FG70 FG75
FG85 FG105
SERIES B

MOTOR GRADERS

SERVICE MANUAL SET

73160217

CUT ON LINE & INSERT IN BINDER TAB

FG70 FG75 FG85 FG105
SERIES B

SERVICE MANUAL SET CONSISTS OF

73160219	SERVICE MANUAL TEXT
73160218	INDEX CARD
73155591	2 INCH BINDER
73160587	CLARK 24000 TRANSMISSION SERVICE MANUAL
73160588	CLARK 28000 TRANSMISSION SERVICE MANUAL

73160586 ZF WG200 TRANSMISSION SERVICE MANUAL IS NOT INCLUDED IN THE SET BUT CAN BE PURCHASED SEPARATELY

CARD # 73160218
REVISED 12/91

SAFETY RULES

Always before leaving the operator's seat and after making certain all people are clear of the machine, slowly lower the attachments or tools flat to the ground in a positive ground support position. Move any multi purpose tool to positive closed position. Return the controls to hold. Place transmission control in neutral and move engine controls to off position. Engage all control locks, set parking brake, and open and lock the master (key, if so equipped) switch. Consult Operation and Maintenance Instruction Manual.

Always follow the shut down instructions as outlined in the Operation and Maintenance Instruction Manual.

MAINTENANCE

Do not perform any work on equipment that is not authorized. Follow the Maintenance or Service Manual procedures.

Machine should not be serviced with anyone in the operator's seat unless they are qualified to operate the machine and are assisting in the servicing.

Shut off engine and disengage the Power Take Off lever if so equipped before attempting adjustments or service.

Always turn the master switch (key switch if so equipped) to the *OFF* position before cleaning, repairing, or servicing and when parking machine to forestall unintended or unauthorized starting.

Disconnect batteries and *TAG* all controls according to local or national requirements to warn that work is in progress. Block the machine and all attachments that must be raised per local or national requirements.

Never lubricate, service or adjust a machine with the engine running, except as called for in the Operation and Maintenance Instruction Manual. Do not wear loose clothing or jewelry near moving parts.

Do not run engine when refueling and use care if engine is hot due to the increased possibility of a fire if fuel is spilled.

Do not smoke or permit any open flame or spark near when refueling, or handling highly flammable materials.

Always place the fuel nozzle against the side of the filler opening before starting and during fuel flow. To reduce the chance of a static electricity spark, keep contact until after fuel flow is shut off.

Do not adjust engine fuel pump when the machine is in motion.

Never attempt to check or adjust fan belts when engine is running.

When making equipment checks that require running of the engine, have an operator in the operator's seat at all times with the mechanic in sight. Place the transmission in neutral and set the brakes and lock. *KEEP HANDS AND CLOTHING AWAY FROM MOVING PARTS.*

Avoid running engine with open unprotected air inlets. If such running is unavoidable for service reasons, place protective screens over all inlet openings before servicing engine.

Do not place head, body, limbs, feet, fingers, or hands near rotating fan or belts. Be especially alert around a pusher fan.

Keep head, body, limbs, feet, fingers, or hands away from bucket, blade or ripper when in raised position.

If movement of an attachment by means of machine's hydraulic system or winches is required for service or maintenance, do not raise or lower attachments from any position other than when seated in the operator's seat. Before starting machine or moving attachments or tools, set brakes, sound horn and call for an all clear. Raise attachments slowly.

Never place head, body, limbs, feet, fingers, or hands into an exposed portion between uncontrolled or unguarded scissor points of machine without first providing secure blocking.

Never align holes with fingers or hands - Use the proper aligning tool.

Disconnect batteries before working on electrical system or repair work of any kind.

Check for fuel or battery electrolyte leaks before starting service or maintenance work. Eliminate leaks before proceeding.

BATTERY GAS IS HIGHLY FLAMMABLE. Leave battery box open to improve ventilation when charging batteries. Never check charge by placing metal objects across the posts. Keep sparks or open flame away from batteries. Do not smoke near battery to guard against the possibility of an accidental explosion.

Do not charge batteries in a closed area. Provide proper ventilation to guard against an accidental explosion from an accumulation of explosive gases given off in the charging process.

Be sure to connect the booster cables to the proper terminals (+ to +) and (- to -) at both ends. Avoid shorting clamps. Follow the Operation and Maintenance Instruction Manual procedure.

Due to the presence of flammable fluid, never check or fill fuel tanks, storage batteries or use starter fluid near lighted smoking materials or open flame or sparks.

Rust inhibitors are volatile and flammable. Prepare parts in well ventilated place. Keep open flame away - *DO NOT SMOKE.* Store containers in a cool well ventilated place secured against unauthorized personnel.

Do not use an open flame as a light source to look for leaks or for inspection anywhere on the machine.

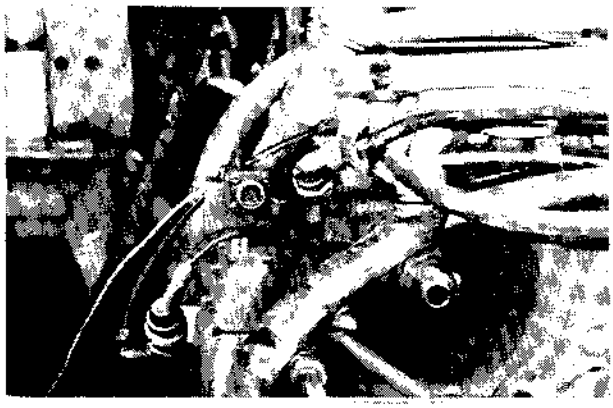
DO NOT pile oily or greasy rags - they are a fire hazard. Store in a closed metal container.

SECTION 1
ENGINE RELATED COMPONENTS

TABLE OF CONTENTS

1.2.1.28
Disconnect electric cable and tube from transmission valve.

T-95032

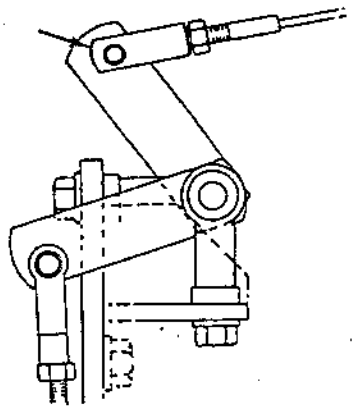


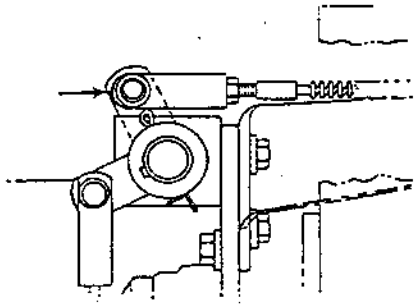
1.2.1.29
Disconnect drive shaft.

T-95034

T-101229

1.2.1.30
Disconnect transmission oil temperature gauge and parking brake.





1.2.6 THROTTLE LINKAGE and FUEL SHUT-OFF

1.2.6.1

Should the throttle linkage and fuel shut-off ever need to be removed or replaced, it would be for one of four reasons: The fuel pump or engine must be removed, the levers and linkage at the fuel pump are damaged, the push-pull cables are corroded or damaged, or the cab is to be removed. Refer to Section 8 for Cab Removal. Refer to Engine Removal for disconnecting the throttle linkage. Refer to Specifications for torques and adjustments.

1.2.7 RADIATOR

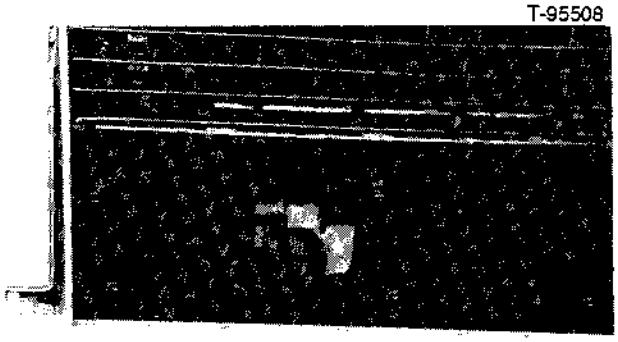
1.2.7.1

Shut off master electrical switch.

⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

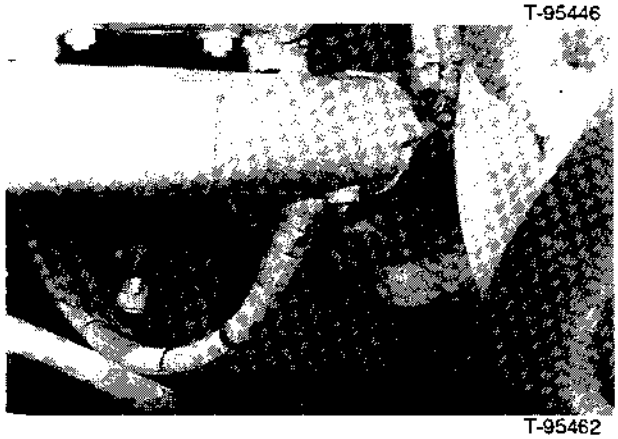
T-95508



1.2.7.2

Drain the radiator coolant by means of a fitting located on the end of the transmission heat exchanger.

T-95446



1.2.7.3

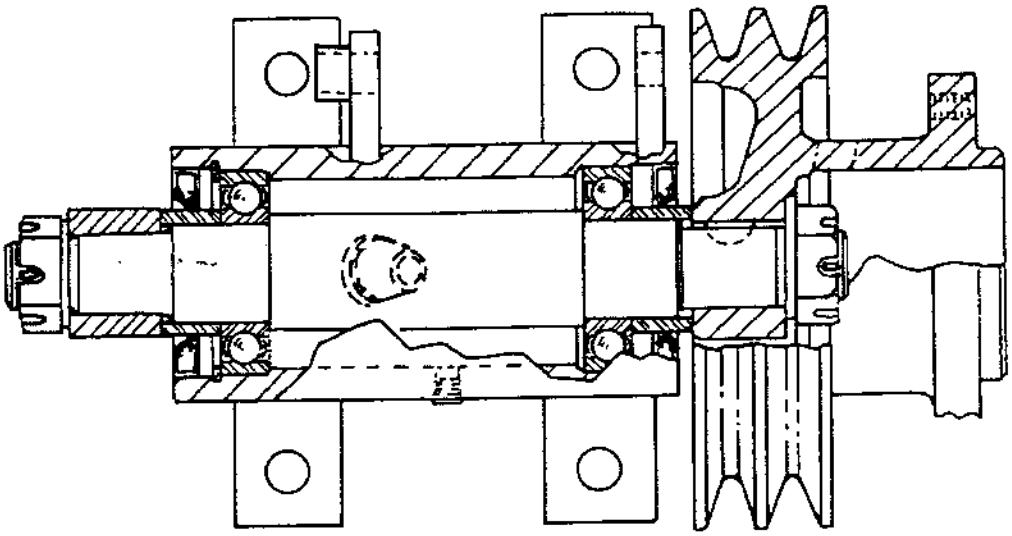
Remove the top and side access covers from the radiator shell.

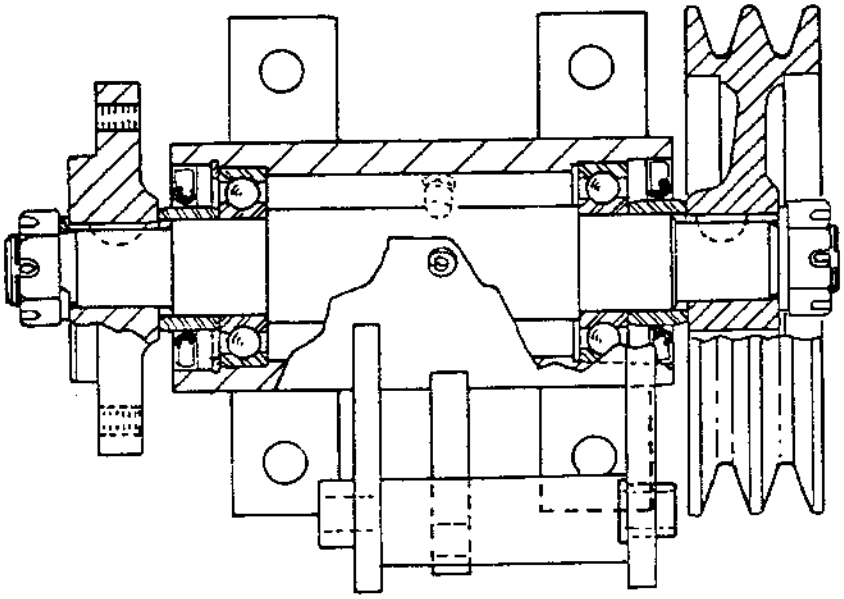
T-95462

1.3.4 FAN DRIVE BEARING PRELOAD & TORQUE

Torque nut to 16.2 daNm (120 lbs. ft.) minimum. Continue to torque to align cotter pin hole with slot in nut.

	mm	inch
Bearing I.D. Bearing O.D.		
Shaft O.D.	35.0114-35.0215	1.3784-1.3788
Housing I.D.	71.9988-72.0242	2.8346-2.8356





T-101227

2.2.21
Install a suitable lifting device to support radiator guard.

⚠ WARNING

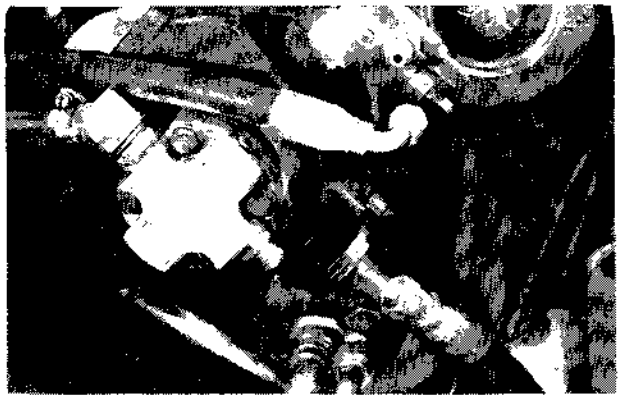
Lift and handle all heavy parts with a lifting device or proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

2.2.22
Remove radiator guard.

T-95717

2.2.23
Disconnect hoses and tube from hydraulic pump.

T-95027



2.2.24
Disconnect hoses from ground drive pump.

T-95028

2.3 SPECIFICATIONS

2.3.5 TORQUE SPECIFICATIONS FOR MODEL FG70, FG70A

	daNm	ft. lbs.
Dipstick bracket to flywheel housing capscrew	8.7	64
Dipstick clamp to bracket	10.2	75
Engine mount to engine capscrews	8.7	64
Engine to frame center bolt	100	737
Engine to frame mount capscrews	30	220
Muffler stand to engine capscrew	12.7	94
Muffler to adapter stand bolts	3.0	22
Transmission mount to transmission capscrews	36.6	270
Transmission to frame center bolt	100	737
Transmission to frame mount capscrews	30	220
Fan drive mounting capscrews	10.2	75
Steering & brake pump mounting capscrews	10.2	75
Implement pump mounting capscrews	10.2	75
Steering pump to brake pump mounting capscrews	6.5	50
Transmission to flywheel housing capscrews	6.5	50
Torque converter ring gear capscrews	3.3	24
Transmission shift lever pivot bolts	10.2	75
Transmission shift lever pivot bracket capscrews	4.1	30
Transmission shift tower mounting capscrews	10.2	75
Transmission shift cable adjustment bracket	4.1	30
Shift cable to control lever jam nuts	1.2	8.8
Control assembly to shift tower capscrews	2.4	17.7
Shift tower, access cover hinge screws	1.2	8.8
Parking brake lever support mounting capscrews	12.6	93
Parking brake lever to support mounting capscrews	5.1	37.6
Parking brake linkage pivot pin (at support) capscrew	5.1	37.6
Parking brake linkage cable clamp (at support) capscrew	1.4	10.3
Parking brake linkage pivot bracket (at transmission) mounting capscrew	7.8	57.5
Transmission oil cooler mounting capscrew & nut	4.1	30
Tubes from radiator to transmission oil cooler capscrew	4.1	30

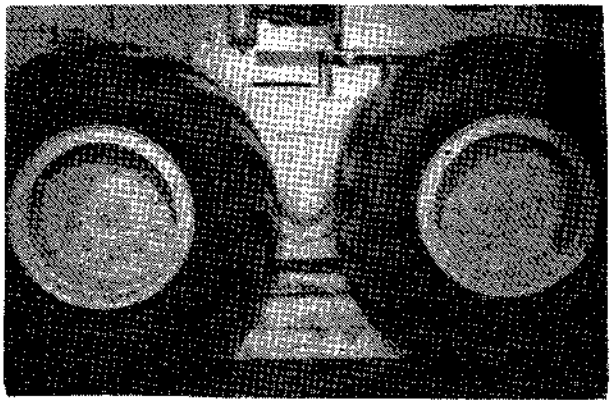
3.3 NoSPIN TEST

T-86002

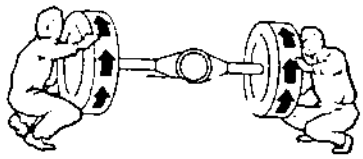
3.3.1
Use a jack or hoist of sufficient capacity to raise the rear axle off the floor. Tires must be completely free of drag.

⚠ WARNING

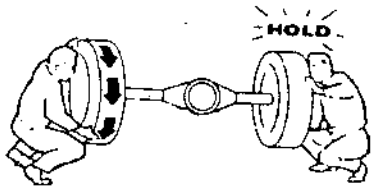
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.



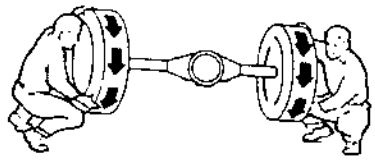
3.3.2
Start the test by simultaneously rotating a wheel on each tandem in a forward direction as far as possible. Both should stop after a few inches of movement.



3.3.3
With the right wheel held firmly forward against the stop rotate the left wheel rearward. The left wheel should overrun, and you may hear a clicking or indexing noise. The wheel will not disengage unless the right wheel is held firmly.

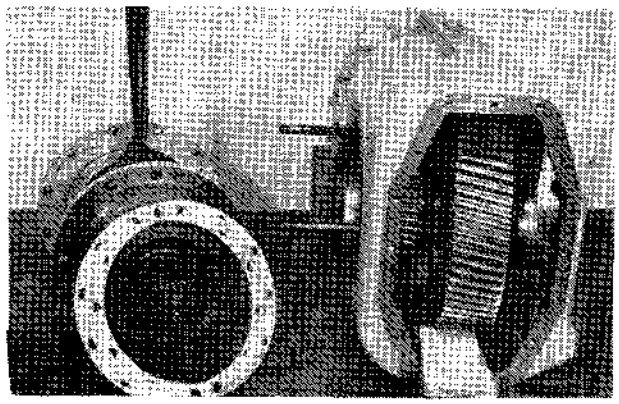


3.3.4
Rotate both wheels rearward as far as possible. Again both wheels should turn only a few inches.



3.4.3.11
Tie shims together for reassembly purposes.

T-91827

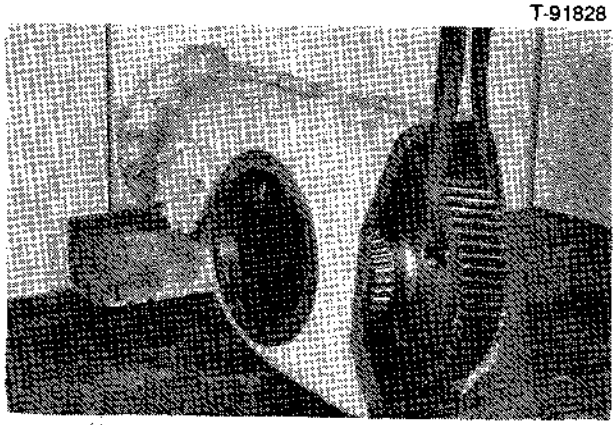


3.4.3.12
Lift the bull gear from the housing using adequate lifting facilities. Bull gear weighs 100 kg (220 lbs.).

⚠ WARNING

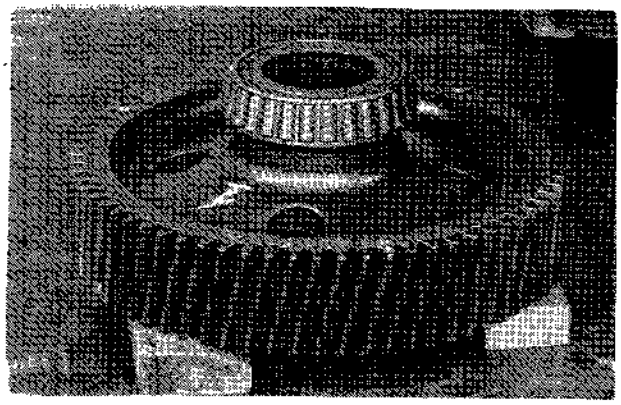
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

T-91828



3.4.3.13
The bull gear bearings should not be removed unless the bearing is failed. Removing the bearing will destroy the bearing. If working on an articulated machine, see the next six steps for rebuild. If not, then go to 3.4.3.20.

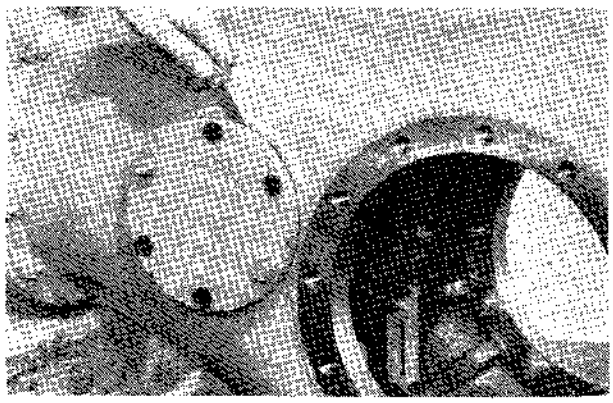
T-91829



3.4.3.14
A new NoSPIN differential should not be taken apart prior to installation.

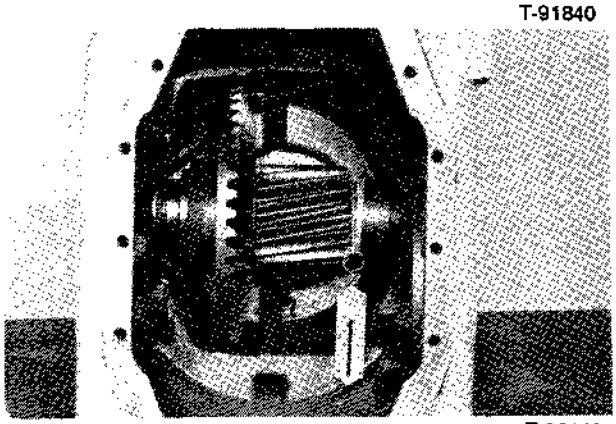
3.4.3.51
Measure the gap between the end cap and the housing. Make a shim pack to this measurement and install it between the end cap and the housing.

T-91839



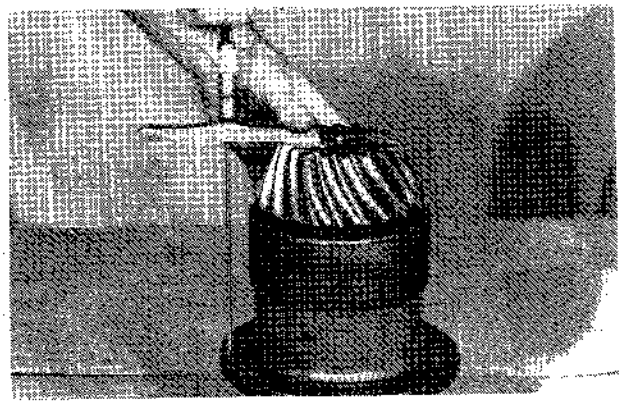
3.4.3.52
Re-measure the ring gear shaft rolling torque to insure that the rolling torque remains the same. If the rolling torque changes, then the previous three steps must be repeated.

T-91840



3.4.3.53
Measure the distance from the pinion gear face to the carrier flange. Record this measurement. These are the dimensions needed to set the pinion depth. Dimension A^1 is given in the specification section. Dimension A^2 is etched on the ring gear as MD. Dimension A^3 was just measured. To find the correct shim pack, add A^2 and A^3 and subtract from A^1. The remainder is the shim pack.

T-86143



3.4.3.54

$S = (A^2 + A^3) - A^1$

$S = 4.301 + 7.606 - 11.757$

$S = 0.150$ inch

S = Shim pack thickness

$$S = (A^2 + A^3) - A^1$$

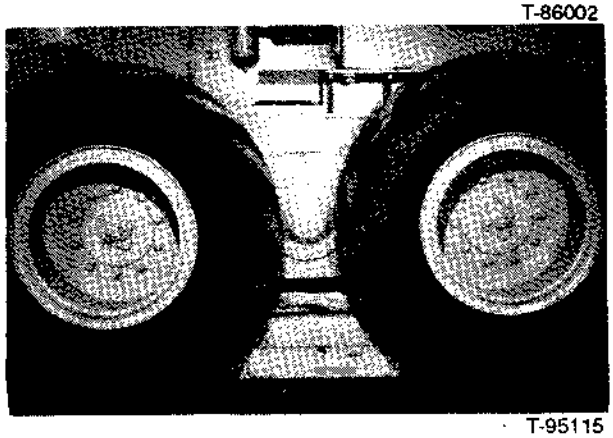
$$S = 4.301 + 7.606 - 11.757$$

$$S = 0.150 \text{ in}$$

3.4.4.4

Apply blocks under tandem case. Lower machine onto blocks. Repeat the same procedure for the other side. Disconnect electrical power. Be sure blocking does not interfere with oil draining.

T-86002



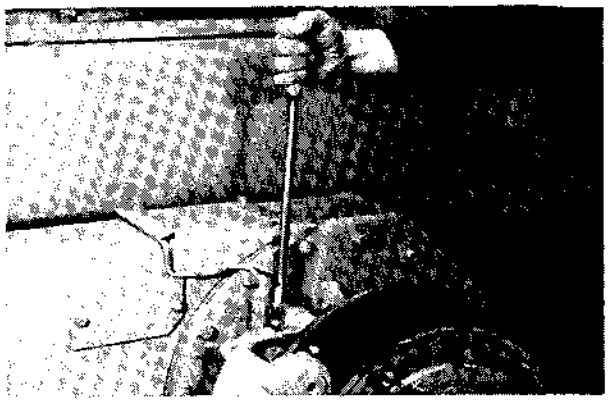
⚠ WARNING

When supporting machine component must be removed or installed and jacks are used, be sure the support of the jack at the machine and on the ground are appropriate to the load applied. Transfer the load to authorized blocking or jack stands immediately. Do not work on or under the machine or its components while supported only on a jack or other lifting device, according to local or national requirements.

3.4.4.5

If the wheel and hub are to be pulled together, remove the brake caliper. See section 3.4.5.

T-95115



3.4.4.6

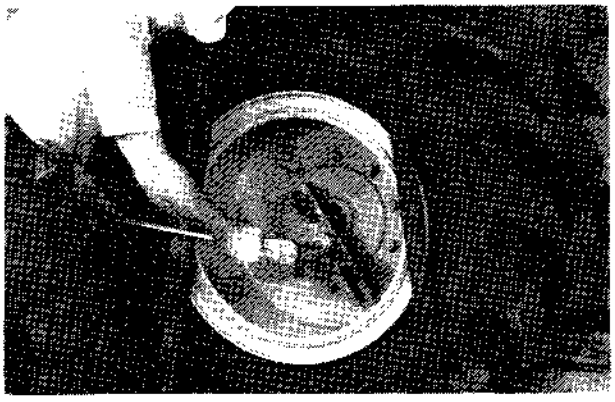
Set brakes and disconnect electrical power.

T-86004

3.4.4.7

Pull wheel from shaft. Use slings around the tire as shown to lift the tire and wheel. Repeat procedure for front tandem wheel.

T-86008



⚠ WARNING

Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

3.4.4.44

Loop the chain over the drive sprocket. Connect the two ends of the chain with the master link. Keep the master link in position by installing the **special cotter pins**. The chain may need to be pried over to get the master link through the chain ends.

⚠ WARNING

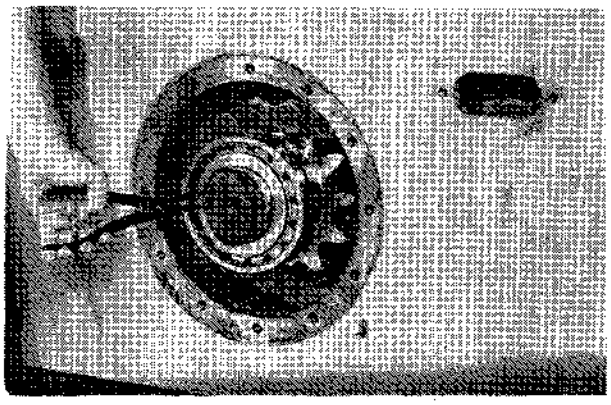
Use proper tools to bring holes into alignment. "Do not use fingers or hands."

T-91876

3.4.4.45

Heat the bearing to 121°C (250°F) and install the bearing onto the rear axle. Hold the bearing in place with the snap ring.

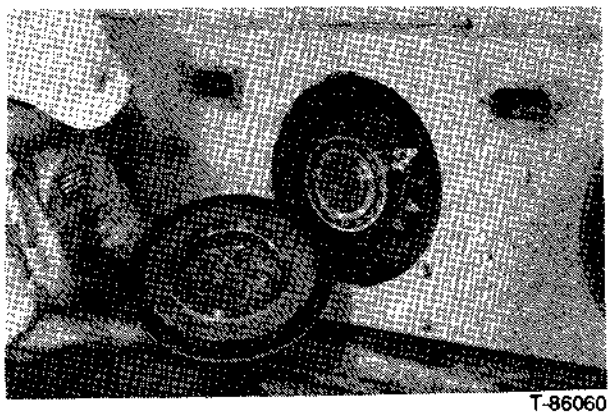
T-86057



3.4.4.46

Install Permatex to the cover and axle. Pack bearing in grease 70604026.

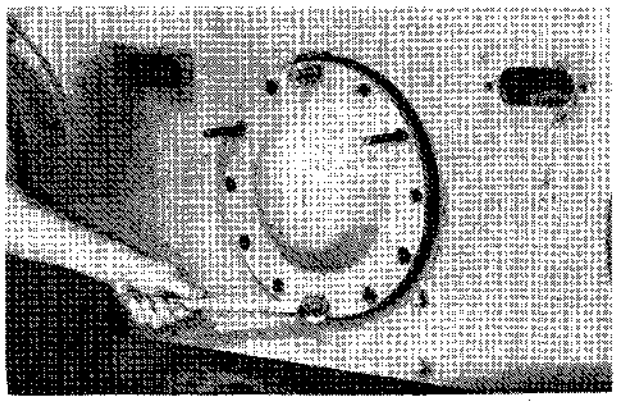
T-86059



3.4.4.47

Install the bearing cover onto the case. Tighten capscrews to specified torque. Use guide studs and puller capscrews to draw the cover over the bearing.

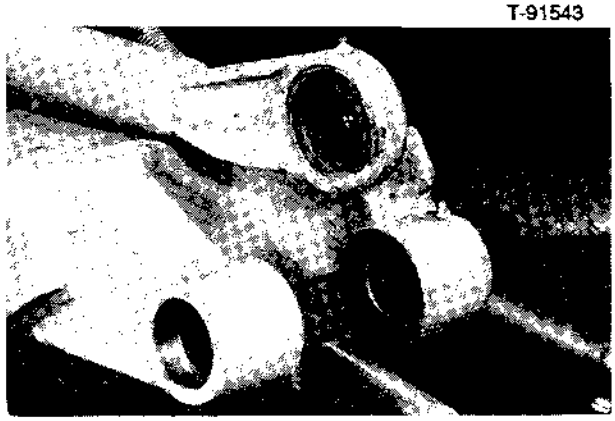
T-86060



Item	Rolling torque	Nm	in lb
1	Pinion shaft bearings	2.35-4.5	20-40
2	Ring gear shaft bearings	1.17-3.52	10-30
	Radius of shaft at gear teeth for figuring rolling torque is 64.2mm (2.529in)		
	Backlash	mm	in
3	Backlash tolerance	.028-.05	.007-.012
	Torques	daNm	ft lb
A	Ring gear cap capscrews	12.2-13.6	90-100
B	Pinion cartridge to center housing capscrew	12.2-13.6	90-100
C	Extension housing to center housing capscrews	36.6-40.7	270-300
D	Extension housing to bearing retainer capscrews	12.2-13.6	90-100
E.	Pinion cover bolts	12.2-13.6	90-100
F	Backplate to housing capscrews	12.2-13.6	90-100
G	NoSpin Differential case bolts		
	Wheel to shaft nut	30.2-33.2	223-245
	Axle support to pinion cover capscrews	44.1-42.5	
	Axle support to top capscrews	40.8-44.9	
	Axle support to bottom capscrews	5.04	
	Shim thickness	mm	in
J	Extension housing to center housing bearing preload	.01-.02	.004-.008
K	Extension housing bearing preload	.01-.02	.004-.008
	Dimensions	mm	in
	Differential case capscrews	8.4-9.2	62-68
A[1]	Distance from mounting surface to bore center line	298.63	11.757
L	Pinion shaft O. D.	66.70-66.71	2.6260-2.6265
	Bearing cone I. D.	66.67-66.69	2.6250-2.6255
M	Bearing carrier I.D.	122.19-122.21	4.8105-4.8115
	Bearing cup O. D.	122.24-122.26	4.8125-4.8135
N	Pinion shaft O. D.	77.81-77.83	3.0635-3.0640
	Bearing cone I. D.	77.79-7781	3.0625-3.0635
O	Bearing carrier I. D.	136.47-136.50	5.3730-5.3740
	Bearing cup O. D.	136.52-136.55	5.3750-5.3760
P	Bearing bore I. D.	135.76-135.78	5.3447-5.3457
	Bearing cup O. D.	135.76-135.78	5.3447-5.3457
Q	Shaft O. D.	65.11-65.13	2.5635-2.5640
	Bearing cone I. D.	65.09-65.10	2.5625-2.5630
R	Extension housing I. D.	196.77-196.82	7.747-7.749
	Bearing cup O. D.	196.85-196.88	7.750-7.751
R[1]	Extension housing I. D.	180.90-180.95	7.122-7.124
	Bearing Cup O. D.	180.97-181.00	7.125-7.126
S	Gear flange O. D.	133.41-133.44	5.2525-5.2535
	Bearing cone I. D.	133.35-133.38	5.250-5.251
S[1]	Axle shaft O. D.	104.84-104.86	4.127-4.128
	Bearing cone I. D.	104.78-104.80	4.125-4.126
T	Extension housing I. D.	206.35-206.40	8.124-8.126
	Bearing cup O. D.	206.38-206.40	8.125-8.126
U	Axle shaft O. D.	114.34-114.36	4.502-4.503
	Bearing cone I. D.	114.30-114.33	4.500-4.501
V	NoSpin Differential		
W	Apply 70699262 to external threads		

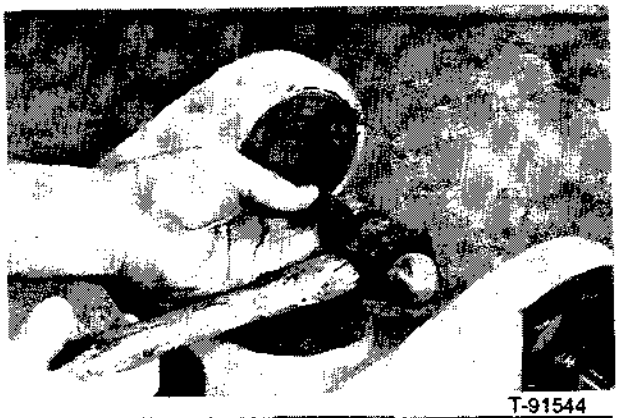
3.9.1.17
Remove wheel lean knuckle.

T-91543



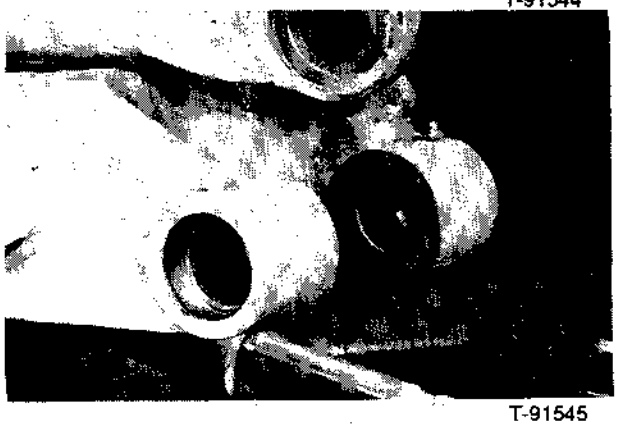
3.9.1.18
Remove seals from wheel lean knuckle.

T-91559



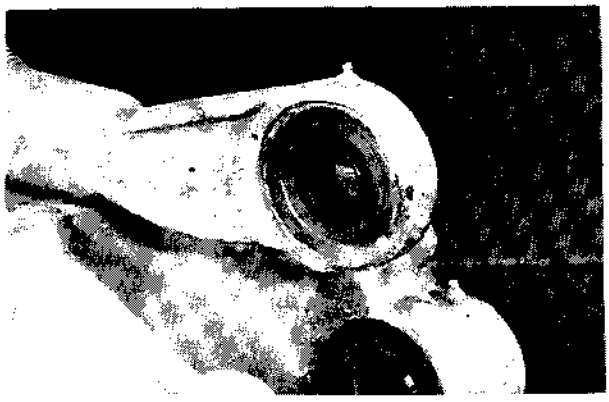
3.9.1.19
Remove seals and needle roller bearing from the front axle.

T-91544



3.9.1.20
Remove bearing from wheel lean arm.

T-91545



3.10.3 FRONT WHEEL LEAN

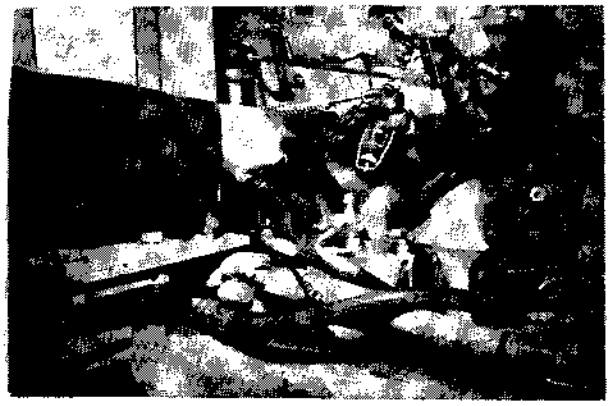
ITEM	NAME	mm	in
A	Cylinder pivot bearing I. D.	50.762 - 50.787	1.9885 - 1.9995
	Bearing O. D.	50.787 - 50.800	1.9995 - 2.0000
	Pivot Pin O. D.	31.763 - 31.788	1.2505 - 1.2515
	Bearing I. D.	31.737 - 31.750	1.2495 - 1.2500
B	Cylinder rod I. D.	50.762 - 50.787	1.9985 - 1.9995
	Bearing O. D.	50.787 - 50.800	1.9995 - 2.0000
C	Front wheel lean link bearing bore I.D.	50.762 - 50.787	1.9985 - 1.9995
	Bearing O. D.	50.787 - 50.800	1.9995 - 2.0000

PROCEDURE

D Tighten nut to 54.2 - 67 daNm (400 -500 ft lbs), then increase torque to align holes for the cotter pin.

4.4.1.1.5
Remove mount capscrews as well as U-bolt holding the pump on the engine.

T-95275



4.4.1.2 **Brake Pump Removal FG105**
4.4.1.2.1
Turn off electrical master switch.

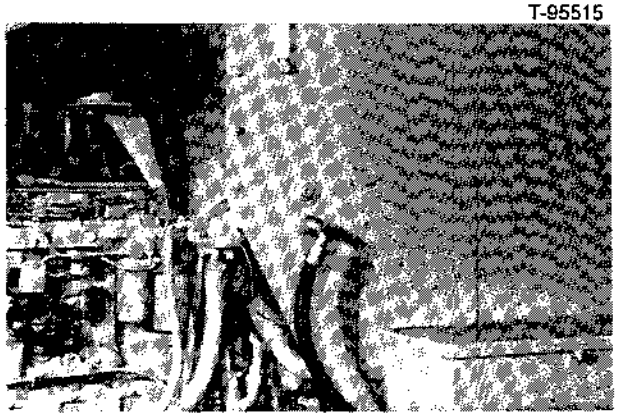
⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

T-95508

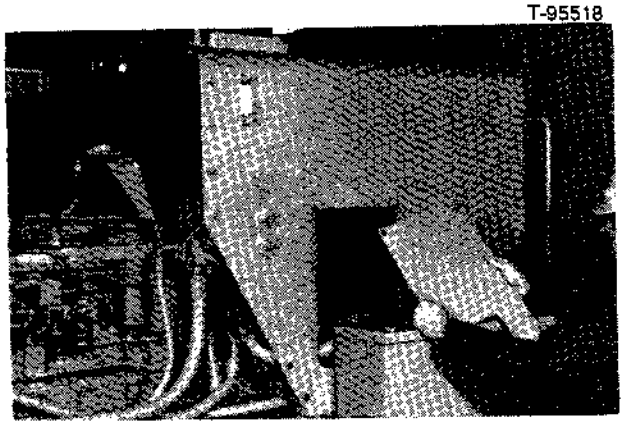
4.4.1.2.2
Drain implement tank.

T-95515



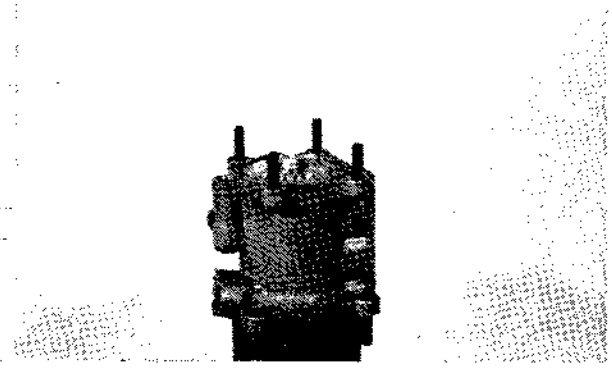
4.4.1.2.2
Remove side panels on radiator wrap around.

T-95518



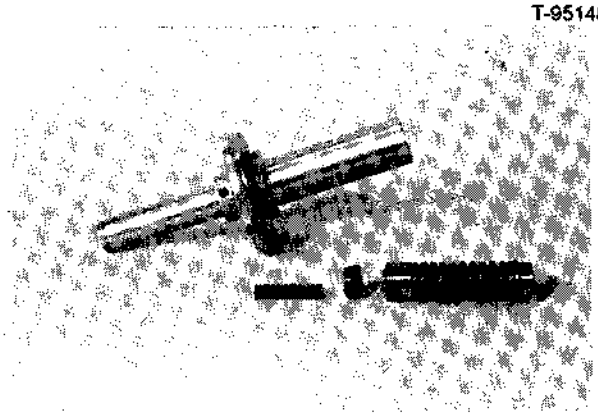
4.4.2.3.9
Be sure end cap is fitted into booster housing and seal is not rolled.

T-95206



4.4.2.3.10
Install the valve rod and reaction piston assembly in the hollow end of the power piston. Insert the reaction piston end in the power piston first.

T-95148

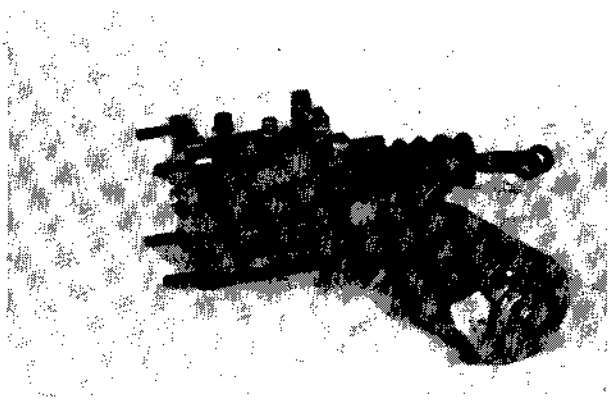


4.4.2.3.11
Screw the input plug and push rod assembly into the power piston and hand tighten. Gently clamp the input plug flats in the jaws of a vise and firmly hand tighten the power piston and plug until seated. Do not use tools to tighten. Push boot onto booster housing.

T-95210

4.4.2.3.12
Lubricate and install the two oval face seals in the grooves of the electric motor pump assembly.

T-95214



5.1 GENERAL DESCRIPTION

FG70 AND 75B IMPLEMENT SCHEMATIC

The schematic includes the implement hydraulic and steering systems. These systems all utilize a common reservoir (29). Therefore, the systems use a common specified oil.

There are three pumps supplying the two systems. They are all gear type pumps. One pump (15a) supplies the steering system and the circle turn circuit. Two pumps (13a & 13b) supply the two valve banks one for left bank, one for right bank, both of these pumps also supply the circle turn circuit when no other functions are used.

The steering circuit consists of the following: pump (15a) orbitrol type control valve (24) cross relief valves and anticavitation valves (26) and cylinders (27). The cross reliefs function both as steering main reliefs and circuit reliefs. A relief valve (22) teed out of the steering pump circuit is the circle turn relief.

When a steering function is made the steering control valve is activated. The valve directs oil to the internal gear flow control meter. (The rate at which the meter is turned determines the flow to the cylinders). Therefore, whatever amount of flow not required for steering continues on to the circle turn circuit. Return oil from the cylinders is directed by the steering valve back to the reservoir.

During the steering function when forces high enough are encountered, and the pressure build up equals the setting of the cross relief valves, the valve open and protect the steering system. When the cross relief opens, it exhausts oil to the opposite side anticavitation valve and to tank to prevent cavitation in the opposite ends of the cylinders.

When the steering valve is in neutral the cross relief valves function the same as described above. In this case they become circuit reliefs.

The implement system consists of the two pumps (13a) and (13b), implement control spool valves (12 & 14), over center valves (1), dual check valves (3), dual operation solenoid valves (6), circuit relief valves, main relief valves, and load check valves.

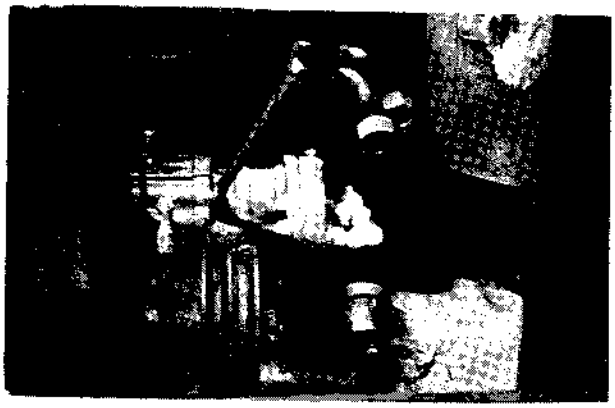
One of the pumps supplies the left valve bank. The other pump supplies the right valve bank.

Left Stack Top to Bottom Circuit	Components
Circle shift	Spool, dual over center valve, cylinder
Moldboard pitch	Spool, solenoid, check valve, cylinder
Moldboard lateral shift	Spool, solenoid, cylinder
Ripper	Spool, dual over center valve, cylinder
Left moldboard lift	Spool, dual over center valve, cylinder

Right Stack Top to Bottom Circuit	Components
Scarifier lift	Spool, dual over center, cylinder
Articulation	Spool, solenoid, dual check valve, cylinders
Wheel lean	Spool, solenoid, dual check valve, cylinder
Saddle lock	Spool, relief valves, cylinders
Right moldboard lift	Spool, dual over center, cylinder

5.4.2.5
Remove mount capscrews and remove pump.

T-95309



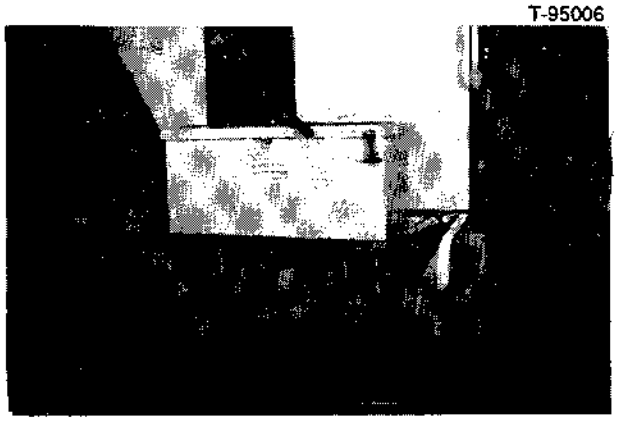
5.4.3 Implement Control Valve Removal and Installation

5.4.3.1
Drain the implement tank and turn off the electrical master switch.

⚠ WARNING

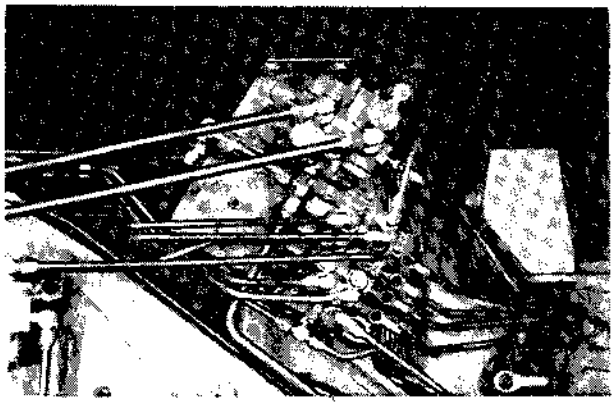
Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

T-95006



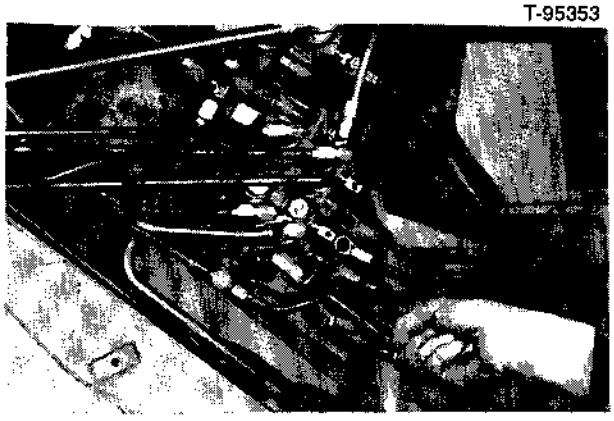
5.4.3.2
Remove cover from the control valve.

T-95346



5.4.3.3
Disconnect the control linkages from the spools.

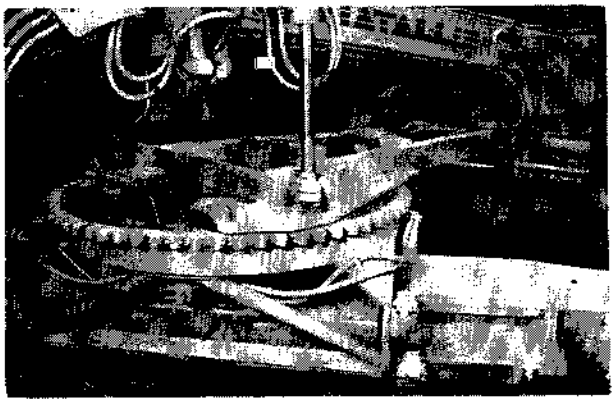
T-95353



5.4.9 Moldboard Lateral Shift Cylinder Removal & Installation

T-91682

5.4.9.1
Position moldboard upon the ground.

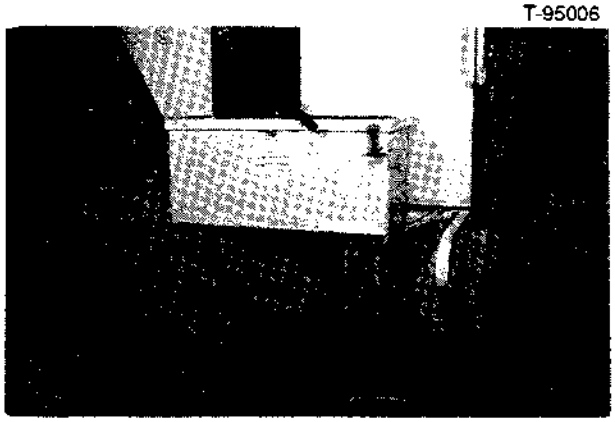


T-95006

5.4.9.2
Turn off master switch and drain the implement tank.

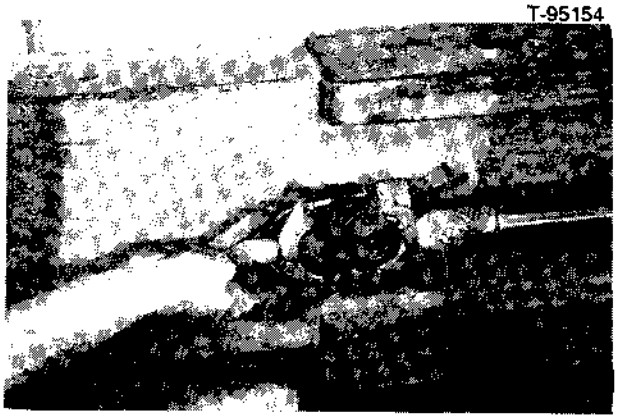
⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.



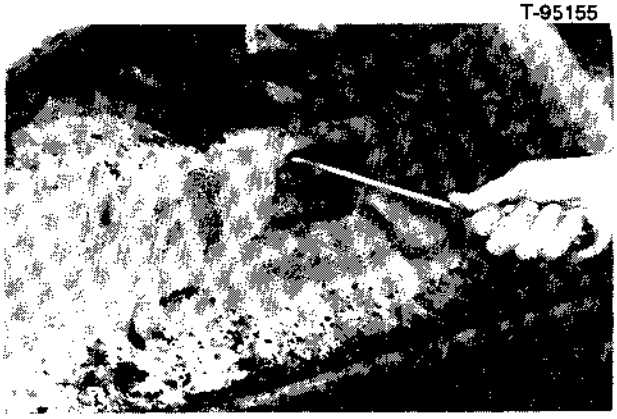
T-95154

5.4.9.3
Remove the cylinders end caps, keeping shims in position. Force the piston rod into the cylinder.



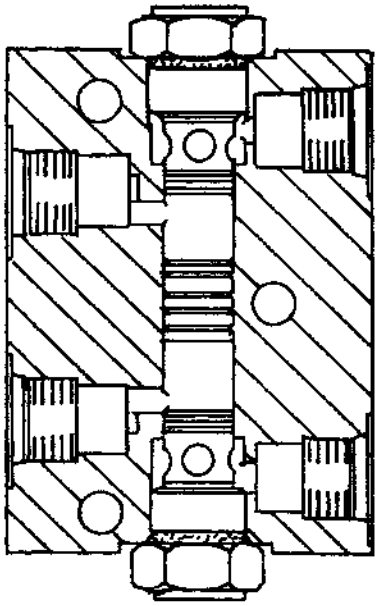
T-95155

5.4.9.4
Remove cylinder hoses.



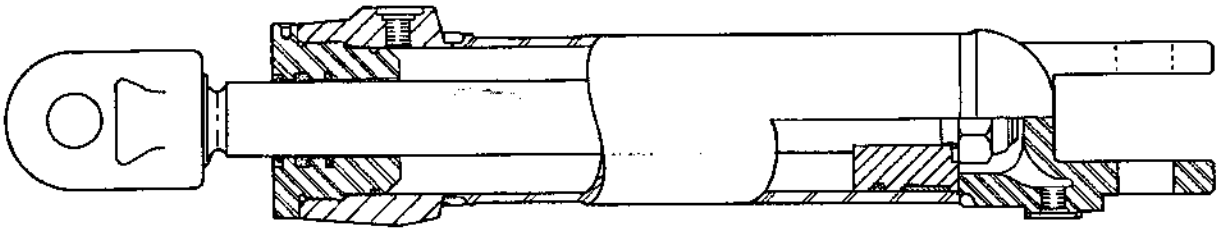
5.6 SPECIFICATIONS

5.6.3 Dual Check Valve



5.6 SPECIFICATIONS

5.6.13 Scarifier Lift Cylinder



Torque (lubricated)	daNm	ft.lbs.
Rod Nut	115-129	850-950
Head	190-203	1400-1500

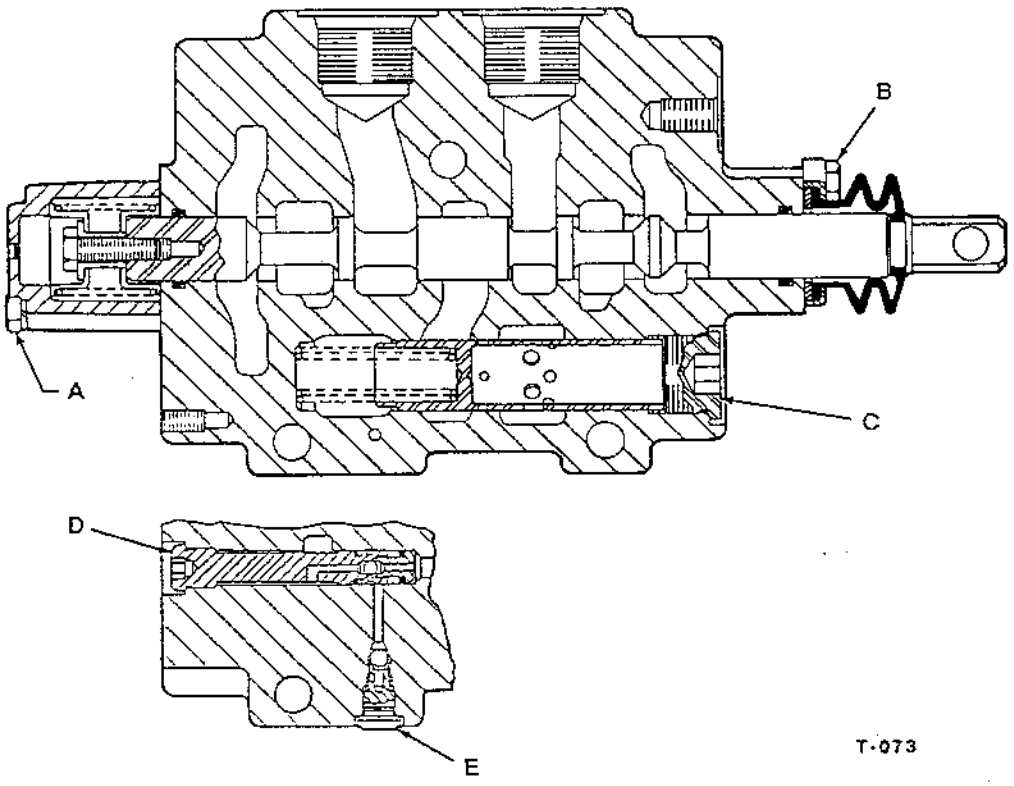
Dimensions	mm	in
Cylinder I.D.	104.1-104.4	4.100-4.110
Piston I.D.	35.05-35.10	1.380-1.382
Rod O.D.	50.72-50.80	1.997-2.000
Rod O.D.	34.89-34.92	1.374-1.375
Head I.D.	50.85-50.90	2.002-2.004

5.6 SPECIFICATIONS

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Cylinder moves while control valve is in neutral	Over-center valve (or cylinder lock valve) not sealing properly		Disconnect line between over-center valve and control valve with blade in the air. Blade should remain in position.	If blade drifts, rebuild or replace the over-center valve (or cylinder lock valve).
	Oil leakage around cylinder piston seal.			Replace all the piston seals of the affected cylinder.
Cylinder moves due to gravity load while control valve is in neutral.	Control valve spool is stuck open or not fully stroking.		Check to make sure spool travel is not limited due to external interference or make sure linkage is adjusted to insure proper stroke of the spool.	Check affected spool in control valve for scoring or scratches. Spool may be repaired with some light *"dressing"*, otherwise, it must be replaced.
	The signal check is not working properly	Two pressure gauges 75300110	Check the differential pressure between the signal port and the work port of the affected valve. Operate the questionable function while *"dead-heading"* another function. If a differential of over 1.4 bar (20 psi) is produced at any time, the signal is not working.	Examine the signal check for sticking and check the o-rings on the orifice plug in the valve end plate.
	In the moldboard lift circuit, the circuit relief is not working properly.		Check the differential pressure between the signal port and the work port of the affected valve. Operate the questionable function while *"dead-heading"* another function. If a differential of over 1.4 bar (20 psi) is produced at any time, the signal is not working.	In the moldboard lift circuits, if the differential is normal but full system pressure cannot be produced, replace the circuit relief and/or defective o-rings.
	In the moldboard lift circuit, over-center valve malfunction.		Disconnect line between over-center valve and control valve with blade in the air. Blade should remain in position.	If blade drifts, rebuild or replace the over-center valve (or cylinder lock valve).

FG85 FG105 SPECIFICATIONS

5.12.2 Valve Section (FG85-95)



	daNm	ft.lbs.
A	0.81-1.35	6-10
B	0.4-0.67	3-5
C	2.44-3.0	18-22
D	1.08-1.35	8-10
E	1.08-1.35	8-10

SECTION 6 REBUILD PROCEDURES

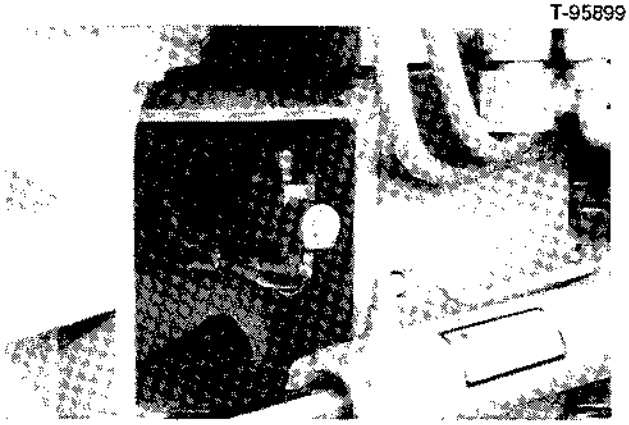
6.1

6.2 ARTICULATION JOINT

6.2.1

The hitch used consists of tapered roller bearings. The hitch allows a total of 50 degrees articulation.

T-95899



6.2.2

Support the two main frames on jack stands during rebuild.

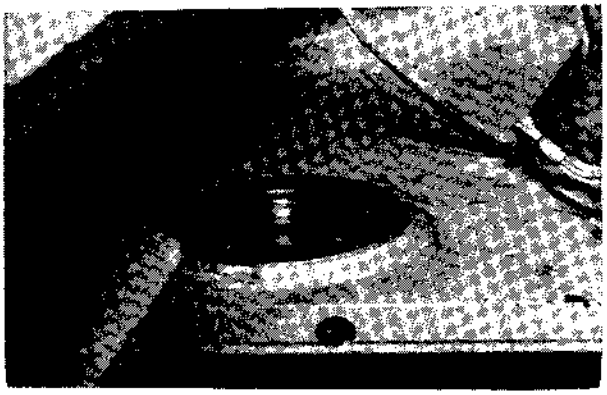
⚠ WARNING

Do not work under or near unblocked or unsupported linkage, parts or machine.

6.2.3

Clean bearing bores.

T-95403



⚠ WARNING

Never use gasoline solvent or other flammable fluids to clean element. Use authorized commercial, non-flammable, non-toxic solvents.

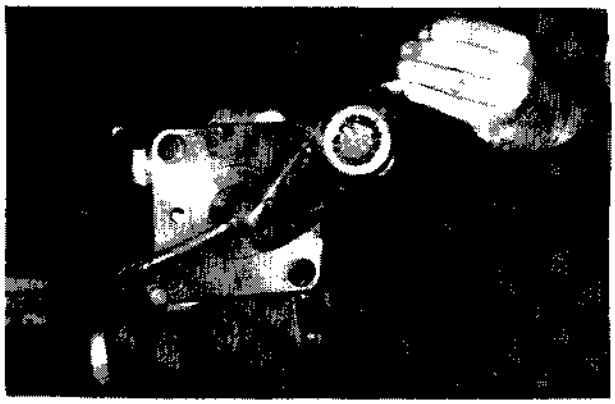
6.2.4

Measure the bearing height of the outer races plus the height of the spacer. Record these dimensions. Keep the bearing pieces matched. Repeat the measurement for the other hitch bearing.

T-95402

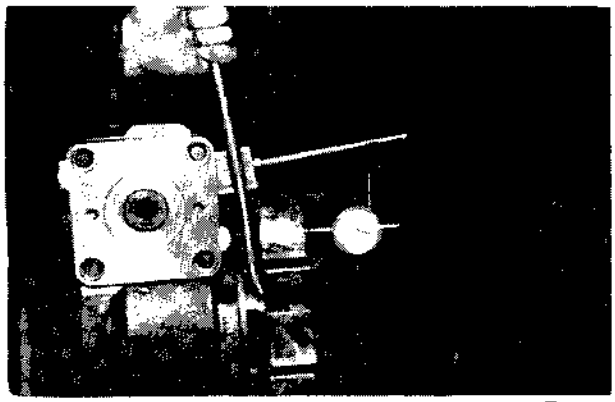
6.3.4.13
Rebuild is the reverse of disassembly except for preloading the worm bearings. See section 6.6.3.4 for specifications.

T-95894



6.3.4.14
The shaft weld assembly must have an end shake. Check Section 6.6.3.4 for specifications.

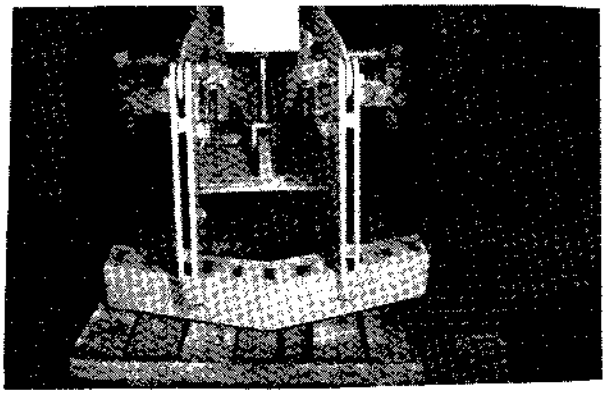
T-95896



6.4 SCARIFIER REMOVAL

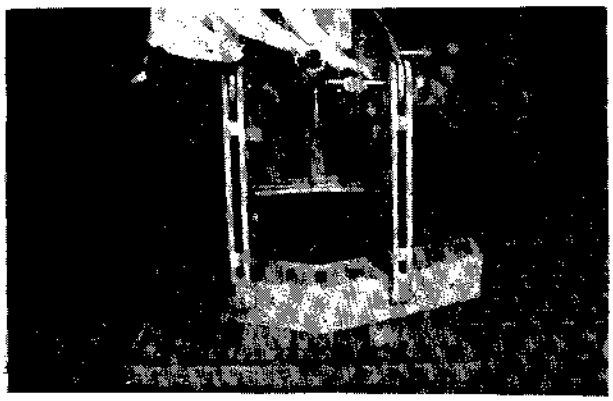
6.4.1
Lower scarifier teeth to the ground. Shut off engine.

T-95361

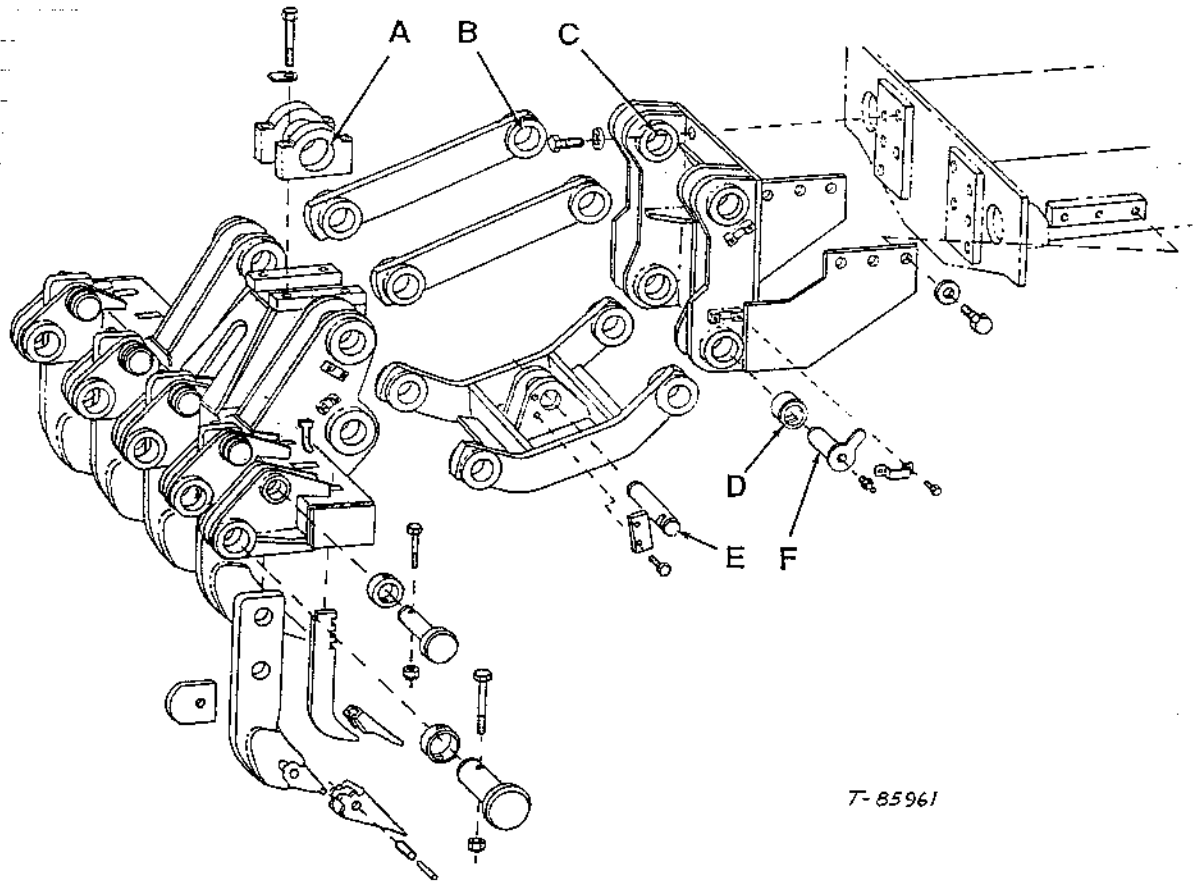


6.4.2
Remove pin locks and push pin from scarifier and mount.

T-95363



6.6.5 RIPPER



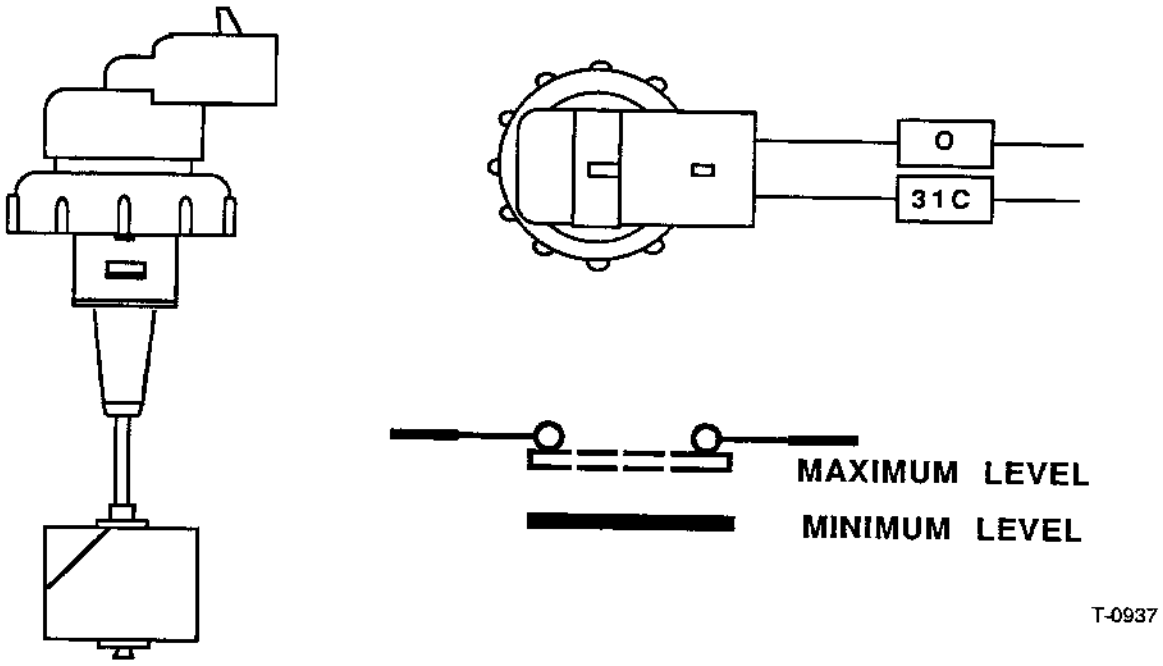
Dimensions	mm	inch
A. Support bore I.D.	70.100-70.174	2.7598-2.7627
B. Strut bore I.D.	60.000-60.046	2.3622-2.3640
C. Frame bore I.D.	50.080-50.180	1.9716-1.9756
D. Bushing O.D.	60.07-60.10	2.365-2.366
Bushing I.D.	50.195-50.265	1.9761-1.9789
E. Pin O.D.	59.954-60.000	2.3604-2.3622
F. Pin O.D.	49.961-50.000	1.9669-1.9685

Torque	daNm	ft.lbs.

See section 0 for individual bolt torques per size of bolt.

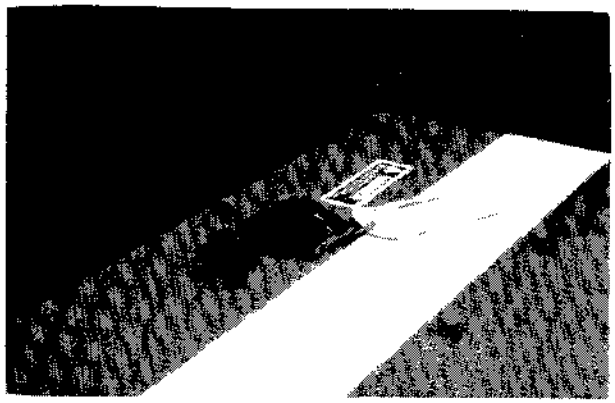
FG75, 85 ALPHABETICAL INDEX

6 COOLANT LEVEL SENSOR

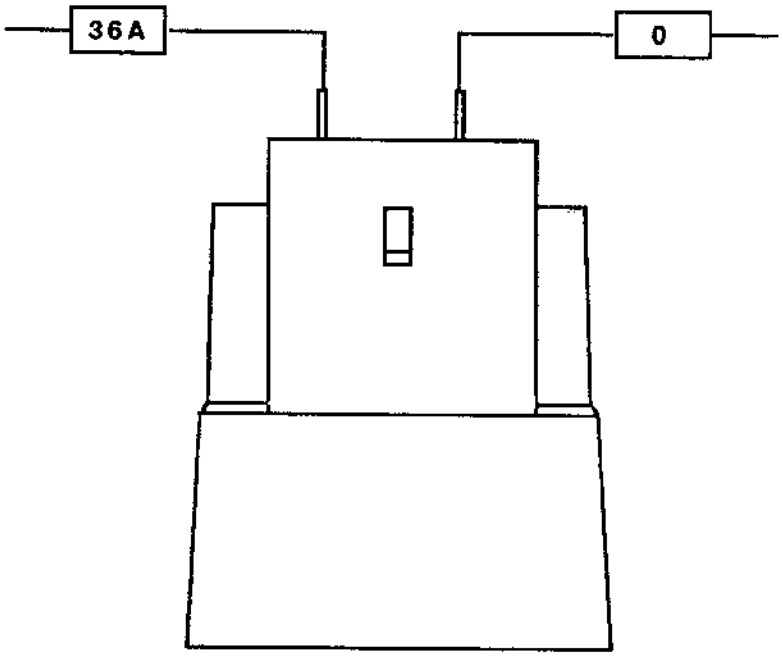


WIRE

0	To frame ground
31C	To data monitor (26) plug A position 5

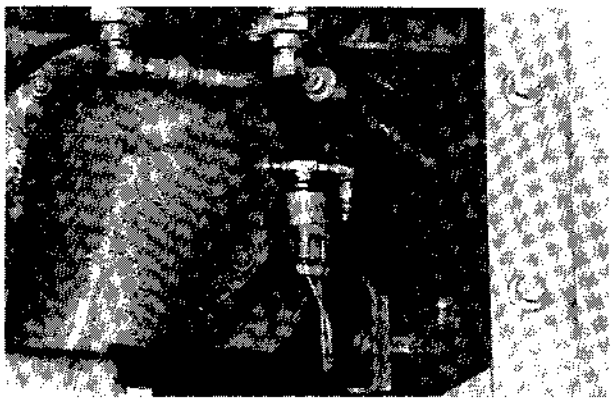


16 AIR CLEANER SWITCH

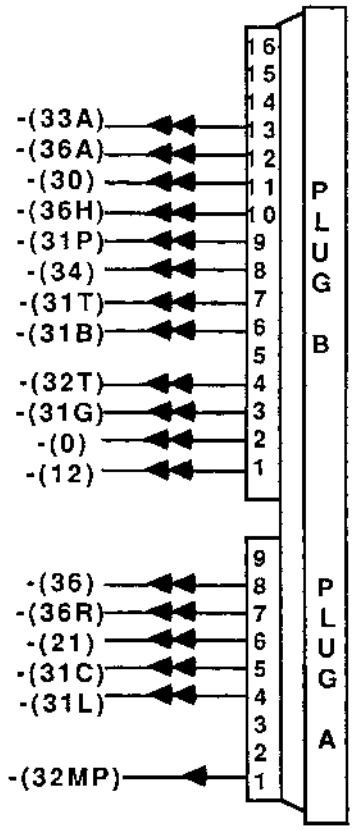


T-01171

WIRE
36A To data monitor (26) plug B, position 12
0 To frame ground



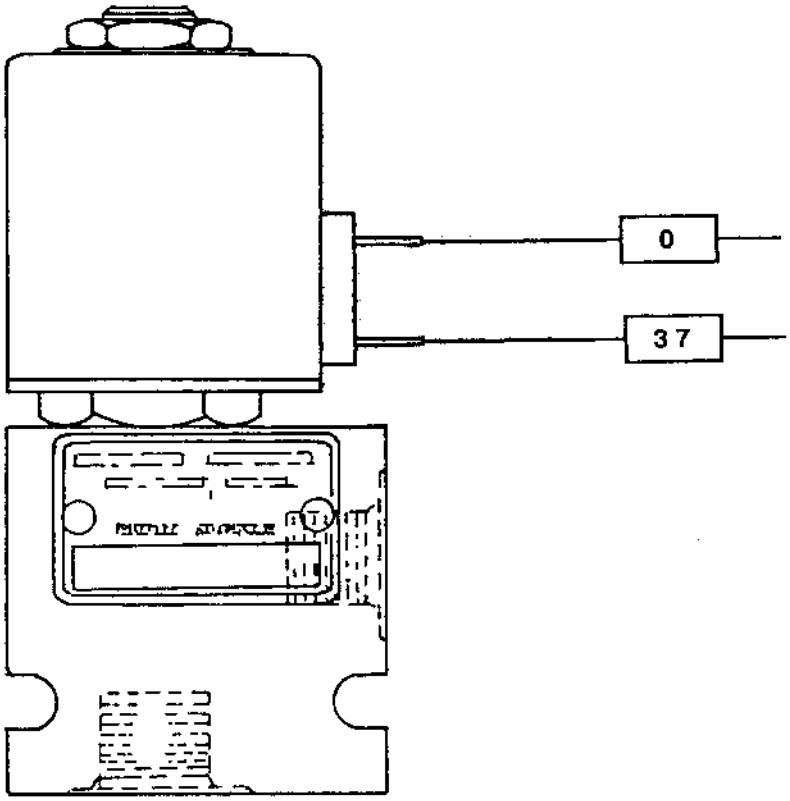
26 DATA MONITOR



T-01172

WIRE	
33A	To brake relay (34), position D
36A	To air cleaner switch (16)
30	To fuse box (78) 4 amp fuse, position 4, to hour meter (80), + position
36H	To hydraulic filter pressure switch (10)
31P	To engine oil pressure switch (17), to hour meter (80), - position
34	To alternator (15), position D+
31T	To engine coolant temperature sensor (18)
31B	To buzzer (29) + position
32T	To transmission temperature switch (8)
31G	To buzzer (29), - position
0	To frame ground
12	To fuse box (78) 4 amp fuse, position 2 & 3, also ignition switch (76) "ACC" position
36	To fuel level sensor (22)
36R	To fuel level sensor (22)
21	To ignition switch (76), "ST" position
31C	To coolant level sensor (6)
31L	To engine oil level sensor (19)
32MP	To transmission main pressure switch (9)

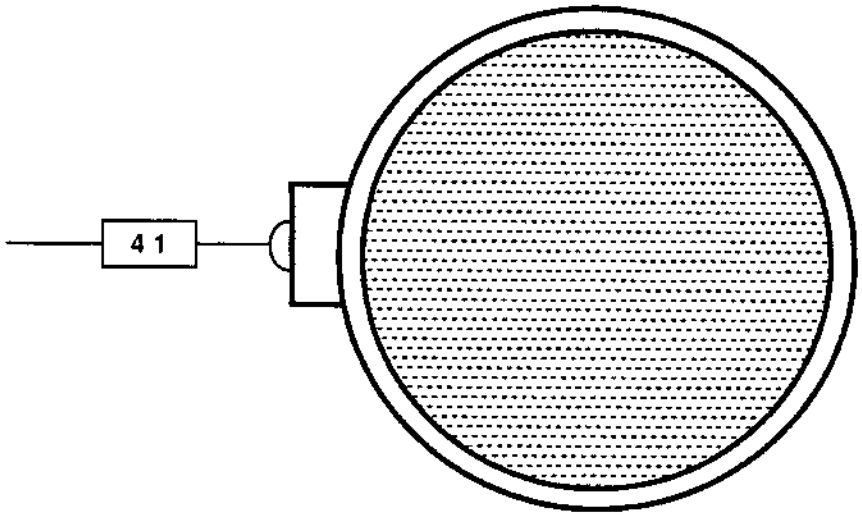
36 EMERGENCY STEERING SOLENOID VALVE



T-01166

WIRE
37 To emergency steering test switch (39)
0 To pressure switch (33), to frame ground

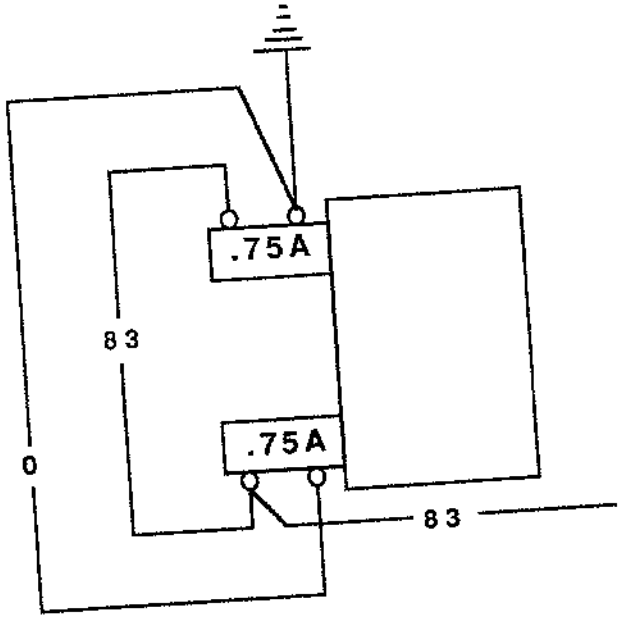
46 HEAD LIGHT



T-0221

WIRE
41 To light switch (81), position "HL"

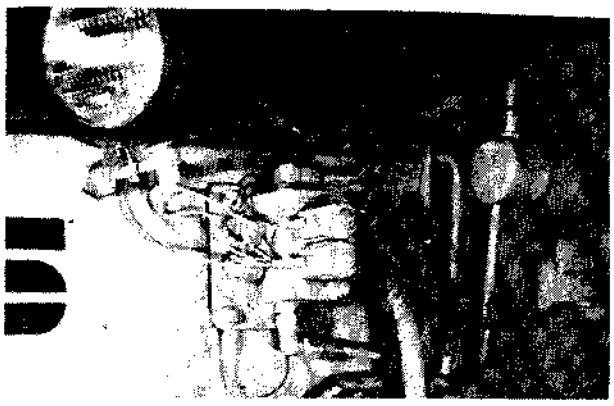
56 RIGHT LIFT FLOAT SOLENOID VALVE



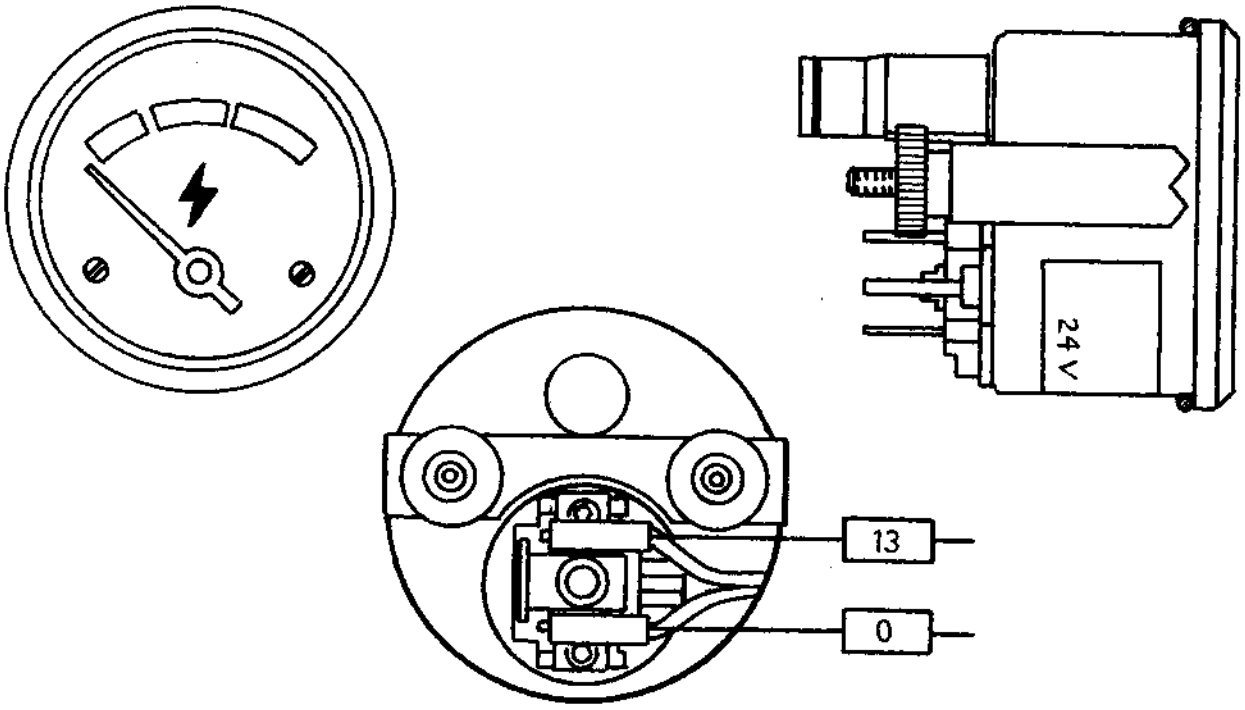
T-01176

WIRE

83	To right lift float switch (87)
0	To ground



66 VOLTMETER

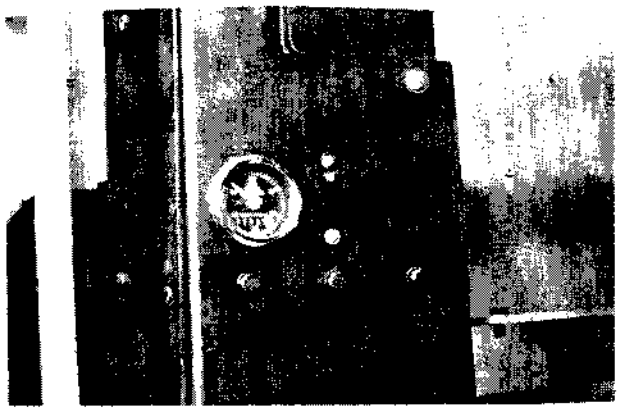


T-0240

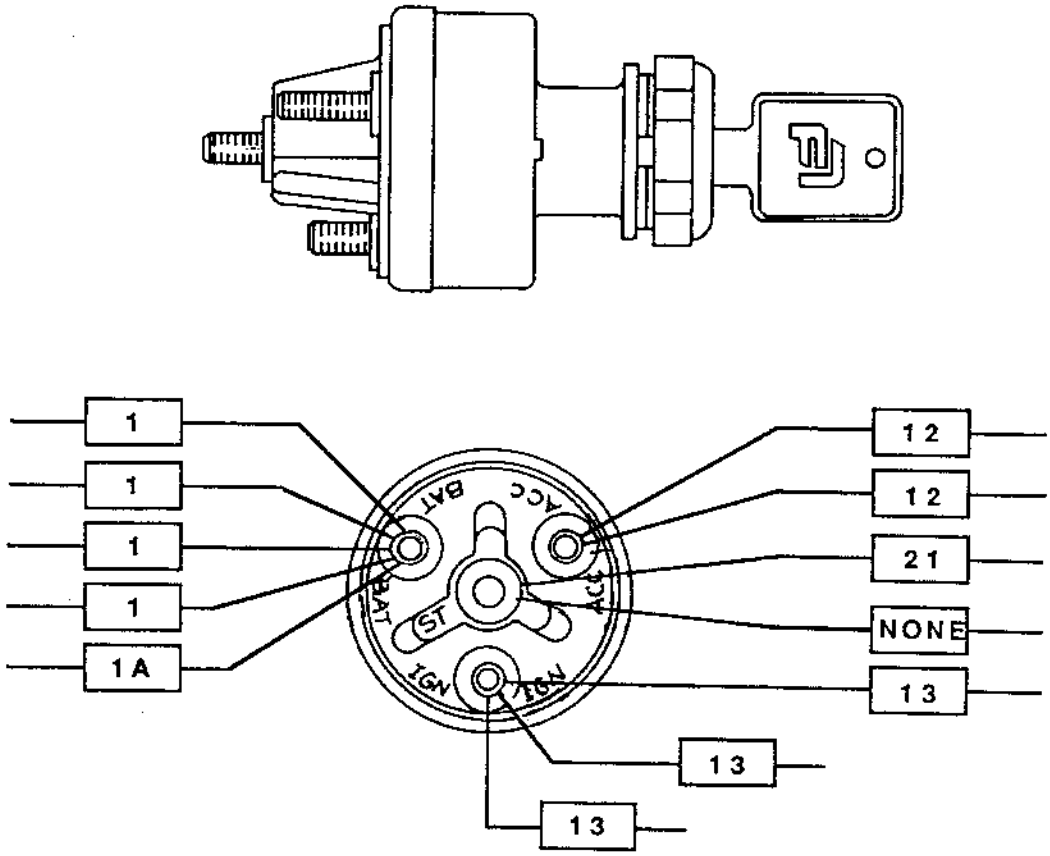
WIRE

13 To engine oil pressure gauge (89), engine temperature gauge (88) and ignition switch (76) "IGN" position

0 To engine oil pressure gauge (89), engine temperature gauge (88) to panel ground



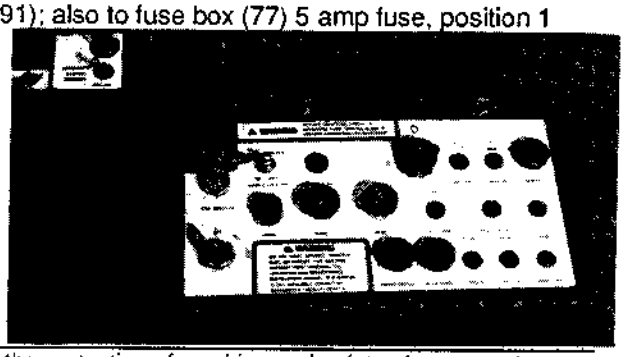
76 IGNITION SWITCH



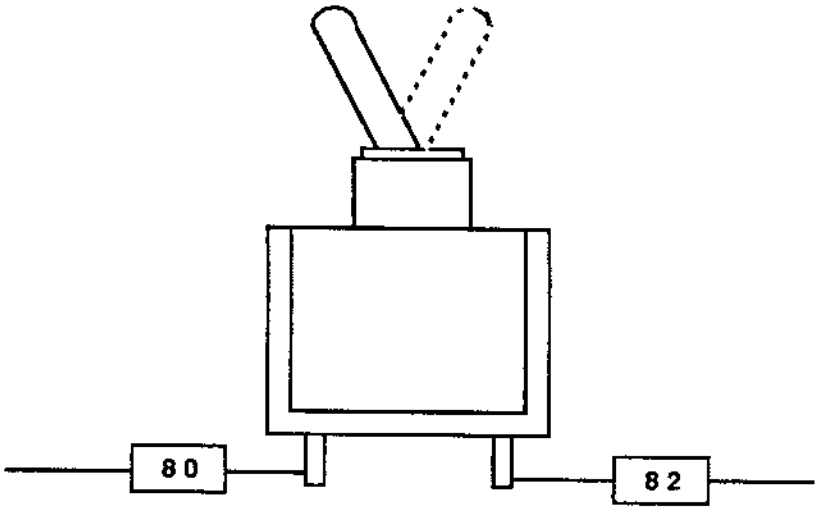
T-0156

WIRE

1	To starter (14); also to fuse box (77) 15 amp fuse, position 4
1A	To fuse box (78) 15 amp fuse, position 7, 10 & 11
12	To data monitor (26) plug B, position 1; also fuse box (78) 4 amp fuse, position 2 & 3, 15 amp fuse, position 6 and fuse box (77) 15 amp fuse, position 5, 8, 9 & 12
13	To instrument panel gauges (66, 88, 89, 90 & 91); also to fuse box (77) 5 amp fuse, position 1
21	To data monitor (26) plug A, position 6
None	To fuse (83), to starting aid switch (84)



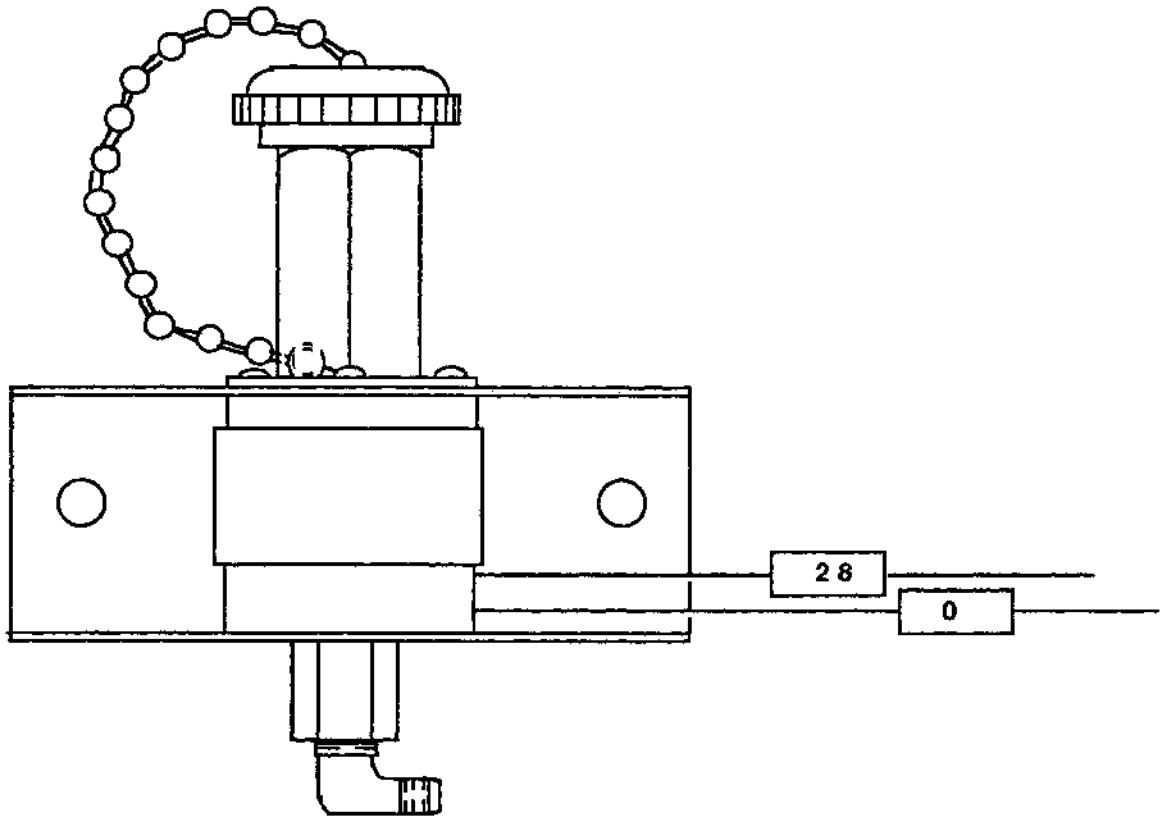
86 LEFT LIFT FLOAT SWITCH



T-0204

WIRE
80 To dozer float switch (85)
82 To left lift float control solenoid (44)

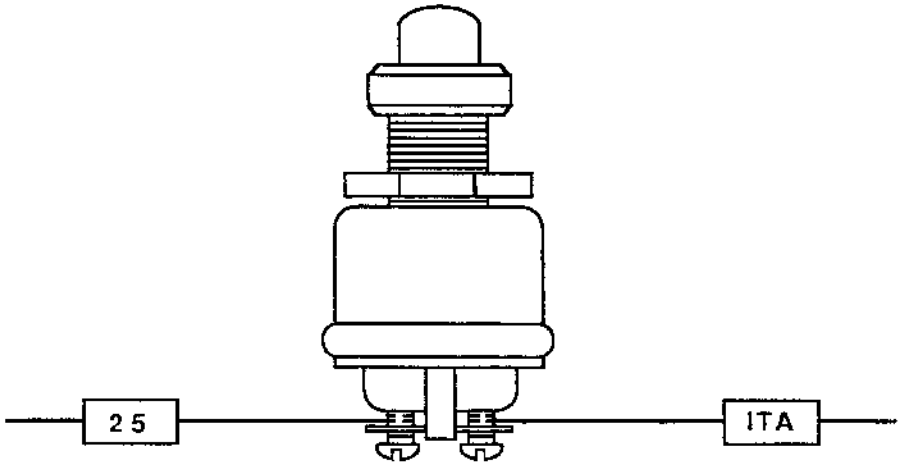
96 STARTING AID VALVE



T-0247

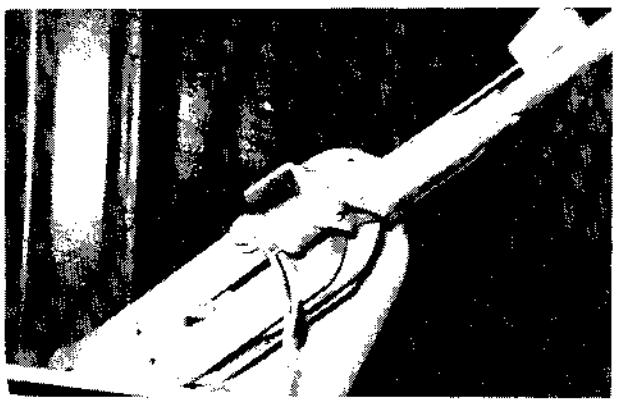
WIRE
28 To starting aid switch (84)
0 To ground

106 PARKING BRAKE SWITCH

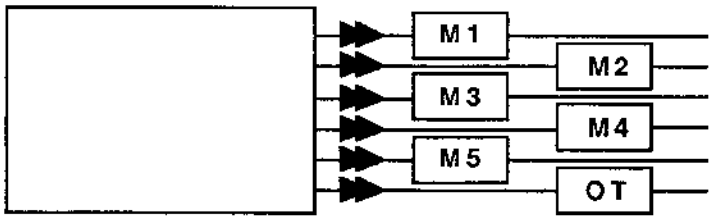


T-0250

WIRE
25 To forward declutch relay (107), position A
1TA To wire1T, to fuse box (77) 10 amp fuse, position 2



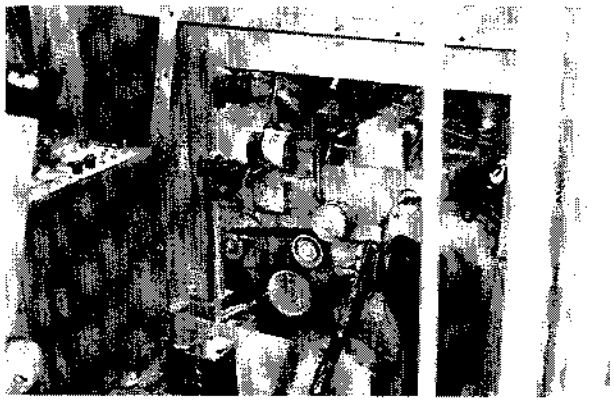
116 TRANSMISSION CONTROL VALVE



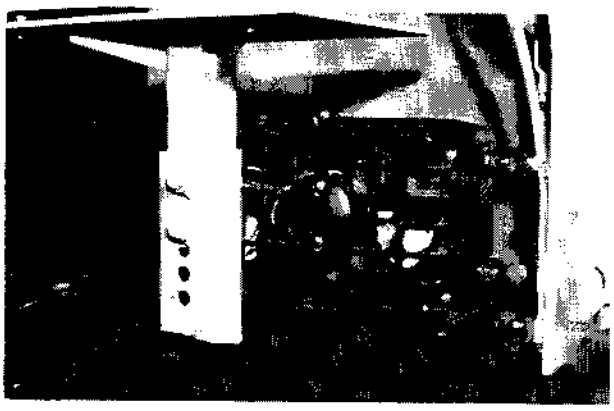
T-01186

WIRE

M1	To shift control (120) 7 terminal connector, position 1
M2	To shift control (120) 7 terminal connector, position 2
M3	To shift control (120) 7 terminal connector, position 3
M4	To shift control (120) 7 terminal connector, position 4
M5	To shift control (120) 7 terminal connector, position 5
0T	To frame ground



8.2.2.3
The access panel can be removed to gain access to the front of the engine and to the steering relief valve.



8.2.2.4
Height adjustment can be made by raising or lowering the seat on the pedestal.

8.2.3 Vent Fan

8.2.3.1
Remove capscrews holding vent panel to the cab roof. Turn off master switch.

⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

8.2.3.2
Disconnect fan.

TABLE OF CONTENTS

NOTE: Metric Dimensions Shown in Brackets [ ].

CLARK

CLUTCH AND GEAR GROUP

ITEM	DESCRIPTION	QTY.
1	Forward Shaft Pilot Bearing	1
2	Spring Retainer Ring	1
3	Spring Retainer	1
4	Piston Return Spring - Belleville Washer	7
5	Piston Return Spring Spacer	1
6	Forward Shaft, Drum & Plug Assembly	1
7	Piston Ring Expander Spring	3
8	Forward Shaft Piston Ring	3
9	Piston Ring Sleeve Retaining Ring	1
10	Piston Ring Sleeve	1
11	Forward Shaft Rear Bearing	1
12	Reverse Shaft Piston Ring	3
13	Front Bearing Retaining Ring	1
14	Front Bearing Snap Ring	1
15	Reverse Shaft Front Bearing	1
16	Front Bearing Retaining Ring	1
17	Clutch Driven Gear Bearing Assembly	1
18	Reverse Clutch Gear & Hub Assembly	1
19	Baffle Ring	1
20	Spring Retaining Snap Ring	1
21	Spring Retainer	1
22	Piston Return Spring - Belleville Washer	7
23	Piston Return Spring Spacer	1
24	Reverse and 3rd & 4th Clutch Drum and Plug Assembly	1
25	Piston Return Spring	1
26	Spring Retainer	1
27	Spring Retainer Snap Ring	1
28	3rd & 4th Clutch Shaft Pilot Bearing	1
29	Retainer Locating Ring	1
30	Retaining Ring Retainer	1
31	Clutch Disc Hub Retaining Ring	1
32	Baffle Ring	1
33	Clutch Disc Hub	1
34	Piston Return Spring	1
35	Spring Retainer	1
36	Spring Retainer Ring	1
37	5th & 6th Clutch Shaft Pilot Bearing	1
38	Retainer Snap Ring	1
39	Retaining Ring Retainer	1
40	Clutch Disc Hub Retaining Ring	1
41	Baffle Ring	1
42	Clutch Disc Hub	1
43	Spring Retainer Ring	1
44	Spring Retainer	1
45	Piston Return Spring - Belleville Washer	7
46	Piston Return Spring Spacer	1
47	Forward High and 5th & 6th Clutch Drum & Plug Assembly	1
48	Forward High Shaft Piston Ring	3
49	Front Bearing Retaining Ring	1
50	Front Bearing Snap Ring	1
51	Forward High Shaft Front Bearing	1
52	Front Bearing Retaining Ring	1
53	Clutch Driven Gear Bearing	1
54	Clutch Gear Bearing Retaining Ring	1
55	Clutch Driven Gear Bearing Spacer	1
56	Forward High Clutch Gear & Hub Assembly	1
57	Oil Baffle Ring	1
58	Clutch Gear Bearing Retaining Ring	1
59	Clutch Driven Gear Bearing	1
60	Front Bearing Cap Screw Lockwasher	4
61	Front Bearing Cap Screw	4
62	Flange Nut	1
63	Flange Washer	1
64	Flange "O" Ring	1
65	Front Output Flange	1
66	Front Bearing Cap Oil Seal	1
67	Front Bearing Cap	1
68	Bearing Cap Shim	AR
69	Front Bearing Cap "O" Ring	1
70	Front Bearing Cup	1
71	Front Bearing Cone	1
72	Forward Shaft Gear	1
73	Gear Retaining Ring	1
74	1st & 2nd Clutch Shaft Front Bearing	1
75	Front Bearing Spacer	1
76	1st & 2nd Clutch Gear Bearing	1
77	Bearing Locating Ring	1
78	Bearing Spacer	1
79	1st & 2nd Clutch Gear	1
80	Baffle Ring	1
81	Bearing Locating Ring	1
82	1st & 2nd Clutch Gear Bearing	1
83	Belleville Washer Retainer	1
84	Spring Retainer Ring	1
85	Belleville Washer	7
86	Belleville Washer Spacer	1
87	1st & 2nd Clutch Drum & Bleed Valve Assembly	1
88	Bearing to Shaft Spacer	1
89	Clutch Shaft Rear Bearing	1
90	Bearing Retainer Ring	1
91	1st & 2nd Shaft Piston Ring	1
92	Bearing Cap Gasket	1
93	Bearing Cap "O" Ring	1
94	Bearing Cap Plug	1
95	Rear Bearing Cap	1
96	Bearing Cap Screw Lockwasher	4
97	Bearing Cap Screw	4
98	Idler Shaft Front Bearing	1
99	Idler Shaft	1
100	Idler Shaft Rear Bearing	1
101	Idler Shaft Rear Bearing Lock Ball	1
102	Rear Bearing Locating Ring	1
103	Pump Drive Sleeve	1
104	Idler Shaft Nut	1
105	Idler Gear Spacer	1
106	Idler Shaft Gear	1
107	Idler Shaft Gear	1
108	Idler Shaft Bearing Cap Gasket	1
109	Idler Shaft Bearing Cap	1
110	Idler Shaft Bearing Cap Screw Lockwasher	4
111	Idler Shaft Bearing Cap Screw	4
112	Output Shaft	1
113	Output Gear Spacer	1
114	Output Shaft Gear	1
115	Rear Bearing Cone	1
116	Rear Bearing Cup	1
117	Rear Bearing Cap "O" Ring	1
118	Rear Bearing Cap "O" Ring	1
119	Rear Bearing Cap	1
120	Rear Bearing Cap Screw Lockwasher	3
121	Rear Bearing Cap Screw	3
122	Rear Bearing Cap Oil Seal	1
123	Rear Output Flange	1
124	Flange "O" Ring	1
125	Flange Washer	1
126	Flange Nut	1
127	Rear Bearing Cap Screw	1
128	Rear Bearing Cap Screw Lockwasher	1

1. Assemble oil filter and tighten 20 to 25 Lbs.Ft. [27,2-33,8 N·m]
2. Teflon seals must be sized prior to ass'y.
3. Must be loose internal fit bearing with a No. 3 etched on the bearing.
4. 10-outer steel plates, 10-inner friction plates. Alternately assemble, starting with outer steel plate.
5. 6-outer steel plates, 6-inner friction plates. Alternately assemble, starting with outer steel plate.
6. 12-outer steel plates, 12-inner friction plates. Alternately assemble, starting with outer steel plate.
7. Tighten 200 to 250 Lbs.Ft [271,2-338,9 N·m]
8. Special bearing loading notches opposite snap ring.
9. Bend lock tabs after tightening cap screws to proper torque.
10. Tighten oil screen assy 10 to 15 Lbs.Ft. [13,6-20,3 N·m]
11. Low, Forward and Reverse Clutch Springs - Concave side of first Belleville spring to be placed against clutch piston. Remaining six springs of each clutch to be stacked alternately reversed as shown.

12. Shim output shaft bearings to produce 6 to 8 Lbs. in. [0,68-0,90 N·m] pre load.
13. Clean mounting surfaces and tapped holes with solvent. Dry thoroughly, being certain tapped holes are dry and clean. **See text for proper installation.**
14. Tighten 200-250 Lbs. Ft. [271,2-338,9 N·m] and stake nut securely into shaft notch.
15. Stator support screw assembly: (View "S")
    1. Clean stator support mounting surface and tapped holes with solvent. Dry thoroughly, being certain tapped holes are clean and dry.
    2. Install 6 special stator support screws. Tighten screws 12 to 16 Lbs. Ft. [16,3-21,6 N·m] torque. See Caution.

Notes

All lead in chamfers for oil seals, piston rings, and "O" rings must be smooth and free from burrs. Inspect at assembly.

Lubricate all piston ring grooves and "O" rings with oil before assembly.

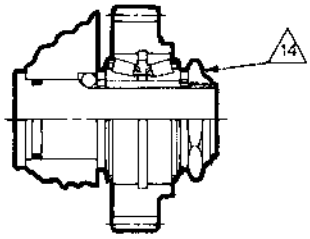
Apply a thin coating of grease between seal lips on lip type seals prior to assembly.

Apply a very light coat of Permatex No. 2 to O.D. of all oil seals and bore plugs before assy.

Apply a light coat of Loctite No. 92 to all plug threads.

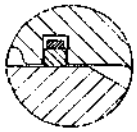
Apply a light coat of Permatex No. 2 to all thru hole stud threads.

After assembly of parts using Loctite or Permatex, there must not be any free or excess material which might enter the oil circuit.



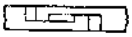
VIEW "T"
REVERSE IDLER

VIEW "V"



Enlarged view of stator support piston ring & expander

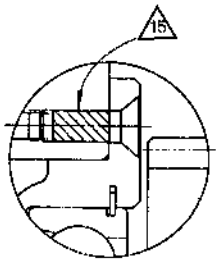
Note:
Expander gap to be approx. 180° from ring hook joint to aid assembly.



1ST
(Low)

Caution:

Assembly of stator support to converter housing must be completed within a 15 minute period from start of screw installation. The special screw is to be used for one installation only. If screw is removed for any reason, it must be replaced. The Loctite left in the holes must be removed with the proper tap and cleaned with solvent. Dry hole thoroughly and use a new screw for reinstallation.



VIEW "S"

Torque Specification for Lubricated or Plated Screw Threads

NOM. SIZE	Grade 5 FINE THREAD LB-FT	[N·m]	Grade 5 COARSE THREAD LB-FT	[N·m]	Grade 8 FINE THREAD LB-FT	[N·m]	Grade 8 COARSE THREAD LB-FT	[N·m]
.2500	9 - 11	[12,3 - 14,9]	8 - 10	[10,9 - 13,5]	11 - 13	[15,0 - 17,6]	9 - 11	[12,3 - 14,9]
.3125	16 - 20	[21,7 - 27,1]	12 - 16	[16,3 - 21,6]	28 - 32	[38,0 - 43,3]	26 - 30	[35,3 - 40,6]
.3750	26 - 29	[35,3 - 39,3]	23 - 25	[31,2 - 33,8]	37 - 41	[50,2 - 55,5]	33 - 36	[44,8 - 48,8]
.4375	41 - 45	[55,6 - 61,0]	37 - 41	[50,2 - 55,5]	58 - 64	[78,7 - 86,7]	52 - 57	[70,6 - 77,2]
.5000	64 - 70	[86,8 - 94,9]	57 - 63	[77,3 - 85,4]	90 - 99	[122.1 - 134,2]	80 - 88	[108,5 - 119,3]
.5625	91 - 100	[123,4 - 135,5]	82 - 90	[111,2 - 122,0]	128 - 141	[173,6 - 191,1]	115 - 127	[156,0 - 172,2]
.6250	128 - 141	[173,5 - 191,2]	113 - 124	[153,2 - 168,1]	180 - 198	[224,0 - 268,5]	159 - 175	[215,6 - 237,3]
.7500	223 - 245	[302,3 - 332,2]	200 - 220	[271,2 - 298,3]	315 - 347	[427,1 - 470,5]	282 - 310	[382,3 - 420,3]

FIGURE I

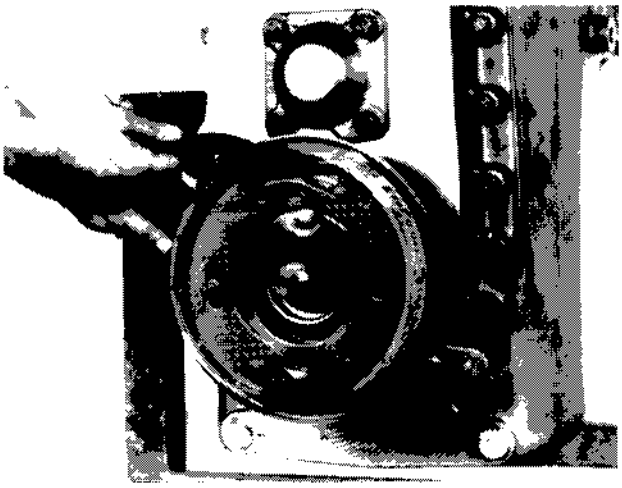


Figure 35
Remove brake shoe return spring.

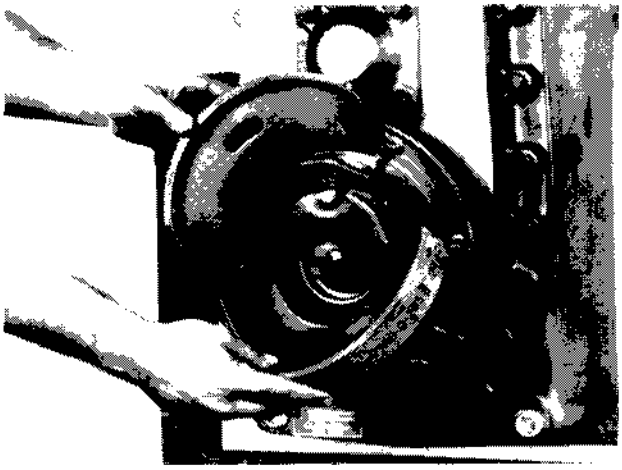


Figure 36
Remove brake shoe and lining.

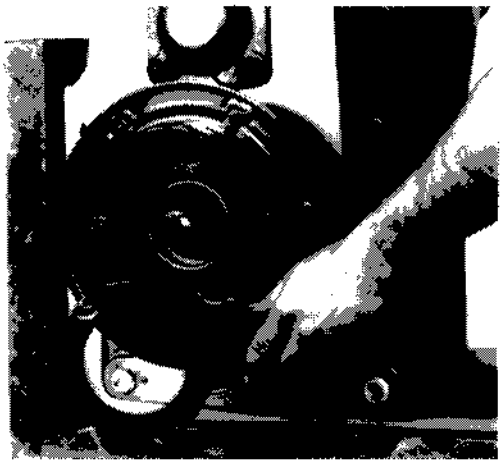


Figure 37
Remove brake actuator lever.

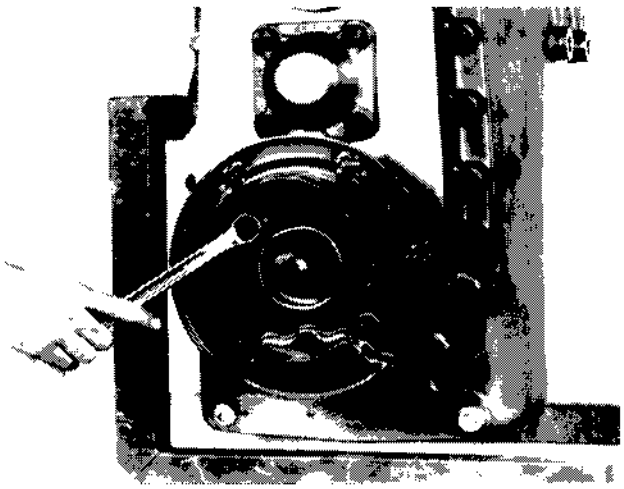


Figure 38
Remove brake backing plate attaching bolts and washers.

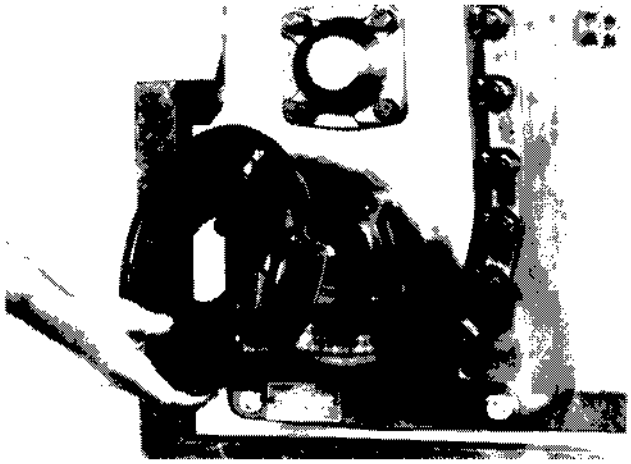


Figure 39
Remove backing plate.

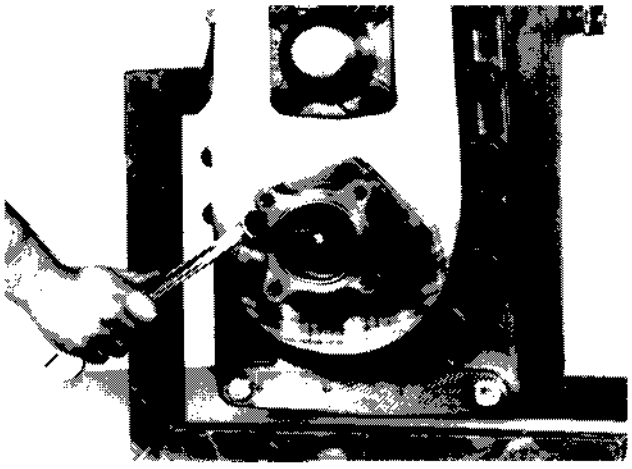


Figure 40
Remove output shaft rear bearing cap bolts and washers.

Figure 94
Remove end plate retainer ring.

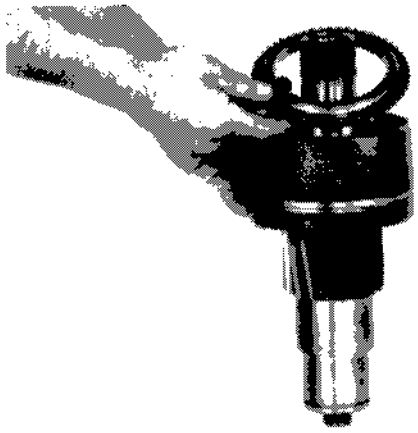


Figure 95
Remove end plate.

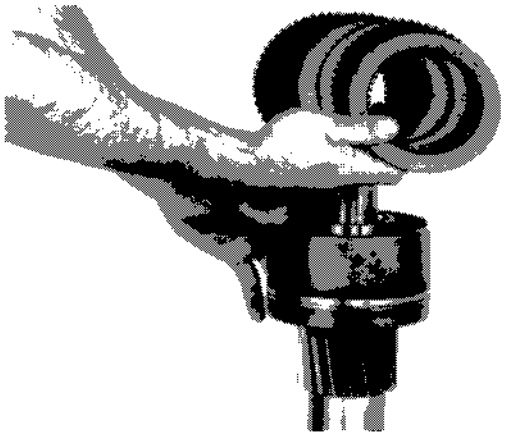


Figure 96
Remove inner and outer clutch discs.

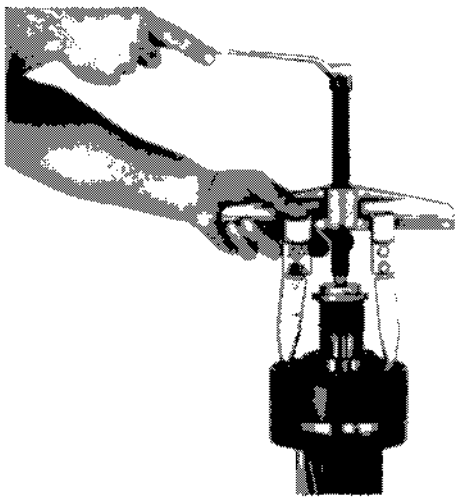


Figure 97
Remove clutch inner bearing.

Figure 98
Remove piston return spring (belleville washer) retainer ring retainer.

Figure 99
Remove return spring retainer ring.

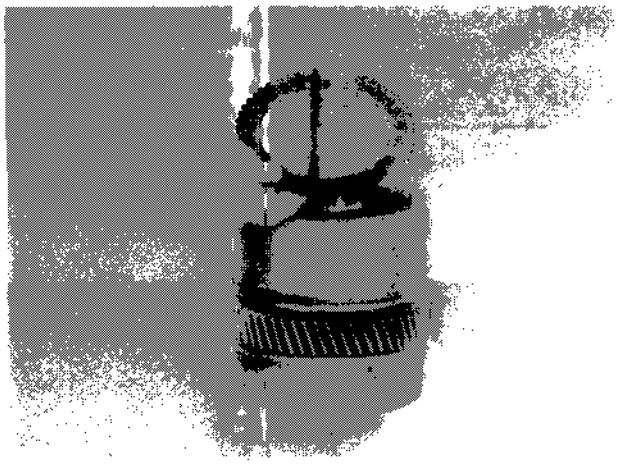


Figure 154
Install one steel disc.

Figure 155
Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is friction.

Figure 156
Install clutch disc end plate.

Figure 157
Install end plate retainer ring.

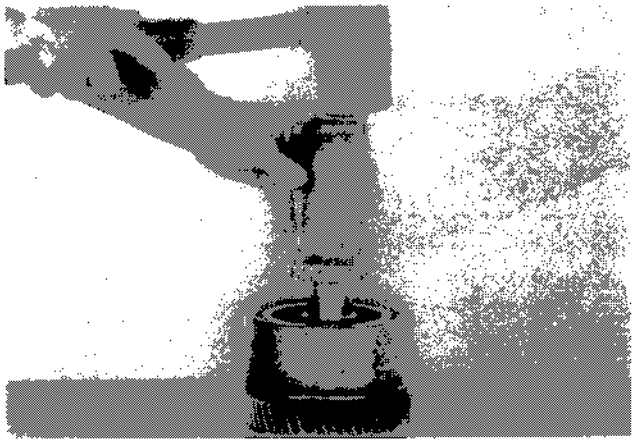


Figure 158
Install clutch gear inner taper bearing, small diameter of taper up.

Figure 159
Position taper bearing spacer on shaft.

Figure 213
Remove end plate.

Figure 216
Remove piston return springs. (Belleville washers)

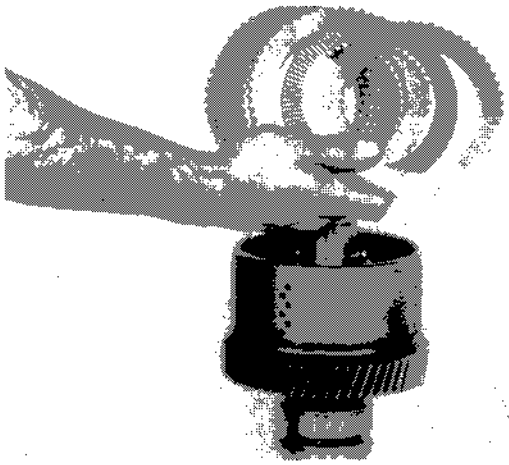


Figure 214
Remove inner and outer clutch discs.

Figure 217
Remove piston spacer.

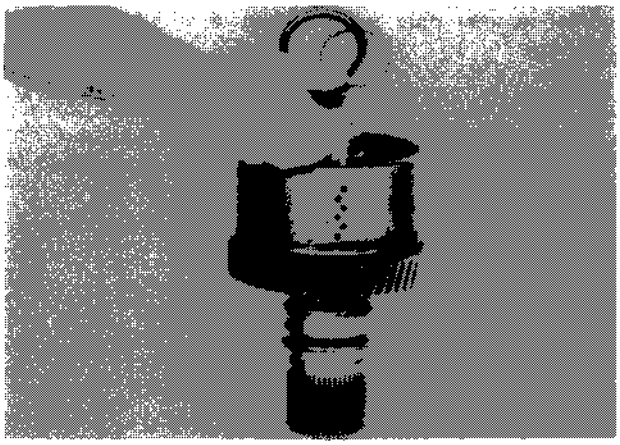


Figure 215
Compress piston return springs (Belleville washers). Remove return spring retainer ring and ring retainer.

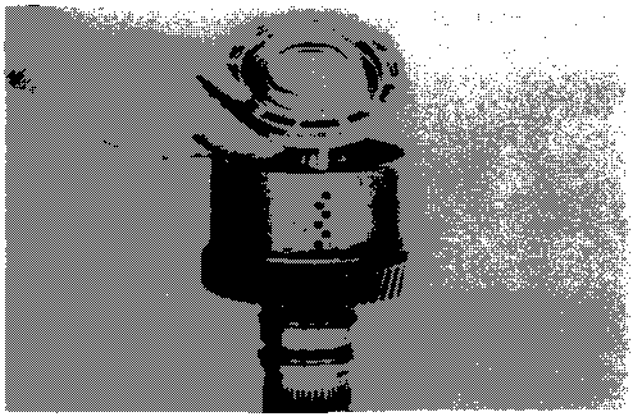


Figure 218
Remove clutch piston.

See cleaning and inspection page.

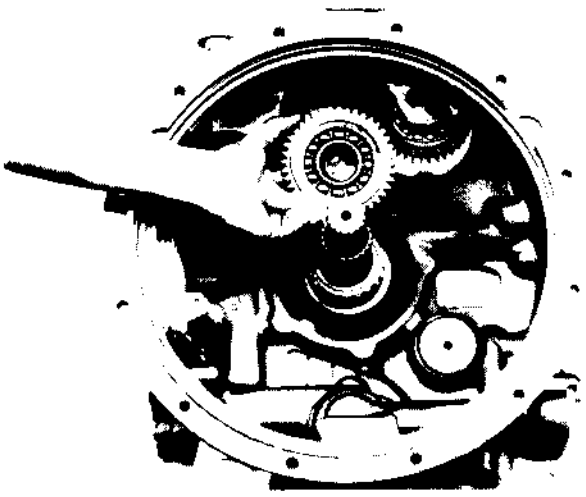


Figure 272
Position pump drive idler gear and bearing on idler gear stub shaft.

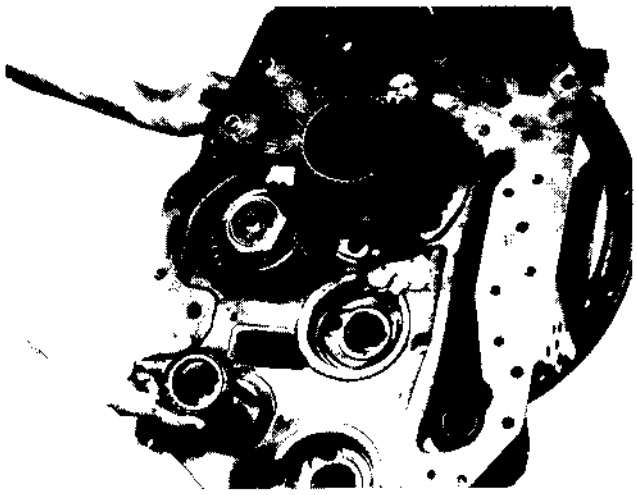


Figure 275
Install idler gear inner taper bearing on shaft with large diameter of taper down.

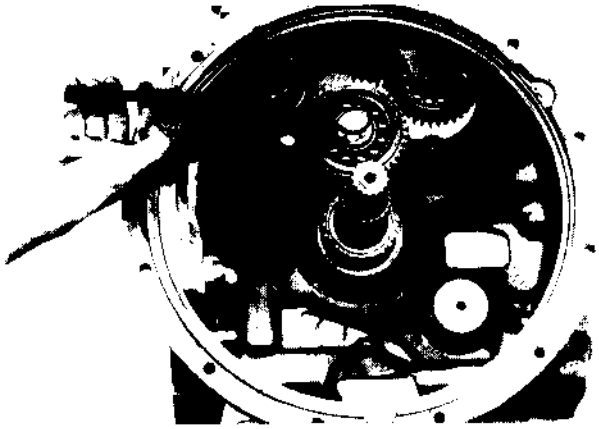


Figure 273
Install idler gear to stub shaft retainer ring.

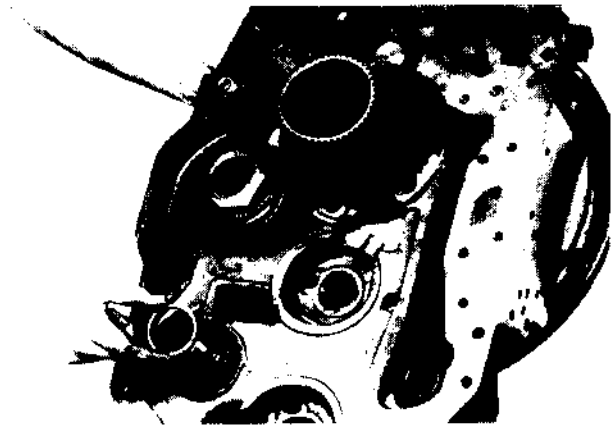


Figure 276
Position bearing spacer on shaft.

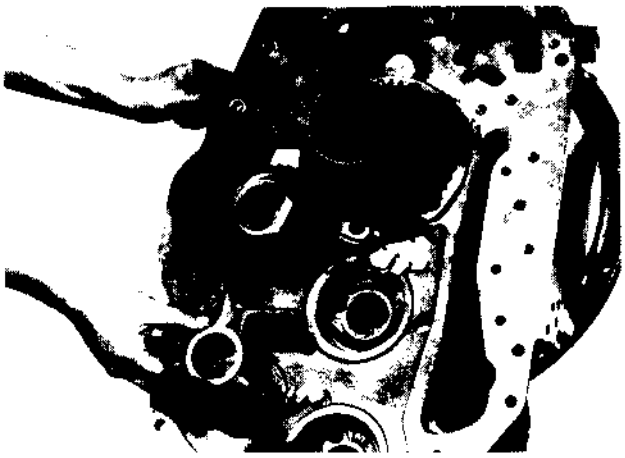


Figure 274
Install idler shaft spacer.

Figure 277
Position idler gear on bearing with hub of gear up.

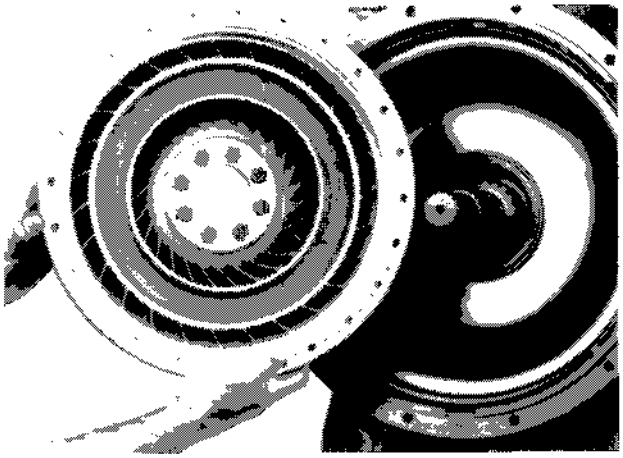


Figure 329
Install impeller and hub assembly using caution as not to damage the oil baffle oil seal. **NOTE:** Use extreme caution as not to cut, break or unhook the oil sealing ring on the support.

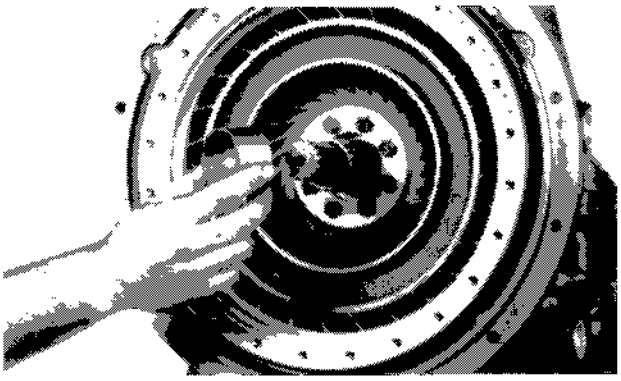


Figure 330
Position impeller hub bearing spacer on stator support.

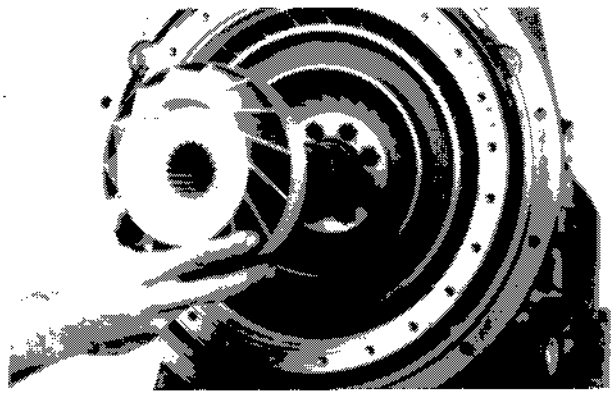


Figure 331
For a fixed reaction member, install reaction member with thick side of blades out.

For freewheel reaction member see Figure 333.

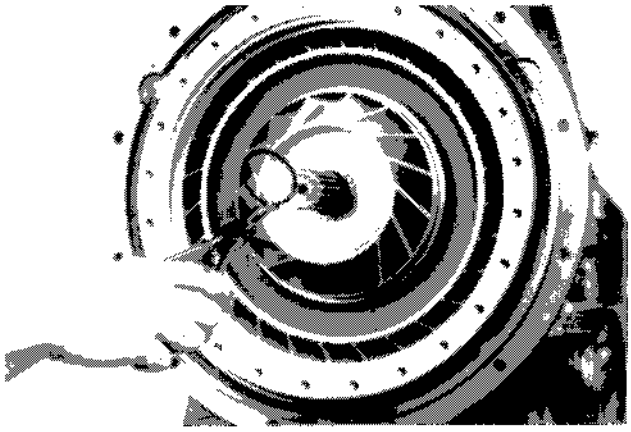


Figure 332
Install reaction member retainer ring. Proceed to Figure 337.

FREEWHEEL REASSEMBLY

NOTE: The freewheel assembly cannot be serviced. If the freewheel is damaged it must be replaced as an assembly.

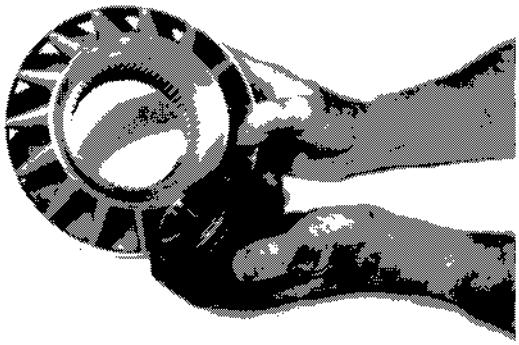


Figure 333
Install outer race and sprag assembly in reaction member. **NOTE:** Undercut shoulder of race must go toward the rear of the reaction member.

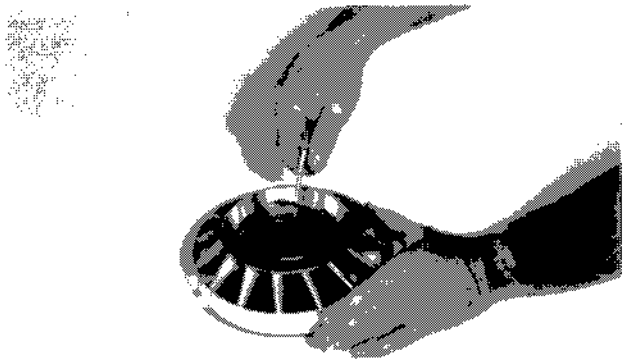


Figure 334
Install outer race to reaction member retainer ring.

SPECIFICATIONS AND SERVICE DATA—POWER SHIFT TRANSMISSION AND TORQUE CONVERTER

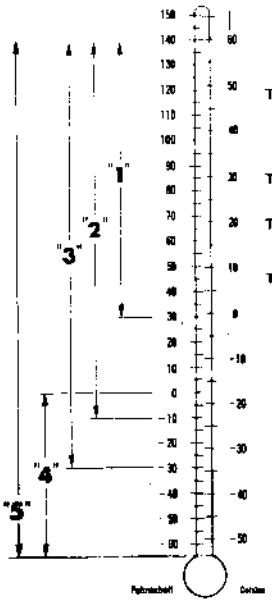
CONVERTER OUT PRESSURE	Converter outlet oil temp. 180° - 200° F. [82,3° - 93,3° C]. Transmission in **NEUTRAL**. Operating specifications: 25 P.S.I. [172,4 kPa] minimum pressure at 2000 R.P.M. engine speed **AND** a maximum of 70 P.S.I. [482,6 kPa] outlet pressure with engine operating at no-load governed speed.
CONTROLS	Forward and Reverse — Manual Speed Selection — Manual
CLUTCH TYPE	Multiple discs, hydraulically actuated, spring released, automatic wear compensation and no adjustment. All clutches oil cooled and lubricated.
CLUTCH INNER DISC	Friction.
CLUTCH OUTER DISC	Steel.
OIL FILTRATION	Full flow oil filter safety by-pass, also strainer screen in sump at bottom of transmission case.
CLUTCH PRESSURE	240 - 280 psi [1654,8 - 1930,5 kPa] — With parking brake set **(see note)**, oil temperature 180° - 200° F. [82,2° - 93,3° C], engine at idle (400 to 600 RPM), shift thru direction and speed clutches. All clutch pressure must be equal within 5 psi. [34,5 kPa]. If clutch pressure varies in any one clutch more than 5 psi. [34,5 kPa] repair clutch. **NOTE: Never use service brakes while making clutch pressure checks. Units having brake actuated declutching in forward and/or reverse will not give a true reading.** **ALWAYS USE PARKING BRAKE WHEN MAKING CLUTCH PRESSURE CHECKS.**

LUBRICATION

TYPE OF OIL	See Lube Chart.
CAPACITY	Consult Operator's Manual on applicable machine model for system capacity. Torque Converter, Transmission and allied hydraulic system must be considered as a whole to determine capacity.
CHECK PERIOD	Check oil level DAILY with engine running at 500-600 RPM and oil at 180° to 200° F. [82, 2 - 93, 3° C]. Maintain oil level to FULL mark.
NORMAL * DRAIN PERIOD	Every 500 hours, change oil filter element. Every 1000 hours, drain and refill system as follows: Drain with oil at 150° to 200° F. [65, 6 - 93, 3° C]. **NOTE: It is recommended that filter elements be changed after 50 and 100 hours of operation on new and rebuilt or repaired units.** (a) **Drain transmission and remove sump screen. Clean screen thoroughly and replace, using new gaskets.** (b) **Drain oil filters, remove and discard filter elements. Clean filter shells and install new elements.** (c) **Refill transmission to LOW mark.** (d) **Run engine at 500-600 RPM to prime converter and lines.** (e) **Recheck level with engine running at 500 - 600 RPM and add oil to bring level to LOW mark. When oil temperature is hot (180-200° F.) [82,2-93,3° C] make final oil level check. BRING OIL LEVEL TO FULL MARK.**

RECOMMENDED LUBRICANTS FOR CLARK POWER SHIFTED TRANSMISSION AND TORQUE CONVERTERS

Prevailing Ambient Temperature



*Dexron is a registered trademark of General Motors Corporation.

Temperature Range	"1"	(a) C-2 Grade 30 (b) C-3 Grade 30 (c) Engine Oil-Grade 30 API-CD/SE or CD/SF (d) MIL-L-2104C-Grade 30 (e) MIL-L-2104D-Grade 30
Temperature Range	"2"	(a) MIL-L-2104C-Grade 10 (b) MIL-L-2104D-Grade 10 (c) C-2 Grade 10 (d) C-3 Grade 10 (e) Engine Oil-Grade 10 API-CD/SE or CD/SF (f) Quintolubric 822-220 (Non Phosphate Ester Fire Resistant Fluid)
Temperature Range	"3"	(a) *Dexron (b) *Dexron II D - **See Caution Below**
Temperature Range	"4"	(a) MIL-L-46167 (b) MIL-L-46167 A
Temperature Range	"5"	(a) Conoco Polor Start DN-600 Fluid

NOTES: Temperature ranges "2" and "3" may be used to lower ambient temperatures when sump preheaters are used. Temperature range "4" should be used only in ambient temperature range shown.

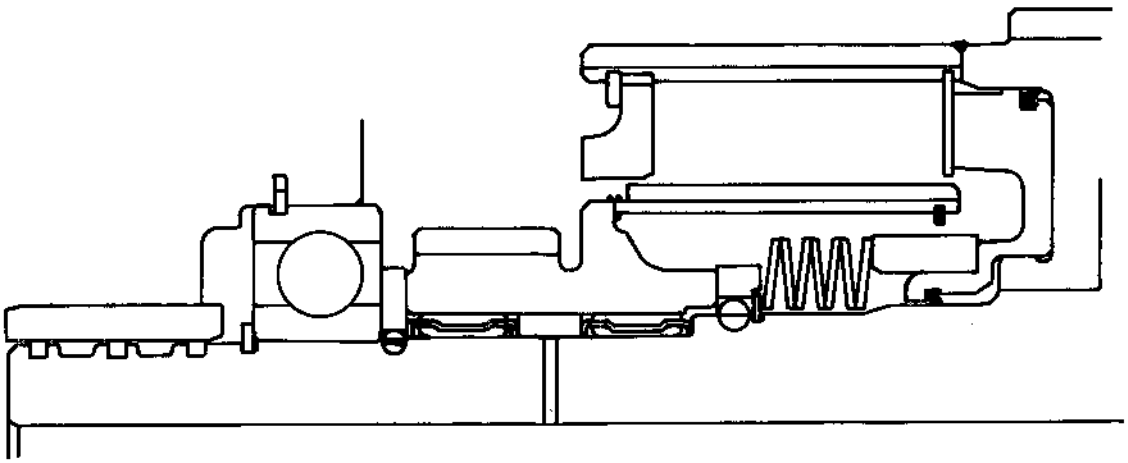
MODULATED SHIFT TRANSMISSIONS: H125, H200, H500, H600, 18000, 24000, 28000, 32000 & 34000 series transmissions with modulated shift use only C-3 or temperature range 3 items (a) & (b) *Dexron or *Dexron II D. **SEE CAUTION BELOW.** 3000, 4000, 5000, 6000, 8000 & 16000 series transmissions with modulated shift use only C-3 or temperature range 3 items (a) only *Dexron. Do **NOT** use *Dexron II D. **SEE CAUTION BELOW.**

CAUTION: *Dexron II D is not compatible with graphitic clutch plate friction material UNLESS IT MEETS THE APPROVED C-3 SPECIFICATIONS. *Dexron II D cannot be used in the 3000, 4000, 5000, 6000, 8000 or 16000 series power shift transmissions, or the HR28000, HR32000 & HR34000 series having converter lock-up, or the C270 series converter having lock-up UNLESS IT MEETS THE APPROVED C-3 SPECIFICATIONS.

Any deviation from this chart must have written approval from the application department of the Clark Components International Engineering and Marketing Department.

*** Normal drain periods and filter change intervals are for average environmental and duty-cycle conditions. Severe or sustained high operating temperatures or very dusty atmospheric conditions will cause accelerated deterioration and contamination. For extreme conditions judgment must be used to determine the required change intervals.**

FORWARD HIGH CLUTCH WITH SPECIAL RATIO



NOTES

FOREWORD

This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the **CLARK-HURTH COMPONENTS** product.

Extreme care has been exercised in the design, selection of materials and manufacturing of these units. The slight outlay in personal attention and cost required to provide regular and proper lubrication, inspection at stated intervals, and such adjustments as may be indicated will be reimbursed many times in low cost operation and trouble free service.

In order to become familiar with the various parts of the product, its principle of operation, trouble shooting and adjustments, it is urged that the mechanic study the instructions in this manual carefully and use it as a reference when performing maintenance and repair operations.

Whenever repair or replacement of component parts is required, only **Clark-Hurth Components**-approved parts as listed in the applicable parts manual should be used. Use of "will-fit" or non-approved parts may endanger proper operation and performance of the equipment. **Clark-Hurth Components** does not warrant repair or replacement parts, nor failures resulting from the use of parts which are not supplied by or approved by **Clark-Hurth Components.** IMPORTANT: **Always furnish the Distributor with the serial and model number when ordering parts.**

HR 28000 CONVERTER AND TRANSMISSION CASE GROUP

ITEM	DESCRIPTION	QTY
1	Suction Tube Assembly	1
2	Pipe Plug	1
3	Pipe Plug	1
4	Converter Housing and Tube Assembly	1
5	Tube Sleeve	1
6	Tube Sleeve	1
7	Converter Housing Sleeve	1
8	Converter Housing Sleeve Lock	1
9	Converter Housing Sleeve Screw Lockwasher	1
10	Converter Housing Sleeve Screw	1
11	Converter Housing Sleeve Screw	1
12	Converter Housing Sleeve Screw Lockwasher	1
13	Converter Housing Sleeve Lock	1
14	Converter Housing Sleeve	1
15	Breather	1
16	Street Ell	1
17	Tube Sleeve	3
18	Breather Reducing Bushing	1
19	Pipe Plug	1
20	Converter Housing to Transmission Housing Screw Lockwasher	4
21	Converter Housing to Transmission Housing Screw	4
22	Converter Housing to Transmission Housing Lockwasher	4
23	Converter Housing to Transmission Housing Screw	4
24	Lube Tube Retaining Screw	1
25	Lube Tube Retaining Screw Lockwasher	1
26	Valve Oil Supply Tube	1
27	3rd Speed Tube "O" Ring	1
28	3rd Speed Tube Assembly	1
29	Tube Clip	1
30	Tube Clip Screw Lockwasher	1
31	Tube Clip Screw	1
32	Lube Tube Assembly	1
33	Lube Tube Retainer Screw Lockwasher	1
34	Lube Tube Retainer Screw	1
35	Reverse Tube "O" Ring	1
36	Reverse Tube Assembly	1
37	Tube Clip	1
38	Tube Clip Screw Lockwasher	1
39	Tube Clip Screw	1
40	Suction Tube "O" Ring	1
41	Suction Tube Spacer Ring	1
42	Suction Tube Retainer Lockwasher	1
43	Suction Tube Retainer Screw	1
44	Tube Sleeve	1
45	Clutch Pressure Tube "O" Ring	1

ITEM	DESCRIPTION	QTY.
46	Converter Housing to Transmission Case Gasket	1
47	Suction Line Tube Clip Rivet	1
48	Converter Housing to Transmission Case Dowel Pin	2
49	Low Speed Clutch Pressure Tube	1
50	Transmission Case to Converter Housing Screw Lockwasher	10
51	Transmission Case to Converter Housing Screw	10
52	Transmission Case Assembly	1
53	Transmission Case to Rear Cover Dowel Pin	2
54	Transmission Case to Rear Cover Gasket	1
55	Transmission Case Rear Cover	1
56	Rear Cover to Case Screw Lockwasher	13
57	Rear Cover to Case Screw	13
58	Rear Cover Pipe Plug	1
59	Rear Cover to Transmission Case Stud Nut	2
60	Rear Cover to Transmission Case Lockwasher	2
61	Clutch Pressure Tube "O" Ring	1
62	Tube Sleeve	1
63	Transmission Case to Rear Cover Stud	2
64	Drain Plug	1
65	Oil Level Plug	2
66	Screen Assembly Gasket	1
67	Screen Assembly	1
68	Suction Tube Assembly	1
69	Suction Tube Clip Washer	1
70	Suction Tube Clip	1
71	Pipe Plug	1
72	Suction Tube "O" Ring	1
73	Suction Tube Retainer Washer	1
74	Suction Tube Retainer Washer Screw	2
75	Oil Distributor Retainer Ring	1
76	Oil Distributor Lock Ball	1
77	Oil Distributor	1
78	Oil Distributor Retainer Ring	1
79	4th Clutch Lube Tube	1
80	Tube Sleeve	1
81	Clutch Pressure Tube "O" Ring	1
82	Tube Sleeve	1
83	4th Speed Pressure Tube	1
84	4th Speed Pressure Tube "O" Ring	1
85	Control Valve Mounting Plate	1
86	Remote Valve Plate Screw	9
87	Remote Valve Plate Screw Lockwasher	9
88	Control Valve Mounting Plate Plug	1
89	Valve Cover Plate	1

AXLE DISCONNECT

ITEM	DESCRIPTION	QTY.
1	Disconnect Housing Capscrew	4
2	Disconnect Housing Capscrew Lockwasher	4
3	Disconnect Housing	1
4	Disconnect Housing Plug	1
5	Shift Hub	1
6	Shift Fork	1
7	Shift Fork Lockscrew	1
8	Disconnect Shaft	1
9	Detent Ball	1
10	Detent Spring	1
11	Shift Rail	1
12	Shift Rail Oil Seal	1
13	Bearing Retainer Ring	1
14	Bearing	1
15	Bearing Retainer Ring	1

MECHANICAL PARKING BRAKE

ITEM	DESCRIPTION	QTY.
1	Backing Plate Assembly	1
2	Actuating Lever	1
3	Brake Shoe and Lining	2
4	Brake Flange	1
5	Brake Drum	1
6	Brake Drum to Flange Screw Lockwasher	6
7	Brake Drum to Flange Screw	6
8	Return Spring	2
9	Brake Shoe (see item 3)	
10	Brake Lining	2
11	Rivet	20
12	Backing Plate Screw	4
13	Backing Plate Screw Lockwasher	4

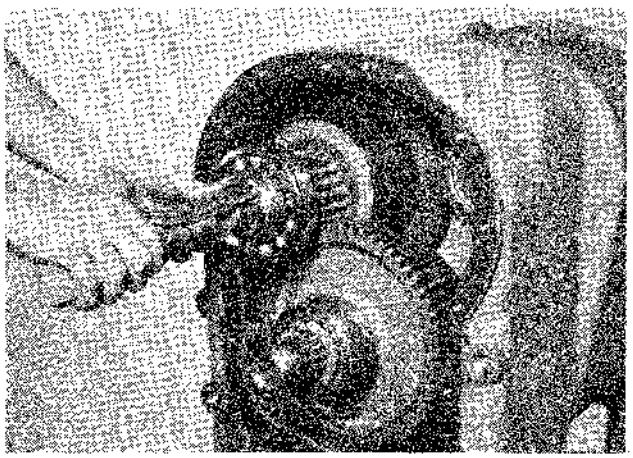


Figure 47

Remove low clutch rear bearing retaining ring.
NOTE: See page 33 for disassembly of low clutch utilizing a rear double taper bearing (helical gears).

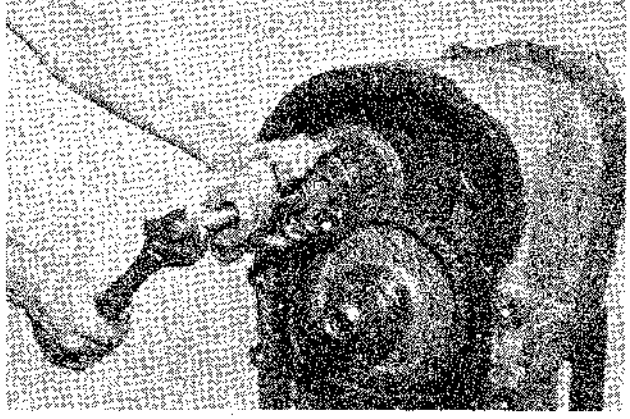


Figure 48

Remove low clutch rear bearing.

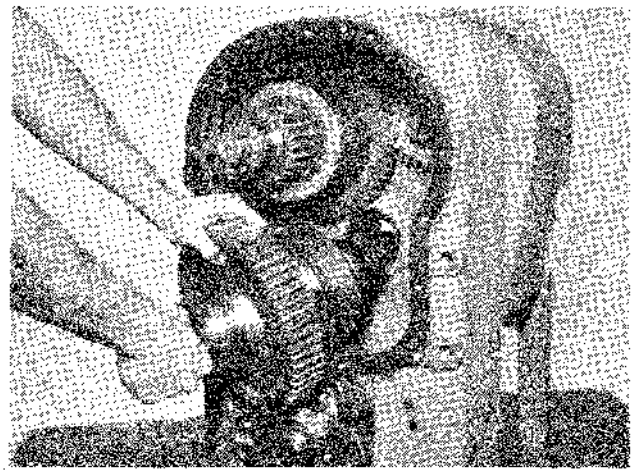


Figure 49

Remove idler shaft and 4th speed clutch from housing.
NOTE: Do not lose rear bearing lock ball.

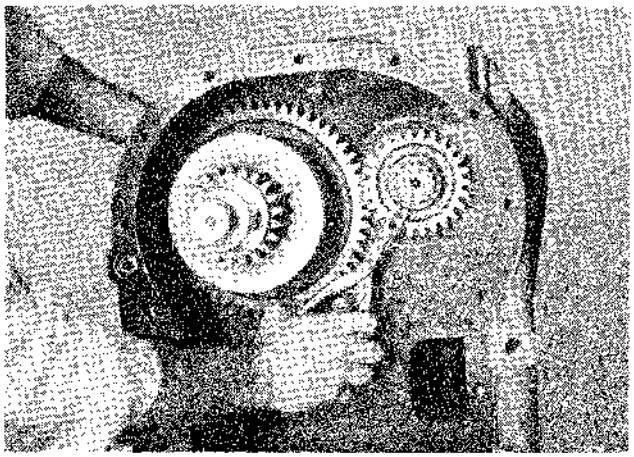


Figure 50

Remove low speed drive gear retainer ring and drive gear.

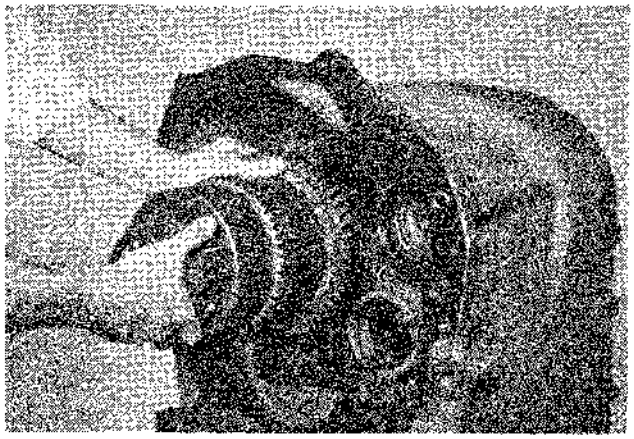


Figure 51

Remove reverse and 3rd clutch assembly.

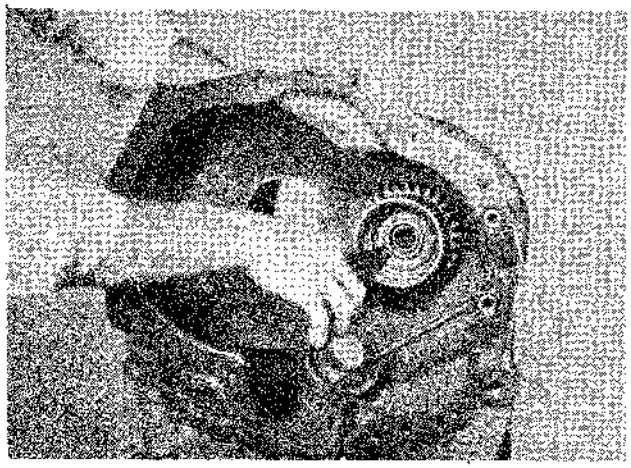


Figure 52

Remove 2nd gear retaining ring.

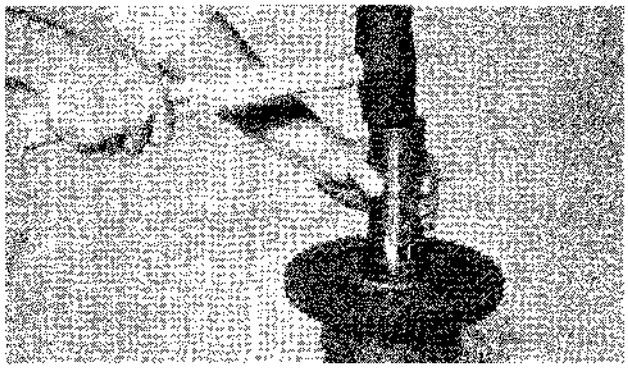


Figure 101

Install low clutch shaft front bearing inner race with large diameter of race down.

4th Speed Clutch Reassembly

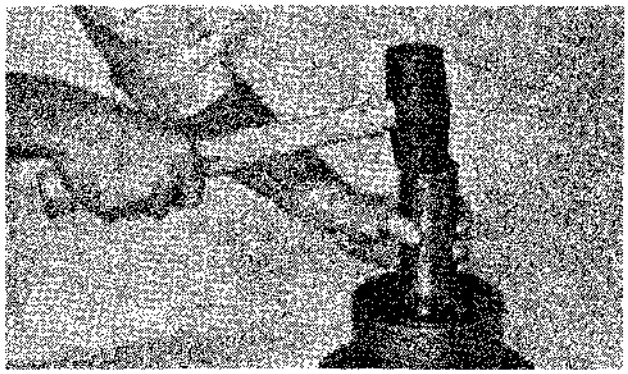


Figure 102

Install piston, piston return spring and inner and outer discs as explained in Fig. 81 through Fig. 86.

Install 4th speed gear inner bearing. **NOTE:** Bearing Part Number must go down. See Figure 104-A.

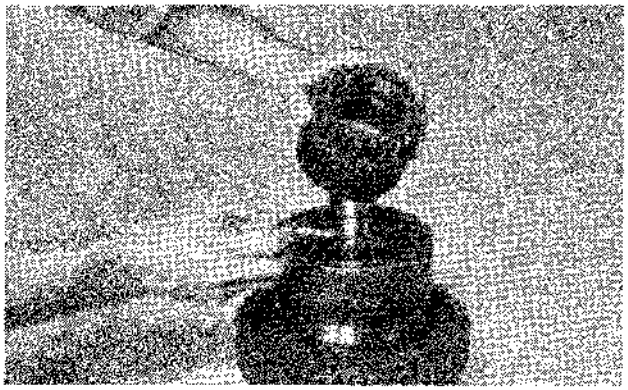


Figure 103

Install bearing spacer between inner and outer 4th speed gear bearings.

Install 4th speed gear into clutch drum. Align splines on clutch gear with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

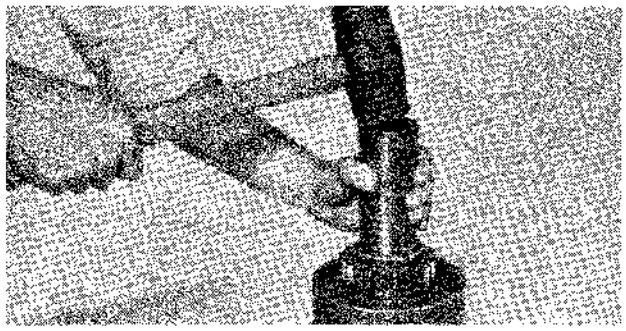


Figure 104

Install 4th speed gear outer bearing. **NOTE:** Bearing Part Number must go up. See Figure 104-A. It is recommended a rubber band be used to hold outer bearing rollers in position when installing bearing.

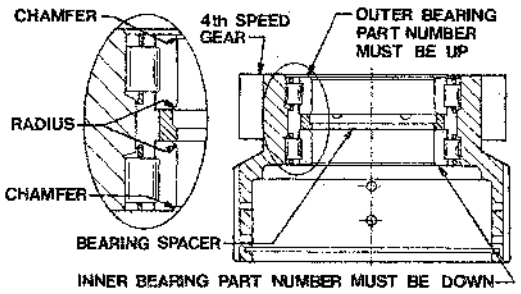


Figure 104-A

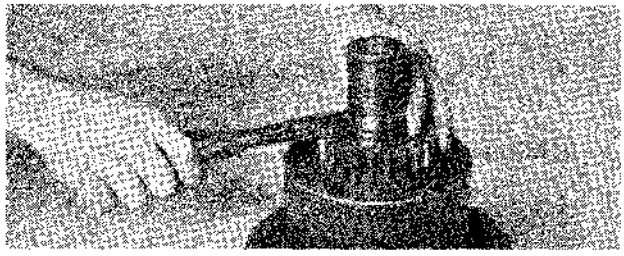


Figure 105

Install front bearing locating ring.

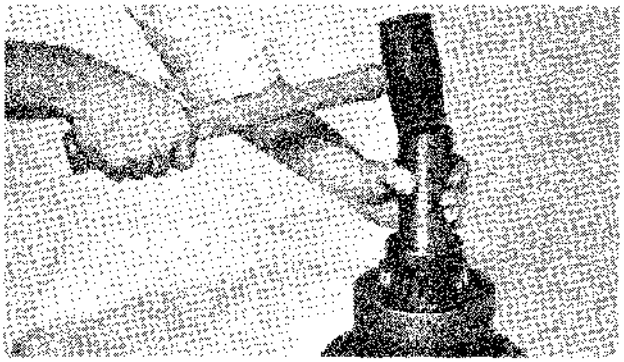


Figure 106

Install front bearing and bearing retainer ring.

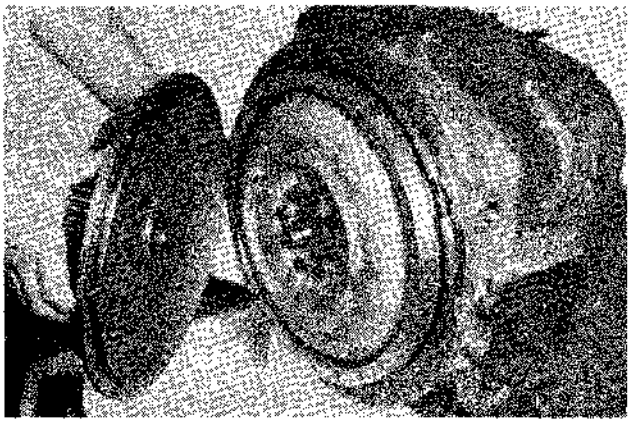


Figure 161

Align holes in impeller cover with holes in impeller. Install bolts and washers and tighten to specified torque.

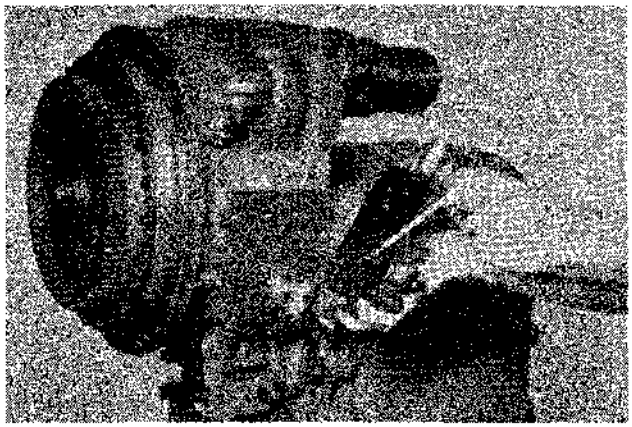


Figure 162

Locate detent balls and springs in control valve. Position new gasket. Secure valve with bolts and washers. Tighten to specified torque.

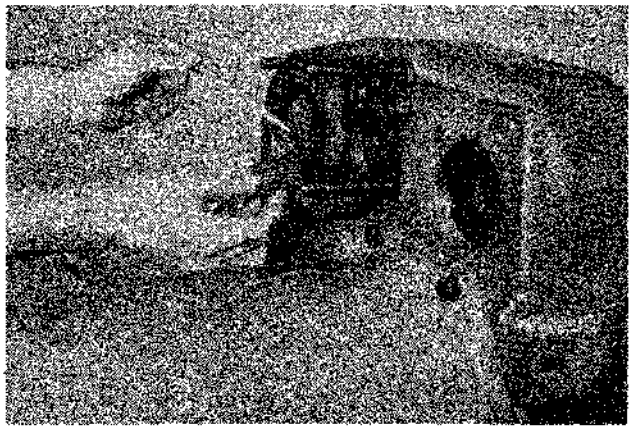


Figure 163

Install pump drive sleeves

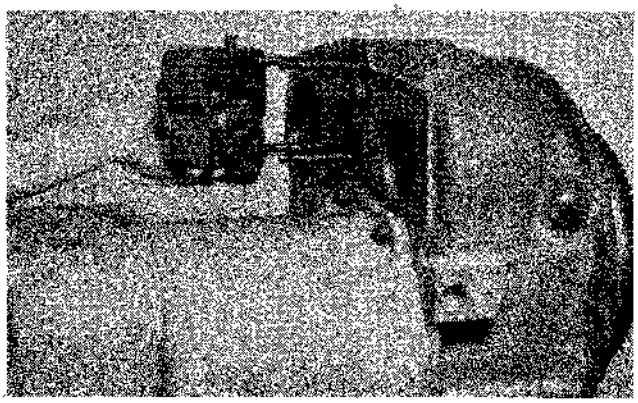


Figure 164

Position new gasket and "O" rings on pressure regulator valve. Install valve on studs.

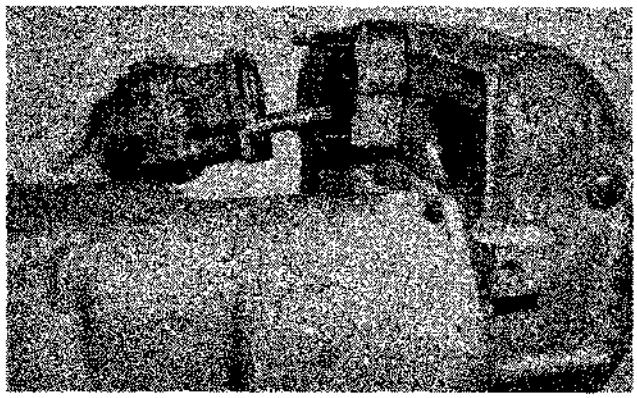


Figure 165

With new valve body to pump gasket in position insert pump drive shaft through valve body. Use caution as not to damage valve body oil seal. It may be necessary to turn impeller one way or the other to align pump shaft with drive sleeves.

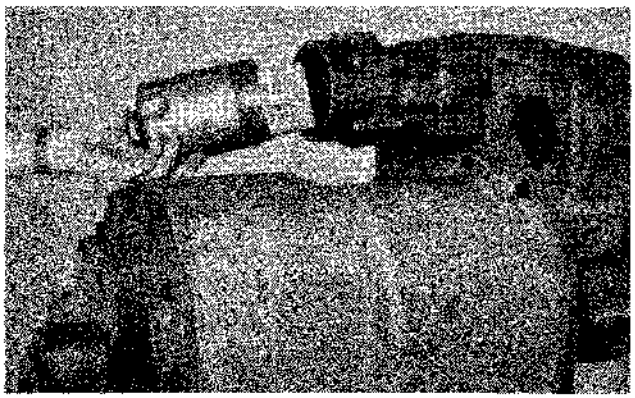


Figure 166

Install new "O" ring in filter adaptor housing. Install filter element and housing. Tighten filter housing 20 to 25 ft. lbs. torque. [27,2 - 33,8 N.m.]

Figure G

Install bearing cup.

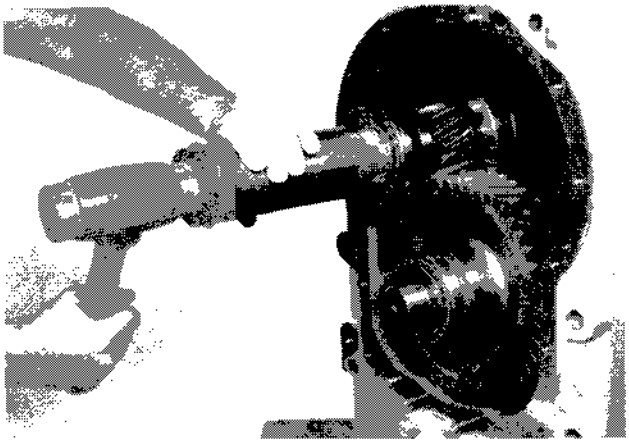


Figure H

Install outer taper bearing. **NOTE:** Heat bearing in hot oil bath prior to installation.

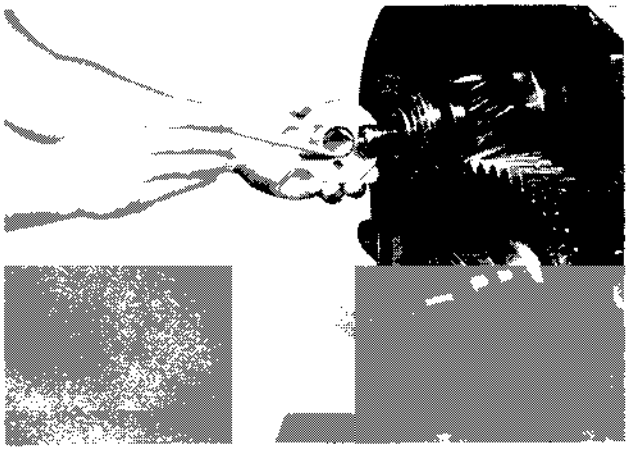


Figure I

Install retainer plate, inner diameter chamfer toward bearing.

Figure J

Install bolts and block gears. Torque bolts to specifications and lock wire together.

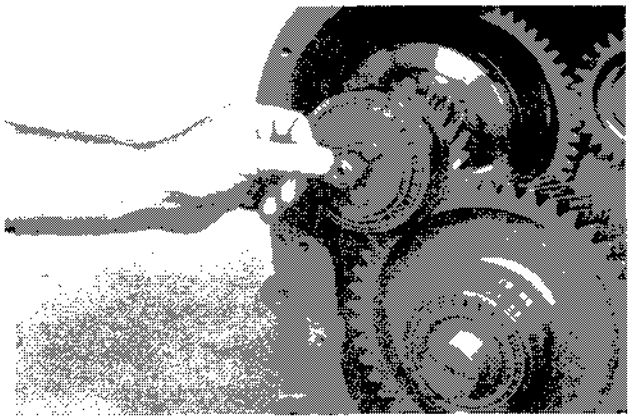


Figure K

Install low clutch shaft sealing ring.

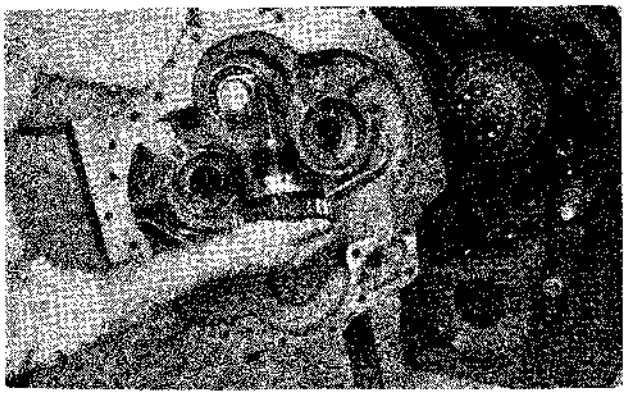


Figure 11
Install input shaft into front bearing.

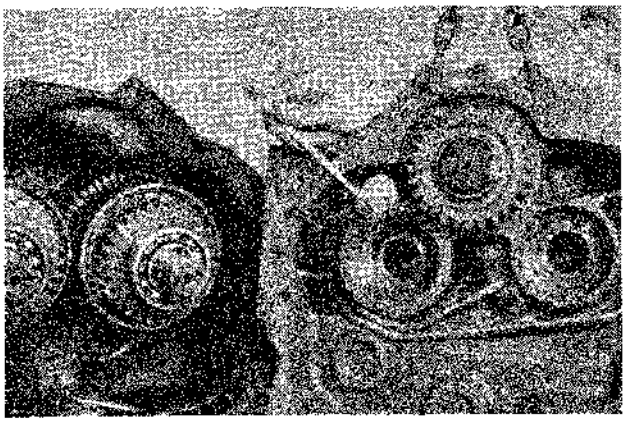


Figure 12
Forward clutch front bearing locating ring.

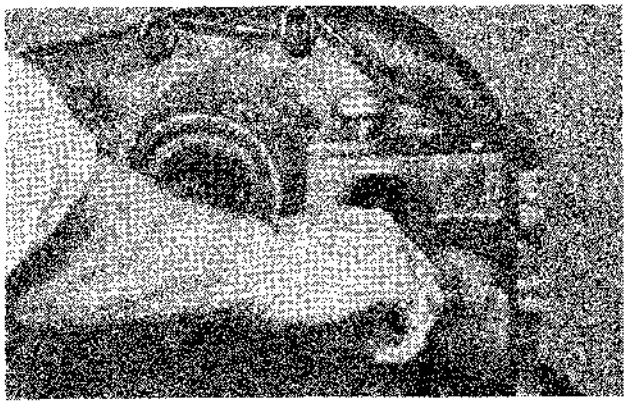


Figure 13
Support front cover with a chain fall. Spread forward clutch front bearing retainer ring. Position front cover to transmission case. Tap cover into place using caution as not to damage any of the clutch shaft piston rings.

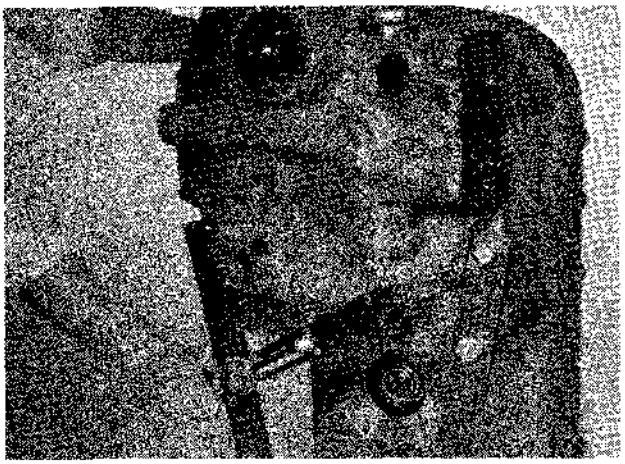


Figure 14
Install cover to case bolts. Tighten to specified torque.

Figure 15
Install front cover plug.

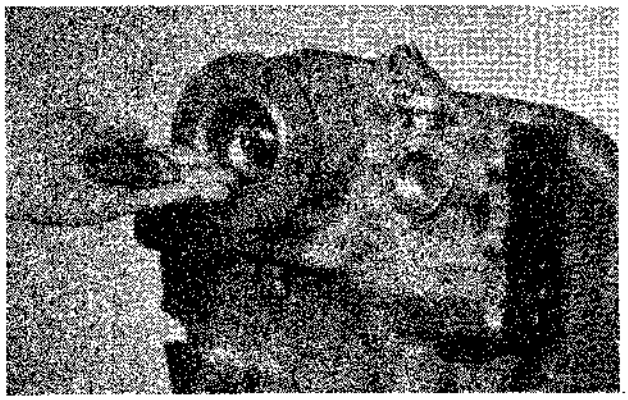


Figure 16
Install companion flange, flange "O" ring, washer and nut. Tighten standard slotted nut or elastic stop nut to specified torque. (See elastic stop nut torque chart.)

CONVERTER SECTION WITH FREEWHEEL REACTION MEMBER

Item	Description	Qty.
1	Bearing Support Screw	2
2	Lockwasher	2
3	Drive Gear Snap Ring	1
4	Drive Gear Bearing	1
5	Drive Gear Bearing Support	1
6	Drive Gear	1
7	Snap Ring (internal) —See item 8	1
8	Pump Drive Sleeve Assembly — Inc. items 7 and 9	1
9	Snap Ring (external) — See item 8	1
10	Valve Body to Converter Housing Gasket	1
11	Valve Body O-Ring	1
12	Valve Body O-Ring	1
13	Valve Body O-Ring	1
14	Regulator Valve, Charging Pump & Filter Assy	1
15	Impeller Hub Gear	1
16	Impeller Hub Gear Snap Ring	1
17	Piston Ring	1
18	Stator Support Screw	3
19	Stator Support Screw	3
20	Stator Support & Sleeve Assembly	1
21	Turbine Shaft Piston Ring	1
22	Turbine Shaft	1
23	Piston Ring	1
24	Turbine Shaft Bearing	1
25	Converter Housing & Tube Assembly	1
26	Turbine Shaft Gear	1
27	Turbine Shaft Gear Snap Ring	1
28	Piston Ring	2
29	Turbine Shaft Piston Ring Race	1
30	Tachometer Drive Tube Nut	1
31	Drive Shaft Oil Seal	1
32	Drive Shaft Front Bearing	1
33	Drive Shaft	1
34	Drive Shaft Rear Bearing	1
35	Bearing Retaining Ring	1
36	Drive Gear	1
37	Woodruff Key	1
38	Gear Retaining Ring	1
39	Detent Spring	2
40	Detent Ball	2
41	Valve to Converter Gasket	1
42	Control Valve Assembly	1
43	Valve to Converter Housing Washer	9
44	Valve to Converter Housing Screw	9
45	Hub to Impeller Screw	8
46	Hub to Impeller Screw Washer	8
47	Impeller Hub Bearing	1
48	Impeller Hub	1
49	Impeller Hub O-Ring	1
50	Impeller	1
51	Oil Baffle Retainer Ring	1
52	Oil Baffle	1
53	Oil Baffle Seal Ring	1
54	Impeller to Drive Disc O-Ring	1
55	Snap Ring	1
56	Turbine	1
57	Turbine Ring	1
58	Snap Ring	1
59	Thrust Washer Snap Ring	1
60	Thrust Washer	1
61	Reaction Member Snap Ring	1
62	Reaction Member	1
63	Bearing Spacer	1
64	Bearing	2
65	Outer Race	1
66	Sprag Assembly	1
67	Snap Ring	1
68	Bearing Washer Snap Ring	1
69	Bearing Washer	1
70	Bearing Snap Ring	1

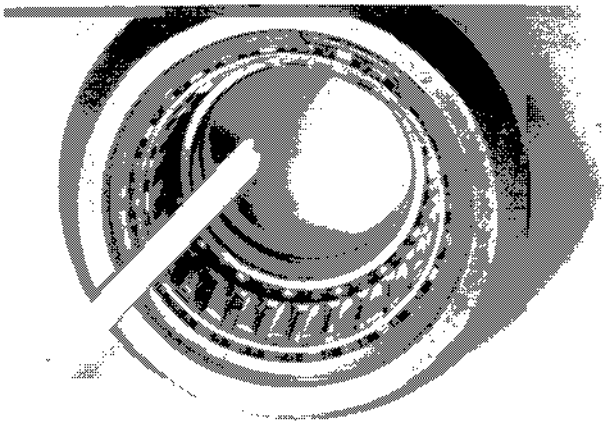


Figure 32
Install sprag assembly retainer ring. Note drag strips at top.

Figure 33
Press free-wheel race assembly into reaction member and secure with retainer ring.

DISASSEMBLY OF LOCK-UP COVER

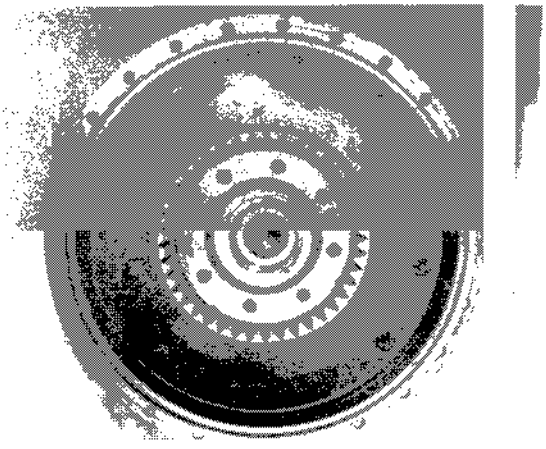


Figure 34
Remove end plate to lock-up cover bolts.

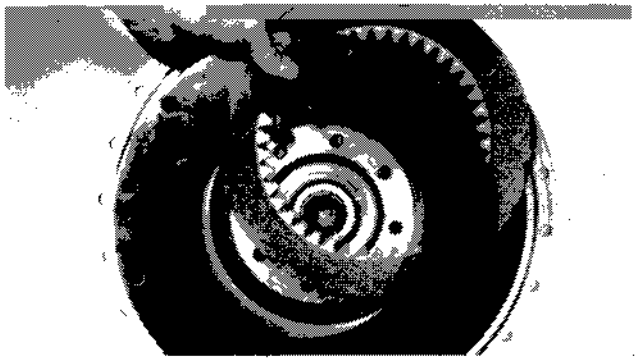


Figure 35
Remove end plate and clutch disc.

Figure 36
Remove piston and outer drive disc.

List of special Tools

S

Order-No. 5871 162 102

Supplement to the WORKSHOP MANUAL WG-180/WG-200 (ref. Order-No. 5871 162 002)

ZAHNRADFABRIK PASSAU GmbH
Donaustr. 25 - 71
D- 94 034 Passau

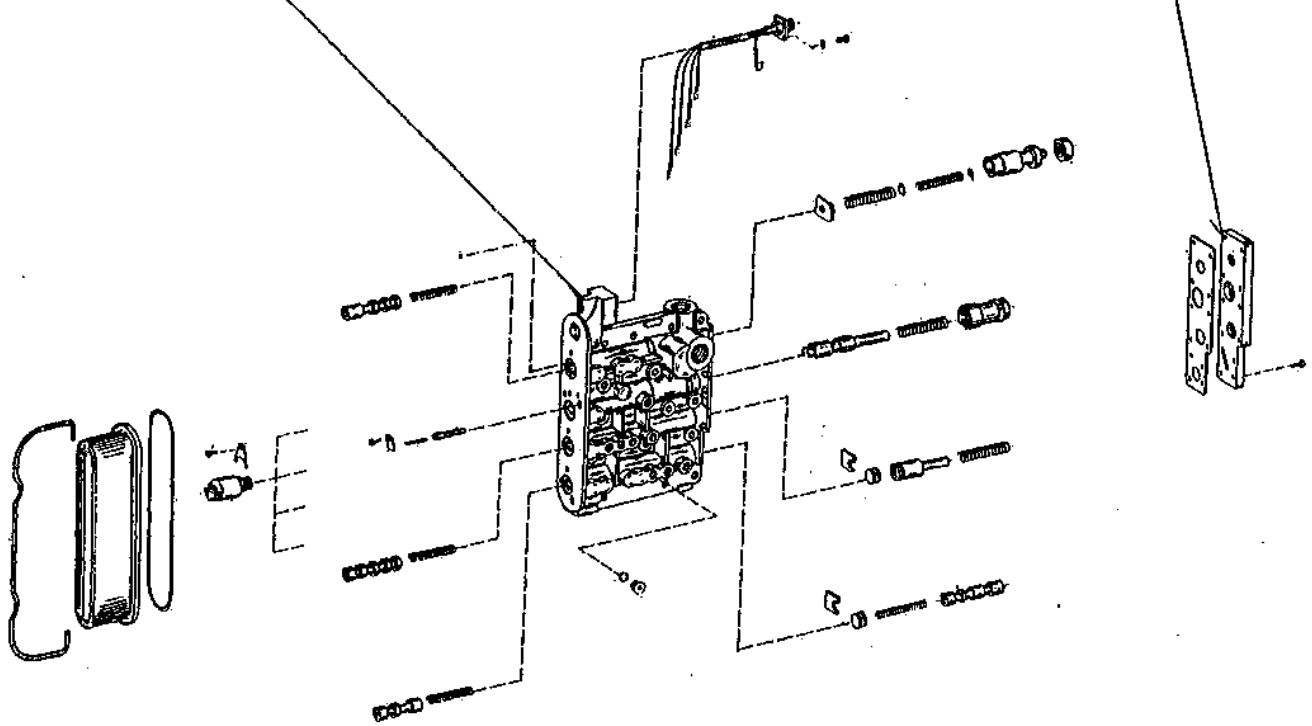
73160586

5870 204 011

Gearbox control
6 WG 180

SPEZIAL

5870 204 036

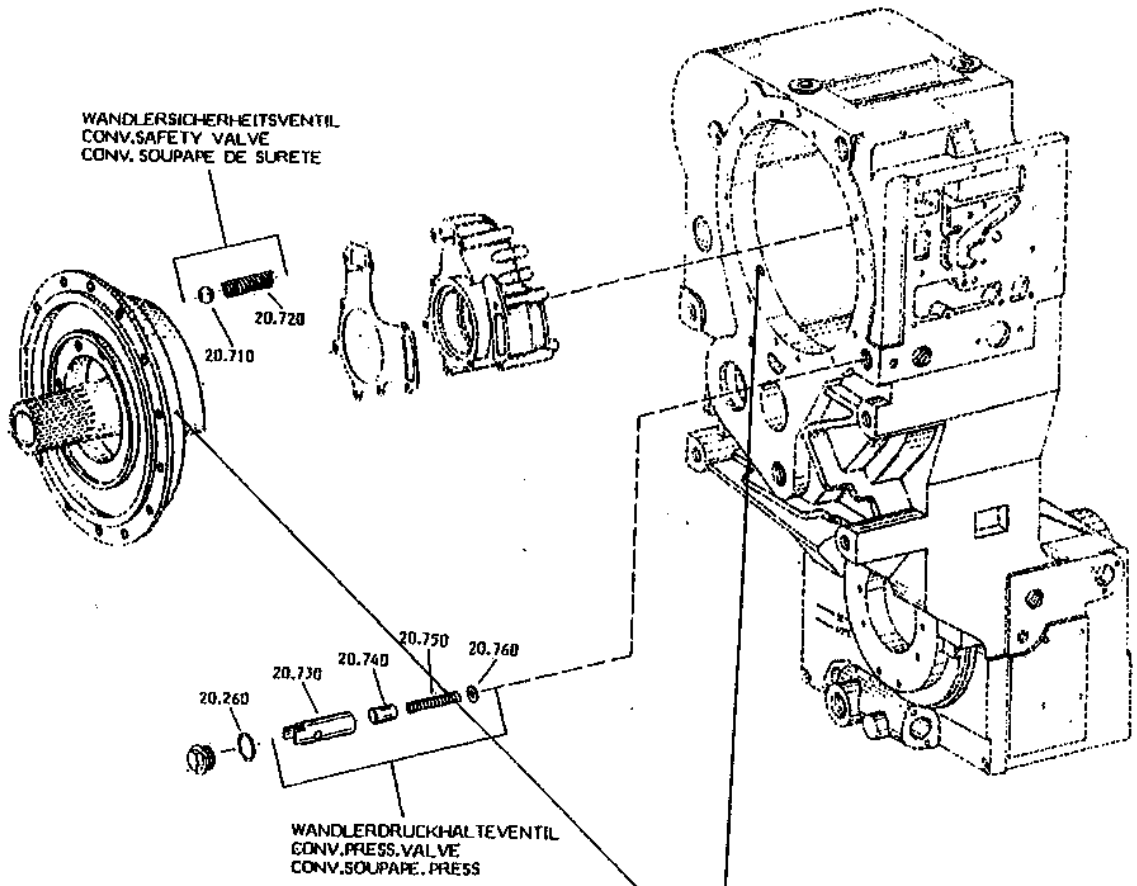


Zahnradfabrik Passau GmbH Donaustrasse 25-71 94034 Passau Ausgabe 11/93

6 WG 180

Pressure control

SPEZIAL



	220 V	110V
		
5870 801 003	5870 221 500	5870 221 501

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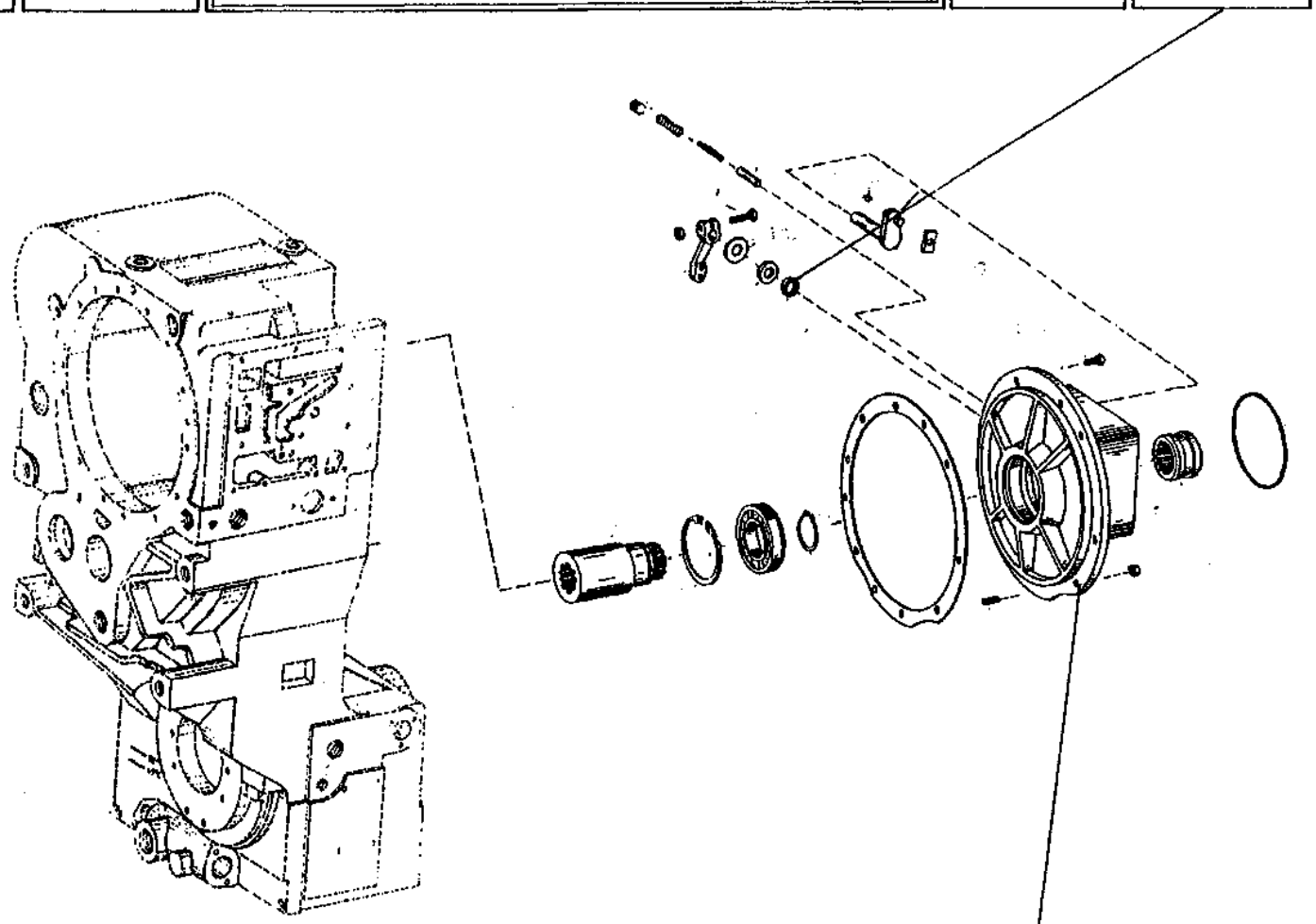
6 WG 180 Liebherr

Power take-off

SPEZIAL

5870 651 018

5870 048 074



5870 204 011

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