Open front screen

Service Manual

406
407
408
409

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This Service Manual covers the following machines:

406
407
408
409
* 409 Telemaster

407 and 409 Machines commence from Serial Number 632700.

Unless otherwise stated, information for 406 also applies to 407 and information for 408 also applies to 409 and the 409 Telemaster.

Introduction

This publication is designed for the benefit of JCB Distributor Service Engineers who are receiving or have received training by the JCB Technical Training Department.

It is assumed that such personnel have a sound knowledge of good workshop practice, safety procedures and general techniques associated with the maintenance and repair of hydraulic earthmoving equipment. Details of such may therefore be omitted from this manual, the primary intention being to convey the more specialised information concerning particular aspects of the machine or component in question.

Renewal of oil seals, gaskets, etc. and any component showing obvious wear or damage is expected. It is also expected that components will be thoroughly cleaned and lubricated where appropriate, also that any opened hose or pipe connections will be blanked to prevent entry of dirt and excessive loss of hydraulic fluid.

For convenience the manual is compiled in sections, e.g. "Hydraulics", "Electrics" etc., but to find details of a specific component or its application, reference should be made to the alphabetical index at the back of the manual.

Except where a maximum and minimum figure is given, torque settings quoted in the text are intended as 'mean' figures which may be varied by + or - 3%. Where no figure is quoted in the text, refer to page 1/1 - 3.

'Left Hand' and 'Right Hand' are as viewed from the rear of the machine looking forward.

⚠ WARNING

Fluoroelastomeric Materials

Certain seals and gaskets (e.g. crankshaft oil seal) on JCB machines contain fluoroelastomeric materials such as Viton, Fluorel and Technoflon. Fluoroelastomeric materials subjected to high temperatures can produce highly corrosive hydrofluoric acid. THIS ACID CAN SEVERELY BURN.

New fluoroelastomeric components at ambient temperature require no special safety precautions.

Used fluoroelastomeric components whose temperatures have not exceeded 300°C require no special safety precautions. If evidence of decomposition (e.g. charring) is found, refer to the next paragraph for safety instructions DO NOT TOUCH COMPONENT OR SURROUNDING AREA.

Used fluoroelastomeric components subjected to temperatures greater than 300°C (e.g. engine fire) must be treated using the following safety procedure. Make sure that heavy duty gloves and special safety glasses are worn:

1 Ensure that components have cooled then remove and place material into plastic bags.

2 Thoroughly wash contaminated area with 10% calcium hydroxide or other suitable alkali solution, if necessary use wire wool to remove burnt remains.

3 Thoroughly wash contaminated area with detergent and water.

4 Contain all removed material, gloves etc. used in this operation in sealed plastic bags and dispose of in accordance with Local Authority Regulations.

DO NOT BURN FLUOROELASTOMERIC MATERIALS.

If contamination of skin or eyes occurs, wash the affected area with a continuous supply of clean water or with calcium hydroxide solution for 15-60 minutes. Get medical attention immediately.

INT-3-3-5/1

⚠ WARNING

Asbestos

Asbestos dust can damage your lungs. Some engine joints and gaskets may contain asbestos. Take the following precautions when working on them.

1 Wear a face mask and gloves.

2 Work in a well ventilated area and do not smoke.

3 Do not use a rotary wire brush, use a hand scraper.

4 Make sure the material to be removed is wet with oil or water to contain loose particles.

5 Place all material into plastic bags and dispose of in accordance with local regulations.

GEN-1-8

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Note: *New engines DO NOT require a running-in period. The engine/machine should be used in a normal work cycle immediately; glazing of the piston cylinder bores, resulting in excessive oil consumption, could occur if the engine is gently run-in. Under no circumstances should the engine be allowed to idle for extended periods; (e.g. warming up without load). Engines of new machines are filled at the factory with JCB 10W/30 Multigrade oil. This oil should be drained after the first 100 hours operation and the engine filled with the appropriate recommended grade as shown in the lubrication chart. JCB 10W/30 Multigrade should also be used for the first 100 hours operation whenever a new or reconditioned engine is fitted to the machine. After the first 100 hours operation, it is essential that the 10W/30 oil is replaced by the lubricant recommended below.*

ITEM	CAPACITY	FLUID/LUBRICANT	SPECIFICATION
Engine Oil -18 to 0° C -10 to 50° C	**406** 7.2 litres (1.6 UK gal) **408** 10.7 litres (2.4 UK gal)	JCB Torque Converter Fluid JCB 15W/40 Multigrade	API CD MIL-L-2104C
Gearbox	**Syncro Shuttle** †19 litres (4.2 UK gal) **Powershift** †19 litres (4.2 UK gal)	JCB Special Transmission Fluid JCB Special Transmission Fluid	Ford ESN-M2C 33G Ford ESN-M2C 33G
Transfer box	1.3 litres (0.3 UK gal)	JCB HD 90 Gear Oil	API-GL-5, MIL-L-2105C
Axles - Hurth (406) Differential Housing Hubs (Individual)	 5.0 litres (1.1 UK gal) 0.2 litres (0.04 UK gal)	 JCB Special Gear Oil JCB Special Gear Oil	 Ford ESE-M2C 86B Ford ESE-M2C 86B
Axles - JCB	**406** 5.0 litres (1.1 UK gal) **408** 16 litres (3.6 UK gal)	JCB Special Gear Oil JCB Special Gear Oil	Ford ESE-M2C 86B Ford ESE-M2C 86B
Hydraulic System Up to 38° C Above 38°C	**406** 59 litres (13.2 UK gal) **408** 63 litres (14.1 UK gal)	JCB Special Hydraulic Fluid JCB High Performance Hydraulic Fluid	ISO 32 ISO 46
Brake System	1.2 litres (0.27 UK gal)	JCB Light Hydraulic Fluid **CAUTION: DO NOT USE ORDINARY BRAKE FLUID**	ISO 15
Cooling System	**406** 12.5 litres (2.8 UK gal) **408** 15.5 litres (3.5 UK gal)	Water/Anti-freeze (see Coolant mixture)	ASTM D3306-74
Fuel System	**406** 65 litres (14.5 UK gal) **408** 90 litres (20.2 UK gal)	Diesel Oil (see Types of Fuel)	ASTM D975-66T Nos. 1D, 2D.
Grease Points		JCB Special MPL Grease	Lithium based, No. 2 consistency

Note: *The total hydraulic system capacity depends on the equipment being used. Fill the system with all rams closed and watch the level indicator.*

† The figure quoted is TOTAL system capacity. Use the **'MAX'** and **'MIN'** marks on the dipstick when refilling the system.

FLUIDS, CAPACITIES AND LUBRICANTS

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Transfer box	1.3 litres (0.3 UK gal)	JCB HD 90 Gear Oil	API-GL-5, MIL-L-2105C
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Grease Points		JCB Special MPL Grease	Lithium based, No. 2 consistency
Wear Pad Runways		JCB Waxoyl	

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TORQUE SETTINGS

Use only where no torque setting is specified in the text. Values are for dry threads and may be within three per cent of the figures stated. For lubricated threads the values should be REDUCED by one third.

UNF Grade 'S' Bolts

Bolt Size		Hexagon (A/F)	Torque Settings		
in	(mm)	in	Nm	kgf m	lbf ft
1/4	(6.3)	7/16	14	1.4	10
5/16	(7.9)	1/2	28	2.8	20
3/8	(9.5)	9/16	49	5.0	36
7/16	(11.1)	5/8	78	8.0	58
1/2	(12.7)	3/4	117	12.0	87
9/16	(14.3)	1/16	170	17.3	125
5/8	(15.9)	15/16	238	24.3	175
3/4	(19.0)	1 1/8	407	41.5	300
7/8	(22.2)	1 5/16	650	66.3	480
1	(25.4)	1 1/2	970	99.0	715
1 1/4	(31.7)	1 7/8	1940	198.0	1430
1 1/2	(38.1)	2 1/4	3390	345.0	2500

Metric Grade 8.8 Bolts

Bolt Size		Hexagon (A/F)	Torque Settings		
	(mm)	mm	Nm	kgf m	lbf ft
M5	(5)	8	7	0.7	5
M6	(6)	10	12	1.2	9
M8	(8)	13	28	3.0	21
M10	(10)	17	56	5.7	42
M12	(12)	19	98	10	72
M16	(16)	24	244	25	180
M20	(20)	30	476	48	352
M24	(24)	36	822	84	607
M30	(30)	46	1633	166	1205
M36	(36)	55	2854	291	2105

Note: All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.

A badly maintained machine is a danger to the operator and the people working around him. Make sure that the regular maintenance and lubrication jobs listed in the schedules are done to keep the machine in a safe and efficient working condition. A badly maintained machine is a danger to the operator and the people working around him. Make sure that the regular maintenance and lubrication jobs listed in the schedules are done to keep the machine in a safe and efficient working condition.

The schedules are based on machine running hours. Keep a regular check on the hourmeter readings. Do not use a machine which is due for a service. Make sure any defects found during the regular maintenance checks are rectified immediately.

Pre-start Cold Checks Service Points and Fluid Levels	**Operation**	**10 Hr**	**50 Hr**	**First 100 Hr**	**500 Hr**	**1000 Hr**	**2000 Hr**
ENGINE							
Generally for Leaks	- Check	❑					
Oil level	- Check	❑		❑			
Oil and Filter	† - Change			❑	❑	❑	❑
Fuel Filter	- Drain		❑				
Fuel Filter	† - Change			❑	❑	❑	❑
Coolant Level and Antifreeze Strength	- Check	❑		❑	❑	❑	❑
Air Cleaner Dust Valve	- Clean					❑	❑
Air Cleaner Outer Element	- Change					❑	❑
Air Cleaner Inner Element	- Change						❑
Coolant	- Change						❑
Fuel Lift Pump	- Clean			❑	❑	❑	❑
Fuel Sedimenter	- Drain		❑	❑			
Fan Belt Tension/Condition	- Check		❑	❑	❑	❑	❑
Valve Clearances	- Check and Adjust						❑
Engine Mount Security	- Check			❑	❑	❑	❑
Fuel System for Leaks and Contamination	- Check	❑		❑	❑	❑	❑
TRANSMISSION AND AXLES							
Hub Oil Levels	- Check			❑			
Hub Oil	†† - Change					❑	❑
Oil Filter	- Change			❑	❑	❑	❑
Drive Axle(s) Oil Level	- Check			❑			
Drive Axle(s) Oil	†† - Change					❑	❑
Transmission Oil Level	- Check			❑	❑		
Transmission Oil	- Change					❑	❑
Transmission Strainer	- Clean					❑	❑
Transfer Gearbox Oil Level	- Check				❑		
Transfer Gearbox Oil	- Change			❑		❑	❑
Axle Breather(s)	- Clean			❑			
Drive shaft/Prop. Shaft Security	- Check			❑	❑	❑	❑
Drive Shaft/Prop. Shaft	- Lubricate			❑	❑	❑	❑
Axle Mount Security	- Check			❑			
Transmission Mount Security	- Check			❑			
HYDRAULICS							
* Oil Filter	- Change			❑	❑	❑	❑
Oil	- Sample/Change						❑
Suction Strainer	- Clean						❑
Oil Level	- Check	❑		❑	❑	❑	
Hoses - Damage or Leaks	- Check		❑	❑	❑	❑	❑
Rams - Condition	- Check			❑	❑	❑	❑
Pipework - Damage or Leaks	- Check		❑	❑	❑	❑	❑

Pre-start Cold Checks Service Points and Fluid Levels	Operation	10 Hr	50 Hr	First 100 Hr	500 Hr	1000 Hr	2000 Hr
BRAKES							
Parking Brake	- Check and Adjust	❑		❑	❑	❑	❑
Brake System Fluid Level	- Check	❑		❑	❑	❑	
Brake System Fluid	- Change						❑
ELECTRICS							
Battery Electrolyte Level	- Check			❑	❑	❑	❑
Wiring for Chaffing	- Check		❑	❑	❑	❑	❑
Battery Terminals for Condition and Tightness	- Check		❑	❑	❑	❑	❑
BODY AND FRAMEWORK							
All Articulation and Steer Pivots	- Grease		❑	❑			
All Loader Pivots	- Grease		❑	❑			
All Pivot Pins	- Check and Grease		❑	❑	❑	❑	❑
Windscreen Washer Fluid Level	- Check	❑		❑	❑	❑	❑
* ROPS/FOPS Structures	- Check				❑	❑	❑
Boom Wear Pads	* - Check and Inspect				❑		
ATTACHMENTS							
Optional Equipment (as required)	- Check			❑	❑	❑	❑

Functional Test and Final Inspection	Operation	10 Hr	50 Hr	First 100 Hr	500 Hr	1000 Hr	2000 Hr
ENGINE							
Idle Speed	- Check and Adjust			❑	❑	❑	❑
Maximum Governed speed	- Check and Adjust			❑	❑	❑	❑
Torque Converter Stall Speed	- Check			❑	❑	❑	❑
Exhaust Smoke	- Check		❑	❑			
Exhaust System Security	- Check			❑	❑	❑	❑
Air Inlet System Security	- Check			❑	❑	❑	❑
Coolant System for Leaks	- Check		❑	❑			
Throttle System and Control Cable	- Check		❑	❑			
Operation of Stop Control/E.S.O.S.	- Check		❑	❑			
TRANSMISSION AND AXLES							
Torque Converter Mainline Pressure	- Check			❑	❑	❑	❑
Clutch Pack Pressures	- Check			❑	❑	❑	❑
Tyre pressure and condition	- Check			❑	❑	❑	❑
Wheel Nut Torque	- Check			❑	❑	❑	❑
Steering Operation	- Check		❑	❑	❑	❑	❑
Neutral Start Operation	- Check			❑	❑	❑	❑
Forward/Reverse Selection/Operation	- Check			❑	❑	❑	❑
Gear Change and Selection	- Check			❑			
Clutch Disconnect	- Check			❑			
Reverse Alarm (if fitted)	- Check			❑			
Oil Cooler and Pipework	- Check			❑			

Functional Test and Final Inspection	Operation	10 Hr	50 Hr	First 100 Hr	500 Hr	1000 Hr	2000 Hr
HYDRAULICS							
MRV Pressure	* - Check and Adjust			❑	❑	❑	❑
All ARV's	* - Check and Adjust			❑	❑	❑	❑
Auxiliary Circuit	* - Check and Adjust			❑	❑	❑	❑
Steer Circuit MRV	* - Check and Adjust			❑	❑	❑	❑
Operation of All Services	- Check		❑	❑	❑	❑	❑
Loader Valve and Controls	- Check		❑	❑			
BRAKES							
Foot Brake Operation	- Check		❑	❑	❑	❑	❑
ELECTRICS							
All Electrics	- Operate		❑	❑	❑	❑	❑
Starter Motor	- Check			❑			
Alternator	- Check			❑			
Warning Lights	- Check			❑			
Lights and Instruments	- Check			❑			
Wipers	- Check			❑			
Heater	- Check			❑			
Other (give details)	- Check			❑			
PAINTWORK							
Condition	- Check			❑	❑	❑	❑
CAB							
Glazing for Correct Fit	- Check			❑			
Doors and Hinges	- Check			❑			
Locks and Keys	- Check			❑			
Seat/Seat Belts	- Check	❑		❑			
ATTACHMENTS							
Attachment Circuit Pressures	- Check			❑	❑	❑	❑
Operation	- Check		❑	❑			
REGISTRATION/CERTIFICATION							
Form 2530 (F91) (UK Requirement) - Lift	- Check			❑	❑	❑	❑
Form 2531 (F96/F97) (UK Requirement)	- Check			❑	❑	❑	❑
SWL Stickers (UK)	- Renew as Required			❑	❑	❑	❑

Note: *Operation must be carried out at the end of each set period, ie. The 10 Hour operations must be carried out after* ***every*** *10 Hours.*

Note: *The First 100 Hour Operations are carried out after the initial 100 hours only.*

Note ††: *When operating in regions where ambient temperatures exceed 32° C (90° F), change at 500 Hours.*

Note †: *When operating in extreme conditions, change at 250 Hours.*

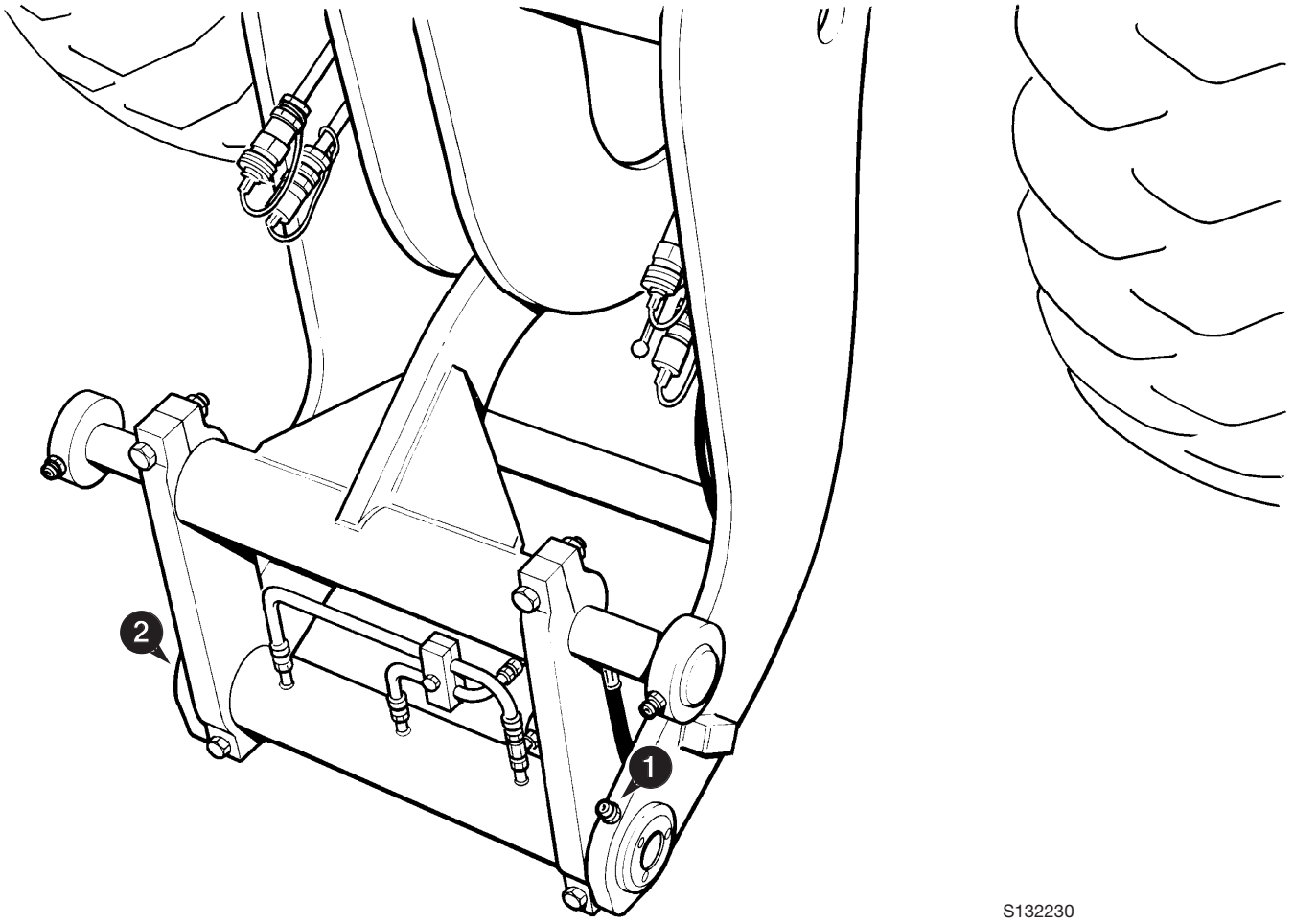
Note: *We recommend that the services marked with an * are carried out by a recognised JCB Distributor.*

GREASING

Shovel Pivot Pins

Total of 2 grease points.

Normally two strokes of the gun should be sufficient. Stop greasing when fresh grease appears at the joint.



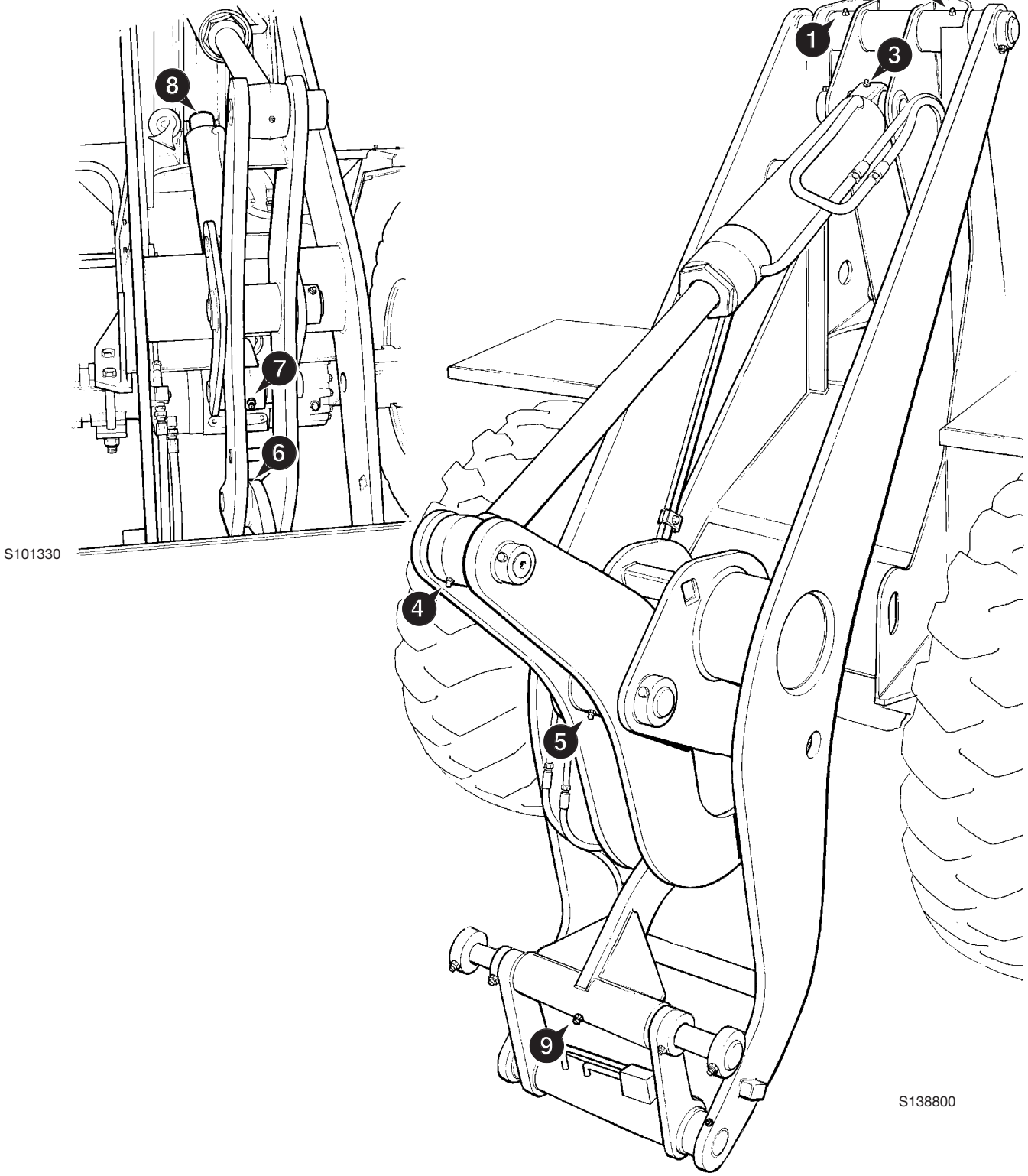
S132230

GREASING

Loader End

Total of 9 grease points.

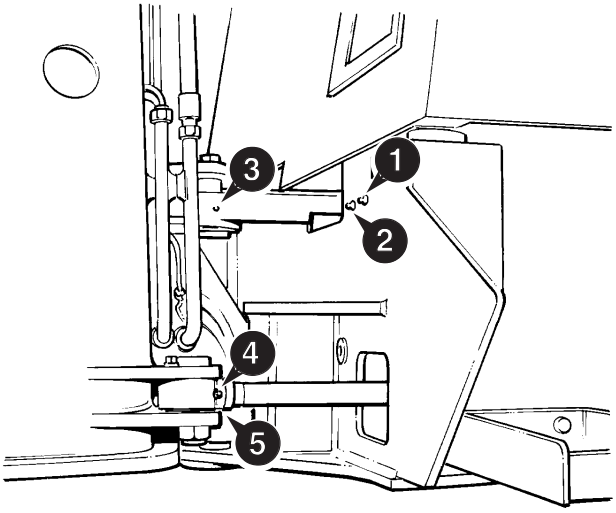
Normally two strokes of the gun should be sufficient. Stop greasing when fresh grease appears at the joint.



GREASING

Centre Pivot and Steering Ram

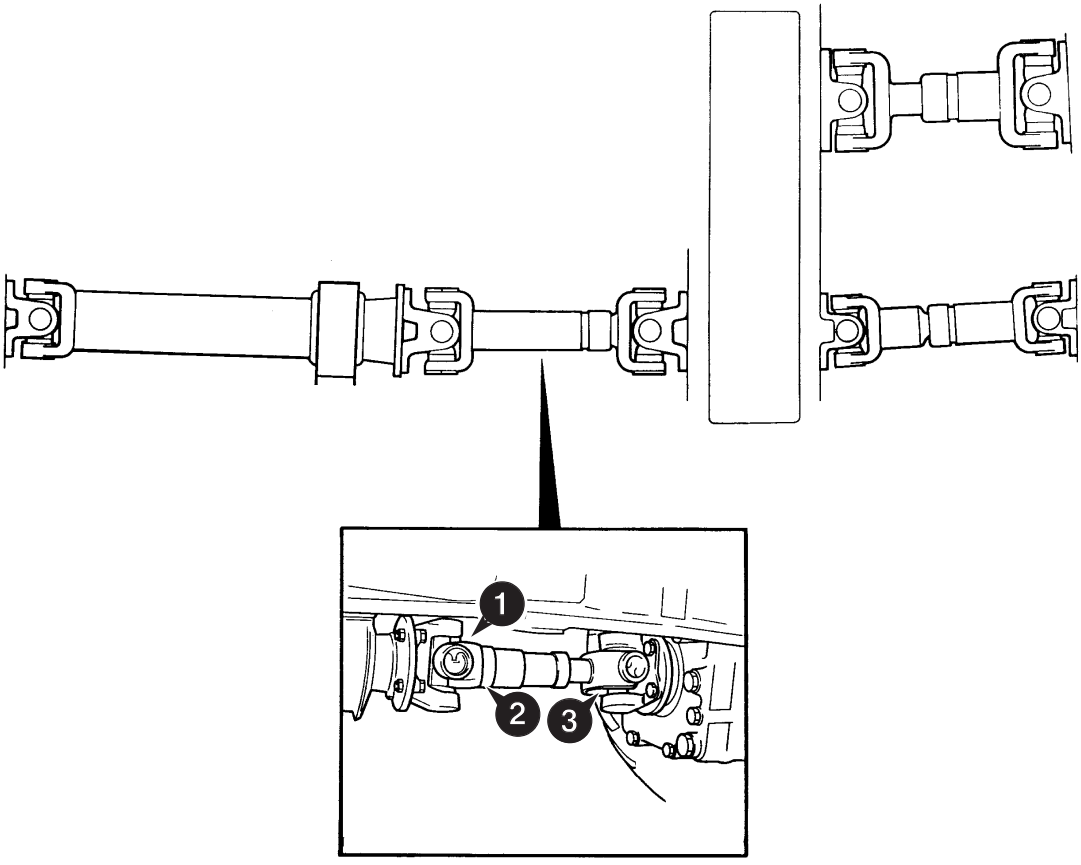
Total of 5 grease points.



S101340

Intermediate Propshaft

Total of 3 grease points.

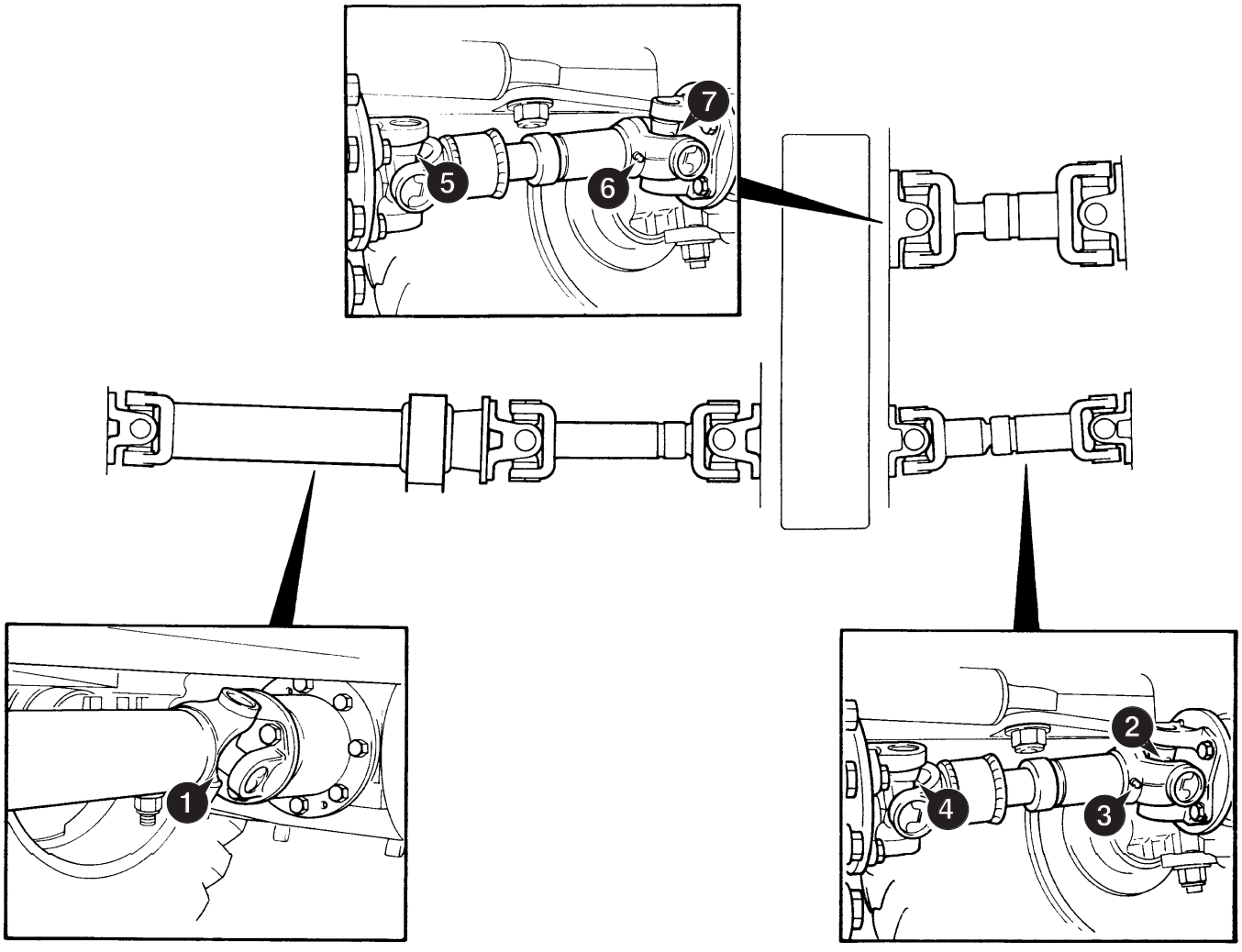


S132240

GREASING

Propshafts (Except Intermediate)

Total of 7 grease points.



S132250

GREASING (409 Telemaster)

Boom Wear Pad Runways

Extend the boom fully. Spray Waxoyl evenly over the swept surfaces; internally to the outer boom and externally to the inner boom. Ensure that all surfaces have complete and even cover. Allow 2-3 hours drying time before re-assembling or retracting the boom.

* **Note:** Waxoyl to be applied internally to inner boom rear end for 300 mm length.

⚠ CAUTION

Waxoyl contains turpentine substitute, which is flammable. Keep flames away when applying Waxoyl. Waxoyl can take a few weeks to dry completely. Keep flames away during the drying period.

Do not weld near the affected area during the drying period. Take the same precautions as for oil to keep Waxoyl off your skin. Do not breathe the fumes. Apply in a well-ventilated area.

5-3-1-9

GREASING (409 Telemaster)

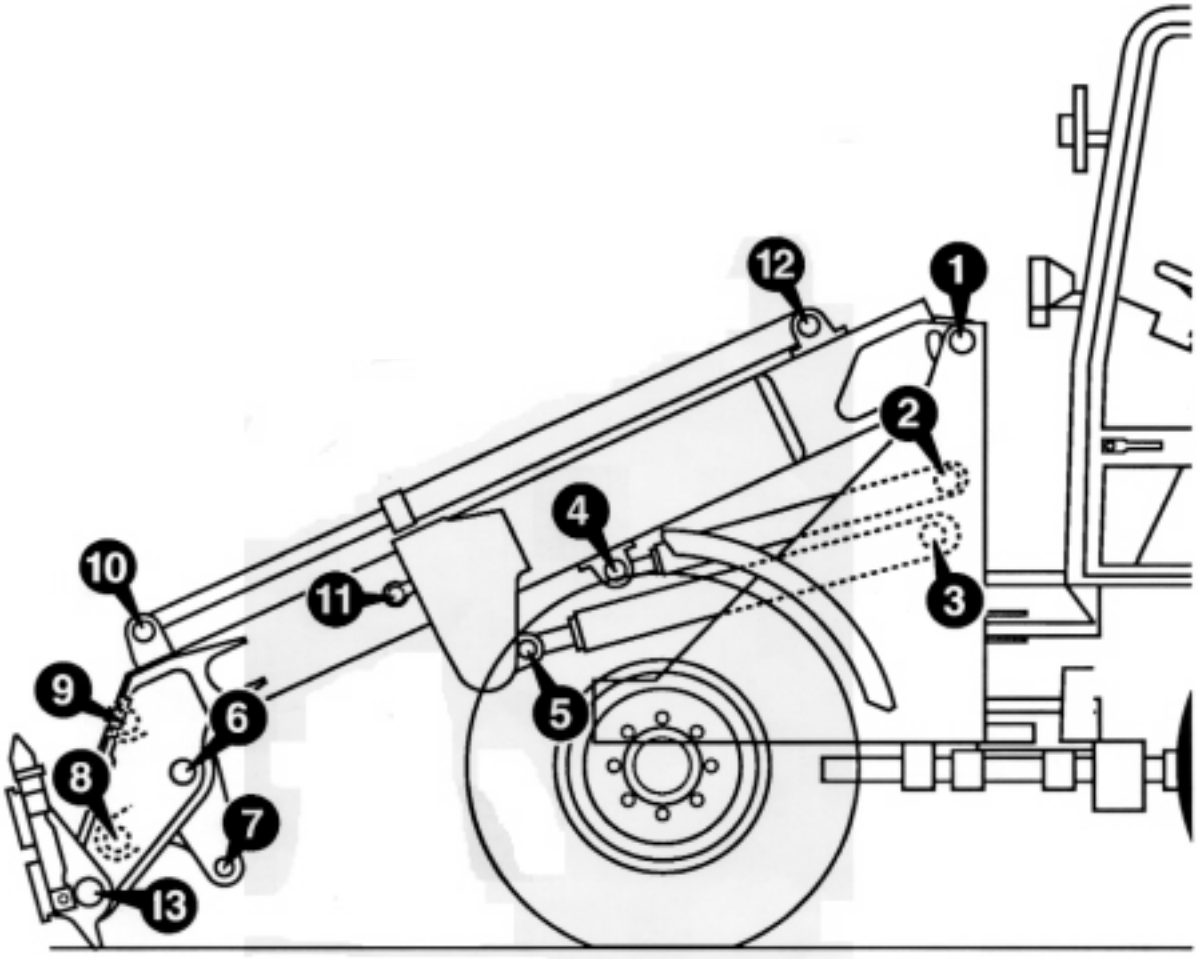
⚠ WARNING

Make the machine safe before working underneath it. Park the machine on level ground and lower the attachments, (if it is necessary to work with the boom raised, the boom safety strut must be fitted). See Boom Safety Strut in MAINTENANCE section**. Engage the parking brake, put the transmission in neutral and stop the engine. Chock both sides of all four wheels. If you are working near the articulation danger zone, fit the articulation safety lock.** See Articulation Lock in MAINTENANCE section.

4-3-2-6

Boom Pivot Points

Total of 13 grease points.



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Contents No. **P a g e**

* **TECHNICAL DATA (406 and 407 Machines)**

Pump

Type	Sundstrand AFGP 28L-30442 (gear type)		
Flow at 2000 rev/min and186 bar (2700lbf/in^2)	56 litres/min	12.3 UK gal/min	14.8 US gal/min

Main Relief Valve Operating Pressure	bar	kgf/cm^2	lbf/in^2
	186	190	2700

Auxiliary Relief Valves Operating Pressures

Shovel Ram Rod Side	158	160	2300
Shovel Ram Head Side	227	230	3300

Filter

By-pass pressure	1.05	1.07	15.0

Ram Torque Settings	Nm	kgf m	lbf ft
Piston Head (all rams except steer ram)	405	41.3	300
End Cap (all rams except steer ram)	678	69.2	500
Piston Head (steer ram)	300	30.6	221
End Cap (steer ram)	450	45.9	332

Ram Dimensions [mm (in.)]	Bore	Stroke	Rod Dia.	Piston Head A/F	Cap A/F
* Steering Ram (to m/c 631796)	60 (2.36)	245.5 (9.67)	30 (1.18)	40	50
* Steering Ram (from m/c 631797)	60 (2.36)	245.5 (9.67)	30 (1.18)	45	55
* Shovel Ram (to m/c 631796)	100 (3.94)	387.5 (15.26)	60 (2.36)	75	95
* Shovel Ram (from m/c 631797)	100 (3.94)	387.5 (15.26)	60 (2.36)	75	85
* Lift Ram (to m/c 631796)	100 (3.94)	715.0 (28.15)	60 (2.36)	75	95
* Lift Ram (from m/c 631797)	100 (3.94)	715.0 (28.15)	60 (2.36)	75	85
Quick Hitch (Twin piston cylinder)	60 (2.36)	54.0 (2.13)	44.4 (1.75)	-	73

* **TECHNICAL DATA (408 and 409 Machines)**

Pump

Type	Sundstrand AFGP 36L-31805 (gear type)		
Flow at 2000 rev/min and 207 bar (3000lbf/in2)	72 litres/min	15.8 UK gal/min	19 US gal/min

Main Relief Valve Operating Pressure	bar	kgf/cm^2	lbf/in^2
	207	211	3000

Auxiliary Relief Valves Operating Pressures

Shovel Ram Rod Side	172	175	2494
Shovel Ram Head Side	228	233	3306

Filter

By-pass pressure	1.05	1.07	15.0

Ram Torque Settings

	Nm	kgf m	lbf ft
Piston Head (all rams)	405	41.3	300
End Cap (all rams)	678	69.2	500

	Ram Dimensions [mm (in.)]	Bore	Stroke	Rod Dia.	Piston Head A/F	Cap A/F
	Steering Ram	70 (2.76)	246 (9.69)	40 (1.58)	55	65
*	Shovel Ram (to m/c 631870)	100 (3.94)	397 (1563)	60 (2.36)	75	95
*	Shovel Ram (from m/c 631871)	100 (3.94)	397 (1563)	60 (2.36)	75	85
*	Lift Ram (to m/c 631870)	110 (4.33)	708 (27.87)	60 (2.36)	75	95
*	Lift Ram (from m/c 631871)	110 (4.33)	708 (27.87)	60 (2.36)	85	95
	Quick Hitch (Twin piston cylinder)	60 (2.36)	54 (2.13)	44.4 (1.75)	-	73

TECHNICAL DATA (409 Telemaster)

Pump

Type	Sundstrand AFGP 36L-31805 (gear type)		
Flow at 2250 rev/min and 207 bar (3000 lbf/in^2)	81 litres/min	17.8 UK gal/min	21.4 US gal/min

Main Relief Valve Operating Pressure	bar	kgf/cm^2	lbf/in^2
	207	211	3000

Auxiliary Relief Valves Operating Pressures

* Forward Tilt (G)	280	286	4060
* Backward Tilt (F)	280	286	4060
* Servo Presure (at PRV)	30	30	435

Filter

By-pass pressure	1.05	1.07	15.0

Ram Torque Settings

	Nm	kgf m	lbf ft
Piston Head (all rams)	405	41.3	300
End Cap (all rams)	678	69.2	500

Ram Dimensions [mm (in.)]	Bore	Stroke	Rod Dia.	Piston Head A/F	Cap A/F
Steering Ram	70 (2.76)	246 (9.69)	40 (1.58)	55	65
Tilt Ram	120 (4.73)	285 (11.23)	70 (2.76)	95	105
Compensating Ram	70 (2.76)	630 (24.82)	40 (1.58)	55	65
Lift Ram	110 (4.33)	842 (33.18)	60 (2.36)	85	95
Extending Ram	70 (2.76)	1,200 (47.28)	40 (1.58)	55	65
Quickhitch (Twin piston cylinder)	40 (1.58)	40 (1.58)	30 (1.18)	-	-

FLUID LEVEL & FILTER (406 Machine)

* **Check Level** *for interval see Service Schedule*

Before checking level place the machine on firm level ground with loader arms lowered and shovel resting on the ground, transmission in neutral, parking brake applied, and engine switched off.

Examine sight gauge at **A** to ensure that fluid is visible between the upper and lower marks.

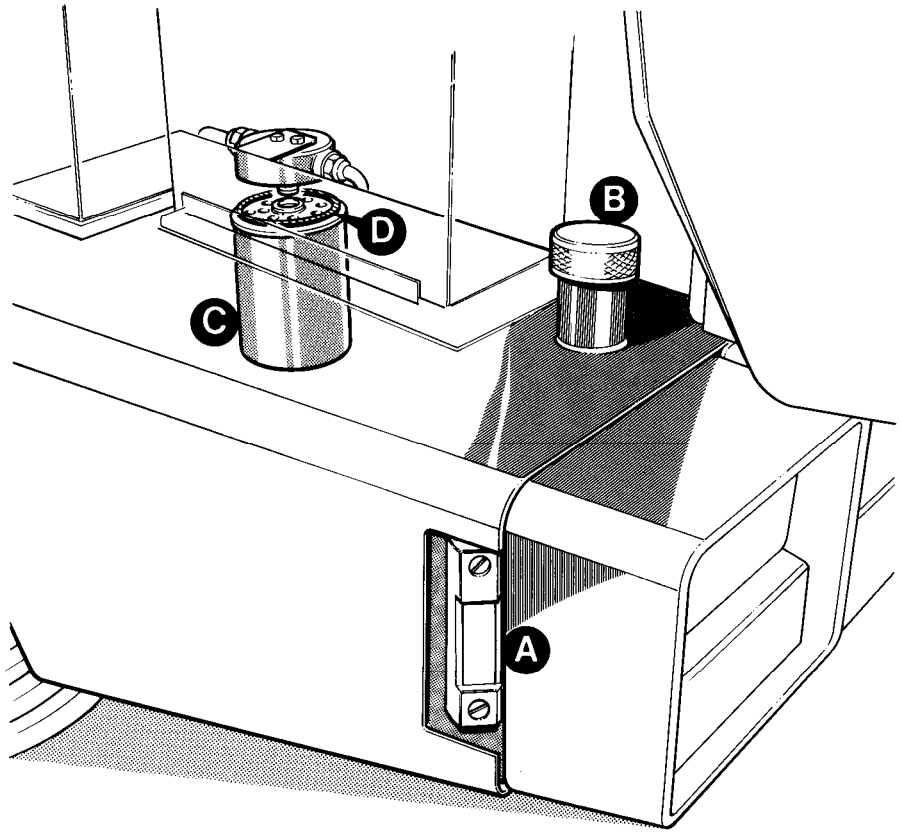
Top up at **B** as required.

⚠ CAUTION

Do not run engine with filler cap removed.
HYD 3-1

* **Renew Element** *for interval see Service Schedule*

1. Follow precautions above, except place the shovel in the fully dumped position to inhibit syphoning when the filter element is removed.
2. Remove filler cap; unscrew and discard element **C**.
3. Clean all metal parts in JCB Hydraulic Fluid.
4. Lubricate seal **D**; fit new element hand tight only.
5. Top up system at **B**.
6. Run engine for a few minutes, then recheck level at **A**.



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FLUID LEVEL & FILTER (406 Machine)

* **Check Level** *for interval see Service Schedule*

Before checking level place the machine on firm level ground with loader arms lowered and shovel resting on the ground, transmission in neutral, parking brake applied, and engine switched off.

Examine sight gauge at **A** to ensure that fluid is visible between the upper and lower marks.

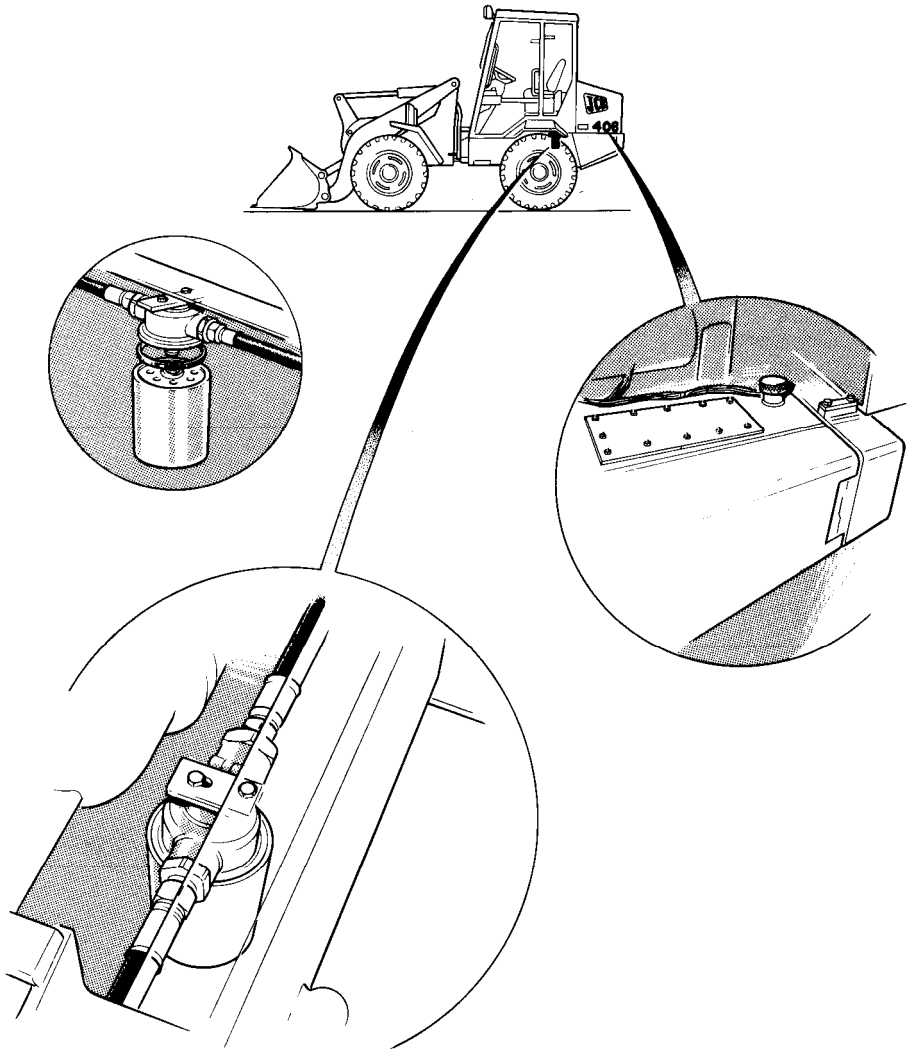
Top up at **B** as required.

⚠ CAUTION

Do not run engine with filler cap removed.
HYD 3-1

* **Renew Element** *for interval see Service Schedule*

1. Follow precautions above, except place the shovel in the fully dumped position to inhibit syphoning when the filter element is removed.
2. Remove filler cap; unscrew and discard element **C**.
3. Clean all metal parts in JCB Hydraulic Fluid.
4. Lubricate seal **D**; fit new element hand tight only.
5. Top up system at **B**.
6. Run engine for a few minutes, then recheck level at **A**.



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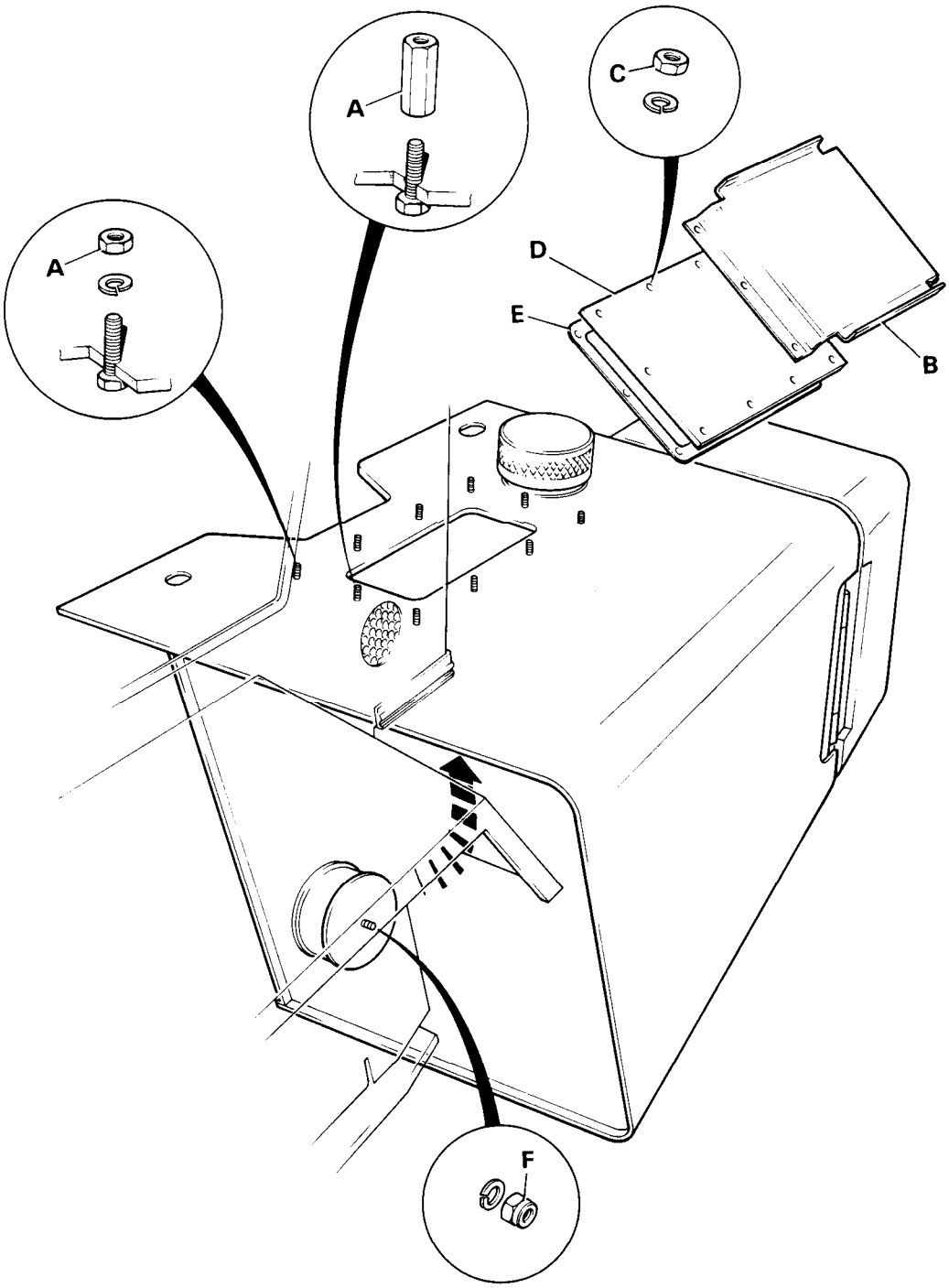

S102110

HYDRAULIC TANK & SUCTION STRAINER

Drain and Refill *for interval see Service Schedule*

Place the machine on firm level ground with loader arms lowered and shovel resting on the ground, transmission in neutral, parking brake applied, and engine switched off. Fit articulation safety link and chock wheels.

1 To drain tank remove filler cap and drain plug.

2 Before replacing drain plug, apply JCB Lock and Seal to thread.

3 Refill tank to sight gauge markings.

4 Run engine for a few minutes, then recheck level.

Clean Suction Strainer *for interval see Service Schedule*

1 After draining tank, unscrew nuts **A** and remove battery mounting plate **B**.

2 Unscrew nuts **C**, remove cover plate **D** and gasket **E**.

3 Unscrew nut **F**, remove strainer and wash in petrol or carbon tetrachloride.

Note: If a new strainer is fitted it should be washed in the same way to remove any protective coating.

4 Reassemble in reverse order, using a new gasket **E**.

5 After refilling to the correct level check the sight gauge to ensure that the hydraulic fluid remains clear during machine operation. Cloudiness indicates that water or air has entered the system which could cause serious damage.

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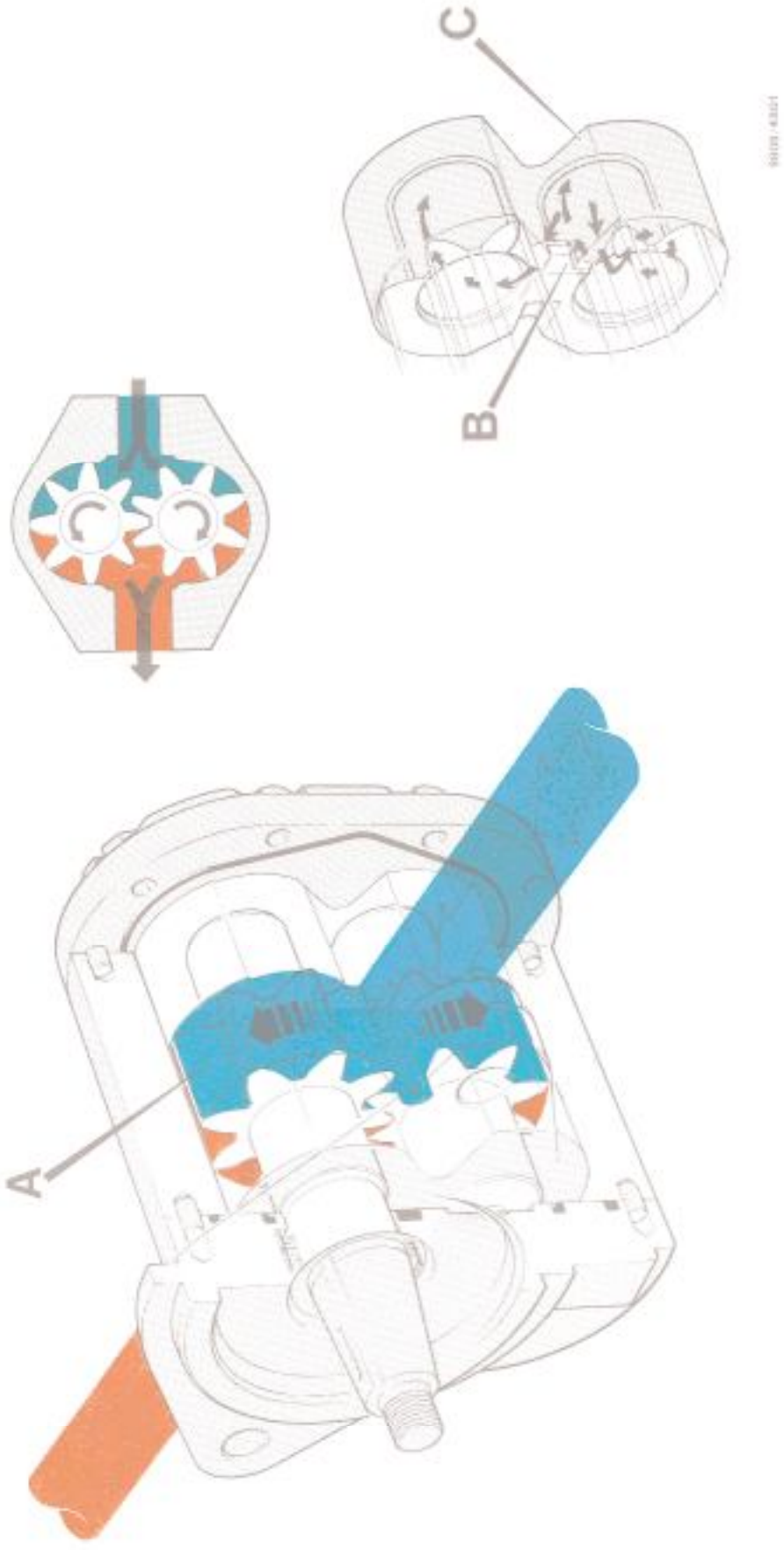


PUMP OPERATION

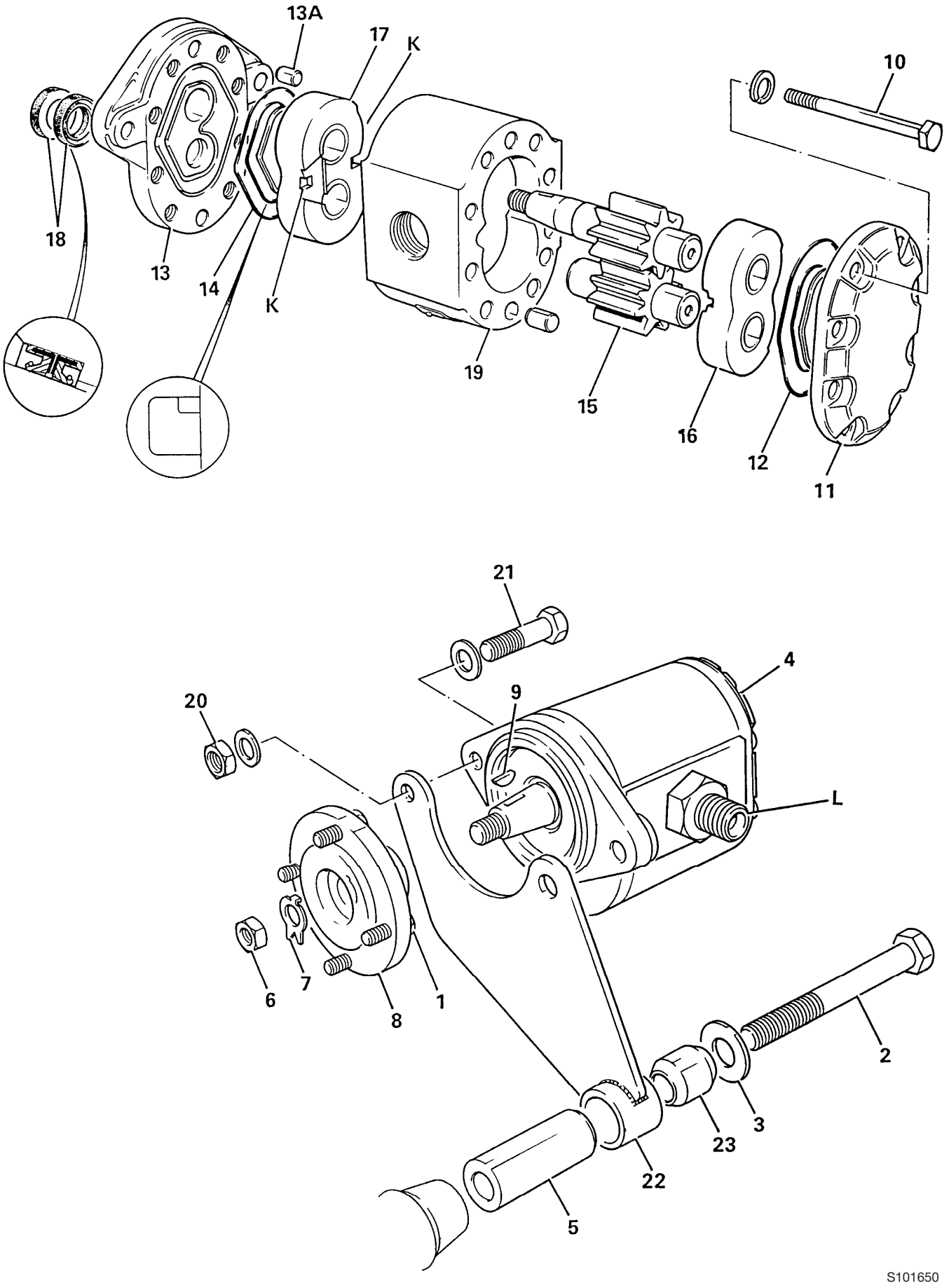
PUMP OPERATION

The pump is a gear type, mounted at the rear of the machine and driven by the engine.

The working principle of a gear pump depends upon the meshing of two spur gears **A**. Oil is picked up on the suction side of the pump by the gears and carried round between the gear teeth and the pump body. As the gears come into mesh the oil is forced out through the outlet port.

Some oil is allowed to circulate behind the bearings **C** to hold them against the gears and minimise oil slippage. Lubrication oil is drawn through the recess **B** and around the counterbore. The oil then flows along scrolled grooves in the bearing bushes, induced by the viscous drag of the rotating shaft.

3 - 2
2



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PUMP (Sundstrand)

Note: Before removing and dismantling the pump, check flow and pressure. If either of these is low and cannot be corrected at the relief valve, the appropriate pump section must be renewed completely. Renewal of components such as gears, bearings and housings will not effect a permanent cure. If the pump output is satisfactory but there is external leakage, the pump should be removed and dismantled for re-sealing only.

Removal and Replacement

Remove number plate carrier to gain access to pump. Disconnect and plug inlet and outlet hoses. Unscrew coupling bolts **1** then remove bolt **2** and withdraw pump from machine.

Replace by reversing the removal sequence.

When renewing resilient bush **23**, coat with concentrated soap solution and press into the boss so that it protrudes a nominal 2 mm (0.080 in) either side. When pump is mounted on machine there must be nil clearance between bush and sleeve **5** in order to avoid loading bracket **22**. Incorrect assembly will cause premature pump shaft failure.

Assemble sleeve **5** with chamfered end toward bracket **22**.

⚠ CAUTION

Because the pump inlet connection is above the maximum fluid level in the hydraulic tank it is essential that, after reinstallation, the pump and the inlet hose are primed with JCB Hydraulic Fluid prior to running the engine.

HYD 3-2

Priming the Pump

Before connecting the outlet hose from the pump, fill the pump with clean hydraulic fluid and allow to drain partially.

Make sure that the engine cannot start (Remove the engine stop fuse on later machines - pull the engine stop handle on earlier machines).

Motor the engine until there is a positive flow of hydraulic fluid from the pump outlet.

Connect the outlet hose.

Dismantling and Assembly

When Dismantling

The numerical sequence shown on the illustration is intended
as a guide to dismantling.

Remove sharp edges and burrs from shaft to avoid seal damage.

Mark covers **11** and **13** and housing **19** to ensure correct replacement. Do not damage machined faces by prising them apart - use a soft faced hammer.

Withdraw the gears **15** and bearings **16** and **17** from the body bore as an assembly, carefully noting their original position.

* **Inspection**

It is normal for the gears to have cut a slight track in the body bore on the inlet side. The gear track wear cannot be measured accurately but will be related to bearing wear. Examine the bores of the bearing blocks **16**, and **17**, which are coated during manufacture with PTFE. If the grey PTFE is worn through so that the bronze base is visible, the complete pump must be renewed.

Renew pump if faces of bearing blocks are scored or if side faces of gears are chipped or damaged. DO NOT use any abrasives on the bearing blocks or gears as this would destroy critical manufacturing dimensions.

When Assembling

Wash all components, then apply hydraulic oil immediately afterwards to prevent moisture from collecting.

Renew all seals and 'O' rings. Grease the lips of seals **18**.

Install bearings **16** and **17** with recesses **K** positioned on the inlet side facing the gears, and the relieved radii on the outlet side of the pump.

Align housing and covers using marks previously made, after checking that protrusion of dowels **13A** is 3.5 mm (0.138 in).

Locate bolts **1** in drive flange before fitting flange to shaft. Ensure that tab washer **7** is located in the keyway, and bend up tabs after torque tightening nut **6**.

Apply Loctite 577 to threads of inlet and outlet adaptors L.Fit and tighten adaptors **L** to 45 - 50 Nm (4.6 - 5.1 kgf m; 33 - 37 lbf ft).

Refit and prime the pump.

Torque Settings

Item	Nm	kgf m	lbf ft
1	77	7.9	57
2	118	12.0	87
6	95-100	9.7-10.2	70-74
10	85-95	8.7-9.7	63-70
20	117	11.9	86