TABLE OF CONTENTS

TABLE OF CONTENTS

* * * *

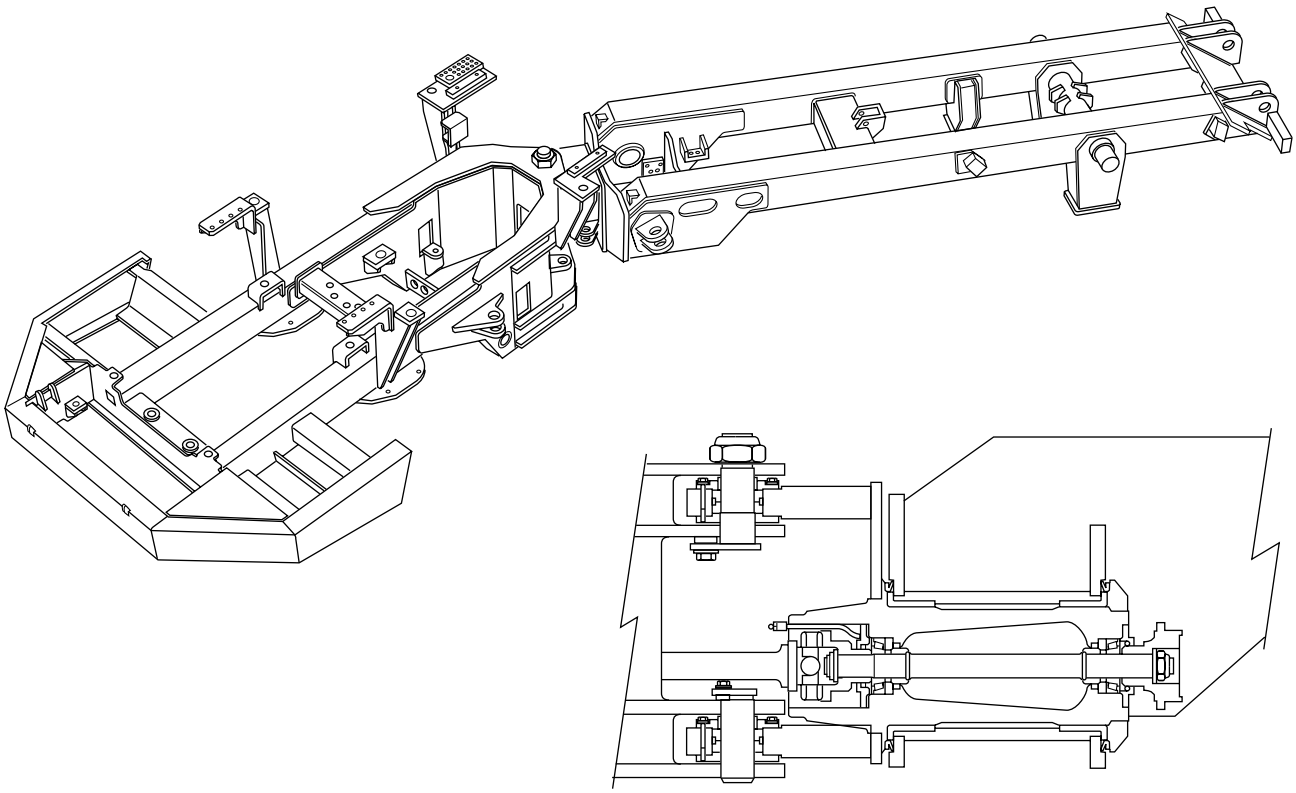


Fig. 1 - General Arrangement of Frame Assemblies

DESCRIPTION

The chassis consists of two separate frame assemblies which provide the articulation of the unit. The front and rear frames are constructed of all welded high-grade steel fabrications with rectangular box section beams forming main, side and cross members. The frames are coupled to provide 45° articulation to each side as well as oscillation.

The front frame is fabricated to form a rigid structure which carries the cab, power train and suspension system.

The rear frame is fabricated to form a rigid structure which carries the body, body hydraulics, suspension and rear drive axles.

Oscillation between the front and rear frames is provided by a large diameter cylindrical coupling carried on nylon bushes located in the rear frame. Longitudinal shocks are absorbed by the thrust faces of the nylon bushes. A large thrust nut, which is threaded to the end of the coupling and locked to the frame, secures the coupling in position. Wear on the thrust faces of the bushes is compensated by tightening this thrust nut.

INSPECTION AND MAINTENANCE

Inspection

Inspect the frames and attached parts at intervals not exceeding 250 hours for cracked or broken welds and bending of the frame. Any defects found should be repaired before they progress into major failures.

Straightening

Hydraulic straightening or aligning equipment should be used to straighten bent or twisted frames whenever possible. However, if heat must be applied, never heat the metal beyond a dull, cherry red colour, as too much heat will weaken the metal. When it is necessary to heat the metal, apply heat uniformly over the area to be straightened and protect the heated surface from sudden cooling. Frame parts that cannot be straightened should be renewed.

and use lifting equipment to pull the rear frame away from the front frame. After moving, block the rear frame and wheels securely.

12. Mark all bearing retainers (5, 11, 17 & 21) to aid in 'Installation'.

Note: Retainers (5, 11, 17 & 21) are not interchangeable.

13. Remove bolts (13), lockwashers (14), retainers (5, 11, 17 & 21) and upper and lower shims (7, 8 & 9).

14. Remove and discard 'O' rings (4, 10 & 18). Remove spacer (52) noting orientation to aid in 'Installation'.

15. Remove and tag all bearings (6) to aid in 'Installation', where appropriate.

Note: Never interchange cups or cones between bearings.

Inspection

Numbers in parentheses refer to Fig. 1.

1. Clean parts with a suitable solvent and let dry. DO NOT spin bearings with compressed air. Place bearings on clean surface, cover with lint free cloth and allow to dry.

2. Check articulation bearings (6) and pins (32 & 55) for wear or damage. Renew if required.

Installation

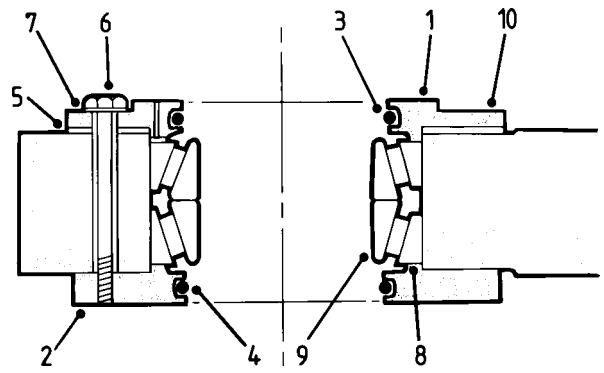
Numbers in parentheses refer to Fig. 1, unless otherwise specified.

⚠ WARNING
To prevent personal injury and property damage, make sure blocking or lifting equipment is properly secured and of adequate capacity to do the job safely.

Note: Two bearings are installed on EACH articulation point. Each bearing comprises a cup and a cone and are installed into the articulation point with the cones 'back to back'. Refer to Fig. 7.

Note: Never interchange cups or cones between bearings.

1. Insert both bearing cups and cones into housing so that bearing cones are back to back and position retainer (11), for top articulation bearing, and retainer (21), for bottom articulation bearing on underside of bearing housing. Make sure that bearings are pre-packed with grease including end faces and faces on bearing cups.



1 - Upper Retainer
2 - Lower Retainer
3 - Upper 'O' Ring
4 - Lower 'O' Ring
5 - Shims
6 - Bolts
7 - Washers
8 - Cups
9 - Cones
10 - Lugs

Fig. 7 - Section Through Articulation Bearing

2. Install top retainer (5), for top articulation bearing, and retainer (21), for bottom articulation bearing.

3. Lubricate bolts (13 for top and 33 for bottom) and install along with washers (14). Torque tighten bolts (13 & 33) to 27 Nm (20 lbf ft).

4. Use feeler gauges to measure end float and record value. Refer to Fig. 8.

Note: End float is equal to the sum of the clearances between both retainers and the lug.

5. Select shims to total value of -0.07 to +0.02 mm (-0.003 to +0.001 in) of that recorded at Step 4.

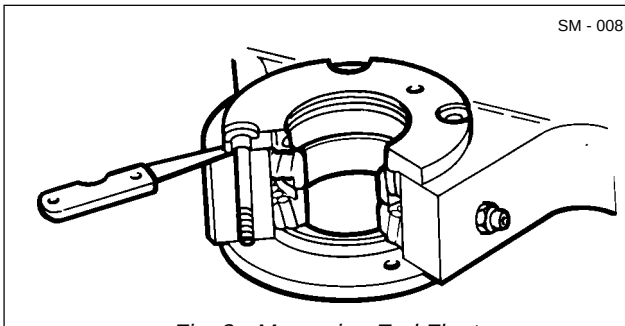
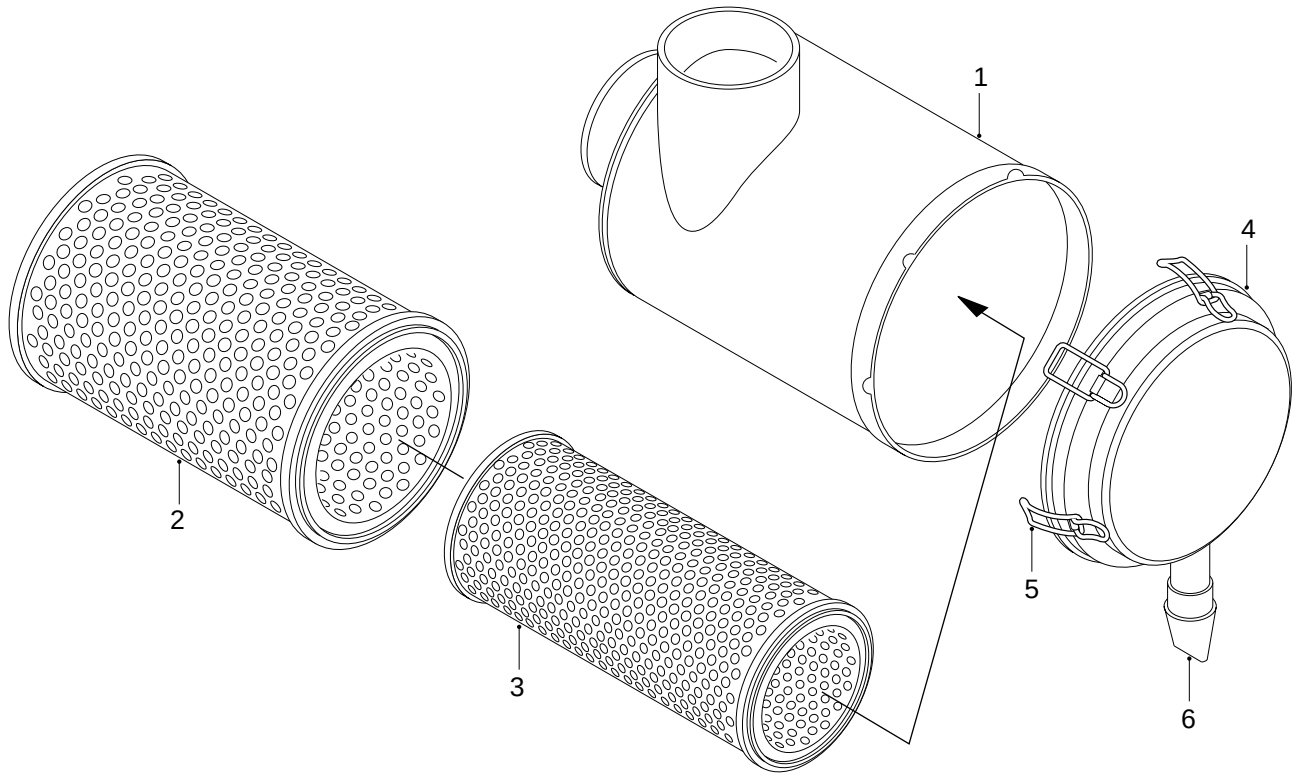


Fig. 8 - Measuring End Float



1 - Air Cleaner Body
2 - Primary Element
3 - Safety Element
4 - Cover Assembly
5 - Latch
6 - Vacuator Valve

Fig. 1 - Exploded View of Typical Air Cleaner

DESCRIPTION AND OPERATION

Numbers in parentheses refer to Fig. 1.

The dual dry element air cleaner is remote mounted horizontally on the right hand fender of the machine. The air cleaner prolongs engine life by removing grit, dust and water from the air as it enters the engine. Grit and dust, combined with engine oil, forms a highly abrasive compound which can destroy the engine in a comparatively short period of time.

A rubber vacuator valve (6) attached to end cover (1) in a downward position, ejects grit, dust and water while the engine is running. Vacuator valve (6) minimizes the need for daily servicing. Even though vacuator valve (6) is normally under a slight vacuum when the engine is running, pulsing of the vacuum opens and closes the rubber valve, expelling dust and water as they collect. When the engine is stopped, vacuator valve (6) opens and expels any accumulated grit, dust or water.

A mechanical air restriction gauge (16, Fig. 2) is mounted on the air cleaner body and shows when the system air flow is being restricted. A red band gradually rises in the gauge window as air restriction increases. The red band is locked when maximum allowable restriction is reached. When the red band locks at the top of the gauge window, primary filter element (2) should be serviced. Air restriction gauge (16, Fig. 2) should be reset by pushing the button on the gauge, holding it for several seconds and then releasing it.

While air restriction gauge (16, Fig. 2) indicates the need for servicing, it does not give as precise a measurement as a water manometer or vacuum gauge. Refer to 'Measuring Air Restriction'.

Secondary (safety) element (3) is installed in air cleaner body (1) inside of primary element (2). This element increases the reliability of the air cleaner's

Display during AEB-Mode - Continued		
Symbol	**Meaning**	**Remarks**
⇩T	transmission oil temperature too high -> cool down transmission	
FT	transmission temperature not in defined range during calibration	Transmission stays in neutral, you have to restart the TCU (ignition off/on)
FB	operating mode not NORMAL or transmission temperature sensor defective or storing of Calibrated values to EEPROM-has failed.	Transmission stays in neutral, you have to restart the TCU (ignition off/on)
FO	Outputspeed_not_zero	Transmission stays in neutral, you have to restart the TCU (ignition off/on)
FN	Shift lever not in Neutral position	Transmission stays in neutral, you have to restart the TCU (ignition off/on)
FP	Parkbrake_not_applied	Transmission stays in neutral, you have to restart the TCU (ignition off/on)
STOP	AEB - Starter was used incorrect or is defective	Transmission stays in neutral, you have to restart the TCU (ignition off/on)

TABLE OF FAULT CODES				
Fault Code (hex)	**MEANING OF CODE possible reason for fault detection**	**TCU reaction**	**Checks**	**Remarks**
11	LOGICAL ERROR AT GEAR RANGE SIGNAL TCU detected a wrong signal combination for the gear range •*cable from shift lever to TCU is broken* •*cable is defective and is contacted to battery voltage or vehicle ground* •*shift lever is defective*	TCU shifts transmission to neutral OP-Mode: transmission shutdown	•check cables from TCU to shift lever •check signal combinations of shift lever positions for gear range	Failure cannot be detected in systems with DW2/DW3 shift lever
12	LOGICAL ERROR AT DIRECTION SELECT SIGNAL TCU detected a wrong signal combination for the direction •*cable from shift lever to TCU is broken* •*cable is defective and is contacted to battery voltage or vehicle ground* •*shift lever is defective*	TCU shifts transmission to neutral OP-Mode: transmission shutdown	•check cables from TCU to shift lever •check signal combinations of shift lever positions F-N-R	
23	S.C. TO BATTERY VOLTAGE AT LOAD SENSOR INPUT the measured voltage is too high: •*cable is defective and is contacted to battery voltage* •*load sensor has an internal defect* •*connector pin is contacted to battery voltage*	retarder function is affected TCU uses default load OP-Mode: normal	•check cable from TCU to sensor •check connectors •check load sensor sensor •check assembly tolerances of load sensor	Availability of retarder depends on default load
24	S.C. TO GROUND OR O.C. AT LOAD SENSOR INPUT the measured voltage is too low: •*cable is defective and is contacted to vehicle ground* •*cable has no connection to TCU* •*load sensor has an internal defect* •*connector pin is contacted to vehicle ground or is broken*	retarder function is affected TCU uses default load OP-Mode: normal	•check cable from TCU to sensor •check connectors •check load sensor sensor •check assembly tolerances of load sensor	Availability of retarder depends on default load
25	S.C. TO BATTERY VOLTAGE OR O.C. AT TRANSMISSION SUMP TEMPERATURE SENSOR INPUT the measured voltage is too high: •*cable is defective and is contacted to battery voltage* •*cable has no connection to TCU* •*temperature sensor has an internal defect* •*connector pin is contacted to battery voltage or is broken*	no reaction, TCU uses default temp. OP-Mode: normal	•check cable from TCU to sensor •check connectors •check temperature sensor	

Fault Code (hex)	MEANING OF CODE possible reason for fault detection	TCU reaction	Checks	Remarks
D5	ERROR AT SWITCH 1 FOR VALVE POWER SUPPLY VPS1 TCU switched on VPS1 and measured VPS1 is off or TCU switched off VPS1 and measured VPS1 is still on •*cable or connectors are defect and are contacted to battery voltage* •*cable or connectors are defect and are contacted to vehicle ground* •*permanent power supply KL30 missing* •*TCU has an internal defect*	shift to neutral OP-Mode: TCU shutdown	•check fuse •check cables from gearbox to TCU •check connectors from gearbox to TCU •replace TCU	
D6	ERROR AT SWITCH 2 FOR VALVE POWER SUPPLY VPS2 TCU switched on VPS2 and measured VPS2 is off or TCU switched off VPS2 and measured VPS2 is still on •*cable or connectors are defect and are contacted to battery voltage* •*cable or connectors are defect and are contacted to vehicle ground* •*permanent power supply KL30 missing* •*TCU has an internal defect*	shift to neutral OP-Mode: TCU shutdown	•check fuse •check cables from gearbox to TCU •check connectors from gearbox to TCU •replace TCU	
E3	S.C. TO BATTERY VOLTAGE AT DISPLAY OUTPUT TCU sends data to the display and measures always a high voltage level on the connector. •*cable or connectors are defect and are contacted to battery voltage* •*display has an internal defect*	no reaction OP-Mode: normal	•check cable from TCU to the display •check connectors at the display •change display	
E4	S.C. TO GROUND AT DISPLAY OUTPUT TCU sends data to the display and measures always a high voltage level on the connector. •*cable or connectors are defect and are contacted to vehicle ground* •*display has an internal defect*	no reaction OP-Mode: normal	•check cable from TCU to the display •check connectors at the display •change display	
F1	GENERAL EEPROM FAULT TCU cannot read non volatile memory •*TCU is defective*	no reaction OP-Mode: normal	•replace TCU	often shown together with fault code F2
F3	APPLICATION ERROR something of this application is wrong	transmission stay neutral OP-Mode: TCU shutdown	•replace TCU	fault occurs only if a test engineer did something wrong in the application of the vehicle
F5	CLUTCH FAILURE AEB was not able to adjust clutch filling parameters •*One of the AEB-Values is out of limit*	transmission stay neutral OP-Mode: TCU shutdown	•check clutch	TCU shows also the affected clutch on the Display
F6	CLUTCH ADJUSTMENT DATA LOST TCU was not able to read correct clutch adjustment parameters •*interference during saving data on non volatile memory* •*TCU is brand new or from another vehicle*	TCU shifts to neutral OP-Mode: limp home	•execute AEB	

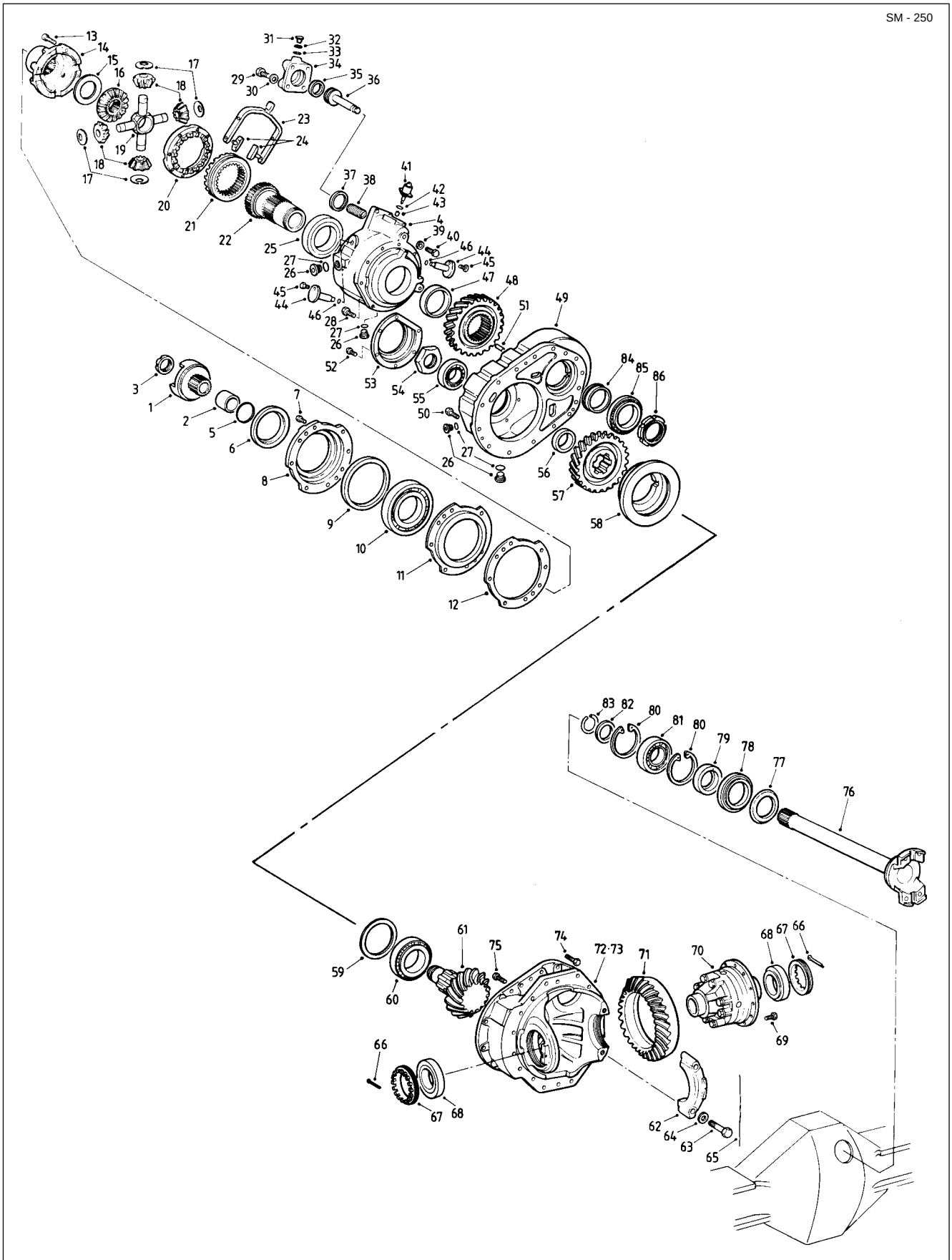


Fig. 1 - Exploded View Of Centre Differential

GLEASON GEAR TOOTH SYSTEM

Ideal tooth-contact pattern shown in Figs. 45 and 46 indicating the pinion distance is correct.

If the patterns obtained are the same as that shown in Figs. 47 and 48 then decrease the pinion distance (Fig. 49).

If the patterns obtained are the same as that shown in Figs. 50 and 51 then increase the pinion distance (Fig. 52).

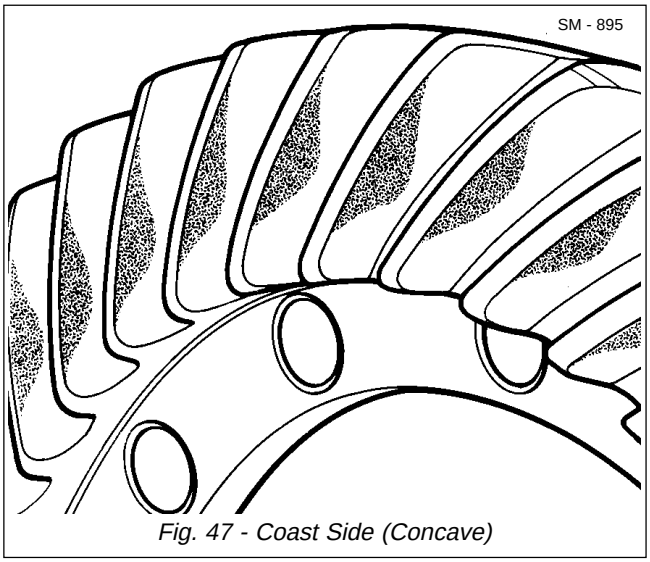


Fig. 47 - Coast Side (Concave)

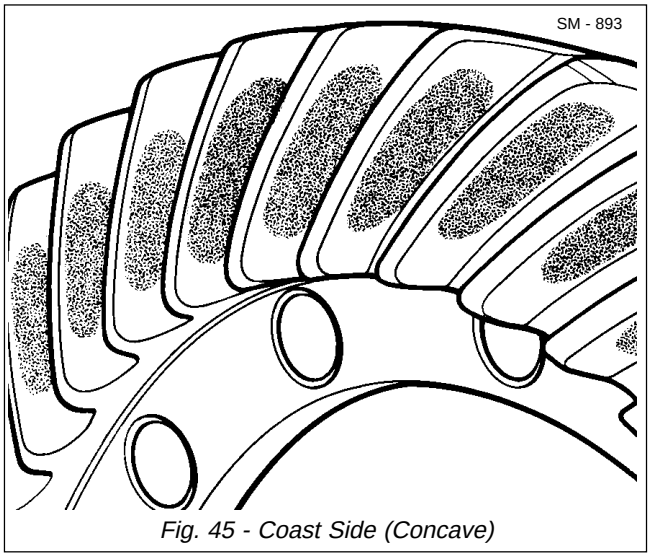


Fig. 45 - Coast Side (Concave)

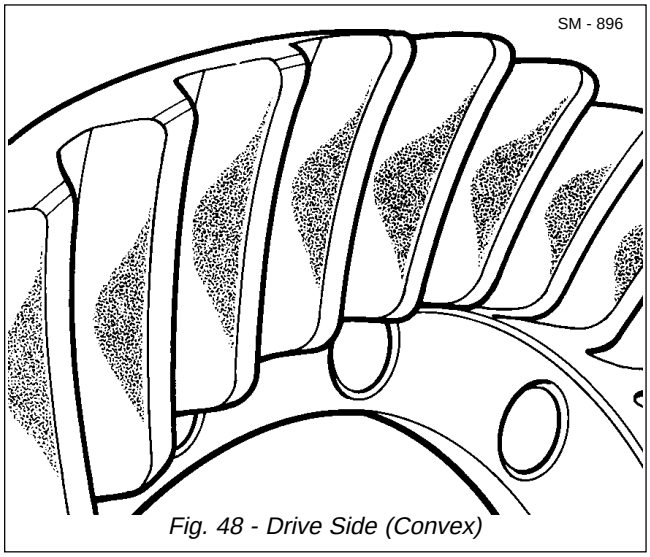


Fig. 48 - Drive Side (Convex)

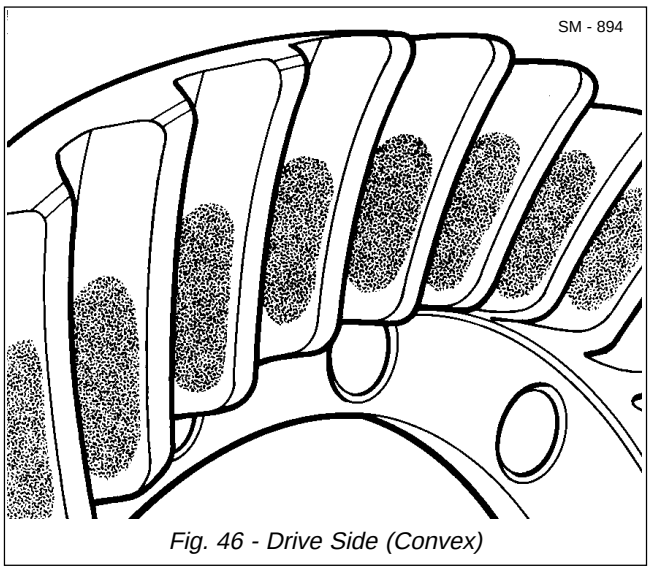


Fig. 46 - Drive Side (Convex)

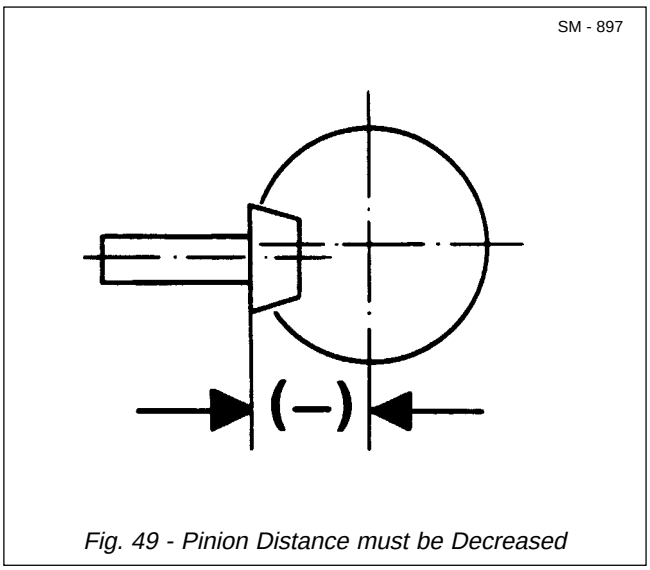
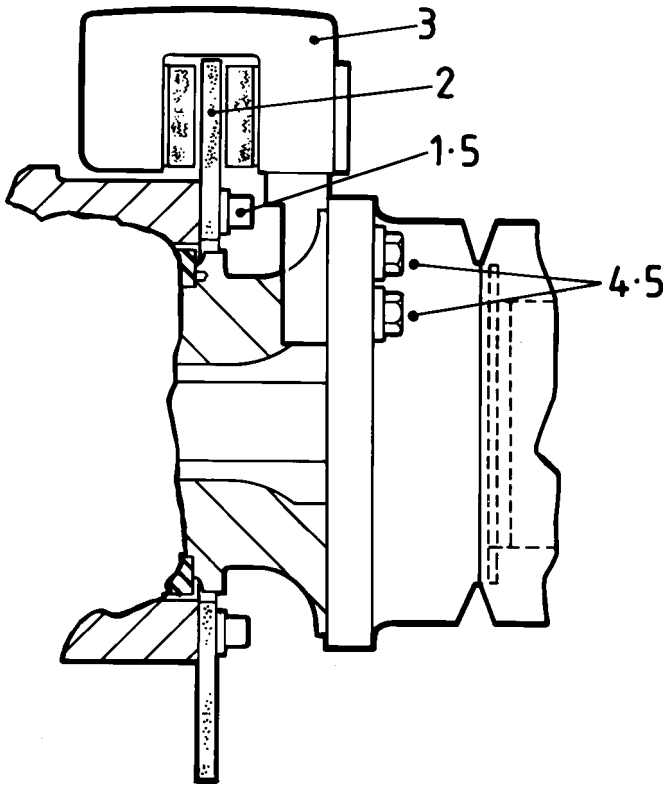


Fig. 49 - Pinion Distance must be Decreased

SM - 048



1 - Capscrew
2 - Brake Disc
3 - Brake Heads
4 - Bolt
5 - Washer

Fig. 1 - Cutaway View of Typical Brake Head and Disc Mounting

DESCRIPTION AND OPERATION

The service brakes are of the calliper disc-type. The calliper brake head is designed for use with hydraulic brake fluid. The head is bolted to a mounting plate on the axle housing. The disc is bolted to the wheel. There is one brake head and one brake disc at each wheel.

Each calliper brake head assembly consists of a torque plate, two brake pads, one on each side of the brake disc, and four brake pistons, two on each side of the brake disc.

The brake is actuated by hydraulic brake fluid entering the brake head through one of the bleeder ports. The piston bores on each side of the torque plate are interconnected by internal passages.

When the brake is actuated, the hydraulic pressure forces the pistons against the brake pads which are, in turn, forced against each side of the brake disc, slowing or stopping the disc and wheel rotation.

GENERAL INSPECTION

1. Inspect brake pads for wear. If the brake pad friction material is worn down to 3 mm (0.12 in) thickness, the pads must be replaced.

2. Inspect brake disc as follows:

a. Measure original thickness of disc at outside diameter (this area is not contacted by brake pad friction material).

b. Measure thickness of disc at three points on the brake pad friction material contact circumference and determine the average disc thickness.

c. Subtract 'b' from 'a'. If difference is 3 mm (0.12 in) or greater, the disc must be replaced.

Note: Refer to Section 160-0030, AXLE GROUP (HUB), for brake disc replacement instructions.

DISASSEMBLY

Numbers in parentheses refer to Fig. 2.

1. Remove top and bottom clamp plates (4 & 3) and clamp rings (2) from bellows (1).

2. Remove centre ring (5) from bellows (1) convolutions.

3. If necessary, remove nut (7) and bump stop (6) from bottom clamp plate (3). A sealing compound is applied to bump stop mounting face at assembly, it is necessary to break the seal to remove bump stop.

INSPECTION

Numbers in parentheses refer to Fig. 2.

1. Clean clamp rings (2), bottom clamp plate (3), top clamp plate (4) and centre ring (5) in solvent to remove all contamination. Thoroughly dry all parts.

2. Inspect all parts for damage and excessive corrosion. Replace all worn or damaged parts.

ASSEMBLY

Numbers in parentheses refer to Fig. 2.

1. If bump stop (6) was removed from bottom clamp plate (3), coat the bump stop mounting face with sealing compound, such as 'Heldite' or equivalent. Bolt the bump stop to the lower clamp plate with nut (7). Torque tighten nut (7) to 23 Nm (17 lbf ft).

2. Install centre ring (5) on bellows (1).

3. Lightly coat the top and bottom beads of the bellows (1) with silicon or soapy water to aid in assembly of clamp rings (2) and clamp plates (3 & 4).

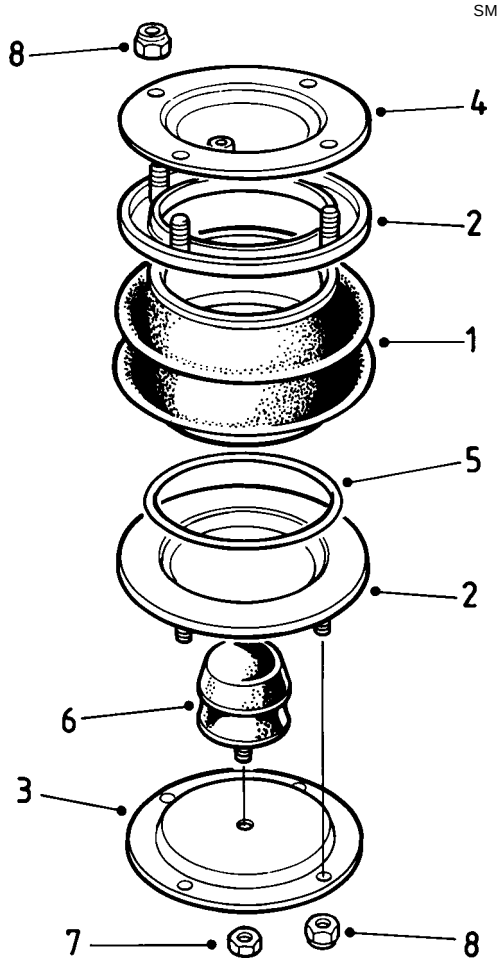
4. Install clamp rings (2) and bottom and top clamp plates (3 & 4) on bellows (1).

INSTALLATION

Numbers in parentheses refer to Fig. 1.

⚠ WARNING
To prevent personal injury and property damage, be sure wheel chocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

SM - 1068



1 - Bellows
2 - Clamp Ring
3 - Bottom Clamp Plate
4 - Top Clamp Plate
5 - Centre Ring
6 - Bump Stop
7 - Nut
8 - Nut

Fig. 2 - Exploded View of Air Spring

1. Install air spring assembly between the frame cross member and suspension frame. Torque tighten nuts (8) to 23 Nm (17 lbf ft). Do not overtighten.

2. Connect the air line to the air spring assembly.

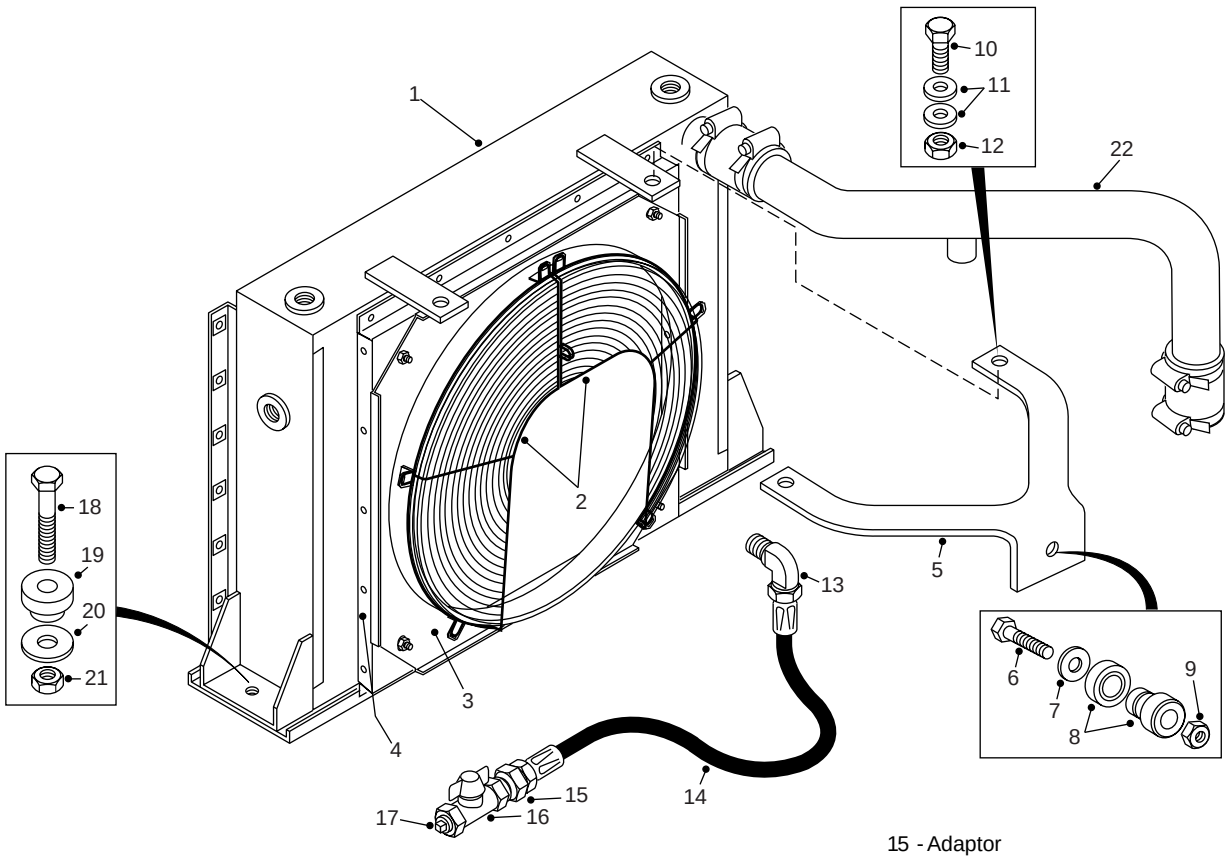
3. Raise frame, remove workshop stands and lower frame.

4. Install levelling valve control lever on mounting bracket.

5. Close primary air tank drain cock and start engine to charge air system to system pressure. Check connections for air leaks.

6. Refer to Section 180-0022, LEVELLING VALVE, for air spring ride height adjusting instructions.

* * * *



1 - Radiator Assembly
2 - Fan Guard
3 - Fan Shroud
4 - Fan Cowl
5 - Support Bracket
6 - Bolt
7 - Washer
8 - Rubber Mount
9 - Nut
10 - Bolt
11 - Washer
12 - Nut
13 - Elbow
14 - Hose Assembly
15 - Adaptor
16 - Drain Cock
17 - Plug
18 - Bolt
19 - Rubber Mount
20 - Snubbing Washer
21 - Nut
22 - Coolant Inlet Pipe

Fig. 1 - Typical Radiator Mounting

DESCRIPTION

Numbers in parentheses refer to Fig. 1, unless otherwise specified.

Radiator assembly (1) is mounted in front of the engine cooling fan at the front end of the vehicle. It is fed from header tank (8) located in front of the operators compartment and mounted to the goalpost support assembly.

A fan shroud (3) improves the engine cooling fan efficiency, provides a more uniform distribution of air over radiator core (7, Fig. 2) and helps restrict recirculation of air within the engine compartment.

Recirculation baffle plates around radiator assembly (1) prevent hot air from the engine cooling fan being reintroduced into the cooling air circuit.

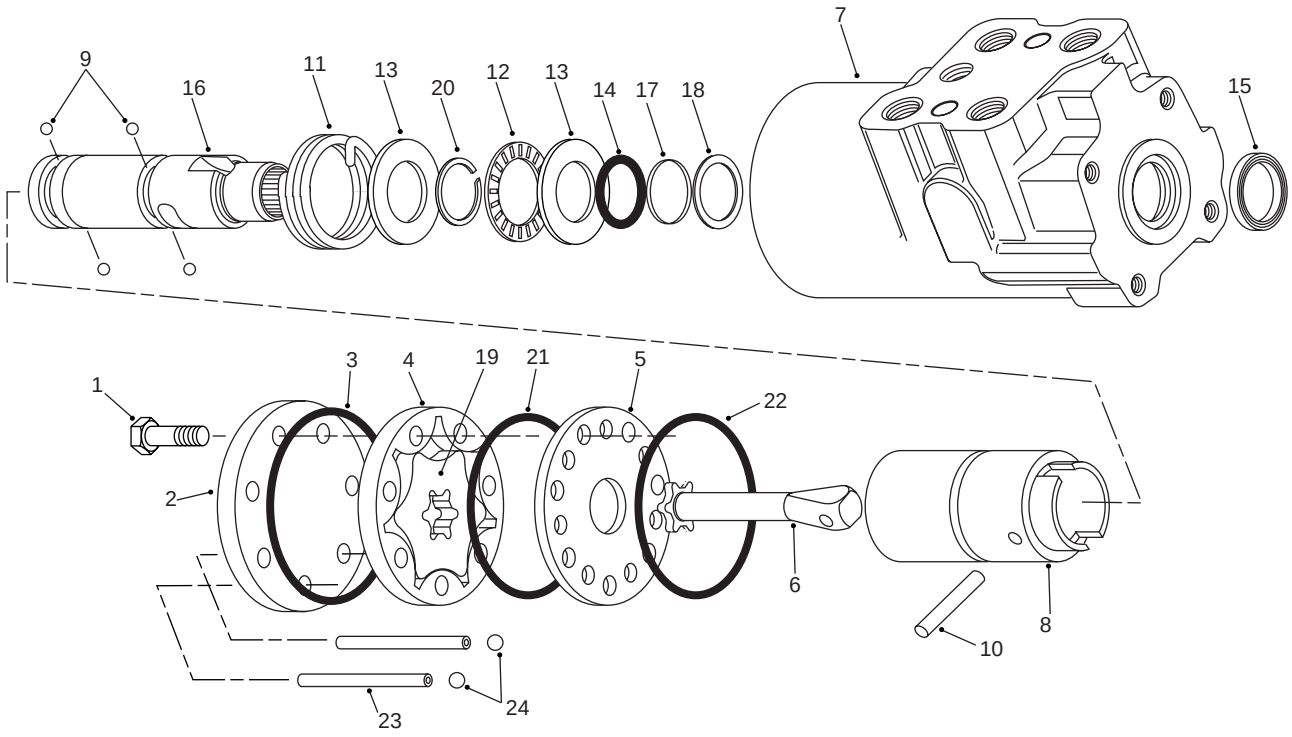
REMOVAL

Numbers in parentheses refer to Fig. 1, unless otherwise specified.

⚠ WARNING

Do not remove the filler cap from the radiator header tank or attempt to drain the coolant until the engine has cooled to below 50° C (120° F). Once the engine has cooled, use extreme caution when removing the cap. When removing filler cap, always partially unscrew cap slowly to release pressure from the system. Remove filler cap slowly, as the sudden release of pressure from a heated cooling system can result in a loss of coolant and possible personal injury (scalding) from the hot liquid.

SM - 2017



1 - Capscrew
2 - End Cap
3 - 'O' Ring
4 - Gerotor Housing
5 - Spacer Plate
6 - Driveshaft
7 - Valve Housing
8 - Sleeve
9 - Ball - Check
10 - Pin
11 - Centring Springs
12 - Needle Bearing
13 - Bearing Race
14 - 'O' Ring
15 - Dust Seal
16 - Spool
17 - Seal
18 - Backup Ring
19 - Gerotor Gear
20 - Retainer
21 - 'O' Ring
22 - 'O' Ring
23 - Roll Pin
24 - Ball valve

Fig. 5 - Exploded View of Steering Valve

DISASSEMBLY

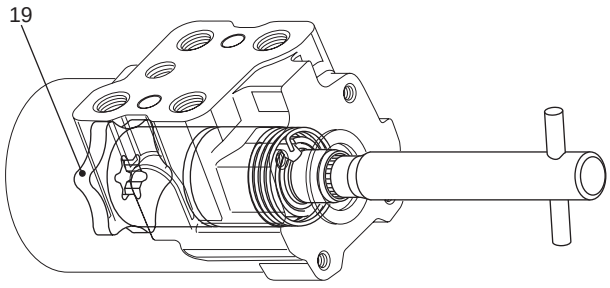
Numbers in parentheses refer to Fig. 5, unless otherwise specified.

Note: Steering valves fitted with anti-cavitation valves must be disassembled and assembled in the vertical postion to prevent ball valves (24) becoming trapped in the wrong cavities within the valve housing (7).

1. Clamp steering valve assembly horizontally in a soft jawed vice and break loose the seven capscrews (1). With capscrews (1) loosened, place steering valve vertically in vice, end cap (2), up.

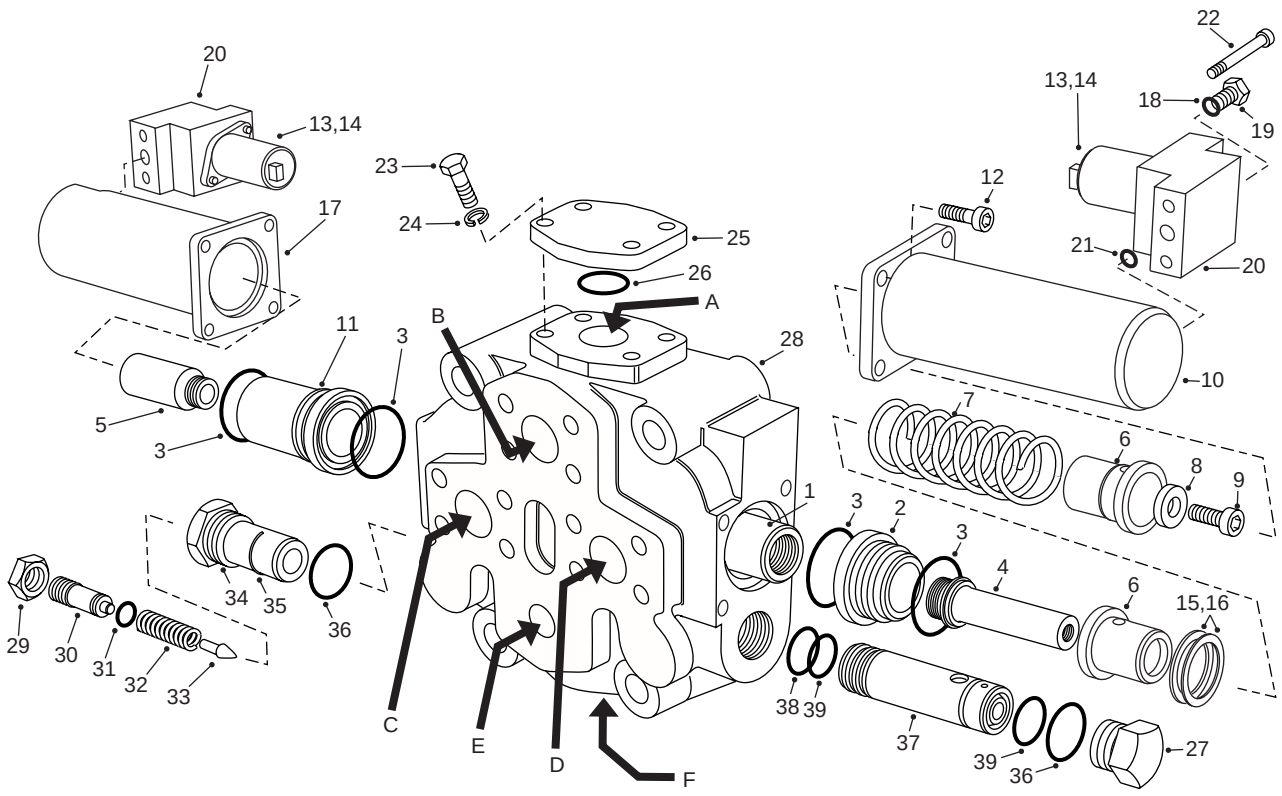
Note: Hidden pin. If tension on this pin is released

SM - 2018



19 - Gerotor Gear

Fig. 6 - Gerotor Gear and Splined Drive Engaged



1 - Control Spool
2 - Retainer
3 - 'O' Ring
4 - Spool Cap
5 - Spool Cap
6 - Spring Retainer
7 - Spring
8 - Washer
9 - Capscrew
10 - End Cap
11 - Seal Retainer
12 - Capscrew
13 - Pressure Reducing Valve
14 - Capscrew
15 - Shim
16 - Shim
17 - End Cap
18 - Seal
19 - Plug
20 - Mounting Block
21 - 'O' Ring
22 - Capscrew
23 - Capscrew
24 - Lockwasher
25 - Blanking Plate
26 - 'O' Ring
27 - Cap
28 - Valve Housing
29 - Locknut
30 - Adjusting Screw
31 - 'O' Ring
32 - Spring
33 - Poppet
34 - Cap
35 - Ring
36 - 'O' Ring
37 - Relief Valve
38 - 'O' Ring
39 - 'O' Ring

Fig. 1 - Exploded View of Body Control Valve

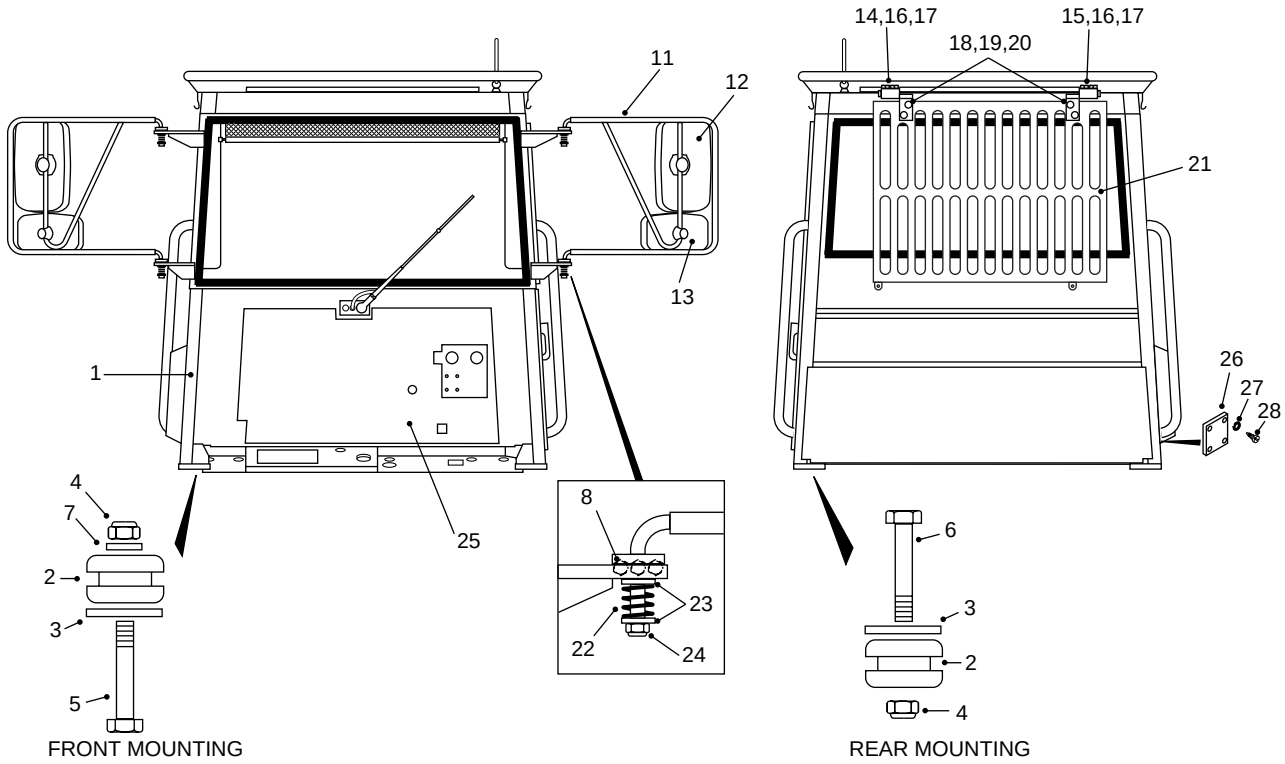
DESCRIPTION

Numbers and letters in parentheses refer to Fig. 1.

The body control valve can be identified as item 3 in Section 230-0000, BODY SYSTEM SCHEMATIC.

The single spool body control valve, which is fitted with electro hydraulic operation, is mounted behind the front right hand wheel, onto a bracket mounted to the frame rail. The main components of the control valve assembly are a four position control spool (1), relief valve (37), check valve assembly and valve housing (28).

The position of the control spool is controlled by the body control joystick by means of electrical signals to



1 - Cab Assembly
2 - Isolation Mount
3 - Washer
4 - Locknut
5 - Bolt
6 - Bolt
7 - Hardened Washer
8 - Ball Bearing
9 - Hardened Washer
10 - Locknut
11 - Mirror Arm
12 - Mirror
13 - Mirror - Wide Angle
14 - Hinge
15 - Hinge
16 - Bolt
17 - Locknut
18 - Bolt
19 - Lockwasher
20 - Washer
21 - Rear Window Guard
22 - Spring
23 - Hardened Washer
24 - Locknut
25 - Firewall Barrier Mat
26 - Plate
27 - Lockwasher
28 - Screw

Fig. 1 - Cab and Mounting

DESCRIPTION

Numbers in parentheses refer to Fig. 1.

The cab is fully insulated and mounted on rubber isolation mounts (2) to damp structure-borne noise and vibration. It conforms with ISO/SAE, ROPS (Roll Over Protective Structure) and FOPS (Falling Object Protective Structure) requirements as standard.

ROPS - ISO 3471, SAE J1040 APR 88
FOPS - ISO 3449, SAE J231

⚠ WARNING
The protection offered by the roll over and falling object protective structure may be impaired if it has been subjected to any modification or damage.

Cab assembly (1) is spacious and offers outstanding visibility through large areas of tinted safety glass. Access to cab assembly (1) is from the left hand side with open tread steps, platform and handrail.

The cab interior, trimmed with noise-absorbent material, is extensively thermally insulated and a heater/filter/pressurizer and demisting unit keeps internal air fresh and dust free. Sliding windows provide additional ventilation. A side mounted air conditioner is also fitted. Refer to Section 260-0130, AIR CONDITIONING.

Note: Access from the cab, in the case of an emergency, can be gained by breaking any of the windows using the hammer provided (mounted on the right hand cab pillar).