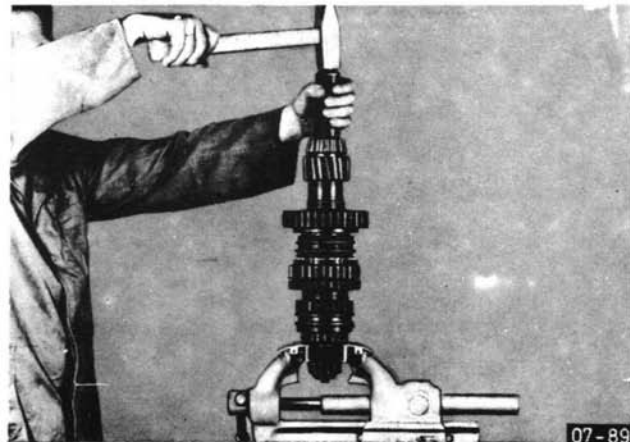


Fig. 26-7/17

1. Remove bearing cover and seal from bearing flange.
Fig. 26-8/1.

Note: Always use new seal.

2. Clamp drive shaft into vise and unlock grooved nut in bearing flange.

Note: Always insert new locking washer during assembly.

3. Unscrew grooved nut with Pipe Spanner 401 589 07 07 00.
Fig. 26-8/2.

4. Force drive shaft out of bearing flange.

5. Remove locking ring on grooved ball bearing from bearing flange.

6. Pull grooved ball bearing out of bearing flange.

Note: Force in grooved ball bearing during assembly by means of Installation Sleeve 401 589 05 61 00.
Fig. 26-8/3.

7. Check all parts for wear and replace those which are defective.

8. For reassembly proceed vice versa.

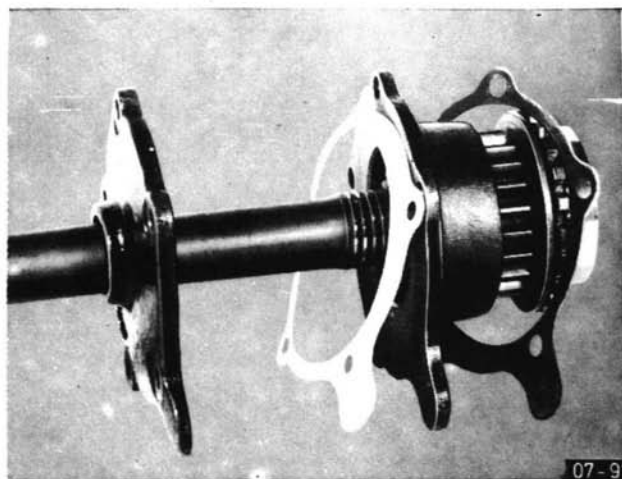


Fig. 26-8/1

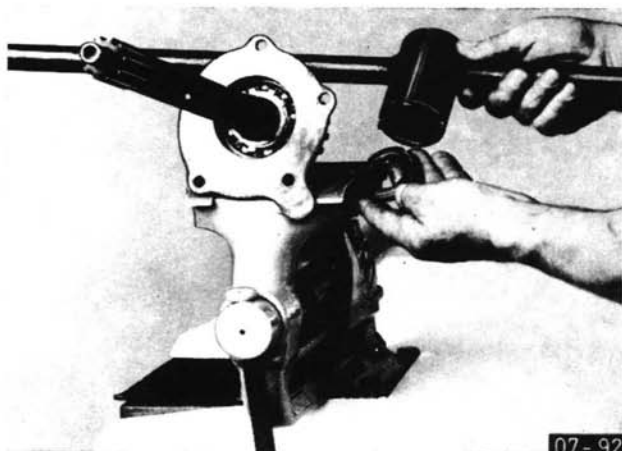


Fig. 26-8/2



Fig. 26-8/3

Disassembly and Reassembly of Bearing Flange for Axle Drive

1. Remove sealing ring from bearing flange.
2. Remove two locking rings from bearing flange.
3. Remove oil feed ring.
4. Force out grooved ball bearing.
5. Check all parts for wear and replace those which are defective.
6. For reassembly proceed vice versa.
7. Insert locking ring.
8. Position bearing flange on Fixture 401 589 00 31 00.
9. Force in grooved ball bearing using Installation Sleeve of Fixture 401 589 00 31 00.
Fig. 26-9/1.
10. Insert oil feed ring. Insert locking ring.
11. Position sealing ring and force in.
Fig. 26-9/2.

Note: Sealing rings have a spiral grinding pattern and are therefore different for front and rear axle drive. Sealing rings may not be interchangeable and are therefore identified on cage. Shaft sealing ring for front axle drive
DB No. 99.2990.1008-00.

Right-hand spiral. Fig. 26-9/3.
Shaft sealing ring for rear axle drive
DB No. 99.2990-1009-00. Left-hand spiral.
Fig. 26-9/3a



Fig. 26-9/2

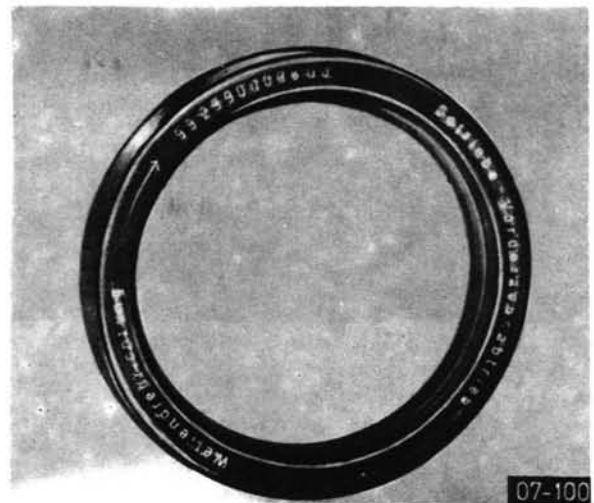


Fig. 26-9/3

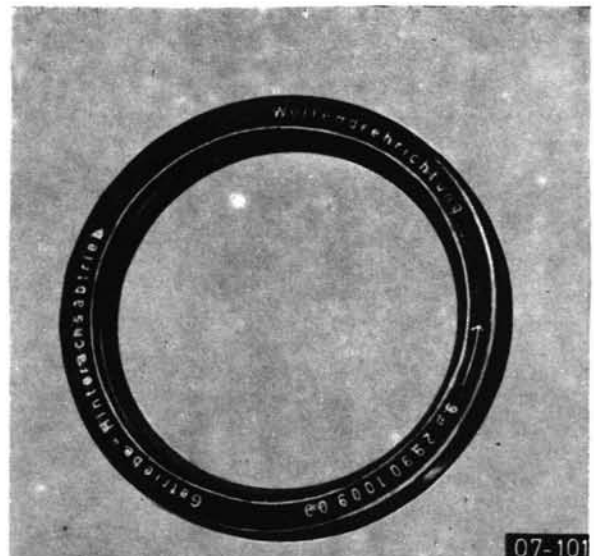


Fig. 26-9/3a

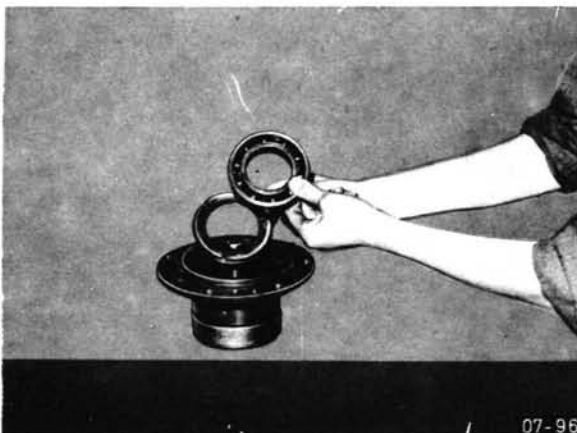


Fig. 26-9/1

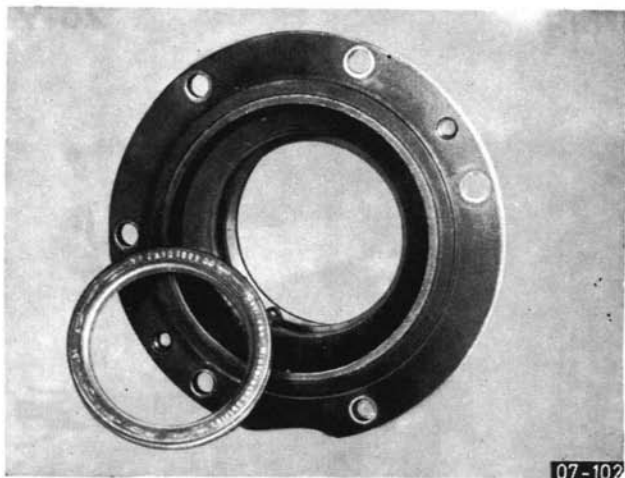


Fig. 26-9/4

Formerly, sealing rings with the following code colours were installed in sequence: black – blue – white – red.

Note that only **red sealing rings** may be installed as from now.

In the event of transmission repairs, replace all sealing rings which have another colour against red sealing rings.

The direction of rotation indicated on the sealing rings always refers to the flange seen from the front.

Fig. 26-9/4.

Note:

Each time a sealing ring on the front axle pto. is replaced, also replace felt plug in shaft for front axle pto.

1. Remove hollow screw. Remove defective felt plug with drill 8.5 mm dia. Clean drilled hole well (compressed air).
2. Insert new felt plug soaked with oil into shaft until **one** thread of the M-10-threads shows up. Then screw in felt plug by means of hollow screw.

Fig. 26-9/5.

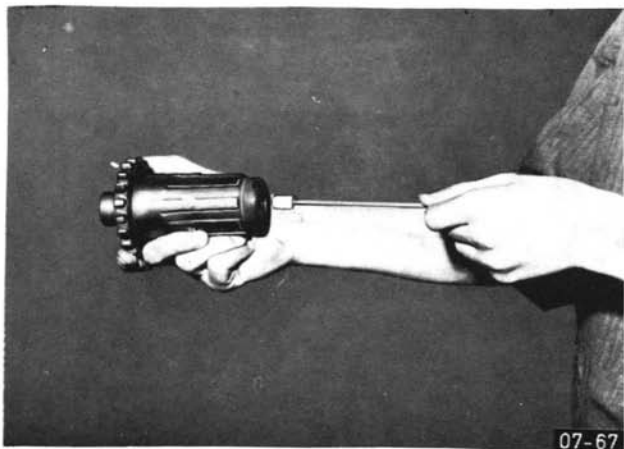


Fig. 26-9/5

I. Removal and Installation

1. Unflange special take-off on transmission housing.
Fig. 26-10/1.
2. Remove gaskets and sealing rings.
3. Clean sealing surfaces well.
4. Coat new gasket on both sides with sealing compound. Always use new seals and sealing rings.
5. Screw special take-off to transmission housing.

Note: During installation, be sure that the hexagon bolts, which are of different length, are entering the correct screw hole. Insert screws and set pins according to Fig. 26-10/2.

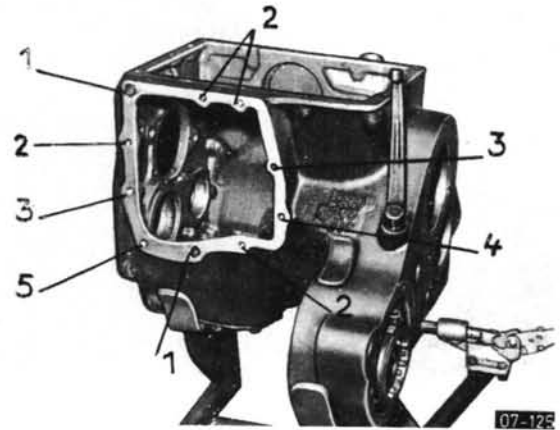


Fig. 26-10/2

Set pin and screw	1 35 mm	4 40 mm
	2 30 mm	5 25 mm
	3 20 mm	

II. Disassembly and Assembly

A. Intermediate Shaft

1. Unlock grooved nut of intermediate shaft and unscrew with Pin Spanner 401 589 05 07 00. Remove lock washer.
Fig. 26-10/3.
2. Remove locking ring on shaft rear.
Fig. 26-10/4.
3. Remove locking ring from seat behind drive gear (in shaft center) and leave loosely on shaft. Fig. 26-10/5.
4. Force intermediate shaft **from the rear toward the front** until the drive gear on the rear shaft end can be removed, as well as the grooved ball bearing at the shaft front.

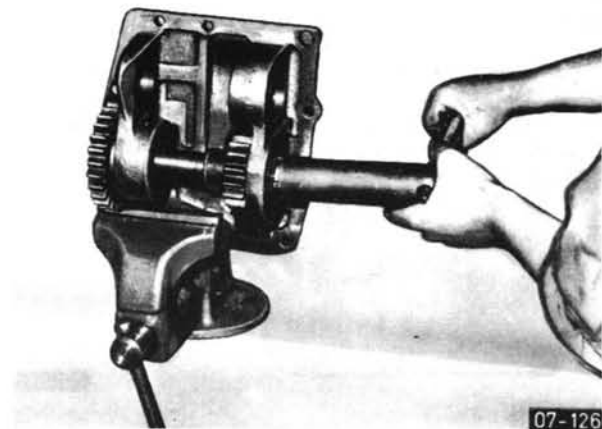


Fig. 26-10/3

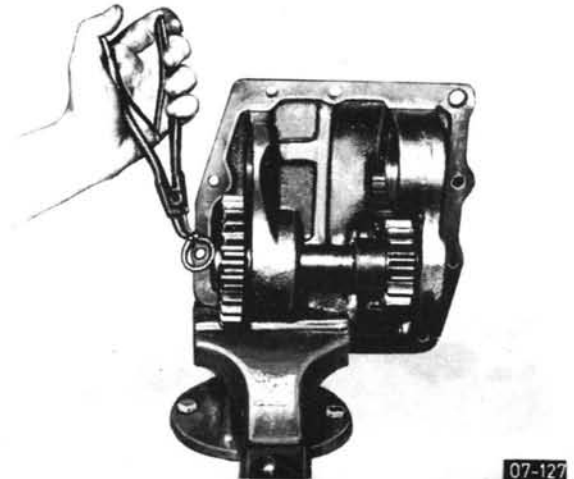


Fig. 26-10/4

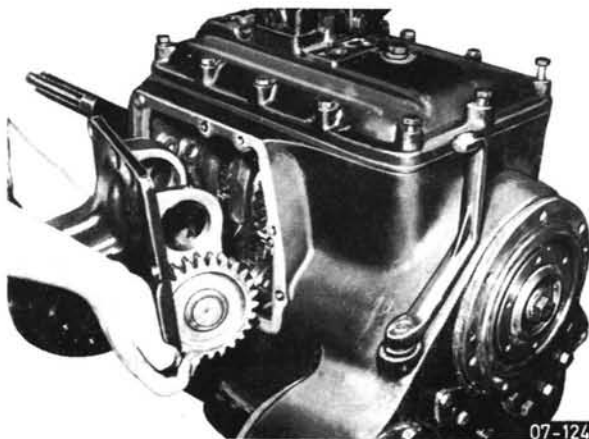


Fig. 26-10/1

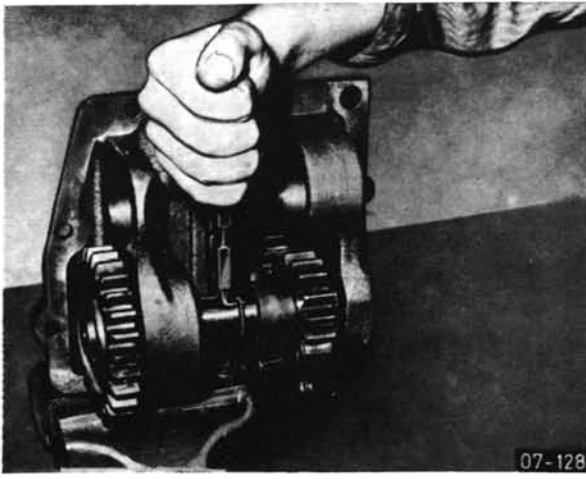


Fig. 26-10/5

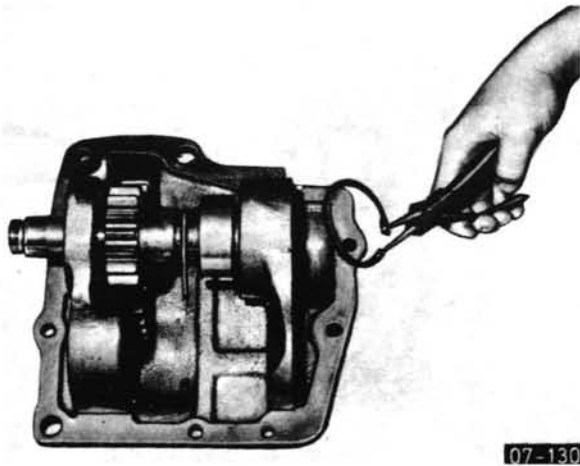


Fig. 26-10/6



Fig. 26-10/7

5. Remove locking ring behind drive gear (locking ring pliers).
Fig. 26-10/6.
6. Force intermediate shaft out toward the rear. Watch out for the two locking rings in shaft center, which should be lifted from the groove in each case.
7. Remove drive gear, spacing tube, locking rings and shaft together with tapered ball bearing.
8. Remove locking ring from rear bearing boss.
9. Remove tapered ball bearing and locking rings from shaft. Take keys out of shaft.

B. Output Shaft

Fig. 26-10/7.

10. Remove cotter pins on both sides from castle nut and unscrew, remove together with washer.
 11. Pull off both output flanges.
(Conventional puller.)
 12. Unscrew cover on both sides and remove with sealing ring front or seal and fitted washer rear.
- Note:** Always place **new sealing rings** under hexagon bolts.
13. Force output shaft out toward the rear. This will free the rear grooved ball bearing and the spacer ring for removal.
 14. Remove output gear.
 15. Remove shaft and key.
 16. If required, unscrew the two studs in shaft and replace.
 17. Force front grooved ball bearing out of housing.
 18. Check all parts for wear and replace those which are defective.
 19. For reassembly proceed vice versa.

1. Unscrew cheesehead screw holding shift lever and remove shift lever.
2. Remove holding plate and bushing.
3. Unscrew bearing flange with spacing tube from housing.
4. Remove bearing flange with spacing tube from housing and pull out spacing tube.

Note: Always use new seal.

A. Shaft with Two-gear Block (Shaft I)

Fig. 26-11/1.

5. Loosen cheesehead screw.

Fig. 26-11/2.

Tightening torque 3 mkp.

Note: Upon assembly, fill recess with filling compound.

6. Knock out shaft I and remove two-gear block.
7. Remove both locking rings on two-gear block on bearing bushing.
8. Remove bearing bushing with spacer sleeve, needle bearing and thrust washer from two-gear block.

B. Shaft with Intermediate Gear

(Shaft II, refer to Fig. 26-11/1)

9. Pull out set pin.
10. Knock out shaft II for intermediate gear and remove intermediate gear.
11. Remove locking ring from bearing bushing.
12. Remove bearing bushing, needle bearing and thrust washer from intermediate gear.
13. Remove shift fork.

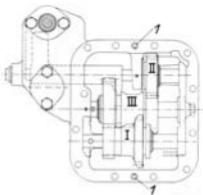


Fig. 26-11/1

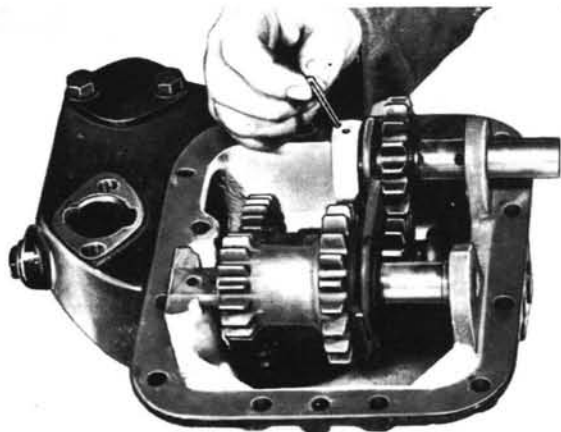
- I Shaft with two-gear block
- II Shaft with intermediate gear
- III Shaft with intermediate gear block
- 1 Correct location of set pin



Fig. 26-11/2

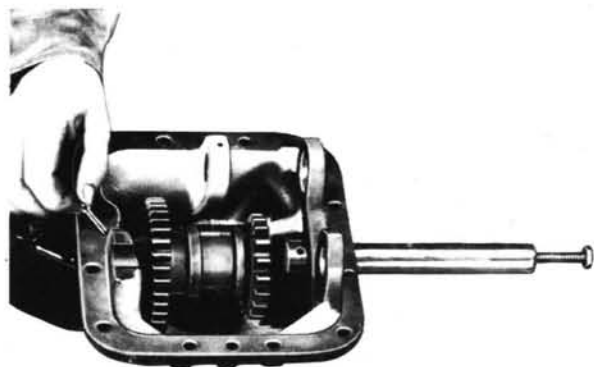


Fig. 26-11/3



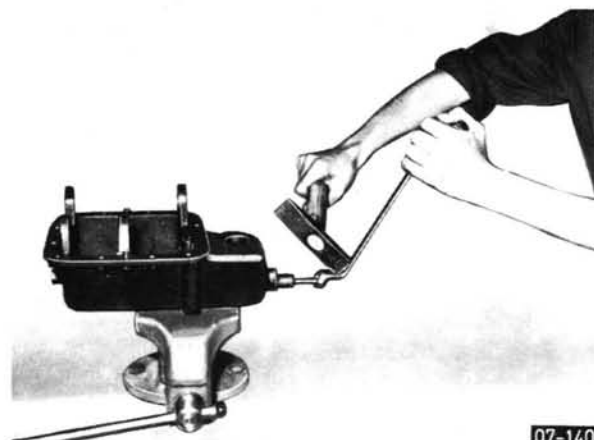
07-137

Fig. 26-11/4



07-139

Fig. 26-11/5



07-140

Fig. 26-11/6

C. Shaft with Intermediate Gear Block (Shaft III, refer to Fig. 26-11/1)

14. Remove set pin.

15. Screw hexagon bolts into face end of shaft III and pull out shaft.
Fig. 26-11/5.
16. Remove intermediate gear block, compensating washer and sealing ring in housing.
17. Remove locking rings from bearing bushing and thrust washer.
18. Remove bearing bushing, needle bearing with spacer bushing from intermediate gear block.

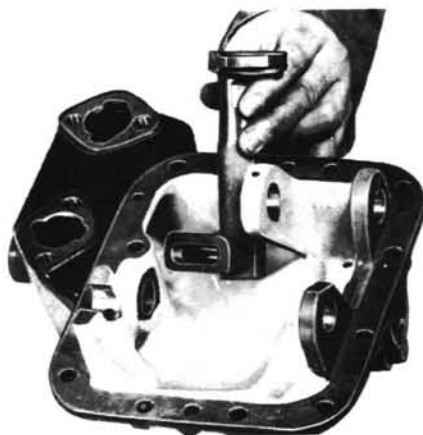
D. Gear Shifting Shaft

19. Remove set pin from gear shifting shaft.
20. Unscrew closing screw with sealing ring from other shaft end.
21. Screw hex. bolt M 10 into shaft and pull out shaft.
Fig. 26-11/6.

Note: For this purpose, turn shaft by means of screw to the right by 90° and push into housing. This will free the locking ball and spring on shifting claw for removal.

Note: During installation, and prior to unscrewing hexagon bolt from shaft, knock down set pin which keeps the shaft from turning.

22. Remove shifting claw.
Fig. 26-11/7.
23. Check all parts for wear and replace those which are defective.
24. For reassembly proceed vice versa.



07-141

Fig. 26-11/7

I. Replacement of Clutch Pedal

1. Remove inner engine cover.
2. Unscrew floor plate on pedals.
3. Loosen clutch push rod on clutch actuation lever (remove cotter pin).
4. Knock notch pin from clutch pedal on shaft and loosen locking screw of shaft.
Fig. 29-1/1.
5. Disconnect return spring from clutch pedal.
Fig. 29-1/2.
6. Pull out shaft toward engine end by turning clutch actuation lever back and forth until pedal is released.
7. Pull out pedal in upward direction.

Note: Check whether pedal shaft shows wear and replace, if required, together with guide bushing.

8. For reassembly proceed vice versa.
9. Adjust clutch play.

II. Replacement of Brake Pedal

1. Remove clutch pedal first, as described under I, item 1 to 7.
2. Disconnect return spring from brake pedal.
3. Remove cotter pin from fork head of push rod to master brake cylinder and remove.
Fig. 29-1/3.

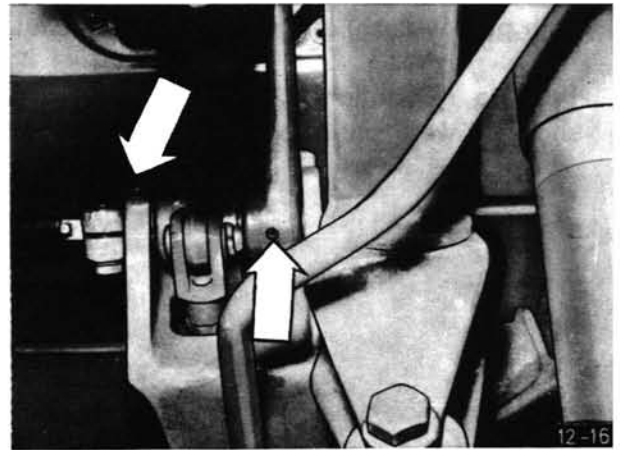


Fig. 29-1/1



Fig. 29-1/2

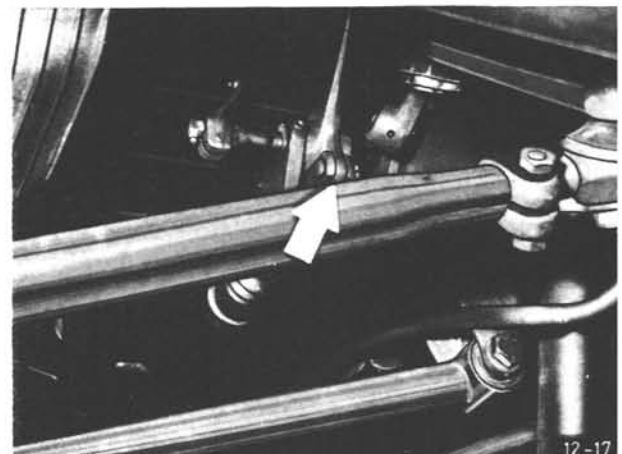


Fig. 29-1/3

4. On right-hand pedal carrier end, loosen locking screw M 6 which secures the slide bushing of brake pedal against rotation. Then knock out bushing (if required, remove with pipe wrench) and remove brake pedal.

Prior to reinstallation, check bushing and shaft for wear and replace, if required. For

reassembly proceed vice versa. Slots of locking pin should be crosswise to shaft.

Note: Upon completion of the reassembly, adjust piston rod for master brake cylinder to 1 mm play. This play can be set by turning the piston rod (loosen conternut first).

Removal and Installation with Tilting Cab

1 Protect vehicle against moving off (pull hand brake).

2 Remove outer engine hood.

3 Loosen brake fluid line from clutch master cylinder.

Note: Catch emerging brake fluid. Keep brake fluid away from paintwork, since fluid will destroy the paint.

4 Pull dust cap from piston rod of clutch master cylinder as well as line between brake fluid reservoir and master brake cylinder.

5 Unscrew fastening screws for clutch master cylinder. Remove clutch master cylinder in forward direction.

6 Unscrew fastening screws for console of brake or clutch pedal at rear top. Unscrew fastening nuts for console of brake pedal front.

7 Remove console with pedal and piston rod in inward direction.

8 For reconditioning of pedal assembly refer to Job No. 29-2.

9 For installation proceed vice versa.

Note: Attach return spring of clutch pedal only when the clutch master cylinder was been installed. In rest position of clutch or brake pedal, the piston rod toward clutch master cylinder or single chamber brake booster should have approx. 1 mm play on piston.

Adjust this pedal play (lash) at adjusting screw (cam screw) by which the piston rod is connected to pedal. This play should amount to approx. 10 mm measured at pedal upper edge.

However adjust clutch play only between clutch slave cylinder and clutch lever. Job. No. 25-2.

- 1 Removing pedal from console:
Unscrew hex. nut.
Pull hex. screw out of pedal bearing.
- 2 Force bearing sleeve out of bearing bushings.
- 3 Take pedal out of console.
- 4 Remove piston rod, if required.
 - a) Unscrew hex. nut.
Remove together with snap ring.
 - b) Pull adjusting screw (cam screw) out of pedal.
 - c) Remove bearing bushings.
- 5 Check all parts thoroughly for wear and damage. Parts damaged or worn beyond wear limit should no longer be used.
- 6 Replace bearing bushings, if required:

The two bearing bushings in pedal are made of plastics. They limit both the lateral play of the pedal as well as the radial play in relation to bearing sleeve. If play is noticed, be sure to replace both bearing bushings.

Press-in the new bearing bushings with overlap. Use pertinent installation mandrel of approx. 19 mm dia. and pertinent support. Do not distort! In the event of refinishing, use only machine reamer at low speed while simultaneously applying some oil for lubrication when reaming bushings. High speed will result in heat welding of bearing bushings and reamer.

- 7 For assembly proceed vice versa.

Note: Lateral play of pedal should be max. 1.5 mm. Protect bearing sleeve with a few drops of oil against corrosion.

- 1 Remove outer and inner engine hood.
- 2 Remove linkage at bottom of chassis from control shaft and following lever.
- 3 Unscrew hex. nut from angle lever shaft and pull off pedal.
- 4 Disconnect return spring of angle lever and pulling wire of hand throttle control. Remove angle lever.
- 5 If required, remove bearing bushings for angle lever shaft.
- 6 Remove roller from angle lever.
- 7 If required, remove following lever.
- 8 Disconnect return spring from bracket on cylinder crankcase.
- 9 Remove pull rod between control lever and adjusting lever of injection pump.
- 10 Remove control lever from control shaft. Remove control shaft.

11 Check all parts thoroughly for wear and damage. Parts damaged or worn beyond wear limit may not be used again.

12 If required, replace roller.

13 If required, replace bearing bushings:

The two bearing bushings in bearing for angle lever shaft are made of plastics. They limit both the lateral play of the angle lever as well as the radial play in relation to angle lever shaft. When play is noticed, be sure to replace both bearing bushings.

14 For installation proceed vice versa. The following items should be **particularly** observed:

- a) During installation, coat angle lever shaft with molybdenum disulfide paste (Molykote Paste G Rapid).
- b) Protect bearing of angle lever shaft with a few drops of oil against corrosion.
- c) The pedal control is adjusted at lever arm of control shaft.

- 1 Remove outer and inner engine hood.
- 2 Loosen pulling wire on clamp. Remove clamp and hemisphere.

Note: Clamp and hemisphere have been replaced by an adjusting ring.

- 3 Remove intake pipe.
- 4 Remove heater hose left.
- 5 Remove protective cap of hand throttle control.
- 6 Loosen slot nut and remove together with toothed washer.

Note: The slot nut has been replaced by a hex. nut.

- 7 Remove bell. Watch out for spring underneath!
- 8 Pull detent lever with hub and cyl. pin from shaft.

9 After loosening both fastening nuts, pull spring cup, cup spring, thrust washer, friction disc, pulley lever and friction disc from bearing flange from direction of cab front end.

10 Pull off bearing flange and detent in inward direction.

11 If the hand throttle control operates too easily, replace the two friction discs.

12 If hand throttle control is hard to move, check whether detent lever has been forcibly distorted. The pulling lever shaft may also be bent. Replace distorted or bent detent lever since lever may break while straightened.

13 Check all parts thoroughly for wear and damage. Parts damaged or worn beyond wear limit may not be used again.

14 For installation proceed vice versa.

For accurate and thorough measuring the vehicle frame should be completely dismantled. Then place on two supports free of distortions. Check supports with spirit level.

Clean frame and check for cracks and loose components. In particular, check rivet seat and screw connections.

Distorted side members, cross members and crossies may be straightened if distortions and deviations are low.

Badly distorted frames as the result of accidents are scrapped since the quality and freedom from cracks of welding connections can no longer be guaranteed after straightening.

The frame dimensions are shown on the reference drawing below and should be maintained. Fig. 31-1/1.

When exchanging the frame, punch chassis no. again on right-hand frame side member (front).

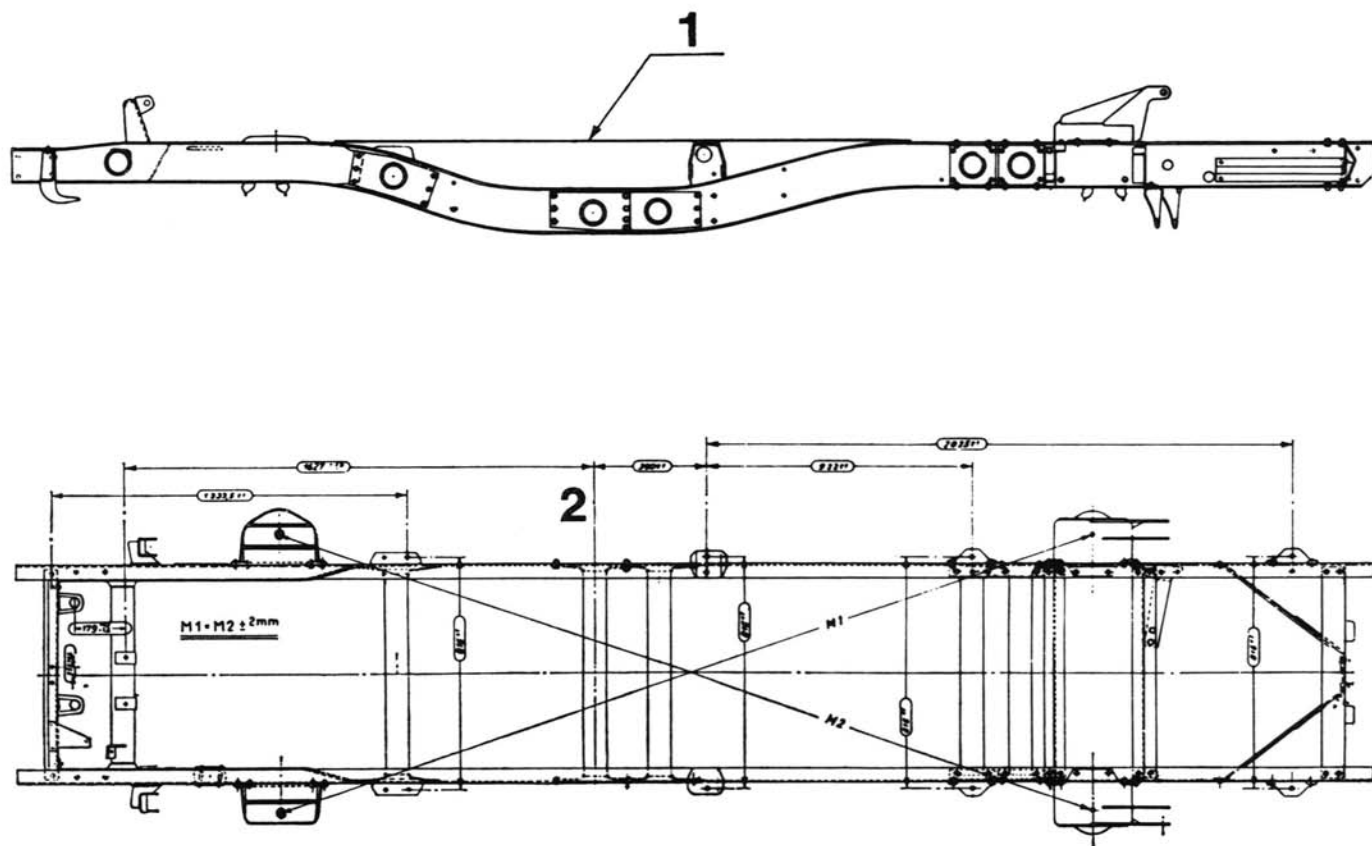


Fig. 31-1/1

- 1 Gauge bar for buckling test
- 2 Engine mountings
- 2 Power train mountings

I. General Information

Manufacturer	Rockinger
Type	227/G 110 D
Coupling jaw with pull rod	
axially rotatable	360°
with detents each	180°
Hand lever	
position	left upwards
repluggable	yes
Tightening torque castle nut SW 45 of pull rod	50 to 75 kpm
Tightening torque	
fastening bolts	—
fastening nuts	6 kpm
Lube nipple	
coupling jaw	1
springs	2
Lubricant	Molybdenum Disulfide Paste
Control pull knob	left
Automatic coupling for towing eye assured	DIN 74 054 British SMMT No. 53 NATO
Towing eye	
horizontal swivel	2 x 76°
vertical swivel	2 x 30°
NATO	
DIN 74 054	
axially rotatable	2 x 25°
DIN 74 054	—

31-2 Trailer Coupling

II Automatic Trailer Coupling Rockinger Type 227/6 110 D



Fig. 31-2/1



Fig. 31-2/2



Fig. 31-2/3

When installing this trailer coupling, the following instructions should be observed:

The final nut of the pull rod is tightened by the manufacturer to a tightening torque of 50 to 75 kpm prior to drilling the cotter pin hole. Unscrew final nut for installation. Upon installation of spring housing and coupling jaw, screw-on final nut together with pull rod (SW 45) and tighten to a **torque of 50 to 75 kpm** in such a manner that the cotter pin hole is in correct position for inserting pin. Secure nut with pin. Mount protective cap.

Tighten fastening nuts for studs in flange of spring housing to a **tightening torque of 6 kpm** and secure with cotter pins.

For replugging proceed as follows:

- a) Remove cotter pin and washer.
- b) Place self-made guide mandrel on end of hand lever in such a manner that the surfaces of the guide mandrel and the hand lever end are in alignment. Fig. 31-2/1.
- c) Remove hand lever carefully by means of the guide mandrel and keep checking whether guide mandrel enters without canting.
- d) Knock guide mandrel down until hand lever drops out. Fig. 31-2/2.
- e) Position hand lever at opposite end and insert carefully until guide mandrel drops out. Fig. 31-2/3.
- f) Slip-on washer and insert cotter pin.

I. Test Values for Shock Absorber Test on Testing Machine

Table 32-1

Strokes/min	Stroke mm	High pressure kp		Low pressure kp	
		max.	min.	max.	min.
100	100	350	330	60-70	50
Measure between 5th and 10th stroke		- 370			
Measure at normal temperature					

II. Test Values for Front Springs

Table 32-2

Test	Rated Value	
Front spring	05.4041.1003-00	05.4041.1015-00
Compress spring by 100 mm in height	1456 kp	2002 kp
Measure unloaded height	282 ± 5 mm	282 ± 5 mm
Measure load at 162 mm spring travel	1300 + 180 kp	1780 kp
Spring travel at 100 kp load	12 mm	9 mm
Spring dia.	21 + 0.2 mm	22.5 + 0.2 mm

III. Test Values for Rear Springs

Table 32-3

Test	Rated Value	
Rear Spring	05.4041.1004-00	05.4041.1013-00
Measure unloaded height	350 ± 5 mm	350 ± 5 mm
Measure load at 200 ± 15 mm spring travel	1200 kp	2270 kp
Spring travel at 100 kp load	16.7 mm	8.8 mm
Spring dia.	20.5 + 0.2 mm	24 ± 0.2 mm

IV. Test Values Supplementary Springs Rear

Table 32-4

Test	Rated Value
Supplementary spring rear	05.4041.1005-00
Measure unloaded height	210 ± 3 mm
Measure load at 75 ± 6 mm spring travel	1150 kp
Spring travel at 100 kp load	7.65 mm
Spring dia.	16 ± 0.2 mm

1. Secure vehicle against rolling off.
2. Remove road wheel.
3. Loosen spring fastening screws on spring brackets top and bottom. Fig. 32-1/1.

Note:

During installation, be sure that the supplementary springs are turned in such a manner that they will be seated accurately on bottom impact plate during deflection or under platform load.

Replacing both springs of one side (main and supplementary spring) simultaneously is not absolutely necessary.

Tightening torque of fastening bolt and nut:
14 mkp.

4. Lift vehicle with hoist at pertinent axle (front or rear) until spring is released. (Fig. 32-1/2.)
5. Remove spring.
6. On rear suspension, unscrew supplementary spring from main spring. Fig. 32-1/3.
7. For reassembly proceed vice versa.

Note:

When replacing defective springs be sure that the replacement springs are selected or exchanged in pairs in accordance with unloaded length, to prevent the installation of springs of different length and the resulting one-sided sagging of the vehicle.



Fig. 32-1/1



Fig. 32-1/2



Fig. 32-1/3

1. Secure vehicle against rolling off.
2. Loosen shock absorber attachment on top and bottom.
Fig. 32-2/1.

Note:

When removing the front shock absorbers, use the through holes in body for shock absorber bolts provided for that purpose.
Fig. 32-2/2.

3. The silent blocks on the shock absorbers can be replaced, if required. Leaky shock absorbers should be shipped to the manufacturer for repairs.

Note:

A definite determination of shock absorber capacity can be made on a testing machine only, but a manual test is generally adequate. The dampers should not have any "slip", that is, they should not have lost a part of their effect by oil losses (when installed, indicated by an obviously very high oil loss). Upon disassembly, such dampers will clearly show "slip" between push and pull when checked manually. When the oil traces on the jacket tubing are low, the shock absorber operates generally still satisfactory, since shock absorbers are provided with an oil reserve for small leaks.

4. For installation proceed vice versa, but be sure that the thicker tube is always on top.

When using a shock absorber testing machine, refer to test values of Table 32-1.

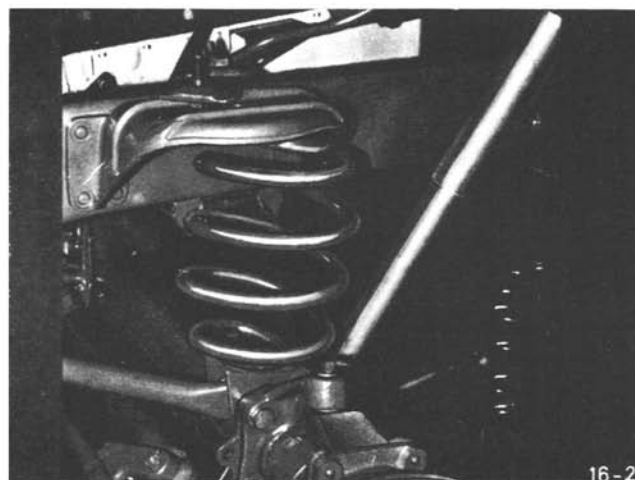


Fig. 32-2/1

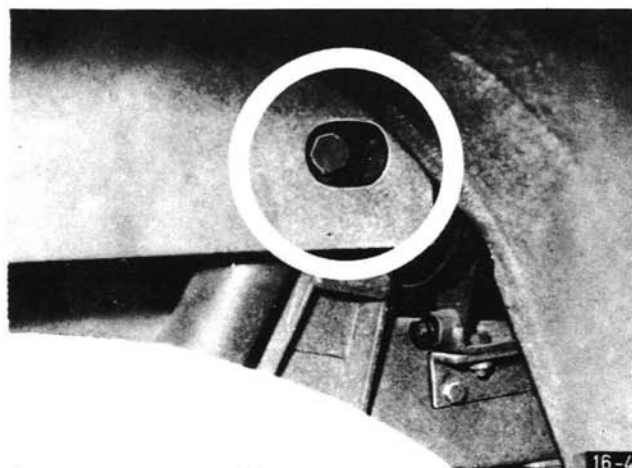


Fig. 32-2/2

Note:

Tighten fastening screws with torque spanner 12-14 mkp!

Note! Telescoping shock absorbers require no servicing. Repairs should not be made on principle. If repairs are required, install exchange shock absorbers.

General Adjusting Rules for Spiral Bevel Gears

- 1. Basic Rule:** Always install in accordance with **correct contact pattern**, no matter whether tooth ends are in alignment or not.
- 2. Correct Contact pattern:** Unloaded.
Drive side (1): Contact pattern in center.
Coast side (2): Contact pattern closer to large dia.

No contact whatsoever on small dia!

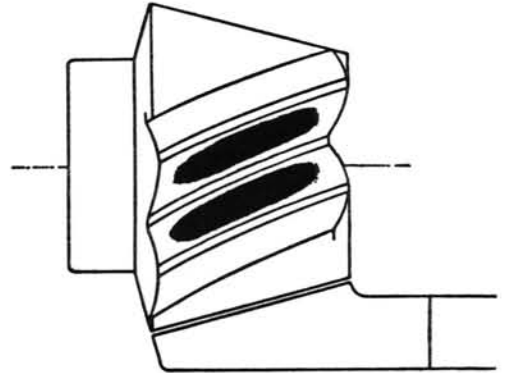
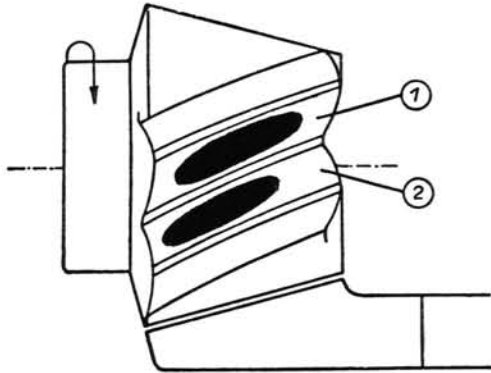
- 3. Shifting of contact pattern:** The higher the load, the higher the axle displacement, the more will the contact pattern move toward the small gear dia. Therefore: Under no load conditions, **weak** bearings require **short** contact patterns heavily leaning toward large dia. **Caution!** Contact patterns which are too short will **reduce** overall strength and are **in favour** of increased noise!

Therefore, if contact pattern is shorter than 50 % of tooth length, reinforce bearings.

- 4. Inspection of contact pattern:** Coat tooth flanks of one gear with thin oil paint, rotate gears several times in direction of operation. The contact patterns will show up as bright spots. Backlash should normally not exceed 0.15 to 0.20 mm.

Contact **during installation** (no load).

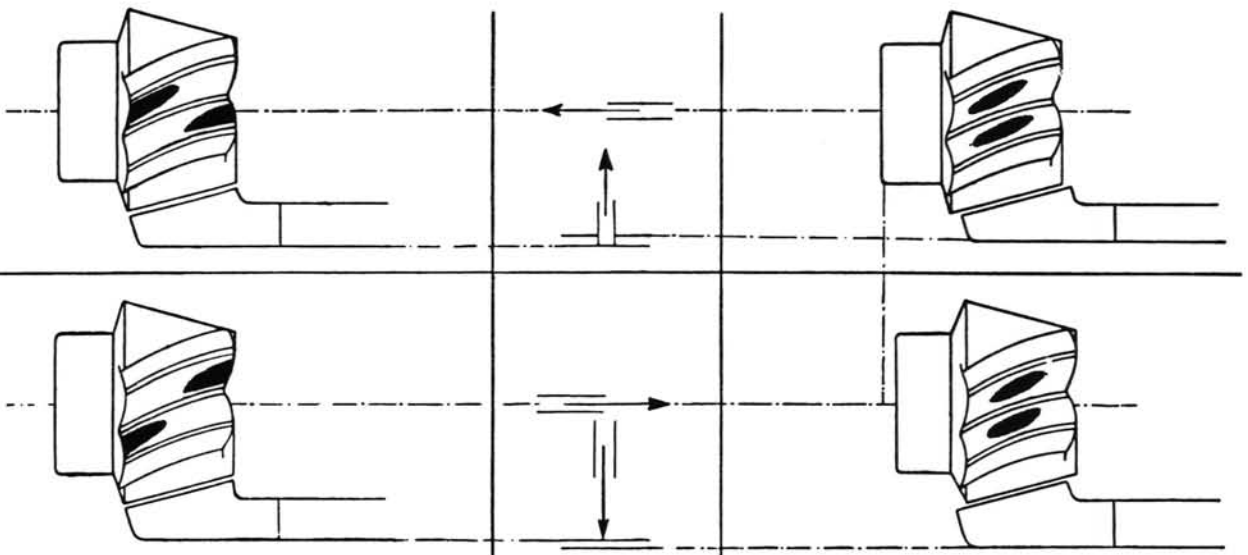
Contact **during operation under load!**



What to do if the contact pattern as follows shows up **during installation?**

Proceed as follows

The normal pattern shown above should result.



All the above data refer to the **driving** pinion, with (1) = drive side and (2) = coast side!

Adjustment of Front Wheels

Upon reconditioning of front wheels and installation into the vehicle, check adjustment of front wheels, such as toe-in, front wheel lock etc. accurately.

If there are differences, find out cause and repair immediately.

Proceed with utmost care, since only perfect steering will provide the required driving safety for the driver.

In addition, correct adjustment of front wheels will protect the tires, that is, tires will not grind and there will be no abnormally high tire wear.

In this connection, inspection of the rims for lateral and vertical wobble is of course mandatory.

Prior to starting with the individual measurements, complete the following basic jobs:

1. Check tire pressure.

Front: 2–2.5 kp/cm²

Rear: 2–2.5 kp/cm² (for road driving)

2. Check rims for:

a) Lateral wobble max. 2 mm permissible

b) Vertical wobble max. 2 mm permissible
(measure at different spots).

3. Place vehicle on plain surface.

4. Set steering to center position and front wheels uniformly straight ahead.

5. Inspection of tire condition.
(Tread wear, vulcanized spots.)

6. Check play of track rod and drag link, of wishbone, etc.

7. Check condition of shock absorbers.

If the individual values are within the specified limits, proceed with actual measurements. The individual steps are described in the following section.

Note: Front wheel camber is 1°45'. This camber is automatically retained by the design of the steering knuckles.

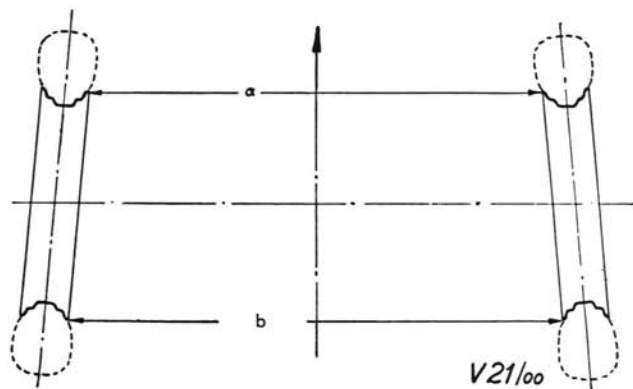


Fig. 33-0/1

Checking Front Wheel Lock

1. Jack up vehicle.
2. Turn steering wheel to the right while simultaneously checking at the right whether the cam of the outer steering knuckle strikes against the rear stop of the inner steering knuckle.

3. Turn steering wheel to the left and check likewise.
4. From steering lock right to steering lock left the steering wheel completes about 5.75 revolutions. If the steering wheel can be turned still further, the fault is within the steering column, the steering arm, the steering knuckles etc.

Note: Under full right-hand and left-hand steering lock of the wheels, some elastic play on the steering wheel should prevail.

The angle of lock of the right-hand wheel should be 40° and that of the left-hand wheel 30° .

Fig. 33-0/2.

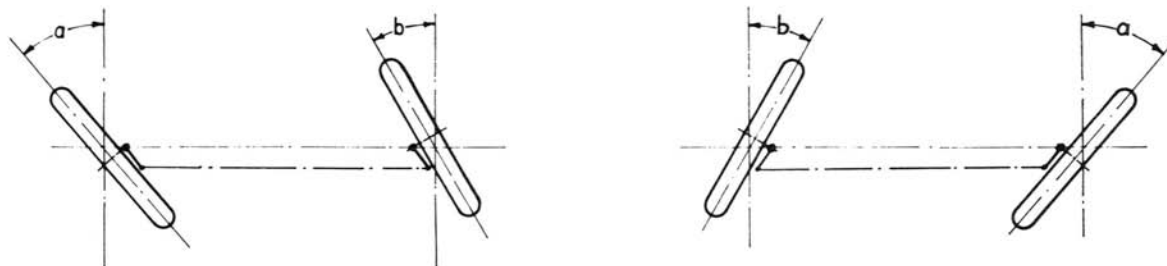


Fig. 33-0/2

$$a = 40^\circ ; \quad b = 30^\circ$$

Assembly Instructions for Track Rod

When assembling the track rod at the right – on the connection to the steering damper – the Holding Bracket 01.4041.1063 must be turned in such a manner that the surface is tilted toward the rear at 32° .

Fig. 33-0/3.

On the present version, the slot of the Clamping Piece 000 338 0445 is aligned with the tube slot of the track rod.

This does not apply to earlier types.

Note:

A noticeable deviation from this position may either result in the steering damper knocking (chafing) against the brake line or against the axial strut. Check for easy operation under full steering wheel lock.

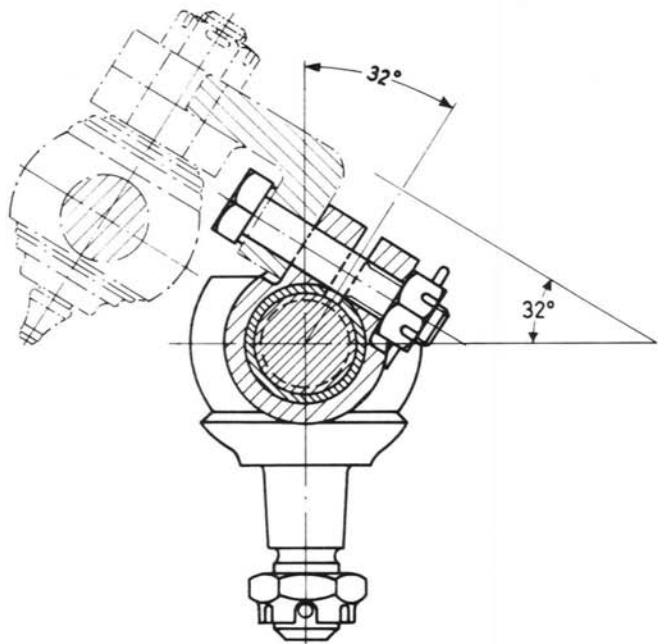


Fig. 33-0/3

I. Removal

1. Remove spare wheel.

For this purpose, loosen hook screw with toggle nut and remove.

Note: Vehicles with standard trunk have two hook screws.

2. Protect vehicle against rolling off. (1st gear, hand brake and chocks)
3. Remove linkage to differential lock on guide lever.
4. Loosen rubber sleeve on torque tube and fold back.
5. Unscrew pto. shafts (on special take-off).
6. Separate brake fluid line on torque tube from brake fluid hose.

Note:

- a) Protect both separated points reliably against the entry of fallen bodies.
- b) Transmission fluid should be drained prior to removing front axle.

7. Unflange ball housing from transmission Fig. 33-1/1.
8. Loosen wishbone from frame bracket.
9. Loosen shock absorber from frame. Fig. 33-1/2.
10. Loosen springs on axle. Fig. 33-1/3.
11. Pull drag link from steering drop arm with Puller 000 589 44 33 00. Fig. 33-1/4.
12. Raise vehicle with hoist until springs are released.
13. Remove axle in forward direction. (This will expose the drive shaft, which remains on transmission.) Check universal joint.

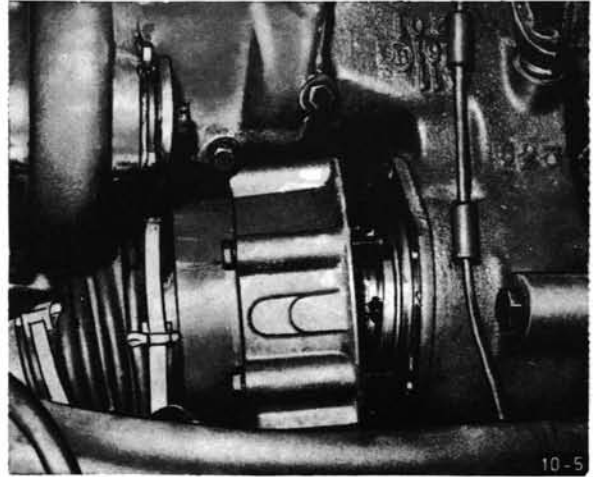


Fig. 33-1/1

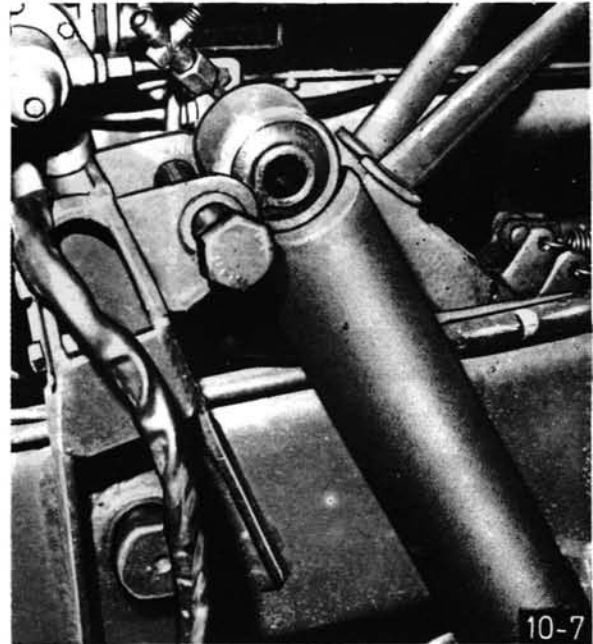


Fig. 33-1/2

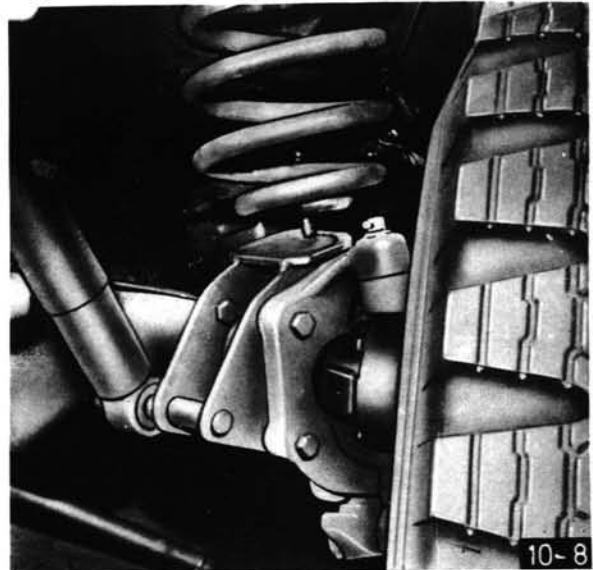


Fig. 33-1/3

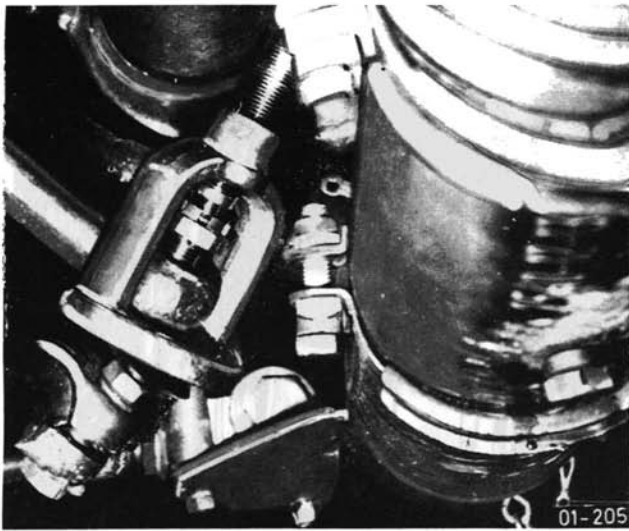


Fig. 33-1/4

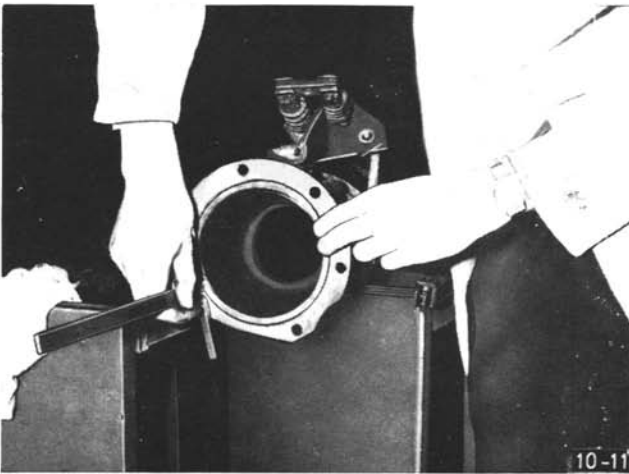


Fig. 33-1/5

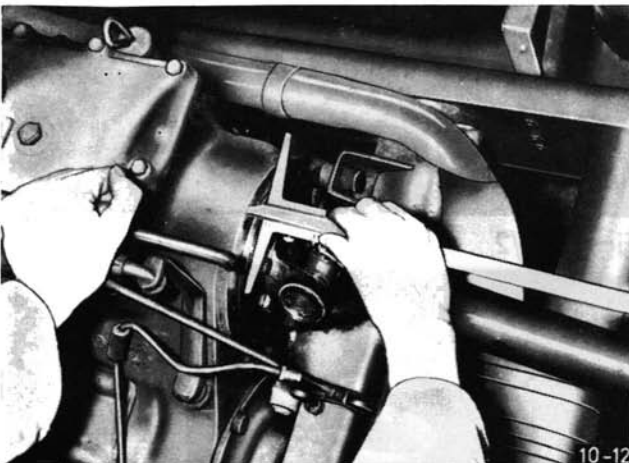


Fig. 33-1/6

II. Installation

1. For reinstallation proceed vice versa.
Observe the following:
 2. Check play in ball housing by placing spacer ring into ball housing, while simultaneously pulling shell up and ring down. Assistant can then measure distance from top edge of flange surface to top edge of spacer ring by means of depth gauge.
 3. Also measure distance on transmission from upper edge of flange to contact surface of ball housing (depth gauge).
- Note:**
- The factory recommends installation of ball housing free of play with a suction fit.
4. When installing the axle, be sure that the cardan shaft enters into the splining of the axle drive without excessive force. If required turn cardan joint with screw-driver and keep axle under slight and careful pressure until the shaft connects.
 5. Tighten wishbone screw to **17 mkp.**
 6. Adjust differential lock.
Refer to Job No. 35-1, section II, item 5.
 7. Bleed brakes.
 8. Fill in transmission fluid and check oil level.

1. Loosen wheel nuts, lift axle from floor, remove wheels, place axle on assembly stand and drain oil.
2. Unscrew axle struts.
3. Remove track rod and steering damper.
4. Unscrew wishbone and shock absorber on spring bracket left and right.
5. Remove drag link and steering drop arm.
6. Unscrew steering drop arm and steering knuckle arm.
7. Unscrew brake fluid lines and hoses.
8. Engage differential lock and arrest lever in this position with wire.
Fig. 33-2/1.

Note: On the latest shifting fork for differential lock with the wider slide pie-

ces, the differential lock needs no longer be engaged when pulling out the drive shaft (wheel hub drive).

9. Unscrew both hub drives on steering knuckle, pull off and put aside.

Note: Pull off hose, if central axle vent is installed.

10. Turn axle in assembly stand (drive up) and unscrew torque tube.
Fig. 33-2/2.
11. Unflange drive housing.
Knock out 2 set pins.
Fig. 33-2/3.
12. Attach drive housing to hoist and raise approx. 1 cm at first, then turn 90° to the left and lift out completely.
Fig. 33-2/4.

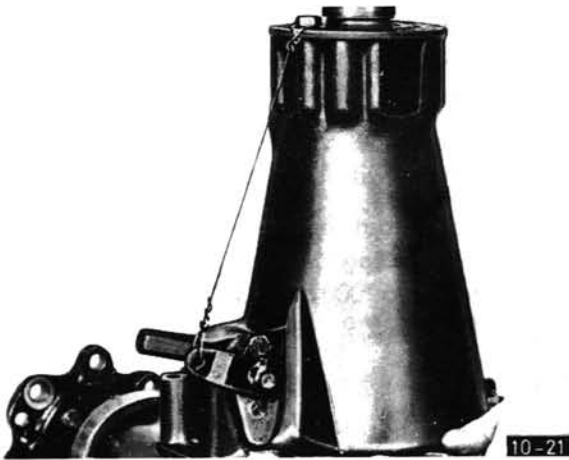


Fig. 33-2/1

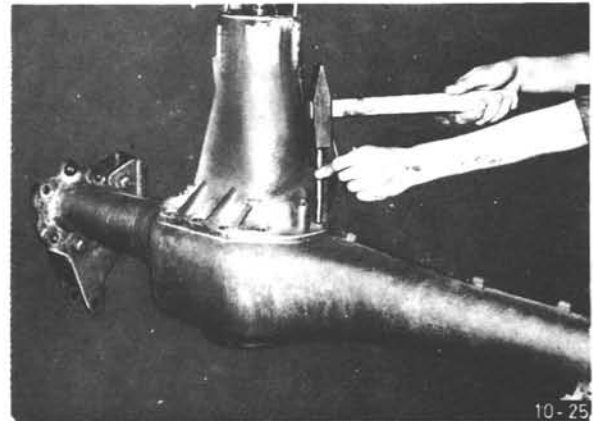


Fig. 33-2/3

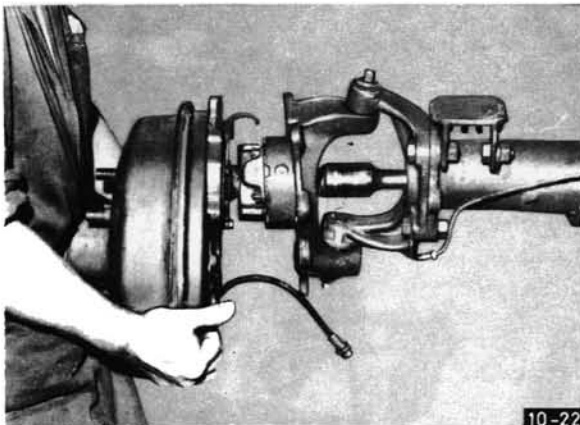


Fig. 33-2/2



Fig. 33-2/4

Untie wire from differential lock and remove sliding claw and 2 slide pieces.

13. Unlock bottom closing cap on steering knuckle and screw off.
Fig. 33-2/5.

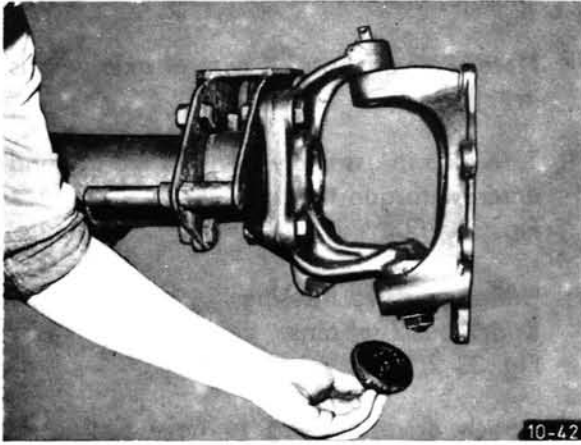


Fig. 33-2/5

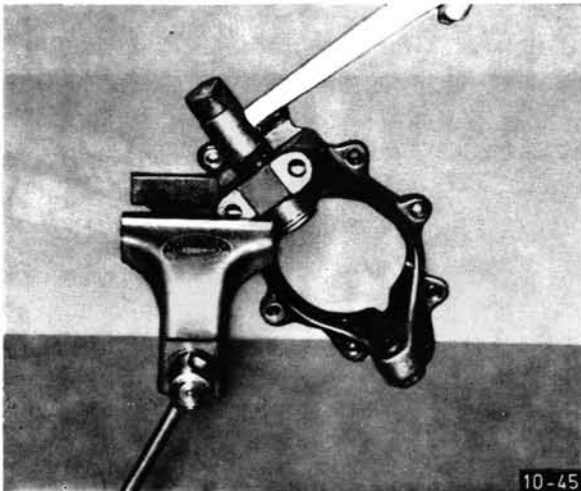


Fig. 33-2/6

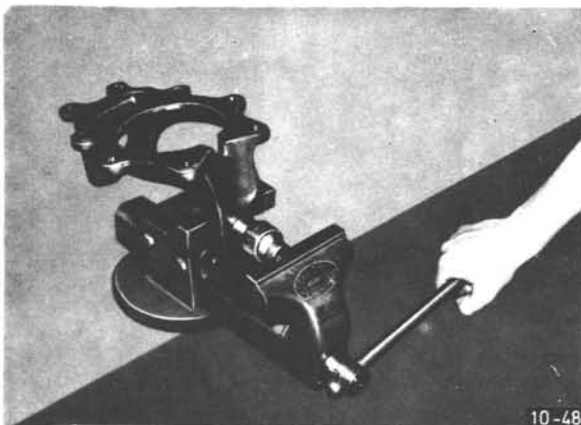


Fig. 33-2/7

14. Remove cotter pin from castle nut of bottom connecting screw, unscrew and remove outer steering knuckle.

Remove bearing plate and sealing rings.

15. Unscrew four fastening screws on inner steering knuckle and remove steering knuckle from set pins with hammer blows. Check inner and outer steering knuckle for cracks.
16. Disassembly is continued, if bolts or bushings are worn.

a) Outer steering knuckle

a1) Force out bottom bearing bushing.
Fig. 33-2/6.

a2) Press in bottom bearing bushing.
(Pressure ring.)

a3) Force out upper cup bushing.

a4) Press in upper cup bushing.
Fig. 33-2/7.

b) Inner steering knuckle.

b1) Forcing out **upper** bolt, first force set pin back.
(Tool No. 000 589 83 33 00).
Fig. 33-2/8.

b2) Use same tool to force in new bolt.
Secure with set pin.

b3) Force out **bottom** bearing bolt with needle cage using tool No. 000 589 83 33 00.
Fig. 33-2/9.

b4) Press in bolt with cage.

17. Replace shaft seal.

Remove cover plate and old sealing ring.

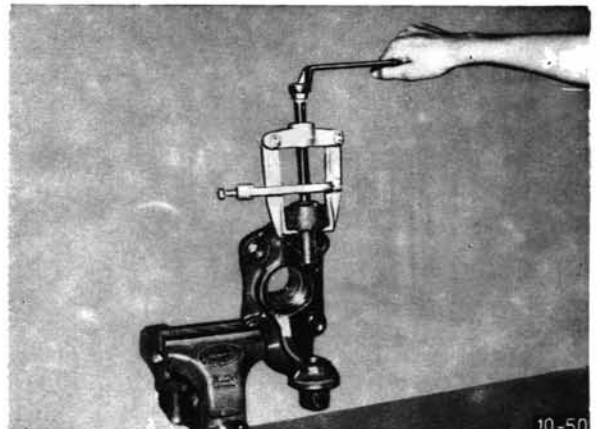


Fig. 33-2/8

Install new sealing ring and cover plate by means of plastic hammer.

18. Force out slide bushing for double universal shaft.

Carefully force in new bushing by means of installation mandrel tool No. 401 589 01 15 00.

Do **not** use hammer to protect porous, sintered bronze (powdered metal).

19. Calibrate installed sinter bushing with tool number 401 589 00 15 00.
Fig. 33-2/10.

20. Install new sealing rings.

21. Assemble steering knuckle, tighten connecting screw and secure.

22. For additional assembly proceed vice versa to disassembly.

Note: Place complete axle drive with new paper seal on connecting flange coated with sealing compound. Watch required 90° turn during removal. Fit two set pins.

Use sealing compound between counter shaft and steering knuckle, as well as for steering knuckle and axle tube.

Tighten screws through track arm and steering knuckle arm on outer steering knuckle to **24 mkp** and secure by means of wire (2.5 mm dia.) through both screw heads.

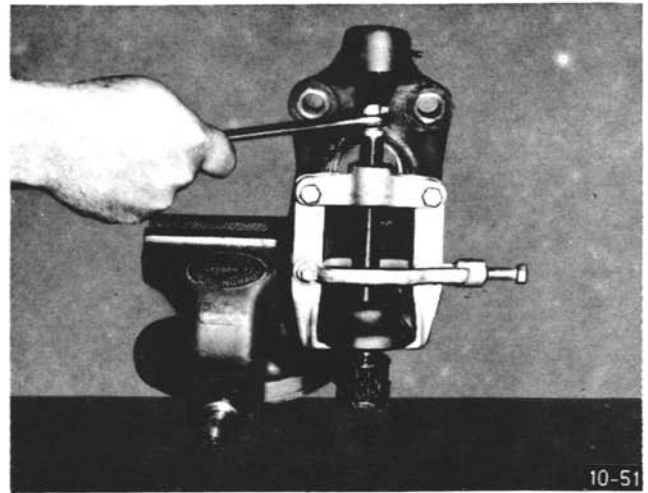


Fig. 33-2/9

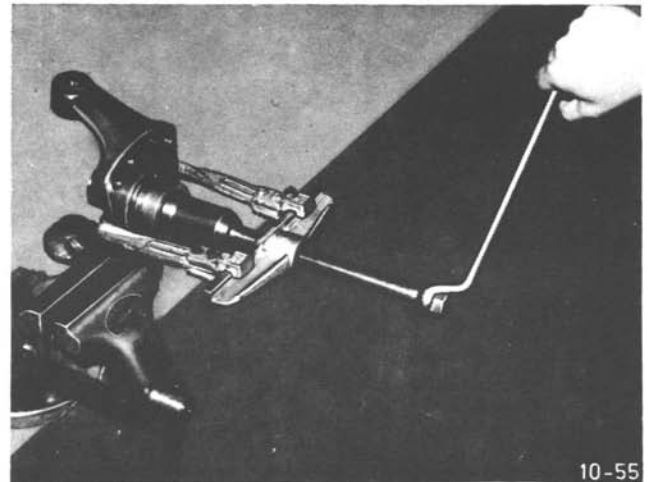


Fig. 33-2/10

I. Disassembly

Clamp axle drive housing into assembly stand.
(Drive shaft pointing downwards.)

1. Unscrew four bearing attachment screws, remove both bearing caps.
2. Remove differential housing together with spacer rings.
Fig. 33-3/1.

Note: Identify rings if unit is assembled again without change, to eliminate additional measuring of backlash.

3. Remove differential lock, take off the two countersunk screws on bearing flange for differential lock actuation. Pull bearing flange with lever.

Pull out shaft of fork lever by screwing in a M 8 bolt. Remove fork lever with shift spring, bushing and spacer ring.
Fig. 33-3/2.

4. Turn housing around in assembly stand (splining of drive shaft up). Unlock small grooved nut and position counterholder 401 589 02 61 00. Loosen grooved nut with socket spanner 401 589 00 61 00 and remove together with lock washer. Remove wide grooved nut in the same manner.
Fig. 33-3/3.

5. Unscrew large adjusting nut with special tool 401 589 00 05 00. Expel inserted sealing ring. Use new sealing ring for reassembly.



Fig. 33-3/2



Fig. 33-3/3



Fig. 33-3/1

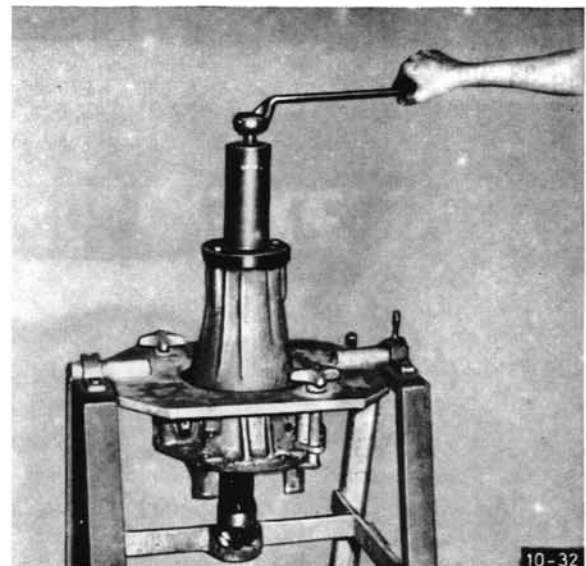


Fig. 33-3/4



Fig. 33-3/5

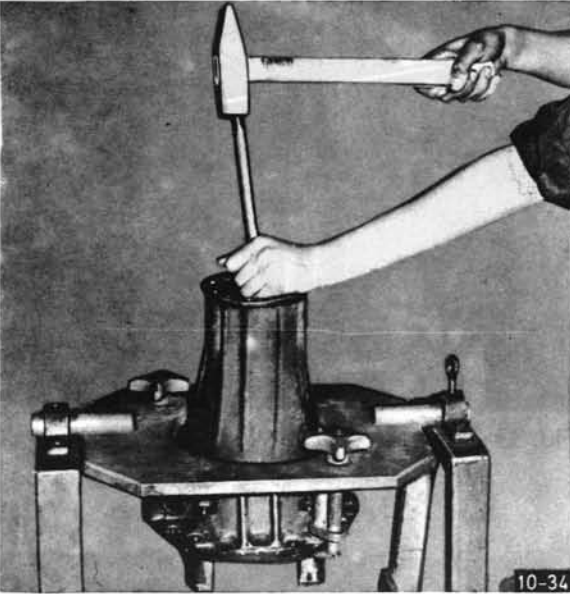


Fig. 33-3/6

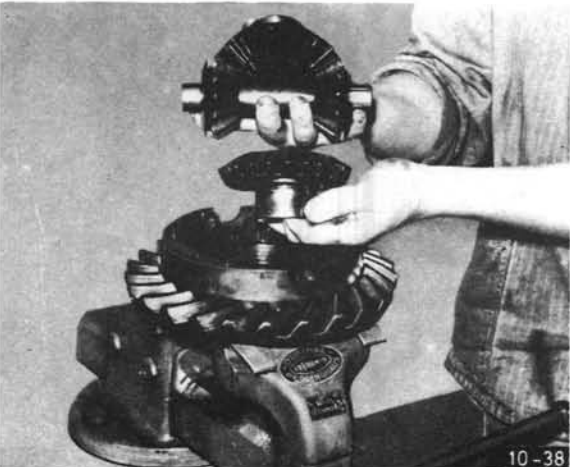


Fig. 33-3/7

6. Position pressing-out fixture 401 589 00 3500 and attach by means of two screws M 10. Screw pressure spindle down until drive shaft is freed in downward direction. Unscrew tool.
Fig. 33-3/4.

This will also free the retainer ring for shaft sealing ring.

7. Force inner bearing race from removed shaft by means of tool No. 401 589 01 3500.
Fig. 33-3/5.
8. Turn housing around in assembly stand (bearing seats up), remove locking ring on drive shaft bearing, force bearing outer ring out together with cage and also remove second locking ring.
Fig. 33-3/6.
9. Turn housing in assembly stand and force out both neck tapered roller bearings.
10. Clamp differential housing disassembled under Item 2 into vise with soft jaws for further disassembly. Ring gear rests on vise. Unscrew bolts.
11. Remove housing half as well as differential pinions with shaft and thrust washers.
Fig. 33-3/7.
12. Remove thrust washers of side gears.
13. Separate ring gear from second housing half by forcing set pins back.

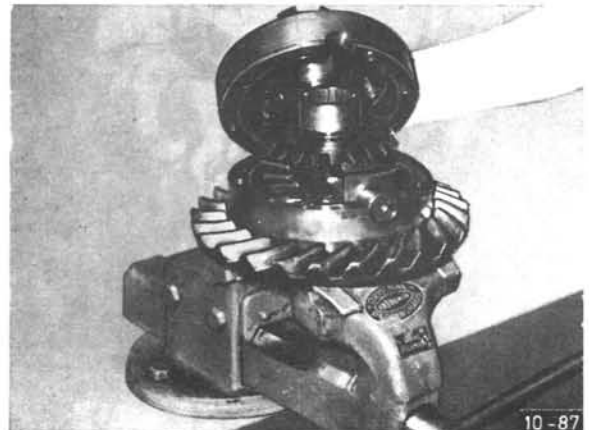


Fig. 33-3/8

II. Assembly:

- 1 Assemble differential housing and tighten connecting screws to **7–8 mkp.** Ring gear should have the same code number as the drive shaft.

Backlash of differential pinions and side gears 0.15–0.20 mm.

Fig. 33–3/8.

2. Clamp axle drive housing in assembly stand. Neck of housing down.
3. Install differential lock. Attach return spring only after assembly of shaft and cambolt.
4. Force cyl. roller bearings (outer race with cage) into housing, insert bottom circlip first, then the one on top.
5. Force pertinent inner race on drive shaft and insert circlip.
6. Turn housing in assembly stand (180°), attach measuring device 401 589 00 23 00 and tighten adjusting screws. Set measuring instrument to empirical value 4.5 mm first.
7. Coat drive shaft on tooth flanks with India ink first, introduce from below into housing and measuring tool and counterscrew tightly with threaded ring of measuring device.
8. Turn housing again by 180° .

Read dimension etched on face of drive pinion. Compare this dimension with actual dimension (measure with depth gauge). If the depth gauge is applied from the center of the bearing, the 60 mm difference from the bearing bottom to the bearing center must be deducted. (For example 84.35 measured $- 60 = 24.35$ mm.)

Any difference between the two dimensions must be compensated by adjusting the measuring device 401 589 00 23 00.

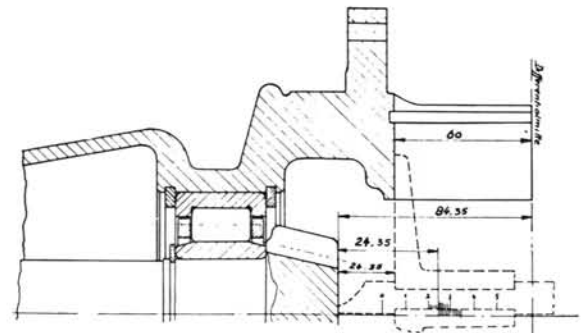
1 Revolution = 1.0 mm.

Fig. 33–3/9.

9. Position the preassembled differential housing together with the required spacer ring. After tightening the two bearing caps,

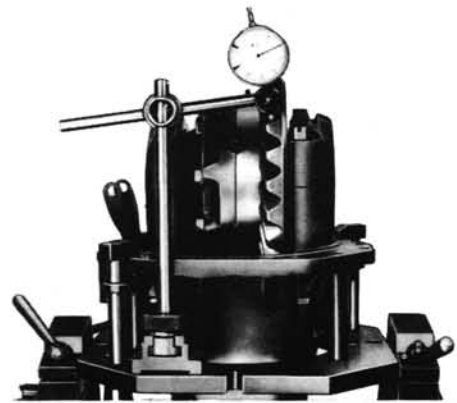
a backlash of 0.15–0.20 mm and an axial play of differential amounting to 0.06 to 0.08 mm (measured with dial gauge) must be available. (Contact pattern test.)

Fig. 33–3/10.



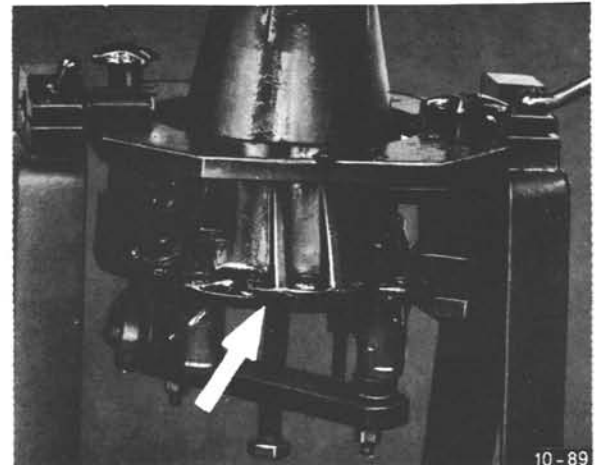
10-90

Fig. 33–3/9



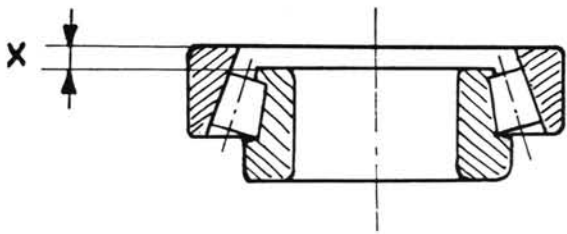
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Fig. 33–3/10



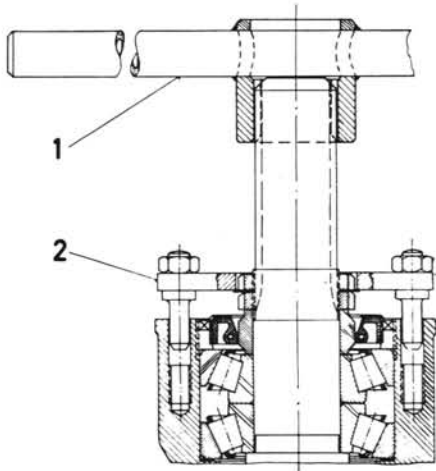
10-89

Fig. 33–3/11



10-94

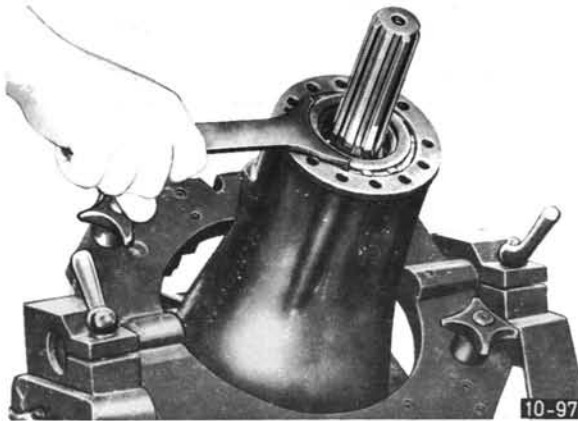
Fig. 33-3/12



10-96

Fig. 33-3/13

- 1 Socket spanner
- 2 Counterhold



10-97

Fig. 33-3/14

10. Take off differential after removing the two bearing caps (do not confuse spacer rings). Attach counterhold 401 589 02 31 00 and screw spindle free of play against drive shaft head without pressure. Turn axle drive housing in assembly stand by 180°.

11. Read dimension (Item 8) set on measuring device. From this dimension, first deduct the difference x Fig. 33-3/12 between inner and outer bearing race of tapered roller bearing installed first. The remainder is the thickness of the required compensating washers.

Remove measuring tool.

Note: Do not interchange measured bearing with second bearing.

12. Insert determined compensating washers into housing and force in measured bearing. Force second bearing in opposite position with installing sleeve 401 589 08 61 00.

Fig. 33-3/13.

13. Force shaft sealing ring into large adjusting nut, with the open end down.

Screw nut in with hook spanner 401 589 00 05 00 until free of play. Fine adjustments are made later.

Fig. 33-3/14.

14. Slide retainer ring on shaft and attach the two grooved nuts with the locking plate in between.

Use socket spanner 401 589 00 61 00 and counterhold 401 589 02 61 00. Tightening torque **14-16 mkp.**

Fig. 33-3/13.

15. Secure grooved nuts.

16. Complete fine adjustment of adjusting nut with hook spanner 401 589 00 05 00. For this purpose, screw nut at first down until strong resistance is felt, then turn back by $\frac{1}{12}$ of the circumference (= 1 groove) to obtain the specified bearing play.

Fig. 33-3/14.

17. Select the required locking washers from the three available washers, position and secure with two hexagon screws M 10.

Note: When positioning the locking washer be sure that the bore for the central axle vent (if applicable) in the axle drive housing is not concealed.

18. Turn housing in assembly stand by 180° , position complete differential with pre-

viously determined compensating rings, screw down bearing cap, secure castle nut with cotter pin.

19. After inserting slide pieces and the shifting claw for the differential lock, tie actuating lever down with wire in engaged condition.

I. Disassembly

1. Take brake drums from removed wheel hub drive by unscrewing the two hex. bolts and, if required, force brake drums off by means of two pulling screws M 10.

2. Unlock wheel locking screws and unscrew with ring spanner 000 589 21 03 00 and 000 589 01 14 00.

3. Remove cover plate and pull out set pins. Fig. 33-4/1.

4. Pull wheel hub by means of puller 401 589 09 33 00 or, if required, with hydraulic press 401 589 10 33 00.

Apply counterhold to wheel fastening bolts. Fig. 33-4/2.

5. The individual wheel fastening bolts in the wheel hub are exchanged under a spindle press, if required with hardwood and hammer.

6. Clamp wheel hub drive into assembly stand and pull brake shoe bolts out, pulling cotter pin first. The bolts are provided with M 8 threads for attachment of a pulling eye or a commercial puller. An offset crowbar can be used to assist from below. Fig. 33-4/3.

7. Disconnect tensioning springs and remove shoes.

8. Remove wheel brake cylinder.

9. Remove top of wheel hub drive housing. Remove top together with driven gear and force driven gear out. Fig. 33-4/4.

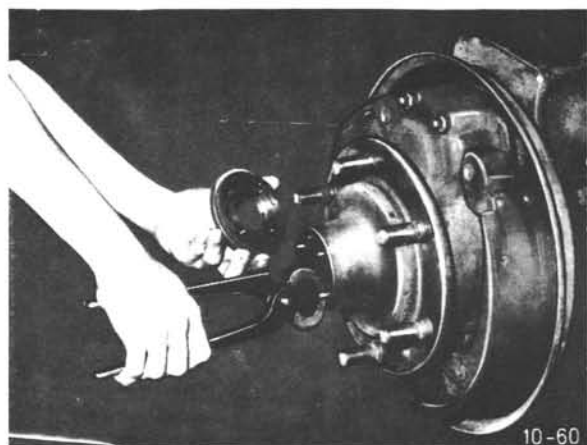


Fig. 33-4/1

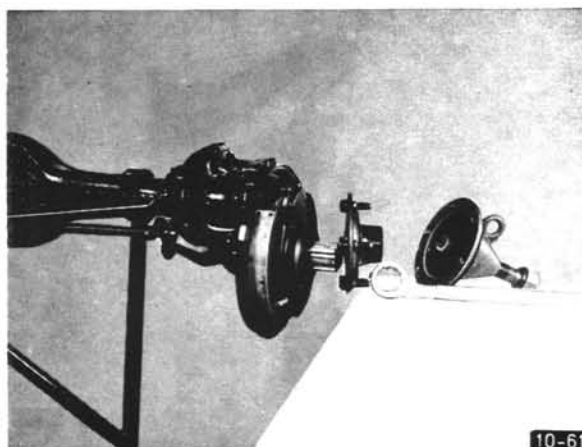


Fig. 33-4/3

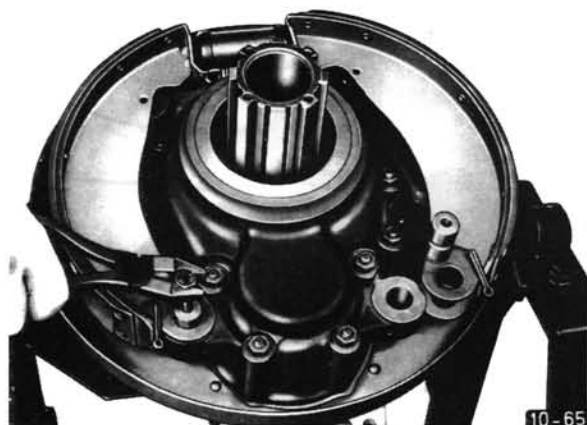


Fig. 33-4/2

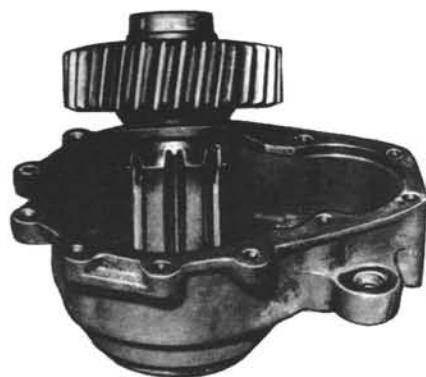


Fig. 33-4/4

10. If required, pull or force inner race of roller bearing from driven gear.

11. Remove locking ring in front of large roller bearing and force out both the bearing and the sealing ring.

Fig. 33 4/5

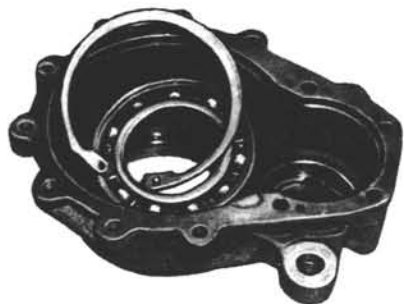


Fig. 33-4/5

10-69



Fig. 33-4/6

10-70

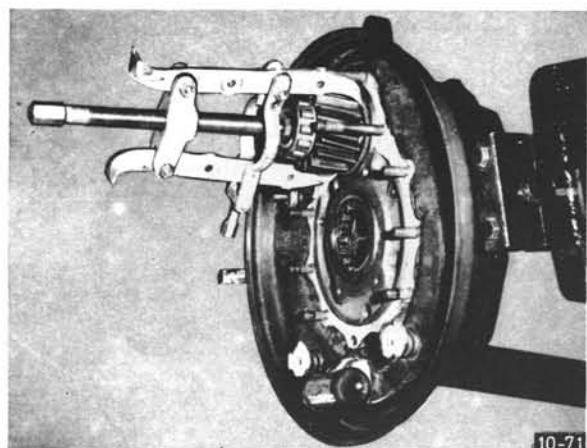


Fig. 33-4/7

10-71

12. If required, pull outer race of small tapered roller bearing with puller 000 589 82 33 00. This will free the compensating washers.

Fig. 33-4/6.

13. Unscrew fastening screw of drive pinion, remove washer and pull pinion together with tapered roller bearing inner race by means of puller 000 589 82 33 00.

Fig. 33-4/7.

14. Force out universal shaft and pull race. A universal shaft with score marks on bearing point in inner steering knuckle can be provided with a repair bushing part No. 01 4041 1061 00. Heatsrink bushing on ground shaft (42 dia. h 6) and grind to nominal dimension.

15. If required, unscrew cover from housing rear. Watch out for venting pipe, hollow screw.

16. Remove sealing ring from cover.

17. Force outer race of tapered roller bearing from housing flange.

Fig. 33-4/8.

18. Unrivet brake cover plate, if required.

Also, if required, unscrew studs in housing flange and replace.

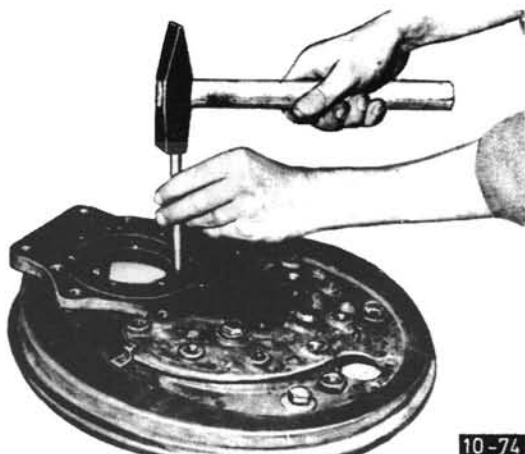


Fig. 33-4/8

10-74

II. Assembly

Note:

Do not install damaged parts. Always replace sealing rings. Use antifriction bearings again only following a checkup. Use only new snap rings or other locking elements. Teeth of wheel assemblies for right-hand and left-hand vehicle end are different.

For assembly proceed vice versa as follows:

- 1 Heat ring and drive pinion prior to assembly.

Fig. 33-4/9.

Note: Exchange drive pinion and output gear in sets only.

- 2 Insert set pin with slot in direction of rotation. Secure slotted screw with punch mark.

- 3 Turn Measuring Device 401 589 00 21 00 to "0" (Fig. 33-4/10) and mount complete outer bearing. Mount measuring device with paper gasket and screw down.

Fig. 33-4/11.

- 4 Turn measuring spindle until shaft can still be turned manually free of play. Read value. Read or find depth in housing top at point x. Normal dimension is 78.50 mm.

Fig. 33-4/12.



Fig. 33-4/9

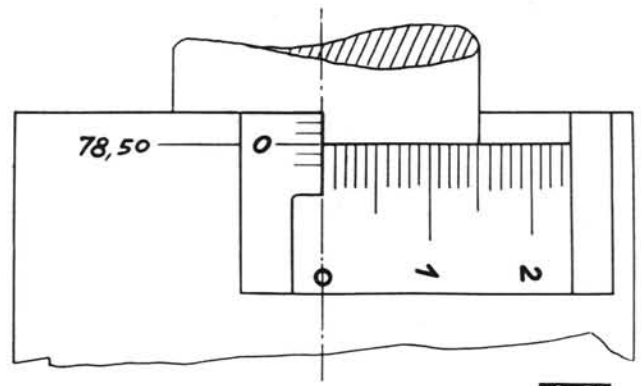


Fig. 33-4/10

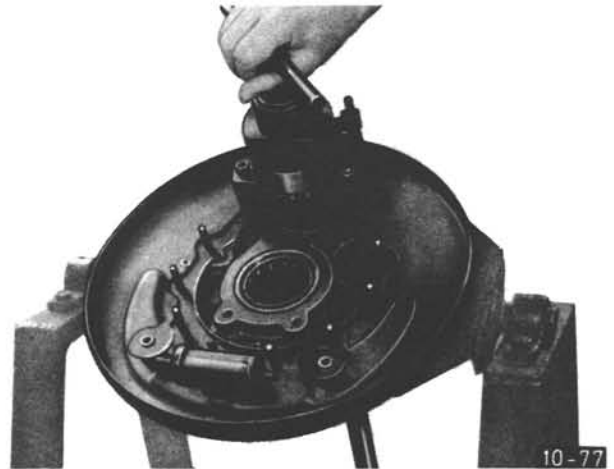


Fig. 33-4/11

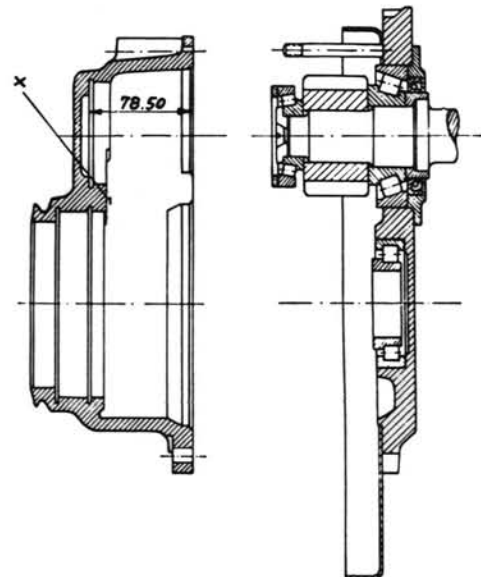


Fig. 33-4/12



Fig. 33-4/13

10-79

The difference between the two values is the thickness of the compensating rings.

The bearing play should amount to 0.08 ± 0.02 mm. Always try for the smaller play.

For example dimension on tool	78.76
housing depth	78.50
difference	0.26

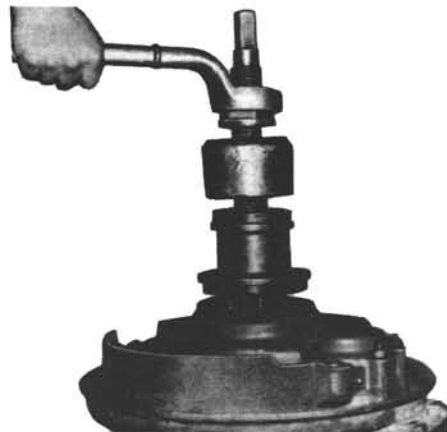


Fig. 33-4/14

10-80

Take compensating rings 1×0.20 mm from kit. Minor differences are of no importance. Insert rings and force-in outer ring of bearing. Special Tool 401 589 09 61 00.

Fig. 33-4/13.

5 Output gear requires no measuring.

6 Press small bearing of output gear into flange.

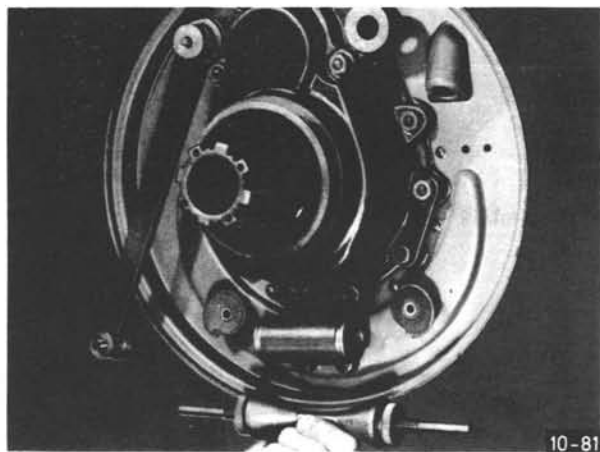


Fig. 33-4/15

10-81

7 Mount counter shaft housing top with locking ring, bearing, seal, output gear with inner ring of small bearing on flange together with paper gasket and tighten. (Use sealing compound).

8 Place large sealing ring on Installation Sleeve 401 589 03 31 00 and force-in with Fixture 401 589 04 31 00. The sealing ring can also be replaced on vehicle.

Fig. 33-4/14.

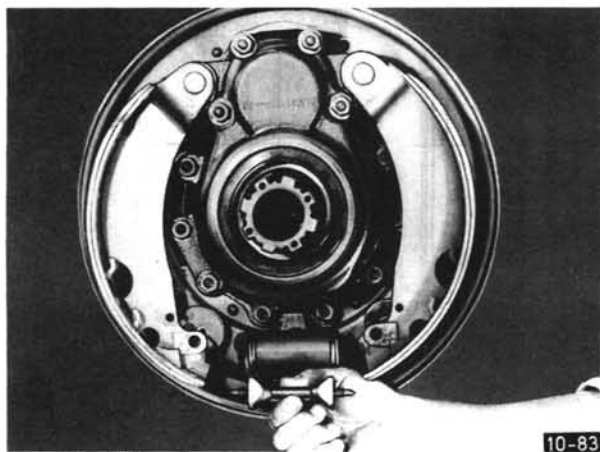


Fig. 33-4/16

10-83

9 When installing wheel cylinder, it will be of advantage to check the installation position with Tool No. 000 589 52 21 00 for best efficiency.

a) Remove wheel cylinder piston and insert long measuring spindle instead.

Fig. 33-4/15.

b) Attach swivel arm successively into brake shoe bearing, tighten clamping cone and turn adjusting screw against measuring spindle.

Comparing the distances at left and right permits checking the installation position and making corrections, if required, by inserting shims.

- c) The height is checked by inserting the matching test center point into wheel cylinder. When swivelled inwards, the web center of the attached brake shoes should encounter the center point.
Fig. 33-4/16.

10. After mounting brake shoes and wheel brake cylinder and return spring, attach wheel hub by means of fixture.

401 589 04 31 00.

Fig. 33-4/17.

11. Mount wheel closing screw with cover plate and lock washer. Tighten wheel closing screw with ring spanner 000 589 21 03 00 and extension tube 000 589 01 14 00 and bend lock washer.

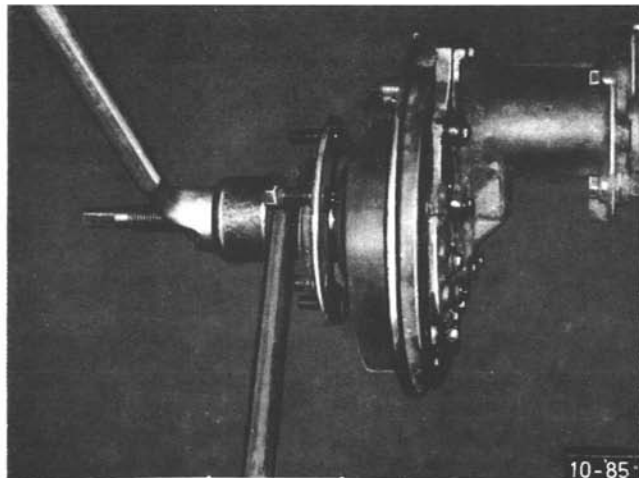


Fig. 33-4/17

Tightening torque 75-100 mkp

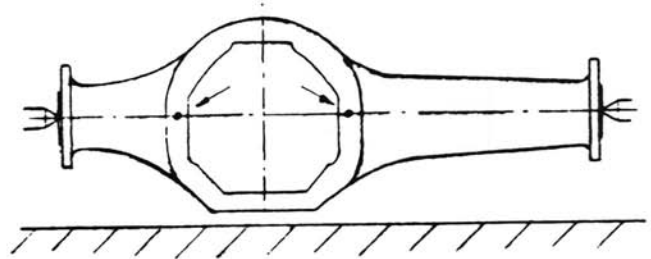
12. Measure brake shoes and brake drum and machine to pertinent dimension prior to installation. Then position brake drum and attach with two countersunk screws. Machine brake drum and brake shoes, refer to Job No. 42-3.

Prior to reusing a disassembled axle tube, complete test measurements as described below:

a) For longitudinal distortion (vertical) by checking flange bores in axle center of axle housing held between lathe points (position centering plates against outer flanges).
Fig. 33-5/1.

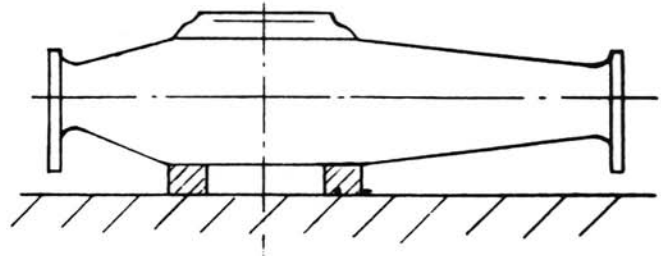
b) For longitudinal distortion (horizontal) by checking outer flange centers with axle tube mounted on support. Check center deviations and flange distortions with try square.
Fig. 33-5/2.

c) For distortion of outer flanges by checking hole planes (rated value = 7°).
Fig. 33-5/3.



10-102

Fig. 33-5/1



10-103

Fig. 33-5/2

Permissible deviations for axle tubes are:

a) Parallelity of wheel hub flanges = in installation position:

horizontal	0° 15'
vertical	0° 08'

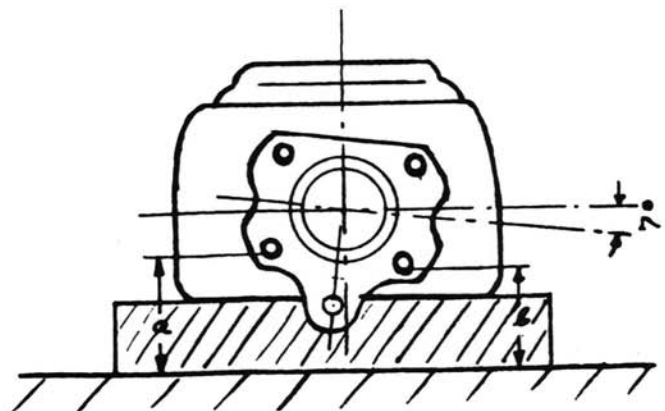
b) Distortion across total length:

horizontally left	± 1.5 mm
horizontally right	± 1.0 mm
vertically left	± 1.9 mm
vertically right	± 0.5 mm

c) Offset ± 0° 15'

d) Distance center of axis and flange (Axle drive): 63-0.1 mm

e) Permissible refinishing on flange up to 13.5 mm



10-104

Fig. 33-5/3

I. Removal

Protect vehicle against rolling off (chocks) and remove spare wheel.

1. Remove cotter pin from hand brake linkage on distributor, remove washer and disconnect linkage from differential lever.
2. Remove linkage for actuating differential lock on reversing lever.
Fig. 35-1/1.

3. Disconnect brake fluid line on holding plate.

Note: Reliably secure both separating points against foreign bodies.

4. Loosen grounding strap between axle and frame on frame.
5. Loosen and fold back rubber sleeve on thrust ball housing.
6. Unflange thrust ball housing from transmission.
Fig. 35-1/2.

7. Loosen shock absorber on top spring bracket.

8. Loosen springs on axle spring bracket.
Fig. 35-1/3.

9. Loosen control arm on frame bracket.

10. Lift vehicle with hoist until springs are exposed.

11. Remove axle toward the rear. (This will free the drive shaft, which remains on transmission.)

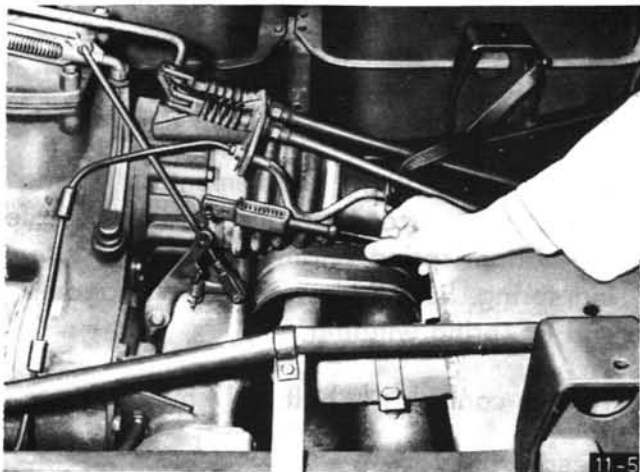


Fig. 35-1/1

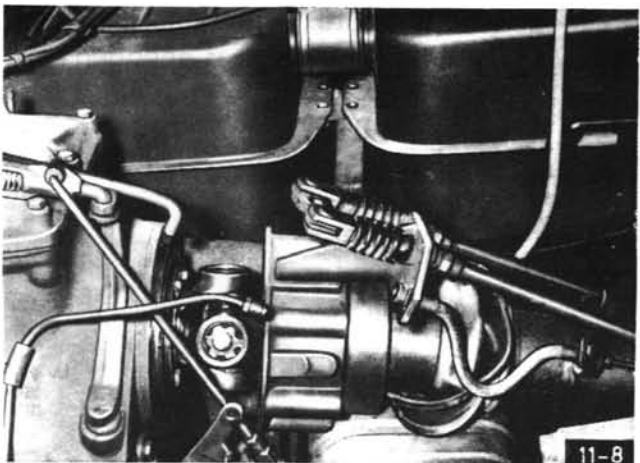


Fig. 35-1/2

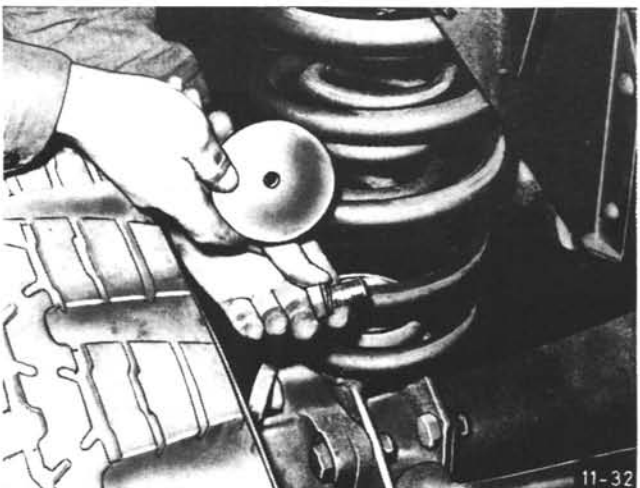


Fig. 35-1/3

II. Installation

For reinstallation proceed vice versa.

1. Check play in thrust ball housing.
Refer to Job No. 33-1, Section II, Item 2-5.
2. During installation, supplementary spring should point accurately in the direction of the bottom spring retainer. Adjust by turning spring. Spring claw should rest against end of spring winding.
3. Tighten control arm bolt to **17 mkp.**
4. Bleed brakes.
5. For adjusting the differential lock, first pull shift lever into position "all-wheel drive engaged". (Be sure that the all-wheel member in the transmission is engaged.)

Then screw forkhead on pull rod toward intermediate lever of differential lock until the intermediate lever lifts off very easily from its starting position when the all-wheel drive is disengaged and engaged.

Then pull shift lever to position differential lock engaged. By pulling manually on pull rod toward lock and by turning the jacked up wheel, the lock will now engage. The spring member is then first turned into the pull rod until the holes of the spring member and the intermediate lever are in alignment. Screw spring member down by two additional turns so that with the differential lock engaged the pull rod is under spring tension. For adjusting the differential lock of the rear axle the pull rod toward the front axle lock is suitably disconnected and turned around.

Proceed according to steps in Job No. 33-2 (Disassembly of front axle).

Observe the following:

1. When removing the axle struts, first unscrew pipe clamps of brake cable holding bracket.
2. Loosen brake fluid lines up to wheel cylinder in holding brackets and screw off.
3. Unscrew both wheel hub drives on axle intermediate member. First tie down lever of differential lock in engaged condition with wire. (This job can also be done with the axle installed in the vehicle.)

Fig. 35-2/1.

Note: On the new shift fork of the differential lock with the wider sliding pieces, disengaging the differential lock when pulling out the drive shaft (wheel hub drive) is no longer required.

4. The brake shoes of the rear axle are connected by an adjusting spindle brake cable connecting parts. For disassembly, lift the clamping springs with spring pliers on both brake shoes.

Fig. 35-2/2.

5. Lift off brake shoes together. Disconnect brake cable.

Fig. 35-2/3.

6. Pull brake cable from holding bracket in brake cover plate.

7. Compared with the universal shaft of the front axle, the drive shaft of the rear axle is rigid.

Therefore, the complete drive shaft can be pulled out and disassembled in a vise.

Fig. 35-2/4.

8. Unscrew connecting housing left and right. This will expose the inner sealing tube.

Fig. 35-2/5.

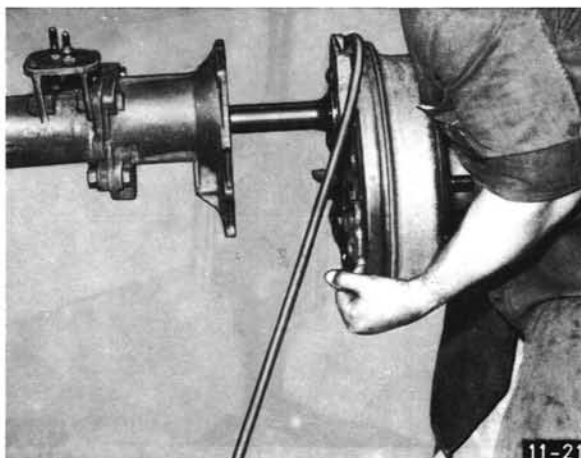


Fig. 35-2/1

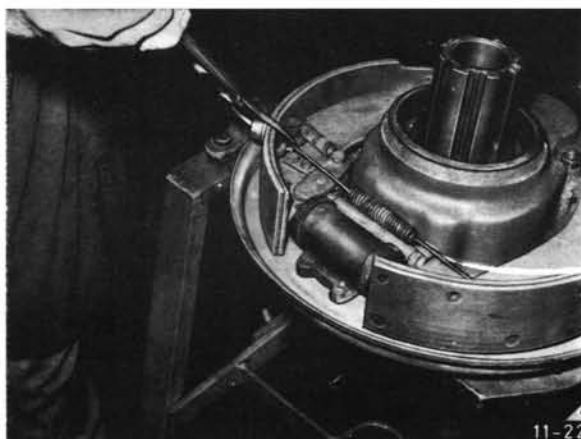


Fig. 35-2/2



Fig. 35-2/3



Fig. 35-2/4

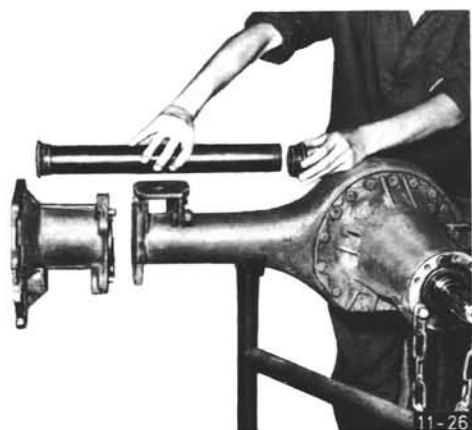


Fig. 35-2/5

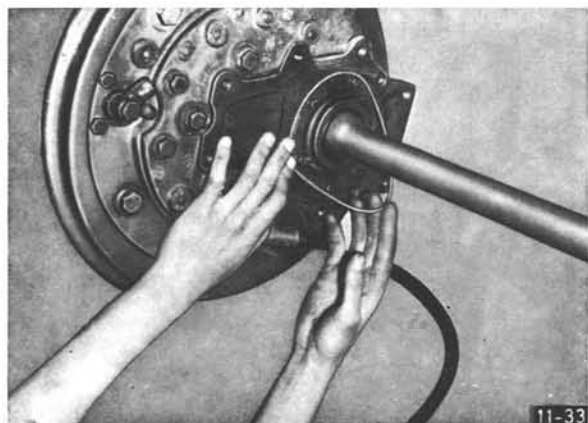


Fig. 35-2/6

9. For reassembly proceed vice versa acc. to Job No. 32-2. In addition, the following deviating points should be observed:
10. The drive shaft in the wheel hub drive of the rear axle can be preassembled together with bearing and pinion.
11. Glue sealing rubber with sealing compound to inner sealing tube. Following assembly of the connecting housing, check whether the seating is in order.
12. Tighten fastening screws of connecting housing to **24 mkp.**
13. Use round cord ring when attaching wheel hub drive to connecting housing. Fig. 35-2/6.
14. For assembly of hand brake, in particular correct adjustment of actuating parts in wheel hub drive, refer to Job No. 42-6.

A. Vehicle Brake

The pedal brake is a hydraulic brake and acts on all the four wheels. When the brake pedal is stepped upon, brake fluid is forced from the master brake cylinder to the wheel brake cylinders. This will force the pistons in the wheel brake cylinders outwards while **simultaneously** all the brake shoes will come to rest against the brake drums. As from a pedal force of approx. 0.7 kp a brake booster, if installed, supports the braking operation with compressed air.

Caution! Use only original brake fluid.

When using mineral oil in the hydraulic brake system, **all the rubber parts** will swell quickly and lock up the system. The hydraulic brake will then be unable to function. Watch out!

B. Trailer Brake System

The compressed air trailer brake system (single or dual circuit brake) optionally installed in the UNIMOG "S" provides the means of attaching trailers to the UNIMOG "S" with the pertinent braking equipment.

Important Service Instructions

1. For metal parts

For cleaning metal parts of Westinghouse units, any of the customary cleaning compounds (for example P 3) may be used.

2. For leather parts

Piston sleeves, stuffing box seals, as well as all other leather parts are cleaned from all dust and then soaked in a bath comprising one part of leather oil, one part of tallow and one part of bees-wax for 20 minutes. The bath should be heated to approx. 60° C. Then, the individual parts are again reassembled and the sleeve kneaded slightly to make it flexible. Pistons should be inserted well greased.

3. For rubber parts

Remove all dust from rubber parts. Be sure to replace damaged seals and valve sets. Never use metal cleaning compounds or gasoline for cleaning parts made of synthetic rubber. Wash rubber parts only slightly with spirit of alcohol. Grease piston sleeves or groove cuffs on running surfaces only.

4. For pipelines (general)

Pipelines installed in frame are normally not removed. Blowing these lines out with compressed air during reconditioning will be sufficient.

If pipe screw connections are showing evidence of wear or leaks, it will be best to shorten the pipe slightly first and then use a new screw connection. For assembly proceed as follows (refer to Fig. 42-0/1).

Clamp screw connection into vise and pull coupling nut 5 with sealing ring 4 on the deburred pipe end which has been smoothly cut at a right angle. Then place thrust ring 3 on pipe and press against screw connection **without** sealing washer 2, while tightening the coupling nut with the spanner and constantly applying pressure. Loosen coupling nut, then install pipe **with** sealing washer 2 into vehicle. Then complete sealing test with soap water.

Be sure that these tubes are provided with enough clamps, so that no vibration fractures will occur.

Note:

The reason for insufficient compressed air delivery may be the compressor, which should then be repaired or replaced by an exchange compressor. After a long period of operation,

a compressor will be subject to the type of leaks caused by natural wear, so that oil may enter into the valves at the compressor head. The heat will change this oil into oil carbon and will constrict the valve cross sections, which will in turn reduce the compressor output.

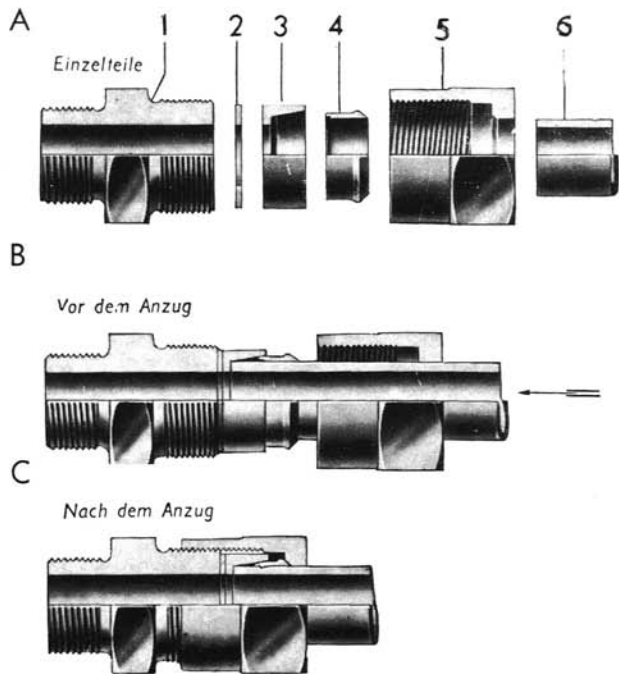


Fig. 42-0/1 Screw connections

- | | | | |
|---|--------------------------|---|------------------|
| A | Components | 1 | Screw connection |
| B | Prior to tightening | 2 | Sealing washer |
| C | Following the tightening | 3 | Thrust ring |
| | | 4 | Sealing ring |
| | | 5 | Coupling nut |
| | | 6 | Pipe |

If such a condition is not recognized in time, the oil carbon deposits may not be restricted to the compressor valves, but may extend toward the pipelines and equipment behind, such as the tire inflation cylinder and the pressure regulators, resulting in a similar restriction of cross sections. If in such a case only the compressor would be reconditioned or replaced, the expected success will not be obtained. Satisfactory results can be expected only when the pipelines, the tire inflation cylinder and the pressure regulator are also cleaned. If this is overlooked or not done for reasons of non-available time, the reconditioned or replaced air compressor may soon be faulty again, because the restricted cross section in the lines will result in constant overloads and increased heat. The valve springs will then lose much of their tension, they might break and will then cause considerable damage to the compressor.

Vacuum Brake Booster

Make	Alfred Teves, Frankfurt
Designation	T 50/26/3
Brake boost	1:40 at 0.8 kp/cm ² vacuum
Hydraulic cylinder	19.05 mm dia. × 70 mm stroke
Vacuum cylinder	197 mm dia. × 72 mm stroke

Compressed Air Brake Booster

Make	Westinghouse GmbH, Hanover
Designation	470 004 010 0
Hydraulic cylinder	27.5 mm dia.
Compressed air cylinder	100 mm dia.

Single Cylinder Air Compressor

Make	Westinghouse	
Designation	411 007 200 0	411 003 110 0
Compressor speed (at engine speed of 4500 rpm)	2350 rpm	2100 rpm
Displacement	82 ccm	150 ccm
Output	192 lits/min.	300 lits/min.
Cylinder	50 mm	75 mm
Stroke	42 mm	34 mm

Trailer Brake Valve

Make	Westinghouse	
Designation	470 003 000 0	470 006 001 0

Tire Inflation Cylinder

Make	Westinghouse	
Designation	432 505 000 0	432 505 000 0

Pressure Regulator

Make (Westinghouse)	Single line	Dual line
Designation	475 302 011 0	475 302 012 0
Cutting-in pressure	4.8 kp/cm ²	6.2 kp/cm ²
Cutting-out pressure	5.3 kp/cm ²	7.2 to max. 7.35 kp/cm ²

Hand Brake Valve

Make (Westinghouse)	
Designation	461 704 008 0
Adjusting pressure	6.5–7.5 kp/cm ²

Compressed Air Tank

Make (Linnemann & Schmelzer, Ahlen/Westf.)		
Designation	074 348 020 001	074 348 020 001
Operating pressure	7.35 kp/cm ²	7.35 kp/cm ²
Capacity	20 lits	20 lits
Test pressure	12 kp/cm ²	12 kp/cm ²

Anti-freeze Pump

Make (Westinghouse)	
Designation	432 002 000 0
Operating pressure	max. 0.8 kp/cm ²
Capacity per actuation	0.50 cm ³

Shutoff Valve

Make (Westinghouse)		
Designation	452 002 007 0	452 002 007 0
Operating pressure max.	8.0 kp/cm ²	8.0 kp/cm ²

Coupling Head

Make (Westinghouse)		452 200 003 0
Designation	452 300 000 0	452 200 101 0
Operating pressure max.	8.0 kp/cm ²	8.0 kp/cm ²

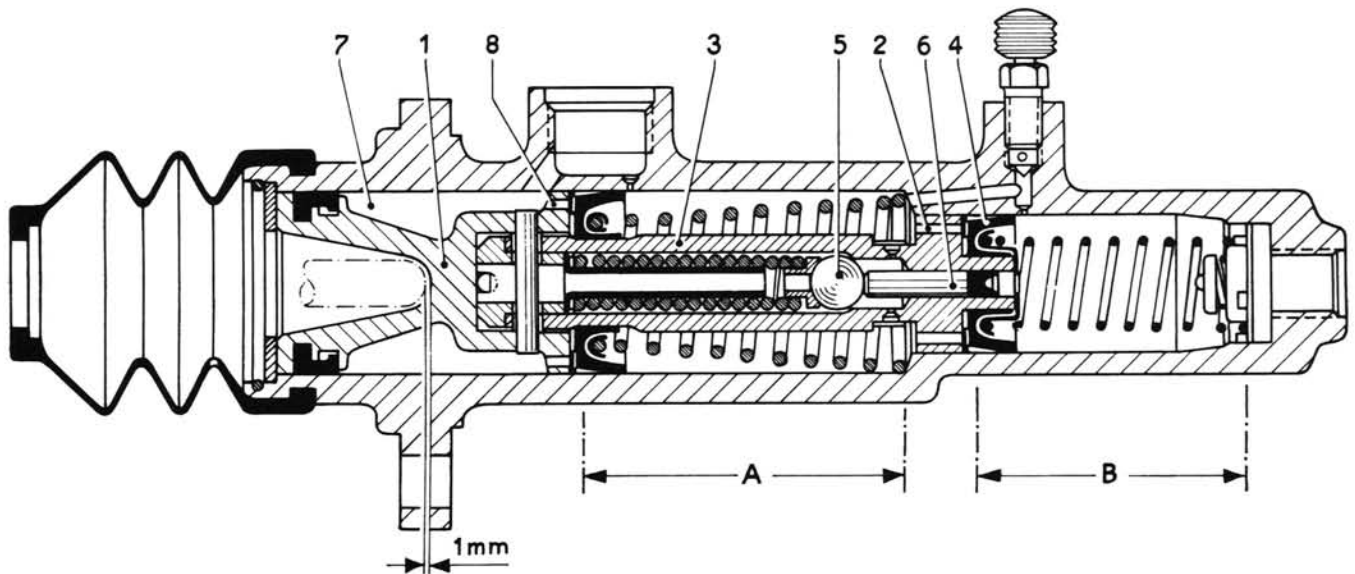


Fig. 42-1/1

Operation

The two-stage master brake cylinder has a filling stage (A, large dia.) and a pressure stage (B, small dia.).

Actuation of the pedal brake and the forward movement of the pistons (1 and 3) will force brake fluid into the brake system. The additional brake fluid delivered likewise by the filling stage flows via the filling holes (2) past the sleeve (4) into the pressure stage. By then, both sleeves have already closed the sniffling holes of the cylinders.

After reaching a preset pressure the control plunger (6), under the influence of the pressure in the pressure stage, opens ball valve (5), through which the additional brake fluid of the filling stage flowing under more intensified braking pressure will return into the plunger space (7). Upon reaching a definite pressure, the filling stage will become absolutely pressureless via this valve (5).

The plunger space (7) has a large bore to the supply tank for compensating the above-named function and for bleeding the brake system.

Upon release of the brake pedal, when the brake shoes are resting against the adjusting cam and the piston of the master brake cylinder has returned to its starting position, the filling stage will be under a vacuum. The brake fluid which has previously escaped via the ball valve is now sucked into the filling stage through this vacuum via the filling holes (8), past the cover plate and the sleeve, and through the sniffling holes upon their exposure.

The hydraulic link operates fully automatic. When making adjustments, the thrust rod to the master brake cylinder should have one mm play on piston, which equals approx. 10 mm on the brake pedal.

Master Brake Cylinder

I. Removal and Installation of Master Brake Cylinder

1. Protect vehicle against rolling off.
2. Drain supply tank and master brake cylinder via bleeding screw of master brake cylinder. **Be careful with paintwork since brake fluid is corrosive.** Filter brake fluid through fine screen or linnen prior to using it again.
3. Remove brake fluid supply line from master brake cylinder.
4. Disconnect electric line on brake light switch.
5. Remove hydraulic brake line from master brake cylinder.
6. Unscrew fastening screws on pedal mounting bracket.
7. Remove master brake cylinder without piston rod but **with** sleeve from bearing bracket.
Fig. 42-1/2.



Fig. 42-1/2

8. For reassembly proceed vice versa.

Note: Install dust sleeve correctly into provided groove of piston rod. Bleed hole in dust sleeve should **always** point downwards.

Bleed brake system.

Play between piston rod and piston: 1 mm, which equals 8-10 mm on brake pedal (adjustable by loosening counter nut on fork head and rotating piston rod).

Check brake system for leaks.

II. Reconditioning of Master Brake Cylinder

Reconditioning of master brake cylinder is required only, if

- a) in spite of a correctly adjusted or completely removed piston rod the piston does not return to its starting position,
- b) brake fluid emerges on protective cap (secondary sleeve leaks),
- c) in spite of properly adjusted and bled wheel brakes no resistance is felt when stepping on brake pedal (leaky primary sleeve),
- d) the floor valve is leaky or contaminated,
- e) the master cylinder is contaminated or the wrong brake fluid has been filled in. Use only brake fluid approved by the manufacturer.

1. Remove protective cap.
2. Clean master brake cylinder externally, remove stop light switch and ring fitting.
3. Remove circlip and stop washer, catch piston with sleeves.
4. Remove compression spring with spring retainer and floor valve.

A can of ATE paste, a small container with ATE brake fluid and a magnifying glass are included in the equipment.

5. Clean all parts in spirit of alcohol and check. Also check small compensating hole for passage. Rusty or badly scored housings and pistons with seizing marks should be replaced.

Note: When in doubt (concerning sleeves and floor valve) always use new parts. Coat cylinder bores, piston running surfaces and sleeve surfaces very sparingly with ATE brake cylinder paste.

Repair sets are available from the Spare Parts Department, Werk GAGGENAU. (Refer to Spare Parts Catalog.)

6. Reassemble master brake cylinder, accurately observing the following sequence: floor valve compression spring with spring retainer – primary sleeve – filling plate – piston with assembled secondary sleeve – stop washer – circlip.

Prior to inserting piston, check again whether filling plate is installed. When inserting the piston, do not damage sleeves. (Use assembly needle 1.5 mm dia. with rounded tip.)

7. Install stop washer, insert piston with push rod, insert circlip.

The piston should return quickly to the stop washer immediately upon insertion. Try several times; if the piston returns slowly, disassemble master brake cylinder again and look for cause. Polishing with Spanish white or French chalk and brake fluid will generally bring success.

I. Removal and Installation of Wheel Brake Cylinder

1. Remove road wheel.
2. Remove brake drum.
3. Set adjusting cam to max. point on brake shoes on rear axle, disconnect return spring on brake shoes of front axle and remove thrust bolt with combination pliers.
4. Install piston clamps 000 589 02 37 00.
5. Remove nose clip of wheel brake cylinder on front axle. Unscrew brake line on wheel cylinder, catch emerging brake fluid. (Caution! Brake fluid is corrosive.)
6. Loosen the two fastening bolts and remove wheel cylinder.
7. For installation proceed vice versa.
8. Adjust brake and bleed brake system.

Note: For installation position of wheel brake cylinders refer to Job No. 33-4, Section II, Item 9.

II. Reconditioning of Wheel Brake Cylinder

1. Clean wheel brake cylinder externally.
 2. Remove sleeves and thrust bolts. Unscrew bleeding screw.
 3. Remove piston.
 4. Remove sleeves.
 5. Remove stop spring with spring retainer.
 6. Clean all parts in **spirit of alcohol** and check for wear.
- Note:** Damaged parts of wheel brake cylinder should always be exchanged against new parts, or complete repair sets should be used.
- Rusty or badly scored housings or pistons with seized spots should be replaced. Coat all internal parts with ATE paste prior to installation.
7. For reassembly proceed vice versa.
 8. Check pistons for easy running upon reassembly.

Note: Increasing wear of the brake linings will make the idle travel of the pedal brake lever constantly larger, so that finally the vehicle can no longer be perfectly braked. The brake shoes should therefore be readjusted in time, with the brake drums cold. New brake linings require readjustment of brake shoes more often. Adjust each wheel and each brake shoe individually. If adjustments are no longer possible, the brake linings are fully worn and should be replaced.

The brake lining of new vehicles is as thick as possible to permit long life. As a result, any loosening of **new** brake shoes beyond the dimension required for unobstructed operation is not possible. If the addition of unfavorable tolerances during reassembly should cause a brake shoe set on a new vehicle to heat up, no attempt should be made to loosen the adjusting cams since no travel for such a purpose is available. The phenomenon will disappear after a few hours of driving. Any turning in the direction of "Loosen" beyond the max. possible "Loose position" is prevented by the cam nose. Using force will result in breaking the connecting point between the bolt and the cam disc.

Wrong adjustments at the same point are also possible when the brake shoes are adjusted by exerting pressure with the cam nose. Such adjustments will become ineffective after a short period. **Always observe the direction of rotation for adjustment in accordance with Fig. 42-3/1.** The direction of rotation is the same for all points on the front and rear axle, that is, the motion of the spanner applied vertically in downward direction is in an alignment with the desired motion of the brake shoe.

1. Jack up vehicle and check whether front and rear wheels are running freely.
2. Turn adjusting cam outwards until the brake shoes rest against the brake drum, that is, until a marked resistance is felt. Always

turn wheel or brake drum against the brake shoes for adjusting cam.

3. Turn adjusting cam back until the brake drums can just be freely rotated.

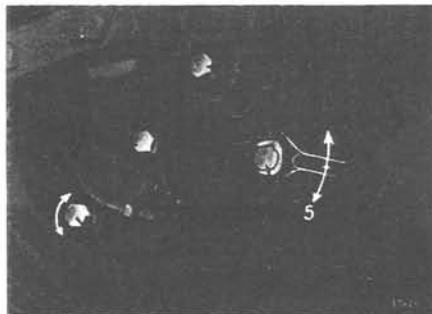


Fig. 42-3/1

- 1 Adjusting cam for brake shoes
 - 2 Bleeding point on brake cylinder
 - 3 Oil filler hole for wheel hub drive
 - 4 Oil drain plug for wheel hub drive
 - 5 Loosening
 - 6 Tightening
- } of cam

4. Step down on pedal brake and check whether idle travel on pedal brake lever plate is approx. 10 mm.
5. Rotate road wheels and check whether they are held when stepping on pedal brake lever, and release when releasing the lever.
6. Let vehicle down and after an extended drive check whether the wheels are unobstructed, that is, the brake shoes should not wipe or rest against the brake drums when the pedal brake lever is not actuated, and brake drums should not get hot. Adjust again, if required.

Note: Check brake linings regularly when pulling off the brake drum as a safety measure. If the rivet heads are showing evidence of grinding, be sure to replace brake linings. The thickness of the brake lining should then still be at least 3 mm.

7. Check brake drums for wear. Do not wash with fatty cleaning agents (such as diesel oil, kerosene, etc.). Dry cleaning should be preferred to using gasoline.

If the brake drum is more than 0.1 mm out-of-round and shows score marks, machine or, if possible, regrind. Refer to table below and to Fig. 42-3/2.

	Brake drum machining allowance in mm	Thickness of brake lining
Normal (basic dimension)	349.2 dia. + 0.3	ground to 6 mm
Rep.-st. I	350 dia. + 0.3	6.4-0.2 mm
Rep.-st. II	351 dia. + 0.3	7.0-0.2 mm
Rep.-st. III	352 dia. + 0.3	7.5-0.2 mm

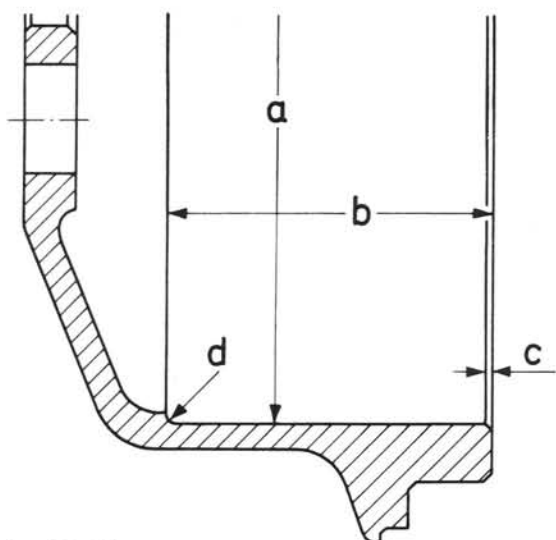


Fig. 42-3/2

a Brake drum dia.
b 78 + 1 mm

c 1.5 mm
d 2 + 1 mm

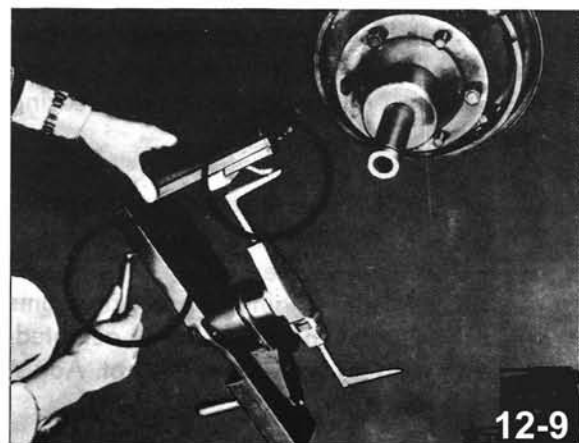


Fig. 42-3/3

8. Machine brake drums.

Note: Even with perfect surface, machine brake drum at least by $\frac{1}{10}$ mm, so that the drum is running free of wobble and the hard, glassy surface is **completely** removed.

9. If required, machine brake shoes with machining tool (for example "Zanchi").

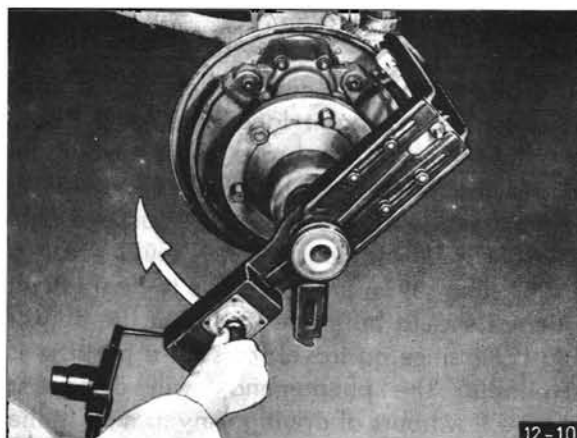


Fig. 42-3/4

10. Measure ID of machined brake drum with gauge of machining unit.

11. Set turning bit machining unit with gauge accurately to measured brake drum dimension.

Fig. 42-3/3.

12. Install brake shoe machining unit.

13. Adjust brake cam on shoes until a sight test shows that the turning bit of the unit removes as little brake lining as possible, while machining each brake shoe along its entire surface.

14. **Only then** adjust hand brake to the same dimension.

Note: The adjustment of the hand brake linkage **after** adjusting the brake cams serves the purpose of providing additional stability against tilting when the brake shoes are machined.

15. Machine brake shoes. Fig. 42-3/4.

Note: Machine at least twice to adjusted gauge to guarantee uniform chip removal.

Important: Uniform machining speed.

16. Remove brake shoe machining tool.

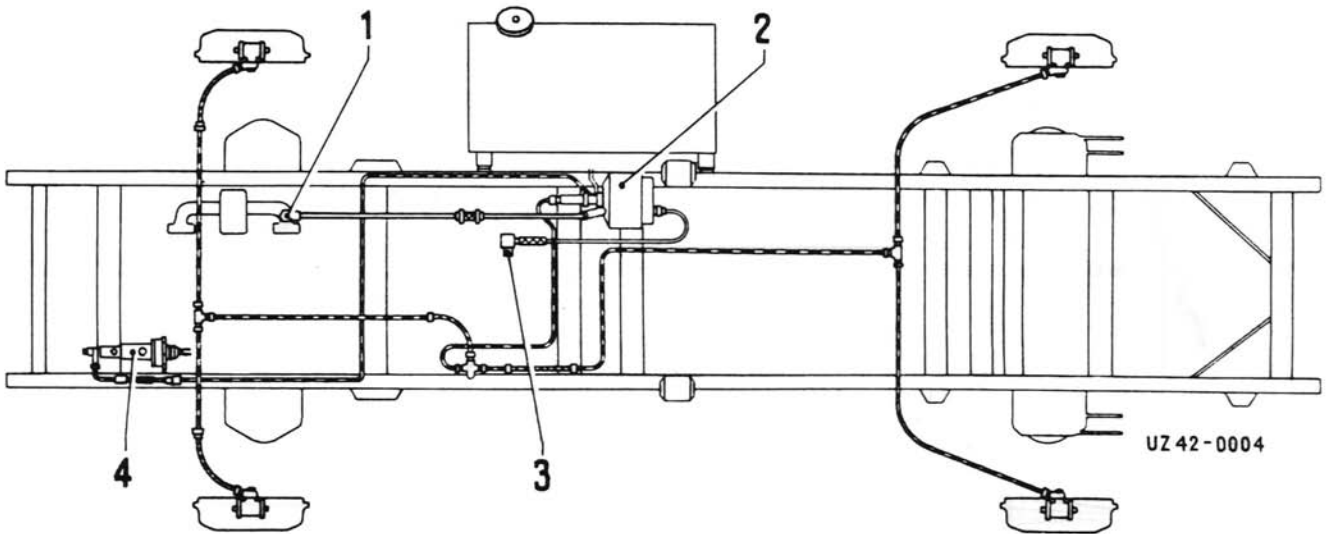


Fig. 42-3.1/1 Diagram of hydraulic brake system with vacuum brake support

1 Vacuum connection
2 Vacuum brake unit

3 Air intake filter
4 Master brake cylinder

Service Brake System

The service brake is a single-circuit hydraulic four-wheel expanding brake. Stepping down on brake pedal will move piston in stepped master brake cylinder, so that brake fluid will be forced to the front and rear wheel brake cylinders via brake lines and the brake shoes will come to rest against

the brake drums. Upon release, the force of the restoring springs in the wheel brakes will force the brake fluid out of the wheel brake cylinders via brake lines back into the stepped master brake cylinder or compensating tank.

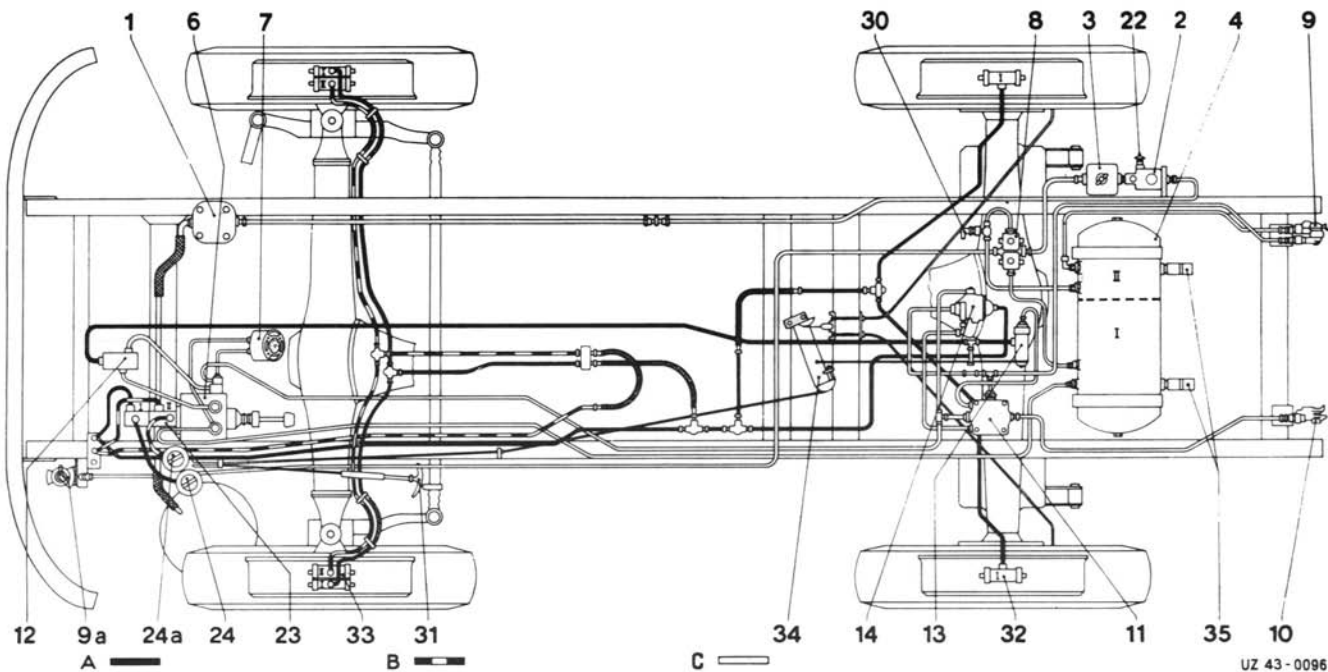
Brake Servo System

The hydraulic service brake can be additionally provided with the following options:

a) **Vacuum brake support** by means of a brake booster. To relieve the driver, this brake unit applies a part of the brake force with the assistance of the vacuum established by the running engine. When the engine is stopped and there is no vacuum, or when the unit itself fails, the full effect

of the brake is nevertheless maintained. Obviously, the brake force required against the brake pedal is considerably higher. The brake booster is not supporting the hand brake. Fig. 42-3.1/1.

b) **Compressed-air brake support** by means of a compressed-air brake booster. In this case, a compressed air control for the trailer brake system may also be installed, which can be actuated both with the brake pedal and the hand brake lever.



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Fig.42-3.1/2 Diagram of compressed air brake assistanz system with compressed-air control for the two-line trailer brake system and hydraulic two-circuit brake system 404.0

A Hydraulic brake line circuit I

- 1 Air compressor
- 2 Pressure regulator
- 3 Antifreeze unit
- 4 Compressed-air reservoir (two-chamber)
- 6 Compressed-air brake booster
- 7 Brake dual pressure gauge
- 8 Three-circuit protective valve
- 9 Palm coupling for supply line

B Hydraulic brake line circuit II

- 9a Palm coupling for supply line (front)
- 10 Palm coupling for brake line
- 11 Trailer control valve
- 12 3/2-way valve
- 13 Hand brake valve
- 14 Hydropneumatic control valve
- 22 Tire inflator connection
- 23 Tandem master brake cylinder

C Compressed-air brake line

- 24 Brake fluid reservoir circuit I
- 24a Brake fluid reservoir circuit II
- 30 Warning pressure switch
- 31 Parking brake ratchet rod
- 32 Wheel brake cylinder
- 33 Twin-wheel brake cylinder
- 34 Parking brake linkage lever
- 35 Pressure relief valve

Note:

If no noticeable resistance is felt when stepping on the brake pedal and when the master cylinder, the wheel brake cylinder, the brake shoes and the lines are in order, there is air in the brake system which must be immediately removed. Be sure to bleed the brake system after each reconditioning or brake repair.

The bleeding requires two men, unless a special unit for filling and bleeding braking systems is available.

Also check brake lines regularly for leaks and the brake fluid supply in the supply tank for completeness and fill up, if required.

If brake fluid must be filled up more often, the oil pressure brake system is leaky and should be checked immediately. Always keep tank tightly closed. The bleeding hole should be unobstructed.

Handle brake fluid carefully since it is corrosive!

Do not permit brake fluid to touch paintwork!

1. Unscrew closing plug on tank of master brake cylinder and fill up to level of thread connection, so that the brake fluid level is still below the strainer.

Be sure that the bottom of the filling up tank is always covered with brake fluid to a height of 10 mm, since otherwise air will be sucked up when the brake pedal is actuated, which would then make the entire bleeding step useless.

2. Remove protective rubber caps from bleed valves on master brake cylinder (if installed), also those on brake booster and wheel brake cylinder.
3. Place bleeding hose on bleeding valve and introduce the other end of the hose into the brake fluid of a glass vessel filled half with brake fluid.
4. Unscrew bleeding screw by one or two threads. Step down quickly on brake pedal. Close bleed screw and release brake pedal.

The air will escape through the bleeding hose.

Repeat until no more air bubbles are showing up.

When stepping down on brake pedal for the last time, keep in its bottom position until the bleed screw is again fully closed.

5. Remove bleed hose from bleed valve and attach protective rubber cap.

I. Removal and Installation of Brake Shoes

1. Jack up vehicle, remove road wheels and brake drums.
2. Remove tension springs.
3. Remove brake shoe bolts.
4. Remove brake shoes. Upon removal of brake shoes, disconnect hand brake cables on brake shoes of rear axle and remove hand brake adjusting linkage.
Fig. 42-5/1.

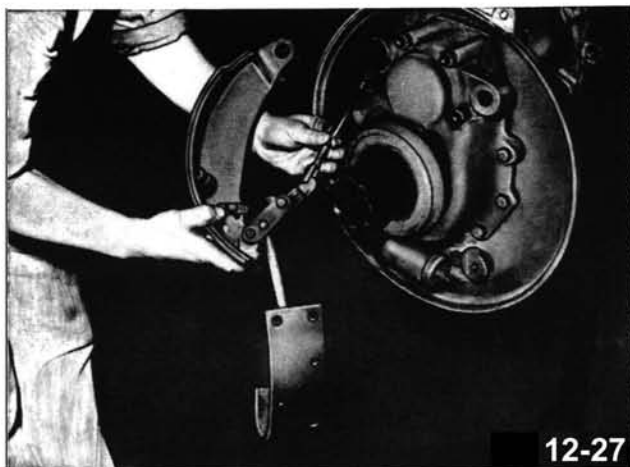


Fig. 42-5/1

Note: Do not damage dust sleeves of wheel brake cylinder.

5. For reassembly proceed vice versa. For adjusting brakes refer to Job No. 42-3 and Job No. 42-6, Section I.

Check for latest design of hand brake system, modify, if not.

II. Reconditioning of Brake Shoes

1. Unrivet old lining.
2. Clean brake lining support and equalize surface.
3. Select lining acc. to Table.

Note: Only in combination with brake drum dimension! Refer to Job No. 42-3, Table.

4. Rivet lining to drum, replacing each time both brake lining pairs at the right and the left.

I. Adjustment

Note: For adjusting or readjusting the hand brake, the pedal brake should always be adjusted first.

- 1 Jack up rear axle.
- 2 Move hand brake lever completely into released position.
- 3 Uncotter pull rod from hand brake lever to connection at rear end and remove.
- 4 Remove rubber plug on brake cover plate and extend the adjusting spindle by turning spindle with a screw driver at notched wheel until the brake shoes come to rest against brake drum. Then turn back until the wheels are just barely turning freely.

Fig. 41-6/1.

- 5 Insert pull rod into connection.

Tighten hand brake to third tooth of pawl and then adjust nuts on brake cables (Fig. 42-6/2) on brake cable carrier in such a manner that the rear wheels can just barely be rotated manually. With the hand brake released, the wheels should rotate freely, when tightening to fourth tooth, wheels should be locked when turned manually.

Note: Once the basic adjustment has been made together with new brake cables, any additional **adjustment** of hand brake is made **only** at notched wheel of adjusting spindle.

- 6 Insert cotter pins into linkage and lubricate joint.
- 7 Lower rear axle.

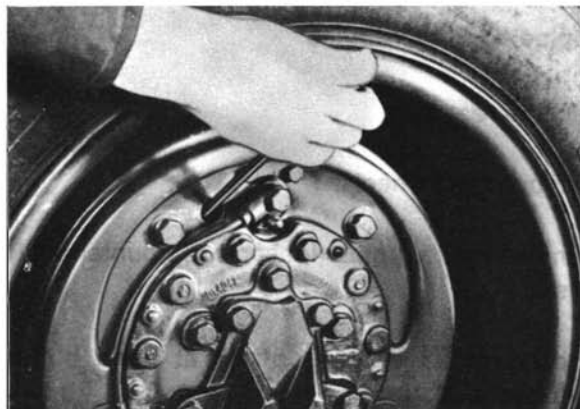


Fig. 42-6/1

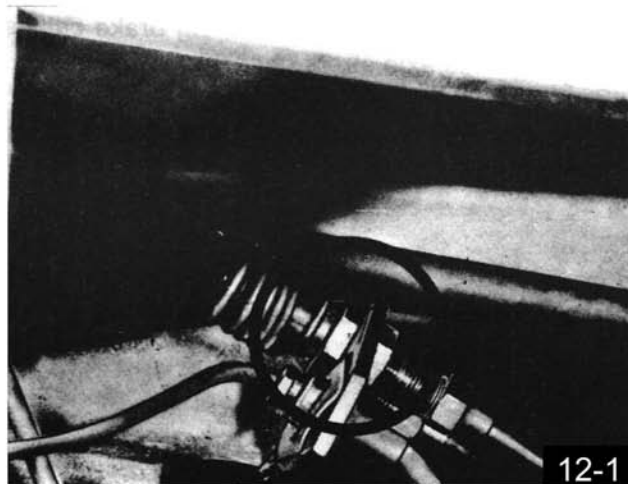


Fig. 42-6/2

42-6 Parking Brake System on Model 404.1

II. Replacing Brake Cables

- 1 Jack up rear axle.
- 2 Remove road wheels.
- 3 Remove brake drums (loosen two counter-sunk screws).
- 4 Loosen brake cable controls at hand brake linkage connection.
- 5 Loosen front hex. nuts on brake cable carrier. Push rubber sleeve forward and take cables out of carrier in upward direction.
- 6 Loosen fastening clip for holding brake cables right and left to axle struts (2 each).
- 7 Remove brake shoe and hand brake lever return spring.

8 Upon removal of cotter pin and bolt, lift off rear brake shoes and disconnect brake cable from brake lever.

9 Pull out brake cables in upward direction.

10 Check brake cables (Bowden wires), replace defective brake cables. Replace rubber sleeves. New brake cables have been provided with grease during installation, enough to last for the duration of their use. Subsequent lubrication is not required.

11 For installation proceed vice versa.

12 Adjust hand brake.

III. Converting the Parking Brake

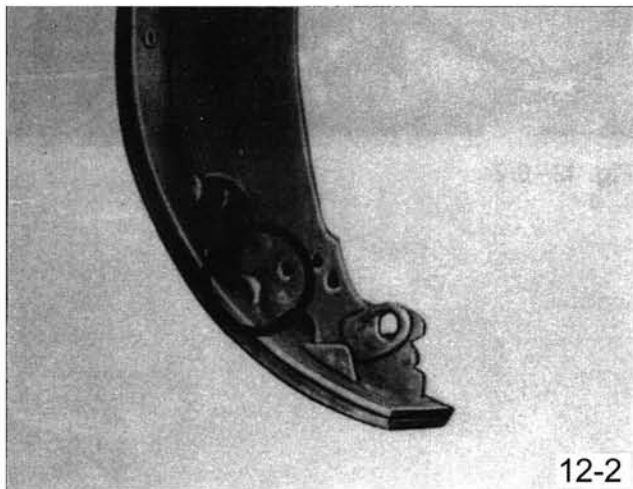


Fig. 42-6/3

1 Jack up vehicle at the rear, remove both rear wheels and brake drums.

2 Uncotter hand brake pull rod on hand brake compensator and force out.

3 Remove brake compensator from brake cables.

4 Loosen brake cables in brake cable carrier and remove.

5 Loosen fastening clips (2 each).

6 Remove brake shoes.

7 Remove brake cables.

Note: On vehicles prior to chassis No. 404 114 0850 00 29 remove hand brake lever complete with pull rod, pawl, spring and pull rod in addition to brake compensator.

8 After unscrewing the installed old pressure plate on brake shoe, from which the brake plate is remove, remove lower inside hook. Fig. 42-6/3.

9 Refinish brake shoes according to template. Fig. 42-6/4.

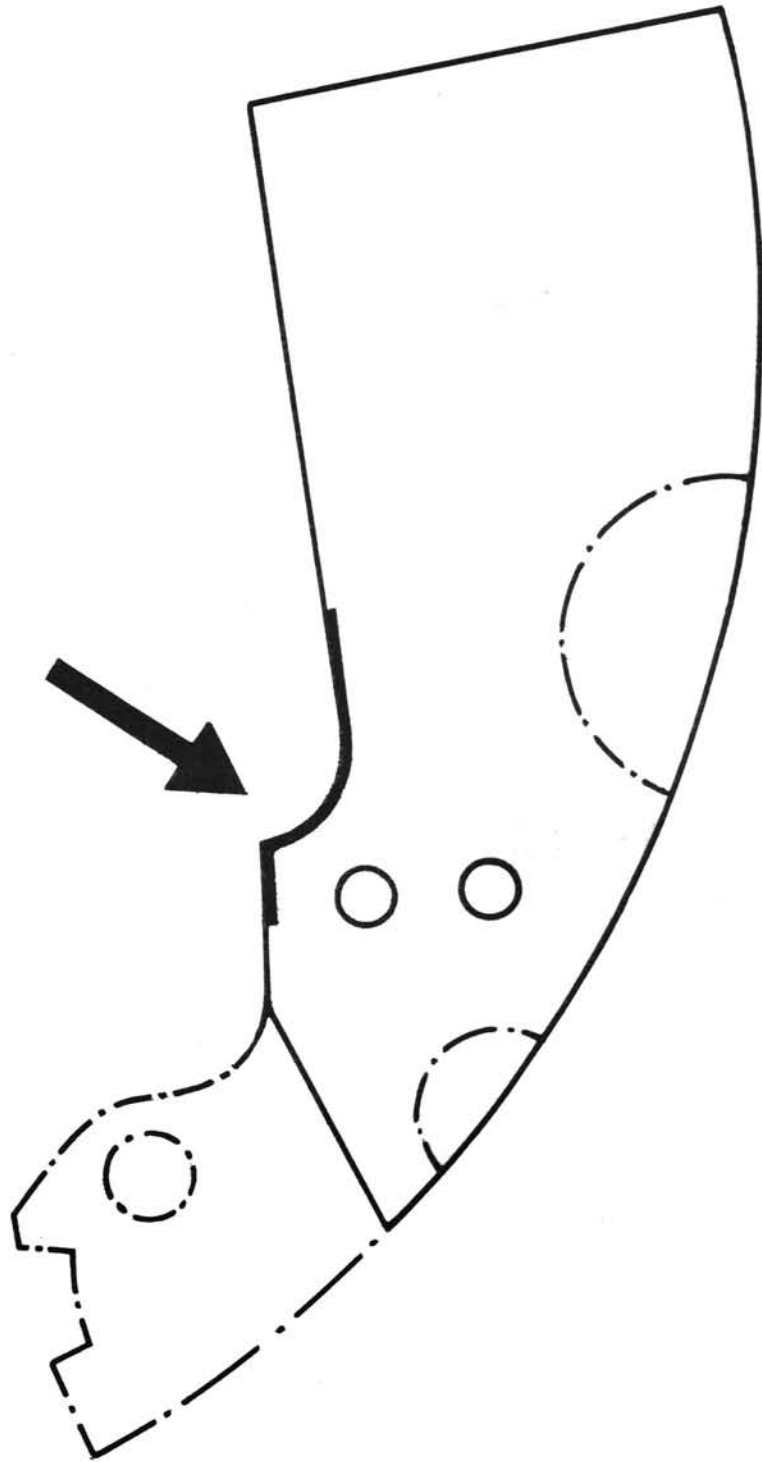


Fig. 42-6/4

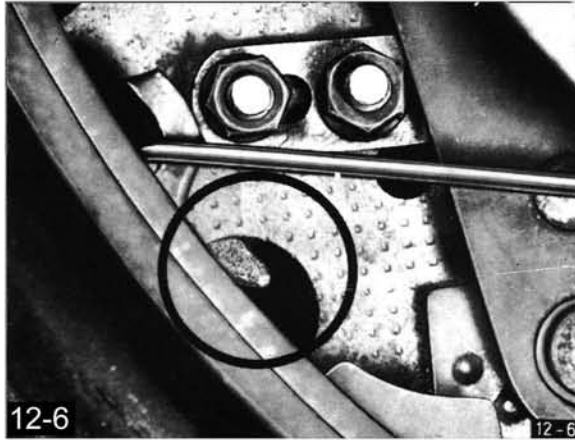
Brake Shoe Template

Note: Use of Graphic Software May Be Needed to Adjust Template Size. Print Template and Adjust Accordingly



12-4

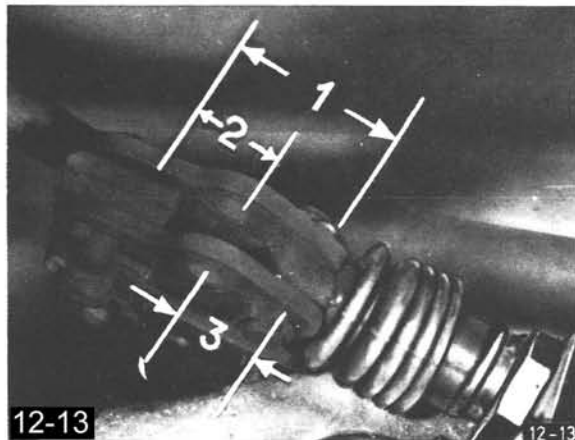
Fig. 42-6/5



12-6

12-6

Fig. 42-6/6



12-13

12-13

Fig. 42-6/7

10. Countersink fastening holes for new pressure strap with 90° countersink in such a manner that the countersunk screws are fully recessed. Fig. 42-6/5.

11. Install new pressure strap.

Note: Use only latest version. Tighten fastening screws well.

12. Reinstall brake strap.

Note: Be sure that the lever for attaching brake cable (hook) is as far down as possible, lever should be visible through lower half bore in brake shoe (Fig. 42-6/6). If this position is not obtained, make possible by refinishing brake strap, brake shoe or lever. However, cam lever should not exert lateral pressure against pressure strap.

13. Lay new brake cable controls free of tensions.

14. Attach both cables to holding plate.

Note: The holding plate is provided with standard oblong holes as from the middle of 1965, permitting limited displacement on supporting tube. Note when attachment of cables shows that the adjusting path is very low. Attach brake cables into the four straps. Three possibilities for attachment are available, depending on wear of brake shoes.

Choose position which permits adequate travel for readjusting brake cables.

Fig. 42-6/7.

15. Connect brake pull rod and compensating lever with straps.

16. Check hand brake.

Hand brake 3rd tooth: Drums are **uniformly hard** to turn **on both sides**.

Hand brake 4th tooth: Drums held tight. Hand brake lever should still permit pulling up to 5th to 6th tooth at increased force against resilient resistance.

Removal and Installation of Pedal Brake Lever
Refer to Job No. 29-01

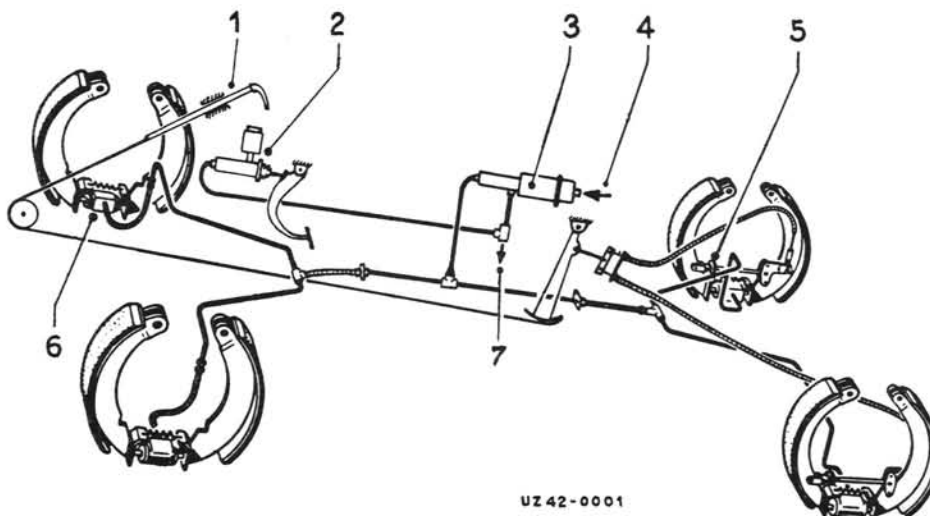


Fig. 42-6.1/1
Hand and pedal brake system (diagram)

- | | |
|---|---|
| <ul style="list-style-type: none"> 1 Hand brake (lever-operated brake) 2 Master brake cylinder with compensating tank 3 Pneumatic brake servo cylinder | <ul style="list-style-type: none"> 4 Compressed air connection 5 Adjusting spindle for hand brake 6 Wheel brake cylinder |
|---|---|

I. Operation

The hand brake serves as an auxiliary and parking brake. Brake acts only mechanically on the rear wheels, but with compressed-air control for the trailer brake system installed also on brake system of trailer. The hand brake permits full braking only.

Acutation is by means of a pawl rod with handle (pistol grip brake) via brake cables, a guide roller and pulley, as well as a lever with return springs acting on brake shoes of rear wheels.

Fig. 42-6.1/1 and 42-6.1/3.

II. Adjustment

Prior to adjusting the parking brake (hand brake), the service brake (pedal brake) must be adjusted first.

Following a basic reconditioning of the brake system or if the hand brake linkage and the cable control are hard to move, disconnect and check for easy operation and wear.

- 1 Protect vehicle against rolling off (chocks).
- 2 Jack up rear axle, release hand brake completely, wheels should turn freely.
- 3 Remove bottom brake cover plates.
- 4 Adjust at notched wheel of push rod with a screw driver until the brake shoes come to rest against brake drum. Refer to Fig. 42-6.1/2. Then turn back until the road wheel is just barely running freely. The push rod has right-hand threads.
- 5 Check whether hand brake becomes effective starting at 2nd tooth. With the brake released, the hand brake lever should rest against stop of pistol grip.
- 6 Reattach brake cover plates and lower axle.
- 7 Take vehicle on trial run. After driving for a short distance, check manually whether brake drums are getting warm.

42-6.1 Parking Brake System on Model 404.0

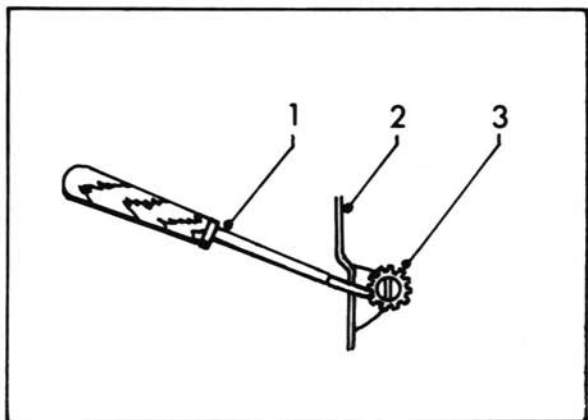


Fig. 42-6.1/2

Adjustment of brake push rod

- 1 Screw driver
- 2 Brake cover plate
- 3 Notched wheel

3 Pull pawl rod completely out of guide tube and unscrew brake cable.

4 Unscrew guide piece for brake cable on pulley bearing.

5 Unscrew housing cover, remove guide roller, pull brake cable out of housing toward the rear.

6 For reassembly proceed vice versa.

Note: During assembly, insert shaft with guide roller into housing with some Molykote "G". The pawl rod can be easily slipped into guide tube when the pawl is slightly raised against the spring pressure.

7 Adjust hand brake.

III. Replacement of Brake Cables

A Brake Cable Front

1 Loosen hand brake cable on lever (counter nut) and remove.

2 Unscrew guide roller with housing from bracket on radiator grille. Also remove pulley on transmission housing by removing bolt.

B Brake Intermediate Cable

- 1 Loosen intermediate cable on brake compensating lever by removing bolt.
- 2 Unscrew fork head and pull out intermediate cable after unscrewing clip from lever.
- 3 For installation proceed vice versa.

C Brake Cable Rear

- 1 Remove road wheels.
- 2 Pull off brake drums.
- 3 Loosen brake cable on compensating lever by removing cotter pin and unscrew guide piece on lever bearing, remove cable.
- 4 Loosen fastening clip for brake cable on rear axle.
- 5 Disconnect brake cable on brake shoes by loosening brake cover plate first.
- 6 Pull out brake cable.
- 7 For reassembly proceed vice versa.

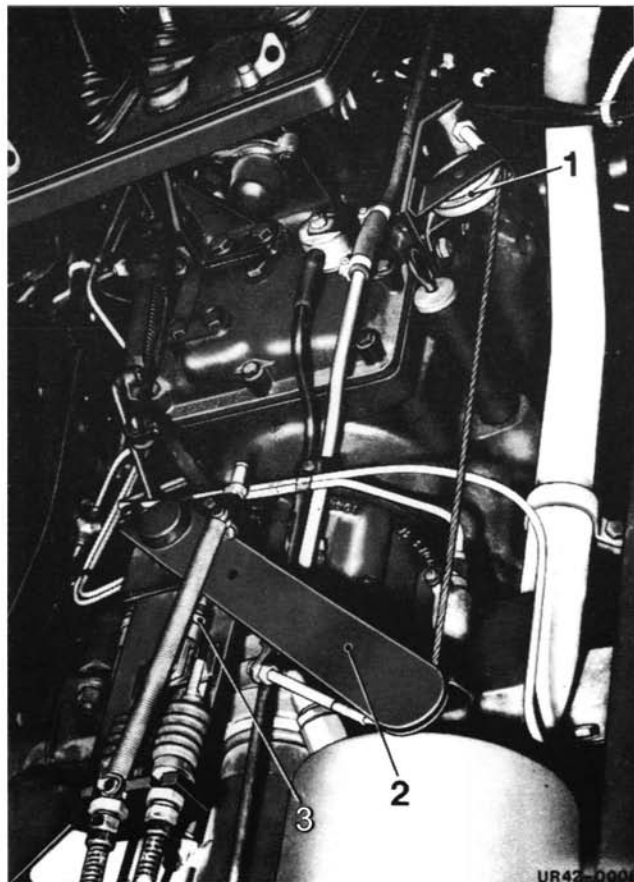


Fig. 42-6.1/3

- 1 Cable pulley
- 2 Compensating lever
- 3 Intermediate cable with fork head

Note: Make sure that the brake cover plate at top is not wiping against brake drum upo reinstallation.

- 8 Adjust hand brake.

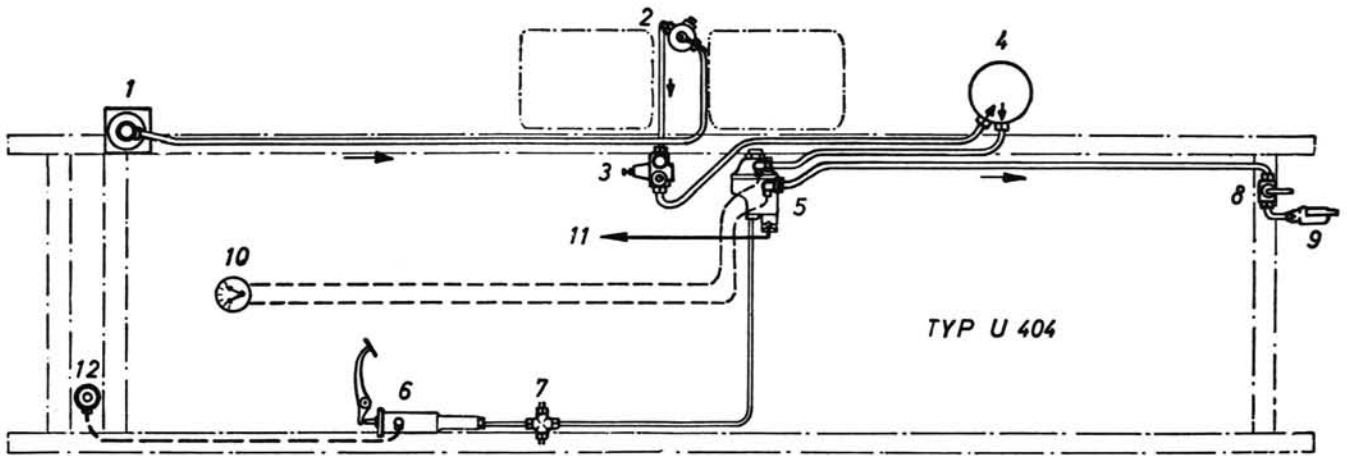


Fig. 42-7/1

Single Circuit Brake System (Diagram)

- | | |
|---|--------------------------------------|
| 1 Compressor | 7 Distributor for pressure oil lines |
| 2 Tire inflation cylinder with filter | 8 Shutoff valve |
| 3 Pressure regulator | 9 Trailer hose coupling |
| 4 Compressed air tank* | 10 Double pressure gauge |
| 5 Oil pressure controlled trailer brake valve | 11 Connections for hand brake |
| 6 Master brake cylinder | 12 Brake oil compensating vessel |

* The tank is now arranged similar to dual circuit brake systems

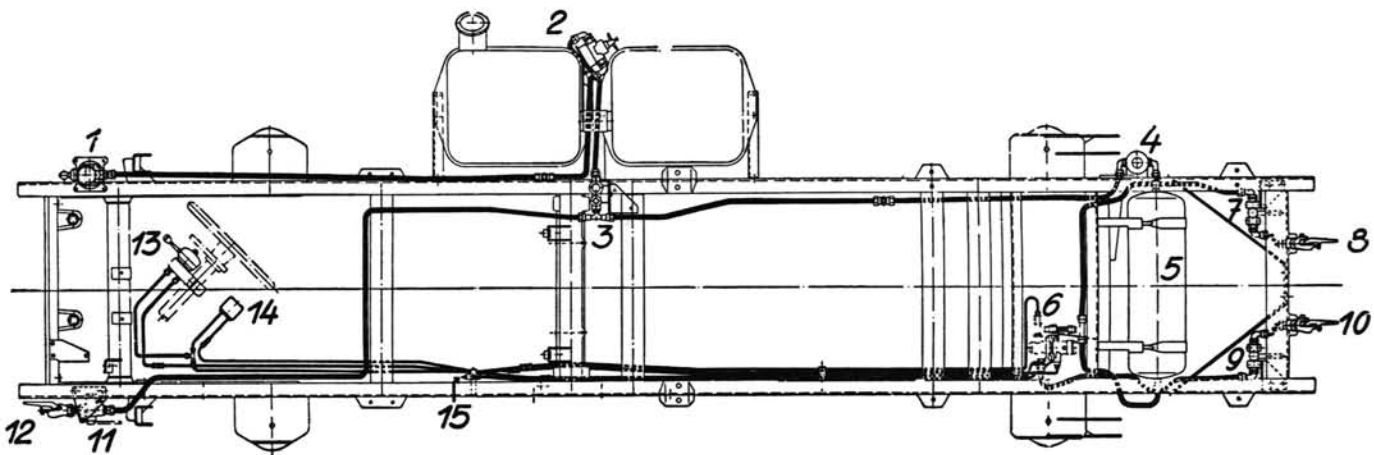


Fig. 42-7/2

Dual Circuit Brake System (Diagram)

- | | |
|---------------------------------------|--|
| 1 Compressor | 9 Shutoff valve |
| 2 Tire inflation cylinder with filter | 10 Trailer hose coupling (brake line, yellow) |
| 3 Pressure regulator | 11 Shutoff valve |
| 4 Anti-freeze protection | 12 Trailer hose coupling (supply, red) |
| 5 Compressed air tank | 13 Hand brake valve |
| 6 Trailer brake valve | 14 Double pressure gauge |
| 7 Shutoff valve | 15 Connection master brake cylinder of pedal brake |
| 8 Trailer hose coupling (supply, red) | |

I. Brake Booster

A. Brake Booster General Information

The brake booster is optionally installed in the UNIMOG-S and serves with its compressed air section to support the pedal pressure exerted by the driver during the braking.

Simultaneously, the trailer brake can be operated via an air-controlled trailer valve. The hydraulic control section is at the left of the cylinder body in which the piston (5) and the piston rod (3) are guided, while the hydraulic booster cylinder is screwed to the right.

The control section comprises the connections (V) for the compressed air supply tank (A) for the trailer brake and (E) for bleeding. The booster cylinder is provided with the connections (st) for the line coming from the master brake cylinder and (Z) for the line to the hydraulic wheel brake cylinders.

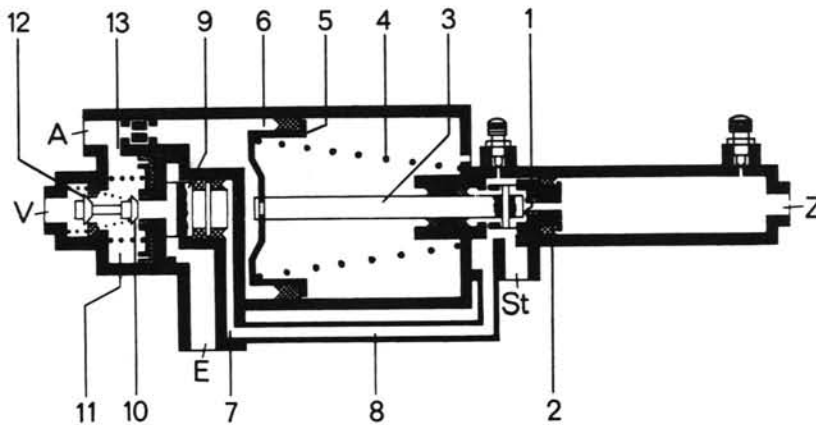


Fig. 42-7/3

Operation: Actuation of the brake pedal is via the hydraulic master cylinder, which will first energize the hydraulic brake system and then build up pressure in the line leading the connection (St) with the pressure acting on the wheel brake cylinders via the opened inlet (1) and the connection (Z) and on the pistons (9) via the connection (8).

Hydraulic Control Section:

If the response pressure of the control section (3 to 5 kp/cm^2 acc. to approx. 7.0 kg pedal pressure) is exceeded, the piston (9) moves to the left. The outlet (10) is closed, the inlet (12) is opened. Compressed air enters chamber (11) and through the hole (13) to the connection (A), as well as to the chamber (6). If the force acting through the pressure in chamber (11) from the left on piston (9) equals the force acting through the pressure in the chamber (7) from the right, the inlet (12) will be closed.

The height of the pressure in chamber (6) depends on the actuation of the brake pedal. At max. actuation the pressure will be that of the supply tank. When releasing the brake, the pressure in room (6) will be reduced acc. to the reduction of the hydraulic pressure when outlet (10) is opened.

Hydraulic Booster Cylinder

When pressure is established in chamber (6), the piston (5) and thereby the piston rod (3) as well as the piston (2) will move to the right. The inlet (1) will close. The hydraulic pressure established in the booster cylinder and thereby in the brake line (max. 120 kp/cm² permissible) depends on the extent of the pressure in chamber (6).

When the brake is released, the spring (4) will return piston (5) with piston rod (3) and piston (2) to their end position. The inlet (1) is opened and the brake line becomes pressureless.

Service:

The brake booster requires no special service. When the brake pedal can be stepped down to $\frac{2}{3}$ of the total stroke, the brake shoes require readjustment. Perfect bleeding of the hydraulic system is a prerequisite for proper functioning of brake system.

B. Reconditioning of Brake Booster

Reconditioning is essentially restricted to the exchange of defective rubber parts and valves. When the piston, the piston running surface or the piston rod are showing evidence of damage, the unit should be exchanged. Refinishing valves or other parts named above will result in faulty functioning of brake booster and accidents may be the result.

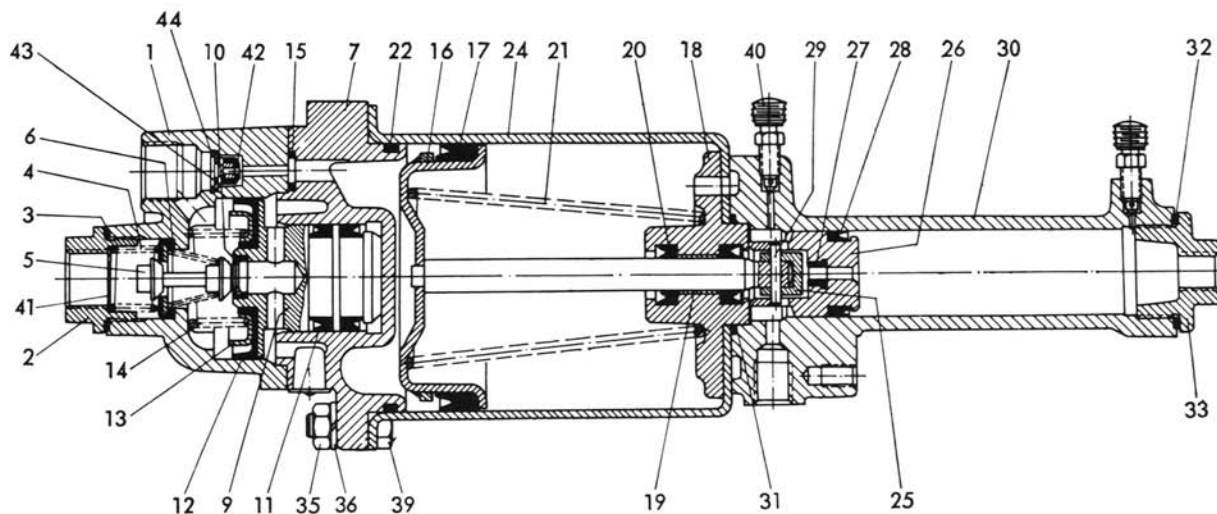


Fig. 42-7/4

- | | |
|------------------------------------|---|
| 1 Housing bottom | 22 O-ring 90 × 4* |
| 2 Cap | 24 Cylinder (compressed air section)** |
| 3 Sealing ring* | 25 Thrust piece** |
| 4 Compression spring** | 26 Piston (hydr. section compressed air controlled) |
| 5 Valve, compl.* | 27 Valve* |
| 6 Sealing ring | 28 Grooved ring* |
| 7 Housing, compl. | 29 Cylinder notched pin |
| 9 Piston (hydr. section) | 30 Cylinder (hydraulic section) |
| 10 Piston* for throttle valve*** | 31 O-ring 34.2 × 3* |
| 11 Grooved ring* | 32 Sealing ring** |
| 12 Pot sleeve* | 33 Cap |
| 13 Spring retainer** | 35 Hex. nut M 8 |
| 14 Compression spring** | 36 Circlip B 8 |
| 15 O-ring 8.3 × 2.4* | 39 Hex. screw M 8 × 25 |
| 16 Piston (compressed air section) | 40 Vent screw with rubber cap |
| 17 Grooved ring* | 41 Screen plate** |
| 18/19 Housing center portion | 42 Valve* |
| 20 Grooved ring* | 43 Washer |
| 21 Cone spring | 44 Locking ring 14 × 1 |

* Parts subject to wear

** Parts to be replaced during repairs

1. Clean brake booster externally with spirit of alcohol. Use no water or dry-cleaning gasoline.
2. Separate housing (7) with housing bottom (1) from cylinder (24) by loosening the 8 hex. screws.
Refer to Fig. 42-7/4.
3. Remove round cord ring (22) from housing.
4. Remove cylinder (24) from hydraulic cylinder (30) upon loosening of hex. nuts.
5. Knock out cyl. notched pin (29) from thrust piece (25) and pull piston (16) with cone spring (21) out of cylinder.
6. Disassemble piston (26).
7. Unscrew housing bottom (1) from housing (7).
8. Unscrew cap (2) on housing bottom (1) and remove valve (5) with sealing ring (6).
9. Remove compression spring (14) and take off piston (9) with cup sleeve (12) and spring retainer.
10. Remove 2 grooved rings (11) on piston (9).
11. Clean parts in spirit of alcohol or brake fluid.
12. Check all parts for wear. Replace defective parts.
13. For reassembly proceed vice versa.

II. Pressure Regulator and Tire Inflation Cylinder

A. Removal and Installation of Pressure Regulator

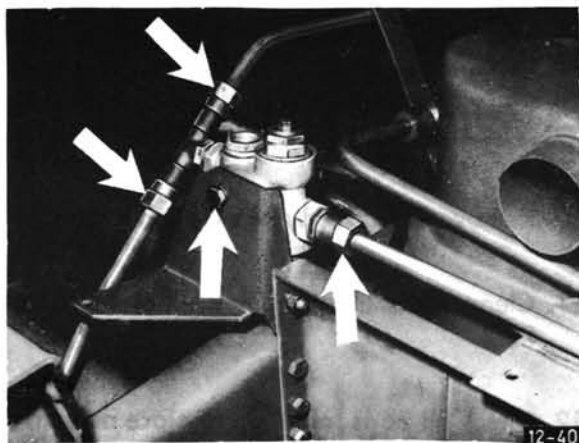


Fig. 42-7/5

1. Make system pressureless.
2. Unscrew lines (of tire inflation cylinder and to anti-freeze pump).
3. Unscrew pressure regulator from console.
4. For reinstallation proceed vice versa.

Note: Slide holes 13 × 200 mm on bleed pipe (protection against corrosion).

B. Reconditioning of Pressure Regulator

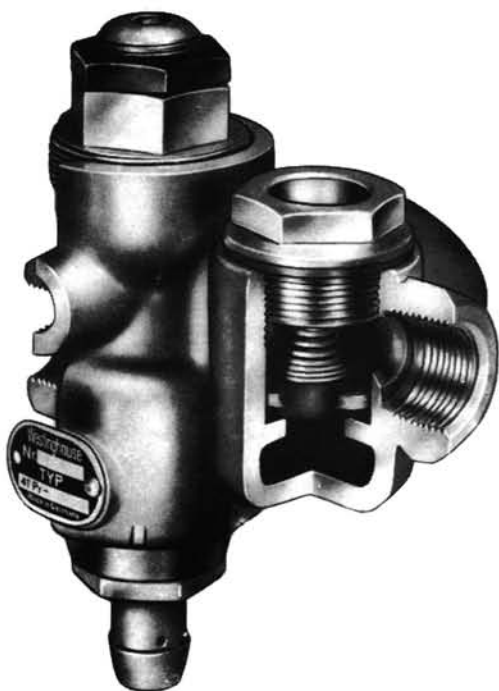


Fig. 42-7/6

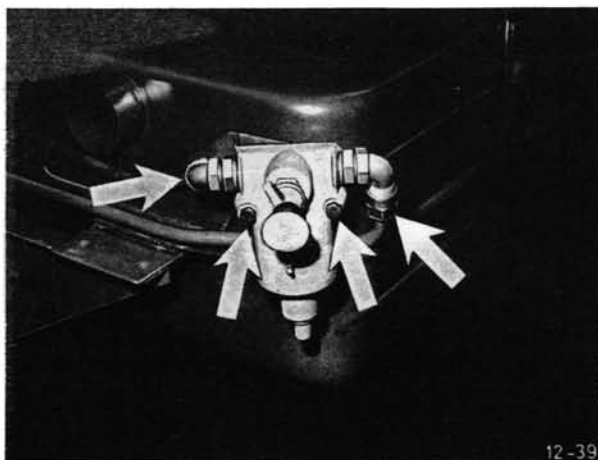


Fig. 42-7/7

1. Unscrew cap of overpressure bottom valve. Fig. 42-7/6.
2. Pull out valve set.
3. Continue disassembly, if required, by removing the safety disc. Replace rubber rings, if required, also rubber sealing disc bottom.
4. Unscrew lateral closing screw with filter sealing ring to check for free flow.
5. Unscrew closing nut of adjustable pressure control valve above. Remove spring with retainer as well as valve plate. Fig. 42-7/7.
6. Unscrew adjacent closing screw for overflow valve with filter sealing ring. Remove cone spring and sealing plate.
7. Clean housing passage completely. For cleaning of rubber parts, use only spirit of alcohol. Grease sliding surfaces slightly with acid-free mineral oil. Replace damaged seals and reassemble vice versa. Test for leaks. Adjust pressure on top threaded cap secured by counter nut. Use 8 mm hexagon socket spanner for making adjustments.

C. Removal and Installation of Tire Inflation Cylinder

1. Unscrew lines (of air compressor and to pressure regulator).
2. Unscrew tire inflation cylinder from console.
3. For reinstallation proceed vice versa.
Fig. 42-7/8.



12-39

Fig. 42-7/8

D. Reconditioning of Tire Inflation Cylinder

1. Unscrew water and oil separator hose connections at bottom and remove bottom valve with spring. (Secured by punch mark.)
2. Unscrew housing cover at bottom.

Remove sealing ring, spring and filter.

3. Unscrew connecting piece at top after removing wing nut.

Pressure spring, valve, plunger etc. are exposed. Clean all parts thoroughly – rubber parts in spirit of alcohol only – and grease slide surfaces with acid-free grease. Replace damaged parts.

4. For reassembly proceed vice versa.

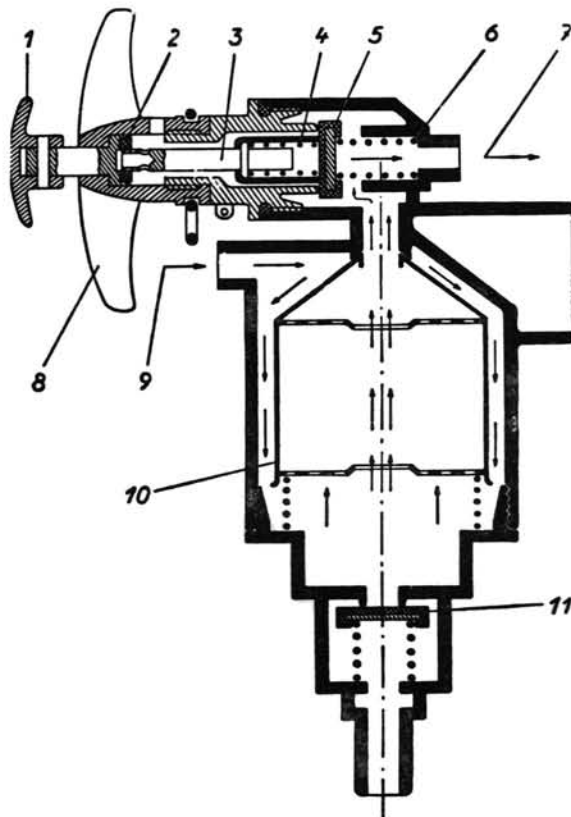


Fig. 42-7/9

- 1 Push button
- 2 Rubber seal
- 3 Plunger
- 4 Spring
- 5 Plate valve
- 6 Valve spring
- 7 Connection to pressure regulator
- 8 Wing nut
- 9 Connection from air compressor
- 10 Air filter
- 11 Safety valve

III. Compressed Air Tank and Anti-Freeze Pump

A. Removal and Installation of Compressed Air Tank

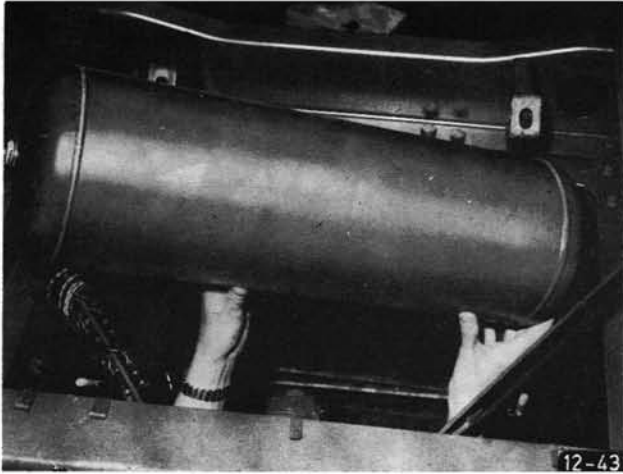


Fig. 42-7/10

1. Make system pressureless.
2. Remove lines (of anti-freeze pump and to trailer brake valve) on air tank.
3. Remove air tank from consoles.
4. Remove air tank diagonally downwards. Refer to Fig. 42-7/10.
5. Remove angle pieces on air tank and attach to new air tank.

Note: The compressed air tank carries a test symbol. Welding or brazing on compressed air tank is not permitted (inner protective layer will be damaged).

6. For reinstallation proceed vice versa.

Note: Tighten angle pieces of air tank only when air tank is in consoles.

B. Removal and Installation of Anti-freeze Pump



Fig. 42-7/11

1. Make system pressureless.
2. Unscrew lines (of pressure regulator and to air tank). Refer to Fig. 42-7/11.
3. Remove anti-freeze pump.
4. For reinstallation proceed vice versa.

C. Reconditioning of Anti-freeze Pump

1. Unscrew cover.
2. Replace rubber seal top, if required (remove clamp).
3. Replace cork seal in cover screw connection, if required.
4. Use socket spanner 000 589 61 09 00 to unscrew attachment screw = pump cylinder.
5. Remove tank and rubber seal.
6. Remove clamp on piston rod and compression spring.
7. Pull push rod out of pump cylinder and replace sealing sleeve, if required.
8. Remove bottom valve and compression spring from bottom and replace, if required.

Note: Clean parts in spirit of alcohol only and coat with acid-free grease upon reinstallation.
9. For reinstallation proceed vice versa.

IV. Trailer Brake Valve (Hydr.)

A. Removal and Installation of Trailer Brake Valve (Dual Circuit Brake)

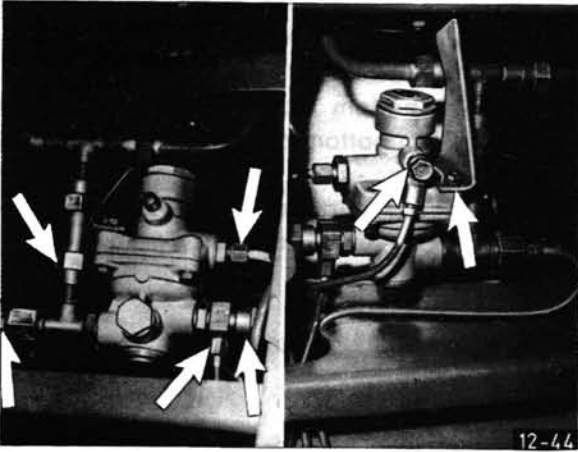


Fig. 42-7/12

1. Make system pressureless.
2. Loosen supply line of air tank. Refer to Fig. 42-7/12.
3. Loosen supply line toward brake line (yellow). Refer to Fig. 42-7/12.
4. Loosen supply line from hand brake control valve.
5. Loosen supply line "brake pressure" toward pressure gauge. Refer to Fig. 42-7/12.
6. Loosen hydraulic line connection to brake valve.

Note: Protect loosened hydraulic line against entry of dirt.

Do not actuate service brake!

7. Unscrew trailer brake valve from console and remove sideways.
8. Unscrew remaining connections on valve.
9. For reinstallation proceed vice versa.
Tighten connections only when valve is attached to console and the lines are connected.
10. Bleed hydraulic brake on trailer brake valve.

B. Removal and Installation of Trailer Brake Valve (Single Circuit Brake)

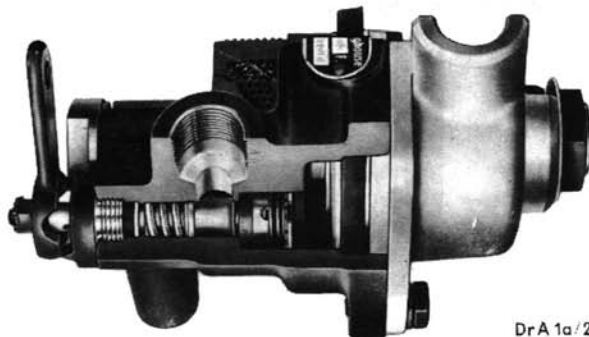
1. Make compressed air system pressureless.
2. Unscrew 5 pipelines on valve (Caution! Brake fluid).
3. Uncotter linkage toward hand brake and remove.
4. Loosen fastening nuts at bottom (circlips) and remove valve.
5. For installation proceed vice versa. Do not forget bleeding the oil line from master brake cylinder on control valve and checking all connections for leaks.

C. Reconditioning of Trailer Brake Valve (Single Circuit Brake)

1. Clamp valve body carefully into vise (pipe connections up).
2. Unscrew three-way connections. Watch sealing ring (air outlet).
3. Unscrew hex. nut at actuating lever and screw off. Remove washer and lever. Fig. 42-7/13.
4. Remove cam adjusting disc behind together with washer after loosening hex. bolts.
5. Remove ring nut behind.
6. Unscrew connecting plug for oil pressure line (watch sealing ring).
7. Remove venting screw.
8. Remove housing half after loosening the four cap screws.
9. Remove piston including outlet valve, spring and intake valve.
10. Remove locking ring in hand brake valve passage and pull out valve set. Fig. 42-7/14.
11. Unclamp housing and pull out remaining sleeves as well as oil pressure piston.
12. Pull off circlip and valve at outlet valve.
13. Clean all parts, replace those which are damaged. Use spirit of alcohol only for cleaning rubber sleeve and valve plates.
14. For reassembly proceed vice versa, greasing inside of housing lightly with non-acid mineral oil.



Fig. 42-7/13



DrA 1a/2

Fig. 42-7/14

V. Shutoff Valve

A. Removal and Installation of Shutoff Valve

1. Evacuate brake system.
2. Loosen coupling nut from shutoff valve.
3. Remove both fastening screws.
4. Loosen clip on coupling head (watch shim) and remove both.
5. Clamp shutoff valve into vise and unscrew coupling head together with angle piece.
6. For installation proceed vice versa (check for leaks).

B. Reconditioning of Shutoff Valve

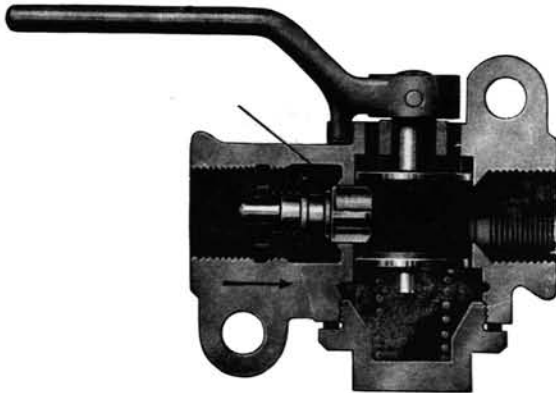


Fig. 42-7/15

1. Clamp shutoff valve into vise (input connection up).
2. Unscrew guide nut for valve stem and remove valve set.
3. Reclamp housing (bottom closure up).
4. Unscrew closing plug (watch sealing ring). Remove spring.
5. Reclamp housing (handle up).
6. Knock cross pin out of handle and knock camshaft out in downward direction including sealing disc.
7. Clean all parts, replace those which are damaged.
8. For reassembly proceed vice versa.
Fig. 42-7/15.

VI. Coupling Head (Single Circuit Brake)

A. Removal and Installation of Coupling Head

1. Close shutoff valve.
2. Remove holding clip upon removal of both nuts (watch shim and circlips).
3. Unscrew coupling head (watch sealing ring).
4. For reinstallation proceed vice versa.
Coat threads with sealing compound.

B. Reconditioning of Coupling Head

1. Clamp coupling head into vise.
2. Unscrew ring nut with hook spanner and remove sealing ring.
3. Remove valve plate.
4. Clean all parts, replace those which are damaged.
5. For reassembly proceed vice versa.

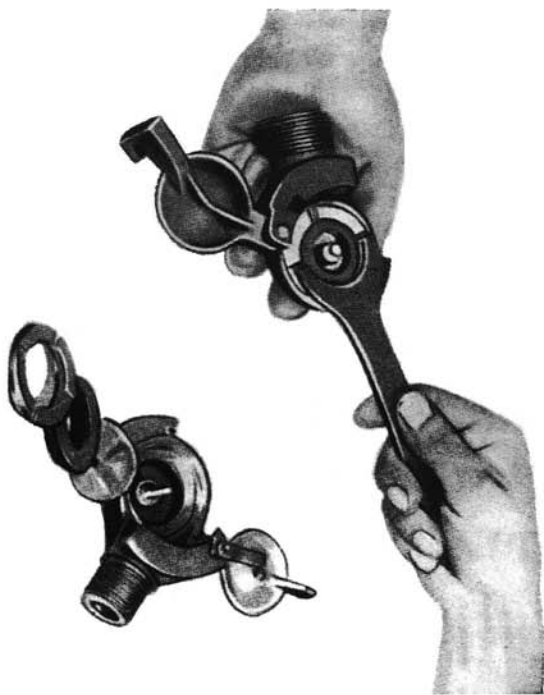


Fig. 42-7/16

VII. Hand Brake Valve (Dual Circuit Brake)

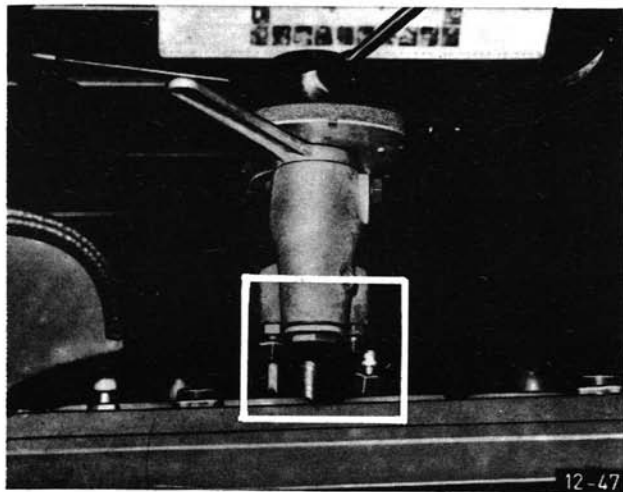


Fig. 42-7/17

1. Evacuate system.
2. Loosen both connections on control valve.
Fig. 42-7/17.
3. Loosen holding screws for valve on steering column and remove valve.
4. For reinstallation proceed vice versa.

I. Removal and Installation of Air Compressor

1. Loosen belt tensioning device on engine after opening engine hood.
2. Remove V-belt.
3. Loosen intake line on engine intake pipe.

Note: Some vehicles are provided with a wet air filter, so that Item 3 will not be applicable.

4. Unscrew pressure line from air compressor to tire inflation cylinder on air compressor.
5. Remove air compressor from console.

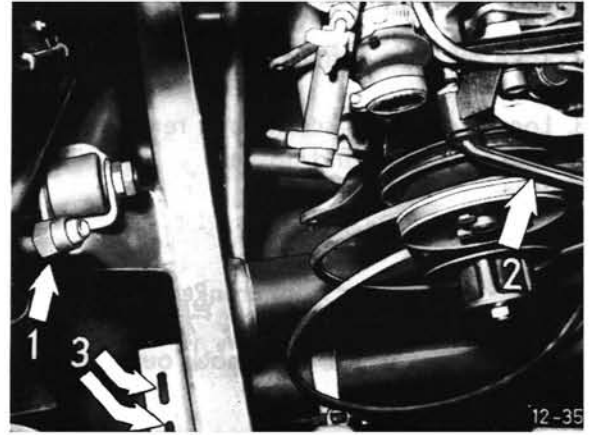


Fig. 42-8/1
 1 Pressure line
 2 Compressor support
 3 Fastening holes for air compressor

6. Remove air compressor in lateral direction.
7. Take compressor support, bearing cap and intake line from removed compressor.

Note: Some vehicles are provided with a wet air filter, so that the removal of the intake line is not applicable.

8. For reinstallation proceed vice versa.

Note:

Watch out for correct tension of V-belt. Two points should be specially noted.

a) Tensioning of old version:
 Adjust threaded rod by turning turnbuckle.
 V-belt should sag for approx. 10 mm under thumb pressure at its longest unsupported portion.

b) Tensioning of new version (with rubber buffer). After loosening the two counter nuts, turn turnbuckle in such a manner that the rubber buffer is compressed to 55 mm. Also maintain a normal dimension of at least 9 mm between the air compressor and radiator, otherwise use V-belt with more favorable longitudinal tolerance. Tighten counter nut again after tensioning. Fig. 42-8/3.

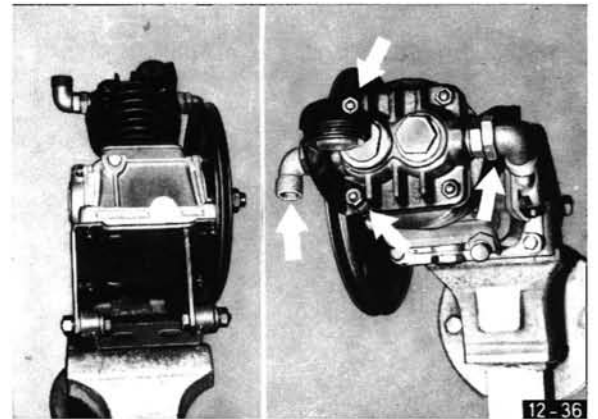


Fig. 42-8/2

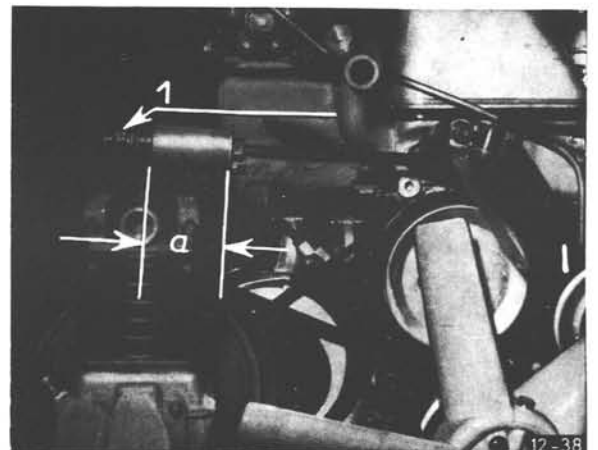


Fig. 42-8/3
 a 55 mm
 1 Counter nut

II. Reconditioning of Air Compressor

1. Drain oil.
2. Take off pulley after removing nut.
3. Loosen cyl. head screws and remove head with valve sets and gasket.
4. Unscrew valve sets.
5. Unscrew cylinder from crankcase.
6. Unlock piston pin and knock out, remove piston.
7. Loosen crankshaft bearing cover on both sides and remove. On older versions, remove oil filler neck first.
8. Force crankshaft from bearing seat in direction of drive end, then force out front bearing.
9. Remove locking ring from crankshaft and pull crankshaft from connecting rod. Older versions have a split connecting rod eye. (Loosen big end bearing bolts and remove connecting rod.)
10. Clean all parts, replace those which are damaged.
11. For reassembly proceed vice versa.

Description and Operation of Unit

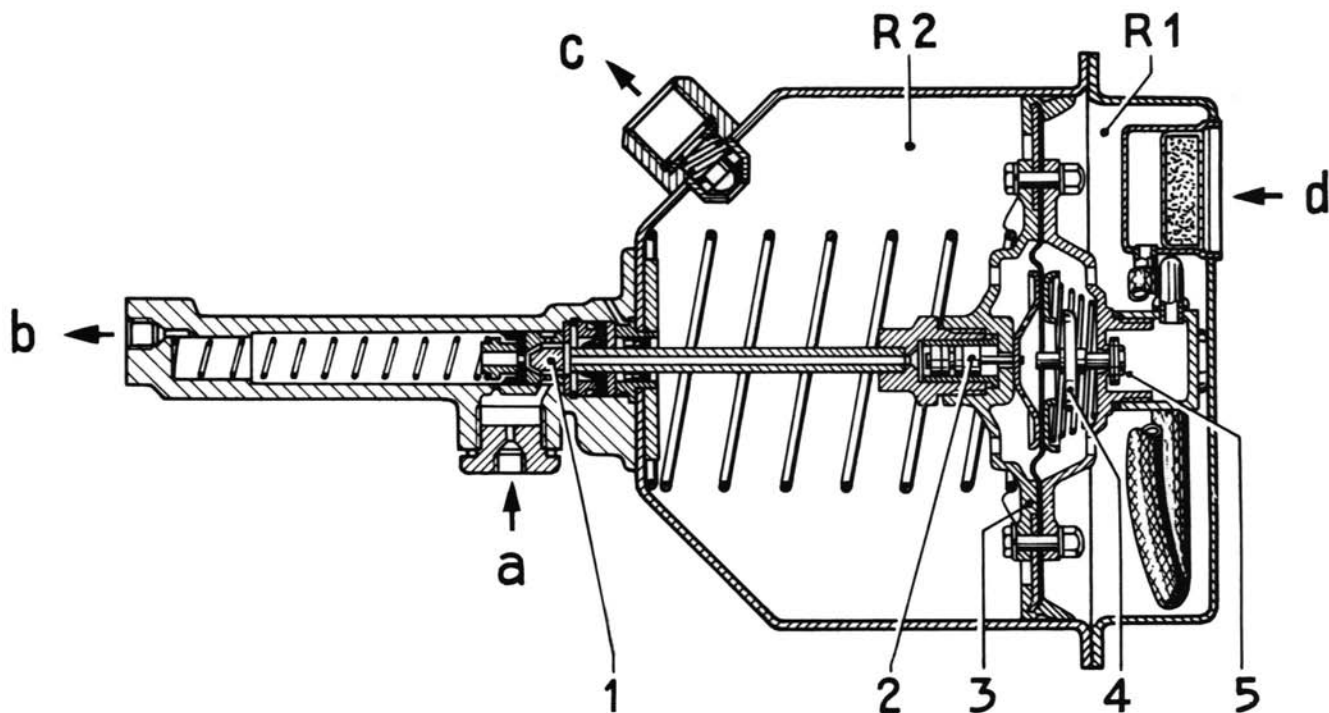


Fig. 42-9/1

Brake Unit in Disengaged Position

a from master brake cylinder
 b to wheel brake cylinders
 c Vacuum connection
 d Atmospheric pressure

1 Check valve
 2 Control piston
 3 Control valve
 4 Diaphragm valve
 5 Outside air valve
 R1 + R2 = Vacuum space

Removal and Installation of Brake Unit

1. Unscrew vacuum line.
2. Unscrew charging and discharging line.
3. Loosen hydraulic brake line and remove (catch brake fluid).
4. Screw brake unit from holding bracket.
5. For reassembly proceed vice versa.

MB Mechanical Circulating Ball Steering L 3,5 K

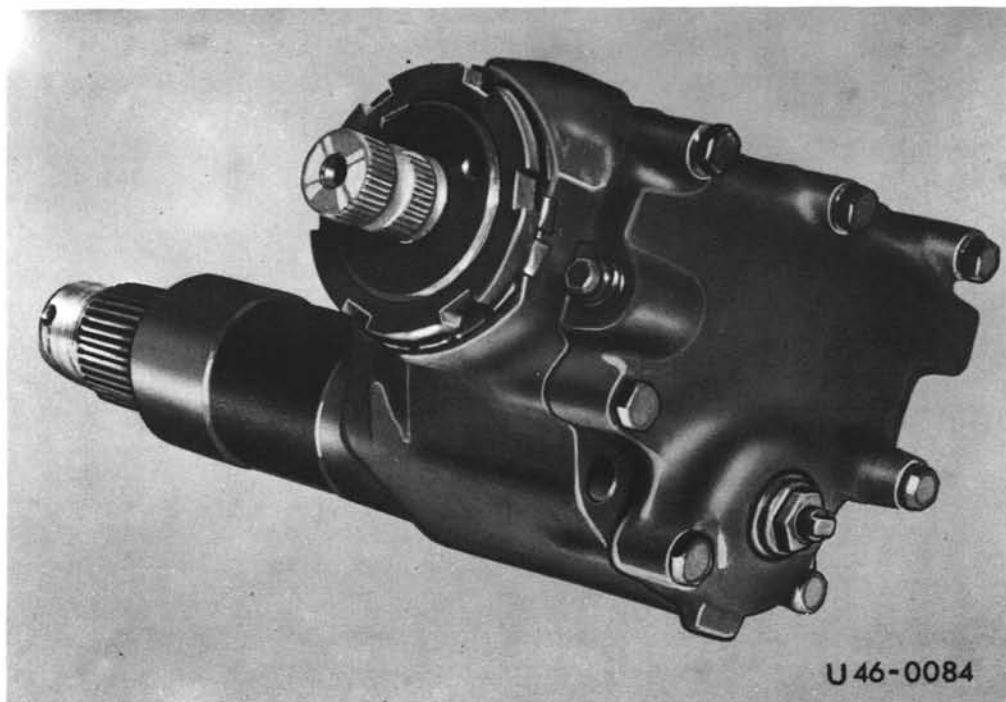
Installation Survey

Tilting cab

UNIMOG Sales designation	MB Mechanical circulating ball steering installed in		
	Chassis model designation	Standard	Optional
U 060/404 Diesel	404.117	starting PB	—
U 082/404 Gasoline	404.010 404.011		
U 110/404 Gasoline	404.012 404.013		

PB = Begin of production

General View



U 46-0084

Fig. 1 Steering (tilting cab)

MB Mechanical Circulating Ball Steering L 3,5 K**Technical Data, Capacities****Technical Data**

Reduction in center	34.2 : 1
Max. total turns of steering worm	6.64
Max. pitman shaft turning angle	75°
Pitch angle of steering worm	5° 33'
Pitch of steering worm	11 mm
Pitch direction of steering worm	lefthand
Number of balls in ball circuit	2 x 38

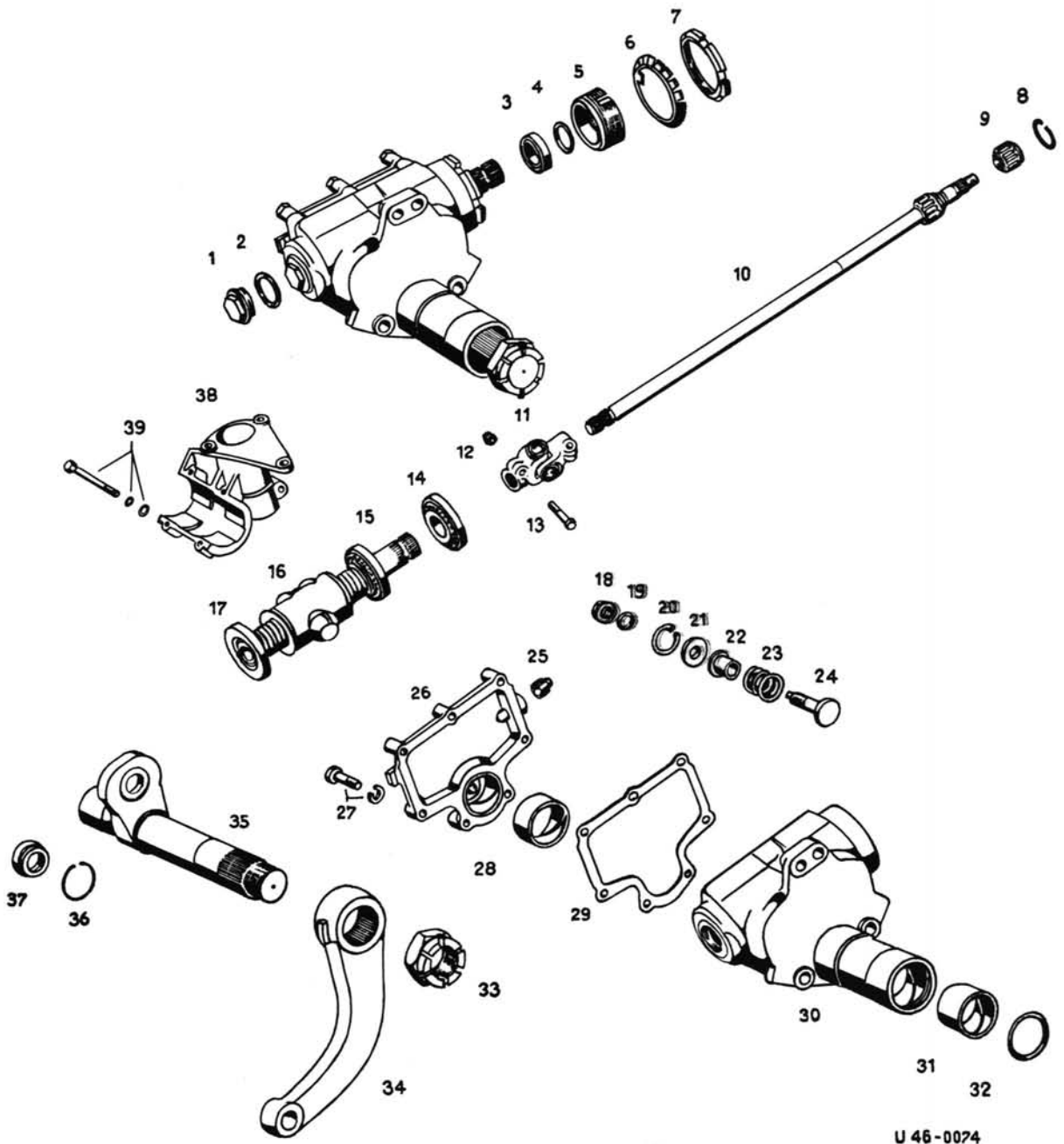
Oil Capacity in Liters

Transmission fluid ¹⁾	0.9 to 1
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¹⁾ refer to MB Specifications for Service Products

MB Mechanical Circulating Ball Steering L 3,5 K

Exploded View

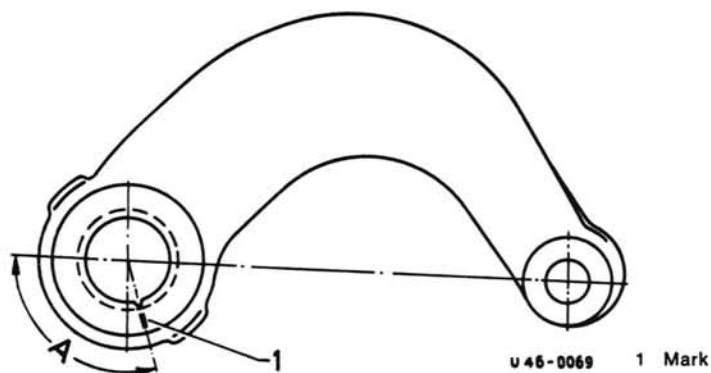


U 46-0074

Fig. 1 Steering (tilting cab)

- | | | |
|------------------------------|---|--|
| 1 Closing plug | 14 Tapered barrel-shaped roller bearing | 27 Fastening screw with snap ring |
| 2 Sealing ring | 15 Steering worm | 28 Bearing bushing |
| 3 Radial sealing ring | 16 Steering nut with ball guide | 29 Gasket |
| 4 O-ring | 17 Tapered barrel-shaped roller bearing | 30 Steering housing |
| 5 Adjusting ring | 18 Flanged nut | 31 Bearing bushing |
| 6 Locking plate | 19 Sealing ring | 32 O-ring |
| 7 Slot nut | 20 Locking ring | 33 Fastening nut |
| 8 Locking ring | 21 Thrust washer | 34 Pitman arm |
| 9 Self-aligning ball bearing | 22 Thrust sleeve | 35 Pitman shaft |
| 10 Steering wheel shaft | 23 Compression spring | 36 Locking ring |
| 11 Universal joint | 24 Adjusting screw | 37 Ball socket |
| 12 Locking nut | 25 Closing plug | 28 Steering bracket |
| 13 Fitted screw | 26 Steering housing cover | 39 Fastening screw with snap ring and washer |

MB Mechanical Circulating Ball Steering L 3,5 K



Installation Survey Pitman Arm

UNIMOG Sales designation	Chassis model designation	Pitman arm MB Part No.	Steering	A
U 060/404 Diesel	404.117	406 463 00 01	MB-L 3.5 K	90°
U 082/404 Gasoline	404.010 404.011			
U 110/404 Gasoline	404.012 404.013			

Wheel Locks

UNIMOG Sales designation	Chassis model designation	Tires			Max. wheel lock, wheel nearest to curve ¹⁾	
		Tire size	PR	Application	left	right
U 060/404 Diesel	404.117	10.5-20	6 8 10	Off-road/ road	40°	40°
U 082/404 Gasoline	404.010 404.011					
U 110/404 Gasoline	404.012 404.013					

¹⁾ Front axle without wheel stop screw, therefore max. wheel lock included in design.

Complaint	Remedy
13 Check center position of steering in relation to center position of front axle.	
14 Check center position of steering wheel in relation to center position of steering.	
15 Check power steering pump with bracket for tight seat.	
16 Check pulley of power steering pump for tight seat.	
17 Check V-belt of power steering pump for correct tension and ageing or cracks.	
Hydraulic Section	
18 Check external seals on power steering pump/steering, delivery lines and oil tank.	
19 Check oil level in oil tank.	
20 Check delivery lines for chafing marks, squeeze marks, corrosion, ageing and cracks.	
21 Check power steering pump for pressure.	
22 Check power steering pump for delivery flow.	
23 Check steering for pressure.	
24 Check steering for leak oil.	
25 Check hydraulic steering limitation.	
26 Check for mechanical play in steering gear.	
27 Complete functional checkup of steering or power steering pump during trial run.	
28 In the event of excessive damage, inform customer and ask for approval of additional jobs.	

Complete jobs according to items 21 and 26 following checkups I and II, basic reconditioning and upon exchange of power steering pump or steering with hydrotester.

Items subject to complaints: _____

Checkup completed by: _____

_____ Date _____

Rubber stamp/Signature

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Prior to checking steering for individual trouble, check oil level in steering gear and correct, if required (page 3.1/1). For oil type or grade refer to MB Specifications for Service Products.

Observed Trouble	Possible Cause	Remedy
Steering gear losing oil	Shaft sealing ring of pitman shaft leaking	Renew shaft sealing ring
	Gasket between steering housing and steering housing cover leaking	Replace gasket
	Shaft sealing rings in adjusting ring on lower steering shaft leaking	Replace shaft sealing rings
	Seal on collar nut (adjusting screw) leaking	Replace seal
UNIMOG inaccurately steering when driving straight ahead	Fastening bolts of steering bearing bracket, of steering shaft bearing, of steering knuckle arm and track arm loose	Tighten all fastening bolts or nuts to specified torque. Make sure that steering is not distorted during installation
	Play in ball joints of steering linkage	Install new ball joints
	Universal joint loose	Tighten fastening nuts
	Adjustment of toe-in not in order	Have toe-in adjusted
Steering hard to operate during righthand and lefthand lock	Universal joint not running smoothly	Make joint run smoothly by repeatedly turning back and forth, so that joint can almost tilt under its own weight. If this is not possible, install new joint
Steering restrained during return motion	Steering knuckles or transmitting members not lubricated	Lubricate steering knuckles, ball joints and other transmitting members
	Steering distorted	Loosen attachment of steering shaft on instrument panel and on bearing bracket. Remove distortion and reattach steering
	Bearing of upper steering shaft not running smoothly	Make steering shaft bearing run smoothly

46.1 Trouble Diagnosis

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Observed Trouble	Possible Cause	Remedy
Steering wheel suffering from heavy impacts while steering	Not enough oil in steering	Correct oil level, check steering for oil loss and eliminate leaks
	Play in universal joint	Install new universal joint
	Backlash in threads of steering worm or steering nut	Replace steering worm with steering nut and including balls
	Steering worm subject to end play	Eliminate end play of steering worm
	Ball socket of steering worm not entering ball pint of steering nut free of play	Adjust pitman shaft
Torsional vibrations on steering wheel (flutter)	Unbalance of wheels or brake drums and wheel hubs	Balance statically and dynamically
	Toe-in, camber, caster or KPI not in order	Readjust
Too much free travel on steering wheel	Externally of steering: Bearing bracket or front axle suspension loose. Ball joints subject to play	Fasten bearing bracket or front axle suspension. Replace ball joints.
	Universal joint subject to play	Replace universal joint
	Threads on steering worm or steering nut subject to play	Replace steering worm with steering nut including balls
	Steering worm subject to end play	Eliminate end play of steering worm
	Ball socket of pitman shaft not entering ball pin of steering nut free of play	Adjust pitman shaft

MB Mechanical Circulating Ball Steering L 3,5 K

Tightening Torques in kpm

Pitman arm to pitman shaft

35 to 40

Oil Capacity

Steering

refer to **General**
Technical Data, Capacities**Special Tool**

000 589 44 33 00 Puller

Steering on steering bracket,
steering bracket on frame,
pitman arm,
steering arm and track arm,
for tight seat.**General Note:**

Place chocks in front of and behind rear wheels to protect UNIMOG against moving-off.

If required, tighten fastening bolts or nuts to specified torque. The fastening nut of the pitman arm can be tightened to next-following cotter pin hole.

1 Checking for External Leaks

Check entire steering gear for leaks. If required, replace shaft sealing rings or gasket between steering housing and steering housing cover.

4 Checking for Play and Wear

Check ball joints of drag link and track rod for end play, replace joints if play is too high. Replace leaking and damaged protective caps.

2 Checking Oil Level

Check oil level regularly every 200 hours of operation. The oil level should reach up to bottom edge of filler hole of steering gear. No oil change required.

5 Checking Steering Lock

A prerequisite for adjusting the steering lock is correct air pressure in tires and correct adjustment of track or alignment of marks on pitman shaft and pitman arm.

3 Checking Attachment of Steering and of Transmitting Members

Shake steering wheel to check attachment of steering shaft bearing.

With the vehicle stopped, turn steering wheel counter-clockwise and clockwise up to lock while simultaneously checking:

Remove drag link and pitman arm with puller 000 589 44 33 00 and reattach provisionally. Turn steering counter-clockwise up to lock. Disconnect pitman arm and keep turning steering wheel to determine steering reserve, if any. Repeat clockwise. Both sides should have a steering reserve. If there is none, the drag link can be changed in length by turning ball joint in or out, if the steering reserve at the other end permits. If the above cannot be done, the required steering reserve can be obtained by readjusting the steering lock. If the length of the drag link has been changed, subsequently measure whether the front wheels are still in straight ahead driving position when the steering gear is in center position.

46.1 Maintenance Jobs

6 Moving Steering into Center Position

Move front wheels into straight ahead position. Measure distance of steered wheels in relation to frame. The straight ahead position is attained when the distance of both wheels in relation to frame is the same.

Disconnect provisionally attached drag link to

pitman arm. Move steering into center position by halving the entire steering wheel turns from lock to lock.

Adjust length of drag link in such a manner that drag link can be inserted into pitman arm without changing the straight ahead position of the front wheels and the center position of the steering gear.

Tightening Torques in kpm

Steering to steering bracket	M 12 x 1.5–8.8	9.5
Steering bracket to frame (fastening nut of bearing pin)		60–5
Fastening nut pitman arm		35 to 40
Fastening nuts drag link cone connections		14.5
Fastening nut steering wheel to steering shaft		7 to 8
Fastening nut fitted screw universal joint M 8		2.5
Fastening nut of clamping screw on steering bracket		7
Wheel fastening nuts		29
Installation position of steering in UNIMOG		47°

Special Tools

406 589 05 21 00 Adjusting gauge
 000 589 44 33 00 Puller
 000 589 02 35 00 Puller

Scope:

- 1 Place chocks in front of and behind rear wheels to protect UNIMOG against moving-off.
- 2 Remove front-mounted attachments.
- 3 Tilt cab. Refer to Gr. 60, Job No. 60–1.
- 4 Raise UNIMOG at front until wheels are off-the-ground.
- 5 Support UNIMOG with jacks.

6 Uncotter fastening nut on ball pin of drag link, unscrew and pull-off pitman arm with puller 000 589 44 33 00.

7 Uncotter fastening nut on pitman arm, unscrew and pull pitman arm from pitman shaft with puller 000 589 02 35 00.

Note: Do not loose pitman arm from pitman shaft by means of hammer blows, since this may result in damage to internal steering components.

Note: When positioning jacks, watch-out for solid ground and correct positioning at UNIMOG (safety risk).

46.1 Removal and Installation of Steering

8 With the pto shaft installed, loosen fastening bolts of front pto shaft bearing bracket and unscrew, remove pto shaft bearing bracket with slide piece from pto shaft.

Place pto shaft aside and tie-up, if required.

9 Remove torque support from frame and steering.

10 Unlock fastening nut on bearing bolt and unscrew.

11 Remove steering bracket from frame cross member, also remove steering together with steering bracket.

Note: Loosen any rusted down bearing bolts by means of conventional rust dissolving compound.

12 Unscrew fastening nut from clamping screw on steering bracket and remove clamping screw.

13 Unscrew fastening nuts with fastening bolts from steering on steering bracket. Remove steering bracket from steering.

Note: Loosen rusted-down bearing seat (steering bracket) by means of a conventional rust dissolving compound. Do not apply hammer blows to pitman shaft. Clean steering and steering bracket.

14 Install steering in vice versa sequence while observing the following instructions:

Re Item 7

Markings on pitman arm and pitman shaft must be in alignment during installation.

Re Item 8

Markings of pto shaft and slide piece must be in alignment.

Re Item 11

When installing the steering, insert bearing bolt with graphited grease. In addition, adjust to specified installation position with adjusting gauge 406 589 05 21 00. Fig. 1.

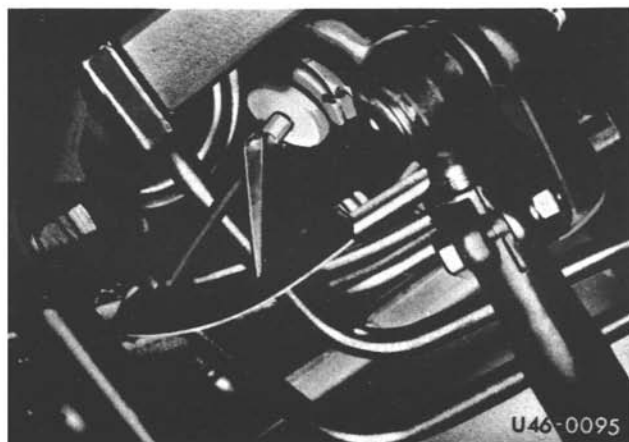


Fig. 1

MB Mechanical Circulating Ball Steering L 3,5 K

Adjusting Steering Worm (steering removed)**Tightening Torque in kpm**

Slot nut of adjusting ring

22

Adjusting Value in kpcm

Friction torque of steering shaft with steering worm in steering housing

max. 18 to 22

Special Tools

000 589 09 05 00 Slot nut wrench

000 589 35 07 00 Pin spanner

General Note:**Adjust steering worm and pitman shaft always together with the steering gear removed.****Scope**

1 Relieve pitman shaft by loosening adjusting screw (turning slightly clockwise).

2 Unlock slot nut of adjusting ring and loosen with slot nut wrench 000 589 09 05 00 while holding adjusting ring in position. Fig. 1.

Steering

with jacket tube

without jacket tube

Tool

matching open end wrench

Pin spanner

000 589 35 07 00

3 Tighten adjusting ring at slight preload in such a manner that the steering wheel can still be smoothly rotated **without end play**.

4 Tighten and lock slot nut while holding adjusting ring in position.

Note: If the steering binds when rotated (while making adjustments), the axial bearings of the steering worm are worn out. Even additional adjustment will then no longer provide the required running characteristics, since the end play will either be too large or the steering will show a tendency toward binding.

5 Disassemble steering and replace bearing to remove end play.

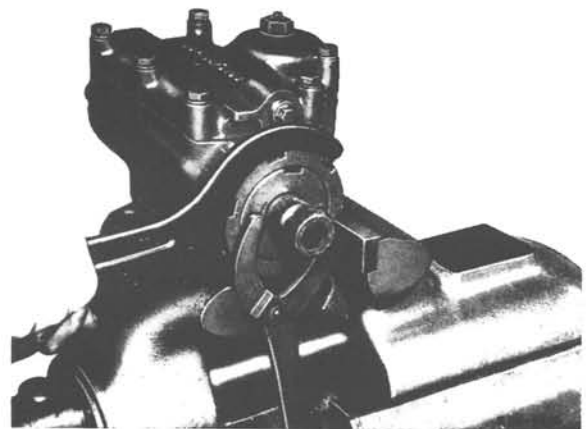


Fig. 1

MB Mechanical Circulating Ball Steering L 3,5 K

Adjusting Pitman Shaft (steering removed)**Tightening Torque in kpm**

Counter nut of adjusting screw

5 to 6

Adjusting Value in kpm

Friction torque of pitman shaft

max. 6 to 8

Special Tool

000 589 24 21 00 Torque wrench

General Note:

Adjust steering worm and pitman shaft always together and with steering gear removed.

Scope

1 Unscrew counter nut of adjusting screw and remove sealing ring. Fig. 1.

2 Move steering nut into center position.

3 Loosen and unscrew adjusting screw several times in succession to check function of adjusting device. Then completely **unscrew** adjusting screw **counter-clockwise** up to locked position (at approx. 1 kpm) and screw down again by approx. $\frac{1}{8}$ turn.

4 Turn steering several times from lock to lock, during which the pitman shaft should not bind in center position range but a light pressure point should be felt.

5 Check friction torque of pitman shaft. For this purpose, screw castle nut on pitman shaft and secure against rotation with pertinent steel pin. Mount matching socket wrench insert with torque wrench 000 589 24 21 00 or conventional wrench with an adjusting range of 0–10 kpm and complete checkup.

6 Clean contact surface of sealing ring on steering housing cover and place sealing ring over adjusting screw.

7 Screw-on counter nut and attach while holding adjusting screw in position. Fig. 1.

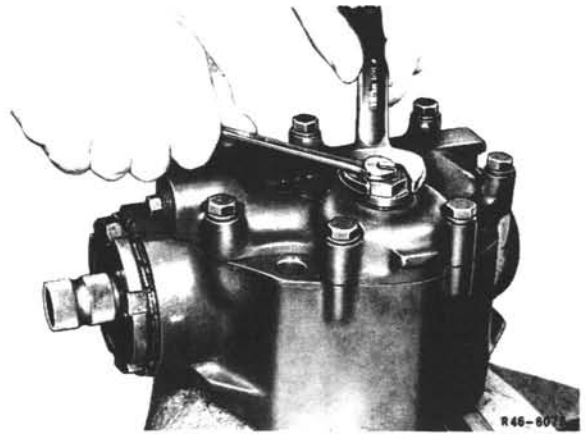


Fig. 1

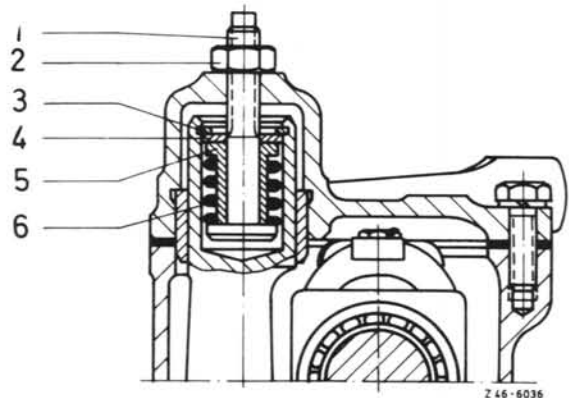


Fig. 2

- | | |
|-------------------|----------------------|
| 1 Adjusting screw | 4 Thrust washer |
| 2 Counter nut | 5 Thrust bushing |
| 3 Locking ring | 6 Compression spring |

Note: If steering binds while turning, ball pin and ball socket are worn out. In such a case, disassemble steering and replace ball circuit and ball socket.

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Special Tools

- 000 589 09 05 00 Slot nut wrench
- 000 589 35 07 00 Pin spanner
- 321 589 07 15 00 Mandrel
- 322 589 00 15 00 Mandrel
- 000 589 28 33 00 Puller
- 000 589 29 33 00 Puller
- 000 589 33 33 00 Counter-support
- 000 589 34 33 00 Counter-support
- 321 589 00 35 00 Sleeve
- 321 589 01 35 00 Angle mandrel

Scope

- 1 Clean removed steering, drain oil and clamp steering into vise.
- 2 Unscrew fastening screws of steering housing cover.
- 3 After unscrewing counter nut and removing sealing ring, **turn** adjusting screw of pitman shaft for a few turns **clockwise** until steering housing cover is slightly raised.
- 4 Unscrew steering housing cover of adjusting screw and remove cover with gasket. Fig. 1.
- 5 Pull bearing bushing out of housing cover with puller 000 589 29 33 00 and counter support 000 589 34 33 00. Fig. 2.
- 6 Unlock slot nut of adjusting ring and unscrew with slot nut wrench 000 589 09 05 00 while raising adjusting ring. Fig. 3.

Steering

with jacket tube
without jacket tube

Tool

matching open end wrench
Pin spanner
000 589 35 07 00

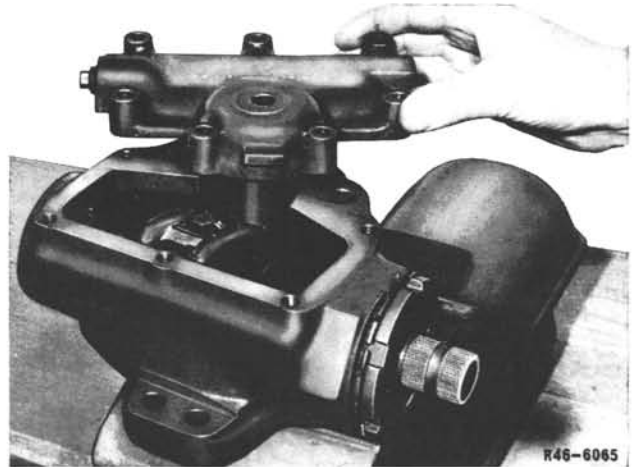


Fig. 1



Fig. 2

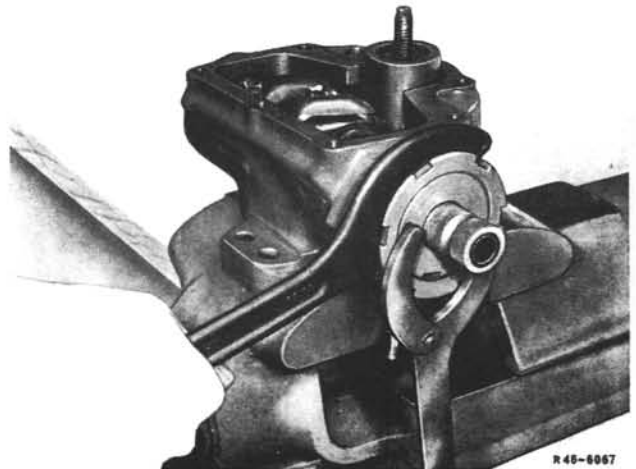


Fig. 3

46.1 Disassembly of Steering

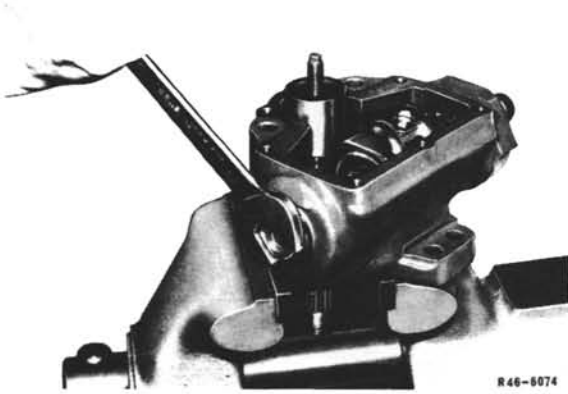


Fig. 4

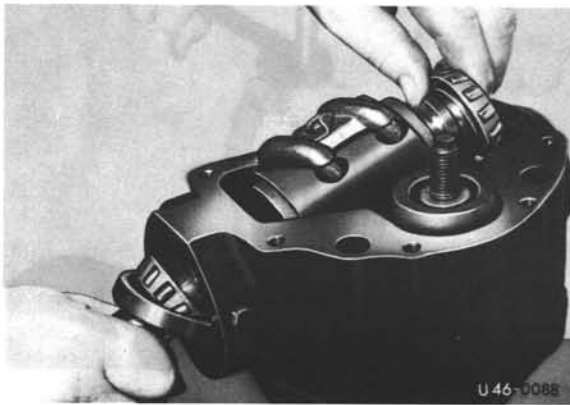


Fig. 5

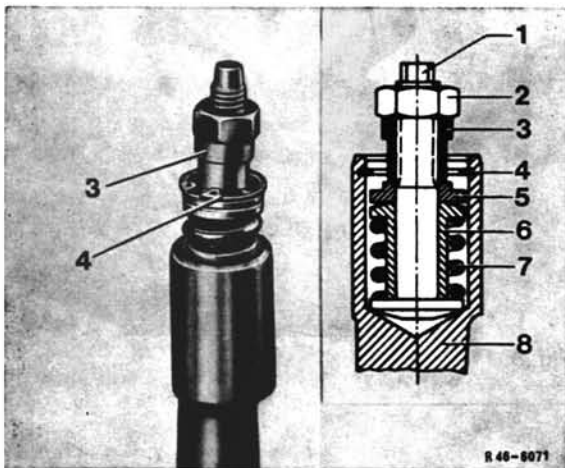


Fig. 6

- | | |
|-------------------|----------------------|
| 1 Adjusting screw | 5 Thrust washer |
| 2 Hex. nut | 6 Thrust sleeve |
| 3 Thrust piece | 7 Compression spring |
| 4 Locking ring | 8 Pitman shaft |

7 Unscrew adjusting ring with tool.

Steering

with jacket tube
without jacket tube

Tool

matching open end wrench
Pin spanner
000 589 35 07 00

8 Remove O-ring from adjusting ring and pull-out sealing ring with puller 000 589 28 33 00 and counter support 000 589 33 33 00.

Note: Only on steering without jacket tube.

9 Unscrew oil level tube or closing plug with sealing ring out of steering housing. Fig. 4.

10 Force steering worm with steering nut out of steering housing from below in upward direction using a soft metal mandrel. The outer bearing race of the upper tapered barrel roller bearing will then jump out of steering housing.

11 Remove steering worm with steering nut out of steering housing. Fig. 5.

12 Unlock fastening screw of ball circuit pipes and unscrew. Remove clamp and circuit pipe halves from steering nut.

Note: When removing circuit pipe halves from steering nut, catch balls in circuit.

13 Remove steering nut from steering shaft by rotating shaft while catching balls in threads.

14 Pull tapered barrel roller bearing inner races from steering worm with sleeve 321 589 00 35 00.

15 Knock-out outer race of lower tapered barrel roller bearing in steering housing by means of angle mandrel 321 589 01 35 00.

Note: Mark all bearing members of steering worm in relation to each other to avoid confusion during assembly.

- 16 Remove pitman shaft from steering housing.
- 17 Slip matching thrust piece over adjusting screw of pitman shaft and tighten adjusting device with hex. nut. Remove locking ring and take adjusting screw with thrust washer, thrust sleeve and compression spring out of pitman shaft. Fig. 6.
- 18 Press-out ball socket with mandrel 321 589 07 15 00 while removing locking ring from groove.
- 19 Take O-ring of pitman shaft out of steering housing.
- 20 Force bearing bushing of pitman shaft out of steering housing by means of mandrel 322 589 00 15 00. Fig. 7.



Fig. 7

MB Mechanical Circulating Ball Steering L 3,5 K

Adjusting Value in kpcm

Friction torque ball circuit

1.5 to 2.5

Special Tool

ZF 7470 798 703 Torque measuring tool
Clean all parts thoroughly in a cleaning fluid prior to checkup. Do not clean sealing rings and other rubber parts with trichloro ethylene, but use a detergent such as P 3 or Pril which must be soluble in water without residue.

Checking Steering Housing and Cover

Check externally for cracks and damage, as well as for flatness of contact surface.

Check threads of adjusting ring for easy operation.

Checking Steering Worm and Steering Nut

Check ball circuit of steering worm for score marks, hairline cracks, dents or other damage.

On steering nut, check ball guide pipes for distortion and ball pin for dents or wear.

Checking Ball Circuit Section for Friction Torque

Check friction torque of ball circuit with torque measuring tool ZF 7470 798 703. If the permissible value is not attained, replace ball circuit section (steering worm, steering nut and balls), since otherwise the free play on steering wheel will be too large.

Note: When the ball circuit section is exchanged, new bearings are included.

Checking Pitman Shaft and Adjusting Device

Check pitman shaft for distortion, bends and cracks.

Check bearing points for wear and dents.

Check seat of shaft sealing ring for rust and score marks.

Check ball socket of pitman shaft for score marks, cracks and damage.

Check adjusting device of pitman shaft for perfect function.

Note:

Replace pitman shaft if damaged during accident.

Checking Bearings

Check tapered roller bearings and bearing bushings for wear.

MB Mechanical Circulating Ball Steering L 3,5 K

Adjusting Value in kpcm

Friction torque of pitman shaft	max. 600 to 800
Friction torque of steering shaft with steering worm in steering housing	max. 18 to 22

Tightening Torque in kpm

Fastening bolts housing cover	3
Counter nut adjusting ring	22
Counter nut adjusting screw	5 to 6

Special Tools

000 589 09 05 00 Slot nut wrench
 000 589 35 07 00 Pin spanner
 305 589 01 15 00 Mandrel
 321 589 07 15 00 Mandrel
 321 589 08 15 00 Mandrel
 322 589 00 15 00 Mandrel
 000 589 24 21 00 Torque wrench

- 3** Install O-ring for lower pitman shaft seal into housing.
- 4** Press bearing outer race of lower steering worm bearing into steering housing with mandrel 321 589 08 15 00.
- 5** Slip compression spring, thrust sleeve and thrust washer on adjusting screw. Tighten adjusting device with matching thrust piece and nut.

Scope

During assembly, coat all sliding parts, particularly the bearings, with oil.

- 1** Force bearing bushing of pitman shaft into steering housing with mandrel 322 589 00 15 00. Fig. 1

Note: The open end of the lubricating groove should face inwards.

- 2** Ream bearing bushing with machine reamer acc. to dia. of pitman shaft.



Fig. 1.

46.1 Assembly of Steering

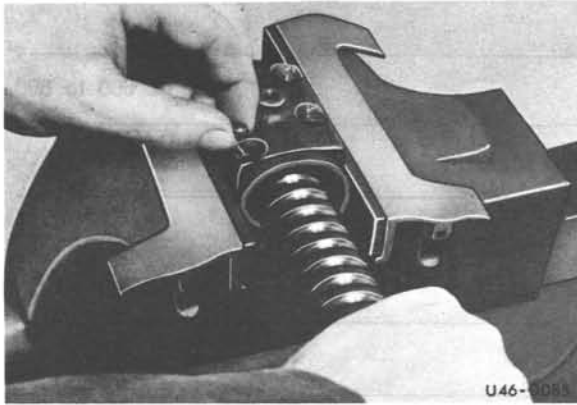


Fig. 2

6 Fill bore of pitman shaft with grease. Insert adjusting device and install locking ring.

7 Install locking ring into groove of pitman shaft and press-in ball socket with mandrel 321 589 07 15 00.

8 Carefully insert pitman shaft into steering housing (avoid damaging O-ring).

9 Clamp steering nut into vise using soft jaws. Introduce worm into bore of steering nut until the balls can be filled into threads of worm at front bore of ball circuit pipe as follows:

Fill balls through front bore (Fig. 2), and keep turning worm so that the balls are taken along toward rear bore of circuit pipe.

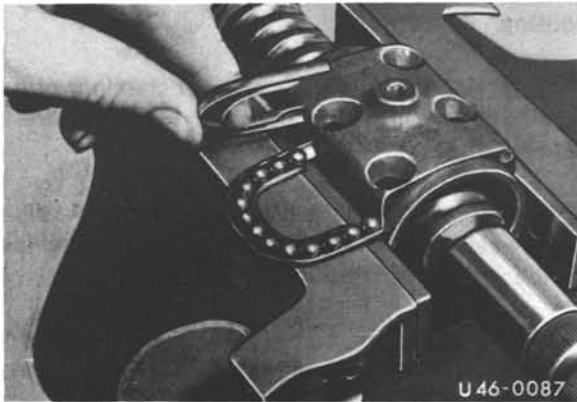


Fig. 3

10 Place remaining balls into circuit pipe (Fig. 3). To facilitate assembly, coat outer balls with grease, then insert filled circuit pipe into bores (Fig. 4) while turning steering worm slightly so that balls are distributed in circuit.

11 Repeat steps item 9 and 10 in a similar manner for second circuit pipe. The number of balls in each circuit amounts to half the number of all the balls.

12 Mount clamp, locking plate and fastening screw and secure.

13 Press both inner bearing races on steering worm and position roller cages on inner races of tapered ball bearing, insert steering worm into bearing points and upper outer race into steering housing. Fig. 5.



Fig. 4

14 Insert O-ring into groove of adjusting ring provided.

15 Press sealing ring into adjusting ring with mandrel 305 589 01 15 00.

16 Fill space between sealing and dust lip with grease.

17 Coat adjusting ring threads with sealing compound and screw into steering housing until pitman shaft has no more end play. Use pertinent wrench.

Steering	Tool
with jacket tube	matching open end wrench
without jacket tube	Pin spanner 000 589 35 07 00

Turn steering worm uniformly **back and forth** so that axial bearings can relax and **can be adjusted** without play. Tighten adjusting ring at slight **pre-load** so that the steering worm can still be smoothly turned **without end play**.

18 Coat contact surface of slot nut with sealing compound. Screw slot nut with locking ring on adjusting ring and tighten by means of slot nut wrench 000 589 09 05 00.

19 Apply counterhold to adjusting ring with wrench so that the adjustment of steering worm bearing will not change.

Steering	Tool
with jacket tube	matching open end wrench
without jacket tube	Pin spanner 000 589 35 07 00

Note: Upon tightening, check adjustment of end bearings once again acc. to item 17 to guarantee perfect functioning of steering.

20 Screw oil level tube or closing plug (coat threads with sealing compound) into steering housing using new sealing rings. Fig. 6.

21 Force bearing bushing of pitman shaft into housing cover with mandrel 322 589 00 15 00. Fig. 7.

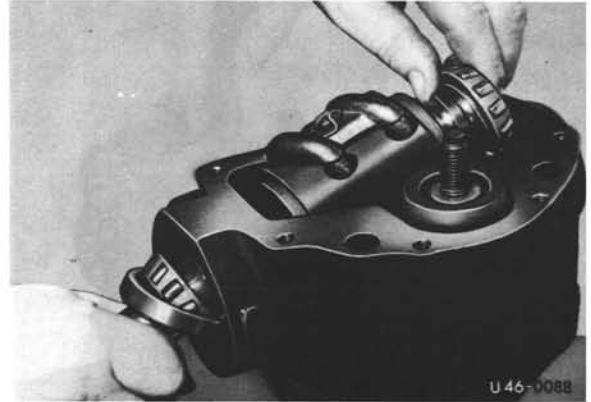


Fig. 5

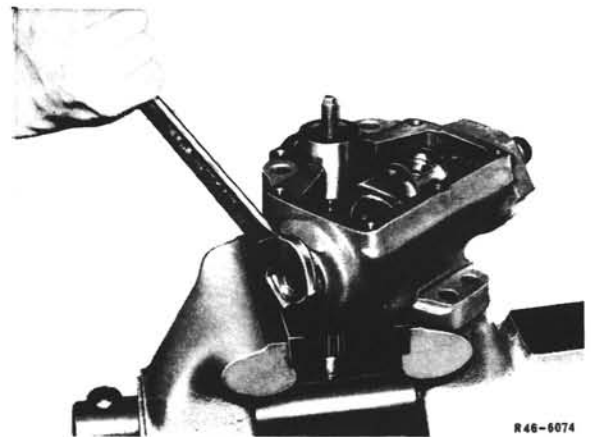


Fig. 6



Fig. 7

U 46-0088

R 46-6074

R46-6075

46.1 Assembly of Steering

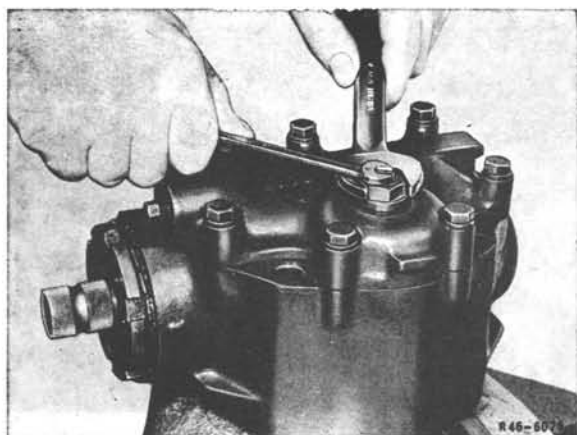


Fig. 8

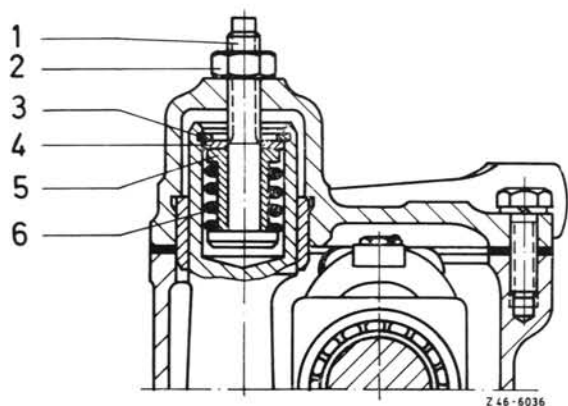


Fig. 9

- | | |
|-------------------|----------------------|
| 1 Adjusting screw | 4 Thrust washer |
| 2 Hex. nut | 5 Thrust sleeve |
| 3 Locking ring | 6 Compression spring |

22 Ream bearing bushing.

23 Coat gasket with grease and place on parting surface of steering housing.

24 **Move steering nut into center position.**

25 Turn steering housing cover onto adjusting screw up to stop against steering housing.

26 Coat fastening screws of steering housing cover with sealing compound and screw-in, **but do not yet tighten**, to prevent any distortion of cover.

27 **Unscrew** adjusting screw **counter-clockwise** up to compressed position of compression spring and tighten steering housing cover bolts. Fig. 8.

28 Loosen adjusting screw several times and screw out again to check function of adjusting device.

29 Then **unscrew** adjusting screw again completely **counter-clockwise** up to compressed position (at approx. 1 kpm) and screw down by approx. $\frac{1}{8}$ turn.

30 Turn steering several times from lock to lock, pitman shaft should then not bind in center position range, but a light pressure point should be felt.

31 Check friction torque of pitman shaft by screwing castle nut onto pitman shaft and securing nut with pertinent steel pin against rotation. Mount pertinent socket wrench insert with torque wrench 000 589 24 21 00 or with conventional wrench having an adjusting range of 0 to 10 kpm and complete checkup.

32 Screw-on counter nut with seal while counter-holding adjusting screw and tighten.

1. Remove horn button.
2. Remove pedal cover plate.
3. Loosen both lines top and bottom of hand brake valve on steering column and remove. Fig. 46-1/1 and Fig. 46-1/2.
4. Remove hand brake valve. Fig. 46-1/1.
5. Pull steering wheel with thrust ring 000 589 40 33 00 and puller 000 589 10 33 00. Fig. 46-1/3.

Note: Centerbore head of hex. screw used as thrust piece for puller and insert into steering column.

6. Remove wheel position indicator.
7. Remove horn with holding bracket from steering.
8. Uncotter steering bolt and remove nut. Fig. 46-1/4.

Note: Insert steering bolt coated with graphited grease. **Tightening torque 55 + 5 mkp.**

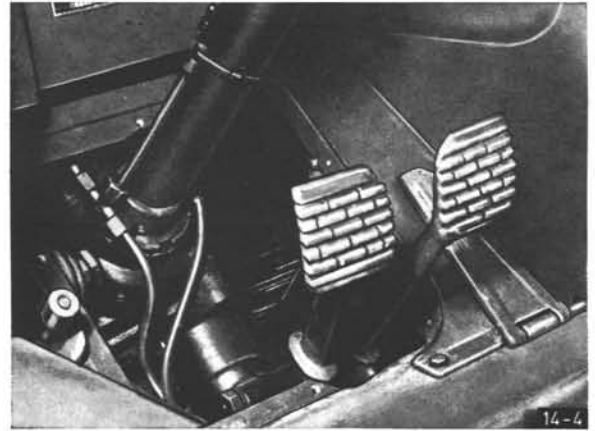


Fig. 46-1/2

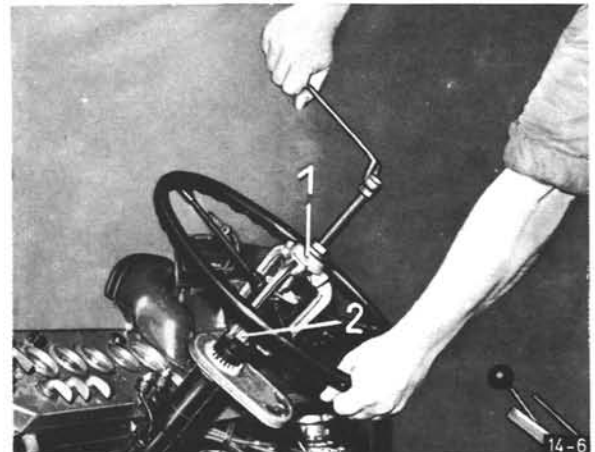


Fig. 46-1/3

- 1 Puller 000 589 10 33 00
- 2 Thrust ring 000 589 40 33 00

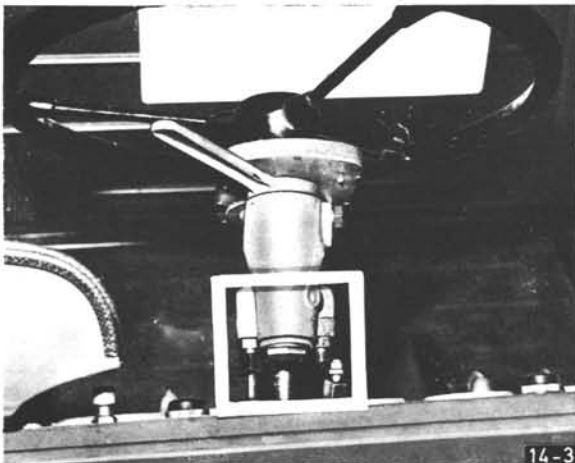


Fig. 46-1/1

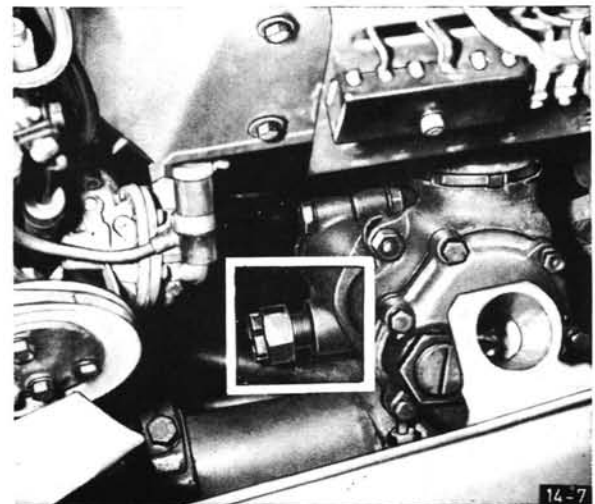


Fig. 46-1/4

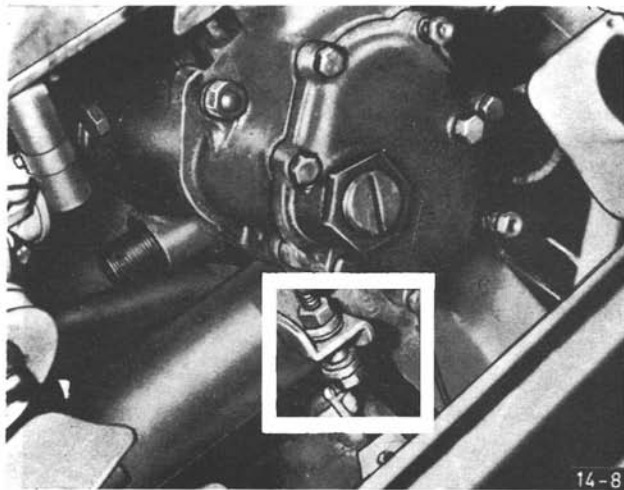


Fig. 46-1/5

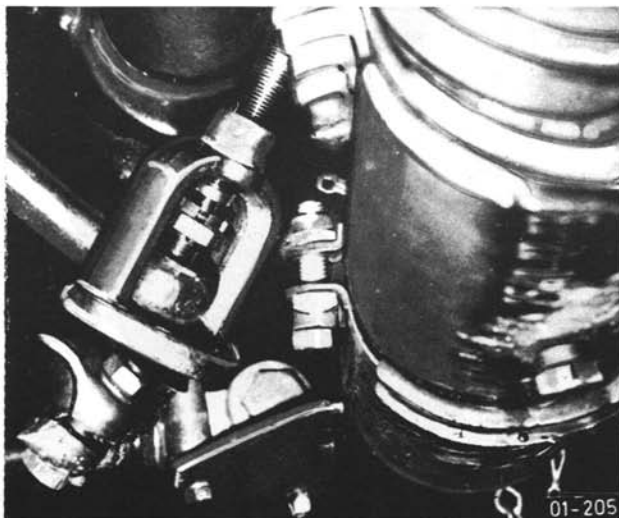


Fig. 46-1/6

9. Loosen torque support. Fig. 46-1/5.
10. Pull drag link from steering knuckle arm with puller 000 589 44 33 00. Fig. 46-1/6.
11. Remove steering assembly in downward direction.

Note: Turn steering in such a manner, that the steering drop arm points in the direction of the oil pan.
12. For reassembly proceed vice versa.

1. Clamp steering assembly into vise.
2. Pull steering drop arm from steering shaft with puller 000 589 83 33 00.
Fig. 46-2/1.

Note: Identify position of steering drop arm prior to pulling from steering shaft.
Fig. 46-2/2.

3. Pull steering column bracket from steering housing.
4. Remove oil level pipe and drain oil.
5. Replace sealing ring of oil level pipe.
6. Loosen counter nut for thrust screw of steering shaft adjustment and unscrew thrust screw.
Fig. 46-2/3.
7. Remove released pressure sleeve and pressure spring.
8. Unscrew steering housing cover from steering housing.
9. Take steering shaft from steering housing.
Fig. 46-2/4.
10. Loosen grooved nut from jacket tube and remove jacket tube from steering housing.

Note: The latest steering assemblies are provided with a locking plate.

11. Knock steering spindle and steering nut out of housing from bottom to top by means of a suitable mandrel.

Note: This will release the bearing race of the upper tapered roller bearing.
Fig. 46-2/5.

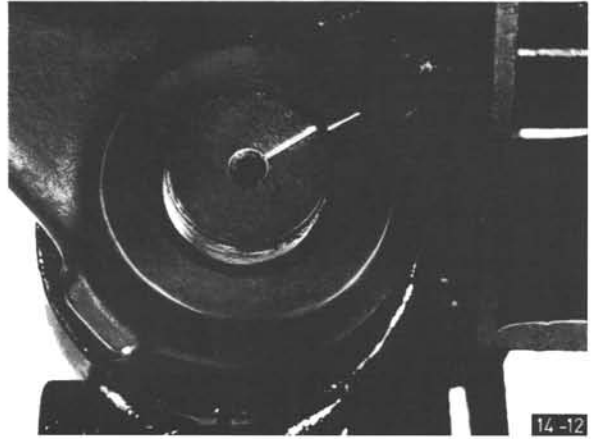


Fig. 46-2/2



Fig. 46-2/3

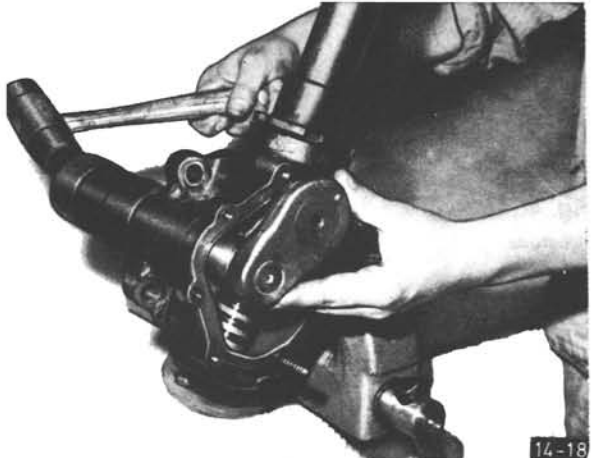


Fig. 46-2/4

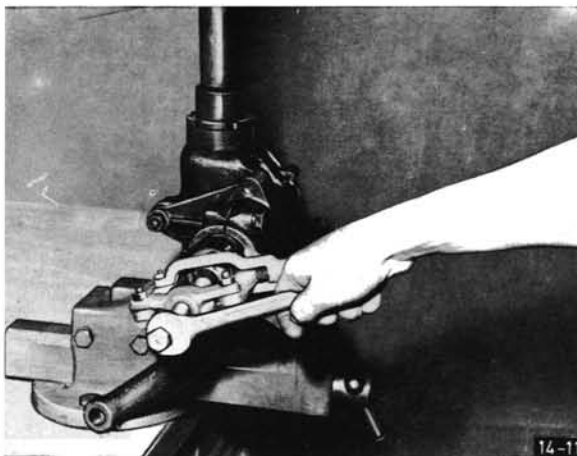
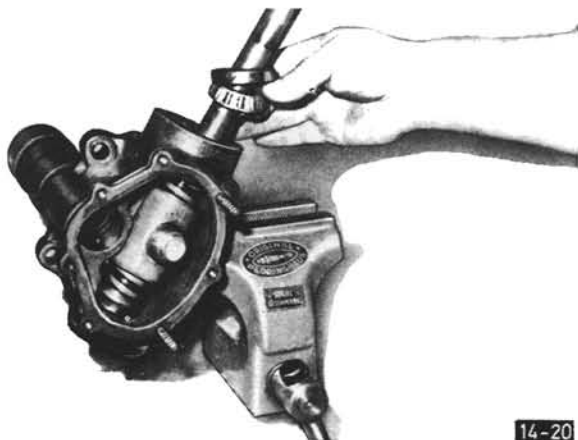
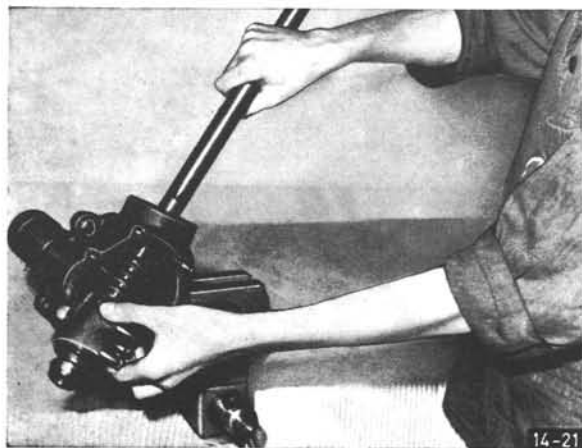


Fig. 46-2/1



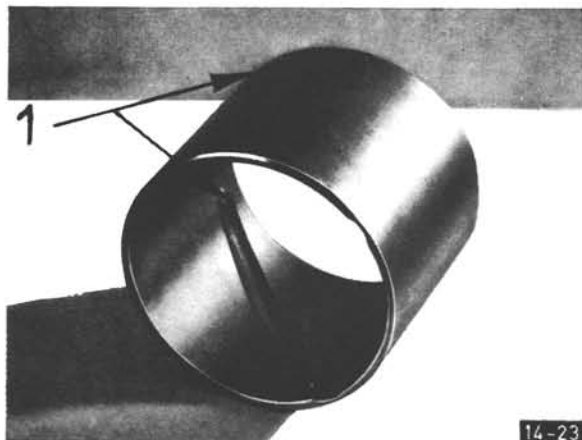
14-20

Fig. 46-2/5



14-21

Fig. 46-2/6



14-23

Fig. 46-2/7

1 outside

12. Remove steering spindle and steering nut from housing in downward direction. Fig. 46-2/6.
13. Press bearing bushings of steering shaft out of steering housing, if required.

Note: When pressing in bearing bushings be sure that the runout of the lubricating grooves on the outer bushing points toward the sealing ring, on the inner bushing toward the housing cover. (That is, leaving on both bushings a small outside margin without groove.) Running clearance of steering shaft in bushing is 0.03 to 0.08 mm. Fig. 46-2/7.

14. Pull outer and inner races of tapered barrel-shaped roller bearings from or out of steering worm and housing.

Note: Do not mix up outer races of barrel roller bearings to prevent damage.

15. Clean all parts and check.

Pay particular attention as follows:

- a) Steering nut on steering worm should have no noticeable play and should run easily without binding. (Max. radial play between steering nut and steering worm 0.040 mm.)
- b) Barrel-shaped roller bearings should have no defects.

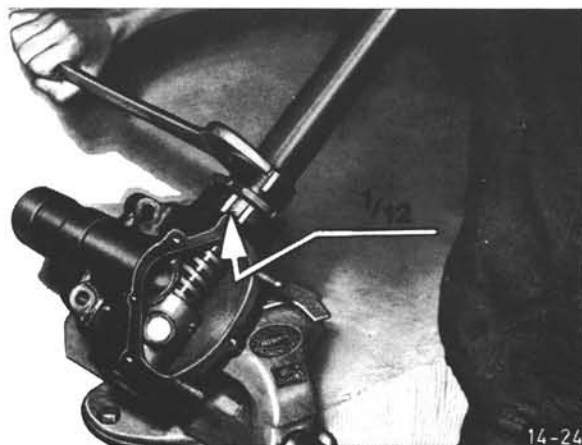
If one of the two objections applies, replace part, **don't** refinish.

Note: Danger! Handle carefully.

16. For reinstallation proceed vice versa.

Note: For adjustment of tapered roller bearings tighten jacket tube, then loosen by $\frac{1}{12}$ turn, tighten grooved nut and secure.

Fig. 46-2/8.



14-24

Fig. 46-2/8

1. Place steering in center position by screwing adjusting screw 186 589 00 23 00 into housing cover. Center bore in steering knuckle arm should match bore in housing cover.

Fig. 46-3/1.

2. First screw pressure screw and pressure sleeve into housing cover **without** spring until the edge of the sleeve rests free of play on pressure screw bottom, but without preload.

3. In this position, mark pressure screw in relation to housing cover and screw counter nut down until it rests against housing cover.

Fig. 46-3/2.

Note: Do not change position of counter nut in relation to pressure screw **any more**, since the present position is required for adjusting with spring.

4. Unscrew pressure screw **with** counter nut and remove pressure sleeve.

5. Coat spring with grease or molykote and insert into sleeve.

6. Coat counter nut on contact surface of housing cover with sealing compound and screw pressure screw with pressure sleeve, with spring installed and counter nut unchanged, back to the same point which has previously been marked.

7. Tighten counter nut.

8. Remove control plug on housing cover and fill up with oil (0.55 lits).

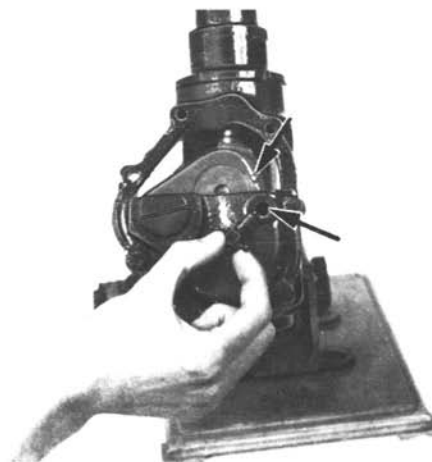


Fig. 46-3/1

14-25

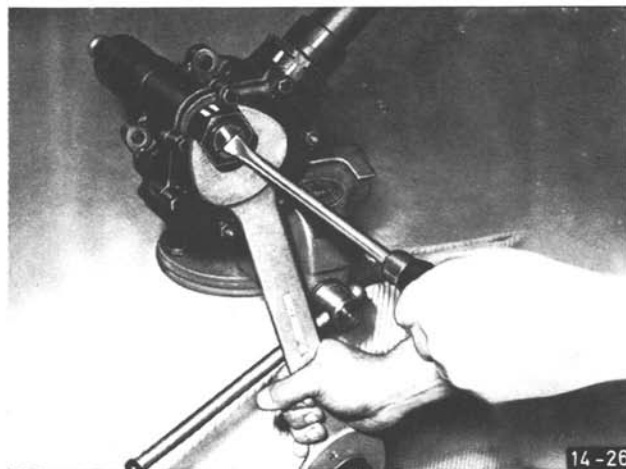


Fig. 46-3/2

14-26

General Note:

Clean and check tanks, intake pipe, strainer, closing cap.

Scope:

1 Loosen drain-closing plug at bottom on both tanks and unscrew. Watch out for gasket. Drain fuel, remove closing cap and strainer.

2 Unscrew fuel lines from fuel tank to changeover valve on fuel tank.

3 Unscrew vent lines on fuel tank.

4 Loosen the two hex. screws or nuts each laterally on brackets of fuel tanks and remove fuel tanks. Remove connecting hose after loosening wrapping.

5 Close fuel tank at bottom with drain-closing plugs and seal.

6 Remove intake pipes by loosening and unscrewing the four hex. screws.

7 Flush tank several times with **clean** fuel to flush out dirt and deposits.

8 Wash intake pipe and strainer in **clean** fuel and clean with compressed air, if required. Insert intake pipe (watch out for sealing ring) and screw down.

9 Wash strainer (filling strainer) in clean fuel. Clean closing cap and check. Fig. 1.



Fig. 1

10 Check seal of closing cap and replace, if required.

11 For installation proceed vice versa.

Note: When installing a new tank, flush tank with fuel first.

General Note

Changeover valve removed

Scope:

- 1 Unscrew actuating lever on valve first, if not already done during removal.
- 2 Unscrew closing nut M 32 and remove together with spring.
- 3 Remove intermediate lever together with distributing disc.
- 4 Carefully remove cork seal underneath. Replace seal, if damaged.
- 5 Clean all passages.
- 6 Proceed vice versa for assembly. Make sure that the cork seal is placed on small locking pipes without damage. Position intermediate washer in such a manner that the path restriction is at the right of the locking slot in housing. Screw-in closing nut until threads are flush with housing. Using a socket wrench will be of advantage.
- 7 Proceed with leak test.

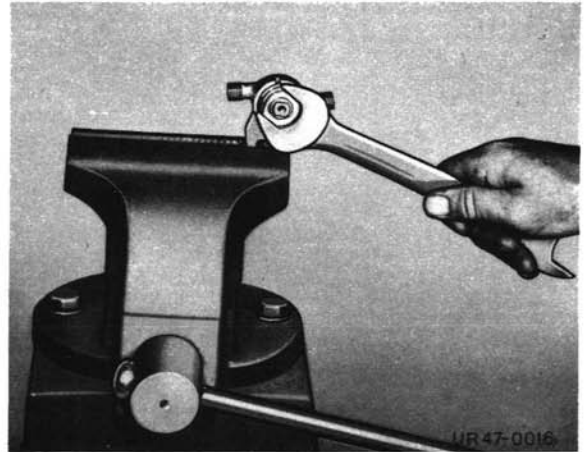
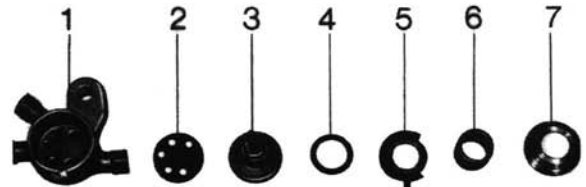


Fig. 1



UR 47-0022/1

Fig. 2

- 1 Housing
- 2 Sealing washer (cork)
- 3 Distributing disc
- 5 Restricting disc
- 6 Spring
- 7 Nut

Disassembling and Cleaning Prefilter

- 1 Loosen holding clip, remove filter cup and clean.
- 2 Unscrew strainer filter and clean. Fig. 1.
- 3 Check seal and replace, if required.
- 4 For assembly proceed vice versa.

Note: Upon assembly, check lower half for leaks.

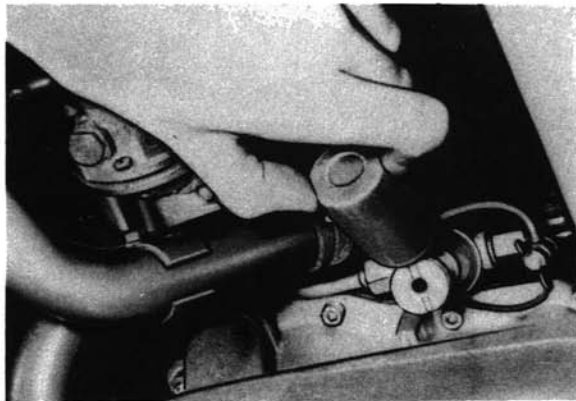


Fig. 1

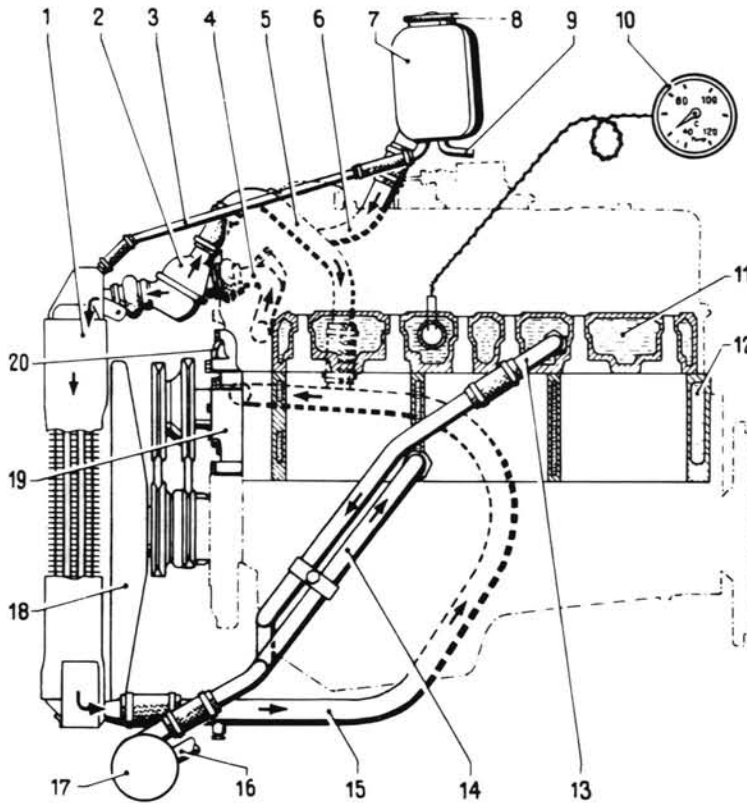


Fig. 50-0/1

- | | | | |
|---------------------|-------------------------------------|--|--|
| 1 Radiator | 8 Closing cover | 12 Coolant ducts
cylinder crankcase | 16 Connecting line for
battery preheating |
| 2 Coolant regulator | 9 Overflow pipe | 13 Preheating connection
cylinder head | 17 Heat exchanger |
| 3 Vent line | 10 Coolant temperature
indicator | 14 Preheating connection
cylinder crankcase | 18 Fan |
| 4 Return line | 11 Coolant ducts
cylinder head | 15 Supply line | 19 Coolant pump |
| 5 Bypass line | | | 20 Venting line
(coolant pump) |
| 6 Compensating line | | | |
| 7 Compensating tank | | | |

The coolant pump forces the coolant into the coolant chambers of the cylinder crankcase, the cylinder head and into the coolant regulator (thermostat) installed in return line to radiator block. With the coolant regulator closed, the coolant is fed back to the coolant pump in uncooled condition via a bypass line. In such a case, the radiator is disconnected and the coolant will circulate only within engine. With the coolant regulator opened, the coolant flows into radiator block and from there in cooled condition via the radiator outlet and the engine inlet connection also back to coolant pump.

The coolant regulator serves the purpose of disconnecting the radiator when the engine is cold, so that the favorable operating temperature is attained as soon as possible. In a system with a

small radiator, the coolant regulator will therefore start to open only at a water temperature of $73 + 2^{\circ}\text{C}$ (fluid thermostat) and with a larger radiator at $79 - 1^{\circ}\text{C}$ (wax thermostat). The coolant regulator remains closed below these temperatures.

In addition to quickly attaining the operating temperature, the coolant regulator serves the purpose of preventing excessively fast cooling down, e. g. on long drives downhill. In view of the desired low cylinder wear, this is particularly important. The heater (if installed) is always fed with coolant directly from cylinder head and is therefore not depending on opening temperature of coolant regulator.

50-0 Cooling System General

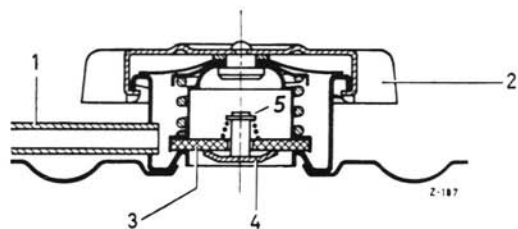


Fig. 50—0/2 (Basic diagram)

- 1 Overflow line
- 2 Closing cover
- 3 Pressure relief valve (rubber seal)
- 4 Vacuum valve (valve cone)
- 5 Water level marking plate

The closing cover of the coolant compensating tank is provided with a pressure relief valve (3), which limits the pressure prevailing in cooling system. When the pressure is too high, the pressure relief valve will open and permit the overflow line (1) to operate. Fig. 50—0/2.

To prevent the establishment of a vacuum in cooling system, the closing cover (2) is additionally provided with a vacuum valve (4), which opens at a vacuum of 0.1 bar (kp/cm²), which is also compensated by means of the overflow line (1).

The closing cover is identified by the punched-in number 40, which means that the pressure relief valve opens at 0.40 ± 0.1 bar (kp/cm²).

Check valves (3) and (4) in closing cover for easy operation. The pressure relief valve (4) should not bind, since this would cause the coolant compensating tank to contract as the result of the respective vacuum. Fig. 50—0/2.

For this reason, check particularly whether the rubber seal (3) is swollen, since in such a case the vacuum valve can no longer lift from rubber seal. Replace rubber seal (3), if required. For this purpose, pull rubber seal out of groove at its circumference by means of a knife or screw driver.

Then push out lock (8) and remove compression spring as well as valve cone (4) from rubber seal (3).

Insert new rubber seal in vice versa sequence. Check valves once again for easy operation.

1. Drain cooling fluid (approx. 20 lits) (catch contents, if anti-freeze has been added).

Note:

1 Drain plug or valve on engine block at left (on latest engines at the right).

Fig. 50-1/1.

1 Drain plug on front cooling fluid line bottom right.

1 Drain plug on water container, center of slide plate with preheater installed.

1 Drain valve on heater pipe left bottom (open vent valve on heater body), (lefthand and righthand as seen in driving direction).

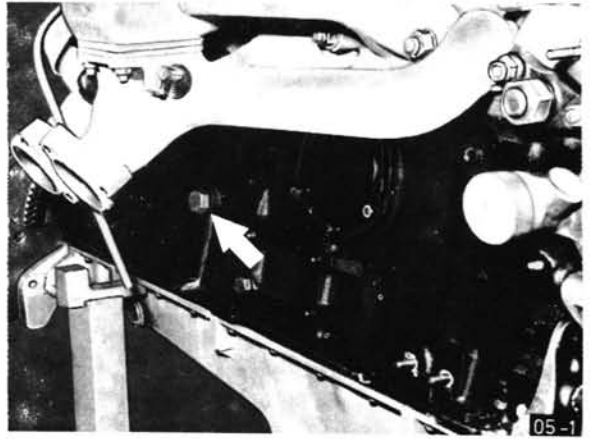


Fig. 50-1/1

2. Remove heater lines above radiator block.

Note: This will also free the radiator attachment top and grounding strap.

3. Remove cooling fluid return line on radiator top. Fig. 50-1/2.

4. Loosen cooling fluid supply line at the right on pipe clamp and holder.

5. Remove underfloor protection (slide plate), if installed. If engine and battery preheater is installed, remove underfloor protection and water container (heat exchanger).



Fig. 50-1/2

6. Loosen radiator attachment bottom.

7. For enlarged cooling system, release short circuit line between radiator and cooling fluid compensating tank. Fig. 50-1/3.

8. Remove holding clip on drain pipe from radiator to water pump.

9. Release cooling fluid supply line on radiator.

10. Remove radiator block in upward direction. Use assistance to turn fan.

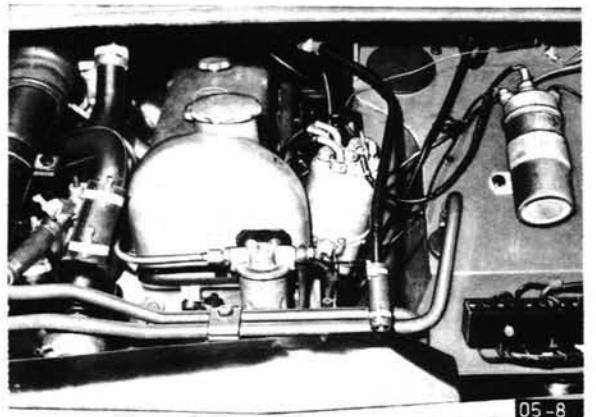


Fig. 50-1/3

11. For reinstallation proceed vice versa.

Removal and Installation of Cooling Water Regulator Inspection

50-2

1. Drain part of cooling water. Catch contents if anti-freeze has been added.
2. On version with small radiator, loosen two large connections and one with smaller diameter, on enlarged cooling systems loosen three hose connections of similar size on thermostat.
3. Remove thermostat.
4. For reinstallation proceed vice versa. Watch out for correct installation position.



Fig. 50-2/1

Thermostat for standard type cooling system
(fluid-type thermostat)



Fig. 50-2/2

Thermostat for enlarged cooling system
(wax-type thermostat)

Checking the Thermostat

1. Clean removed thermostat in a 5 % P-3 solution (Henkel degreasing agent).
2. Check for unobstructed passage acc. to test instructions.
3. Replace defective thermostats.

Test Instructions for Thermostats in Trucks 1.5 t UNIMOG-S

	Type	Opening temperature °C beginning	Opening temperature °C end	Stroke in mm	Pressure/atü
In normal cooling system	Fluid-type thermostat	73 ± 2	$81 + 2$	8 - 1	0
In enlarged cooling system, also in vehicle with preheater	Wax-type thermostat	79 - 1	$91 + 3$	9 - 1	0

Caution! Remove thermostat when cleaning cooling system from boiler scale to protect thermostat against damage.

If the cooling water comes to a boil, the fault is in the cooling system, there may be not enough water or excessive contamination.

If required, the cooling system must be degreased, descaled and cleaned.

Note: When checking, above all check venting line from water pump housing to cylinder head as follows:

1. For contamination.
2. For lime deposits.

Degreasing:

1. If the cooling system is heavily contaminated by oil or grease, fill up cooling unit **without** anti-freeze and add one to two hands full of chemical cleaning agent (100 to 200 g) for example Soda, P 3 or Imi into cooling fluid. (This provides an approximate 5 % solution.)

Fig. 50-4/1.

2. Drive vehicle with this mixture for one day, but at least 300 km (180 miles). Maintain warm operating temperature.
3. Drain cooling fluid and flush thoroughly with the engine running and a good supply of fresh water.
4. Fill in cooling fluid and add anti-freeze, if required.

Descaling:

(Hydrchrome cure of Wewa Wasserchemie Idstein/Taunus.)

1. Drain cooling fluid and remove thermostat. Establish provisional connection by self-made pipes.

Fig. 50-4/2.

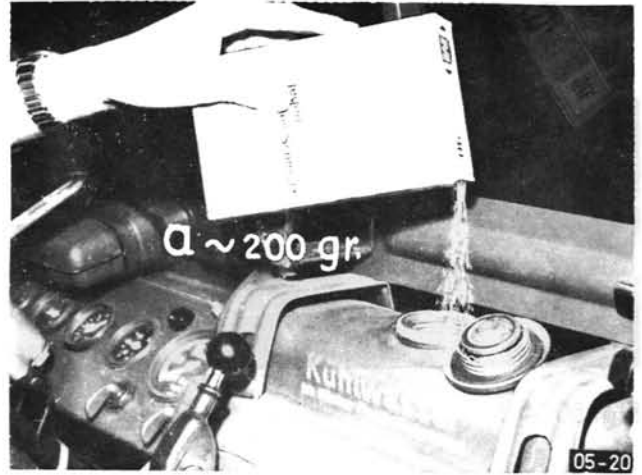


Fig. 50 4/1

a ~ 200 g cleaning agent



Fig. 50 4/2



Fig. 50-4/3

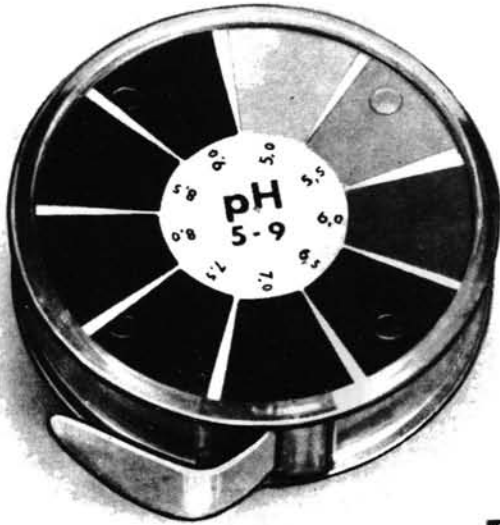


Fig. 50-4/4

2. Add mixture of water and hydrochrome solution to cooling fluid (mixing ratio shown in table below).

Caution! ACID!

Do not permit solution to touch clothes. If so, wash immediately with warm water. Do not permit solution to touch open wounds or part of face. Wash with lots of warm water, if required.

Solution is not compatible with anti-freeze.

Solution Table			
Capacity of cooling system	Service age of motor vehicle in months	Distance covered of motor vehicle	Quantity of solution in liters
25 liters	from up to 6	12000 km	1/2
	15 up to 20	40000 km	1
	to up to 40	80000 km	2
	up to 60	120000 km	3

3. Drive (approx. 100 – 150 km).
4. At end of drive, determine with universal indicating paper "Mark" whether ph value is below 6. Refer to Fig. 50-4/3.
5. Drive with mixture and **change** until ph value is below 6. Fig. 50-4/4.
6. Drain solution, install thermostat.

Cleaning:

Blow out radiator from engine with compressed air or spray with water to clean the radiator fins thoroughly from foreign bodies. Also clean cylinder head and cylinder block to eliminate any deposits of rusty sludge.

Never use muriatic acid solutions for cleaning.

Add anti-freeze to cooling fluid, if required.

Check Cooling System for Leaks

The cooling system operates under over-pressure, which is controlled by the valve at the filling lock of compensating tank.

When the cooling water is heated, the over-pressure valve keeps the system at a pressure of up to 0.4 kp/cm², while during the cooling stage the underpressure valve equalizes any damaging vacuum which may occur. This is why the cooling systems must be checked for leaks when cold and also **under pressure**.

1. Remove screw connection on compensating tank.

2. Fill with cooling fluid up to filler neck.

3. Mount radiator test pump
No. 000 589 27 27 00
with adapter No. 401 589 00 25 00.
Fig. 50-5/1.

4. Place cooling system under pressure by means of radiator test pump (0.5 atü).
Fig. 50-5/2.

5. If the overpressure does not remain constant when the engine is stopped, the following causes may apply:

- a) Radiator leaks.
- b) Cooling fluid compensating tank leaks.
- c) Lines and hoses have major leaky points.
- d) Hair crack in crankcase.
- e) Hair crack in cylinder head.
- f) Leaky cylinder head gasket.

At points d and f additional water traces are showing up in the oil, or there are oil traces in the cooling fluid circuit.

g) Sweat points on hose connections indicate "needle hole leaks".
Fig. 50-5/3.

6. If the test pressure fluctuates when the engine is running, the cylinder head gasket may leak.



Fig. 50-5/1



Fig. 50-5/2

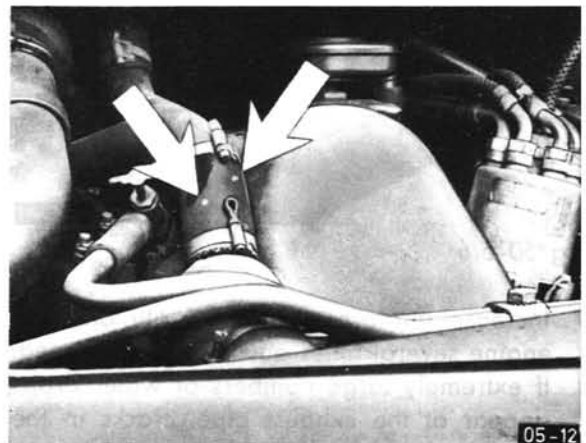


Fig. 50-5/3



Fig. 50-5/4

- Excessive operating temperature caused by oiler scale deposits. In such a case, degrease and descale cooling fluid system.

Note:

Degreasing and descaling often shows leaks which were previously covered by scale. This is why Items 1 to 6 must be specially watched following descaling.

Inspection of Radiator Closing Cover

- Remove radiator lock.
- Wash radiator lock in grease-dissolving cleaning agent (for example Imi, P3, dimal).
- Check whether sealing ring and rubber seal of pressure relief valve are showing cracks and notches, or are swollen. Fig. 50-5/5.
- When sealing ring is faulty, replace; when rubber seal faulty, replace radiator lock.
- Check whether vacuum valve can be raised from its seat and whether a clearly visible gap shows up. Fig. 50-5/6.

If so, the locking cap can be used again.



Fig. 50-5/5

Caution!

Use only radiator caps with the **code number 40** punched in on face end.

Blow-off overpressure $0.4 \pm 0.1 \text{ kg/cm}^2$

Blow-off underpressure 0.1 kg/cm^2

Fig. 50-5/7.

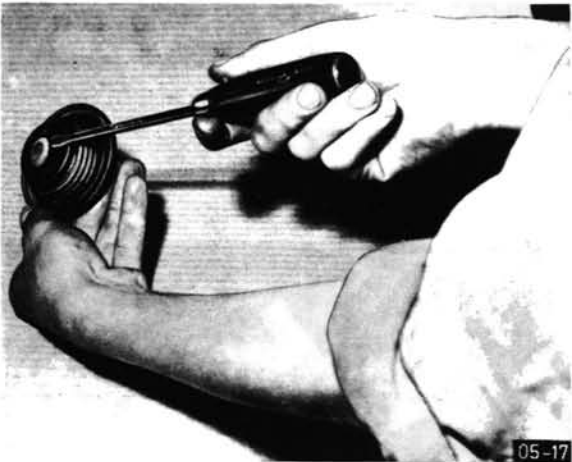


Fig. 50-5/6

- Increase test pressure to 0.6 atü and run engine several times quickly to max. speed. If extremely large numbers of water drops appear at the exhaust pipe, cracks in the crankcase or in cylinder head must be expected. Fig. 50-5/4.



Fig. 50-5/7

The possibility of modifying the cooling system for increased cooling capacity is available for all engines and chassis.

1. Drain cooling fluid (max. 18 lits).
 2. Remove radiator.
- Note:** Also remove heater line (if applicable).
3. Remove cooling fluid compensating tank.
 4. Remove fan.

Note: Catch emerging oil.

5. Remove cooling fluid lines (including thermostat).
6. Remove cooling fluid drain connection on cylinder head above chain tensioner.
7. Install new cooling fluid connection. Fig. 50-6/1.

8. Install fan with intermediate ring.

Note: New screw length (8 x 25). Fig. 50-6/2.

9. Fill fan with engine oil.
10. Install new (enlarged) radiator with new fastening members top and bottom. Fig. 50-6/3.
11. Remove old overflow-drain pipe to cooling fluid compensating tank and install new type.
12. Install new (enlarged) cooling fluid compensating tank.
13. Install short circuit line from radiator to radiator fluid compensating tank.

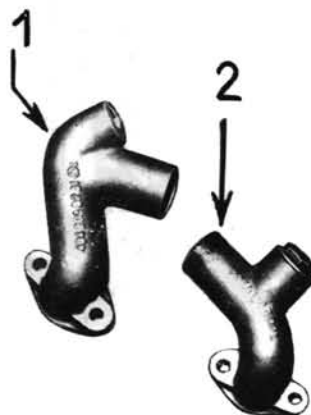


Fig. 50-6/1
1 Enlarged version
2 Standard version

05-42

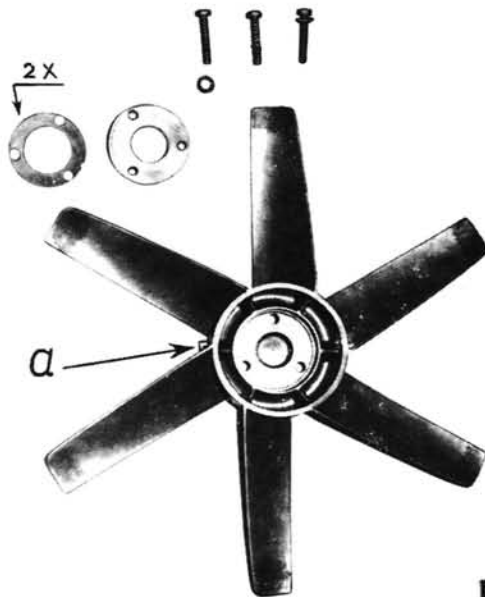


Fig. 50-6/2
a Oil filler screw

05-43

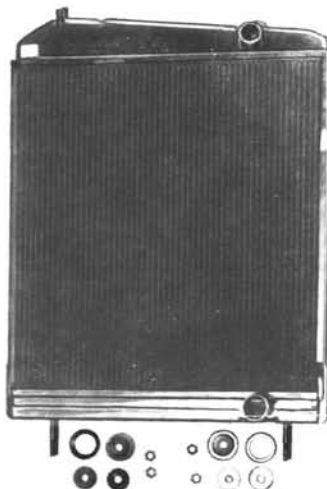


Fig. 50-6/3

05-44

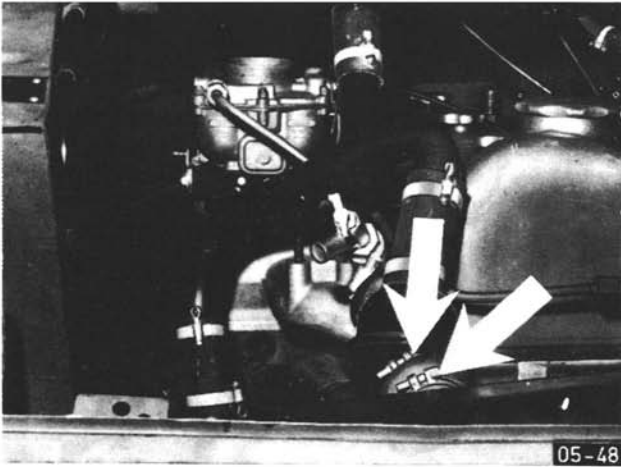


Fig. 50-6/4

14. Install new cooling fluid pipe at bottom from above across generator.

Note:

Do not yet clamp generator.

Do not yet tighten holder for cooling fluid pipe.

15. Attach the three hose sections of connections to enlarged thermostat.

Note:

Tighten hose clips!

Use only **Norma hose clips**.

16. Install thermostat with connections.

Note:

Tighten hose connection on cooling water outlet with **Aero-Seal-Yet Hose Binders**. Use Norma hose clips for all other connections.

Fig. 50-6/4.

17. Tighten holder and clip for cooling fluid pipe at bottom.

18. Tension generator V-belt.

19. Reinstall heater pipes and connect (if applicable).

20. Fill up with cooling fluid and add anti-freeze, if required (vent heating system, if applicable).

Subsequent Installation of Engine and Battery Preheating System

50-7

We should like to emphasize that this installation is only possible for chassis number 404.114-020 808 with engine installed.

- a) DB No. 404 010 00 00
- b) DB No. 404 010 01 00
- c) DB No. 404 010 13 02

as from Chassis No. 404 114-020 089, subsequent installation is generally possible.

1. Find out whether cooling water system with increased cooling capacity is installed. If not, convert (refer to Group 50-6).
2. Remove front slide plate.
3. Loosen radiator attachment at bottom.
4. Remove battery box. Also remove electric cables.
5. Remove rear exhaust pipe with holder.
6. Loosen fastening screws of exhaust muffler and modify rear attachment in top hole. Fig. 50-7/1.
7. Preassemble new battery box. Fig. 50-7/2.

- a) Install heater coil.
- b) Install outside exhaust gas pipe.
- c) Install battery lines (do not forget rubber sleeves).

Note: On chassis with + pole on battery main switch, simultaneously convert this vehicle to - pole on battery main switch.

8. Attach battery box to frame.
9. Install new tail pipe at rear together with pipe clip and holder.
10. Mount exhaust pipe on tail pipe. Fig. 50-7/3.

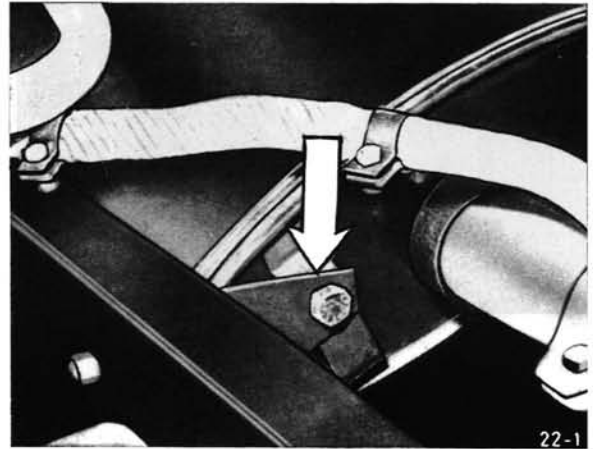


Fig. 50-7/1

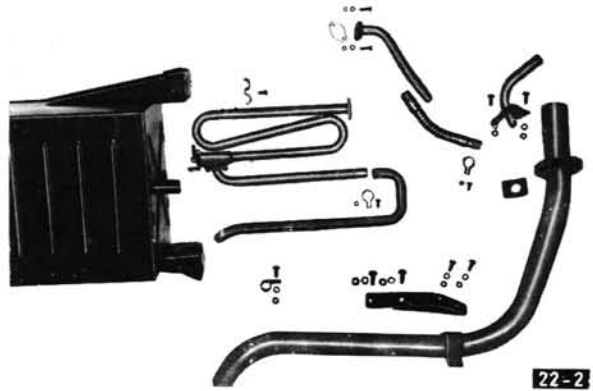


Fig. 50-7/2

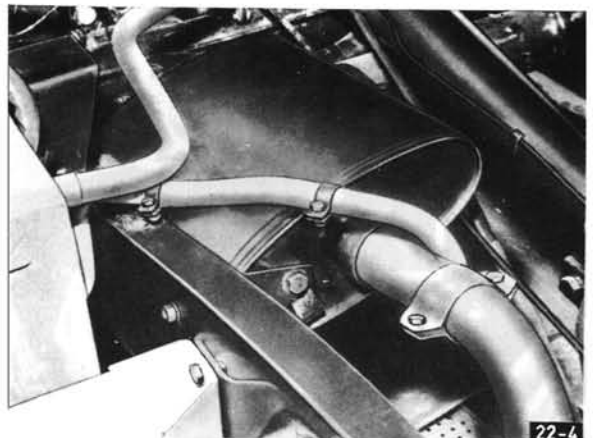


Fig. 50-7/3

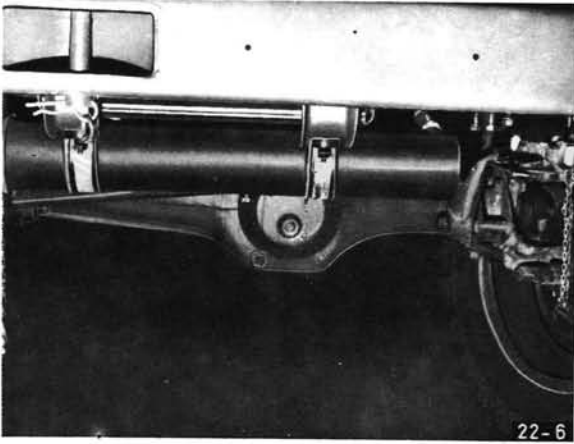


Fig. 50-7/4

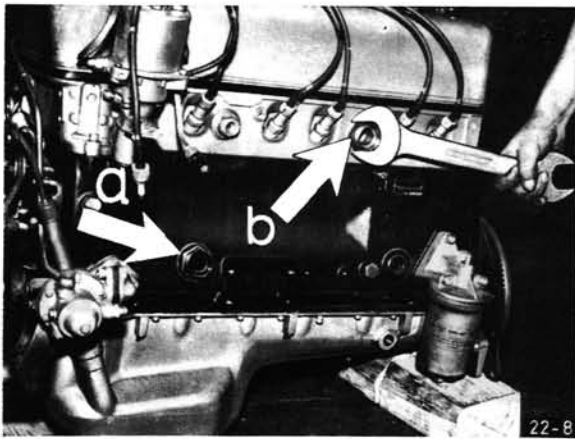


Fig. 50-7/5

- a Drain on crankcase
- b Drain on cylinder head

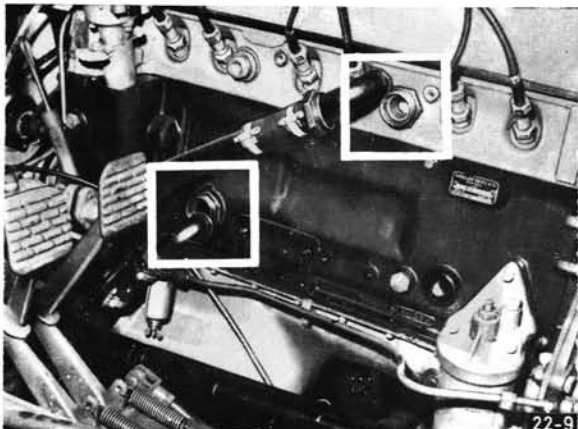


Fig. 50-7/6

11. Connect flexible lines. Connect pipe clamps.
12. Attach water container with clamps to bottom radiator attachment. Fig. 50-7/4.
13. Install radiator attachment on top.
14. Drain cooling fluid. Remove blind plugs on crankcase and on cylinder head and screw in connection for water pipe. Fig. 50-7/5.

Note:

Install with sealing compound.

15. Connect water container to engine circuit with two connecting pipes. Fig. 50-7/6.
16. Clamp holding bracket for both lines of engine preheating system to fastening screw of engine mount front.
17. Mount exhaust gas line from water container to battery box.
18. Attach holding bracket of exhaust gas line to frame. Fig. 50-7/7.
19. Install front slide plate (new type).

Note:

Clamp securing chain for water container lock to fastening screw.

20. Fill up with cooling fluid and add anti-freeze, if required.
21. Check engine by test run whether all parts can swing freely and connecting points are free of leaks.

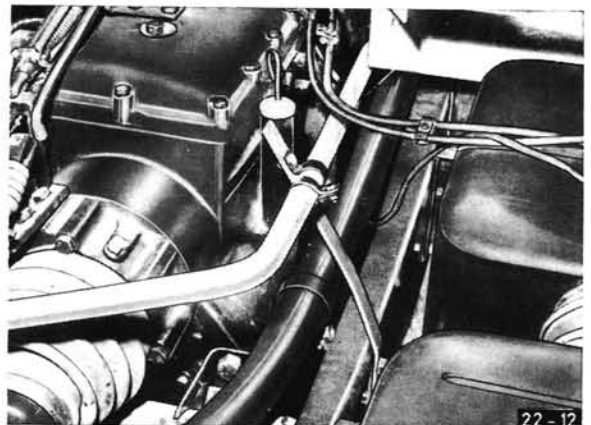


Fig. 50-7/7

I. Removal and Installation of Battery

1. Unscrew closing bolts on battery box cover and fold cover down.
2. Pull battery slide out until the terminals of the first battery are exposed.
3. Loosen screw on negative terminal and remove connection in upward direction from terminal.
4. Pull slide out still further and loosen terminal cable.

Then pull slide with both batteries out.

For testing the acid level only, simply loosen negative cable of first battery and pull battery slide out until filling plugs are exposed.

5. For reassembly proceed vice versa.

Note: During installation and connection of the battery observe the following:

Prior to connecting the battery, it will be of advantage to clean the cable connection terminals well with spirit of alcohol or a soda solution.

Tighten cable terminals well. Loose, contaminated or oxidized terminals are often the reason for bad functioning of the electrical system. Regular greasing of the terminals (following the tightening) with acid-resisting grease F 40 v 1 (Bosch) or Vaseline will inhibit oxidation.

Note: Do not cover inside of pole terminals with protective grease.

Caution! Do not confuse + and – terminals (carrying identification) during connection. Prevent sparking when removing and installing batteries. Explosion risk.

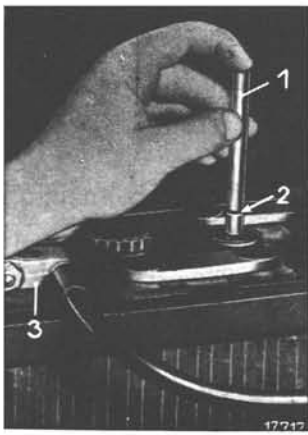


Fig. 54-1/1

- 1 Glass measuring tube
- 2 Mark for acid level
- 3 Grease terminals

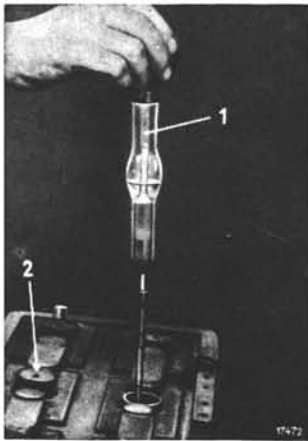


Fig. 54-1/2

- 1 Acid syphon 000 589 01 27 00
- 2 Closing plug



Fig. 54-1/3

II. Checking the Battery

Also refer to Job No. 00-0, Table 41.

1. Always keep battery clean and dry. Check fluid level and acid density regularly (refer to Lubrication and Service Schedule).
2. Clean battery externally only with the closing plugs screwed in, so that no dirt can enter the cells. Venting holes in closing plugs must be opened, so that the gases created when the battery is charged while driving are permitted to escape.
3. The fluid level of each battery should be approx. 10-12 mm above the top plate edge.
Fig. 54-1/1.

Use only clean, distilled water for refilling.

(Water evaporates when charging while driving.)

Caution: Do not use metal vessels or metal funnels for filling up distilled water or acid. Fill up only using a clean glass vessel and a glass funnel.

4. **Measuring acid density at an acid temperature of + 20° C.**

Suck up enough acid with syphon until acid spindle (acid tester) is floating.

The battery is well charged, when the acid tester immerses to the point where the number 1.285 of the printed scale is flush with the acid level.

Fig. 54-1/2 and 54-1/3. The tables on page 00-0/24 indicate the individual data for acid density and specific weight, or the respective charging condition.

Note: Batteries not in use require regular care to remain operational. Recharge once at least every 6 to 8 weeks. If not, the battery will become unusable.

III. Recharging the Battery

Note: If the battery check has shown that the acid density or the specific weight is lower than 1.20 (in tropics lower than 1.17), the battery must be recharged.

The max. charging current intensity of the battery is $\frac{1}{10}$ of the battery capacity.

1. Check acid level prior to recharging battery. (10–12 mm above plate top edges.) Fill up, if required.
2. Connect battery to outside DC source.
3. During the charging, the acid temperature will indicate from 15° C to 40° C. Accurate measuring of acid density is possible only $\frac{1}{2}$ hour upon charging.
4. When charging the battery, see that there will be uniform gassing from each cell and that the voltage on each cell reaches 2.6–2.7 Volt (Fig. 54–1/4). Gassing will increase toward the end of the charging period.
5. The charging is completed when the acid density is 1.285 and the terminal voltage of each cell 2.6 to 2.7. Measure voltages with the charging current switched on, and measure acid density at the specified acid level.
6. Batteries with sulphated plates, identified by the white deposits or the low specific weight (below 1.12) must be charged for 40 hours at 2.5 Amps. Then complete the charging at full charging current intensity.



Fig. 54–1/4

1 Cell tester 000 589 00 27 00

Removal and Installation

1. Remove blinker transmitter fuse.
2. Disconnect cable on blinker transmitter (identify).
3. Loosen fastening screws and remove blinker transmitter.
4. For reinstallation proceed vice versa. Observe installation instructions.
5. Check installation for function.

Note: Repairs on blinker transmitter can be made by the manufacturer only and defective blinker transmitters should therefore be exchanged.

Refer to Job No. 00-0, page 00-0/23.

Possible Damage on Blinker Transmitter

1. Bulges on housing (light metal alloy) may result in failure of blinker transmitter, since the coils and contacts in the transmitter require almost the entire inside space.
2. The bulbs of the blinker system in the UNIMOG and also in the trailers must be acc. to regulations, since each blinker transmitter will operate reliably only when

the correct load (Watt) is connected (for example 20- or 10-Watts bulbs when 15-Watts bulbs are specified).

3. The trailer cable plug, for example, can be one of the most current causes for trouble. Since the connection and the plug itself on the various terminals are not yet fully standardized, trailers which are not pertinently inspected may cause a short circuit or a wrong function.

When coupling trailers of other make to the UNIMOG, a check prior to inserting the cable plug is required. Use test lamp only. The so-called "screw driver test" will definitely result in a short circuit in blinker transmitter. A short bridge, which need not necessarily result in scorching the fine coils, may very well distort the contact points and jeopardize their function.

When checking the trailer cable plug it will be sufficient in most cases to inspect only the terminals with the numbers 30, 30 since the remaining terminals 31 for ground connection and 58, 58 for the tail light left and right are standardized. (Terminals 52 and 54 are not used on UNIMOG.) The **top** contact 30 is for blinker light **left**, the **bottom** for blinker light **right**.

I. Removal and Installation

1. Lift off installed equipment (generator and compressor).
2. Remove pto shaft on chain distributor drive. Fig. 55-2/1.

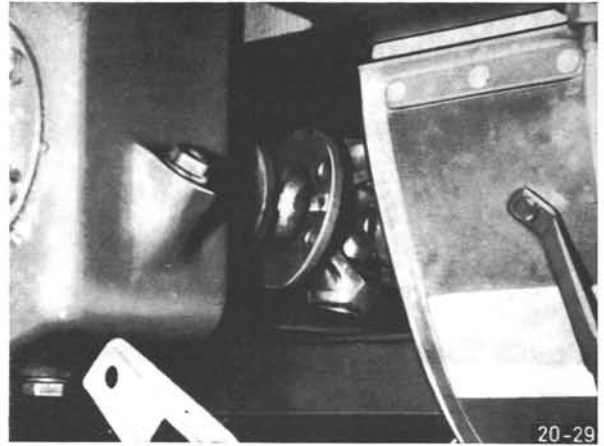


Fig. 55-2/1

Note:

Up to chassis number 404.114-950 2884 pto shafts were installed with fastening bolts M 6. In the event of repairs on drive end of these vehicles change to new version (fastening bolts M 8). This will also require replacement of flanges on special pto and on chain distributor drive.

3. Remove chain distributor drive from supporting unit by loosening three hex. bolts. Fig. 55-2/2.
4. Remove chain distributor drive in upward direction.
5. For reinstallation proceed vice versa.
6. Check oil level upon installation and drill up, if required. Fig. 55-2/3.

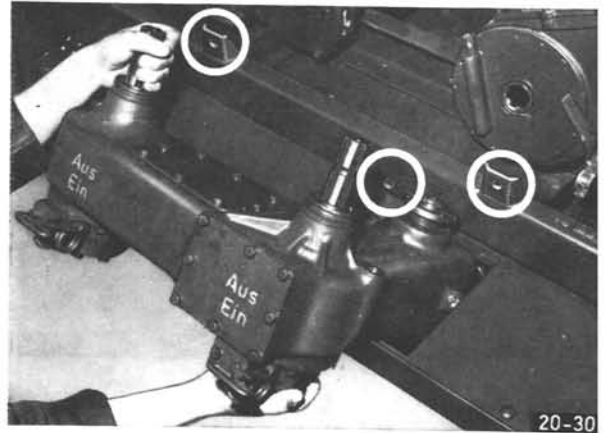


Fig. 55-2/2

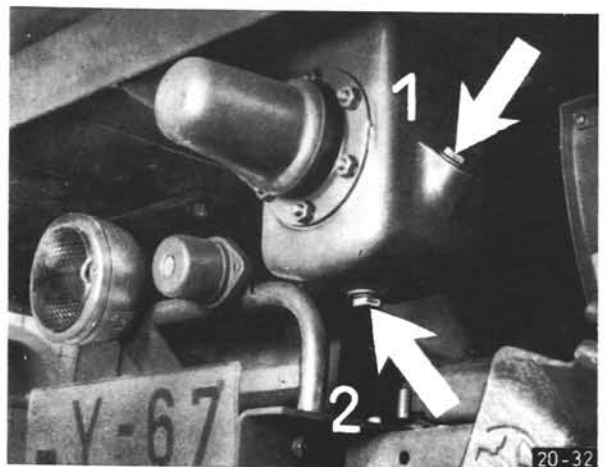


Fig. 55-2/3

- 1 Oil filler and control plug
- 2 Oil drain plug

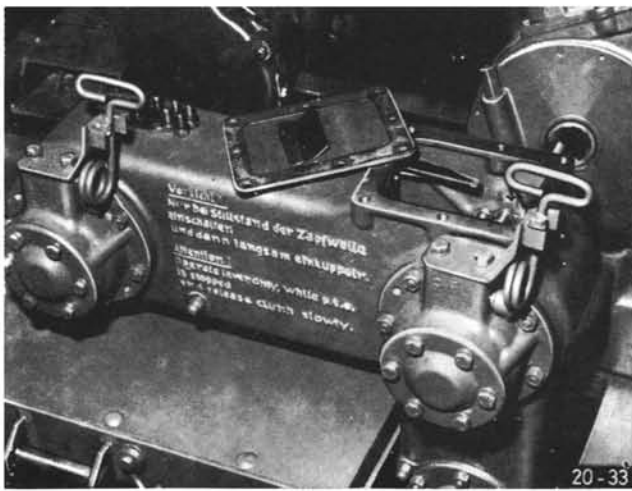


Fig. 55-2/4

II. Replacement of Chain Tensioner for Double Roller Chain

1. Remove cover with oil drip plate.
Fig. 55-2/4.

Note: Use new seal for reassembly.

2. Unscrew cap nut laterally on housing and remove sealing ring.

3. Pull out hex. bolt, **watch out for sealing rings.**

Fig. 55-2/5.



Fig. 55-2/5

4. Insert suitable wire (welding wire or the like) from above to hold chain tensioner under supporting plate, then pull out carefully in upward direction. Fig. 55-2/6.

5. For installation of new chain tensioner proceed vice versa.

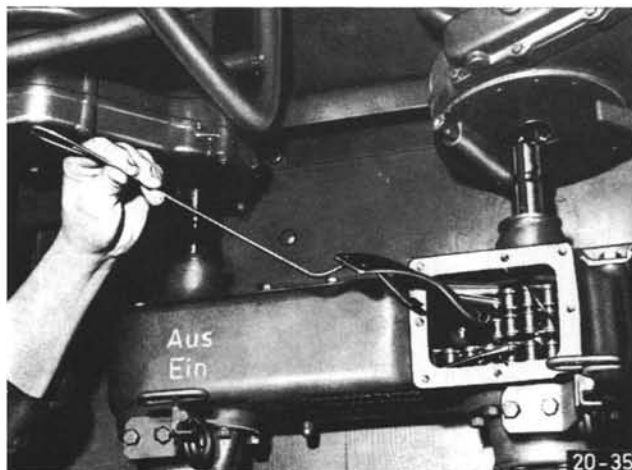


Fig. 55-2/6

1. Drain oil.
2. Remove all rubber caps.
3. Unlock grooved nut on drive flange and loosen.
4. Remove grooved nut, lock washer, washer and pull drive flange off with puller 000 589 10 33 00.
Fig. 55-3/1.

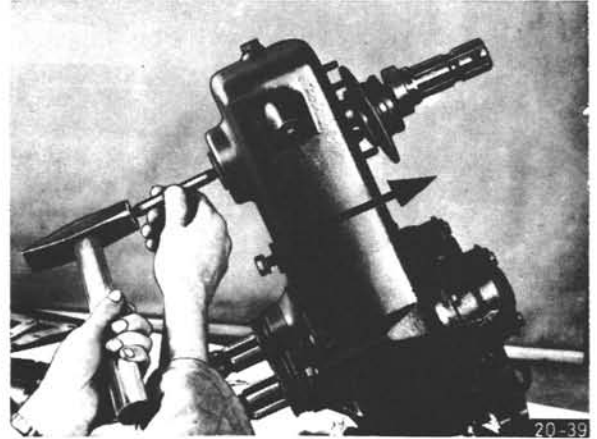


Fig. 55-3/2

5. Remove keys (2 each) from shaft.
6. Remove hex. nut and circlips (2 each) on flange.
7. Knock out pto shaft in direction toward **splining**.
Fig. 55-3/2.

Note: This will expose drive gear with mounted double chain.

8. Remove both keys for drive gear from drive shaft and pull off spacer tube.
Fig. 55-3/3.



Fig. 55-3/3

9. Place drive shaft with flange on vise and knock out drive shaft.
Note: Pull off exposed wear ring and grooved ball bearing on drive shaft.

10. Remove wear ring and sealing ring on chain distributor housing.

11. Remove upper locking ring.

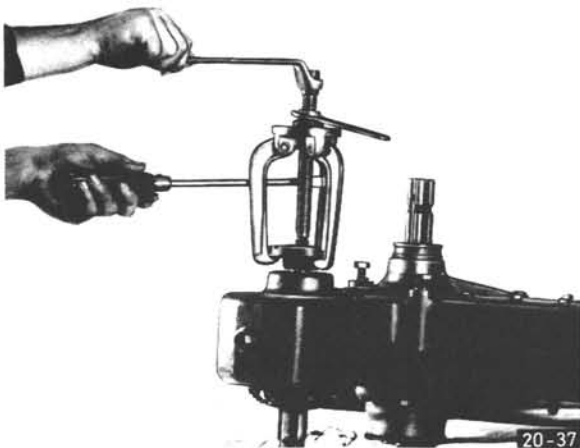


Fig. 55-3/1

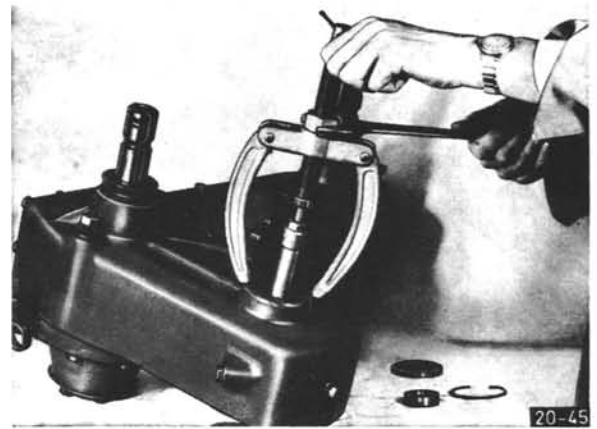


Fig. 55-3/4

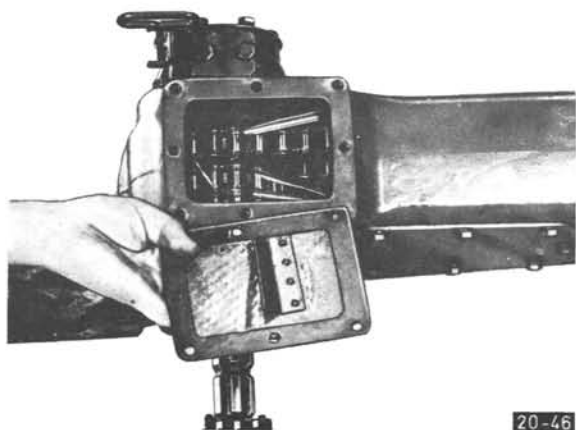


Fig. 55-3/5

20-46

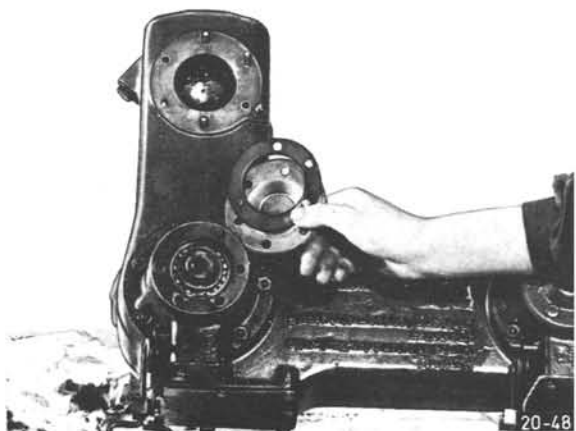


Fig. 55-3/6

20-48

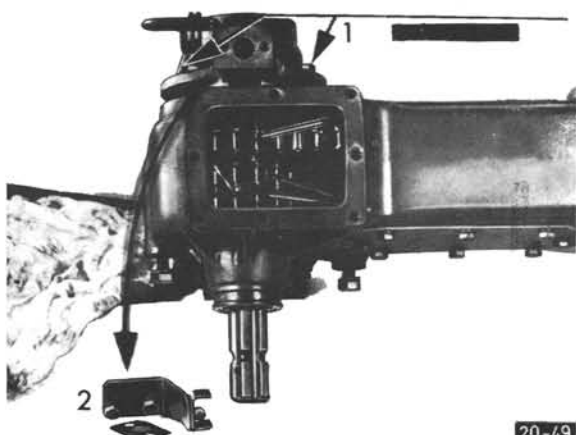


Fig. 55-3/7

- 1 Pressing-off screw
- 2 Lever lock

20-49

12. Pull out radial ball bearing with puller 000 589 27 33 00 and counter support 000 589 34 33 00. Fig. 55-3/4.
13. Remove bottom locking ring.
14. Remove cover with oil drip plate on housing upon loosening of 8 fastening screws. Remove seal. Fig. 55-3/5.
15. Unscrew lateral cover with seal.
16. Remove cover with sealing ring on distributor shaft rear. Fig. 55-3/6.
17. Remove lever lock.
18. Loosen slot screw for gear shifting shaft released by removal of lever lock and pull gear shifting shaft out in lateral direction.

Note: Do not drop circlip into housing. Fig. 55-3/8.
19. Remove bearing flange from housing after loosening the six hex. nuts. Fig. 55-3/7.

Note: Use two puller screws M 8 x 35 DIN 933 - 8 G.
20. Remove shifting fork with slide rail.
21. Unlock grooved nut and screw out. Remove lock washer and spacing washer.
22. Pull radial ball bearing from hollow shaft with puller 000 589 10 33 00.



Fig. 55-3/8

20-50

23. Pull hollow shaft together with gear shift wheel and fitted oil collecting ring with puller 000 589 10 33 00. Fig. 55-3/9.

24. Remove rubber ring.

25. Take off both keys.

26. Remove spacing tube.

27. Knock out drive shaft in direction of **splining**.

Fig. 55-3/10.

28. Pull wear ring from drive shaft with puller 000 589 10 33 00.

29. Remove locking ring.

30. Remove spacing washer.

Fig. 55-3/11.

Note: Use fitted washers in sizes from 1.2 to 1.7 mm thick. Install free of play.

31. Remove radial sealing ring.

32. Remove upper locking ring (V-ring).

33. Pull radial ball bearing with puller 000 589 27 33 00 and counter support 000 589 34 33 00.

34. Remove **oil collecting ring** and bottom locking ring (**V-ring**).

35. Remove **oil needle** after pulling out **fastening clip**.

Refer to Fig. 55-3/12.

36. Unscrew second lateral cover.

Note: Cover is provided with a venting hole. Be sure that this hole is not closed during installation. (By paint or the like).

37. Remove cover with seal from bearing flange of end shaft.

38. Continue disassembly similar to Item 17 to 29.

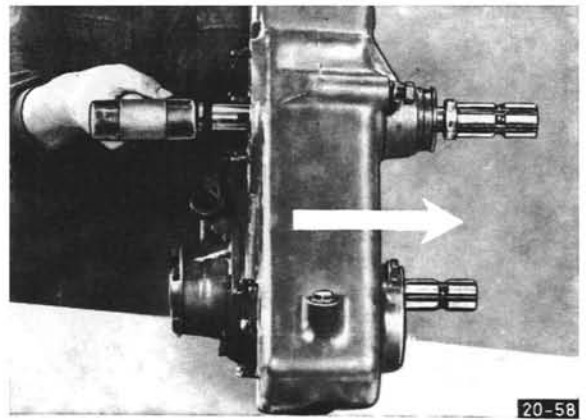


Fig. 55-3/10

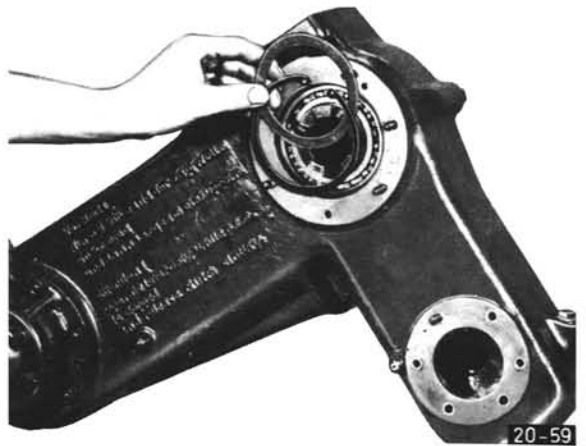


Fig. 55-3/11

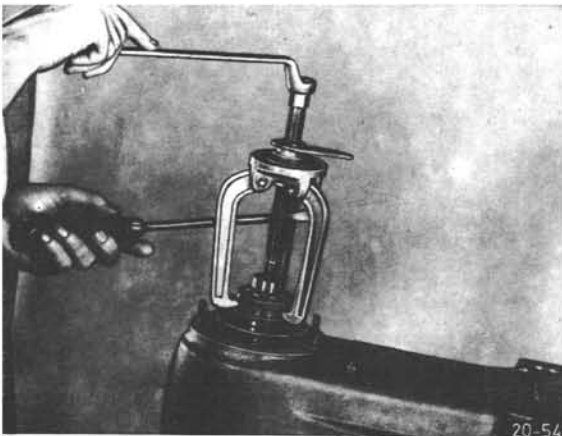


Fig. 55-3/9

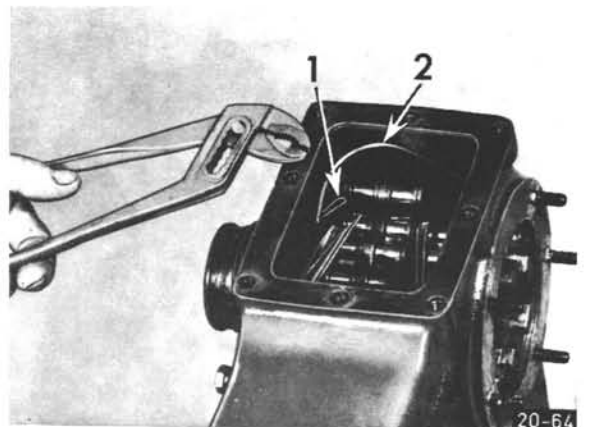


Fig. 55-3/12

1 Fastening clip
2 Oil needle

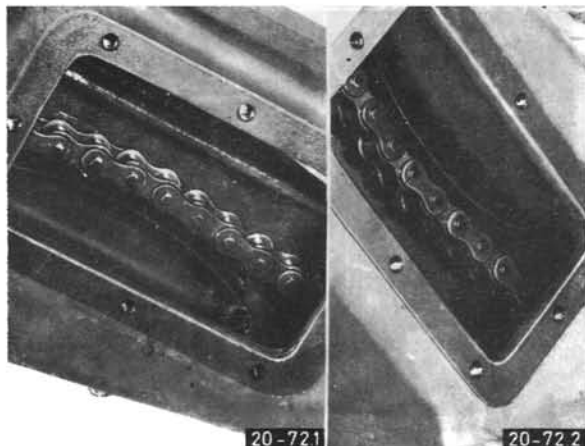


Fig. 55-3/13

39. Remove chain tensioner.
Fig. 55-3/13.

40. Remove single sprocket wheel.

Note: This will release spacer tube, which is then removed.

41. Place Simplex chain above Duplex chain.
Fig. 55-3/14.

42. Knock tout triple sprocket in direction of claw.

43. Move Simplex chain back and forth and slide as far as possible toward small ball bearing, while simultaneously turning on claw of sprocket by means of screw driver.
Fig. 55-3/15.

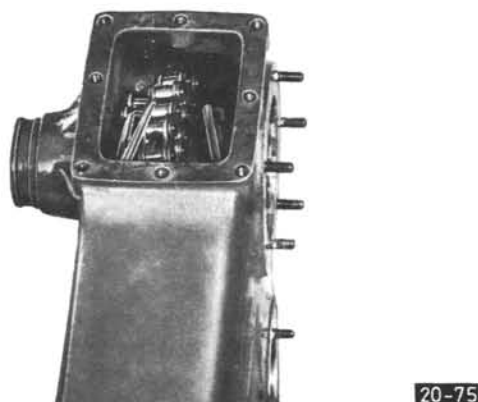


Fig. 55-3/14

44. Remove Duplex chain together with Simplex chain by additionally turning claws with screw driver.
Fig. 55-3/16.

45. Remove Simplex chain.

46. Remove Duplex chain together with double sprocket wheel of drive shaft in lateral direction.

Note: Double sprocket wheel with smooth face toward bearing flange.

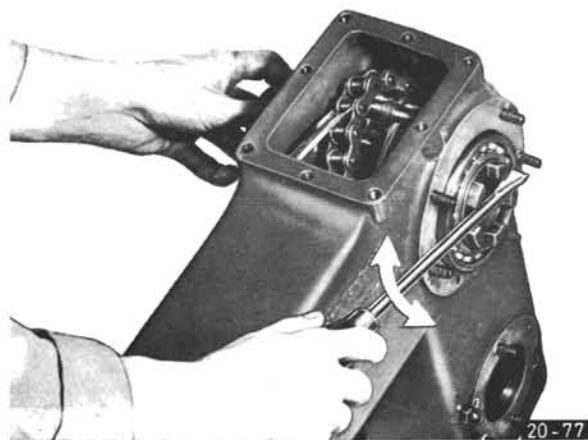


Fig. 55-3/15

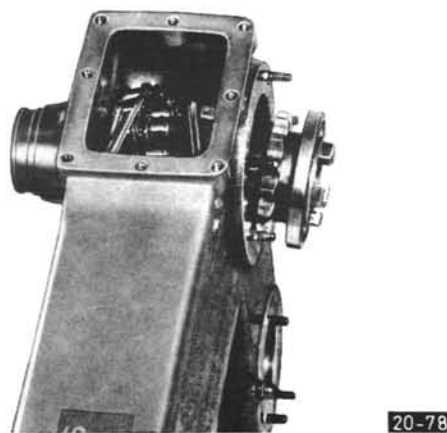


Fig. 55-3/16

I. Disassembly and Assembly

Type C

1. Drain oil.
2. Remove guard.
3. Unscrew cam clutch with drive joint.
4. Completely remove hand brake.

Note: If the hand brake can no longer be adjusted, continue with disassembly of brake and install new brake lining.
5. In the event of damage to bearing cap, brake lever or brake shaft, replace **all** the three above named parts against new parts on rope winches No. 428.0115/05753 (approx. June 1964).
Fig. 56-1/1.
6. Unscrew cover of brake drum.

Note: Use new gasket! Watch out for drive pins (2 each).
7. Remove locking ring 20×2.5 from brake shaft. Fig. 56-1/2.
8. Remove drive wedge with set pin from brake shaft. Fig. 56-1/3.
9. Pull brake drum. For this purpose, install 2 hex. bolts M 8 in brake drum.
Fig. 56-1/4.
10. Unscrew flange on bearing plate.

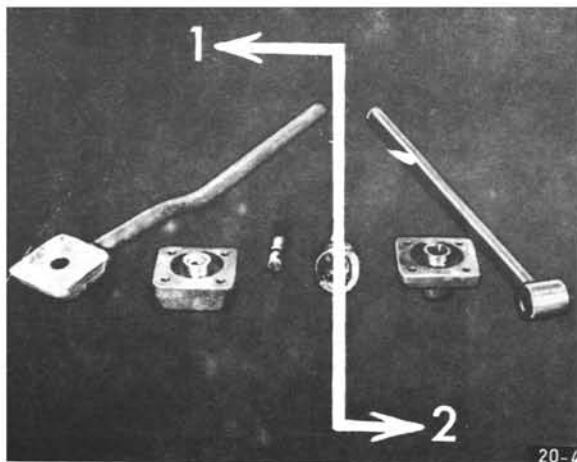


Fig. 56-1/1

- 1 new type
- 2 previous type

11. Remove bearing plate. Watch out for wedge; simultaneously remove rope guide.

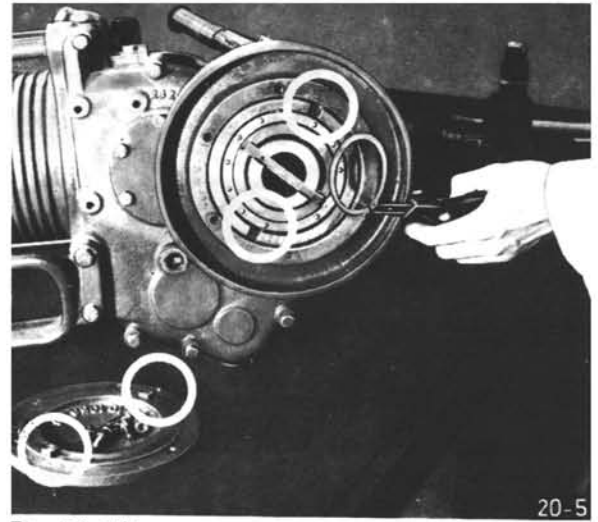


Fig. 56-1/2



Fig. 56-1/3

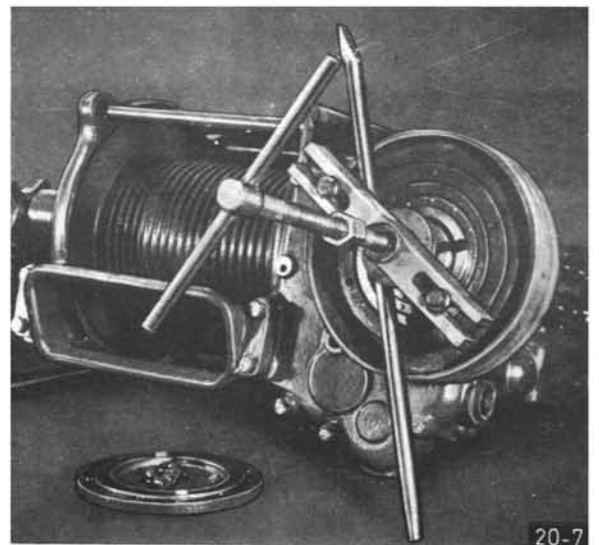


Fig. 56-1/4

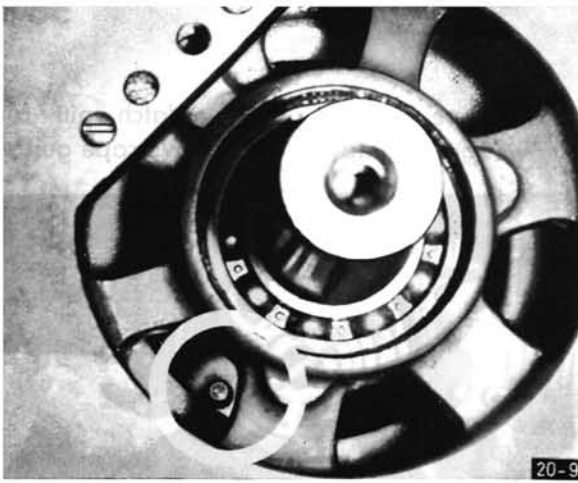


Fig. 56-1/5

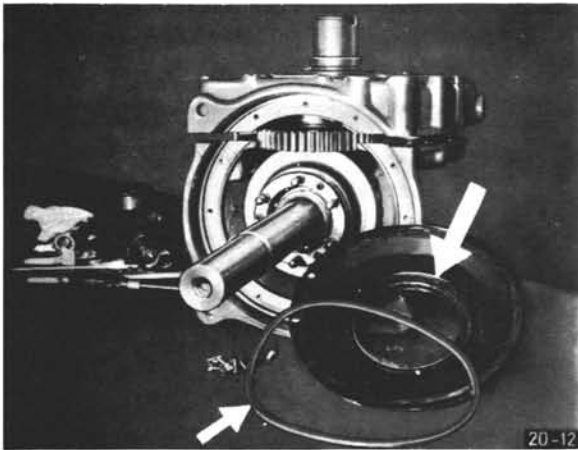


Fig. 56-1/6

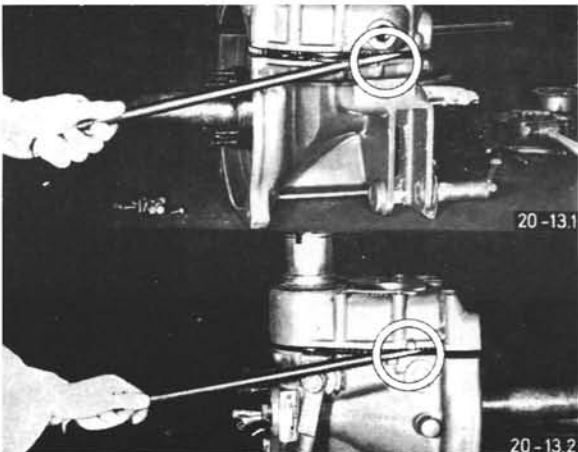


Fig. 56-1/7

12. Loosen rope drum on connecting flange for taper wheel. Fig. 56-1/5.

13. Remove rope drum by means of hex. bolts M 12. Watch the three released set pins.

Note: If rope drums of an older design are not yet provided with tapped holes for applying puller, proceed **carefully** during removal.

14. Pull radial ball bearing from drum.

15. Remove cover after loosening the 12 cheesehead screws.

16. Remove rubber seal and sealing ring. Fig. 56-1/6.

Note: Fill sealing lips of sealing ring with grease.

17. Remove all fastening screws (10 each) on freed housing cover and remove cover. Watch out for the two cyl. pins. Fig. 56-1/7.

Note: When removing the housing cover, the brake shaft together with the pinion and counter bearing is also pulled out.

In addition, the double gear wheel with shaft and needle bearing in the cover will be released.

To continue with the disassembly in the event of a damaged pinion, remove locking ring behind counter bearing and push brake shaft out in forward direction. During reassembly, be particularly careful of the sealing rings and be sure that the locking ring engages. Pinion with ring gear end toward brake shaft.

Fig. 56-1/8.

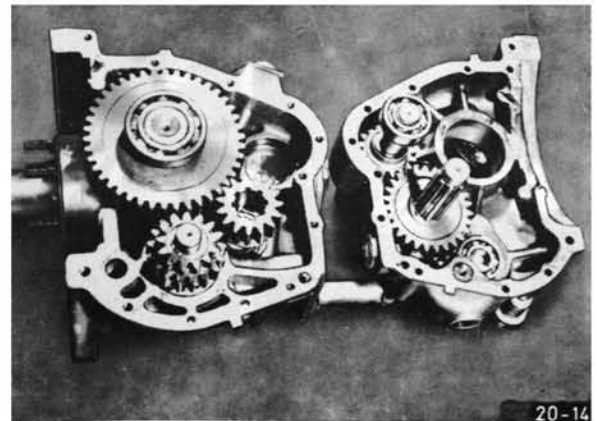


Fig. 56-1/8

18 Pull double gear with shaft and needle bearing out of cover. Fig. 56-1/9.

19 Remove locking ring on drive shaft and force-out pinion with running wheel and needle bearing.

20 Force-out drive V-shaft toward drive end.

Note: This will free the sealing ring and the radial ball bearing.

21 Force-out control shaft with spur gear.

22 Remove exposed sliding control gear with slide piece. Fig. 56-1/10.

23 Remove both radial ball bearings in drive housing and cover.

24 Force-out double pinion. Fig. 56-1/11.

Note: Small spacing ring and large compensating washer from housing cover.

Note: Backlash between double pinion and pinion cable drum is 0.1–0.3 mm. This backlash is attained by adding large and pertinently small compensating washers on both shafts of pinion.

26 Knock-out set pin at control lever top.

27 Remove control lever.

28 Strike set pin at control claw.

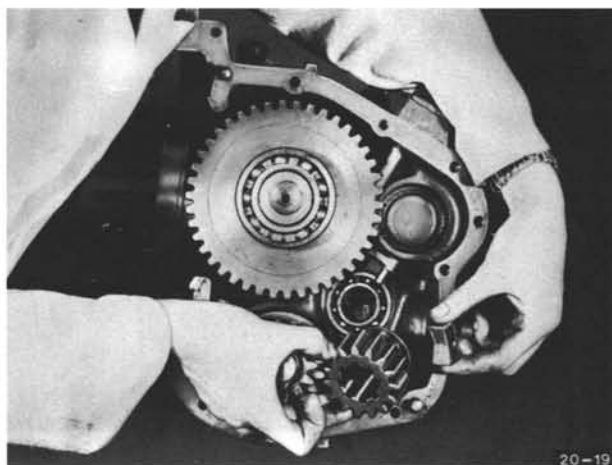


Fig. 56-1/10

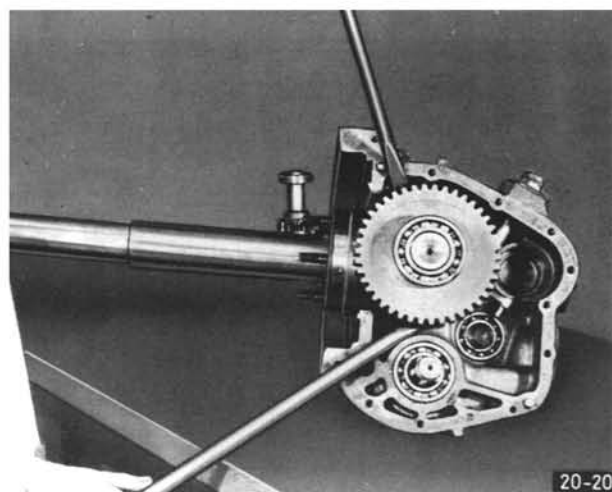


Fig. 56-1/11

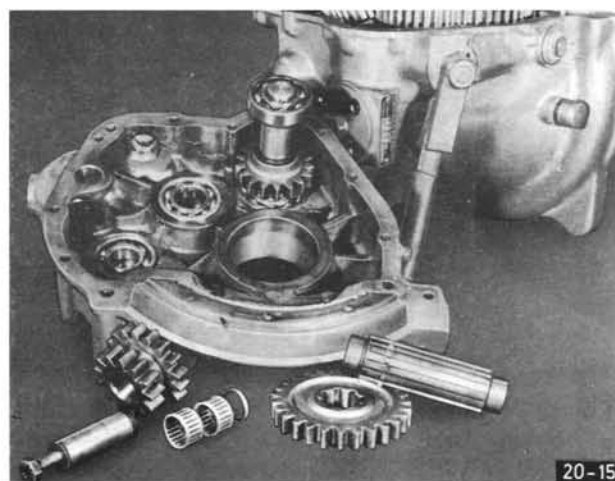


Fig. 56-1/9

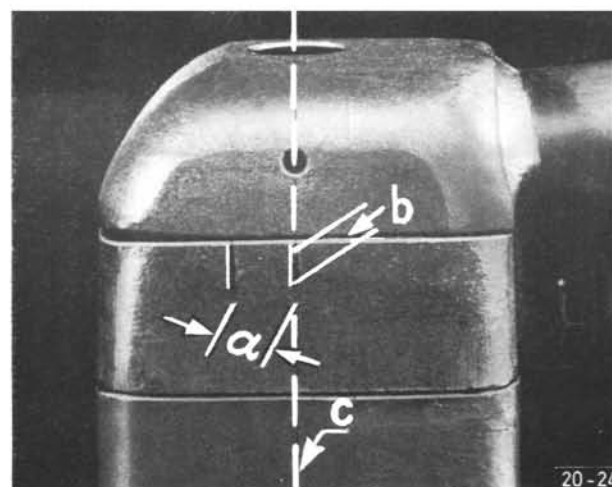


Fig. 56-1/12

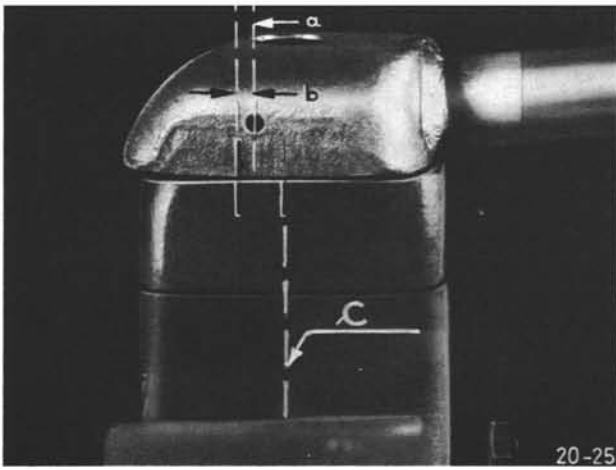


Fig. 56-1/13

- c Center of housing
- a Center of housing cover, dimension b 1.4 mm ± 5

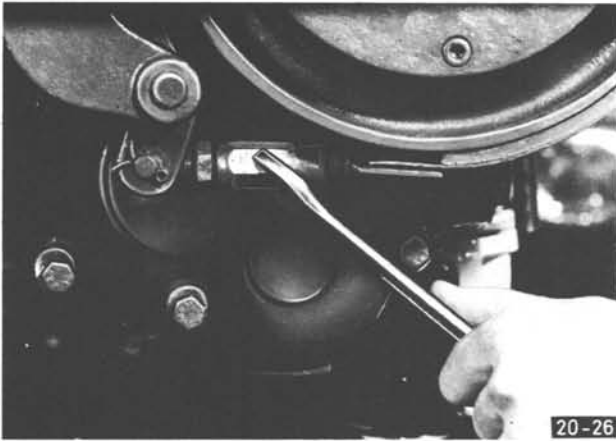


Fig. 56-1/14

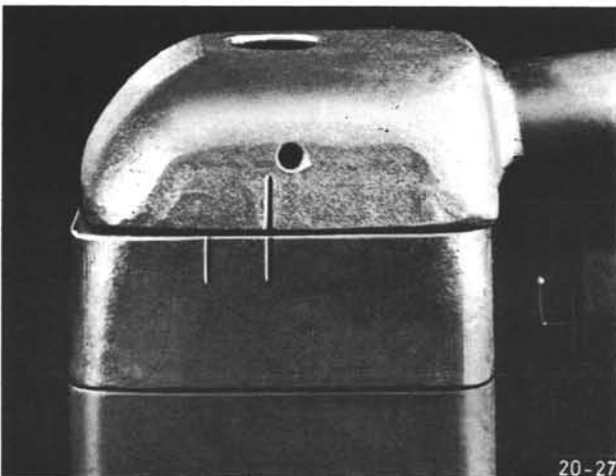


Fig. 56-1/15

- 29 Pull-off control claw.

- 30 Remove detent plate after loosening the two fastening screws.

Note: Watch out for released set pin!

- 31 Pull-out control shaft.

- 32 For assembly proceed vice versa.

II. Adjustment of Cable Brake

- 33 Turn brake lever counter-clockwise up to stop. Punch-in two notches at connection between bearing caps.

Fig. 56-1/12.

- 34 Put another notch on brake lever, 6 mm high, distance from notch in center 1.4 mm ± 5 (radius).

Fig. 56-1/13.

- 35 Tension spring with turnbuckle nut until thrust point (begin of brake release) and markings acc. to Fig. 56-1/13 are in alignment.

Fig. 56-1/14.

- 36 If the brake lining is worn down to the extent that the thrust point (begin of brake release) and the mark acc. to Fig. 56-1/15 are in alignment, the spring must be newly tensioned acc. to Fig. 56-1/14.

- 37 Add oil (approx. 1.5 liters).

Fig. 56-1/16

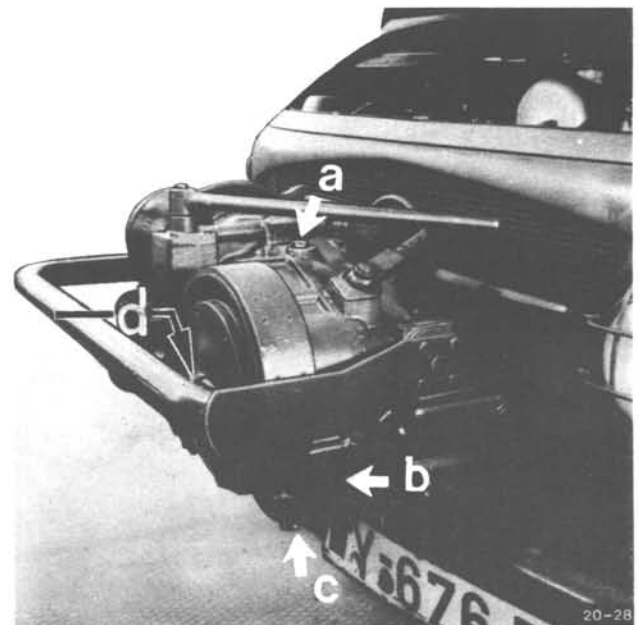


Fig. 56-1/16

- a = Oil filler plug
- b = Sight glass oil level mark
- c = Oil drain plug
- d = here, add 0.1 lits of oil (Shell Donax A 1)

Tightening Torques in kpm

Fastening nut of fitted bolt on universal joint of steering	M 8	2.5
Fastening bolt of cab attachment rear	M 14 x 1.5–8.8	14
Fastening nuts of cab attachment front	M 10	4.7

Special Tools

404 580 00 51 00 Raising device

Scope:

Prior to starting work, check whether raising device is available. Fig. 1.

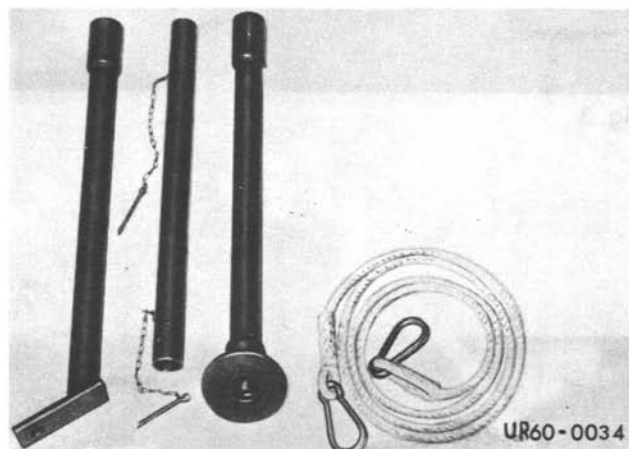


Fig. 1 Raising device 404 580 00 51 00

1 Place chocks in front of and behind rear wheels to protect UNIMOG against moving-off.

2 Remove front-mounted attachments. The mounting brackets for front-mounted attachments may remain on frame side members.

3 Remove front engine hood.

4 Force housing lower half of cable guide roller of hand brake out of leaf spring in downward direction. Fig. 2.

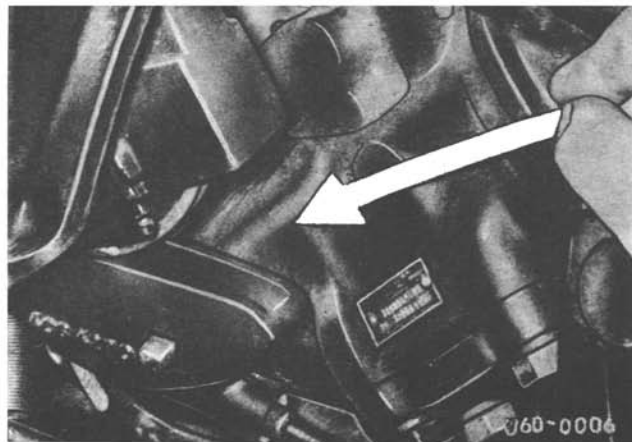


Fig. 2

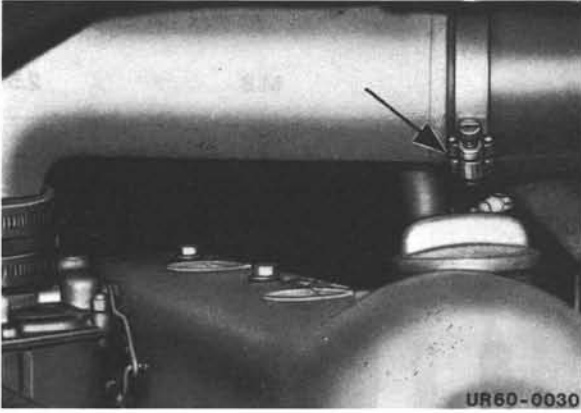


Fig. 3

5 Loosen fastening clip of air intake pipe on double connection. Fig. 3.

6 Unscrew fastening nut of fitted screw on universal joint (steering end) and remove fitted screw. Fig. 4.

7 Pull universal joint out of splining of steering worm and pull-out by applying light hand blows against steering wheel from below.

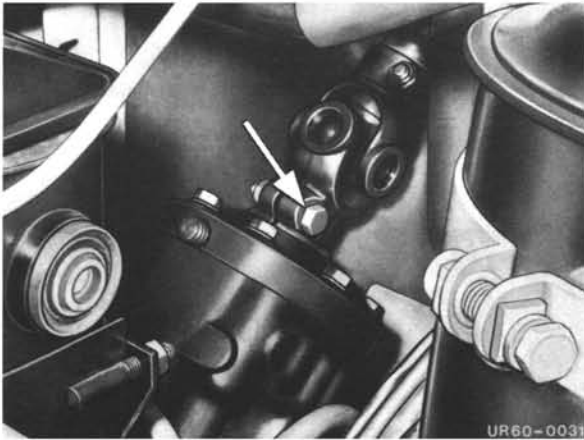


Fig. 4

8 Loosen fastening nuts of cab attachment front. Fig. 5.

9 Loosen spare wheel and remove from UNI-MOG. Fig. 6.

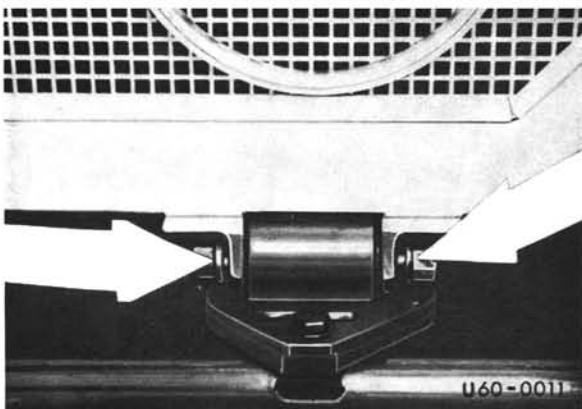


Fig. 5



Fig. 6

10 Remove camouflage net bracket (if installed). For this purpose, loosen screws on pipe linkage left and right and remove bracket.

11 Loosen fastening bolts of cab attachment rear and screw-out. Fig. 7.

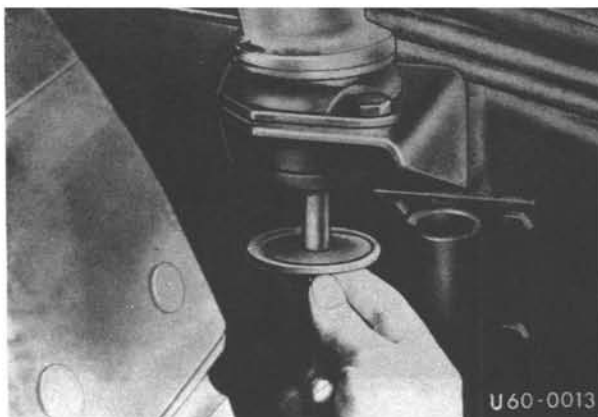


Fig. 7

12 Completely loosen pawl rod of hand brake. Fig. 8.



Fig. 8

13 Open latch of transmission cover in cab. Fig. 9.

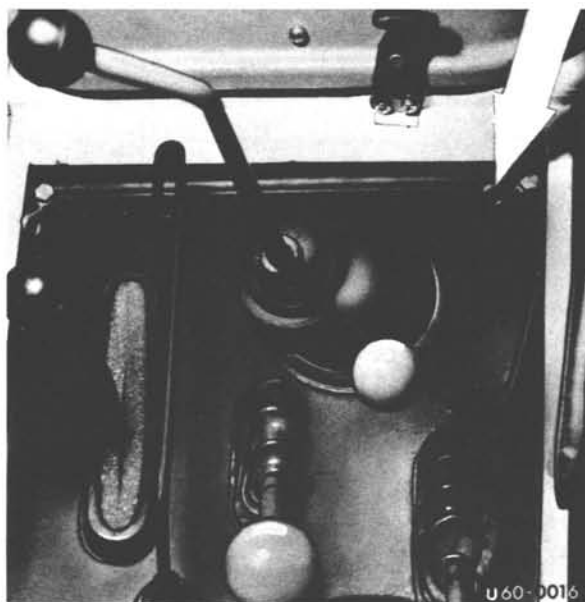


Fig. 9

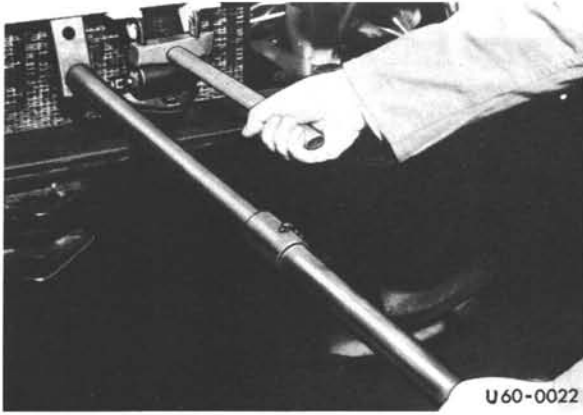


Fig. 10

14 Attach cable of raising device and safety rope at top in eye of cab rear wall. Also attach safety rope below at entrance. Fig. 13.

15 Raise cab at front with support until a wooden block (40 mm high) or, in an emergency, a hammer can be introduced in-between the front cab mount and holder. Fig. 10.

Note: Make sure that the radiator fins are not damaged when raising the cab.

16 Unscrew fastening bolts on cab support left and right and swing support in downward direction. If required, keep raising cab and screw support back on frame side member left and right using the same fastening bolts. Fig. 11.

17 Raise cab with raising device, until cab arrives at tilting point and safety rope is tensioned. Fig. 12.

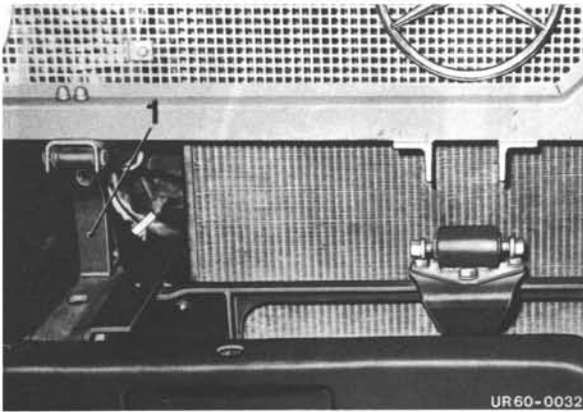


Fig. 11

1 Cab support front

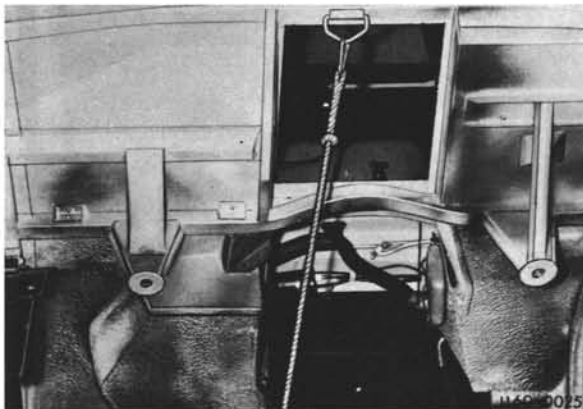


Fig. 12

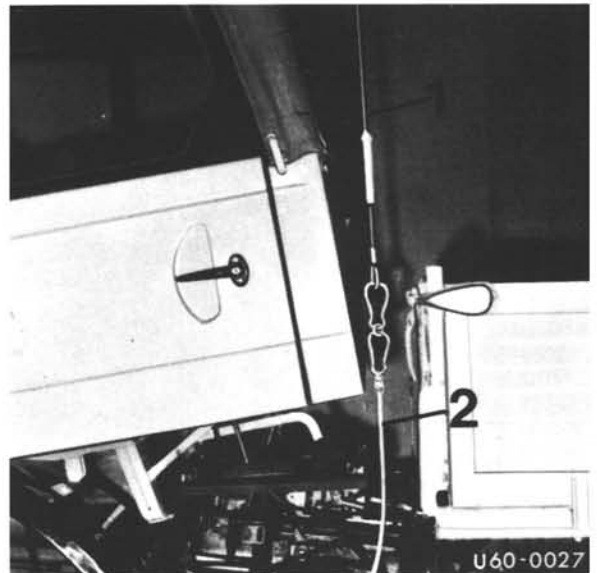


Fig. 13

1 Rope of raising device
2 Safety rope

60-1 Raising the Cab

18 Attach three-piece support of raising device with fastening bolts to cab supporting bearing rear left and to holder of frame side member. Fig. 14.

19 Lower cab in vice versa sequence while observing the following instructions:

Re Item 4 Push housing lower half of rope guide roller upwards after lowering cab until leaf spring engages.

Re Item 7 To introduce universal joint into splining of steering worm, move front axle into center position. The spokes of the steering wheel should point horizontally toward driving direction upon introduction. Change position of universal joint, if required.

Re Item 16 Upon lowering, swivel the two supports in upward direction first and then attach again to cab left and right.

Re Item 17 When lowering cab, make sure that the main shift lever is fully in idle position and that the radiator fins are not damaged.

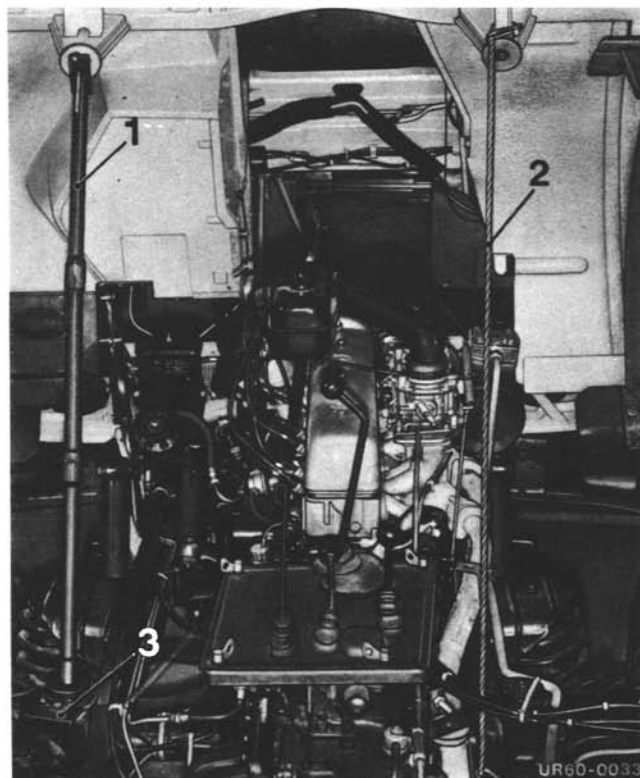


Fig. 14

- 1 Three-piece cab support
- 2 Safety rope
- 3 Lefthand, rear cab mount

1. Protect vehicle against moving off (chocks).
2. Disconnect vehicle batteries.
3. Drain cooling fluid.
 - a) Open drain plug on water container of preheater system of installed heater. Fig. 60-2/1.
 - b) Open drain plug at bottom of front cooling fluid line. Fig. 60-2/2.
 - c) Open drain valve on heater pipe left bottom. Fig. 60-2/3.
 - d) Open drain plug or valve on engine block left. (On more recent engines at the right.) Fig. 60-2/4.
4. Remove top (open cab).
5. Remove doors; first release grounding straps (open cab).
 - a) With fixed cab, open doors.
6. Remove windshield (open cab). Remove spare wheel.
7. Remove both seats.
8. Remove engine panelling inside.
9. Remove pedal plate and lateral cover plate.
10. Loosen handle of fuel changeover valve on joint. Fig. 60-2/5, Item 1.
11. Disconnect hand brake lever on brake cable compensation.
12. Unscrew oil pressure measuring line on oil filter. Fig. 60-2/5, Item 2.

13. Force gas linkage from ball heads on accelerator pedal and on intermediate lever shaft.



Fig. 60-2/1



Fig. 60-2/2

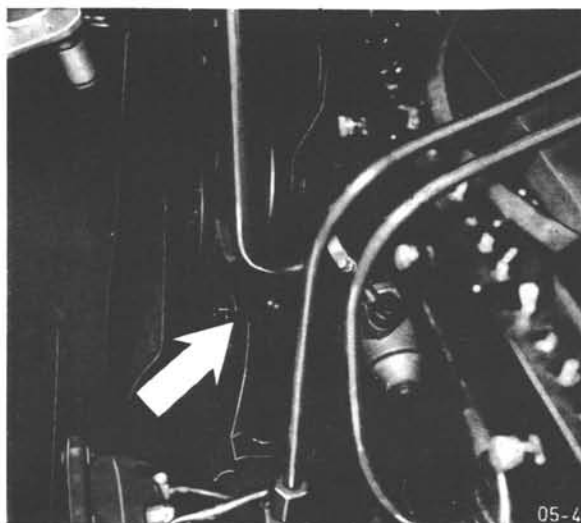


Fig. 60-2/3

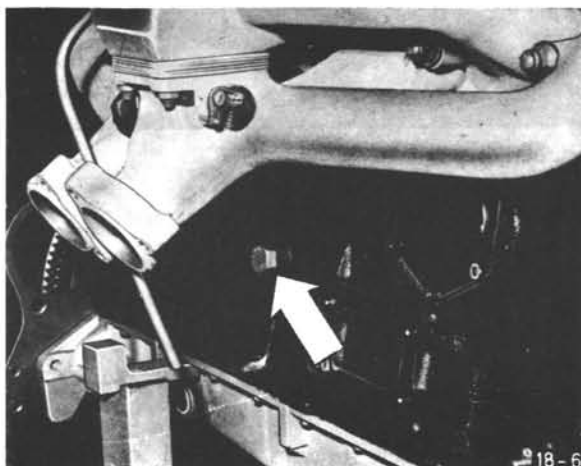


Fig. 60-2/4

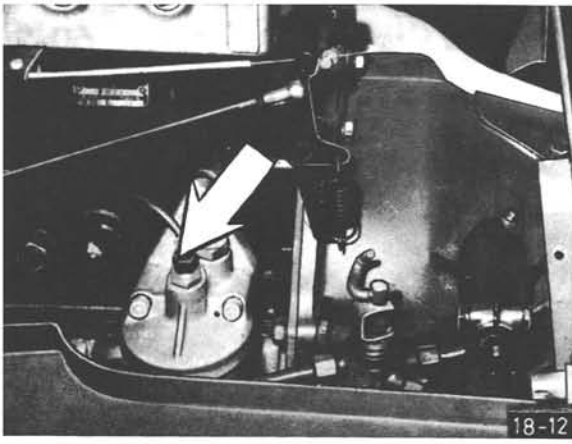


Fig. 60-2/5

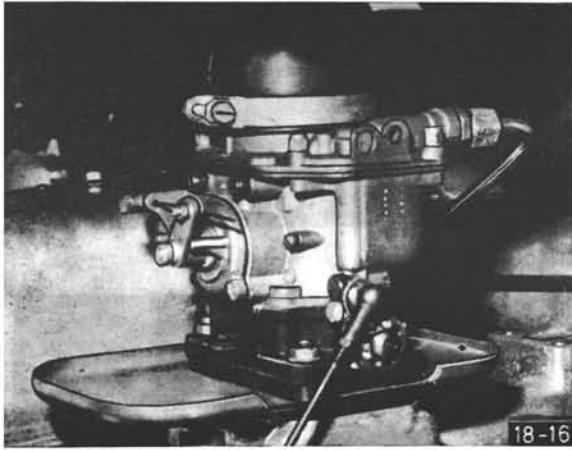


Fig. 60-2/6

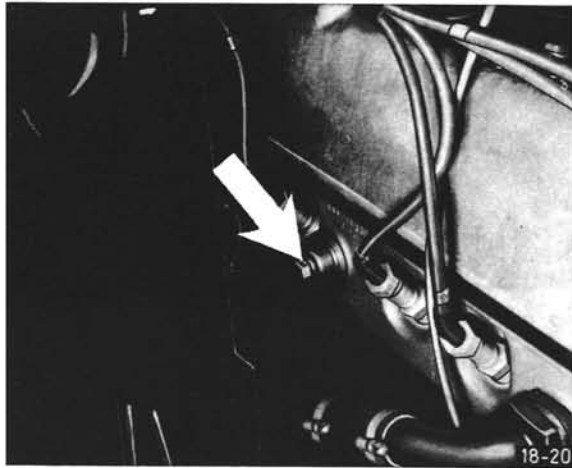


Fig. 60-2/7

14. Remove lever seal on transmission and hand lever assembly.
15. Release cable control on carburetor connection. Fig. 60-2/6, Item 1.
16. Loosen rubber boot of intake line from carburetor. Fig. 60-2/6, Item 2.
17. Loosen hand throttle control on pedal lever shaft.

18. Unscrew holder of hand throttle control on crankcase.
19. Disconnect electric lines from starter.

Note: Cable black on terminal 30.
Cable red on terminal 50.
20. Unscrew connection of cooling fluid thermometer on cylinder head. Fig. 60-2/7.
21. Loosen hand brake valve on steering column, both lines on top and below, and remove if applicable. Remove hand brake valve, if applicable. Fig. 60-2/8.
22. Remove signal button (horn).
23. Remove steering wheel. Refer to Job No. 46-1.
24. Remove wheel position indicator (if applicable).

Note: Pin in steering wheel should fit into teeth of wheel position indicator in center position with the wheels in straight ahead position.
25. Remove frame cable assembly on fuse boxes and terminal boards. Loosen pipe clamps.
26. Loosen generator cable on generator.

Note: On vehicles with van body, if applicable, disconnect + cable on supplementary regulator, terminal 87. Fig. 60-2/9.
27. Remove both heater lines on radiator block.
28. Remove short circuit line radiator-cooling fluid compensating tank.

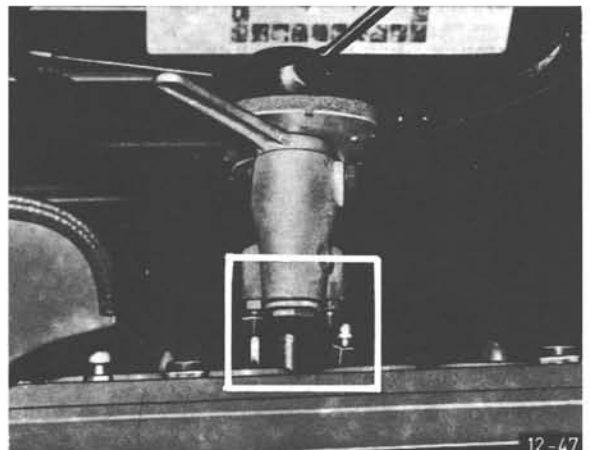


Fig. 60-2/8

29. On vehicles with automatic crankcase breather, remove breather hose on cylinder head cover.
30. Loosen cooling fluid line on cooling fluid compensating tank, radiator and on bottom water pipe.

Note: Remove Norma hose clamp on radiator completely.

31. Unscrew speedometer shaft on speedometer.

Note: For this purpose, pull out speedometer light and loosen pipe clamp.

32. Loosen lines to double air pressure gauge on connections.
33. Remove horn with holder from steering.
34. Remove camouflage headlights, if installed, and suspend on electric line freely hanging downwards.
35. Remove radiator. Refer to Job No. 50-1.
36. Remove outside current socket on holder (if applicable).
Fig. 60-2/10.

37. Battery main switch, loosen both grounding connections. Fig. 60-2/11.

Note: On vehicles with fan body, if applicable, also loosen electric line for current supply. Fig. 60-2/9.

38. Remove steering. Refer to Job No. 46-1.
39. Remove ignition distributor line from terminal 1 on ignition coil and high-voltage cable on ignition coil.
40. Loosen connection for air compressor intake line (if appl.).

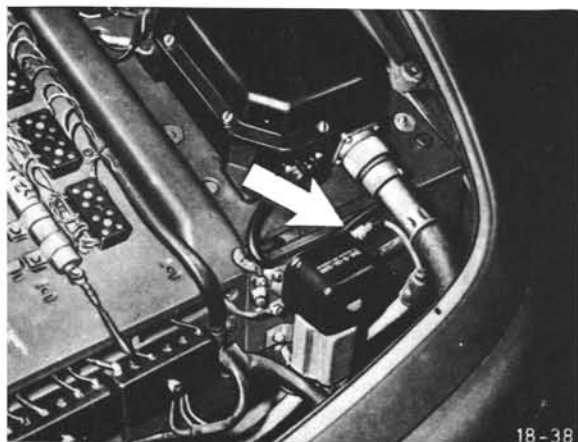


Fig. 60-2/9

41. Loosen cab on frame attachment points:
 - a) One attachment at front center.
 - b) One attachment each at rear left and right.
42. Attach hoist:
 - a) Open cab. (Fig. 60-2/12).
 - b) Closed cab. (Fig. 60-2/13).

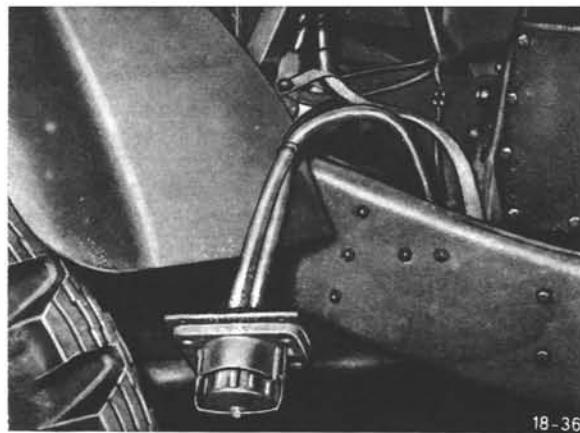


Fig. 60-2/10

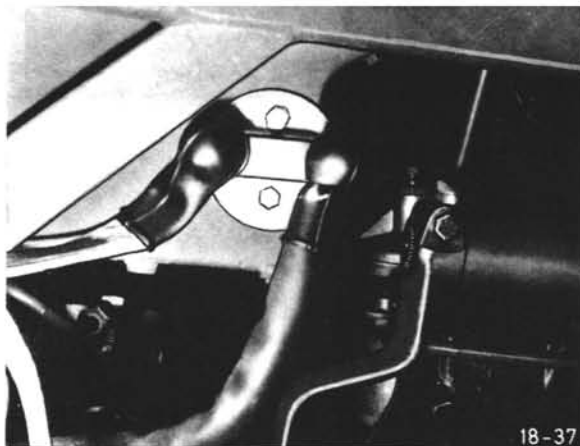


Fig. 60-2/11

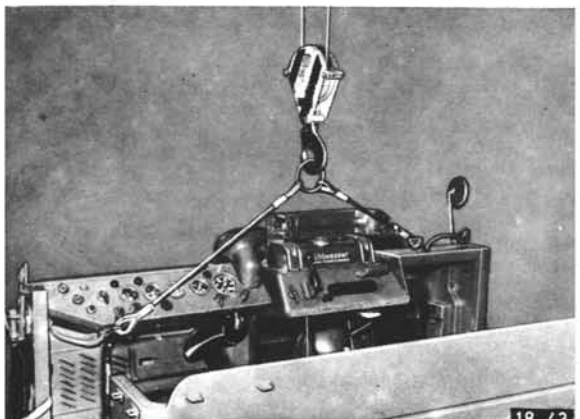


Fig. 60-2/12



Fig. 60-2/13

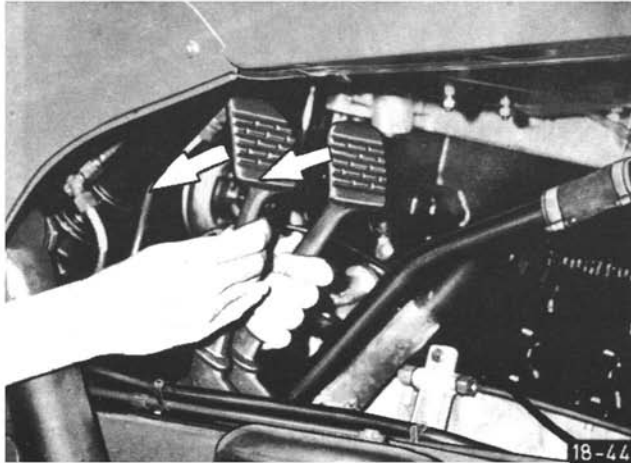


Fig. 60-2/14

43. Lift cab **slowly** and check whether all connections are released. In particular, cable connections to pto. drives and to pto. shaft engaging lever, as well as to supplementary fuel pump.
 44. Pull hand brake, engage all-wheel drive. Shift main shift lever 2nd or 4th gear, changeover lever for forward and reverse to the rear. Disengage pto. shaft lever.
 45. Lift cab.
- Note:** With one man pushing clutch and brake pedal down from radiator end.
Fig. 60-2/14.
46. For reassembly proceed vice versa.

1. Protect vehicle against moving off (chocks).
2. Shift battery main switch under driver's seat to "Off". Fig. 60-4/1.
3. Remove wireless battery, if installed. First loosen lock. Fig. 60-4/2.
4. Remove spare wheel.
5. Remove all antennas (if still erected).
6. Disconnect power supply for van.
 - a) Disconnect + cable on regulator switch in engine compartment (terminal 87). Fig. 60-2/9.
 - b) Disconnect - cable on battery main switch. Fig. 60-2/11.

Note: Both cables are removed together with fan.

7. Unscrew supply line for CRC selector switch in FM van. Fig. 60-4/3.
8. Disconnect voice communication between van and cab and pull back into cab.
9. Pull out two bolts each at front and rear on bottom edge of van body for attaching hoist.

Note: Remove locks on bolts.

10. Attach hoist and raise to **slight** tension. Fig. 60-4/4.
11. Disconnect electric line for tail light and camouflage circuit on individual equipment.
12. Loosen fan attachment on frame.

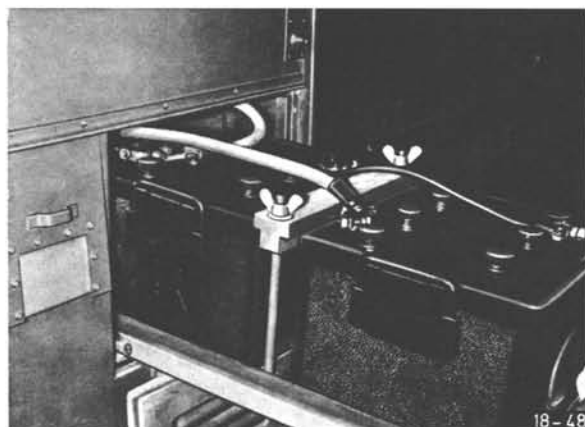


Fig. 60-4/2

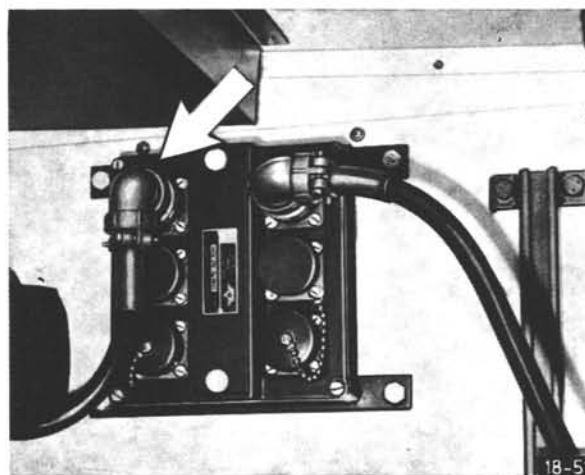


Fig. 60-4/3

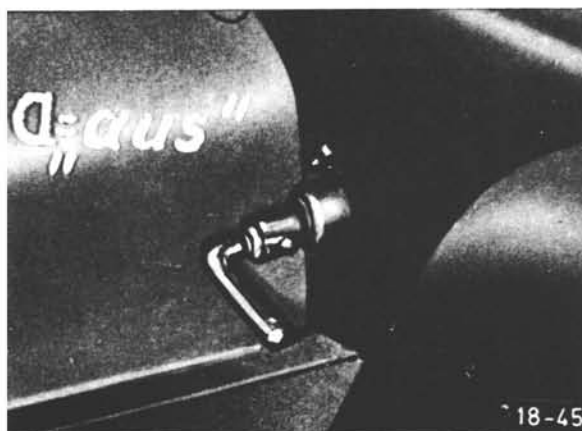


Fig. 60-4/1

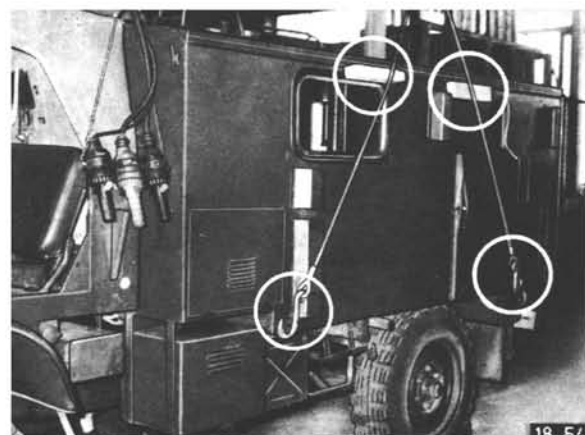


Fig. 60-4/4

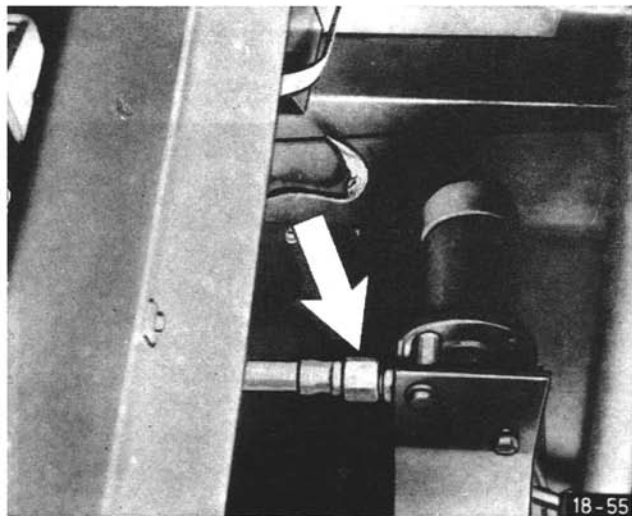


Fig. 60-4/5

13. Loosen grounding cable for radio battery on frame.
14. Loosen grounding strap from body on frame.
15. Loosen fuel line for van heater on fuel pump.
Fig. 60-4/5.
16. Carefully lift van body and place on previously prepared stands.
Note: Do not place on ground, since damage to bottom of van will then be unavoidable.
17. For reinstallation proceed vice versa.

A perfect lighting system is absolutely necessary for driving a vehicle safely in the dark. The lighting system is subject to pertinent Highway Codes and should be checked acc. to regular intervals.

The license plates must be cleaned and adequately lighted.

The reflector of the headlamp insert is highly sensitive and should not be touched in any way. Replace defective headlamp lenses immediately.

Any dust entered through a defective headlamp lens must be wiped off immediately with a very soft hair brush wiping from inside out.

A. Replacement of Headlamps and Bulbs

1. Set ignition key or light switch to zero, pull out ignition key.
2. Loosen screw on protective grille. Swivel grille outwards and remove.
3. Loosen fastening screw on cover ring of headlamps. Tilt headlamp insert slightly, disconnect and remove. Fig. 82-1/1.
4. Loosen socket plate (rubber cap) by a quick turn to the left and remove.
5. Push bulb slightly against socket, turn to the left and pull out of Renk socket.
6. Loosen cable connection (bayonet lock) and remove rubber cap together with socket plate. Fig. 82-1/3.
7. Pull cable assembly out of headlamp in downward direction.
8. Loosen fastening screw (clamping screw) on headlamp base and pull headlamp housing out in upward direction.
9. For reinstallation proceed vice versa.
10. Adjust (aim) headlamps.



Fig. 82-1/1



Fig. 82-1/2

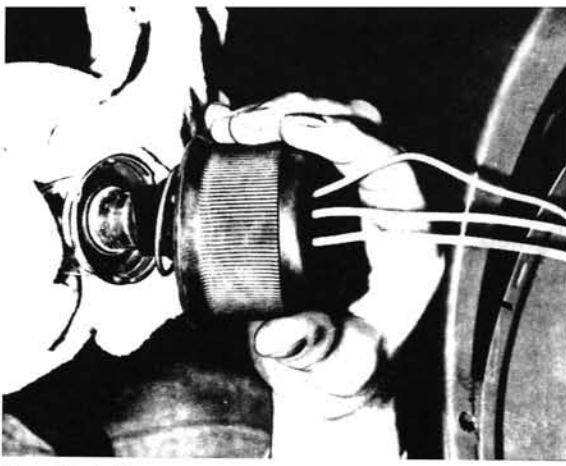


Fig. 82-1/3

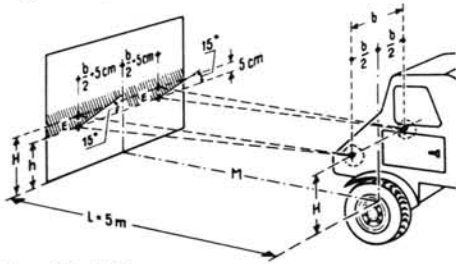


Fig. 82-1/4

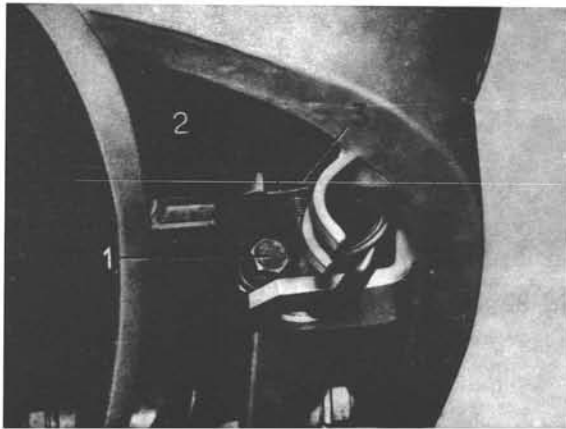


Fig. 82-1/5

- 1 Fastening screw
- 2 Angle spanner
- 3 Locking nut

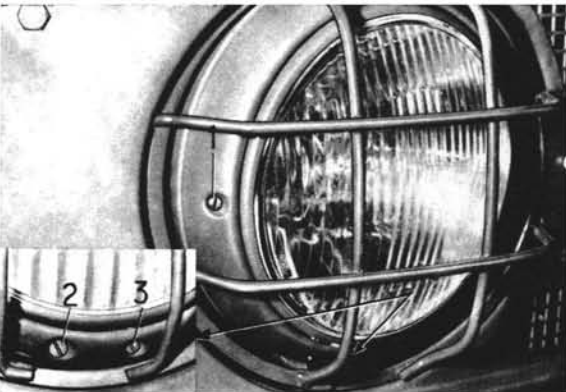


Fig. 82-1/6

- 1 Vertical adjustment
- 2 Fastening screw
- 3 Horizontal adjustment

Note:

- a) Insert socket plate into reflector with feel. First fold rubber cap back so that the lamp socket projects freely in forward direction. Fig. 82-1/2 and 82-1/3. The small, embossed nose of the socket plate is then inserted into the recess of the reflector. Align nose of rubber cap to arrow on outside of reflector. Push rubber cap down and turn quickly to the right. Do not use excessive force. Fig. 82-1/1.
- b) When replacing a bulb, do not work with dirty or oily fingers, since the heat of the bulb will evaporate the oil and the vapor will settle on the headlamp reflector, which will then reduce the light intensity of the headlamps considerably.

B. Adjustment of Headlamp

1. Place the normally loaded vehicle for testing on level ground approx. 5 meters (16 ft.) from adjusting board, which is mounted in vertical relation to center of vehicle. Fig. 82-1/4.
2. Place focusing crosses "E" on adjusting board or on a wall at height "H" and at a horizontal distance of "b + 10 cm" to indicate the center of the light beam.

"H" is the distance of the centers of the headlamp lenses above the ground.

"b" is the horizontal distance of the headlamp centers. On the adjusting board, the horizontal distance of the crosses from each other must be 10 cm larger than the distance "b".

3. Adjustment of high beam:

After switching on the high beam, align the headlamps in such a manner that each light spot is in alignment with the respective focusing cross.

Check each headlamp individually, while covering the second headlamp and the remaining lights.

Wrongly aimed headlamps must be readjusted.

(Ball adjustment on support below.)

Fig. 82-1/5.

4. Adjustment of Low Beam (Dimmer):

a) Symmetrical Light

Draw an adjusting line 5 cm under height of headlamp center on adjusting board or wall to indicate the border line between bright and dark to be aimed at.

Switch on low beam and check whether border line between bright and dark on the adjusting board or wall is below the adjusting line or, at the most, in alignment. If not, readjust headlamps.

Here again, check each headlamp individually and cover headlamp not checked.

Vertical and horizontal adjustments are made by means of slotted screws at edge of headlamp. Fig. 82-1/6.

b) Asymmetric Light

Lateral adjustment: The intersection between the lefthand, as much as possible horizontal portion of the border line between bright and dark and the righthand portion which rises to 15° should be at the vertical line passing through the focusing crosses. The intersection is more clearly shown by covering and uncovering the left side of the lens several times with the hand.

Vertical adjustment: The border line between bright and dark should touch the separating line of the test surface at the left of the bottom focusing cross. In a properly positioned border line between bright and dark of the low beam the center of the high beam should be directed against the upper focusing cross.

Note: The term border line between bright and dark indicates the zone of the light beam where the transition from the upper, dark portion of the low beam to the lower, bright portion is the most distinctive.

C. Replacement of Front Blinker and Clearance Light

1. Set ignition key or light switch to zero, pull out ignition key.
2. Loosen two countersunk screws on clearance light and remove framing. Fig. 82-1/7.
3. Remove blinker or/and clearance light.

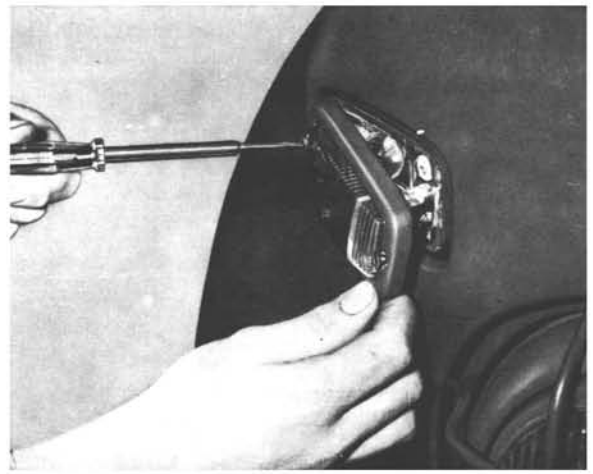


Fig. 82-1/7

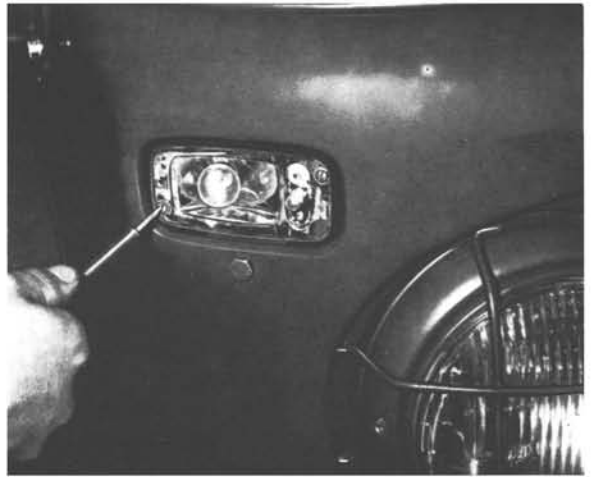


Fig. 82-1/8

4. Loosen two cheesehead screws and remove reflector. Fig. 82-1/8.
5. Pull cable out toward the rear through rubber sleeve.
6. Loosen fastening screw from clearance lamp housing and remove housing.
7. For reassembly proceed vice versa.

D. Tail Lights

Regulations applicable to Germany with regard to tail lights are as follows:




License plate light	white
Stop light	orange or red
Blinker	yellow
Tail light	red

For replacements, use only bulbs of specified watt number.

TORQUE SPECIFICATIONS

STANDARD BOLTS

The torque values given in the following table should be applied when a particular torque is not specified.

		kg-m (ft. lbs.)		
Bolt identification				
	4 T (Low carbon steel)	7 T (High carbon steel)	9 T (Alloy steel)	
Bolt diameter x pitch (mm)				
M 6 x 1.0	0.4 — 0.8 (3 — 6)	0.5 — 1.0 (4 — 7)	—	
M 8 x 1.25	0.8 — 1.8 (6 — 13)	1.2 — 2.3 (9 — 17)	1.7 — 3.1 (12 — 22)	
M10 x 1.25	2.1 — 3.5 (15 — 25)	2.8 — 4.7 (20 — 34)	3.8 — 6.4 (27 — 46)	
*M10 x 1.5	2.0 — 3.4 (14 — 25)	2.8 — 4.6 (20 — 33)	3.7 — 6.1 (27 — 44)	
M12 x 1.25	5.0 — 7.5 (36 — 54)	6.2 — 9.3 (45 — 67)	7.7 — 11.6 (56 — 84)	
*M12 x 1.75	4.6 — 7.0 (33 — 51)	5.8 — 8.6 (42 — 62)	7.3 — 10.9 (53 — 79)	
M14 x 1.5	7.8 — 11.7 (56 — 85)	9.5 — 14.2 (69 — 103)	11.6 — 17.4 (84 — 126)	
*M14 x 2.0	7.3 — 10.9 (53 — 79)	9.0 — 13.4 (65 — 97)	10.9 — 16.3 (79 — 118)	
M16 x 1.5	10.6 — 16.0 (77 — 116)	13.8 — 20.8 (100 — 150)	16.3 — 24.5 (118 — 177)	
*M16 x 2.0	10.2 — 15.2 (74 — 110)	13.2 — 19.8 (95 — 143)	15.6 — 23.4 (113 — 169)	
M18 x 1.5	15.4 — 23.0 (111 — 166)	19.9 — 29.9 (144 — 216)	23.4 — 35.2 (169 — 255)	
M20 x 1.5	21.0 — 31.6 (152 — 229)	27.5 — 41.3 (199 — 299)	32.3 — 48.5 (234 — 351)	
M22 x 1.5	25.6 — 42.2 (185 — 305)	37.0 — 55.5 (268 — 401)	43.3 — 64.9 (313 — 469)	
M24 x 2.0	36.6 — 55.0 (265 — 398)	43.9 — 72.5 (318 — 524)	56.5 — 84.7 (409 — 613)	

An asterisk * indicates that the bolts are used for female-threaded parts made of soft materials, such as casting.

NOTE: Torque values are intended for NEW bolts. Used bolts should be discarded and not be reused.

METRIC CONVERSION FACTORS

(Symbols of SI units, multiples and submultiples are given in parentheses in the right-hand column)

Multiply	By	To Obtain
LENGTH		
centimeter	0.03280840	foot
centimeter	0.3937008	inch
fathom	1.8288*	meter (m)
foot	0.3048*	meter (m)
foot	30.48*	centimeter (cm)
foot	304.8*	millimeter (mm)
inch	0.0254*	meter (m)
inch	2.54*	centimeter (cm)
inch	25.4*	millimeter (mm)
kilometer	0.6213712	mile [U.S. statute]
meter	39.37008	inch
meter	0.5468066	fathom
meter	3.280840	foot
meter	0.1988388	yard
meter	1.093613	rod
meter	0.0006213712	mile [U.S. statute]
microinch	0.0254*	micrometer
micrometer	39.37008	microinch
mile (U.S. statue)	1609.344*	meter (m)
mile (U.S. statue)	1.609344*	kilometer (km)
millimeter	0.003280840	foot
millimeter	0.03937008	inch
rod	5.0292*	meter (m)
yard	0.9144*	meter (m)
AREA		
acre	4046.856	meter ² (m ²)
acre	0.4046856	hectare
centimeter ²	0.1550003	inch ²
centimeter ²	0.001076391	foot ²
foot ²	0.09290304*	meter ² (m ²)
foot ²	929.0304*	centimeter ² (cm ²)
foot ²	92,903.04*	millimeter ² (mm ²)
hectare	2.471054	acre
inch ²	645.16*	millimeter ² (mm ²)
inch ²	6.4516*	centimeter ² (cm ²)
inch ²	0.00064516*	meter ² (m ²)
meter ²	1550.003	inch ²
meter ²	10.763910	foot ²
meter ²	1.195990	yard ²
meter ²	0.0002471054	acre
millimeter ²	0.00001076391	foot ²
millimeter ²	0.001550003	inch ²
yard ²	0.8361274	meter ² (m ²)

* Where an asterisk is shown, the figure is exact.

METRIC CONVERSION FACTORS

(Symbols of SI units, multiples and submultiples are given in parentheses in the right-hand column)

Multiply	By	To Obtain
VOLUME (including CAPACITY)		
Centimeter ³	0.06102376	Inch ³
Foot ³	0.02831685	Meter ³ (m ³)
Foot ³	28.31685	Liter
Gallon [U.K. liquid]	0.004546092	Meter ³ (m ³)
Gallon [U.K. liquid]	4.546092	Liter
Gallon [U.S. liquid]	0.003785412	Meter ³ (m ³)
Gallon [U.S. liquid]	3.785412	Liter
Inch ³	16,387.06	Millimeter ³ (mm ³)
Inch ³	16.38706	Centimeter ³ (cm ³)
Inch ³	0.00001638706	Meter ³ (m ³)
Liter	0.001*	Meter ³ (m ³)
Liter	0.2199692	Gallon [U.K. liquid]
Liter	0.2641720	Gallon [U.S. liquid]
Liter	0.03531466	Foot ³
Meter ³	219.9692	Gallon [U.K. liquid]
Meter ³	264.1720	Gallon [U.S. liquid]
Meter ³	35.31466	Foot ³
Meter ³	1.307951	Yard ³
Meter ³	1000. *	Liter
Meter ³	61,023.76	Inch ³
Millimeter ³	0.00006102376	Inch ³
Yard ³	0.7645549	Meter ³ (m ³)
VELOCITY, ACCELERATION, and FLOW		
Centimeter/second	1.968504	Foot/min.
Centimeter/second	0.03280840	Foot/sec.
Centimeter/minute	0.3937008	Inch/min.
Foot/hour	0.00008466667	Meter/sec. (m/s)
Foot/hour	0.00508*	Meter/min.
Foot/hour	0.3048*	Meter/hour
Foot/minute	0.508*	Centimeter/sec.
Foot/minute	18.288*	Meter/hour
Foot/minute	0.3048*	Meter/min.
Foot/minute	0.00508*	Meter/sec. (m/s)
Foot/second	30.48*	Centimeter/sec.
Foot/second	18.288*	Meter/min.
Foot/second	0.3048*	Meter/sec. (m/s)
Foot/second ²	0.3048*	Meter/sec. ² (m/s ²)
Foot ³ /minute	28.31685	Liter/min.
Foot ³ /minute	0.0004719474	Meter ³ /sec. (m ³ /s)
Gallon [U.S. liquid]/min.	0.003785412	Meter ³ /min.
Gallon [U.S. liquid]/min.	0.00006309020	Meter ³ /sec. (m ³ /s)
Gallon [U.S. liquid]/min.	0.06309020	Liter/sec.
Gallon [U.S. liquid]/min.	3.78412	Liter/min.
Gallon [U.K. liquid]/min.	0.004546092	Meter ³ /min.
Gallon [U.K. liquid]/min.	0.00007576820	Meter ³ /sec. (m ³ /s)
Inch/min.	25.4*	Millimeter/min.
Inch/min.	2.54*	Centimeter/min.
Inch/min.	0.0254*	Meter/min.
Inch/second ²	0.0254*	Meter/sec. ² (m/s ²)

* Where an asterisk is shown, the figure is exact.

METRIC CONVERSION FACTORS

(Symbols of SI units, multiples and submultiples are given in parentheses in the right-hand column)

Multiply	By	To Obtain
VELOCITY, ACCELERATION, & FLOW (<i>continued</i>)		
Kilometer/hour	0.6213712	Mile/hour [U.S. statute]
Liter/min.	0.03531466	Foot ³ /min.
Liter/min.	0.2641720	Gallon [U.S. liquid]/min.
Liter/sec.	15.85032	Gallon [U.S. liquid]/min.
Mile/hour	1.609344*	Kilometer/hour
Millimeter/min.	0.03937008	Inch/min.
Meter/sec.	11,811.02	Foot/hour
Meter/sec.	196.8504	Foot/min.
Meter/sec.	3.280840	Foot/sec.
Meter/sec. ²	3.280840	Foot/sec. ²
Meter/sec. ²	39.37008	Inch/sec. ²
Meter/min.	3.280840	Foot/min.
Meter/min.	0.05468067	Foot/sec.
Meter/min.	39.37008	Inch/min.
Meter/hour	3.280840	Foot/hour
Meter/hour	0.05468067	Foot/min.
Meter ³ /sec.	2118.880	Foot ³ /min.
Meter ³ /sec.	13,198.15	Gallon [U.K. liquid]/min.
Meter ³ /sec.	15,850.32	Gallon [U.S. liquid]/min.
Meter ³ /min.	219.9692	Gallon [U.K. liquid]/min.
Meter ³ /min.	264.1720	Gallon [U.S. liquid]/min.
MASS & DENSITY		
Grain [1/7000 lb avoirdupois]	0.06479891	Gram (g)
Gram	15.43236	Grain
Gram	0.001*	Kilogram (kg)
Gram	0.03527397	Ounce [avoirdupois]
Gram	0.03215074	Ounce [troy]
Gram/centimeter ³	0.03612730	Pound/inch ³
Hundredweight [long]	50.80235	Kilogram (kg)
Hundredweight [short]	45.35924	Kilogram (kg)
Kilogram	1000. *	Gram (g)
Kilogram	35.27397	Ounce [avoirdupois]
Kilogram	32.15074	Ounce [troy]
Kilogram	2.204622	Pound [avoirdupois]
Kilogram	0.06852178	Slug
Kilogram	0.0009842064	Ton [long]
Kilogram	0.001102311	Ton [short]
Kilogram	0.001*	Ton [metric]
Kilogram	0.001*	Tonne
Kilogram	0.01968413	Hundredweight [long]
Kilogram	0.02204622	Hundredweight [short]
Kilogram/meter ³	0.06242797	Pound/foot ³
Kilogram/meter ³	0.01002242	Pound/gallon [U.K. liquid]
Kilogram/meter ³	0.008345406	Pound/gallon [U.S. liquid]
Ounce [avoirdupois]	28.34952	Gram (g)
Ounce [avoirdupois]	0.02834952	Kilogram (kg)

* Where an asterisk is shown, the figure is exact.

METRIC CONVERSION FACTORS

(Symbols of SI units, multiples and submultiples are given in parentheses in the right-hand column)

Multiply	By	To Obtain
MASS & DENSITY (continued)		
Ounce [troy]	31.10348	Gram (g)
Ounce [troy]	0.03110348	Kilogram (kg)
Pound [avoirdupois]	0.4535924	Kilogram (kg)
Pound/foot ³	16.01846	Kilogram/meter ³ (kg/m ³)
Pound/inch ³	27.67990	Gram/centimeter ³ (g/cm ³)
Pound/gal. [U.S. liquid]	119.8264	Kilogram/meter ³ (kg/m ³)
Pound/gal. [U.K. liquid]	99.77633	Kilogram/meter ³ (kg/m ³)
Slug	14.59390	Kilogram (kg)
Ton [long 2240 lb.]	1016.047	Kilogram (kg)
Ton [short 2000 lb.]	907.1847	Kilogram (kg)
Ton [metric]	1000. *	Kilogram (kg)
Tonne	1000. *	Kilogram (kg)
FORCE & FORCE/LENGTH		
Dyne	0.00001*	Newton (N)
Kilogram-force	9.806650*	Newton (N)
Kilopond	9.806650*	Newton (N)
Newton	0.1019716	Kilogram-force
Newton	0.1019716	Kilopond
Newton	0.2248089	Pound-force
Newton	100,000. *	Dyne
Newton	7.23301	Poundal
Newton	3.596942	Ounce-force
Newton/meter	0.005710148	Pound/inch
Newton/meter	0.06852178	Pound/foot
Ounce-force	0.2780139	Newton (N)
Pound-force	4.448222	Newton (N)
Poundal	0.1382550	Newton (N)
Pound/inch	175.1268	Newton/meter (N/m)
Pound/foot	14.59390	Newton/meter (N/m)
BENDING MOMENT or TORQUE		
Dyne-centimeter	0.0000001*	Newton-meter (N · m)
Kilogram-meter	9.806650*	Newton-meter (N · m)
Ounce-inch	7.061552	Newton-millimeter
Ounce-inch	0.007061552	Newton-meter (N · m)
Newton-meter	0.7375621	Pound-foot
Newton-meter	10,000,000. *	Dyne-centimeter
Newton-meter	0.1019716	Kilogram-meter
Newton-meter	141.6119	Ounce-inch
Newton-millimeter	0.1416119	Ounce-inch
Pound-foot	1.355818	Newton-meter (N · m)

* Where an asterisk is shown, the figure is exact.

METRIC CONVERSION FACTORS

(Symbols of SI units, multiples and submultiples are given in parentheses in the right-hand column)

Multiply	By	To Obtain
MOMENT of INERTIA & SECTION MODULUS		
Moment of inertia [kg · m ²]	23.73036	Pound-foot ²
Moment of inertia [kg · m ²]	3417.171	Pound-inch ²
Moment of inertia [lb · ft ²]	0.04214011	Kilogram-meter ² [kg · m ²]
Moment of inertia [lb · inch ²]	0.0002926397	Kilogram-meter ² [kg · m ²]
Moment of section [foot ⁴]	0.008630975	Meter ⁴ [m ⁴]
Moment of section [inch ⁴]	41.62314	Centimeter ⁴
Moment of section [meter ⁴]	115.8618	Foot ⁴
Moment of section [centimeter ⁴]	0.02402510	Inch ⁴
Section modulus [foot ³]	0.02831685	Meter ³ [m ³]
Section modulus [inch ³]	0.00001638706	Meter ³ [m ³]
Section modulus [meter ³]	35.31466	Foot ³
Section modulus [meter ³]	61,023.76	Inch ³
MOMENTUM		
Kilogram-meter/sec.	7.233011	Pound-foot/sec.
Kilogram-meter/sec.	86.79614	Pound-inch/sec.
Pound-foot/sec.	0.1382550	Kilogram-meter/sec. [kg · m/s]
Pound-inch/sec.	0.01152125	Kilogram-meter/sec. [kg · m/s]
PRESSURE & STRESS		
Atmosphere [14.6959 lb/inch ²]	101,325	Pascal [Pa]
Bar	100,000. *	Pascal [Pa]
Bar	14.50377	Pound/inch ²
Bar	100,000. *	Newton/meter ² [N/m ²]
Hectobar	0.6474898	Ton [long]/inch ²
Kilogram/centimeter ²	14.22334	Pound/inch ²
Kilogram/meter ²	9.806650*	Newton/meter ² [N/m ²]
Kilogram/meter ²	9.806650*	Pascal [Pa]
Kilogram/meter ²	0.2048161	Pound/foot ²
Kilonewton/meter ²	0.1450377	Pound/inch ²
Newton/centimeter ²	1.450377	Pound/inch ²
Newton/meter ²	0.00001*	Bar
Newton/meter ²	1.0*	Pascal [Pa]
Newton/meter ²	0.0001450377	Pound/inch ²
Newton/meter ²	0.1019716	Kilogram/meter ²
Newton/millimeter ²	145.0377	Pound/inch ²
Pascal	0.00000986923	Atmosphere
Pascal	0.00001*	Bar
Pascal	0.1019716	Kilogram/meter ²
Pascal	1.0*	Newton/meter ² [N/m ²]
Pascal	0.02088543	Pound/foot ²
Pascal	0.0001450377	Pound/inch ²

* Where an asterisk is shown, the figure is exact.

METRIC CONVERSION FACTORS

(Symbols of SI units, multiples and submultiples are given in parentheses in the right-hand column)

Multiply	By	To Obtain
PRESSURE & STRESS (<i>continued</i>)		
Pound/foot ²	4.882429	Kilogram/meter ²
Pound/foot ²	47.88026	Pascal [Pa]
Pound/inch ²	0.06894757	Bar
Pound/inch ²	0.07030697	Kilogram/centimeter ²
Pound/inch ²	0.6894757	Newton/centimeter ²
Pound/inch ²	6.894757	Kilonewton/meter ²
Pound/inch ²	6894.757	Newton/meter ² [N/m ²]
Pound/inch ²	0.006894757	Newton/millimeter ² [N/mm ²]
Pound/inch ²	6894.757	Pascal [Pa]
Ton [long]/inch ²	1.544426	Hectobar
ENERGY & WORK		
Btu [international table]	1055.056	Joule [J]
Btu [mean]	1055.87	Joule [J]
Calorie [mean]	4.19002	Joule [J]
Foot-pound	1.355818	Joule [J]
Foot-poundal	0.04214011	Joule [J]
Joule	0.0009478170	Btu [international table]
Joule	0.0009470863	Btu [mean]
Joule	0.2386623	Calorie [mean]
Joule	0.7375621	Foot-pound
Joule	23.73036	Foot-poundal
Joule	0.9998180	Joule [international U.S.]
Joule	0.9999830	Joule [U.S. legal, 1948]
Joule [international U.S.]	1.000182	Joule [J]
Joule [U.S. legal, 1948]	1.000017	Joule [J]
Joule	.0002777778	Watt-hour
Watt-hour	3600. *	Joule [J]
POWER		
Btu [international table]/hour	0.2930711	Watt [W]
Foot-pound/hour	0.0003766161	Watt [W]
Foot-pound/min.	0.02259697	Watt [W]
Horsepower [550 ft/s]	0.7456999	Kilowatt [kW]
Horsepower [550 ft/s]	745.6999	Watt [W]
Horsepower [electric]	746. *	Watt [W]
Horsepower [metric]	735.499	Watt [W]
Horsepower [U.K.]	745.70	Watt [W]
Kilowatt	1.341022	Horsepower [550 ft/s]
Watt	2655.224	Foot-pound/hour
Watt	44.25372	Foot-pound/min.
Watt	0.001341022	Horsepower [550 ft/s]
Watt	0.001340483	Horsepower [electric]
Watt	0.001359621	Horsepower [metric]
Watt	0.001341022	Horsepower [U.K.]
Watt	3.412141	Btu [international table]/hour

* Where an asterisk is shown, the figure is exact.

METRIC CONVERSION FACTORS

(Symbols of SI units, multiples and submultiples are given in parentheses in the right-hand column)

Multiply	By	To Obtain
VISCOSITY		
Centipoise	0.001*	Pascal-sec. [Pa · s]
Centistoke	0.000001*	Meter ² /sec. [m ² /s]
Meter ² /sec.	1,000,000. *	Centistoke
Meter ² /sec.	10,000. *	Stoke
Pascal-sec.	1000. *	Centipoise
Pascal-sec.	10. *	Poise
Poise	0.1*	Pascal-sec. [Pa · s]
Stoke	0.0001*	Meter ² /sec. [m ² /s]

* Where an asterisk is shown, the figure is exact.

TEMPERATURE

To Convert Form	To	Use Formula
Temperature Celsius, <i>tC</i>	Temperature Kelvin, <i>tK</i>	$tK = tC + 273.15$
Temperature Fahrenheit, <i>tF</i>	Temperature Kelvin, <i>tK</i>	$tK = [tF + 459.67] / 1.8$
Temperature Celsius, <i>tC</i>	Temperature Fahrenheit, <i>tF</i>	$tF = 1.8 tC + 32$
Temperature Fahrenheit, <i>tF</i>	Temperature Celsius, <i>tC</i>	$tC = [tF - 32] / 1.8$
Temperature Kelvin, <i>tK</i>	Temperature Celsius, <i>tC</i>	$tC = tK - 273.15$
Temperature Kelvin, <i>tK</i>	Temperature Fahrenheit, <i>tF</i>	$tF = 1.8 tK - 459.67$
Temperature Kelvin, <i>tK</i>	Temperature Rankine, <i>tR</i>	$tR = 9/5 tK$
Temperature Rankine, <i>tR</i>	Temperature Kelvin, <i>tK</i>	$tK = 5/9 tR$

MISCELLANEOUS CONVERSION FACTORS

[English units]

Multiply	By	To Obtain
VISCOSITY		
Atmospheres	29.92	Inches of mercury [32° F.]
Atmospheres	14.70	Pounds/inch ²
British thermal units/hour	12.96	Foot-pounds/min.
Circular mils	0.7854	Square mils
Feet of water [60° F.]	0.8843	Inches of mercury [60° F.]
Feet of water [60° F.]	0.4331	Pounds/inch ²
Feet/min.	0.01136	Miles/hour
Foot-pounds/sec.	0.07716	British thermal units/min.
Gallons [U.S.] of water [60° F.]	8.337	Pounds of water [60° F.]
Gallons [U.S.]/sec.	8.021	Feet ³ /min.
Inches of mercury [32° F.]	0.03342	Atmospheres
Inches of mercury [60° F.]	1.131	Feet of water [60° F.]
Inches of mercury [60° F.]	0.4898	Pounds/inch ²
Inches of water [60° F.]	0.03609	Pounds/inch ²
Knots [international]	1.151	Miles[statute]/hour
Miles/hour	88	Feet/min.
Miles[statute]/hour	0.8690	Knots [international]
Ounces [avoirdupois]	0.9115	Ounces [troy]
Ounces [troy]	1.097	Ounces [avoirdupois]
Ounces [troy]	0.06857	Pounds [avoirdupois]
Pounds [avoirdupois]	14.58	Ounces [troy]
Pounds of water [60° F.]	0.01603	Feet ³
Pounds of water [60° F.]	0.1199	Gallons [U.S.]
Pounds/inch ²	0.06805	Atmospheres
Pounds/inch ²	2.309	Feet of water [60° F.]
Pounds/inch ²	2.042	Inches of mercury [60° F.]
Pounds/inch ²	27.71	Inches of water [60° F.]
Square mils	1.273	Circular mils

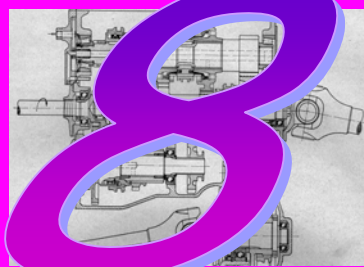
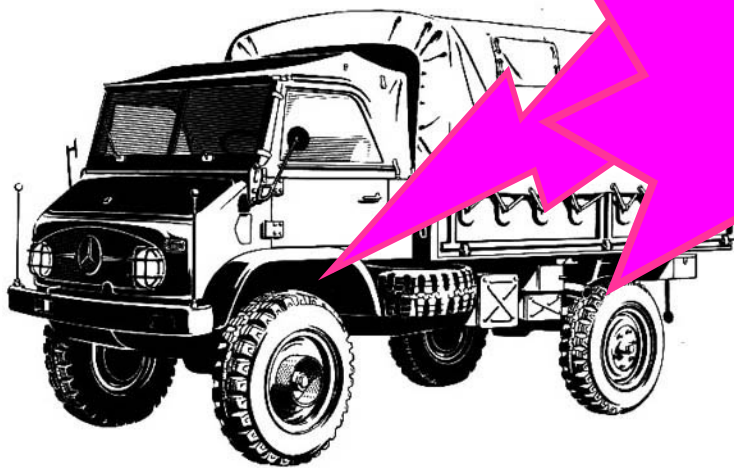


Section 3- Unimog Type 404

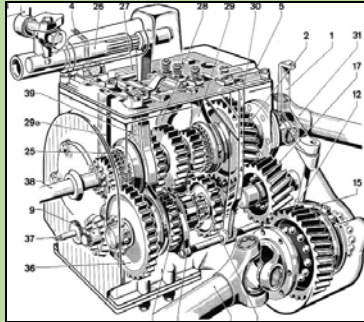
ARJ TECHNICA
ELECTROGRAPHICS

Transmission modification of the UG1/11 from the U 404 S to

*Transmission modification of
the UG1/11 to
the U 404 S to
8 speed.*



Modification of the UG1/11 transmission from the U 404 S from 6- to 8 forward speeds.



Introduction:

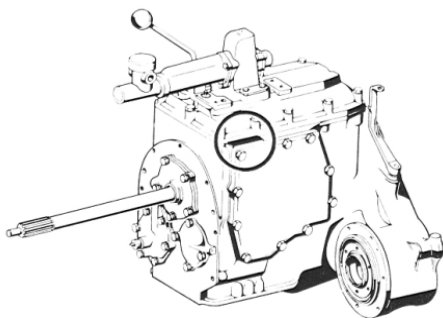
UG stands for Unimog Getriebe and the UG1/11 found in the '404 S' is the same as installed in the early Boeringer and 411's mogs, with some little changes and improvements over the time. The original design is still in all the transmissions from the U 4xx.xxx series, from the first unsynchronized UG1/11 to the synchromesh over the UG2/27 to the UG2/30 with a lot of combinations for PTO, sideway power take off and winches, splitters, creeper gears, hydraulic and air operated systems. The basic modular design is well thought, so the original idea is valid for over 55 years now with only mayor changes and developments in the brass bushings, bearings, the shift plate and that they now operate with some air cylinders.

A quick look to the 3 issues of transmissions let you recognize, that the transmission housing is still the same, but with some additional bores & mounting points, later with stronger gears - but the same basic size. You can find this transmission housing in their corresponding Mog models from the 70200, 2010, 401, 402, 403, 411, 404, 421, (406):

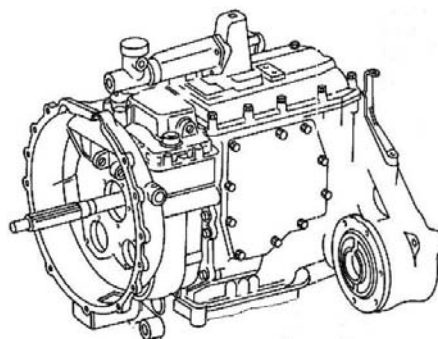
UG1/11 6 speed (U404S)

UG2/27 6,8, up to 20

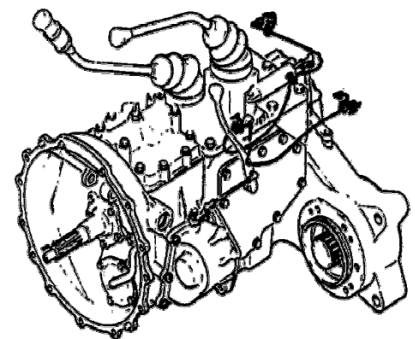
UG2/30 20 speed, new



basic 1x6 shift plate



speed 2x4 shift plate(U406)



shift plate (U419, SEE)

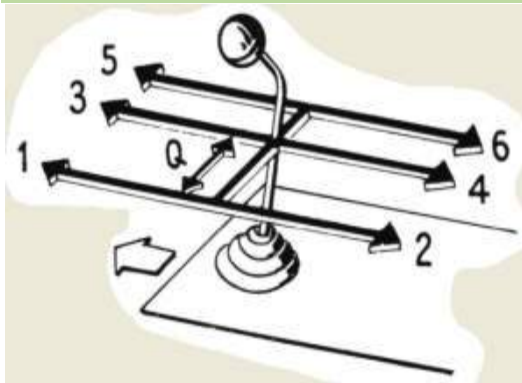
To know really about all possible combinations, you have to think about a serious study of this topic. There where also special designs for the customer needs and military applications.

Researching for information:

To find info about the 404S 'Mog' transmission today is difficult, especially for our old UG1/11 tranny. Thanks to the list members from RMM, Mog4x4 and MogTech, I was able to collect sufficient info from manuals, images, e-mails, photos and scanned material to see, that due to the basic, modular design of the transmission, especially the housing and the shift plate, it should be possible to modify the UG1/11 to work like the transmissions found in the U421 and U406/416 with 8 forward speeds: 4 in the low range and 4 in the high range. Here where I live in Venezuela is no 'mog' with a 2x4 transmission around, so it was a detective like work to see what the mayor differences between the 'trannies' are and what they have in common, looking only on the material collected as the source for technical information. But relatively quickly it was clear, that the mod is possible without touching the gears or shift forks inside the transmission. The clue is in the shift plate and the shift cover plate in both models. After understanding the differences, it was obvious that the old Q-shifting ("Q = Querschaltlen" = traverse shifting) has to be substituted with an additional lever.



Searching for info with
all imaginable sources

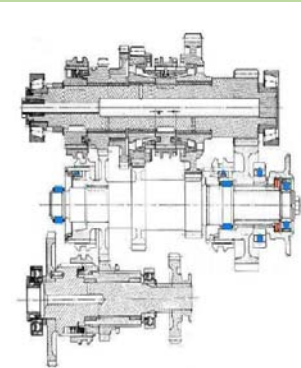


The first impression may be now that you can get a 12 forward speed tranny, but no - the conversion gives you two additional speeds in the low range, like a 3rd low and 4th low speed because the original 1,2 and 3,4 positions share the same shifting fork. There will be also the two usual reverse gears plus two with higher ratio. Use wisely: Fast in reverse with a 404 makes no sense. But two additional low range gears with the original engine with only 82 hp at the clutch really could be interesting.

And that leads to the question: Is this mod useful, why make such a modification, what is involved in such a work?

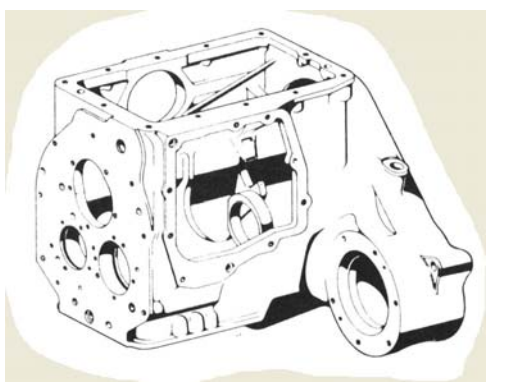
The benefits of the modification to 8 speeds:

For me personally, that is no question and some 404 moppers would like not to shift so frequently between low and high range when off road, loosing impulse or battling with a dying engine. And- as the two new speeds promise a good final torque - (small gear driving a bigger gear two times) there is no doubt, the result will be great off road driving with four useful low gears without leaving the low range for shifting to a little more off road speed ! And there is some bonus too, the new gears are nice stepped with the existing gears as we will see later, with some useful overlap over the "on road" gears - just what a 404 needs.

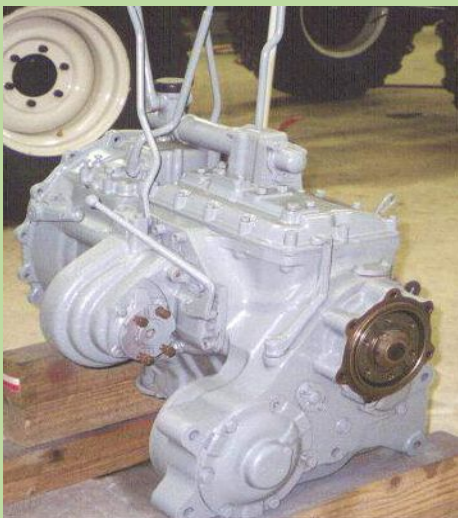


What do you need for the 6- to 8 fwd speed conversion:

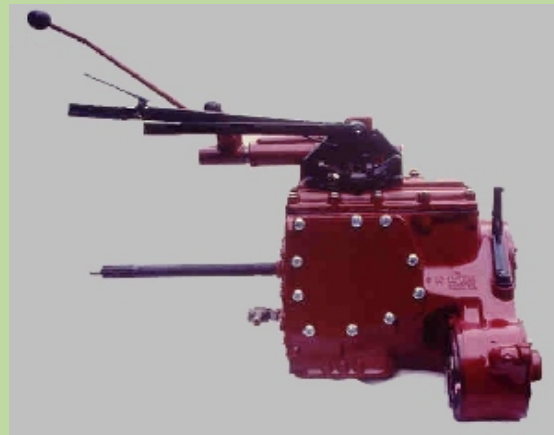
If you like to keep your Mog original, find you a shift cover with levers and a shift plate from a spare or toasted U404 tranny sitting around. If you can get those parts from a 2x4 tranny, for example from a 421 or 406 transmission, then you have found the best shortcut. With the 404S material, you need to find or fabricate the additional lever for the high/low range selection. The transmission housings are basically the same.



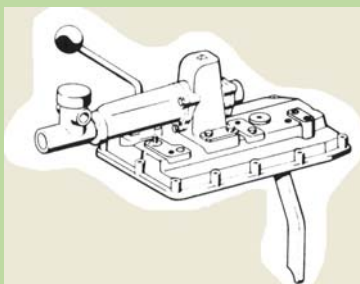
There are no special tools or knowledge needed. If you have basic tools and some skills and like wrenching, the 'mod' can be done in a couple of hours. The most time consuming work is to fabricate the lever, if you don't have already one with a 55mm finger or something similar to adapt.



An overhauled UG2/27 (with PTO) you recognize the family



A nice finished UG1/11



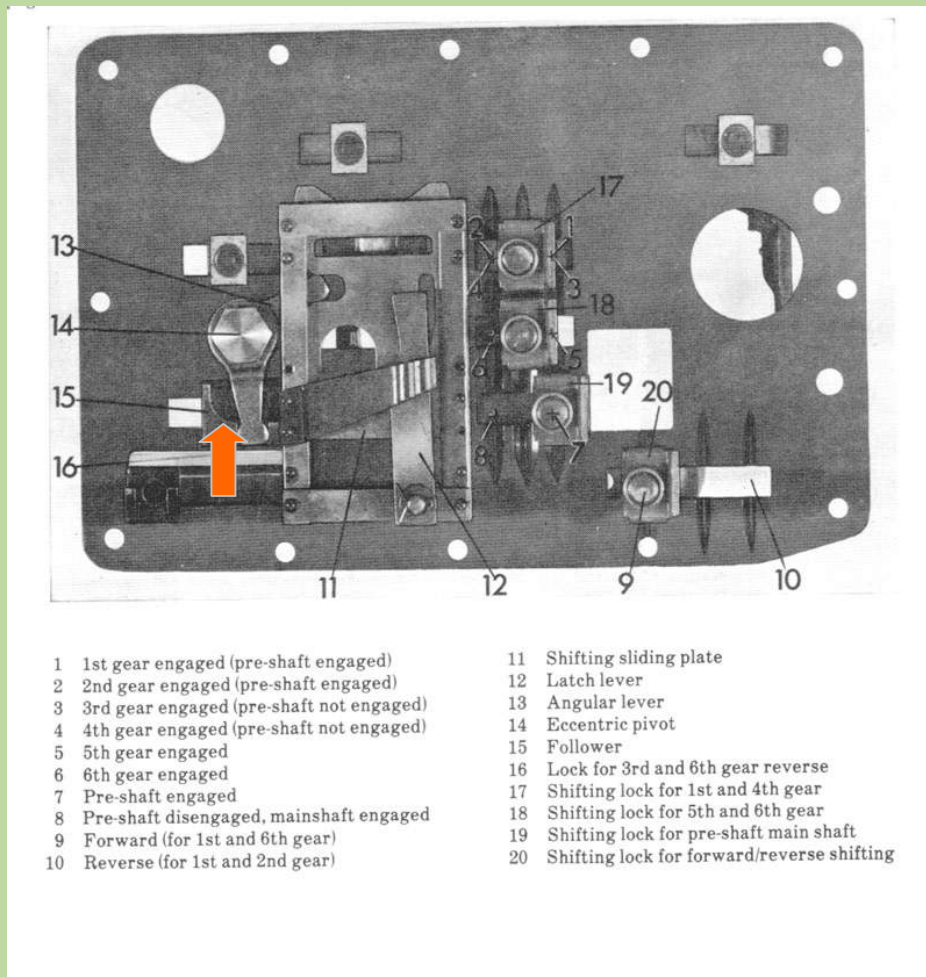
You need a shift cover...

... and a shift plate.



The theoretical part of the modification: The shift plate

Looking now at some pictures with good detail let you quick understand what is to do here:
This is an original 6 speed shift plate found in 411, 404, 421 and 406(?) in their basic setup.

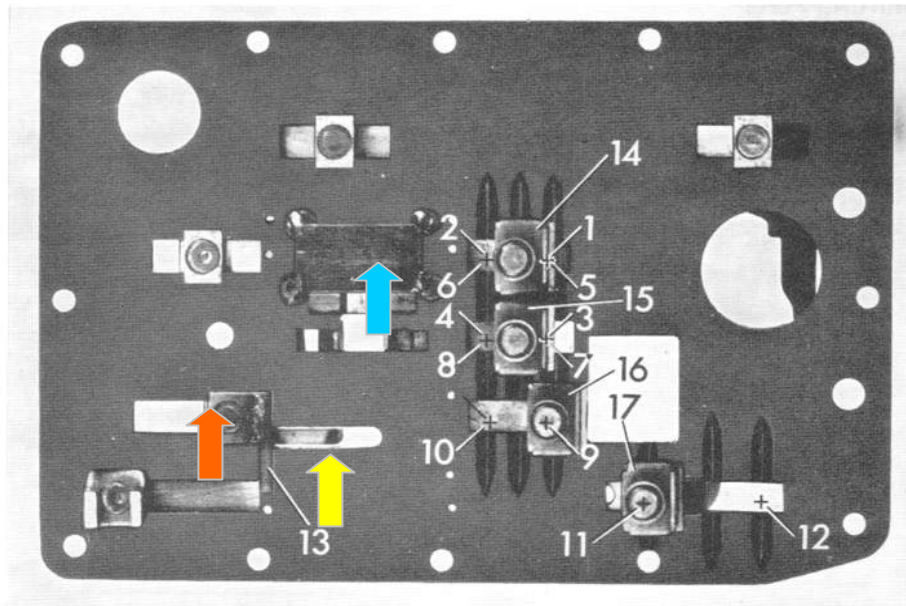


The group of parts that conforms the simple " shift logic " , items # 11,12,13,14,15 and 16 are not on the 2x4 shift plate. These parts will be taken apart for the conversion, among others. The angular lever (#13) is actuated when shifting " Q-traverse " in to low gears (1 & 2) and this unlocks the two reverse gears too. But this also blocks our additional two low gears that we want .

We do not need this few parts



Here is a shift plate from an UG2/27 tranny. Same size, same holes and bores, the slots for the engaged position of the shift forks. Compare !, it is the same basic plate, - fundamentally.



- | | |
|---------------------------------|--|
| 1 1st gear engaged (low range) | 10 Low range disengaged, High range engaged |
| 2 2nd gear engaged (low range) | 11 Forward (low and high range) |
| 3 3rd gear engaged (low range) | 12 Reverse (low range) |
| 4 4th gear engaged (low range) | 13 Lock for high range in reverse shifting position and vice versa |
| 5 1st gear engaged (high range) | 14 Shifting lock for 1st/2nd gear for low, high and reverse range |
| 6 2nd gear engaged (high range) | 15 Shifting lock for 3rd/4th gear for low, high and reverse range |
| 7 3rd gear engaged (high range) | 16 Shifting lock for low high range |
| 8 4th gear engaged (high range) | 17 Shifting lock for forward/reverse speeds |
| 9 Low range engaged | |

Figure 40 - Shifting Plate for 2 x 4 Shifting With Three shifting Lock slots for Forward/Reverse Shifting.

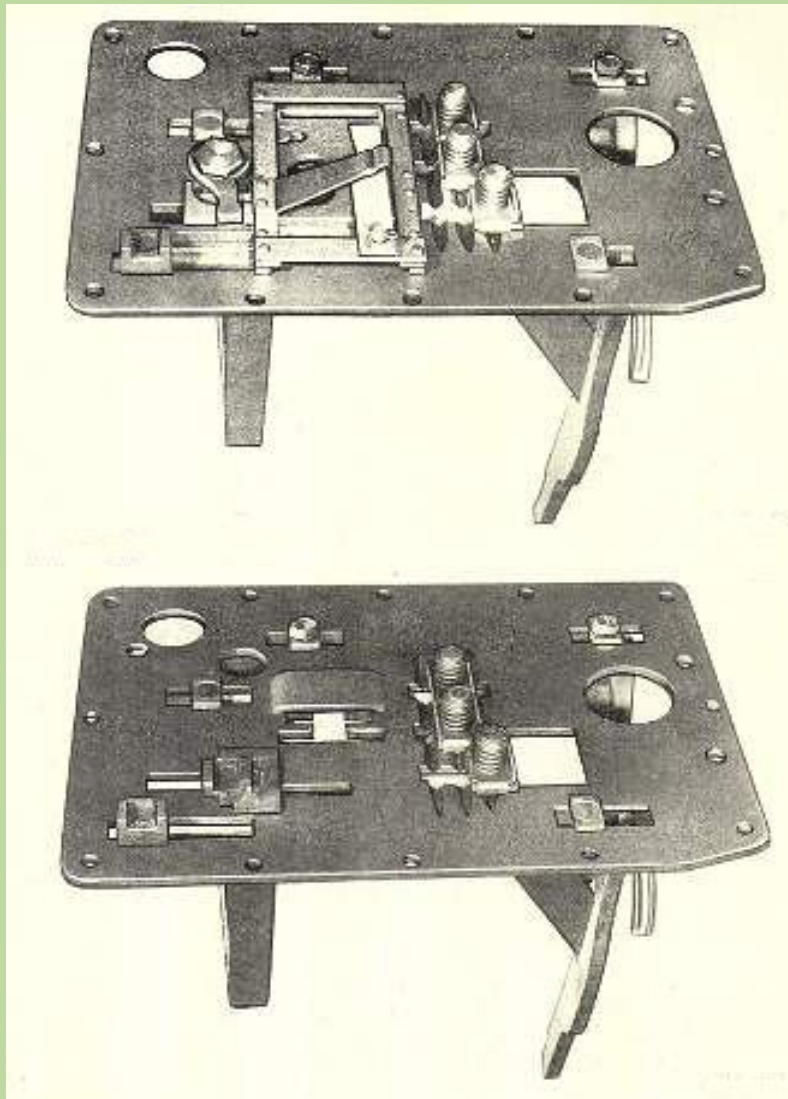
There is one minor difference on this plate, it is the little slot above the #13 (arrowed yellow), this could be used to shift the high/low range where it is already present if you have this version of the plate from a newer (2x4) transmission and the lever with the longer finger. If this is your case, you need to make a lever with approx. an 80mm long finger.

For the conversion starting from a 404 (UG1) tranny there is another easy solution. The red arrow on both images (pages 5 & 6) points to the part where on the other side is the shift fork located for the selection of the high and low range.

The blue arrow points to a small 60mm x 30mm (3mm thick piece of metal) welded on to the plate; that eliminates the old 1st and 2nd gear lever positions from the 1x6 plate.

This is already the 2x4 plate and do not use that third part of the 'double "H" slot for shifting.

Here is another older image from an earlier shift plate (again with minor differences that Gagenau changed later, - did you see them ?) that shows very good the two shift variants: First the 1x6 speed, below there is the 2x4 speed shift plate.

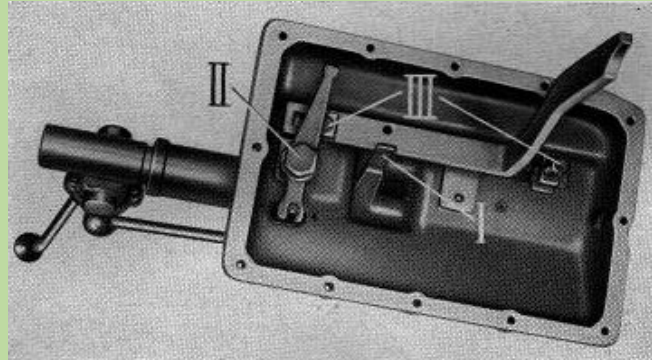
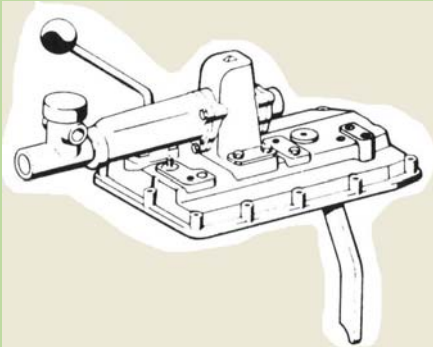


Now, let's look to the next involved component of the transmission mod : The main cover.

Remark: The photos and diagrams are regular quality, so you can zoom in (200-400x) to observe details better.

The shift cover:

The (main) shift cover is a simple part in these versions for the UG1 and UG2 type transmissions. The two or three shift levers (I) on the top (beside the hand brake and 4x4 / difflock lever) and on the underside is only a long shift fork (III) for the "So" applications (So= Sonderantriebe, meaning something like 'special drives' like a PTO.) and a lever (II) for the forward/reverse positions of the corresponding shift fork. That is all from the underside of the cover.

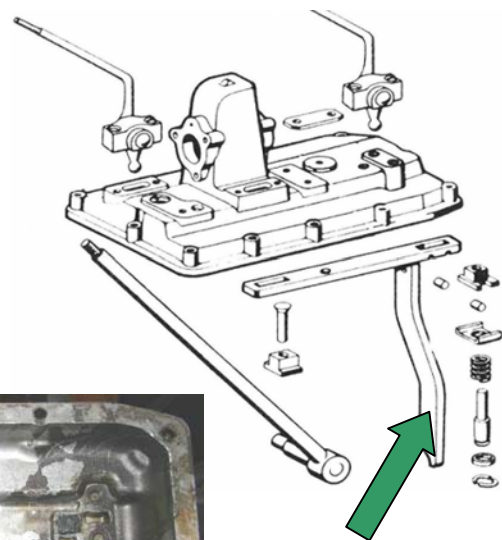
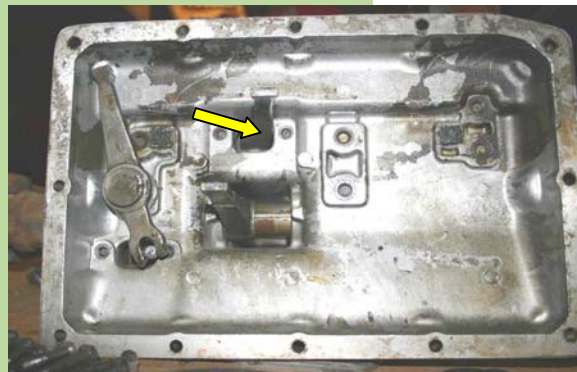


Here you have to keep in mind, as " a reminder ", that with the modification in the way I did it, you can not use a PTO from a UG1/11 (404S) when driving with the 8 speed modified transmission, because I took the place for the PTO lever for the high/low range shift lever and put the long shift fork out of the way. That is why I still keep a set of a transmission cover and an unmodified original shift plate as a spare, so I can return to the original setup if I want or if needed some day. You can use a PTO from a U421 or similar after the mod, but this is to be checked out first, but it really looks do-able.

The work on the cover plate is short:

Two big rivets must come out to take the long shift fork (arrowed green) out of the way. Then you can use this fork as raw material for the modification. It is nice 10mm steel and the bore for the lever end can be re-used for the new purpose. Details follows later.

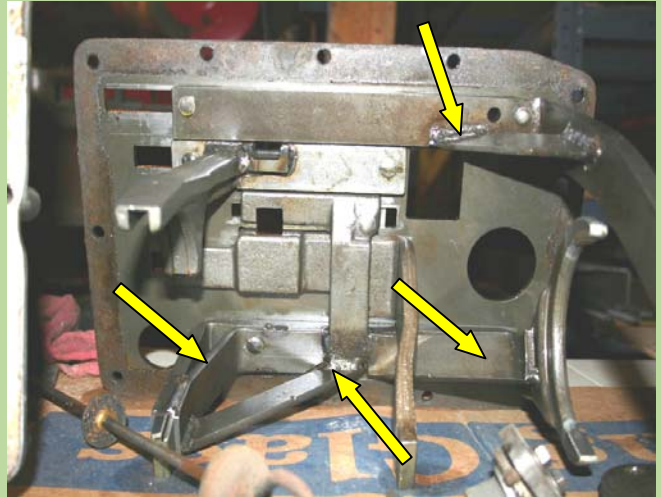
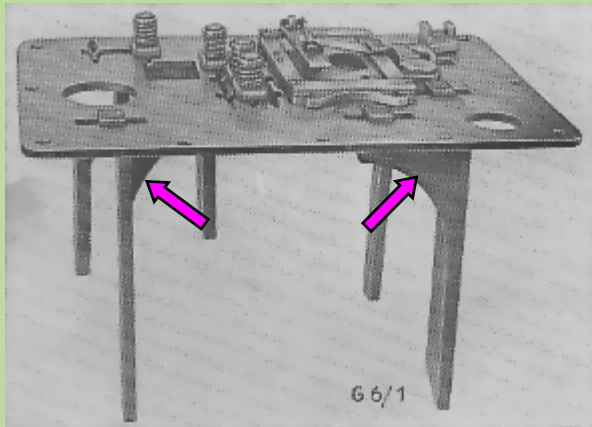
Perhaps to reduce manufacturing costs and weight, the cover from some day on is made out of aluminium casting. The cover shown is from a U421 and you can see that it is the same type as the cover from a U404 with the exception, that there is no slider and shift fork for the PTO. Also pictured is the long shifting finger for the hi/lo range (arrowed yellow).



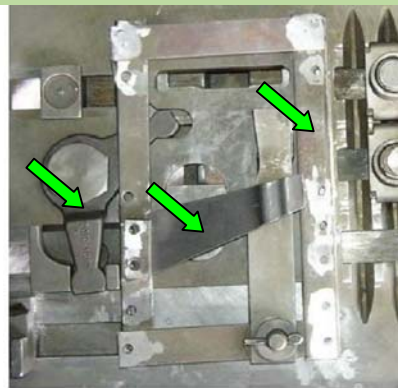
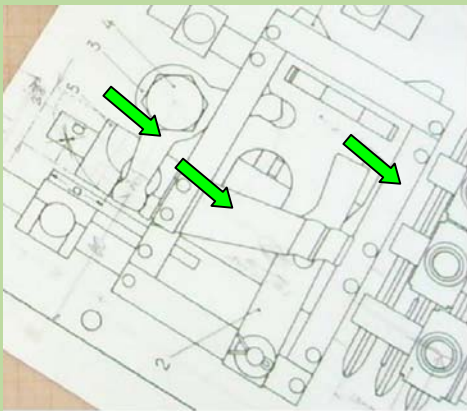
The shift plate:

On the shift plate were arranged the entire shift tongues -and shift forks- on the underside. As there is no work to do on this parts on the underside, I go only in to the details of the top, where the 'shift logic' and shift levers actuates. As a side note, looking to the underside it seems that Gaggenau did some 'last minute' reinforcements to the shift forks, the work done here don't looks too nice (improvisation that never was refined??) and I could observe this with various plates... (See ↓ arrows, ugly welding)

On very old pics from plates, the reinforces ↓ were small, perhaps the original setup was too weak and bent, when a "Bub" shifts around... ;^)



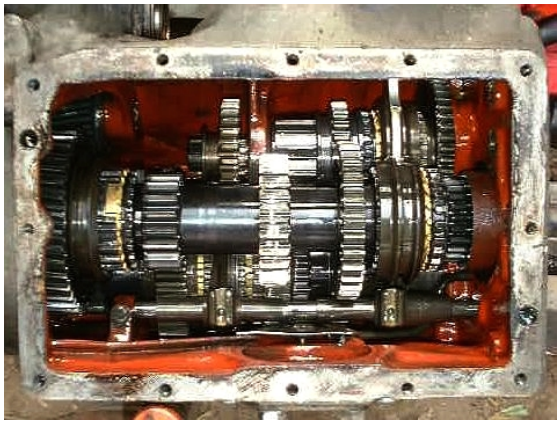
Most of the modification is to be done here on the shift plate, and consists more or less in taking pieces away .



The angle lever for the 'Q' - shifting of the high /low range in the 1st and 2nd gears forward and reverse, the flat holder, the frame with all its components and the slider plate- are not needed. You can save them as spares (or elaborate a trophy for the next NWMF?).

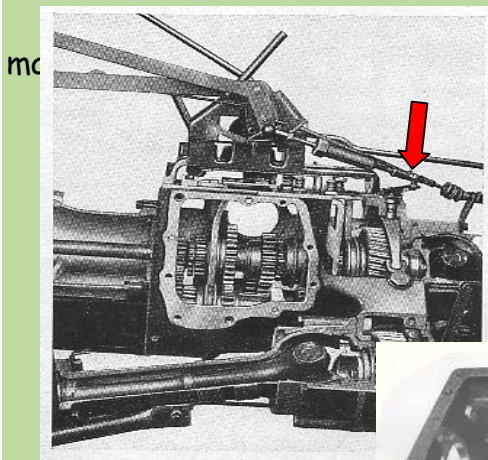
A quick sidekick in to the gearbox:

Here I put two similar images together, the left one is a UG1/11 tranny from a 404, the right one is a UG2/27 from a 416:

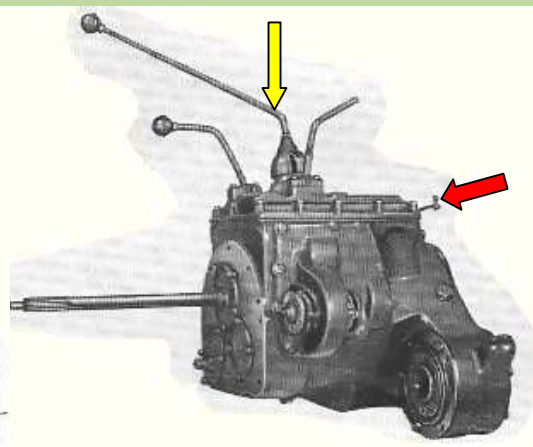


You can observe (again) that the two transmissions share the same housing, the eye catching difference is, that the gears from the UG2/27 are stronger (thicker and have a little lesser teeth), also you can see how the torque transmission goes from the right to the left, from "thinner" gears and with more teeth to the 'heavy' ones on the right. The original design is still in all transmissions: A drive shaft (input from the engine/clutch) and three shafts with the gears (pre stage shaft, counter shaft and the main shaft)

A little transmission history:

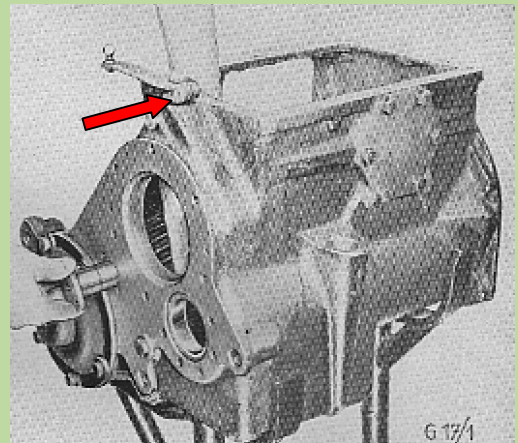


Early ↓ designs (U411) have a different shift plate with a lever going direct through the plate with no 'turret'.

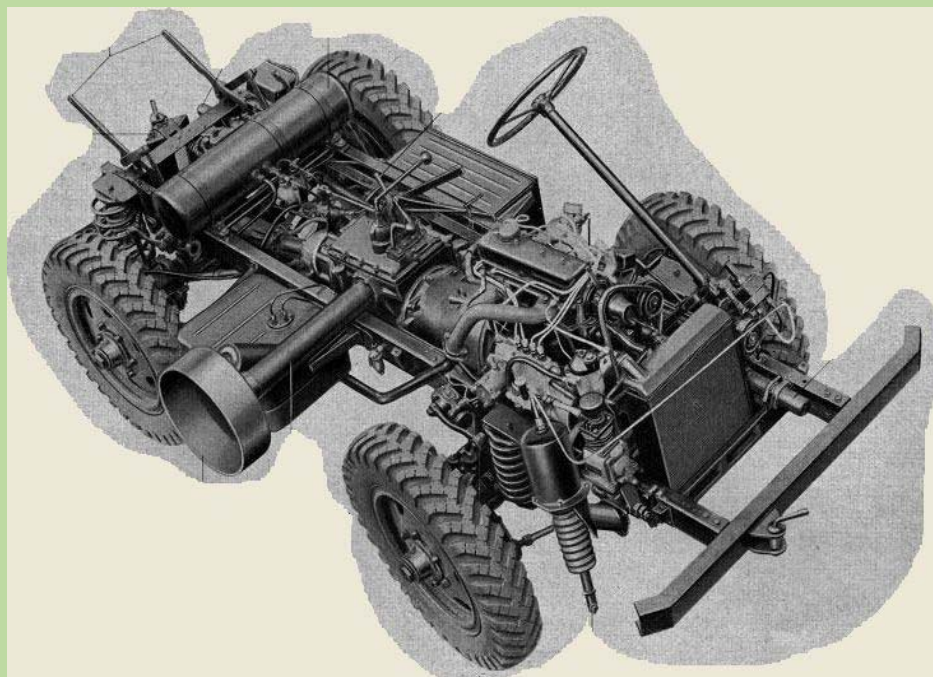


The 4x4 wheel drive is activated with a long shaft from the top of the housing to the fork (red arrow) ↓, later the casting was modified.

Curious: The early shift plate looks similar to the modern shift plate from the U2/30 ... but only from an external view at the main lever... (yellow arrow page 10)



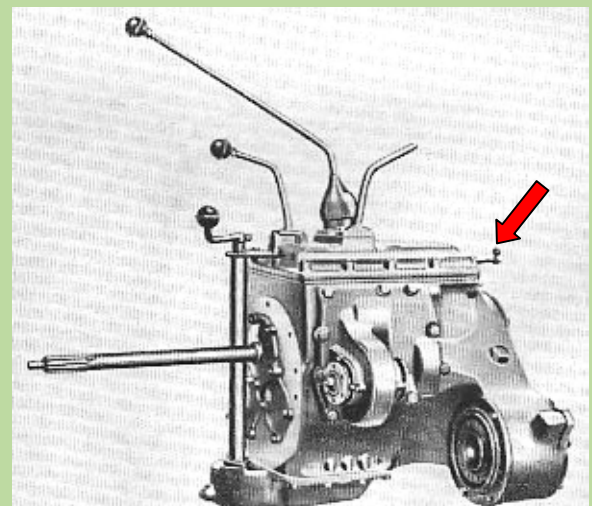
The first transmission was not synchronized, the little 411 with the 25 hp diesel engine was a real tractor with four equal sized wheels and an incredible hauling capability.



Note the lateral power take off with a big pulley for belts or hydraulic pumps and the early type shift covers...

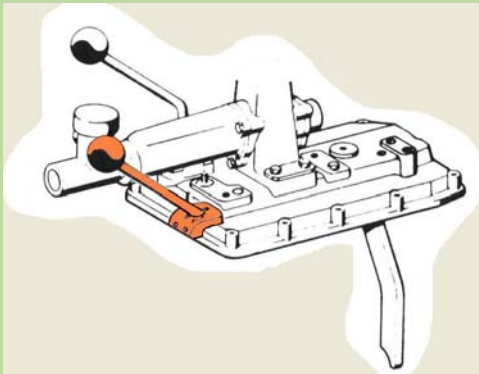
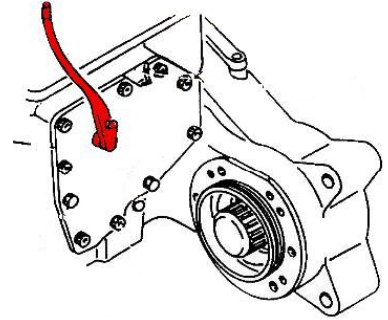
A full equipped early design transmission with creeper gears and PTO. Note the old cover and main shift lever design and the location of the 4x4 lever.

It would be interesting to know, why they did not "unlock" the transmission for 8 fwd speeds. At a first glance, there is no apparent reason other than the virtual conflict with the PTO add on. But there is more than one way to go, for sure.



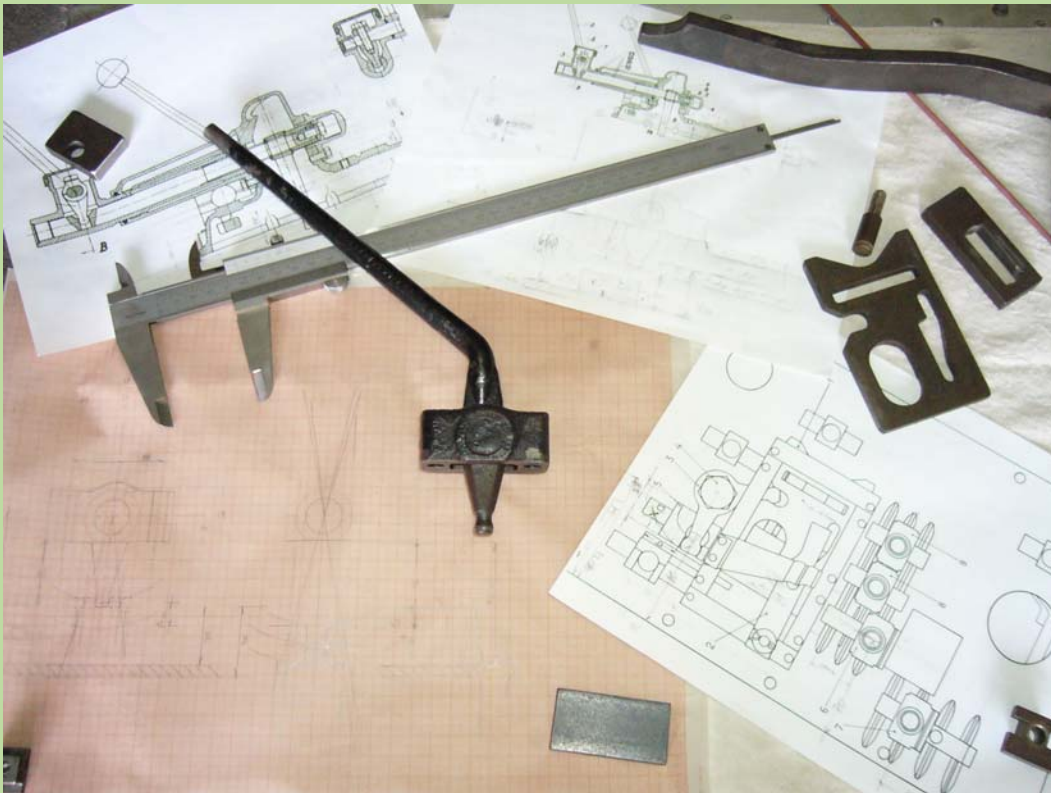
Possible variations of the modification:

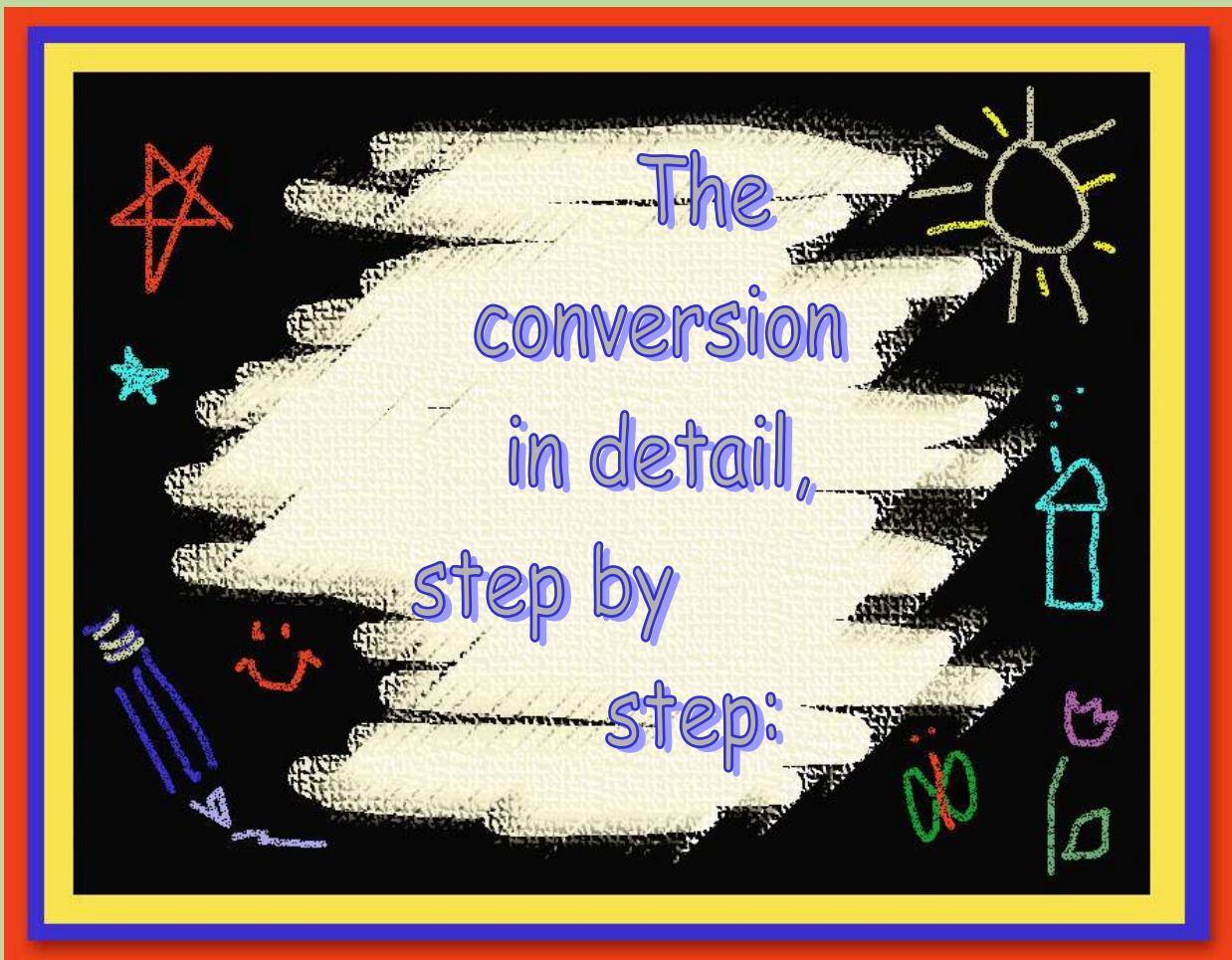
The way I choose to make the modification is because I have no PTO on the tranny and a set of spare UG1/11 main cover and shift plate lounging around. Sure there are 3, 4 or even more other ways to realize this conversion: Starting with parts from an U421/406/416 2x4 tranny, or leave the PTO shift tongue in it's place and relocate the additional lever required to the side opening plate, or mill a space on the front of the main cover for a device to accommodate the lever, think about air (manifold vacuum) operated cylinders, and so on .



You could modify the inner pivoting arm for the fwd / reverse lever (II on page 7) and have this to actuate the high/low range and use it instead of the additional shift lever for forwards and reverse selection More than only one way to go for sure.

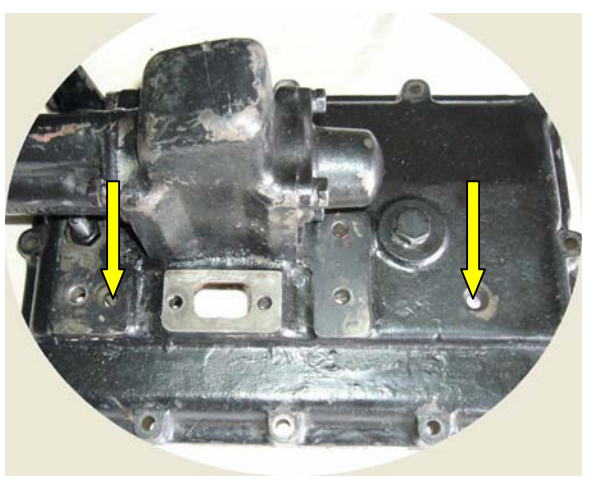
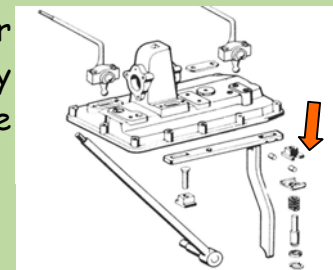
Here is an opportunity for creativity and different solutions.





First, to take apart the main cover and the shift plate, or if you take it out from a spare transmission, please refer always to the shop manual, the procedures are well described .

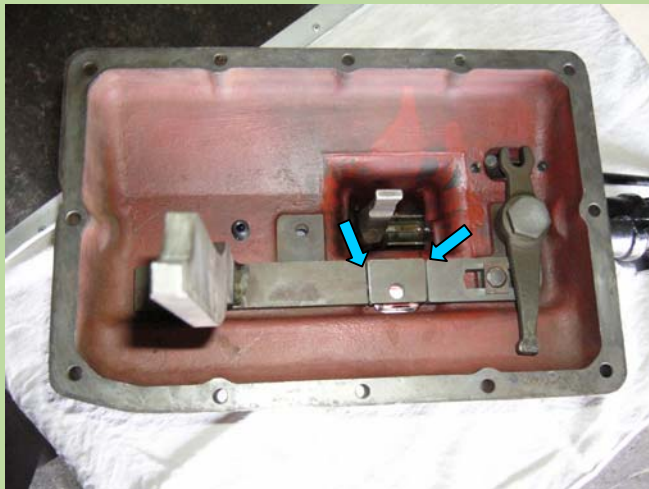
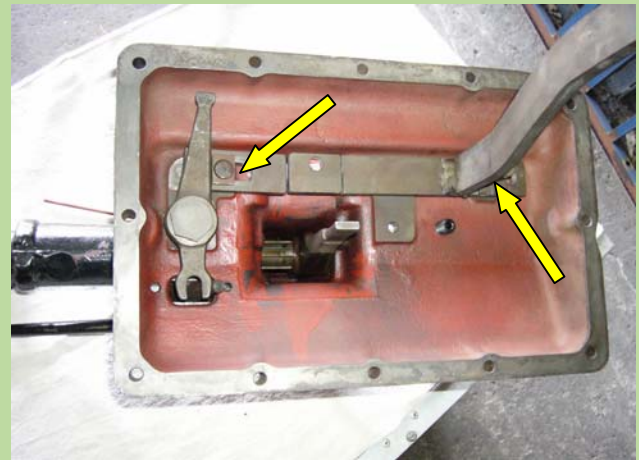
Take the main cover: For easier manipulating, put the long main lever apart. On the underside, take the coil spring of the detent (safety lockers, spring retainer, roller guide and two small rollers out. See the manual page. 26.4.4.4.).



There are two big rivets that hold the sliders for the shift fork of the PTO gear. Put the main cover on the work bench or in a grip (holding it on the shift fork). On the top, punch mark ↓ the two rivets (centered) and drill with a 4mm or similar diameter about 10mm deep.

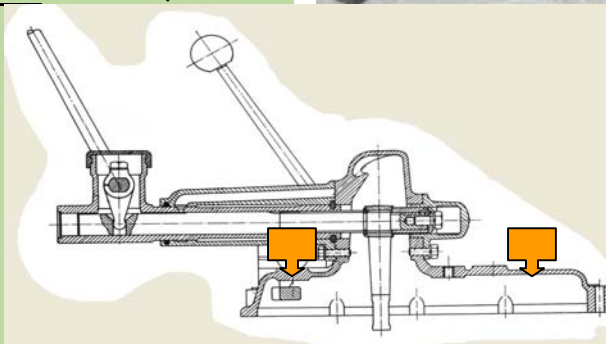
Then, with a 10mm or 11mm bore drill careful until the top of the rivet begins to spin, or you feel that it becomes loose. Take care not to drop the main cover when the last rivet comes out. Take apart the shift fork, the guide pieces and followers. Save the fork to fabricate some parts with it later.

Knock out this two rivets of the fork from the top with a punch.

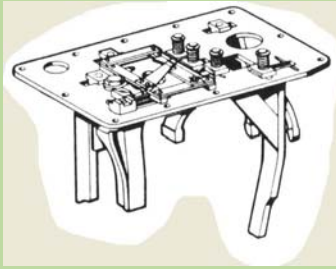


When the shifting fork is apart, mark 75mm (from the right to left) and a second segment of 40mm. Cut the pieces and eliminate sharp edges, sand them. This pieces are for the connection of the new shift lever with the high/low range slider on the shift plate.

Now put two bolts (allen) with nuts where the rivets were in the main cover (s. page 12) to plug the bores. They should be at level like the rivets. Tighten well and punch mark on the underside or make a spot with the welder to make sure the nuts never could fall into the tranny.

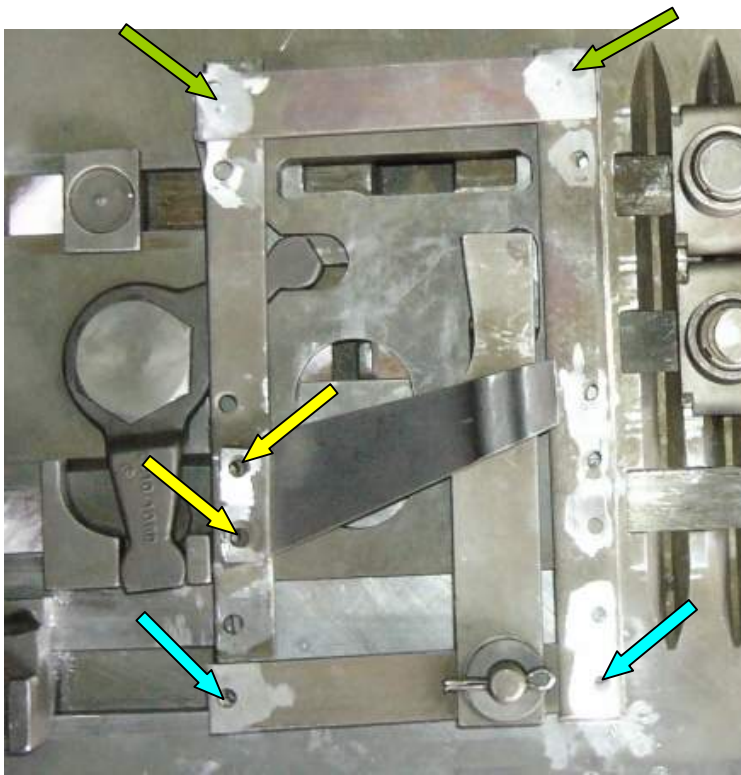
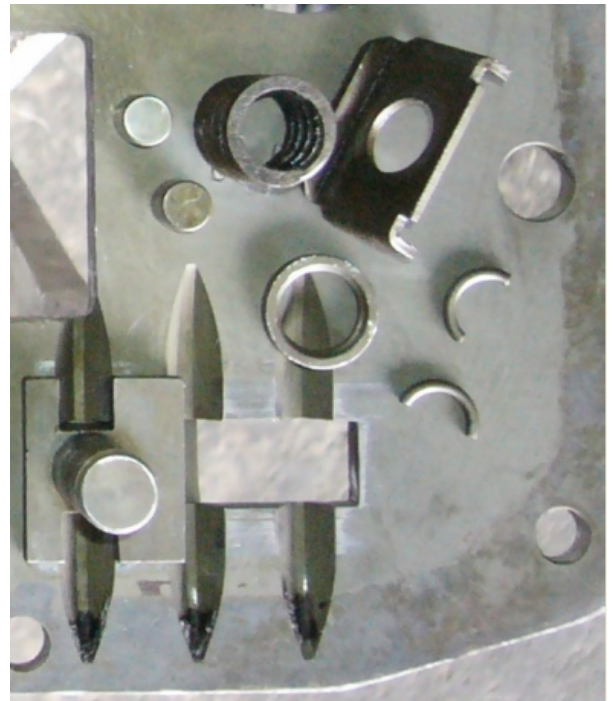


Clean the main cover, lubricate, this part is finished 8^)



Second, put the shifting plate on the bench or grip: When you have the part cleaned and ready: To manipulate the shift plate easier, put the springs and associated parts from the fwd/rev and from the high/low range detent apart for a while.

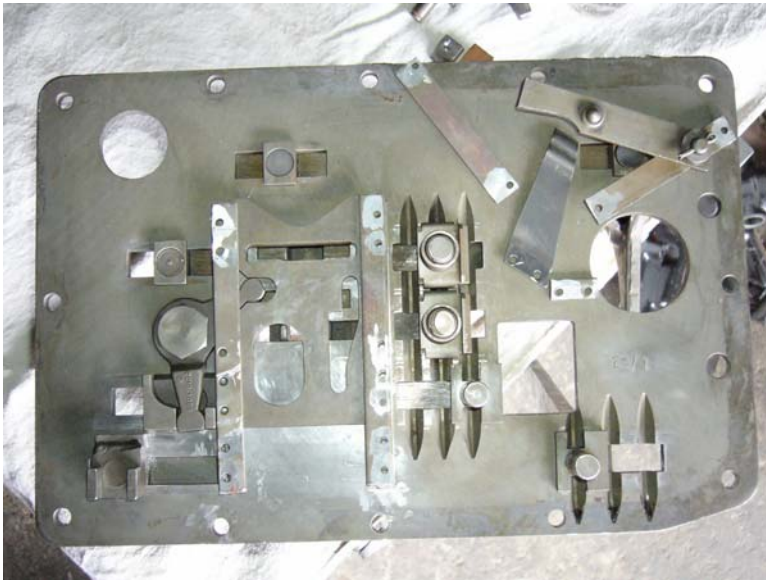
There are two sets of: small rollers, 2 springs (they have different heights and constants - depending from where they come) 2 holders, rings and 4 lock inserts. (Don't mix them) .



With a small grinder or a "Dremel" grind the yellow arrowed rivets careful away, take the small plate and the (black) holder apart. Then grind the two light blue rivets away and take the little traverse with the lock arm (complete) apart. Help with a small flat sharp chisel and a hammer to separate the pieces. Take the slide plate out.

Now grind the green arrowed rivets, take the piece and continue with all the remaining rivets. Take your time and have patience. Have the chisel sharp and cut with care.

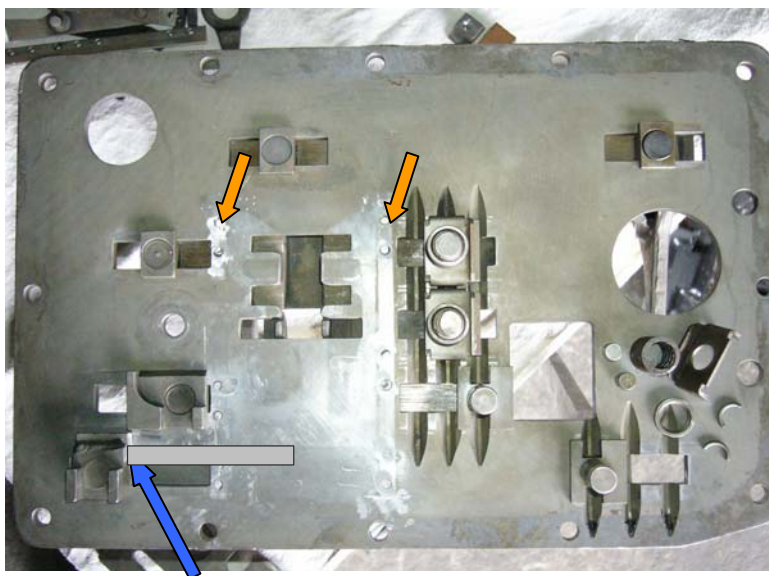
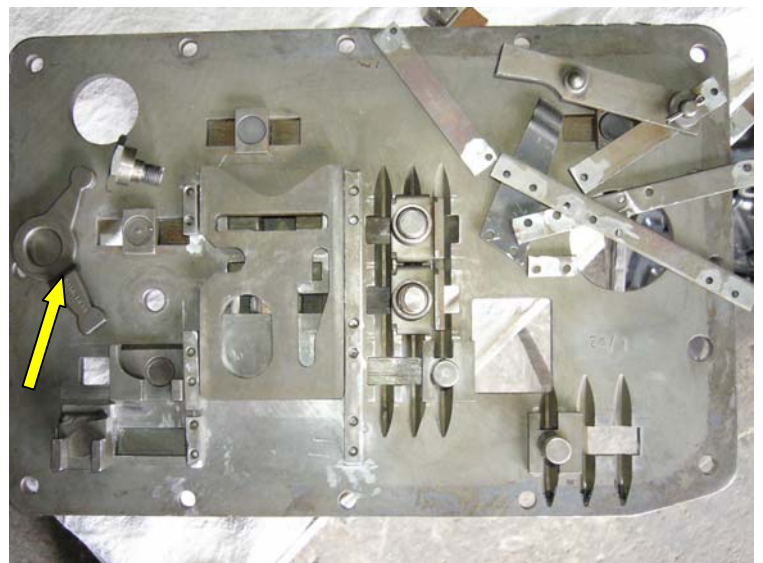
You see where my traces are.



Grind, chisel, take apart...

If the rivets are over the surface of the parts, regrind and help with the flat chisel to loosen the components.

Unbolt the eccentric bolt and counter screw to take the angle lever out of the way. The screw is secured with punches, but comes apart with no or little force.

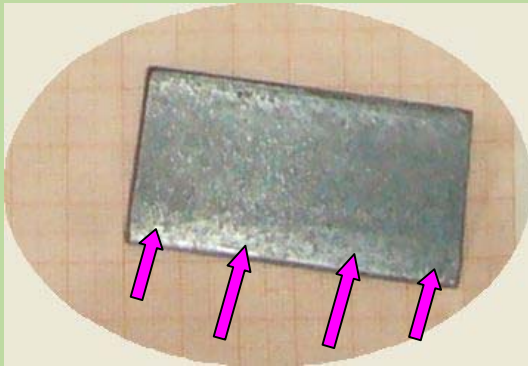
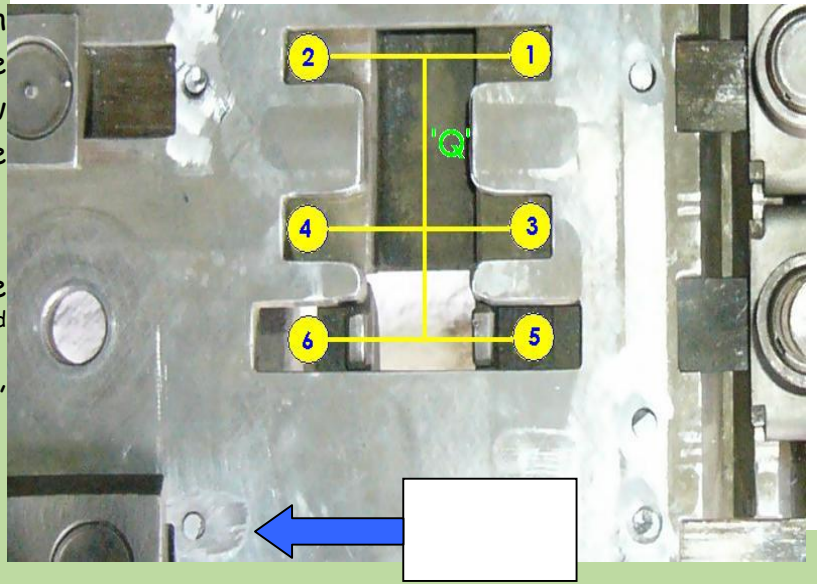



You can punch these two rivets ↓ out to the other side. The others can be left in place, due to its shape they can not fall out and the sliders hold them from the other side. If you want, spot weld them. Cut the square shaped pin of the security lock of the reverse gear (grey, w. blue arrow).

Now clean and smooth the area careful with a fine grinder or a polisher. Check that no rivet is over the surface level of the plate itself.

Remember how you shifted? The positions are mirrored because the main lever works over pivoting points. You also see the large slot where the traverse (Q) shifting point was. We don't need this 'double H' pattern because we will add a new lever for the high/low range selection later. This new lever will supplant the "Q" transverse shifting movement.

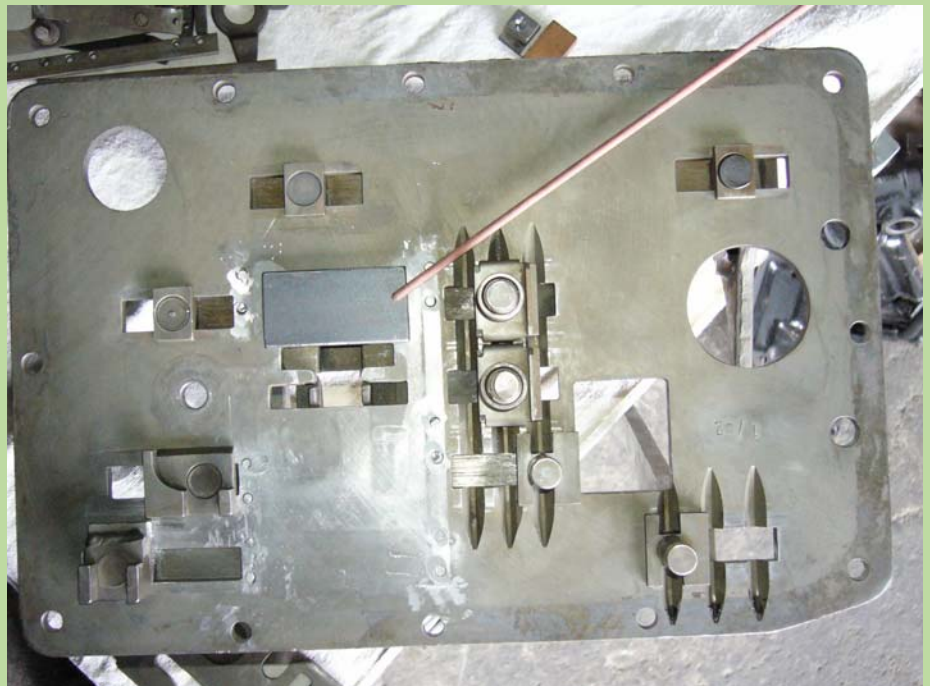
Now a piece of steel is needed to close the part of the 'Q' and 1st and 2nd positions. Prepare a 60mm by 30mm, piece, 4 to 4.5mm thick is o.k.



Smooth and polish the surface  where the finger of the main shift lever will slide along.

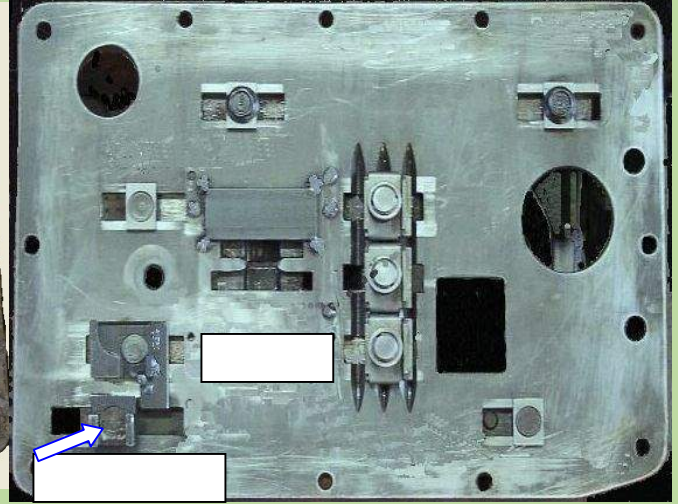
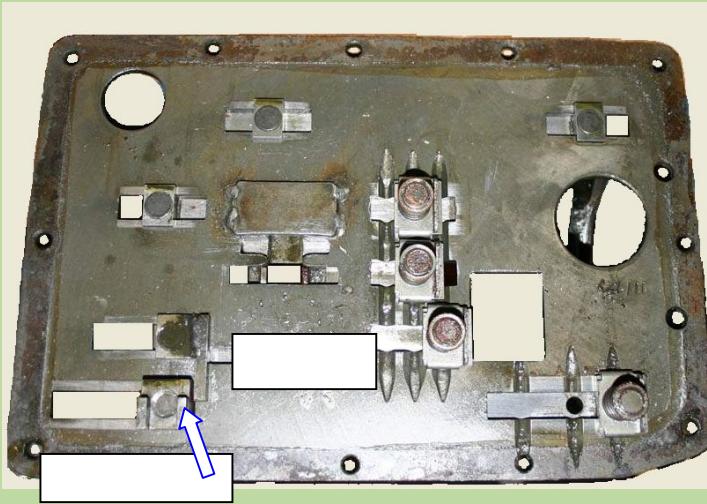
Align the steel plate well to the slot in the shift plate to guarantee a good and even shift feeling.

Weld at two or four points. Clean the plate, do not leave welding residues in the slots or on the surfaces.



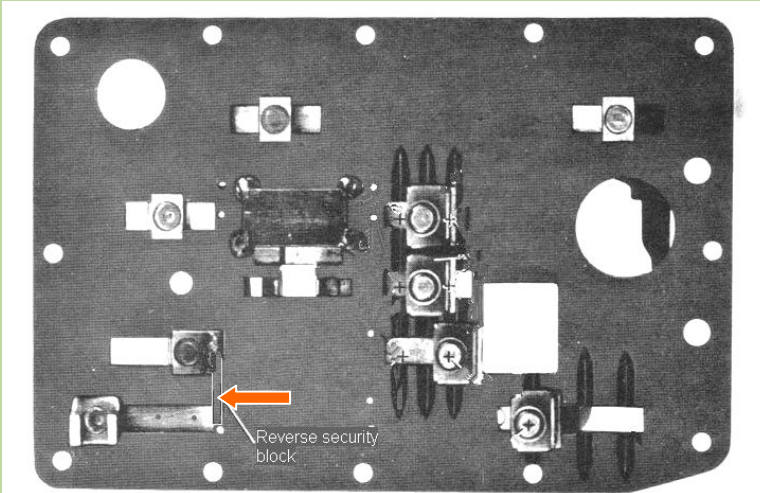
Examples:

Here are some different images of a shifting plate after welding the small steel plate:



This is an original from a U421 from Gaggenu

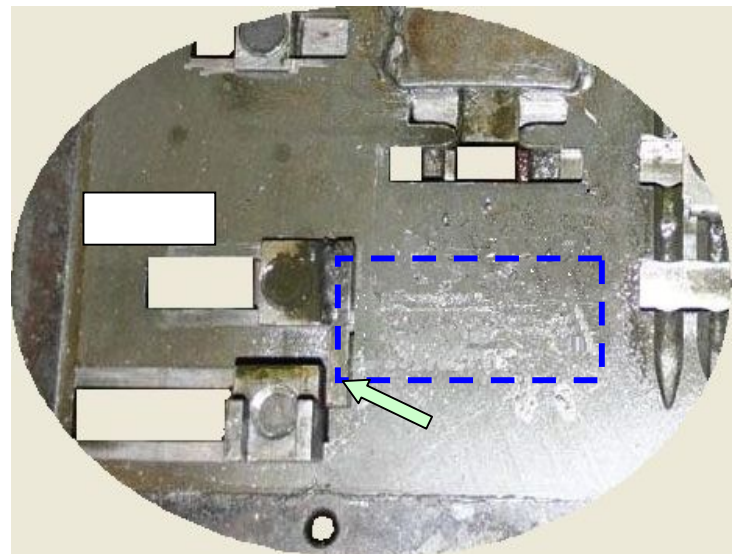
This one is an 'user' modified from a U404

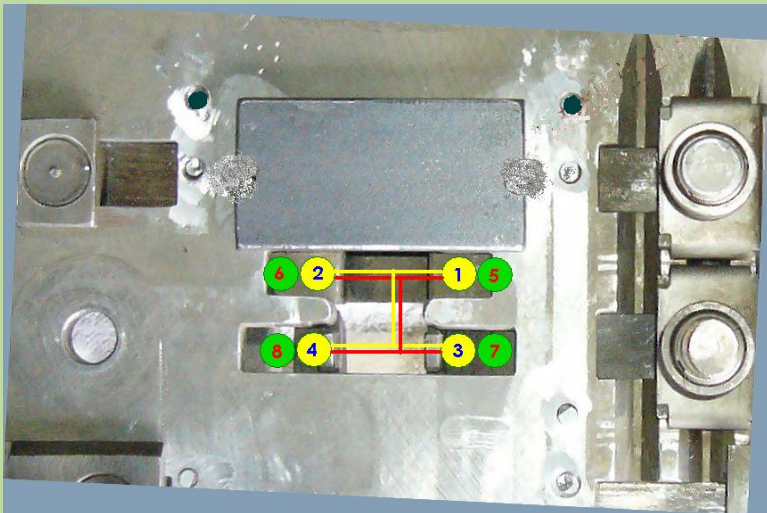


Another view from an old manual.....

Later we have to weld a piece of steel saved from the old fork to the high/low range slider so that you can go in to reverse gears only in the low range. It makes no sense to drive fast in reverse with a 4045. This lock secures the tranny against bad shifting. Reverse gears work only in the low range to avoid gear salad (!)

Do not do it at this stage, we first need to prepare the additional slider (blue pointed line); it works as a lock ↓ to allow only the 1st and 2nd gear work in reverse.



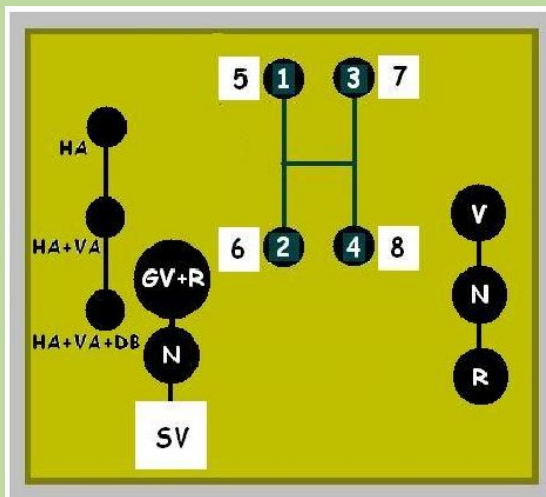


The new shift pattern looks this way. A nice and simple "H" as found in the stock 2x4 transmissions.

Shift lever	Shifting positions
1	1st-8th 1st to 8th gear
2	V R Forward Reverse 1st to 4th gear
3	GV + R SV Forward-range gear 1 to 4 and High range gear forward 5 to 8
4	O VA VA + AS Rear-wheel drive Four-wheel drive Four-wheel drive and differential locks
5	V + H V O H Front and rear pto Front pto Neutral Rear pto disengaged

A decal from an U421 ...

A new decal must be made for..... let's baptize the creature: " OctoTran " (?)



1 ... 8 = Erster bis achter Gang = First to eight gear

V = Vorwärts = Forward

N = Nullstellung = Neutral

R = Rückwärts = Reverse

HA = Hinterachse = Rear axle

VA = Vorderachse = Front axle

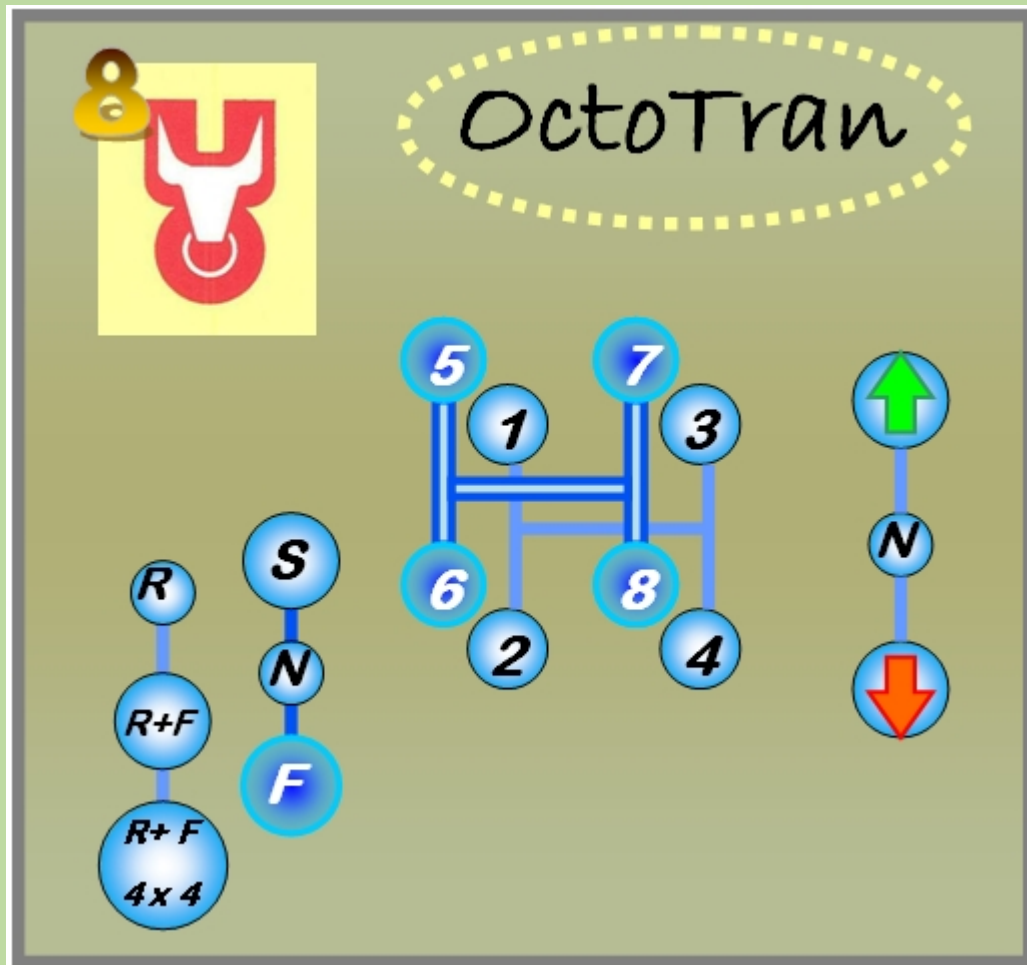
DB = Differentialblockierung = Diff lock

SV = Strasse vorwärts = Street forward

GV = Gelände vorwärts = Off road forward

This is a conservative design, an 'old mog' style decal ... (imitation).

Perhaps the " OctoTran " need a special "new" decal : =^D



Legend:

1.....4 = Off road gears, slow.

5.....8 = Street gears, fast(er).

Green arrow = Forward

Red arrow = Reverse

N = Neutral position

S = Slow

F = Fast

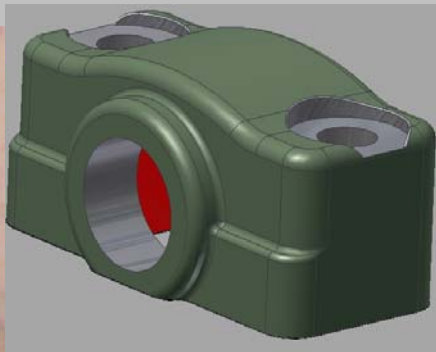
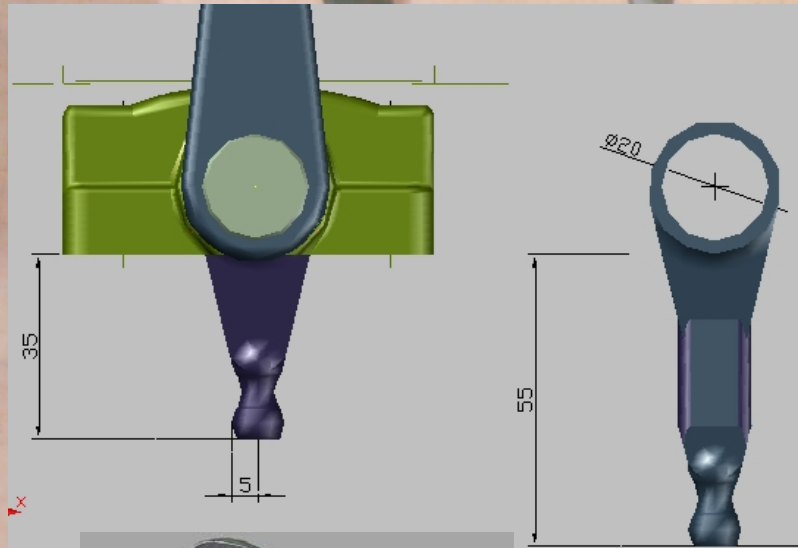
R = Rear axle

F = Front axle

R+F 4x4 = Rear and front axle with differential lock

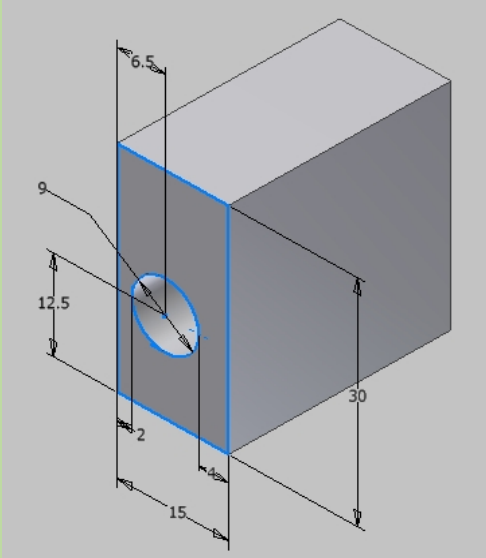
.....well, everybody could be creative now and design his decal to the individual tastes.

Important: Before shifting from high in to low range, stop the vehicle (as usual). Shifting from the low range in to the high range can be done while driving normally.



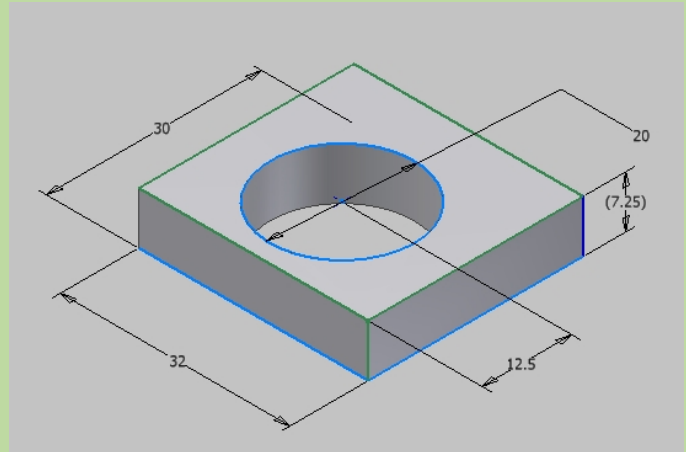
An alternative to construct a lever is - for example - using simple pieces of steel:

Take the measures from the drawings:

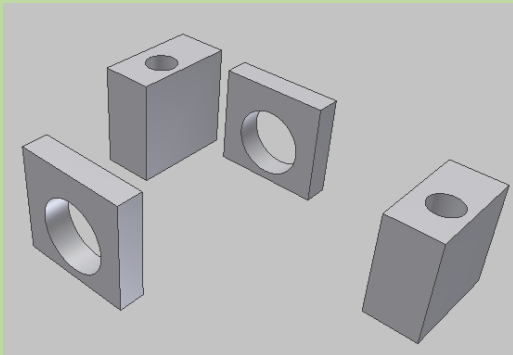


← Two (2) 30mm x 30mm x 15mm piece with a 9mm bore

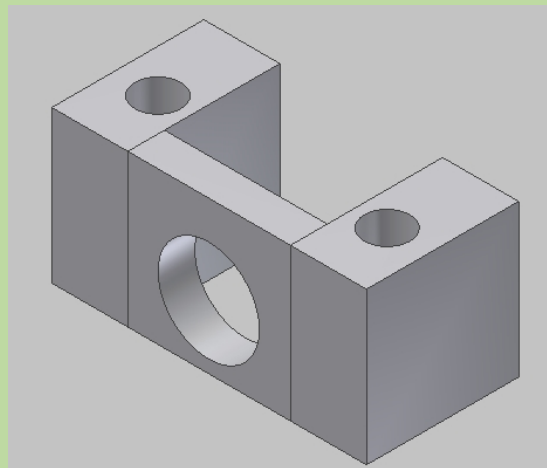
Two (2) 32mm x 30mm x 7.25mm pieces with a 20mm bore ----->



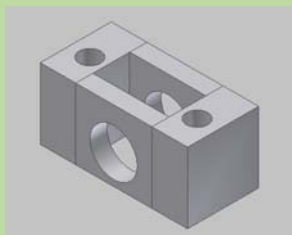
Assemble and weld ...



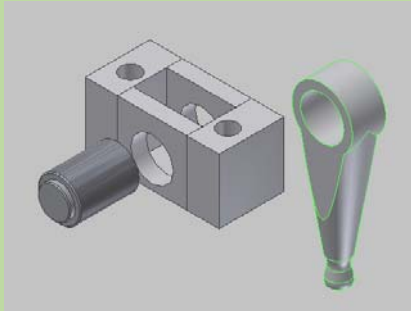
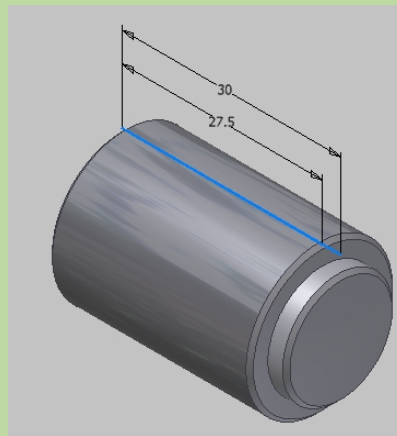
... this way ...



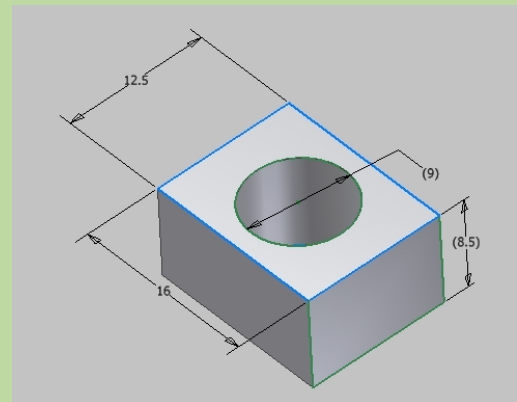
... you get a block for the shift fork assy.



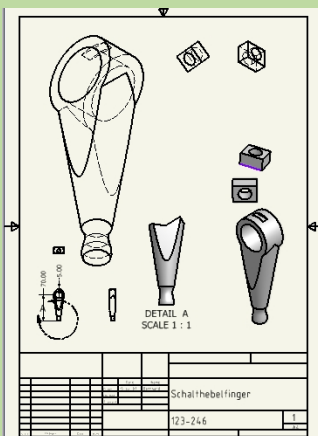
Fire your lathe and fabricate this small shaft.
The diameter is 20mm. The small landing is to
weld the shaft to the sidewall of the block
later .



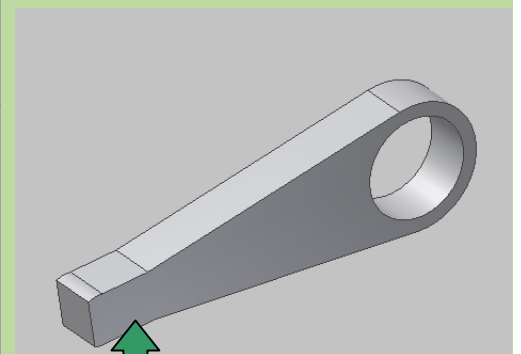
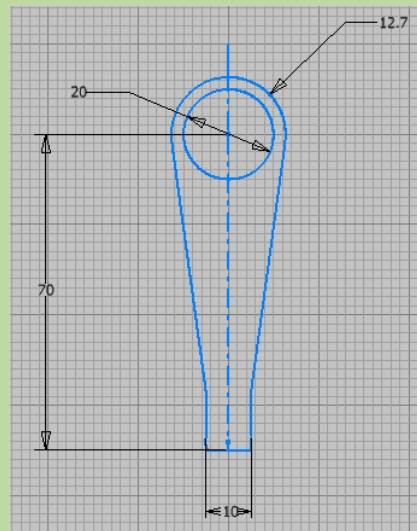
Now fabricate a receiver piece for the shift lever:
(16mm x 12.5mm x 8.5mm, the bore is centered). →



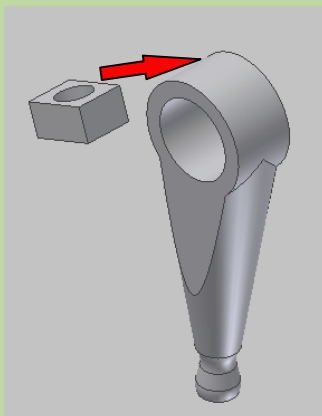
The shift finger could be very simple or more or less
elaborated and detailed. (See also page 21)



This very simple type will do the work too:



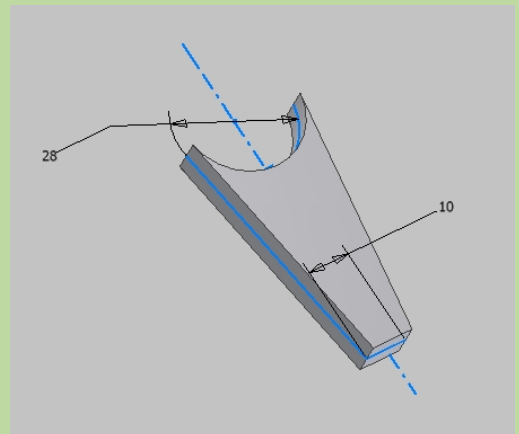
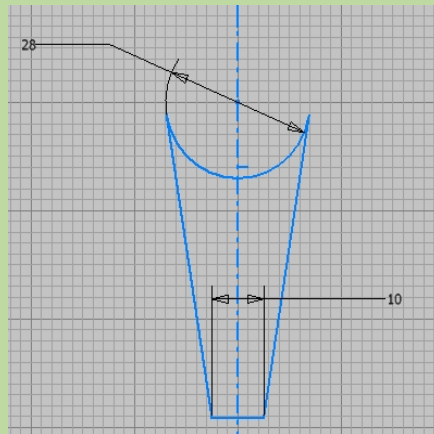
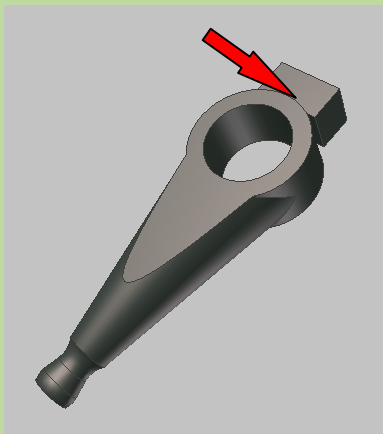
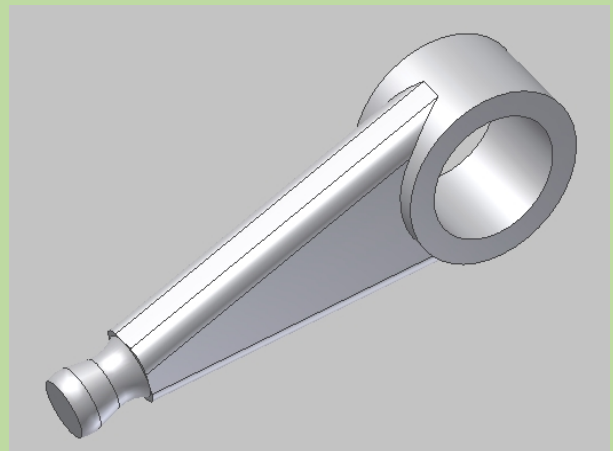
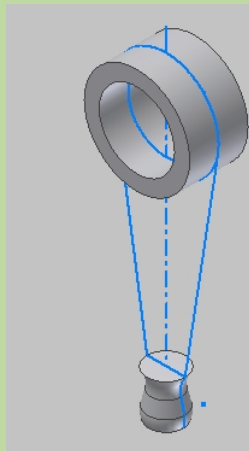
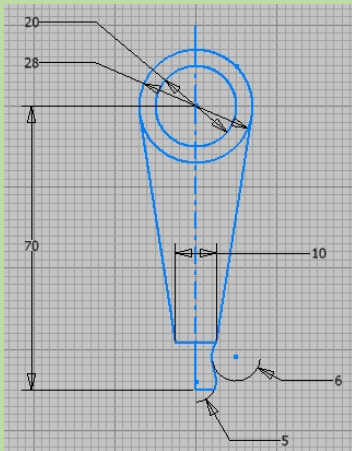
Lathe this end to the
shape of the original.



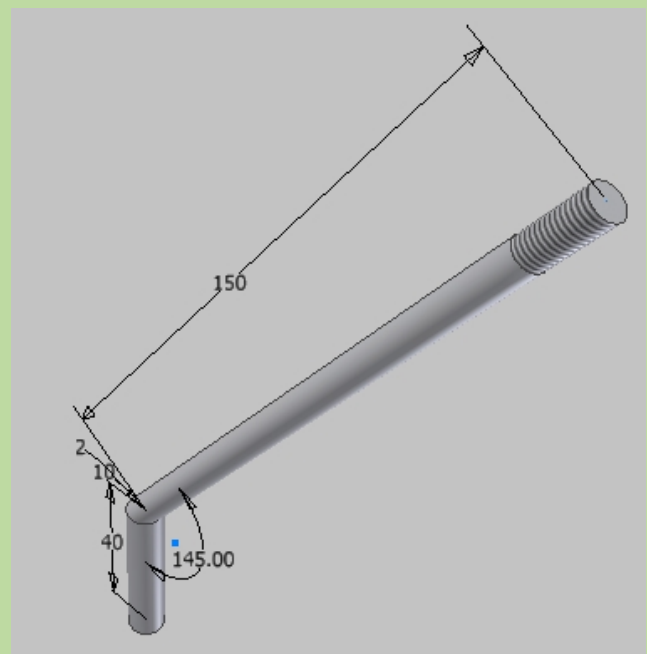
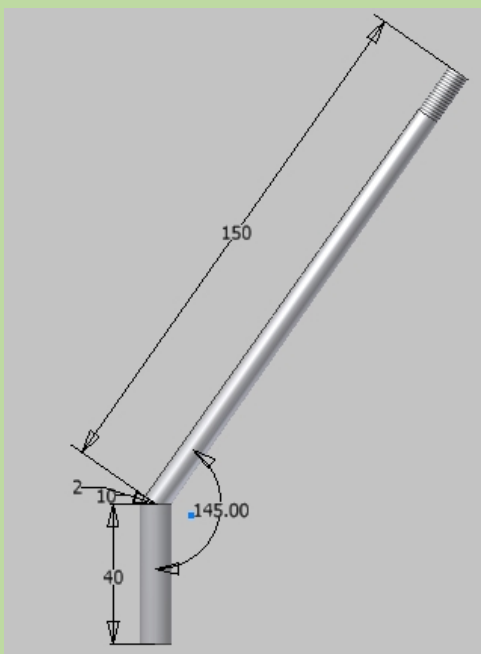
←----- Weld the receiver part to the (70mm) shift finger

Some other possible steps to make a shift finger.....

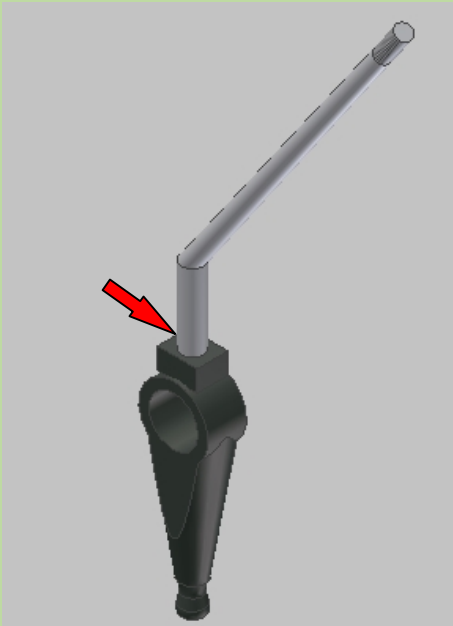
To make the shift finger I took again material from what remains from the old shift fork of the PTO, it is nice steel, flat, smooth and 10mm thick. That is useful.



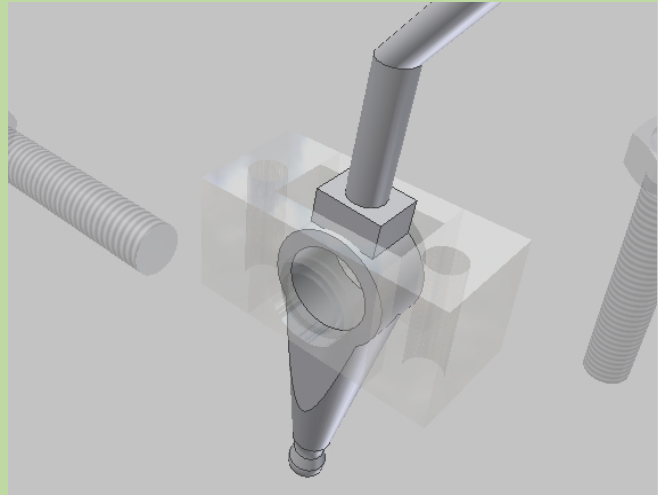
Now make a lever modifying a spare lever or bend something (Φ 9mm) useful into shape:



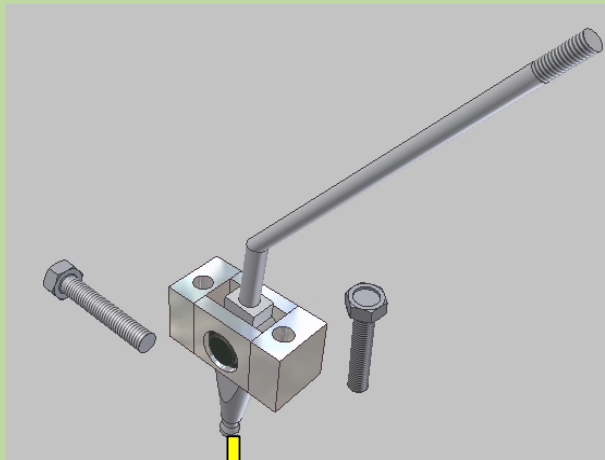
(Sorry, no more real pics (no Mog nearby) - the Mog is sold).
This is the lever & finger assy,



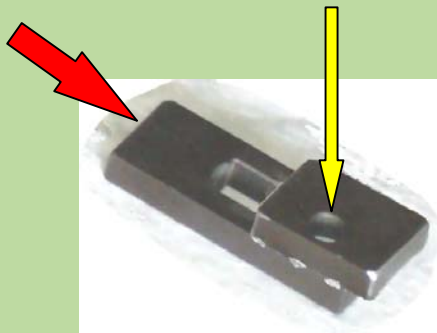
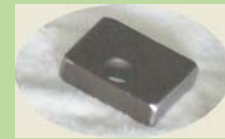
The assembly in the fabricated block.



The new finger fit into the receiver on the main shift plate (yellow arrow), This must be measured and arranged on the shift plate and then welded.

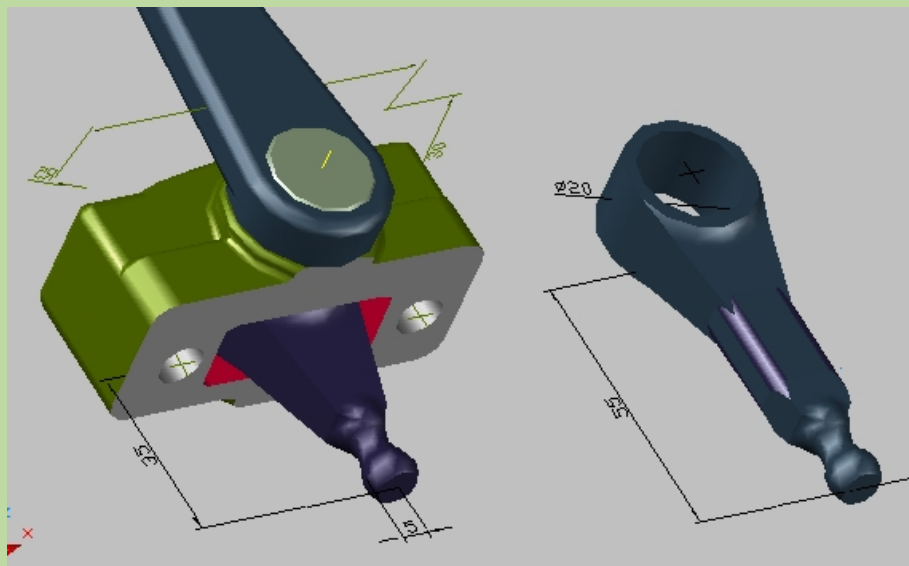


The counter part to actuate the high/low slider on the shift plate is made of the two pieces cut from the shift fork (s. page 13).

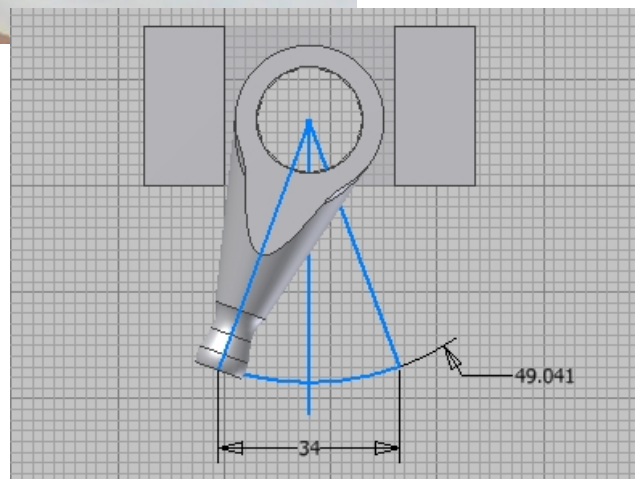
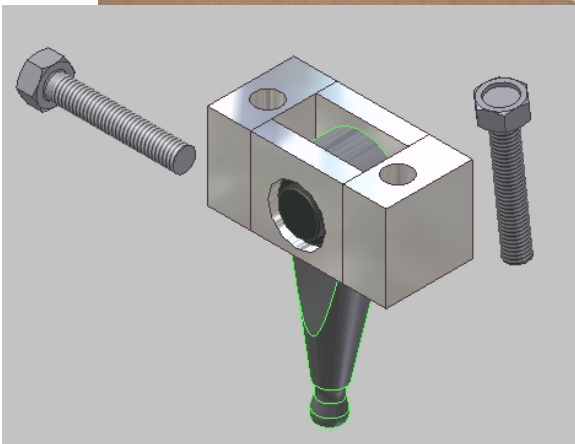
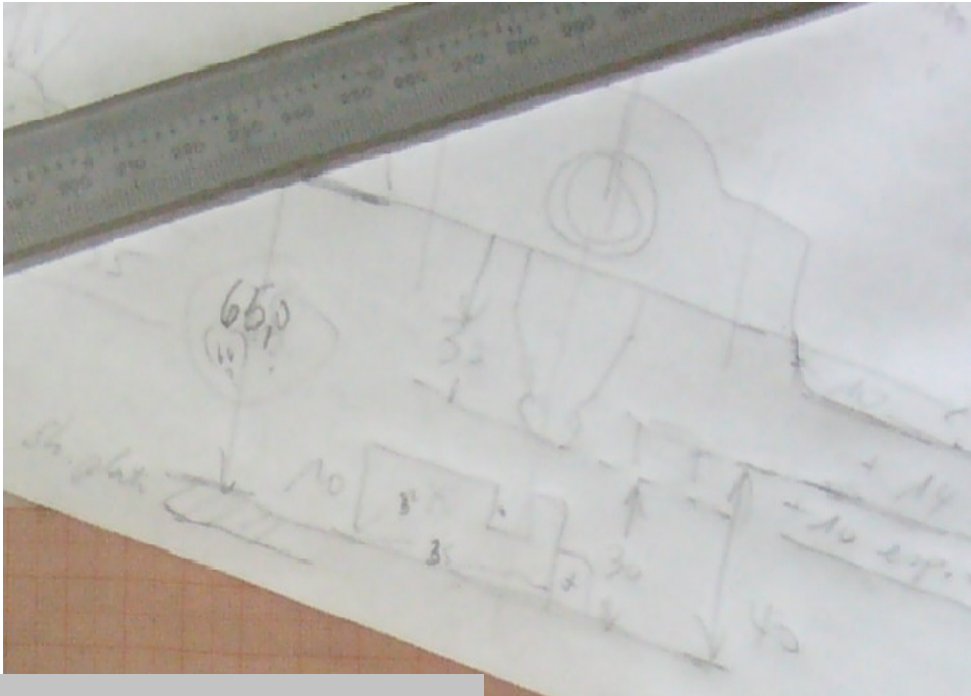
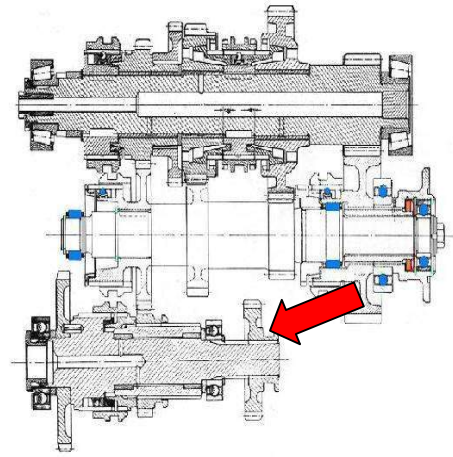
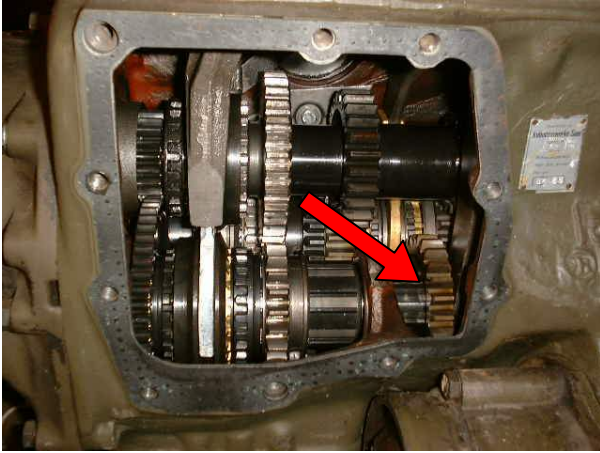


This part will be welded here (red arrow) to the slider of the high/low range shift fork on the shift plate. The yellow arrow points to where the finger of the additional lever connects (see page 25).

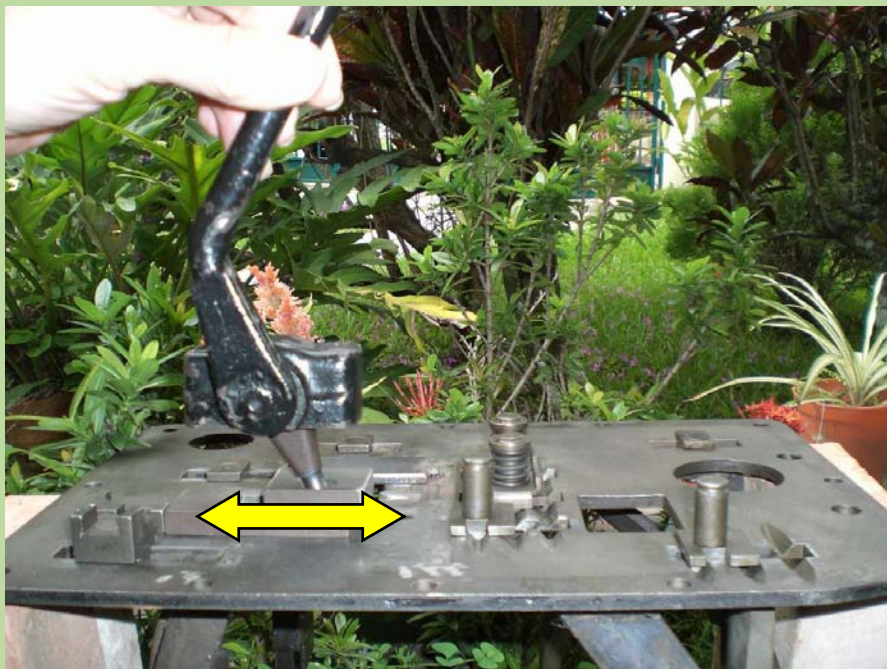
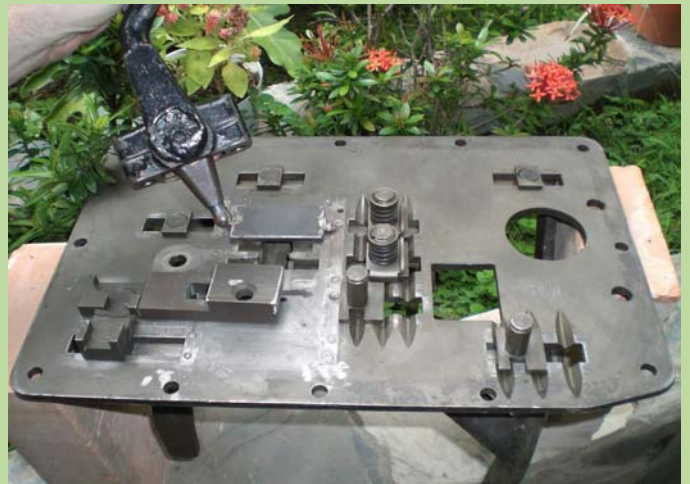
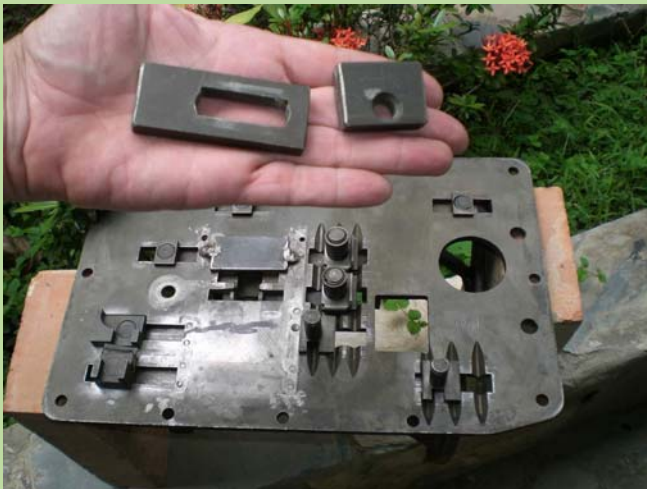
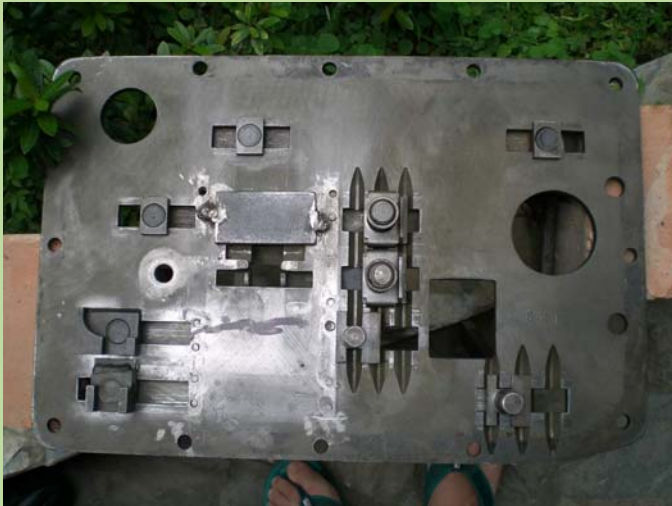
If you have a shop, you perhaps want to fabricate this part from scratch (new) and mill a piece of steel, sure more elegant. (This one is only an example). I'm using up some of the left over parts and material from the modified shifting cover and trying to keep the things simple and easy!



The (useless) pinion of the PTO is to be limited from moving backwards with a little weld point or a punch on the shaft with a chisel, so it could not slide and not touch the housing. (Arrowed red)



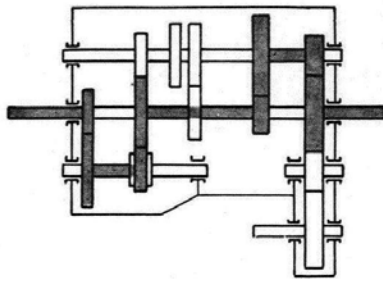
Some other earlier pictures from the shift plate during the work:



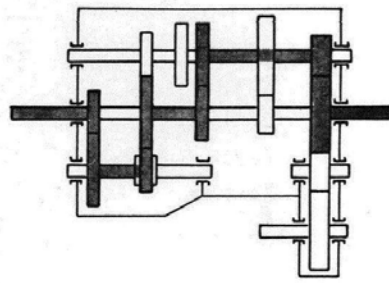


Power flow in various gears of the main transmission after modification :

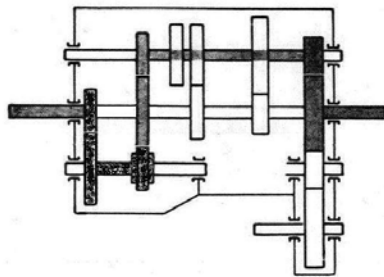
1st Gear



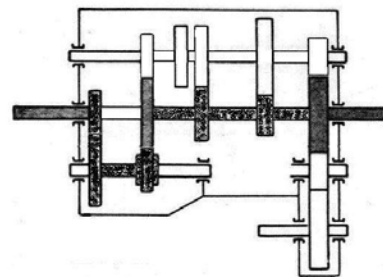
2nd Gear



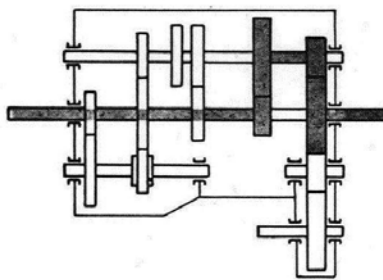
3rd low Gear (added)



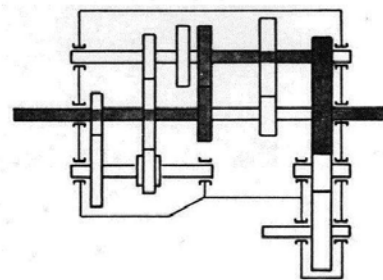
4th low Gear (added)



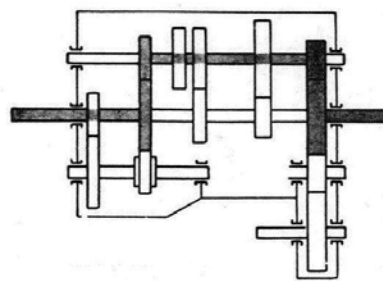
3rd Gear



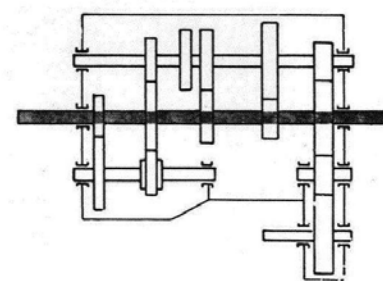
4th Gear



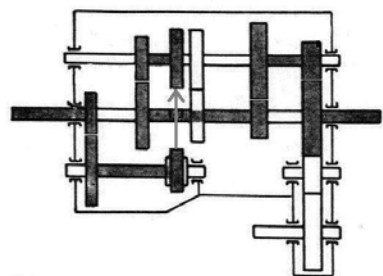
5th Gear



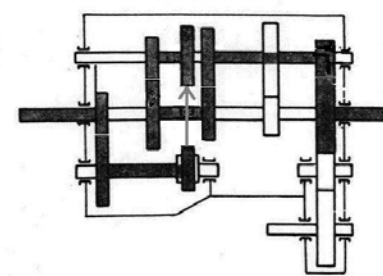
6th Gear



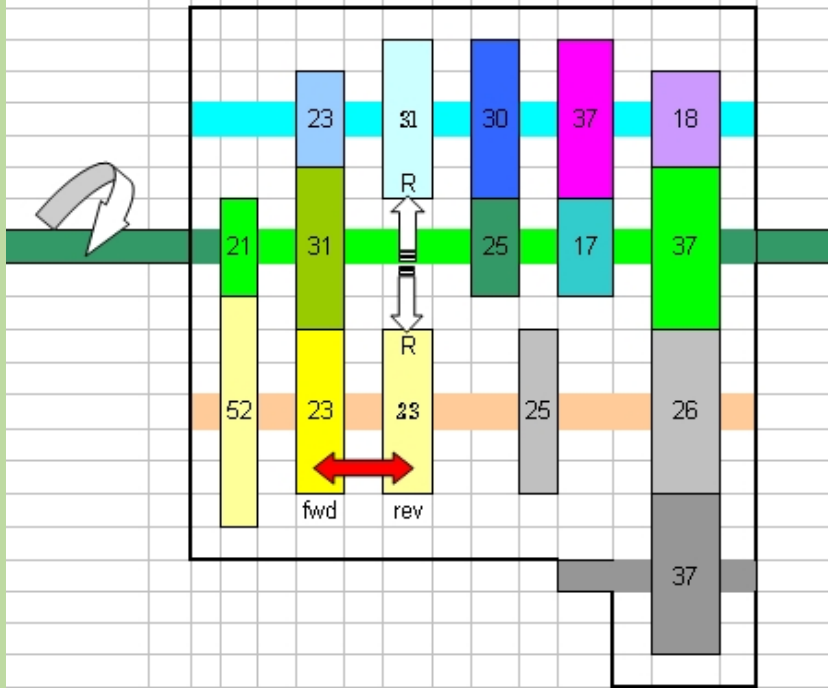
1st Reverse Gear



2nd Reverse Gear



[Empty box]



Forward gears

Gear (Range)	Ratio	Speed(max.) km/h
1st speed low	14.931	7.130
2st speed low	8.232	13.280
3st speed low	5.090	21.000
4st speed low	3.337	31.000
5st speed high	4.474	24.474
6st speed high	2.467	44.400
7st speed high	1.525	72.030
8st speed high	1.000	95.00

Reverse gears

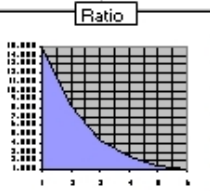
1st r. low	20.125	5.44
2st r. low	11.096	9.87

Axle ratio (tot.)

7.56

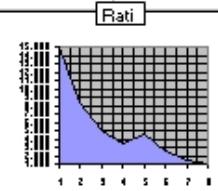
Modification of the UG1/11 shift plate from 6 - to 8 fwd speeds:

Forward Gears	Original Ratio /1	Max. km/h
(L) 1	14.931	7.130
(L) 2	8.232	13.280
3	4.473	24.474
4	2.466	44.400
5	1.525	72.030
6	1.000	95.000

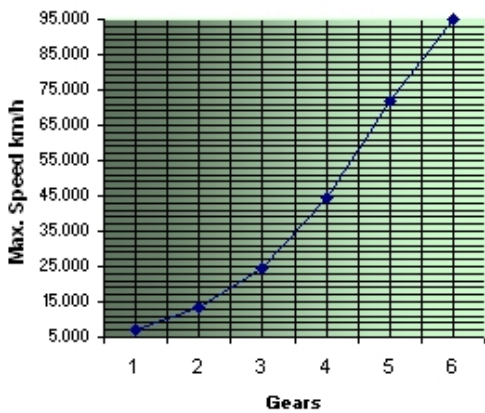


Forward Gears	Extended Ratio /1	Max. km/h
(L) 1	14.931	7.130
(L) 2	8.232	13.280
(L) 3	5.090	21.000
(L) 4	3.337	31.000
5	4.474	24.474
6	2.466	44.400
7	1.525	72.030
8	1.000	95.000

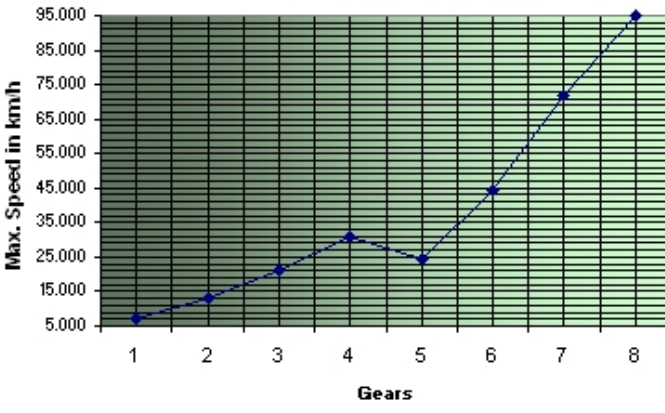
- Low range
- High range
- New gears & speeds

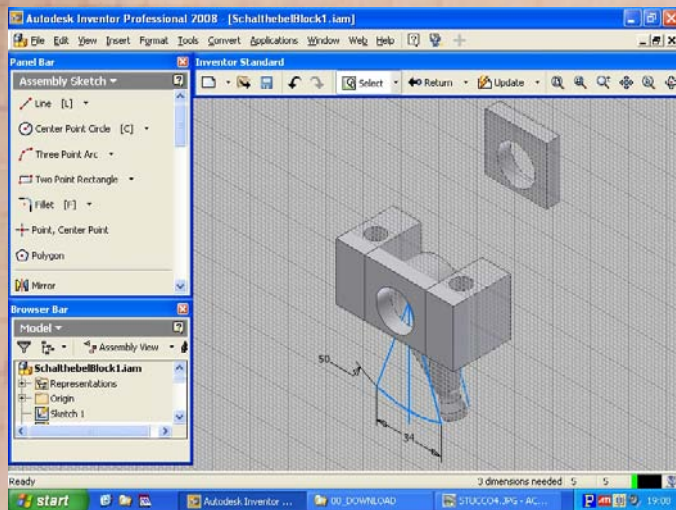
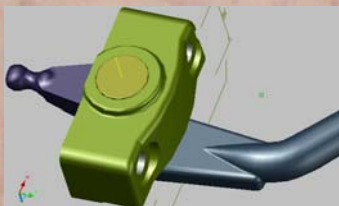
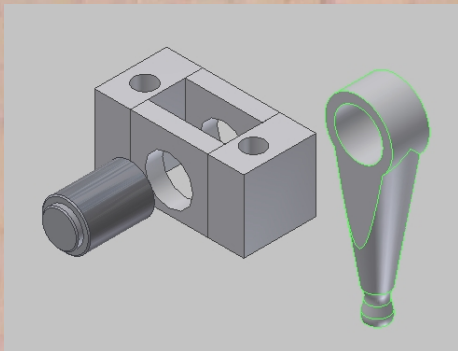
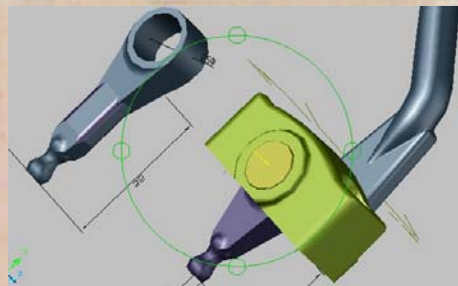
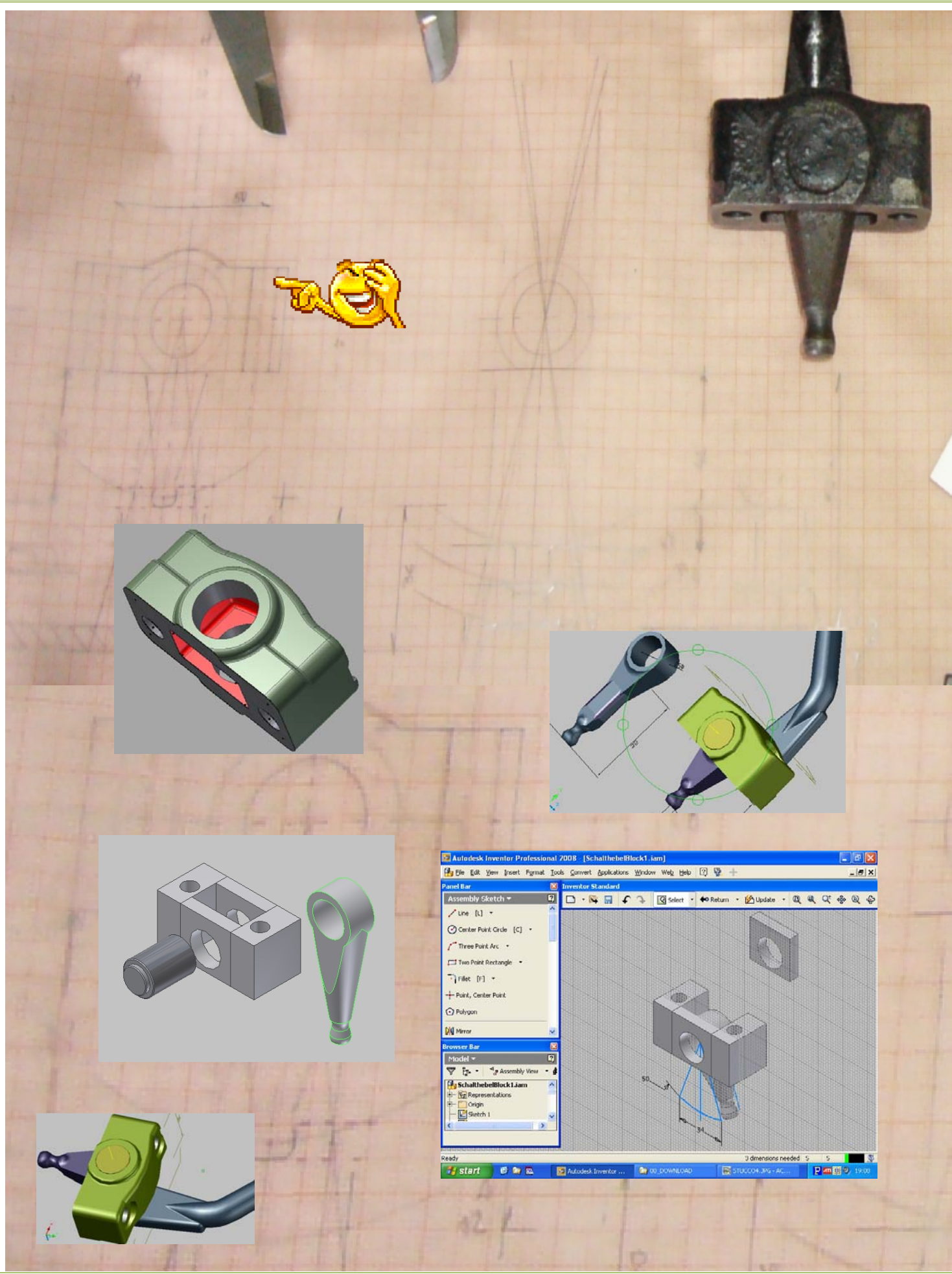


Original Speeds UG1/11



Speeds with modified Shift Plate







Section 4– Mercedes Benz M180 Overhaul Manual

ATS TECHNICA
ELECTROGRAPHICS

Table I - Vehicle Identification

- 1 - Type Plate
- 2 - Chassis # on Passenger Side Frame
- 3 - Cab Number
- 4 - Engine Plate Identifier

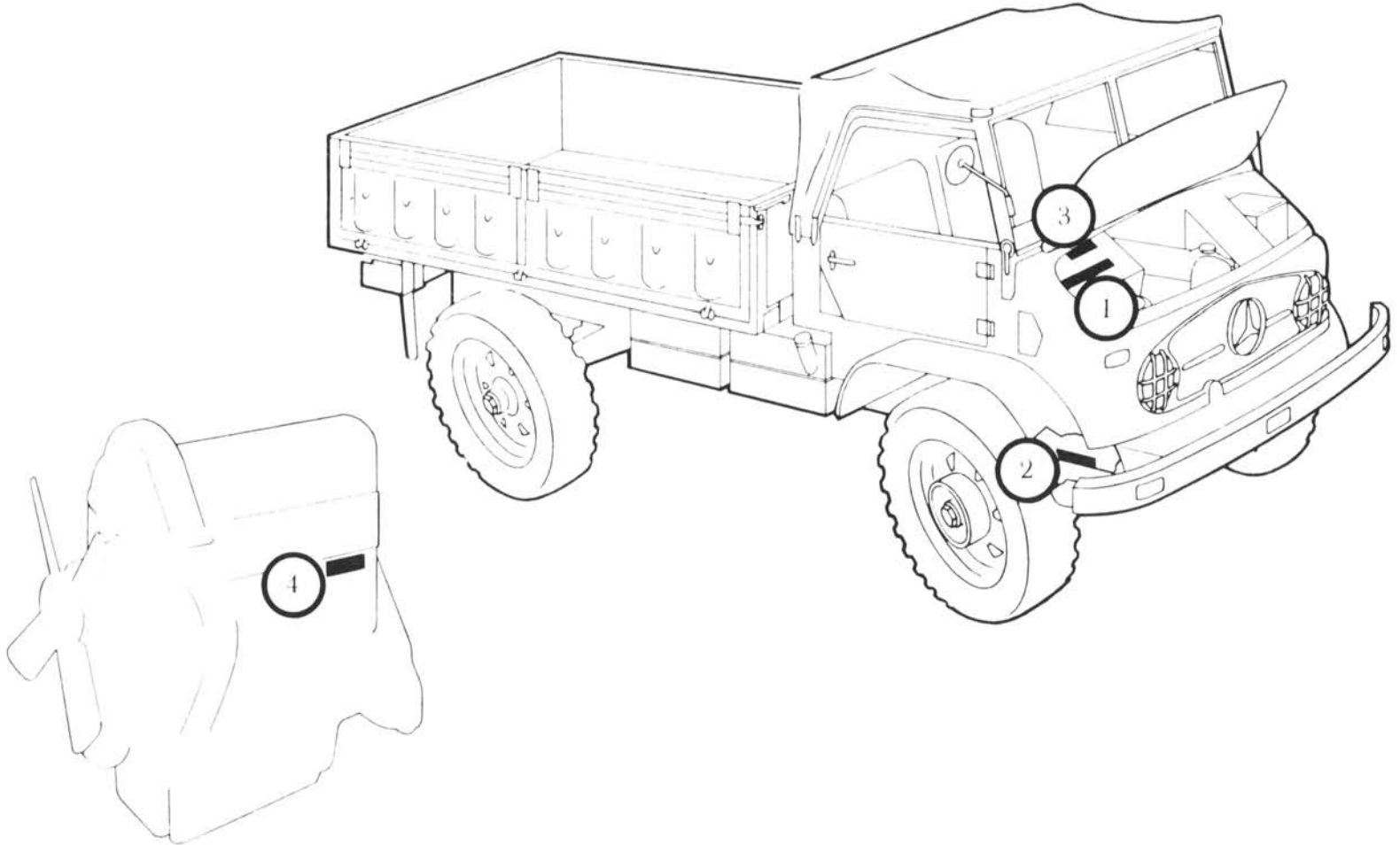


Table II - Major Component Identifiers

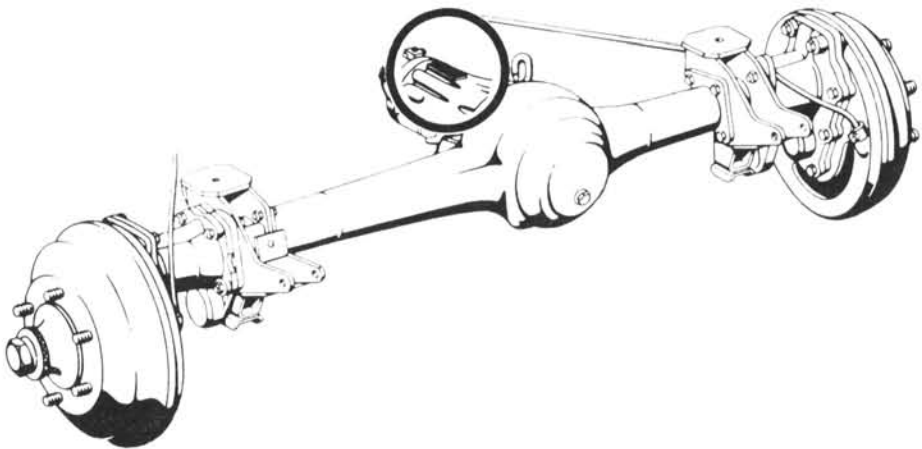
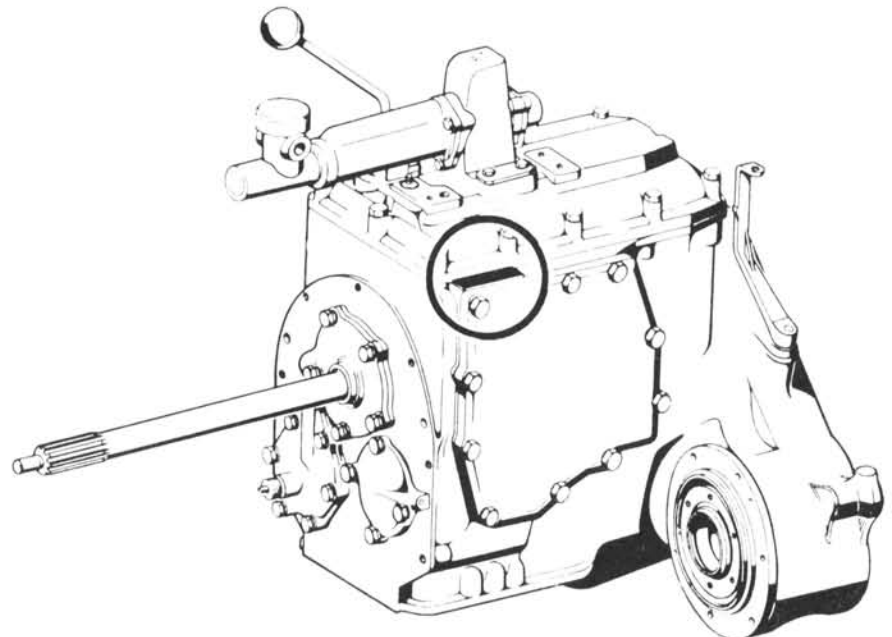
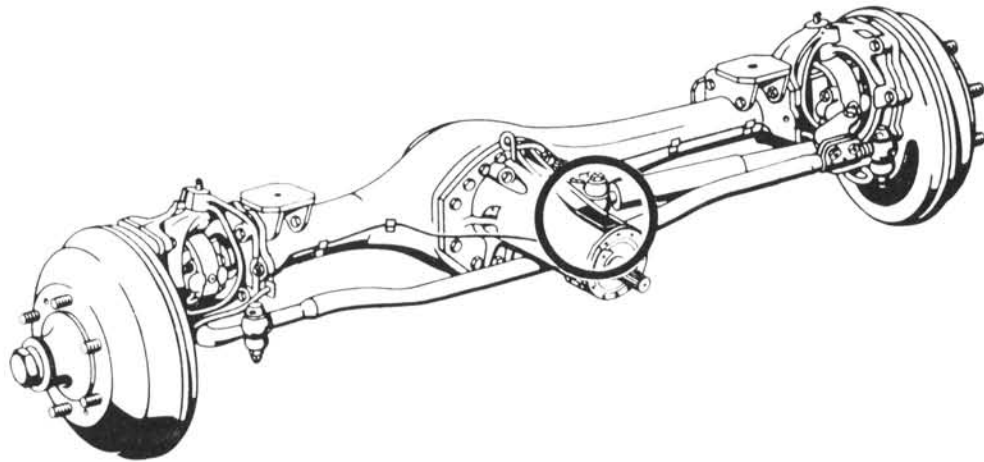


Table 1 - Front Axle - Group 01

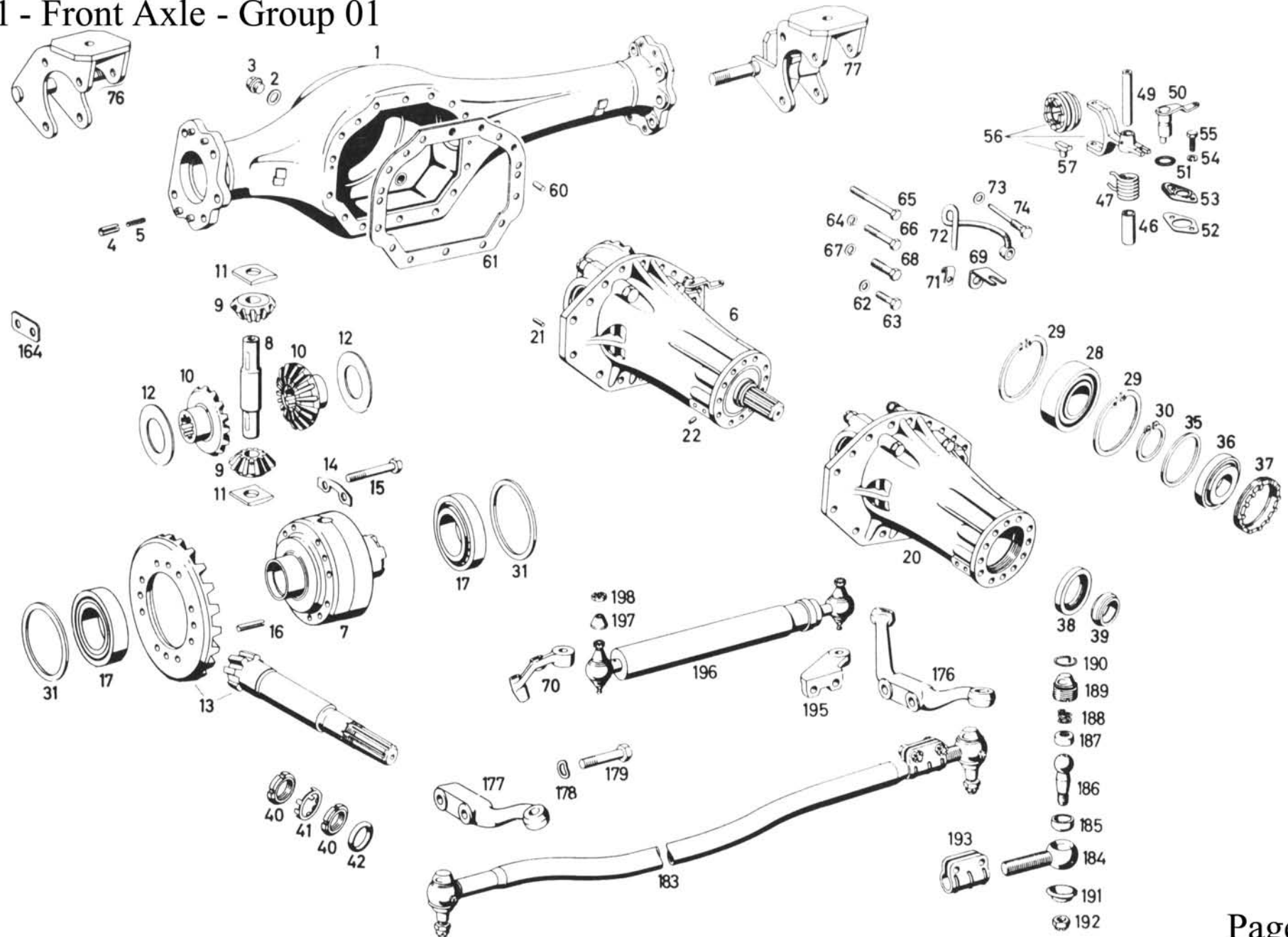


Table 1 - Front Axle - Group 01

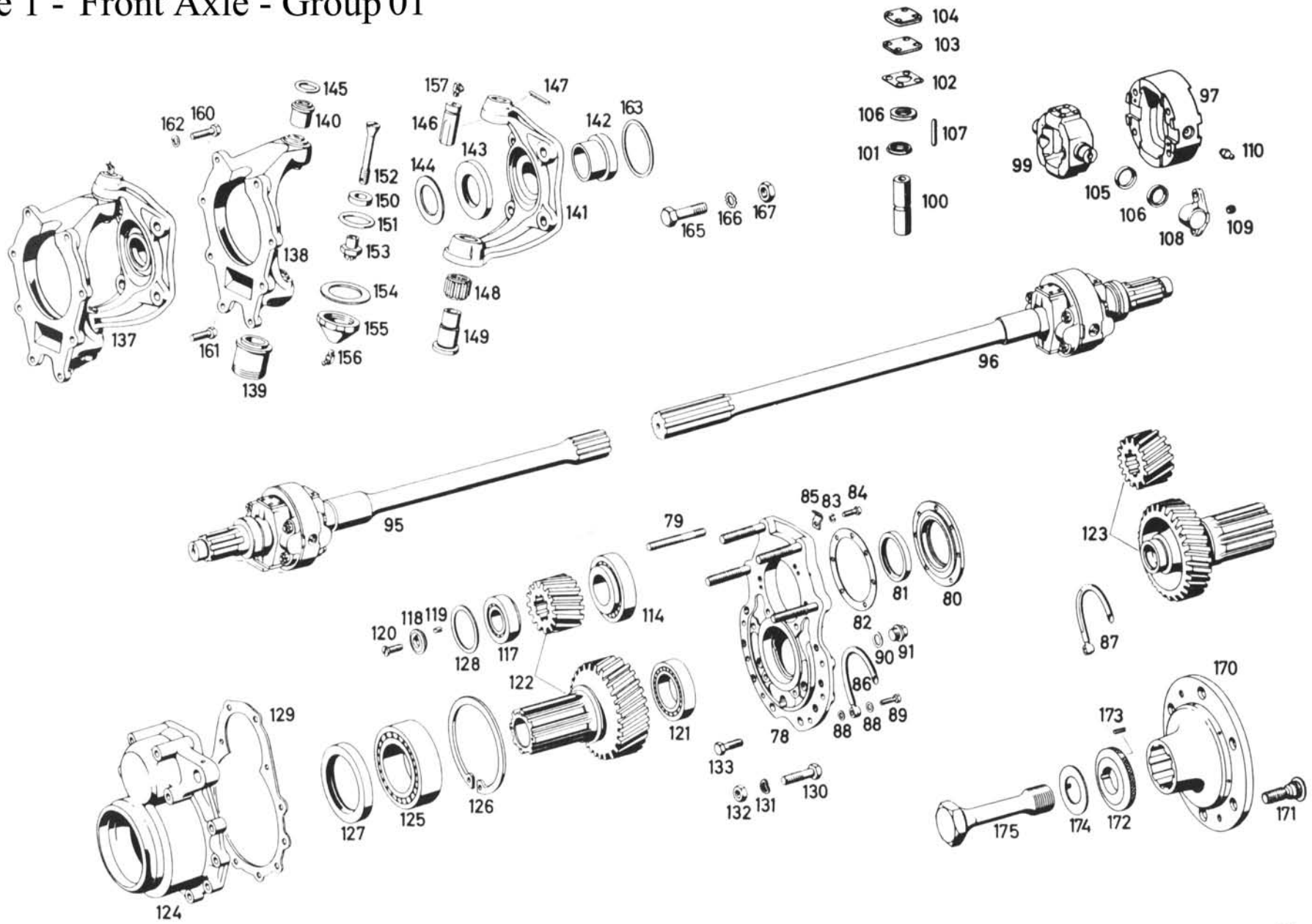


Table 2 - Front Wheel Brake - Group 01

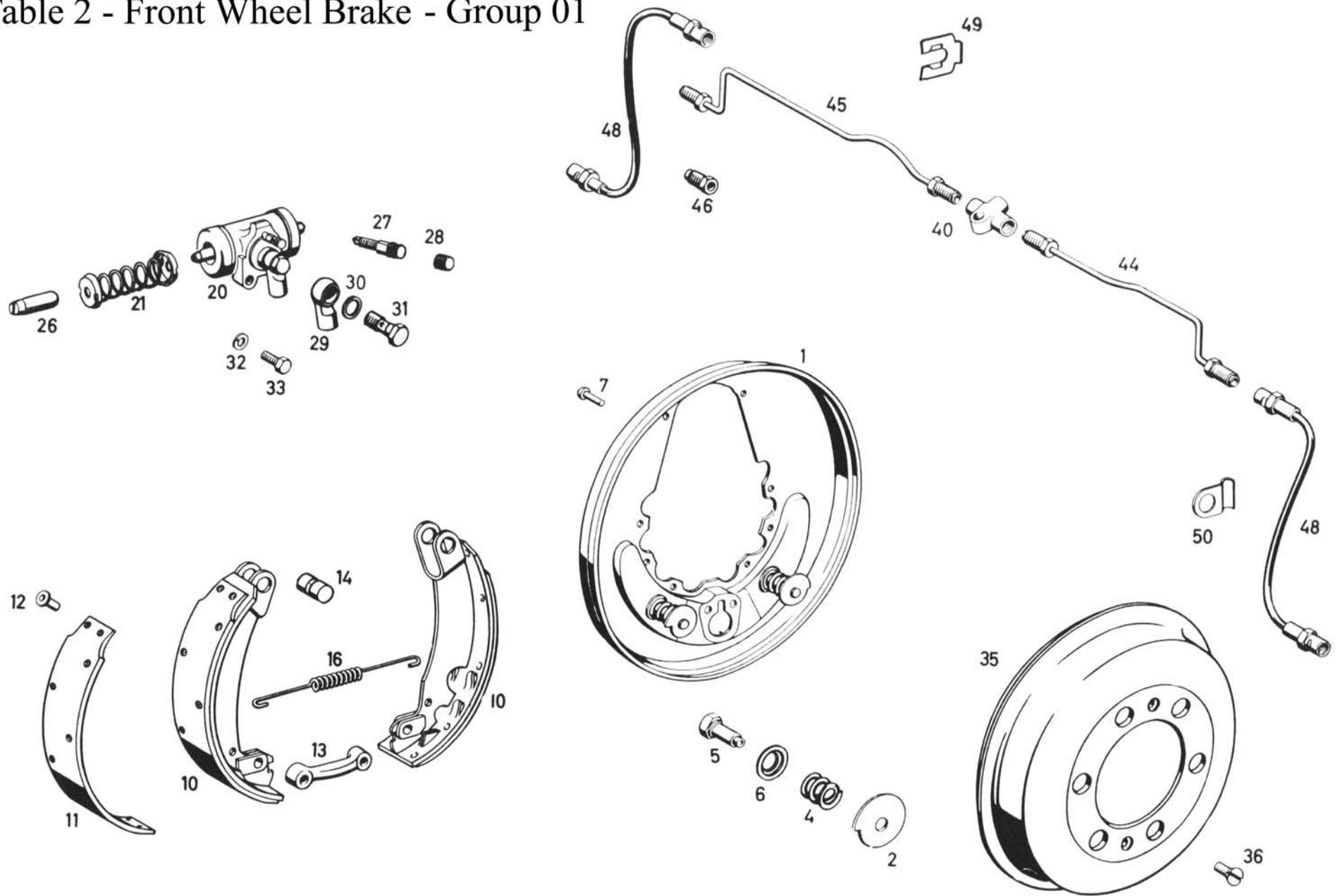
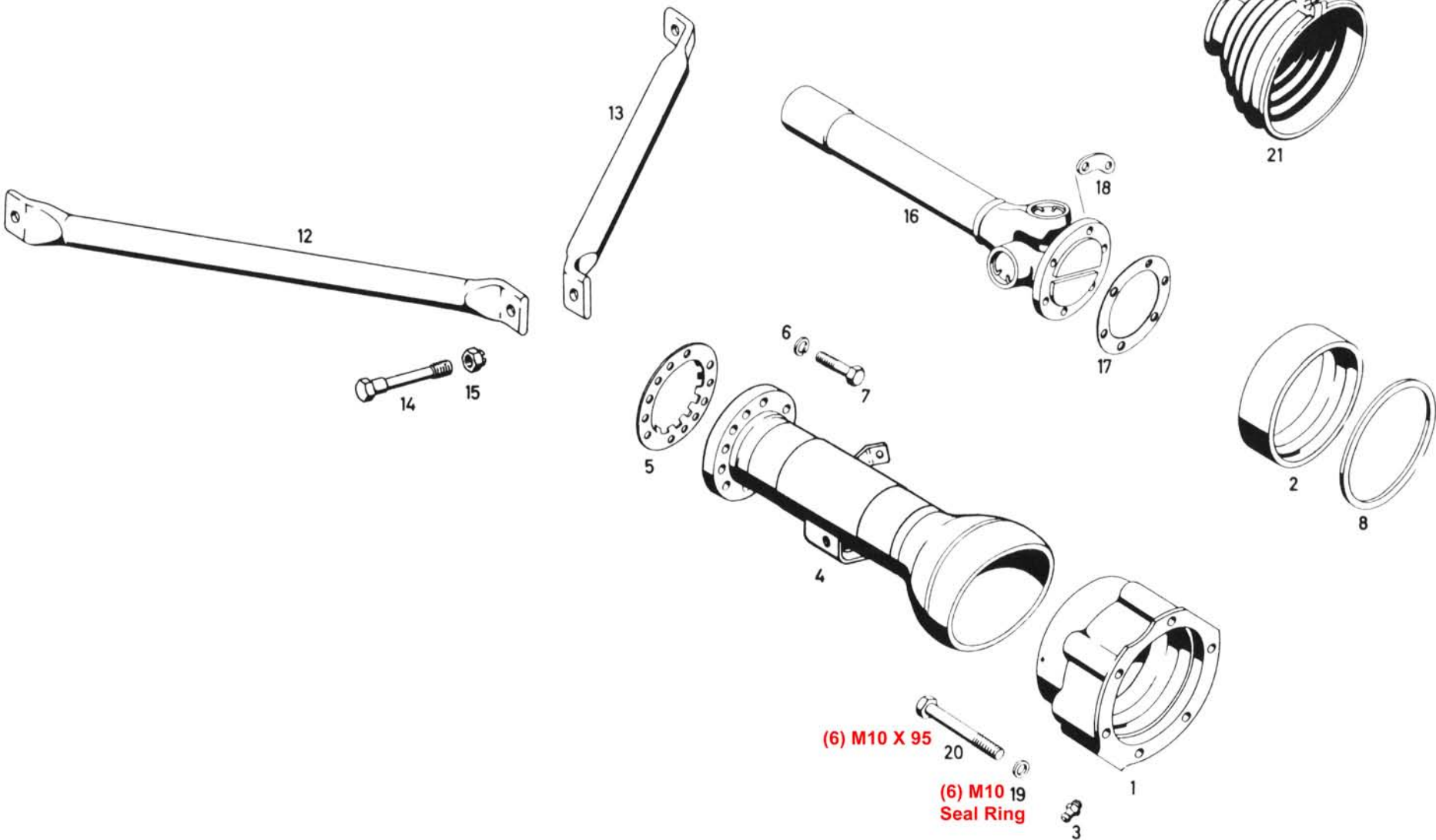


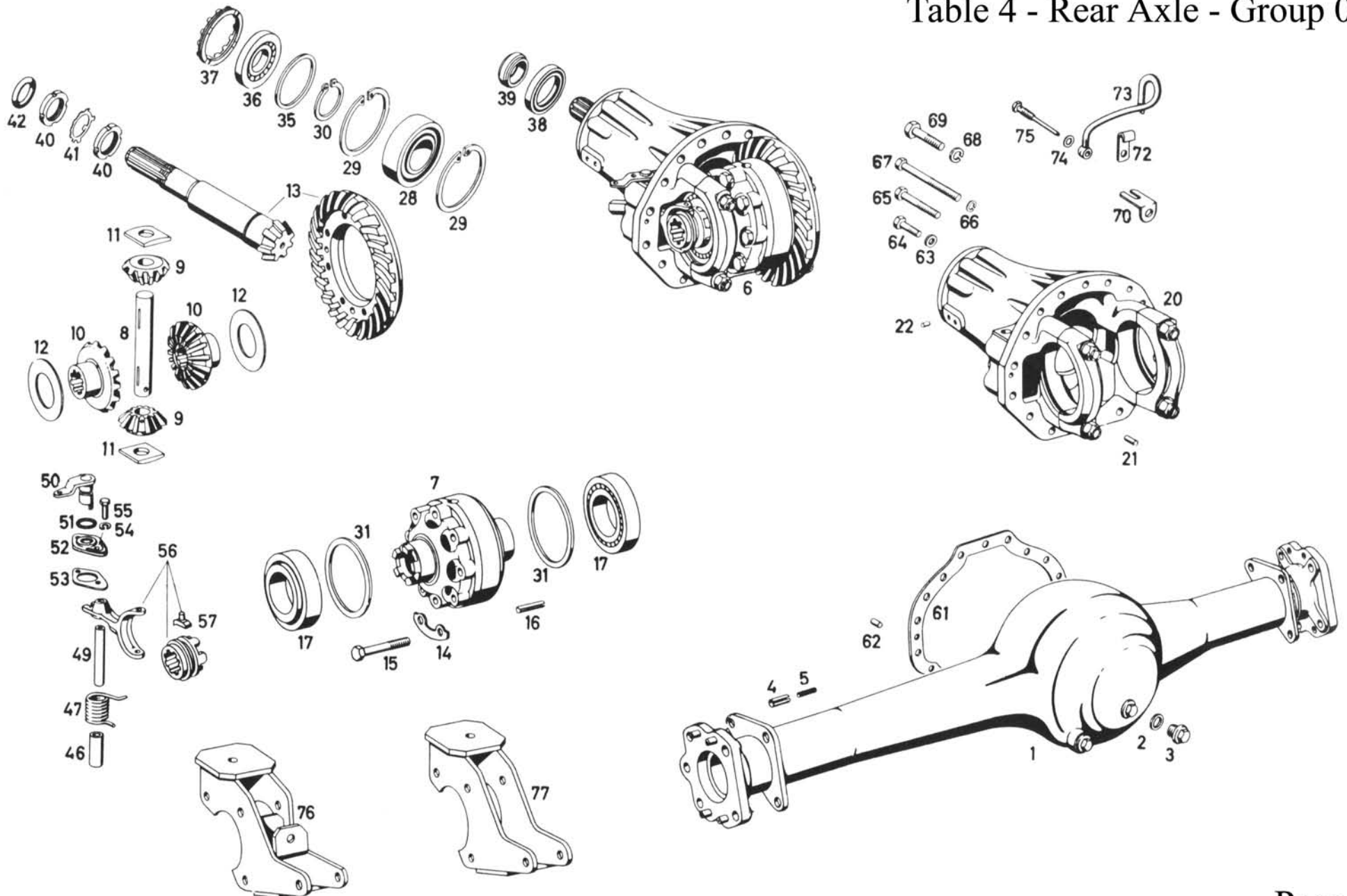
Table 3 - Front Drive Shaft - Group 01



- (5) M6 Nut
- (5) M6 Washer
- (5) M6 Lock-Washer
- (5) M6 X 25 Bolt

- (6) M10 X 95
- (6) M10 19 Seal Ring

Table 4 - Rear Axle - Group 02



See table for inboard fasteners

Table 4 - Rear Axle - Group 02

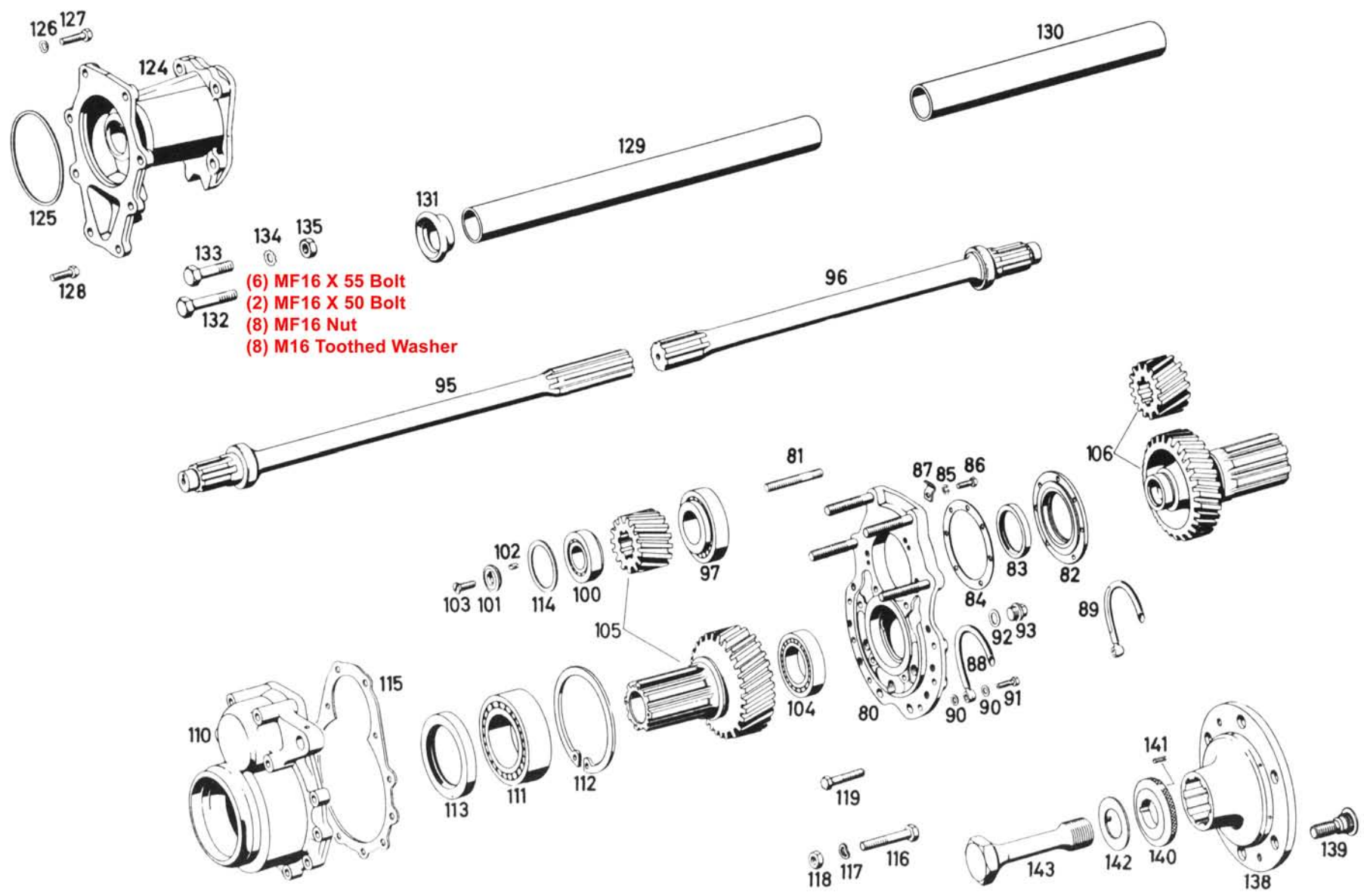
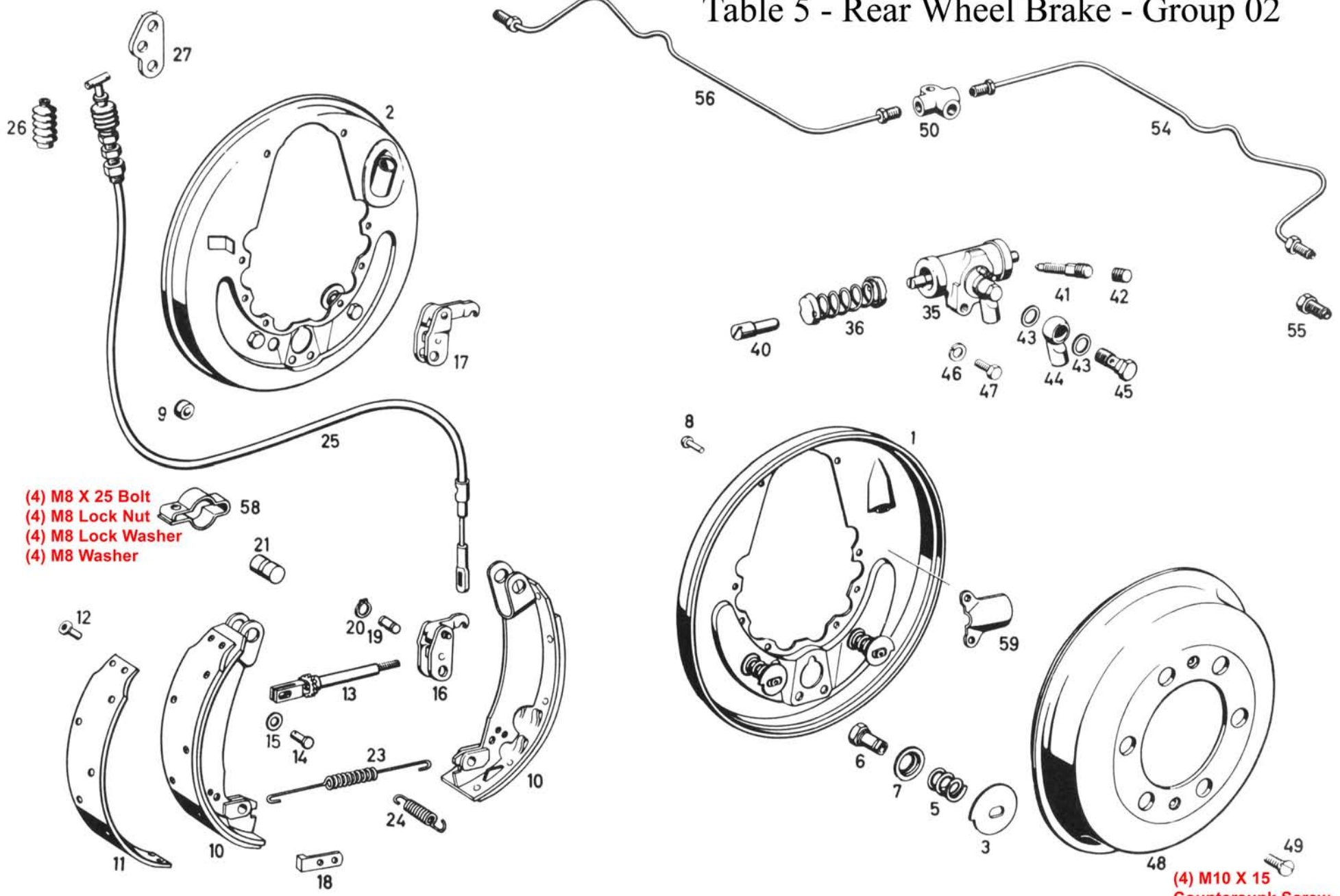


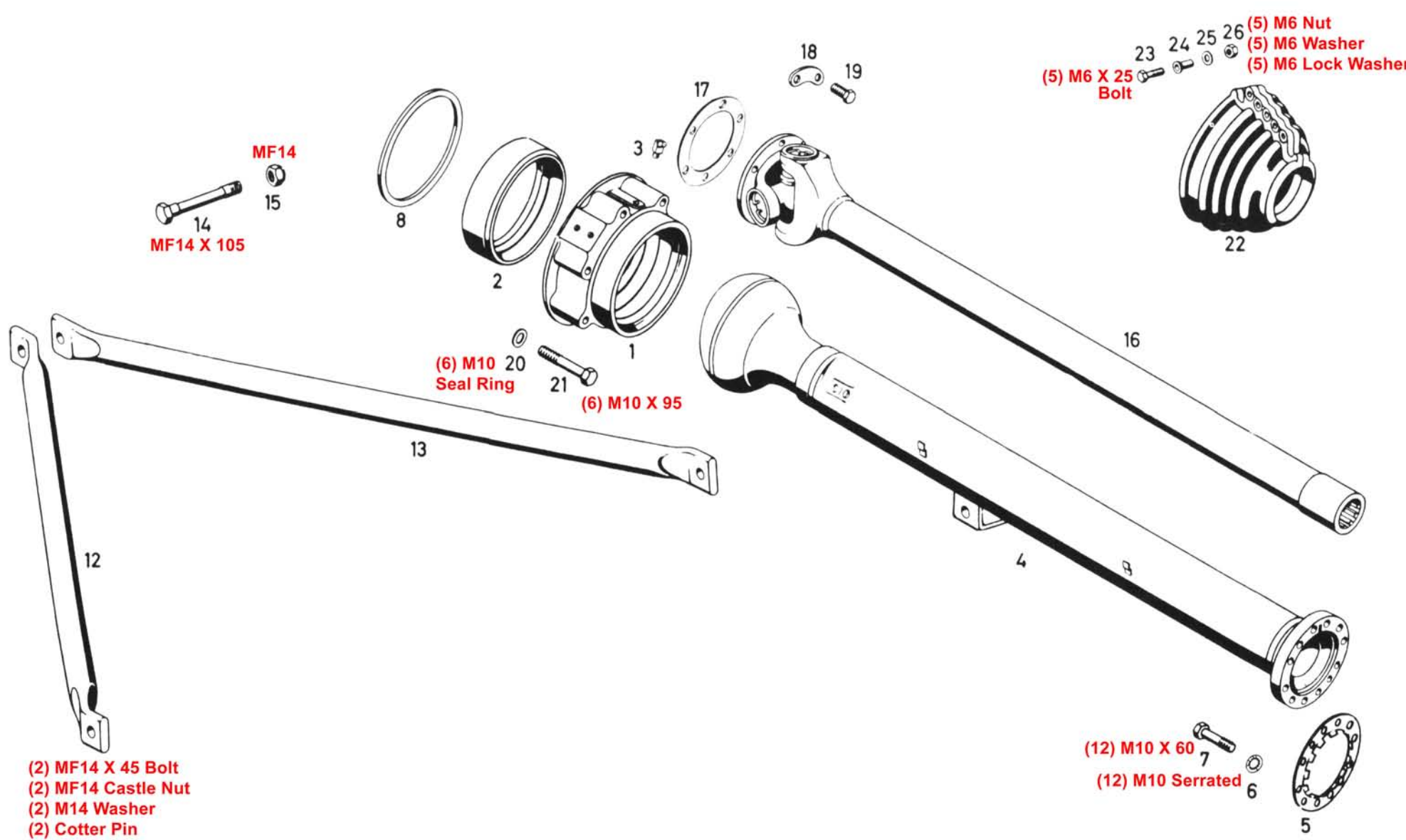
Table 5 - Rear Wheel Brake - Group 02



(4) M8 X 25 Bolt
 (4) M8 Lock Nut
 (4) M8 Lock Washer
 (4) M8 Washer

(4) M10 X 15
 Countersunk Screw

Table 6 - Rear Axle - Group 02



- (2) MF14 X 45 Bolt
- (2) MF14 Castle Nut
- (2) M14 Washer
- (2) Cotter Pin

- (12) M10 X 60
- (12) M10 Serrated

Table 7 - Frame - Group 03/18

(4) 7/16-20 G8 Bolt } For Replacing Rivets
(4) 7/16-20 G8 Lock Nut }

- (1) Guide Cross Mounting Bracket
60.4041.1125-00
(2) M8 X 25 Bolt
(2) M8 Lock Washer
(2) M8 Nut

- (8) M10 X 24 Bolt
(8) M10 Lock Washer
(8) M10 Nut

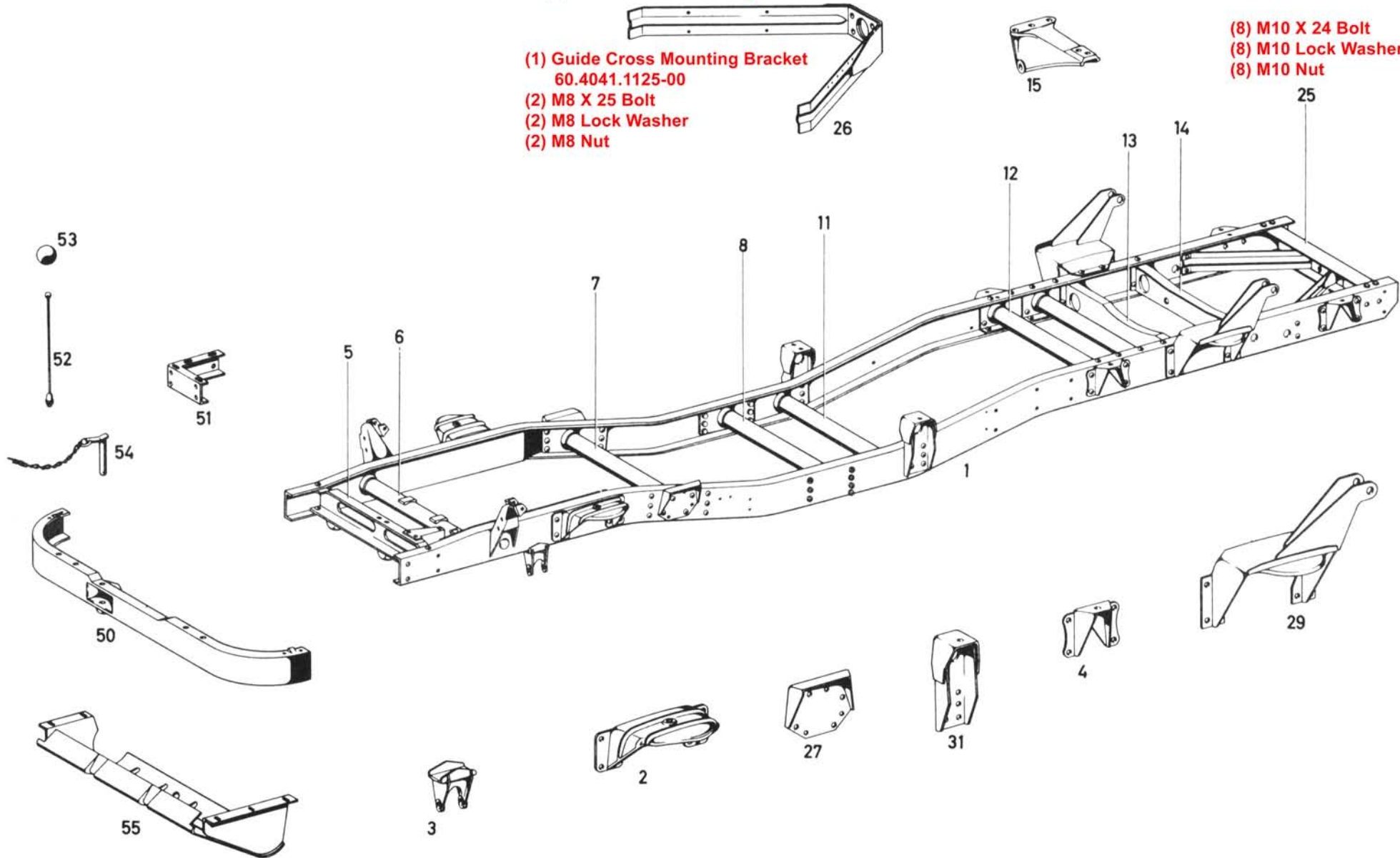


Table 8 - Wheels - Group 04

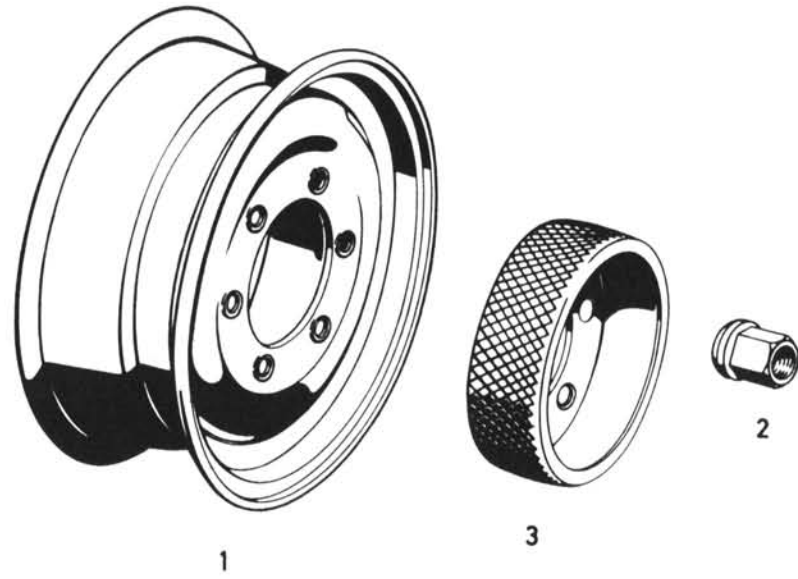


Table 9 - Springs & Suspension - Group 05

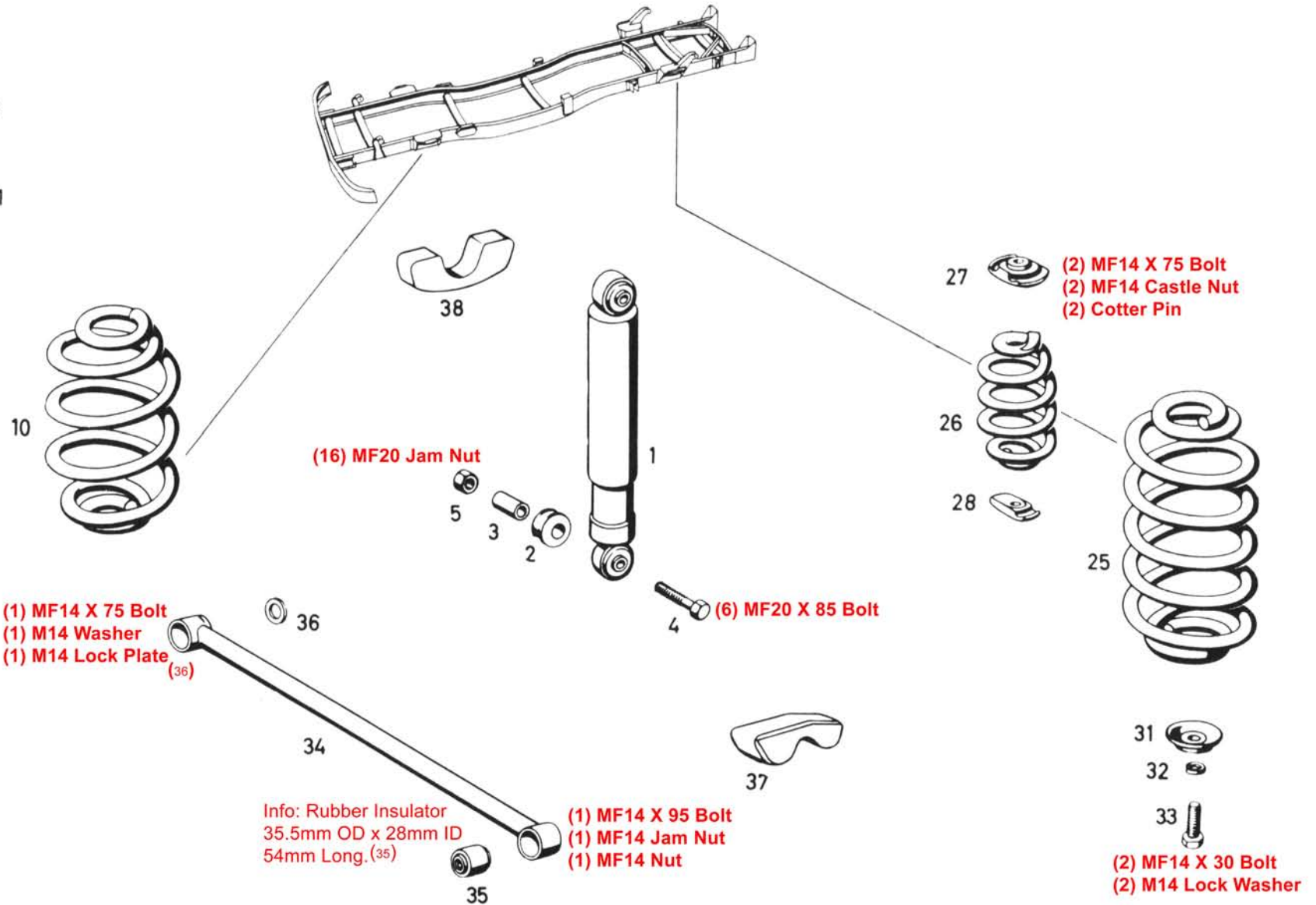


Table 10 - Brake & Clutch Pedal Assemblies - Group 06

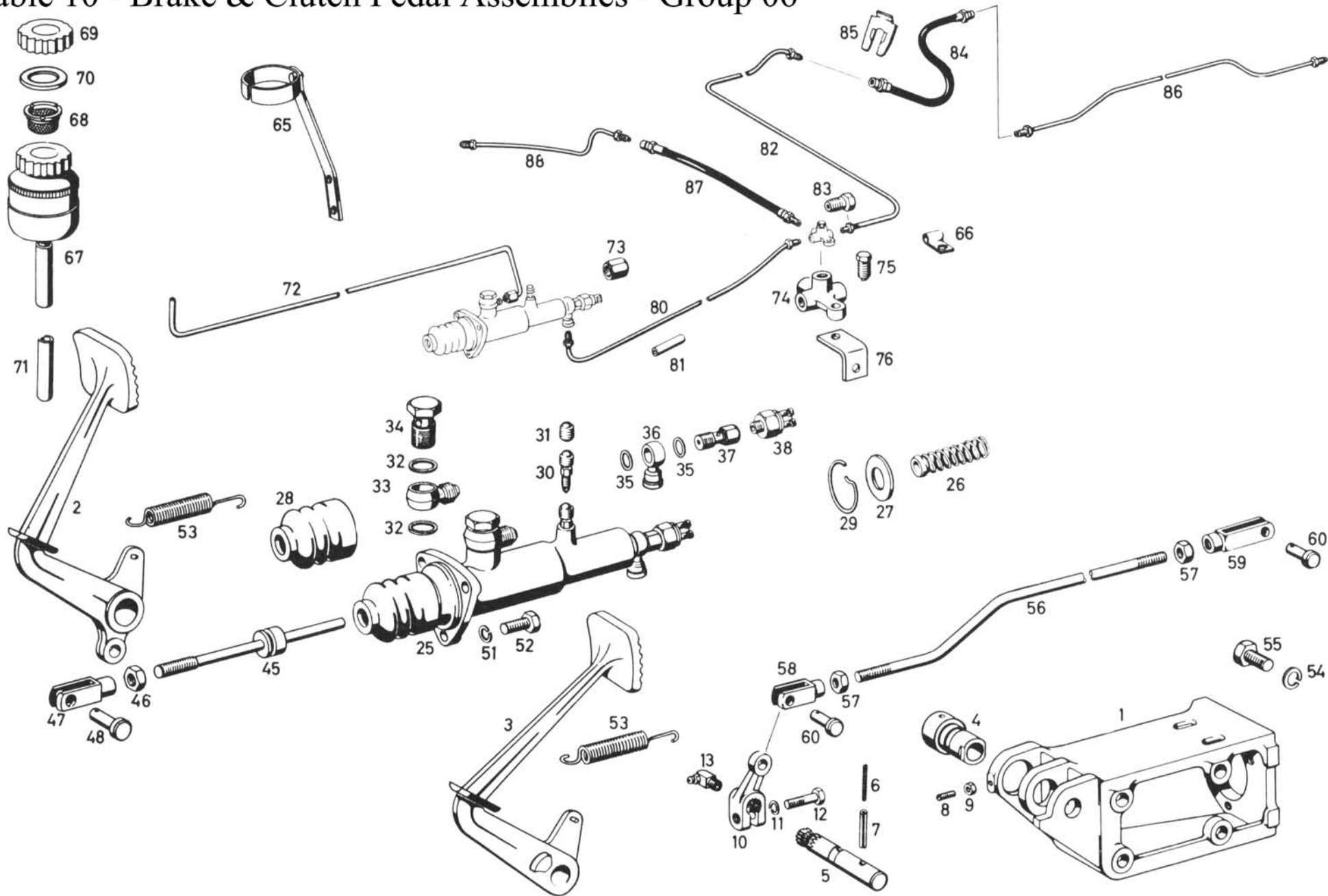


Table 11 - Brake & Clutch Assemblies - Group 06

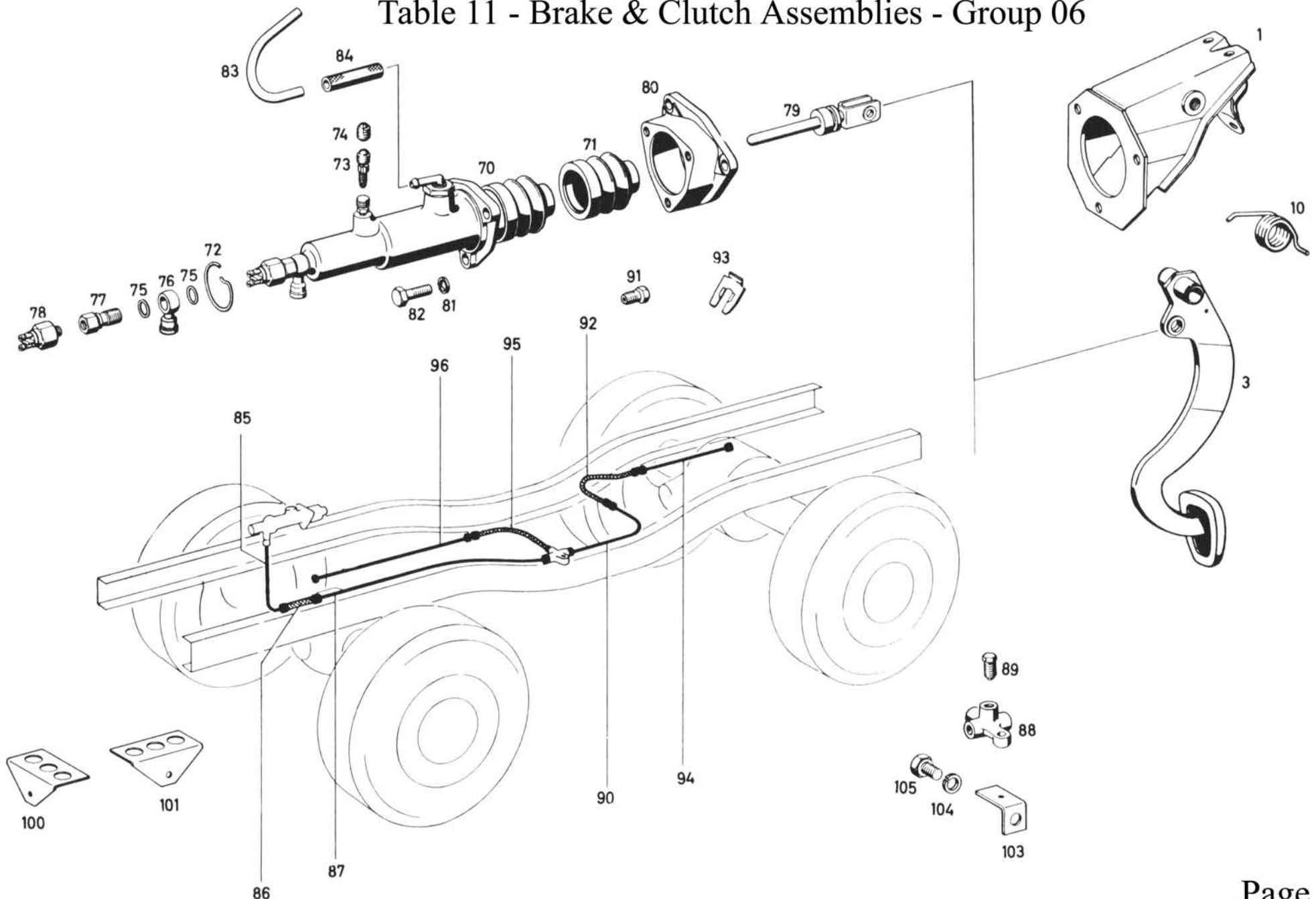


Table 11 - Brake & Clutch Assemblies - Group 06

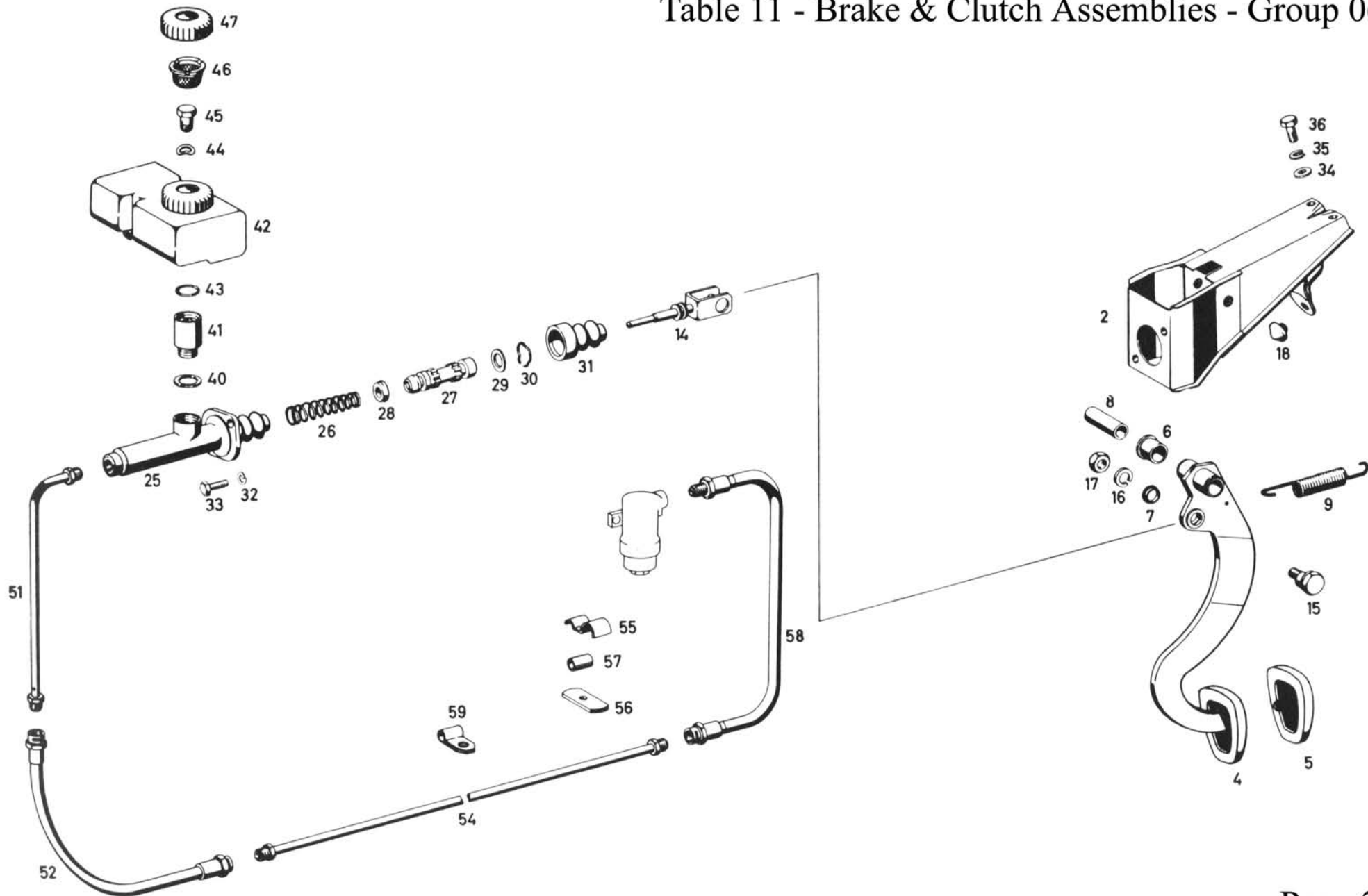


Table 12 - Hand Brake & 4WD Lever Assemblies - Group 07

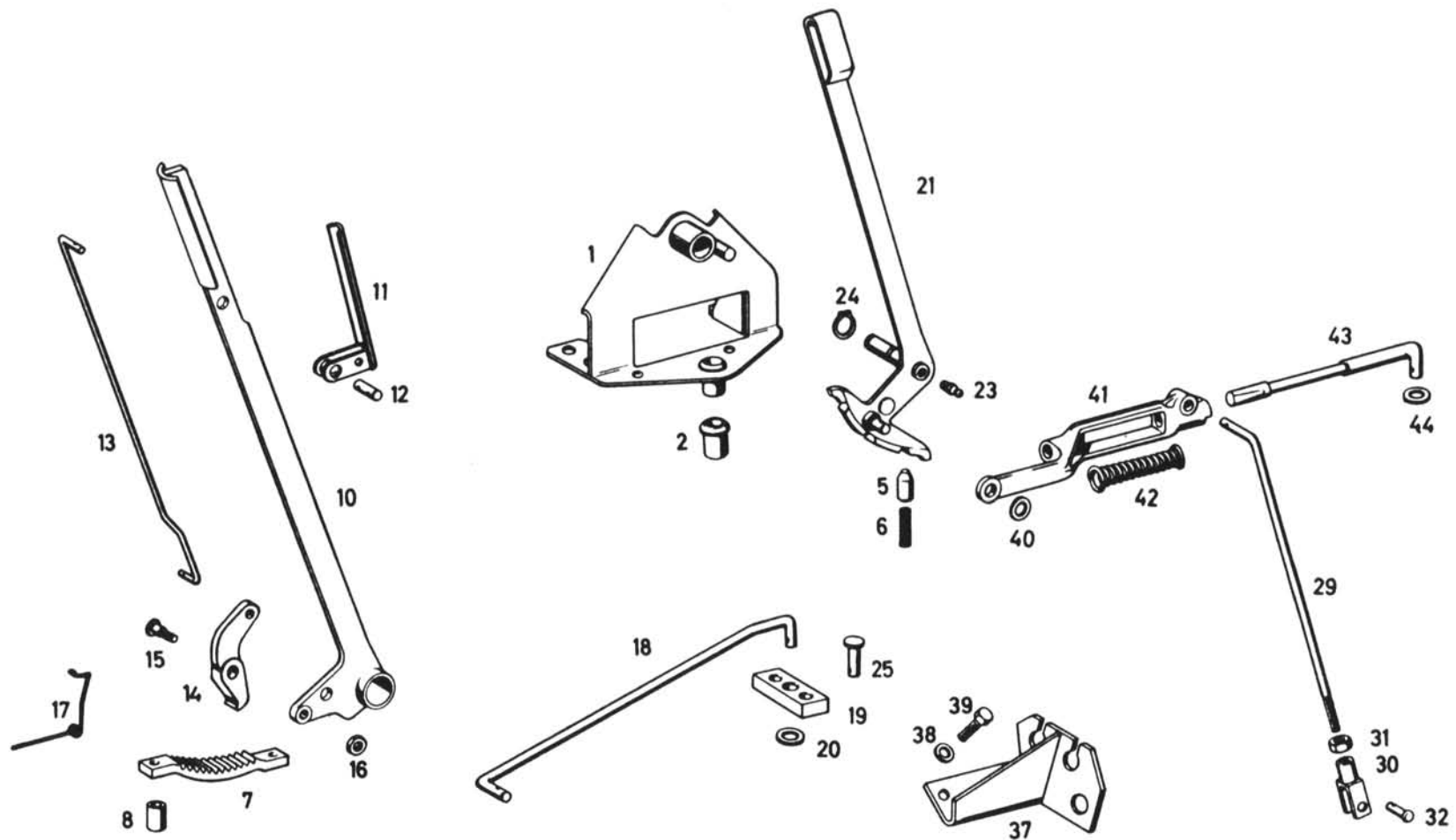


Table 12 - Hand Brake Lever Assembly - Group 07

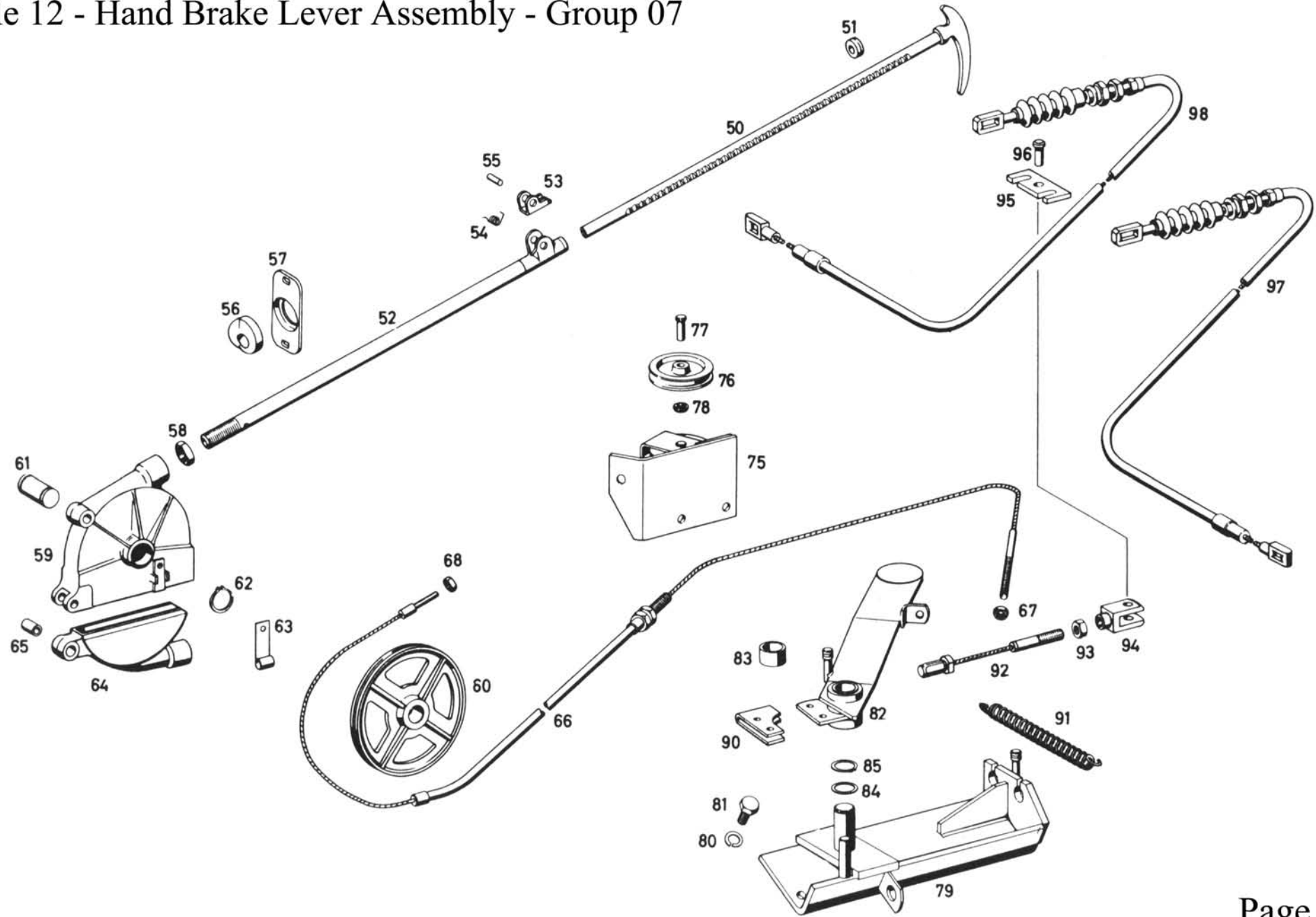


Table 13 - Steering Assembly - Group 08

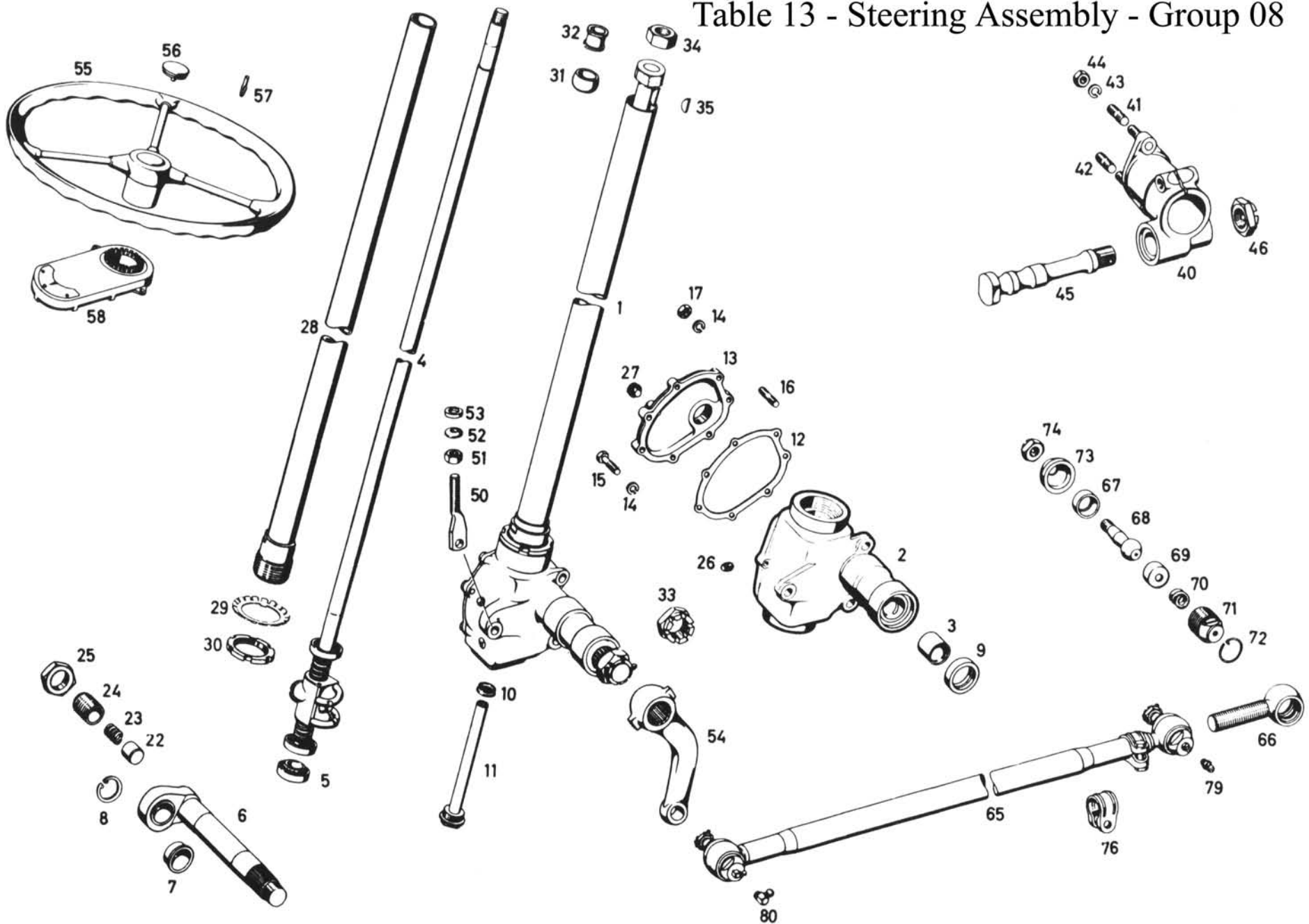


Table 14 - Steering Box Assembly - Group 08

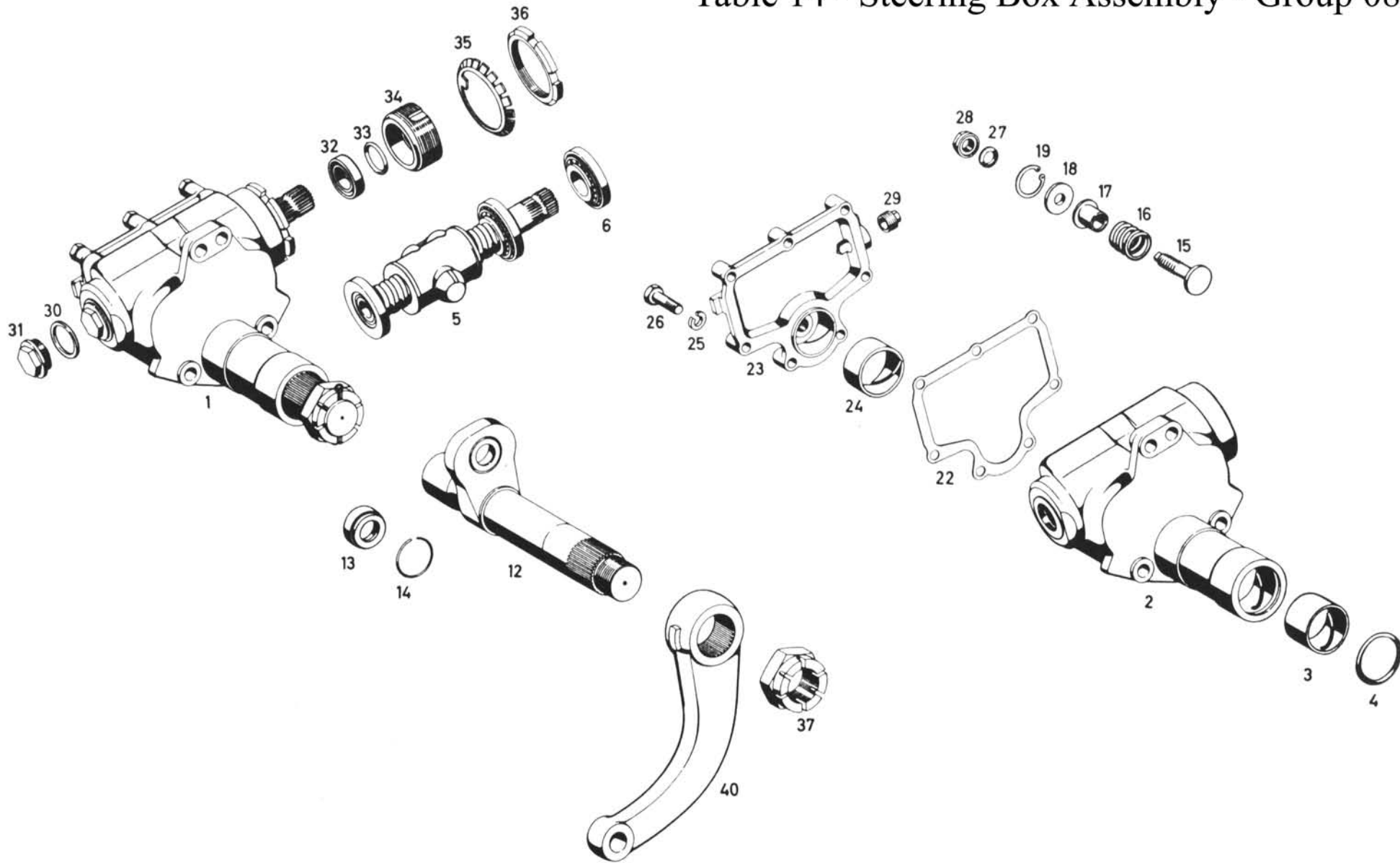


Table 14 - Steering Assembly - Group 08

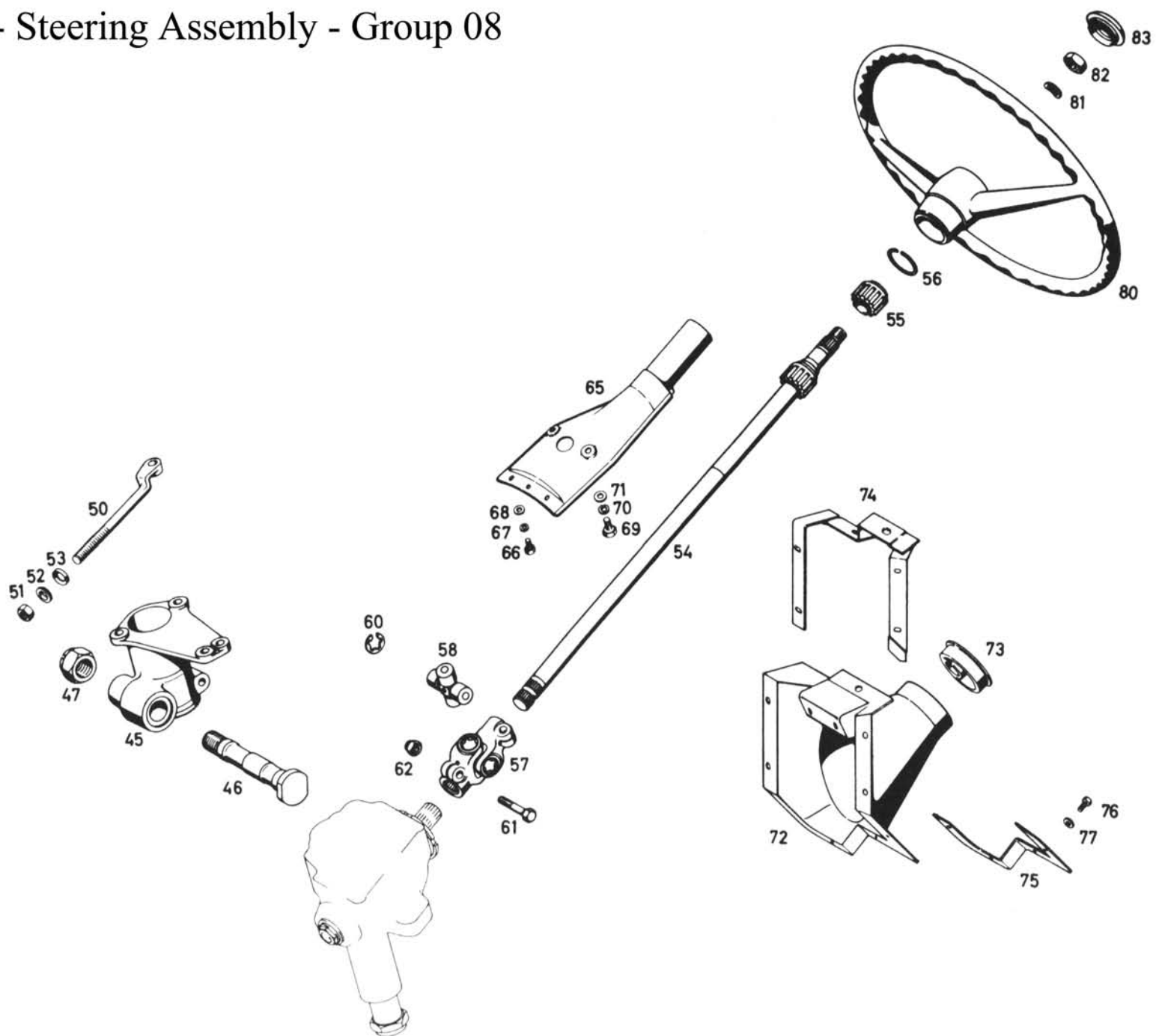


Table 15 - Accelerator Pedal Assembly - Group 09

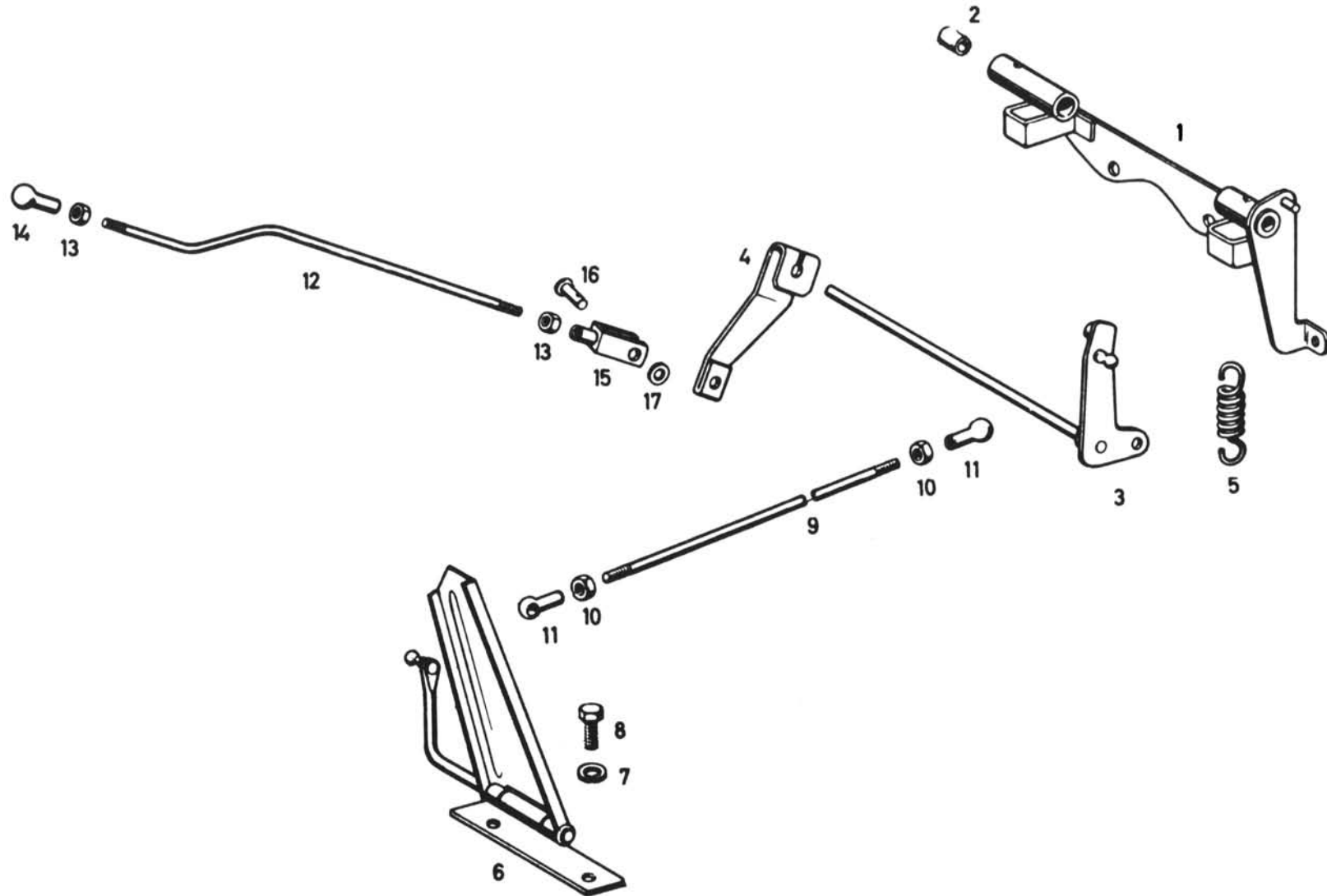


Table 15 - Accelerator Pedal Assembly - Group 09

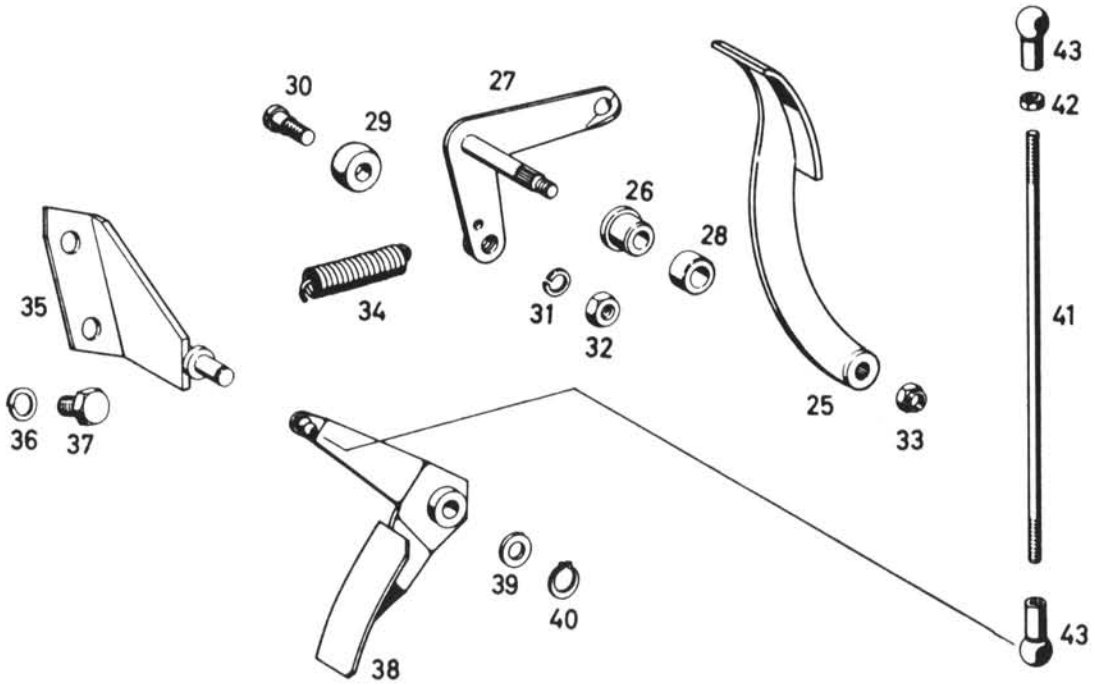


Table 16 - Clutch Assembly - Group 10

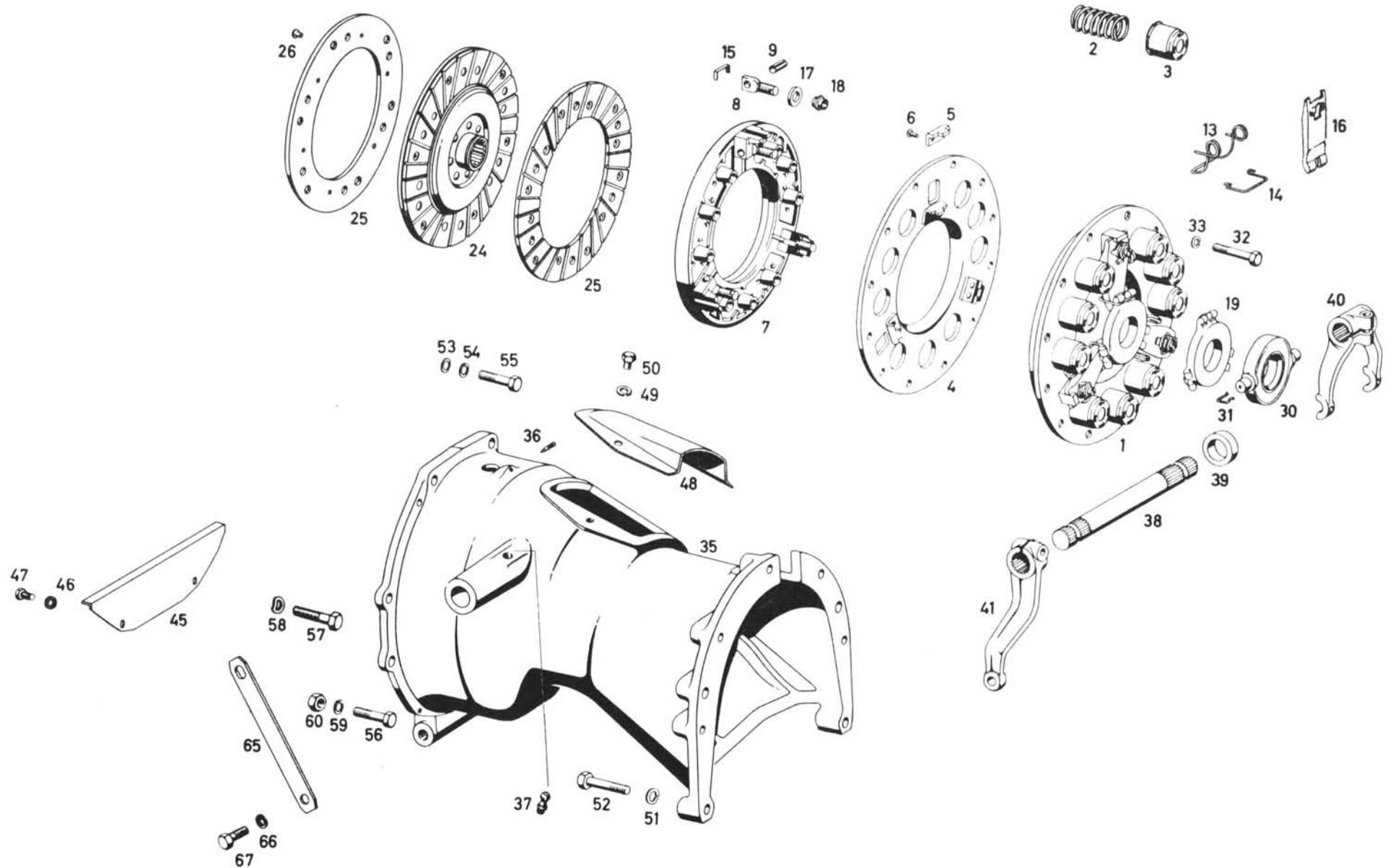


Table 16 - Clutch Assembly - Group 10

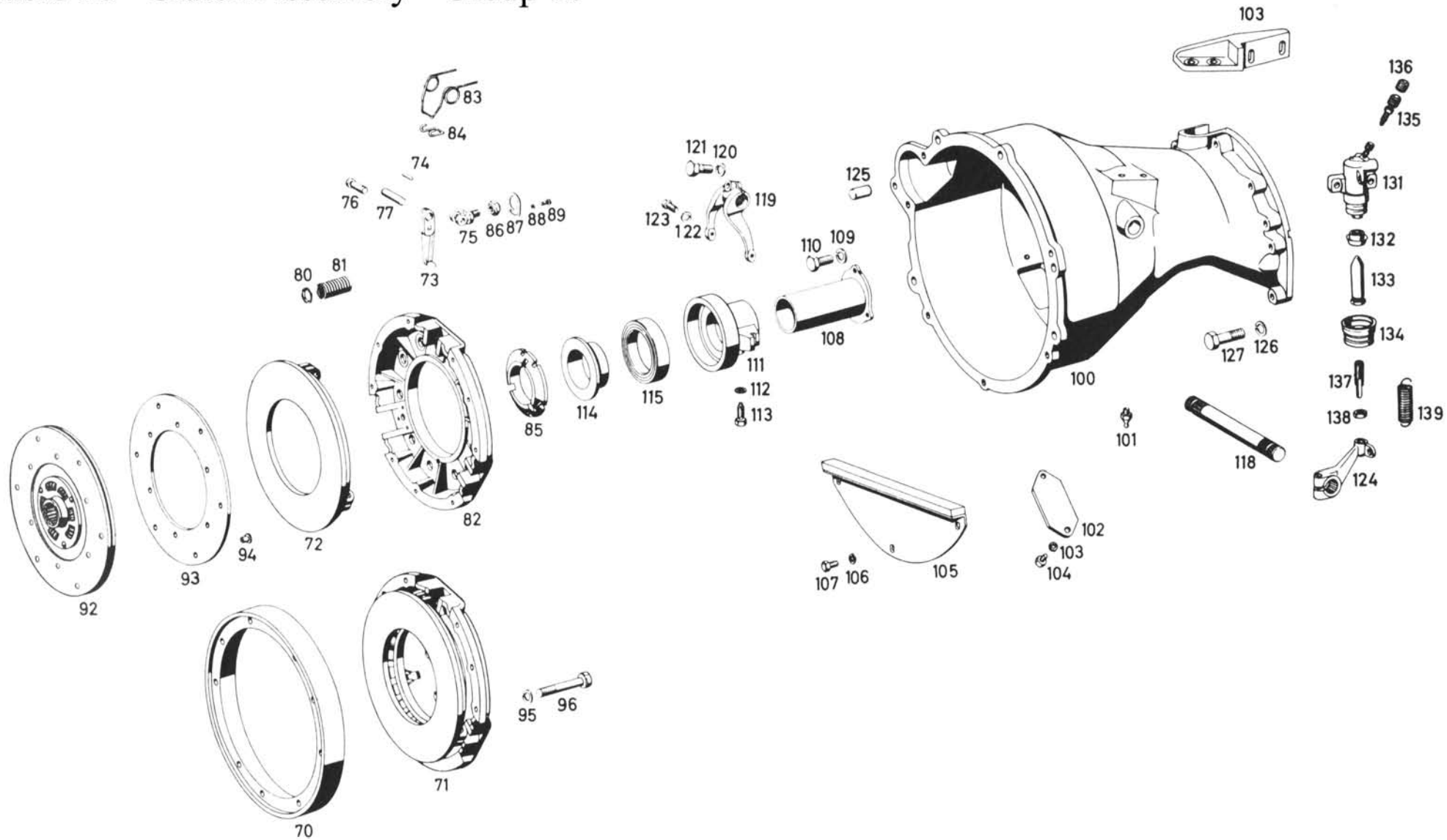


Table 17 - Differential Lock Shift Assembly - Group 11

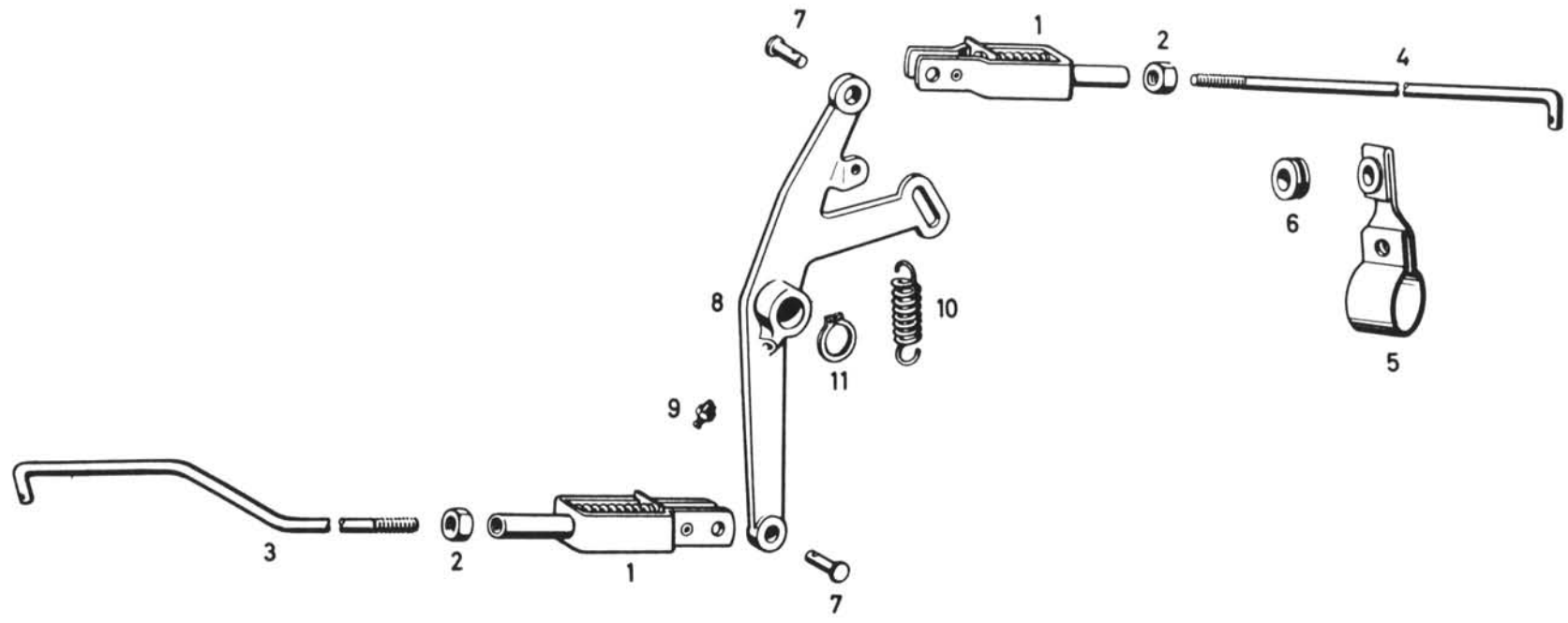


Table 18 - Transmission Assembly - Group 13

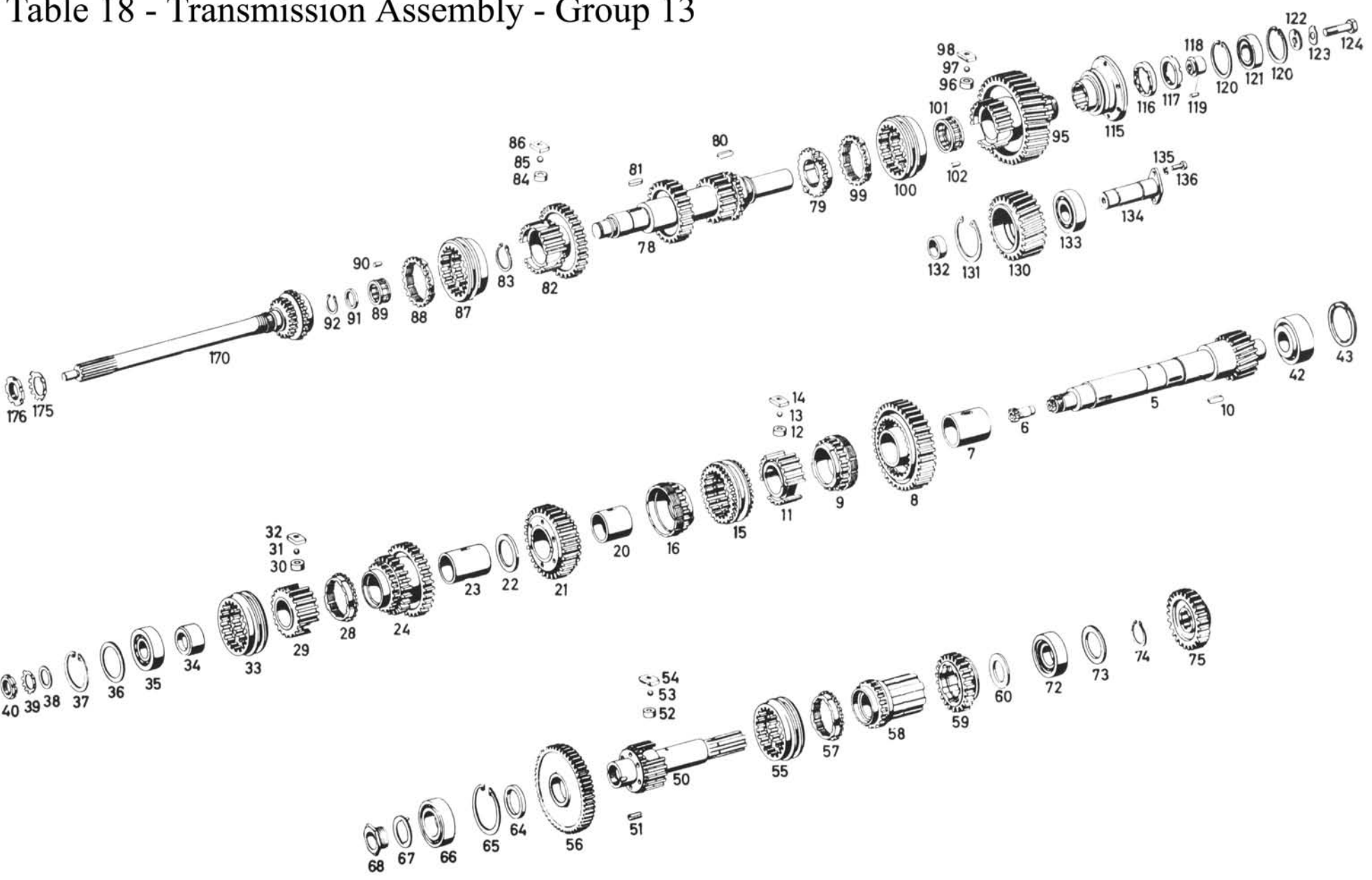


Table 19 - Shifting Plate Mechanism

Group 13

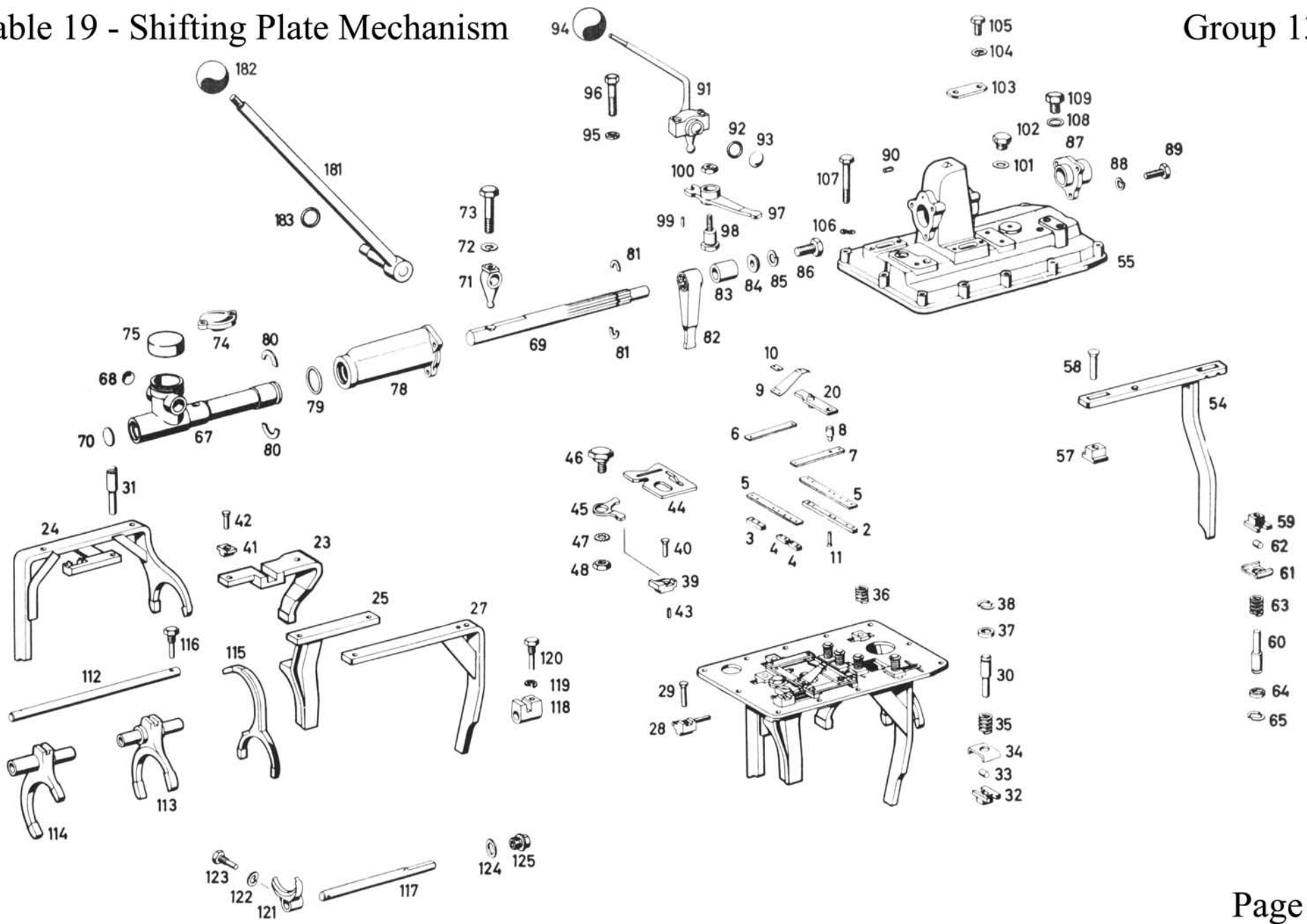


Table 19 - Shift Plate & Covers - Group 13

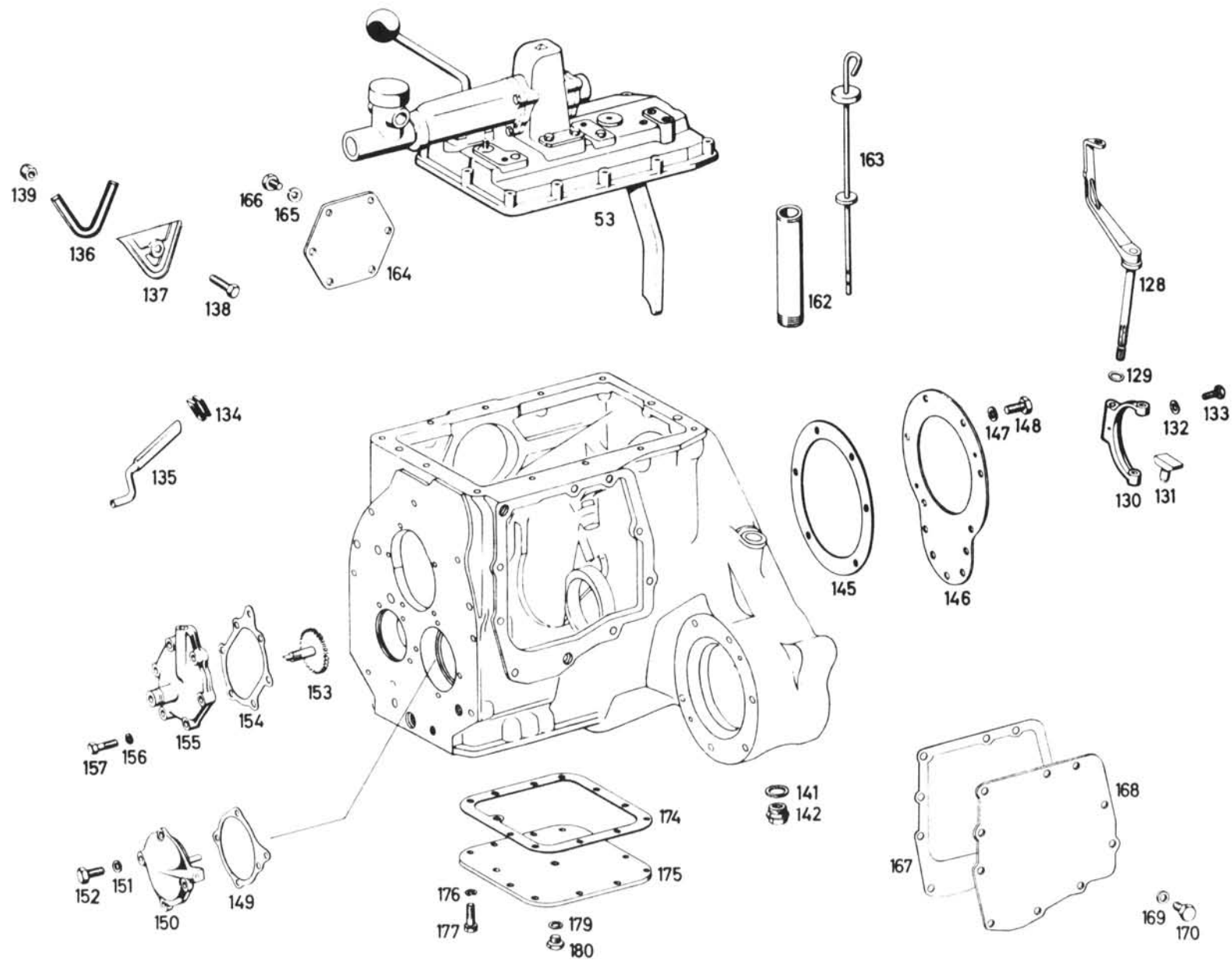


Table 20 - Manual Control & Choke Cables - Group 29

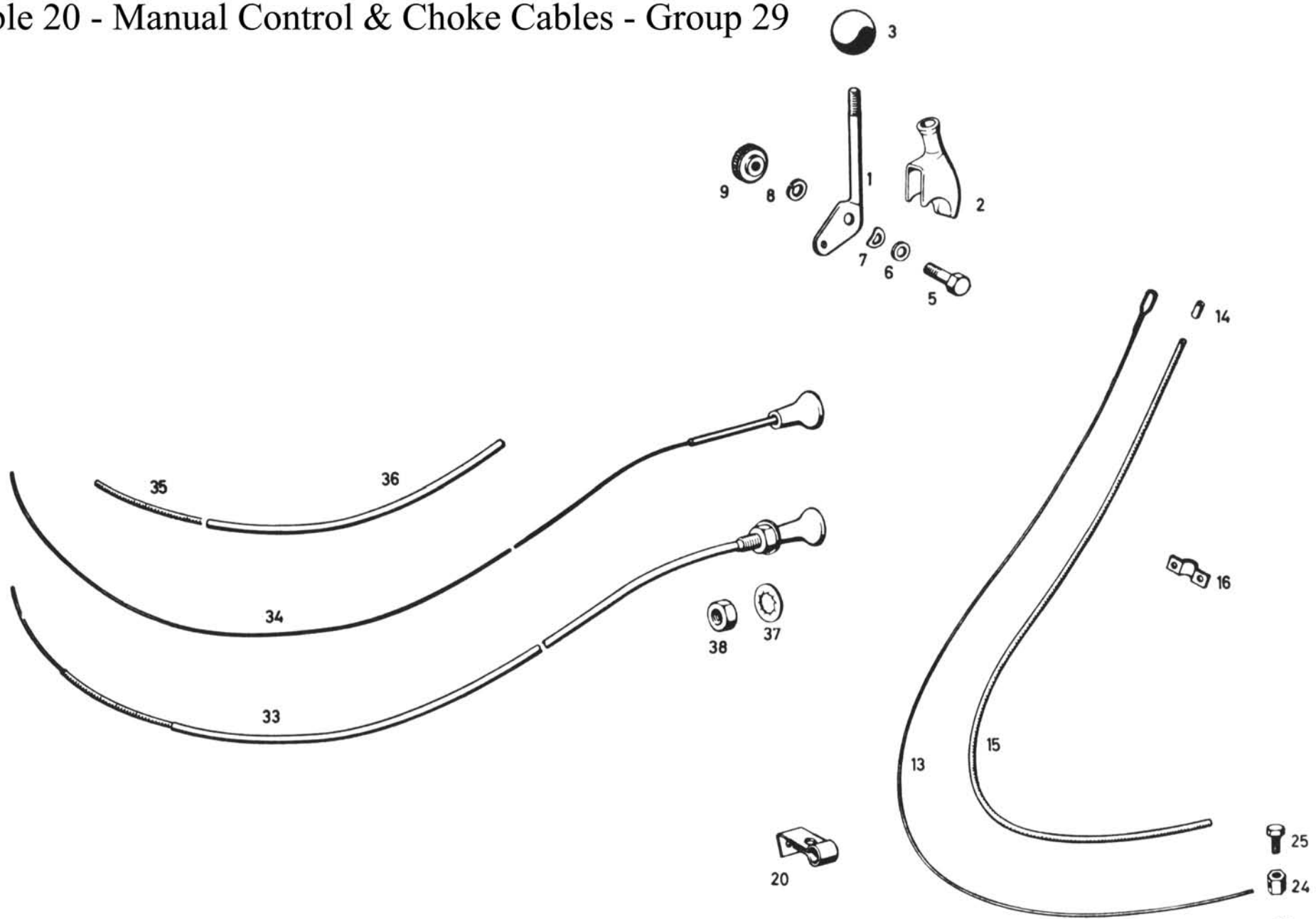


Table 20 - Manual Control & Choke Cables - Group 29

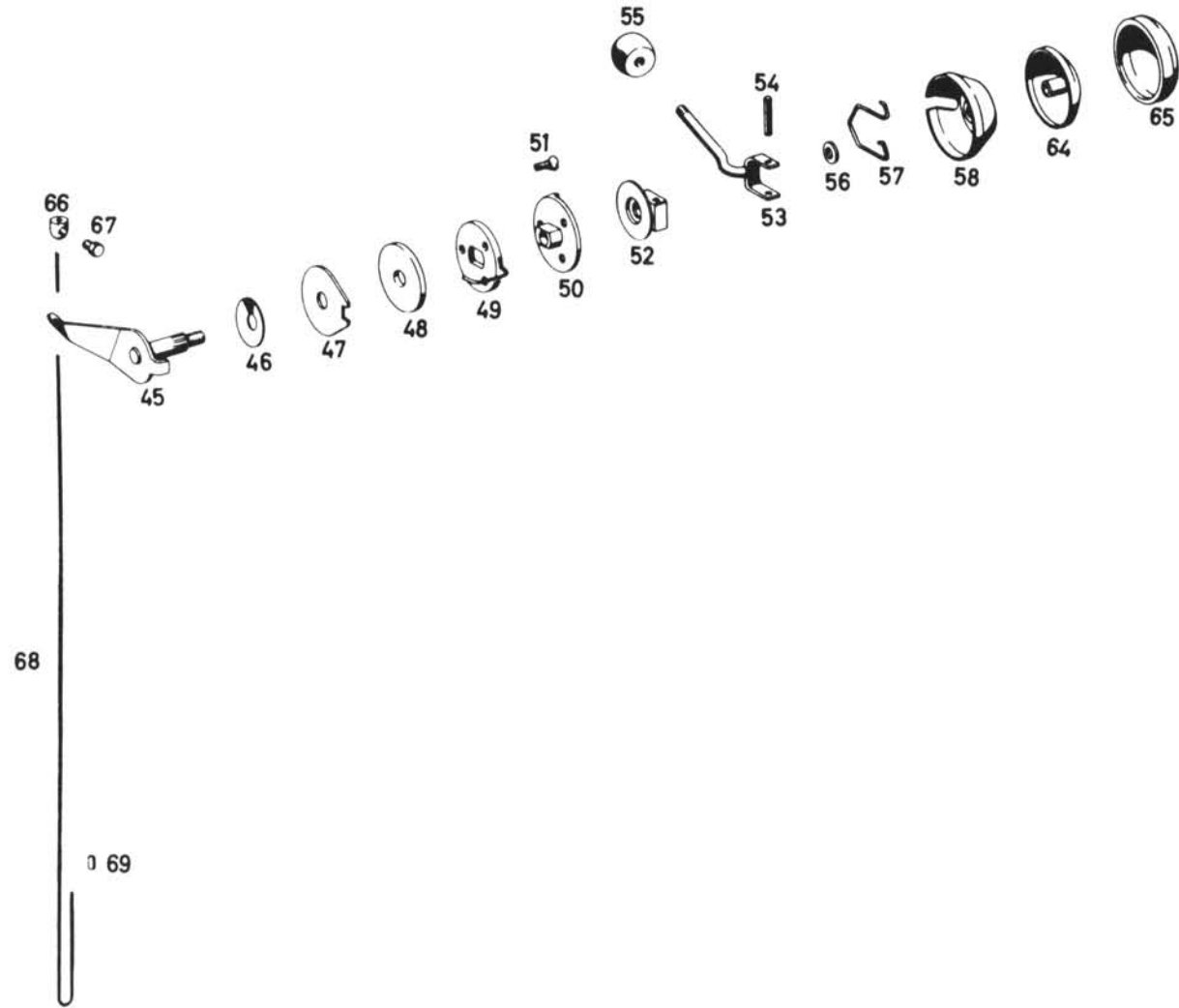
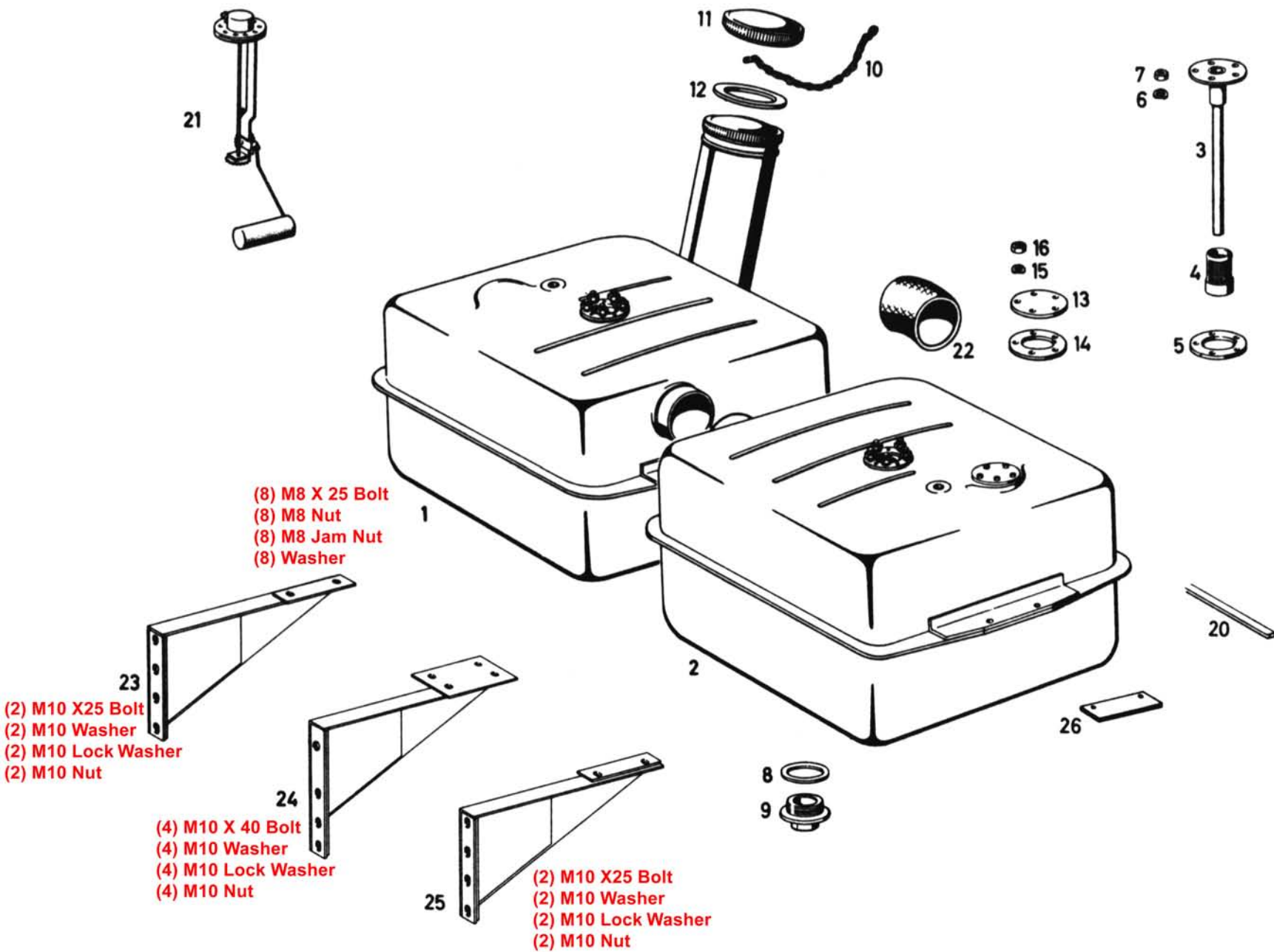


Table 21 - Fuel Tank Assembly - Group 31



Fuel Delivery System Assembly

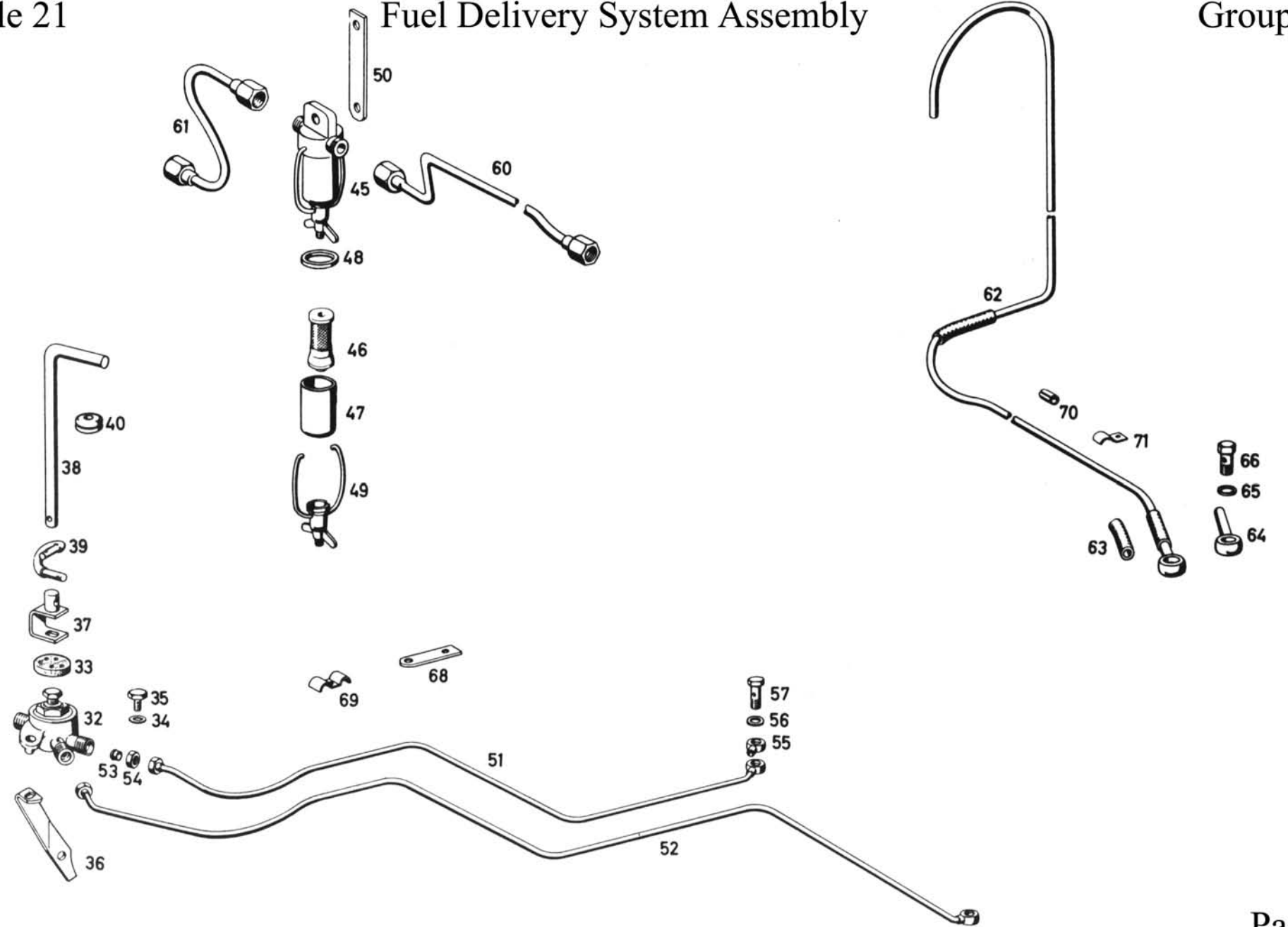


Table 22 - Fuel Tank Assembly - Group 31

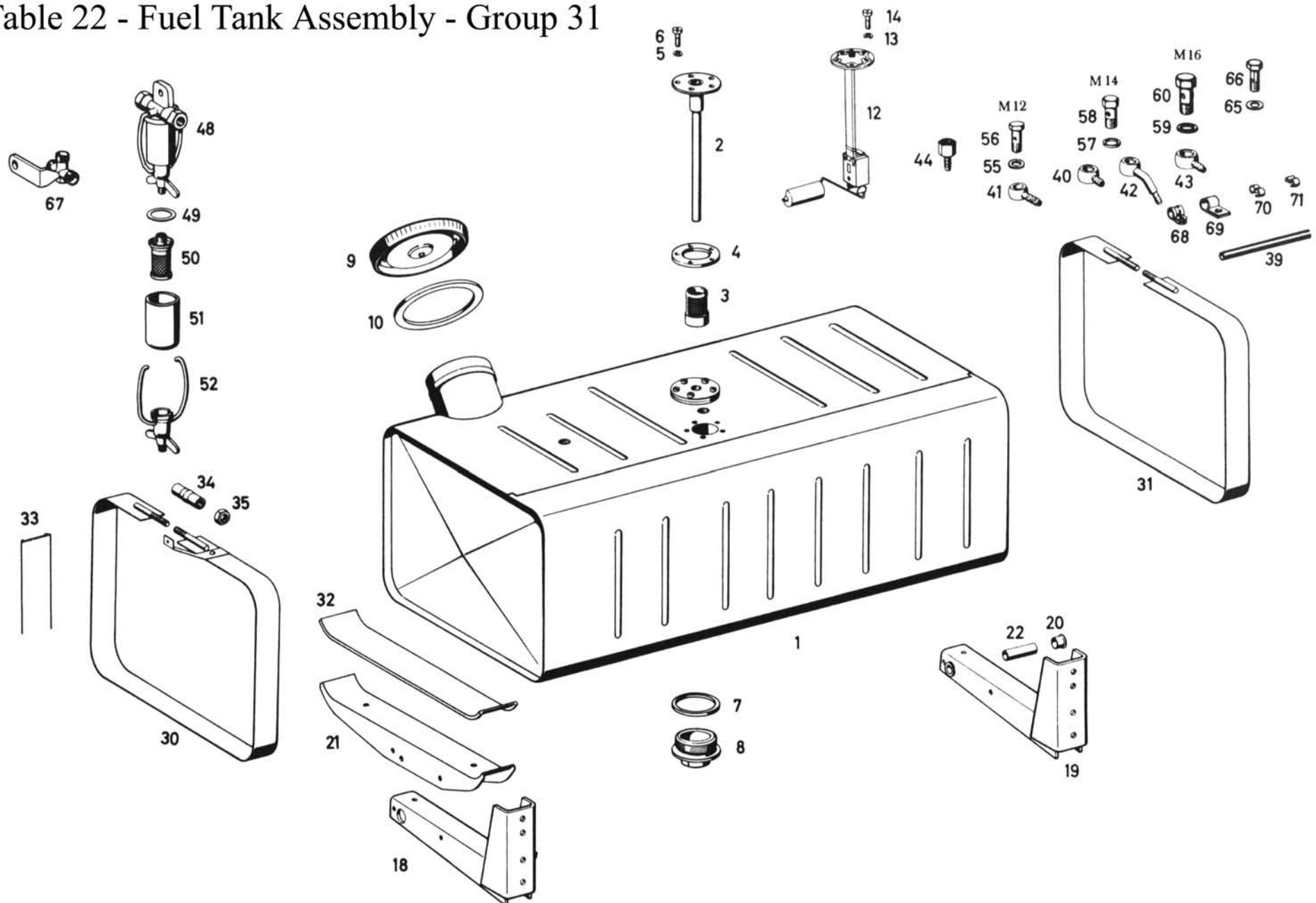


Table 23 - Exhaust System - Group 32

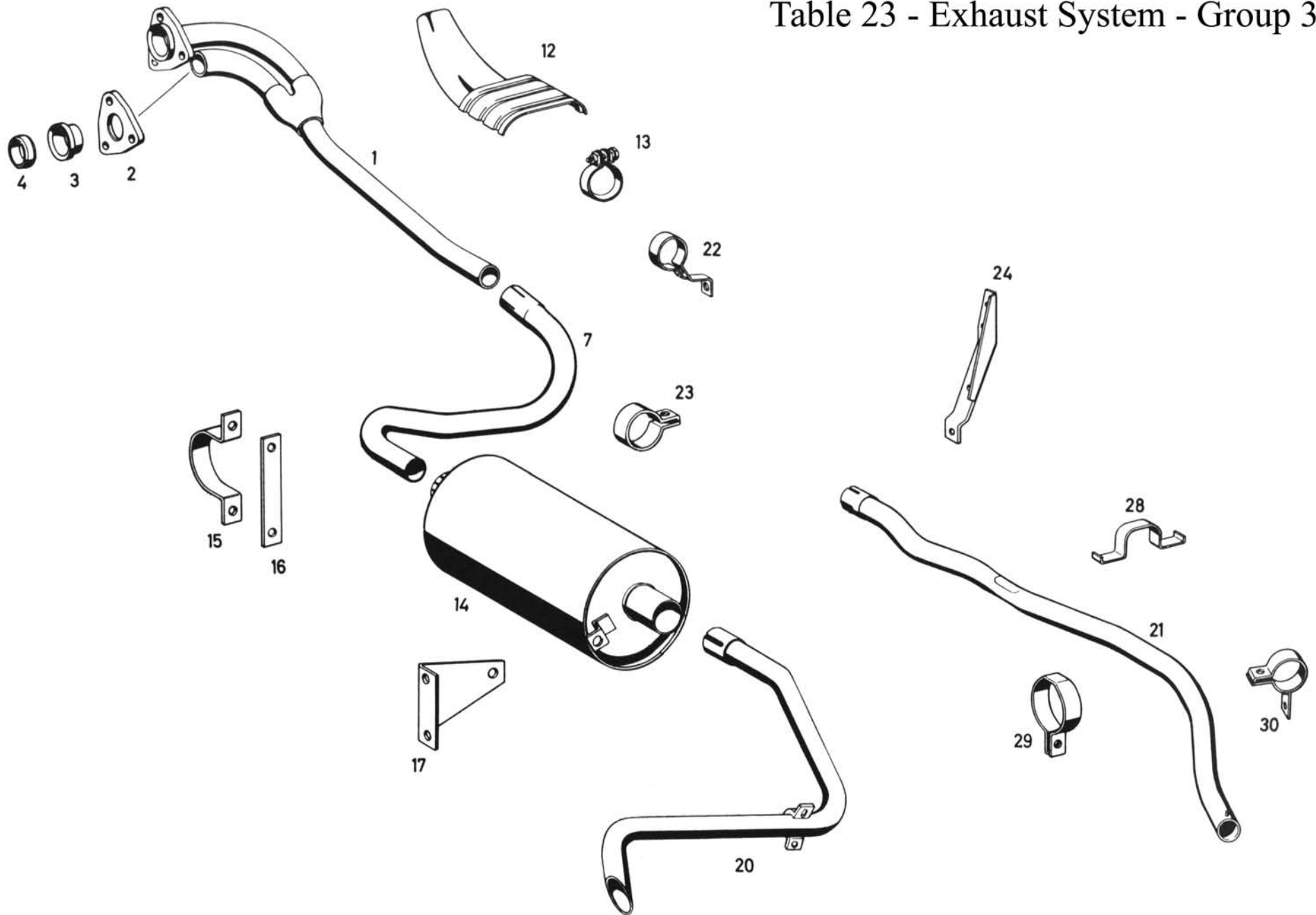


Table 24 - Engine Suspension - Group 35

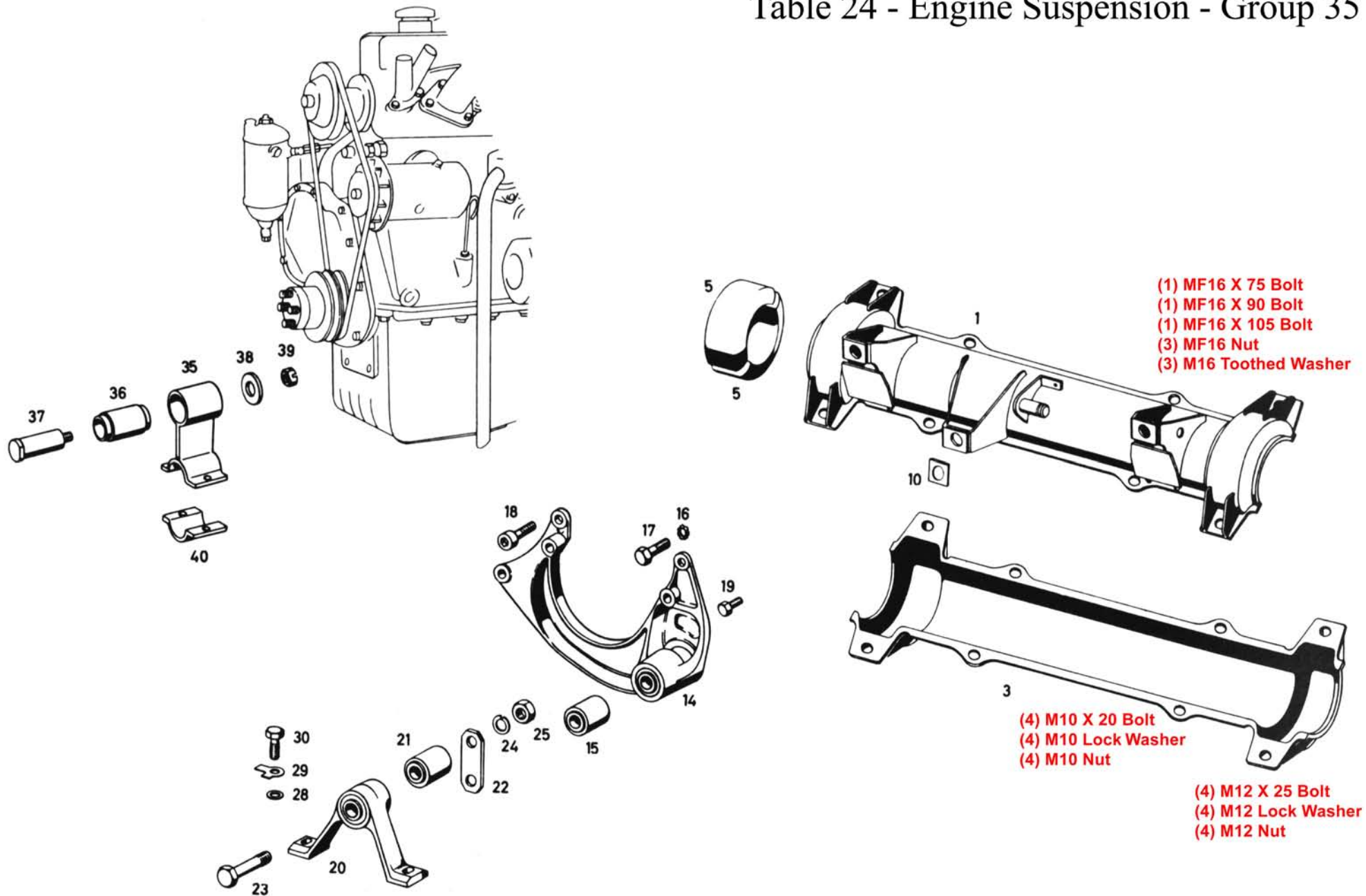


Table 25 - Cooling System - Group 40

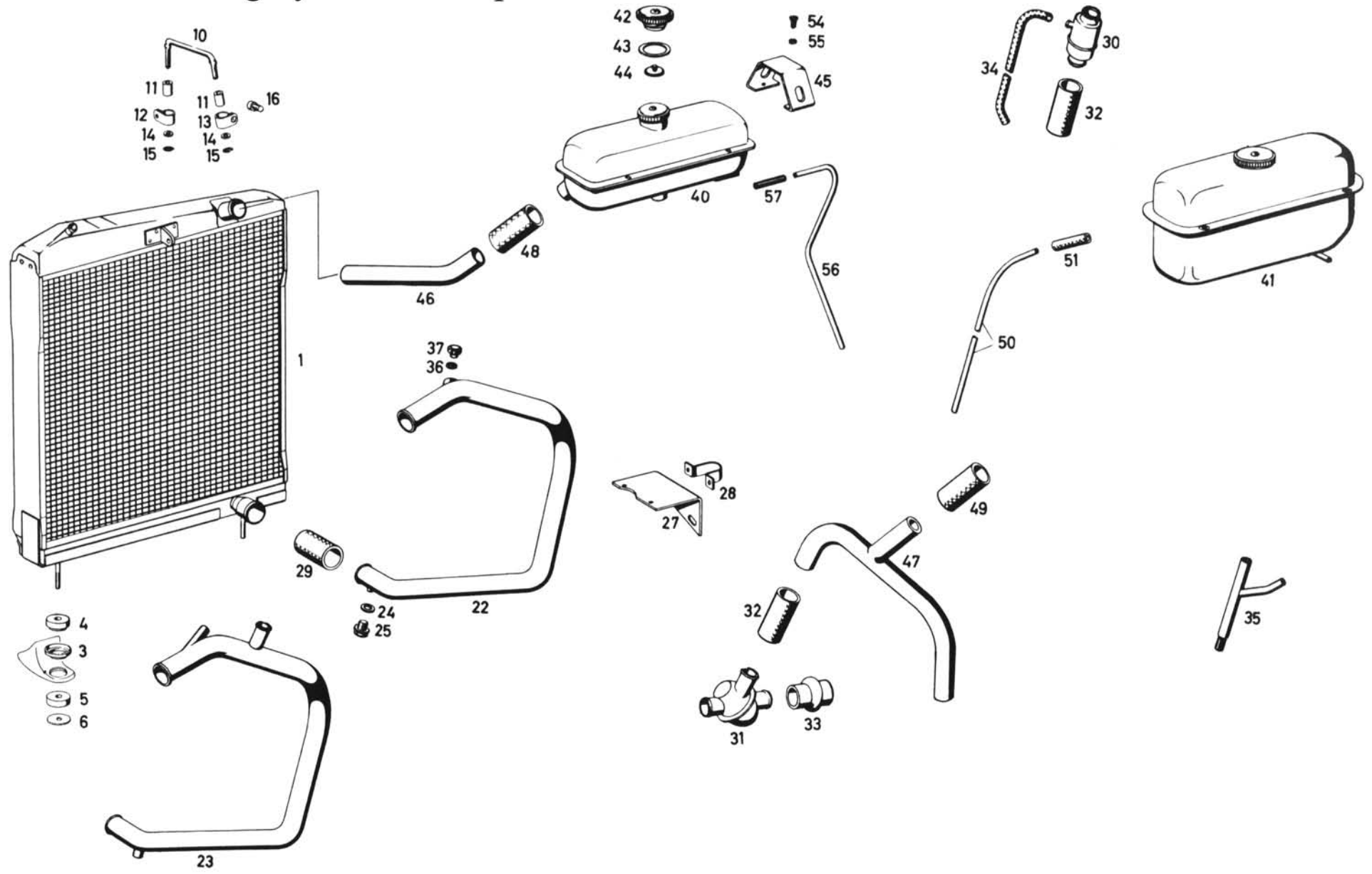


Table 26 - Cooling System - Group 40

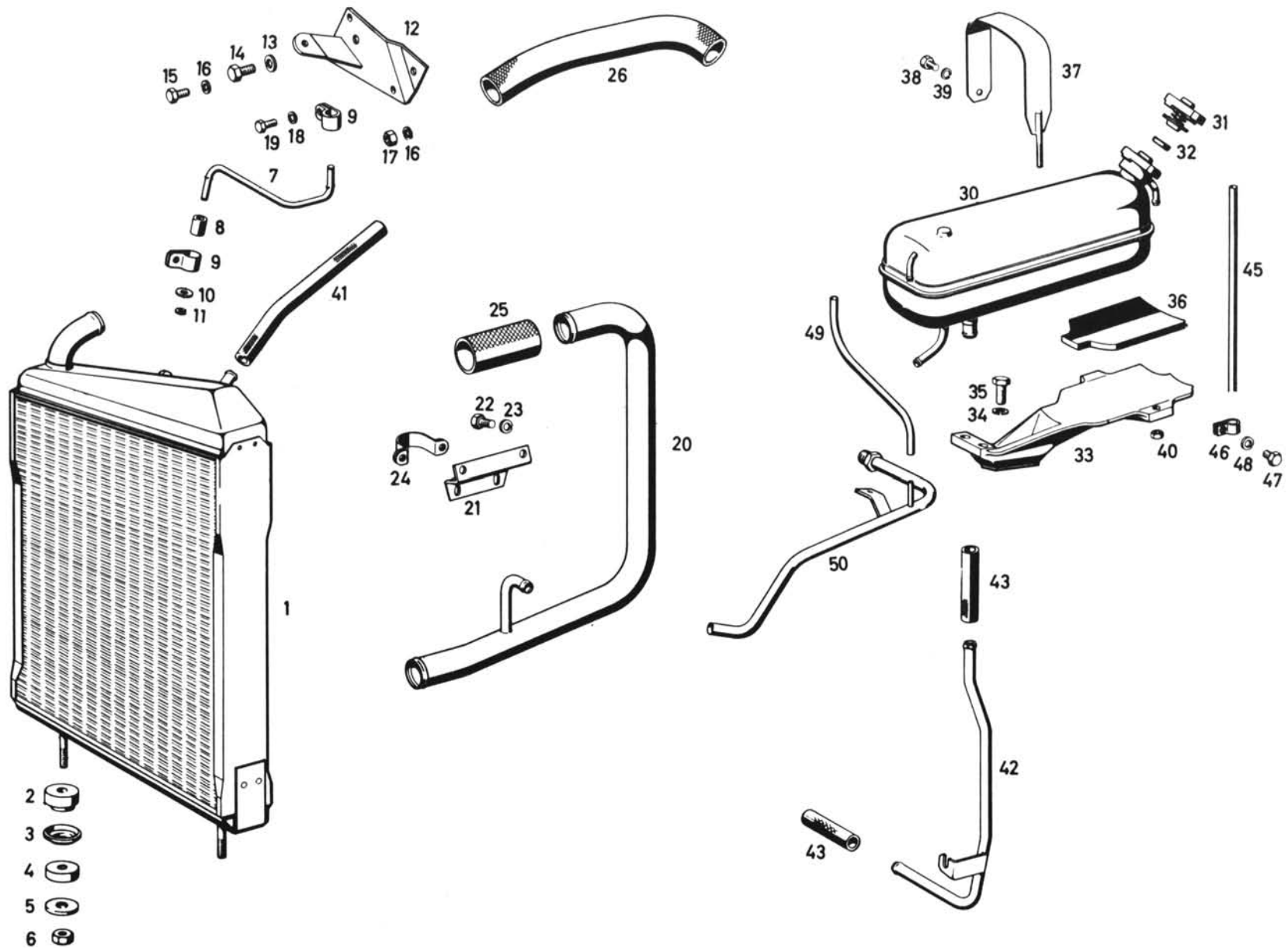
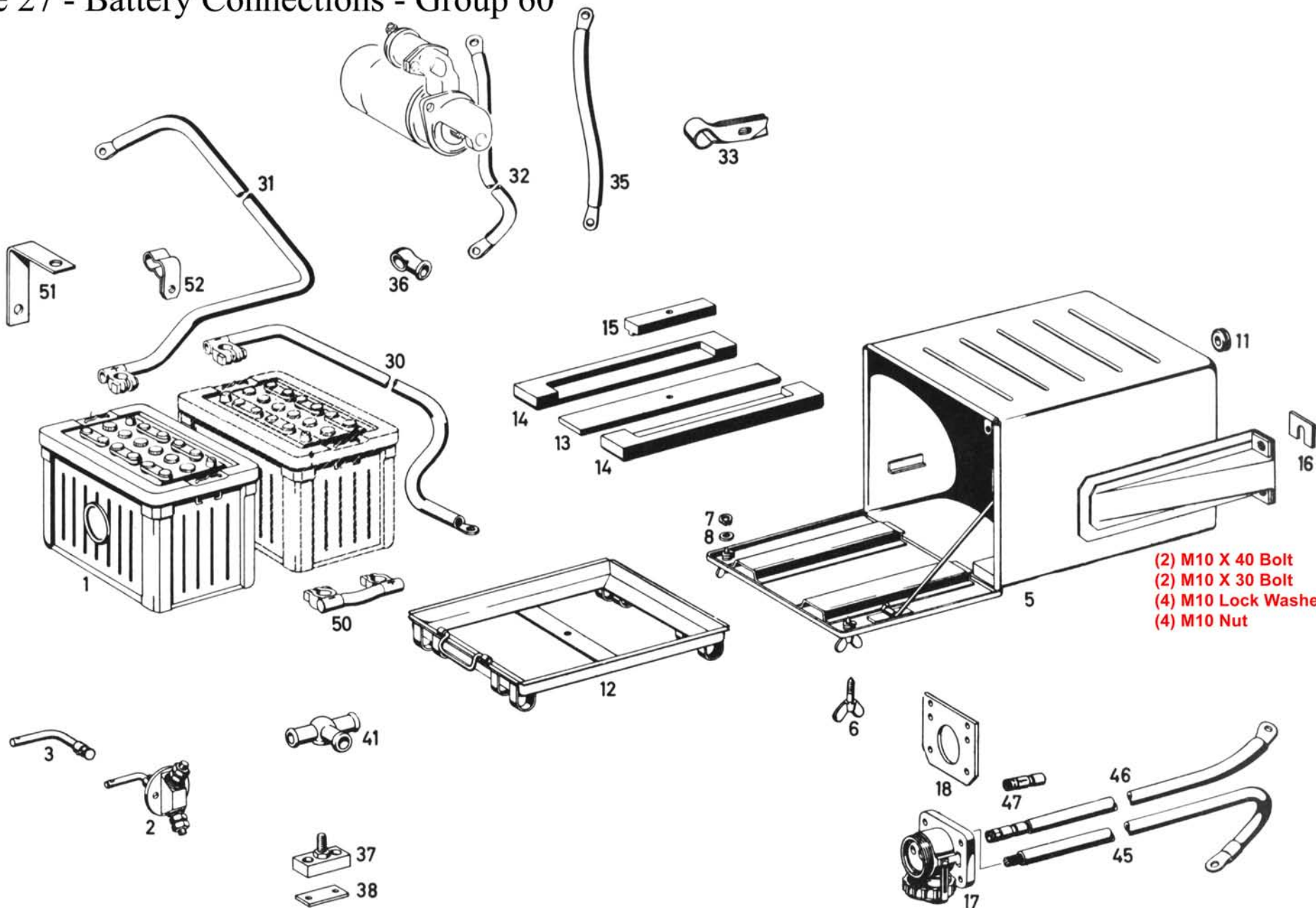


Table 27 - Battery Connections - Group 60



(2) M10 X 40 Bolt
 (2) M10 X 30 Bolt
 (4) M10 Lock Washer
 (4) M10 Nut

Table 28 - Electrical Equipment & Instruments - Group 60

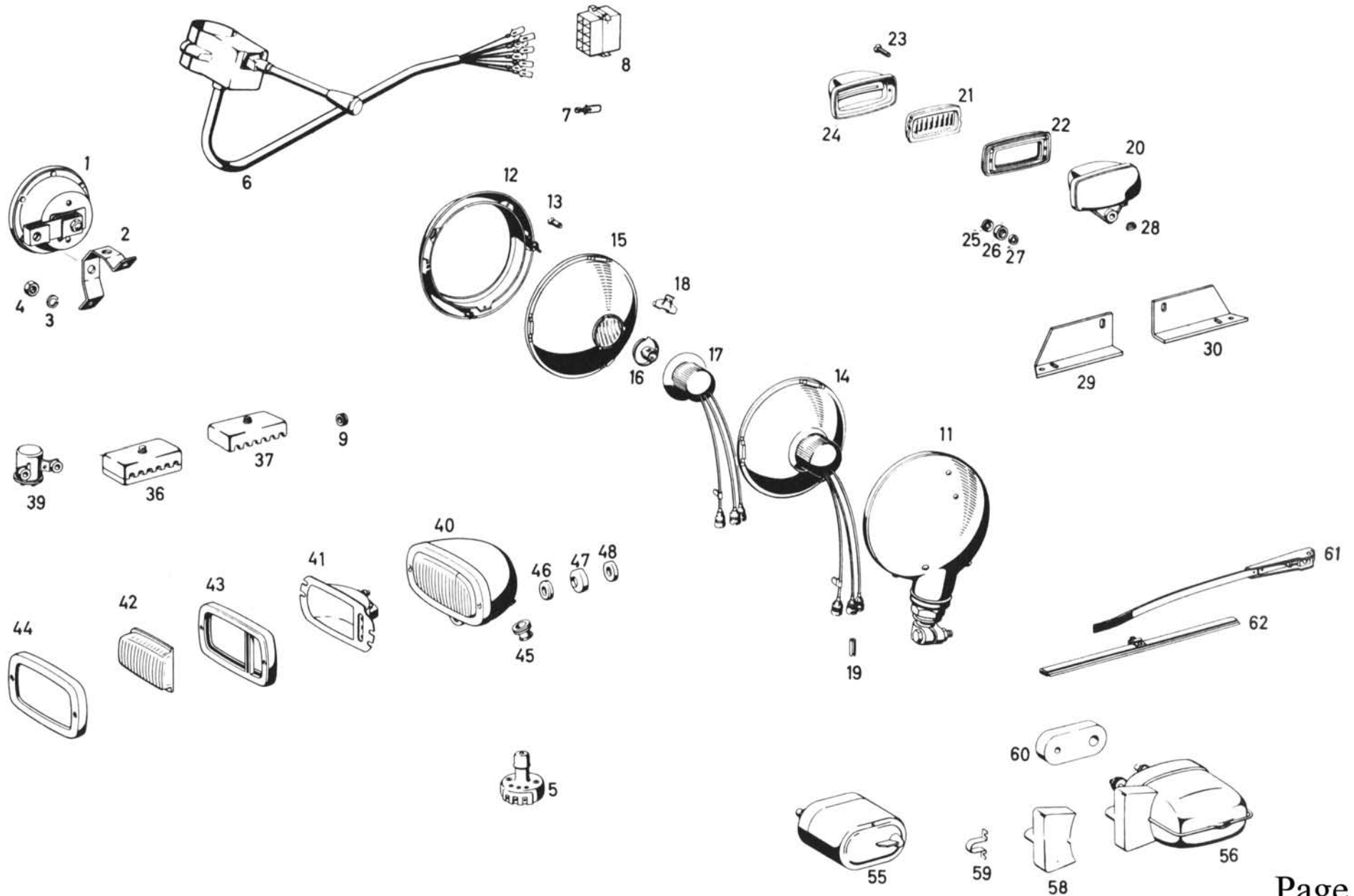


Table 28 - Electrical Equipment & Instruments - Group 60

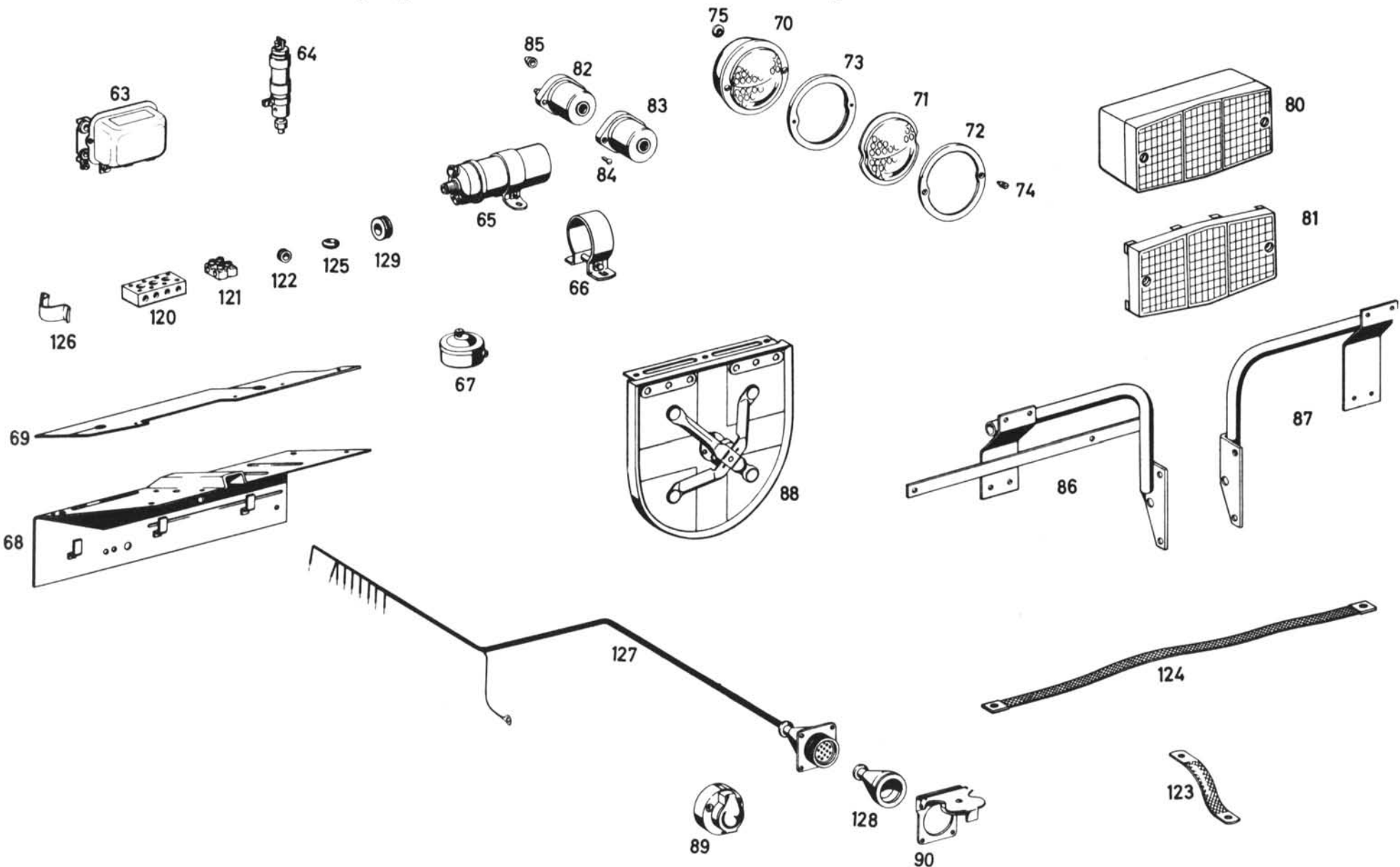


Table 29 - Electrical Equipment & Instruments - Group 60

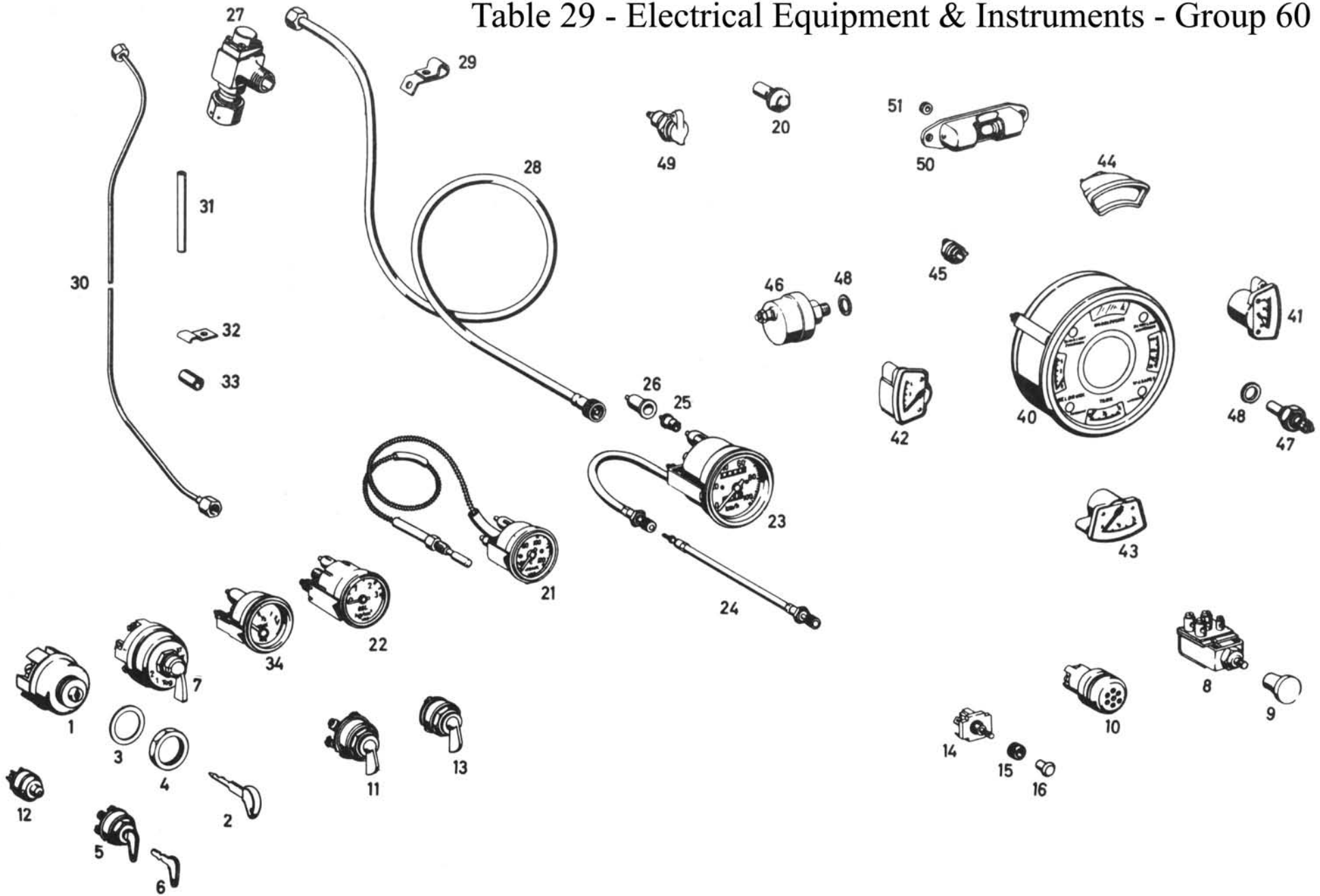


Table 30- Cab Shell, Open - Group 62

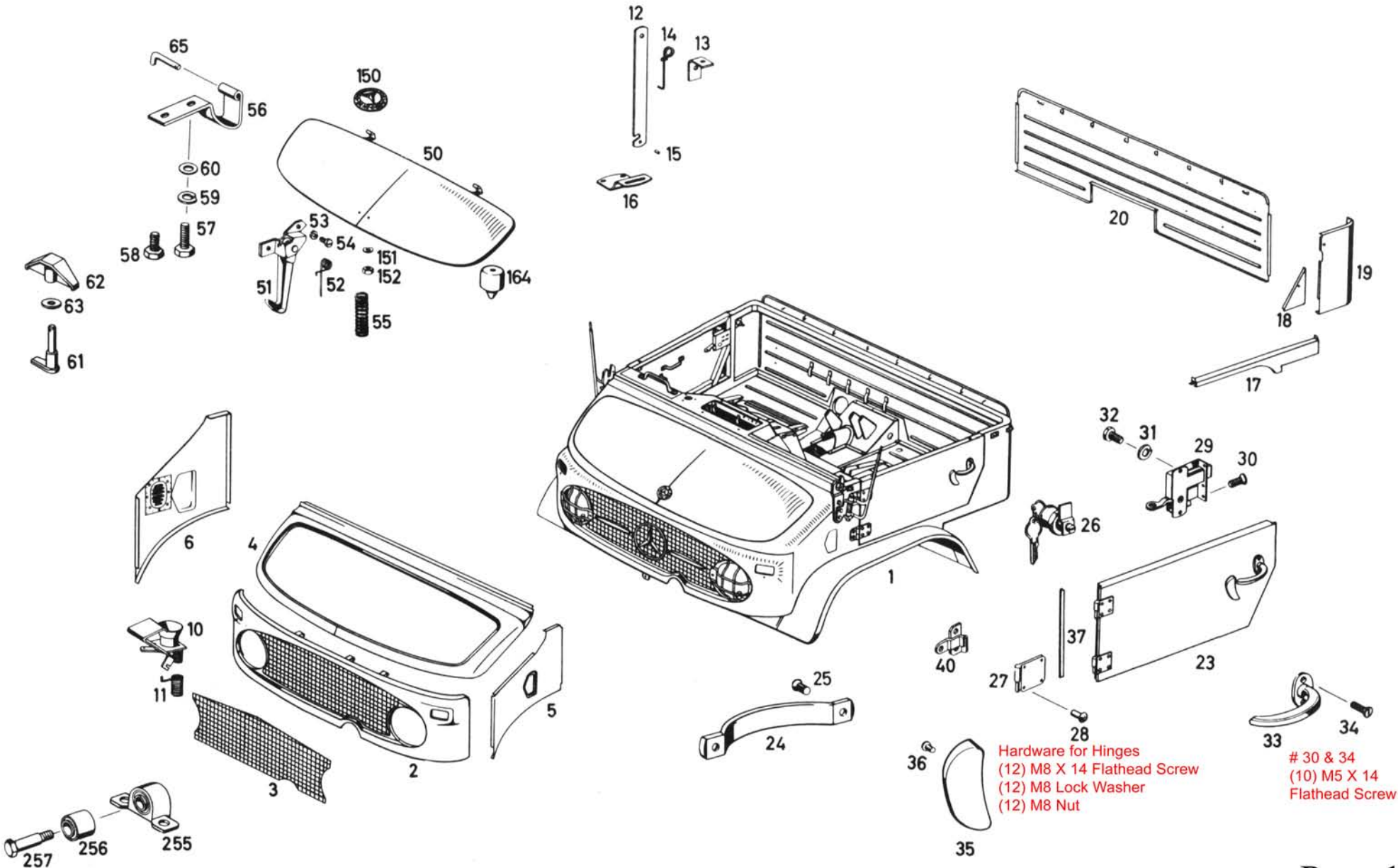


Table 30- Cab Shell, Open - Group 62

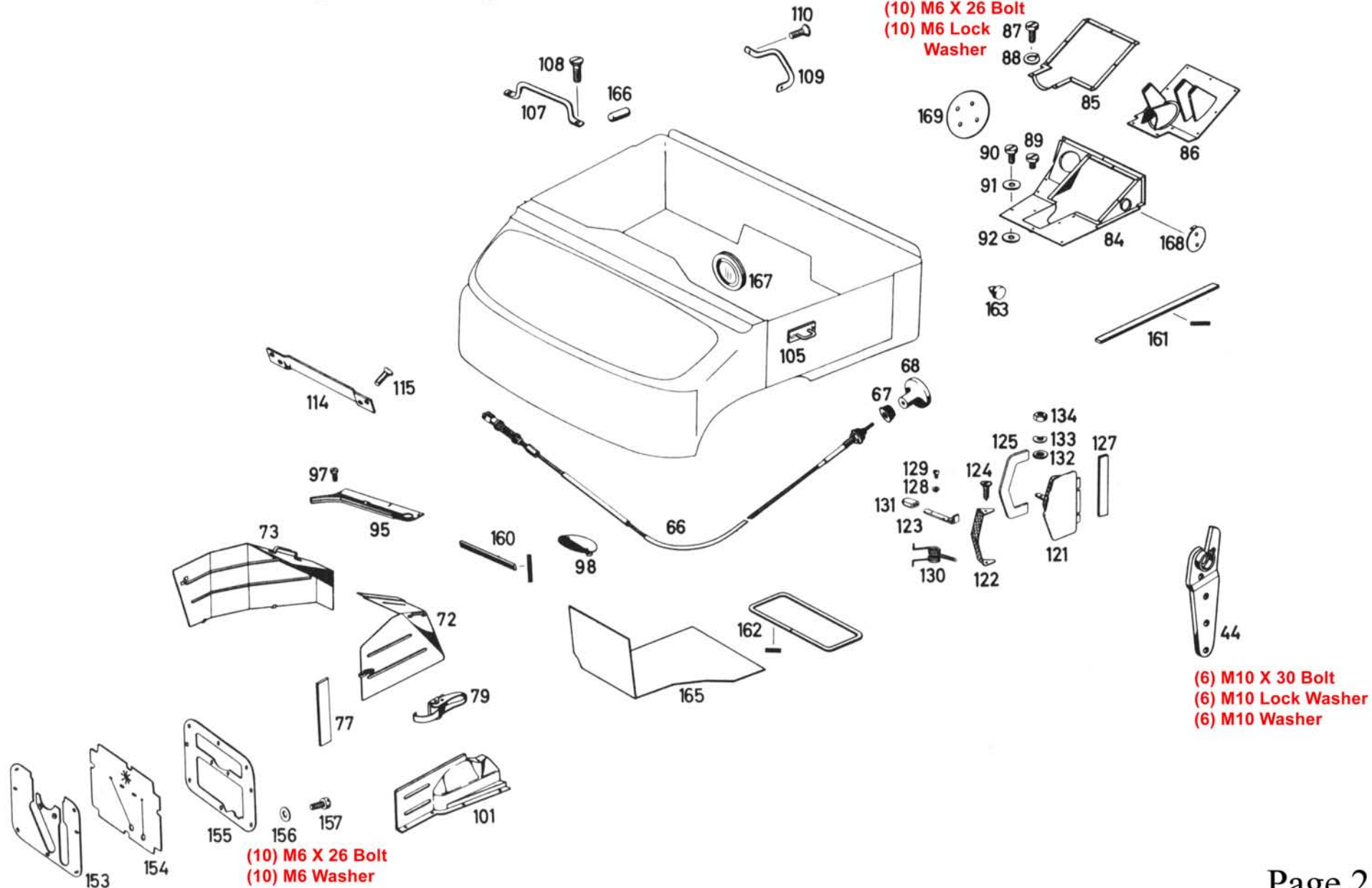


Table 30- Cab Shell, Open - Group 62

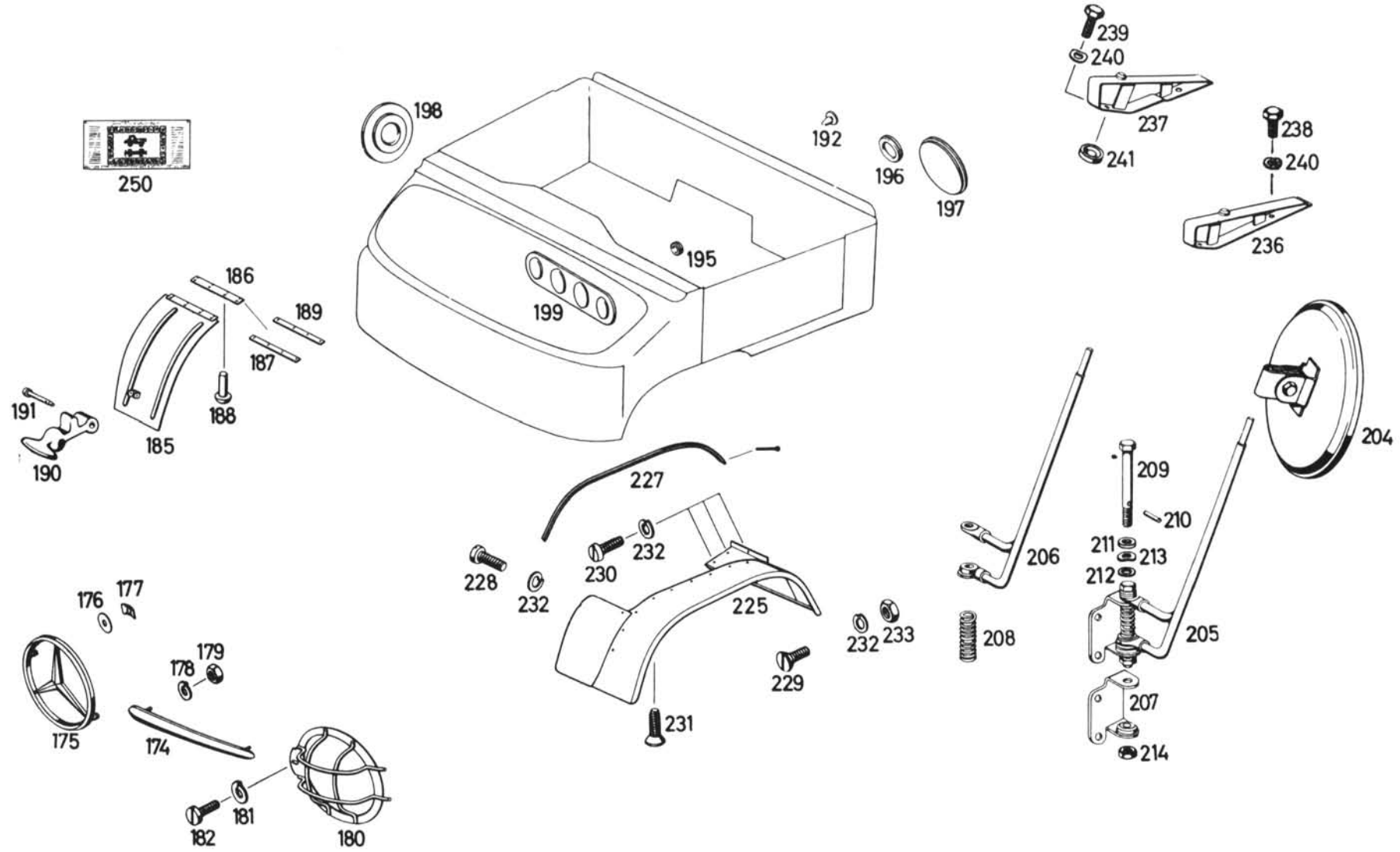


Table 31 - Cab Shell, Closed Group 62

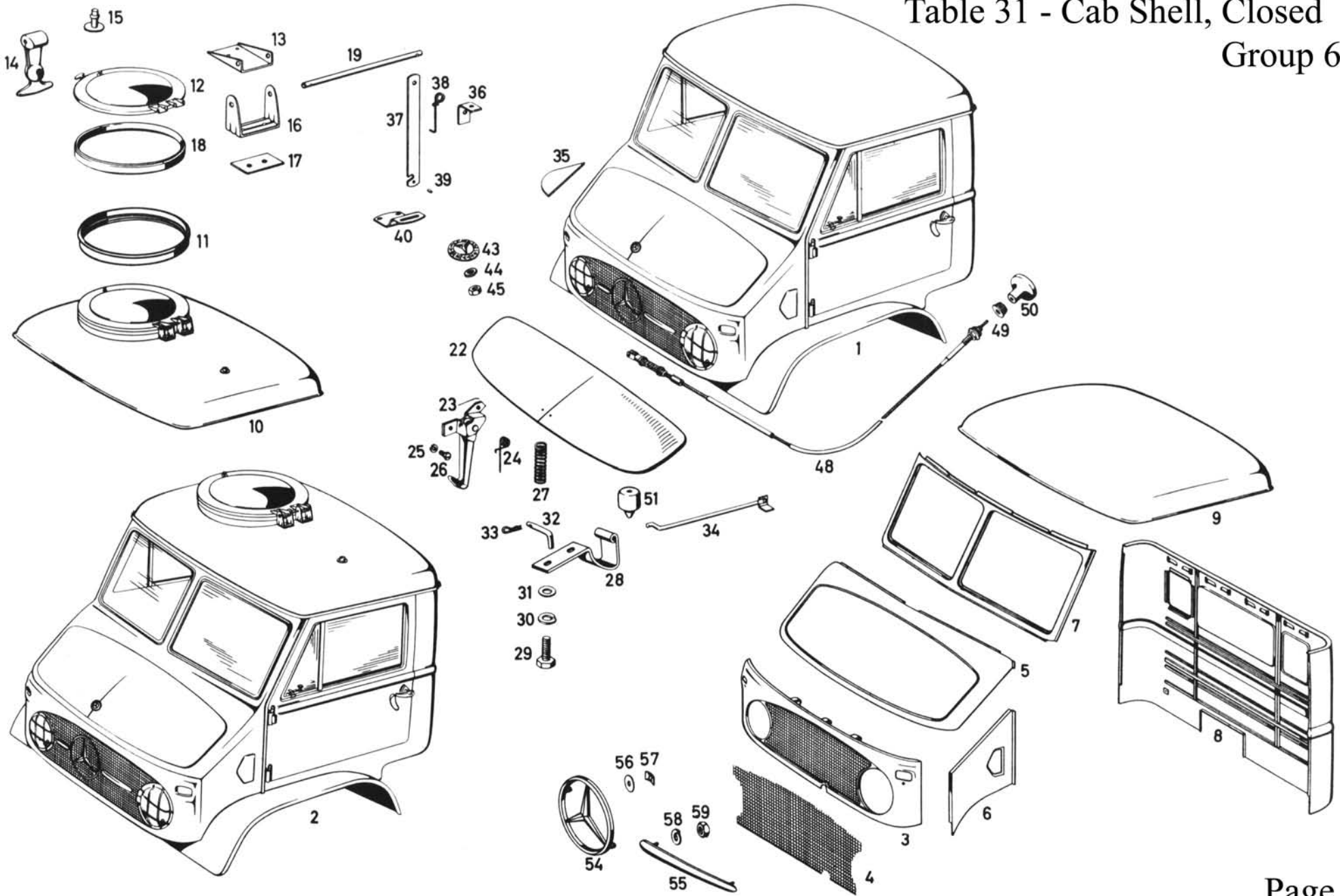


Table 31 - Cab Shell, Closed - Group 62

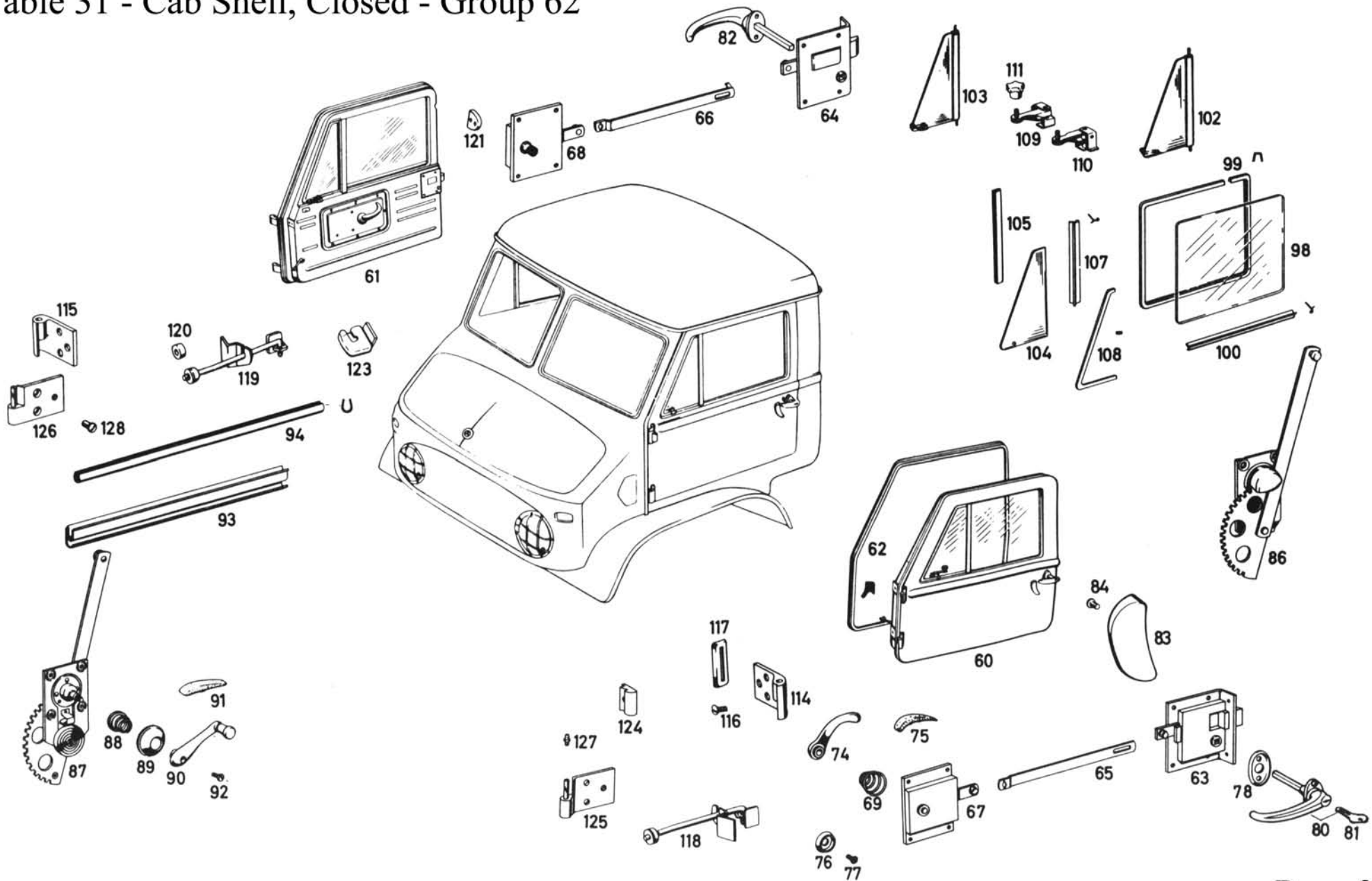


Table 31 - Cab Shell, Closed - Group 62

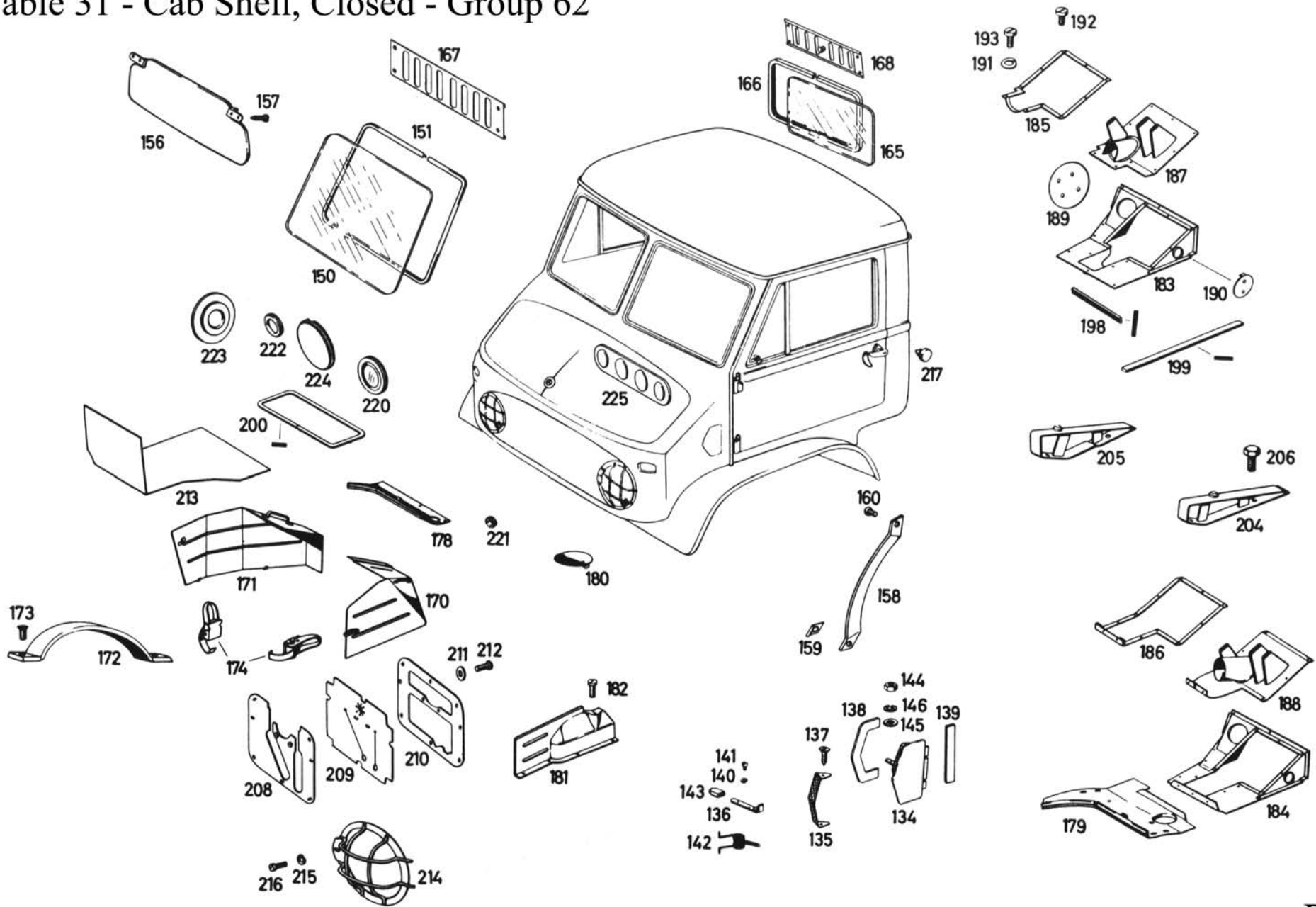


Table 31 - Cab Shell, Closed - Group 62

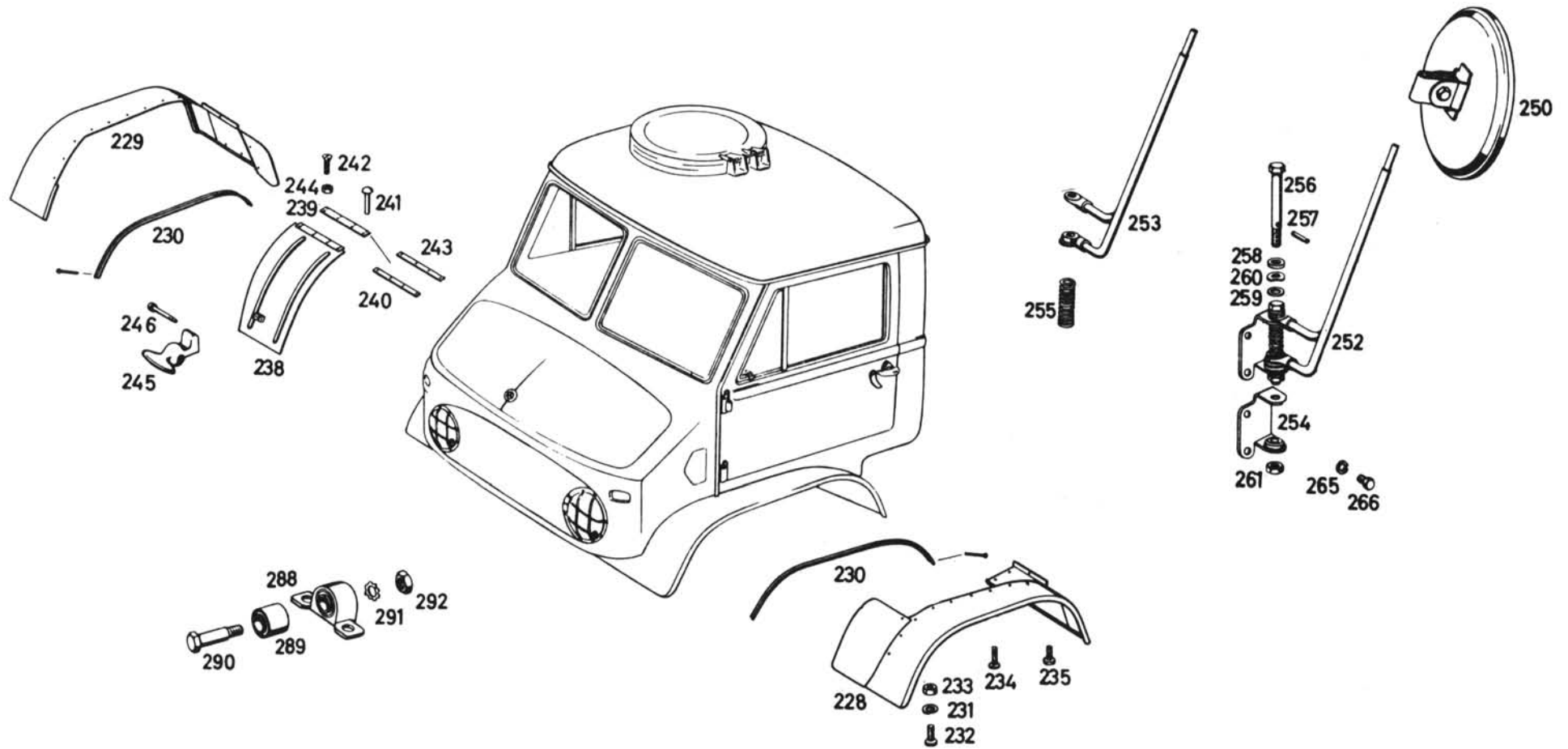


Table 32 - Seats - Group 63

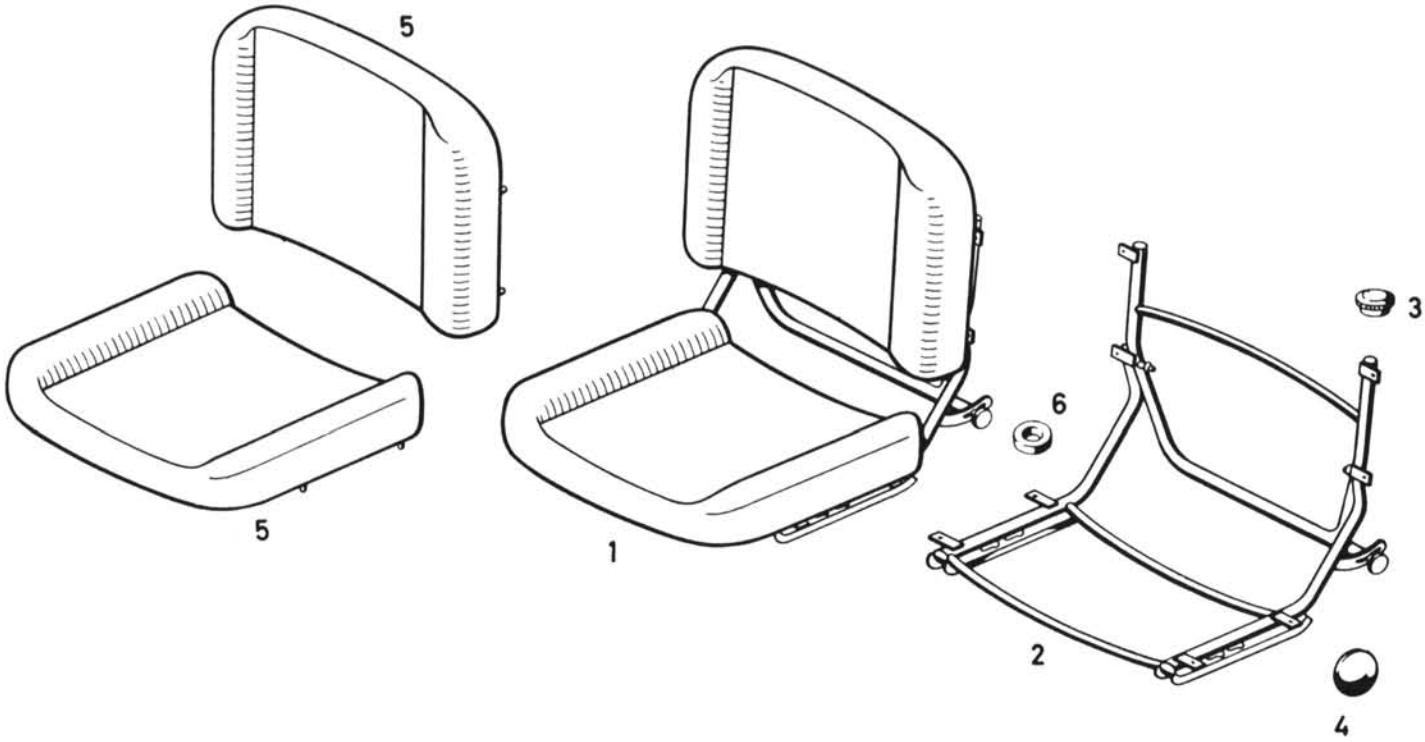


Table 33 - Flat Bed Platform - Group 65

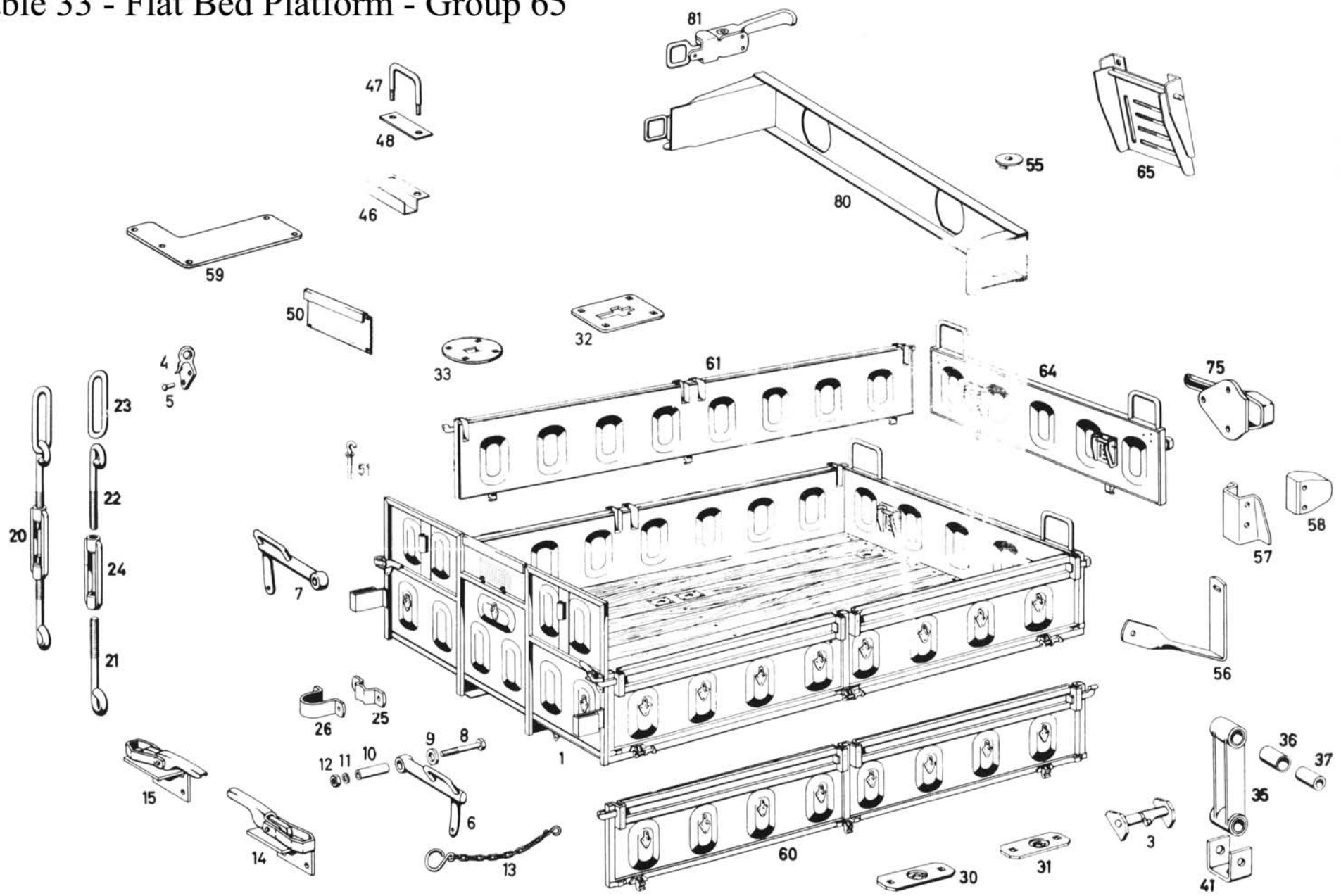


Table 34 - Windshield - Group 68

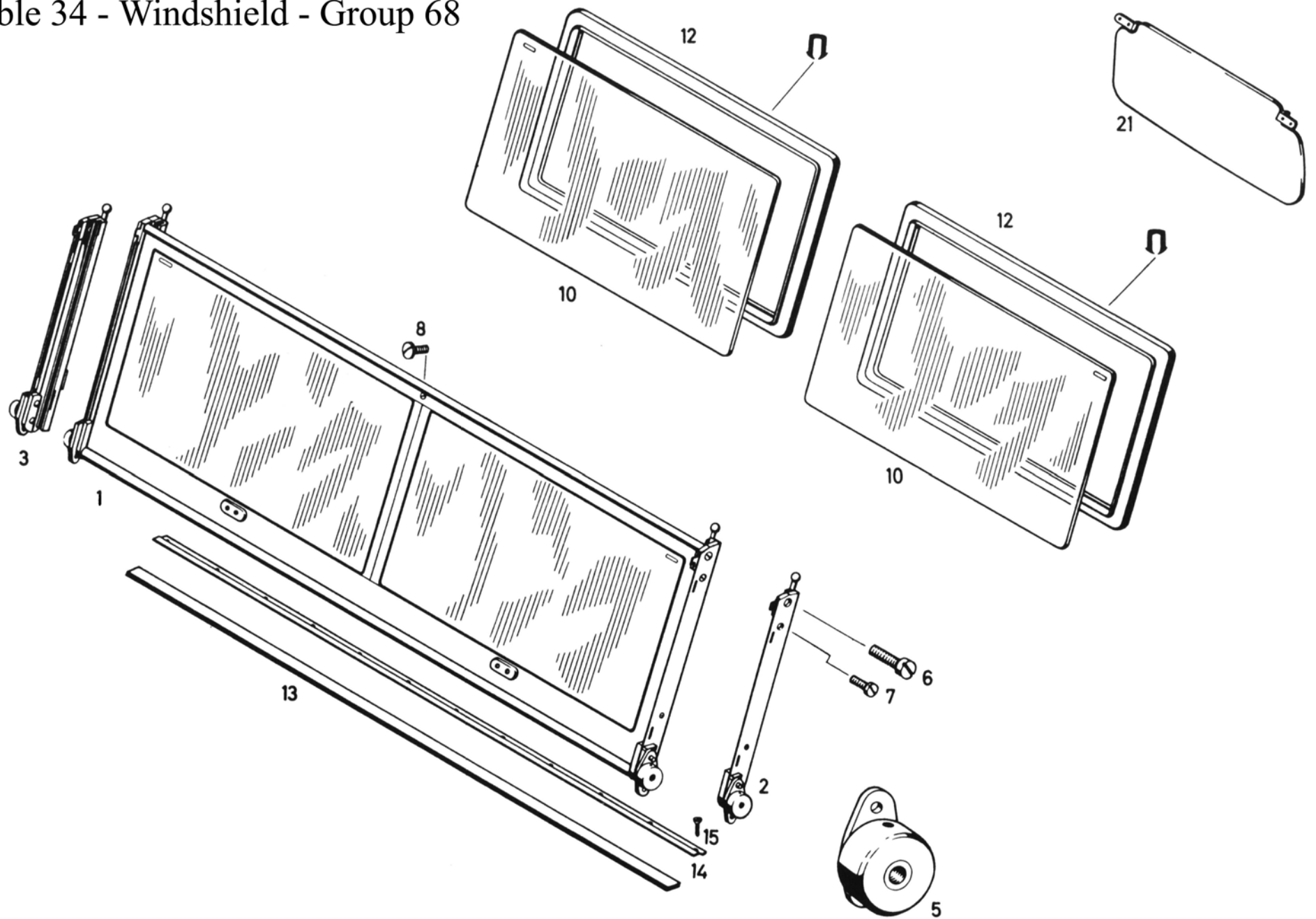


Table 35 - Canvas Top & Upper Half Doors - Group 69

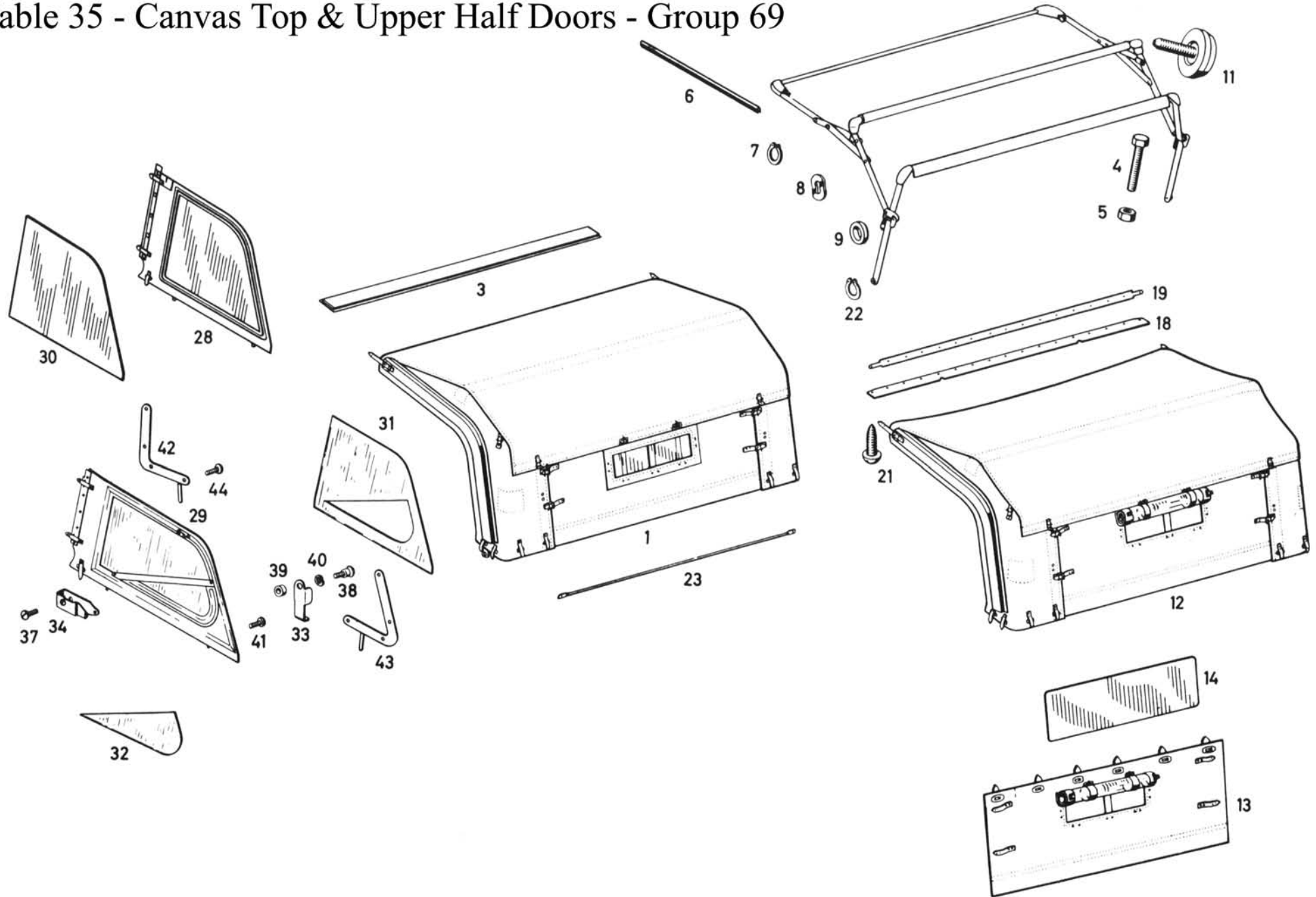


Table 36 - Troop Tarpaulin & Bench

Group 70

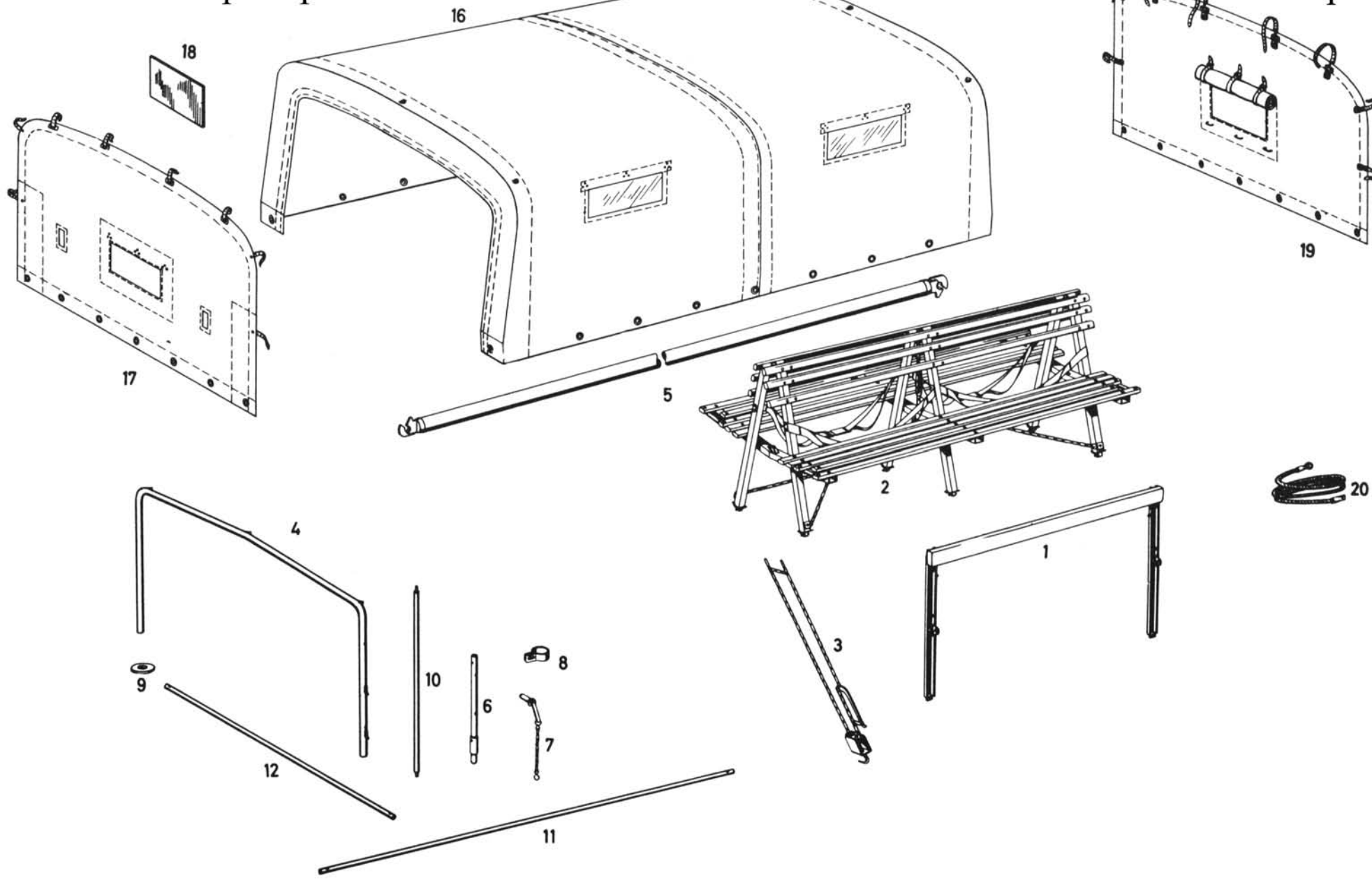


Table 37 - Tools & Accessories

Group 90 / 91

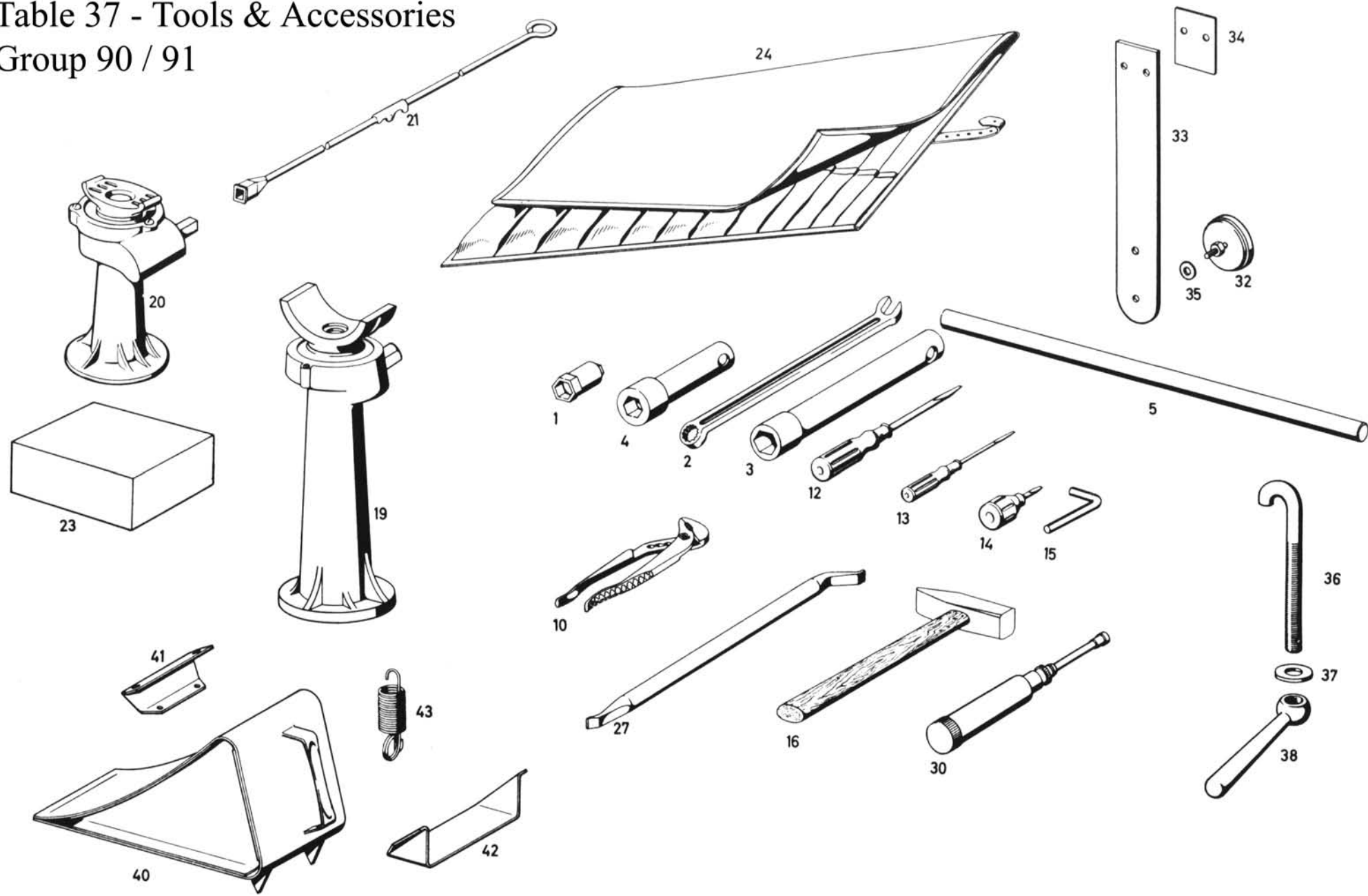


Table 1 – Front Axle – Group 01

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	01.4041.0113-00		replaced by 404 330 02 99		-				
-	01.4041.0116-00		replaced by 404 330 02 99		-				
-	404 330 02 99		Front Axle with Tie Rods Only		1				
1	01.4041.0760-00		Axle Housing		1				
2	007603 018303		Seal Ring		2				
3	007604 018100		Screw Plug		2				
4	001481 013001		Roll Pin		8				
5	001481 008003		Cylindrical Pin		8				
6	01.4111.0801-00		Axle Drive		1				
7	01.2010.0863-00		Differential Case		1				
8	01.2010.1547-00		Shaft, Differential Pinion		1				
9	01.2010.1043-00		Differential Pinion		2				
10	01.2010.1045-00		Side Gear		2				
11	01.2010.1042-00		Butting Segment		2				
12	01.4111.1031-00		Guard Plate, Side Gear		2				
13	01.4041.0827-00		Ring Gear & Drive Pinion		1				
14	01.2010.1526-00		Lock Plate		4				
15	000960 012092		Hex Head Screw		8				
16	001481 010003		Roll Pin		4				
17	000720 030213		Tapered Roller Bearing		2				
20	01.4111.0715-00		Housing, Axle Drive		1				
*	000960 012118		* Cover to Axle Drive Housing Hex Head Screw		4				
	007603 012103		Replaced By 007603 012108		-				
*	007603 012108		Seal Ring		4				
*	000125 013006		Washer		4				
	000 990 21 55		Replaced By 000935 012002		-				
*	000935 012002		Castle Nut		4				
*	000094 003004		Cotter Pin		4				
21	000007 006204		Cylindrical Pin		4				

22	99.2937.1001-00	Plug	4
-	WUM50DIN5412	Replaced By 005412 202310	-
28	005412 202310	Cylindrical Roller Bearing	1
29	000472 110000	Lock Ring	2
30	000471 050000	Lock Ring	1
31	01.2010.1171-10	Axial Shim Adjustment Spacer Washer 3.4 mm (.134")	2
-	01.2010.1171-11	Spacer Washer 3.5 mm (.138")	2
-	01.2010.1171-12	Spacer Washer 3.6 mm (.142")	2
-	01.2010.1171-13	Spacer Washer 3.7 mm (.146")	2
-	01.2010.1171-14	Spacer Washer 3.8 mm (.150")	2
-	01.2010.1171-15	Spacer Washer 3.9 mm (.154")	2
-	01.2010.1171-16	Spacer Washer 4.0 mm (.157")	2
-	01.2010.1171-17	Spacer Washer 4.1 mm (.161")	2
-	01.2010.1171-18	Spacer Washer 4.2 mm (.165")	2
-	01.2010.1171-19	Spacer Washer 4.3 mm (.169")	2
-	01.2010.1171-20	Spacer Washer 4.4 mm (.173")	2
-	01.2010.1171-21	Spacer Washer 4.5 mm (.177")	2
-	01.2010.1171-22	Spacer Washer 4.6 mm (.181")	2
-	01.2010.1171-23	Spacer Washer 4.7 mm (.185")	2
-	01.2010.1171-24	Spacer Washer 4.8 mm (.189")	2
-	01.2010.1171-25	Spacer Washer 4.9 mm (.193")	2
-	01.2010.1171-26	Spacer Washer 5.0 mm (.197")	2
35	99.2902.1002-01	Preload Slim Adjustment Spacer Washer 1.9 mm (.075")	nB
-	99.2902.1002-02	Spacer Washer 2.0 mm (.079")	nB
-	99.2902.1002-03	Spacer Washer 2.1 mm (.083")	nB
-	99.2902.1002-04	Spacer Washer 2.2 mm (.087")	nB
-	99.2902.1002-05	Spacer Washer 2.3 mm (.091")	nB
-	99.2902.1002-06	Spacer Washer 2.4 mm (.094")	nB
-	99.2902.1002-07	Spacer Washer 2.5 mm (.098")	nB

-	99.2902.1002-08	Spacer Washer 2.6 mm (.102")	nB
-	99.2902.1002-09	Spacer Washer 2.7 mm (.106")	nB
-	99.2902.1002-10	Spacer Washer 1.8 mm (.071")	nB
-	31 308 DIN 720	Replaced By 001 981 44 05	-
-	000 981 43 05	Replaced By 001 981 44 05	-
36	001 981 44 05	Tapered Roller Bearing, Pinion	2
37	99.2913.1002-00	Nut, Grooved	1
38	99.2990.1001-04	Seal Ring	1
39	01.2010.1049-00	Race	1
-	070852 0400000	Replaced By 000 990 09 60	-
40	000 990 09 60	Nut, Grooved	2
41	99.2905.1017-00	Lock Plate	1
42	99.2996.1005-00	Seal Ring	2
46	01.4111.1024-00	* For Differential Lock Bushings*	1
47	01.4111.1013-00	Shifting Spring*	1
49	01.2010.1200-00	Shaft*	1
50	01.4111.0716-00	Eccentric Pin*	1
51	01.4111.1027-00	Seal Ring*	1
52	01.2010.1206-00	Gasket, Cover	1
53	01.4111.1028-00	Cover	1
54	000127 006204	* Cover to Axle Drive Housing Lock Washer*	2
55	000933 006102	Screw*	2
-	01.4111.1029-00	Replaced By 404 350 00 87	-
-	01.2010.1051-00	Replaced By 404 350 00 87	-
56	404 350 00 87	Repair Kit, Shift Cover	1
-	13.2010.1057-00	Replaced By 404 335 00 49	-
57	404 335 00 49	Slide	2
60	000007 008102	*Axle Drive to Axle Housing Cylindrical Pin*	2
61	01.4111.1023-00	Gasket*	1
62	007603 010108	Seal Ring*	10

63	000931 010044	Screw*		11
64	99.2953.1001-01	Lock Washer "Ateco"*		6
65	000931 010154	Screw*		1
-	000931 010127	Replaced By 000931 010117		-
66	000931 010117	Screw*		1
-	000931 010142	Screw*		1
67	99.2953.1001-02	Lock Washer "Ateco"*		1
68	000960 012054	Screw*		1
69	01.4111.1038-00	Bracket, Distributor	2	1
70	01.4041.1102-00	Shock Pitman Arm		1
-	007603 010108	Seal Ring		2
71	01.2010.1209-00	* For Axle Drive Housing Vent Clamp*		1
72	01.2010.0613-00	Breather Tube*		1
73	007603 010108	Seal Ring*		3
74	01.2010.0772-00	Breather Screw*		1
76	01.4041.0745-00	Spring Bracket, Front Left		1
77	01.4041.0746-00	Spring Bracket, Front Right		1
-	000961 016006	These items	3	-
-	000 990 18 55	are replaced by		-
-	000 990 17 51			-
-	17 DIN 125	000961 016004 and		-
-	4x35 DIN 94	000934 016003		-
-	000961 016004	Screw		6
-	000934 016003	Nut		6
-	01.4041.0823-00	Replaced by 01.4111.0819-00		-
78	01.4111.0819-00	Flange, Housing		2
79	000939 010021	Stud		8
-	000931 010040	Screw		12
80	01.2010.0620-00	Bearing Flange		2
81	99.2990.1003-02	Seal Ring		2
82	01.2010.1010-00	Gasket		2
83	000127 006204	Lock Washer		12

-	000931 006005	Replaced By 000933 006121	-
84	000933 006121	Screw	12
-	01.2010.1194-00	Replaced By 01.4111.1068-00	-
85	01.4111.1068-00	Mounting Clamp	2
86	01.2010.0768-00	Breather Tube, Left	1
87	01.2010.0767-00	Breather Tube, Right	1
-	007603 006104	Replaced By 007603 006111	-
88	007603 006111	Seal Ring	4
89	99.2916.1005-00	Hex Head Screw	2
90	007603 018303	Seal Ring	6
91	007604 018100	Screw Plug	6
-	01.4041.0737-00	Replaced By 01.4041.0763-00	-
95	01.4041.0763-00	CV Joint & Shaft, Left	1
-	01.4041.0738-00	Replaced By 01.4041.0764-00	-
96	01.4041.0764-00	CV Joint & Shaft, Right	1
97	000 337 02 17	Follower Ring	2
99	000 337 02 11	Journal Cross	4
100	000 337 01 74	Joint Pin	4
101	000 337 06 80	Seal Ring	8
102	000 337 08 80	Gasket, Cover	8
103	000 337 00 76	Intermediate Plate	8
104	000 337 02 30	End Cover	8
105	000 337 01 27	Protective Cap	8
106	000 337 07 80	Seal Ring	8
107	000 981 34 87	Needle, Bearing	480
108	000 337 03 18	Support	8
109	000 337 09 80	Seal Ring	8
110	071412 008100	Grease Nipple	4
-	000720 030309	Replaced By 001 981 37 05	-
114	001 981 37 05	Tapered Roller Bearing	2
117	000720 030306	Outside Bearing	2

118	01.4111.1022-00	Fitted Washer	2
119	001481 006000	Clamping Pin	2
120	000063 010103	Countersunk Screw	2
-	NJL50NADIN5412	Replaced By 005412 530210	-
121	005412 530210	Cylindrical Roller Bearing	2
-	01.4041.1080-00	Replaced By +404 330 02 52	-
-	01.2010.0848-00	Replaced By +404 330 02 52	-
122	+404 330 02 52	Gear Set, Left	1
-	01.4041.1081-00	Replaced By +404 330 03 52	-
-	01.2010.0849-00	Replaced By +404 330 03 52	-
123	+404 330 03 52	Gear Set, Right	1
124	01.4041.1066-00	Housing	2
-	6215 DIN 625	Replaced By 000625 036215	-
125	000625 036215	Grooved Ball Bearing	2
126	000472 130000	Lock Ring	2
127	99.2990.1004-01	Seal Ring	2
128	99.2902.1007-01	Spacer Washer 0.2 mm	nB
-	99.2902.1007-02	Spacer Washer 0.3 mm	nB
-	99.2902.1007-03	Spacer Washer 0.4 mm	nB
-	99.2902.1007-04	Spacer Washer 0.5 mm	nB
-	99.2902.1007-05	Spacer Washer 0.1 mm	nB
129	01.4041.1083-00	*Housing to Housing Flange Gasket*	2
-	000931 010080	Replaced By 000931 010093	-
130	000931 010093	Screw*	4
-	99.2953.1001-01	Replaced By 000137 010103	-
131	000137 010103	Spring Washer*	24
132	000934 010000	Hex Nut*	12
-	000931 010040	Replaced By 000933 010056	-
133	000933 010056	Screw*	12
137	01.2010.0861-00	Steering Knuckle	2
138	01.2010.0615-00	Steering Knuckle, Outside	2

139	01.2010.1019-00	Bushing	2
140	01.2010.1644-00	Collar Bushing	2
141	01.2010.1607-00	Steering Knuckle, Inside	2
142	01.4041.1057-00	Bushing	2
143	99.2990.1004-06	Seal Ring with Dust Lip	2
144	99.2901.1023-00	Washer	2
145	99.2996.1010-00	Rubber Ring, Top	2
146	01.2010.1205-00	King Pin, Top	2
147	001481 005007	Clamping Pin	2
-	28x40x30 DIN 5407	Replaced By 005407 022028	-
148	005407 022028	Roller Cage	2
149	01.2010.1020-00	King Pin, Bottom	2
150	01.2010.1024-00	Thrust Plate	2
151	99.2996.1012-00	Rubber Ring, Bottom	2
152	01.2010.1163-00	Connecting Bolt, Steering Knuckle	2
153	01.2010.1164-00	Castle Nut	2
-	000094 003024	Cotter Pin	2
154	99.2905.1018-00	Lock Plate	2
155	01.2010.1023-00	Lock Nut	2
156	071412 010200	Grease Nipple	2
157	071412 010300	Grease Nipple	2
160	000931 010045	*Steering Knuckle to Housing Flange Screw*	12
-	000931 010019	Replaced By 000933 010049	-
161	000933 010049	Screw*	4
-	99.2953.1001-01	Replaced By 000137 010103	-
162	000137 010103	Spring Washer*	16
163	01.4041.1059-00	O-Ring	2
164	01.2010.1628-00	Retaining Plate, Brake Hose	2
165	000960 016023	Screw (hub to axle housing)	7

-	000960 016040	Screw (Front Right Axle Housing)	1
-	01.2010.1627-00	Replaced By 006797 016151	-
-	A 16, 5 DIN 6798	Replaced By 006797 016151	-
166	006797 016151	Toothed Washer	8
-	000 990 17 51	Replaced By 000934 016003	-
167	000934 016003	Nut	8
170	01.4111.1018-00	Hub, Wheel	2
171	01.4111.1019-00	Bolt, Wheel Mounting	12
172	01.2010.1069-00	Lock Plate	2
173	001481 006003	Clamping Pin	8
174	99.2905.1009-00	Lock Plate	2
175	01.2010.1070-00	Lock Bolt, Wheel	2
176	01.4041.1076-00	Steering Arm, Right	1
177	01.4041.1077-00	Steering Arm, Left	1
-	A 16, 5 DIN 6798	Toothed Washer	-
-	006797 016151	Replaced By 000137 016200	-
		Steering Arms to Outside Steering Knuckles Spring Washer	
178	000137 016200		4
-	000960 016055	Replaced By 000960 016153	-
179	000960 016153	Screw*	4
-	000177 002000	Lock Wire, 300 mm long*	2
183	01.4041.0813-00	Tie Rod	1
184	000 338 19 30	Ball Cup Housing w/threaded shaft	1
-	000 338 02 27	Replaced by 000 338 00 27	-
185	000 338 00 27	Ball Socket, Bottom	2
186	071831 030001	Ball Pivot	2
187	000 338 00 26	Ball Socket, Top	2
188	000 338 04 93	Pressure Spring	2
189	000 338 03 31	Lock Nut	2
190	000 994 00 37	Snap Hook, Lock Nut	2
191	000 338 16 56	Dust Cap, Rubber	2
192	000937 006000	Castle Nut	2

-	000094 004026	Cotter Pin	2
-	000 338 03 45	Replaced by 000 338 04 45 & together with 000931 010220 & 000935 010003	-
193	000 338 04 45	Clamp	1
-	000931 010220	Screw	2
-	000935 010003	Castle Nut	2
-	000094 002008	Cotter Pin	2
-	071412 008100	Grease Nipple	2
195	01.4041.1063-00	Bracket, Steering Shock Absorber	1
196	01.4041.0820-00	Steering Shock Absorber	1
197	000 463 06 56	Seal Cap	2
198	000937 012001	Castle Nut	2
-	000094 003024	Cotter Pin	2

Table 2 – Front Wheel Brake – Group 01

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	01.4041.0803-00		Cover Plate		2				
-	01.2010.1147-00		Replaced By 01.4041.1103-00		-				
-	01.2010.1150-00		Replaced By 01.4041.1103-00		-				
2	01.4041.1103-00		Adjusting Eccentric		4				
4	000 421 03 90		Spring		4				
-	01.2010.1148-00		Replaced By 01.4041.1105-00		-				
5	01.4041.1105-00		Adjusting Pin		4				
6	000 421 10 52		Retainer, Adjusting Pin		4				
7	000660 006008		Round Head Rivet		16				
-	01.4041.0709-00		Replaced By 404 420 01 19		-				
-	02.4041.0752-00		Replaced By 404 420 01 19		-				
10	404 420 01 19		Brake Shoe O.D. 349 mm		4				
-	404 420 05 19		Brake Lining O.D. 352 mm-dto		4				
-	01.4041.1013-00		Brake Lining 6.0 mm thick for 349.2 mm Dia. Brake Drum		4				
11	01.4041.1075-00		Brake Lining 6.4 mm thick for 350.0 mm Dia. Brake Drum		4				

-	404 421 00 10	Brake Lining 7.0 mm thick for 351.0 mm Dia. Brake Drum	4	
-	404 421 01 10	Brake Lining 7.5 mm thick for 352.0 mm Dia. Brake Drum	4	
12	007338 006300	Tubular Rivet	36	
13	01.4041.1067-00	Link	2	
14	99.2939.1008-00	Pin	4	
-	000094 005012	Cotter Pin	4	
16	01.4041.1049-00	Release Spring	2	
20	000 420 66 18	Wheel Cylinder, 1.625" Dia.	2	
21	000 421 15 90	Pressure Spring with Retainer	2	
-	000 421 12 86	Seal Cup Replaced By Repair Kit	-	
-	000 421 10 83	Piston Replaced By Repair Kit	-	
-	000 421 14 87	Boot included in Repair Kit	4	
26	000 421 10 88	Thrust Pin	4	
27	000 420 00 55	Bleeder Screw	2	
28	000 421 08 87	Rubber Cap	2	
-	000 421 02 84	Replaced By 000 428 07 30	-	
29	000 428 07 30	Connector	2	
30	007603 014102	Seal Ring	4	
31	000 428 00 26	Hollow Screw	2	
32	99.2953.1001-03	*Wheel Cyl. to Brake Cover Plate Lock Washer "Ateco"*	4	
33	000933 008016	Screw*	4	
35	01.4041.1079-00	Drum, Brake	2	
36	000063 010100	Countersunk Screw	4	
Brake Lines				
40	000 429 04 37	Distributor	1	
-	000931 008028	Screw	1	
-	000127 008205	Lock Washer	1	
-	000934 008010	Nut	1	
-	01.4041.0720-00	Pipe Line. Left	1	1
44	01.4041.0768-00	dto	2	1

-	000 428 00 72	Pipe Union Nut		2
-	01.4041.0721-00	Pipe Line, Right	1	1
45	01.4041.0769-00	dto	2	1
46	000 428 00 72	Pipe Union Nut		2
-	404 987 00 60	Pad (for brake hose)		2
48	000 428 07 35	Brake Hose		2
-	000 428 00 73	Replaced By 000 428 04 73		-
49	000 428 04 73	Bracket, Brake Hose		2
50	01.2010.1633-00	Mounting Clamp		2
-	404 586 00 86	Repair Kit, Steering Knuckle		1
-	000 586 02 88	dto		2

Table 3 – Front Drive Shaft – Group 01

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	02.4041.0809-00		Thrust Ball Housing		1				
2	01.2010.1537-00		Thrust Ball Cup		1				
3	071412 010100		Grease Nipple		1				
-	01.4041.0700-00		Replaced By 01.4041.0757-00		-				
4	01.4041.0757-00		Thrust Tube		1				
5	99.2905.1005-00		*Thrust Tube to Axle Drive Lock Plate*		nB				
-	99.2905.1005-01		dto*		nB				
-	99.2905.1005-02		dto*		nB				
-	01.2010.1154-00		Retaining Plate, Distributor*	1	1				
6	000127 010205		Lock Washer*		12				
7	000931 010102		Screw*		12				
8	99.2902.1006-01		Spacer Washer 2.9 mm Thick		nB				
-	99.2902.1006-02		Spacer Washer 3.0 mm Thick		nB				
-	99.2902.1006-03		Spacer Washer 3.1 mm Thick		nB				
-	99.2902.1006-04		Spacer Washer 3.2 mm Thick		nB				
-	99.2902.1006-05		Spacer Washer 2.8 mm Thick		nB				

-	99.2902.1006-06	Spacer Washer 3.5 mm Thick	nB
-	99.2902.1006-07	Spacer Washer 3.7 mm Thick	nB
-	99.2902.1006-08	Spacer Washer 4.0 mm Thick	nB
-	99.2902.1006-09	Spacer Washer 4.5 mm Thick	nB
-	99.2902.1006-10	Spacer Washer 5.0 mm Thick	nB
12	01.4041.0718-00	Axle Strut, Left	1
13	01.4041.0751-00	Axle Strut, Right	1
-	000960 014200	Screw	1
-	000125 015000	Washer	1
-	000 990 17 55	Replaced By 000935 014002	-
-	000935 014002	Castle Nut	1
-	000094 003005	Cotter Pin	1
14	99.2921.1005-00	Necked-Down Bolt	1
-	000 990 13 55	Replaced By 000937 014001	-
15	000937 014001	Castle Nut	1
-	000094 003005	Cotter Pin	1
16	01.4041.0830-00	Propeller Shaft	1
17	411 411 00 80	Gasket	1
18	99.2905.1012-00	Lock Plate	3
-	000933 008031	Screw	6
-	13.2010.1109-00	Gasket – No Longer Installed	-
19	007603 010108	Seal Ring (M10)	6
-	000931 010143	Replaced By 000931 010229	-
20	000931 010229	Screw (M10 X 95)	6
21	01.2010.1153-00	Boot	1
22	000933 006123	Screw (M6 X 25)	5
23	007340 008103	Tubular Rivet	5
24	009021 006205	Washer (M6)	5
25	000934 006007	Nut (M6)	5

-	900262 009100	Hose Clamp	2
-	900263 009000	Hose Strap – 800 mm Long	1
-	900263 009000	Hose Strap – 1265 mm Long	1

Footnotes

Remarks Tables 1 through 3

- 1 Up to Chassis Number 8501400
 - 2 From Chassis Number 8501401 and Beyond
 - 3 Only Replaceable Together. Secured By Applying Center Punch.
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Table 4 – Rear Axle – Group 02

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	02.4041.0111-00		replaced by 404 350 01 99		-				
-	02.4041.0118-00		replaced by 404 350 01 99		-				
-	02.4041.0114-00		replaced by 404 350 01 99						
-	404 350 01 99		Rear Axle, less thrust tube, struts, wheels			1	1	1	
-	404 350 08 99		dto						1
1	01.4041.0760-00		Axle Housing		1				
2	007603 018303		Seal Ring		2				
3	007604 018100		Screw Plug		2				
4	001481 013001		Roll Pin		8				
5	001481 008003		Cylindrical Pin		8				
6	01.4111.0801-00		Axle Drive		1				
7	01.2010.0863-00		Differential Case		1				
8	01.2010.1547-00		Shaft, Differential Pinion		1				
9	01.2010.1043-00		Differential Pinion		2				
10	01.2010.1045-00		Side Gear		2				
11	01.2010.1042-00		Butting Segment		2				
12	01.4111.1031-00		Guard Plate, Side Gear		2				
13	01.4041.0827-00		Ring Gear & Drive Pinion		1				
14	01.2010.1526-00		Lock Plate		4				
15	000960 012092		Hex Head Screw		8				
16	001481 010003		Roll Pin		4				
17	000720 030213		Tapered Roller Bearing		2				
20	01.4111.0715-00		Housing, Axle Drive		1				
*	000960 012118		* Cover to Axle Drive Housing Hex Head Screw		4				
	007603 012103		Replaced By 007603 012108		-				
*	007603 012108		Seal Ring		4				
*	000125 013006		Washer		4				
	000 990 21 55		Replaced By 000935 012002		-				
*	000935 012002		Castle Nut		4				
*	000094 003004		Cotter Pin		4				

21	000007 006204		Cylindrical Pin	4
22	99.2937.1001-00		Plug	4
-	WUM50DIN5412		Replaced By 005412 202310	-
28	005412 202310		Cylindrical Roller Bearing	1
29	000472 110000		Lock Ring	2
30	000471 050000		Lock Ring	1
31	01.2010.1171-10	-00	Axial Shim Adjustment Spacer Washer 3.4 mm (.134")	2
-	01.2010.1171-11		Spacer Washer 3.5 mm (.138")	2
-	01.2010.1171-12		Spacer Washer 3.6 mm (.142")	2
-	01.2010.1171-13		Spacer Washer 3.7 mm (.146")	2
-	01.2010.1171-14		Spacer Washer 3.8 mm (.150")	2
-	01.2010.1171-15		Spacer Washer 3.9 mm (.154")	2
-	01.2010.1171-16		Spacer Washer 4.0 mm (.157")	2
-	01.2010.1171-17		Spacer Washer 4.1 mm (.161")	2
-	01.2010.1171-18		Spacer Washer 4.2 mm (.165")	2
-	01.2010.1171-19		Spacer Washer 4.3 mm (.169")	2
-	01.2010.1171-20		Spacer Washer 4.4 mm (.173")	2
-	01.2010.1171-21		Spacer Washer 4.5 mm (.177")	2
-	01.2010.1171-22		Spacer Washer 4.6 mm (.181")	2
-	01.2010.1171-23		Spacer Washer 4.7 mm (.185")	2
-	01.2010.1171-24		Spacer Washer 4.8 mm (.189")	2
-	01.2010.1171-25		Spacer Washer 4.9 mm (.193")	2
-	01.2010.1171-26		Spacer Washer 5.0 mm (.197")	2
35	99.2902.1002-01		Preload Slim Adjustment Spacer Washer 1.9 mm (.075")	nB
-	99.2902.1002-02		Spacer Washer 2.0 mm (.079")	nB
-	99.2902.1002-03		Spacer Washer 2.1 mm (.083")	nB
-	99.2902.1002-04		Spacer Washer 2.2 mm (.087")	nB
-	99.2902.1002-05		Spacer Washer 2.3 mm (.091")	nB
-	99.2902.1002-06		Spacer Washer 2.4 mm (.094")	nB

-	99.2902.1002-07	Spacer Washer 2.5 mm (.098")	nB
-	99.2902.1002-08	Spacer Washer 2.6 mm (.102")	nB
-	99.2902.1002-09	Spacer Washer 2.7 mm (.106")	nB
-	99.2902.1002-10	Spacer Washer 1.8 mm (.071")	nB
-	31 308 DIN 720	Replaced By 001 981 44 05	-
-	000 981 43 05	Replaced By 001 981 44 05	-
36	001 981 44 05	Tapered Roller Bearing, Pinion	2
37	99.2913.1002-00	Nut, Grooved	1
38	99.2990.1001-04	Seal Ring	1
39	01.2010.1049-00	Race	1
-	070852 0400000	Replaced By 000 990 09 60	-
40	000 990 09 60	Nut, Grooved	2
41	99.2905.1017-00	Lock Plate	1
42	99.2996.1005-00	Seal Ring	2
46	01.4111.1024-00	* For Differential Lock Bushings*	1
47	01.4111.1013-00	Shifting Spring*	1
49	01.2010.1200-00	Shaft*	1
50	01.4111.0716-00	Eccentric Pin*	1
51	01.4111.1027-00	Seal Ring*	1
52	01.4111.1028-00	Cover	1
53	01.2010.1206-00	Gasket, Cover	1
54	000127 006204	* Cover to Axle Drive Housing Lock Washer*	2
-	000933 006026	Replaced By 000933 006102	
55	000933 006102	Screw*	2
-	01.4111.1029-00	Replaced By 404 350 00 87	-
-	01.2010.1051-00	Replaced By 404 350 00 87	-
56	+404 350 00 87	Repair Kit, Shift Cover	1
-	13.2010.1057-00	Replaced By 404 335 00 49	-
57	404 335 00 49	Slide	2
61	01.4111.1023-00	*Axle Drive to Axle Housing Gasket*	1

62	000007 008102	Cylindrical Pin*		2
63	007603 010108	Seal Ring*		10
64	000931 010044	Screw*		11
65	000931 010117	Screw*		1
66	99.2953.1001-01	Lock Washer "Ateco"*		6
67	000931 010154	Screw*		1
68	99.2953.1001-02	Lock Washer "Ateco"*		1
69	000960 012054	Screw*		1
70	01.4111.1038-00	Bracket, Distributor	10	1
72	01.2010.1209-00	* For Axle Drive Housing Vent Clamp*		1
73	01.2010.0613-00	Breather Tube*		1
74	007603 010108	Seal Ring*		3
75	01.2010.0772-00	Breather Screw*		1
-	404 350 00 32	Spring, Support	1	-
76	02.4041.0726-00	Spring Bracket, Rear Left		1
-	404 350 01 32	Spring, Support	1	-
77	02.4041.0727-00	Spring Bracket, Rear Right		1
-	000 990 18 55	These items	2	-
-	000 990 17 51	are replaced by		-
-	M 18x1.5x30 S	000961 016004 and		-
-	DIN 961-8G	000934 016003		-
-	000961 016004	Bolt (MF16 X 30mm)		6
-	000934 016003	Nut (MF16)		6
-	01.4041.0823-00	Replaced by 01.4111.0819-00		-
80	01.4111.0819-00	Flange, Housing		2
81	000939 010021	Stud		8
-	M10x30DIN939-8G	Replaced by 000931 010040		-
-	000931 010040	Screw		12
82	01.2010.0620-00	Bearing Flange		2
83	99.2990.1003-02	Seal Ring		2
84	01.2010.1010-00	Gasket		2
85	000127 006204	Lock Washer		12

-	000931 006005	Replaced By 000933 006121	-
86	000933 006121	Screw	12
-	01.2010.1194-00	Replaced By 01.4111.1068-00	-
87	01.4111.1068-00	Mounting Clamp	2
88	01.2010.0768-00	Breather Tube, Left	1
89	01.2010.0767-00	Breather Tube, Right	1
-	007603 006104	Replaced Together with by	-
-	007603 006107	007603 006111	-
90	007603 006111	Seal Ring	4
91	99.2916.1005-00	Hex Head Screw	2
92	007603 018303	Seal Ring	6
93	007604 018100	Screw Plug	6
95	02.4041.0736-00	Rear Axle Shaft, Left	1
96	02.4041.0737-00	Rear Axle Shaft, Right	1
-	000720 030309	Replaced By 001 981 37 05	-
97	001 981 37 05	Tapered Roller Bearing	2
100	000720 030306	dto	2
101	01.4111.1022-00	Fitted Washer	2
102	001481 006000	Clamping Pin	2
103	000063 010103	Countersunk Screw	2
-	NJL50NADIN5412	Replaced By 005412 530210	-
104	005412 530210	Cylindrical Roller Bearing	2
-	01.4041.1080-00	Replaced By +404 330 02 52	-
-	01.2010.0848-00	Replaced By +404 330 02 52	-
105	+404 330 02 52	Gear Set, Left	1
-	01.4041.1081-00	Replaced By +404 330 03 52	-
-	01.2010.0849-00	Replaced By +404 330 03 52	-
106	+404 330 03 52	Gear Set, Right	1
110	01.4041.1066-00	Housing	2
111	000625 036215	Grooved Ball Bearing	2
112	000472 130000	Lock Ring	2
113	99.2990.1004-01	Seal Ring	2

114	99.2902.1007-01	Spacer Washer 0.2 mm	nB
-	99.2902.1007-02	Spacer Washer 0.3 mm	nB
-	99.2902.1007-03	Spacer Washer 0.4 mm	nB
-	99.2902.1007-04	Spacer Washer 0.5 mm	nB
-	99.2902.1007-05	Spacer Washer 0.1 mm	nB
115	01.4041.1083-00	*Housing to Housing Flange Gasket*	2
116	000931 010053	Screw*	4
-	99.2953.1001-01	Replaced By 000137 010100	-
117	000137 010100	Spring Washer*	24
118	000934 010000	Hex Nut*	12
-	000931 010040	Replaced By 000933 010056	-
119	000933 010056	Screw*	12
-	02.4041.1024-00	replaced by 02.4041.1083-00	-
-	02.4041.0814-00	replaced by 02.4041.1083-00	-
124	02.4041.1083-00	Connecting Housing	2
125	02.4041.1029-00	O-ring	2
-	99.2953.1001-01	Replaced By 000137 010100	-
126	000137 010100	Spring Washer*	16
127	000931 010045	Screw*	12
-	000931 010019	Replaced By 000933 010049	-
128	000933 010049	Screw*	4
129	02.4041.1027-00	Tube, Left	1
130	02.4041.1030-00	Tube, Right	1
131	02.4041.1028-00	Seal Ring	4
132	000960 016023	MF16X55 Screw (hub to axle housing)	6
133	000960 016014	MF16X50 Screw (Front Right Axle Housing)	2
-	01.2010.1627-00	Replaced By 006797 016151	-
-	A 16, 5 DIN 6798	Replaced By 006797 016151	-
134	006797 016151	Toothed Washer	8
-	000 990 17 51	Replaced By 000934 016003	-
135	000934 016003	Nut	8

138	01.4111.1018-00	Hub, Wheel	2
139	01.4111.1019-00	Bolt, Wheel Mounting	12
140	01.2010.1069-00	Lock Plate	2
141	001481 006003	Clamping Pin	8
142	99.2905.1009-00	Lock Plate	2
143	01.2010.1070-00	Lock Bolt, Wheel	2

Table 5 – Rear Wheel Brake – Group 02

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	02.4041.0804-00		Replaced by 02.4041.0826-00 & 02.4041.1079-00	3	-				
1	01.4041.0826-00		Cover Plate, Left	4	1				
-	02.4041.0807-00		Replaced by 02.4041.0827-00 & 02.4041.1079-00	3	-				
2	02.4041.0827-00		Cover Plate, Right	4	1				
-	01.2010.1147-00		Replaced By 01.4041.1103-00		-				
-	01.2010.1150-00		Replaced By 01.4041.1103-00		-				
3	01.4041.1103-00		Adjusting Eccentric		4				
5	000 421 03 90		Spring		4				
-	01.2010.1148-00		Replaced By 01.4041.1105-00		-				
6	01.4041.1105-00		Adjusting Pin		4				
7	000 421 10 52		Retainer, Adjusting Pin		4				
8	000660 006008		Round Head Rivet		16				
9	02.2010.1041-00		Rubber Plug		2				
-	01.4041.0709-00		Replaced By 404 420 01 19		-				
-	02.4041.0752-00		Replaced By 404 420 01 19		-				
10	404 420 01 19		Brake Shoe O.D. 349 mm		4				
-	404 420 05 19		Brake Lining O.D. 352 mm-dto		4				
11	01.4041.1013-00		Brake Lining 6.0 mm thick for 349.2 mm Dia. Brake Drum		4				
-	01.4041.1075-00		Brake Lining 6.4 mm thick for 350.0 mm Dia. Brake Drum		4				
-	404 421 00 10		Brake Lining 7.0 mm thick for 351.0 mm Dia. Brake Drum		4				

-	404 421 01 10	Brake Lining 7.5 mm thick for 352.0 mm Dia. Brake Drum	4			
12	007338 006300	Tubular Rivet	36			
13	02.2010.0746-00	Push Rod with Adjustment	2			
-	99.2908.1002-00	Replaced by 001434 008041	-			
14	001434 008041	Clevis Pin	2			
15	000125 008406	Washer	2			
-	000094 002019	Cotter Pin	2			
-	02.2010.0735-00	Brake Lever, Left	5	1		
-	02.2010.0734-00	Brake Lever, Right	5	1		
16	02.4041.0751-00	Brake Shackle, Left	6	1		
17	02.4041.0750-00	Brake Shackle, Right	6	1		
-	02.4041.1071-00	Replaced By 404 421 00 06	-			
18	404 421 00 06	Thrust Shackle	6	2		
-	M6X1.5DIN931-8G	Replaced By 000063 006170	-			
-	007987 006143	Replaced By 000063 006170	-			
-	000063 006170	Countersunk Screw	6	4		
-	000127 006204	Lock Washer Replaced By 002093 012100	-			
-	002093 012100	Conical Washer	6	4		
-	000934 006007	Nut	6	4		
19	02.2010.1018-00	Pivot Pin	2			
20	000471 012001	Lock Ring	4			
21	99.2939.1008-00	Pin	4			
-	000094 005012	Cotter Pin	4			
23	01.4041.1049-00	Release Spring	2			
-	02.2010.1008-00	Replaced By 406 993 52 10	-			
24	406 993 52 10	Release Spring	2			
-	02.4041.0742-00	Brake Cable Replaced By	7	-	-	-
	404 421 01 06	Shackle	4			
	404 421 00 06	Thrust Shackle	2			
	000063 006170	Countersunk Screw	4			
	000094 003004	Cotter Pin	4			
25	404 420 00 85	Brake Cable	8	2	2	2

-	404 420 03 85	Brake Cable					2
26	000 427 02 96	Bellows		2			
-	000931 008045	Screw	7		2	2	2
-	000127 008205	Lock Washer	7		2	2	2
-	000934 008010	Nut	7		2	2	2
27	404 421 01 06	Shackle	8	4			
-	000094 003024	Cotter Pin	8	4			
35	000 420 67 18	Wheel Cylinder, 1.125" Dia.		2			
36	000 423 04 93	Pressure Spring with Retainer		2			
-	000 421 05 86	Seal Cup Replaced By Repair Kit		-			
-	000 421 04 83	Piston Replaced By Repair Kit		-			
-	000 423 00 87	Boot included in Repair Kit		4			
40	000 423 05 88	Thrust Pin		4			
41	000 420 00 55	Bleeder Valve		2			
42	000 421 08 87	Rubber Cap		2			
43	007603 014102	Seal Ring		4			
-	000 421 02 84	Replaced By 000 428 07 30		-			
44	000 428 07 30	Connector		2			
45	000 428 00 26	Hollow Screw		2			
46	99.2953.1001-03	*Wheel Cyl. to Brake Cover Plate Lock Washer "Ateco"*		4			
47	000933 008016	Screw*		4			
48	01.4041.1079-00	Drum, Brake		2			
49	000063 010100	Countersunk Screw		4			
50	000 429 04 37	Distributor		1			
-	000931 008028	Screw		1			
-	000127 008205	Lock Washer		1			
-	000934 008010	Nut		1			
		Brake Lines					
-	02.4041.0715-00	Pipe Line. Left	9	1			
54	02.4041.0760-00	Pipe Line. Left	10	1			
55	000 428 00 72	Pipe Union Nut		2			

-	02.4041.0716-00	Pipe Line. Right	9	1
56	02.4041.0761-00	Pipe Line. Right	10	1
-	000 428 00 72	Pipe Union Nut		1
58	02.4041.1032-00	Retaining Clamp, Brake Cable		3
-	000933 008028	Screw		3
-	000127 008205	Lock Washer		3
-	000934 008010	Nut		3
-	02.2010.0716-00	Cable Support, Left	3	1
-	02.2010.0717-00	Cable Support, Right	3	1
59	02.4041.1079-00	Cable Support	4	2
-	000933 006102	Screw	3	4
-	000127 006204	Lock Washer	3	4
-	000934 006007	Nut	3	4
-	000 586 03 88	Repair Kit, Wheel Cylinder		2

Table 6 – Rear Propeller Shaft – Group 02

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	02.4041.0809-00		Thrust Ball Housing		1				
2	01.2010.1537-00		Thrust Ball Cap		1				
3	071412 010300		Grease Nipple		1				
-	02.4041.0744-00		Both replaced by		-				
-	02.4041.0747-00		02.4041.0749-00		-				
4	02.4041.0749-00		Thrust Tube		1				
5	99.2905.1005-00		Lock Plate		nB				
-	99.2905.1005-01		Lock Plate		nB				
-	99.2905.1005-02		Lock Plate		nB				
-	01.2010.1154-00		Retaining Plate	9	1				
6	99.2953.1003-01		Serrated Washer 'Ateco' (M10)		12				
7	070613 010004		Screw (M10 X 60)		12				
8	99.2902.1006-01		Spacer Washer 2.9 mm (.114 “)		nB				
-	99.2902.1006-02		Spacer Washer 3.0 mm (.118”)		nB				
-	99.2902.1006-03		Spacer Washer 3.1 mm (.122 “)		nB				

-	99.2902.1006-04	Spacer Washer 3.2 mm (.126 “)	nB
-	99.2902.1006-05	Spacer Washer 2.8 mm (.110 “)	nB
-	99.2902.1006-06	Spacer Washer 3.5 mm (.138 “)	nB
-	99.2902.1006-07	Spacer Washer 3.7 mm (.146 “)	nB
-	99.2902.1006-08	Spacer Washer 4.0 mm (.157 “)	nB
-	99.2902.1006-09	Spacer Washer 4.5 mm (.177 “)	nB
-	99.2902.1006-10	Spacer Washer 5.0 mm (.197 “)	nB
-	001481 005000	Clamping Pin (Obsolete)	-
12	02.4041.0713-00	Axle Strut, Left	1
13	02.4041.0714-00	Axle Strut, Right	1
-	000960 014020	Screw	2
-	000125 015004	Washer	2
-	000 990 17 55	Replaced By 000935 014002	-
-	000935 014002	Castle Nut	2
-	000094 003005	Cotter Pin	2
14	99.2921.1005-00	Necked-Down Bolt	1
-	000 990 13 55	Replaced By 000937 014001	-
15	000937 014001	Castle Nut	1
-	000094 003005	Cotter Pin	1
16	02.4041.0825-00	Propeller Shaft	1
17	411 411 00 80	Gasket	1
18	99.2905.1012-00	Lock Plate	3
19	000933 008031	Screw	6
-	13.2010.1109-00	Gasket (Obsolete)	-
20	007603 010108	Seal Ring (M10)	6
-	000931 010143	Replaced By 000931 010229	-
21	000931 010229	Screw (M10 X 95)	6
-	01.2010.1153-00	Replaced By 02.4041.1065-00	-
22	02.4041.1065-00	Boot (Repair Size)	1
23	000933 006123	Screw (M6 X 25)	5

24	007340 008103	Tubular Rivet	5
25	009021 006205	Washer (M6)	5
26	000934 006007	Nut (M6)	5
-	900262 009100	Hose Clamp	2
-	900263 009000	Hose Strap 800 mm (31.5")	1
-	900263 009000	Hose Strap 1200 mm (47.25")	1

Footnotes	Remarks Tables 4 through 6
1	Only replaceable in pairs
2	Only replaceable together. Secure with a center punch
3	Up to rear axle 8501336.
4	From rear axle 8501337.
5	Up to chassis 7502329
6	From chassis 8500029
7	Up to chassis 042318
8	From chassis 042319
9	Up to chassis 8501400
10	From chassis 8501401

Table 7 – Frame/Bumper – Group 03/18

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	03.4041.0757-00		Frame			1	1	1	
-	404 310 08 01		Frame						1
-	03.4041.0745-00		Replaced By 404 322 00 01		-				
2	404 322 00 01		Spring Bracket, Upper, Front		2				
3	404 317 00 40		Bearing Bracket, Front Control Arm		1				
-	03.4041.1121-00		All three		-				
-	03.4041.1184-00		Replaced By		-				
-	404 317 01 01		404 317 00 01		-				
4	404 317 00 01		Support, Platform Mounting		4				
5	03.4041.0760-00		Cross Member No. 1			1	1	1	
-	404 310 01 22		Cross Member No. 1						1
-	000933 010129		Screw		2				
-	B 10 DIN 127		Replaced By 000137 010201		-				
-	000137 010201		Spring Washer		2				
-	000934 010014		Nut		2				
6	03.4041.0761-00		Cross Member No. 2			1	1	1	
-	404 310 01 37		Cross Member No. 2						1
7	03.4041.0774-00		Cross Member No. 3		1				
8	03.4041.0752-00		Cross Member No. 4		1				
-	03.4041.0766-00		Guide Bearing	1		-	-	-	
-	22.2010.1059-00		Rubber Mounting	1		-	-	-	
-	000933 010034		Screw		6				
-	000933 010055		Screw		5				
-	000931 010053		Screw			3	3	3	
-	000933 010055		Screw						3
-	006797 010152		Toothed Washer		14				
-	000934 010014		Nut		14				
11	03.4041.0753-00		Cross Member No. 5		1				
12	03.4041.0742-00		Cross Member No. 6, 7		2				
13	03.4041.1116-00		Cross Member Rear Spring Bracket		1				

14	03.4041.1117-00	Cross Member Rear Control Arm	1			
-	03.4041.0744-00	Replaced By 404 317 01 40	-			
15	404 317 01 40	Bearing Bracket, Control Arm	1			
-	000961 012011	Replaced By 000961 012039 or 000961 012027	-			
-	000961 012039	Bolt (M12 X 26mm)	4			
-	000961 012027	Bolt (M12 X 30mm)	1			
-	000127 012202	M12 Lock Washer	5			
-	000934 012009	M12 Nut	5			
25	03.4041.1149-00	End Piece, Rear	1			
-	03.4041.1145-00	These two	-			
-	03.4041.1135-00	Replaced By 404 310 01 53	-			
26	404 310 01 53	Traction Strut	1			
-	000933 010016	Screw	8			
-	000933 010044	Screw	4			
-	000127 010203	Lock Washer	4			
-	000934 010014	Nut	12			
27	03.4041.1124-00	Mounting Bracket, Left		1	1	1
-	404 310 05 09	Mounting Bracket, Left				1
-	03.4041.1125-00	Mounting Bracket, Right		1	1	1
-	404 310 06 09	Mounting Bracket, Right				1
29	03.4041.0754-00	Spring Bracket, Upper, Left	1			
-	03.4041.0755-00	Spring Bracket, Upper, Right	1			
31	03.4041.0767-00	Bracket, Left & Right, Support	2			
-	03.4041.0756-00	Replaced By 03.4041.0767-00	-			
-	000 990 13 96	Cold Rivet #10x24 mm (.945“*)	nB			
-	000 990 14 96	Cold Rivet #10x28 mm (1.102“)	nB			
-	000 990 16 96	Cold Rivet #10x30 mm (1.181“)	nB			
-	000 990 17 96	Cold Rivet #10x32 mm (1.260“)	nB			
-	000 990 20 96	Cold Rivet #10x36 mm (1.417“)	nB			
-	000 990 05 96	Cold Rivet #12x28 mm (1.102 “)	nB			

-	000 990 08 96	Cold Rivet #12x34 mm (1.339“)	nB			
-	000 990 02 93	C’sunk Cold Rivet #10x24 mm*	nB			
-	18.4041.0706-00	Replaced By 404 520 01 70		-	-	-
50	404 520 01 70	Bumper Bar	1			
51	18.4041.1004-00	Sectional Angle		2	2	2
-	404 525 01 56	Sectional Angle				2
-	M12X30DIN933-8G	Replaced By 000933 012008 and 000961 012038		-	-	-
-	000933 012008	Screw	8			
-	000961 012038	Screw	8			
-	B 12 DIN 127	Replaced By 000137 012201		-	-	-
-	000137 012201	Spring Washer	16			
-	000934 012021	Nut	8			
-	000934 012009	Nut	4			
-	000 595 04 01	Replaced By 000 595 10 01	2		-	
52	000 595 10 01	Side Member			2	
-	001 987 13 40	Rubber Buffer			2	
53	000 595 01 02	Ball			2	
54	18.4041.0800-00	Insert Pin	1			
-	18.4041.0703-00	Replaced By 404 520 01 75			-	
55	404 520 01 75	Sliding Plate			1	
-	000933 010034	Screw			3	
-	000137 010201	Spring Washer			3	

Footnotes

Remarks Table 7

- 1 No longer available
- 2 From Chassis 8502256

Table 8 – Wheels – Group 04

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	04.4041.1003-00		Replaced By 404 401 00 01		-				
1	404 401 00 01		9.00 x 20 Wheel for 10-20 tires		5				
-	074361 018104		Replaced By 074361 018105		-				
2	074361 018105		Spherical Collar Nut		24				
3	62.2010.1224-00		Step Ring			4	4	4	

Table 9 – Suspension – Group 05

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	05.4041.0705-00		These Two Replaced By			-	-	-	
-	404 323 00 00		404 323 01 00						
-	000 323 05 44		Rubber Buffer			8	8	8	
-	000 323 04 50		Joint Bushing			8	8	8	
1	404 323 01 00		Telescopic Shock Absorber		4				
2	000 323 17 44		Rubber Buffer		8				
3	000 323 15 50		Joint Bushing		8				
4	000960 020030		Screw		6				
5	000936 020000		Nut		16				
10	05.4041.1003-00		Front Spring		2				
-	05.4041.1010-00		Replaced By 05.2010.1010-00			-	-	-	
11	05.2010.1010-00		Mounting Claw		4				
-	000960 014039		Replaced By 000960 014031		-				
12	000960 014031		Screw, Front Spring MF14 X		2				
-			Screw, Rear Spring MF14 X 75		2				
13	404 321 00 51		Spacer Washer		2				
14	000125 015004		Washer		2				
-	000937 014001		Castle Nut		4				
-	000094 003005		Cotter Pin		4				
25	05.4041.1004-00		Rear Spring		2				
26	05.4041.1005-00		Helper Spring		2				
-	05.4041.0704-00		Replaced By 05.4111.1014-00			-	-	-	
27	05.4111.1014-00		Retainer		2				
-	05.2010.1007-00		Replaced By 05.4111.1017-00			-	-	-	
28	05.4111.1017-00		Mounting Claw for Helper Spring		2				
-	000960 014058		Screw		2				
-	000433 015000		Washer		2				
-	000937 014001		Castle Nut		2				
-	000094 003005		Cotter Pin		2				

-	05.4041.0703-00	Replaced By 05.4111.1007-00	-	-	-
31	05.4111.1007-00	Stop Plate	2		
32	000127 014201	Lock Washer	2		
33	000961 014007	Screw	2		
34	05.4041.0701-00	Control Arm	2		
-	99.2956.1004-00	Replaced By 180 223 04 12	-		
35	180 223 04 12	Rubber Mounting	4		
-	000960 014069	These Two Replaced By 000960 014160	-	-	-
-	000960 014143				
-	000960 014160	Screw	1		
-	000960 014105	Replaced By 000960 014144	-	-	-
-	000960 014144	Screw	1		
-	000960 014056	Replaced By 000960 014141	-	-	-
-	000960 014141	Screw	2		
36	404 994 00 10	Lock Plate	2		
-	000125 015004	Washer	1		
-	000936 014008	Nut	1		
-	000 990 26 51	Replaced By 000934 014020	-	-	-
-	000934 014020	Nut	1		
-	000935 014001	Castle Nut	1		
-	000094 003005	Cotter Pin	1		
37	05.4041.1011-00	Rubber Stop	4	4	4
38	406 322 00 44	Stop Buffer			4

Table 10 – Pedals/ Brake System – Group 06

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	06.4041.1025-00		Support, Pedal			1	1	1	
2	06.4041.1026-00		Pedal, Brake			1	1	1	
3	06.4041.1027-00		Clutch, Pedal			1	1	1	
4	06.4041.1004-00		Bearing Bushing, Brake Pedal			1	1	1	
5	06.4041.1032-00		Shaft, Clutch Pedal			1	1	1	
6	001481 003500		Clamping Pin			1	1	1	
7	001481 006017		Clamping Pin			1	1	1	
8	000417 006002		Threaded Pin			1	1	1	
9	000934 006007		Nut			1	1	1	
10	06.4041.1028-00		Lever, Clutch			1	1	1	
11	000127 008205		Lock Washer			1	1	1	
12	000931 008028		Screw			1	1	1	
13	071412 010300		Grease Nipple, Shaft			1	1	1	
25	000 430 53 01		Brake Master Cylinder, 1.5"x1.125" Ø, 36 mm stroke			1	1	1	
26	000 431 40 93		Pressure Spring and Retainer			1	1	1	
27	000 431 03 76		Stop Washer			1	1	1	
28	000 431 03 87		Dust Cap			1	1	1	
29	000 431 01 94		Snap Ring			1	1	1	
30	000 431 02 65		Bleeder Valve			1	1	1	
31	000 431 08 87		Rubber Cap			1	1	1	
32	007603 022102		Seal Ring			2	2	2	
33	000 428 01 30		Banjo Union			1	1	1	
34	000 428 01 26		Hollow Screw			1	1	1	
35	007603 014102		Seal Ring			2	2	2	
36	000 428 08 30		Banjo Union			1	1	1	
37	000 428 05 26		Hollow Screw			1	1	1	
-	C DIN 72 759		Replaced By 000 545 34 09 and 000137 004100			-	-	-	
38	000 545 34 09		Stop Light Switch			1	1	1	

-	000137 004100	Spring Washer		2	2	2
-	000 430 03 81	Bottom Valve	*	-	-	-
-	000 431 28 83	Piston	*	-	-	-
-	000 431 35 86	Double Lip, Cup	*	-	-	-
-	000 431 15 85	Filler Washer	*	-	-	-
-	000 431 08 86	Secondary Cup	*	-	-	-
-	000 586 01 88*	Repair Kit, Brake Master Cylinder		1	1	1
45	06.4041.0802-00	Piston Rod		1	1	1
46	000934 012004	Nut		1	1	1
47	071752 012001	Yoke		1	1	1
48	001434 012003	Clevis Pin		1	1	1
-	000433 013005	Washer		1	1	1
-	000094 004026	Cotter Pin		1	1	1
51	000127 010203	Lock Washer		3	3	3
52	000933 010034	Screw		3	3	3
53	99.2981.1014-00	Release Spring, Clutch & Brake		2	2	2
54	000127 012202	Lock Washer		4	4	4
55	000961 012020	Screw		4	4	4
56	06.4041.1029-00	Pull Rod		1	1	1
57	000934 010009	Nut		2	2	2
58	071752 010000	Yoke		1	1	1
59	071752 010002	Yoke		1	1	1
60	001434 010031	Clevis Pin		2	2	2
-	000094 003024	Cotter Pin		2	2	2
-	06.4041.0707-00	Replaced By 06.4041.0711-00 together with 000 431 12 02 and 06.4041.0712-00	3	-	-	-
65	06.4041.0711-00	Bracket	4	1	1	1
66	31.2010.1022-00	Clamp		1	1	1
-	000933 008028	Screw		3	3	3
-	000127 008205	Lock Washer		3	3	3

-	000934 008010	Nut		3	3	3
-	000 431 01 32	Replaced By 000 431 12 02 together with 06.4041.0711-00 and 06.4041.0712-00	3	-	-	-
-	000 431 01 35	Screw Fitting	3	1	1	1
-	007603 014106	Seal Ring	3	3	3	3
-	000 431 06 40	Bracket	3	1	1	1
-	000936 014000	Nut	3	1	1	1
-	000 431 00 34	Filler Strainer	3	1	1	1
-	000 431 07 33	Filler Cap	3	1	1	1
-	000 997 02 40	Seal Ring	3	1	1	1
67	000 431 12 02	Brake Fluid Reservoir	4	1	1	1
68	000 431 00 34	Filler Strainer	4	1	1	1
-	000 431 08 33	Replaced By 000 431 09 33		-	-	-
69	000 431 09 33	Filler Cap	4	1	1	1
70	000 997 29 40	Seal Ring	4	1	1	1
71	002 997 67 82	Connecting Hose 60 mm (2.362")	4	1	1	1
-	000933 006015	Screw	3	2	2	2
-	000127 006200	Lock Washer	3	2	2	2
-	000934 006000	Nut	3	2	2	2
-	06.4041.0702-00	Replaced By 06.4041.0712-00 together with 000 431 12 02 and 06.4041.0711-00	3	-	-	-
72	06.4041.0712-00	Brake Line, Reservoir to Master Cylinder	4	1	1	1
73	000 997 02 73	Union Nut		1	1	1
74	000 428 20 24	Distributor		1	1	1
75	000 428 00 32	Screw Plug		1	1	1
76	06.4041.1031-00	Retaining Bracket		1	1	1
-	000933 008062	Screw		2	2	2
-	000127 008205	Lock Washer		2	2	2
-	000934 008010	Nut		2	2	2
80	06.4041.0704-00	Brake Line, Master Cylinder to Distributor		1	1	1

-	000 428 00 72	Union Nut		1	1	1
81	320 992 22 82	Hose		2	2	2
82	06.4041.0701-00	Brake Line		1	1	1
83	000 428 00 72	Union Screw		2	2	2
84	000 428 38 35	Brake Hose to Rear Axle		1	1	1
-	000 428 00 73	Replaced By 000 428 04 73		-	-	-
85	000 428 04 73	Bracket, Brake Hose		3	3	3
-	06.4041.0710-00	Brake Line, Hose to Rear Axle	1	1	1	1
86	06.4041.0715-00	Brake Line, Hose to Rear Axle	2	1	1	1
-	000 428 00 72	Union Screw		2	2	2
87	000 428 36 35	Brake Hose, Distributor to Front Axle		1	1	1
-	06.4041.0708-00	Brake Line, Hose to Front Axle	1	1	1	1
88	06.4041.0713-00	Brake Line, Hose to Front Axle	2	1	1	1
-	000 428 00 72	Union Screw		2	2	2

Table 11 – Pedals/ Brake System – Group 06

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	404 290 02 33		Console, for Brake Pedal						1
2	406 290 06 33		Console, for Clutch Pedal						1
3	404 290 02 18		Brake Pedal						1
4	406 290 04 01		Clutch Pedal						1
5	319 292 00 82		Cover						2
6	110 291 05 50		Bearing Bushing						4
7	110 292 01 50		Bearing Bushing						4
8	111 292 01 50		Bearing Sleeve						2
-	000960 012088		Screw						1
-	000960 012082		Screw						1
-	000127 012202		Lock Washer						2
-	000934 012004		Nut						2
9	406 993 00 10		Release Spring, Clutch Pedal						1
10	406 993 50 10		Release Spring, Brake Pedal						1

14	406 290 07 39	Piston Rod, Clutch Master Cylinder	1
15	110 295 05 71	Adjusting Screw	2
16	000127 008205	Lock Washer	2
17	000934 008007	Nut	2
18	111 291 00 86	Stop Buffer for Brake & Clutch	2
25	000 295 31 06	Clutch Master Cylinder .750" Ø, 34 mm Stroke (1.339")	1
26	000 993 20 05	Pressure Spring	1
27	000 295 08 30	Piston	1
28	001 997 52 40	Ring, Grooved	2
29	000 990 70 40	Stop Washer	1
30	000 994 33 35	Lock Ring	1
31	000 295 04 83	Protective Cap	1
32	000127 008205	Lock Washer	2
33	000933 008036	Screw	2
34	000125 005400	Washer	4
35	000127 008205	Lock Washer	2
36	000933 008036	Screw	2
40	007603 022102	Seal Ring	1
41	000 997 92 72	Screw Fitting	1
42	000 431 41 02	Brake Fluid Reservoir	1
43	005 997 84 45	O-Ring	1
44	000137 012201	Spring Washer	1
45	000 990 23 63	Hollow Screw	1
46	000 431 00 34	Strainer	1
47	000 431 13 33	Filler Plug	1
51	406 290 02 13	Clutch Line, Front	1
52	000 428 70 35	Brake Hose, Front	1
54	404 290 00 13	Clutch Line, Rear	1
55	421 295 02 50	Bracket	1
56	421 295 00 87	Plate	1

57	406 338 00 82	Hose	1
-	000084 006137	Cylindrical Head Screw	1
-	000127 006204	Lock Washer	1
-	000934 006007	Nut	1
58	000 428 08 35	Brake Hose, Clutch Slave Cylinder	1
59	411 995 00 44	Mounting Clamp	1
70	002 430 54 01	Stepped Master Brake Cylinder 1.5"x1" Ø, 36 mm Stroke (1.417")	1
71	000 431 03 87	Boot	1
72	000 431 01 94	Snap Ring	1
73	000 431 02 65	Bleeder Screw	1
74	000 421 08 87	Rubber Cap	1
75	007603 014102	Seal Ring	2
76	000 428 08 30	Banjo Union	1
77	000 428 05 26	Hollow Screw	1
78	000 545 34 09	Stop Light Switch	1
79	404 290 03 39	Piston Rod, Stepped Master Brake Cylinder	1
-	000 586 54 43	Repair Kit, Brake Master Cylinder	1
80	404 431 01 45	Flange	1
81	000127 010203	Lock Washer	3
82	000933 010047	Screw	3
-	000933 010049	Screw	3
-	000127 010203	Lock Washer	3
-	000934 010009	Nut	3
83	404 428 00 30	Pipe Elbow	1
84	005 997 55 82	Connecting Hose	2
85	404 420 22 35	Brake Line, Front	1
86	000 428 70 35	Brake Hose, Front	1
87	404 420 23 35	Brake Line, Rear, Hose to Distributor	1
88	000 428 20 24	Distributor	1

89	000 428 00 32	Screw Plug	1
90	06.4041.0701-00	Brake Line	1
91	000 428 00 72	Union Screw	2
92	000 428 38 35	Brake Hose to Rear Axle	1
93	000 428 04 73	Bracket, Brake Hose	1
94	06.4041.0715-00	Brake Line, Hose to Rear Axle	1
-	000 428 00 72	Union Screw	2
95	000 428 36 35	Brake Hose, Distributor to Front Axle	1
96	06.4041.0713-00	Brake Line, Hose to Front Axle	1
-	000 428 00 72	Union Screw	2
100	421 295 00 40	Bracket	1
-	000933 006019	Screw	1
-	000125 006410	Washer	1
-	000127 006204	Lock Washer	1
-	000934 006007	Nut	1
101	404 295 02 40	Bracket at Steering	1
-	000 428 04 73	Bracket, Hose	4
103	404 295 03 40	Bracket	1
104	000127 012202	Lock Washer	1
105	000961 012006	Screw	1
-	312 078 01 85	Mounting Clamp	1
-	000084 005112	Cylindrical Head Screw	1
-	000127 005205	Lock Washer	1
-	000934 005008	Nut	1
-	312 078 01 85	Mounting Clamp	4
-	000084 005110	Cylindrical Head Screw	2
-	000127 005205	Lock Washer	2
-	000934 005008	Nut	2

Footnotes

Remarks Table 10, 11

1 Up to Chassis 85 01400

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- 2 From Chassis 85 01401
 - 3 Up to Chassis 75 02329
 - 4 From Chassis 85 00029
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Table 12 – Hand Lever Linkage – Group 07

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	07.2010.0702-00		Support, Brake & Shift Lever			1	1	1	
2	07.2010.1004-00		Bushing			1	1	1	
-	406 420 01 68		Support						1
5	07.2010.1026-00		Stop Pin			1	1	1	
6	99.2980.1005-00		Pressure Spring			1	1	1	
-	421 427 01 74		Detent Pin						1
-	421 993 00 01		Spring						1
-	001473 002000		Round Head Grooved Pin						1
-	07.2010.1018-00		Replaced By 07.4111.1001-00 together with 07.4111.1009-00, 000933 008093, 000933 008048, and 000934 008000	1		-	-	-	
7	07.4111.1001-00		Toothed Segment	2		1	1	1	
8	07.4111.1009-00		Spacer Tube	2		1	1	1	
-	000933 008014		Screw	1		2	2	2	
-	000933 008093		Screw	2		1	1	1	
-	000933 008048		Screw	2		1	1	1	
-	000127 008202		Lock Washer			2	2	2	
-	000934 008000		Nut	2		2	2	2	
-	07.2010.0718-00		Hand Brake Lever	1		1	1	1	
10	07.4111.0701-00		Hand Brake Lever	2		1	1	1	
11	07.2010.0704-00		Pawl Rod Handle			1	1	1	
12	001433 008019		Pin			1	1	1	
-	000094 002003		Cotter Pin			2	2	2	
-	07.2010.1012-00		Pull Rod	1		1	1	1	
13	07.4111.1004-00		Pull Rod	2		1	1	1	
-	000094 001502		Cotter Pin			2	2	2	
-	07.2010.1013-00		Pawl	1		1	1	1	
14	07.4111.1005-00		Pawl	2		1	1	1	
15	07.2010.1014-00		Screw			1	1	1	

16	000439 008200	Nut		1	1	1	
-	99.2981.1003-00	Spring	1	1	1	1	
17	07.4111.1006-00	Spring	2	1	1	1	
-	07.2010.1066-00	Pull Rod, Hand Brake	1	1	1	1	
18	07.4111.1007-00	Pull Rod, Hand Brake	2	1	1	1	
-	07.2010.1067-00	Replaced By 411 427 00 13		-	-	-	
19	411 427 00 13	Compensating Lever, Hand Brake		2	2	2	
20	000125 013000	Washer		2	2	2	
-	000094 003024	Cotter Pin		2	2	2	
-	07.2010.0720-00	Replaced By 404 260 01 39		-	-	-	
21	404 260 01 39	Shift Lever		1	1	1	
-	404 260 01 39	Shift Lever					1
23	071412 010100	Grease Nipple		1	1	1	
-	071412 010200	Grease Nipple					1
24	000471 018000	Lock Ring		1	1	1	
-	10 N 343 e	Replaced By 001434 010031		-	-	-	
25	001434 010031	Clevis Pin		2	2	2	
-	000094 003024	Cotter Pin		2	2	2	
-	000933 010011	Screw	3				
-	000127 010200	Lock Washer	4				
-	000934 010014	Nut	1				
29	07.2010.1061-00	Shifting Rod	1				
30	071752 008001	Yoke	1				
31	000934 008000	Nut	1				
32	001454 008019	Clevis Pin	1				
-	000094 002019	Cotter Pin	1				
-	000094 002019	Cotter Pin	1				
-	000933 008053	Screw	1	1	1	1	
-	000936 008011	Nut	1	1	1	1	
-	000094 002008	Cotter Pin	1	1	1	1	
37	07.2010.0719-00	Retaining Plate		1	1	1	

38	000127 010205	Lock Washer	2	2	2	
39	000933 010034	Screw	2	2	2	
40	000125 010504	Washer	1			
-	000094 002008	Cotter Pin	1			
41	07.2010.1058-00	Shifting Tube	1			
42	07.2010.1059-00	Pressure Spring	1			
43	07.2010.1060-00	Shifting Rod	1	-	-	-
-	000125 013000	Replaced By 000433 013000		-	-	-
44	000433 013000	Washer	1			
-	000094 003004	Cotter Pin	1			
50	406 420 01 88	Pawl Rod with Handle				1
51	112 427 00 86	Stop Ring				1
52	406 420 01 77	Guide Tube				1
53	120 427 01 15	Pawl				1
54	120 993 00 20	Restoting Spring				1
55	007341 006101	Clinic-Pin				1
56	406 427 00 60	Seal Ring				1
57	406 427 01 93	Bearing Flange				1
-	000933 006024	Screw				2
-	000125 006400	Washer				2
-	000127 006206	Lock Washer				2
-	000934 006000	Nut				2
58	000936 018000	Nut				1
59	406 427 03 81	Housing, Upper Part				1
60	406 427 00 42	Guide Pulley				1
61	406 427 15 74	Spindle				1
62	900055 020200	Lock Ring				2
63	406 993 50 15	Leaf Spring				1
-	001476 006003	Round Head Nail, Grooved				1
64	406 427 04 81	Housing, Lower Part				1

65	406 427 07 53	Spacer Tube	1
-	000933 008135	Screw	2
-	000125 008407	Washer	2
-	000127 008203	Lock Washer	2
-	000934 008008	Nut	2
66	404 420 07 85	Hand Brake Cable	1
67	000934 008000	Nut	2
68	000934 006000	Nut	1
75	404 420 00 78	Support, Cable Pulley	1
76	404 427 00 42	Cable Pulley	1
77	001434 008007	Pin	1
78	000 994 08 60	Lock (Starlock)	1
79	404 420 02 68	Bearing, Lever	1
80	000127 010205	Lock Washer	2
81	000933 010026	Screw	2
82	404 420 00 81	Lever	1
83	404 427 00 50	Bearing Bushing	2
84	000988 022022	Fitted Washer	1
85	000471 022000	Lock Ring	1
90	404 427 00 44	Clamp	1
-	000933 006046	Screw	2
-	000127 006206	Lock Washer	2
-	000934 006000	Nut	2
91	315 993 02 10	Release Spring	1
92	404 420 03 85	Intermediate Cable, Hand Brake	1
93	000936 010000	Nut	1
94	071752 010000	Yoke	1
95	404 427 01 83	Locking Pin	1
96	001434 010031	Clevis Pin	1
-	000433 010500	Washer	1
-	000094 003000	Cotter Pin	1

97	404 420 05 85	Brake Cable, Left	1
98	404 420 06 85	Brake Cable, Right	1

Footnotes

Remarks Table 12

- 1 Up to Chassis 75 02329
 - 2 From Chassis 85 00029
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Table 13 – Steering – Group 08

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	312 460 85 01		These Two Replaced By			-	-	-	
-	312 460 98 01		312 460 07 51						
1	312 460 07 51		Steering			1	1	1	
2	312 460 14 02		Case, Steering Gear	3		1	1	1	
3	321 461 00 50		Bearing Bushing			2	2	2	
-	312 460 29 08		Replaced By 312 460 55 08	4		-	-	-	
-	312 460 30 08		Eliminate: 312 462 16 01 321 462 02 22 312 462 00 34 312 462 01 34						
-	312 460 55 08		Steering Nut with Steering Worm & Barrel-Type Roller Bearing	4		1	1	1	
-	312 460 45 08		Replaced By 312 460 94 08			-	-	-	
4	312 460 94 08		Steering Nut with Steering Worm & Barrel-Type Roller Bearing	5		1	1	1	
5	000 981 04 06		Barrel- Type Roller Bearing			2	2	2	
-	312 460 11 11		Steering Shaft	2		1	1	1	
-	312 460 12 11		Replaced By 312 460 13 11			-	-	-	
6	312 460 13 11		Steering Shaft	3		1	1	1	
-	321 462 00 37		Ball Socket	6		1	1	1	
7	321 462 01 37		Ball Socket	7		1	1	1	
8	000472 040000		Lock Ring	7		1	1	1	
-	006503 038200		Replaced By 000 997 17 46			-	-	-	
9	000 997 17 46		Seal Ring			1	1	1	
-	321 997 01 40		Replaced By 321 997 06 40			-	-	-	
10	321 997 06 40		Seal Ring, Steering Worm			1	1	1	
-	321 460 01 15		Replaced By 321 460 04 15			-	-	-	
11	321 460 04 15		Oil Level Tube			1	1	1	
-	321 461 03 80		Gasket, Steering Gear Case	2		1	1	1	
12	321 461 04 80		Gasket, Steering Gear Case	3		1	1	1	
-	321 461 00 05		Cover, Steering Gear Case	2		1	1	1	
13	321 461 01 05		Cover, Steering Gear Case	3		1	1	1	

-	000127 008205	Lock Washer		7	7	7
-	000931 008028	Screw		5	5	5
-	312 990 18 05	Replaced By 000939 008058		-	-	-
16	000939 008058	Stud		2	2	2
17	000936 008011	Nut		2	2	2
22	321 462 00 85	Thrust Sleeve		1	1	1
23	321 993 09 01	Pressure Spring		1	1	1
24	321 461 00 08	Pressure Screw		1	1	1
25	321 990 00 51	Nut		1	1	1
26	000909 016000	Plug		1	1	1
27	007604 010100	Screw Plug		1	1	1
-	312 462 16 01	Steering Column Tube	4	-	-	-
-	312 462 00 34	Threaded Spring, 26x1 mm thread	1, 4	-	-	-
-	321 462 02 22	Threaded Spring	4	-	-	-
-	312 462 01 34	Threaded Spring, 26x1.5 mm thread	1, 4	-	-	-
-	312 460 02 16	Replaced By 312 460 05 16		-	-	-
28	312 460 05 16	Jacket Tube	8	1	1	1
29	322 994 01 15	Lock Nut		1	1	1
30	070852 060000	Grooved Nut		1	1	1
31	312 462 10 65	Retaining Ring		1	1	1
32	312 462 10 50	Collar Bushing		1	1	1
33	000937 030000	Castle Nut		1	1	1
-	000094 006004	Cotter Pin		1	1	1
34	000936 022000	Nut		1	1	1
35	006888 005006	Woodruff Key		1	1	1
40	08.4041.0808-00	Steering Bracket		1	1	1
41	000833 012005	Stud		1	1	1
42	000833 012003	Stud		1	1	1
-	000960 014054	Screw		1	1	1
-	000127 014200	Lock Washer		1	1	1
-	000934 014003	Nut		1	1	1

43	99.2953.1001-02	“Ateco” Lock Washer	2	2	2
-	000 990 37 51	Replaced By 000934 012004	-	-	-
44	000934 012004	Nut	2	2	2
45	08.4041.1016-00	Pivot Pin	1	1	1
-	000937 028001	Replaced By 000 990 24 55	-	-	-
46	000 990 24 55	Castle Nut	1	1	1
-	000094 005006	Cotter Pin	1	1	1
-	000960 012041	Screw	1	1	1
-	000 990 37 51	Replaced By 000934 012004	-	-	-
-	000934 012004	Nut	1	1	1
-	000127 012202	Lock Washer	1	1	1
50	08.4041.1018-00	Connecting Bolt	1	1	1
51	000934 012004	Nut	2	2	2
52	006319 013303	Spherical Washer	2	2	2
53	006319 014400	Ball Socket	2	2	2
54	08.4041.1019-00	Pitman Arm	1	1	1
-	08.4041.0807-00	Replaced By 08.4041.0809-00	-	-	-
55	08.4041.0809-00	Steering Wheel, 450 mm Ø (17.717”)	1	1	1
-	08.2010.1002-00	Replaced By 000 464 17 20	-	-	-
56	000 464 17 20	Horn Button	1	1	1
57	001474 003000	Insert Pin, Grooved	1	1	1
58	000 465 01 30	Wheel Position Indicator		1	
65	08.4041.1002-00	Drag Link	1		
66	000 463 04 30	Ball Socket Housing with Pin	1		
-	000 338 02 27	Replaced By 000 338 00 27	-	-	-
67	000 338 00 27	Ball Socket, Bottom	2		
68	071831 030001	Ball Pivot	2		
69	000 338 00 26	Ball Socket, Top	2		
70	000 338 04 93	Pressure Spring	2		
71	000 338 02 31	Lock Nut	2		

72	000 994 00 37	Snap Hook, Lock Nut	2
73	000 338 16 56	Rubber Dust Cap	2
74	000937 016000	Castle Nut	2
-	000094 004005	Cotter Pin	2
76	000 995 05 44	Clamp	1
-	000960 010021	Screw	1
-	000127 010200	Lock Washer	1
-	000934 010004	Nut	1
79	071412 008100	Grease Nipple	1
80	071412 008300	Grease Nipple	1

Table 14 – Steering – Group 08

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	312 460 28 52		Steering, Less Pitman Arm						1
2	312 460 20 02		Case, Steering Gear						1
3	321 461 03 50		Bearing Bushing						1
4	001 997 06 45		O-Ring						1
5	406 460 01 18		Steering Nut, 57 mm OD with Worm & Roller Bearing						1
6	000 981 08 06		Inclined Self-Aligning Roller Bearing						2
12	322 460 02 11		Steering Shaft						1
13	321 462 05 37		Ball Socket						1
14	009045 038000		Snap Ring						1
15	321 462 01 71		Adjusting Screw						1
16	321 993 22 01		Pressure Spring						1
17	321 462 01 85		Thrust Sleeve						1
18	321 461 01 26		Thrust Washer						1
19	000 994 60 41		Lock Ring						1
22	321 461 08 80		Gasket						1
23	327 460 02 14		Cover, Steering Gear Case						1
24	321 462 02 50		Bearing Bushing						1
25	000127 008206		Lock Washer						7

26	001 990 91 01	Hex, Head Screw	7
27	001 997 61 40	Seal Ring	1
28	321 990 00 50	Collar Nut	1
29	000909 016000	Screw Plug	1
30	007603 030400	Seal Ring	1
31	007604 030100	Screw Plug	1
32	002 997 43 46	Seal Ring	1
33	002 997 98 45	O-Ring	1
34	322 462 01 51	Adjusting Nut	1
35	322 994 01 15	Lock Plate	1
36	070852 060000	Nut, Grooved	1
37	000 990 25 55	Castle Nut	1
-	000094 006006	Cotter Pin	1
40	406 463 00 01	Pitman Arm	1
45	404 461 01 40	Steering Bracket	1
46	08.4041.1016-00	Pivot Pin	1
47	000 990 24 55	Castle Nut	1
-	000094 005006	Cotter Pin	1
-	000960 012135	Screw	2
-	000960 012041	Screw	1
-	000960 012069	Screw	1
-	000127 012202	Lock Washer	4
-	000934 012009	Nut	4
-	000960 014054	Screw	1
-	000127 014201	Lock Washer	1
-	000934 014003	Nut	1
50	404 463 01 70	Connecting Bolt	1
51	000934 012009	Nut	2
52	006319 013303	Spherical Washer	2
53	006319 014400	Ball Socket	2
54	404 460 00 57	Steering Column	1

55	000 462 03 28	Self-Aligning Bearing	1
56	001 994 19 41	Lock Ring	1
57	421 460 04 57	Universal Joint	1
58	000 462 04 44	Universal Cross Assembly	1
60	000984 022000	Lock Ring	4
61	316 990 01 14	Fitted Screw	2
62	001 990 16 51	Lock Nut	2
65	404 460 00 31	Bracket, Steering Column	1
66	000933 006102	Screw	2
67	000127 006204	Lock Washer	2
68	000125 006410	Washer	2
69	000933 008016	Screw	2
70	000127 008205	Lock Washer	2
71	000125 008410	Washer	2
72	406 462 03 97	Seal, Teoboard Support	1
73	406 462 00 23	End Cover	1
-	000 997 21 90	Hose Clamp	1
74	406 610 50 73	Weatherstrip	1
75	406 616 50 06	Weatherstrip	1
76	000933 006106	Screw	9
-	000933 006078	Screw	1
77	009021 006100	Washer	11
-	000934 006007	Nut	1
80	406 460 02 03	Steering Wheel, 450 mm Ø	1
81	000137 018200	Spring Washer	1
82	000936 018003	Nut	1
83	000 464 05 31	Cap	1

Footnotes

Remarks Table 13, 14

1 From Steering 6500677

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- 2 Up to Steering 6500722
 - 3 From Steering 6500723
 - 4 Up to Steering 6501049
 - 5 From Steering 6501050
 - 6 Up to Steering 8500704
 - 7 From Steering 8500705
 - 8 From Steering 039750
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Table 15 – Accelerator Pedal – Group 09

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	09.4041.0709-00		Replaced By 404 300 00 36		-	-	-		
1	404 300 00 36		Mounting Support		1	1	1		
2	404 303 02 50		Bushing		2	2	2		
3	09.4041.0703-00		Operating Shaft		1	1	1		
4	09.4041.1008-00		Traction Lever		1	1	1		
-	000931 006027		Replaced By 000931 006128		-	-	-		
-	000931 006128		Screw		1	1	1		
-	000125 006400		Replaced By 009021 006100		-	-	-		
-	009021 006100		Washer		1	1	1		
-	M 6 DIN 934-5S		Replaced By 000934 006005		-	-	-		
-	000934 006017		Nut		1	1	1		
5	99.2981.1015-00		Return Spring		1	1	1		
-	071412 008100		Grease Nipple, Mounting Support		2	2	2		
6	09.4041.0705-00		Accelerator Pedal		1	1	1		
7	000127 008205		Lock Washer		2	2	2		
8	000933 008016		Screw		2	2	2		
9	09.4041.1014-00		Pull Rod, Accelerator Pedal		1	1	1		
10	000934 005008		Nut		2	2	2		
11	071805 008103		Ball Socket		2	2	2		
-	071805 008300		Snap Ring		2	2	2		
12	09.4041.1015-00		Pull Rod, Traction Lever		1	1	1		
13	000934 005008		Nut		2	2	2		
14	071805 008103		Ball Socket		1	1	1		
-	071805 008300		Snap Ring		1	1	1		
15	071752 005001		Yoke		1	1	1		
16	001434 005005		Clevis Pin		1	1	1		
17	000433 005302		Washer		1	1	1		
-	000094 001513		Cotter Pin		1	1	1		
25	406 301 00 20		Accelerator Pedal						1

26	406 301 03 50	Bushing	2
27	421 300 09 28	Double Lever	1
28	421 301 01 53	Spacer Bushing	1
29	421 301 00 11	Roller	1
30	07.2010.1014-00	Screw	1
31	000127 008206	Lock Washer	1
32	000439 008100	Nut	1
33	001 990 16 51	Lock Nut	1
34	421 993 01 10	Release Spring	1
35	404 300 02 36	Mounting Plate	1
36	000127 010202	Lock Washer	2
37	000933 010198	Screw	2
38	421 300 00 28	Double Lever	1
39	000125 010500	Washer	1
40	000471 010000	Lock Ring	1
41	900331 005066	Pull Rod	1
42	000934 005000	Nut	2
43	071805 008103	Ball Socket	2
-	071805 008300	Snap Ring	2

Table 16 – Clutch – Group 10

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	000 250 08 04		Replaced By 000 250 20 04		-	-	-	-	-
1	000 250 20 04		Clutch Pressure Plate, Assembly		1	1	1	1	
2	000 252 29 20		Main Spring (White)		6	6	6	6	
-	000 252 18 20		Main Spring (Yellow)		3	3	3	3	
3	000 252 03 35		Spring Sleeve		9	9	9	9	
4	000 250 00 30		End Plate		1	1	1	1	
5	000 252 03 33		Supporting Angle		3	3	3	3	
6	000 252 07 75		Rivet		6	6	6	6	
7	000 250 33 04		Pressure Plate		1	1	1	1	
8	000 252 09 16		Swivel Pin		3	3	3	3	
9	001481 008001		Clamping Pin		3	3	3	3	
13	000 252 03 27		Spring		3	3	3	3	
14	000 252 01 29		Clip		3	3	3	3	
15	000 252 07 29		Mounting Bracket		3	3	3	3	
16	000 252 22 13		Lever		3	3	3	3	
17	000 252 02 51		Ring, Adjusting Nut		3	3	3	3	
18	000 252 21 72		Adjusting Nut		3	3	3	3	
19	000 252 01 28		Release Plate		1	1	1	1	
-	000 250 09 03		Replaced By 000 250 15 03		-	-	-	-	-
24	000 250 15 03		Clutch Plate Assembly with Damper		1	1	1	1	
-	10.2010.1027-00		These three Replaced By		-	-	-	-	-
-	186 252 03 10		000 252 34 10						
-	000 252 06 10								
25	000 252 34 10		Lining		2	2	2	2	
26	000 252 03 75		Hollow Rivet		24	24	24	24	
30	000 250 01 15		Clutch Release Bearing		1	1	1	1	
31	000 254 01 94		Molded Spring		2	2	2	2	
-	000931 008182		Screw	1	12	12	12	12	
32	000931 008246		Screw	2	12	12	12	12	
33	000127 008205		Lock Washer		12	12	12	12	

35	10.4041.1008-00	Housing, Clutch		1	1	1
-	000007 008222	Cylindrical Pin		1	1	1
36	312 251 11 27	Notched Dowel Pin, T.D.C.	3	1	1	1
37	071412 010100	Grease Nipple		1	1	1
38	10.2010.1015-00	Clutch Shaft		1	1	1
39	10.2010.1014-00	Spacer Ring		1	1	1
-	10.2010.1003-00	Replaced By 404 265 00 08		-	-	-
40	404 265 00 08	Lever, Clutch		1	1	1
41	10.4041.1009-00	Lever		1	1	1
-	000931 008181	Screw		2	2	2
-	000127 008205	Lock Washer		2	2	2
-	000934 008010	Nut		2	2	2
-	180 251 00 10	These two Replaced By 180 250 02 56		-	-	-
-	180 251 01 10					
45	180 250 02 56	Cover Plate		1	1	1
46	000125 006410	Washer		2	2	2
47	000933 006074	Screw		2	2	2
48	10.2010.1008-00	Breather Cover		1	1	1
49	000127 008205	Lock Washer		2	2	2
50	000933 008016	Screw		2	2	2
51	000127 010203	Lock Washer		6	6	6
-	000125 010504	Washer		1	1	1
52	000931 010089	Screw		7	7	7
53	000125 010504	Washer		2	2	2
54	000127 010023	Lock Washer		2	2	2
55	000931 010053	Screw		2	2	2
-	000931 010046	Screw		1	1	1
57	000931 010080	Screw		2	2	2
58	000137 010201	Spring Washer		2	2	2
59	000127 010203	Lock Washer		1	1	1
60	000934 010013	Nut		3	3	3

65	10.4041.1007-00	Brace	2	2	2	
66	000127 012202	Lock Washer	4	4	4	
67	000961 012016	Screw	4	4	4	
70	421 252 00 36	Intermediate Ring				1
71	000 250 81 04	Clutch Pressure Plate, Assembly less Clutch Plate				1
72	000 252 24 12	Pressure Plate				1
73	000 252 10 13	Release Lever				3
74	000 252 00 18	Bearing Needle				57
75	000 252 11 14	Bracket				3
76	000 252 03 16	Pin, Short				3
-	000094 002052	Cotter Pin				3
77	000 252 08 16	Pin, Long				3
80	000 252 00 24	Insulating Ring				9
81	000 252 10 20	Main Spring				9
82	000 252 13 32	Housing				1
83	000 252 17 27	Spring				3
84	000 252 08 29	Spring Clip				3
85	000 252 02 45	Release Ring				1
86	000 252 15 72	Ball Nut				3
87	000 252 04 73	Lock Plate				3
88	000127 005100	Lock Washer				3
89	000085 005153	Lens Head Screw				3
92	001 250 69 03	Clutch Plate Assembly with Damper				1
93	000 252 50 10	Lining				2
94	000 252 18 75	Rivet				24
95	000127 008205	Lock Washer				9
96	000931 008091	Screw				9
100	404 251 01 01	Housing, Clutch				1
101	071412 008100	Grease Nipple				1
102	421 261 00 33	Cover				1

103	000127 008205	Lock Washer	2
104	000933 008016	Screw	2
105	421 250 00 55	Cover Plate, Clutch	1
106	000127 008205	Lock Washer	3
107	000933 008016	Screw	3
108	406 254 06 16	Guide Tube	1
109	000127 008205	Lock Washer	3
110	000933 008062	Screw	3
111	406 254 05 10	Release Sleeve	1
112	000 994 06 51	Lock	1
113	406 990 00 15	Hex, Head Screw	1
114	406 252 01 52	Butting Ring	1
115	000 981 67 25	Release Bearing	1
118	406 253 00 01	Shaft, Clutch	1
119	406 254 00 08	Release Lever	1
120	000127 008205	Lock Washer	1
121	000933 008036	Screw	1
122	000127 006204	Lock Washer	2
123	406 990 01 15	Hex, Head Screw	2
124	421 254 00 25	Lever, Clutch Shaft, Outside	1
-	000931 008181	Screw	1
-	000127 008205	Lock Washer	1
-	000934 008008	Nut	1
125	000007 012203	Cylindrical Pin	2
-	000933 010129	Screw	3
-	000931 010094	Screw	2
-	000127 010203	Lock Washer	5
-	000934 010014	Nut	5
-	001481 013001	Clamping Pin	2
126	000127 010200	Lock Washer	9

127	000931 010040	Screw	9
130	421 254 00 30	Bearing Bracket, Clutch Slave Cylinder	1
-	000933 010034	Screw, Bearing Bracket	2
-	000127 010203	Lock Washer	2
-	000934 010014	Nut	2
131	000 295 35 07	Clutch Slave Cylinder	1
132	001 997 51 40	Cup, Grooved	1
133	000 295 03 74	Thrust Pin	1
134	000 295 05 83	Boot	1
135	000 420 10 55	Bleeder Valve	1
136	000 421 08 87	Dust Cap	1
-	000931 008066	Screw	2
-	009021 008102	Washer	2
-	000127 008205	Lock Washer	2
-	000934 008008	Nut	2
137	111 295 07 33	Push Rod	1
138	000934 008008	Nut	1
139	111 993 10 10	Return Spring	1

Footnotes	Remarks Table 16
1	On Model 927 up to Engine 9501493 On Model 928 up to Engine 9500236
2	On Model 927 From Engine 9501494 On Model 928 From Engine 9500237
3	Up to Chassis 011664

Table 17 – Differential Linkage – Group 11

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	11.2010.0804-00		Spring Link		2				
2	000934 008010		Nut		2				
3	11.4041.1001-00		Pull Rod, Front Axle		1				
4	11.4041.1005-00		Pull Rod, Rear Axle		1				
5	11.4041.0807-00		Guide Bracket, Pull Rod		1				
-	60.2010.1031-00		Replaced By 070 546 05 37			-	-	-	
6	070 546 05 37		Grommet		1				
-	000933 008028		Screw		1				
-	000127 008203		Lock Washer		1				
-	000934 008008		Nut		1				
7	001434 008015		Clevis Pin		2				
-	000094 002019		Cotter Pin		2				
-	000094 003024		Cotter Pin		2				
8	11.4041.1003-00		Intermediate Lever		1				
9	071412 008100		Grease Nipple		1				
10	99.2981.1001-00		Spring		1				
11	000471 017000		Lock Ring		1				

Table 18 – Transmission Gears – Group 13

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	13.4041.0101-00		Replaced By 404 260 02 01 Together with 411 260 00 39, 000319 040500 & 000 987 43 46.			-	-	-	
-	404 260 02 01		Transmission, Synchronized Including 000960 016086, 000960 016087, 000960 016088, and 000934 016003.			1	1	1	
-	404 260 04 01		Transmission, Synchronized						1
-	13.2010.1600-00		Replaced By 411 260 02 12 Including 000960 016086, 000960 016087, 000960 016088, and 000934 016003.	9		-	-	-	
-	411 260 02 12		Replaced By 411 260 05 12			-	-	-	
1	411 260 05 12	??	Transmission, Case	10	1				
-	411 264 10 50		Bushing, Countershaft			1	1	1	
-	007604 022100		Screw Plug			1	1	1	
-	007603 022103		Seal Ring			1	1	1	
-	007603 018102		Seal Ring			1	1	1	
-	007604 018100		Screw Plug			1	1	1	
-	007603 010104		Seal Ring			1	1	1	
-	000933 010008		Screw			1	1	1	
-	001481 013000		Replaced By 000007 013103			-	-	-	
2	000007 013103		Cylindrical Pin, Case to Clutch Housing		2				
5	13.2010.0915-00		Countershaft		1				
6	13.2010.1608-00		Pinion, Speedometer Drive		1				
7	13.2010.1562-00		Bearing Bushing		1				
-	13.3031.1002-00		Replaced By 13.4041.1002-00			-	-	-	
8	13.4041.1002-00		Gear, 37 Teeth, 1 st and 3 rd Speeds		1				
9	13.4041.1003-00		Synchronizer Ring		1				
-	006885 010002		Replaced By 006885 010035			-			
10	006885 010035		Key		2				
11	13.4041.1004-00		Follower Ring		1				

-	13.4041.1067-01	Replaced By 000 993 10 26 Together with 005401 305500, 404 262 00 40 and 404 262 00 38	1	-	-	-
12	000 993 10 26	Spring Cup	2	3		
-	005401 306500	Ball	1		3	3 3
13	005401 305500	Ball	2	3		
-	13.4041.1006-00	Replaced By 404 262 00 40 Together with 000 993 10 26, 005401 305500 and 404 262 00 38	1		-	- -
14	404 262 00 40	Follower	2	3		
-	13.4041.1007-00	Replaced By 404 262 00 38 Together with 000 993 10 26, 005401 305500 and 404 262 00 40	1		-	- -
15	404 262 00 38	Shifting Sliding Collar	2	1		
16	13.4041.1003-00	Synchronizer Ring		1		
20	13.2010.1564-00	Bearing Bushing		1		
21	13.4041.1008-00	Gear, 30 Teeth, 2 nd and 4 th Speeds		1		
-	13.2010.1561-00	Replaced By 13.4111.1005-00			-	- -
22	13.4111.1005-00	Guard Ring		1		
23	13.2010.1563-00	Bearing Bushing		1		
24	13.4041.0700-00	Gear, 5 th and Reverse Speeds		1		
-	006885 010002	Replaced By 006885 010035		-		
-	006885 010035	Key		2		
28	13.4041.1009-00	Synchronizer Ring		1		
29	13.4041.1010-00	Follower		1		
-	13.4041.1067-01	Replaced By 000 993 10 26 Together with 005401 305500, 404 262 01 40 and 404 262 01 38	1		-	- -
30	000 993 10 26	Spring Cup	2	3		
-	005401 306500	Ball	1		3	3 3
31	005401 305500	Ball	2	3		
-	13.4041.1012-00	Replaced By 404 262 01 40 Together with 000 993 09 26,	1		-	- -

		005401 305500 and 404 262 01 38					
32	404 262 01 40	Follower	2	3			
-	13.4041.1011-00	Replaced By 404 262 01 38 Together with 000 993 09 26, 005401 305500 and 404 262 01 40	1		-	-	-
33	404 262 01 38	Shifting Sliding Collar	2	1			
-	13.2010.1209-00	Spacer Sleeve	11		1	1	1
34	411 263 08 53	Spacer Sleeve	12	1			
35	000720 032306	Tapered Roller Bearing		1			
36	99.2955.1015-00	Spacer Ring		1			
37	000472 072000	Lock Ring		1			
38	99.2954.1010-00	Shim		1			
39	070952 028100	Lock Plate		1			
40	070852 028000	Nut, Grooved		1			
42	000720 032307	Tapered Roller Bearing		1			
-	99.2955.1007-00	Replaced By			-	-	-
-	99.2955.1007-01	411 991 XX 35 Series					
-	99.2955.1007-02						
-	99.2955.1007-03						
-	99.2955.1007-04						
-	99.2955.1007-05						
-	99.2955.1007-06						
-	99.2955.1007-07						
-	99.2955.1007-08						
-	99.2955.1007-11						
-	99.2955.1007-12						
-	99.2955.1007-13						
-	99.2955.1007-14						
-	99.2955.1007-15						
-	99.2955.1007-16						
-	99.2955.1007-17						
43	411 991 03 35	Spacer Ring 3.9 mm thick (.154")		1			
-	411 991 23 35	Spacer Ring 3.95 mm thick (.156")		1			
-	411 991 04 35	Spacer Ring 4.0 mm thick (.157")		1			
-	411 991 24 35	Spacer Ring 4.05 mm thick (.159")		1			
-	411 991 05 35	Spacer Ring 4.1 mm thick (.161")		1			
-	411 991 25 35	Spacer Ring 4.15 mm thick (.163")		1			
-	411 991 06 35	Spacer Ring 4.2 mm thick (.165")		1			

-	411 991 26 35	Spacer Ring 4.25 mm thick (.167")	1			
-	411 991 07 35	Spacer Ring 4.3 mm thick (.169")	1			
-	411 991 27 35	Spacer Ring 4.35 mm thick (.171")	1			
-	411 991 08 35	Spacer Ring 4.4 mm thick (.173")	1			
-	411 991 28 35	Spacer Ring 4.45 mm thick (.175")	1			
-	411 991 09 35	Spacer Ring 4.5 mm thick (.177")	1			
-	411 991 29 35	Spacer Ring 4.55 mm thick (.179")	1			
-	411 991 10 35	Spacer Ring 4.6 mm thick (.181")	1			
-	411 991 30 35	Spacer Ring 4.65 mm thick (.183")	1			
-	411 991 11 35	Spacer Ring 4.7 mm thick (.185")	1			
-	411 991 31 35	Spacer Ring 4.75 mm thick (.187")	1			
-	411 991 12 35	Spacer Ring 4.8 mm thick (.189")	1			
-	411 991 32 35	Spacer Ring 4.85 mm thick (.191")	1			
-	411 991 13 35	Spacer Ring 4.9 mm thick (.193")	1			
-	411 991 33 35	Spacer Ring 4.95 mm thick (.195")	1			
-	411 991 14 35	Spacer Ring 5.0 mm thick (.197")	1			
50	13.4041.1013-00	Shaft	1			
51	001481 008000	Clamping Pin	6			
-	13.4041.1067-02	Replaced By 000 993 09 26 Together with 005401 305500, 404 262 01 40 and 404 262 01 38	1	-	-	-
52	000 993 09 26	Spring Cup	2	3		
-	005401 306500	Ball	1	3	3	3
53	005401 305500	Ball	2	3		
-	13.4041.1012-00	Replaced By 404 262 01 40 Together with 000 993 09 26, 005401 305500 and 404 262 01 38	1	-	-	-
54	404 262 01 40	Follower	2	3		
-	13.4041.1011-00	Replaced By 404 262 01 38 Together with 000 993 09 26, 005401 305500 and 404 262 01 40	1	-	-	-
55	404 262 01 38	Shifting Sliding Collar	2	1		

56	13.2010.1585-00	Drive Gear, 52 Teeth	1			
57	13.4041.1009-00	Synchronizer Ring	1			
58	13.4041.0701-00	Sliding Collar	1			
59	13.2010.1559-00	Gear, 23 Teeth, Reverse Speed	1			
60	13.2010.1532-00	Guard Plate	1			
64	13.2010.1586-00	Spacer Ring	1			
65	000472 085000	Lock Ring	1			
66	000625 006209	Grooved Ball Bearing	1			
67	99.2905.1011-00	Lock Plate	1			
68	13.2010.1035-00	Hollow Screw	1			
72	000625 006207	Grooved Ball Bearing	1			
73	411 991 34 35	Spacer Ring 2.3 mm thick (.091")	1			
-	411 991 35 35	Spacer Ring 2.4 mm thick (.094")	1			
-	411 991 36 35	Spacer Ring 2.5 mm thick (.098")	1			
-	411 991 15 35	Spacer Ring 2.6 mm thick (.102")	1			
-	411 991 16 35	Spacer Ring 2.7 mm thick (.106")	1			
-	411 991 17 35	Spacer Ring 2.8 mm thick (.110")	1			
-	411 991 37 35	Spacer Ring 2.9 mm thick (.114")	1			
-	411 991 18 35	Spacer Ring 3.0 mm thick (.118")	1			
-	13.2010.1268-03	Replaced By 411 991 19 35		-	-	-
-	411 991 19 35	Spacer Ring 3.1 mm thick (.122")	1			
-	13.2010.1268-01	Replaced By 411 991 20 35		-	-	-
-	411 991 20 35	Spacer Ring 3.2 mm thick (.126")	1			
-	13.2010.1268-02	Replaced By 411 991 21 35		-	-	-
-	411 991 21 35	Spacer Ring 3.3 mm thick (.130")	1			
-	000471 034000	Replaced By 900055 034300		-	-	-
74	900055 034300	Lock Ring	1			
-	13.2010.1026-00	Replaced By 411 264 00 20		-	-	-
75	411 264 00 20	Drive Gear, 25 Teeth, P. T. O.	1			
78	13.4041.0702-00	Main Shaft	1			
79	13.4041.1016-00	Synchronizer Cone	1			

80	006885 008017	Key		1			
-	006885 010002	Replaced By 006885 010035		-			
81	006885 010035	Key		1			
82	13.4041.1017-00	Gear, 31 Teeth, 5 th Speed		1			
83	000471 040000	Lock Ring		1			
-	13.4041.1067-02	Replaced By 000 993 09 26 Together with 005401 305500, 404 262 01 40 and 404 262 01 38	1		-	-	-
84	000 993 09 26	Spring Cup	2	3			
-	005401 306500	Ball	1		3	3	3
85	005401 305500	Ball	2	3			
-	13.4041.1012-00	Replaced By 404 262 01 40 Together with 000 993 09 26, 005401 305500 and 404 262 01 38	1		-	-	-
86	404 262 01 40	Follower	2	3			
-	13.4041.1011-00	Replaced By 404 262 01 38 Together with 000 993 09 26, 005401 305500 and 404 262 01 40	1		-	-	-
87	404 262 01 38	Shifting Sliding Collar	2	1			
88	13.4041.1009-00	Synchronizer Ring		1			
89	13.2010.1354-00	Roller Cage		1			
-	005402 008201	Replaced By 411 981 01 86		-			
90	411 981 01 86	Cylindrical Roller		10			
91	99.2954.1004-00	Butting Ring		1			
92	000471 028000	Lock Ring		1			
95	13.4041.0803-00	Drive Gear, 37 Teeth		1			
-	13.4041.1067-01	Replaced By 000 993 10 26 Together with 005401 305500, 404 262 01 40 and 404 262 01 38	1		-	-	-
96	000 993 10 26	Spring Cup	2	3			
-	005401 306500	Ball	1		3	3	3
97	005401 305500	Ball	2	3			

-	13.4041.1012-00	Replaced By 404 262 01 40 Together with 000 993 10 26, 005401 305500 and 404 262 01 38	1		-	-	-
98	404 262 01 40	Follower	2	3			
99	13.4041.1009-00	Synchronizer Ring		1			
-	13.4041.1011-00	Replaced By 404 262 01 38 Together with 000 993 10 26, 005401 305500 and 404 262 01 40	1		-	-	-
100	404 262 01 38	Shifting Sliding Collar	2	1			
101	99.2997.1005-00	Cage		1			
-	005402 007202	Replaced By 411 981 00 86			-	-	-
102	411 981 00 86	Cylindrical Roller		17			
105	13.2010.1046-00	Bearing Flange		1			
106	000 987 55 46	O-Ring 115x2.5 mm (4.528x.098")		1			
-	000 987 68 46	O-Ring 115x3 mm (4.528x.118")		n/a	-	-	-
-	000 987 69 46	O-Ring 115x4 mm (4.528x.157")		n/a	-	-	-
107	13.2010.1109-00	Gasket		1			
-	000063 066111	Replaced By 000063 006142			-	-	-
108	000063 006142	Countersunk Screw		2			
109	000472 100000	Lock Ring		2			
110	000 981 10 25	Grooved Ball Bearing		1			
111	13.2010.1565-00	Oil Feed Ring		1			
112	99.2990.1009-00	Seal Ring		1			
115	13.2010.1016-00	Driven Flange		1			
116	99.2905.1007-00	Lock Plate		1			
117	99.2913.1003-00	Nut, Slotted		1			
118	13.2010.1454-01	Bearing Tube, Collar 2.0 mm thick		1			
-	13.2010.1454-02	Bearing Tube, Collar 2.2 mm thick		1			
-	13.2010.1454-03	Bearing Tube, Collar 2.4 mm thick		1			
-	13.2010.1454-04	Bearing Tube, Collar 2.6 mm thick		1			
-	13.2010.1454-05	Bearing Tube, Collar 2.8 mm thick		1			
-	13.2010.1454-06	Bearing Tube, Collar 3.0 mm thick		1			

-	13.2010.1454-07	Bearing Tube, Collar 3.2 mm thick	1
-	13.2010.1454-08	Bearing Tube, Collar 3.4 mm thick	1
-	13.2010.1454-09	Bearing Tube, Collar 2.3 mm thick	1
-	13.2010.1454-10	Bearing Tube, Collar 2.5 mm thick	1
119	001473 004001	Cylindrical Pin, Grooved	1
120	000472 062000	Lock Ring	2
121	000 981 15 25	Grooved Ball Bearing	1
122	13.2010.1453-00	Washer	1
123	13.2010.1596-00	Lock Plate	1
124	000960 012055	Screw	1
130	13.2010.1224-00	Intermediate Gear, 26 Teeth	1
131	000472 072000	Lock Ring	2
132	99.2955.1001-00	Spacer Ring	1
133	000625 036306	Grooved Ball Bearing	2
134	13.2010.1029-00	Pivot Pin	1
135	000127 008205	Lock Washer	2
136	000933 008036	Screw	2
140	13.2010.1338-00	Shaft	1
141	13.2010.1329-00	Shifting Sliding Collar	1
142	13.2010.1339-00	Drive Gear, Front Axle	1
143	99.2955.1004-00	Spacer Ring	1
144	13.2010.1455-00	Felt Wick	1
145	13.2010.1250-00	Hex. Head Screw	1
146	000 987 55 46	O-Ring 115x2.5 mm (4.528x.098")	1
147	13.2010.1046-00	Bearing Flange	1
148	000472 100000	Lock Ring	2
149	000625 006211	Grooved Ball Bearing	1
150	13.2010.1565-00	Oil Feed Ring	1
151	99.2990.1008-00	Seal Ring	1
152	13.2010.1109-00	Gasket	1

-	000063 006111	Replaced By 000063 006170	-	-	-
153	000063 006170	Countersunk Screw	2		
154	13.2010.1016-00	Driven Flange	1		
155	99.2905.1007-00	Lock Plate	1		
156	99.2913.1003-00	Slotted Nut	1		
157	000625 006206	Grooved Ball Bearing	1		
160	13.2010.1109-00	Gasket	1		
161	13.2010.1108-00	Cover, Rear	1		
-	000127 010200	Replaced By 000137 010201	-		
162	000137 010201	Spring Washer	6		
-	000933 010034	Replaced By 000933 010016	-		
163	000933 010016	Screw	6		
170	13.4041.1019-00	Drive Shaft	1	1	1
-	404 262 00 05	Drive Shaft			1
171	13.4041.1054-01	Spacer Washer 0.2 mm thick (.008")	1		
-	13.4041.1054-02	Spacer Washer 0.4 mm thick (.016")	1		
-	13.4041.1054-03	Spacer Washer 0.6 mm thick (.024")	1		
-	13.4041.1054-04	Spacer Washer 0.8 mm thick (.031")	1		
-	13.4041.1054-05	Spacer Washer 1.0 mm thick (.039")	1		
-	13.4041.1054-06	Spacer Washer 1.2 mm thick (.047")	1		
-	13.4041.1054-07	Spacer Washer 1.4 mm thick (.055")	1		
172	13.2010.1571-00	Bearing Flange, Drive Shaft	1		
173	000 981 16 25	Grooved Ball Bearing	1		
174	000472 072000	Lock Ring	1		
175	070952 035100	Lock Plate	1		
176	070852 035000	Nut, Grooved	1		
177	13.2010.1573-00	Gasket	1		
178	13.2010.1572-00	Bearing Cover, Drive Shaft	1		
179	007603 008107	Seal Ring	5		
180	000931 008021	Screw	5		

Table 19 – Transmission Linkage – Group 13

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	13.4041.0805-00		Shifting Plate		1				
2	13.2010.1317-00		Guide Rail		1				
3	13.2010.1318-00		Guide Rail		1				
4	13.2010.1319-00		Guide Rail		2				
5	13.2010.1314-00		Guide Rail		2				
6	13.2010.1315-00		Stiffening Rail		1				
7	13.2010.1316-00		Stiffening Rail		1				
8	99.2939.1002-00		Clinch-Bolt		1				
9	13.2010.1320-00		Detent Spring		1				
10	13.2010.1323-00		Base Plate		1				
11	000661 003500		Countersunk Rivet		6				
-	000661 003501		Countersunk Rivet		6				
20	13.2010.0768-00		Latch		1				
-	000125 008410		Washer		1				
-	000094 003025		Cotter Pin		1				
23	13.4041.1055-00		Shifting Tongue, 1 st Thru 4 th Speed		1				
24	13.4041.0704-00		Shifting Tongue, 5 th & 6 th Speed		1				
25	13.4041.0705-00		Shifting Tongue, Direct Gear		1				
27	13.2010.0750-00		Shifting Tongue, Reverse Speed		1				
28	13.2010.0784-00		Follower		1				
29	000661 008006		Countersunk Rivet		1				
30	13.2010.1275-00		Spring Pin		3				
31	13.2010.1286-00		Spring Pin		1				
32	13.2010.1602-00		Guide		4				
33	005402 008200		Cylindrical Roller		4				
34	13.2010.1603-00		Cover, Roller Guide		4				
35	99.2980.1021-00		Spring		2				
36	99.2980.1022-00		Spring		2				
37	13.2010.1273-00		Retainer, Spring		4				

38	13.2010.1274-00	Lock Ring, Two-Part	4			
39	13.2010.1309-00	Follower	1			
40	000661 008011	Countersunk Rivet	1			
41	13.2010.1074-00	Guide	3			
42	000661 008004	Countersunk Rivet	3			
43	001481 004000	Clamping Pin	1			
44	13.2010.1308-00	Shifting Sliding Plate	1			
45	13.2010.1080-00	Angular Lever	1			
46	13.2010.1079-00	Hex. Head Bolt	1			
47	006797 010152	Toothed Washer	1			
48	000936 010002	Nut	1			
-	13.4041.0808-00	Replaced Together By		-	-	-
-	404 260 01 14	404 260 00 14				
53	404 260 00 14	Transmission Cover		1	1	1
-	404 260 02 14	Transmission Cover				1
54	13.2010.0725-00	Shifting Tongue	1			
55	13.4041.1031-00	Transmission Cover	1			
57	13.2010.1324-00	Guide	1			
58	000661 008005	Countersunk Rivet	1			
59	13.2010.1601-00	Guide	1			
60	13.2010.1275-00	Spring Pin	1			
61	13.2010.1603-00	Cover, Roller Guide	1			
62	005402 008200	Cylindrical Roller	2			
63	99.2980.1021-00	Spring	1			
64	13.2010.1273-00	Retainer, Spring	1			
65	13.2010.1274-00	Lock Ring, Two-Part	1			
-	13.4041.1033-00	Replaced By 404 261 00 05, 404 260 00 39, 000 987 43 46, 000470 020000 and 404 267 00 06	3	-	-	-
67	404 261 00 05	Shift Case	4	1		
-	13.4041.1041-00	Seal Ring	3	1	1	1

68	000470 020000	Expansion Plug	4	1			
69	13.4041.1034-00	Shifting Shaft		1			
70	900059 030000	Expansion Plug		1			
71	13.4041.1061-00	Lever		1			
72	000127 010203	Lock Washer		1			
73	000931 010055	Screw		1			
74	13.4041.1037-00	Cover	3		1	1	1
-	000933 008036	Screw	3		2	2	2
-	000127 008200	Lock Washer	3		2	2	2
75	404 267 00 06	Cover	4	1			
78	13.4041.1038-00	Support, Shift Case	4	1			
79	13.4041.1039-00	Seal Ring		1			
80	13.4041.1040-00	Ring Half		2			
81	13.4041.1042-00	Ring Half		2			
82	13.4041.1043-00	Lever		1			
83	13.4041.1044-00	Bearing Tube		1			
84	13.4041.1045-00	Clamping Plate		1			
85	000127 008205	Lock Washer		1			
86	000933 010016	Screw		1			
87	13.4041.1046-00	Cover		1			
88	000127 008205	Lock Washer		6			
89	000933 008066	Screw		3			
-	000933 008048	Screw		3			
90	001473 005000	Cylindrical Pin, Grooved		1			
-	13.4041.0806-00	Replaced By 404 260 00 95			-	-	-
91	404 260 00 95	Shift Lever			1	1	1
-	404 260 00 95	Shift Lever					1
-	001481 003501	Clamping Sleeve	5		1	1	1
-	001481 006005	Clamping Sleeve	5		1	1	1
-	13.4041.1028-00	Seal Ring	5		1	1	1
-	000 987 46 46	Replaced By 000 987 51 46			-	-	-

92	000 987 51 46	O-Ring	6	1			
93	000470 020000	Expansion Plug	6	1			
94	000319 040500	Ball Knob		1			
95	000127 008205	Lock Washer		2			
96	000931 008057	Screw		2			
97	13.2010.1304-00	Forked Lever		1			
98	13.2010.1307-00	Fitted Screw		1			
99	001473 004001	Cylindrical Pin, Grooved		1			
100	000934 010000	Nut		1			
101	007603 012107	Seal Ring		1			
102	13.4041.1047-00	Breather Screw		1			
103	13.2010.1343-00	End Cover	13	1			
104	000127 008205	Lock Washer	13	2			
105	000933 008016	Screw	13	2			
-	007603 008104	Replaced By 000137 008205		-			
106	000137 008205	Spring Washer		12			
107	000931 008246	Screw		12			
108	007603 010100	Seal Ring		2			
109	000933 010001	Screw		2			
112	13.4041.1049-00	Bearing Rod		1			
113	13.4041.1050-00	Shifting Fork, 1 st thru 4 th Speed		1			
114	13.4041.1051-00	Shifting Fork, 5 th Speed		1			
115	13.4041.1052-00	Shifting Dog		1			
116	13.2021.1061-00	Hex. Head Screw with Blut End		1			
117	13.2010.1404-00	Shifting Rod		1			
-	13.2010.1060-00	Replaced By 13.2010.1610-00		-	-	-	
118	13.2010.1610-00	Follower		1			
-	000093 008401	Replaced By 000127 008205		-	-	-	
119	000127 008205	Lock Washer		1			
120	13.2010.1061-00	Hex. Head Screw with Blut End		1			

121	13.2010.1541-00	Sliding Fork	1			
122	000127 008205	Lock Washer	1			
123	13.2010.1061-00	Hex. Head Screw with Blunt End	1			
-	007603 022106	Replaced By 007603 022105		-	-	-
124	007603 022105	Seal Ring	1			
125	007604 022100	Screw Plug	1			
128	13.2010.0616-00	Shifting Crank	1			
129	13.2010.1574-00	Seal Ring	1			
130	13.2010.1575-00	Shifting Fork	1			
131	13.2010.1057-00	Slide	2			
132	000127 006204	Lock Washer	1			
133	000933 006049	Screw	1			
134	13.2010.1570-00	Rubber Seal	1			
135	13.2010.1568-00	Oil Pipe	1			
-	13.2010.1543-00	Replaced By 13.4111.1004-00		-	-	-
136	13.4111.1004-00	Seal	1			
137	13.2010.1569-00	Cover Plate	1			
138	000933 008152	Screw	1			
139	000917 008004	Cap Nut	1			
-	007603 022106	Replaced By 007603 022105		-	-	-
141	007603 022105	Seal Ring	2			
142	007604 022100	Screw Plug	2			
145	13.2010.1109-00	Gasket	1			
146	13.2010.1086-00	Cover, Rear	1			
147	007603 010104	Seal Ring	5			
148	000933 010016	Screw	5			
-	13.2010.1527-00	Replaced By 411 261 00 80		-	-	-
149	411 261 00 80	Gasket	1			
-	13.2010.0606-00	Replaced By 411 260 00 65 Together with 411 261 00 80	7	-	-	-
150	411 260 00 65	Cover	8	1		

-	007603 008104	Replaced By 000125 008410		-	-	-	
151	000125 008410	Washer	4				
152	000933 008153	Screw	4				
153	13.2010.0618-00	Drive Pinion	1				
154	13.2010.1540-00	Gasket	1				
155	13.2010.0605-00	Cover	1				
156	007603 008004	Seal Ring	6				
157	000931 008021	Screw	6				
162	13.2010.1142-00	Filler Pipe	1				
163	13.2010.0731-00	Dipstick	1				
164	13.2010.1282-00	End Cover	1				
165	000127 010203	Lock Washer	6				
166	000933 010008	Screw		6	6	6	4
-	000933 010016	Screw					2
-	13.2010.1093-00	Replaced By 13.4111.1019-00		-	-	-	
167	13.4111.1019-00	Gasket	1				
-	13.2010.1281-00	Replaced By 13.4111.1007-00		-	-	-	
168	13.4111.1007-00	End Cover	1				
169	007603 010104	Seal Ring	10				
170	000933 010016	Screw	8				
-	000933 010034	Screw	2				
-	13.2010.1410-00	Replaced By 13.4111.1018-00		-	-	-	
174	13.4111.1018-00	Gasket	1				
-	13.2010.1401-00	Replaced By 13.4111.1006-00		-	-	-	
175	13.4111.1006-00	End Cover	1				
176	000127 010203	Lock Washer	12				
177	000931 010018	Screw	12				
179	007603 012304	Seal Ring	1				
-	007604 012100	Replaced By 000961 012001		-	-	-	
180	000961 012001	Screw	1				
-	13.4041.0710-00	Replaced By 404 260 00 39	3	-	-	-	

		404 261 00 05,000 987 43 46, 000470 020000 and 404 267 00 06					
181	404 260 00 39	Gearshift Lever	4	1	1	1	
-	404 260 03 39	Gearshift Lever					1
182	000319 040500	Ball Knob		1			
183	000 987 43 46	O-Ring		1			

Footnotes

Remarks Table 18, 19

- 1 Up to Transmission 9501587
 - 2 From Transmission 9501588
 - 3 Up to Transmission 9502750
 - 4 From Transmission 9502751
 - 5 Up to Transmission 9503499
 - 6 From Transmission 9503500
 - 7 Up to Transmission 9503549
 - 8 From Transmission 9503550
 - 9 Up to Transmission 017172
 - 10 From Transmission 017173
 - 11 Up to Transmission 033180
 - 12 From Transmission 033181
 - 13 Only Applicable if Special P. T. O. has NOT Been Installed.
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Table 20 – Control Cables – Group 29

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	29.2010.1001-00		Lever, Manual Control			1	1	1	
2	404 987 02 43		Boot			1	1	1	
3	000319 032500		Ball Knob			1	1	1	
-	29.2010.1002-00		Bearing Bracket	1		2	2	2	
-	29.4041.0702-00		Bracket	1			1		
-	000933 008014		Screw	1			2		
-	000933 008025		Screw	1			2		
-	000127 008200		Lock Washer	1		2	2	2	
-	000934 008000		Nut	1		2	2	2	
-	29.2010.1006-00		Stop, Control Lever	1		1	1	1	
-	29.4041.1004-00		Shim	1		1	1	1	
5	000931 008057		Screw			1	1	1	
6	000125 008400		Washer			2	2	2	
7	000137 008200		Spring Washer			2	2	2	
8	000127 008200		Lock Washer			1	1	1	
9	000467 008001		Nut, Knurled			1	1	1	
13	29.4041.1002-00		Pull Wire			1	1	1	
14	29.4041.1003-00		Lead Seal			1	1	1	
15	29.4041.1005-00		Cable Casing			1	1	1	
16	29.4041.1007-00		Mounting Clamp			1	1	1	
-	000933 004003		Screw			1	1	1	
-	000127 004203		Lock Washer			1	1	1	
-	000934 004004		Nut			1	1	1	
20	29.4041.1009-00		Clamping Piece, Cable Casing			1	1	1	
-	000933 005011		Screw			1	1	1	
-	000127 005203		Lock Washer			1	1	1	
-	000934 005004		Nut			1	1	1	
24	29.2010.1004-00		Clamping Piece, Wire Cable			1	1	1	
25	000933 005011		Screw			1	1	1	

33	30.4041.0800-00	Choke Cable	1	1	1
34	000 302 00 01	Pull Knob, Wire Cable	1	1	1
35	000 988 01 72	Wire Spiral 685 mm long	1	1	1
36	040621 005200	Insulating Hose 585 mm long	1	1	1
37	006798 012200	Serrated Washer	1	1	1
38	000 990 48 51	Hex. Nut	1	1	1
45	406 300 12 26	Lever			1
46	000 993 22 26	Conical Spring washer			4
47	406 302 01 62	Pressure Plate			1
48	406 302 01 54	Friction Disc			1
49	406 300 00 45	Bearing Flange			1
50	406 302 01 28	Detent			1
51	000087 005118	Countersunk Screw			3
52	406 300 01 53	Hub			1
53	406 300 09 26	Detent Lever			1
54	001481 004034	Clamping Sleeve			1
55	000319 025300	Ball Knob			1
56	000125 006400	Washer			1
57	406 993 50 25	Spring			1
58	406 988 50 35	Bell			1
64	406 300 01 38	Adjusting Cover			1
65	406 987 54 45	Protective Cap			1
66	120 302 00 87	Set Collar			1
67	000933 005004	Screw			1
68	406 302 00 05	Pull Wire			1
69	29.4041.1003-00	Lead Seal			1

Footnotes

Remarks Table 20

1 Up to Chassis 85 02850

Table 21 – Fuel System – Group 31

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	31.4041.0808-00		Fuel Tank			1	1	1	
-	31.4041.0821-00		Replaced By 31.4041.0820-00			-	-	-	
2	31.4041.0820-00		Fuel Tank II			1	1	1	
-	31.4041.0807-00		Replaced By Together With			-	-	-	
-	31.4041.0822-00		404 470 01 24, 404 473 00 35			-	-	-	
3	404 470 01 24		Intake Pipe			2	2	2	
-	31.4041.0733-00		These Two Replaced By			-	-	-	
-	31.4111.0705-00		404 473 00 35			-	-	-	
4	404 473 00 35		Strainer			2	2	2	
-	000125 006402		Washer			2	2	2	
-	000934 006000		Nut			2	2	2	
-	186 471 01 80		Replaced By 404 471 00 80			-	-	-	
5	404 471 00 80		Gasket			2	2	2	
6	000137 005203		Spring Washer			10	10	10	
7	000934 005008		Nut			10	10	10	
8	007603 045300		Seal Ring			2	2	2	
9	007604 045200		Screw Plug			1	1	1	
10	303 470 00 31		Chain, Filler Cap			1	1	1	
11	000 471 05 30		Filler Cap			1	1	1	
-	304 997 03 40		Replaced By 404 471 00 79			-	-	-	
12	404 471 00 79		Seal Ring			1	1	1	
13	304 471 00 45		Cover			1	1	1	
-	186 471 01 80		Replaced By 404 471 00 80			-	-	-	
14	404 471 00 80		Gasket			1	1	1	
15	000137 005203		Spring Washer			5	5	5	
16	000934 005008		Nut			5	5	5	
20	001 987 76 25		Edge Guard 700 mm long			2	2	2	
21	000 542 44 17		Fuel Gauge Sender Unit				1	1	
22	31.4041.1020-00		Connecting Hose 70Øx80mm long			1	1	1	
-	900263 009000		Hose Strap			2	2	2	

-	900262 009100	Hose Clamp	2	2	2
23	31.4041.0753-00	Console Arm, Front	1	1	1
24	31.4041.0754-00	Console Arm, Central	1	1	1
25	31.4041.0752-00	Console Arm, Rear	1	1	1
-	000933 010049	Screw	4	4	4
-	000127 010203	Lock Washer	4	4	4
-	000 990 25 51	Replaced By 000934 010014	-	-	-
-	000934 010014	Nut	4	4	4
26	31.4041.1022-00	Rubber pad	4	4	4
-	000933 008066	Screw	8	8	8
-	000934 008010	Nut	16	16	16
32	31.4041.0816-00	Fuel Change-Over Cock	1	1	1
33	000 477 04 60	Gasket	1	1	1
34	006798 006200	Serrated Washer	1	1	1
35	000 476 00 71	Hex. Head Screw	1	1	1
36	31.4041.1060-00	Bracket, Change-Over Cock	1	1	1
-	000933 008153	Screw	1	1	1
-	000137 008202	Spring Washer	1	1	1
-	000934 008010	Nut	1	1	1
37	31.4041.0743-00	Follower Clamp	1	1	1
38	31.4041.1069-00	Operating Shaft	1	1	1
39	304 434 02 31	Joint Wire	1	1	1
-	000125 006410	Washer	2	2	2
-	000094 001501	Cotter Pin	2	2	2
40	000 997 22 81	Grommet, Operating Shaft	1	1	1
-	000 477 22 01	Replaced By 000 477 91 01	-	-	-
45	000 477 91 01	Thru-Flow Fuel Filter	1	1	1
-	000 477 12 15	Replaced By 000 477 37 15	-	-	-
46	000 477 37 15	Filter Element	1	1	1
-	000 477 05 16	Replaced By 000 477 02 16	-	-	-

47	000 477 02 16	Bowl	1	1	1
-	000 477 16 80	Replaced By 000 477 19 80	-	-	-
48	000 477 19 80	Seal, Filter Bowl	1	1	1
-	000 477 07 18	Replaced By 000 477 03 18	-	-	-
49	000 477 03 18	Bail with Tommy Nut	1	1	1
50	31.4041.1059-00	Bracket, Thru-Flow Filter	1	1	1
-	000933 008106	Screw	1	1	1
-	000934 008010	Nut	1	1	1
51	31.4041.0755-00	Fuel Line, Tank I Change-Over	1	1	1
52	31.4041.0756-00	Fuel Line, Tank II Change-Over	1	1	1
53	915003 006202	Seal Cone	2	2	2
54	915001 006000	Union Nut	2	2	2
55	915010 006202	Banjo Union	2	2	2
56	007603 012108	Seal Ring	2	2	2
57	915011 006100	Hollow Screw	1	1	1
60	31.4041.0713-00	Fuel Line, Change-Over to Filter	1	1	1
-	31.4041.0714-00	Replaced By 404 470 01 65	-	-	-
61	404 470 01 65	Fuel Line, Filter to Pump	1	1	1
-	915003 006202	Seal Cone	4	4	4
-	915001 006000	Union Nut	4	4	4
62	31.4041.0819-00	Breather Line, Fuel Tank II	1	1	1
-	A 11x17x60 DIN 73379	Replaced By 073379 009100	-	-	-
63	073379 009100	Rubber Hose 60 mm long	2	2	2
64	31.4041.0751-00	Banjo Union	1	1	1
65	007603 016301	Seal Ring	2	2	2
66	915011 010102	Hollow Screw	1	1	1
-	31.4041.1065-00	Replaced By 31.4041.1091-00	-	-	-
68	31.4041.1091-00	Bracket, Transmission Cover	1	1	1
69	312 078 01 85	Pipe Bracket	7	7	7
-	000084 005110	Cylindrical Head Screw	4	4	4

-	000127 005204	Lock Washer	4	4	4
-	000934 005008	Nut	4	4	4
70	64.2010.1008-00	Spacer	1	1	1
-	304 995 16 20	Replaced By 900285 005100	-	-	-
71	900285 005100	Mounting Clamp	1	1	1
-	000084 005131	Cylindrical Head Screw	1	1	1
-	000127 005204	Lock Washer	1	1	1
-	000934 005008	Nut	1	1	1

Table 22 – Fuel System – Group 31

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	406 470 15 01		Fuel Tank, 120 Liter						1
2	406 470 04 24		Suction Pipe						1
3	404 473 00 35		Strainer						1
4	404 471 00 80		Gasket						1
5	066 997 06 40		Seal Washer						5
6	000084 005110		Cylindrical Head Screw						5
7	007603 045300		Seal Ring						1
8	007604 045200		Screw Plug						1
9	000 471 05 30		Filler Cap						1
10	404 471 05 30		Gasket						1
12	001 542 71 17		Sender Unit, Fuel Gauge						1
-	404 471 00 80		Gasket						1
13	066 997 06 40		Seal Washer						5
14	000084 005132		Cylindrical Head Screw						5
18	404 470 03 42		Console Arm, Front						1
19	404 470 02 42		Console Arm, Rear						1
20	110 291 05 50		Bearing Bushing						2
-	000933 010038		Screw						5
-	007349 010001		Washer						2
-	000127 010203		Lock Washer						5
-	000934 010014		Nut						5
21	404 475 04 27		Support						2
-	000933 010016		Screw						4
-	000125 010504		Washer						4
-	000127 010203		Lock Washer						4
-	000934 010014		Nut						4
22	404 475 01 50		Spacer Bushing						1
-	000960 012088		Screw						1
-	000127 012202		Lock Washer						1

-	000934 012009	Nut	1
30	404 470 01 40	Strap, Front	1
31	404 470 00 40	Strap, Rear	1
32	335 987 02 70	Pad	2
33	335 987 01 70	Pad	4
34	900333 010000	Turnbuckle	2
35	070615 010000	Nut	2
39	008 997 90 82	Synthetic Hose	nB
40	421 476 00 25	Banjo Union 14 mm Hole Ø	nB
41	000 476 02 24	Banjo Union 12 mm Hole Ø	nB
42	000 476 03 24	Banjo Union 14 mm Hole Ø	nB
43	406 476 00 25	Banjo Union 16 mm Hole Ø	nB
44	000 476 01 24	Drive-In Connector	1
48	001 477 17 01	Pre-Filter	1
49	000 477 19 80	Gasket	1
50	31.2010.1045-00	Element, Filter	1
51	000 477 17 16	Bowl, Filter	1
52	000 477 03 18	Bail	1
-	000933 006040	Screw	1
-	000127 006204	Lock Washer	1
-	000934 006007	Nut	1
55	007603 012108	Seal Ring, Steel	nB
-	007603 012112	Seal Ring, Aluminum	nB
56	915011 006100	Hollow Screw	nB
57	007603 014103	Seal Ring, Steel	nB
58	915011 008100	Hollow Screw	nB
59	007603 016108	Seal Ring, Steel	nB
60	915011 010102	Hollow Screw	nB
65	007603 014104	Seal Ring, Aluminum	3
66	421 990 56 63	Throttle Screw, Hollow	1

67	421 470 00 46	T-Fitting with Bracket	1
68	000 995 46 01	Pipe Clamp	4
69	31.2010.1022-00	Pipe Clamp	1
70	000 995 00 68	Double Clamp 8 mm	6
71	000 995 01 68	Double Clamp 6 & 8 mm	2
-	000084 005110	Cylindrical Head Screw	nB
-	000127 005204	Lock Washer	nB
-	000934 005008	Nut	nB

Table 23 – Exhaust System – Group 32

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	32.4041.0708-00		Exhaust Pipe With Socket			1	1	1	
-	181 492 00 11		Three-Hole Flange			1	1	1	
-	153 492 01 08		Sleeve			1	1	1	
-	404 490 03 19		Exhaust Pipe						1
2	181 492 00 11		Three-Hole Flange			1	1	1	
-	309 492 00 13		Three-Hole Flange						1
3	153 492 01 08		Sleeve			1	1	1	
4	153 492 01 81		Seal Ring			2	2	2	
-	007603 048301		Seal Ring						1
-	000931 008091		Screw			6	6	6	3
-	000127 008205		Lock Washer						3
-	999901 008000		Nut			6	6	6	3
7	32.4041.0707-00		Exhaust Pipe, Central Part		1				
12	404 490 00 30		Protective Plate	1	1				
13	900288 080101		Clamp	1	1				
-	32.4041.0705-00		Replaced By 404 491 00 01			-	-	-	
14	404 491 00 01		Muffler		1				
15	32.4041.1008-00		Mounting Clamp		1				
16	32.4041.1009-00		Shackle		1				
-	000933 010034		Screw		1				
-	000127 010203		Lock Washer		1				
-	000934 010014		Nut		1				
17	32.4041.1013-00		Console		1				
-	000933 008036		Screw		2				
-	000127 008205		Lock Washer		2				
-	000934 008010		Nut		2				
-	000933 010011		Screw		1				
-	000127 010203		Lock Washer		1				
-	000934 010014		Nut		1				

-	32.4041.1024-00	Replaced By 32.4041.0715-00	-			
20	32.4041.0715-00	Exhaust Pipe, Rear	1	1		1
21	32.4041.0711-00	Exhaust Pipe, Rear				1
22	32.4041.1025-00	Mounting Clamp	1			
23	32.4041.1006-00	Pipe Clamp	2			
-	000933 010016	Screw	4			
-	000127 010203	Lock Washer	4			
-	000934 010014	Nut	4			
-	32.4041.1026-00	Replaced By 32.4041.0714-00 Together with 32.4041.1040-00 and 000933 010034	2	-	-	-
24	32.4041.0714-00	Bracket	3	1		
-	32.4041.1040-00	Clamp	2	1	1	
-	000933 010016	Screw	1	1		1
-	000933 010034	Screw	1	1		1
-	000127 010203	Lock Washer	2	2		2
-	000934 010014	Nut	2	2		2
-	000933 008036	Screw	2	2		2
-	000127 008205	Lock Washer	2	2		2
-	000934 008010	Nut	2	2		2
28	32.4041.1033-00	Clamp				1
29	32.4041.1034-00	Clamp				2
-	000933 010016	Screw				2
-	000127 010203	Lock Washer				2
-	000934 010014	Nut				2
30	32.4041.0713-00	Clamp				1

Footnotes

Remarks Table 23

- 1 From Chassis 013906
- 3 Up to Chassis 8500100
- 4 From Chassis 8500101

Table 24 – Engine Suspension – Group 35

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	35.4041.0710-00		Bearing Shell, Top		1				
3	35.4041.0711-00		Bearing Shell, Bottom		1				
-	35.4041.0709-00		Replaced By 35.4041.1031-00		-				
-	35.4041.1031-00		No Longer Available (N.L.A.)		-				
5	35.4041.1017-00		Rubber Mounting Half		4				
-	000961 012006		Screw		4				
-	000127 012202		Lock Washer		4				
-	000936 012002		Nut		4				
-	000960 010004		Screw		4				
-	000127 010203		Lock Washer		4				
-	000936 010002		Nut		4				
-	000125 013006		Washer (N.L.A.)		-				
-	000094 004000		Cotter Pin (N.L.A.)		-				
-	000127 012200		Lock Washer (N.L.A.)		-				
-	000936 012002		Nut (N.L.A.)		-				
10	99.2902.1011-03		Spacer Washer 1.0 mm thick		nB				
-	99.2902.1011-01		Spacer Washer 1.5 mm thick		nB				
-	99.2902.1011-02		Spacer Washer 2.0 mm thick		nB				
-	000961 016009		Screw	1		3	3	3	
-	000960 016086		Screw	2	1				
-	000960 016087		Screw	2	1				
-	000960 016088		Screw	2	1				
-	000127 016200		Lock Washer		3				
-	000934 016003		Nut	2	3				
-	108 220 05 16		Replaced By 180 220 06 16			-	-	-	
14	180 220 06 16		Engine Suspension			1	1	1	
-	99.2956.1004-00		Replaced By 180 223 04 12			-	-	-	
15	180 223 04 12		Rubber Mounting			1	1	1	
16	006797 010152		Toothed Washer			3	3	3	

17	000931 010044	Screw	1	1	1	
18	000912 010012	Cylindrical Head Screw	1	1	1	
19	000933 010020	Screw	1	1	1	
20	35.4041.0704-00	Bearing Bracket	1	1	1	
-	99.2956.1004-00	Replaced By 180 223 04 12	-	-	-	
21	180 223 04 12	Rubber Mounting	1	1	1	
22	35.4041.1006-00	Shackle	2	2	2	
23	35.4041.1009-00	Pin	2	2	2	
24	000127 014201	Lock Washer	2	2	2	
25	000934 014000	Nut	2	2	2	
28	000125 013006	Washer	2	2	2	
29	000463 013002	Lock Plate	2	2	2	
30	000961 012020	Screw	2	2	2	
35	421 240 01 30	Bearing, Front				1
36	99.2956.1001-00	Rubber Mounting				2
37	421 242 00 74	Pin				1
38	99.2901.1010-00	Washer				1
39	000937 012001	Castle Nut				1
-	000094 003024	Cotter Pin				1
40	421 242 00 30	Clamp				1
-	000933 008036	Screw				2
-	000127 008205	Lock Washer				2
-	000934 008010	Nut				2
-	000961 012030	Screw				2
-	000934 012009	Nut				2

Footnotes

Remarks Table 24

- 1 Up to Transmission 017172
- 2 From Transmission 017173

Table 25 – Radiator – Group 40

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	40.4041.0701-00		Radiator	1		1	1	1	
1	404 501 00 00		Radiator	2		1	1	1	
3	40.2010.1033-00		Cup			2	2	2	
-	40.2010.1036-00		These Two Replaced By 404 504 00 12			-	-	-	
-	40.4041.1030-00						-	-	-
4	404 504 00 12		Rubber Mounting			2	2	2	
5	40.2010.1037-00		Rubber Mounting			2	2	2	
6	40.2010.1034-00		Washer			2	2	2	
-	000934 010014		Nut			4	4	4	
-	40.4041.1017-00		Replaced By 40.4041.0713-00			-	-	-	
-	40.4041.0713-00		Bracket	1		1	1	1	
-	404 500 01 31		Replaced By 404 504 03 32 Together With 40.2010.1030-00 and 006799 006002	3		-	-	-	
							-	-	-
10	404 504 03 32		Bracket	2		1	1	1	
11	40.2010.1019-00		Rubber Sleeve			2	2	2	
12	40.2010.1017-00		Clamp			1	1	1	
13	40.2010.1018-00		Clamp			1	1	1	
-	000125 008400		Replaced By 40.2010.1030-00			-	-	-	
14	40.2010.1030-00		Washer	3		2	2	2	
					4		4	4	4
-	000094 002005		Cotter Pin	3		2	2	2	
15	006799 006002		Lock Plate	4		2	2	2	
16	000912 012000		Cylindrical Head Screw			1	1	1	
-	000933 008036		Screw			1	1	1	
-	000127 008205		Lock Washer			1	1	1	
-	000934 008010		Nut			1	1	1	
22	40.4041.0714-00		Drain Pipe	1		1	1		
23	404 500 00 72		Drain Pipe	2		1	1		
-	40.4041.0717-00		Drain Pipe					1	
24	007603 014103		Seal Ring			1	1	1	

25	007604 014100	Screw Plug		1	1	1
-	40.4041.1018-00	These Two Replaced By		-	-	-
-	40.4041.0715-00	404 203 00 40		-	-	-
27	404 203 00 40	Bracket		1	1	1
28	40.4041.1019-00	Clamp		1	1	1
-	000933 006102	Screw		2	2	2
-	000127 006204	Lock Washer		2	2	2
-	000934 006007	Nut		2	2	2
29	900271 038026	Rubber Hose, 1 Meter Sections		2	2	2
-	900263 009000	Hose Strap 365 mm long		4	4	4
-	900262 009100	Hose Clamp		4	4	4
30	000 203 38 75	Thermostat	1	1	1	1
31	001 203 08 75	Thermostat	2	1	1	1
32	900271 032008	Rubber Hose, 80 mm long		1	1	1
33	404 501 01 82	Cooling Water Hose		2	2	2
-	900263 009000	Hose Strap 330 mm long		2	2	2
-	900262 009100	Hose Clamp		2	2	2
-	900288 040000	Hose Clamp		3	3	3
34	900271 012029	Rubber Hose, 1 Meter Sections	1	1	1	1
-	900263 005000	Hose Strap 200 mm long	1	2	2	2
-	900262 005100	Hose Clamp	1	2	2	2
35	40.4041.0716-00	Forked Pipe				1
-	007603 016100	Seal Ring				1
-	000936 016007	Nut				1
36	007603 016108	Seal Ring		1	1	1
37	007604 016100	Screw Plug		1	1	1
40	40.4041.0706-00	Water Expansion Tank	1	1	1	1
41	404 500 02 49	Water Expansion Tank	2	1	1	1
42	40.4041.0806-00	Screw Cap		1	1	1
-	50.2010.1053-00	Replaced By 40.2010.1053-00		-	-	-
43	40.2010.1053-00	Seal Ring		1	1	1

44	000 500 05 40	Disc Valve		1	1	1
45	40.4041.1020-00	Protective Clamp			1	
46	40.4041.1005-00	Feed Pipe	1	1	1	1
47	404 500 01 72	Feed Pipe	2	1	1	1
48	900271 038026	Rubber Hose, 80 mm long	1	2	2	2
49	900271 032008	Rubber Hose, 1 Meter Sections	2	2	2	2
-	900263 009000	Hose Strap Order by the Meter		4	4	4
-	900262 009100	Hose Clamp		4	4	4
50	404 501 01 25	Breather Pipie	2	1	1	1
51	900271 012029	Breather Hose, 60 mm long	2	2	2	2
-	900263 005000	Hose Strap 200 mm long	2	4	4	4
-	900262 005100	Hose Clip	2	4	4	4
54	000933 006103	Screw		4	4	4
55	000127 006204	Lock Washer		4	4	4
56	40.4041.1006-00	Overflow Pipe		1	1	1
-	40.2010.1052-00	These Two Replaced By		-	-	-
-	404 501 02 82	404 501 03 82		-	-	-
57	404 501 03 82	Rubber Hose 12x8 mm Ø		1	1	1

Table 26 – Radiator – Group 40

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	404 501 02 00		Radiator						1
2	404 504 00 12		Rubber Mounting						2
3	40.2010.1033-00		Cup						2
4	40.2010.1037-00		Rubber Mounting						2
5	40.2010.1034-00		Washer						2
6	000934 010014		Nut						4
7	404 501 00 20		Bracket						1
8	40.2010.1019-00		Rubber Sleeve						2
9	40.2010.1017-00		Clamp						2
10	40.2010.1030-00		Washer						4
11	006799 006002		Lock Plate						2

12	421 500 06 31	Bracket	1
13	000127 012202	Lock Washer	1
14	000961 012049	Screw	1
15	000933 010106	Screw	1
16	000127 010203	Lock Washer	2
17	000934 010014	Nut	1
18	000127 008205	Lock Washer	1
19	000933 008028	Screw	1
-	000933 008036	Screw	1
-	000127 008205	Lock Washer	1
-	000934 008010	Nut	1
20	404 500 00 07	Feed Pipe	1
21	404 501 01 20	Mounting Plate	1
22	000933 010198	Screw	2
23	000127 010203	Lock Washer	2
24	000 995 18 10	Mounting Clamp	1
-	000933 008214	Screw	2
-	000137 008202	Spring Washer	2
-	000934 008010	Nut	2
25	900271 038026	Rubber Hose, 1 Meter Sections	2
-	000 997 15 90	Hose Clamp	4
26	421 987 61 43	Elbow	1
-	000 997 15 90	Hose Clamp	2
30	404 500 07 49	Water Expansion Tank	1
31	000 501 18 15	Screw Cap with Valve	1
32	000 501 02 81	Rubber Cap	1
33	421 501 00 21	Support	1
34	000127 012201	Lock Washer	2
35	000933 012013	Screw	2
36	421 501 00 81	Rubber Pad	1

37	421 500 00 74	Strap	1
38	000933 008016	Screw	1
39	000127 008205	Lock Washer	2
40	000934 008010	Nut	1
41	900271 012029	Rubber Hose, 280 mm long	1
-	000 997 12 90	Hose Clamp	2
42	421 500 06 07	Feed Pipe	1
43	900271 015080	Rubber Hose, 100 mm long	2
-	000 997 12 90	Hose Clamp	4
45	008 997 90 82	Synthetic Hose	1
46	31.2010.1022-00	Clamp	1
47	000933 010198	Screw	1
48	000127 010203	Lock Washer	1
49	406 997 61 82	Rubber Hose, 250 mm long	1
-	900288 010000	Hose Clamp	2
50	421 830 04 15	Heating Pipe	1

Footnotes

Remarks Table 25, 26

- 1 Up to Chassis 050568
- 2 From Chassis 050569
- 3 Up to Chassis
- 4 From Chassis

Table 27 – Batteries – Group 60

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	072311 012003		Battery 12V/ 56 Ah			2			
-	000 541 56 01		Battery 12V/ 45 Ah				2	2	
-	072311 012011		Battery 12V/ 55 Ah / 255 A						2
2	000 545 03 08		Battery Switch				1	1	
3	000 545 03 56		Wrench				1	1	
-	000933 006016		Screw				2	2	
-	000127 006204		Lock Washer				2	2	
-	000934 006007		Nut				2	2	
5	67.4041.0735-00		Battery Case			1		1	1
-	67.4041.0729-00		Replaced by 404 540 00 14				-		
-	404 540 00 14		Battery Case				1		
-	67.2010.1023-00		Replaced by 67.4041.1113-00 Together with 000471 008000 and 000988 008000				-	-	-
6	67.4041.1113-00		Screw Plug		2				
-	6 DIN 6799		Replaced by 000471 008000 Together with 000988 008000		-				
7	000471 008001		Lock Ring		2				
8	000988 008006		Fitted Washer		2				
11	000 997 29 81		Grommet		2				
12	67.4041.0734-00		Frame		1				
-	000931 006148		Screw		1				
-	009021 006205		Washer		1				
-	000934 006007		Nut		1				
13	67.4041.1085-00		Support		1				
-	67.4041.1086-00		Support			2		2	
14	67.4041.1112-00		Support				2		
15	67.4041.1087-00		Connecting Strip		2				
16	404 541 00 84		Shim 1.0 mm thick (.039")		nB				
-	404 541 01 84		Shim 2.0 mm thick (.079")		nB				

-	404 541 02 84	Shim 3.0 mm thick (.118")	nB		
-	000931 010040	Screw	1		
-	000933 010034	Screw	3		
-	000137 010201	Spring Washer	4		
-	000934 010009	Nut	4		
17	000 545 24 26	Plug Socket, 2-Pole		1	1
18	62.4041.1057-00	Mounting Plate		1	1
-	000931 006005	Screw		2	2
-	000931 006016	Screw		2	2
-	000931 006027	Screw		2	2
-	000127 006204	Lock Washer		6	6
-	000934 006007	Nut		6	6
-	60.4041.0772-00	Cable From Battery, + terminal	14	1	1
30	60.4041.0647-00	Cable From Battery, - terminal	15	1	1
31	60.4041.0642-00	Cable From Battery, Plug Socket		1	1
-	60.4041.0736-00	Cable From Battery, To Starter		1	
-	60.4041.0701-00	Cable From Battery, To Ground		1	1
-	60.4041.0793-00	Cable From Battery, To Switch	14	1	1
32	60.4041.0644-00	Cable From Battery, Plug Socket	15	1	1
33	404 546 00 75	Clamp	1		
-	404 546 01 75	Clamp			1
-	000933 008025	Screw	1		
-	000127 008205	Lock Washer	1		
-	000934 008013	Nut	1		
-	000933 008028	Screw		1	1
-	000125 008410	Washer		1	1
-	000934 008013	Nut		1	1
-	003 997 32 82	Rubber Hose	3		
35	404 547 00 20	Ground Strap, 170 mm (6.693")	15	1	1
-	404 546 00 20	Ground Strap, 300 mm (11.811")			1
36	60.2010.1017-00	Boot		3	3

37	315 540 00 43		Cable Connector	15		1	1	
38	315 546 00 68		Cover Plate	15		1	1	
-	000084 008110		Cylindrical Head Screw	15		2	2	
-	000125 008410		Washer	15		2	2	
-	000934 008013		Nut	15		2	2	
-	000 990 03 47		Replaced by 000127 010203			-	-	
-	000127 010203		Lock Washer	15		1	1	
-	000 990 19 51		Replaced by 000439 010202			-	-	
-	000439 010202		Nut	15		2	2	
41	60.4041.1179-00		Boot	15		1	1	
-	60.4041.0774-00		Cable 620 mm (24.409")	14		1	1	
45	60.4041.0648-00		Cable 870 mm (34.252")	15		1	1	
46	60.4041.0775-00		Cable 510 mm (20.079")			1	1	
47	000 545 00 50		Sleeve			2	2	
-	60.4041.0794-00		Replaced by 60.4041.0703-00		-			
50	60.4041.0703-00		Cable, Battery to Battery			1	1	1
51	404 546 00 43		Bracket		1			
52	60.4041.1185-00		Mounting Clamp		3			
-	000933 010026		Screw		1			
-	000127 010203		Lock Washer		1			
-	000934 010000		Nut		1			
-	000933 008014		Screw		1			
-	000137 008205		Spring Washer		1			
-	000934 008000		Nut		1			

Table 28 – Lighting/Switches – Group 60

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	001 542 70 20		Replaced by 002 542 26 20		-				
1	002 542 26 20		Signal Horn, Bosch		1				
-	000 542 95 20		Replaced by 002 542 35 20		-				
-	002 542 35 20		Signal Horn, Hella		1				

2	60.4041.1052-00	Bracket, Signal Horn		1	1	1	
-	000933 010016	Screw		1	1	1	
-	000933 008108	Screw					1
-	000127 010203	Lock Washer		1	1	1	
-	000127 008205	Lock Washer					1
-	000934 010009	Nut		1	1	1	
-	000934 008013	Nut					1
3	000127 008205	Lock Washer	2				
4	000936 008000	Nut	2				
5	000 545 06 12	Foot Dimmer Switch		1	1	1	
-	000063 005114	Countersunk Screw		2	2	2	
-	000127 005205	Lock Washer		2	2	2	
-	000934 005000	Nut		2	2	2	
6	002 545 59 24	Blinker/Dimmer Switch					1
7	002 545 06 28	AMP Plug					8
8	001 545 82 28	Plug Housing, 8-Pin, Blinker					1
9	000 997 28 81	Grommet					1
-	000 544 44 01	Replaced by 000 544 56 01	-				
-	000 544 65 01	or 000 544 49 01					
-	000 544 21 92	Reflector	16	2			
-	000 544 29 80	Gasket, Diffuser Lens	16	2			
-	000 544 46 90	Diffuser Lens	16	2			
-	000 544 20 91	Lock Spring	16	14			
-	000 544 21 93	Lamp Socket	16	2			
-	000 544 48 92	Reflector, Diffuser Lens	17/31	2			
-	000 544 64 80	Gasket	17/31	2			
-	000 544 66 80	Gasket	17/31	2			
-	000 544 35 91	Lens Retaining Ring	17/31	2			
-	000 544 34 91	Lock Spring	17/31	14			
11	000 544 49 01	Headlamp	32/1	2	2	2	
12	000 544 63 89	Cover Ring with Adjusters	32/1	2	2	2	

13	000 990 13 31	Screw, Bushing	32/1	2	2	2
14	000 544 04 18	Installation Kit	32/1	2	2	2
15	000 544 25 92	Mirror, Glass	32/1	2	2	2
16	000 544 26 93	Socket Plate	32/1		2	2
17	000 544 05 23	Rubber Cap with Cables	32/1	2	2	2
18	000 544 25 91	Retaining Spring, Mirror	32/1	6	6	6
-	000084 004102	Cylindrical Head Screw	32/1	6	6	6
-	000 544 56 01	Replaced by 000 544 49 01			-	-
-	000 544 60 89	No Longer Available			-	-
-	000 990 12 31	Order Component Parts			-	-
-	000 544 03 18	For 000 544 49 01			-	-
-	000 544 04 23				-	-
-	000 544 71 01	Replaced by 000 544 78 01			-	-
-	000 544 78 01	Headlamp, Hella	2	2		2
-	000 544 60 89	Cover Ring with retainer	2/3	2		2
-	001 544 15 89	Cover Ring with retainer	4	2		2
-	000 990 19 31	Lens Head Countersunk Screw	2	4		4
-	000 544 64 92	Reflector	2	2		2
-	000 544 12 23	Locking Cap	2	2		2
-	000 544 24 91	Leaf Spring	2	6		6
19	000 546 00 53	Pin Bushing		6		6
-	072601 024100	Bulb 24 V / 55 / 50 W		2		
-	072601 024201	Bulb 24 V / 45 / 40 W			2	
-	-	Model - 117 see Cab Spare Parts				-
20	000 544 08 14	Masked Headlamp, Hella			2	2
21	000 826 25 90	Diffuser Lens			2	2
22	000 544 38 80	Seal			2	2
23	000 990 11 31	Lens Head Countersunk Screw			4	4
24	000 544 02 28	Anti-Glove Frame with Cap			2	2
25	000 997 01 26	Cup Washer			2	2
26	000 997 00 26	Spherical Washer			2	2
27	000 997 27 41	Rubber Ring			2	2

28	000 997 70 81	Grommet		2	2		
-	072601 024160	Bulb 24 V / 20 W		2	2		
29	18.4041.1020-00	Bracket, Left		1	1		
30	18.4041.1021-00	Bracket, Right		1	1		
-	000933 008036	Screw		4	4		
-	000933 008057	Screw		2	2		
-	000127 008205	Lock Washer		4	4		
-	000934 008013	Nut		6	6		
36	000 545 54 01	Fuse Box (6-Pole)	2	3	3	2	
37	000 545 08 03	Cover	2	3	3	2	
-	404 545 10 00	Marking Strip, Left	1				
-	404 545 11 00	Marking Strip, Right	1				1
-	404 545 07 00	Marking Strip, Left		1	1		
-	404 545 08 00	Marking Strip, Central		1	1		
-	404 545 09 00	Marking Strip, Right		1	1		
-	404 545 25 00	Marking Strip, Left					1
-	072582 006200	Connecting Rail	1	2	1	1	
-	000 545 22 34	Fuse 4 A	12	13	12	12	
-	000 545 29 34	Fuse 8 A		5	5		
-	000084 005110	Cylindrical Head Screw	4	6	6	4	
-	000127 005204	Lock Washer	4	6	6	4	
-	000 990 67 91	Cage Clip with Nut	4	6	6	4	
-	000 822 07 21	Replaced by 001 544 29 32	-				
-	001 544 29 32	Blinker Sending Unit	1				
39	000 544 38 32	Blinker Sending Unit, Hella		1	1		
-	000 544 35 32	Blinker Sending Unit, Bosch		1	1		
-	000 544 37 32	Blinker Sending Unit, SWF		1	1		
-	000 544 91 32	Blinker Sending Unit					1
-	406 542 09 40	Bracket					1
-	000084 006134	Cylindrical Head Screw	2				
-	000127 006204	Lock Washer	2				

-	000 990 68 91	Cage Clip with Nut	2			
-	000 544 12 30	Replaced by 000 544 45 30	-			
-	001 544 40 90	Diffuser Lens	25	2	2	2
-	000 544 40 80	Weatherstrip	25	2	2	2
-	000 990 14 31	Lens Head Countersunk Screw	25	4	4	4
-	000 544 64 89	Ornamental Frame	25	2	2	2
-	000 997 71 81	Grommet	25	2	2	2
-	000 997 02 26	Washer	25	2	2	2
-	000 997 28 41	Seal Washer	25	2	2	2
-	000 997 03 26	Ring	25	2	2	2
40	000 544 45 30	Blinker Lamp	26	2	2	2
41	000 544 70 92	Reflector	26	2	2	2
42	001 544 38 90	Lens, Amber	26	2	2	2
-	001 544 39 90	Lens, White	26	2	2	2
43	000 544 71 80	Seal	26	2	2	2
44	001 544 13 89	Frame	26	2	2	2
-	000 990 11 31	Lens Head Countersunk Screw	26	4	4	4
45	000 997 70 81	Grommet	26	2	2	2
46	000 997 01 26	Cup Washer	26	2	2	2
47	000 997 00 26	Spherical Washer	26	2	2	2
48	000 997 27 41	Rubber Ring	26	2	2	2
-	000933 008057	Screw		2	2	2
-	000934 008000	Nut		2	2	2
-	072601 024900	Bulb 24 V / 4 W		2	2	2
-	072601 024160	Bulb 24 V / 20 W		2	2	2
55	000 824 67 01	Wiper Motor		2		
-	000 824 07 75	Carbon Brush		2		
-	000 824 25 01	Replaced by 000 824 50 01	20		-	-
-	000 824 30 01	Together with 68.4041.1021-00			-	-
-	000 824 32 01				-	-
-	000 824 47 01				-	-
56	000 824 50 01	Wiper Motor 24 V		2	2	

-	000 824 09 75	Carbon Brush			2	2	
-	000 824 10 75	Carbon Brush			2	2	
-	000 824 06 75	Carbon Brush			2	2	
-	000 824 07 99	Cover Cap			2	2	
58	000 824 11 99	Cover Cap			2	2	
-	000 995 00 10	Mounting Clamp			2	2	
59	000 995 07 10	Mounting Clamp			2	2	
60	68.4041.1021-00	Spacer Plate			2	2	
-	000 824 15 28	Replaced by 322 824 01 28	22		-		
-	000 824 29 28	Together with 000 824 11 26			-		
-	000 824 17 28				-		
-	322 824 01 28	Wiper Arm			2		
61	000 824 25 28	Wiper Arm 240 mm			2	2	
-	000 824 17 26	Replaced by 000 824 11 26 Together with 322 824 01 28	22		-		
-	000 824 11 26	Wiper Blade			2		
62	000 824 21 26	Wiper Blade 270 mm			2	2	
-		Model – 117 see Cap Spare Parts					-
63	001 154 54 06	Regulator 24 V / 300 W			1	1	1
-	001 154 91 06	Regulator 24 V / 400 W					1
-	000084 006111	Cylindrical Head Screw			4	4	4
-	000084 006134	Cylindrical Head Screw					2
-	000127 006204	Lock Washer			4		
-	000 990 68 91	Cage Clip with Nut			4		
-	000 156 46 01	Interference Suppressor	33		1	1	
64	000 156 73 01	Interference Suppressor	34		1	1	
-	000084 006106	Cylindrical Head Screw	33		2	2	
-	000127 006200	Lock Washer	33		2	2	
-	000 990 68 91	Cage Clip with Nut	33		2	2	
-	000 158 15 03	Replaced by 000 158 18 03 Together with 000 150 00 28			-	-	-
65	000 158 18 03	Ignition Coil			1	1	1

66	000 158 02 40	Mounting Clamp		1	1	1	
-	000084 005157	Cylindrical Head Screw		1	1	1	
-	000562 005000	Square Nut		1	1	1	
-	000933 008014	Screw		2	2	2	
-	000127 008205	Lock Washer		2	2	2	
-	000 990 69 91	Cage Clip with Nut		2	2	2	
-	000 158 02 45	Series Resistance		1	1	1	
67	000 158 04 45	Series Resistance		1	1	1	
-	60.4041.0746-00	Ignition Wires 350 mm	7	1	1	1	
-	000 150 04 18	Replaced by 000 159 02 18 Together with 000 156 07 15 000 156 06 15, 000 156 00 81 000 990 10 54, 000 997 02 83	18		-		
-	000 159 02 18	Ignition Wires 400 mm	18	1	1	1	
-	000 150 20 18	Ignition Wires 285 mm	19/7	1	1	1	
-	000 159 00 85	Boot	7	2	2	2	
68	60.4041.0619-00	Mounting Plate		1	1	1	
-	406 540 00 21	Mounting Plate					1
69	60.4041.1141-00	Cover Plate		1	1	1	
-	009021 005104	Washer		4	4	4	
-	000084 005106	Cylindrical Head Screw		4	4	4	
-	000084 005130	Cylindrical Head Screw					2
-	000 990 67 91	Cage Clip with Nut		4	4	4	
-	000933 008005	Screw		6	6	6	
-	000125 008410	Washer		6	6	6	
-	000 544 47 03	Replaced by 000 544 89 03		-			
-	000 544 89 03	Tail, Stop, Turn Lamp, Left		1			
-	000 544 48 03	Replaced by 000 544 88 03		-			
-	000 544 88 03	Tail, Stop, Turn Lamp, Right		1			
-	000 544 90 89	Lens with Reflector & Rim		2			
-	000 544 37 80	Lens Gasket		2			
-	000 997 80 81	Grommet		2			

70	000 544 52 03	Masked, Tail, Stop, Turn Lamp, Left		1	
-	000 544 51 03	Masked, Tail, Stop, Turn Lamp, Right		1	2
71	000 544 58 90	Lens with Mask		2	2
72	000 544 58 89	Lens Retaining Ring		2	2
73	000 544 37 80	Lens Gasket		2	2
74	000 990 15 31	Lens Head Countersunk Screw		4	4
75	000 997 70 81	Grommet		2	2
-	000558 006008	Screw		4	4
-	006797 006042	Toothed Washer		4	4
80	000 544 67 03	Tail, Stop, Turn Lamp, Left			1
-	000 544 68 03	Tail, Stop, Turn Lamp, Right			1
81	001 544 44 90	Lens			2
-	007985 004153	Lens Head Screw			4
-	000 544 10 26	Rubber Ring			4
-	000127 006200	Lock Washer			4
-	000934 006006	Nut			4
82	000 544 40 03	Masked Stop Lamp, Left		1	1
83	000 544 01 28	Housing		1	1
84	000 990 10 31	Lens Head Countersunk Screw		2	2
85	000 997 69 81	Grommet		1	1
-	000934 006001	Nut		2	2
-	006797 006042	Toothed Washer		2	2
-	072601 024160	Bulb 24 V / 20 W	2		
-	072601 024701	Bulb 24 V / 5 W		2	2
-	072601 024702	Bulb G 24 V / 10 W			2
-	072601 024801	Bulb 24 V / 2 W		3	3
-	60.4041.0612-00	Replaced by 404 540 08 73 Together with 404 540 17 73	5	-	-
86	404 540 08 73	Bracket, Left		1	
-	60.4041.0798-00	Replaced by 404 540 17 73 Together with 404 540 03 73	5	-	-
87	404 540 17 73	Bracket, Right		1	

-	60.4041.0797-00	Replaced by 404 540 09 73 Together with 404 540 10 73	5	-	-
-	404 540 09 73	Bracket, Left		1	
-	60.4041.0798-00	Replaced by 404 540 10 73 Together with 404 540 09 73	5	-	-
-	404 540 10 73	Bracket, Left		1	
-	60.4041.0630-00	Replaced by 60.4041.1160-00			-
-	60.4041.1160-00	Bracket, Tail Lamp, Left & Right			2
-	404 540 15 73	Bracket, Left			1
-	404 540 16 73	Bracket, Right			1
-	000933 010016	Screw	4		
-	000127 010203	Lock Washer	4		
-	000934 010000	Nut	4		
-	000 544 42 03	Guide Cross Lamp	27	1	1
-	000 544 61 03	Replaced by 000 544 03 13 Together with 404 540 00 14 and 000 546 27 41		-	-
-	000 544 62 92	Light Head	28/29	1	1
88	000 544 03 13	Guide Cross, Individual Lighting	30	1	1
-	072601 024801	Bulb 24 V / 2 W		1	1
-	60.4041.1125-00	Mounting Angle	27	1	1
-	000603 006005	Button Head Rivet	28	3	3
-	000603 006026	Button Head Rivet		3	3
-	000127 006200	Lock Washer		3	3
-	000934 006000	Nut		3	3
-	000933 006026	Screw		4	
-	006797 006042	Toothed Washer		4	
89	000 545 10 26	Plug Socket, 7-Pole, Trailer		1	
-	-	114 Plug Socket see item 127			-
90	000 545 05 03	Locking Flap		1	1
-	000088 005157	Countersunk Lens Head Screw		3	
-	000127 005204	Lock Washer		3	

-	000934 005008	Nut	3		
-	000933 006046	Screw		4	4
-	000127 006204	Lock Washer		4	4
-	000934 006007	Nut		4	4
-	404 540 02 05	Main Cable Harness, Front	1		
-	404 540 03 05	Main Cable Harness, Front		1	1
-	404 540 16 05	Main Cable Harness, Front			1
-	60.4041.0605-00	Cable Harness	1		
-	60.4041.0768-00	Cable Harness		1	1
-	404 540 08 07	Cable Harness			1
-	072571 001012	Mounting Clamp		1	1
-	072571 001010	Mounting Clamp		1	1
-	000084 005130	Cylindrical Head Screw		1	1
-	000084 004139	Cylindrical Head Screw		1	1
-	000127 005204	Lock Washer		1	1
-	000127 004205	Lock Washer		1	1
-	000 990 67 91	Cage Clip with Nut (M 5)		1	1
-	000 990 66 91	Cage Clip with Nut (M 4)		1	1
-	072571 001026	Mounting Clamp		2	2
-	000084 004110	Cylindrical Head Screw		2	2
-	000127 004205	Lock Washer		2	2
-	000934 004006	Nut		2	2
-	60.4041.0795-00	Cable, Fuse Box to Headlamp	1		
-	60.4041.0779-00	Cable, Fuse Box to Headlamp		1	1
-	000 546 29 41	Half-Plug, 1 Pin, Headlamp	4	4	4
-	000 546 30 41	Half-Plug, 1 Pin, Headlamp	2	2	2
-	404 540 15 09	Cable, Fuse Box to Plug			1
-	421 540 04 38	Cable, Fuse Box to Plug			1
-	000 545 33 28	Cable Connector, 6-Pole			1
-	001 545 85 28	Pin Bushing Housing, 3-Pole			2
-	000 545 36 26	Pin Bushing			6

-	000 546 05 75	Cable Harness	11				
-	900286 005100	Bracket, Cable	2				
-	000 987 33 81	Grommet	2				
-	60.4041.1118-00	Mounting Clamp		2	6	6	2
-	000 546 06 41	Cable Connector, 5-Pole		3		3	
-	000 546 09 41	Replaced by 000 546 12 41	-				
120	000 546 12 41	Cable Connector, 4-Pole			7	7	2
121	000 546 27 41	Cable Connector, 2-Pole			1	1	
-	000084 004120	Cylindrical Head Screw		6	6	6	4
-	000127 004205	Lock Washer		6	6	6	4
-	000934 004006	Nut		2			4
-	000 990 66 91	Cage Clip with Nut		4	8	8	
122	60.2010.1032-00	Grommet		1	1	1	
123	60.4041.1056-00	Ground Strap, 150mm	2				
-	60.4041.1077-00	Ground Strap, 200mm					3
-	60.4041.1055-00	Ground Strap, 250mm	1				
124	60.4041.1112-00	Ground Strap, 450mm					2
-	000933 008028	Screw		1	3	3	1
-	000933 008016	Screw					2
-	000125 008410	Washer		2	4	4	2
-	000934 008013	Nut		2	4	4	2
-	60.4041.0611-00	Cable, Wiper Motor		1			1
-	60.4041.0792-00	Cable, Wiper Motor	23			1	1
-	60.4041.0799-00	Cable, Wiper Motor	24			1	1
125	000 997 23 81	Grommet		1	1	1	
126	404 995 01 19	Mounting Clamp		1	1	1	
-	60.4041.0723-00	Cable, Regulator to Generator		1	1	1	
-	421 540 22 38	Cable, Generator to Regulator					1
-	000 150 00 28	Cable, Resistor to Coil		1	1	1	
-	000 546 02 35	Boot, Generator		2		2	2

-	136 995 07 01	Mounting Clamp							4
-	111 995 00 35	Mounting Clamp							2
-	000933 006046	Screw							2
-	000125 006410	Washer							2
-	000137 006204	Spring Washer							2
-	000933 008014	Screw							2
-	000127 008205	Lock Washer							2
-	000933 010016	Screw							2
-	000127 010203	Lock Washer							2
-	404 540 02 07	Cable, Connector to Tail Lamp			1				
-	404 540 03 07	Cable, Connector to Tail Lamp				1	1		
-	404 540 05 07	Cable, Connector to Tail Lamp							1
-	60.2010.1031-00	Grommet			1	1	1	1	
-	404 546 00 14	Cable, Connector to Guide Cross				1	1		
127	60.4041.0770-00	Cable, Connector to Guide Cross				1	1		
128	000 997 67 81	Grommet				1	1		
-	404 540 06 07	Cable, Connector to Trailer Plug							1
-	404 546 00 14	Cable, Connector to Trailer Plug	30			1	1		
129	070 546 05 37	Grommet			1	1	1		
-	900286 005100	Bracket, Cable				10	10		

Table 29 – Instrumentation – Group 60

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	000 545 30 13		Ignition Switch			1			
2	000 545 12 35		Key			1			
-	000 545 31 13		Ignition Switch						1
-	000 545 13 35		Key						1
3	000 545 01 76		Washer			1			1
4	000 545 06 72		Octagonal Nut			1			1
5	000 545 26 08		Ignition Switch, Bosch				1	1	
-	000 545 16 13		Replaced by 000 545 36 13				-		
-	000 545 36 13		Ignition Switch, Kostal				1	1	

6	000 545 07 35	Key	1	1	
7	000 545 14 04	Light Switch	1	1	
8	000 545 25 17	Heater Plug Starting Switch			1
9	110 540 11 83	Knob, Heater Plug Switch			1
10	000 545 37 20	Heater Plug Resistor			1
-	000 545 23 24	Blinker Switch	1		1
-	000 545 02 76	Washer, Blinker Switch	1		1
-	072601 024801	Bulb 24 V / 2 W	1		1
11	000 545 12 10	Blinker Switch, Bosch	1	1	
-	000 545 15 10	Blinker Switch, Kostal	1	1	
12	000 545 23 14	Starter, Push Button	1	1	1
13	000 545 12 04	Lever Switch, Instrumentation	3	4	4
14	000 545 77 11	Push-Pull Switch, Wiper, 2-Pole			1
15	000 545 02 72	Nut, Knurled			1
16	120 540 22 83	Knob			1
20	000 545 31 15	Pilot Light, Red, Charge/Blinker	2	2	2
-	000 545 32 15	Pilot Light, Blue, High Beam	1	1	1
-	072601 024801	Bulb 24 V / 2 W	6	7	6
-	002 542 19 05	Water Temperature Gauge	1		
21	001 542 47 05	Water Temperature Gauge		1	1
-	001 542 14 02	Oil Pressure Gauge	1		
22	000 542 65 02	Oil Pressure Gauge		1	1
-	002 542 68 06	Speedometer	1		
23	001 542 57 06	Speedometer		1	1
24	001 542 36 07	Reset Shaft, Odometer	1		
25	000 544 25 93	Socket	1		
26	000 542 00 81	Rubber Cap	1		
-	004 542 67 06	Speedometer, German			1
27	000 542 51 30	Angle Drive 1:1.53 ratio		1	1
28	075532 000000	Flexible Shaft, Speedometer	1	1	1

-	001 542 93 07	Flexible Shaft, Speedometer 2810				1
29	64.4041.1001-00	Mounting Clamp		1	1	1
-	072571 001008	Mounting Clamp		1	1	1
-	000084 004105	Cylindrical Head Screw		2	2	2
-	000934 004006	Nut		2	2	2
-	406 993 51 10	Tension Spring				1
-	000 990 66 91	Cage Clip with Nut, 4mm thread		1	1	1
-	000 987 92 40	Rubber Buffer		1	1	1
-	000 987 30 40	Buffer Knob	3	2		2
30	64.4041.0701-00	Pipe Line 5mm Ø x 1100mm		1	1	1
31	000 997 77 81	Grommet		1	1	1
32	22.2010.1128-00	Mounting Clamp	1			
33	64.2010.1008-00	Spacer, Rubber		2	2	2
34	000 542 45 03	Fuel Gauge			1	1
40	002 540 32 47	Instrument Cluster				1
41	002 542 59 05	Water Temperature Gauge				1
42	001 542 42 02	Oil Pressure Gauge				1
43	000 542 87 03	Fuel Gauge				1
44	000 542 03 32	Warning Lamp				1
45	000 545 12 19	Lamp Socket				7
-	072601 024801	Bulb 24 V / 2 W				7
46	001 542 49 17	Sending Unit, Oil Pressure				1
47	001 542 23 17	Sending Unit, Water Temperature				1
48	007603 014302	Seal Ring, Sending Unit				2
49	000 545 16 25	Plug Socket, 1-Pole Olive			1	1
-	000 545 18 25	Plug Socket, 1-Pole Black		1		
50	000 820 03 52	Lamp, Instrument Panel			1	1
-	072601 024801	Bulb 24 V / 2 W			1	1
51	62.2010.1194-00	Grommet, Instrument Panel			1	1
-	000063 004103	Countersunk Screw			2	2
-	000127 004205	Lock Washer			2	2

Footnotes

Remarks Table 27, 28, 29

- 1 Up to Chassis 032520
 - 2 From Chassis 032521
 - 3 Up to Chassis 044794
 - 4 From Chassis 044795
 - 5 Up to Chassis 049678
 - 6 From Chassis 049679
 - 7 Up to Chassis 053197
 - 14 Up to Chassis 75 02329
 - 15 From Chassis 85 00029
 - 16 Up to Chassis 9500924
 - 17 From Chassis 9500925
 - 18 Up to Engine 180.927 007450 and 180.928 001450
 - 19 From Engine 180.927 007451 and 180.928 001451
 - 20 Up to Chassis 6501165
 - 21 From Chassis 6501166
 - 22 Up to Chassis 043113
 - 23 Up to Chassis 6500499
 - 24 From Chassis 6500500
 - 25 Up to Chassis 024243
 - 26 From Chassis 024244
 - 27 Up to Chassis 9502535
 - 28 From Chassis 9502536
 - 29 Up to Chassis
 - 30 From Chassis
 - 31 Up to Chassis 023332
 - 32 From Chassis 023333
 - 33 Up to Chassis 9501178
 - 34 From Chassis 9501179
-

38 Up to Engine 007450

39 Up to Chassis 044431

40 From Chassis 044432

Table 30 – Cab Shell Open – Group 62

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	404 600 02 01		These Two Replaced By			-	-	-	
-	62.4041.0823-00		62.4041.0138-00						
1	62.4041.0138-00		Cab, Doors, Hood, Grille, Fenders			1	1	1	
2	51 404 620 04 09		Cowl Paneling, Bottom			1	1	1	
3	51 404 627 00 05		Ventilation Grille			1	1	1	
4	51 404 627 00 03		Cowl Paneling, Top			1	1	1	
5	51 404 627 02 02		Cowl Paneling, Left			1	1	1	
6	51 404 620 05 09		Cowl Paneling, Right			1	1	1	
10	62.4041.0743-00		Lock, Lower Part			1	1	1	
11	62.4041.1090-00		Spring			1	1	1	
-	51 404 620 01 28		Replaced By 404 752 00 75 Together with 404 750 00 14, 404 752 00 24, 000085 006111, 000934 006007, 001481 004025, 404 752 02 14, 000933 006019, and 000127 006204	14		-	-	-	
12	404 752 00 75		Support	15		1	1	1	
13	404 750 00 14		Bracket, Outside Flap	15		1	1	1	
14	404 752 00 24		Spring	15		1	1	1	
-	000085 006111		Lens Head Screw	15		1	1	1	
-	000934 006007		Nut	15		1	1	1	
15	001481 004025		Clamping Sleeve	15		1	1	1	
16	404 752 02 14		Bracket	15		1	1	1	
-	000933 006019		Screw	15		2	2	2	
-	000127 006204		Lock Washer	15		2	2	2	
-	000934 006007		Nut	15		2	2	2	
17	51 404 637 00 01		Side Paneling, Below Left Door			1	1	1	
-	51 404 637 01 01		Side Paneling, Below Right Door			1	1	1	
18	51 404 637 02 01		Side Paneling, Left			1	1	1	
-	51 404 637 03 01		Side Paneling, Right			1	1	1	
19	51 404 647 00 07		Paneling, Rear Wall, Left			1	1	1	

-	51 404 647 01 07	Paneling, Rear Wall, Right		1	1	1
20	51 404 640 02 09	Paneling, Rear Wall, Central		1	1	1
-	51 404 720 04 01	Replaced By 404 720 03 01		-		
23	404 720 03 01	Door, Left		1	1	1
24	411 880 00 20	Handle with Bracket	7	1	1	1
25	000091 006161	Lens Head Countersunk Screw	7	2	2	2
26	404 766 00 30	Lock for Box		1	1	1
-	51 404 723 00 51	Replaced By 62.2010.1208-00	5	-	-	
27	62.2010.1208-00	Hinge Half	6	2	2	2
28	000660 006005	Round Head Rivet		8	8	8
29	62.2010.0752-00	Door Lock, Left		1	1	1
30	000063 005100	Countersunk Screw		3	3	3
31	000127 005204	Lock Washer		2	2	2
32	000084 005149	Cylindrical Head Screw		2	2	2
33	62.2010.0751-00	Door Handle		1	1	1
34	000063 005100	Countersunk Screw		2	2	2
35	404 987 02 37	Shim		1	1	1
36	007985 005125	Lens Head Screw		2	2	2
37	404 766 00 98	Seal		1	1	1
-	51 404 720 05 01	Door, Right		1	1	1
-	411 880 00 20	Handle with Bracket	7	1	1	1
-	007988 006125	Lens Head Countersunk Screw	7	2	2	2
-	51 404 723 01 51	Replaced By 62.2010.1208-00	5	-	-	-
-	62.2010.1208-00	Replaced By 404 720 00 37	6	-	-	-
-	404 720 00 37	Hinge Half		2	2	2
-	000660 006005	Round Head Rivet		8	8	8
-	62.2010.0753-00	Door Lock, Right		1	1	1
-	000063 005100	Countersunk Screw		3	3	3
-	000084 005149	Cylindrical Head Screw		2	2	2
-	000127 005204	Lock Washer		2	2	2
-	62.2010.0751-00	Door Handle		1	1	1

-	000063 005100	Countersunk Screw		2	2	2
-	404 987 02 37	Shim		1	1	1
-	007985 005125	Lens Head Screw		2	2	2
-	404 766 00 98	Seal		1	1	1
40	62.2010.0787-00	Hinge Half, Left		2	2	2
-	62.2010.0788-00	Replaced By 404 720 07 37	16	-	-	-
-	404 720 07 37	Hinge Half, Right		2	2	2
-	62.2010.1206-00	Hinge Half, Bottom Left		2	2	2
-	62.2010.1207-00	Replaced By 62.2010.0787-00		-	-	-
-	62.2010.0787-00	Hinge Half, Bottom Right		2	2	2
-	000063 008105	Countersunk Screw		12	12	12
-	000127 008205	Lock Washer		12	12	12
-	000934 008010	Nut		12	12	12
44	51 404 670 00 35	Windshield Retainer, Left		1	1	1
-	51 404 670 01 35	Windshield Retainer, Right		1	1	1
-	000610 010000	Fitted Hex. Head Screw		2	2	2
-	000933 010129	Screw		4	4	4
-	000127 010203	Lock Washer		6	6	6
-	000934 010014	Nut		6	6	6
-	51 404 750 02 02	Outside Flap with Handle	3	1	1	1
50	62.4041.0748-00	Outside Flap	4	1	1	1
51	10 120 880 00 64	Safety Hook	4	1	1	1
52	10 120 887 01 63	Spring	4	1	1	1
53	000127 006204	Lock Washer	4	2	2	2
54	007985 006101	Lens Head Screw	4	2	2	2
55	62.4041.1096-00	Pressure Spring	4	1	1	1
56	51 404 752 00 51	Hinge Part		2	2	2
57	000933 006102	Screw		2	2	2
58	000933 006078	Screw		2	2	2
59	000127 006204	Lock Washer		4	4	4

60	000125 006410	Washer		4	4	4
61	51 404 750 00 15	Lock Pin	3	2	2	2
62	62.2010.1104-00	Handle	3	2	2	2
63	62.4111.1205-00	Washer, Handle	3	2	2	2
-	001473 003006	Cylindrical Pin, Grooved	3	2	2	2
65	62.2010.1105-00	Hinge Pin, Outside Flap		2	2	2
-	000094 003003	Cotter Pin		2	2	2
66	10 186 880 03 59	Release Cable, Hood	4	1	1	1
67	187 527 00 72	Nut, Knurled	4	1	1	1
-	62.4041.1098-00	Replaced By 110 540 11 83		-	-	-
68	110 540 11 83	Knob, Hood Release Cable		1	1	1
-	51 404 990 00 56	These Two Replaced By		-	-	-
-	51 404 880 00 56	404 880 02 56				
72	404 880 02 56	Engine Hood, Inside Left		1	1	1
-	51 404 880 01 56	Replaced By 404 880 03 56		-	-	-
73	404 880 03 56	Engine Hood, Inside Right		1	1	1
-	411 880 00 20	Handle with Bracket		2	2	2
-	000091 006125	Lens Head Countersunk Screw		2	2	2
-	51 404 887 00 98	These Two Replaced By		-	-	-
-	51 404 887 01 98	000 987 28 33				
77	000 987 28 33	Hood Seal, Inside Left 1900mm		1	1	1
	“	Hood Seal, Inside Right 1500mm		1	1	1
79	62.2010.0729-00	Clack Closure		2	2	2
84	51 404 610 05 88	Cover Plate, Transmission		1	1	1
85	51 404 610 02 73	Frame, Transmission Cover Plate		1	1	1
86	51 404 610 00 98	Seal, Lever		1	1	1
87	000084 006134	Cylindrical Head Screw (M6X26)		10	10	10
88	000127 006204	Lock Washer (M6)		11	11	11
89	000084 006100	Cylindrical Head Screw (M6X26)		5	5	5
90	000084 006134	Cylindrical Head Screw (M6X26)		6	6	6
91	62.4041.1053-00	Washer (M6)		4	4	4
92	009021 006205	Washer (M6)		6	6	6

95	51 404 610 02 88	Cover Plate, Clutch		1	1	1
97	000084 006134	Cylindrical Head Screw		6	6	6
98	62.4111.0618-00	Cover		1	1	1
101	51 404 610 02 79	Side Part, Right		1	1	1
-	000 988 05 83	Replaced By 62.4041.0729-00		-	-	-
105	62.4041.0729-00	Belt Staple		6	6	6
107	51 404 815 00 36	Handle, Right		1	1	1
108	000063 008103	Countersunk Screw		2	2	2
109	51 404 815 01 36	Handle, Left		1	1	1
110	000063 008103	Countersunk Screw		1	1	1
-	000933 008016	Screw		1	1	1
-	009021 008205	Washer		1	1	1
-	000934 008010	Nut		1	1	1
114	404 680 00 57	Web	17	1	1	1
115	000063 006142	Countersunk Screw	17	4	4	4
-	51 404 830 00 42	Replaced By 62.4041.0755-00		-	-	-
121	62.4041.0755-00	Air Flap		2	2	2
122	51 404 830 00 47	Screen with Rim		2	2	2
123	51 404 830 00 44	Lever		2	2	2
124	007972 003200	Countersunk Screw, Sheet Metal		4	4	4
125	62.4041.1120-00	Seal		2	2	2
127	404 752 01 98	Seal 162 mm		2	2	2
128	000127 005204	Lock Washer		2	2	2
129	007513 005207	Cylindrical Head Screw		2	2	2
130	51 404 837 00 35	Spring		2	2	2
131	51 404 837 00 91	Grommet, Operating Lever		2	2	2
132	009021 006205	Washer		4	4	4
133	000137 006204	Spring Washer		4	4	4
134	000934 006007	Nut		4	4	4
-	60.4111.0788-00	Replaced By 303 500 04 11		-	-	-

-	303 500 04 11	Mercedes Badge	1		
-	62.4041.0717-00	Replaced By 315 500 00 11		-	-
150	315 500 00 11	Mercedes Badge		1	1
151	000137 004103	Spring Washer	2	2	2
152	000934 004006	Nut	2	2	2
153	62.4041.0709-00	Cover Plate, Bottom	1	1	1
154	62.4041.1021-00	Rubber Sealing Mat	1	1	1
155	62.4041.1032-00	Tenter	1	1	1
156	009021 006205	Washer (M6)	10	10	10
157	000084 006107	Cylindrical Head Screw (M6X26)	10	10	10
160	000 987 28 33	Rubber Section, Cover Plate	nB	nB	nB
161	000 987 29 33	Rubber Section, Side Part	nB	nB	nB
-	000 987 12 36	Replaced By 404 987 03 41	-	-	-
162	404 987 03 41	Rubber Section, Floor Flap	nB	nB	nB
163	000 987 18 40	Rubber Buffer, Door	4	4	4
164	000 987 64 40	Rubber Buffer, Cowl Flap	2	2	2
165	51 404 684 00 60	Rubber Mat, Right Wheelhousing	1	1	1
166	000 997 68 81	Rubber Cap	5	5	5
167	000 987 12 44	Expansion Plug, Oil & Air Gauge	2	2	2
168	62.2010.0746-00	Cover, Transmission/Hand Brake	1	1	1
169	62.2010.0703-00	Cover, Transmission/Oil Dipstick	1	1	1
-	000262 005102	Hose Clip	4	4	4
-	000263 005000	Hose Strap	nB	nB	nB
174	51 404 690 00 80	Garnish Molding	2	2	2
-	51 404 810 00 18	Replaced By 406 810 01 18	-	-	-
-	51 404 810 02 18	Together with 000 994 30 45			
175	406 810 01 18	Mercedes Star	1	1	1
-	187 990 12 40	Replaced By 000 984 11 55	-	-	-
-	000 984 11 55	Washer	2	2	2
-	000127 004203	Lock Washer	2	2	2
-	000934 004006	Nut	2	2	2

176	000 984 11 55	Washer	2	2	2
177	000 994 30 45	Clip, Flat	2	2	2
-	187 990 12 40	Replaced By 000 984 11 55	-	-	-
-	000 984 11 55	Washer	4	4	4
178	000127 004203	Lock Washer	4	4	4
179	000934 004006	Nut	4	4	4
180	51 404 820 00 18	Gravel Deflector	2	2	2
181	000127 005204	Lock Washer	2	2	2
182	000084 005131	Cylindrical Head Screw	2	2	2
185	51 404 880 00 25	Flap, Front Right	1	1	1
186	51 404 881 00 97	Rubber Strip	1	1	1
187	51 404 881 00 06	Mounting Rail	1	1	1
188	000660 004018	Round Head Rivet	4	4	4
-	000087 004129	Countersunk Screw	4	4	4
189	51 404 881 00 06	Mounting Rail	1	1	1
-	000934 004006	Nut	4	4	4
190	312 527 17 17	Hood Fastener	1	1	1
191	312 527 11 74	Pin	1	1	1
-	000094 001501	Cotter Pin	1	1	1
192	000 987 30 40	Buffer Knob	12	12	12
-	000 987 01 44	Replaced By 000 987 03 44	-	-	-
195	000 987 03 44	Expansion Plug	2	2	2
196	000 987 04 44	Expansion Plug	3	3	3
197	000 987 16 44	Expansion Plug	2	2	2
198	000 987 15 44	Expansion Plug	1	1	1
199	60.4041.1149-00	Ledge, Signal	1	1	1
-	51 312 811 00 30	These Three Replaced By 000 811 15 30	-	-	-
-	404 811 01 30				
-	91.4041.1176-00				
204	000 811 15 30	Rearview Mirror	2	2	2
-	68.4041.0710-00	Replaced By 62.4041.0866-00 or 62.4041.0867-00	3	-	-

205	62.4041.0866-00	Mirror Bracket, Left	4	1	1	1
-	62.4041.0867-00	Mirror Bracket, Right	4	1	1	1
206	62.4041.0753-00	Bracket, Left	4	1	1	1
-	62.4041.0754-00	Bracket, Right	4	1	1	1
207	62.4041.0751-00	Bearing Bracket, Left	4	1	1	1
-	62.4041.0752-00	Bearing Bracket, Right	4	1	1	1
208	62.4041.1107-00	Spring	4	2	2	2
209	62.4041.1112-00	Screw	4	2	2	2
210	000007 005104	Cylindrical Pin	4	2	2	2
211	000433 013005	Washer	4	2	2	2
212	000125 013004	Washer	4	10	10	10
213	000137 012201	Spring Washer	4	2	2	2
214	000936 012007	Nut	4	4	4	4
-	000433 010500	Washer		2	2	2
-	000127 010203	Lock Washer		2	2	2
-	000315 010000	Wing Nut		2	2	2
-	000094 002003	Cotter Pin		2	2	2
-	62.4041.0713-00	Replaced By 51 404 880 00 06		-	-	-
225	51 404 880 00 06	Front Fender, Left		1	1	1
-	62.4041.0714-00	Replaced By 51 404 880 01 06		-	-	-
-	51 404 880 01 06	Front Fender, Right		1	1	1
227	000 987 32 30	Fender Welt 1300 mm		2	2	2
228	000084 006101	Cylindrical Head Screw		3	3	3
229	000087 006135	Countersunk Screw		1	1	1
230	007513 006212	Cylindrical Head Screw		6	6	6
231	007513 006417	Cylindrical Head Screw		21	21	21
232	000127 006204	Lock Washer		10	10	10
233	000934 006007	Nut		1	1	1
236	51 404 610 00 31	Seat Console, Left		2	2	2
237	51 404 610 01 31	Seat Console, Right		2	2	2
238	000933 008016	Screw		7	7	7

239	000933 008028		Screw		1	1	1
240	000137 008202		Spring Washer		8	8	8
241	900056 008400		Washer, Countersunk Rivet		1	1	1
-	91.4041.0723-00		Fixture, Claw Hatchet	1		1	
-	91.4041.0728-00		Fixture, Claw Hatchet	2/3		1	
-	000933 006040		Screw	3		3	
-	000127 006204		Lock Washer	3		3	
-	000934 006000		Nut	3		3	
250	62.4041.1036-00		Lubrication Chart, German		1	1	1
255	62.4041.0701-00		Cab Mounting, Front		1	1	1
256	62.4041.1002-00		Silent Block		1	1	1
-	000961 010004		Screw		2	2	2
-	000127 010203		Lock Washer		2	2	2
-	000934 010010		Nut		2	2	2
257	99.2916.1008-00		Hex. Head Fitted Screw		1	1	1
-	006797 012151		Toothed Washer		1	1	1
-	000936 012002		Nut		1	1	1
-	000961 010008		Screw		4	4	4
-	000127 010203		Lock Washer		4	4	4
-	000934 010010		Nut		4	4	4

Table 31 – Cab Shell Enclosed – Group 62

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	62.4041.0837-00		Cab, Less Hatch		1	1	1		
2	62.4041.0838-00		Cab, With Hatch		1	1	1		
3	51 404 620 04 09		Cowl Paneling, Bottom		1	1	1		
-	62.4041.0741-00		Replaced By 51 404 627 00 05		-	-	-		
4	51 404 627 00 05		Ventilation Grille		1	1	1		
5	404 627 01 02		Cowl Paneling, Top		1	1	1		
-	51 404 627 02 02		Replaced By 404 620 04 09		-	-	-		
6	404 620 04 09		Cowl Paneling, Left		1	1	1		

-	51 404 620 05 09	Replaced By 404 620 05 09	-	-	-
-	404 620 05 09	Cowl Paneling, Right	1	1	1
7	404 670 00 02	Frame, Windshield	1	1	1
8	404 640 00 09	Rear Wall Paneling	1	1	1
-	404 650 00 09	Replaced By 404 657 00 09	-	-	-
9	404 657 00 09	Top Paneling Less Hatch	1	1	1
10	404 650 01 09	Top Paneling With Hatch	1	1	1
11	404 651 00 70	Collar, Hatch	1	1	1
12	404 750 00 08	Lid, Hatch	1	1	1
13	404 752 01 51	Hinge Upper Part	2	2	2
-	000 527 05 17	Replaced By 404 752 03 14	-	-	-
14	404 752 03 14	Fastener	1	1	1
-	404 752 00 14	Replaced By 404 750 00 15	-	-	-
15	404 750 00 15	Retainer, Top Hatch	1	1	1
16	404 752 00 51	Hinge Lower Part, Left	1	1	1
-	404 752 06 51	Hinge Lower Part, Right	1	1	1
17	404 752 01 91	Pad	2	2	2
18	404 752 00 98	Seal, Hatch	1	1	1
19	404 752 00 52	Hinge Pin	1	1	1
-	000125 008410	Washer	2	2	2
-	000094 003015	Cotter Pin	2	2	2
22	51 404 750 06 02	Outside Flap	1	1	1
23	10 120 880 00 64	Safety Hook	1	1	1
24	10 120 887 01 63	Spring	1	1	1
25	000127 006203	Lock Washer	2	2	2
26	007985 006161	Lens Head Screw	2	2	2
-	404 993 00 01	Replaced By 62.4041.1096-00	-	-	-
27	62.4041.1096-00	Pressure Spring, Flap Retaining Pin	1	1	1
-	404 752 00 51	Replaced By 404 752 02 51	-	-	-
28	404 752 02 51	Hinge	2	2	2
29	000933 006040	Screw	4	4	4

30	000127 006204	Lock Washer		4	4	4
31	000125 006410	Washer		4	4	4
32	62.4111.1220-00	Hinge Pin		2	2	2
-	000094 002032	Replaced By 63.4111.1007-00		-	-	-
33	63.4111.1007-00	Securing Clip		2	2	2
34	51 404 620 01 28	Support, Flap	10	1	1	1
35	404 752 01 97	Rubber Edge	11	2	2	2
36	404 750 00 14	Bracket	11	1	1	1
37	404 752 00 75	Support	11	1	1	1
38	404 752 00 24	Spring	11	1	1	1
39	001481 004025	Clamping Sleeve	11	1	1	1
-	000085 006138	Lens Head Screw	11	1	1	1
-	000934 006007	Nut	11	1	1	1
40	404 752 02 14	Bracket	11	1	1	1
-	000933 006015	Screw	11	2	2	2
-	000127 006204	Lock Washer	11	2	2	2
-	000934 006007	Nut	11	2	2	2
-	62.4111.0788-00	Replaced By 303 500 04 11		-		
43	303 500 04 11	Mercedes Badge		1		
-	315 500 00 11	Mercedes Badge			1	1
44	000137 004103	Spring Washer		2	2	2
45	000934 004006	Nut		2	2	2
48	10 186 880 03 59	Release Cable, Hood		1	1	1
49	187 527 00 72	Nut, Knurled		1	1	1
-	120 302 08 01	Replaced By 110 540 11 83		-	-	-
50	110 540 11 83	Knob		1	1	1
51	000 987 64 40	Rubber Buffer		2	2	2
-	51 404 810 00 18	Replaced By 406 810 01 18		-	-	-
-	51 404 810 02 18	Together with 000 994 30 45				
54	406 810 01 18	Mercedes Star		1	1	1
55	51 404 690 00 80	Garnish Molding		2	2	2

-	187 990 12 40	Replaced By 000 984 11 55	-	-	-
-	000 984 11 55	Washer	2	2	2
-	000127 004205	Lock Washer	2	2	2
-	000934 004006	Nut	2	2	2
56	000 984 11 55	Washer	2	2	2
57	000 994 30 45	Clip, Flat	2	2	2
-	187 990 12 40	Replaced By 000 984 11 55	-	-	-
-	000 984 11 55	Washer	4	4	4
58	000127 004205	Lock Washer	4	4	4
59	000934 004006	Nut	4	4	4
-	404 720 00 01	Replaced By 404 720 08 01	-	-	-
60	404 720 08 01	Door, Left	1	1	1
-	404 720 01 01	Replaced By 404 720 09 01	-	-	-
61	404 720 09 01	Door, Right	1	1	1
-	000 987 39 33	These Two Replaced By	-	-	-
-	000 987 68 33	000 987 94 33	-	-	-
62	000 987 94 33	Rubber Seal, Door	2	2	2
63	62.2010.0609-00	Lock, Remote Controlled, Left	1	1	1
64	62.2010.0608-00	Lock, Remote Controlled, Right	1	1	1
65	404 723 00 89	Link, Left	1	1	1
-	404 723 01 89	Replaced By 404 760 00 33	-	-	-
66	404 760 00 33	Link, Right	1	1	1
-	62.2010.0611-00	Remote Control, Left	8	1	1
67	404 760 00 50	Remote Control, Left	9	1	1
-	62.2010.0610-00	Remote Control, Right	8	1	1
68	404 760 01 50	Remote Control, Right	9	1	1
69	62.2010.1259-00	Conical Spiral Spring	8	2	2
-	000063 005121	Countersunk Screw	20	20	20
-	000127 005204	Lock Washer	8	8	8
-	000934 005008	Nut	8	8	8
-	62.2010.1254-00	Interior Handle	8	2	2

74	404 766 01 10	Interior Handle	9	2	2	2
75	404 766 00 91	Pad	9	2	2	2
-	000 766 01 11	Replaced By 110 768 00 13		-	-	-
76	110 768 00 13	Spacer Washer		2	2	2
-	62.2010.1262-00	Attaching Screw	8	-	-	-
77	007987 006128	Countersunk Screw	9	2	2	2
-	10 136 766 00 05	Replaced By 000 766 02 12		-	-	-
78	000 766 02 12	Rubber Pad		2	2	2
-	62.2010.0807-00	Replaced By 000 766 04 10		-	-	-
80	000 766 04 10	Door Handle, Left, with Key		1	1	1
-	000 766 05 06	Key		2	2	2
81	000 766 47 06	Key – State Lock # 3700 - 3799		2	2	2
-	62.2010.0806-00	Replaced By 000 766 05 10		-	-	-
82	000 766 05 10	Door Handle, Right		1	1	1
-	000 990 09 53	Replaced By 001587 008003		-	-	-
-	001587 008003	Cap Nut	18	2	2	2
83	404 987 02 37	Shim		2	2	2
84	000933 005059	Screw		4	4	4
-	007973 004312	Replaced By 000 990 67 97		-	-	-
-	000 990 67 97	Blind Rivet		4	4	4
-	000125 008410	Washer	18	2	2	2
86	62.2010.0804-00	Crank Mechanism, Left		1	1	1
87	62.2010.0805-00	Crank Mechanism, Right		1	1	1
88	62.2010.1263-00	Conical Spring	8	2	2	2
-	62.2010.1260-00	Replaced By 000 768 04 03		-	-	-
89	000 768 04 03	Crank Arm, Cover Black		2	2	2
-	62.2010.1255-00	Replaced By 404 760 01 02 Together with 110 768 01 95	8	-	-	-
90	404 760 01 02	Crank Arm	9	2	2	2
91	110 768 01 95	Pad		2	2	2
-	006797 006140	Toothed Washer		2	2	2

-	62.2010.1261-00	Attaching Screw	2	2	2
92	000063 006124	Countersunk Screw	2	2	2
-	000 985 00 23	Replaced By 000 985 02 23	-	-	-
93	000 985 02 23	Window Lifting Rail	2	2	2
94	000 987 62 30	Rubber Pad 490 mm	2	2	2
98	404 725 00 10	Glass Pane, Door	2	2	2
-	62.2010.1264-00	Replaced By 404 987 00 55	-	-	-
99	404 987 00 55	Velvet Rubber, U-Section	2	2	2
100	000 987 09 56	Rubber Section 530 mm	2	2	2
-	404 720 00 55	Replaced By 404 670 00 33	-	-	-
102	404 670 00 33	Deflector Window, Left	1	1	1
-	404 720 01 55	Replaced By 404 670 01 33	-	-	-
103	404 670 01 33	Deflector Window, Right	1	1	1
104	404 725 01 10	Glass Pane	2	2	2
105	000 987 62 30	Rubber Insert 430 mm	2	2	2
107	000 987 09 56	Rubber Seal, Deflector 425 mm	2	2	2
108	000 675 00 24	Rubber Seal, Deflector 700 mm	2	2	2
-	404 987 03 41	Rubber Seal, Deflector 410 mm	2	2	2
-	404 670 00 07	Replaced By 404 670 01 04	-	-	-
-	404 670 01 07	or 404 670 04 04	-	-	-
109	404 670 01 04	Deflector, Right	1	1	1
110	404 670 04 04	Deflector, Left	1	1	1
-	000 990 02 57	Replaced By 404 763 00 70	-	-	-
111	404 763 00 70	Star Handle	2	2	2
-	62.4111.0793-00	Replaced By 62.4111.0795-00	-	-	-
-	62.4111.0794-00	or 62.4111.0796-00	-	-	-
114	62.4111.0795-00	Door Hinge, Left	2	2	2
115	62.4111.0796-00	Door Hinge, Right	2	2	2
116	000087 008120	Countersunk Screw	12	12	12
-	51 312 766 00 25	Replaced By 404 766 00 25	-	-	-
117	404 766 00 25	Hinge Molding			

118	62.4111.0801-00	Door Check, Left		1	1	1
119	62.4111.0802-00	Door Check, Right		1	1	1
120	000 766 01 13	Rubber Buffer		2	2	2
121	000 766 00 13	Buffer, Wedge-Type		4	4	4
-	007983 004328	Screw, Sheet Metal		8	8	8
123	404 723 00 24	Cap, Door Check		2	2	2
-	62.2010.1253-00	Replaced By 404 631 01 21		-	-	-
124	404 631 01 21	Striker		2	2	2
-	62.4111.0602-00	Replaced By 404 720 04 37 or		-	-	-
-	62.4111.0603-00	404 720 03 37 Together with 071412 006100		-	-	-
125	404 720 04 37	Frame Hinge Half, Left		2	2	2
126	404 720 03 37	Frame Hinge Half, Right		2	2	2
127	071412 006100	Grease Nipple		4	4	4
128	000087 008119	Countersunk Screw		12	12	12
-	51 404 830 00 42	Replaced By 62.4041.0755-00		-	-	-
134	62.4041.0755-00	Air Flap		2	2	2
135	51 404 830 00 47	Screen with Rim		2	2	2
136	51 404 830 00 44	Lever		2	2	2
137	007972 003201	Countersunk Screw, Sheet Metal		4	4	4
138	62.4041.1120-00	Seal		2	2	2
-	000 987 10 33	Replaced By 404 752 01 98		-	-	-
139	404 752 01 98	Rubber Seal 162 mm		2	2	2
140	000127 005204	Lock Washer		2	2	2
141	007513 005207	Cylindrical Head Screw		2	2	2
142	51 404 837 00 35	Spring		2	2	2
143	51 404 837 00 91	Grommet		2	2	2
144	000934 006007	Nut		4	4	4
145	009021 006205	Washer		4	4	4
146	000127 006204	Lock Washer		4	4	4
-	000 671 01 10	Windshield 470x771; 4-5 mm	12	2	2	2
150	000 671 02 10	Windshield 445x770; 4-5mm, Right	13	1	1	1

-	000 671 04 10	Windshield 445x770; 4-5mm, Left	13	1	1	1
151	000 671 03 20	Rubber Seal		2	2	2
156	000 810 14 10	Sun Visor	19	1	1	1
157	007973 004228	Screw, Sheet Metal, Sun Visor	19	4	4	4
-	51 404 815 00 36	Replaced By 411 815 04 36	20	-	-	-
-	000 815 01 36	Together with 411 887 01 27 and 007985 008125				
158	411 815 04 36	Handle, Flexible	21	2	2	2
-	000063 008110	Countersunk Screw	20	4	4	4
159	411 887 01 27	Shim, Handle	21	4	4	4
160	007985 008125	Lens Head Screw	21	4	4	4
-	404 680 00 57	Web	6	1	1	1
-	000063 006141	Countersunk Screw	6	4	4	4
165	404 678 00 10	Rear Window 241x706; 4-5 mm		1	1	1
166	000 678 03 20	Rubber Seal, Rear Window		1	1	1
-	000 834 04 06	These Two Replaced By		-	-	-
-	000 838 04 06	000 838 01 25				
167	000 838 01 25	Air Louver, Front		2	2	2
168	000 838 03 06	Air Louver, Rear		4	4	4
-	007981 003227	Screw, Sheet Metal, Louver		20	20	20
-	51 404 880 00 56	Replaced By 404 880 02 56		-	-	-
170	404 880 02 56	Engine Hood, Inside Left		1	1	1
-	51 404 880 01 56	Replaced By 404 880 03 56		-	-	-
171	404 880 03 56	Engine Hood, Inside Right		1	1	1
-	411 887 00 27	Replaced By 411 880 00 20		-	-	-
172	411 880 00 20	Handle, Engine Cowling		2	2	2
173	000091 006125	Lens Head Countersunk Screw		4	4	4
174	62.2010.0729-00	Clack Closure		4	4	4
178	51 404 610 02 88	Cover Plate, Clutch	8	1	1	1
179	404 610 05 88	Cover Plate, Clutch	9	1	1	1
180	62.4111.0618-00	Cover		1	1	1
181	51 404 610 02 79	Side Part, Right		1	1	1

182	000084 006134	Cylindrical Head Screw		13	13	13
183	51 404 610 05 88	Cover Plate, Transmission	8	1	1	1
184	404 610 04 88	Cover Plate, Transmission	9	1	1	1
185	51 404 610 02 73	Frame	8	1	1	1
186	404 610 00 73	Frame	9	1	1	1
187	51 404 610 00 98	Sealing, Lever	8	1	1	1
188	404 610 04 98	Sealing, Lever	9	1	1	1
189	62.2010.0703-00	Cover, Transmission/Oil Dipstick		1	1	1
190	62.2010.0746-00	Cover, Transmission/Brake Lever		1	1	1
191	000127 006204	Lock Washer		14	14	14
192	000084 006132	Cylindrical Head Screw		5	5	5
193	000084 006134	Cylindrical Head Screw		13	13	13
-	000931 006046	Screw		3	3	3
-	000934 006005	Nut		3	3	3
-	90263 005000	Hose Strap 140 mm		3	3	3
	“	Hose Strap 500 mm		1	1	1
-	90262 005102	Hose Clip		4	4	4
198	000 987 28 33	Rubber Seal, Cover Plate		nB	nB	nB
199	000 987 29 33	Rubber Seal, Cover Plate		nB	nB	nB
-	51 404 616 00 98	Replaced By 404 987 03 41		-	-	-
200	404 987 03 41	Rubber Section, Tool Kit		1	1	1
204	51 404 610 00 31	Seat, Console Left		2	2	2
205	51 404 610 01 31	Seat, Console Right		2	2	2
206	000933 008016	Screw		8	8	8
208	62.4041.0709-00	Cover Plate Bottom		1	1	1
209	62.4041.1021-00	Rubber Seal		1	1	1
210	62.4041.1032-00	Tenter		1	1	1
211	009021 006100	Washer		10	10	10
212	000084 006135	Cylindrical Head Screw		10	10	10
213	51 404 684 00 60	Rubber Mat		1	1	1

214	51 404 820 00 18	Gravel Deflector	2	2	2
215	000127 005204	Lock Washer	2	2	2
216	000084 005131	Cylindrical Head Screw	2	2	2
217	000 987 18 40	No Longer Installed	-	-	-
220	000 987 12 44	Expansion Plug, Instrument Panel	2	2	2
-	000 987 01 44	No Longer Installed	-	-	-
221	000 987 03 44	Expansion Plug, Heater Passages	1	1	1
222	000 987 04 44	Expansion Plug	3	3	3
223	000 987 15 44	Expansion Plug	2	2	2
224	000 987 16 44	Expansion Plug	3	3	3
225	60.4041.1149-00	Ledge	1	1	1
228	51 404 880 00 06	Front Fender, Left	1	1	1
229	51 404 880 01 06	Front Fender, Right	1	1	1
230	000 987 32 30	Fender Welt 1300 mm	2	2	2
231	000127 006204	Lock Washer	10	10	10
232	000087 006135	Countersunk Screw	1	1	1
233	000934 006005	Nut	1	1	1
234	007513 006417	Cylindrical Head Screw	20	20	20
235	007513 006212	Cylindrical Head Screw	6	6	6
-	000084 006133	Cylindrical Head Screw	3	3	3
238	51 404 880 00 25	Flap, Front Right	1	1	1
239	51 404 881 00 97	Rubber Strap	1	1	1
240	51 404 881 00 06	Mounting Rail	1	1	1
241	000660 004018	Round Head Rivet	4	4	4
242	000087 004129	Countersunk Screw	4	4	4
243	51 404 881 00 06	Mounting Rail	1	1	1
244	000934 004006	Nut	4	4	4
245	312 527 17 17	Hood Fastener	1	1	1
246	312 527 11 74	Pin	1	1	1
-	000094 001513	Cotter Pin	1	1	1
-	51 312 811 00 30	These Three Replaced By	-	-	-

-	91.4041.1176-00	000 811 15 30			
-	404 811 01 03				
250	000 811 15 30	Rearview Mirror	2	2	2
-	91.4041.0704-00	Replaced By 62.4041.0866-00 or	-	-	-
-	91.4041.0705-00	62.4041.0867-00 Together with			
		000961 010002 & 000127 010203			
252	62.4041.0866-00	Mirror Bracket, Left	1	1	1
-	62.4041.0867-00	Mirror Bracket, Right	1	1	1
253	62.4041.0753-00	Bracket, Left	1	1	1
-	62.4041.0754-00	Bracket, Right	1	1	1
254	62.4041.0751-00	Bearing Bracket, Left	1	1	1
-	62.4041.0752-00	Bearing Bracket, Right	1	1	1
255	62.4041.1107-00	Spring	2	2	2
256	62.4041.1112-00	Screw	2	2	2
257	000007 005104	Cylindrical Pin	2	2	2
258	000433 013005	Washer	2	2	2
259	000125 013006	Washer	10	10	10
260	000137 012201	Spring Washer	2	2	2
261	000936 012007	Nut	4	4	4
-	000086 008205	Round Head Screw	2	2	2
-	000127 008205	Lock Washer	2	2	2
-	000936 008011	Nut	2	2	2
265	000127 010203	Lock Washer	4	4	4
266	000961 010017	Screw	4	4	4
-	62.4041.1036-00	Lubrication Chart, German	1	1	1
-	007971 002217	Cylindrical Head Screw	6	6	6
288	62.4041.0701-00	Cab Support, Front	1	1	1
-	62.4041.1001-00	Replaced By 62.4041.1002-00	-	-	-
289	62.4041.1002-00	Silent Block	1	1	1
290	99.2916.1008-00	Hex. Head Fitted Screw	1	1	1
291	006797 012151	Toothed Washer	1	1	1
292	000936 012002	Nut	1	1	1

-	000961 010008	Screw	6	6	6
-	000127 010202	Lock Washer	6	6	6
-	000934 010004	Nut	6	6	6

Table 32 – Front Seats – Group 63

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	63.4041.0800-00		Seat (Black)			2	2	2	
2	63.4041.0703-00		Seat Frame			2	2	2	
3	000 997 22 35		Plug			4	4	4	
-	000 919 03 60		Replaced By 51 312 919 00 60			-	-	-	
4	51 312 919 00 60		Adjuster Knob			2	2	2	
-	63.4041.0704-00		Replaced By 404 910 00 08			-	-	-	
5	404 910 00 08		Upholstery (Black)			4	4	4	
6	63.4111.1006-00		Rubber Washer			16	16	16	
-	000094 002003		Cotter Pin			16	16	16	

Footnotes	Remarks Table 30, 31, 32
1	Up to Chassis 6500749
2	From Chassis 6500750
3	Up to Chassis 7502329
4	From Chassis 8500029
5	Up to Chassis 8500204
6	From Chassis 8500205
7	From Chassis 039060
8	Up to Chassis 039300
9	From Chassis 039301
10	Up to Chassis 042633
11	From Chassis 042634
12	Up to Cab 133
13	From Cab 134
14	Up to Chassis
15	From Chassis

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- 16 See Service Information
 - 17 From Chassis 010734
 - 18 Up to Chassis 053136
 - 19 From Chassis 050569
 - 20 Up to Chassis 052283
 - 21 From Chassis 052284
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Table 33 – Flatbed Platform – Group 65

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	65.4041.0831-00		Platform, Front Panel 404.641			1	1		
-	65.4041.0812-00		These Two Replaced By			-	-		
-	65.4041.0832-00		404 600 02 03						
1	404 600 02 03		Platform, Front Panel 404.632			1	1		
-	65.4041.0827-00		These Two Replaced By			-	-		
-	65.4041.0836-00		404 600 01 03						
-	404 600 01 03		Platform, Front Panel 404.631			1	1		
-	65.4041.0812-00		Replaced By 404 600 00 03			-	-		
-	404 600 00 03		Platform, Front Panel 404.630			1	1		
-	404 600 32 03		Platform, Front Panel 404.642						1
-	65.4041.0704-00		Hinge	5		8	8		
3	65.4041.0608-00		Hinge	6		8	8		8
4	000 988 30 83		Tarpaulin Hook, Front Panel			3	3		3
5	000660 005002		Round Head Rivet, Tarpaulin Hook			9	9		9
-	65.4041.1216-00		Replaced By 315 631 00 56			-	-		
6	315 631 00 56		Locking Hook, Left	11		1	1		1
-	65.4041.1217-00		Replaced By 315 631 01 56			-	-		
7	315 631 01 56		Locking Hook, Right	11		1	1		1
8	000931 010110		Screw	11		2	2		2
9	65.4041.1205-00		Washer	11		2	2		2
10	65.4041.1200-00		Spacer Bushing	11		2	2		2
11	000125 010504		Washer	11		2	2		2
12	000934 010014		Nut	11		2	2		2
13	000 850 00 95		Safety Chain	11		2	2		2
14	65.4041.0777-00		Tension Lock, Front Left	12		1	1		
15	65.4041.0778-00		Tension Lock, Front Right	12		1	1		
-	000933 008016		Screw	12		8	8		
-	000127 008205		Lock Washer	12		8	8		
20	65.4041.0816-00		Turnbuckle Assembly	15,2,5		2	2		
21	65.4041.1237-00		Pull Hook, L. H. Thread	15,2,5		2	2		

22	65.4041.1238-00	Pull Hook, R. H. Thread	15,2,5	2	2	
23	65.4041.1239-00	Eye, Welded	15,2,5	2	2	
24	001480 012200	Turnbuckle	15,2,5	2	2	
25	65.4041.1303-00	Bracket	2	2	2	
26	65.4041.1302-00	Tube Clamp	2	2	2	
-	000931 008246	Screw	2	4	4	
-	000127 008205	Lock Washer	2	4	4	
-	000934 008010	Nut	2	4	4	
30	65.4041.0748-00	Support	15,2,5	6	6	
31	65.4041.0773-00	Support	15,2,5	2	2	
32	404 937 00 11	Foot Plate	16	12	12	
33	404 937 01 11	Plate	16	4	4	
-	000603 008006	Button Head Screw	16	32	32	
-	000934 008010	Nut	16	32	32	
35	65.4041.0743-00	Shackle		3	3	3
36	65.4041.1160-00	Bearing Bushing		6	6	6
37	65.4041.1156-00	Spacer Bushing		6	6	6
-	000960 014062	Screw		6	6	6
-	000127 014201	Lock Washer		6	6	6
-	000934 014003	Nut		6	6	6
41	65.4041.1140-00	Retaining Bracket		3	3	3
-	000603 008005	Button Head Screw		nB	nB	nB
-	000440 009150	Washer		nB	nB	nB
-	000934 008000	Nut		nB	nB	nB
46	65.4041.1262-00	Pocket, Sheet Metal	15	2	2	
-	000097 005007	Countersunk Screw, Wood	15	8	8	
47	65.4041.1232-00	U-Bolt	15	2	2	
48	65.4041.1233-00	Washer	15	2	2	
-	000127 008205	Lock Washer	15	4	4	
-	000934 008010	Nut	15	4	4	

50	65.4041.1348-00	Locking Slide, Front Panel	16	1	1	
-	000931 008057	Screw	16	4	4	
-	000127 008205	Lock Washer	16	4	4	
-	000934 008010	Nut	16	4	4	
51	404 930 00 76	Eyebolt	16	2	2	
-	000127 006204	Lock Washer	16	2	2	
-	000934 006007	Nut	16	2	2	
-	000 988 30 83	Tarpaulin Hook	2	2	2	
-	000095 005000	Lens Head Countersunk Screw	2	6	6	
55	65.4041.0600-00	End Cover		6	6	6
-	65.4041.0817-00	Replaced By 404 643 00 38		-	-	
-	000 877 02 65	Together with 404 643 01 38, 000933 008036, 000933 008057 000433 008400, 000127 008205 000934 008000, 000931 006050 and 000934 006000		-	-	
56	404 643 00 38	Supporting Angle	16	2	2	
-	000933 008036	Screw	16	2	2	
-	000933 008057	Screw	16	2	2	
-	000433 008400	Washer	16	2	2	
-	000127 008205	Lock Washer	16	4	4	
-	000934 008010	Nut	16	4	4	
57	404 643 01 38	Bracket	16	2	2	
58	404 987 00 39	Rubber Stop	16	2	2	
-	000931 006050	Screw	16	4	4	
-	000934 006004	Nut	16	4	4	
59	65.4041.1291-00	Cover Plate	2	1	1	
-	000097 005011	Countersunk Screw, Wood	2	5	5	
-	65.4041.0620-00	Side Panel	13	2	2	2
-	65.4041.0749-00	Side Panel	14/5	2	2	
-	65.4041.0619-00	Replaced By 65.4041.0632-00		-	-	
-	65.4041.0632-00	Side Panel	15/6	2	2	
-	65.4041.0780-00	Replaced By 65.4041.0630-00 Together with 65.4041.0631-00	6/9	-	-	

60	65.4041.0630-00	Side Panel, Left	16/10	1	1	
-	65.4041.0781-00	Replaced By 65.4041.0631-00 Together with 65.4041.0630-00	6/9	-	-	
61	65.4041.0631-00	Side Panel, Right	16/10	1	1	
-	000 988 30 83	Tarpaulin Hook		16	16	16
-	000660 005002	Round Head Rivet		48	48	48
-	65.4041.0789-00	Rear Panel	13	1	1	1
-	65.4041.0752-00	Rear Panel	15,16,5	1	1	
64	65.4041.0782-00	Rear Panel	16/6	1	1	
65	000 870 00 08	Folding Step	15,16,9	2	2	
-	000660 008001	Round Head Rivet	15,16,9	8	8	
-	000 988 30 83	Tarpaulin Hook		5	5	5
-	000660 005002	Round Head Rivet		15	15	15
-	65.4041.1216-00	Replaced By 315 631 00 56		-	-	
-	315 631 00 56	Locking Hook, Left	11	1	1	1
-	65.4041.1217-00	Replaced By 315 631 01 56		-	-	
-	315 631 01 56	Locking Hook, Right	11	1	1	1
-	000931 010110	Screw	11	2	2	2
-	65.4041.1205-00	Washer	11	2	2	2
-	65.4041.1200-00	Spacer Bushing	11	2	2	2
-	000125 010504	Washer	11	2	2	2
-	000934 010014	Nut	11	2	2	2
-	000 850 00 95	Safety Chain	11	2	2	2
75	65.4041.0779-00	Tension Hook	12	2	2	
-	000931 008057	Screw	12	2	2	
-	000934 008010	Nut	12	2	2	
80	65.4041.0771-00	Clamping Bracket	15,16,5	1	1	
81	000 997 05 95	Eccentric Lock	15,16,5	1	1	
-	000961 012027	Screw		9	9	9
-	000127 012201	Lock Washer		9	9	9
-	000934 012004	Nut		9	9	9

Table 34 – Windshield – Group 68

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
1	68.4041.0800-00		Windshield			1	1	1	
2	68.4041.0702-00		Windshield Pillar, Left			1	1	1	
3	68.4041.0703-00		Windshield Pillar, Right			1	1	1	
-	68.2010.0701-00		Replaced By 411 670 01 07			-	-	-	
5	411 670 01 07		Adjuster Claw			2	2	2	
6	000084 010101		Cylindrical Head Screw			2	2	2	
7	000084 006112		Cylindrical Head Screw			2	2	2	
8	000091 010101		Lens Head Countersunk Screw			2	2	2	
-	51 404 671 04 10		Windshield 475x780mm	3		2	2	2	
10	68.4041.1019-00		Windshield 400x780mm	4		2	2	2	
-	000 987 19 35		Replaced By 000 987 62 57			-	-	-	
12	000 987 62 57		Rubber Molding 2450mm			2	2	2	
13	51 404 671 00 24		Rubber Seal, Windshield			1	1	1	
14	51 404 671 00 23		Sealing Rail			1	1	1	
15	007513 003201		Cylindrical Head Tapping Screw			12	12	12	
21	000 810 14 10		Sun Visor Grey-Green	1		1	1	1	
-	000 810 12 10		Sun Visor Olive-Green	1		1	1	1	
-	007513 004415		Cylindrical Head Tapping Screw	1		4	4	4	

Table 35 – Folding Top – Group 69

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	69.4041.0729-00		Folding Top Grey-Green			1	1	1	
1	69.4041.0707-00		Folding Top Olive-Green			1	1	1	
3	69.4041.0725-00		Damper			1	1	1	
4	000933 008082		Screw			2	2	2	
5	000934 008010		Nut			2	2	2	
6	000 987 07 27		Edge Guard 70 mm			2	2	2	
7	000471 012000		Lock Ring			2	2	2	
8	000137 012201		Spring Washer			10	10	10	

9	900056 008400	Washer, Countersunk Rivet		4	4	4
-	M10x30 DIN 316	These Two Replaced By		-	-	-
-	M10x40 DIN 316	404 770 00 26				
11	404 770 00 26	Bolt, Folding Top		2	2	2
-	51 404 770 00 82	Covering, Folding Top Grey-Green		1	1	1
-	69.4041.0708-00	Covering, Folding Top Olive Green	5	1	1	1
12	69.4041.0720-00	Covering, Folding Top Olive Green	6	1	1	1
-	51 404 770 03 82	Rear Panel Grey-Green		1	1	1
13	69.4041.0703-00	Rear Panel Olive-Green		1	1	1
-	51 404 777 00 10	Rear Window Grey-Green		1	1	1
14	69.4041.1010-00	Rear Window Olive-Green		1	1	1
18	51 404 779 00 22	Rubber Seal		1	1	1
19	51 404 779 00 20	Ledge		2	2	2
21	007981 006204	Lens Head Screw, Sheet Metal		34	34	34
22	000471 012001	Lock Ring		2	2	2
23	51 404 770 00 66	Elastic Cord		1	1	1
28	51 404 720 00 57	Slip-In Window, Left Grey-Green		1	1	1
-	69.4041.0713-00	Replaced By 404 720 01 57		-	-	-
29	404 720 01 57	Slip-In Window, Left Olive-Green		1	1	1
30	51 404 725 00 10	Window Pane Grey-Green		1	1	1
	“	Window Pane Olive-Green	7	1	1	1
31	404 725 04 10	Side Window, Top	8	1	1	1
32	404 725 05 10	Side Window, Bottom	8	1	1	1
33	404 725 00 27	Bracket	8	1	1	1
34	404 725 03 29	Pocket, Left	8	1	1	1
37	000091 004130	Lens Head Countersunk Screw	8	2	2	2
38	000923 005006	Lens Head Shoulder Screw	8	1	1	1
39	404 725 00 17	Sleeve	8	1	1	1
-	A 5,3 DIN 6797	Replaced By 000137 007100		-	-	-
40	000137 008101	Spring Washer	8	2	2	2
41	000085 004118	Lens Head Screw	8	1	1	1

42	51 404 720 00 29	Insert Pivot, Left Front		1	1	1
43	51 404 720 02 29	Insert Pivot, Left Rear		1	1	1
44	000088 004104	Lens Head Countersunk Screw		8	8	8
-	51 404 720 01 57	Slip-In Window, Right Grey-Green		1	1	1
-	69.4041.0714-00	Replaced By 404 720 00 57		-	-	-
-	404 720 00 57	Slip-In Window, Right Olive-Green		1	1	1
-	51 404 725 00 10	Window Pane Grey-Green		1	1	1
-	“	Window Pane Olive-Green	7	1	1	1
-	404 725 04 10	Side Window, Top	8	1	1	1
-	404 725 05 10	Side Window, Bottom	8	1	1	1
-	404 725 00 27	Bracket	8	1	1	1
-	404 725 02 29	Pocket, Right	8	1	1	1
-	000091 004130	Lens Head Countersunk Screw	8	2	2	2
-	000923 005006	Lens Head Shoulder Screw	8	1	1	1
-	404 725 00 17	Sleeve	8	1	1	1
-	000137 008101	Spring Washer	8	2	2	2
-	000085 004118	Lens Head Screw	8	1	1	1
-	51 404 720 01 29	Insert Pivot, Right Front		1	1	1
-	51 404 720 03 29	Insert Pivot, Right Rear		1	1	1
-	000088 004104	Lens Head Countersunk Screw		8	8	8

Footnotes

Remarks Table 33, 34, 35

- 1 From Chassis 050569
- 2 For Platform 404 600 01 03
- 3 Up to Chassis 6501165
- 4 From Chassis 6501166
- 5 Up to Chassis 7502329
- 6 From Chassis 8500029
- 7 Up to Chassis 9501178
- 8 From Chassis 9501179
- 9 Up to Chassis 8502255

-
- 10 From Chassis 8502256
 - 11 For Platforms 404 600 01 03 and 404 600 02 03
Up to Chassis 7502329
Remains Applicable to Other Platforms
 - 12 For Platforms 404 600 01 03 and 404 600 02 03
From Chassis 8500029
Inapplicable to Other Platforms
 - 13 For Platforms 65.4041.0831-00 and 404 600 32 03
 - 14 For Platforms 404 600 00 03, 404 600 01 03 and 404 600 02 03
 - 15 For Platform 404 600 00 03
 - 16 For Platforms 404 600 01 03 and 404 600 02 03
-

Table 36 – Rear Seats & Canopy – Group 70

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	70.4041.0717-00		Replaced By 404 630 02 07			-	-		
1	404 630 02 07		Attachment Part	7		4	4		
-	404 930 00 20		These Two Replaced By 404 930 06 20			-	-		
-	315 930 01 20								
2	404 930 06 20		Central Seat, Bench	1/4		1	1		
3	404 930 01 52		Fastening Chain	1/4		1	1		
-	70.4041.0746-00		Replaced By 404 790 03 30 Together With 404 790 00 25	5		-	-		
-	404 790 00 30								
4	404 790 03 30		Tarpaulin Bow	2/6		1	1		
-	70.4041.0745-00		Replaced By 404 790 00 25 Together With 404 790 03 30	5		-	-		
5	404 790 00 25			Folding Top Bow	2/6		3	3	
6	404 790 00 32		Tarpaulin Bow Foot	2		4	4		
7	404 790 00 73		Securing Pin with Chain	2		4	4		
8	404 995 00 44		Clamp	2		4	4		
-	000933 008014		Screw	2		4	4		
-	000934 006000		Nut	2		4	4		
9	70.4041.1132-00		Washer	2		2	2		
10	70.4041.0744-00		Supporting Tube, Tarpaulin Tilt	2		6	6		
11	70.4041.1122-00		Tube	2		2	2		
12	70.4041.1123-00		Tube	2		1	1		
16	70.4041.0728-00		Tarpaulin Dome	1/3		1	1		
-	70.4041.0747-00		Tarpaulin Dome	2		1	1		
17	70.4041.0729-00		Tarpaulin Front Side	3		1	1		
-	70.4041.0750-00		Tarpaulin Front Side	1		1	1		
-	70.4041.0748-00		Tarpaulin Front Side	2		1	1		
-	315 792 00 87		Replaced By 69.4041.1010-00			-	-		
18	69.4041.1010-00		Window Pane	3/7		5	5		
-	69.2010.1040-00		These Two Replaced By 007331 004165			-	-		
-	000 990 29 95								
-	007331 004165		Hollow Rivet			nB	nB		

-	70.4041.0730-00	Replaced By 70.4041.0751-00		-	-
19	70.4041.0751-00	Tarpaulin Rear Side	1/3	1	1
-	70.4041.0749-00	Tarpaulin Rear Side	2	1	1
-	70.4041.0731-00	These Two Replaced By		-	-
-	315 790 04 59	315 790 07 59			
-	315 790 07 59	Tightening Rope 5300 mm	3/7	2	2
-	70.4041.0732-00	Replaced By 404 790 00 59		-	-
20	404 790 00 59	Tightening Rope 7500 mm	2/3	2	2
-	315 790 05 59	Replaced By 315 790 09 59		-	-
-	315 790 09 59	Tightening Rope 10500 mm	2	2	2

Footnotes

Remarks Table 36

- 1 For Plat form 404 600 02 03
 - 2 For Plat form 404 600 01 03
 - 3 For Plat form 404 600 00 03
 - 4 From Chassis 8502256
 - 5 Up to Chassis 040367
 - 6 From Chassis 040368
 - 7 For Plat forms 404 600 01 03 and 404 600 02 03
-

Table 37 – Tools & Accessories – Group 90/91

Item #	Part #	Mod. #	Item Description	footnotes	All	113	114	115	117
-	000 581 00 67		Replaced By 001 589 23 09	1		-	-	-	
-	000 581 06 67		Together with 000 589 30 03						
1	001 589 23 09		Socket Wrench	2	1				
2	000 589 30 03		Combination Box/Open Wrench	2	1				
3	90.4041.0701-00		Wrench, Wheel Nut				1	1	
4	90.2010.0700-00		Hex. Socket Wrench 24mm			1			1
-	90.2010.1002-00		Turn Handle			1			1
5	315 581 00 03		Turn Handle				1	1	
-	000894 013001		Open End Wrench	3	1				
-	000895 008002		Wrench 8 x 10 mm		1				
-	000895 009002		Wrench 9 x 11 mm		1				
-	000895 012001		Wrench 12 x 14 mm		1				
-	000895 017001		Wrench 17 x 19 mm		1				
-	000895 022002		Wrench 22 x 24 mm		1				
-	000895 027001		Wrench 27 x 32 mm		1				
10	000 581 01 38		Universal Pliers, Adjustable				1	1	
-	000 581 00 38		Replaced By 005244 180002			-	-		
-	005244 180002		Combination Pliers			1	1		1
12	000 581 09 20		Screw Driver 7 mm				1	1	
13	000 581 10 20		Screw Driver 3 mm				1	1	
14	000 581 11 20		Screw Driver 6.5 mm				1	1	
-	005270 001100		Screw Driver 5.6 mm			1			1
15	000911 006000		Hex. Key Wrench		1				
-	000 581 06 51		Replaced By 001041 500001				-		
16	001041 500001		Hammer				1	1	
-	000 583 40 15		Replaced By 000 583 69 15			-			
19	000 583 69 15		Spindle Jack			1			1
20	000 583 41 15		Jack, Two- Spindle				1	1	
-	90.2010.1016-00		These items Replaced By			-	-	-	

-	90.2010.1017-00	000 583 22 45				
-	000 583 15 45					
-	000 583 04 43					
21	000 583 22 45	Articulated Wrench	1			
23	304 583 00 80	Base Block, Jack		1	1	
-	90.2010.0701-00	Tool Bag	1			1
-	315 583 00 07	Replaced By 000 585 13 01	-	-		
24	000 585 13 01	Tool Bag	1	1		
-	90.4041.1014-00	Replaced By 000 581 01 37	-	-	-	
-	000 581 01 37	File, No Longer Available	-	-	-	
-	000 585 14 01	Sheath, No Longer Available	-	-	-	
-	000 581 06 58	Replaced By 000 581 15 58	-	-	-	
27	000 581 15 58	Tire Lever		2	2	
-	000 583 14 19	Hand Lamp, No Longer Available	-	-	-	
-	90.4041.0802-00	Air Pump, No Longer Available	-	-	-	
30	000 583 22 18	Grease Gun	1		1	
-	N 202 WG 8	These items Replaced By	-	-	-	
-	900202 000309	900202 000316				
-	900202 000311					
-	900202 000316	Type Plate	1			
-	000662 002600	Lens Head Rivet, Type Plate	2			
-	DIN 72 616	Replaced By 000 544 22 05	-	-	-	
-	000 544 18 05	or 000 544 24 05				
32	000 544 22 05	Reflector	2		2	2
-	000 544 24 05	Reflector		2		
-	000127 005204	Lock washer	2			
-	000934 005008	Nut	2			
33	91.4041.1020-00	Replaced By 404 540 00 64	-	-	-	
34	91.2010.1022-00	Replaced By 404 540 00 64	-	-	-	
-	404 540 00 64	Bracket with Screws	6	2		
35	009021 005104	Washer		2		
-	000931 006011	Screw	7	4		
-	000127 006204	Lock Washer	7	4		

-	000934 006007	Nut	7	4				
36	91.4041.1001-00	Hook Bolt	4		1	1	1	
		Hook Bolt	5		2	2	2	
		Hook Bolt						2
37	99.2901.1022-00	Washer	4		1	1	1	
		Washer	5		2	2	2	
		Washer						2
38	91.4041.1002-00	Tapered Handle	4		1	1	1	
		Tapered Handle	5		2	2	2	
		Tapered Handle						2
-	000094 004000	Cotter Pin	4		1	1	1	
		Cotter Pin	5		2	2	2	
		Cotter Pin						2
40	90.4041.0703-00	Chock			1	2	1	1
41	91.4041.1057-00	Supporting Plate, Chock			1	2	1	1
42	91.4041.1059-00	Shoe			1	2	1	1
-	91.4041.1058-00	Replaced By 91.4041.1165-00			-	-	-	
43	91.4041.1165-00	Tension Spring	8		1	2	1	
		Tension Spring	9		2	4	2	
		Tension Spring						2
-	000605 008003	Countersunk Screw			4	8	4	4
-	000127 008205	Lock Washer			4	8	4	4
-	000934 008010	Nut			4	8	4	4
-	404 584 13 21	Sign, Fuel Change Over Cock			1			
-	404 584 37 21	Sign, Control Diagram			1			
-	000660 003010	Round Head Rivet			2			

Footnotes	Remarks Table 37
1	On Models 113, 115 Up to Chassis 040617 On Models 114 Up to Chassis 043001
2	On Models 113, 115 From Chassis 040618 On Models 114 From Chassis 043002
3	On Models 113 From Chassis 038267 On Models 114, 115 From Chassis 039544
4	Up to Chassis
5	From Chassis
6	On Models 113, 115 Up to Chassis 049678 Left & Right Parts Replaceable Together ONLY. On Models 114 Up to Chassis 049740 Left & Right Parts Replaceable Together ONLY.

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- 7 On Models 113, 115 Up to Chassis 049678
On Models 114 Up to Chassis 049740
 - 8 Up to Chassis
 - 9 From Chassis
-



Section 5– Mercedes Benz M130 Overhaul Manual

ATS TECHNICA
ELECTROGRAPHICS

Table 00 – Engine M180 – Group 01

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
-	180 010 33 45		Engine, 8.7 : 1 Compression Ratio			1		
-	180 010 57 45		Engine, 7.0 : 1 Compression Ratio				1	
-	180 010 82 45		Engine, 7.0 : 1 Compression Ratio					1
-	180 586 42 90		Gasket Kit, Engine			1		
-	180 586 41 90		Gasket Kit, Engine				1	1

Table 01 – Engine Block – Group 01

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
Cylinder Crankcase								
1	180 010 34 08		Block, One Piece Casting		1			
-	000933 010111		Screw		1			
-	007603 010101		Seal Ring		1			
3	108 011 02 11		Crankshaft Bearing Cap, 1, 3, 4		3			
4	108 011 01 13		Crankshaft Bearing Cap, Lapped Bearing		1			
9	000931 012061		Screw		8			
10	121 990 28 40		Washer		8			
12	000007 010101		Cylindrical Pin		4			
13	000007 008101		Cylindrical Pin		4			
14	180 186 02 40		Bracket, Oil Pump Suction Pipe		1			
15	180 991 03 62		Dowel Pin, Necked-Down		1			
16	180 991 04 62		Dowel Pin, Necked-Down		1			
20	186 991 00 55		Lock Pin, Fabric Seal Ring		1			
21	000 990 47 12		Screw Plug, Front & Rear Oil Passages		3			
23	000939 008072		Stud, Generator Support		2			
Cylinder Side Cover								
26	180 015 08 05		Cylinder Side Cover		2			
28	180 015 10 21		Gasket		2			
-	000 990 30 12		Replaced By 914020 006009			-	-	
29	914020 006009		Combination Bolt		12			

36	000961 014022	Screw	1	1	
37	636 997 02 44	Seal Ring	2	2	
-	180 052 10 06	Bearing Bushing	1		
-	180 150 01 07	Bearing with Bushing	1		
40	900037 010100	Dowel Pin, Cylinder Head	2		
41	180 010 01 35	Cover	1		
-	000007 006207	Cylindrical Pin	1		
45	180 011 03 79	Gasket	1		
46	000912 006044	Cylindrical Head Screw	4		
47	000137 006101	Spring Washer	4		
50	180 011 14 05	Intermediate Plate	1		
51	000933 010008	Screw	3		
		Oil Pan			
55	180 010 32 13	Oil Pan	1	1	
-	130 010 12 13	Oil Pan			1
-	900421 012006	Threaded Bushing			4
56	186 991 00 55	Lock Pin	1		
57	007603 022100	Seal Ring			1
58	007604 022102	Screw Plug			1
60	180 010 07 66	Guide Tube	1	1	
61	198 997 00 40	Seal Ring	1	1	
62	180 010 07 72	Oil Dipstick	1	1	
63	136 997 12 30	Screw Plug	1		
64	007603 026301	Seal Ring	1		
65	914020 006000	Combination Bolt	20		
-	000912 008066	Cylindrical Head Screw	2		
66	000912 006047	Cylindrical Head Screw	2		
67	000433 006400	Washer	2		
68	000912 008055	Cylindrical Head Screw	3		
69	000433 008403	Washer	5		

Table 02 – Cylinder Head – Group 01

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
Cylinder Head								
1	180 010 00 21		Head, with Studs & Valve Guides				1	
-	180 010 97 20		Head, with Studs & Valve Guides			1		
-	180 010 59 21		Head, with Studs & Valve Guides					1
2	180 997 06 30		Screw Plug		3			
4	180 053 07 31		Valve Seat Ring 40.8 mm Ø		6			
-	180 053 08 31		Valve Seat Ring 42.0 mm Ø		6			
5	180 053 07 32		Valve Seat Ring Standard Ø		6			
-	180 053 08 32		Valve Seat Ring 40.3 mm Ø		6			
7	127 016 06 60		Water Distributor		3			
8	127 016 03 60		Water Distributor		5			
9	127 016 04 60		Water Distributor		1			
10	127 016 05 60		Water Distributor		1			
11	000007 008202		Cylindrical Pin		8			
12	000939 008004		Stud		4			
13	000939 008053		Stud, Water Outlet			2	2	
-	000939 008045		Stud					2
14	000835 010046		Stud, Manifold		6			
15	000835 010047		Stud, Exhaust Manifold		2			
16	000939 008048		Stud, Chain Tensioner Housing		1			
17	621 016 05 29		Fitting, Heat Feeler			1	1	
-	130 016 00 29		Fitting, Heat Feeler					1
18	007603 030100		Seal Ring		1			
20	180 050 02 24		Valve Guide Intake 14.007 – 14.013 OD Ø Color Green		6			
			Valve Guide Intake 14.013 – 14.019 OD Ø Colorless		nB			
			Valve Guide Intake 14.019 – 14.025 OD Ø Color Brown		nB			
-	180 050 03 24		Valve Guide Intake 14.025 – 14.031 OD Ø Color Green		nB			
			Valve Guide Intake 14.031 – 14.037 OD Ø Colorless		nB			

		Valve Guide Intake 14.037 – 14.043 OD Ø Color Brown	nB		
-	180 050 04 24	Valve Guide Intake 14.200 OD Ø Color Red	nB		
-	180 050 05 24	Valve Guide Intake 14.400 OD Ø Color White	nB		
-	009045 014000	Snap Ring	6		
21	121 050 16 24	Valve Guide Exhaust 14.007 – 14.013 OD Ø Color Green	6		
		Valve Guide Exhaust 14.013 – 14.019 OD Ø Colorless	nB		
		Valve Guide Exhaust 14.019 – 14.025 OD Ø Color Brown	nB		
-	121 050 21 24	Valve Guide Exhaust 14.025 – 14.031 OD Ø Color Green	nB		
		Valve Guide Exhaust 14.031 – 14.037 OD Ø Colorless	nB		
		Valve Guide Exhaust 14.037 – 14.043 OD Ø Color Brown	nB		
-	121 050 22 24	Valve Guide Exhaust 14.200 OD Ø Color Red	nB		
-	121 050 23 24	Valve Guide Exhaust 14.400 OD Ø Color White	nB		
22	009045 014000	Snap Ring	6		
26	114 050 00 97	Camshaft Bearings, Set - Standard	1		
-	114 050 01 97	Camshaft Bearings, Set - Intermediate	1		
-	114 050 02 97	Camshaft Bearings, Set - Repair Size	1		
27	000433 008400	Washer	4		
28	000934 008000	Nut	4		
29	836 997 00 30	Screw Plug	1		
30	007603 032103	Seal Ring	1		
-	180 016 27 20	Gasket, Head	1		
31	180 016 28 20	Gasket, Head	1	1	1
-	000912 008008	Cylindrical Head Screw	2		
-	000433 008403	Washer	1		
-	000433 008400	Washer	2		
-	000912 008019	Cylindrical Head Screw	1	1	1
-	000912 008022	Cylindrical Head Screw	1		

36	000912 012038	Cylindrical Head Screw	8		
-	186 990 09 40	Replaced By 130 990 01 40		-	-
37	130 990 01 40	Washer	8		
38	115 016 00 38	Cylinder Head Cover, Clamp	3		
39	000912 012031	Cylindrical Head Screw	6		
40	130 990 01 40	Washer	6		
41	180 180 01 27	Oil Pipe	1		
42	914020 006000	Combination Bolt	1		
43	000137 006200	Spring Washer	1		
-	121 995 04 20	Mounting Clamp	3		
-	000933 004003	Screw	3		
-	000137 004200	Spring Washer	3		
Valve Cover					
50	180 010 19 30	Valve Cover, less Filler Cap	1		
-	180 997 16 72	Replaced By 615 997 00 72		-	-
53	615 997 00 72	Screw Fitting	1		
54	007603 018100	Seal Ring	1		
55	136 501 00 54	Filler Cap	1		
56	180 997 02 40	Seal Ring	1		
57	180 016 04 80	Gasket, Valve Cover	1		
58	000933 008116	Screw	3		
59	007603 008303	Seal Ring	3		

Table 03 – Crank/Moving Parts – Group 03

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
Crankshaft								
1	180 030 90 01		Crankshaft with Counterweight & Flywheel		1			
3	121 991 00 67		Woodruff Key, Crankshaft Gear		1			
4	180 052 08 03		Crankshaft Gear		1			
-	108 031 01 51		Replaced By 108 031 02 51			-	-	
5	108 031 02 51		Spacer Ring		1			

7	180 031 13 07	Counterweight	1		
8	900037 008100	Dowel Pin	2		
10	127 031 00 71	Necked-Down Bolt	1		
11	127 993 00 26	Conical Spring Washer	3		
13	180 030 27 05	Flywheel with Ring Gear	1		
14	121 032 03 05	Starting Ring Gear	1		
15	000007 010204	Cylindrical Pin	1		
16	180 032 05 71	Necked-Down Bolt	6		
21	000625 006202	Grooved Ball Bearing	1		
22	189 031 00 33	Cover Ring	1		
23	180 030 19 05	Intermediate Ring	1		
24	000007 006210	Cylindrical Pin	2		
-	108 031 02 81	These Two Replaced By	-	-	
-	108 031 01 81	108 031 04 81			
25	108 031 04 81	Seal Ring, Crankshaft Front End	1		
26	108 032 01 15	Timing Pointer for T.D.C.	1		
-	000084 006132	Cylindrical Head Screw	1		
-	180 200 25 05	Triple Pulley			1
30	180 200 21 05	Double Pulley	1	1	
31	000912 008067	Cylindrical Head Screw	3	3	
-	000912 008038	Cylindrical Head Screw			3
32	000137 008101	Spring Washer	3		
33	900255 075701	Fabric Seal Ring	1		
		Crankshaft Bearings			
40	180 030 30 97	Crankshaft Bearing Shells, Set 60 mm ID - Standard	1		
-	180 033 44 07	Lapped Bearing Shell, Upper	1		
-	180 033 43 07	Lapped Bearing Shell, Lower	1		
-	180 030 31 97	Crankshaft Bearing Shells, Set 59.75 mm ID, Repair Size I	nB		
-	180 030 32 97	Crankshaft Bearing Shells, Set 59.50 mm ID, Repair Size II	nB		
-	180 030 33 97	Crankshaft Bearing Shells, Set	nB		

		59.25 mm ID, Repair Size III	
-	180 030 34 97	Crankshaft Bearing Shells, Set 59.00 mm ID, Repair Size IV	nB
		Connecting Rods	
45	180 030 22 20	Connecting Rod with Bushing 27mmØ	6
46	127 038 00 50	Bushing, Piston Pin, 27x23.5x29.6 mm Standard Size	6
-	127 038 01 50	Bushing, Piston Pin, 27.5x23.5x29.6 mm Repair Size	nB
47	186 038 04 71	Screw	12
48	182 038 00 72	Nut	12
49	180 586 05 03	Connecting Rod Bearing Shells, Set 48.00 mm ID – Standard Size	1
-	180 586 06 03	Connecting Rod Bearing Shells, Set 47.75 mm ID – Repair Size I	nB
-	180 586 07 03	Connecting Rod Bearing Shells, Set 47.50 mm ID – Repair Size II	nB
-	180 586 08 03	Connecting Rod Bearing Shells, Set 47.25 mm ID – Repair Size III	nB
-	180 586 09 03	Connecting Rod Bearing Shells, Set 47.00 mm ID – Repair Size IV	nB
		Pistons	
50	180 030 08 18	Piston, for Cylinder Bore 80.00 mm Standard Size	6
-	180 030 09 18	Piston, for Cylinder Bore 80.25 mm Intermediate Size	nB
-	180 030 10 18	Piston, for Cylinder Bore 80.50 mm Repair Size I	nB
-	180 030 11 18	Piston, for Cylinder Bore 81.00 mm Repair Size II	nB
-	180 030 12 18	Piston, for Cylinder Bore 81.50 mm Repair Size III	nB
-	000 037 03 20	Piston Pin	6
52	000 994 24 35	Wire Snap Ring	12
53	002 586 87 03	Piston Rings, Set – Standard Size	6
-	002 586 88 03	Piston Rings, Set – Intermediate Size	nB
-	002 586 89 03	Piston Rings, Set – Repair Size I	nB

-	002 586 90 03	Piston Rings, Set – Repair Size II	nB
-	002 586 91 03	Piston Rings, Set – Repair Size III	nB

Table 04 – Cam/Timing/Valves – Group 05

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
Camshaft								
1	180 051 93 01		Camshaft		1			
3	121 052 02 01		Gear, Camshaft		1			
4	186 052 01 52		Spacer Washer		1			
5	006888 004002		Woodruff Key		1			
6	000961 014012		Screw		1			
7	000127 014200		Lock Washer		1			
8	180 990 03 40		Washer		1			
Timing Gear Drive								
9	180 052 10 06		Bearing Bushing		1			
-	180 050 03 06		Replaced By 180 050 06 06			-	-	
10	180 050 06 06		Intermediate Gear Shaft & Helical Gear		1			
11	121 052 04 02		Intermediate Gear		1			
12	006888 003000		Woodruff Key		1			
13	000933 008071		Screw		1			
14	912004 008101		Lock Washer		1			
15	180 990 06 40		Washer		1			
16	127 052 00 06		Bearing Bushing		1			
17	000933 006015		Screw		1			
18	000127 006200		Lock Washer		1			
19	180 990 01 40		Washer		1			
-	000 997 08 94		Replaced By 000 997 44 94			-	-	
20	000 997 44 94		Timing Chain 9.525x5.72 mm		1			
-	008187 002100		Replaced By 000 997 01 98			-	-	
21	000 997 01 98		Connector Link with Spring Lock		1			
25	180 050 08 16		Sliding Rail		2			
26	180 052 00 76		Lock Wire		2			

-	001476 004000	Round Head Pin, Grooved	4		
27	180 050 07 16	Sliding Rail	1		
28	180 052 01 76	Lock Wire	1		
-	001476 004000	Round Head Pin, Grooved	1		
29	621 052 00 74	Pivot Pin 49 mm long	3		
30	180 050 07 74	Pivot Pin with Screw Plug	1		
31	007603 020100	Seal Ring	1		
32	180 052 10 74	Pivot Pin 58 mm long	2		
-	180 050 07 11	These Two Replaced By 130 050 00 11		-	-
-	180 050 08 11				
40	130 050 00 11	Chain Tensioner	1		
41	009045 016000	Snap Ring	1		
42	005401 305000	Ball	1		
43	621 052 00 35	Ball Cage	1		
-	621 052 01 35	Ball Cage	1		
44	621 993 06 01	Pressure Spring	1		
-	121 991 00 74	Replaced By 000007 008217		-	-
45	000007 008217	Cylindrical Pin	1		
46	007603 018100	Seal Ring	1		
47	621 052 00 32	Lock Nut	1		
51	002 997 36 45	Seal Ring	1		
52	000934 008008	Nut	1		
53	189 052 00 71	Securing Screw, 12 mm thread	1		
54	007603 012112	Seal Ring	1		
55	121 050 15 10	Bearing, Timing Chain	1		
56	180 050 04 09	Sprocket, Timing Chain	1		
57	180 052 00 50	Bearing Bushing	1		
58	180 990 35 40	Washer	1		
59	000471 020000	Lock Ring	1		
60	186 993 11 01	Pressure Spring	1		
61	127 052 01 74	Pivot Pin	1		

Valves

70	180 053 02 01	Intake Valve	6
71	180 053 11 05	Exhaust Valve	6
72	127 053 00 53	Washer	6
73	186 053 06 60	Seal Ring	6
74	127 053 00 58	Holder, Seal Ring	6
75	121 053 02 62	Thrust Ring	6
77	180 053 06 22	Valve Spring, Inside	12
78	180 053 06 20	Valve Spring, Outside	12
79	180 053 06 60	Seal Ring	6
80	180 053 11 25	Retainer, Valve Spring - Intake	6
81	180 050 22 23	Retainer, Valve Spring - Exhaust	6
-	180 050 13 23	Retainer, Valve Spring - Optional	6
-	180 050 20 23	Retainer, Valve Spring – Repair Size	nB
82	180 053 01 27	Valve Cone Half - Optional	24
-	180 053 06 27	Valve Cone Half - Optional	24
85	180 053 19 52	Thrust Piece 4.5mm High Standard	12
-	180 053 20 52	Thrust Piece 3.5mm High Repair Size I	nB
-	180 053 21 52	Thrust Piece 2.5mm High Repair Size II	nB

Rocker Arm

-	108 055 01 01	Replaced By 114 055 00 01	-	-
90	114 055 00 01	Rocker Arm	12	
91	180 055 06 74	Threaded Pin	12	
92	180 055 07 74	Ball Head Stud	12	
93	180 993 09 25	Annular Spring	12	
94	180 993 12 25	Clamping Spring	12	

Table 05 – Carburetor – Group 07

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
1A	000 071 53 01		Carburetor - Complete		1			
1B	000 071 12 06		Throttle Body 5x0.9mm thread		1			

2	000 071 06 70	Headless Set Screw, Test Connection	1
3	000 071 07 11	Shaft, Throttle Valve	1
4	000 071 14 10	Throttle Valve	2
5	000 071 56 71	Lens Head Countersunk Screw	4
6	000 071 10 12	Support	1
7	000 072 04 21	Throttle Control Lever	1
8	000 071 08 22	Lever, Pump	1
9	000 071 21 24	Rod, Pump	1
10	000 071 22 16	Spring	1
11	000125 003200	Washer	1
12	000 071 01 73	Lock Spring	1
15	000 071 57 71	Idle Adjusting Screw	1
16	000 071 15 16	Pressure Spring, Idle Adjusting Screw	1
17	000 071 01 62	Washer	1
18	000 071 02 62	Ring	1
19	000 071 09 72	Hex. Nut	2
20	000 071 04 56	Screw Plug 5x0.9mm thread	1
22	000 071 24 80	Seal Ring	1
26	000 071 58 71	Idle Mixture Adjusting Screw	2
27	000 071 15 16	Pressure Spring, Idle Mixture Screw	2
28	000 071 59 71	Cylindrical Head Screw	4
29	000 990 06 47	Lock Washer	4
30	000 071 25 80	Gasket	1
31	000 070 03 44	Float Chamber	1
32	000 071 10 43	Double Float with Joint Bearing	1
33	000 071 15 42	Venturi Tube 26 mm	2
34	000 071 60 71	Retaining Screw, Venturi Tube	2
35	000 071 06 83	Mixing Tube Carrier, Pre-Atomizer	2
36	000 071 61 71	Retaining Screw, Mixing Tube Carrier	1
37	000125 005300	Washer	1

38	000127 005100	Lock Washer	1
39	000 071 02 49	Mixing Tube	2
40	000 071 42 34	Compensator Nozzle Size 210	2
41	000 071 60 35	Main Nozzle 140, > 1500 meters	2
-	000 071 76 35	Main Nozzle 132.5, 1500 - 3000 meters	2
-	000 071 62 35	Main Nozzle 125, to 4500 meters	2
-	000 071 77 35	Main Nozzle 120, < 4500 meters	2
42	000 071 29 36	Idling Nozzle Size 55	2
43	000 071 08 60	Seal Ring	2
44	000 071 14 04	Cover, Main & Idling Nozzle	1
45	000 071 09 60	Seal Ring	1
46	000 071 62 71	Hex. Head Screw	1
47	000 071 10 60	Seal Ring	1
50	000 071 11 39	Idling Nozzle Size 140	2
51	000 071 12 37	Starting Fuel Nozzle Size 100	1
52	000 071 11 60	Seal Ring, Starting Fuel Nozzle	1
53	000 071 05 86	Nozzle, Pump Size 55	2
54	000 071 08 60	Seal Ring, Pump Nozzle	2
55	000 071 04 49	Injection Pipe, Long - No. 3	2
56	000 071 04 18	Piston, Pump	1
57	000 071 16 16	Spring, Pump	1
58	000 071 03 76	Retainer, Pump Spring	1
59	000 994 06 10	Lock Plate	1
60	000 071 07 15	Annular Spring, Pump Cup	1
64	000 070 03 46	Suction Valve, Pump	1
65	000 071 12 60	Seal Ring, Pump Suction Valve	1
66	000 070 12 46	Pressure Valve, Pump	1
67	000 071 13 60	Seal Ring, Pump Pressure Valve	1
68	000 071 08 28	Choke Body	1
69	000 071 35 80	Gasket	1
70	000 071 63 71	Lens Head Countersunk Screw	2

71	000 072 02 74	Clamping Screw	1
72	000 071 13 30	Choke Plate, with 5mm Choke Shaft	1
73	000 071 17 16	Pressure Spring, Choke Plate	1
74	000 994 07 10	Lock Plate, Pressure Spring	1
75	000 071 14 60	Seal Ring, Choke Shaft	1
80	000 071 13 31	Choke Lever	1
81	136 072 00 71	Adjusting Screw, 4mm thread	1
82	136 072 00 50	Bushing	1
-	000433 004300	Washer	1
-	000934 004000	Nut	1
-	000125 006400	Washer	1
-	000934 006000	Nut	1
87	000 071 16 04	Cover, Float Chamber	1
88	000 071 26 80	Gasket	1
89	001476 002008	Round Head Pin, Grooved	2
90	000 071 04 44	Valve, Float Needle	1
91	000 997 37 40	Seal Ring, 0.5 mm thick	1
-	000 997 48 40	Seal Ring, 1.5 mm thick	1
92	915013 006000	Screw Fitting	1
93	007603 012101	Seal Ring	1
94	000 071 01 25	Shaft, Pump	1
95	000 071 18 22	Lever, Pump Outside	1
96	000 071 19 22	Lever, Pump Inside	1
97	000 071 26 16	Pressure Spring	1
98	006797 006240	Toothed Washer	2
99	000439 006200	Nut	2
100	000 071 03 49	Spray-Nozzle Tube, Choke	1
101	000 071 64 71	Attaching Screw	5
102	000127 005200	Lock Washer	5
-	180 586 01 90	Lock Washer	1

105	180 071 05 01	Insulating Flange	2			
106	180 070 00 70	Screening Plate	1			
107	000137 008101	Spring Washer	4			
108	000 990 08 51	Hex. Nut	4			
119	180 070 12 32	Fuel Line, Pump to Carburetor	1	1		
-	180 070 22 32	Fuel Line, Pump to Carburetor				1
120	186 995 00 01	Pipe Clamp	1			
121	007603 012100	Seal Ring	3	3		1
122	915011 006102	Hollow Screw	1	1		
-	000961 012047	Screw	1			
125	180 070 00 38	Drain Pipe	1			
126	915001 006000	Union Nut	1			

Table 06 - Fuel Pump/Air Cleaner - Group 09

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
Fuel Pump								
1	000 091 91 01		Fuel Pump			1	1	
2	000 993 09 10		Release Spring			1	1	
3	000 994 00 41		Lock Ring			1	1	
5	000 091 05 07		Lever, Pump Drive			1	1	
7	000 091 00 21		Spindle			1	1	
8	000 091 08 15		Pressure Spring			1	1	
9	000 091 16 15		Diaphragm Spring			1	1	
10	000 091 00 36		Oil Protective Plate			1	1	
11	000 091 01 15		Seal, Oil Protective Plate			1	1	
12	000 091 04 28		Diaphragm			1	1	
13	000063 003116		Countersunk Screw, Valve Plate			3	3	
14	006797 003350		Toothed Washer			3	3	
15	000 091 04 29		Valve Plate			1	1	
16	000 091 01 80		Gasket, Valve Plate			1	1	
17	000 091 04 19		Valve Spring			2	2	
18	000 091 07 29		Valve Reed			2	2	

20	000 091 00 16	Spring Cage, Exhaust Valve	1	1	
22	000085 005109	Lens Head Screw	6	6	
23	000127 005200	Lock Washer	6	6	
24	000 091 08 39	Strainer with Pressure Spring	1	1	
25	000 091 06 80	Seal (Cork)	1	1	
26	000 091 01 46	Cap	1	1	
27	000933 006015	Screw	1	1	
28	007603 006101	Seal Ring	1	1	
29	007603 008112	Seal Ring	1	1	
30	000 091 03 56	Screw Plug, 8x1 mm thread	1	1	
33	007603 012101	Seal Ring	1	1	
34	007604 012100	Screw Plug	1	1	
35	915013 006000	Screw Fitting	2	2	
36	007603 012101	Seal Ring	2	2	
37	180 586 02 90	Repair Kit, Fuel Pump	1	1	
38	181 091 00 80	Gasket	2	2	
39	181 091 00 81	Insulating Flange	1	1	
40	000912 008048	Cylindrical Head Screw	2	2	
41	000137 008202	Spring Washer	2	2	
42	180 091 01 80	Sealing Flange	1	1	
43	180 090 02 44	Intermediate Flange	1	1	
47	000912 008009	Cylindrical Head Screw	2	2	
48	000125 008417	Washer	2	2	
49	180 091 02 08	Push Rod, Fuel Pump Drive	1	1	
52	001 091 69 01	Fuel Pump			1
54	000 091 02 03	Cap			1
55	000 091 04 60	Seal Ring			1
56	000 091 12 39	Filter			1
57	007603 004400	Seal Ring			1
58	000084 004164	Cylindrical Head Screw			1

61	130 091 00 80	Gasket		2
62	130 091 00 81	Insulating Flange		1
-	000137 008202	Spring Washer		2
-	000933 008116	Screw		2
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-	404 094 00 01	Replaced By 404 094 02 01	-	-
65	404 094 02 01	Oil Bath Air Cleaner	1	1
66	000 094 80 06	Oil Tank	1	1
-	000 094 01 55	Replaced By 000 094 12 55	-	-
67	000 094 12 55	Snap Fastener	3	3
68	000 094 31 04	Element	1	1
69	000 094 28 80	Seal, Inside	1	1
70	000 094 29 80	Seal, Outside	1	1
71	41.4041.1009-00	Rubber Seal	1	1
72	000084 008119	Cylindrical Head Screw	4	4
73	000127 008202	Lock Washer	4	4
74	000091 006125	Lens Head Countersunk Screw	4	4
75	900272 060000	Rubber Hose, 80 mm long	1	1
-	900262 009100	Hose Clamp	2	2
-	900263 009000	Hose Strap, 535 mm long	2	2
76	41.4041.0708-00	Elbow	1	1
77	41.4041.1031-00	Grommet	1	1
-	900262 009100	Hose Clamp	1	1
-	900263 009000	Hose Strap, 235 mm long	1	1
78	404 094 01 41	Bracket	1	1
-	000933 008057	Screw	1	1
-	000934 008000	Nut	1	1
-	000933 008014	Screw	1	1
-	000127 008206	Lock Washer	1	1
-	000934 008000	Nut	1	1
79	41.4041.1013-00	Connecting Cap	1	1

-	900262 009100	Hose Clamp		1	1
-	900263 009000	Hose Strap, 535 mm long		1	1
-	900288 072005	Hose Clamp		1	1
-	900273 010000	Rubber Hose, 700 mm long	1	1	1
80	404 528 01 08	Breather Tube	2	1	1
-	900288 016008	Hose Clamp		1	1
82	121 094 02 91	Molded Hose		1	1
-	900288 026001	Hose Clamp		1	1
85	000 995 03 36	Hose Clamp		1	1
-	000084 004162	Cylindrical Head Screw		1	1
95	404 094 02 41	Bracket		1	1
96	41.4041.1017-00	Mounting Clamp		1	1
-	000933 008036	Screw		1	1
-	000127 008206	Lock Washer		1	1
-	000934 008000	Nut		1	1

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100	004 094 61 02	Oil Bath Air Cleaner			1
101	000 094 43 03	Oil Tank			1
102	000 094 88 80	Gasket			1
103	000 094 10 71	Tommy Screw			1
104	000 094 01 76	Washer			1
105	000471 010000	Lock Ring			1
106	000 094 86 04	Filter Element			1
107	000 094 83 80	Seal, Inside			1
108	000 094 84 80	Seal, Outside			1
109	900288 240101	Hose Clamp			1
111	406 092 05 44	Elbow, Line			1
112	406 520 01 01	Intake Pipe			1
113	404 098 01 15	Elbow, Intake Pipe & Engine			1
-	000 997 21 90	Hose Clamp, Line Elbow			4

115	404 528 03 08	Intake Pipe			1
116	404 987 07 43	Elbow			1
117	406 987 50 45	Cap			1
-	000 997 12 90	Hose Clamp			1
119	007603 010100	Seal Ring			1
120	007604 010100	Screw Plug			1
121	000125 006410	Washer			1
122	000933 006102	Screw			1
123	404 528 05 08	Breather Pipe			1
124	404 987 09 43	Reducing Elbow			1
125	404 524 00 40	Mounting Plate, at Cylinder Head			1
126	007980 010002	Lock Washer			1
127	000912 010006	Cylindrical Head Screw			1
128	007980 012002	Lock Washer			1
129	000912 012003	Cylindrical Head Screw			1
130	912004 008100	Lock Washer			1
131	000933 008036	Screw			1
134	426 090 00 29	Intake Duct	6		1
135	000933 008028	Screw	6		3
136	000137 008202	Spring Washer	6		3
137	000 094 97 06	Cap, Detachable	6		1
138	406 092 06 44	Rubber Elbow	6		1
-	001 997 16 90	Hose Clamp, Rubber Elbow	6		2
-	406 987 76 43	Intake Elbow, Oil Bath Air Cleaner	7		1

Table 07 - Intake/Exhaust Manifold - Group 14

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
			Intake Manifold					
1	180 140 51 01		Intake Manifold		1			
2	000835 008056		Stud,		1			
3	000835 008057		Stud,		2			
4	000939 008059		Stud,		4			

5	007604 014102	Screw Plug	1
6	007603 014100	Seal Ring	1
Exhaust Manifold			
11	180 140 09 11	Exhaust Manifold, Front Section	1
12	181 143 03 50	Bushing, Heater Flap Shaft	2
13	000 991 00 61	Neck-Type Pin, Grooved	1
14	000 991 02 61	Neck-Type Pin, Grooved	1
15	180 143 01 06	Heater Flap, Exhaust Manifold	1
16	186 143 01 05	Shaft, Heater Flap	1
17	153 143 00 10	Thermo Spiral	1
18	180 143 04 07	Balancing Weight, Heater Flap	1
19	001481 003004	Clamping Pin	1
20	121 993 04 25	Tension Spring	2
21	180 140 00 27	Damping Spring, Heater Flap	1
22	000912 005007	Cylindrical Head Screw	1
23	912004 005100	Lock Washer	1
24	180 141 00 62	Insulating Flange	1
25	000 990 08 51	Hex. Nut	3
27	180 142 00 04	Exhaust Manifold, Rear Section	1
28	180 142 03 80	Gasket	1
-	180 142 04 80	Gasket	1
-	180 142 05 80	Gasket	1
29	000125 010517	Washer	6
30	000137 010101	Spring Washer	3
31	999901 010000	Nut	8

Table 08 – Electrical Equipment – Group 15

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
Starter								
1	000 151 65 01		Starter Motor			1	1	
-	001 151 75 01		Starter Motor					1

3	000 151 16 13	Overrunning Clutch, with Pinion		1	1	
-	000 151 57 13	Overrunning Clutch, with Pinion				1
5	000 152 04 10	Starter Magnetic Switch		1	1	
-	000 152 28 10	Starter Magnetic Switch				1
-	000 151 09 14	Carbon Brush		4	4	
-	000 151 48 14	Set of Carbon Brushes				1
9	000 151 01 93	Pressure Spring, Carbon Brush		4	4	
-	000 151 11 93	Pressure Spring, Carbon Brush				1
11	000 151 00 50	Bearing Bushing, Drive & Commutator		2	2	
-	000 151 17 50	Bearing Bushing, Drive & Commutator				2
14	000960 012010	Screw		2	2	
-	000961 012023	Screw				2
15	000127 012201	Lock Washer		2		
		Generator				
21	000 154 80 02	Generator	5	1	1	
22	003 154 55 02	Generator				1
-	000 154 21 14	Set of Carbon Brushes		1	1	
-	000 154 55 14	Set of Carbon Brushes				1
25	000 154 01 93	Pressure Spring		4	4	
-	000 154 09 93	Pressure Spring				2
-	000084 005102	Cylindrical Head Screw		4	4	
-	000127 005200	Lock Washer		4	4	
27	30.4041.1107-00	Pulley		1	1	
28	000 155 31 18	Pulley				1
35	000 155 29 18	Fan				1
36	006888 004002	Woodruff Key	1			
37	000127 014201	Lock Washer	1			
38	000936 014005	Nut	1			
39	001 156 08 01	Suppressor Condenser				1
40	000 159 08 34	Connecting Cable				1
42	30.4041.0701-00	Frame		1	1	

43	130 150 09 73	Frame				1
44	000137 008202	Spring Washer		2		
45	000934 008013	Nut		2		
46	30.4041.1005-00	Spacer Tube		1	1	
47	30.4041.1016-00	Spacer Sleeve		1	1	
48	30.4041.1012-00	Spacer Sleeve		1	1	
49	30.4041.1007-00	Hex. Head Screw		1	1	
50	000127 010205	Lock Washer		1	1	
51	000934 010000	Nut		1	1	
-	30.4041.1088-00	Replaced By 121 155 24 23 Together with 121 155 02 72 121 155 00 71, 000127 014201 and 900071 010202	3	-	-	
54	121 155 24 23	Clamping Bolt	4	1	1	
55	121 155 02 28	Clamping Piece		1	1	
-	121 155 00 72	Replaced By 121 155 02 72 Together with 121 155 24 23 121 155 00 71, 000127 014201 and 900071 010202	3	-	-	
56	121 155 02 73	Clamping Nut	4	1	1	
58	000934 008008	Nut	3	1	1	
-	900071 010202	Nut	4	1	1	
60	30.4041.1085-00	Hex. Head Screw		1	1	
61	000127 016202	Lock Washer		1	1	
62	000137 010201	Spring Washer		1	1	
63	000931 008171	Screw		1	1	
64	000125 008407	Washer		1	1	
65	404 155 00 53	Sleeve		1	1	
66	000137 008202	Spring Washer		1	1	
67	000934 008045	Nut		1	1	

Table 09 – Engine Ignition – Group 15

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
			Distributor					

1	000 158 82 01	Ignition Distributor, One-Part Coupling	1		
2	000 158 12 02	Ignition Shield, Distributor Cap & Brush	1		
-	000 158 00 34	Replaced By 000 158 04 34		-	-
4	000 158 04 34	Carbon Brush with Spring	1		
5	000 158 04 89	Oiler	1		
-	000 156 04 81	Rubber Seal Ring, Ignition Shield	1		
7	000 158 08 90	Points	1		
8	000 158 15 31	Rotor, Dust-Proof & Shielded	1		
9	000 156 71 01	Condenser	1		
-	000084 004158	Cylindrical Head Screw	2		
-	000127 004200	Lock Washer	2		
10	000 158 05 09	Coupling, One-Part	1		
-	000 158 01 76	Replaced By 000 158 02 76		-	-
11	000 158 02 76	Fiber Washer	1		
12	000 158 00 52	Spacer Washer, 1.0 mm thick	nB		
-	000 158 04 52	Spacer Washer, 2.0 mm thick	nB		
13	000 158 07 74	Pin	1		
14	000 158 02 77	Snap Ring	1		
21	000 150 21 18	Screened Cable	1		
22	000 156 03 81	Rubber Seal Ring	1		
23	180 586 03 90	Repair Kit, Distributor	1		
-	130 150 17 07	These Two Replaced By		-	-
-	130 150 18 07	114 150 00 07			
24	114 150 00 07	Bearing, Distributor	1		
25	180 150 05 24	Timing Lever	8	1	1
26	000912 006042	Cylindrical Head Screw	8	1	1
27	180 158 05 21	Adjusting Eccentric		1	1
28	000933 006078	Screw		1	1
-	000933 006106	Screw	8	1	1
29	000137 006203	Spring Washer	8	1	1
30	000433 006402	Washer		1	

31	000912 006042		Cylindrical Head Screw		1			
32	121 158 00 51		Intermediate Ring		1			
33	000912 008072		Cylindrical Head Screw		1			
34	000433 008403		Washer		1			
45	180 150 11 19		Spark Plug Wire Rail Harness		1			
46	180 150 21 18		Spark Plug Wires No. 1, 2		2			
47	180 150 22 18		Spark Plug Wires No. 3, 4		2			
48	180 150 23 18		Spark Plug Wires No. 5, 6		2			
49	000 156 15 10		Suppressor Cap		6			
50	000 159 09 85		Boot		6			
51	000 159 10 85		Boot		6			
52	000 997 02 83		Hose, Distributor Side		6			
53	000 990 16 54		Nut		6			
54	000 997 28 40		Seal		6			
55	000 156 03 20		Connector		6			
56	000 158 08 74		Pin		6			
57	000 997 22 81		Grommet, Protective Tube		6			
58	000 150 20 18		Coil Wire		1			
-	000933 008106		Screw		2			
-	00127 008203		Lock Washer		2			
			Spark Plugs					
-	000 159 51 03		These Two Replaced By		-			
-	000 159 85 03		000 159 68 03 or 000 159 71 03					
60	000 159 68 03		Spark Plug		6			
-	000 159 71 03		Spark Plug		6			
-	000 159 84 03		These Two Replaced By		-			
-	000 159 90 03		000 159 85 03 or 000 159 86 03					
-	000 159 85 03		Spark Plug		6		6	
-	000 159 86 03		Spark Plug		6		6	

Table 10 – Oil Pump – Group 18

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
			Oil Pump					

1	180 180 08 01	Oil Pump	1	1	
-	130 180 06 01	Oil Pump			1
2	180 181 01 50	Bearing Bushing	1		
3	180 180 03 07	Drive Shaft with Gear (optional)	1	1	
-	108 180 01 07	Drive Shaft with Gear	1	1	
-	130 180 02 07	Drive Shaft with Gear			1
4	180 180 02 08	Oil Pump Spindle with Gear	1	1	
-	180 180 03 08	Oil Pump Spindle with Gear (optional)	1	1	
-	116 180 02 08	Oil Pump Spindle with Gear			1
-	114 180 01 15	Oil Pressure Relief Valve			1
-	114 993 00 01	Spring			1
-	321 181 00 42	Piston			1
-	073123 012300	Snap Ring			1
6	121 180 01 55	Strainer	1		
7	000 994 23 35	Snap Ring	1		
9	121 186 00 80	Gasket, Oil Pump Housing	1		
10	000931 006056	Screw	1		
-	000931 006059	Screw			2
-	000931 006044	Screw	2	2	
-	000931 006059	Screw			2
-	000931 006163	Screw	2	2	
11	000137 006200	Spring Washer	5		
-	900055 006002	Spring Washer			4
-	913002 006000	Nut	4		
12	180 091 03 12	Cam	1		
14	000912 008005	Cylindrical Head Screw	1		
15	000137 008207	Spring Washer	1		
-	000933 006024	Screw	1		
-	000127 006200	Lock Washer	1		
-	000934 006000	Nut	1		

Oil Filter

18	000 184 96 01	Oil Filter (optional)	1	1	
-	000 184 97 01	Oil Filter	1	1	
-	002 184 25 01	Oil Filter			1
-	002 184 26 01	Oil Filter			1
19	000 184 11 08	Oil Filter Housing Upper Part	1	1	
-	000 184 66 08	Oil Filter Housing Upper Part			1
-	181 184 00 30	Valve Cone			1
-	181 993 06 01	Spring			1
-	007603 018400	Seal Ring			1
-	000 184 05 56	Screw Plug			1
20	000 184 02 17	Screw Fitting			2
22	181 184 00 30	Valve Cone	1	1	
23	181 993 06 01	Spring	1	1	
24	007603 018400	Seal Ring	1	1	
25	000 184 05 56	Screw Plug	1	1	
26	180 184 01 17	Screw Fitting	1	1	
28	000 184 33 80	Seal Ring	1		
30	000 184 23 02	Housing	1		
34	000 184 17 80	Seal Ring, Housing to Filter	1		
35	000 184 32 80	Seal Ring, Screw to Housing	1		
37	181 997 03 41	Seal Ring, Housing Upper to Lower	1		
38	000 184 42 25	No Longer Available as a Spare Part	-	-	
-	000 184 43 25	Filter Element	1		
40	000960 010024	Screw	1		
41	000 997 24 44	Seal Ring	1		
45	121 184 00 80	Gasket	1		
46	000912 008019	Cylindrical Head Screw	1		
47	000912 008038	Cylindrical Head Screw	2		
48	000433 008403	Washer	3		

Oil Pressure Relief Valve

-	127 180 00 15	Replaced By 114 180 02 15	-	-	
50	114 180 02 15	Oil Pressure Relief Valve	1		
51	127 993 02 01	Spring	1		
52	321 181 00 42	Piston	1		
53	000472 012000	Lock Ring	9	1	1
54	073123 012300	Snap Ring	10	1	1 1
-	127 184 01 56	Replaced By 130 180 00 56	-	-	
55	130 180 00 56	Screw Plug, Oil Pressure Relief Valve	1		
56	007603 024105	Seal Ring	1		
57	001 542 49 17	Sending Unit, Oil Pressure Gauge			1

Table 11 – Engine Cooling – Group 20

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
Water Pump								
1	180 200 15 01		Water Pump less Pulley		1			
3	180 201 04 05		Shaft, Water Pump		1			
4	127 201 01 07		Impeller		1			
5	000 201 27 19		Slide Ring Seal, Axial		1			
10	136 997 00 47		Seal Ring		1			
11	000625 036202		Grooved Ball Bearing		1			
12	000471 015000		Lock Ring		1			
13	180 201 01 51		Spacer Sleeve		1			
14	000625 036302		Grooved Ball Bearing		1			
15	180 200 00 60		Holder, Seal Ring		1			
16	180 997 01 47		Seal Ring		1			
17	180 201 00 18		Intermediate Ring		1			
18	180 202 00 14		Hub		1			
22	127 201 02 01		Housing, Water Pump		1			
23	121 201 00 80		Gasket		1			
24	007604 008100		Screw Plug		1			
25	007603 008101		Seal Ring		1			

26	127 997 00 30	Screw Plug	1		
27	007603 010101	Seal Ring	1		
-	000933 006026	Screw	5		
28	007604 016100	Screw Plug	1		
29	007603 016000	Seal Ring	1		
30	180 205 07 10	Pulley	1	1	
-	180 205 14 10	Pulley			1
31	30.4041.0725-00	Pulley, Fan Drive	1	1	
32	000933 008028	Screw	3	3	
33	000137 008200	Spring Washer	3	3	
-	180 200 23 05	Pulley			1
-	130 202 00 52	Spacer Washer			1
-	000137 008202	Spring Washer			3
-	000912 008009	Cylindrical Head Screw			3
-	180 203 06 80	Replaced By 180 203 09 80 Together with 621 990 03 40	-	-	
37	180 203 09 80	Gasket	1		
-	621 990 02 40	Replaced By 621 990 03 40 Together with 180 203 09 80	-	-	
38	621 990 03 40	Washer	1		
39	000931 008046	Screw	2		
40	000912 008022	Cylindrical Head Screw	1		
41	000137 008200	Spring Washer	3		
42	180 200 03 58	Breather Line, Water Pump	1		
43	915011 002102	Hollow Screw	2		
44	007603 008101	Seal Ring	4		
Water Outlet					
47	404 203 02 31	Water Cooling Outlet	1	1	
48	130 203 01 31	Water Cooling Outlet			1
49	007604 016100	Screw Plug	1	1	
50	007603 016100	Seal Ring	1	1	
51	180 203 08 80	Gasket	1		

52	000433 008400	Washer	2	2	
53	000 990 08 51	Hex. Nut	2	2	
-	000137 008103	Spring Washer			2
-	001 990 51 51	Hex. Nut			2
54	180 203 02 36	Connector, Heating			1
-	007603 032103	Seal Ring			1
55	116 130 01 60	Pulley, Belt Tensioner			1
57	130 202 00 53	Spacer Sleeve			1
58	130 990 00 14	Fitted Screw			1
-	130 206 00 33	Lever			1
-	000127 014203	Lock Washer			1
-	000934 014000	Nut			1
-	30.4041.1069-00	Clamping Plate			2
-	000137 008200	Spring Washer			2
-	000933 008062	Screw			2
Fan Drive Assembly					
60	30.4041.0712-00	V-Belt Pulley	1	1	
-	404 200 00 05	V-Belt Pulley			1
61	30.4041.1063-00	Hub	1	1	
-	130 205 00 04	Hub			1
62	30.4041.1064-00	Race	1		
63	000 997 22 45	Seal Ring	1		
64	30.4041.1065-00	Spacer Ring	1		
65	000625 006004	Grooved Ball Bearing	2		
66	30.4041.1066-00	Spacer Ring	1	1	
67	000472 042000	Lock Ring	1		
68	000137 016200	Spring Washer	1		
69	000936 016001	Nut	1		
70	30.4041.1067-00	Gasket, Hub to Fan	2		
71	404 205 00 26	Intermediate Ring	1		

72	404 205 02 06	Fan	1		
73	007604 008100	Screw Plug	1		
74	007603 008101	Seal Ring	1		
-	000933 008062	Screw	3	3	
-	000933 008094	Screw	3	3	
-	000931 008086	Screw			3
-	000137 008200	Spring Washer	6	6	3
V-Belt Tensioner Assembly					
80	30.4041.1123-00	Hub Half, Rear	1	1	
81	30.4041.1127-00	Pivot Pin	1	1	
-	30.4041.1064-00	Race	1	1	
82	000 997 22 45	Seal Ring	1	1	
83	000472 042000	Lock Ring	1	1	
84	30.4041.1066-00	Spacer Ring	2	2	
85	000625 026004	Grooved Ball Bearing	1	1	
86	30.4041.1070-00	Spacer Ring	1	1	
87	30.4041.1126-00	Spacer Ring	1	1	
88	000471 020000	Lock Ring	1	1	
89	30.4041.1074-00	Gasket	2	2	
90	404 205 00 19	Hub Half, Front	1	1	
91	007604 008100	Screw Plug	1	1	
92	007603 008101	Seal Ring	1	1	
93	30.4041.0724-00	Pulley, Fan Belt Tensioner	1	1	
94	000933 008062	Screw	3	3	
95	000127 008204	Lock Washer	3	3	
-	007980 008004	Lock Washer			3
-	007984 008001	Screw			3
-	007603 008101	Seal Ring	1	1	
96	30.4041.1058-00	Lever, Fan Belt Tensioner to Support	1	1	
97	000007 006207	Cylindrical Pin	1	1	
98	900055 014000	Spring Washer	2	2	

99	000127 014200	Lock Washer	1	1	
100	000936 014000	Nut	1	1	
101	30.4041.1069-00	Clamping Plate, Lever	2	2	
102	000931 008000	Screw	2	2	
103	000137 008200	Spring Washer	2	2	
-	007753 009505	V-Belt, Water, Generator, Fan	1	1	
-	007753 009507	V-Belt, Water, Generator	1	1	
-	007753 009504	V-Belt			2

Table 12 – Engine Mounting – Group 22

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	952	953	958
Front Mount								
1	180 220 06 16		Engine Support, Front			1	1	
-	130 223 01 01		Engine Support, Front					1
3	180 223 04 12		Rubber Mounting			1	1	
4	006797 010151		Toothed Washer		3			
5	000933 010058		Screw			1	1	2
6	000912 010012		Cylindrical Head Screw		1			
7	000933 010020		Screw			1	1	
-	130 014 00 53		Spacer Tube					2
-	000127 012201		Lock Washer					2
-	000912 012049		Cylindrical Head Screw					2

Footnotes

Remarks Table 01 through 12

- 1 Up To Engine 055 765
- 2 From Engine 055 766
- 3 Up to Chassis 056 526
- 4 From Chassis 056 527
- 5 Applicable to 404.113.
- 6 Use Only with Cab 416.81
- 7 Use Only with Cab 406.82
- 8 Up To Engine Model 952 – 000 071

-
- Up To Engine Model 953 – 003 131
 - 9 Up To Engine Model 952 - 000 033
 - Up To Engine Model 953 – 002 376
 - 10 From Engine Model 952 – 000 034
 - From Engine Model 953 – 002 377
 - 11 Has Not Been Installed.
-

Table 1 - Engine Block - Group 01

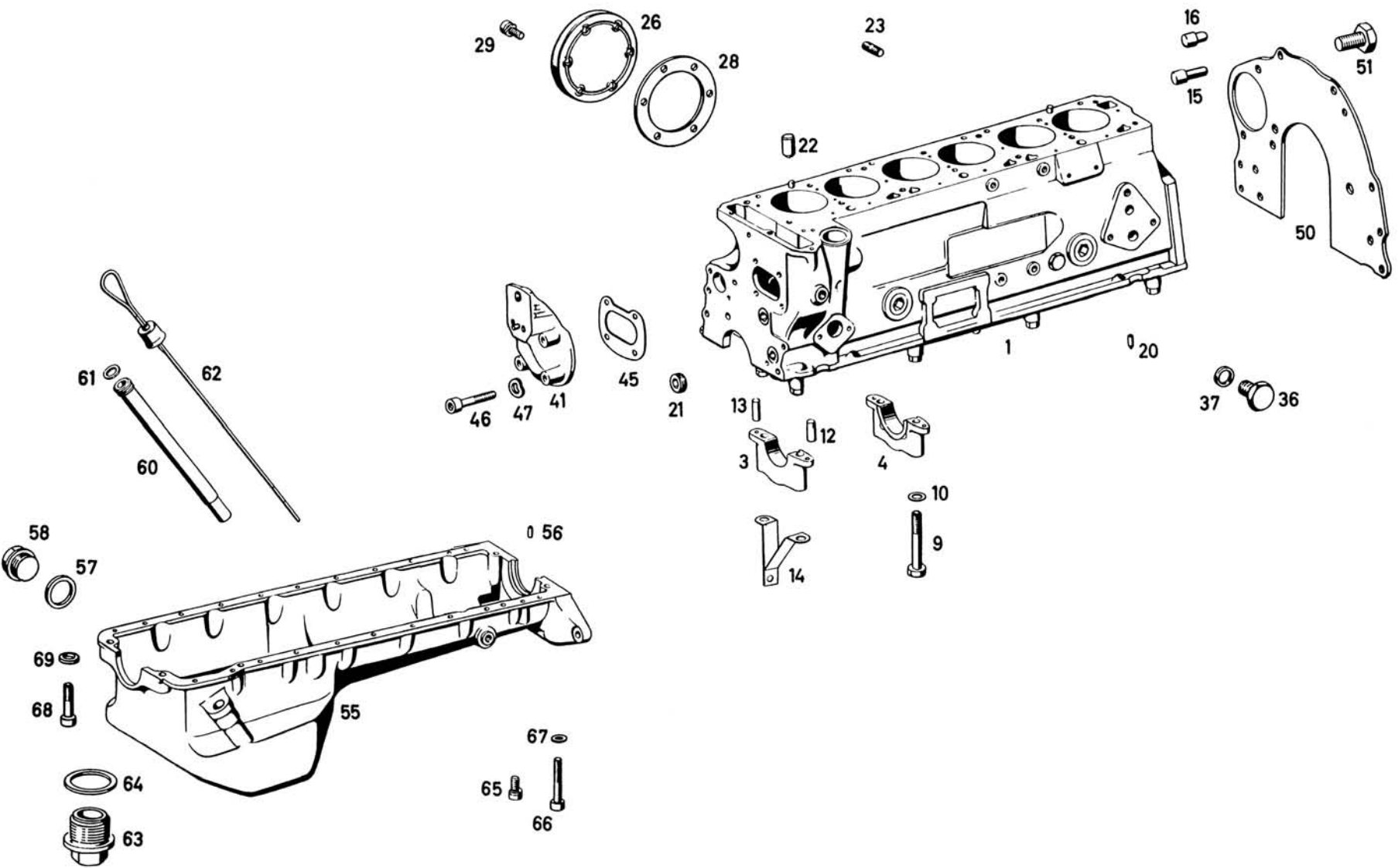


Table 2 - Cylinder Head - Group 01

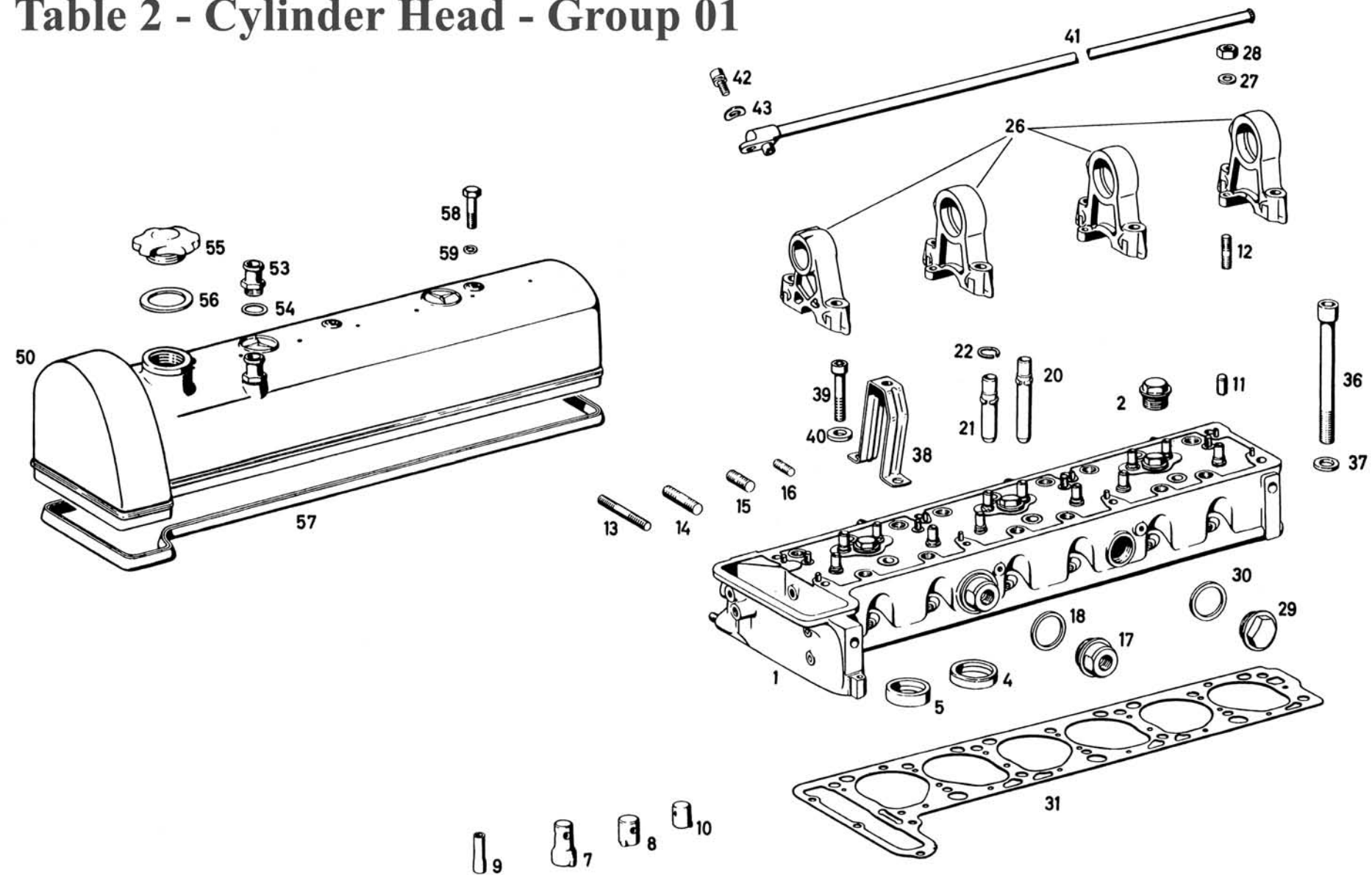


Table 3 - Crank Assembly - Group 03

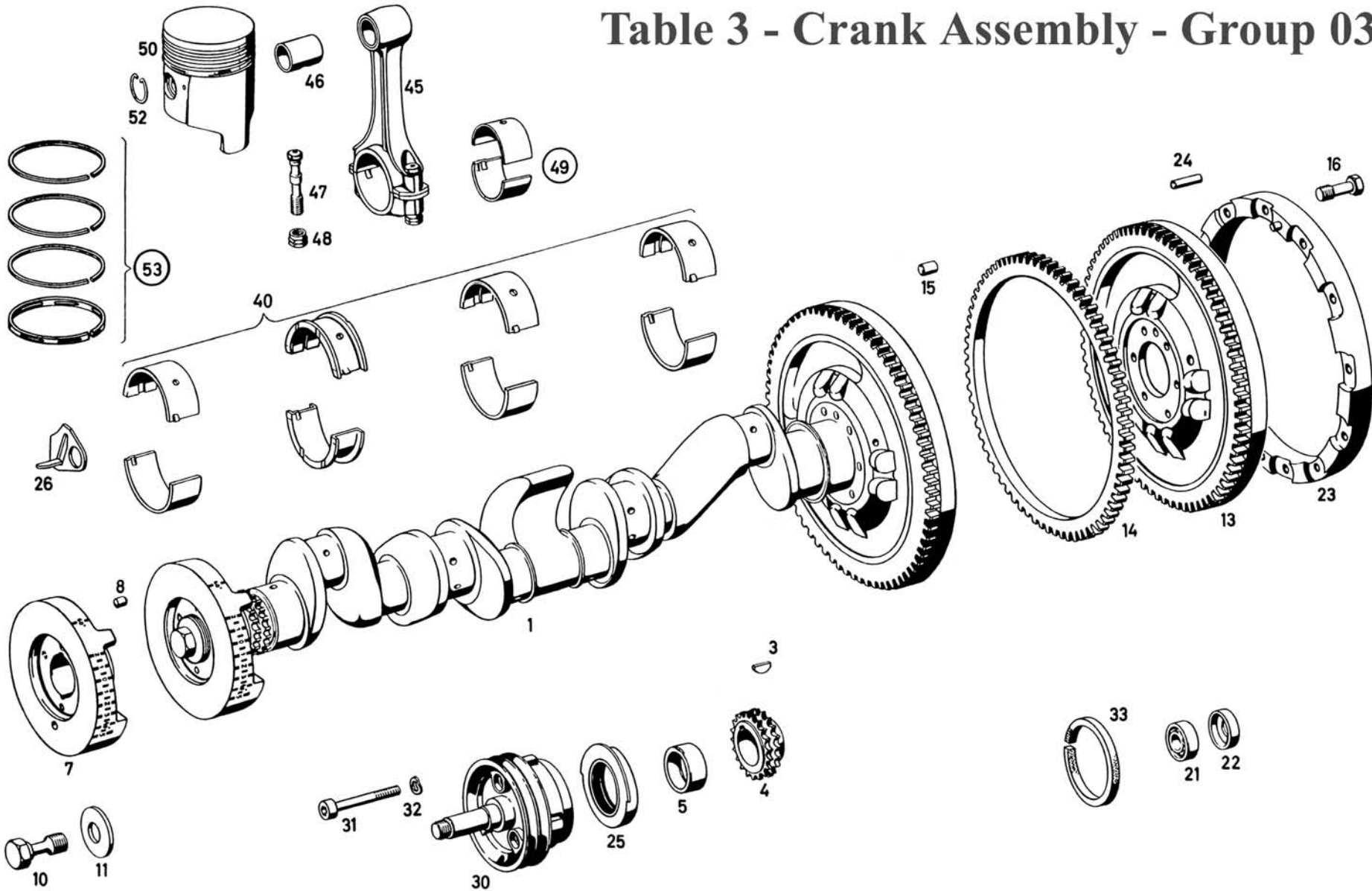


Table 4 - Cam / Timing - Group 05

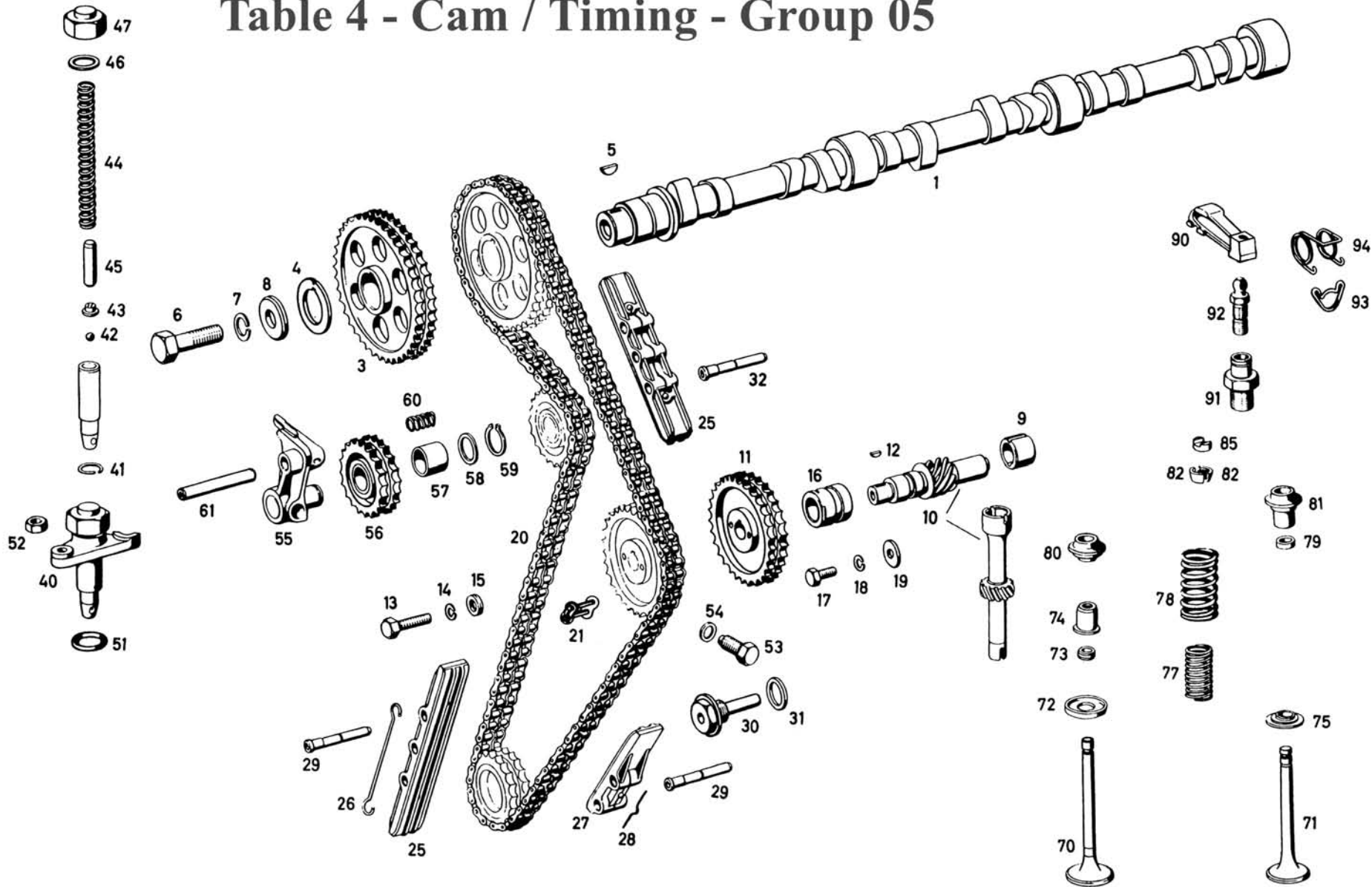


Table 5 - Carburetor - Group 07

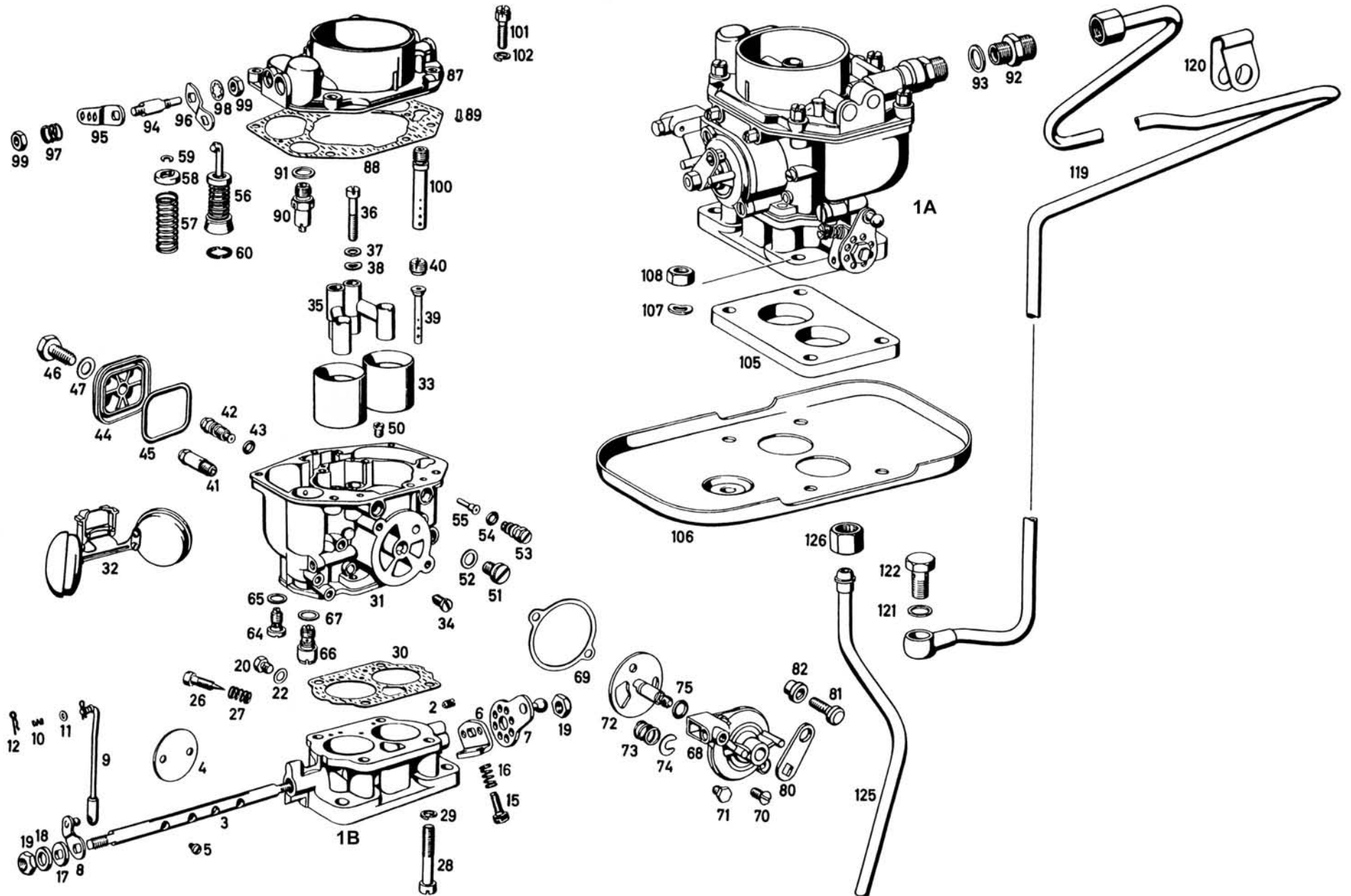


Table 6 - Air Cleaner Models 952, 953 - Group 09

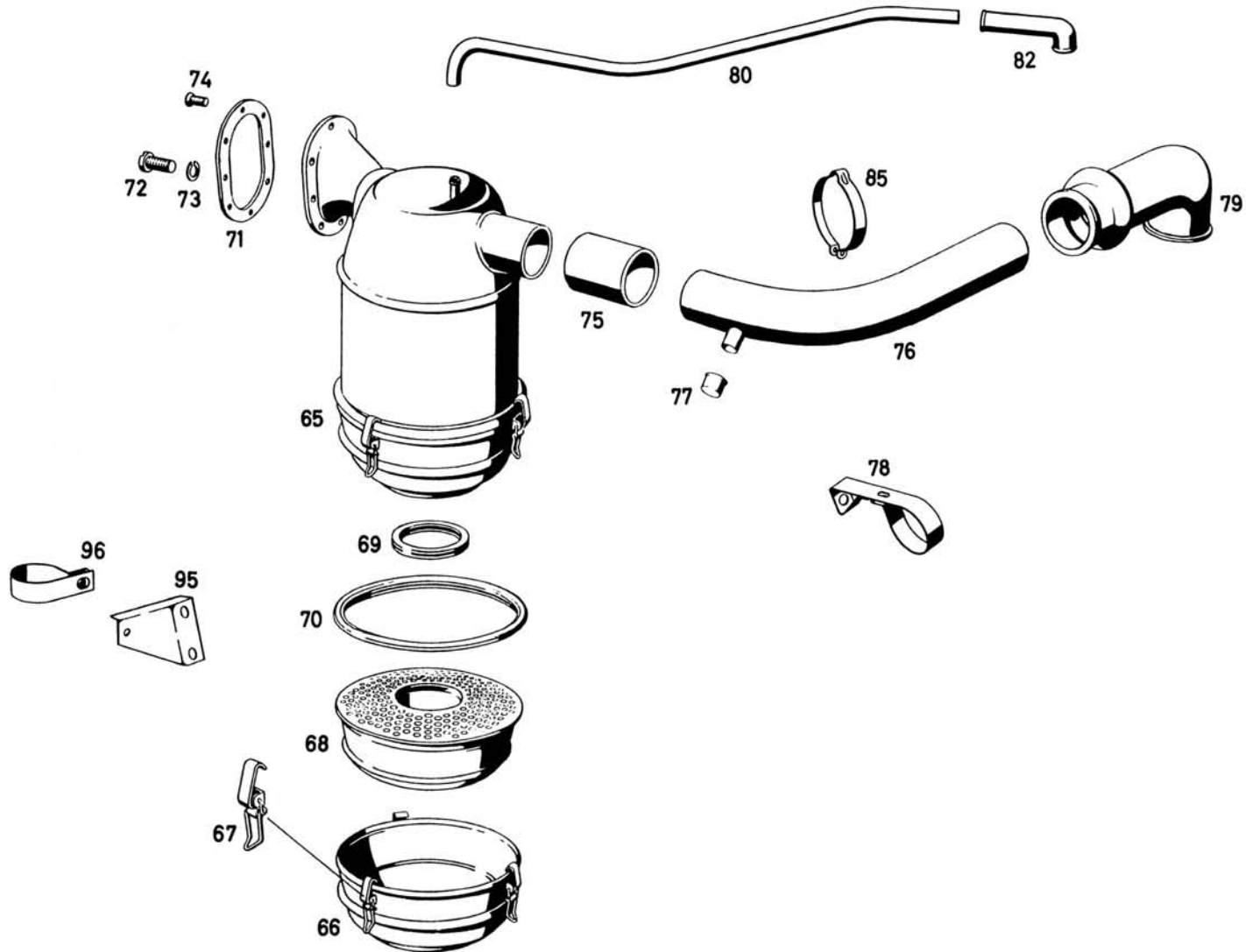


Table 6 - Air Cleaner Model 958

Group 09

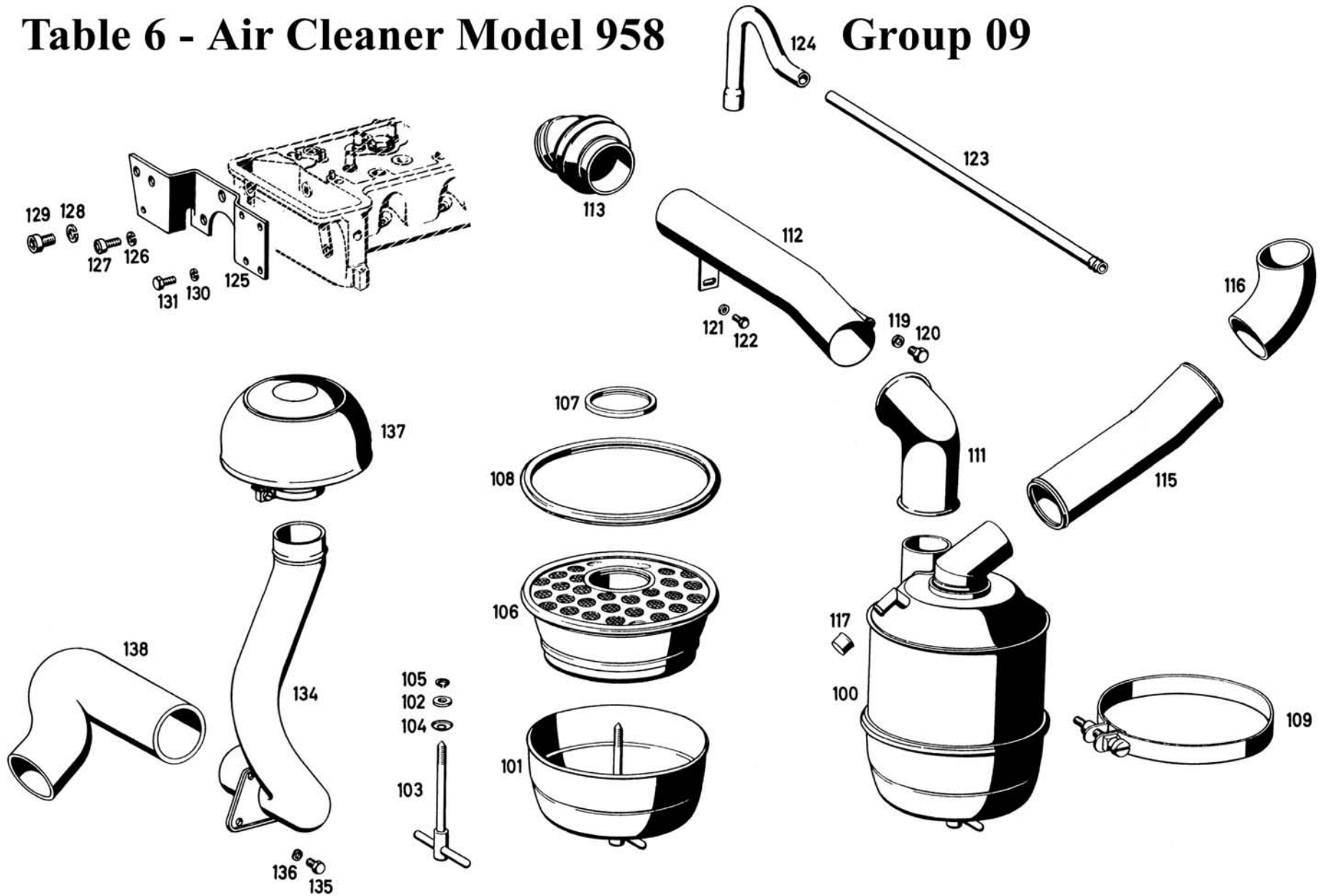


Table 6 - Fuel Pump - Group 09

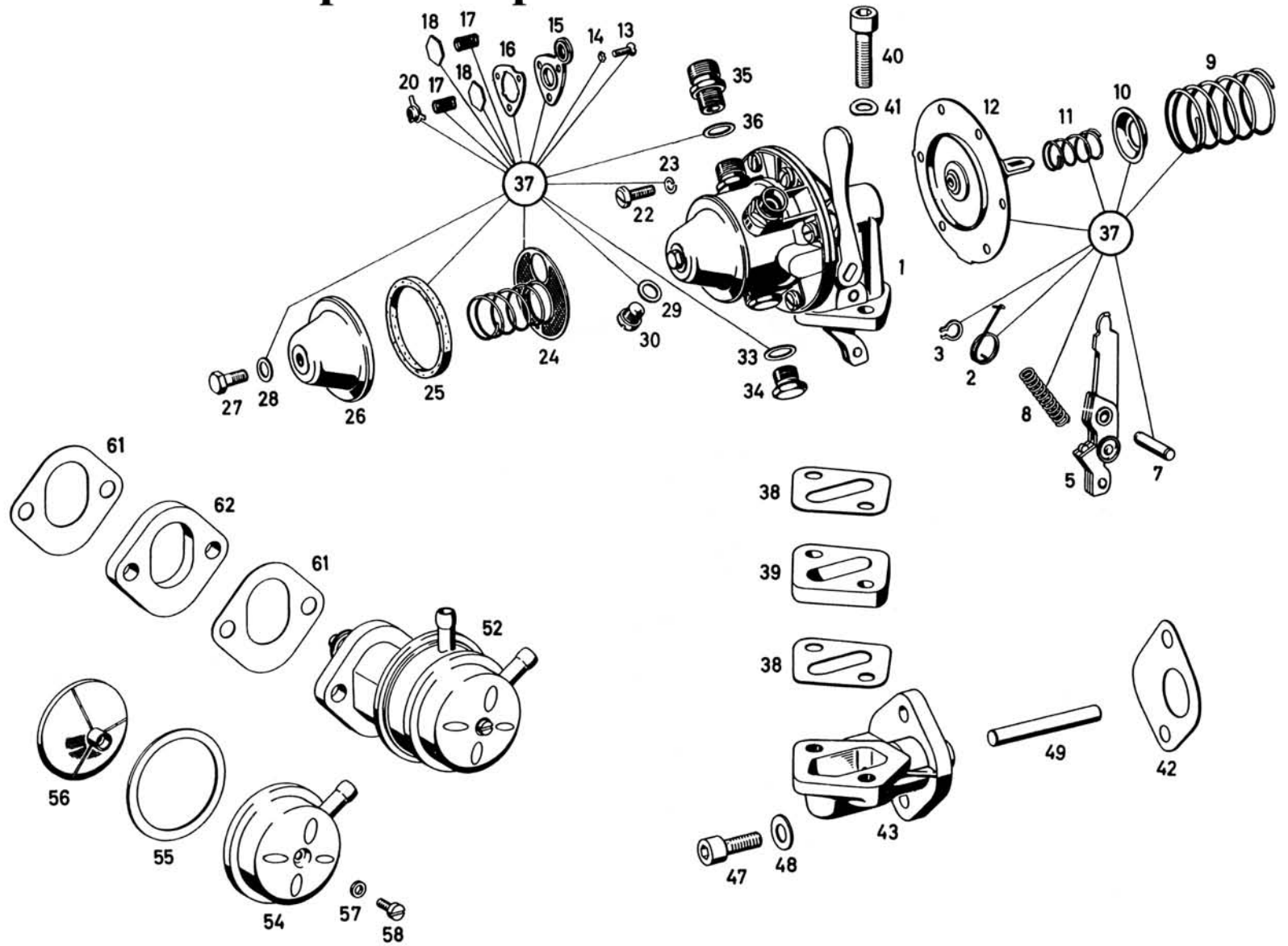


Table 7 - Intake / Exhaust Manifold - Group 14

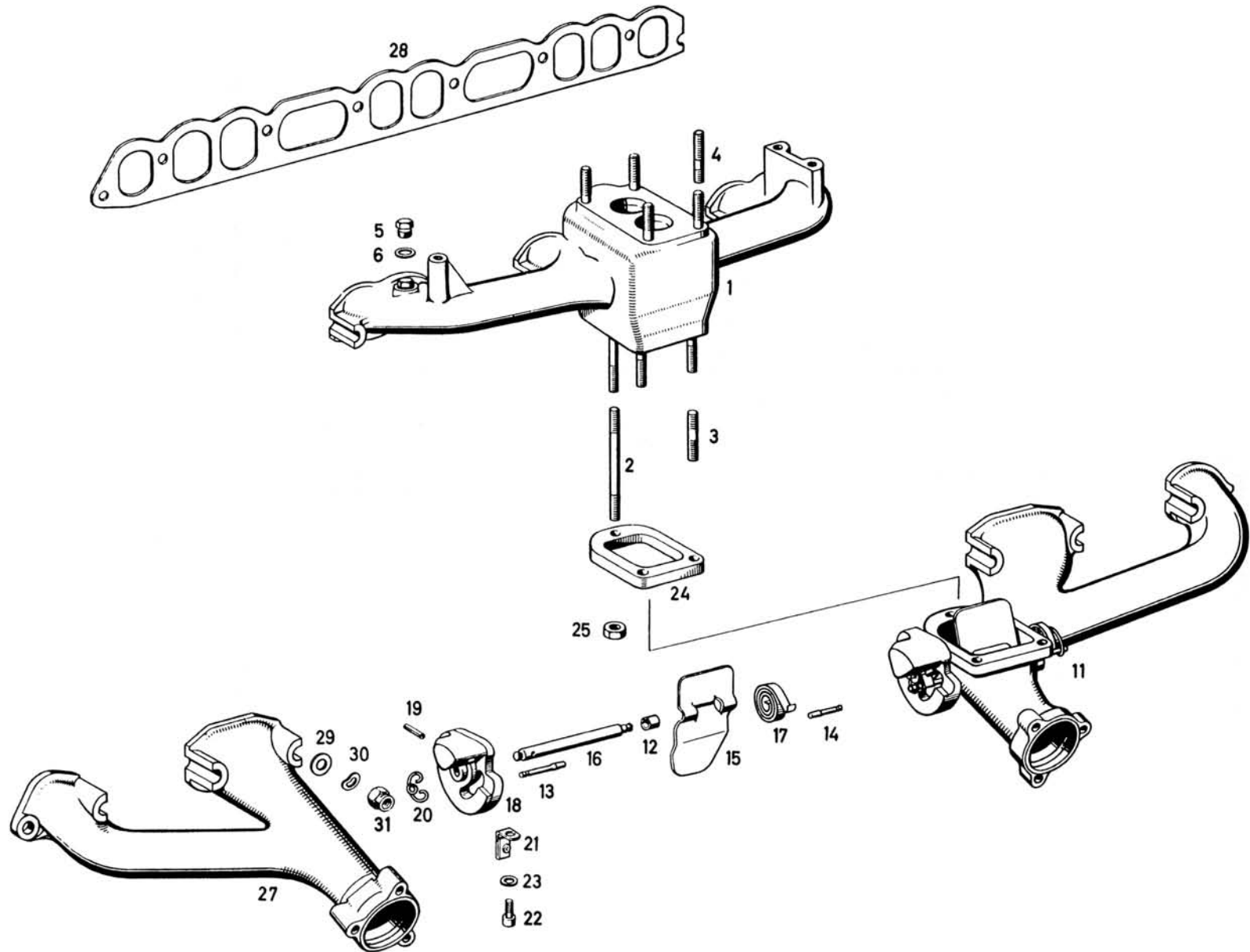


Table 8 - Starter / Generator - Group 15

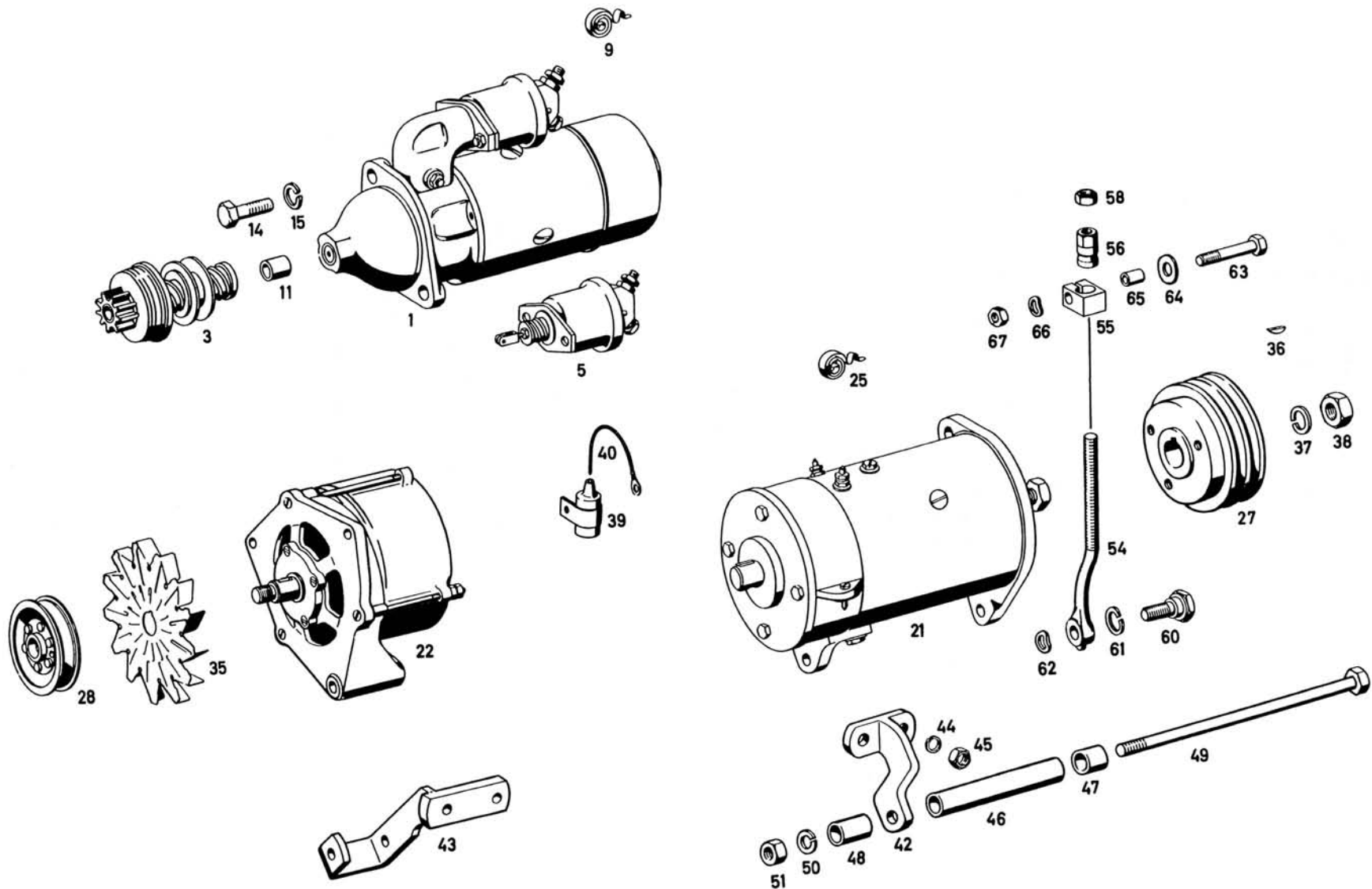


Table 9 - Ignition - Group 15

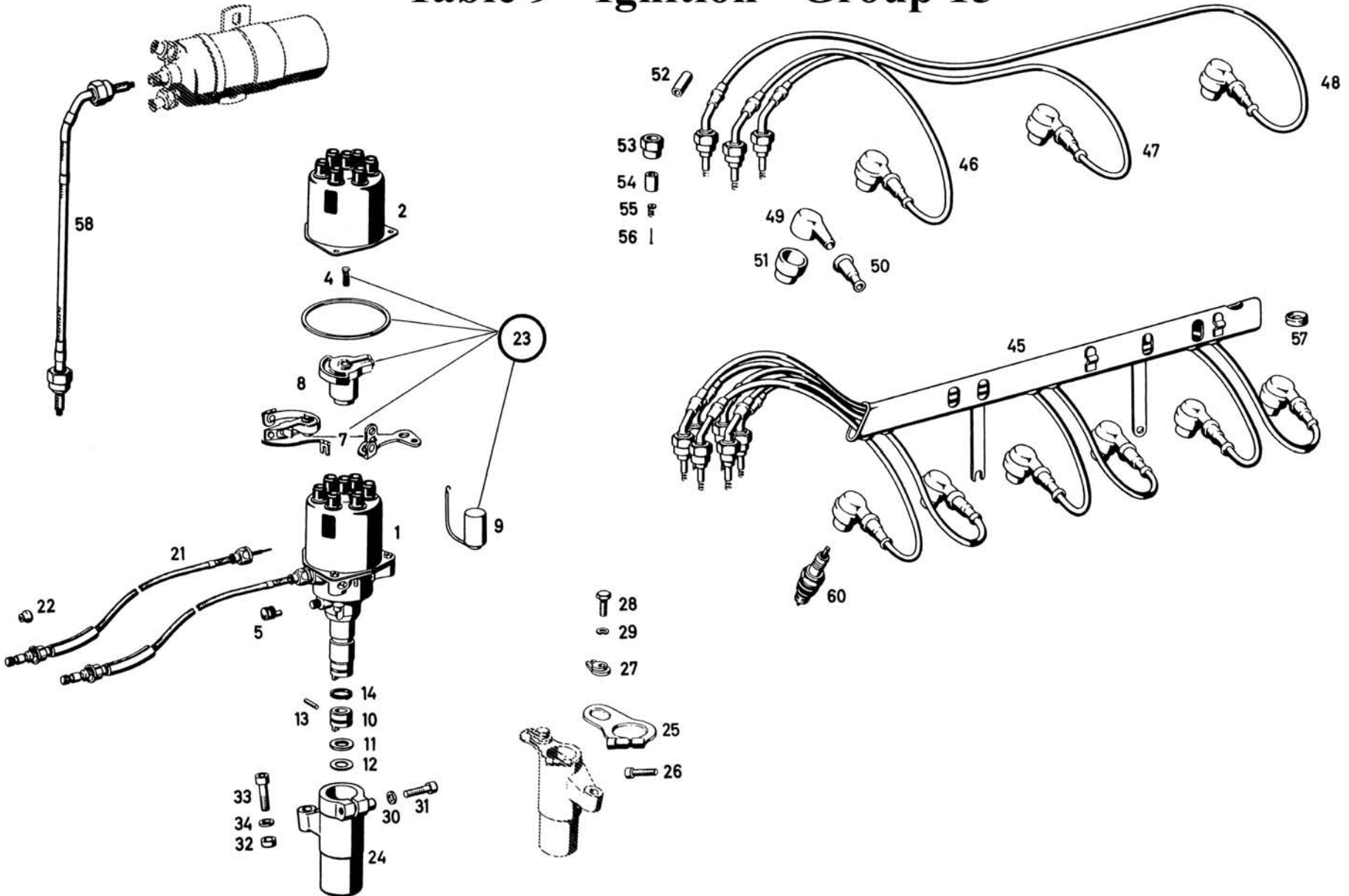


Table 10 - Engine Lubrication - Group 18

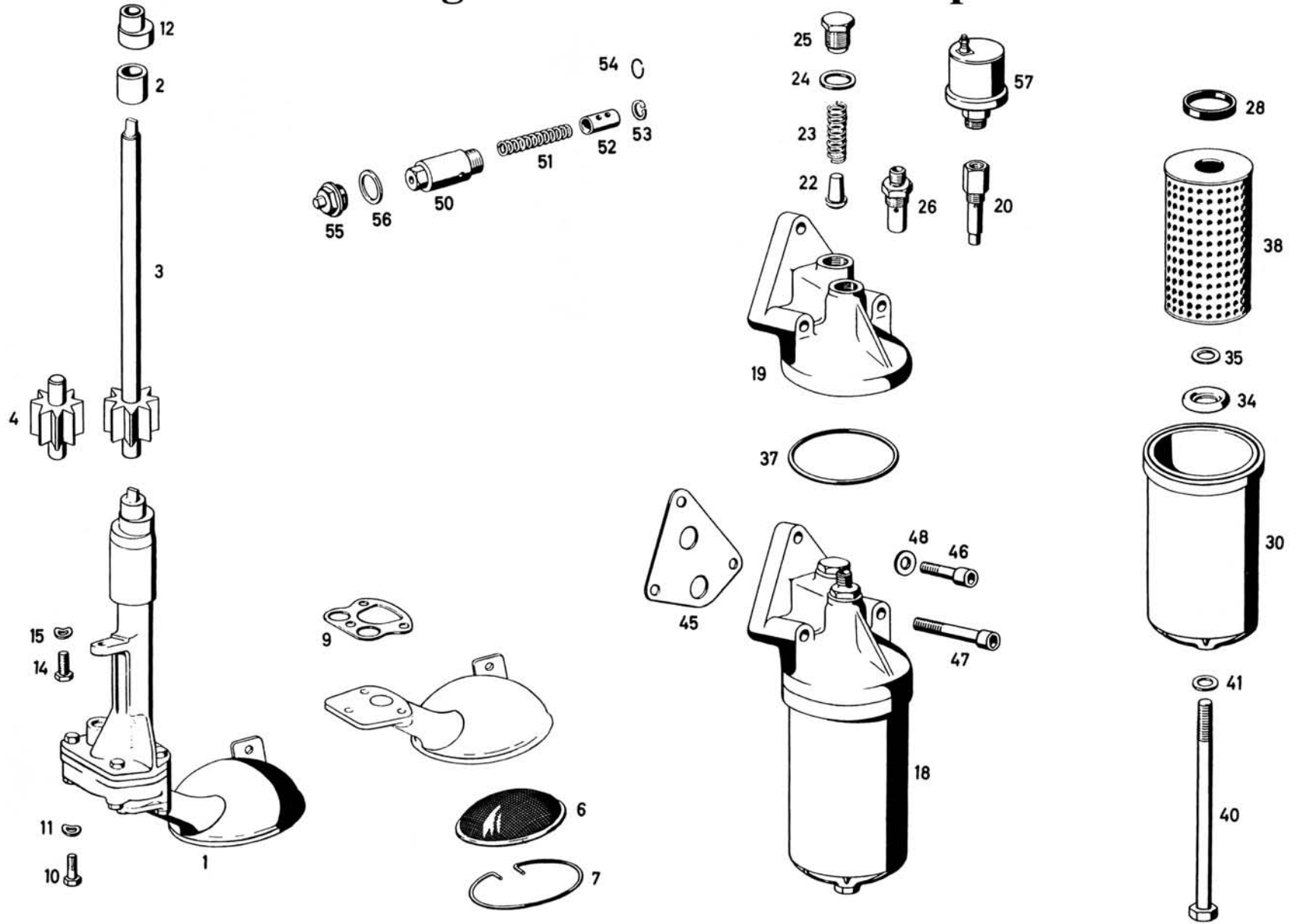


Table 11 - Engine Cooling - Group 20

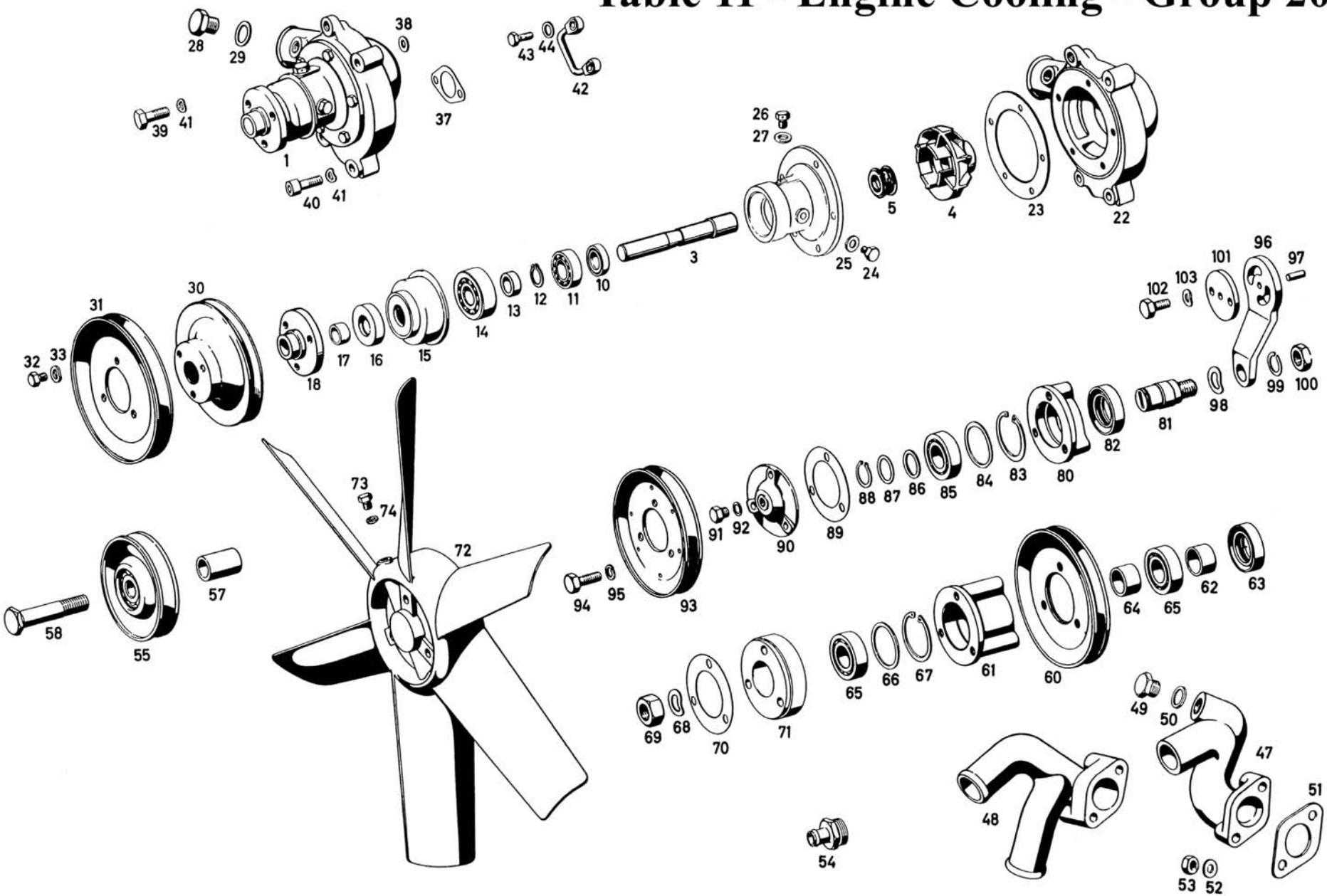
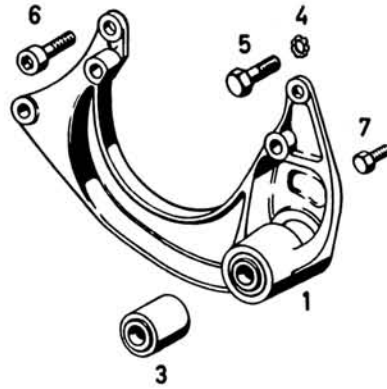


Table 12 - Engine Suspension - Group 22





Section 6– Unimog Type 404 Parts Film

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Table 00 – Engine M130 – Group 01

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
-	404 010 25 02		Engine, 7.8 : 1 Compression Ratio			1	
-	130 010 24 98		Engine, 7.8 : 1 Compression Ratio				1
-	130 586 08 90		Gasket Kit, Engine	1		-	
-	130 586 21 90		Gasket Kit, Engine	2		1	1

Table 01 – Engine Block – Group 01

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
1	130 010 13 08		Block, less Intermediate Flange	1		1	
-	130 010 66 08		Block, less Intermediate Flange	2		1	1
2	000906 030003		Screw		2		
3	007603 010100		Seal Ring		1		
-	130 997 00 35		Tapered Plug, with Nozzle		3		
4	000933 010111		Screw		1		
5	108 010 00 23		Crankshaft Bearing Cap, 1, 3, 4		6		
6	108 010 01 23		Crankshaft Bearing Cap, Lapped Bearing		1		
7	000007 010101		Cylindrical Pin		7		
8	000007 008101		Cylindrical Pin		7		
9	108 011 01 71		Screw		14		
11	121 990 28 40		Washer		14		
13	130 015 00 05		Cylinder Side Cover		5		
14	180 015 08 05		Cylinder Side Cover		2		
15	130 015 00 21		Gasket		5		
16	180 015 10 21		Gasket		2		
-	000 990 30 12		Replaced By 914020 006009		-		
17	914020 006009		Combination Bolt		24		
18	180 072 01 81		Threaded Pin		3		
19	000125 006420		Washer		3		
21	180 991 03 62		Dowel Pin, Necked-Down		1		

22	180 991 04 62	Dowel Pin, Necked-Down	1			
23	186 991 00 55	Lock Pin, Fabric Seal Ring	1			
26	000961 014022	Screw		1		
27	636 997 02 44	Seal Ring		1		
28	000 990 47 12	Screw Plug, Front & Rear Oil Passages	2			
31	000939 008072	Stud, Generator Support	2			
32	900085 006001	Plug	1			
33	180 052 10 06	Bearing Bushing	1	-	-	
34	180 150 01 07	Bearing with Bushing	1			
-	000933 008123	Screw	1			
-	007603 008100	Seal Ring	1			
35	900037 010100	Dowel Pin, Cylinder Head	2			
36	180 011 14 05	Intermediate Plate	1			
37	000933 010008	Screw	2			
38	071401 014200	Drain Valve, Water				1
41	180 010 01 35	Cover	1			
42	000007 006207	Cylindrical Pin	1			
44	180 011 03 79	Gasket	1			
45	000137 006101	Spring Washer	4			
46	000912 006044	Cylindrical Head Screw	4			
-	-	Oil Pan Components	-	-	-	-
-	130 010 05 13	Replaced by 130 010 06 13			-	
47	130 010 06 13	Oil Pan, less Guide Tube		1		
-	130 010 12 13	Oil Pan, less Guide Tube				1
48	900421 012006	Threaded Bushing				4
50	186 991 00 55	Lock Pin	1			
51	007603 022400	Seal Ring				1
52	007604 022100	Screw Plug				1
54	136 997 12 30	Screw Plug	1			
55	007603 026301	Seal Ring	1			

56	914020 006000	Combination Bolt	20	
57	000433 008403	Washer	5	
58	000912 008066	Cylindrical Head Screw	2	
59	000912 008055	Cylindrical Head Screw	3	
60	000433 006402	Washer	2	
61	000912 006047	Cylindrical Head Screw	2	
62	180 010 07 66	Guide Tube		1
63	130 010 00 72	Oil Dipstick		1
64	198 997 00 40	Seal Ring		1
65	130 186 00 40	Bracket, Oil Pump 130 180 01 01		1
-	130 186 01 40	Bracket, Oil Pump 130 180 05 01		1
-	180 186 02 40	Bracket, Oil Pump Suction Pipe		1

Table 02 – Cylinder Head – Group 01

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
			Cylinder Head				
1	130 010 28 20		Head, with Studs & Valve Guides	1		1	
-	130 010 63 20		Head, with Studs & Valve Guides	2		1	1
2	180 997 06 30		Screw Plug			3	
4	108 053 00 31		Valve Seat Ring, Standard			6	
-	108 053 01 31		Valve Seat Ring 44.0 mm Ø			6	
5	129 053 00 32		Valve Seat Ring Standard Ø			6	
-	129 053 01 32		Valve Seat Ring 42.3 mm Ø			6	
7	127 016 08 60		Water Distributor			3	
9	127 016 04 60		Water Distributor			1	
11	000007 008202		Cylindrical Pin			8	
12	000939 008004		Stud			4	
14	000935 010046		Stud, Manifold		6		
15	000835 010047		Stud, Exhaust Manifold		2		
16	000939 008048		Stud, Chain Tensioner Housing		1		
-	127 050 10 24		Replaced By 130 050 00 24			-	

20	130 050 00 24	Valve Guide Intake 14.012 – 14.021 OD Ø Color Green Valve Guide Intake 14.021 – 14.030 OD Ø Color Brown	6	
-	127 050 12 24	Replaced By 130 050 01 24		-
-	130 050 01 24	Valve Guide Intake 14.030 – 14.039 OD Ø Color Grey-Green Valve Guide Intake 14.039 – 14.043 OD Ø Color Grey-Brown	6	
-	127 050 13 24	Replaced By 130 050 02 24		-
-	130 050 02 24	Valve Guide Intake 14.200 OD Ø Color Red	6	
-	127 050 14 24	Replaced By 130 050 03 24		-
-	130 050 03 24	Valve Guide Intake 14.400 OD Ø Color White	6	
21	009045 014000	Snap Ring	6	
22	108 050 05 24	Valve Guide Exhaust 15.007 – 15.013 OD Ø Color Green Valve Guide Exhaust 15.013 – 15.019 OD Ø Colorless Valve Guide Exhaust 15.019 – 15.025 OD Ø Color Brown	6	
-	108 050 06 24	Valve Guide Exhaust 15.025 – 15.031 OD Ø Color Grey-Green Valve Guide Exhaust 15.031 – 15.037 OD Ø Grey Valve Guide Exhaust 15.037 – 15.043 OD Ø Color Grey-Brown	6	
-	108 050 07 24	Valve Guide Exhaust 15.200 OD Ø Color Red	6	
-	108 050 08 24	Valve Guide Exhaust 15.400 OD Ø Color White	6	
-	009045 014000	Snap Ring	6	
26	114 050 00 97	Camshaft Bearings, Set - Standard	1	
-	114 050 01 97	Camshaft Bearings, Set – Intermediate .10 under	1	
-	114 050 02 97	Camshaft Bearings, Set - Repair Size .25 under	1	
27	000433 008400	Washer	4	
28	000934 008000	Nut	4	
29	621 016 05 29	Fitting, Heat Feeler		1
-	130 016 00 29	Fitting, Heat Feeler		1

30	007603 030100	Seal Ring		1			
31	836 997 00 30	Screw Plug		1			
32	007603 032103	Seal Ring		1			
33	000939 008053	Stud, Water Outlet			2		
-	000939 008045	Stud				2	
34	130 016 11 20	Replaced By 130 016 17 20			-		
-	130 016 17 20	Gasket, Head	1		1		
-	130 016 20 20	Replaced By 130 016 27 20	12		-		
-	130 016 27 20	Gasket, Head	6		1		1
-	000912 008008	Cylindrical Head Screw		2			
-	000433 008403	Washer		1			
-	000433 008400	Washer		2			
-	000912 008022	Cylindrical Head Screw		1			
36	000912 012039	Cylindrical Head Screw		8			
37	186 990 09 40	Washer		8			
38	115 016 00 38	Cylinder Head Cover, Clamp		3			
39	000912 012031	Cylindrical Head Screw		3			
40	130 990 01 40	Washer		6			
41	180 180 01 27	Oil Pipe	5		1		
-	130 180 02 27	Oil Pipe	6		1		1
42	000912 006039	Cylindrical Head Screw		1			
43	130 187 00 84	Shim		1			
44	000137 006203	Spring Washer		1			
45	121 995 04 20	Mounting Clamp	5		3		
-	130 995 00 20	Mounting Clamp	6		3		3
-	000137 004201	Spring Washer		3			
-	000933 004003	Screw		3			
-	-	- Valve Cover with Breather	-	-	-	-	-
-	180 010 25 30	Replaced By 180 010 26 30 together with 000 018 07 02	3		-		

50	180 010 26 30	Valve Cover, with Filler Cap	4	1	1
51	007603 018100	Seal Ring	1		
-	180 997 21 72	Replaced By 615 997 00 72		-	
52	615 997 00 72	Screw Fitting	1		
53	136 501 00 54	Screw Cap	3	1	
53a	000 018 07 02	Filler Cap	4	1	1
54	180 997 02 40	Seal Ring	3	1	
55	180 016 04 80	Gasket, Valve Cover	1		
-	180 016 08 80	Gasket, Valve Cover	1		
56	000933 008116	Screw	3		
57	007603 008303	Seal Ring	3		

Table 03 – Crank/Moving Parts – Group 03

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
			Crankshaft				
-	130 030 10 01		Replaced By 130 030 16 01 together with 108 032 03 15	5		-	-
1	130 030 16 01		Crankshaft		1		
3	108 991 00 67		Woodruff Key, Crankshaft Gear		1		
4	180 052 08 03		Crankshaft Gear		1		
-	108 031 01 51		Replaced By 108 031 02 51			-	-
5	108 031 02 51		Spacer Ring		1		
-	180 031 09 07		Replaced By 180 031 11 07 together with 108 032 03 15	5		-	-
7	180 031 11 07		Balancing Plate (Repair Size)		1		
8	900037 008100		Dowel Pin		2		
9	000625 006202		Grooved Ball Bearing		1		
10	189 031 00 33		Lock Ring		1		
12	130 030 02 05		Flywheel		1		
-	121 032 02 05		Replaced By 121 032 03 05			-	-
14	121 032 03 05		Starting Ring Gear		1		

15	000007 010204	Cylindrical Pin	1			
18	130 032 00 71	Necked-Down Bolt	6			
-	108 031 01 81	Replaced By 108 031 04 81		-	-	
20	108 031 04 81	Seal Ring, Crankshaft Front End	1			
21	108 032 02 15	Timing Pointer for T.D.C.	5	1		
-	108 032 03 15	Timing Pointer for T.D.C.	6	1		1
23	108 030 03 03	Vibration Damper	1			
24	130 030 00 68	V-Belt Pulley		1		
-	130 030 01 68	V-Belt Pulley				1
25	000912 008054	Cylindrical Head Screw	6			
26	000961 018019	Screw	1			
27	127 993 00 26	Conical Spring Washer	3			
28	900255 075701	Seal Ring (Fabric)	1			
29	180 030 19 05	Intermediate Ring	1			
30	000007 006210	Cylindrical Pin	2			
-	-	-				
		Crankshaft Bearings	-	-	-	-
31	130 586 00 03	Replaced By 130 586 07 03		-	-	
-	130 586 07 03	Crankshaft Bearing Shells, Set 60 mm ID - Standard	1			
-	130 586 01 03	Replaced By 130 586 08 03		-	-	
-	130 586 08 03	Crankshaft Bearing Shells, Set 59.75 mm ID, Repair Size I	1			
-	130 586 02 03	Replaced By 130 586 09 03		-	-	
-	130 586 09 03	Crankshaft Bearing Shells, Set 59.50 mm ID, Repair Size II	1			
-	130 586 03 03	Replaced By 130 586 10 03		-	-	
-	130 586 10 03	Crankshaft Bearing Shells, Set 59.25 mm ID, Repair Size III	1			
-	130 586 04 03	Replaced By 130 586 11 03		-	-	
-	130 586 11 03	Crankshaft Bearing Shells, Set 59.00 mm ID, Repair Size IV	1			
-	-	-				
		Connecting Rods	-	-	-	-
40	130 030 06 20	Connecting Rod, less Bearing Shells	6			

41	130 038 01 50	Bushing, Piston Pin	6			
42	108 038 02 71	Screw, Connecting Rod	12			
43	108 038 01 72	Nut	12			
44	114 586 00 03	Connecting Rod Bearing Shells, Set 48.00 mm ID – Standard Size	1			
	114 586 01 03	Connecting Rod Bearing Shells, Set 47.75 mm ID – Repair Size I	1			
	114 586 02 03	Connecting Rod Bearing Shells, Set 47.50 mm ID – Repair Size II	1			
	114 586 03 03	Connecting Rod Bearing Shells, Set 47.25 mm ID – Repair Size III	1			
	114 586 04 03	Connecting Rod Bearing Shells, Set 47.00 mm ID – Repair Size IV	1			
-	-	Pistons	-	-	-	-
-	130 030 21 17	Replaced By 130 030 74 17			-	-
-	130 030 44 17					
-	130 030 59 17					
-	130 030 68 17					
45	130 030 74 17	Piston, for Cylinder Bore 86.50 mm Diameter - Standard Size	6			
-	002 586 65 03	Replaced By 002 586 62 03			-	-
-	003 586 62 03	Piston Rings, Set	5		6	
46	003 586 70 03	Piston Rings, Set	6		6	6
47	000 994 30 35	Wire Snap Ring	12			
-	130 030 22 17	Replaced By 130 030 75 17			-	-
-	130 030 45 17					
-	130 030 60 17					
-	130 030 69 17					
-	130 030 75 17	Piston, for Cylinder Bore 86.75 mm Diameter - Intermediate Size	6			
-	002 586 66 03	Replaced By 002 586 63 03			-	-
-	003 586 63 03	Piston Rings, Set	5		6	
-	003 586 71 03	Piston Rings, Set	6		6	6
-	000 994 30 35	Wire Snap Ring	12			
-	130 030 23 17	Replaced By 130 030 76 17			-	-
-	130 030 46 17					
-	130 030 61 17					

-	130 030 70 17							
-	130 030 76 17		Piston, for Cylinder Bore 87.00 mm Diameter - Repair Size I		6			
-	002 586 67 03		Replaced By 002 586 64 03			-	-	
-	003 586 64 03		Piston Rings, Set		5	6		
-	003 586 72 03		Piston Rings, Set		6	6		6
-	000 994 30 35		Wire Snap Ring		12			
-	130 030 24 17		Replaced By 130 030 77 17			-	-	
-	130 030 47 17							
-	130 030 62 17							
-	130 030 71 17							
-	130 030 77 17		Piston, for Cylinder Bore 87.50 mm Diameter - Repair Size II		6			
-	002 586 68 03		Replaced By 002 586 65 03			-	-	
-	003 586 65 03		Piston Rings, Set		5	6		
-	003 586 73 03		Piston Rings, Set		6	6		6
-	000 994 30 35		Wire Snap Ring		12			

Table 04 – Cam/Timing/Valves – Group 05

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
			Camshaft				
1	180 051 08 35		Camshaft		1		
3	121 052 03 01		Gear, Camshaft		1		
4	186 052 01 52		Spacer Washer (Shim)		1		
-	186 052 00 52		No Longer Available			-	-
-	186 052 02 52		No Longer Available				
-	186 052 03 52		No Longer Available				
-	186 052 04 52		No Longer Available				
5	006888 004002		Woodruff Key		1		
6	000961 014012		Screw		1		
7	000127 014201		Lock Washer		1		
8	180 990 03 40		Washer		1		
-	-	-	Timing Gear Drive		-	-	-
	180 052 10 06		Bearing Bushing		1		
10	180 050 05 06		Intermediate Gear Shaft & Helical Gear		1		

-	180 052 09 02	Replaced By 114 052 00 02		-	-
11	114 052 00 02	Intermediate Gear	1		
12	006888 003000	Woodruff Key	1		
13	000933 008071	Screw	1		
14	912004 008101	Lock Washer	1		
15	180 990 06 40	Washer	1		
16	127 052 00 06	Bearing Bushing	1		
17	000933 006016	Screw	1		
18	000127 006203	Lock Washer	1		
19	180 990 01 40	Washer	1		
-	000 997 08 94	Replaced By 000 997 44 94		-	-
20	000 997 44 94	Timing Chain 9.525x5.72 mm	1		
-	008187 002100	Replaced By 000 997 01 98		-	-
21	000 997 01 98	Connector Link with Spring Lock	1		
24	180 050 08 16	Sliding Rail, Long	1		
25	180 050 14 16	Sliding Rail, Reinforced	1		
26	180 052 00 76	Lock Wire	2		
-	001476 004000	Round Head Pin, Grooved	4		
27	180 050 07 16	Sliding Rail, Short	1		
28	180 052 01 76	Lock Wire	1		
-	001476 004000	Round Head Pin, Grooved	1		
29	621 052 00 74	Pivot Pin 49 mm long	3		
30	180 050 07 74	Pivot Pin with Screw Plug	1		
31	007603 020100	Seal Ring	1		
32	180 052 10 74	Pivot Pin 58 mm long	2		
	180 050 07 11	These Two Replaced By		-	-
	180 050 08 11	130 050 00 11			
40	130 050 00 11	Chain Tensioner	1		
41	009045 016000	Snap Ring	1		
42	005401 305000	Ball	1		
43	621 052 01 35	Ball Cage	1		

-	621 993 02 01	Replaced By 621 993 06 01		-	-
44	621 993 06 01	Pressure Spring	1		
-	121 991 00 74	Replaced By 000007 008217		-	-
45	000007 008217	Cylindrical Pin	1		
46	007603 018100	Seal Ring	1		
47	621 052 00 32	Lock Nut	1		
51	002 997 36 45	Seal Ring	1		
52	000934 008008	Nut	1		
53	189 052 00 71	Securing Screw, 12 mm thread (Safety Bolt)	1		
54	007603 012100	Seal Ring	1		
55	121 050 15 10	Bearing, Timing Chain Sprocket	1		
56	180 050 04 09	Sprocket, Timing Chain	1		
57	180 052 00 50	Bearing Bushing	1		
58	180 990 35 40	Washer	1		
59	000471 020000	Lock Ring	1		
60	186 993 11 01	Pressure Spring	1		
61	127 052 01 74	Pivot Pin	1		
-	-	-			
		Valves		-	-
70	130 053 00 01	Intake Valve	6		
71	129 053 01 05	Exhaust Valve	6		
75	108 053 00 22	Valve Spring, Inner	12		
76	129 053 00 20	Replaced By 129 053 02 20		-	-
-	129 053 02 20	Valve Spring, Outer	12		
77	115 053 00 26	Valve Collet	24		
-	000 053 08 58	Replaced By 114 586 00 05		-	-
-	000 053 10 58				
79	114 586 00 05	Gasket Kit, Valve Seating	1		
-	121 053 04 25	130 053 00 25 130 053 03 53	7	-	-
80	130 053 00 25	Retainer, Valve Spring	12		
81	000 053 13 35	Rotocap (For Intake)	12		

83	180 053 19 52		Thrust Piece 4.5mm High Standard	7	12		
	130 053 03 53		Thrust Piece 4.5mm High Standard	8	12		12
-	180 053 20 52		Thrust Piece 3.5mm High Repair Size I	7	12		
	130 053 04 53		Thrust Piece 3.5mm High Repair Size I	8	12		12
-	180 053 21 52		Thrust Piece 2.5mm High Repair Size II	7	12		
	130 053 05 53		Thrust Piece 2.5mm High Repair Size II	8	12		12
-	-	-	Rocker Arm	-	-	-	-
-	108 055 01 01		Replaced By 114 055 00 01			-	-
90	114 055 00 01		Rocker Arm		12		
-	130 055 00 74		Replaced By 130 050 02 74			-	-
91	130 050 02 74		Ball Head Bolt		12		
-	100 055 00 21		Replaced By 130 055 01 21			-	-
92	130 055 01 21		Ball Head Bolt		12		
93	130 993 00 25		Annular Spring		12		
94	180 993 12 25		Tension Spring		12		

Table 05 – Carburetor – Group 07

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
-	001 071 73 01		Carburetor – Complete (Front)		1		
1	001 071 74 01		Carburetor – Complete (Rear)		1		
2	000 071 12 06		Throttle Body 5x0.9mm thread		2		
3	000 071 06 70		Headless Set Screw, Test Connection		2		
4	000 071 07 11		Shaft, Throttle Valve		2		
5	000 071 14 10		Throttle Valve		4		
6	000 071 56 71		Lens Head Countersunk Screw		8		
7	000 071 10 12		Support		2		
8	000 072 04 21		Throttle Control Lever to 001 071 73 01		1		
-	000 071 06 14		Throttle Control Lever to 001 071 74 01		1		
9	000 071 08 22		Lever, Pump		2		
10	000 071 21 24		Rod, Pump		2		

11	000 071 22 16	Spring	2
12	000125 003200	Washer	2
13	000 071 01 73	Lock Spring	2
15	000 071 57 71	Idle Adjusting Screw	2
16	000 071 15 16	Pressure Spring, Idle Adjusting Screw	2
17	000 071 01 62	Washer	2
18	000 071 02 62	Ring	2
19	000 071 09 72	Hex. Nut	4
20	000 071 04 56	Screw Plug 5x0.9mm thread	2
22	000 071 24 80	Seal Ring	2
26	000 071 58 71	Idle Mixture Adjusting Screw	4
27	000 071 15 16	Pressure Spring, Idle Mixture Screw	4
28	000 071 59 71	Cylindrical Head Screw	8
29	000 990 06 47	Lock Washer	8
30	000 071 36 80	Gasket	2
31	000 070 03 44	Float Chamber	2
32	000 071 10 43	Double Float with Joint Bearing	2
33	000 071 15 42	Venturi Tube 26 mm	4
34	000 071 60 71	Retaining Screw, Venturi Tube	4
35	000 071 06 83	Mixing Tube Carrier, Pre-Atomizer	4
36	000 071 61 71	Retaining Screw, Mixing Tube Carrier	2
37	000125 005303	Washer	2
38	000137 005100	Spring Washer	2
39	000 071 02 49	Mixing Tube	4
40	000 071 42 34	Compensator Nozzle Size 210	4
41	000 071 60 35	Main Nozzle 140, > 1500 meters	4
42	000 071 29 36	Idling Nozzle Size 55	4
44	000 071 14 04	Cover, Main & Idling Nozzle	2
45	000 071 09 60	Seal Ring	2
46	000 071 62 71	Hex. Head Screw	2

47	000 071 10 60	Seal Ring	2
50	000 071 11 39	Idling Nozzle Size 140	4
51	000 071 12 37	Starting Fuel Nozzle Size 100	2
52	000 071 11 60	Seal Ring, Starting Fuel Nozzle	2
53	000 071 05 86	Nozzle, Pump Size 55	4
54	000 071 08 60	Seal Ring, Pump Nozzle	4
55	000 071 04 49	Injection Pipe, Long - No. 3	4
56	000 071 04 18	Piston, Pump	2
57	000 071 16 16	Spring, Pump	2
58	000 071 03 76	Retainer, Pump Spring	2
59	000 994 06 10	Lock Plate	2
60	000 071 07 15	Annular Spring, Pump Cup	2
64	000 070 03 46	Suction Valve, Pump	2
65	000 071 12 60	Seal Ring, Pump Suction Valve	2
66	000 070 12 46	Pressure Valve, Pump	2
67	000 071 13 60	Seal Ring, Pump Pressure Valve	2
68	000 071 08 28	Choke Body	2
69	000 071 35 80	Gasket	2
70	000 071 63 71	Lens Head Countersunk Screw	4
71	000 072 02 74	Clamping Screw	2
72	000 071 13 30	Choke Plate, with 5mm Choke Shaft	2
73	000 071 17 16	Pressure Spring, Choke Plate	2
74	000 994 07 10	Lock Plate, Pressure Spring	2
75	000 071 14 60	Seal Ring, Choke Shaft	2
80	000 071 20 31	Choke Lever	2
81	136 072 00 71	Adjusting Screw, 4mm thread	2
82	136 072 00 50	Bushing	2
83	000433 004300	Washer	2
84	000934 004000	Nut	2
85	000125 006400	Washer	2
86	000934 006000	Nut	2

87	000 071 30 04	Cover, Float Chamber	2		
88	000 071 26 80	Gasket	2		
89	001476 002008	Round Head Pin, Grooved	4		
90	000 071 04 44	Valve, Float Needle	2		
91	000 997 37 40	Seal Ring, 0.5 mm thick	2		
-	000 997 48 40	Seal Ring, 1.5 mm thick	2		
92	915013 006000	Screw Fitting	2		
93	007603 012101	Seal Ring	2		
94	000 071 01 25	Shaft, Pump	2		
95	000 071 18 22	Lever, Pump Outside	2		
96	000 071 19 22	Lever, Pump Inside	2		
97	000 071 26 16	Pressure Spring	2		
98	006797 006240	Toothed Washer	4		
99	000934 006200	Nut	4		
100	000 071 03 49	Spray-Nozzle Tube, Choke	2		
101	000 071 64 71	Attaching Screw	10		
102	000127 005200	Lock Washer	10		
-	180 586 01 90	Repair Kit, Carburetor	2		
125	130 071 00 55	Screening Plate	1		
126	180 071 05 81	Insulating Flange	2		
127	130 071 00 80	Gasket	2		
128	000137 008101	Spring Washer	8		
129	000 990 08 51	Hex. Nut	8		
135	130 070 01 40	Bracket	2		
-	130 070 00 21	Replaced By 130 070 03 21 together with 115 072 00 50	5	-	-
136	130 070 03 21	Reversing Lever	2		
137	180 072 03 50	Bushing	5	2	
-	115 072 00 50	Bushing	6	4	
					4
138	006799 007001	Lock Plate	2		

139	130 070 02 75	Pull Rod	2		
140	130 071 01 24	Pull Rod	2		
-	000 991 02 20	Replaced By 000 991 16 22		-	-
141	000 991 16 22	Ball Socket	2		
142	000934 005004	Nut	2		
143	000125 005306	Washer	2		
-	000094 001509	Cotter Pin	2		
145	130 070 03 75	Pull Rod	1		
146	130 071 00 24	Pull Rod	1		
-	000 991 02 20	Replaced By 000 991 16 22		-	-
147	000 991 16 22	Ball Socket	2		
148	000934 005004	Nut	2		
151	180 070 03 75	Pull Rod	1		
152	180 070 02 75	Pull Rod	1		
153	000 991 16 22	Ball Socket	1		
154	000934 005010	Nut	1		
155	000 991 17 22	Ball Socket	1		
156	000934 005004	Nut	1		
159	130 070 00 32	Fuel Line, Carburetor		1	
-	130 070 03 32	Fuel Line, Carburetor			1
161	915011 006102	Hollow Screw		1	
162	007603 012112	Seal Ring		2	
163	114 476 09 26	Fuel Hose			1
-	916002 012100	Clamp			2
166	007603 012108	Seal Ring	1		
167	000961 012047	Screw	1		
-	115 070 00 40	Items Not Installed		-	-
-	180 995 01 20				
-	000127 006203				
-	000084 006133				
168	186 995 00 01	Pipe Clamp	1		

Table 06 - Fuel Pump - Group 09

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
			Fuel Pump				
1	000 091 91 01		Fuel Pump			1	
2	000 993 09 10		Release Spring			1	
3	000 994 00 41		Lock Ring			1	
5	000 091 05 07		Lever, Pump Drive			1	
7	000 091 00 21		Spindle			1	
8	000 091 08 15		Pressure Spring			1	
9	000 091 16 15		Diaphragm Spring			1	
10	000 091 00 33		Oil Protective Plate			1	
11	000 091 01 15		Seal, Oil Protective Plate			1	
12	000 091 04 28		Diaphragm			1	
13	000063 003116		Countersunk Screw, Valve Plate			3	
14	006797 003350		Toothed Washer			3	
15	000 091 04 29		Valve Plate			1	
16	000 091 01 80		Gasket, Valve Plate			1	
17	000 091 04 19		Valve Spring			2	
18	000 091 07 29		Valve Reed			2	
20	000 091 00 16		Spring Cage, Exhaust Valve			1	
22	000085 005109		Lens Head Screw			6	
23	000127 005200		Lock Washer			6	
24	000 091 08 39		Strainer with Pressure Spring			1	
25	000 091 06 80		Seal (Cork)			1	
26	000 091 01 46		Cap			1	
27	000933 006015		Screw			1	
28	007603 006101		Seal Ring			1	
29	007603 008112		Seal Ring			1	
30	000 091 03 56		Screw Plug, 8x1 mm thread			1	
33	007603 012101		Seal Ring			1	
34	007604 012100		Screw Plug			1	

35	915013 006000	Screw Fitting	2	
36	007603 012101	Seal Ring	2	
37	180 586 02 90	Repair Kit, Fuel Pump	1	
38	181 091 00 80	Gasket	2	
39	181 091 00 81	Insulating Flange	1	
40	000933 008116	Screw	2	
41	000137 008202	Spring Washer	2	
42	180 091 01 80	Sealing Flange	1	
43	180 090 02 44	Intermediate Flange	1	
44	180 091 01 50	Bushing	1	
45	180 091 00 91	Cap Collar	1	
47	000912 008000	Cylindrical Head Screw	2	
48	000125 008407	Washer	2	
49	180 091 02 08	Push Rod, Fuel Pump Drive	1	
52	001 091 69 01	Fuel Pump		1
54	000 091 02 03	Cap		1
55	000 091 04 60	Seal Ring		1
56	000 091 12 39	Filter		1
57	007603 004400	Seal Ring		1
58	000084 004164	Cylindrical Head Screw		1
61	130 091 00 80	Gasket		2
62	130 091 00 81	Insulating Flange		1

Table 07 – Oil Bath Air Cleaner - Group 09

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
Oil Bath Air Cleaner (Model 922)							
1	404 094 01 01		Oil Bath Air Cleaner			1	
3	000 094 64 03		Oil Reservoir			1	
4	001 094 20 04		Element			1	
5	000 094 28 80		Seal, Inside			1	
6	000 094 29 80		Seal, Outside			1	

8	41.4041.1009-00	Rubber Seal	1
9	000127 008002	Lock Washer	4
10	000084 008119	Cylindrical Head Screw	4
11	000091 006125	Lens Head Countersunk Screw	4
12	41.4041.1031-00	Grommet	1
-	900269 024101	Hose Clamp	1
15	406 092 05 44	Elbow	1
16	404 098 00 07	Pipe	1
17	404 098 00 15	Elbow	1
-	900269 078101	Hose Clamp	5
19	404 090 02 41	Bracket	1
-	000933 008015	Screw	1
-	000127 008200	Lock Washer	1
-	000934 008000	Nut	1
-	000933 008057	Screw	1
-	000934 008000	Nut	1
22	900273 010000	Rubber Hose, 700 mm long	1
-	900269 016100	Hose Clamp	1
23	121 094 02 91	Molded Hose	1
-	900288 026001	Hose Clamp	1
24	000 995 03 36	Hose Clamp	1
-	000084 004162	Cylindrical Head Screw	1
26	130 090 00 33	Intake Pipe Socket	1
-	916001 074000	Hose Clamp	2
29	130 094 01 10	Intake Pipe Socket	1
30	130 094 01 12	Fitting	2
-	916002 078100	Clamp	4
-	-	Intake Ducting	-
36	404 140 00 56	Intake Duct, less Rain Deflector	1
-	41.2010.0104-00	Replaced By 006 094 17 02	-
37	006 094 17 02	Cyclone Air Trap	1

38	41.4041.1019-00	Gasket	1
39	404 094 02 41	Bracket	1
40	41.4041.1017-00	Mounting Clamp	1
-	000933 008036	Screw	1
-	000127 008200	Lock Washer	1
-	000934 008000	Nut	1
-	-	Oil Bath Air Cleaner (Model 925)	-
45	004 094 61 02	Oil Bath Air Cleaner	1
46	000 094 43 03	Oil Tank	1
48	000 094 88 80	Gasket	1
49	000 094 10 71	Tommy Screw	1
50	000 094 01 76	Washer	1
51	000471 010000	Lock Ring	1
52	000 094 86 04	Filter Element	1
54	000 094 83 80	Seal, Inside	1
55	000 094 84 80	Seal, Outside	1
58	900288 240101	Hose Clamp	1
59	406 092 05 44	Elbow, Line	1
60	406 520 01 01	Intake Pipe	1
61	406 987 54 43	Bellows, Between Intake Pipe & Engine	1
-	000 997 21 90	Hose Clamp, Line Elbow	4
65	406 987 50 45	Cap	1
-	000 997 12 90	Hose Clamp	1
67	007603 010100	Seal Ring	1
68	007604 010100	Screw Plug	1
69	000125 006410	Washer	1
70	000933 006102	Screw	1
73	404 528 05 08	Breather Pipe	1
74	404 987 09 43	Reducing Elbow	1
75	404 524 00 40	Mounting Plate, at Cylinder Head	1

76	007980 010002	Lock Washer	1
77	000912 010006	Cylindrical Head Screw	1
78	007980 012002	Lock Washer	1
79	000912 012003	Cylindrical Head Screw	1
80	912004 008100	Lock Washer	1
81	000933 008036	Screw	1
87	426 090 00 29	Intake Duct	1
88	000933 008028	Screw	3
89	000137 008202	Spring Washer	3
90	000 094 97 06	Cap, Detachable	1
91	416 551 21 56	Rubber Elbow	1
-	001 997 16 90	Hose Clamp, Rubber Elbow	2

Table 08 - Intake/Exhaust Manifold - Group 14

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
Intake Manifold							
1	130 140 01 01		Intake Manifold		1		
3	000939 008052		Stud,		4		
4	000939 008053		Stud		8		
5	007603 014100		Seal Ring		1		
6	007604 014102		Screw Plug		1		
-	-	-	Exhaust Manifold	-	-	-	-
30	108 140 00 11		Exhaust Manifold, Cylinders 1, 2, 3		1		
31	130 140 00 11		Exhaust Manifold, Cylinders 4, 5, 6		1		
32	121 143 00 50		Bushing, Heater Flap Shaft		4		
33	000 991 02 61		Neck-Type Pin, Grooved		4		
-	000939 008053		Stud		4		
-	180 143 08 06		Replaced By 114 143 00 06		-		
34	114 143 00 06		Heater Flap		2		
35	180 143 01 05		Shaft, Heater Flap, Exhaust Manifold		2		
36	153 143 00 10		Thermo Spiral		2		
37	180 143 02 07		Balancing Weight, for 108 140 00 11		1		

-	180 143 03 07	Balancing Weight, for 130 140 00 11	1
38	001481 003004	Clamping Pin	2
39	186 993 01 25	Tension Spring	2
40	180 140 01 27	Damping Spring	2
41	000084 005149	Cylindrical Head Screw	2
50	180 141 01 62	Insulating Flange	2
51	000125 008413	Washer	4
52	000 990 08 51	Hex. Nut	8
55	000125 010517	Washer	6
56	000137 010101	Spring Washer	3
57	999901 010000	Nut	8
-	127 142 03 80	Replaced By 127 142 04 80	-
60	127 142 04 80	Gasket	1

Table 09 – Electrical Equipment – Group 15

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
			Starter				
1	000 151 65 01		Starter Motor			1	
2	001 151 75 01		Starter Motor				1
3	000 151 16 13		Overrunning Clutch, with Pinion			1	
-	000 151 57 13		Overrunning Clutch, with Pinion				1
5	000 152 04 10		Starter Magnetic Switch			1	
-	000 152 28 10		Starter Magnetic Switch				1
-	000 151 09 14		Carbon Brush			4	
-	000 151 48 14		Set of Carbon Brushes				1
9	000 151 01 93		Pressure Spring, Carbon Brush			4	
-	000 151 11 93		Pressure Spring, Carbon Brush				4
11	000 151 00 50		Bearing Bushing, Drive & Commutator			4	
-	000 151 17 50		Bearing Bushing, Drive & Commutator				2
14	000127 012200		Lock Washer			2	
15	000960 012010		Screw			2	

-	-	-	Generator	-	-	-	-
21	000 154 68 02		Generator			1	
22	003 154 55 02		Generator				1
-	000 154 26 14		Carbon Brushes			4	
-	000 154 55 14		Set of Carbon Brushes				1
25	000 154 02 93		Pressure Spring			4	
26	000 154 09 93		Pressure Spring				2
-	000084 005102		Cylindrical Head Screw			4	
-	000127 005200		Lock Washer			4	
29	000 154 04 18		Connecting Housing			1	
30	000063 005102		Countersunk Screw			4	
34	326 150 00 74		Fan			1	
35	000 155 29 18		Fan				1
36	000127 006200		Lock Washer			3	
37	000084 006104		Cylindrical Head Screw			3	
38	404 155 00 15		Pulley			1	
39	000 155 31 18		Pulley				1
42	006888 004002		Woodruff Key		1		
43	000127 014201		Lock Washer		1		
44	000936 014005		Nut		1		
47	001 156 08 01		Suppressor Condenser				1
48	000 159 08 34		Connecting Cable				1
51	130 150 09 73		Frame				1
52	30.4041.0713-00		Frame			1	
53	000007 008203		Cylindrical Pin			1	
54	900288 155100		Clamp			2	
55	30.4041.1083-00		Support			1	
56	000137 008202		Spring Washer		2		
57	000934 008013		Nut		2		
59	30.4041.1079-00		Spacer Tube			2	
60	000931 010193		Screw			1	

61	000127 010205	Lock Washer	1
62	000934 010000	Nut	1
63	30.4041.1088-00	Clamping Bolt	1
64	121 155 02 28	Clamping Piece	1
65	121 155 00 72	Clamping Nut	1
66	000934 008008	Nut	1
-	30.4041.1085-00	Replaced By 404 155 01 71	-
68	404 155 01 71	Hex. Head Screw	1
69	000127 016202	Lock Washer	1
70	000137 010201	Spring Washer	1
71	000931 008007	Screw	1
72	000137 008202	Spring Washer	1
75	130 155 00 25	Clamping Shackle	1
-	000933 008117	Screw	1
-	000125 008417	Washer	1
-	000127 008203	Lock Washer	1
-	000934 008008	Nut	1
78	007349 008002	Washer	1
79	000127 008203	Lock Washer	1
80	000933 008114	Screw	1
81	000125 008417	Washer	1
82	000931 008237	Screw	1
86	000 158 15 03	Ignition Coil	1
87	000 158 02 40	Mounting Clamp	1
-	000084 005157	Cylindrical Head Screw	1
-	000562 005000	Square Nut	1
-	000933 008014	Screw	2
-	000127 008200	Lock Washer	2
-	000 990 69 91	Cage Clip, with Nut	2
92	000 158 04 45	Series Resistance	1

-	000084 004105	Cylindrical Head Screw		2
-	000127 004200	Lock Washer		2
-	000 990 66 91	Cage Clip, with Nut		2
-	60.4041.0762-00	Cable, Coil to Distributor		1
97	000 158 82 01	Ignition Distributor, One-Part Coupling		1
98	000 158 12 02	Ignition Shield, Distributor Cap & Brush		1
99	000 158 04 89	Oiler		1
-	000 156 04 81	Rubber Seal Ring, Ignition Shield		1
100	000 158 08 90	Points		1
-	000 158 15 31	Replaced By 000 158 20 31		-
101	000 158 20 31	Rotor, Dust-Proof & Shielded		1
102	000 156 71 01	Condenser		1
-	000084 004158	Cylindrical Head Screw		2
-	000127 004200	Lock Washer		2
105	000 158 06 09	Coupling, One-Part		1
-	000 158 01 76	Replaced By 000 158 02 76		-
106	000 158 02 76	Fiber Washer		1
107	000 158 00 52	Spacer Washer, 1.0 mm thick		nB
-	000 158 04 52	Spacer Washer, 2.0 mm thick		nB
-	000 158 04 74	Pin, Two-Part Coupling		1
108	000 158 07 74	Pin		1
109	000 158 02 77	Snap Ring		1
112	000 150 21 18	Screened Cable		1
113	000 156 03 81	Rubber Seal Ring		2
116	180 586 03 90	Repair Kit, Distributor		1
-	180 150 18 07	Replaced By 114 150 00 07		-
119	114 150 00 07	Bearing, Distributor		1
120	180 150 05 24	Timing Lever	5	1
121	000912 006042	Cylindrical Head Screw		1
122	000433 006402	Washer	6	1
123	000933 006106	Screw	5	1

124	000137 006203	Spring Washer	5	1
128	000912 008072	Cylindrical Head Screw	1	
129	000433 008403	Washer	1	
130	121 158 00 51	Intermediate Ring	1	
132	180 150 21 18	Spark Plug Wires No. 1, 2	2	
133	180 150 22 18	Spark Plug Wires No. 3, 4	2	
134	180 150 23 18	Spark Plug Wires No. 5, 6	2	
135	000 156 03 20	Connector	6	
136	001 997 28 40	Seal	6	
137	000 158 08 74	Pin	6	
140	000 150 20 18	Coil Wire	1	
141	000 159 68 03	Spark Plug	6	
144	121 150 02 73	Mounting, Ignition Cable	2	
145	000137 008202	Spring washer	2	
146	000933 008106	Screw	2	

Table 10 – Oil Pump – Group 18

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
			Oil Pump				
-	130 180 01 01		Replaced By 130 180 05 01			-	
1	130 180 05 01		Oil Pump			1	
-	130 180 06 01		Oil Pump				1
2	180 181 01 50		Bearing Bushing, Top			1	
-	108 180 00 07		Replaced By 108 180 02 07			-	
-	108 180 02 07		Drive Shaft with Gear	5		1	
3	130 180 02 07		Drive Shaft with Gear	6		1	1
-	108 180 00 08		Replaced By 108 180 01 08			-	
-	108 180 01 08		Oil Pump Spindle with Gear	5		1	
4	116 180 02 08		Oil Pump Spindle with Gear	6		1	1
-	114 180 00 15		Replaced By 114 180 01 15			-	

6	114 180 01 15	Oil Pressure Relief Valve	1		
7	114 993 00 01	Spring	1		
8	321 181 00 42	Piston	1		
9	073123 012300	Snap Ring	1		
-	121 180 01 55	Strainer	5	1	
10	615 180 02 55	Strainer	6	1	1
10a	615 186 00 07	Adapter	6	1	1
11	000 994 23 35	Snap Ring	1		
12	121 186 00 80	Gasket, Oil Pump Housing	1		
-	000931 006050	Screw	2		
-	000931 006059	Screw	2		
13	000931 006056	Screw	1		
14	000137 006203	Spring Washer	5		
-	000985 006001	Nut	4		
-	900055 006001	Spring Washer	4		
15	180 091 03 12	Cam	1		
17	000912 008005	Cylindrical Head Screw	1		
18	000137 008207	Spring Washer	1		
-	001 184 54 01	Oil Filter (optional)		1	
30	001 184 36 01	Oil Filter (optional)		1	
-	002 184 25 01	Oil Filter (optional)			1
-	002 184 26 01	Oil Filter (optional)			1
31	000 184 23 02	Housing	1		
32	000 184 32 80	Seal Ring, Screw to Housing	1		
33	000 184 17 80	Seal Ring, Housing to Filter	1		
41	000 184 43 25	Filter Element	1		
42	181 997 03 41	Seal Ring, Housing Upper to Lower	1		
43	000 184 33 80	Seal Ring	1		
45	000 184 31 08	Oil Filter Housing Upper Part		1	
-	000 184 66 08	Oil Filter Housing Upper Part			1

46	180 184 01 17	Screw Fitting		1			
47	181 184 00 30	Valve Cone		2		1	
48	181 993 06 01	Spring		2		1	
49	007603 018400	Seal Ring		2		1	
50	000 184 05 56	Screw Plug		2		1	
51	007603 018100	Seal Ring		2			
52	915013 013002	Screw Fitting		2			
52a	000 184 02 17	Screw Fitting					2
-	000 997 24 44	Replaced By 000 997 25 44		-			
53	000 997 25 44	Seal Ring		1			
54	000960 010033	Screw		1			
55	121 184 00 80	Gasket		1			
56	000912 008019	Cylindrical Head Screw		2			
57	000912 008066	Cylindrical Head Screw		1			
58	000433 008403	Washer		3			
-	-	- Oil Pressure Relief Valve		-	-	-	-
-	127 180 00 15	Replaced By 114 180 02 15					
61	114 180 02 15	Oil Pressure Relief Valve		1			
62	127 993 02 01	Spring		1			
63	321 181 00 42	Piston		1			
-	000472 012000	Lock Ring		9		1	
64	073123 012300	Snap Ring		10		1	1
-	127 184 01 56	Replaced By 130 180 00 56					
65	130 180 00 56	Screw Plug, Oil Pressure Relief Valve		1			
66	007603 024105	Seal Ring		1			
67	404 180 00 27	Oil Line, Cooler to Filter				1	
68	404 180 01 27	Oil Line, Filter to Cooler				1	
69	404 187 00 40	Bracket				1	
-	000933 010011	Screw				1	
-	000127 010205	Lock Washer				1	

70	114 995 00 32	Pipe Clamp	1	
-	000931 006095	Screw	1	
-	000127 006206	Lock Washer	1	
-	000934 006006	Nut	1	
72	001 542 49 17	Sending Unit, Oil Pressure Gauge		1
86	404 188 00 01	Oil Cooler	1	
-	000933 006067	Screw	4	
-	000137 006024	Spring Washer	4	
-	000125 006410	Washer	4	
-	000934 006007	Nut	4	
89	404 187 00 82	Oil Hose	2	
90	404 187 00 24	Pipe Elbow, Return Hose	1	
-	000 995 33 44	Cable Clamp (Plastic)	1	

Table 11 – Engine Cooling – Group 20

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
			Water Pump				
1	180 200 15 01		Water Pump less Pulley		1		
2	127 200 04 20		Bearing Housing, with Hub		1		
3	180 201 04 05		Shaft, Water Pump		1		
4	127 201 01 07		Impeller		1		
5	000 201 27 19		Slide Ring Seal, Axial		1		
6	136 997 00 47		Seal Ring		1		
7	000625 036202		Grooved Ball Bearing		1		
8	000471 015000		Lock Ring		1		
9	000625 036302		Grooved Ball Bearing		1		
10	180 201 00 18		Intermediate Ring		1		
11	180 201 01 56		Holder, Seal Ring		1		
12	180 997 01 47		Seal Ring		1		
13	180 202 00 14		Hub		1		
14	127 201 02 01		Housing, Water Pump		1		

15	007603 010101	Seal Ring		1	
16	127 997 00 30	Screw Plug		1	
17	007603 008100	Seal Ring		1	
18	007604 008101	Screw Plug		1	
19	121 201 00 80	Gasket		1	
20	000933 006026	Screw		5	
21	130 586 00 20	Repair Kit		1	
22	180 203 09 80	Gasket		1	
25	621 990 03 40	Washer		1	
-	000931 008049	Replaced By 000931 008054 Together with 006912 008014 and 115 990 44 40	11		-
26	000931 008054	Screw		2	
-	000912 008023	Replaced By 006912 008014 Together with 000931 008053 and 115 990 44 40			-
27	006912 008014	Screw		1	
-	000137 008202	Replaced By 115 990 44 40 Together with 000931 008054 and 006912 008014			-
28	115 990 44 40	Washer		3	
30	180 200 04 58	Breather Line, Water Pump		1	
31	915011 002102	Hollow Screw		2	
32	007603 008100	Seal Ring		4	
35	007603 016000	Seal Ring			1
36	007604 016100	Screw Plug			1
37	180 200 23 05	Pulley		1	
38	404 202 00 11	Pulley, Front			1
39	000127 008206	Lock Washer			3
40	000933 008023	Screw			3
-	000137 008202	Spring Washer			3
-	000912 008009	Cylindrical Head Screw			3
43	130 202 00 52	Spacer Washer			1
-	-	-	Water Outlet	-	-

47	404 200 04 56	Water Cooling Outlet		1	
-	130 203 01 31	Water Cooling Outlet			1
48	007603 016100	Seal Ring		1	
49	007604 016100	Screw Plug		1	
50	180 203 08 80	Gasket	1		
51	000433 008400	Washer		1	
52	000 990 08 51	Hex. Nut		1	
-	000137 008103	Spring Washer			2
-	001 990 51 51	Hex. Nut			2
53	180 203 02 36	Connector, Heating			1
54	007603 032103	Seal Ring			1
-	-	Fan Drive Assembly	-	-	-
55	404 200 00 05	V-Belt Pulley	1		
-	30.4041.0724-00	V-Belt Pulley			1
56	30.4041.1063-00	Hub		1	
-	130 205 00 04	Hub			1
57	000 997 22 45	Seal Ring	1		
58	30.4041.1064-00	Race	1		
59	000625 006004	Grooved Ball Bearing	2		
60	30.4041.1065-00	Spacer Ring	1		
61	000472 042000	Lock Ring	1		
62	30.4041.1066-00	Spacer Ring		1	
63	000137 016200	Spring Washer	1		
64	000936 016001	Nut	1		
65	30.4041.1067-00	Gasket, Hub to Fan		1	2
66	404 205 01 26	Intermediate Ring	1		
67	404 205 03 06	Fan		1	
-	404 205 02 06	Fan			1
68	007603 008101	Seal Ring	1		
69	007604 008100	Screw Plug	1		

69a	000137 008200	Spring Washer	6	3
69b	000933 008062	Screw	6	
-	000933 008128	Screw		3
70	30.4041.1123-00	Hub Half, Rear	1	
71	000 997 22 45	Seal Ring	1	
72	30.4041.1127-00	Pivot Pin	1	
73	000472 042000	Lock Ring	1	
74	30.4041.1066-00	Spacer Ring	2	
75	000625 026004	Grooved Ball Bearing	1	
76	30.4041.1070-00	Spacer Ring	1	
77	30.4041.1126-00	Spacer Ring	1	
78	000471 020000	Lock Ring	1	
79	30.4041.1074-00	Gasket	2	
80	404 203 00 72	Hub Half, Front	1	
82	30.4041.1066-00	Spacer Ring	1	
85	404 202 01 11	V-Belt Pulley	1	
86	000137 008200	Spring Washer	3	
87	000931 008008	Screw	3	
-	007980 008004	Lock Washer		3
-	007984 008001	Screw		3
88	30.4041.1058-00	Lever, Fan Belt Tensioner to Support	1	
89	000007 006207	Cylindrical Pin	1	
91	000127 014200	Lock Washer	1	
92	000936 014000	Nut	1	
93	30.4041.1069-00	Clamping Plate	2	
94	000137 008200	Spring Washer	2	
95	000931 008008	Screw	2	
-	007753 009505	V-Belt, Water, Generator, Fan	1	
-	007753 009507	V-Belt, Water, Generator	1	
-	007753 009504	V-Belt		2
101	116 130 01 60	Pulley, Belt Tensioner		1

103	130 202 00 53	Spacer Sleeve	1
104	130 990 00 14	Fitted Screw	1
105	130 206 00 33	Lever	1
108	000127 014203	Lock Washer	1
109	000934 014000	Nut	1
110	30.4041.1069-00	Clamping Plate, Lever	2
113	000137 008200	Spring Washer	2
114	000933 008062	Screw	2

Table 12 – Engine Mounting – Group 22

Fig. #	Part Number	Mod. #	Item Description	footnotes	All	922	925
Front Mount							
1	130 223 00 01		Engine Support, Front			1	
2	130 223 01 01		Engine Support, Front				1
4	006797 010151		Toothed Washer		3		
5	000933 010058		Screw			1	2
6	000912 010012		Cylindrical Head Screw		1		
7	000933 010020		Screw		1		
11	130 014 00 53		Spacer Tube			2	
12	000127 012201		Lock Washer			2	
13	000912 012049		Cylindrical Head Screw			2	

Footnotes

Remarks Table 01 through 12

- 1 On Model 922, Up to Engine 000038
- 2 On Model 922, From Engine 000039
- 3 On Model 922
- 4 On Model 922
- 5 On Model 922, Up to Engine 000057
- 6 On Model 922, From Engine 000058
- 7 On Model 922, Up to Engine 000047
- 8 On Model 922, From Engine 000048
- 9 On Model 922, Up to Engine 000043

-
- 10 On Model 922, From Engine 000044
 - 11 On Model 922, Up to Engine 000015
 - 12 On Model 922, From Engine 000057. Use up all old stock before issuing new parts
-

Table 1 - Engine Block - Group 01

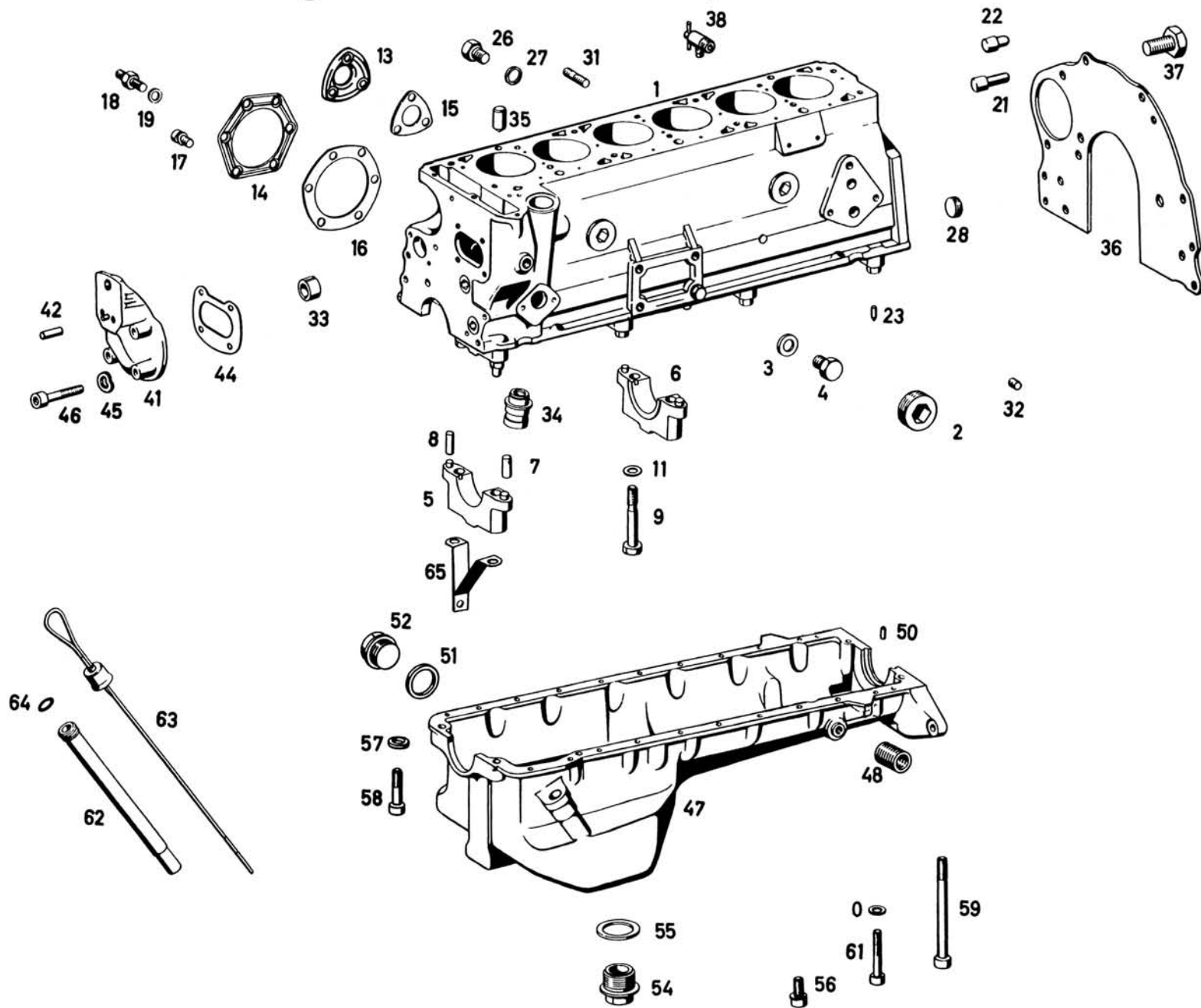


Table 2 - Cylinder Head - Group 01

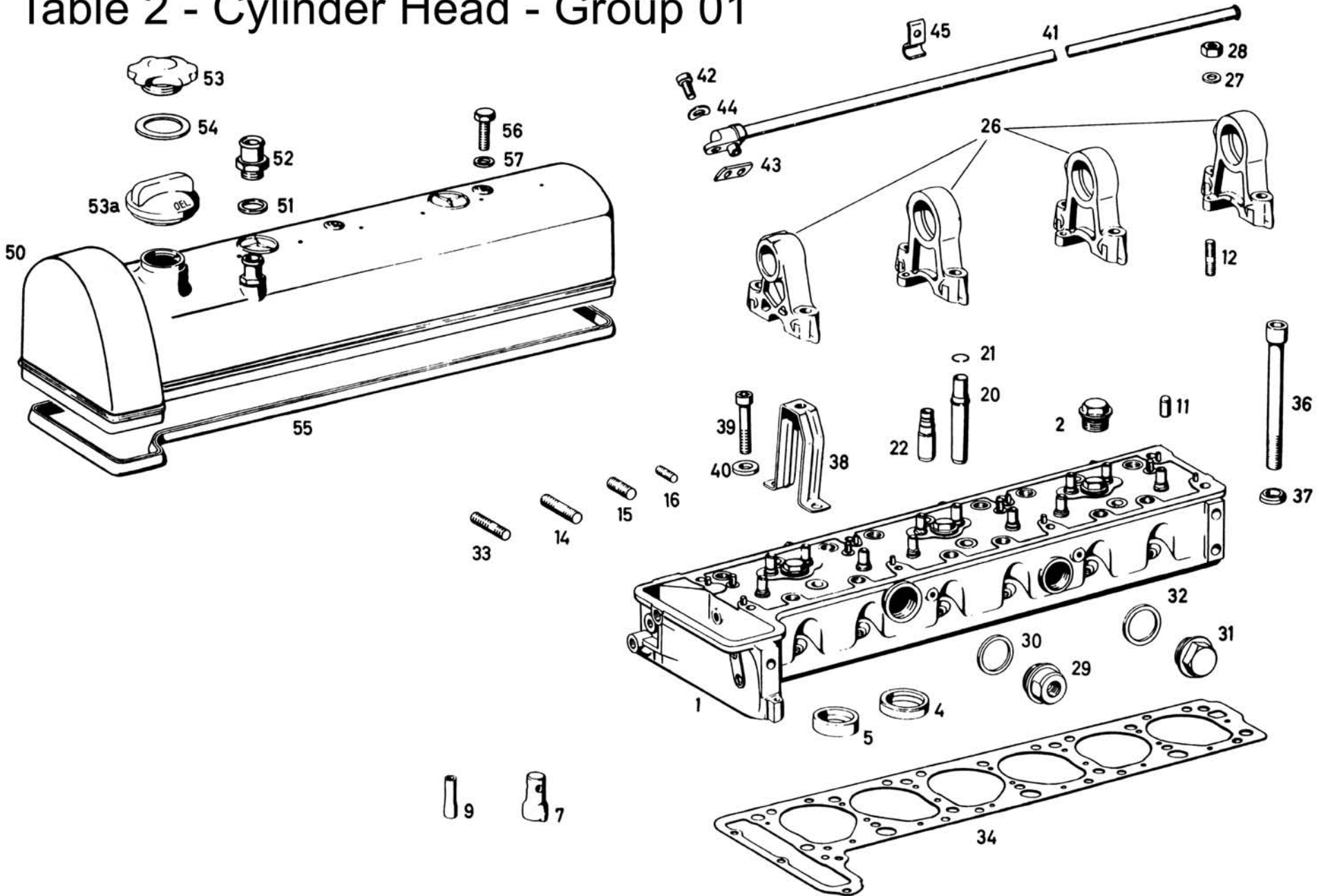


Table 3 - Crank Assembly - Group 03

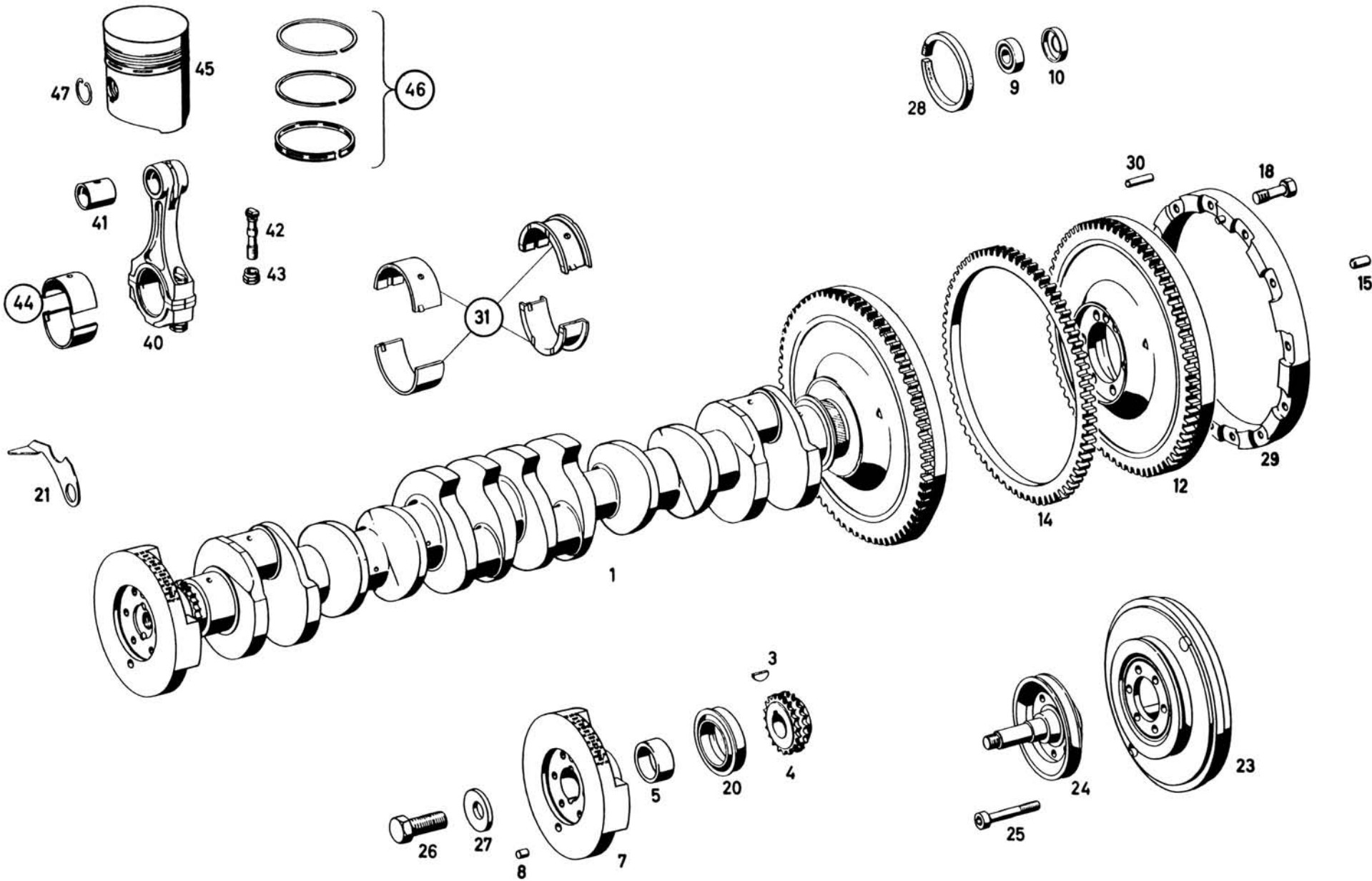


Table 5 - Carburetor (Exploded View)

Group 07, Page 1

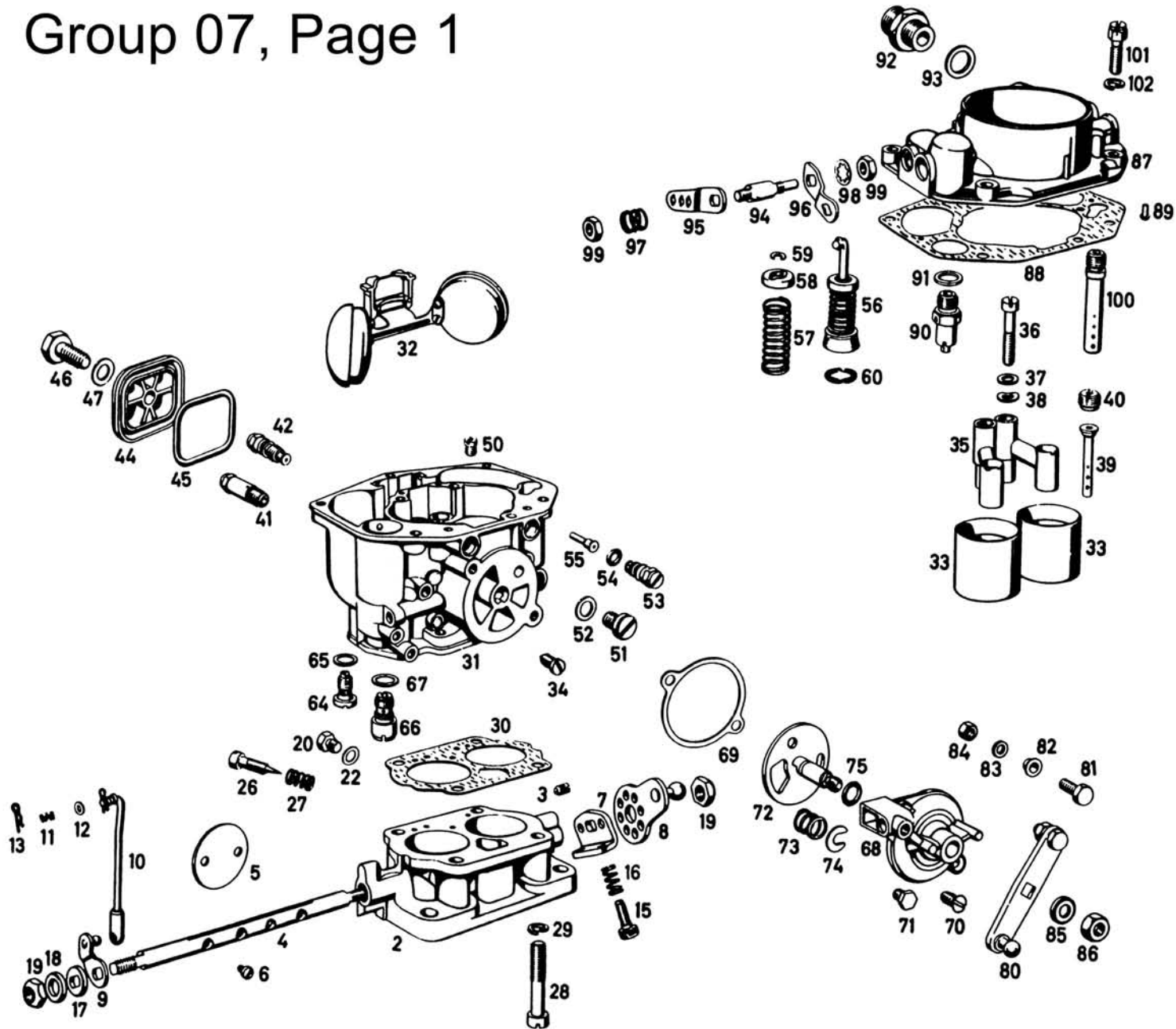


Table 5 - Carburetor Fuel/Linkage Set-up

Group 07, Page 2

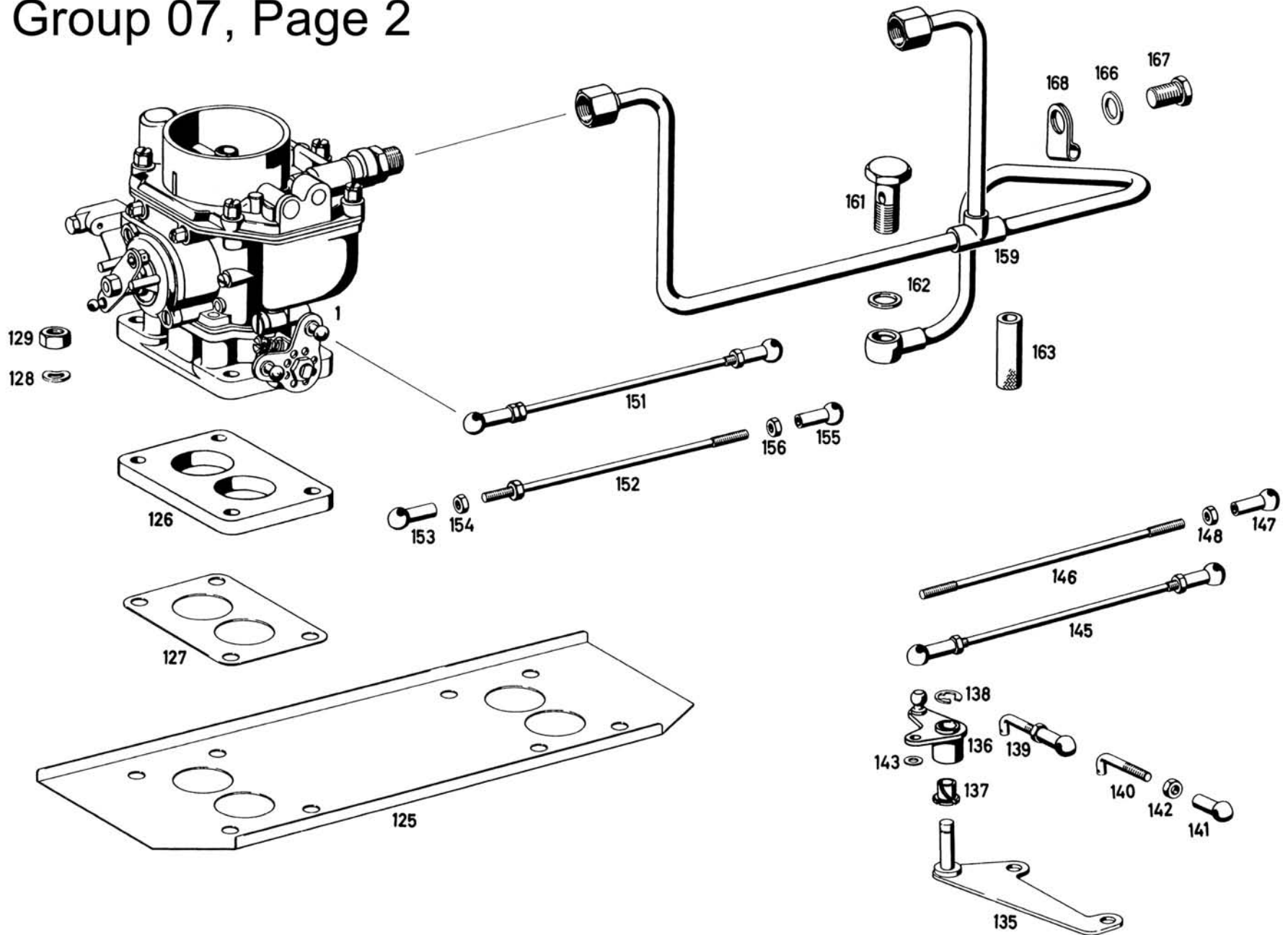


Table 6 - Fuel Pump - Group 09

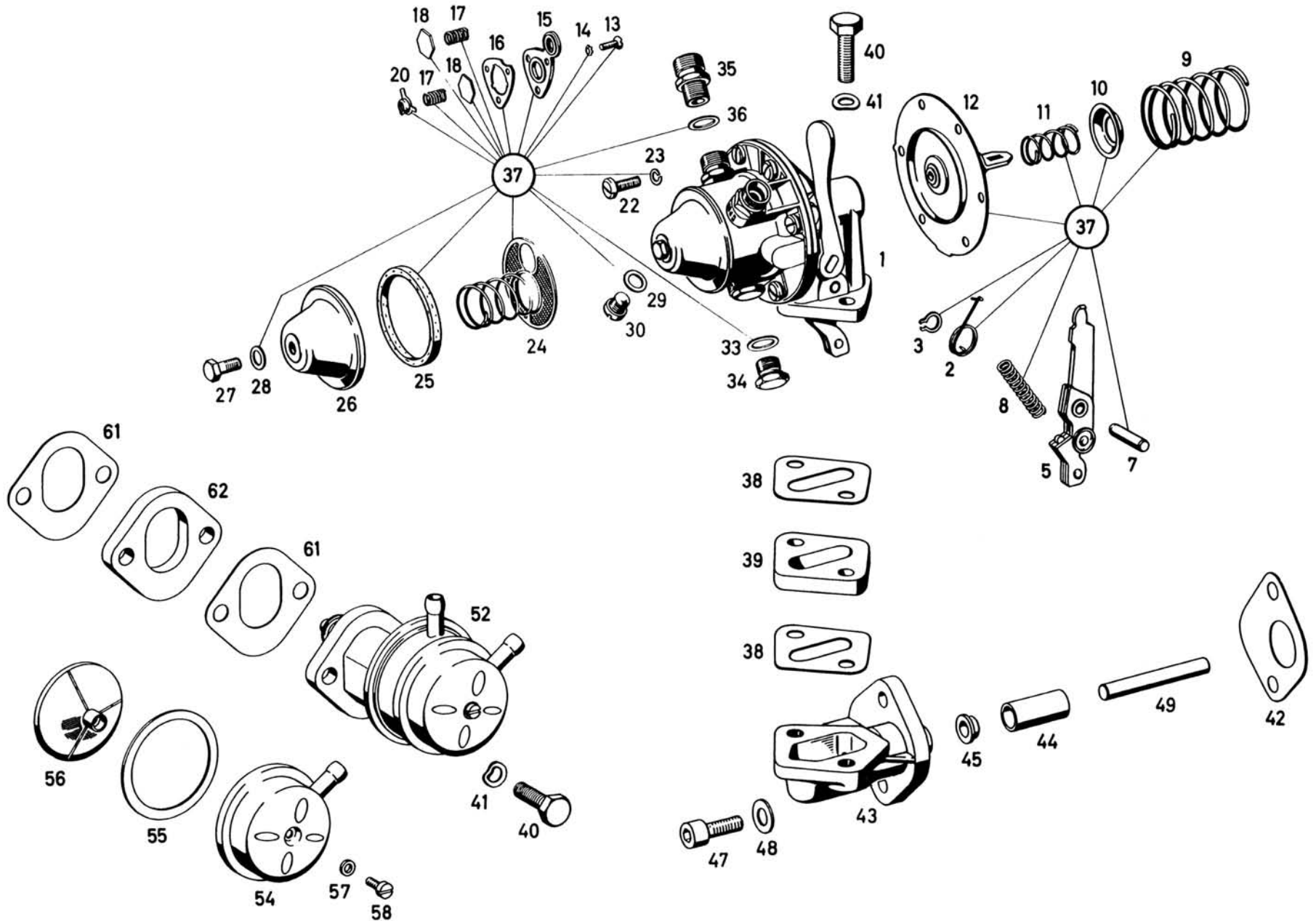


Table 7 - Air Cleaner (Model 922) - Group 09

29 and 30 used on Model 925.

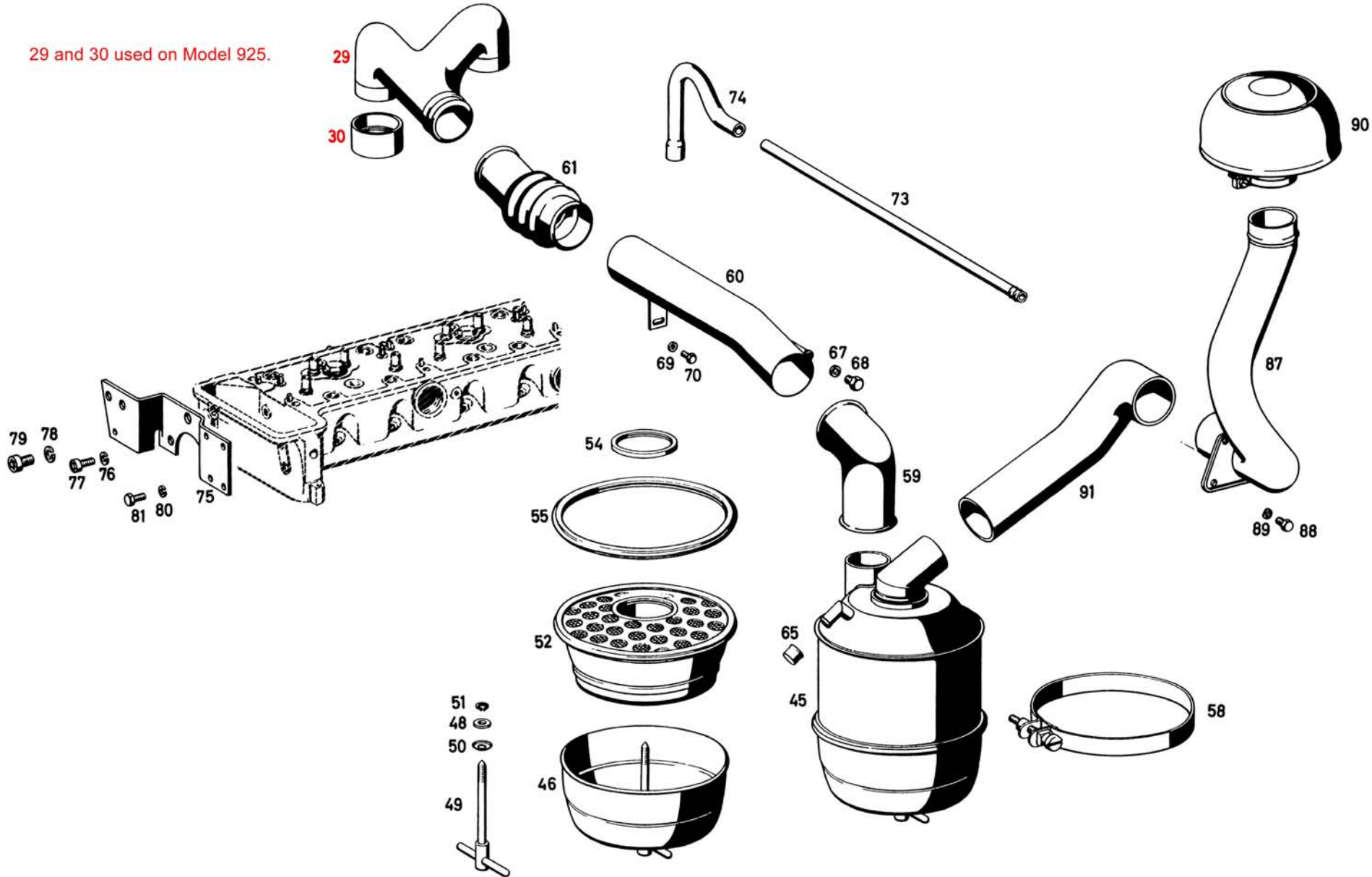


Table 7 - Air Cleaner (Model 925) - Group 09

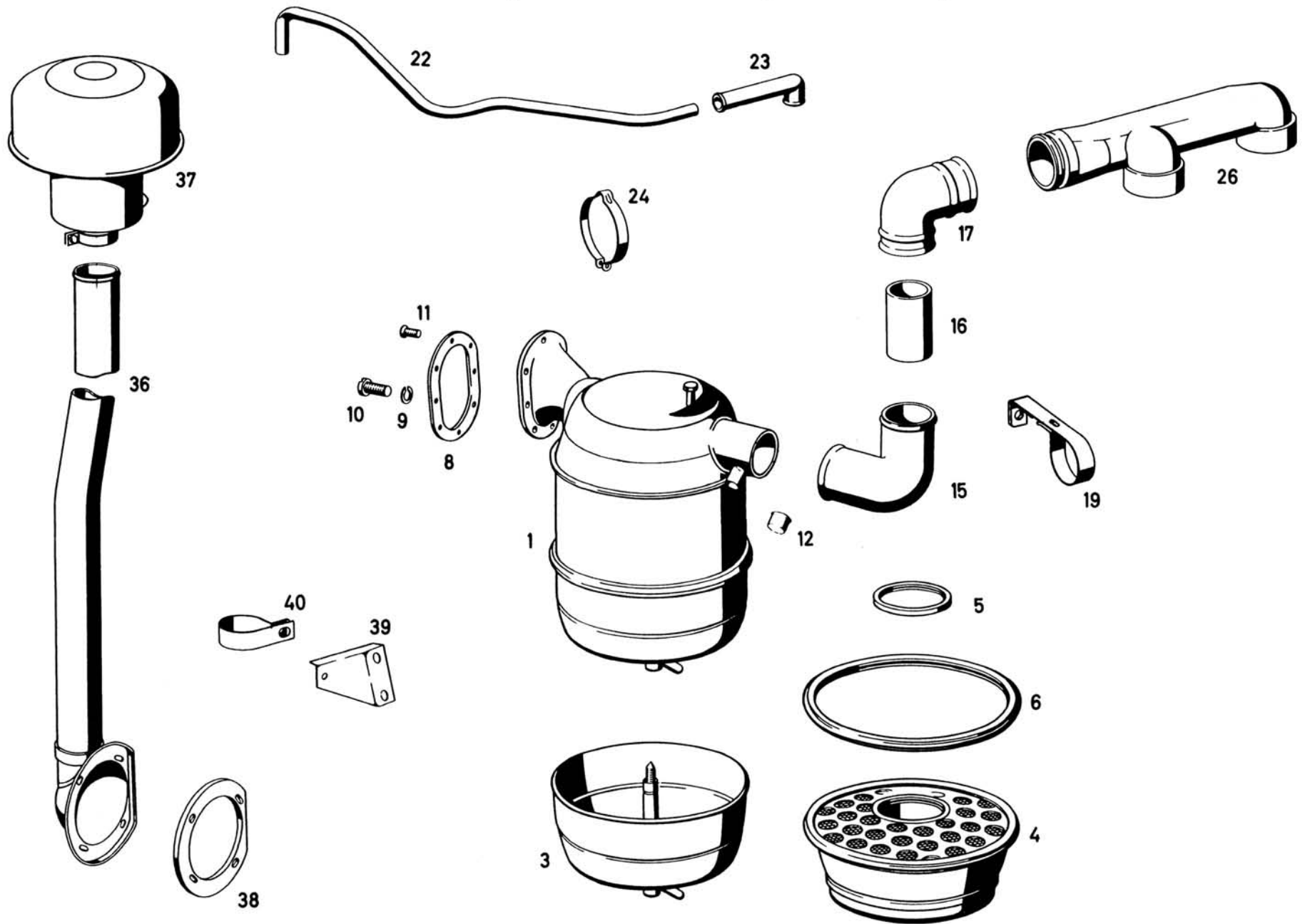


Table 8 - Intake/Exhaust Manifold - Group 14

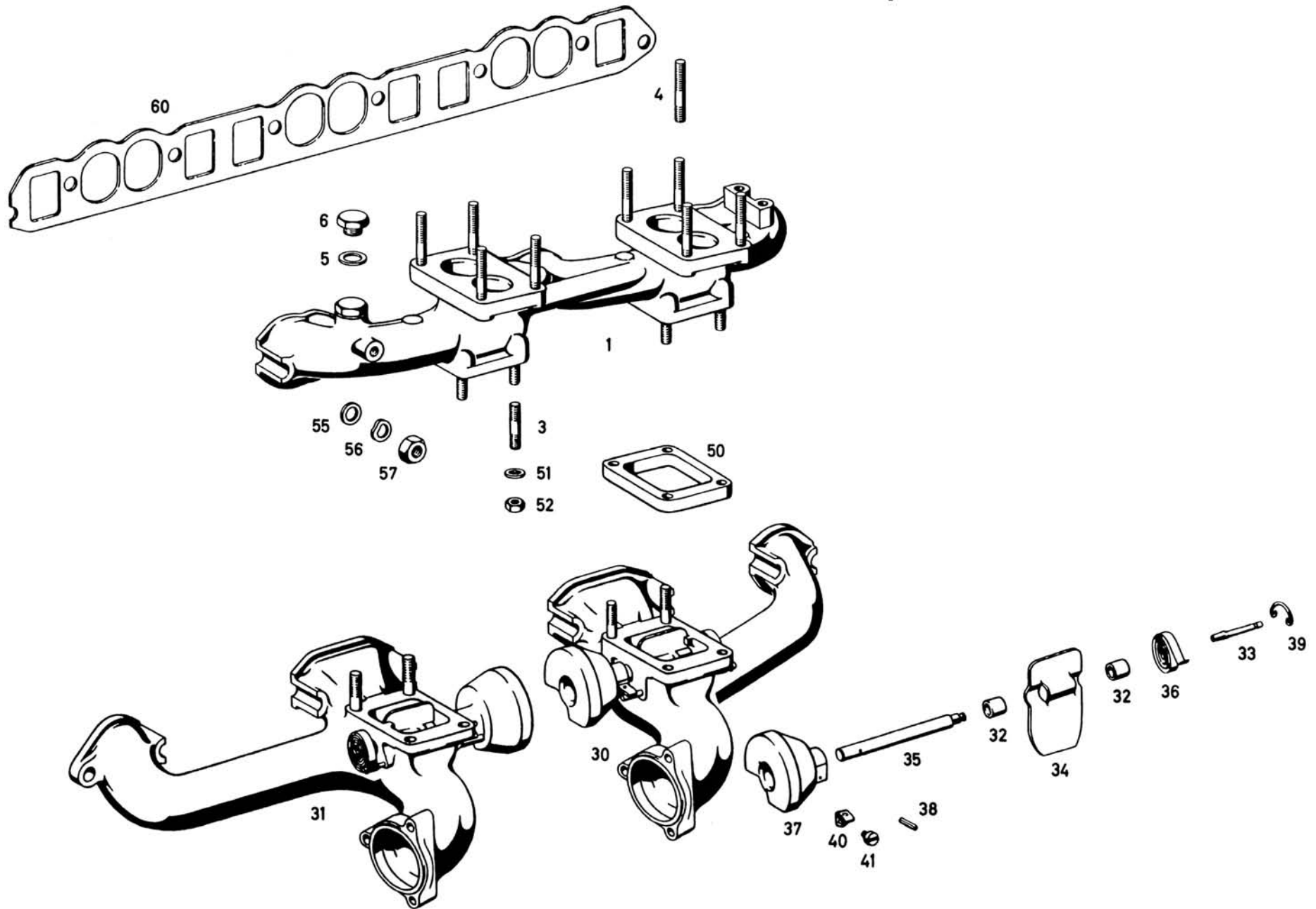


Table 9 - Ignition/Generator/Starter - Group 15, Page 1

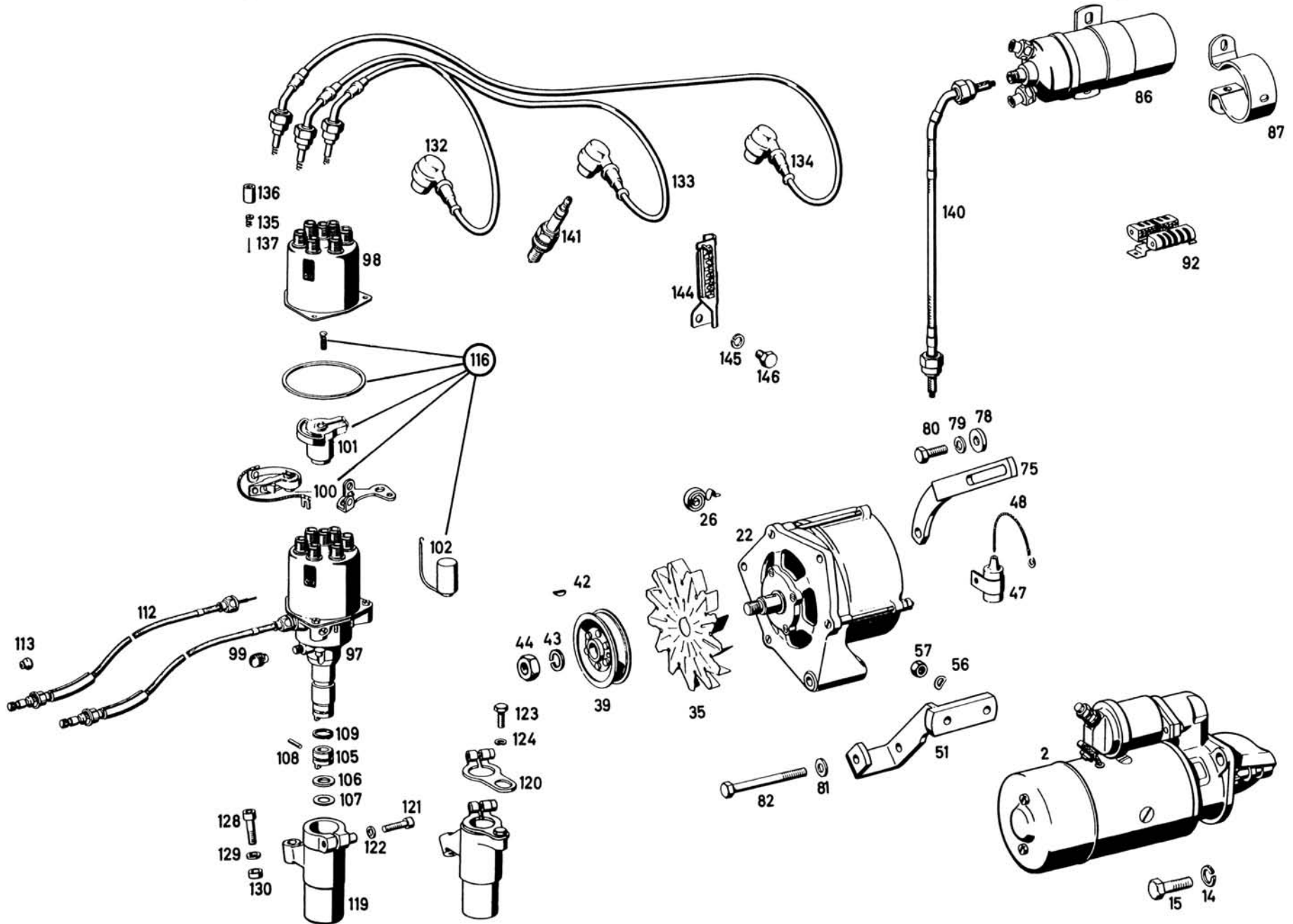


Table 9 - Generator/Starter - Group 15, Page 2 (Model 922)

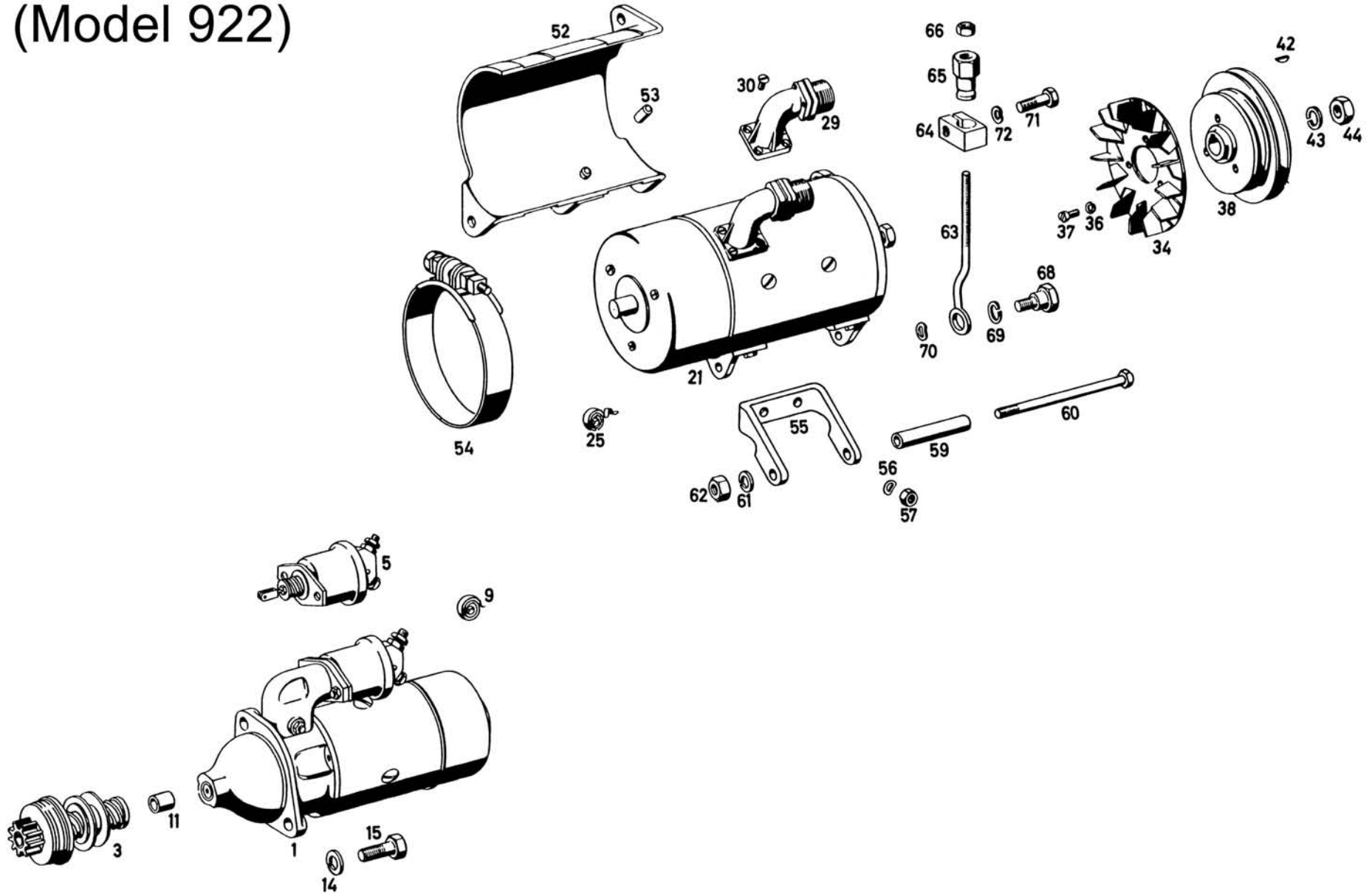


Table 10 - Engine Lubrication - Group 18

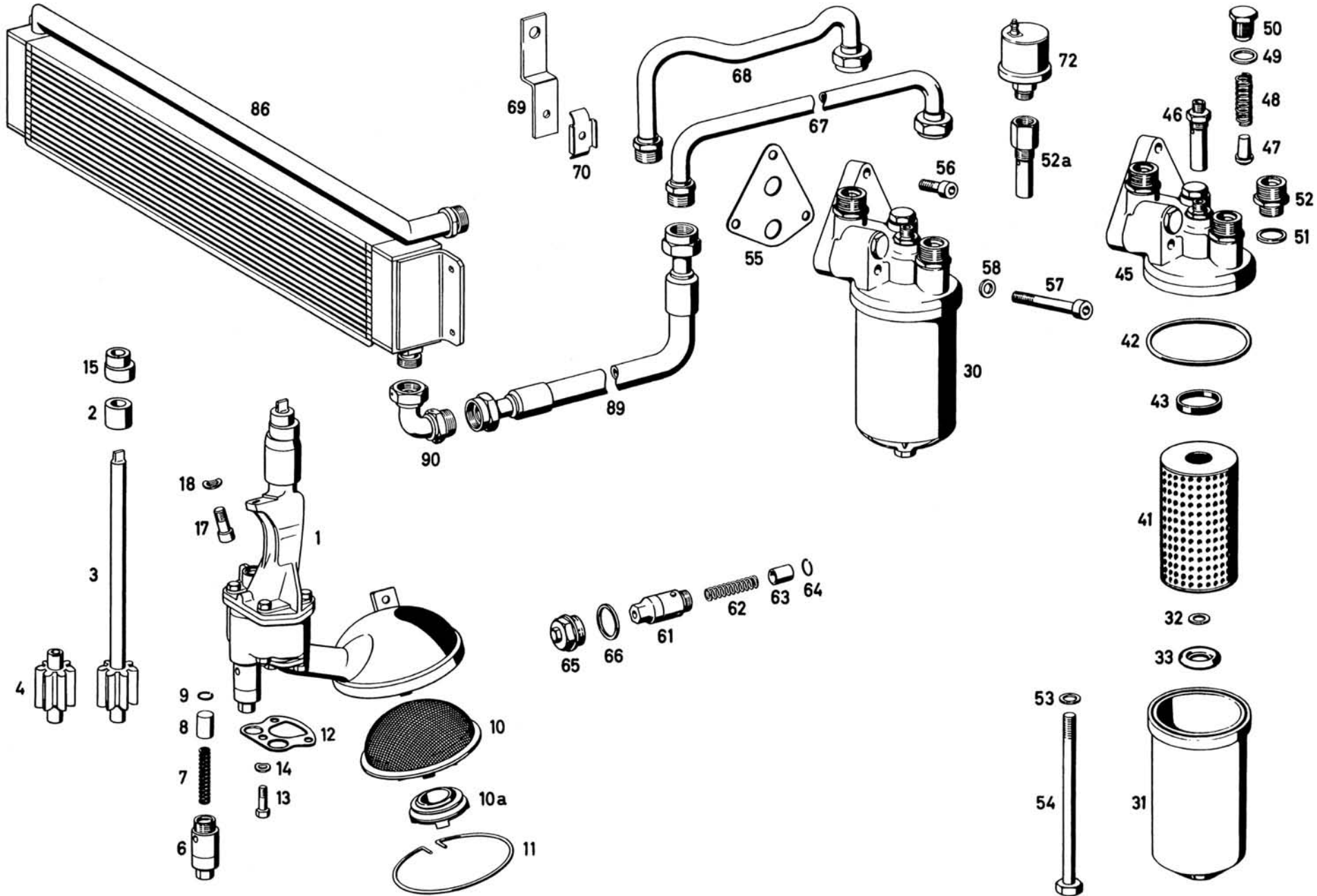


Table 11 - Engine Cooling - Group 20

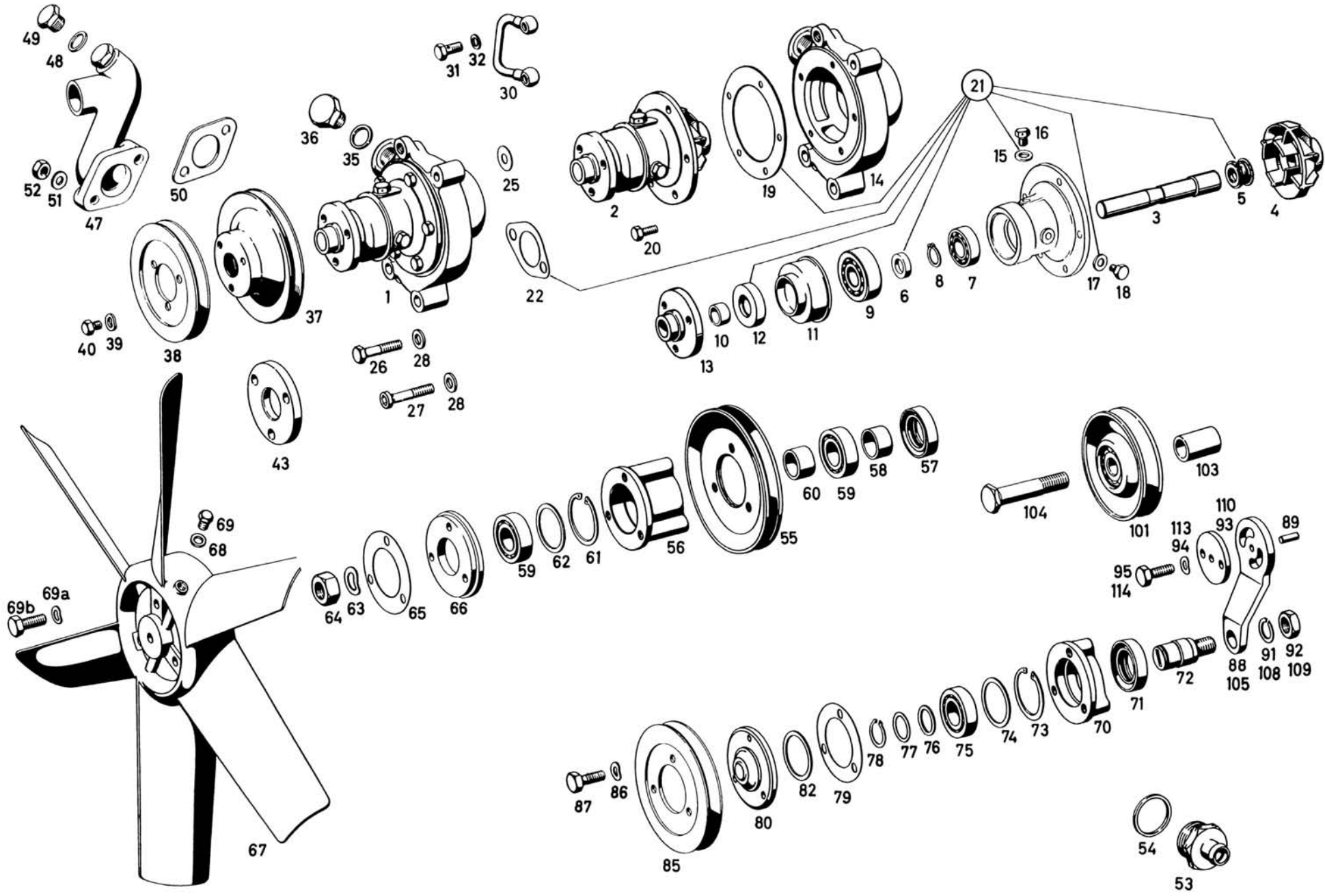
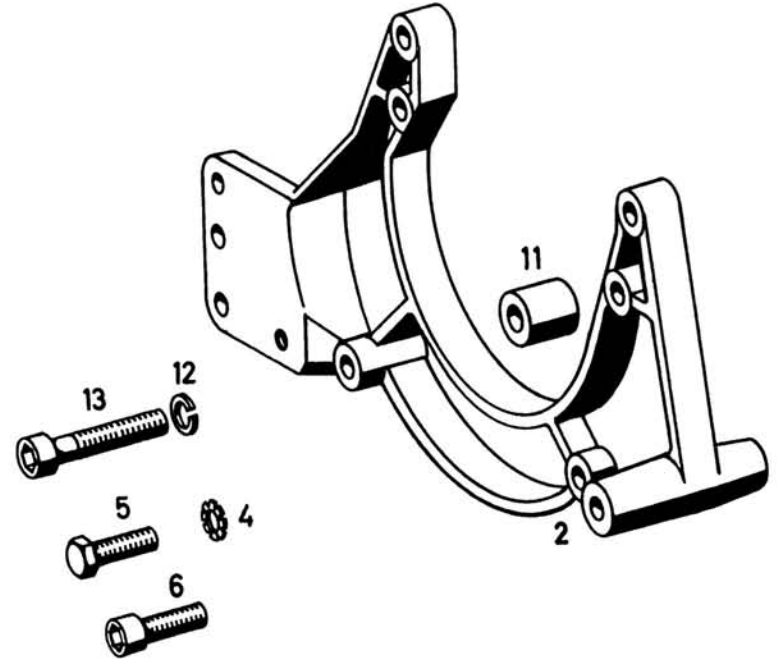
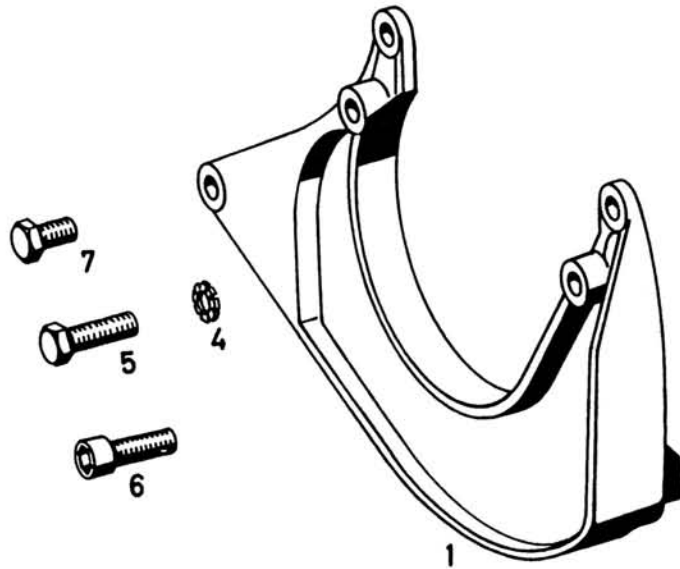


Table 12 - Engine Suspension - Group 22





Section 7– Unimog Type 404 Winch Manual

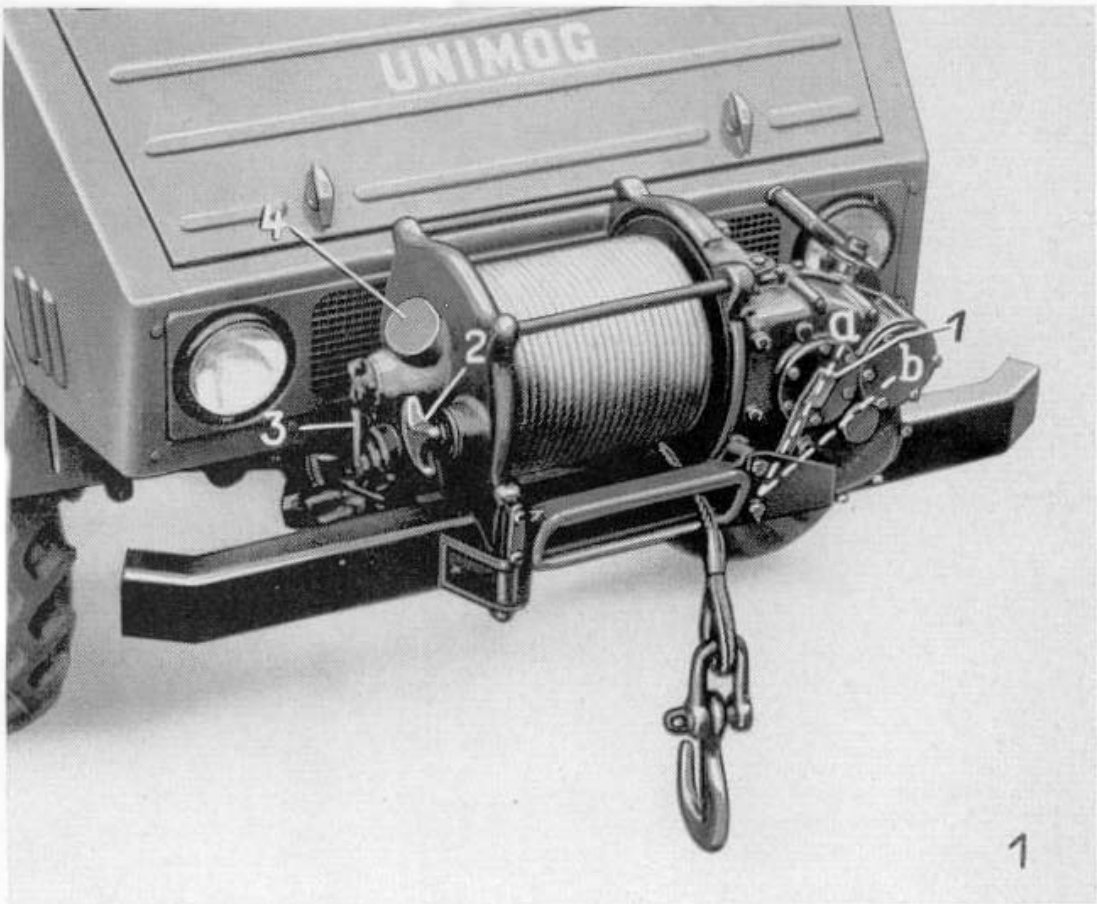
ATS TECHNICA
ELECTROGRAPHICS



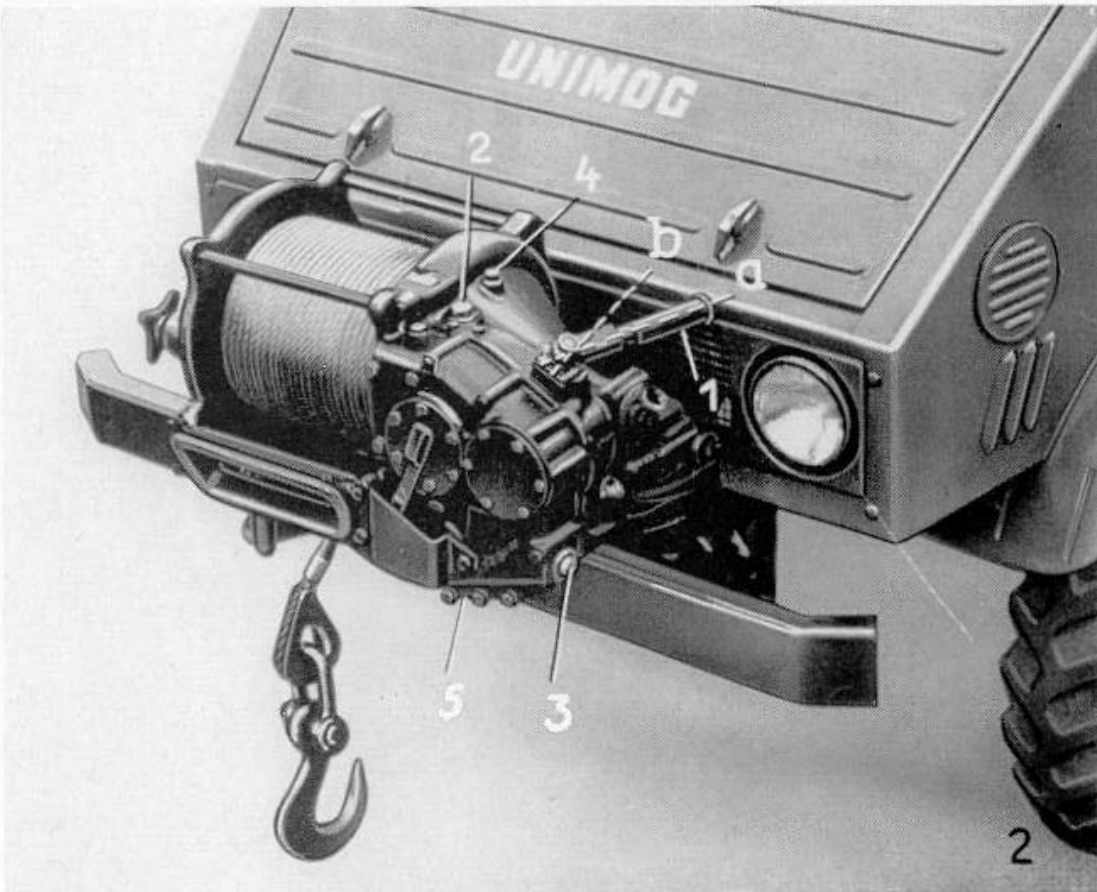
Anbau- und
Bedienungsanleitung
zur
Vorderen Seilwinde
am UNIMOG

AUSGABE A
(Änderungen vorbehalten)

DAIMLER-BENZ AKTIENGESELLSCHAFT
WERK GAGGENAU · ABTEILUNG UNIMOG



Anbau am UNIMOG 25 PS oder 30 PS (Typ A)



Vordere Seilwinde zum UNIMOG

A. Beschreibung

Die vordere Seilwinde wurde entwickelt, um eine Reihe von Arbeiten, welche mit der hinteren Seilwinde nur umständlich oder gar nicht durchgeführt werden können, nunmehr vollkommen zu beherrschen.

Um für alle vorkommenden Aufgaben die richtige Ausführung zur Verfügung zu haben, wird die vordere Seilwinde in zwei Typen hergestellt.

Typ A: Einfache Ausführung mit Rücklaufsperrklinke für eine Seilgeschwindigkeit von 0,8–1,0 m/sec. (Bilder 1 bis 3).

Typ C: Ausführung mit Reduziergetriebe für eine Seilgeschwindigkeit von nur 0,31 bis 0,41 m/sec. und angekuppelter Bandbremse zum Abbremsen von rücklaufenden Lasten (Bild 4, b = Bremslufthebel).

Beide Ausführungen haben gleiche Anbaumaße und die gleiche Zugkraft von **zirka 3000 kg** und die gleiche Seillänge von 50 m normal und 70 m für Sonderfälle. Sie lassen sich an alle UNIMOG-Typen anbauen.

Anwendungsgebiete für die vordere Seilwinde sind zum Beispiel folgende:

Typ A: Bergung von Fahrzeugen,
Herausziehen des eigenen Fahrzeuges aus unwegsamem Gelände.
Heranziehen von Lasten in bergigem Gelände (mit Rücklaufsperrklinke) als Ergänzung zur hinteren Seilwinde im Forstbetrieb.

Typ C: Aufstellen von Masten bei kleiner Seilgeschwindigkeit,
Ablassen von Lasten in Gräben und Schächte (Rohr- und Kabelverlegung),
Anheben von Lasten im Baugewerbe (Zimmererarbeiten) mit Hilfe einer Umlenkrolle.

Der Antrieb erfolgt über die vordere Zapfwelle des UNIMOG. An- und Abbau erfolgt durch Lösen von je einem Steckbolzen links und rechts. Für die Erstmontage folgt Anleitung unter Abschnitt B.

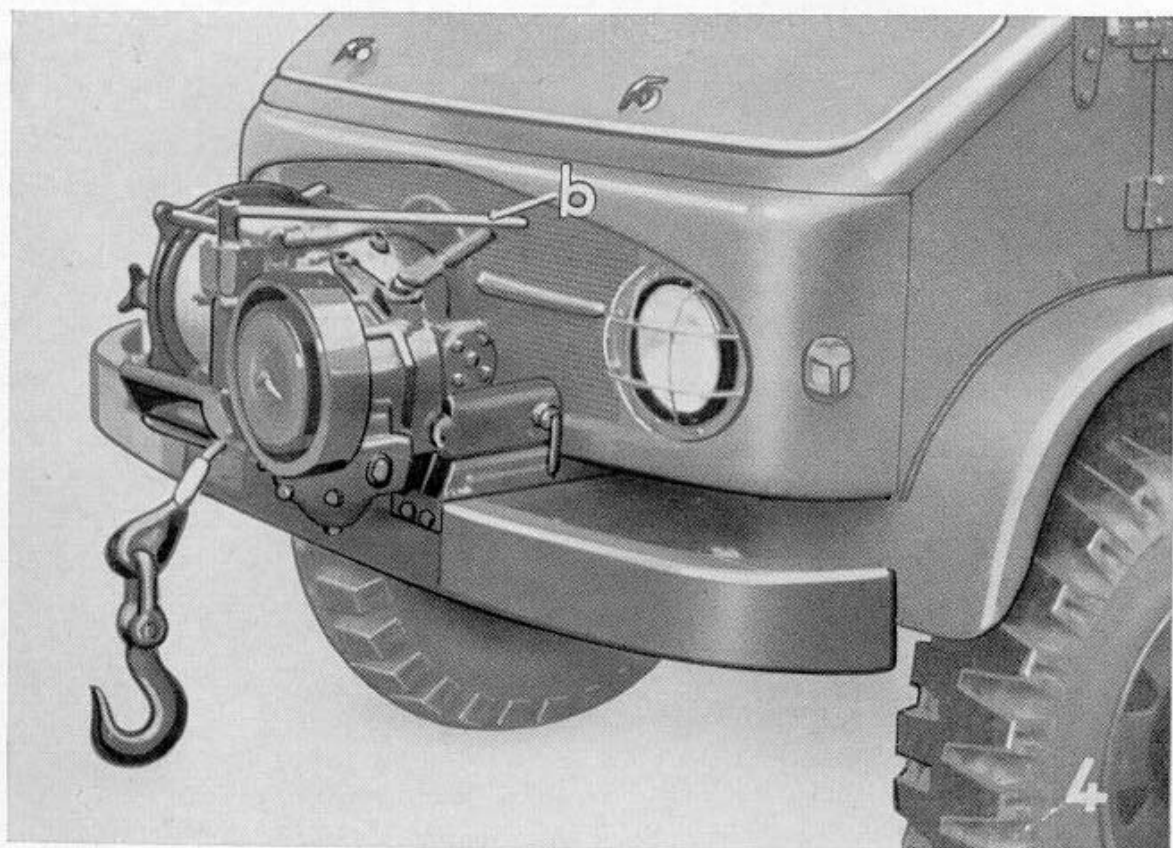
Die Winde vom Typ A besitzt außer einem Schalthebel für das Ein- und Ausschalten des Antriebes (Bild 2 Pkt. 1) einen Schalthebel zum Einschalten der Rücklaufsperrklinke (Bild 1 Pkt. 1). An der rechten Trommelseite befindet sich eine Regulierschraube (Bild 1 Pkt. 2), um den Freilauf der Trommel so einzustellen, daß das Seil nicht von selbst abläuft (wichtig bei großer freihängender Seillänge). Bei Nichtgebrauch der Winde wird die Trommel mit dieser Schraube gegen unbeabsichtigtes Lockern während der Fahrt gesichert.

Die Type C weist statt des Sperrklinkenhebels einen Bremslufthebel zum regulierbaren Ablassen der Lasten auf (Bild 4 Pkt. b).



3

Anbau am UNIMOG-S (oben Typ A, unten Typ C)



4

B. Erstanbau

(Die Bezeichnungen links und rechts gelten in Fahrtrichtung gesehen.)

I. Anbau an UNIMOG 25 PS und 30 PS (Typ 401 und 411)

1. Voraussetzung für den Anbau ist das Vorhandensein der vorderen Zapfwelle.
2. Sofern an dem Fahrzeug die Beschläge für Ackergeräte angebaut sind, ist festzustellen, ob diese in neuester Ausführung, d. h. mit Kugelkappen an den obenliegenden vier Befestigungslöchern, vorhanden sind. Ist dies nicht der Fall und werden die Beschläge überhaupt zum Anbau von Ackergeräten benötigt, so sind sie gegen solche mit der Teilnummer 22.2010.1328 (links) und 22.2010.1329 (rechts) auszutauschen. Bei Fahrzeugen ohne Gerätebeschläge wird je ein Zwischenbock mit der Teilnummer 28.2110.1080-00 (links) bzw. 28.2110.1081-00 (rechts) benötigt und so an das Fahrzeug angeschraubt, daß das einzelne Loch mit M-12-Gewinde an beiden Trägern nach außen zeigt. Obere Schrauben nicht einsetzen.
3. Linken und rechten Seilwindenhalter mit den mitgelieferten längeren Schrauben anschrauben, nachdem die oberen Schrauben im Gerätebeschlag am Fahrzeug herausgeschraubt worden sind. Für die hinterste Schraube, welche als Durchgangsschraube vorgesehen ist, muß noch im unteren Schenkel des Rahmenträgers (links und rechts) ein Loch von 13 mm \varnothing gebohrt werden. Beim Einsetzen dieser Schraube (M 12x140) ist zwischen Ober- und Unterschenkel das mitgelieferte Abstandsrohr mit einzusetzen. Beide Halter sollen auf den Kuppen gut aufsitzen, evtl. Grat entfernen.
4. Die anbaufertige Winde wird gleichmäßig angehoben und auf der Stoßstange abgesetzt. Beide Stecker (links und rechts) entfernen und die Winde mit der entsprechenden Bohrung für den Führungsbolzen (links) vorsichtig auf den linken Befestigungsbock einführen. Dabei ist gleichzeitig das Antriebskupplungsstück (Doppelkreuzgelenk mit Hülse) auf die Zapfwelle aufzuschieben. Bei Versatz der Längsnuten ist die Hülse etwas zu verdrehen. Dann Winde vollends aufschieben, wobei die Winde, wenn nötig, anzuheben ist, bis die Steckbolzenlöcher fluchten. Beide Steckbolzen, mit nach oben oder unten gerichtetem Griff soweit hineinstecken, bis die Sicherungsfeder einschnappt. Alle Verbindungsstellen sollen vorher eingefettet werden.
5. Ölfüllung kontrollieren, evtl. Öl (Getriebeöl SAE 80) nachfüllen. (Füllmenge max. 0,75 l für Typ A bzw. 1,25 l für Typ C.) Die Winde ist danach betriebsbereit.

II. Anbau an UNIMOG-S (Typ 404)

1. Voraussetzung für den Anbau ist, daß das Fahrzeug bereits mit der vorderen Zapfwelle ausgerüstet ist.
2. Vordere Stoßstange abschrauben und beide Befestigungswinkel (U-Profil) zwischen Stoßstange und Rahmen am Rahmenlängsträger abschrauben und mit dem anderen, längeren Schenkel wieder anschrauben. Stoßstange wieder anschrauben, wobei diese durch diesen Umbau um ca. 100 mm weiter nach vorn gekommen ist.

3. Zunächst ist nur der rechte Befestigungsbock mit der hinteren Schraube und dem vorhandenen Loch am Winkelstück anzuschrauben. Dabei soll die vordere Abwinklung des Bockes an der Stoßstange zur Anlage kommen.
4. Die Befestigungsschrauben für das Zapfwellenlager müssen für die Erstmontage (auch für den vorübergehenden Abbau) mindestens um 1 cm losgeschraubt werden, damit sich das Lager frei bewegen läßt. Nach der Montage darf das Festziehen der Schrauben nicht vergessen werden! Die Winde wird nun provisorisch aufgesetzt, wobei der linke Befestigungsbock mit Hilfe des Steckers mit der Winde verbunden wird. Beim Aufsetzen ist das Doppel-Kreuzgelenk zum Antrieb der Winde mit dem freien Zapfwellenende zu verbinden. Eine Versetzung der Längsnuten kann durch Drehen der Zapfwelle oder des Kreuzgelenkes an der Winde ausgeglichen werden. Das Zapfwellenende soll vorher eingefettet sein. Die übrigen Befestigungslöcher (links 3, rechts 2) sind jetzt anzudeckeln und nach dem Abbau der Winde durchzubohren. Die hintere Schraube im rechten Befestigungsbock ist danach wieder zu entfernen und in den unteren Schenkel des U-Profiles ein entsprechendes Loch von 13 mm \varnothing zu bohren, damit die mitgelieferte Durchgangsschraube (M 12x150) mit Abstandsrohr eingesetzt werden kann.
5. Außer diesen Befestigungslöchern ist im Abstand von 30 mm vor dem neugebohrten Loch am linken Rahmenlängsträger ein zusätzliches Loch von 13 mm \varnothing zu bohren. Dieses Loch wird dazu benutzt, um die Gewindeplatte, die für die hintere Befestigungsschraube benötigt wird, so anzuschweißen, daß das Gewindeloch in der Mitte des Befestigungsloches zu liegen kommt. Danach ist diese Gewindeplatte mit einer kurzen Schraube in der richtigen Lage festzuhalten und durch Lochschweißung mit dem Rahmenlängsträger zu verbinden. (Vgl. Skizze auf Seite 8; a = Gewindeplatte, b = hier Lochschweißung.)
6. Die Befestigungsböcke sind zunächst lose anzuschrauben. Dabei ist die linke Schraube im rechten Befestigungsbock wegen des geringen freien Raumes **vor** Anbau des Bockes einzusetzen; bei späterem Einsetzen könnte das Gewinde beschädigt werden. Danach kann die Winde wieder aufgesetzt werden. Nachdem die Winde ausgerichtet ist, d. h. die Befestigungsböcke an der vorderen Stoßstange zur Anlage gekommen sind, können alle Befestigungsschrauben fest angezogen werden. Die beiden Stecker werden zweckmäßigerweise mit dem Quergriff nach **unten** eingesetzt, da sie sich aus dieser Lage beim Abbau der Winde am leichtesten aus der Sicherungsfeder herausdrehen lassen. Beide Stecker müssen vorher gut eingefettet werden. (Vgl. Bild 1 Pkt. 3.)
7. Ölfüllung kontrollieren und evtl. Getriebeöl SAE 80 nachfüllen. Füllmenge max. 0,75 l für Typ A bzw. 1,25 l für Typ C. Danach ist die Winde betriebsfähig.

C. Bedienungsanleitung

Allgemein

Die Bedienung der vorderen Seilwinde erfolgt für Typ A grundsätzlich vom Fahrersitz aus.

Bei der Type C ist für wechselnden Einzieh- und Ablaßvorgang ein zweiter Mann an

der Winde erforderlich. Soll jedoch nach erfolgtem Einziehen (bzw. Anheben einer Last) nur noch Last abgelassen werden, so kann dazu der Bedienungsmann nach Ausschalten des Zapfwellenantriebes seinen Platz verlassen und selbst den Bremslülthebel an der Winde bedienen.

Im einzelnen ist wie folgt vorzugehen:

1. Sperrklinkenhebel auf „aus“ stellen, **wenn keine rücklaufende Last zu erwarten ist, sonst auf Stellung „ein“ belassen.**
(Vgl. Bild 1 Pkt. 1; a=ein, b=aus.)
Die Sperrklinke sichert nur gegen Rücklauf (Seilablauf), läßt aber den Einzieh-Vorgang frei (Ratschenwirkung). Nur beim Typ A vorhanden. Bei der Type C übernimmt diese Sicherung die Bandbremse, daher fehlt die Sperrklinke bei dieser Type. Zum Ausziehen des Seiles von Hand ist der obere Schalthebel auf „aus“ zu stellen. Trommelfreilauf mit Regulierschraube einstellen (Bild 1 Pkt. 2).
2. Oberen Schalthebel auf „ein“ stellen. Dieser Hebel wird nur ausgeschaltet, wenn das Seil ausgezogen werden soll, oder die vordere Zapfwelle zu einem anderen Zweck mit angetrieben wird (z. B. Arbeiten mit der hinteren Zapfwelle; vgl. Bild 2 Pkt. 1; a=ein, b=aus).
Auf keinen Fall darf mit diesem Hebel während des Einziehvorganges aus- und eingeschaltet werden.
3. Motor laufen lassen, Kupplung treten, Zapfwelle am Getriebe einschalten (Hebel nach hinten = ein, Hebel nach vorn = aus), und die Kupplung langsam loslassen, dabei die Motordrehzahl je nach Belastung regulieren.

Der Einziehvorgang beginnt

Soll mit der Winde eine Last heran- oder hochgezogen werden, so ist das Fahrzeug selbst, entsprechend der zu erwartenden Last, zu blockieren. Es soll dabei möglichst in Zugrichtung stehen.

Bei leichter Belastung genügt das Festhalten des Fahrzeuges mit der Fußbremse. In diesem Falle erfolgt die Motordrehzahl-Regulierung mit dem Handgashebel.

4. Zur Unterbrechung oder Beendigung des Einziehvorganges wird nur die Kupplung getreten und der „Gashebel“ zurückgenommen.
Für das Arbeiten mit einer Winde vom Typ A wird nochmals darauf hingewiesen, daß zur Sicherung gegen Motorrücklauf (bei Überlastung) die Sperrklinke eingeschaltet sein soll.
5. Die Bremse bei der Type C wird nur beim Ablassen von Lasten betätigt, und zwar muß der Bremslülthebel während der ganzen Zeit des Ablassens der Last gehalten werden. Ein Loslassen bewirkt sofortiges Abbremsen. Durch verschieden starkes Betätigen kann die Abbläßgeschwindigkeit reguliert werden (Bremse schleift).
Auf keinen Fall darf der Einschalthebel (Bild 2 Pkt. 1) bei belastetem Seil auf „aus“ geschaltet werden, da dann auch die Bremse ausgeschaltet wird.

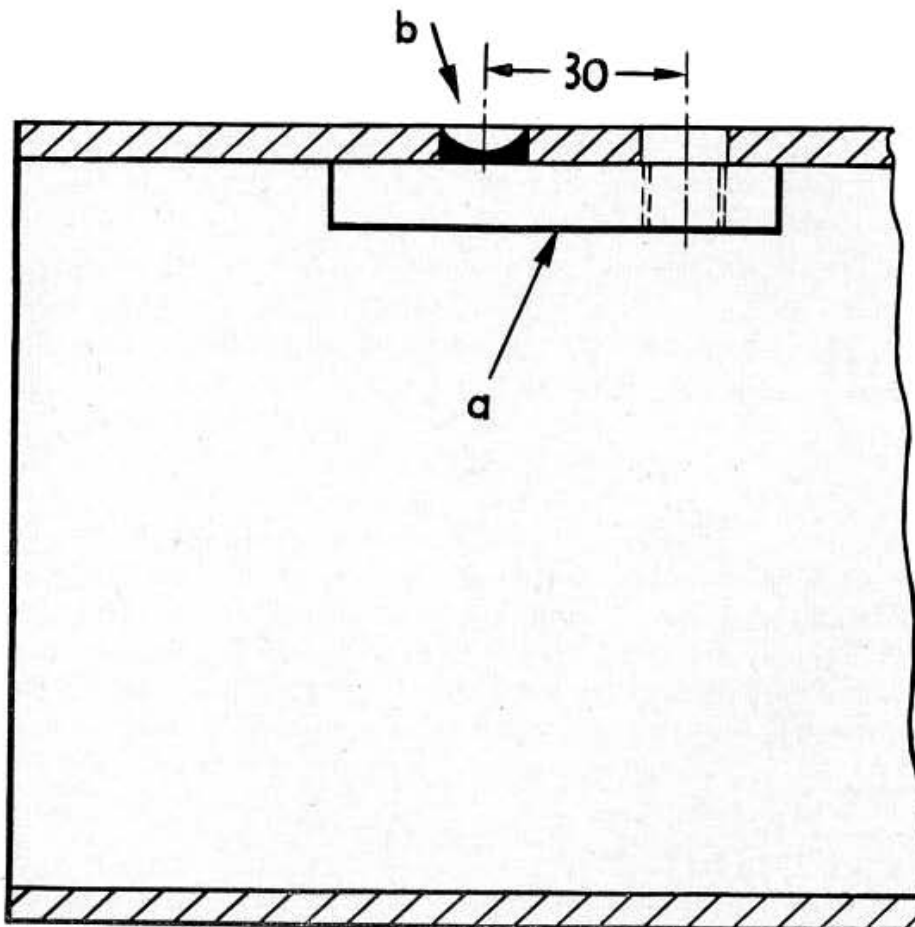
D. Wartung

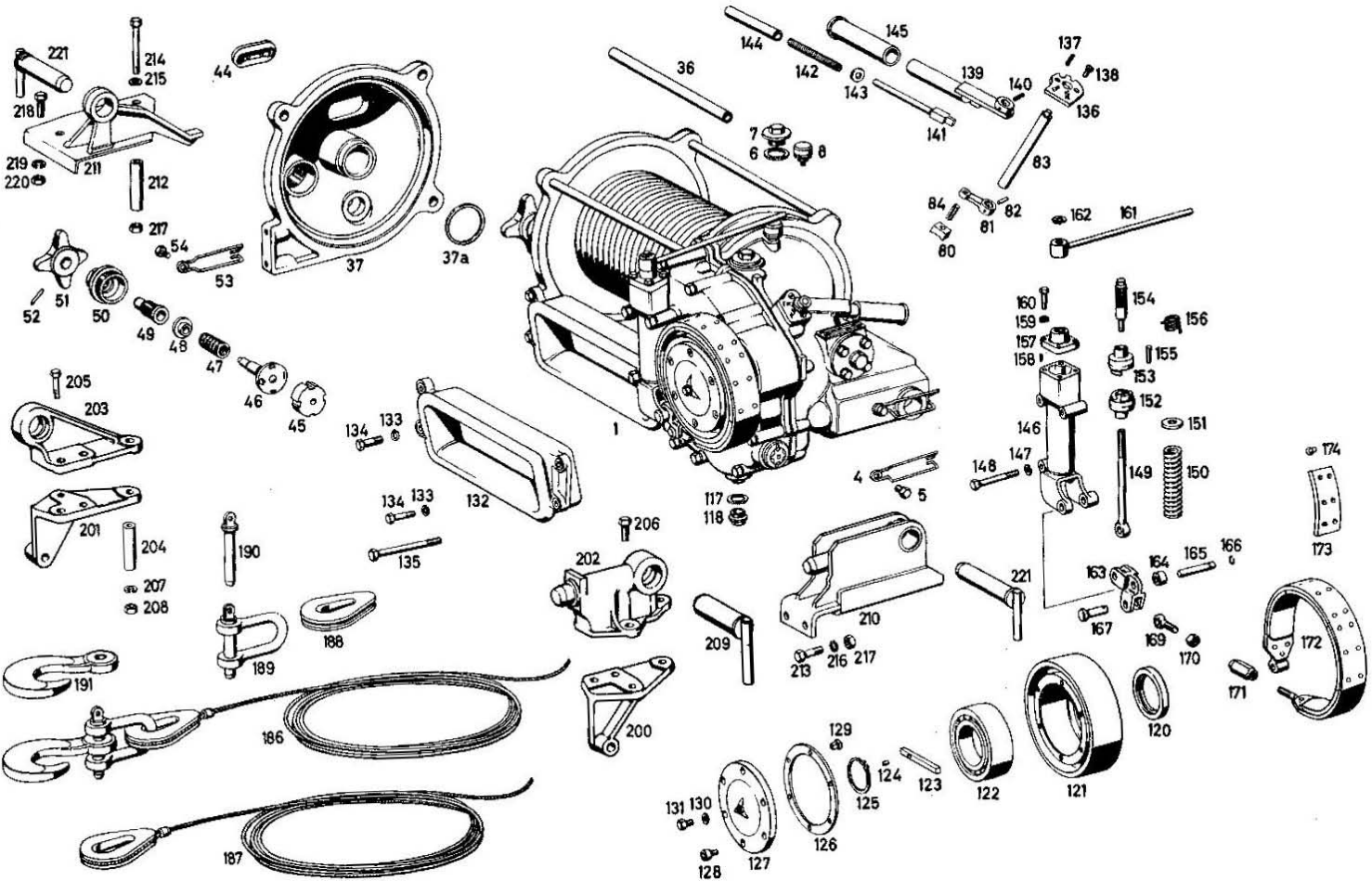
1. Nach 100 Betriebsstunden ist das Getriebeöl abzulassen und frisches Öl (SAE 80) aufzufüllen (Füllmenge ca. 0,75 l für Typ A bzw. ca. 1,5 l für Typ C) bis Oberkante

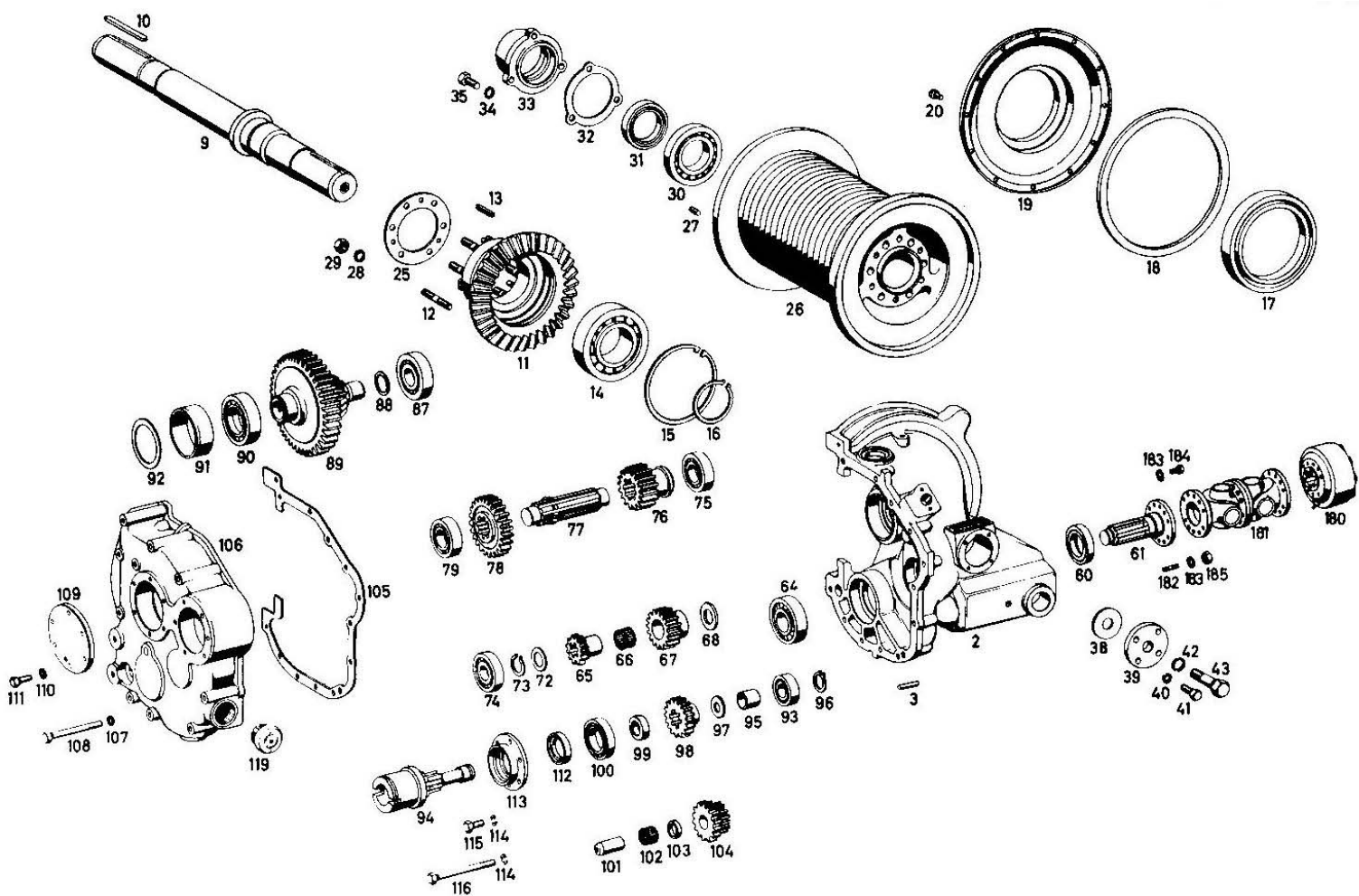
Schauglas. (Vgl. Bild 2 Pkt. 2; 2=Öleinfüllschraube, 3=Schauglas, 4=Entlüftung, 5=Ölablaß.)

2. Gelenke an Hebeln und Bremsgestänge von Zeit zu Zeit mit Öl schmieren.
3. Das Seil ist, wenn nötig, abzubürsten und mit einem in dünnem Öl getränkten Lappen leicht einzureiben, um Rostbildung zu vermeiden. Beim Austausch des Seiles sind die Endbefestigungsschrauben durch den Deckel am rechten Trommelschild zugänglich. (Vgl. Bild 1 Pkt. 4.)
4. Das Doppelkreuzgelenk ist nach 100 Betriebsstunden mit einer Hochdruckpresse (mit Spitzmundstück) mit Getriebeöl zu schmieren.
5. Bei Verschleiß des Bremsbelages bei Typ C kann das Bremsgestänge an dem unten befindlichen Spannschloß nachreguliert werden.
6. Für den vorübergehenden Abbau werden nur die Steckbolzen entfernt. Die Befestigungsböcke verbleiben am Fahrzeug. Außerdem muß das Zapfwellenlager wie unter Pkt. B II/4 angegeben, gelöst werden. Zapfwellenende mit Gummischutzkappe versehen.

Anm.: Bei angebauter Winde am UNIMOG-S ist der Bolzen zum Kupplungsmaul in der vorderen Stoßstange nicht mehr von oben her einzustecken.
Bei Benutzung ist der Steckbolzen ausnahmsweise von unten einzusetzen und oben mit einer Sicherungsnadel zu sichern.



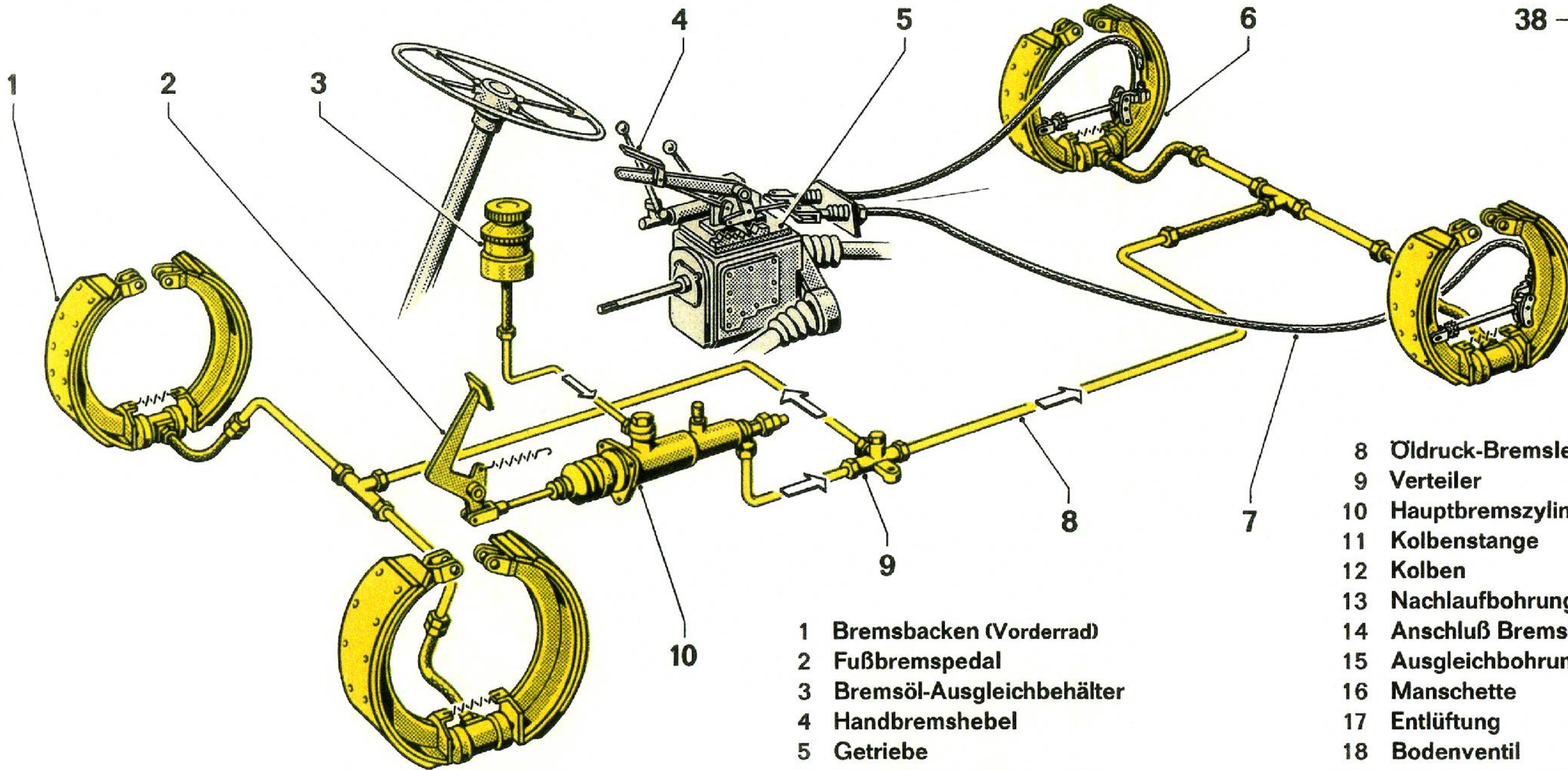
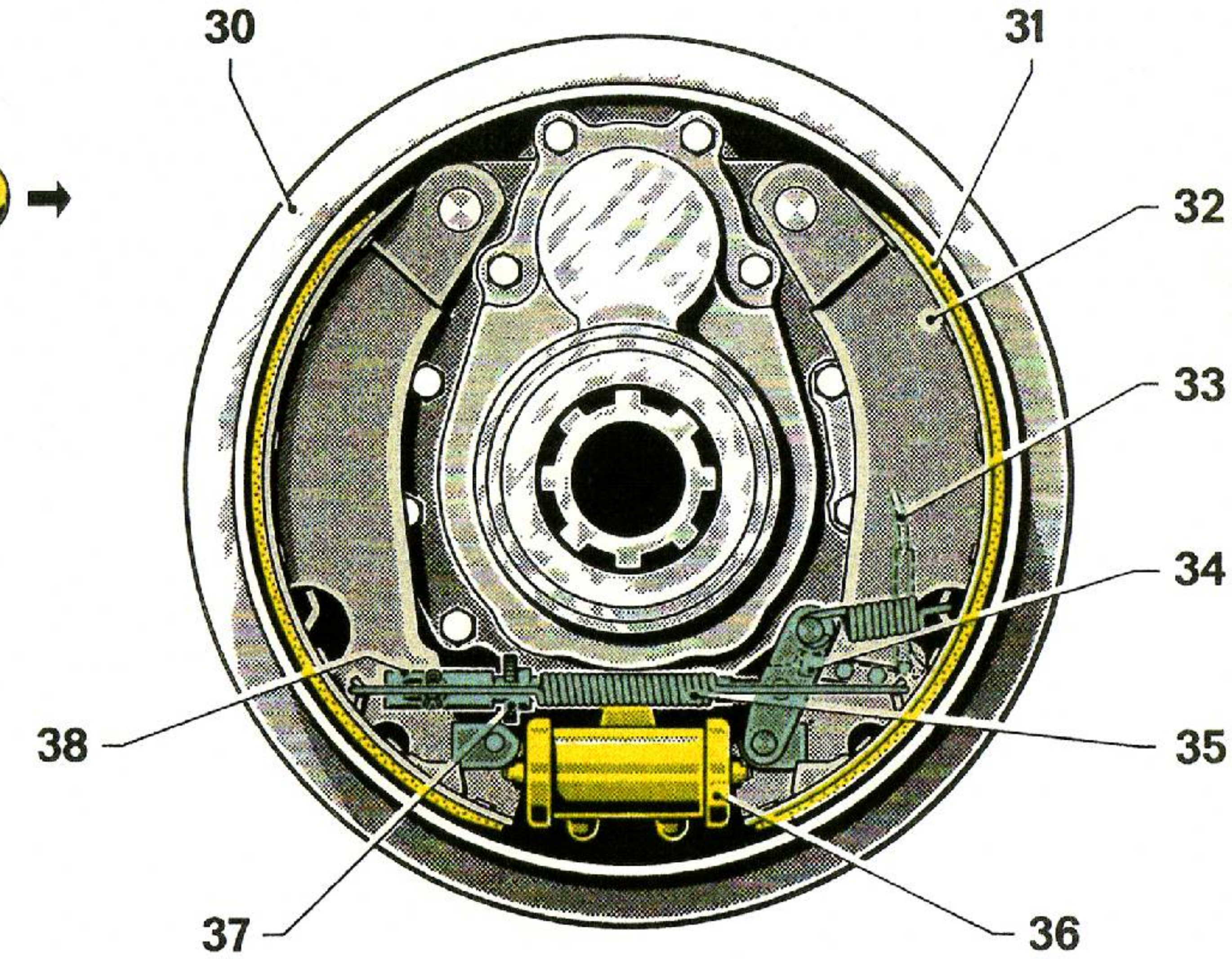
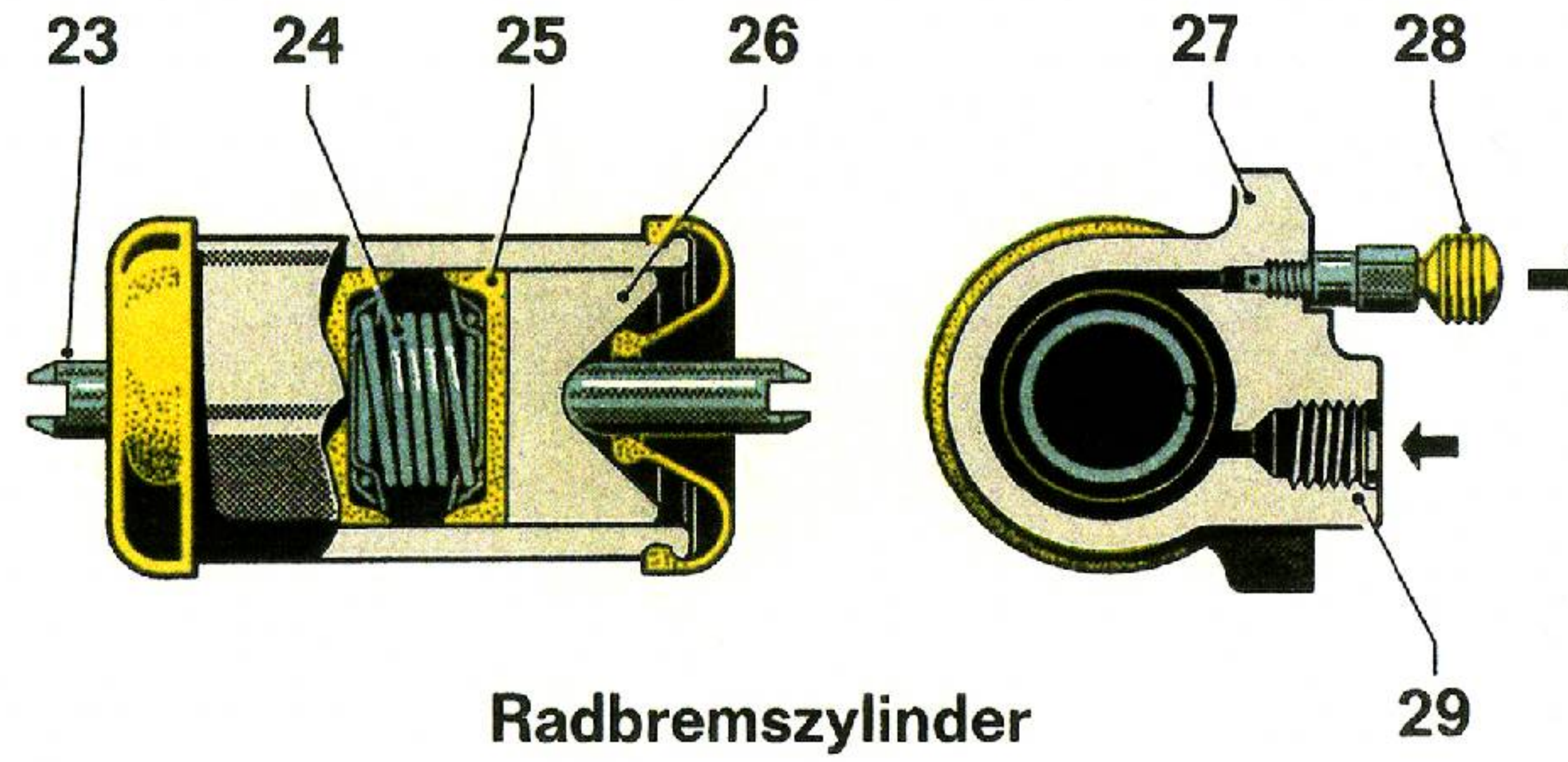
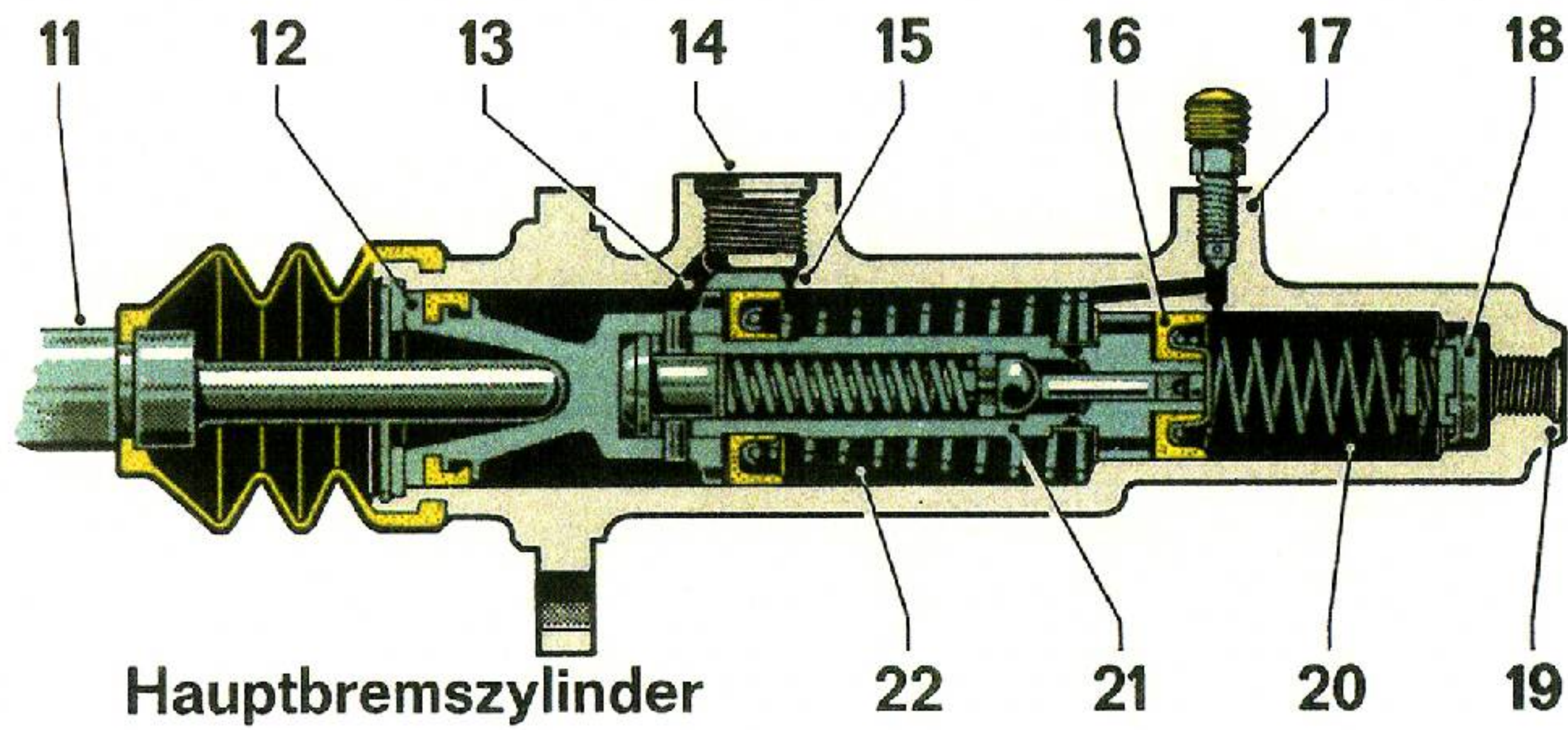






Section 8– Unimog Type 404 Technical Illustrations

ATS TECHNICA
ELECTROGRAPHICS

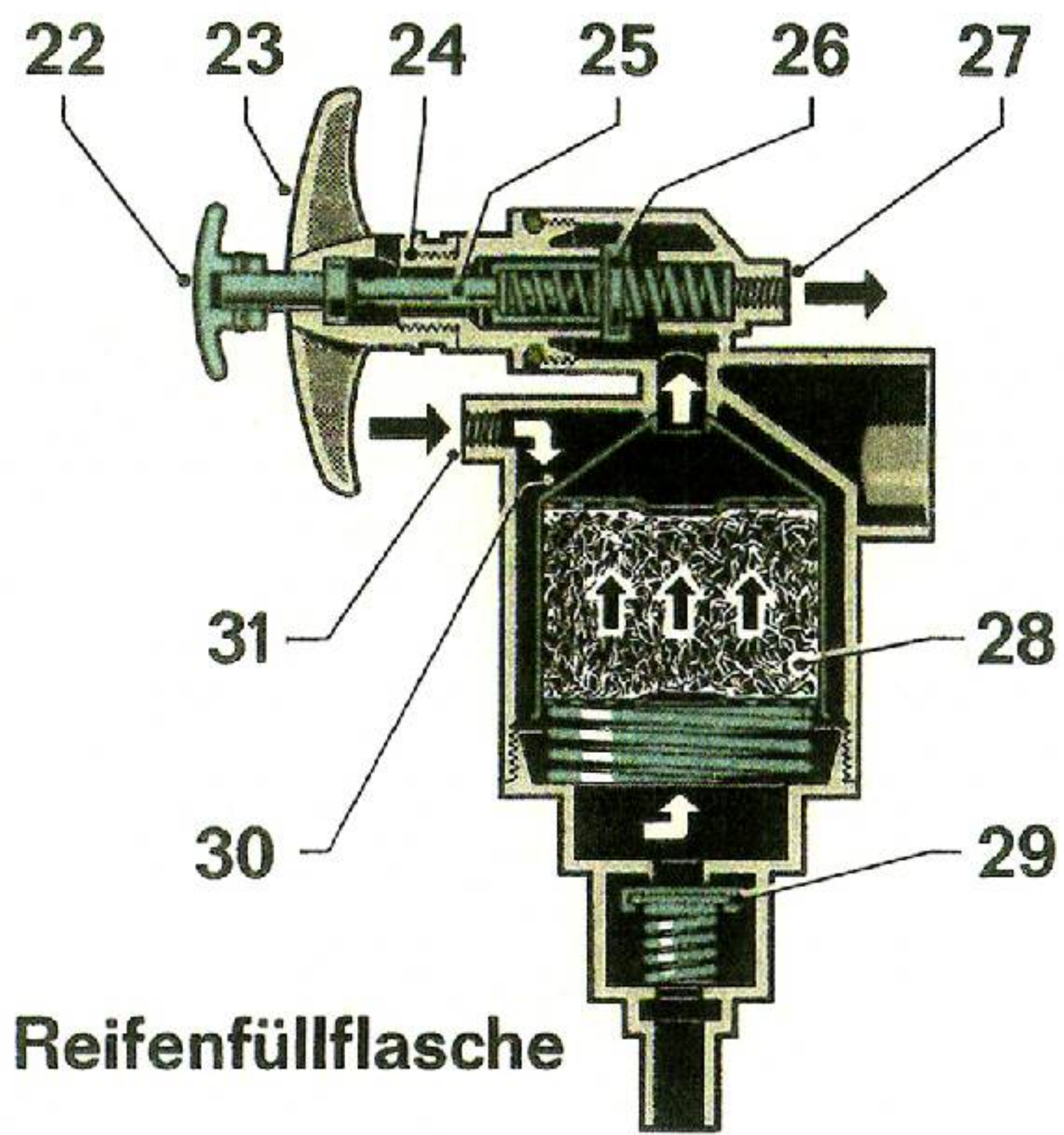


- 1 Bremsbacken (Vorderrad)
- 2 Fußbremspedal
- 3 Bremsöl-Ausgleichbehälter
- 4 Handbremshebel
- 5 Getriebe
- 6 Bremsbacken (Hinterrad)
- 7 Bremszug

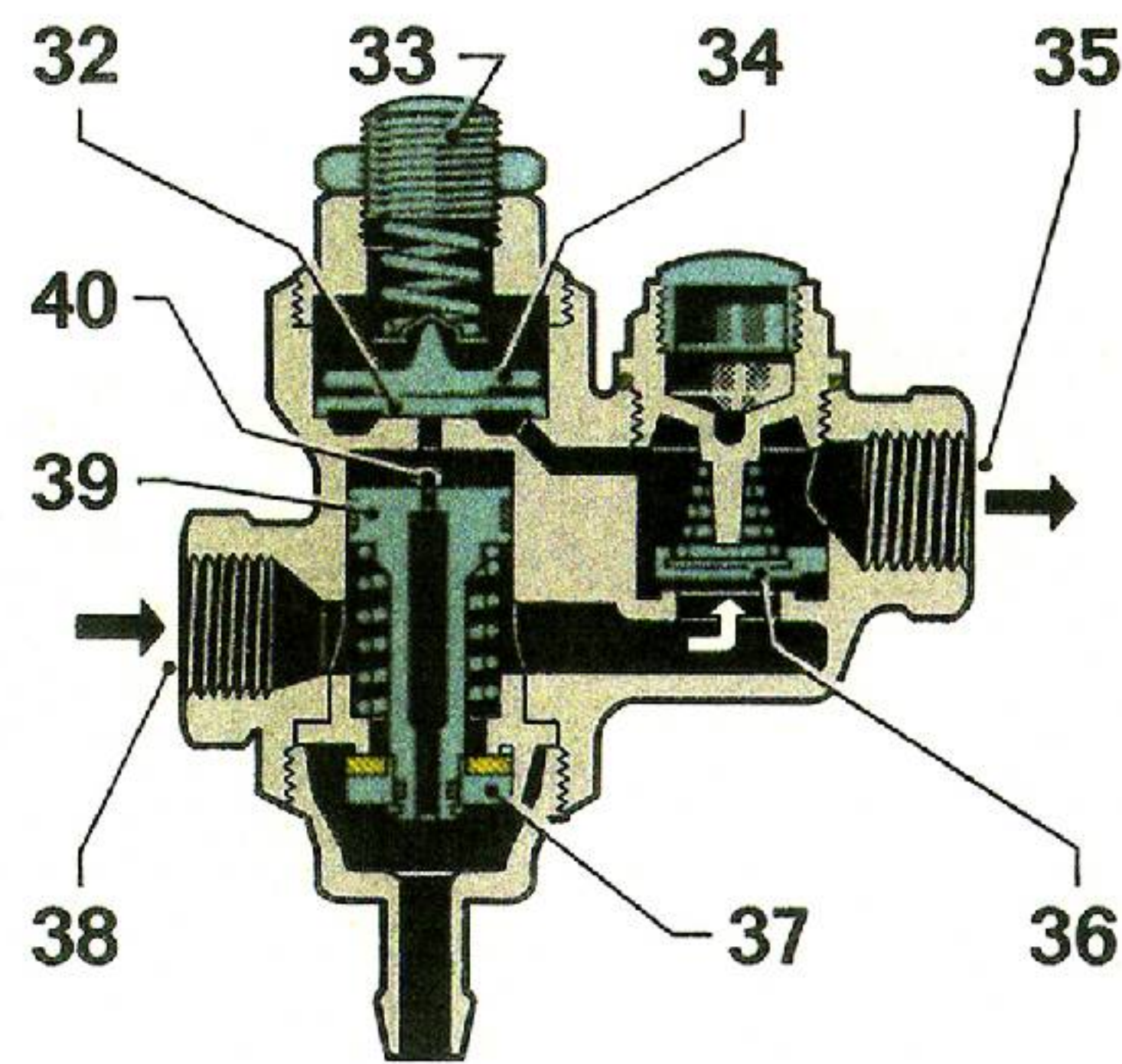
- 8 Öldruck-Bremsleitung
- 9 Verteiler
- 10 Hauptbremszylinder
- 11 Kolbenstange
- 12 Kolben
- 13 Nachlaufbohrung
- 14 Anschluß Bremsöl-Nachlaufbehälter
- 15 Ausgleichbohrung
- 16 Manschette
- 17 Entlüftung
- 18 Bodenventil
- 19 Anschluß Verteiler
- 20 Druckstufe

- 21 Druckkolben
- 22 Füllstufe
- 23 Druckbolzen
- 24 Druckfeder
- 25 Manschette
- 26 Kolben
- 27 Gehäuse
- 28 Entlüftung
- 29 Anschluß Öldruckleitung
- 30 Bremstrommel
- 31 Bremsbelag
- 32 Bremsbacken
- 33 Bremszug (mech. Handbremse)
- 34 Bremslasche
- 35 Rückholfeder
- 36 Bremszylinder
- 37 Nachstellmutter
- 38 Druckstange

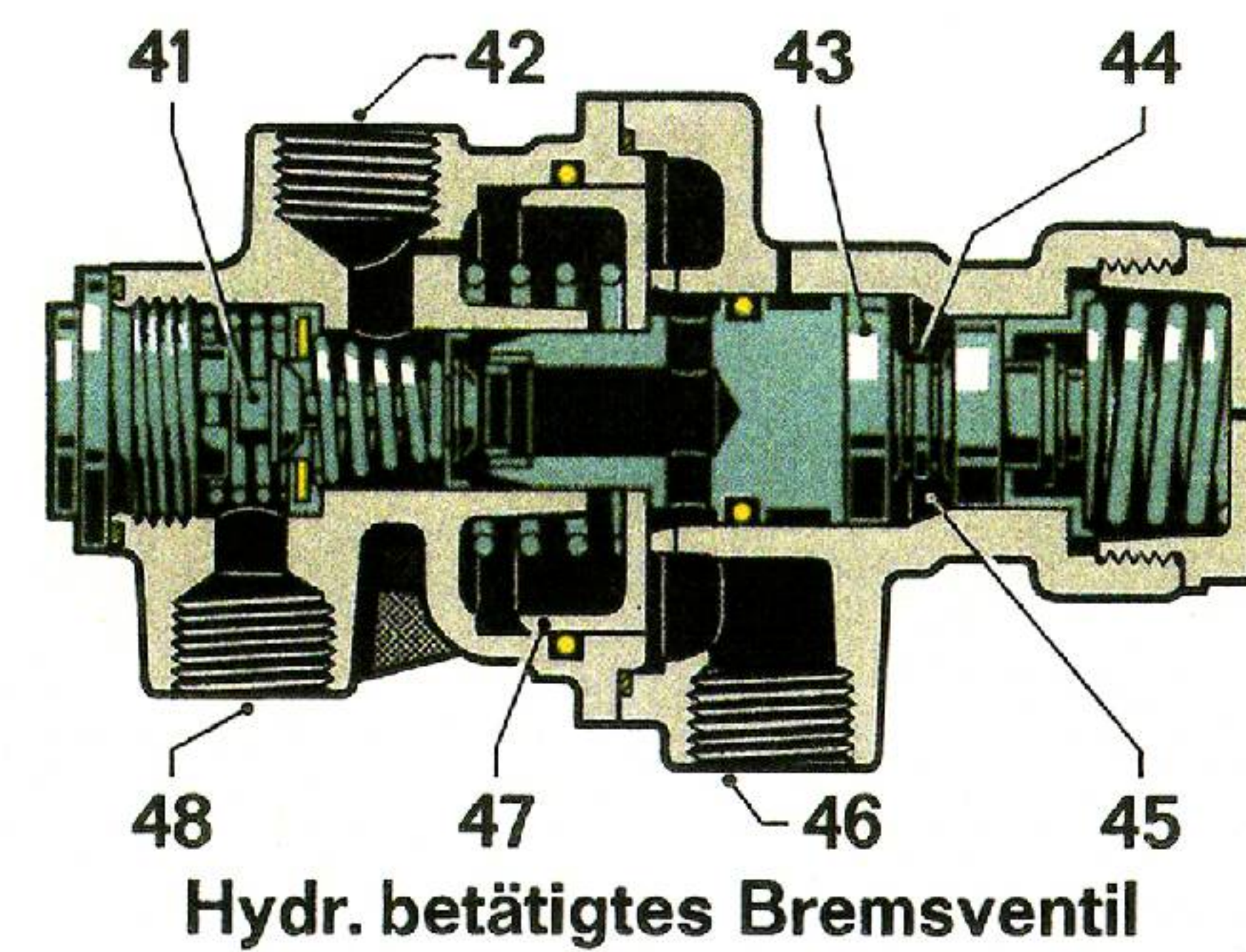




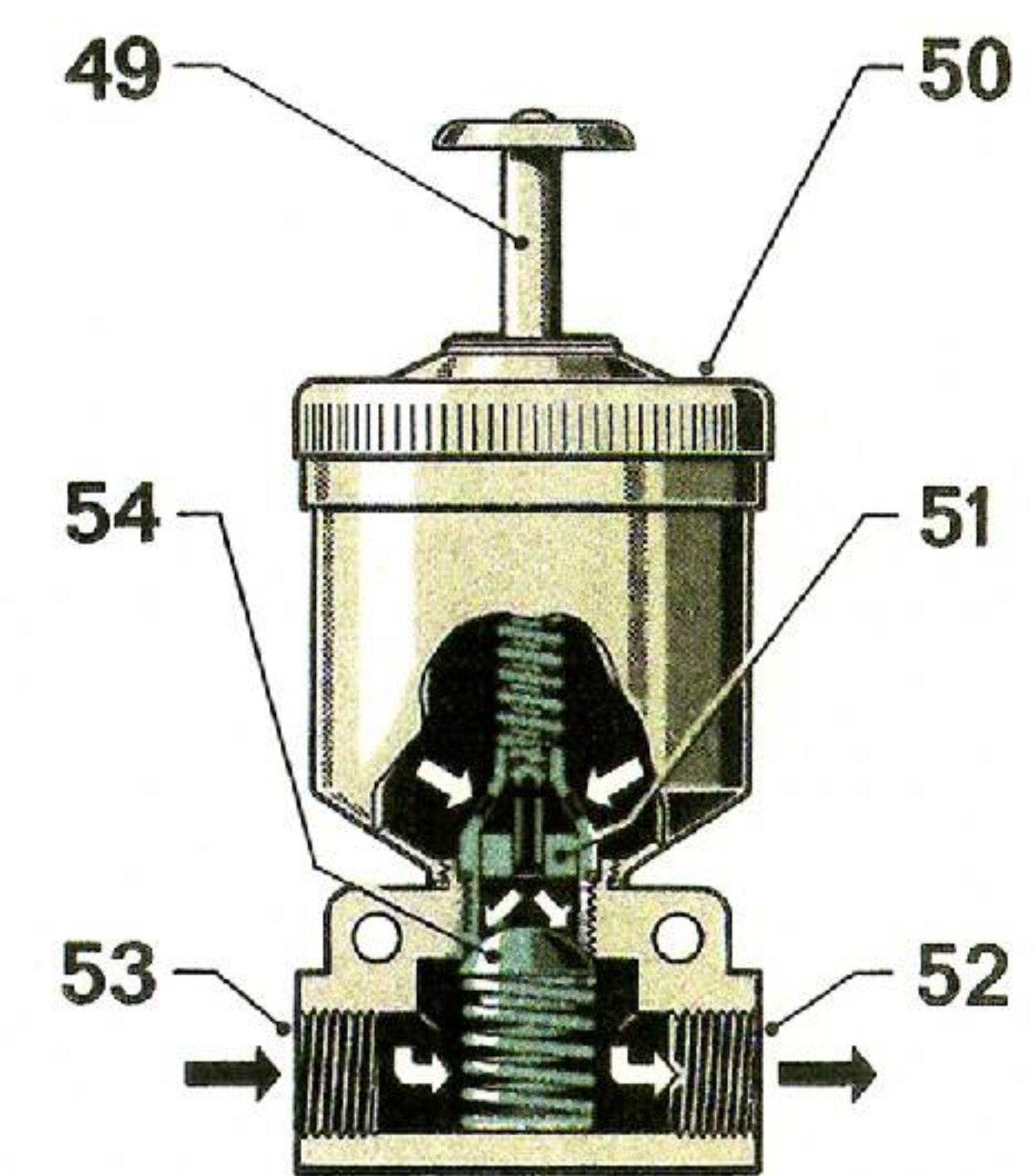
Reifenfüllflasche



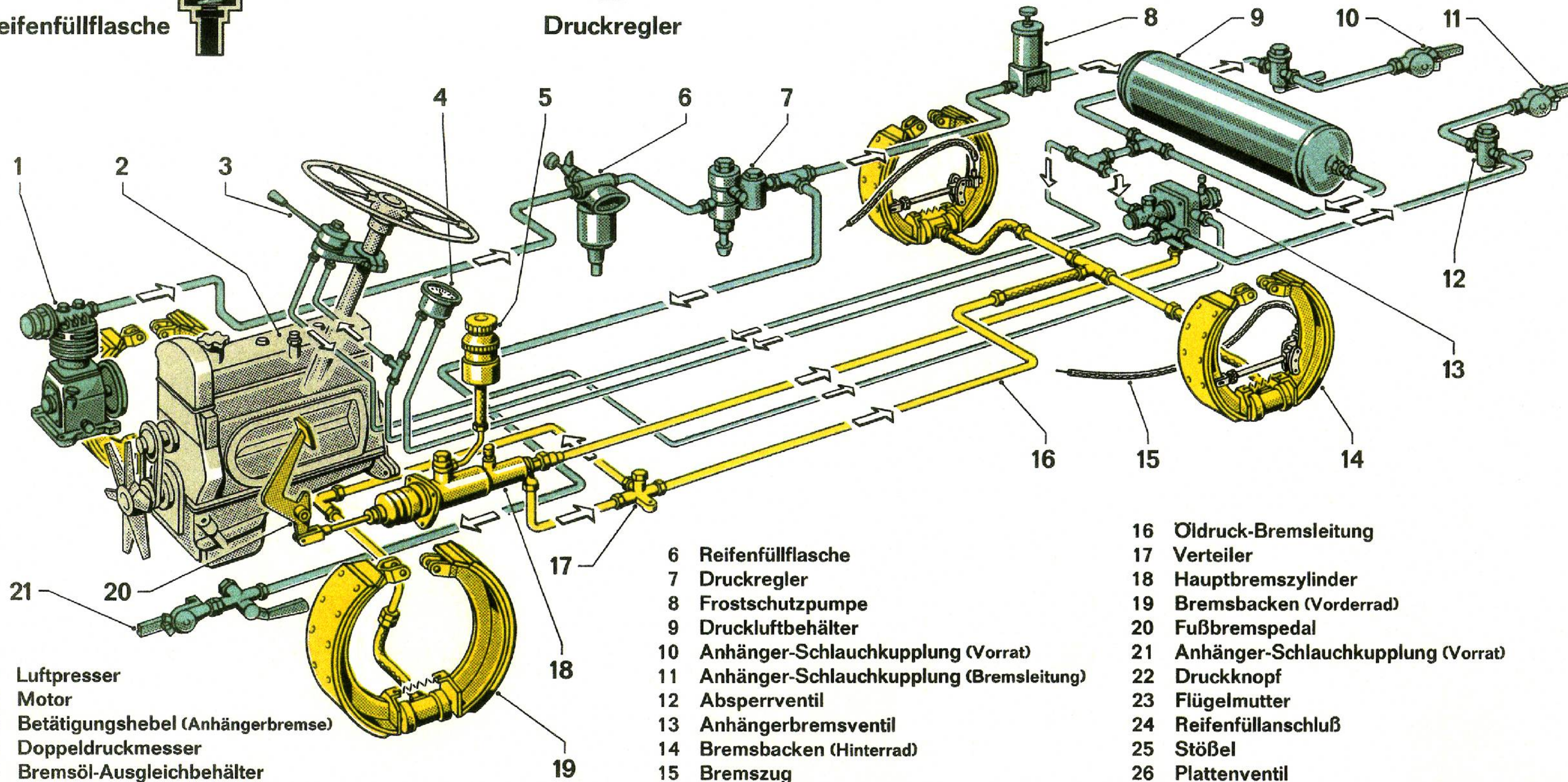
Druckregler



Hydr. betätigtes Bremsventil



Frostschutzpumpe



- 27 Anschluß Druckregler
- 28 Filter
- 29 Sicherheitsventil
- 30 Aufprallfläche
- 31 Anschluß Luftpresse
- 32 Gummi-Membrane
- 33 Stellschraube
- 34 Membranstößel
- 35 Anschluß Druckluftbehälter
- 36 Rückschlagventil
- 37 Leerlaufventil
- 38 Anschluß Luftpresse
- 39 Abschaltkolben
- 40 Entlüftungsdüse
- 41 Doppelventil
- 42 Anschluß Anhänger -
bremsleitung
- 43 Nutring
- 44 Kolben
- 45 Druckflüssigkeits-Kammer
- 46 Anschluß Betätigungsventil
- 47 Abstufungskolben
- 48 Anschluß Vorratsleitung
- 49 Stößel zur Betätigung
- 50 Flüssigkeitsbehälter
- 51 Kolben
- 52 Anschluß Druckluftbehälter
- 53 Anschluß Druckregler
- 54 Ventil

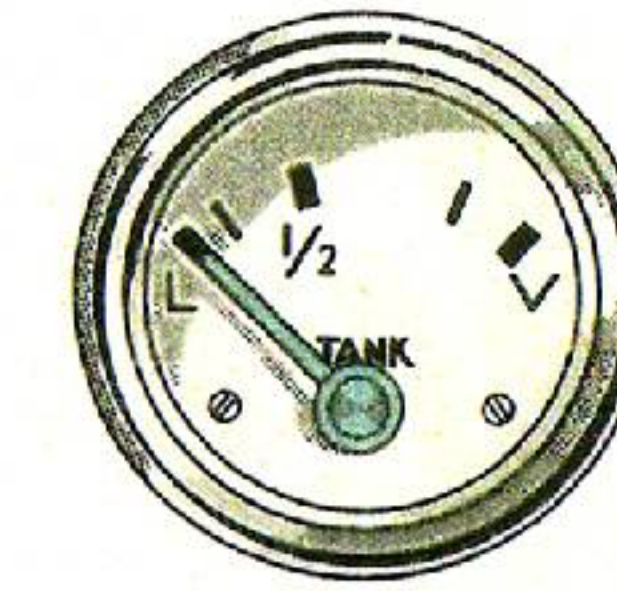
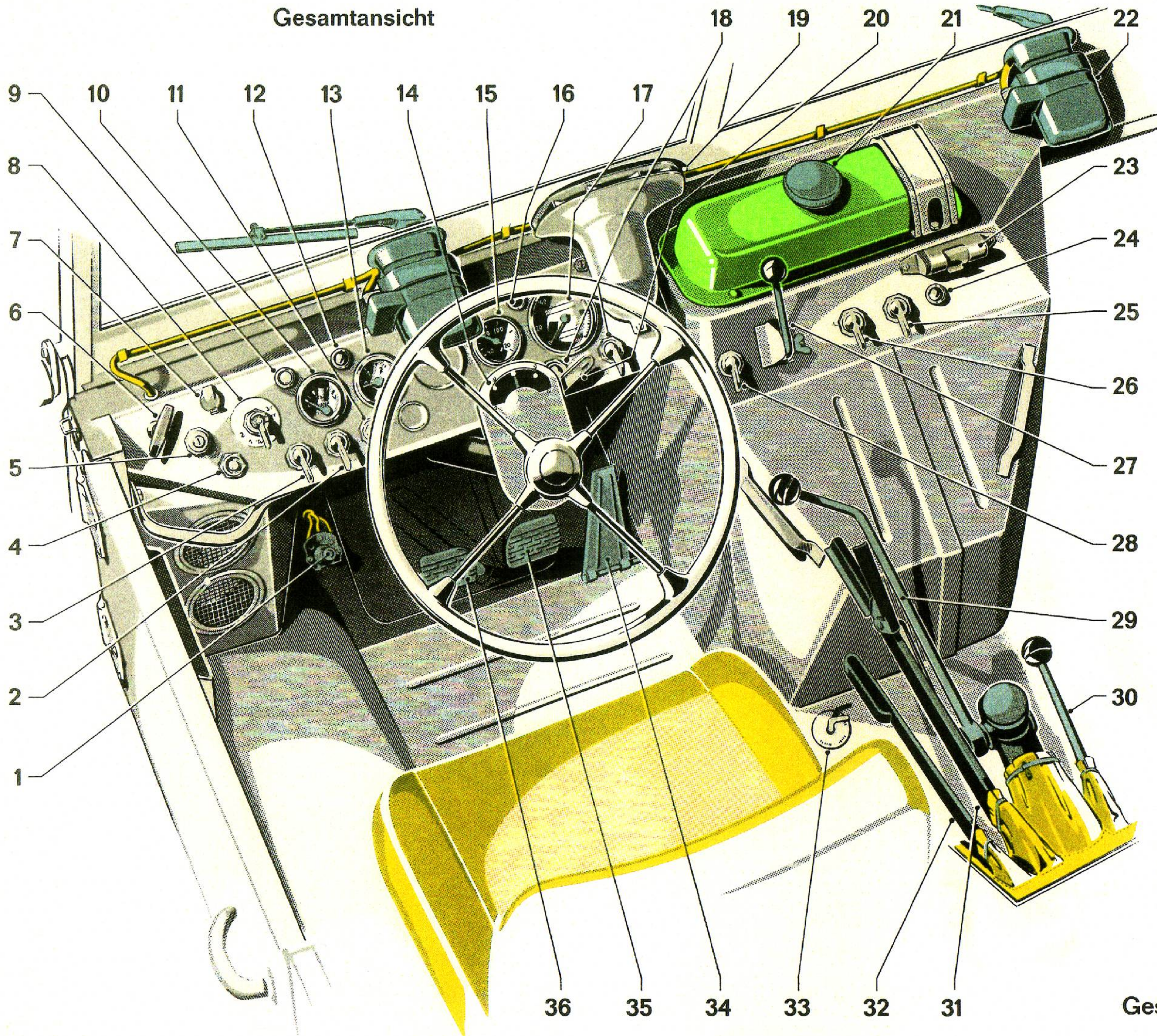
- 1 Luftpresse
- 2 Motor
- 3 Betätigungshebel (Anhängerbremse)
- 4 Doppeldruckmesser
- 5 Bremsöl-Ausgleichbehälter

- 6 Reifenfüllflasche
- 7 Druckregler
- 8 Frostschutzpumpe
- 9 Druckluftbehälter
- 10 Anhänger-Schlauchkupplung (Vorrat)
- 11 Anhänger-Schlauchkupplung (Bremsleitung)
- 12 Absperrventil
- 13 Anhängerbremsventil
- 14 Bremsbacken (Hinterrad)
- 15 Bremszug

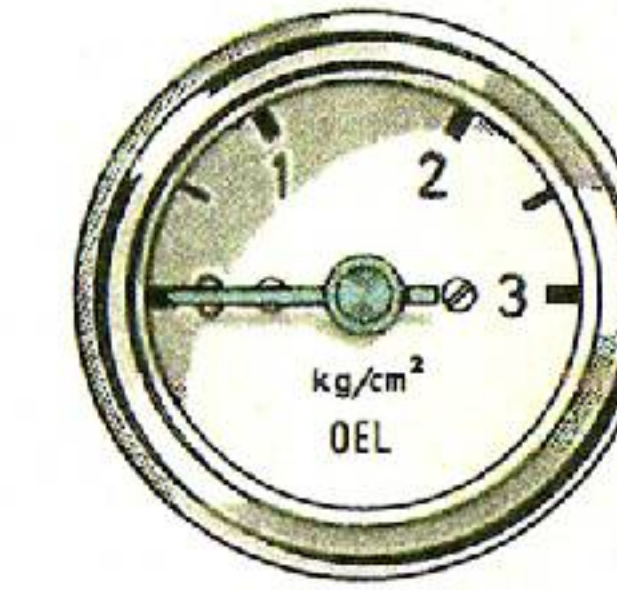
- 16 Öldruck-Bremsleitung
- 17 Verteiler
- 18 Hauptbremszylinder
- 19 Bremsbacken (Vorderrad)
- 20 Fußbremspedal
- 21 Anhänger-Schlauchkupplung (Vorrat)
- 22 Druckknopf
- 23 Flügelmutter
- 24 Reifenfüllanschluß
- 25 Stößel
- 26 Plattenventil



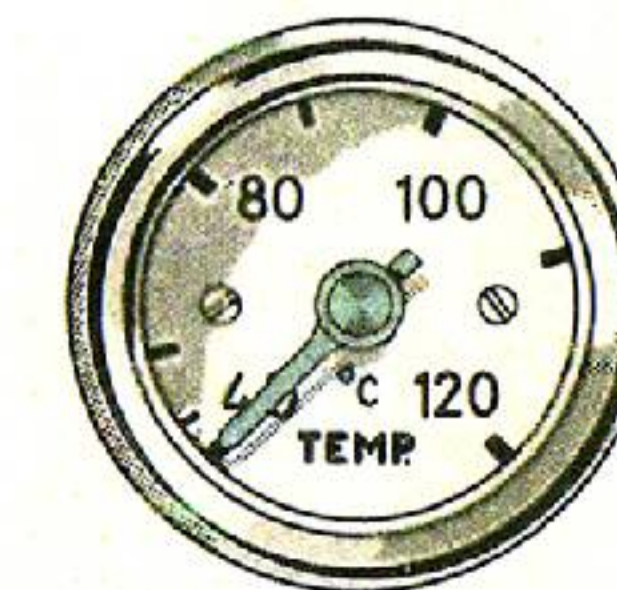
Gesamtansicht



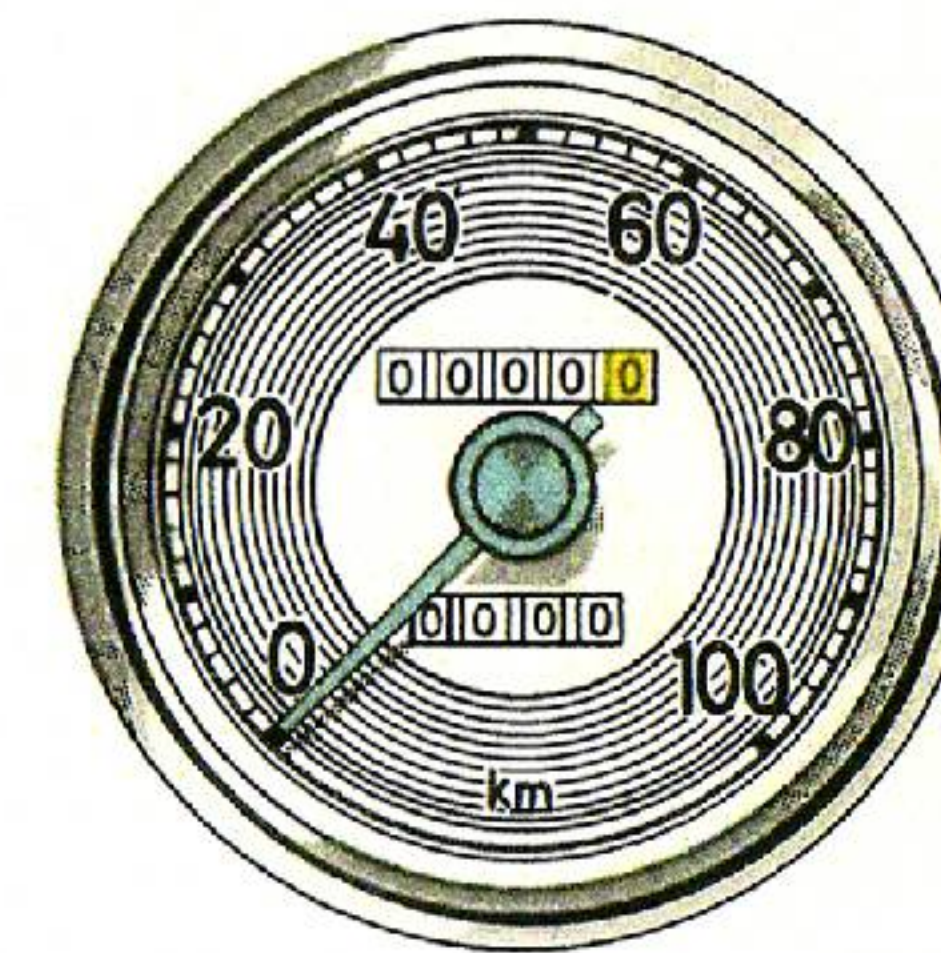
Kraftstoffvorrats-
zeiger



Öldruckmanometer



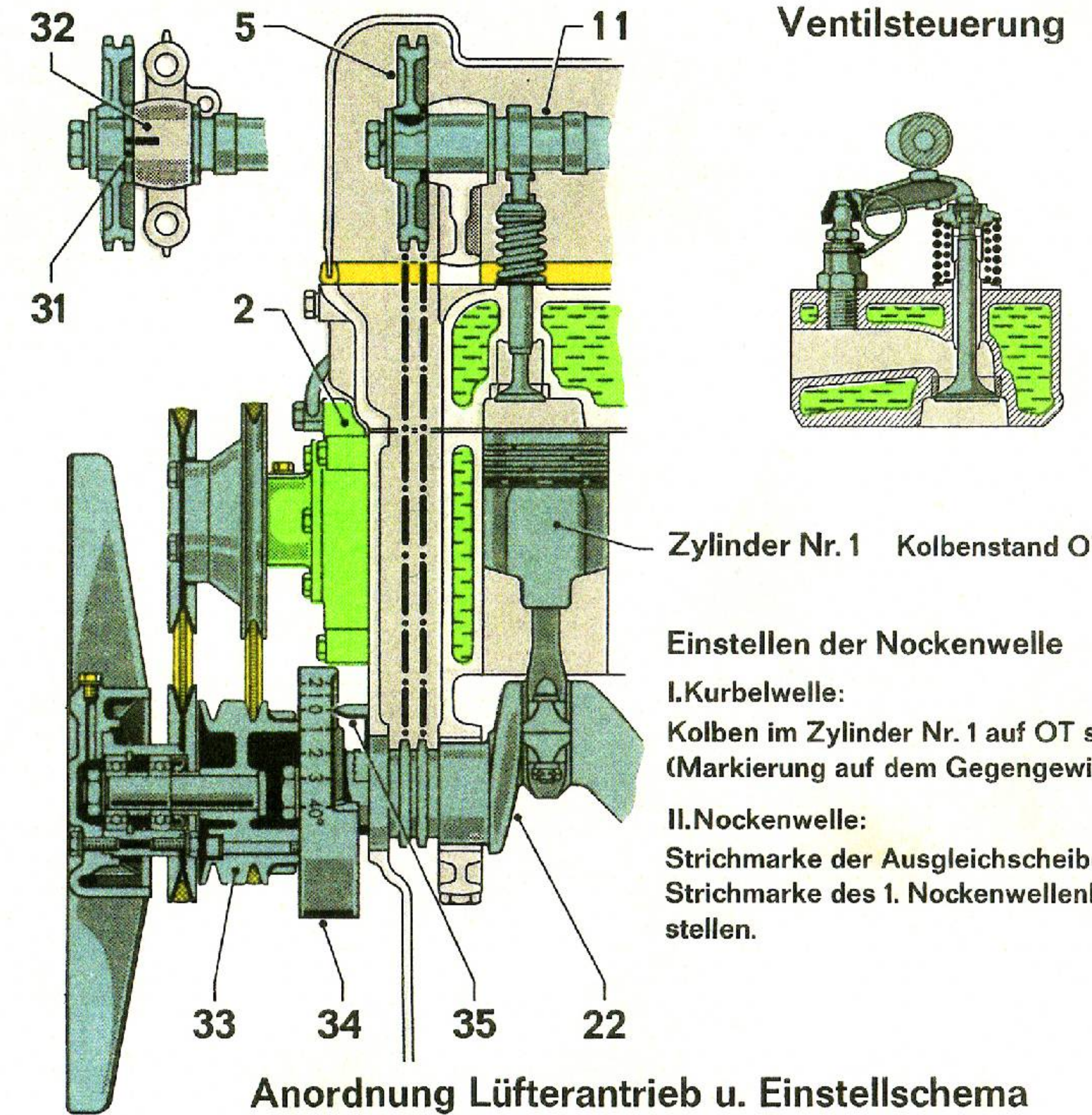
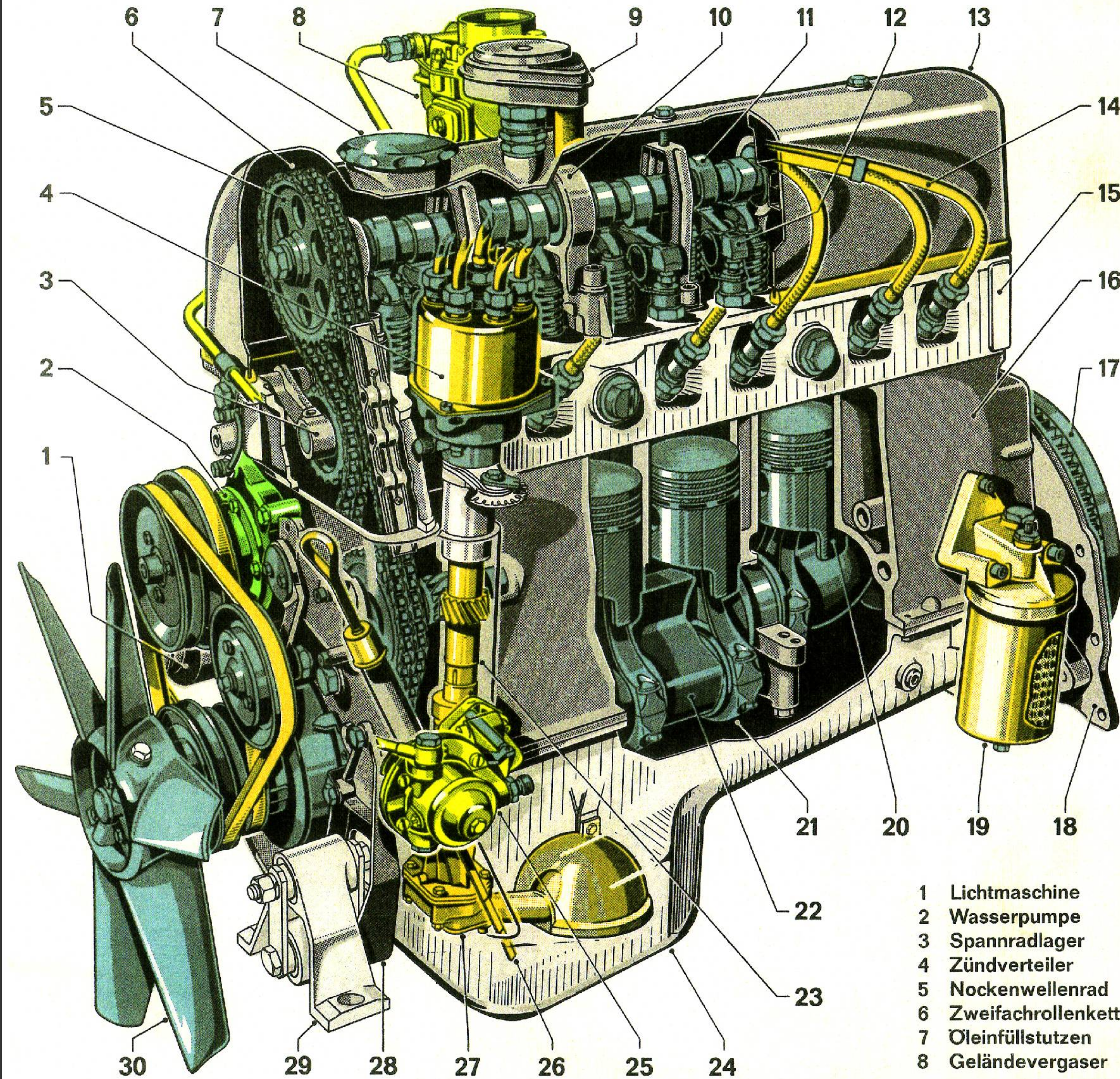
Kühlwasser-
Fernthermometer



Geschwindigkeitsmesser

- 1 Ablend-Fußschalter
- 2 Schalter für Heizung
- 3 Schalter für Instrumentenbeleuchtung
- 4 Anlaßdruckknopfschalter
- 5 Fahrtschalter
- 6 Zuggriff (Motorhaubenschluß)
- 7 Steckdose für Handlampe
- 8 Hauptlichtschalter
- 9 Ladekontrolleuchte
- 10 Kraftstoffvorratszeiger
- 11 Schalter für Anhänger-Steckdose
- 12 Fernlichtkontrolleuchte
- 13 Ölmanometer
- 14 Radstellungsanzeiger
- 15 Kühlwasserfernthermometer
- 16 Blinkerkontrolleuchte
- 17 Geschwindigkeitsmesser
- 18 Schalter für Scheibenwischer
- 19 Hauptverteiler (Heizung, Lüftung)
- 20 Betätigungshebel (Druckluftbremsventil)
- 21 Kühlwassereinfüllstutzen
- 22 Scheibenwischermotor
- 23 Innenleuchte
- 24 Anzeigeleuchte (Rundumscheinwerfer)
- 25 Schalter für Tonfolge und Rundumscheinwerfer
- 26 Signalschalter
- 27 Handgasregulierung
- 28 Blinkerschalter
- 29 Getriebeschalthebel 1. bis 6. Gang
- 30 Umschalthebel
(Vorwärts- auf Rückwärtsgang)
- 31 Handbremshebel
- 32 Schalthebel für Allradantrieb und
Differentialsperren vorn und hinten
- 33 Kraftstoffumschalthebel
- 34 Fahrpedal
- 35 Bremspedal
- 36 Kupplungspedal





Ventilsteuerung

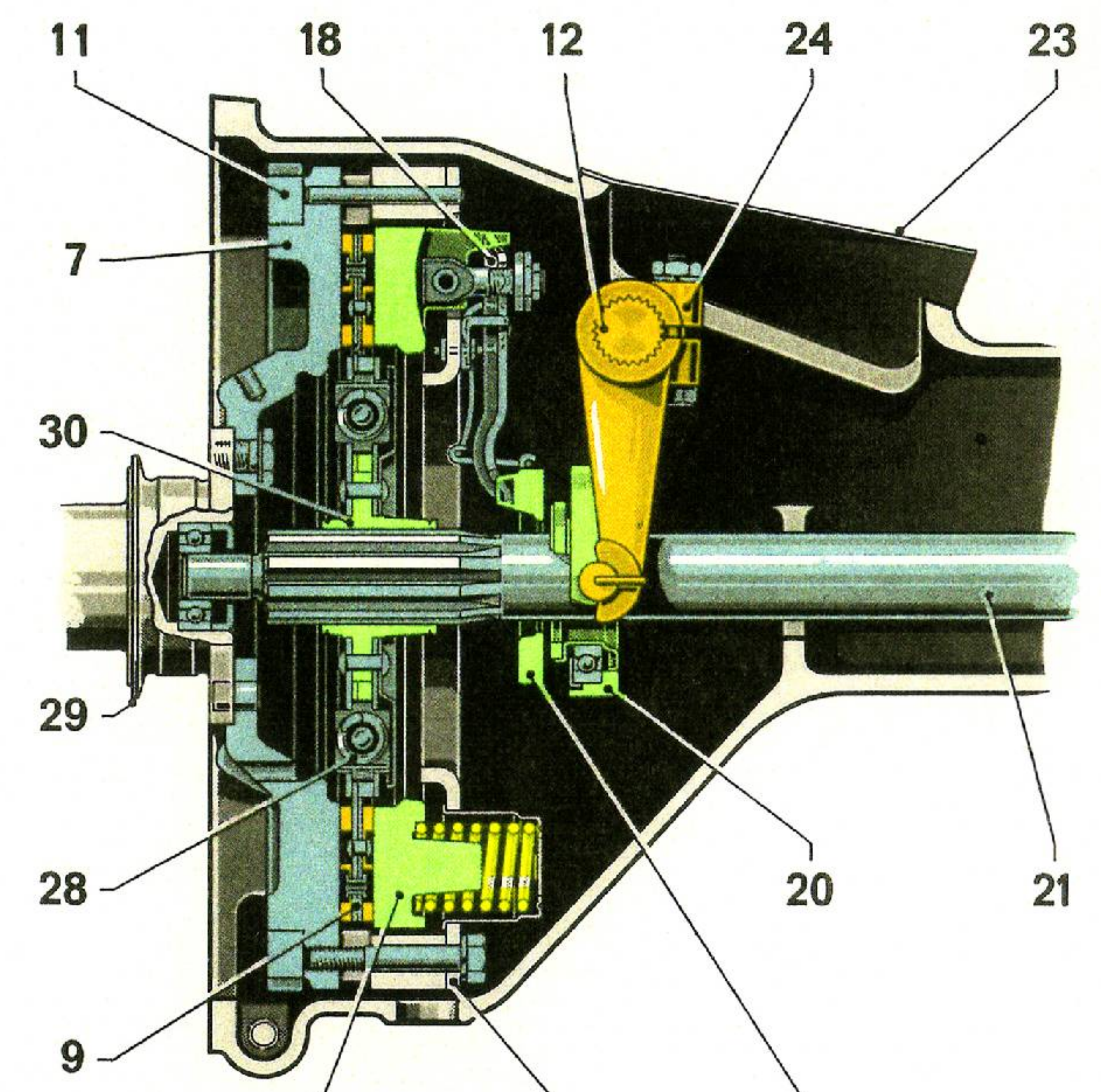
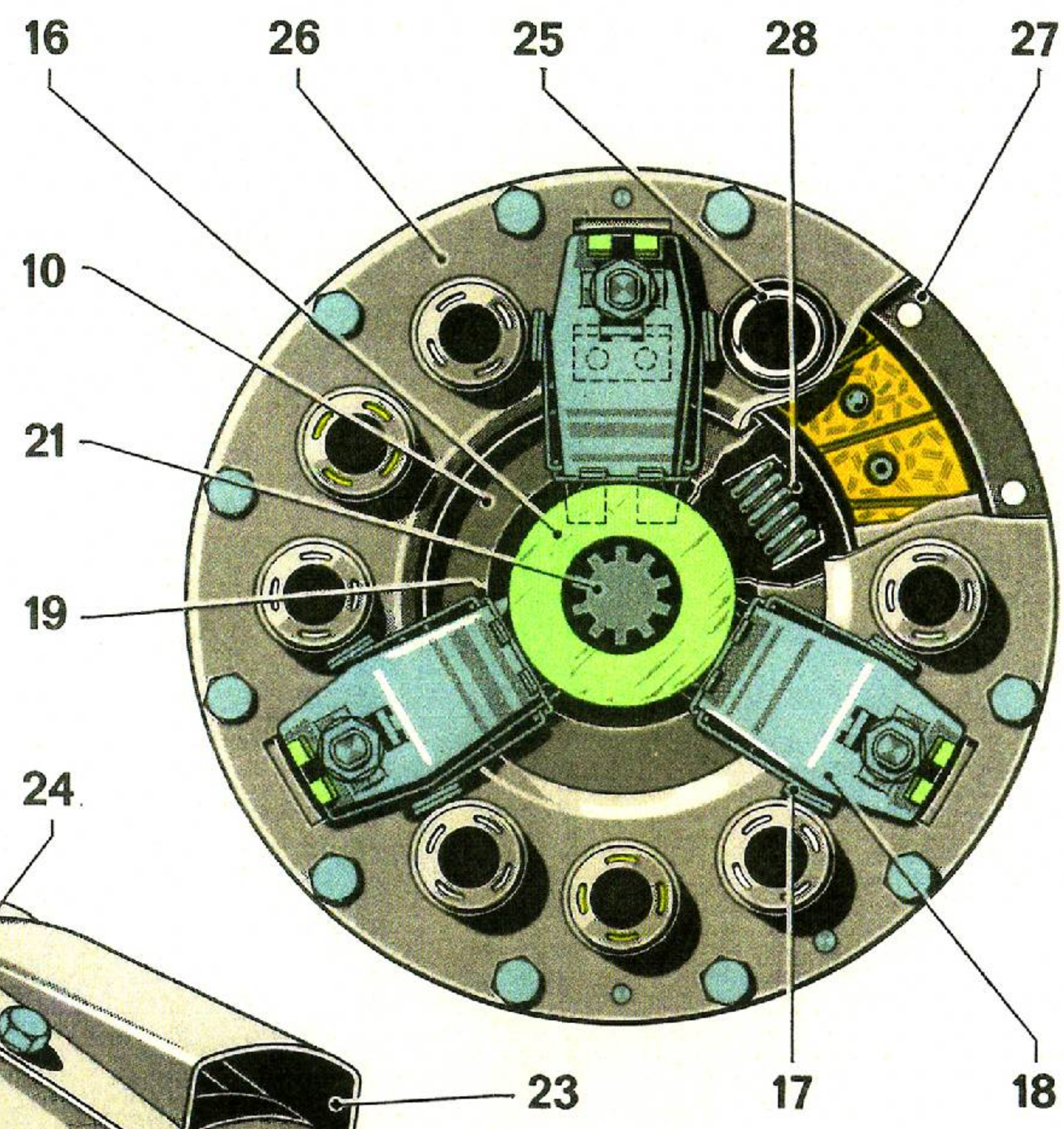
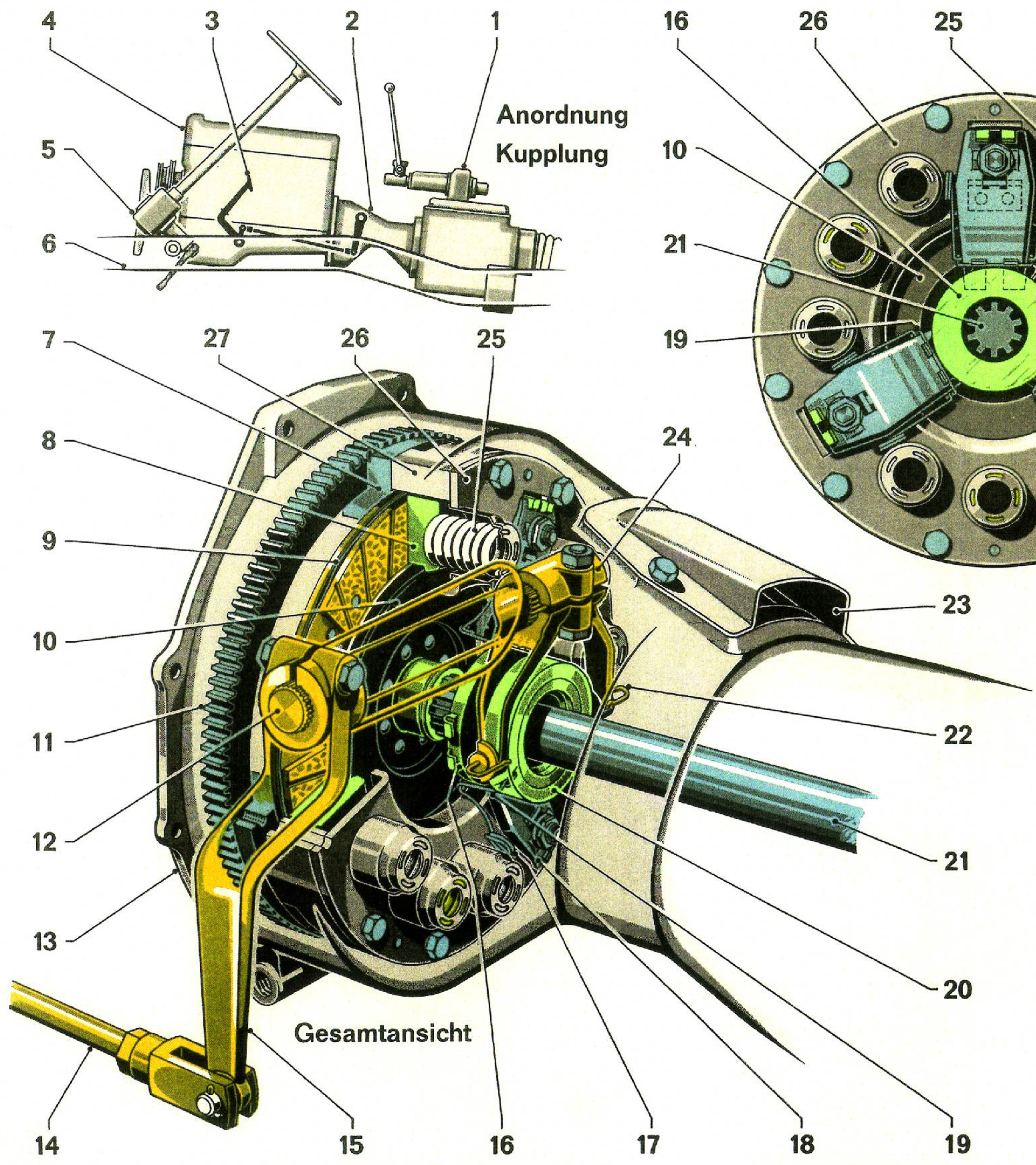
Zylinder Nr. 1 Kolbenstand OT

Einstellen der Nockenwelle
I. Kurbelwelle:
Kolben im Zylinder Nr. 1 auf OT stellen.
(Markierung auf dem Gegengewicht)
II. Nockenwelle:
Strichmarke der Ausgleichscheibe auf
Strichmarke des 1. Nockenwellenlagers
stellen.

Anordnung Lüfterantrieb u. Einstellschema

- | | | |
|-----------------------|-----------------------------|--|
| 1 Lichtmaschine | 9 Entlüftungsfilter | 23 Antriebswelle (Ölpumpe - Zündverteiler) |
| 2 Wasserpumpe | 10 Nockenwellenlager | 24 Ölwanne |
| 3 Spannradlager | 11 Nockenwelle | 25 Kraftstoffpumpe |
| 4 Zündverteiler | 12 Schwinghebel | 26 Ölmeßstab |
| 5 Nockenwellenrad | 13 Zylinderkopphaube | 27 Ölpumpe |
| 6 Zweifachrollenkette | 14 Zündleitung | 28 Motoraufhängung vorn |
| 7 Öleinfüllstutzen | 15 Zylinderkopf | 29 Lagerbock |
| 8 Geländevergaser | 16 Zylinder-Kurbelgehäuse | 30 Lüfter |
| | 17 Schwungrad mit Zahnkranz | 31 Ausgleichscheibe |
| | 18 Zwischenblech | 32 1. Nockenwellenlager |
| | 19 Ölfilter | 33 Doppelriemenscheibe |
| | 20 Kolben | 34 Gegengewicht |
| | 21 Pleuelstange | 35 Einstellzeiger |
| | 22 Kurbelwelle | |



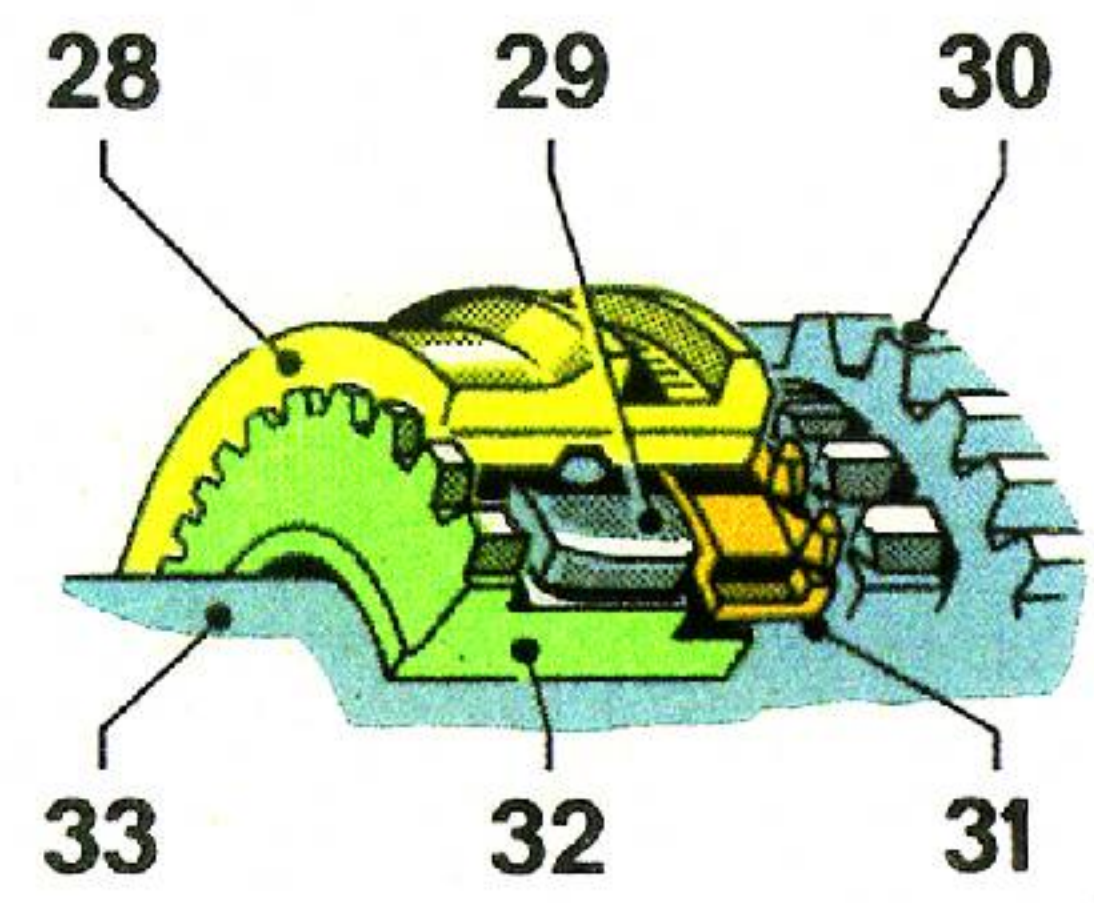
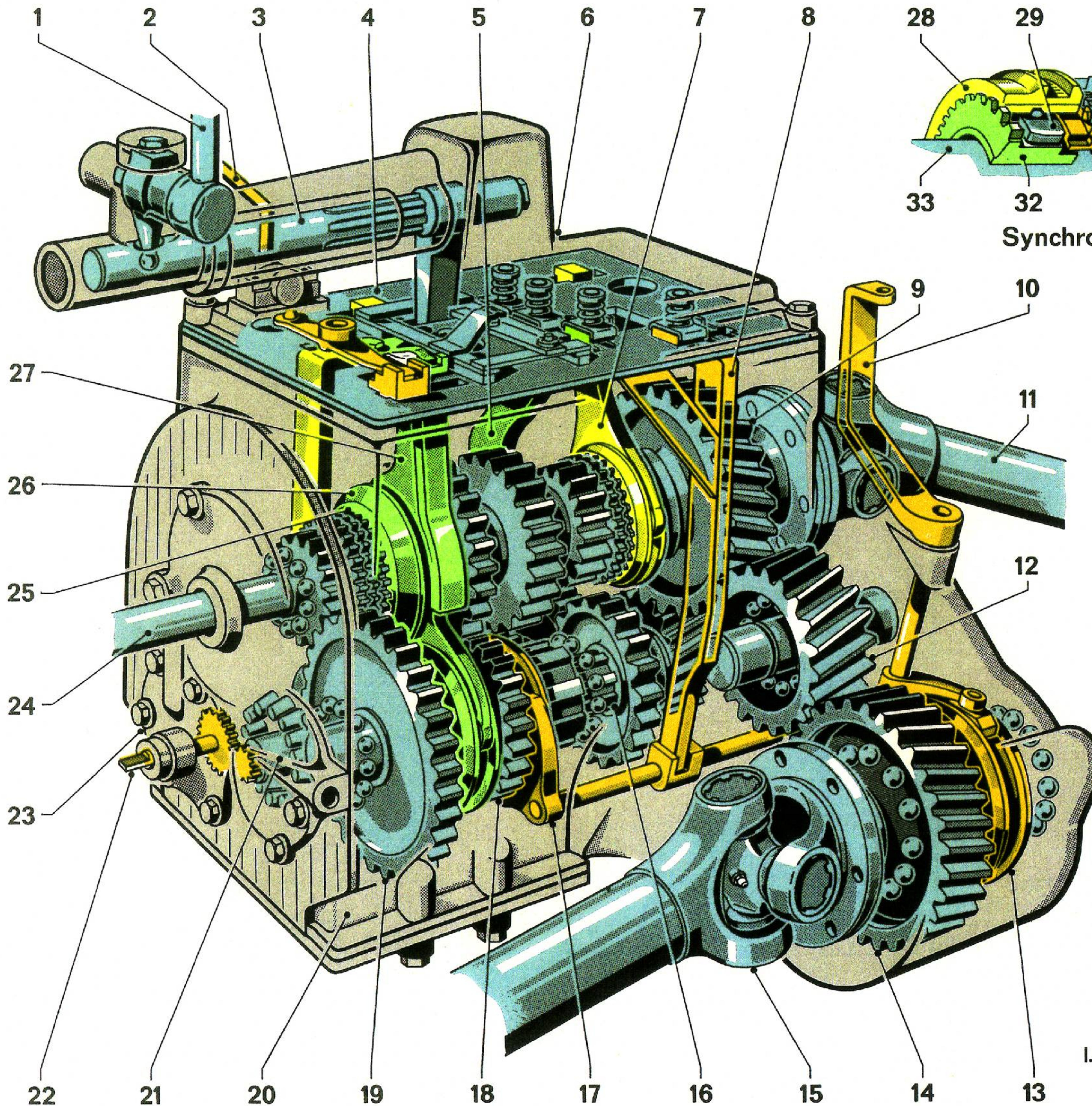


Längs- und Querschnitt

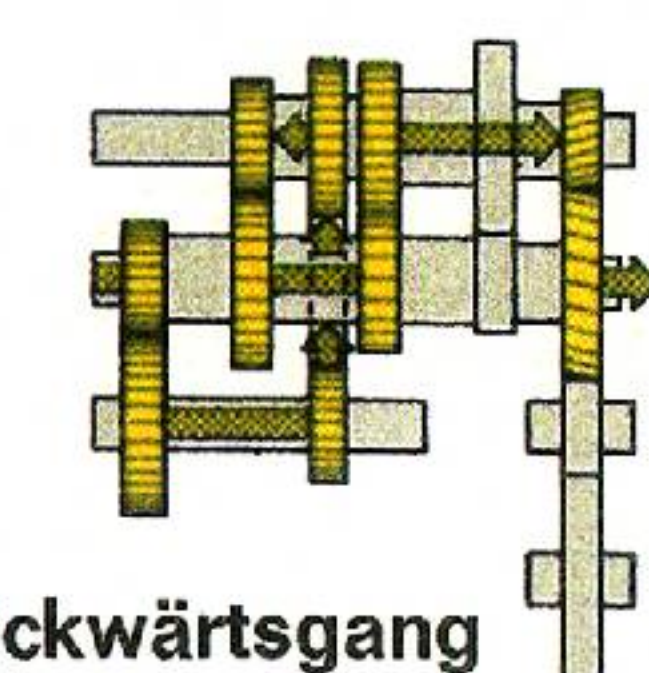
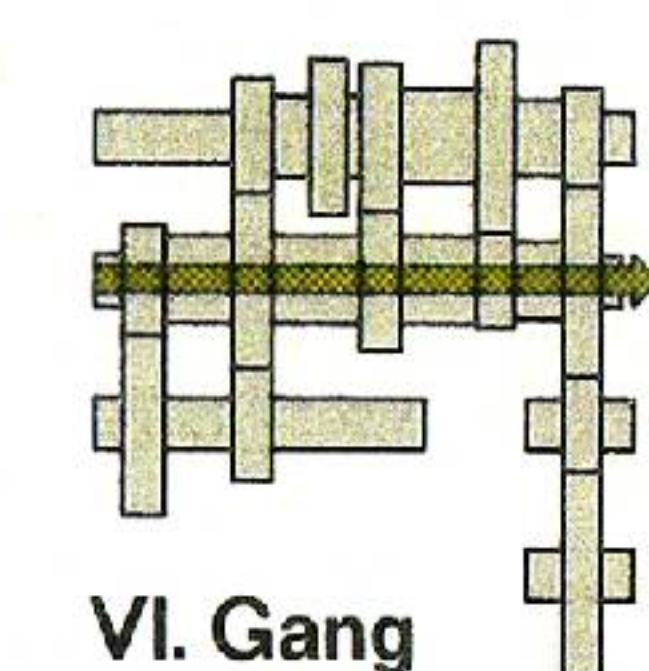
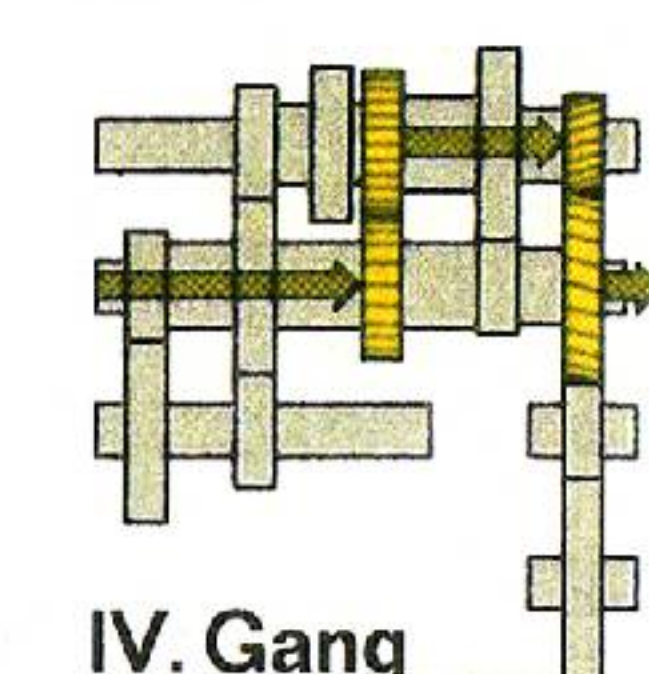
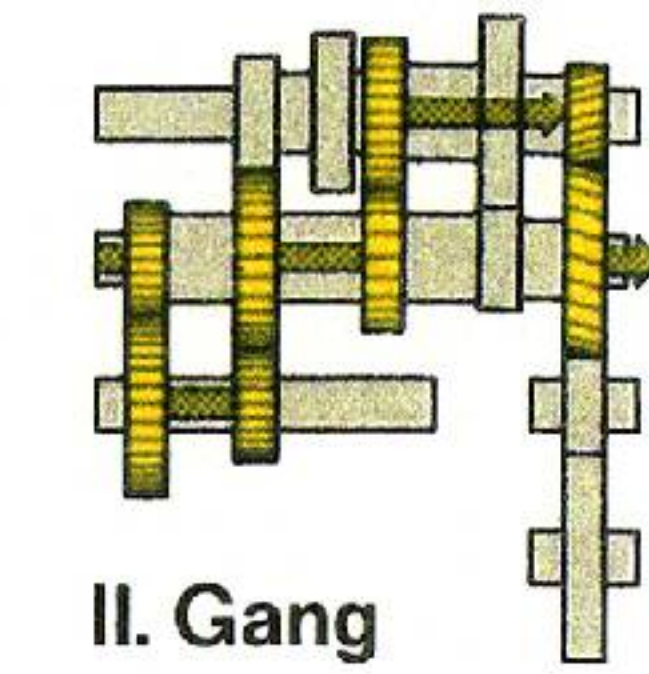
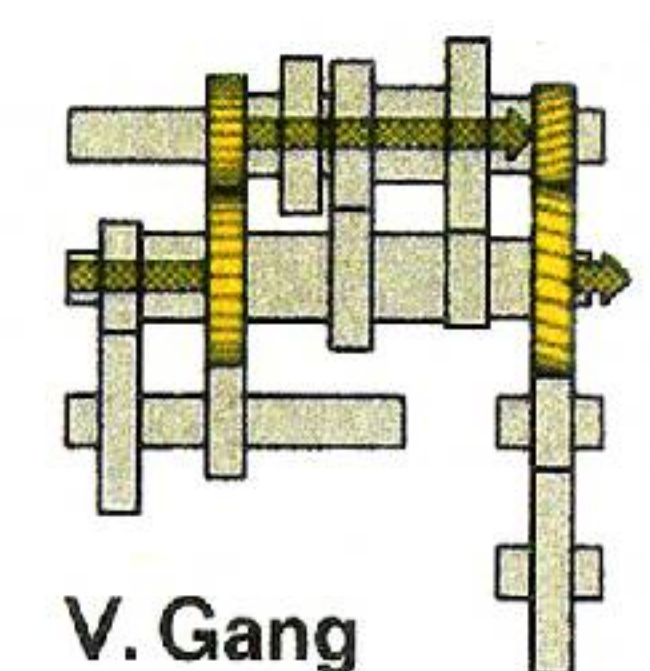
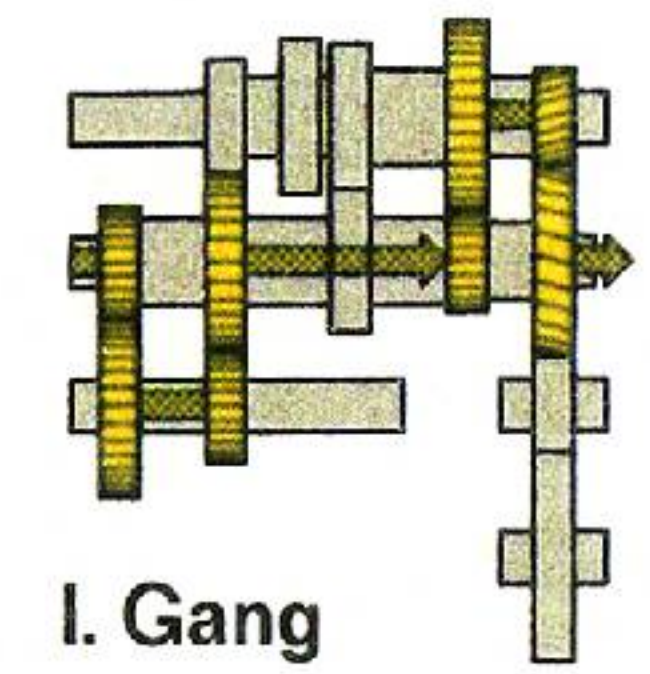
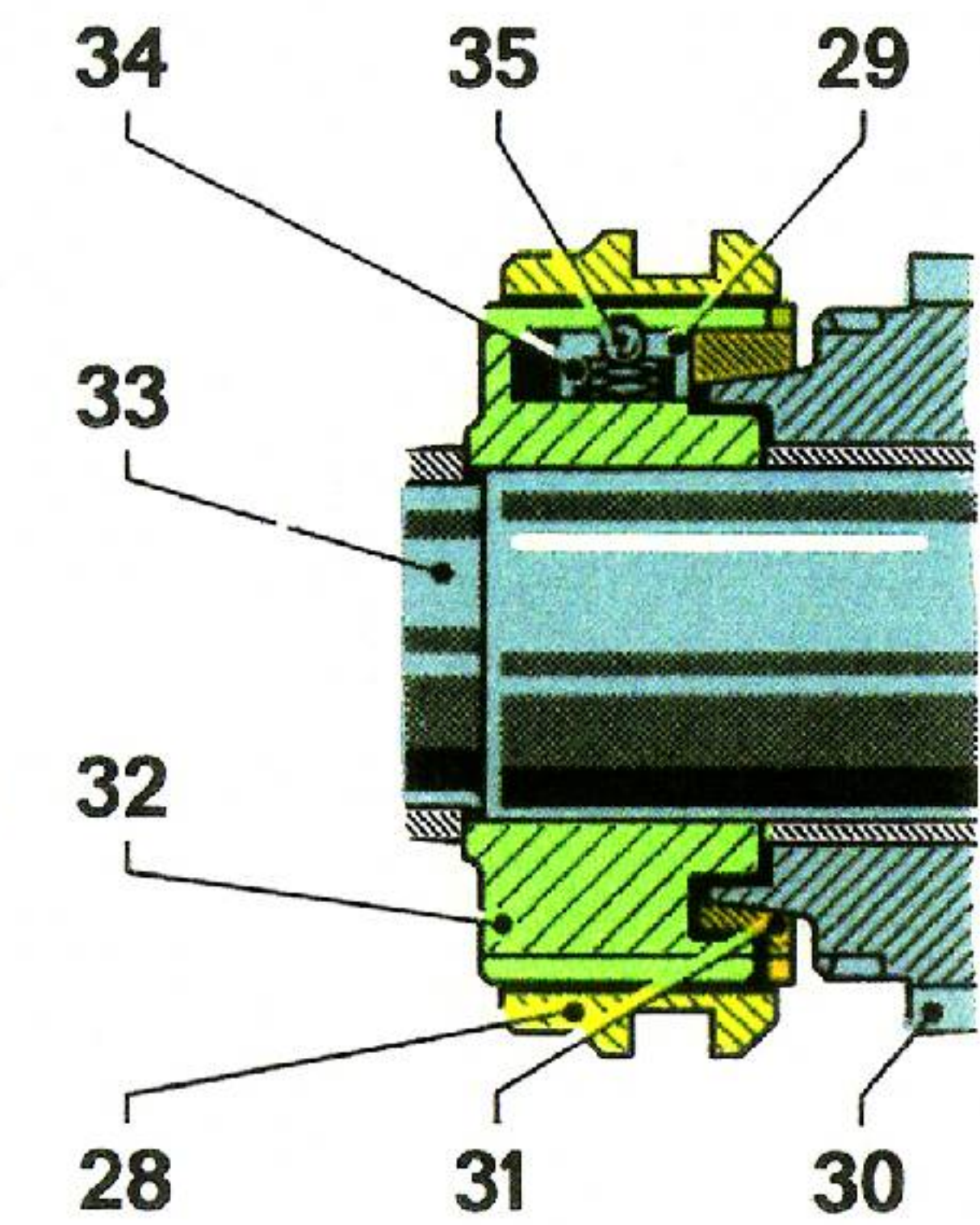
- | | |
|------------------------------|---------------------------|
| 1 Getriebegehäuse | 16 Ausrückring |
| 2 Kupplungsgehäuse | 17 Schenkelfeder |
| 3 Kupplungspedal | 18 Hebel |
| 4 Motorblock | 19 Bügel |
| 5 Lenkung | 20 Kugellager-Ausrückring |
| 6 Rahmen | 21 Getriebeantriebswelle |
| 7 Schwungrad | 22 Formfeder |
| 8 Kupplungsdruckplatte | 23 Entlüftungsdeckel |
| 9 Kupplungsscheibe mit Belag | 24 Kupplungsausrückgabel |
| 10 Abdeckblech | 25 Kupplungsfeder |
| 11 Anlaßzahnkranz | 26 Abschlußplatte |
| 12 Kupplungswelle | 27 Zwischenring |
| 13 Kupplungsgehäuse | 28 Torsionsdämpfer |
| 14 Zugstange | 29 Kurbelwelle |
| 15 Betätigungshebel | 30 Mitnehmerscheibe |



Anordnung Kupplung UNIMOG-S



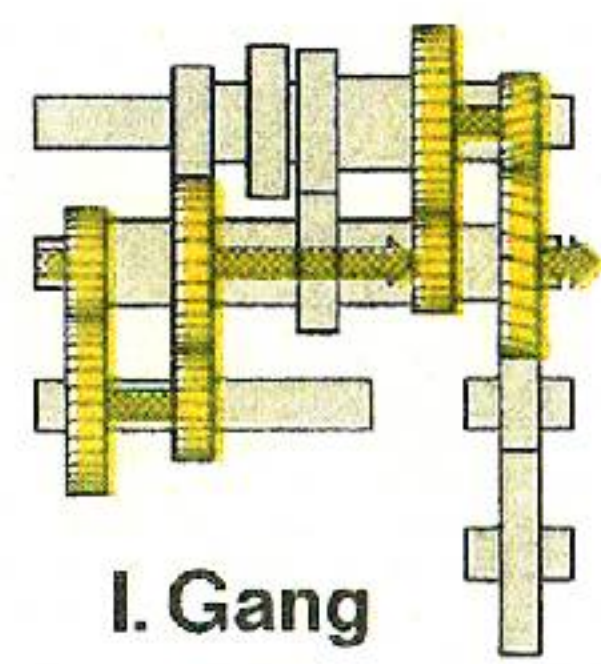
Synchronisierung



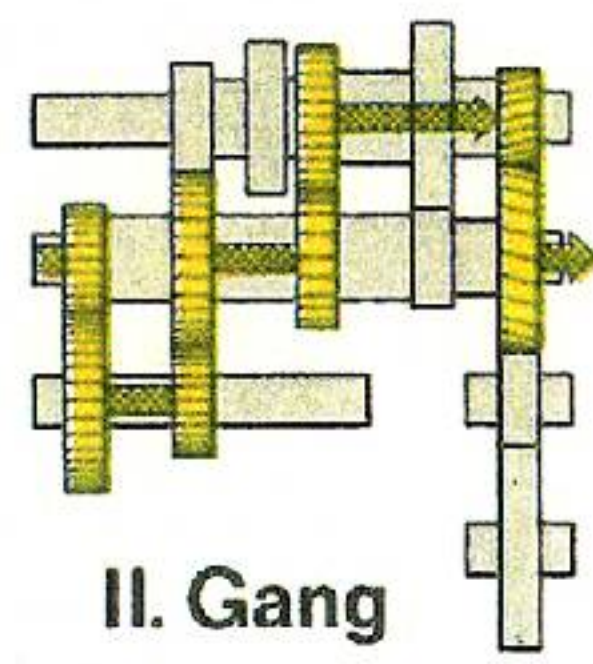
Kraftfluß in den einzelnen Gängen

- 1 Schalthebel
- 2 Schalthebel (Rückwärtsgang)
- 3 Schaltwelle
- 4 Schaltplatte
- 5 Schaltzunge (I.-IV. Gang)
- 6 Getriebedeckel
- 7 Schaltzunge (V. u. VI. Gang)
- 8 Schaltzunge (Rückwärtsgang)
- 9 Hinterachsabtriebsrat
- 10 Schaltkurbel mit Schaltgabel
- 11 Hinterachsabtrieb
- 12 Zwischenrad
- 13 Schaltschiebehülse
- 14 Vorderachsabtriebsrad
- 15 Vorderachsabtrieb
- 16 Welle für Vorstufe
- 17 Schiebegabel
- 18 Gangrad (Rückwärtsgang)
- 19 Abtriebsrad (Vorstufe)
- 20 Getriebegehäuse
- 21 Vorgelegewelle
- 22 Abtrieb für Tachometer
- 23 Lagerdeckel
- 24 Getriebeantriebswelle
- 25 Synchronring
- 26 Schaltschiebehülse
- 27 Schaltzunge mit Schaltklaue
- 28 Schaltschiebehülse
- 29 Mitnehmer
- 30 Gangrad
- 31 Synchronring
- 32 Mitnehmerring
- 33 Welle
- 34 Federnapf
- 35 Stahlkugel





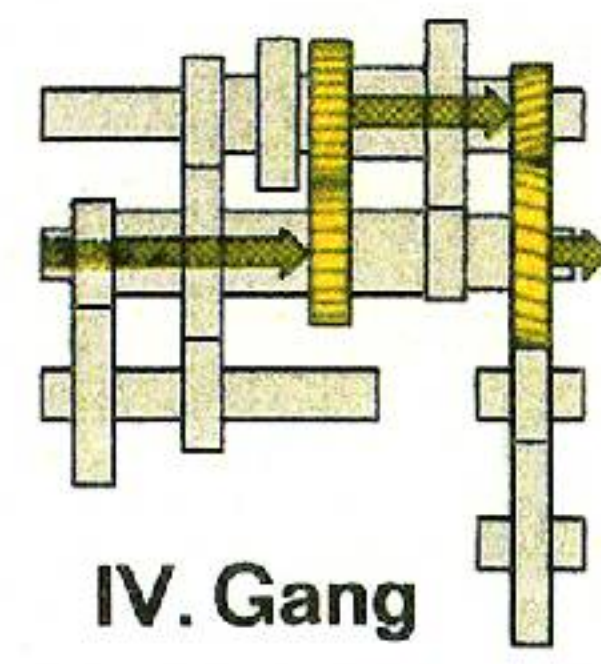
I. Gang



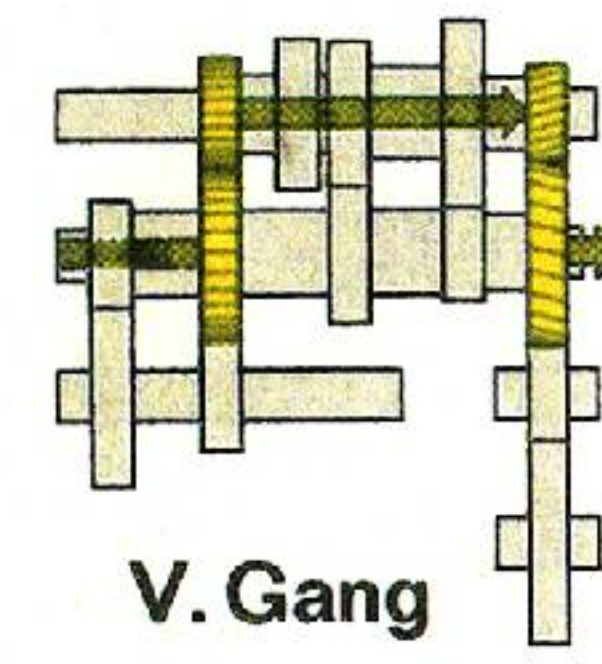
II. Gang



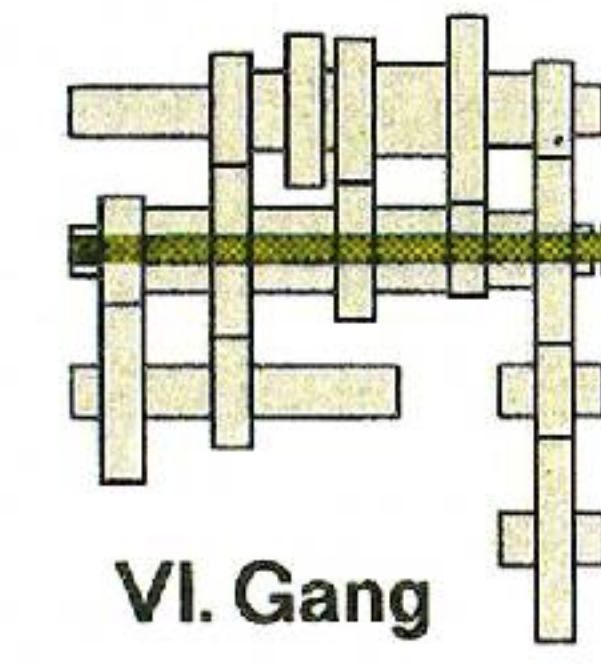
III. Gang



IV. Gang



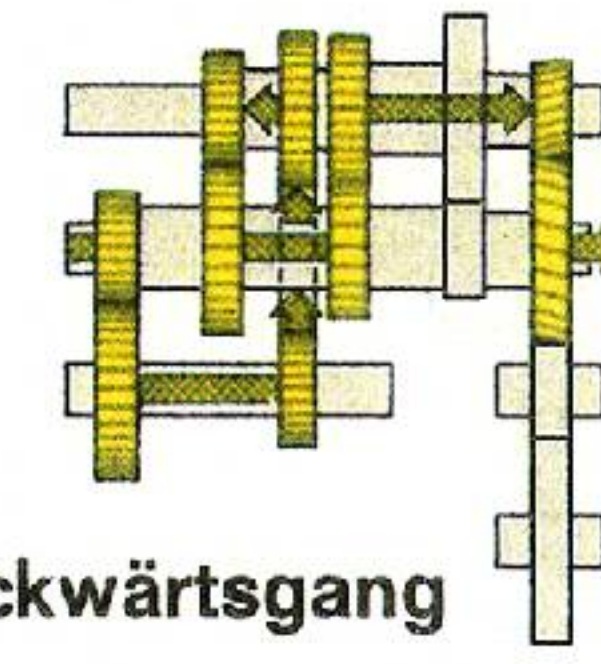
V. Gang



VI. Gang

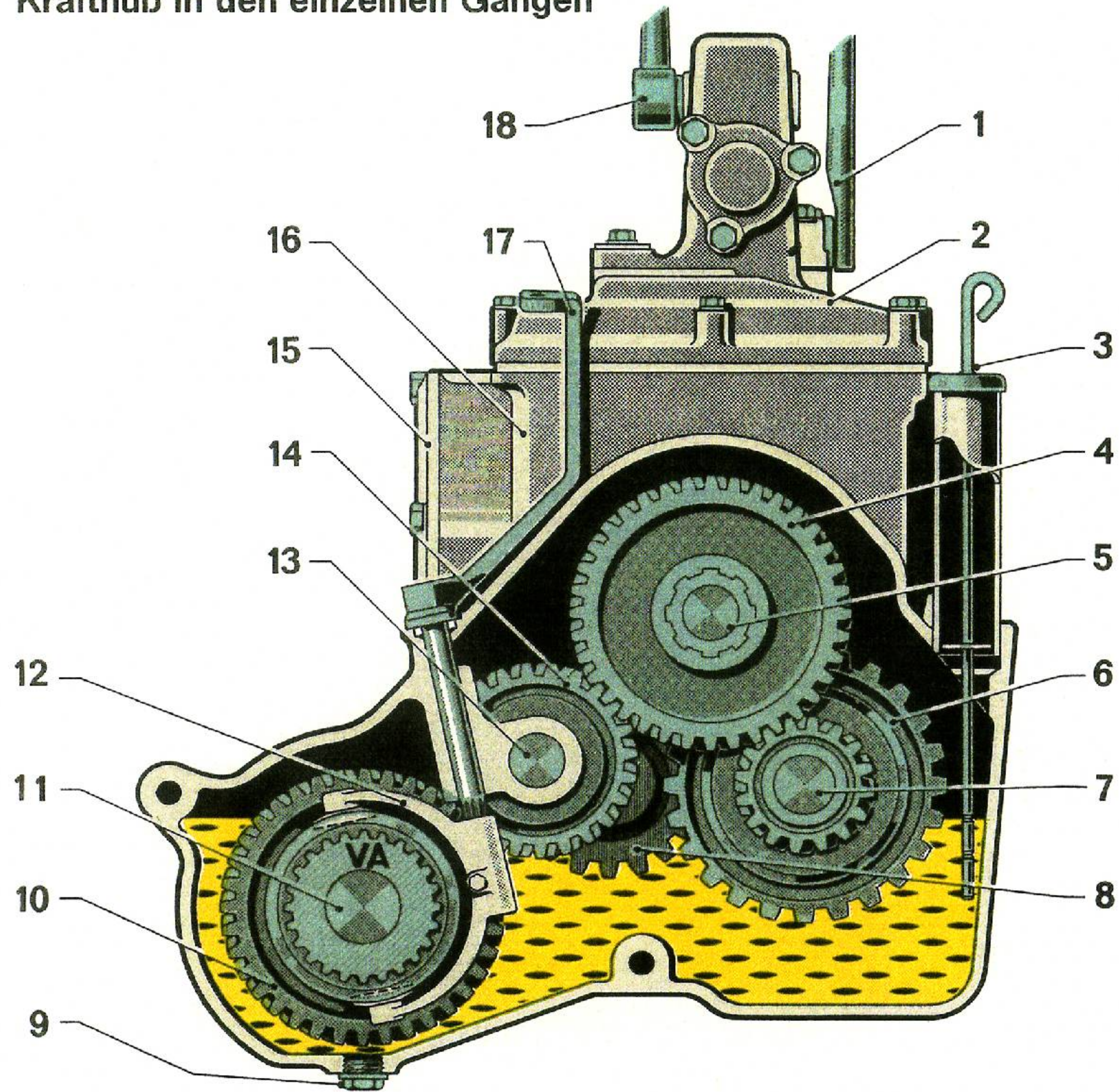


I. Rückwärtsgang



II. Rückwärtsgang

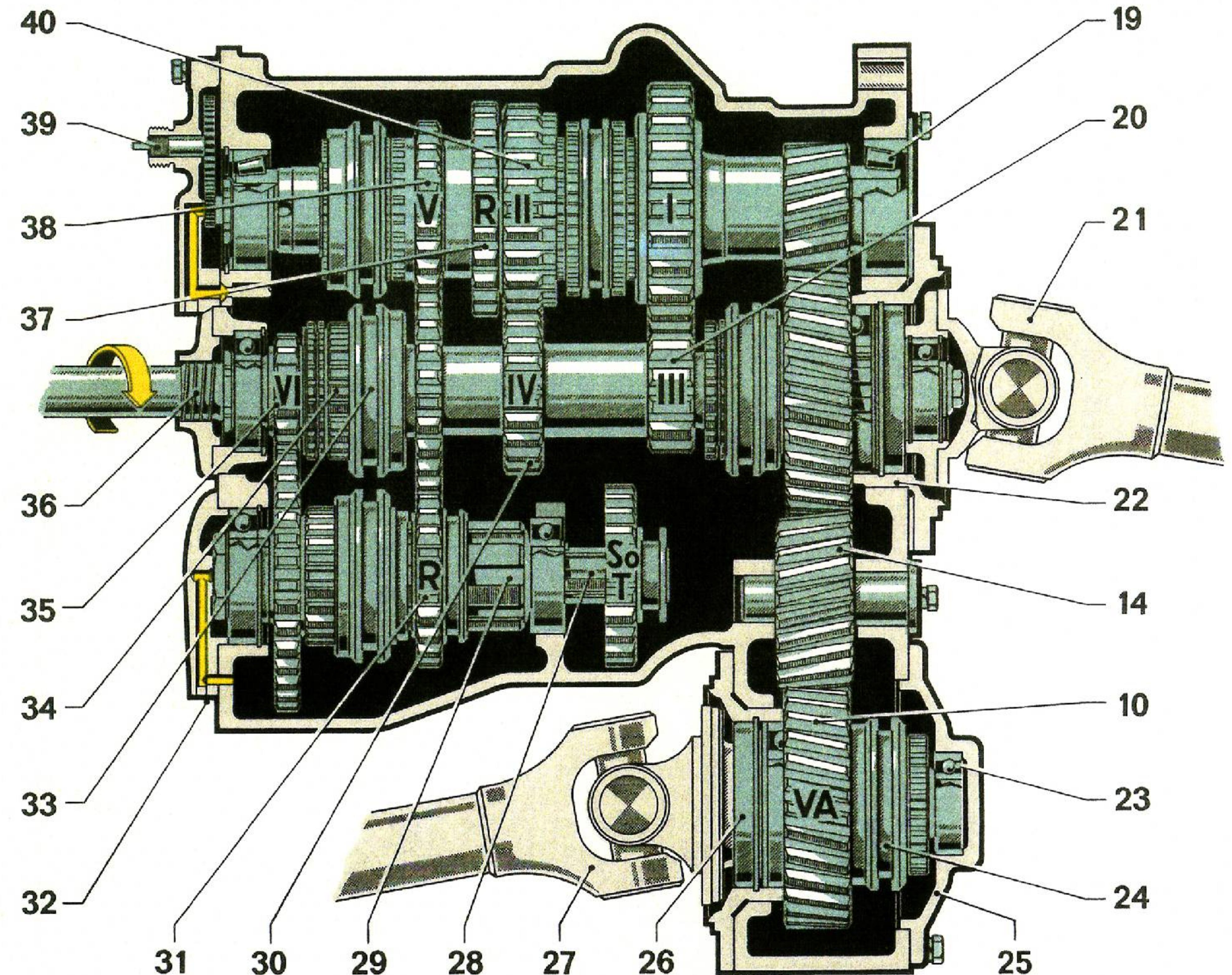
Kraftfluß in den einzelnen Gängen



- 1 Schalthebel für Rückwärtsgang
- 2 Schaltgetriebedeckel
- 3 Ölmeßstab
- 4 Abtriebsrad
- 5 Hauptwelle
- 6 Gangrad I
- 7 Vorgelegewelle
- 8 Schaltrad (Rückwärtsgang)

- 9 Verschußschraube
- 10 Vorderachsabtriebsrad
- 11 Abtriebswelle
- 12 Schaltgabel
- 13 Lagerbolzen (Zwischenrad)
- 14 Zwischenrad
- 15 Abschlußdeckel
- 16 Schaltgetriebegehäuse

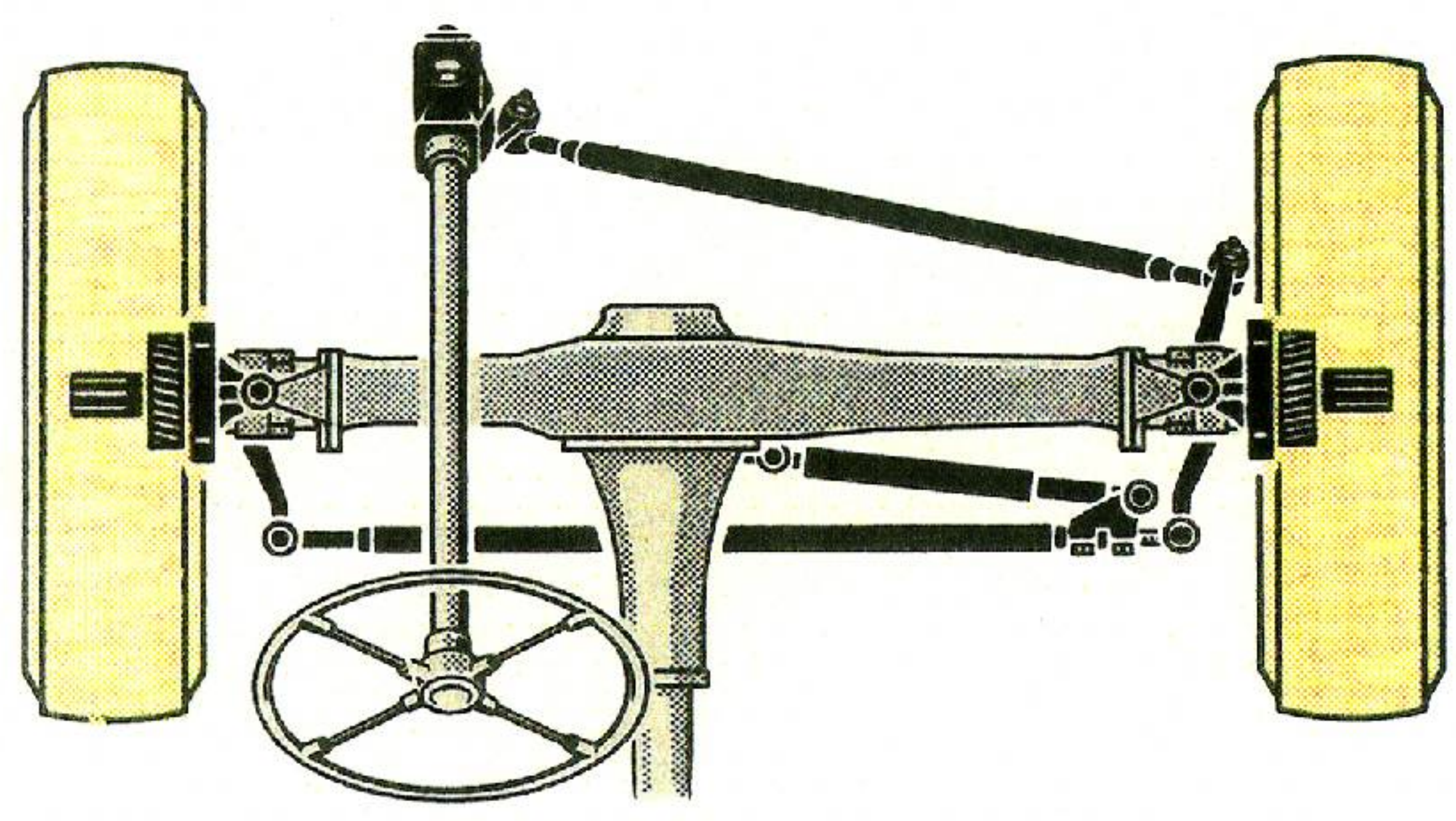
- 17 Schaltkurbel
- 18 Schalthebel
- 19 Ring-Kegellager
- 20 Gangrad III (Hauptwelle)
- 21 Hinterachsabtrieb
- 22 Lagerflansch
- 23 Rillenkugellager
- 24 Schaltschiebehülse



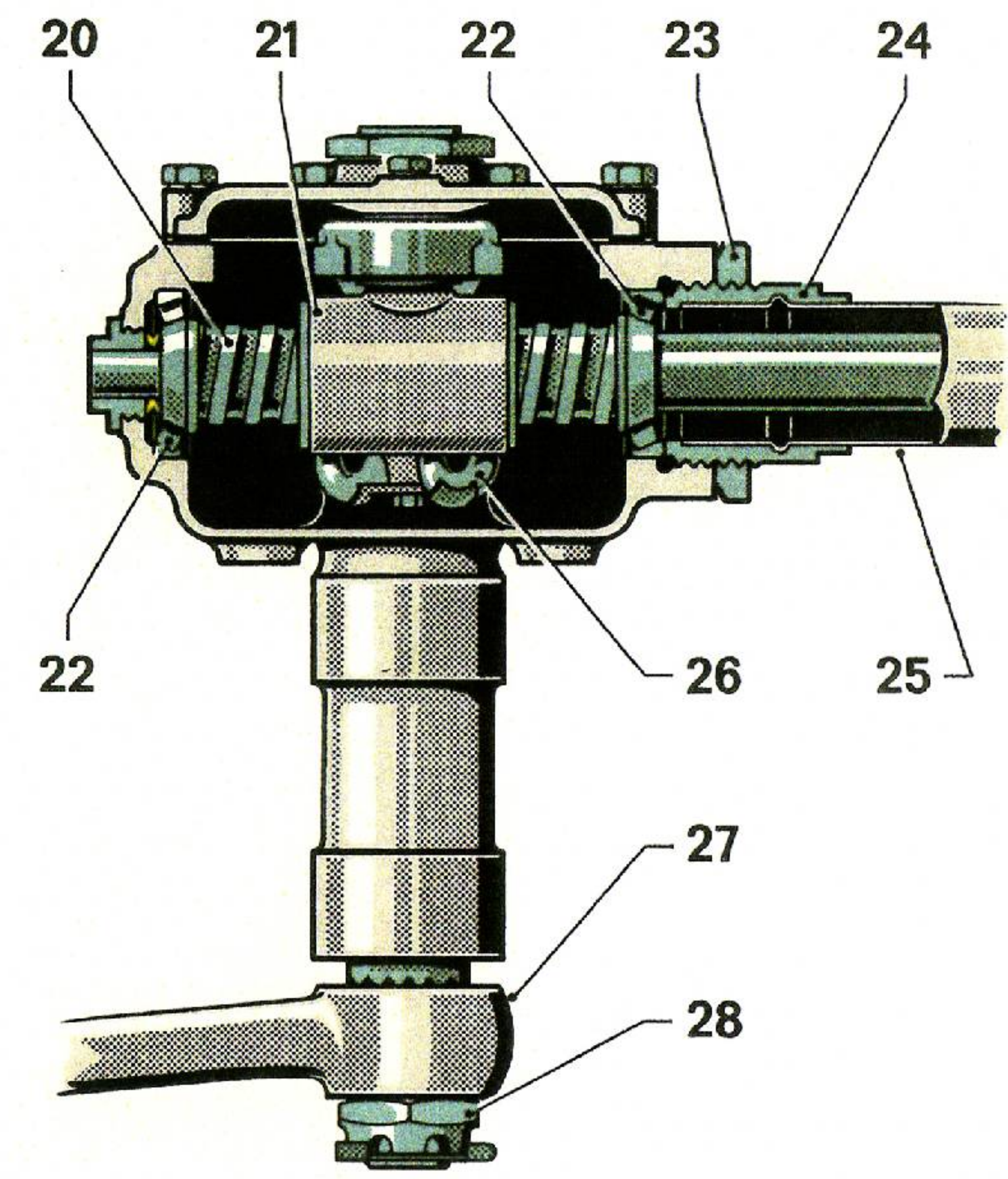
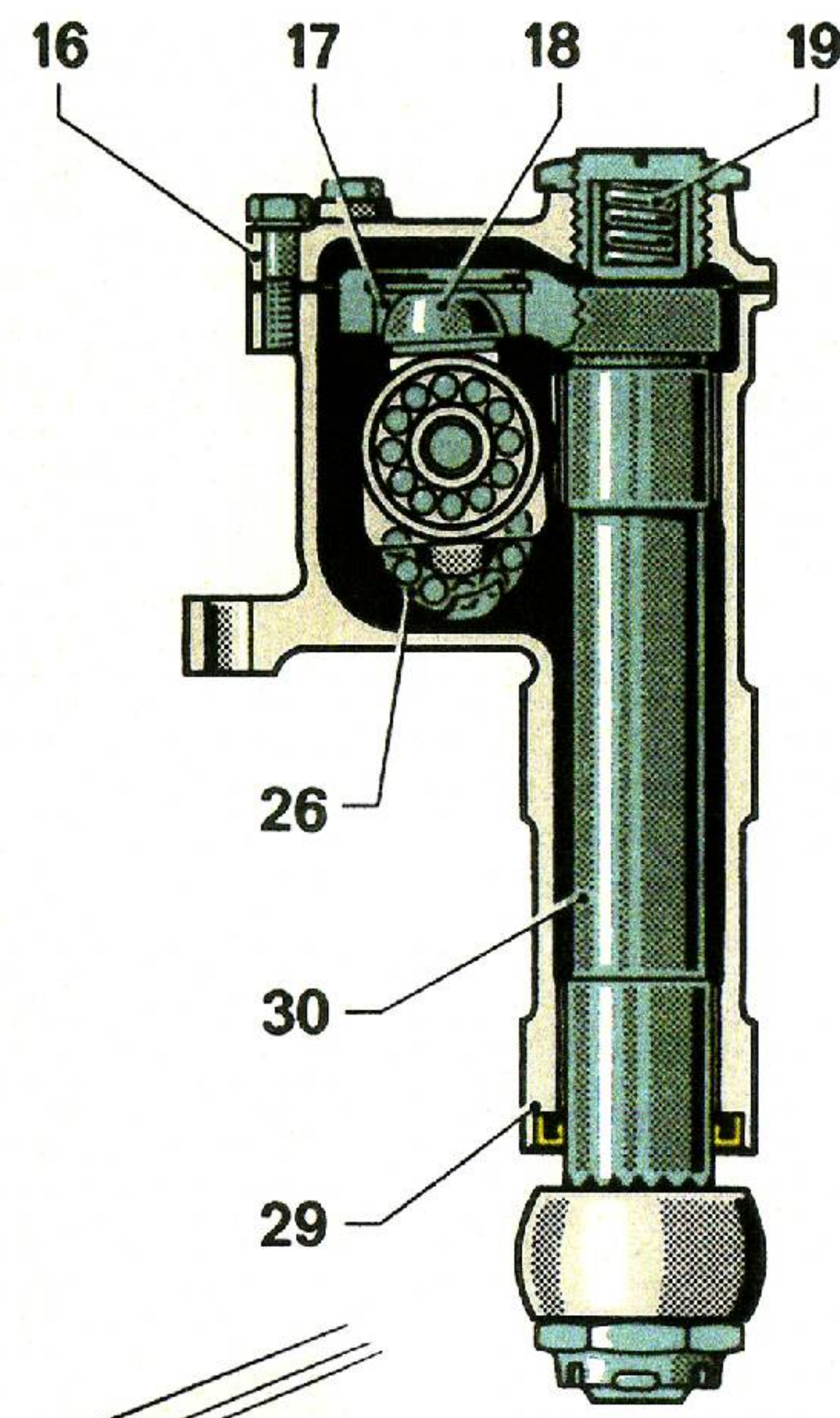
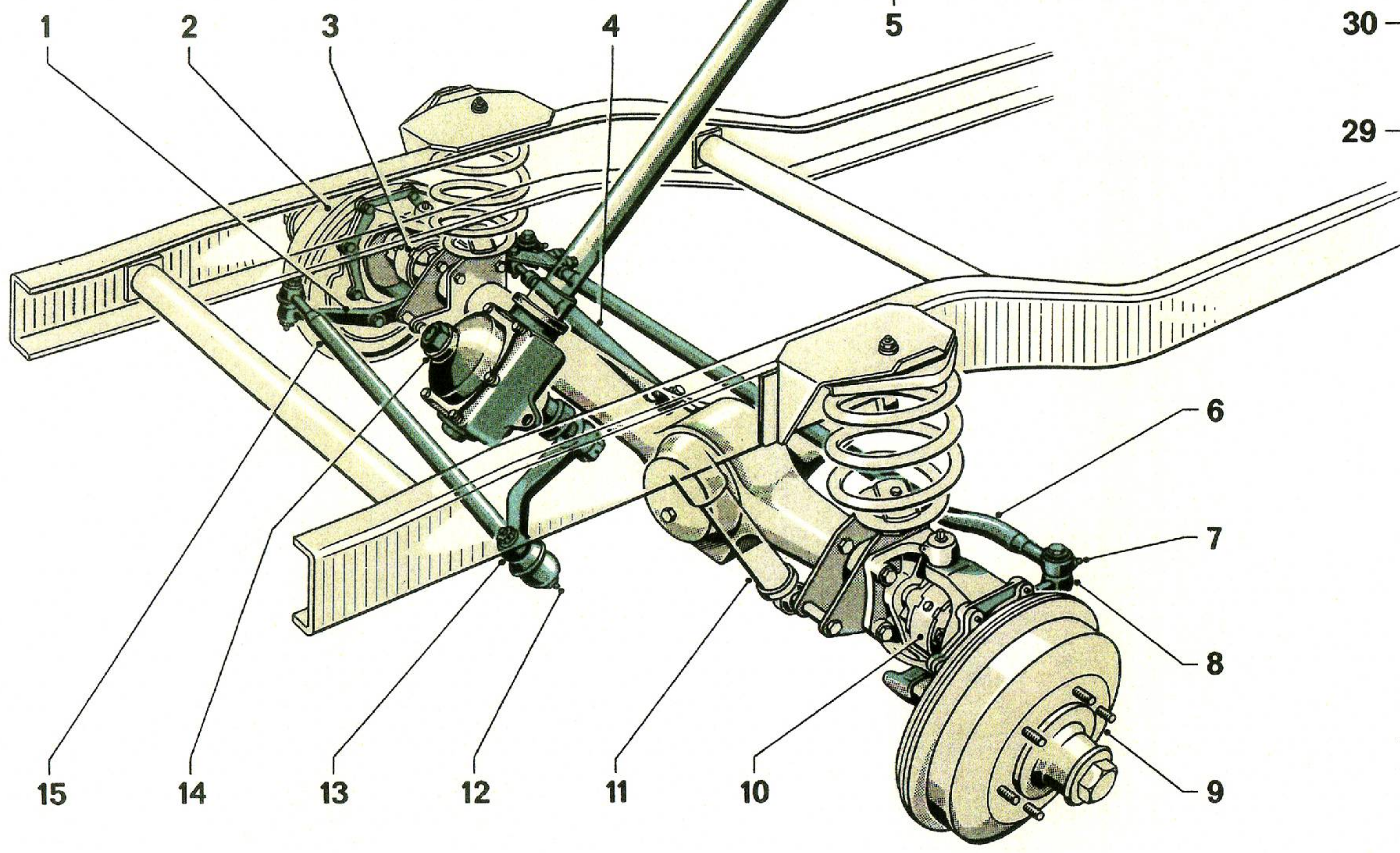
- 25 Deckel
- 26 Abdichting
- 27 Vorderachsabtrieb
- 28 Welle für Vorstufe
- 29 Schiebehülse
- 30 Gangrad IV (Hauptwelle)
- 31 Gangrad Rückwärtsgang
- 32 Deckel für Vorstufe

- 33 Schaltschiebehülse
- 34 Synchronring
- 35 Gangrad VI
- 36 Getriebeantriebswelle
- 37 Gangrad (Rückwärtsgang)
- 38 Gangrad V (Vorgelegewelle)
- 39 Abtrieb für Tachometer
- 40 Gangrad II





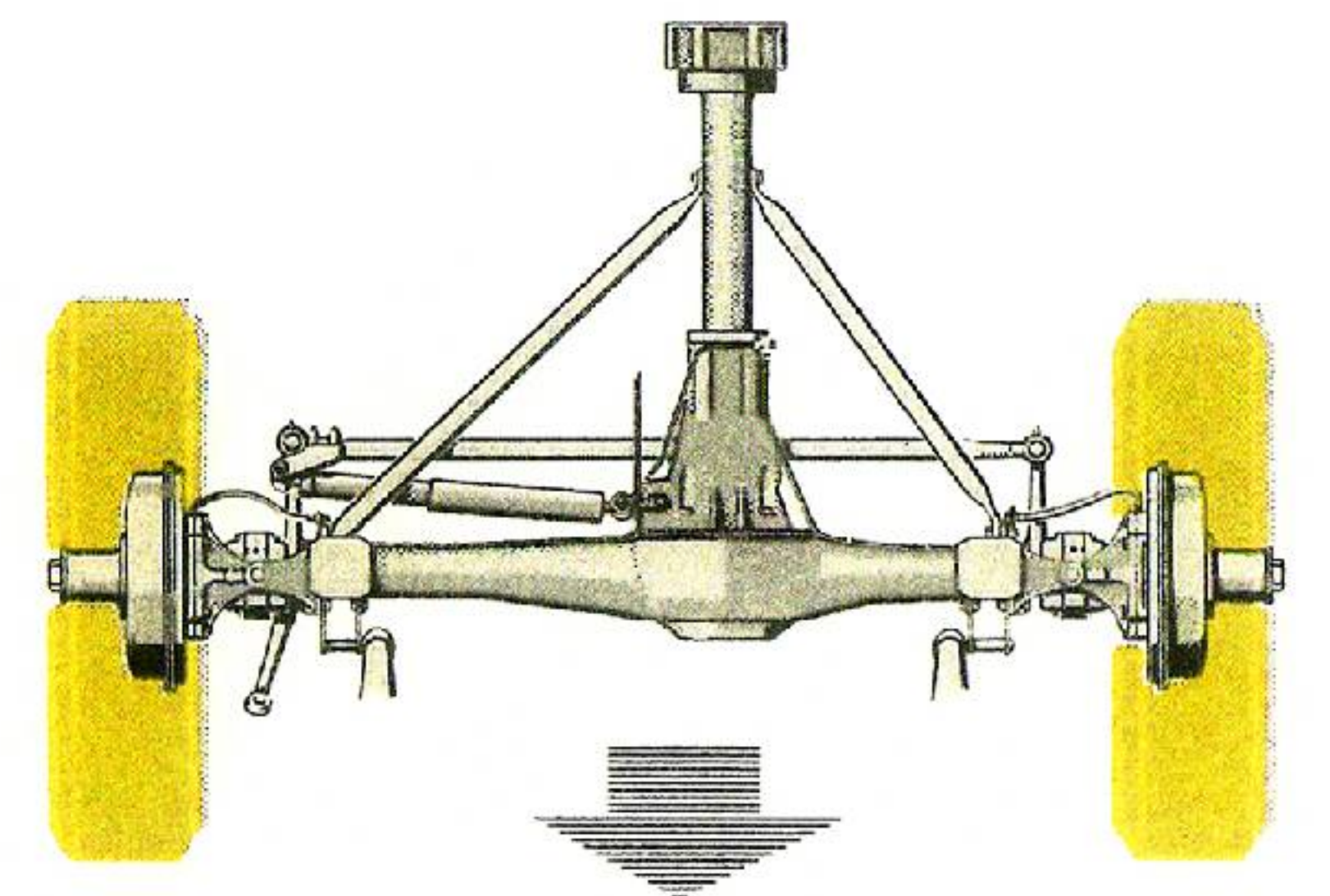
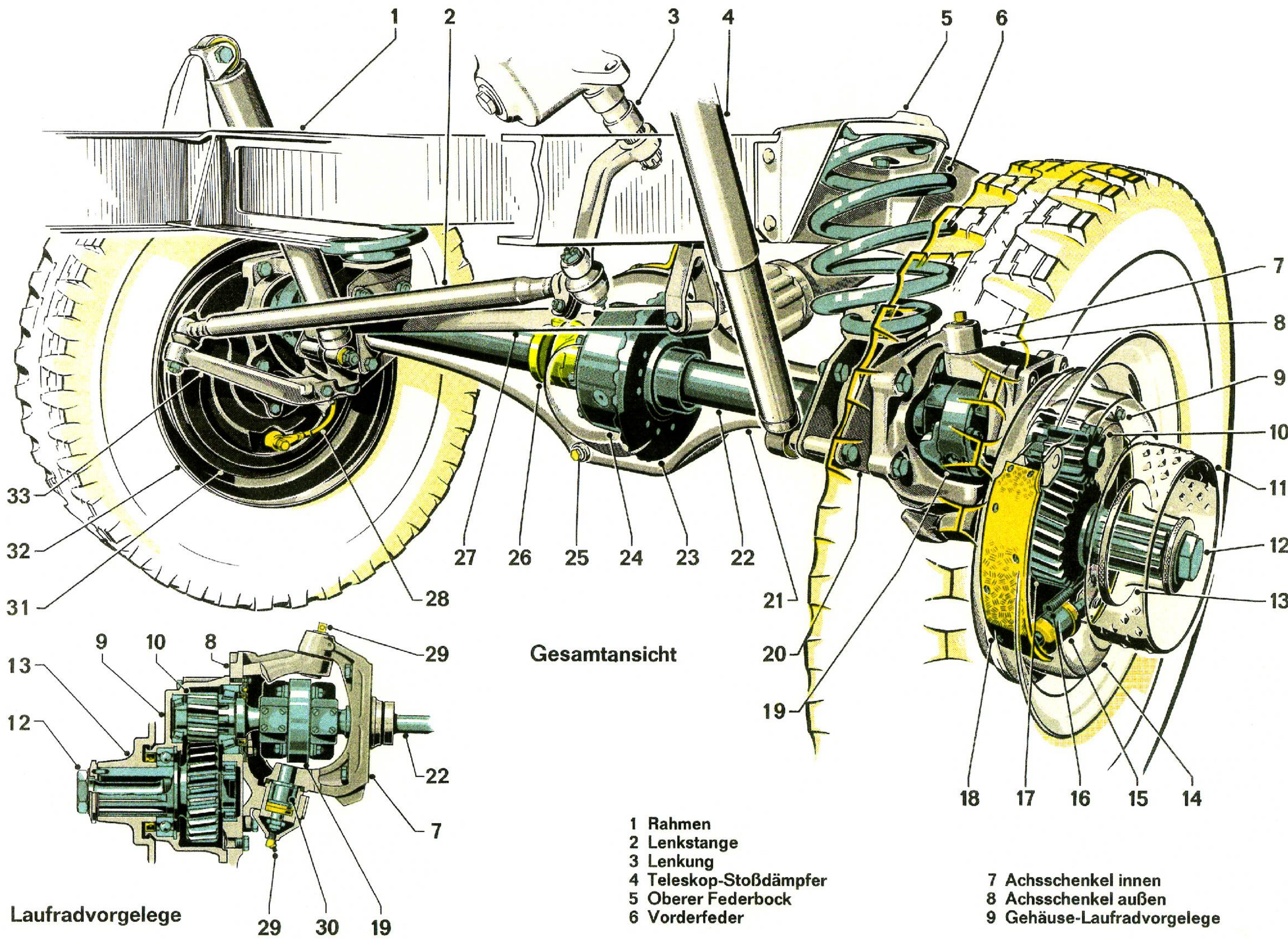
Lenkungsschema



Lenkgehäuse - Schnitt

- | | |
|---------------------------------|----------------------|
| 1 Lenkspurhebel | 16 Gehäusedeckel |
| 2 Bremstrommel rechts | 17 Kugelpfanne |
| 3 Doppelgelenk mit Welle rechts | 18 Kugelzapfen |
| 4 Lenkungsämpfer | 19 Druckfeder |
| 5 Radstellungsanzeiger | 20 Lenkschnecke |
| 6 Spurstange | 21 Lenkmutter |
| 7 Schmiernippel | 22 Schrägtonnenlager |
| 8 Spurhebel | 23 Nutmutter |
| 9 Bremstrommel links | 24 Einstellring |
| 10 Doppelgelenk mit Welle links | 25 Mantelrohr |
| 11 Stoßdämpfer | 26 Kugelumlaufrohr |
| 12 Schmiernippel | 27 Lenkstockhebel |
| 13 Lenkhebel | 28 Kronenmutter |
| 14 Lenkgehäuse | 29 Dichtring |
| 15 Lenkstange | 30 Lenkspindel |





Fahrtrichtung
Vorderachse von oben gesehen

Gesamtansicht

Laufadvorgelege

- 1 Rahmen
- 2 Lenkstange
- 3 Lenkung
- 4 Teleskop-Stoßdämpfer
- 5 Oberer Federbock
- 6 Vorderfeder

- 7 Achsschenkel innen
- 8 Achsschenkel außen
- 9 Gehäuse-Laufadvorgelege

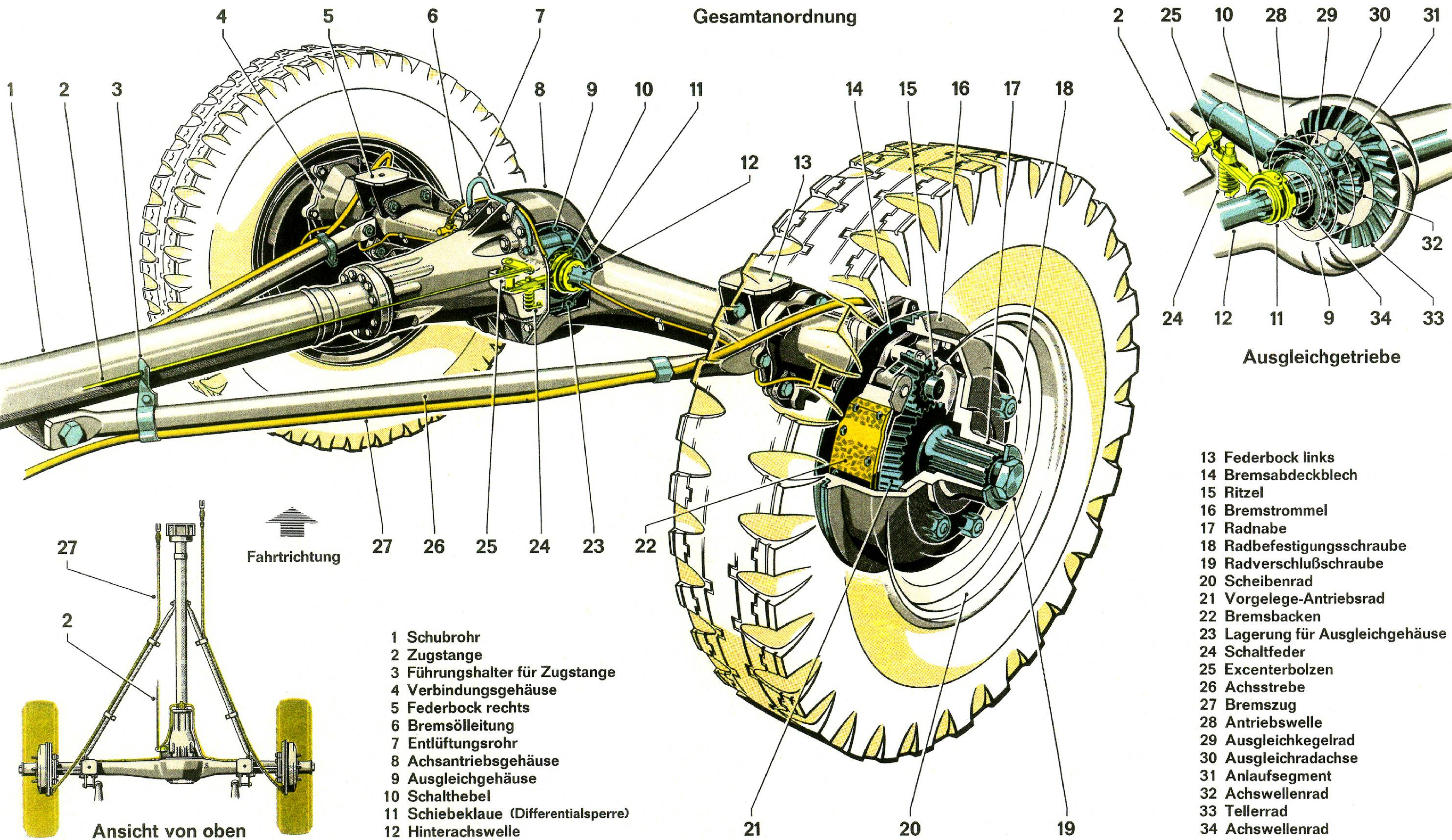
- 10 Ritzel
- 11 Aufstiegring
- 12 Radverschlußschraube
- 13 Radnabe
- 14 Bremstrommel
- 15 Radbremszylinder
- 16 Rückzugfeder
- 17 Vorgelegeabtriebsrad
- 18 Bremsbacke
- 19 Doppelgelenk
- 20 Achsfederbock
- 21 Achsgehäuse
- 22 Welle
- 23 Tellerrad
- 24 Ausgleichgehäuse
- 25 Ölablaßschraube
- 26 Schiebeklaue (Differentialsperre)
- 27 Querlenker
- 28 Bremsschlauch
- 29 Kegelwulstschmierkopf
- 30 Achsschenkelbolzen
- 31 Scheibenrad
- 32 Bremsabdeckblech
- 33 Lenkspurhebel



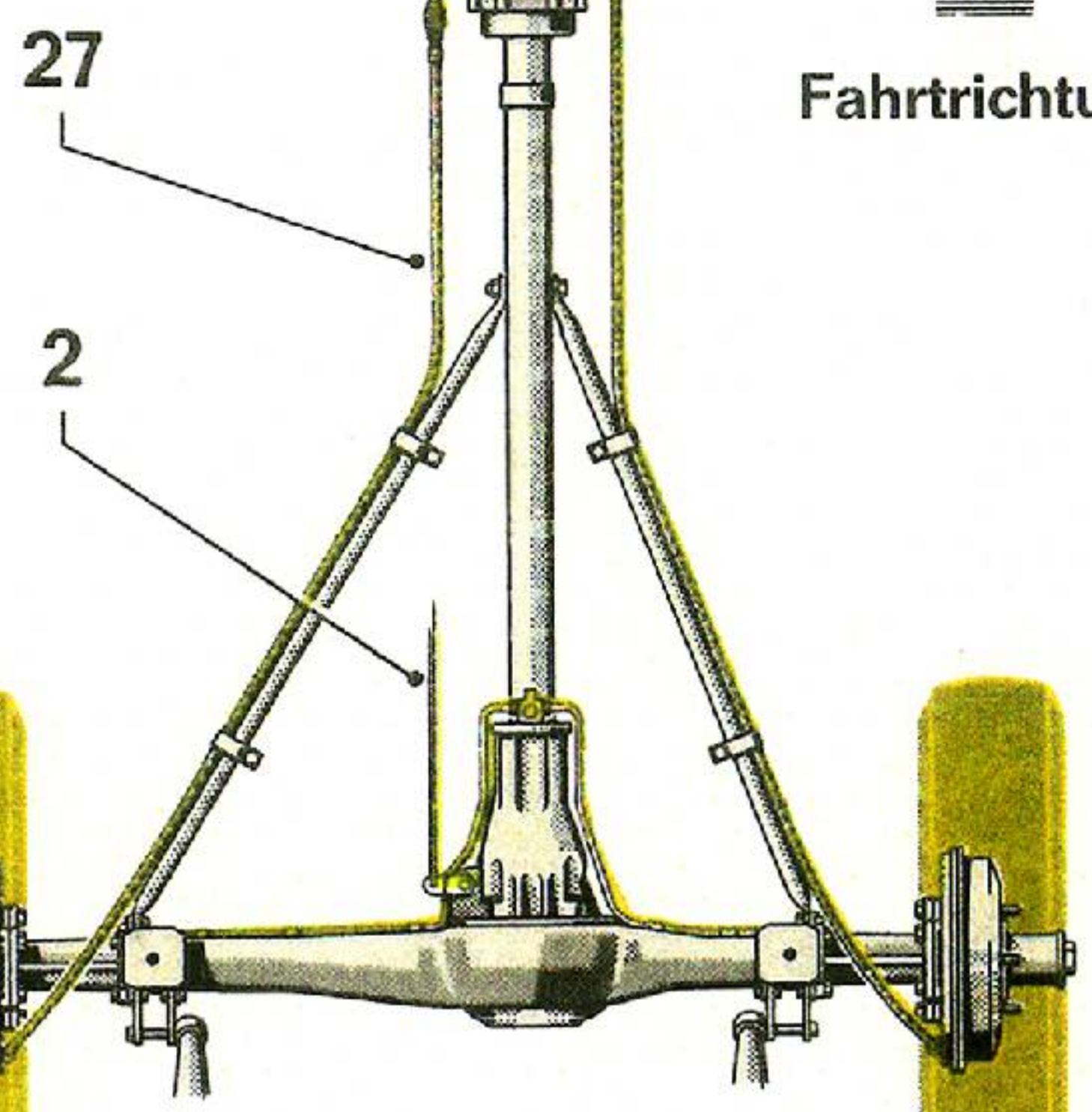
Vorderachse UNIMOG-S

Gesamtanordnung

Ausgleichgetriebe



Fahrtrichtung



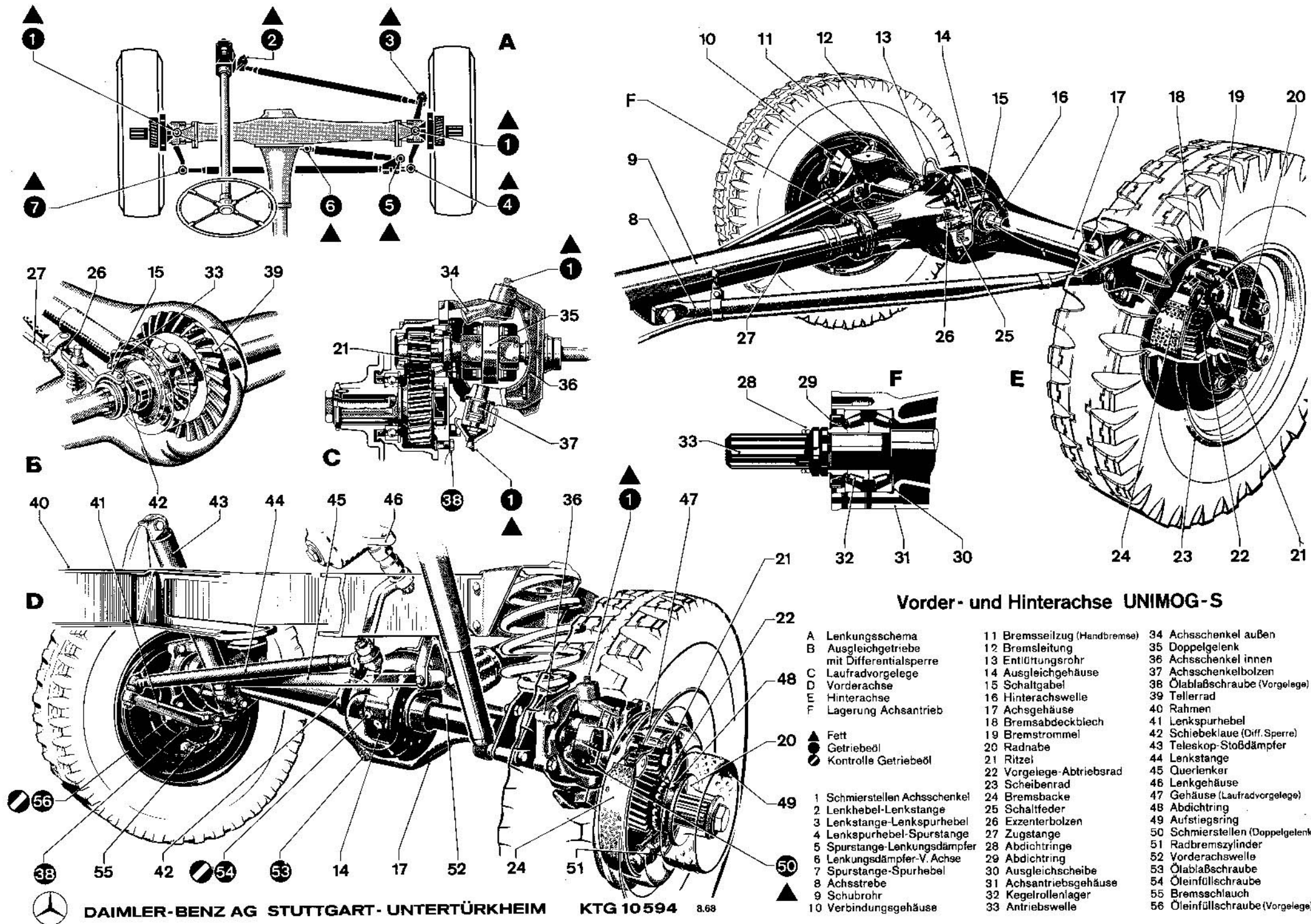
Ansicht von oben

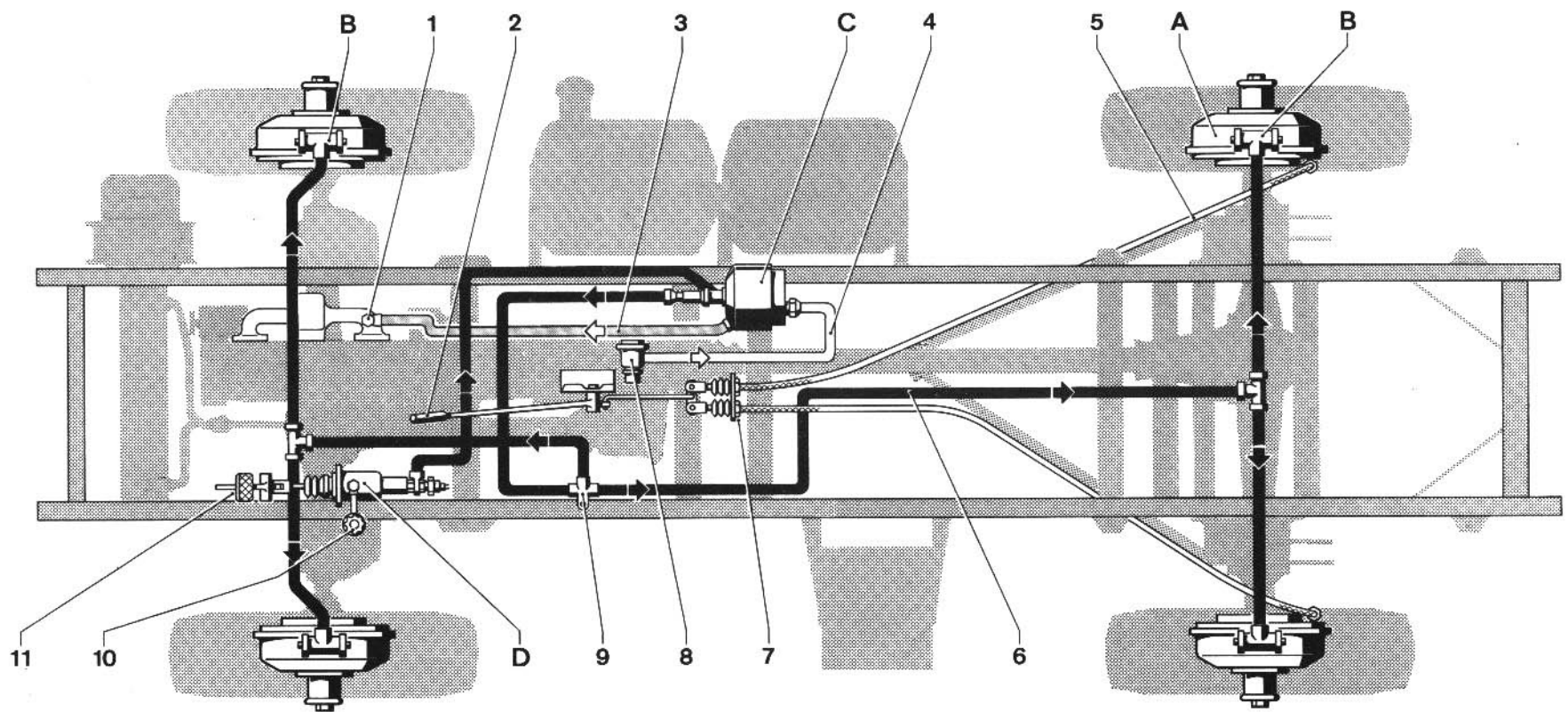
- 1 Schubrohr
- 2 Zugstange
- 3 Führungshalter für Zugstange
- 4 Verbindungsgehäuse
- 5 Federbock rechts
- 6 Bremsölleitung
- 7 Entlüftungsrohr
- 8 Achsantriebsgehäuse
- 9 Ausgleichgehäuse
- 10 Schalthebel
- 11 Schiebeklaue (Differentialsperre)
- 12 Hinterachswelle

- 13 Federbock links
- 14 Bremsabdeckblech
- 15 Ritzel
- 16 Bremstrommel
- 17 Radnabe
- 18 Radbefestigungsschraube
- 19 Radverschlußschraube
- 20 Scheibenrad
- 21 Vorgelege-Antriebsrad
- 22 Bremsbacken
- 23 Lagerung für Ausgleichgehäuse
- 24 Schaltfeder
- 25 Excenterbolzen
- 26 Achsstrebe
- 27 Bremszug
- 28 Antriebswelle
- 29 Ausgleichkegelrad
- 30 Ausgleichradachse
- 31 Anlaufsegment
- 32 Achswellenrad
- 33 Tellerrad
- 34 Achswellenrad

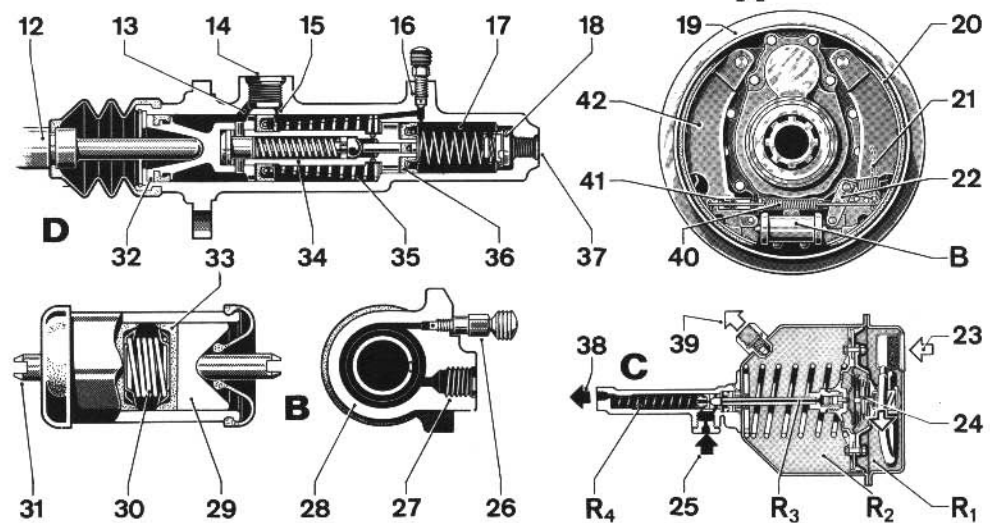
Hinterachse UNIMOG-S





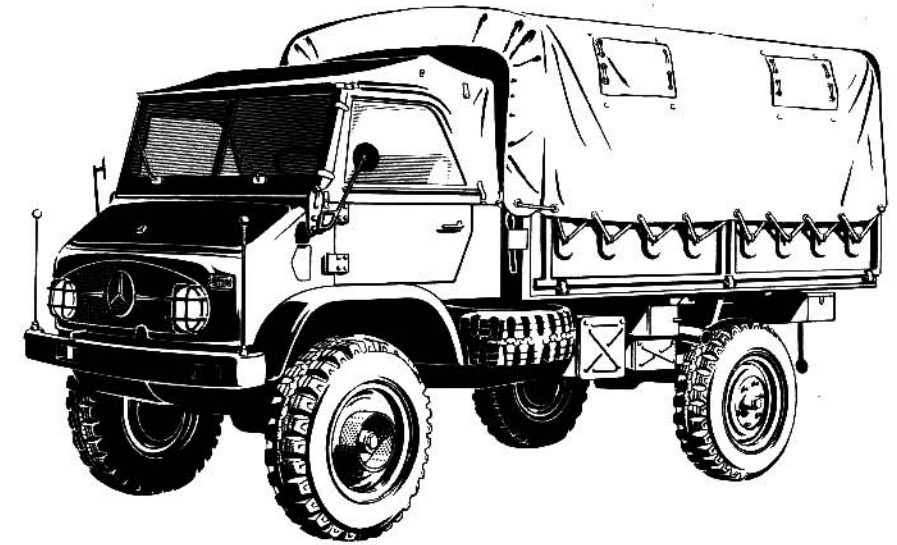
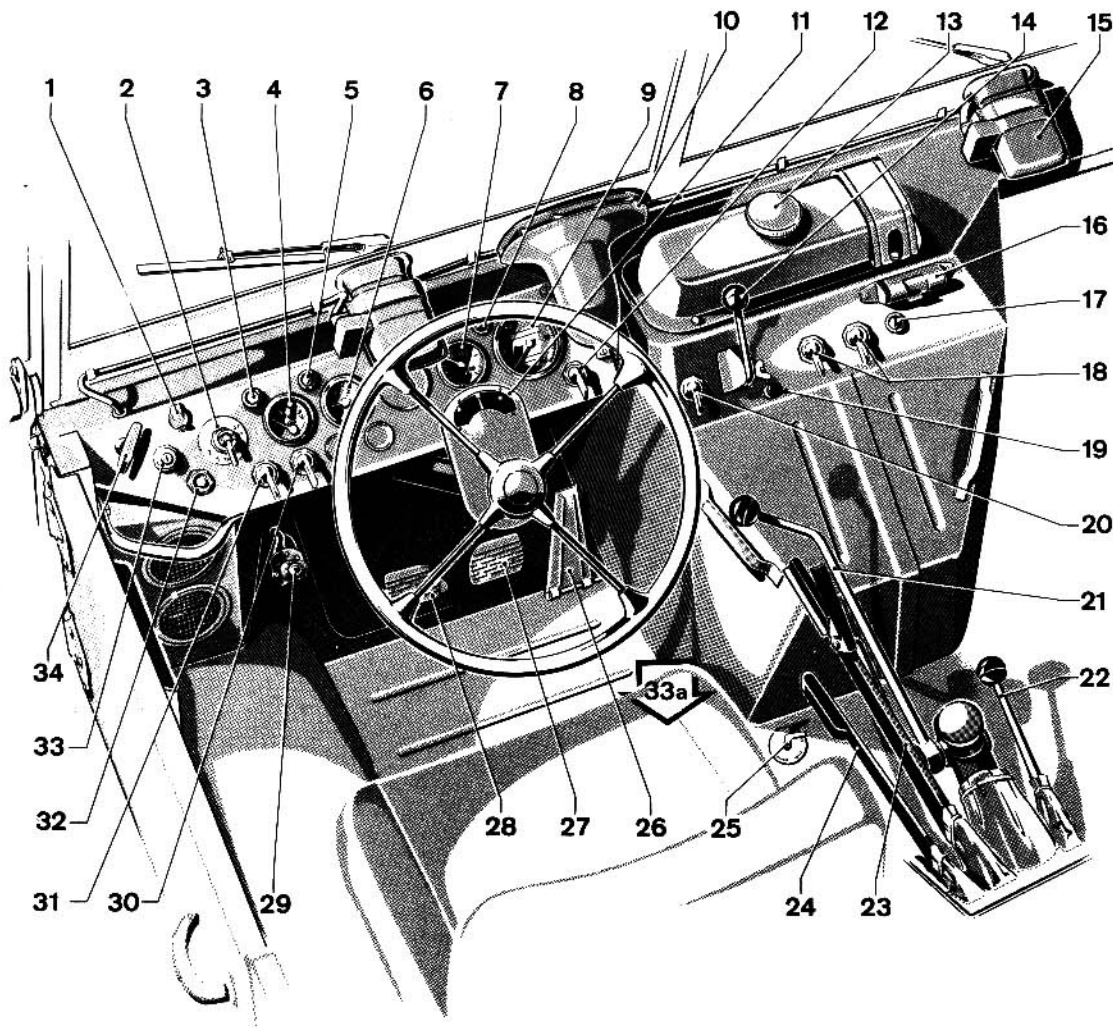


Bremsanlage UNIMOG-S mit Unterdruckverstärker

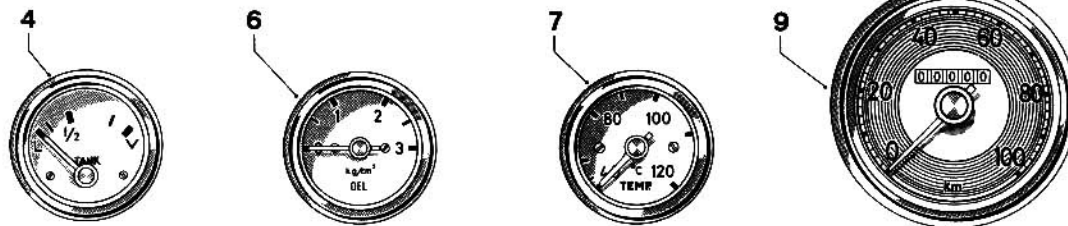


- A = Hinterradbremse
 - B = Radbremszylinder
 - C = Unterdruckbremsgerät
 - D = Hauptbremszylinder
- Erläuterung zu C (Unterdruckverstärker)**
- Aussenluft
 - ▨ Unterdruck
 - Bremsflüssigkeit
- R₁ = a Unterdruck (Lösestellung)
 - b Aussenluft (Bremsstellung)
 - R₂ = Unterdruck
 - R₃ = Steuerdruck
 - R₄ = Bremsdruck
- | | | |
|--|---|--|
| <ul style="list-style-type: none"> 1 Unterdruckanschluß Motor 2 Handbremshebel 3 Unterdruckleitung 4 Belüftungsleitung | <ul style="list-style-type: none"> 5 Handbremsseil 6 Bremsflüssigkeitsleitung 7 Verstellmutter (f. Handbremsseil) 8 Belüftungsfilter 9 Verteiler 10 Bremsflüssigkeits-Ausgleichbehälter 11 Bremspedal 12 Kolbenstange 13 Nachlaufbohrung 14 Anschluß-Ausgleichbehälter 15 Ausgleichbohrung 16 Entlüftungsschraube 17 Druckstufe 18 Bodenventil 19 Bremsstrommel 20 Bremsbelag 21 Handbremsseil (f. Handbremseinstellung) 22 Bremslasche | <ul style="list-style-type: none"> 23 Aussen-Luft 24 Steuerventil 25 vom Hauptbremszylinder 26 Entlüftungsschraube 27 Anschluß Bremsanschlauch 28 Gehäuse-Radbremmszylinder 29 Kolben 30 Druckfeder 31 Druckbolzen 32 Kolben 33 Manschette 34 Druckkolben 35 Füllstufe 36 Manschette 37 Anschluß-Bremsgerät 38 Anschluß-Bremsdruckleitung 39 Unterdruckanschluß zum Motor 40 Rückholfeder 41 Druckstange (f. Handbremseinstellung) 42 Bremsbacke |
|--|---|--|





Anordnung Instrumenten- und Bedienungshebel UNIMOG-S

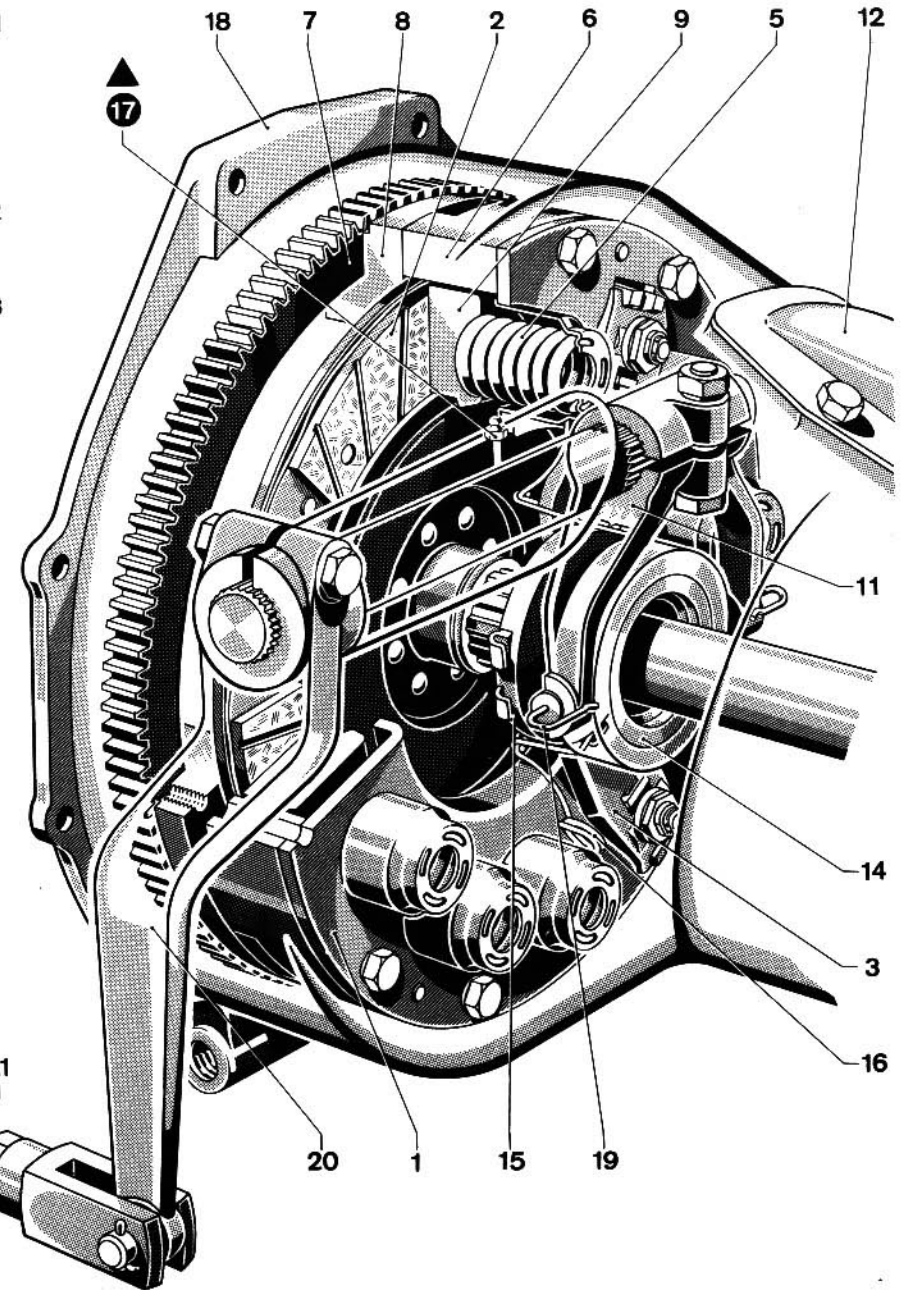
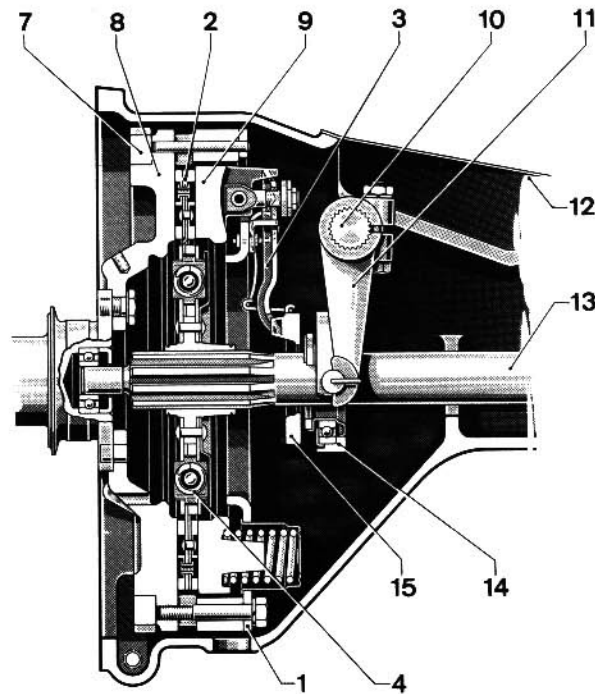
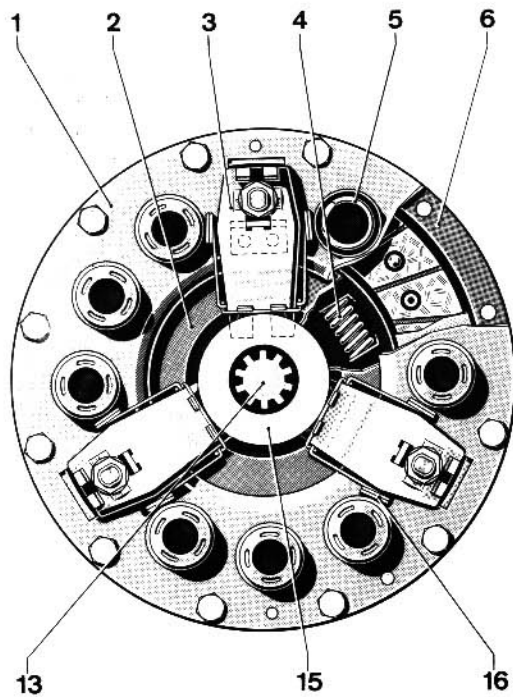


- | | |
|--|---|
| 1 Steckdose für Handlampe | 19 Starterzug |
| 2 Hauptlichtschalter | 20 Blinkerschalter |
| 3 Ladekontrolleuchte | 21 Schalthebel (1. bis 6. Gang) |
| 4 Kraftstoffvorratsanzeiger | 22 Schalthebel (Vorwärts auf Rückwärtsgang) |
| 5 Fernlichtkontrolleuchte | 23 Handbremshebel |
| 6 Öldruckmanometer | 24 Schalthebel (für Allradantrieb,
Differentialsperre vorn u. hinten) |
| 7 Kühlwasserfernthermometer | 25 Kraftstoffschalthahn |
| 8 Blinkerkontrolleuchte | 26 Fahrpedal |
| 9 Geschwindigkeitsmesser | 27 Bremspedal |
| 10 Hauptverteiler (Heizung, Lüftung) | 28 Kupplungspedal |
| 11 Radstellungsanzeiger | 29 Ablend-Fußschalter |
| 12 Schalter für Scheibenwischer | 30 Schalter (für Heizung) |
| 13 Kühlwassereinfüllstutzen | 31 Schalter (Instrumentenbeleuchtung) |
| 14 Handgasregulierung | 32 Anlaßdruckknopfschalter |
| 15 Scheibenwischermotor | 33 Zündschalter |
| 16 Innenleuchte | 33a Batterieauptschalter |
| 17 Anzeigeleuchte (Rundumscheinwerfer,
Kraftstoffzusatzpumpe) | 34 Zuggriff (Motorhaubenschluß) |
| 18 Schalter (Tonfolge u. Rundumscheinwerfer,
Kraftstoffzusatzpumpe) | |



DAIMLER-BENZ AG STUTTGART-UNTERTÜRKHEIM

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Anordnung Kupplung UNIMOG-S

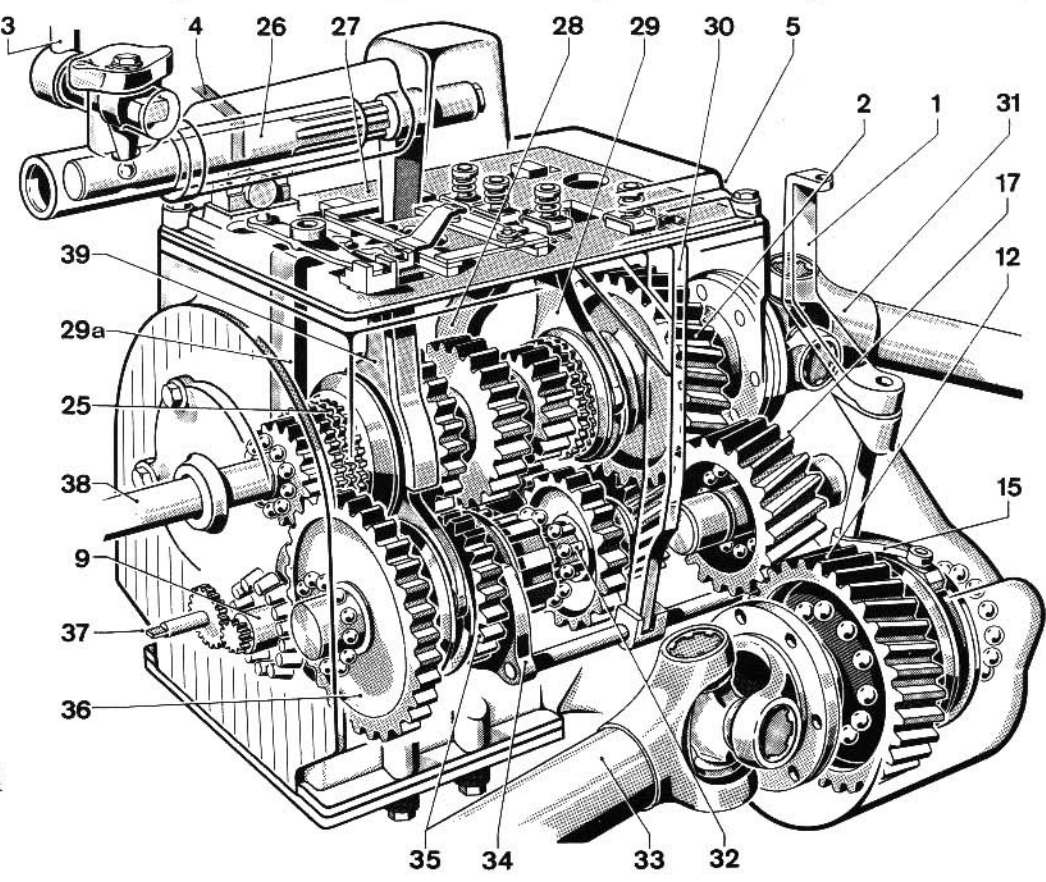
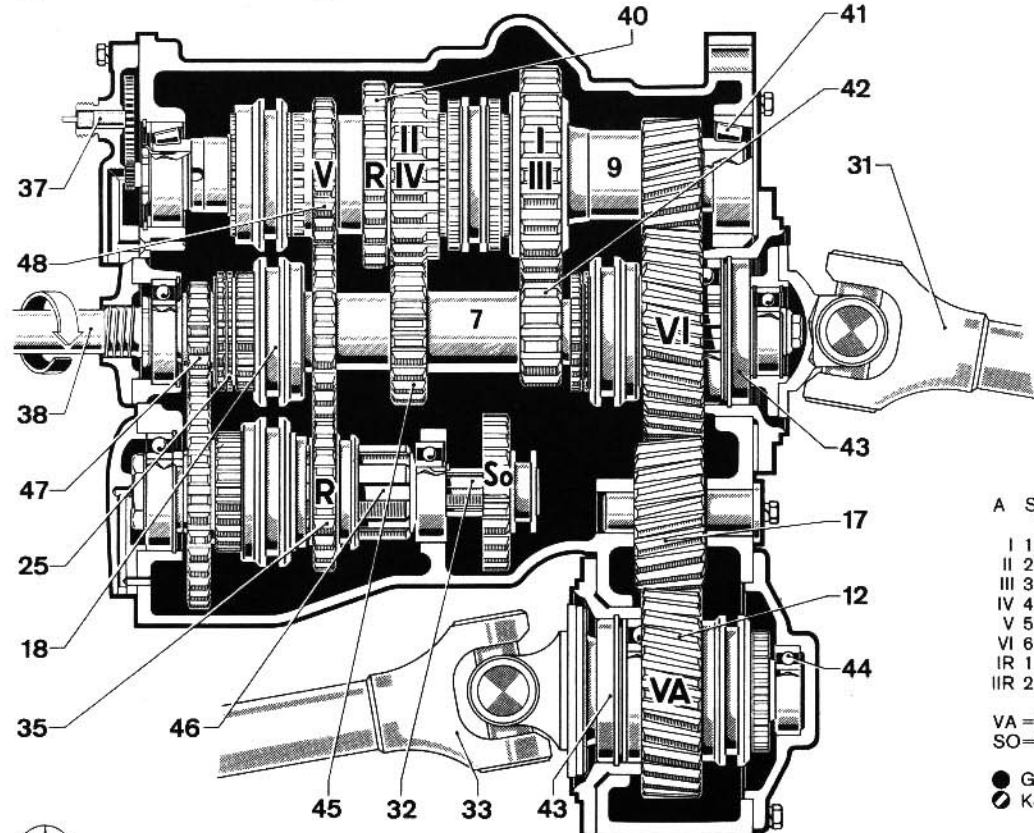
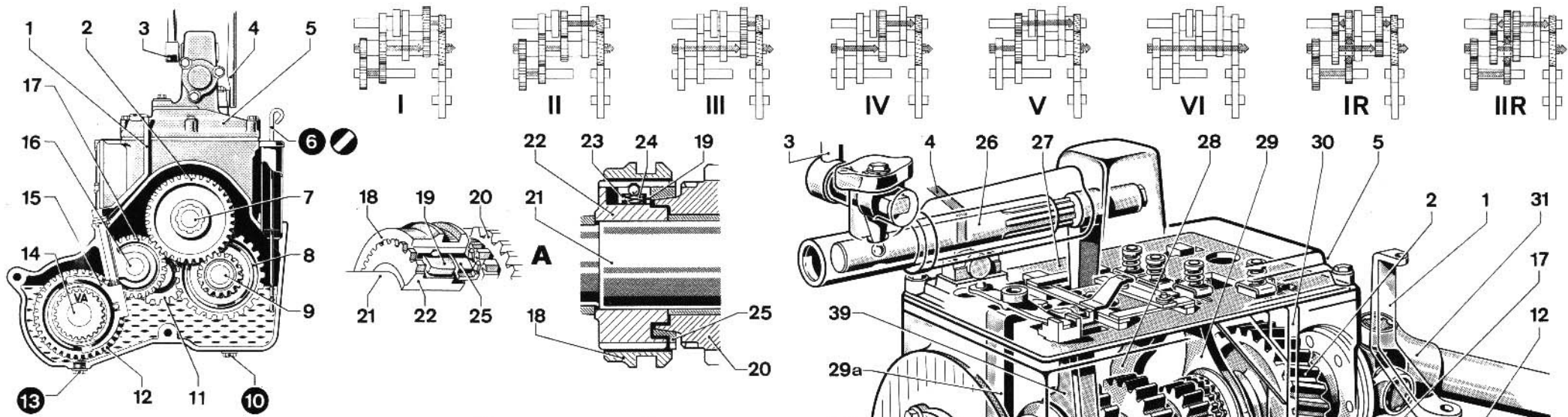
- | | |
|--|--------------------------------------|
| 1 Abschlußplatte | 14 Ausrücklager |
| 2 Kupplungsscheibe
(mit Torsionsdämpfer) | 15 Ausrückring |
| 3 Ausrückhebel | 16 Schenkelfeder |
| 4 Torsionsdämpfer | 17 Schmierstelle
(Kupplungswelle) |
| 5 Kupplungsdruckfeder | 18 Kupplungsgehäuse |
| 6 Zwischenring | 19 Formfeder |
| 7 Anlaßzahnkranz | 20 Betätigungshebel |
| 8 Schwungrad | 21 Zugstange |
| 9 Kupplungsdruckplatte | 22 Getriebe |
| 10 Kupplungswelle | 23 Kupplungspedal |
| 11 Ausrückgabel | 24 Rahmen |
| 12 Entlüftungsdeckel | 25 Lenkung |
| 13 Getriebeantriebswelle | 26 Motor |

▲ Fett ● Getriebeöl



DAIMLER-BENZ AG STUTTGART-UNTERTÜRKHEIM

KTG 10595 8.68



A Synchronisierung

- I 1. Gang
- II 2. Gang
- III 3. Gang
- IV 4. Gang
- V 5. Gang
- VI 6. Gang
- IR 1. Rückwärtsgang
- IIR 2. Rückwärtsgang

- VA = Vorderachsantrieb
- SO = Sonderantrieb

- Getriebeöl
- Kontrolle Getriebeöl

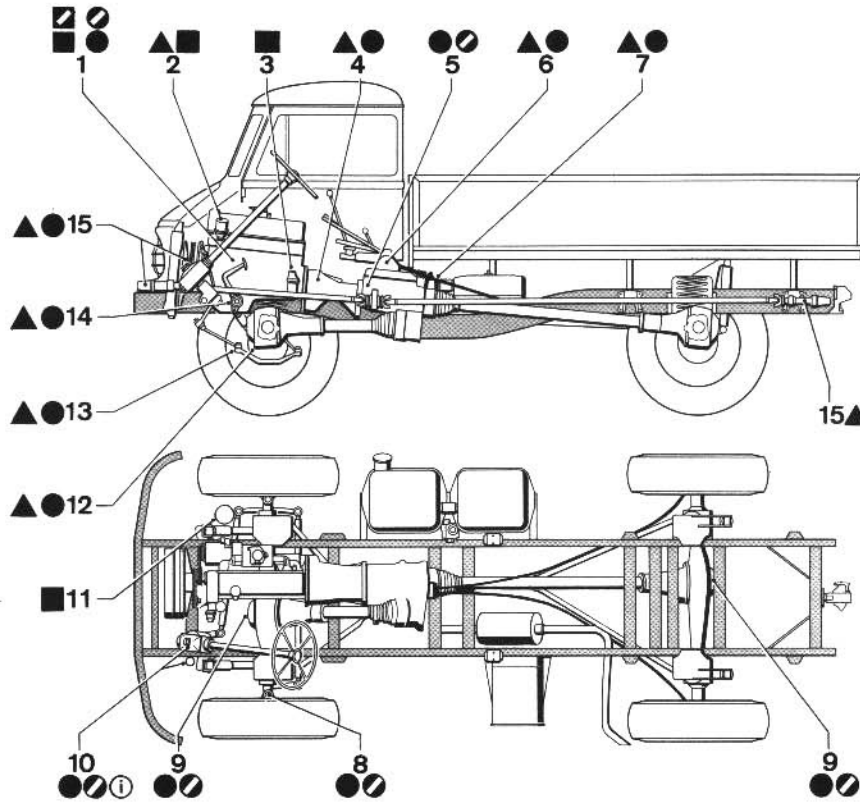
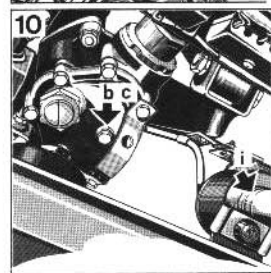
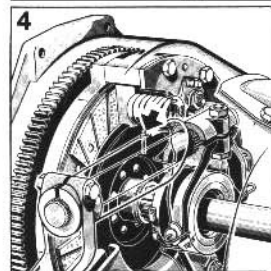
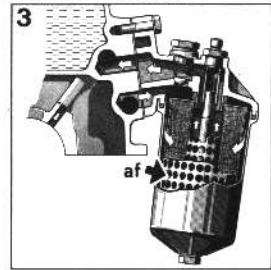
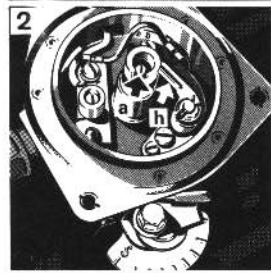
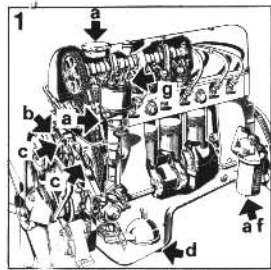
Schaltgetriebe UNIMOG-S

- 1 Schaltkurbel (Allradantrieb)
- 2 Abtriebsrad
- 3 Schalthebel (1.-6. Gang)
- 4 Schalthebel (f. Rückwärtsgänge)
- 5 Getriebedeckel
- 6 Ölmeßstab
- 7 Hauptwelle
- 8 Gangrad (1. u. 3. Gang)
- 9 Vorgelegewelle
- 10 Ölablaßschraube
- 11 Antriebsrad (Sonderantrieb)
- 12 Vorderachsabtriebsrad
- 13 Ölablaßschraube
- 14 Abtriebswelle
- 15 Schaltgabel (Allradantrieb)
- 16 Lagerbolzen (Zwischenrad)
- 17 Zwischenrad
- 18 Schaltschiebehülse
- 19 Mitnehmer
- 20 Gangrad
- 21 Welle
- 22 Mitnehmerring
- 23 Federnapf
- 24 Tellerfeder
- 25 Synchronring
- 26 Schaltwelle
- 27 Schaltplatte
- 28 Schaltzunge (1. - 4. Gang)
- 29 Schaltgabel (6. Gang)
- 29a Schaltzunge (5. Gang)
- 30 Schaltzunge (Rückwärtsgang)
- 31 Gelenkwelle (Hinterachse)
- 32 Vorstufenwelle
- 33 Gelenkwelle (Vorderachse)
- 34 Schiebegabel
- 35 Gangrad (Rückwärtsgang)
- 36 Antriebsrad
- 37 Tachometerantrieb
- 38 Getriebeantriebswelle
- 39 Schaltgabel (Vorstufenwelle)
- 40 Gangrad (Rückwärtsgang)
- 41 Ringkegellager
- 42 Antriebsrad Hauptwelle (1. u. 3. Gang)
- 43 Abdichttring
- 44 Rillenkugellager
- 45 Antriebsrad Hauptwelle (2. u. 4. Gang)
- 46 Schiebeshülse
- 47 Antriebsrad (Vorstufenwelle)
- 48 Gangrad 5. Gang (Vorgelegewelle)



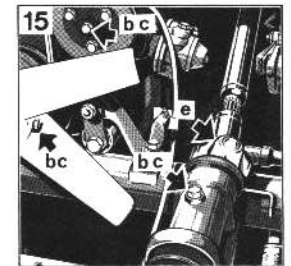
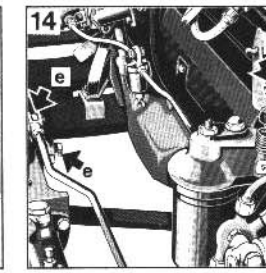
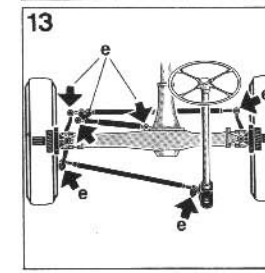
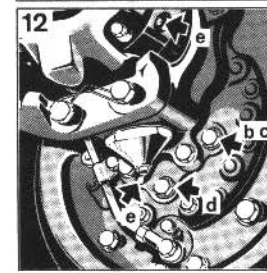
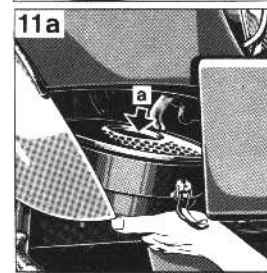
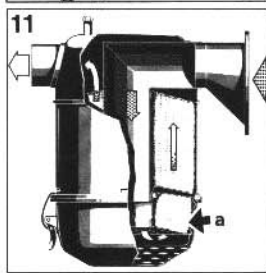
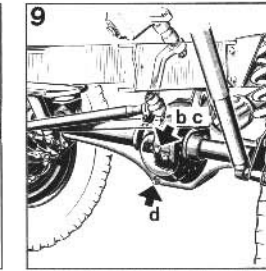
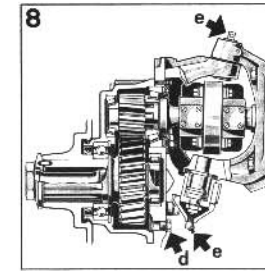
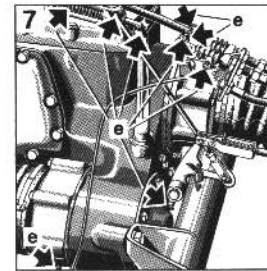
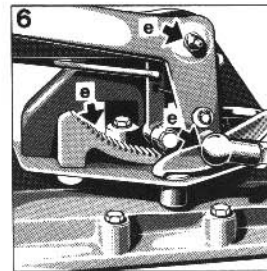
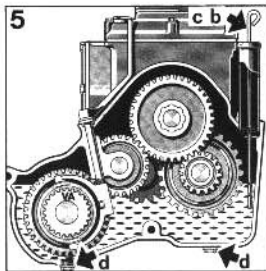
DAIMLER-BENZ AG STUTTGART-UNTERTÜRKHEIM

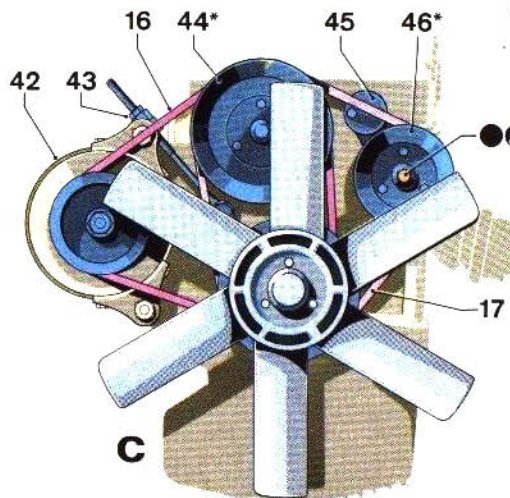
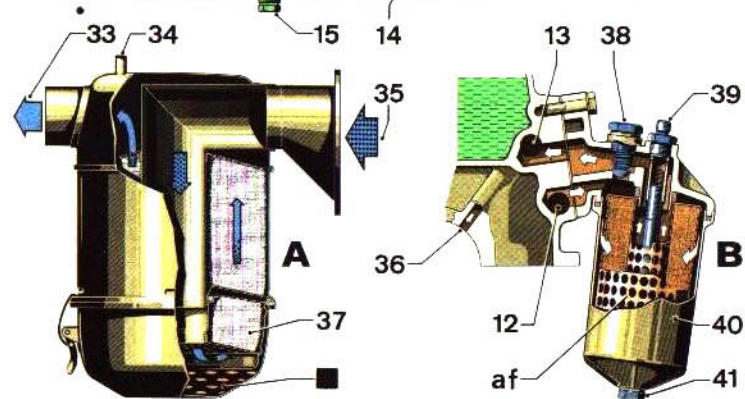
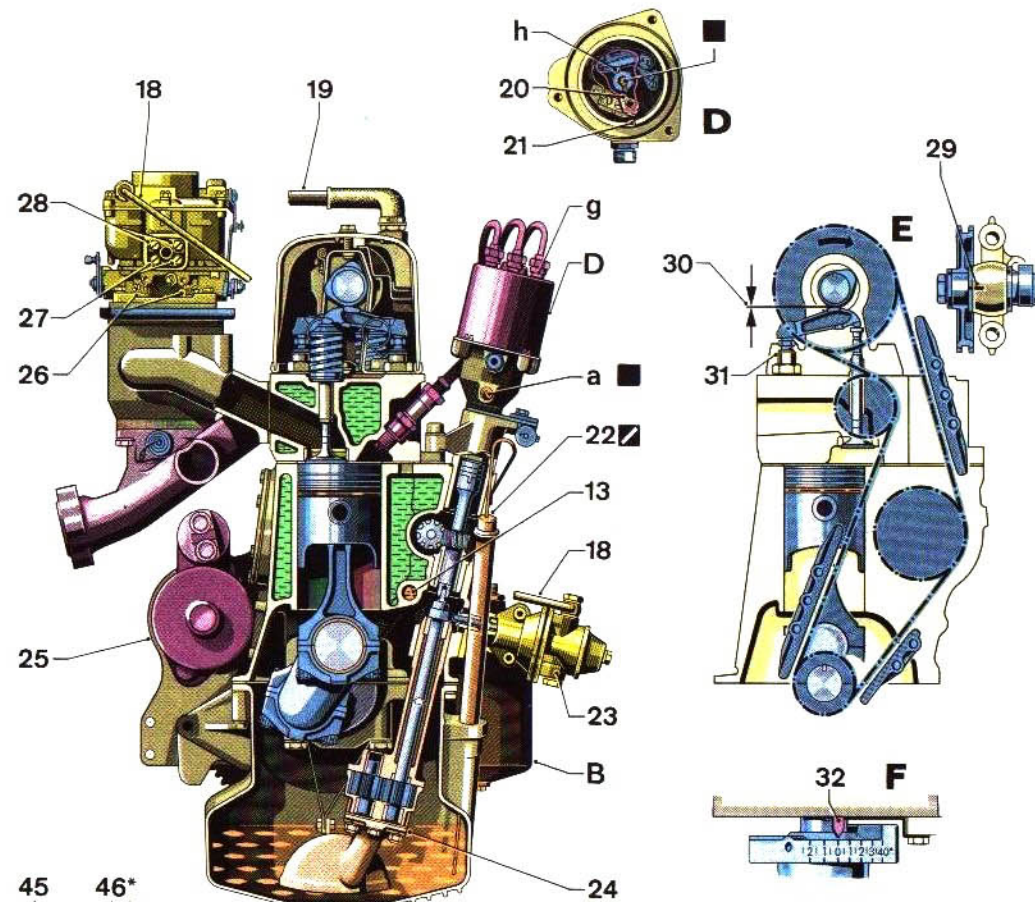
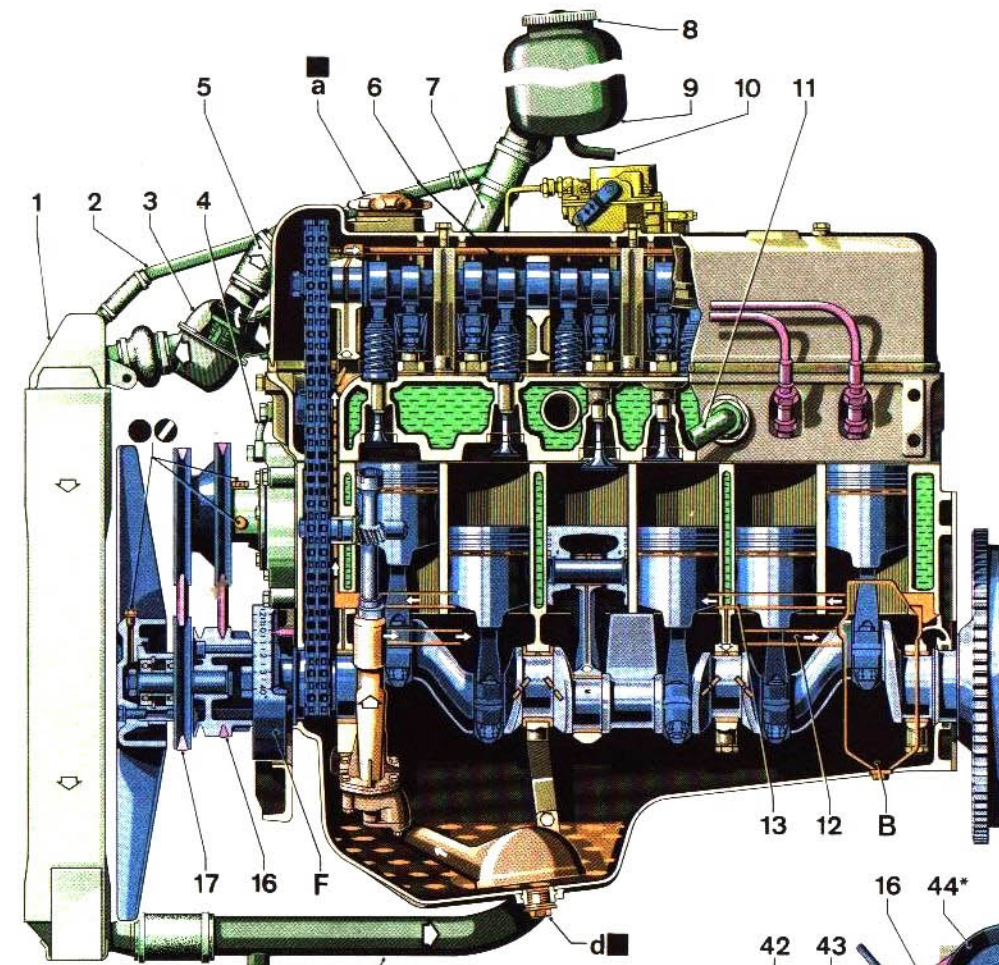
KTG 10596 8.68



Schmierstellen-Übersicht für UNIMOG-S

- | | | | |
|---|--|-----|--------------------------------------|
| a | Motorenöl einfüllen | 1 | Motor |
| b | Getriebeöl einfüllen | 2 | Zündverteiler |
| c | Ölstand kontrollieren | 3 | Ölfilter |
| d | Öl ablassen | 4 | Kupplung |
| e | Mit Fett oder Getriebeöl abschmieren | 5 | Getriebe |
| f | Filterpatrone wechseln | 6 | Handhebelwerk |
| g | Silikonpaste (Bosch VS 9350 Ft) | 7 | Handhebelwerk u. Schubkugeln |
| h | Hochdruckfett (Bosch Ft 1V 4) | 8 | Achsschenkel |
| ① | Bremsflüssigkeit (einfüllen und Kontrolle) | 9 | Achsen |
| ● | Getriebeöl | 10 | Lenkung u. Bremsflüssigkeitsbehälter |
| ◐ | Kontrolle Getriebeöl | 11 | Ölbadluftfilter |
| ◑ | Motorenöl | 11a | Ölbadluftfilter |
| ◒ | Kontrolle Motorenöl | 12 | Laufadvorgelege |
| ▲ | Fett | 13 | Lenkgestänge |
| | | 14 | Fußhebelwerk u. Gestänge |
| | | 15 | Lüfterantrieb u. Zapfwelle |





Motor M 180 UNIMOG - S

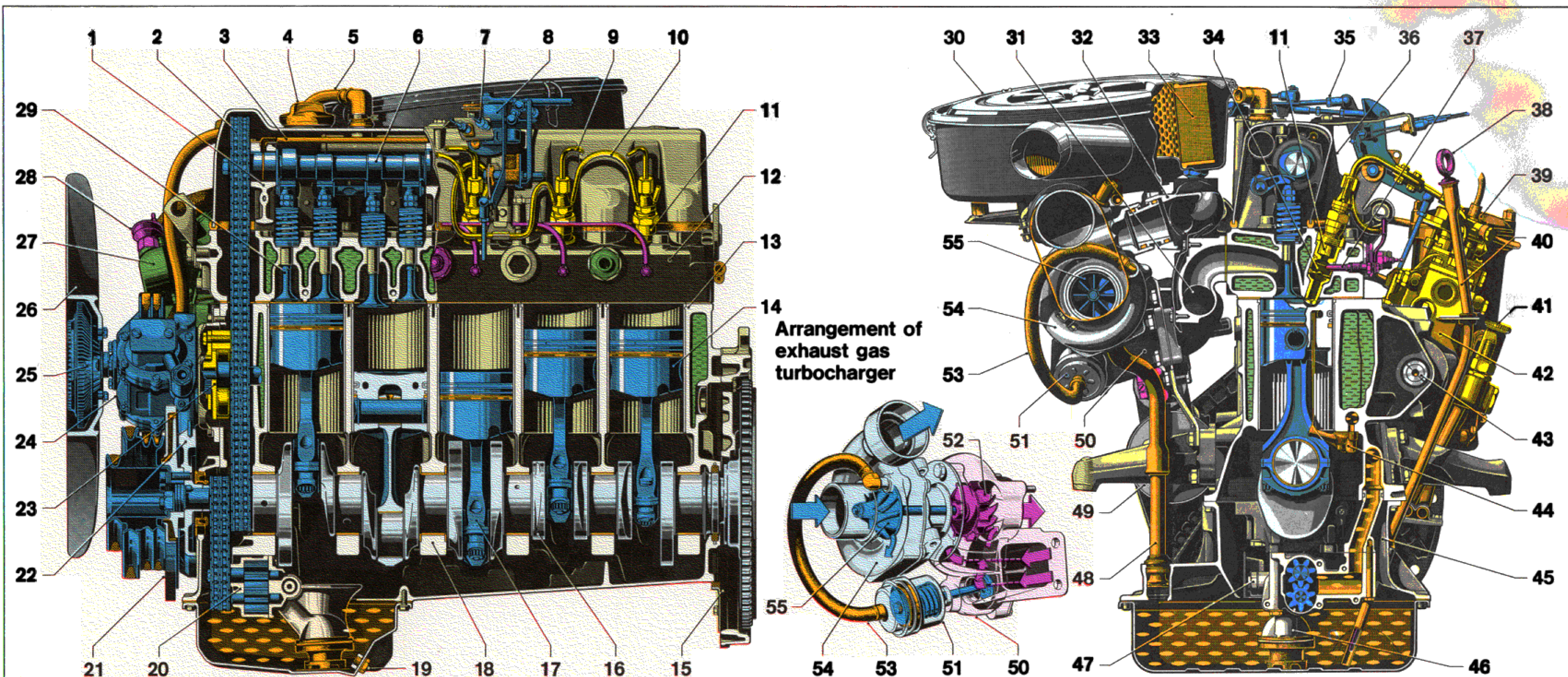
- | | |
|---|--|
| A Ölbadluftfilter | 6 Nockenwellenschmierung |
| B Ölfilter | 7 Ausgleichrohr |
| C Riementriebe | 8 Verschlussdeckel (mit Überdruckventil) |
| D Zündverteiler | 9 Ausgleichbehälter |
| E Einstellschema | 10 Überlaufrohr |
| F Gegengewicht (mit Einstellmarkierung) | 11 Vorwärmanschluß |
| ■ Motorenöl | 12 Ölkanal (von Ölpumpe zum Filter) |
| ▣ Kontrolle Motorenöl | 13 Hauptölkanal |
| ● Getriebeöl | 14 Rücklaufrohr |
| ○ Kontrolle Getriebeöl | 15 Wasserablaßschraube |
| a Motorenöl einfüllen | 16 Keilriemen (Wasserpumpe) |
| f Filterpatrone wechseln | 17 Keilriemen (Lüfter) |
| g Silicon (Bosch VS 9350 Ft) | 18 Kraftstoffleitung |
| h Hochdruckfett (Bosch Fi IV 4) | 19 Motorenlüftung |
| 1 Kühler | 20 Verteilerfinger |
| 2 Entlüftungsleitung | 21 Markierung (Zündeneinstellung Zyl. 1) |
| 3 Thermostat | 22 Ölmeßstab |
| 4 Entlüftungsleitung (Wasserpumpe) | 23 Kraftstoffpumpe |
| 5 Kurzschlußleitung | 24 Ölpumpe (mit Saugkorb) |
| | 25 Anlasser |
| | 26 Leerlaufgemisch-Regulierschrauben |
| | 27 Hauptdüsen |
| | 28 Leerlaufdüsen |
| | 29 Nockenwellenlager (mit Einstellmarke) |
| | 30 Ventilspiel |
| | 31 Einstellschraube (Ventilspiel) |
| | 32 Einstellzeiger (OT Zyl. 1) |
| | 33 Zum Motor |
| | 34 Anschluß (Motorenlüftung) |
| | 35 Außenluft |
| | 36 Ölkanal (zum Hauptlager) |
| | 37 Filtereinsatz |
| | 38 Überdruckventil |
| | 39 Anschluß (Überdruckanzeiger) |
| | 40 Filtertopf |
| | 41 Befestigungsschraube |
| | 42 Lichtmaschine |
| | 43 Keilriemenspanner |
| | 44 Keilriemenscheibe |
| | 45 Lüfterriemenspanner |
| | 46 Spansscheibe (Lüfterriemen) |

* Pos. 44 u. 46 untereinander austauschbar



DAIMLER-BENZ AG STUTTGART-UNTERTÜRKHEIM

KTG 10 599 8.68



Technical data:
 Operation 4-cycle Diesel
 Max. engine output
 acc. to Din 85 kW/115 PS
 acc. to SAE 110 net bhp
 Max. torque
 acc. to DIN 235 Nm/24 mkp
 acc. to SAE 166 net lb-ft
 Number of cyl.5
 Bore/stroke 90.9 mm/92.4 mm
 Eff. total piston
 displacement 2998 cm³

1 Camshaft bearing
 2 Duplex silent chain
 3 Oil tube (camshaft lubrication)
 4 Oil filler cap
 5 Breather line
 6 Camshaft
 7 Wire cable (idle adjustment)
 8 Shut-off lever on engine
 9 Fuel pressure line
 10 Fuel leakage line
 11 Injection nozzle

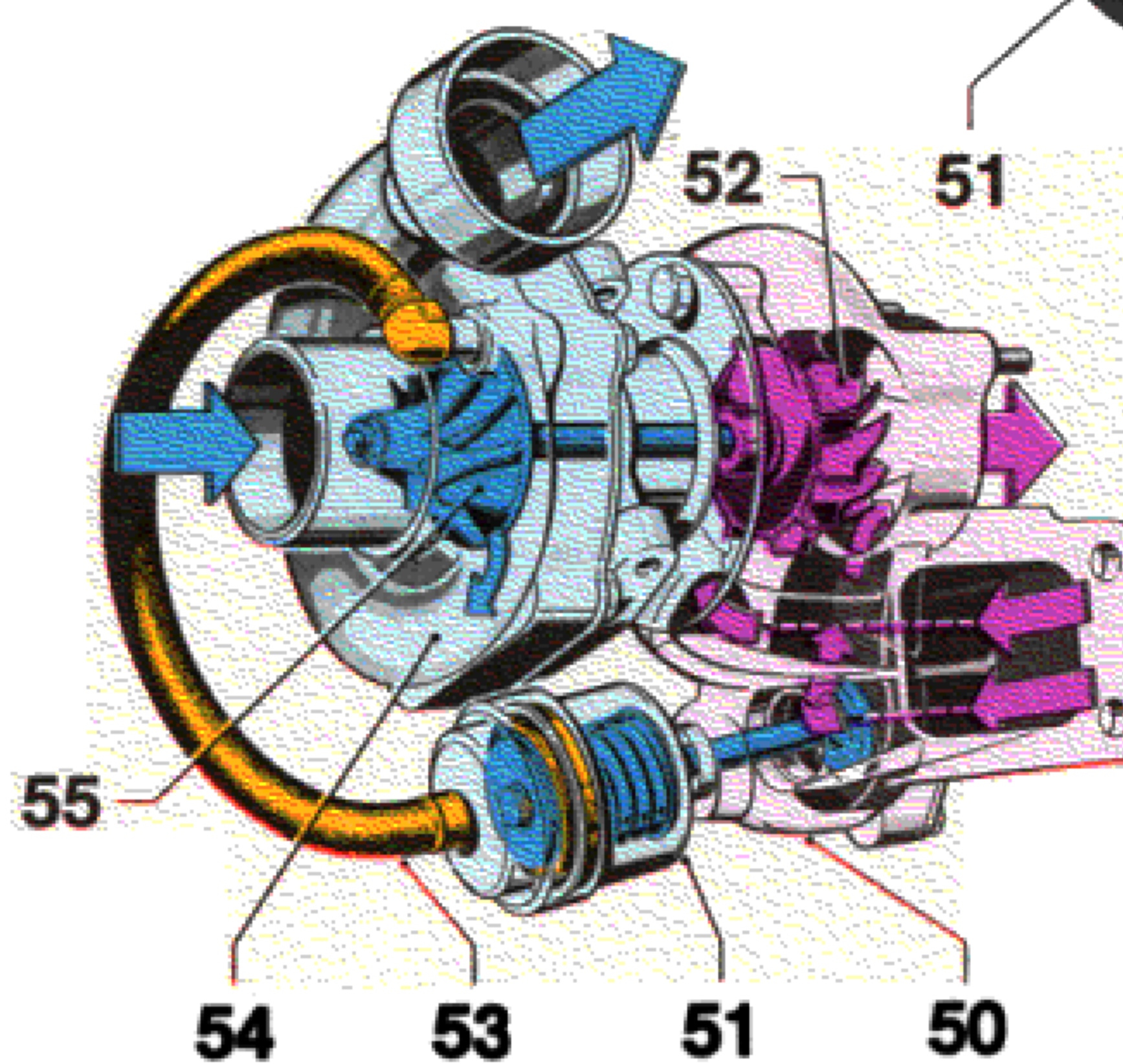
12 Cylinder head
 13 Crankcase
 14 Piston
 15 Intermediate flange
 16 Crankshaft
 17 Connecting rod
 18 Crankshaft bearing cap
 19 Screw plug
 20 Oil pump
 21 Vibration damper
 22 Balancing disc

23 Injection timer
 24 Dual-diaphragm vacuum pump
 25 Viscous-type fan coupling
 26 Fan
 27 Cooling water thermostat
 28 Temperature switch
 29 Exhaust valve
 30 Air cleaner
 31 Exhaust manifold
 32 Charge air distributor pipe
 33 Filter element

34 Pre-chamber
 35 Control linkage
 36 Cylinder head cover
 37 Glow plug
 38 Dipstick
 39 Oil filter
 40 Guide tube
 41 Manual fuel pump
 42 Injection pump
 43 Intermediate gear shaft
 44 Piston cooling nozzle

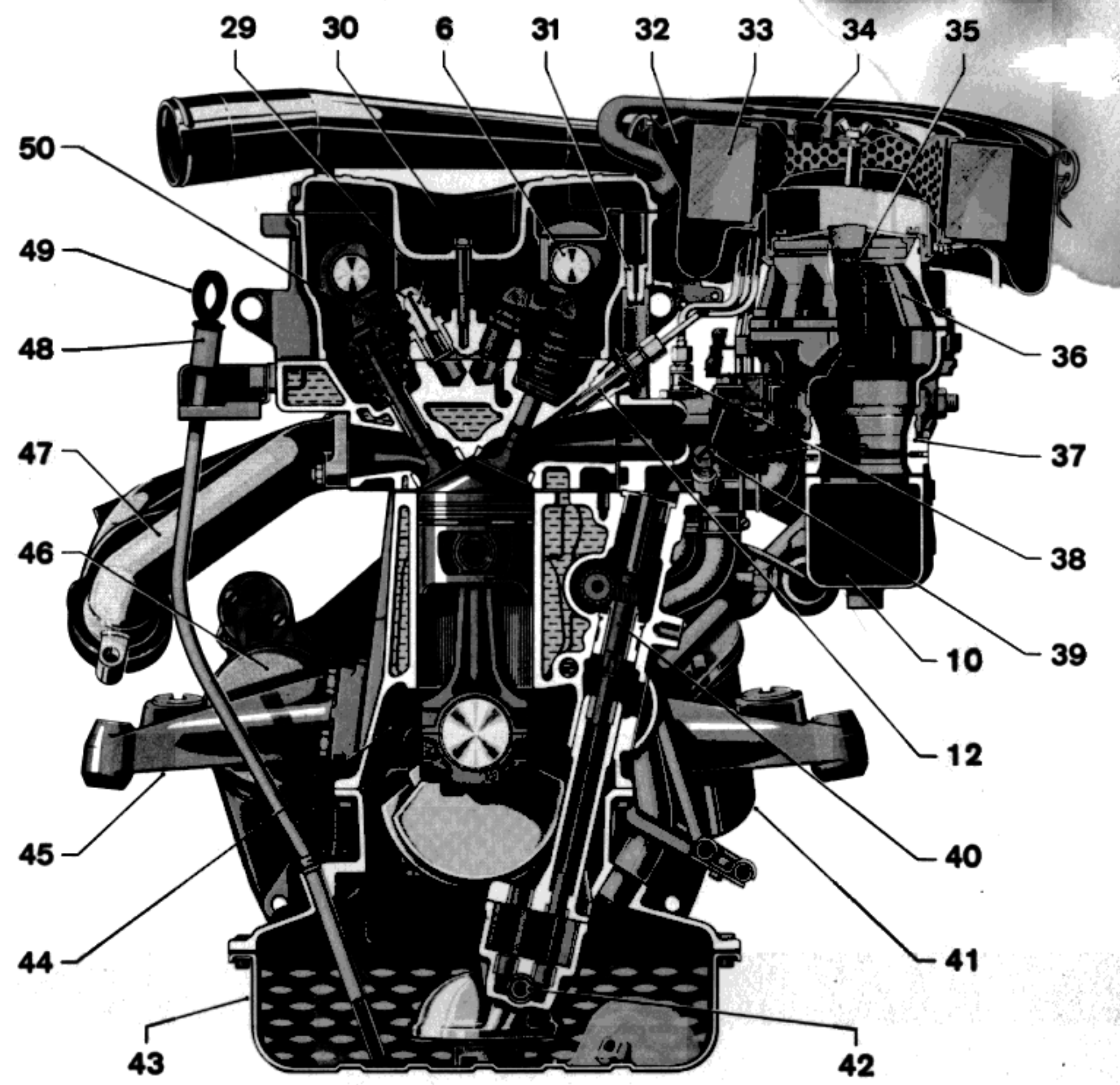
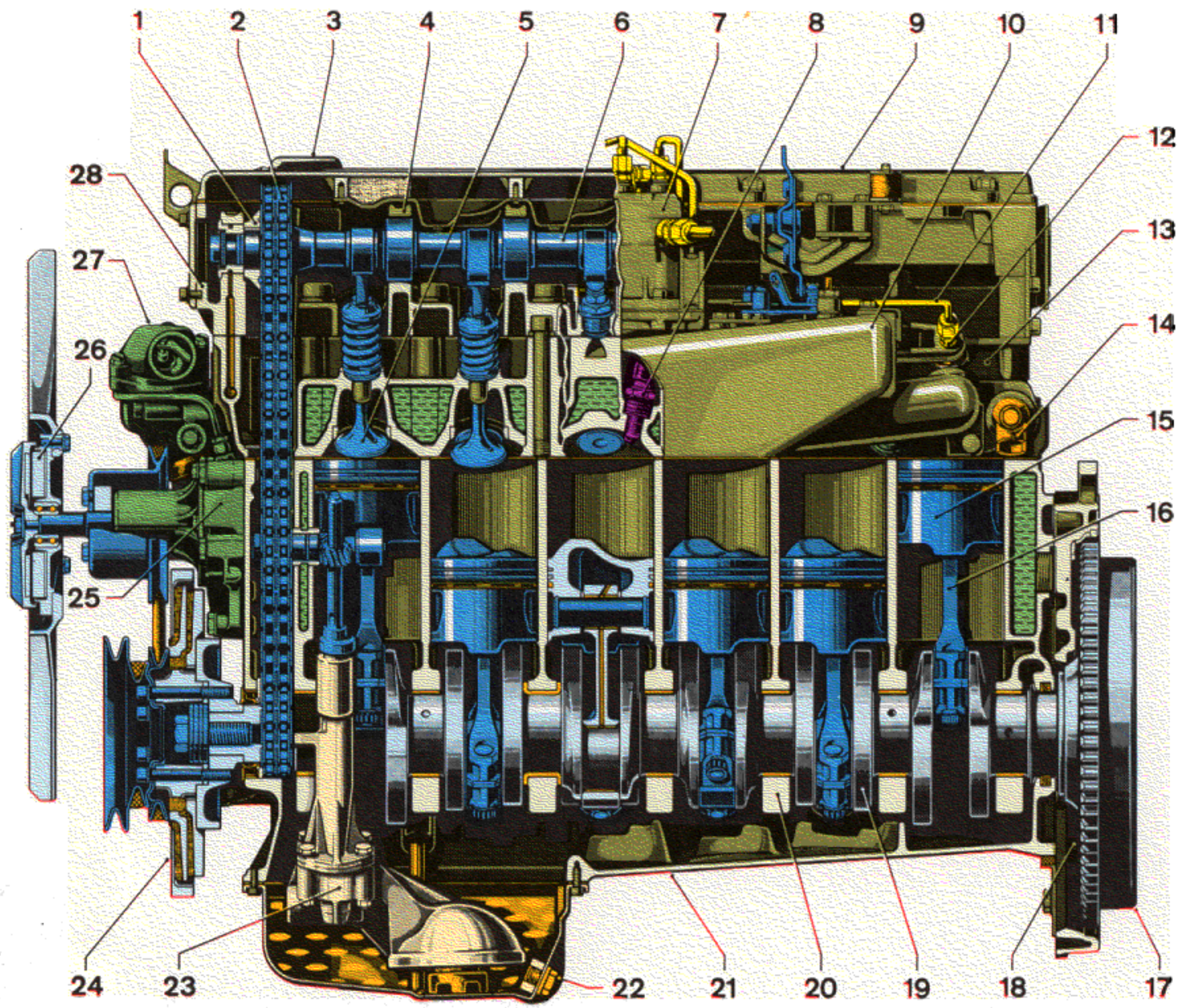
45 Oil pan - top section
 46 Strainer
 47 Oil pressure relief valve
 48 Oil return flow pipe
 (exhaust gas turbocharger)
 49 Starter motor
 50 Turbine case
 51 Charge pressure control valve
 52 Turbine
 53 Connecting hose
 54 Compressor housing
 55 Compressor

Arrangement of
 exhaust gas
 turbocharger



Engine OM 617 A Longitudinal and Cross Section
 Type 300 SD TURBO DIESEL

Daimler-Benz AG
 Stuttgart-Untertürkheim
 TG 15 678



Technical data:

Operation 4-cycle gasoline injection

Max. engine output
 acc. to DIN 130 kW/177 PS
 acc. to SAE 168 net bhp

Max. torque
 acc. to DIN 234 Nm/23,8 mkg
 acc. to SAE 166 net lb-ft

Number of cylinders . 6

Bore/stroke 86/78,8 mm

Total piston displacement 2746 cm³

1 Camshaft sprocket
 2 Duplex roller chain
 3 Oil filler cap
 4 Camshaft bearing
 5 Intake valve
 6 Camshaft (Intake valve)
 7 Fuel metering device
 8 Spark plug
 9 Cylinder head cover
 10 Intake pipe

11 Fuel pressure line
 12 Injection valve
 13 Cylinder head
 14 Oil-return line
 15 Piston
 16 Connecting rod
 17 Flywheel
 18 Intermediate flange
 19 Crankshaft
 20 Crankshaft bearing

21 Oil pan, upper section
 22 Oil drain plug
 23 Oil pump
 24 Vibration damper
 25 Water pump
 26 Magnetic fan coupling
 27 Cooling water thermostat
 28 Camshaft housing
 29 Ball pin
 30 Ignition lines

31 Nozzle (crankcase ventil.)
 32 Intake muffler
 33 Filter element
 34 Breather line
 35 Baffle plate
 36 Air flow sensor
 37 Venturi
 38 Electric starter valve
 39 Idle adjustment screw

40 Drive shaft
 41 Oil filter
 42 Oil pressure relief valve
 43 Oil pan, lower section
 44 Cylinder crankcase
 45 Engine support
 46 Starter motor
 47 Exhaust manifold
 48 Guide tube
 49 Oil dipstick
 50 Rocker arm



Engine M 110 with Mechanically Controlled Gasoline Injection
 Type 280 E

Daimler-Benz AG
 Stuttgart-Untertürkheim
 TG 15 674



UNIMOG

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