SERVICE MANUAL

Grader

845
865
885

6-46503

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

Grader

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865
885

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1. Trim along dashed line.
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SERVICE MANUAL

Grader

845
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6-46503

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

865 GRADER
FLUIDS AND LUBRICANTS

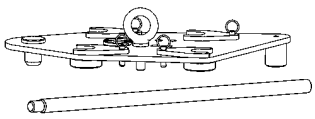
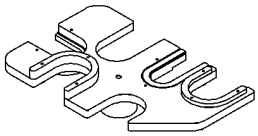
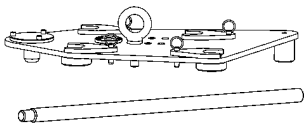
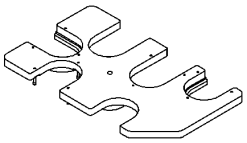
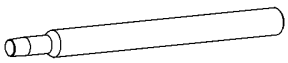
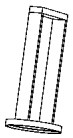
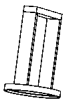
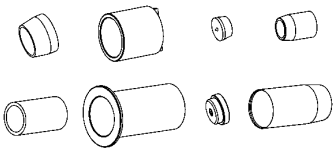
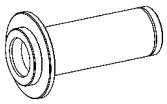
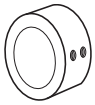
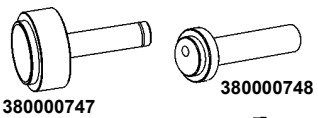
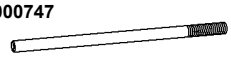
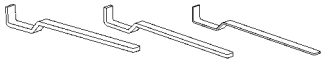
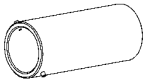
COMPONENTS	CAPACITY LITERS	CAPACITY US Gal.	SPECIFICATIONS
Fuel Tank (Total Capacity)	341.0	90.0	DIESEL Nº. 2
Engine Oil (With Filter Change) (Without Filter Change)	21.1 18.9	5.5 4.8	Nº. 1 ENGINE OIL SAE15W-40 API CH4 MAT 3507 (MS 1121)
Engine Cooling System (Total Capacity)	40.0	10.5	50% WATER + 50% ETHYLENE GLICOL MS 1710
Hydraulic System Total Capacity Hydraulic Tank With Filter	180.0 94.6	47.5 25.0	HY-TRAN ULTRA MAT 3505 (MS 1209)
Transmission Refill capacity (with filter change) Refill capacity (without filter change)	25.0 19.0	6.4 5.0	HY-TRAN ULTRA MAT 3505 (MS 1209)
Rear Axle Graziano Model (Standard) Center Compartment End / Brake compartment (each)	29.0 5.0	7.7 1.33	HY-TRAN ULTRA MAT 3505 (MS 1209)
Rear Axle Clark Model (Optional) Center Compartment Planetary Hubs (Each)	12.0 6.0	3.2 1.6	HY-TRAN ULTRA MAT 3505 (MS 1209)
Tandem Drive Case **(For Graziano Axle)** Refill capacity (each)	29.0	7.7	SAE 80W-90 135H EP API GL5
Tandem Drive Case **(For Clark Axle)** Refill capacity (each)	22.5	5.9	SAE 80W-90 135H EP API GL5
Circle Turn Gear Refill Capacity	2.8	0.75	SAE 80W-90 135H EP API GL5
Grease Fitting **Rear Ripper / Front Scarifier and Dozer Blade**	UQN	UQN	CASE MOLYDISULFIDE GREASE

NOTES

Service Tools

Required Service Tools for Case Motor Graders

380050009 Transmission Tools

380000374 	**380000375** 
380000376 	**380000377** 
380000381 	**380000382**  380000752  380000753  380000754  380000755
380000385 	**380000386** 
380000389 	**380000390** 
380000392  380000747 380000748  380000749	**380000393** 
380000395 	**380000396** 

380050009 Kit Contents:

Lifting Device 380000374 - Used to lift the transmission clutch stage assemblies during repair procedures, Models 845 and 865.

Stack Nest 380000375 - Used to position the transmission clutch stage assemblies while removed from the transmission housing, Models 845 and 865.

Lifting Device 380000376 - Used to lift the transmission clutch stage assemblies during repair procedures, Model 885.

Stack Nest 380000377 - Used to position the transmission clutch stage assemblies while removed from the transmission housing, Model 885.

Plug Installer 380000381 - Used to install plugs in transmission shafts, Models 845, 865, and 885.

Assembly Tools 380000382 - Used to handle individual clutch stage assemblies and in clutch assembly, Models 845, 865, and 885.

Installation Tools 380000385 - Used to install transmission oil seals and retaining rings, Model 885.

Sizing Sleeve 380000386 - Used to size sealing ring on 1st stage assembly, Model 885.

Input Seal Installer 380000389 - Used to protect input shaft seal during installation, Model 885.

Bearing Installer 380000390 - Used to properly install and position roller bearing on end of 4th stage assembly, Models 845 and 865.

Assembly Tools 380000392 - Used to assemble and align the idler shaft in the input housing, Models 845, 865, and 885.

Bearing Driver 380000393 - Used to properly install and position bearings, Models 845 and 865.

Clutch Stack Clearance Gauge Set 380000395 - Used to measure clutch plate clearance, Models 845, 865, and 885.

Aligning Sleeve 380000396 - Used to maintain alignment of the input shaft during input housing installation, Models 845 and 865.

Application: Case Motor Grader Models 845, 865, 885.

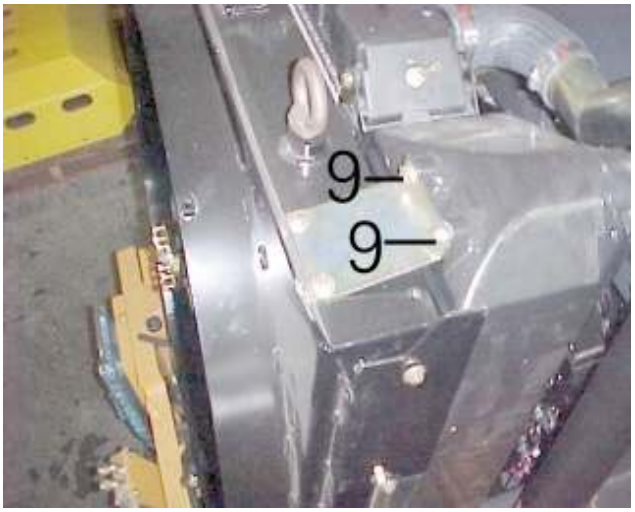
Ordering Information:380050009 Transmission Tools Kit

Dealer Standard: Code A (required at all servicing locations)

Charge Air Cooler Removal

Air cooler removal

1 - Remove top bolts (9)



]

2 - Remove bottom bolts (10)

Air cooler assembly.

1 - Place air cooler in the correct position.
2 - Fit top bolts (9) and torque to 2,8 kfg.
3 - Fit bottom bolts (10) and torque to 2,8 kfg.

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Contagem, MG Brazil

6-75420

Printed in Brazil
June 2003

ALTERNATOR 45A

Removal

1. Turn the master disconnect switch to the OFF position.
2. Use a wrench to move the belt tensioner (15) and loosen the tension on the belt (17). Refer to the illustration on the following page.
3. Remove the belt (17).
4. Remove the boots (4 and 5).
   Tag and disconnect wires (12 and 13) from from the alternator (6).
5. Remove the bolt (8),and washer (9) from the support bracket (7) and the alternator (6).
6. Remove the alternator (6) and shield (3) from the. machine.

.
.

Installation

1. Install the alternator (4),on the machine.
   Torque the bolt
   (0) to 60 to 104 Nm (42.5 to 76 pound-feet).
   Refer to the illustration on the following page.
2. Install the washer (9), and bolt (8).
   Torque the bolt (8) to 60 to 104 Nm (42.5 to 76 pound-feet).
3. Use a wrench to move the belt tensioner (2) until the belt (1) can be installed.
4. Install the belt (17).
5. Install the wire (12), lockwasher and nut to the alternator's D+ terminal. Torque the nut to 3.5 to 3.9 Nm (2.6 to 2.9 pound-feet).
6. Install the boot.
7. Install the wire (13), lockwasher and nut to the alternator's B+ terminal. Torque the nut to 15 to 27 Nm (11 to 20 pound-feet).
8. Install the boot.
9. Turn the master disconnect switch to the ON position.

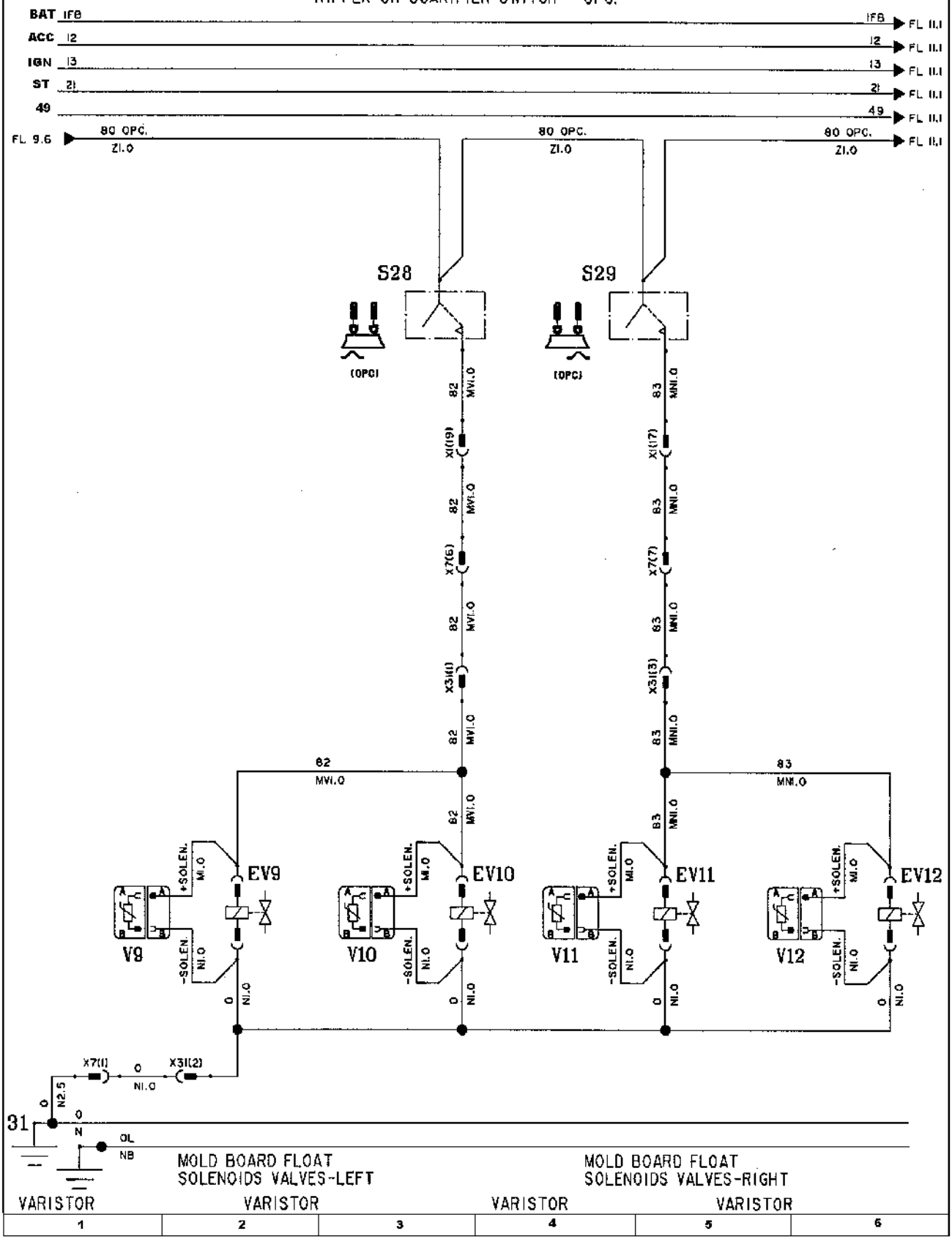
WIRE COLORS TABLE

A. ..... BLUE
B ..... WHITE
C ..... ORANGE
V ..... GREEN
G ..... YELLOW
H ..... GRAY
L. ..... DARK BLUE
M ..... BROWN
N ..... BLACK
R ..... RED
S ..... PINK
Z ..... PURPLE

CASE

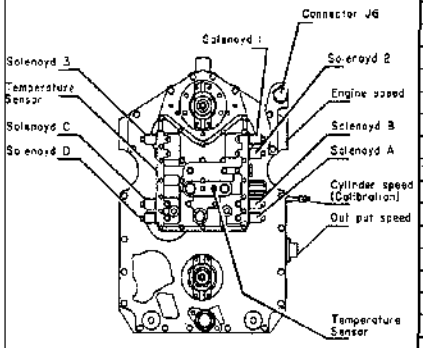
PAGE 10

RIPPER OR SCARIFIER SWITCH - OPC.



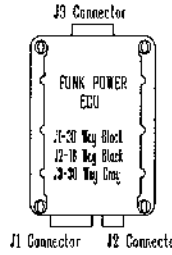
CASE

PAGE 20

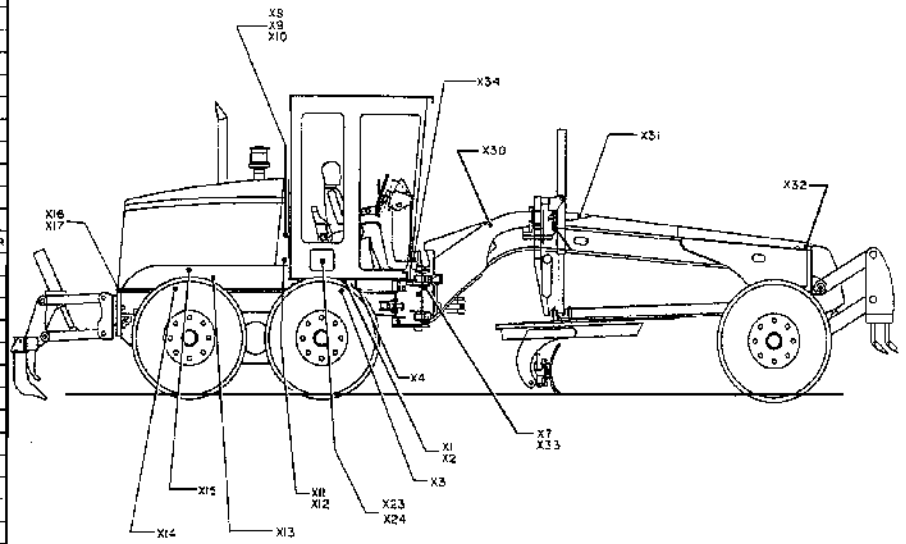


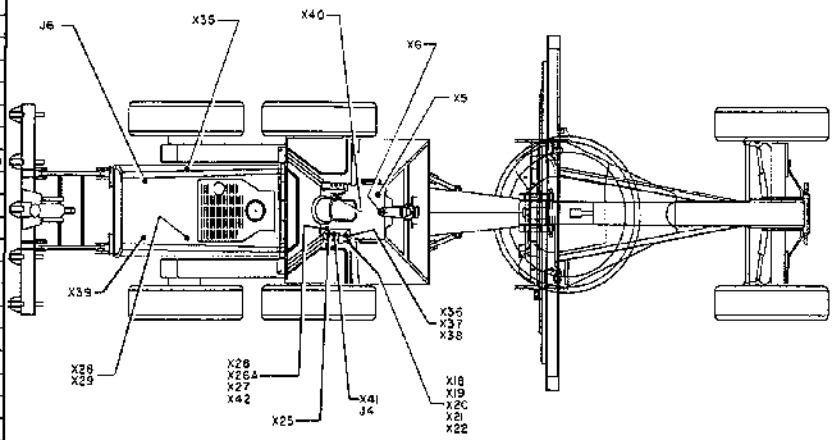
	CLUTCHES/SOLENOYDS	
	Forward	Reverse
1º	1 - 4	3 - A
2º	2 - 4	3 - C
3º	1 - C	3 - B
4º	2 - C	3 - D
5º	1 - B	
6º	2 - B	
7º	1 - D	
8º	2 - D	

	CLUTCHES/SOLENOYDS COME-HOME	
	Forward	Reverse
1º		3 - A
2º	2 - A	



NAME	DESCRIPTION
X1	MAIN REAR HARNESS WITH LATERAL CONSOLE 40 WAY CONNECTOR
X2	MAIN REAR HARNESS WITH LATERAL CONSOLE 26 WAY CONNECTOR
X3	MAIN REAR HARNESS WITH TRANSMISSION 6 WAY CONNECTOR
X4	MAIN REAR HARNESS WITH FUEL TANK 2 WAY CONNECTOR
X5	MAIN REAR HARNESS WITH TRANSMISSION 6 WAY CONNECTOR
X6	MAIN REAR HARNESS WITH FRONT CONSOLE 40 WAY CONNECTOR
X7	MAIN REAR HARNESS WITH MAIN FRONT 20 WAY CONNECTOR
X8	6 WAY CONNECTOR DOR T USED
X9	MAIN REAR HARNESS WITH MAGNETIC CLUTCH AIR CONDITIONER AND START AID 3 WAY CONNECTOR
X10	MAIN REAR HARNESS WITH AIR CLEANER 2 WAY CONNECTOR
X11	MAIN REAR HARNESS WITH REAR LIGHTS 6 WAY CONNECTOR
X12	MAIN REAR HARNESS WITH REAR LIGHTS 2 WAY CONNECTOR
X13	MAIN REAR HARNESS WITH ENGINE 20 WAY CONNECTOR
X14	MAIN REAR HARNESS WITH FRONT WHEEL DRIVE 6 WAY CONNECTOR
X15	MAIN REAR HARNESS WITH PRESSURE SWITCH AIR CONDITIONER 3 WAY CONNECTOR
X16	MAIN REAR HARNESS WITH REAR LIGHTS OPTIONAL STRADALE 6 WAY CONNECTOR
X17	MAIN REAR HARNESS WITH REAR LIGHTS OPTIONAL STRADALE 2 WAY CONNECTOR
X18	LATERAL CONSOLE HARNESS WITH OPTIONAL FRONT LOWER WIPERS 3 WAY CONNECTOR
X19	LATERAL CONSOLE HARNESS WITH RADIO CAB 2 WAY CONNECTOR
X20	LATERAL CONSOLE HARNESS WITH CAB 5 WAY CONNECTOR
X21	LATERAL CONSOLE HARNESS WITH CAB 6 WAY CONNECTOR
X22	LATERAL CONSOLE HARNESS WITH CAB 6 WAY CONNECTOR
X23	LATERAL CONSOLE HARNESS WITH TRANSMISSION 20 WAY GRAY CONNECTOR TO COME-HOME
X24	LATERAL CONSOLE HARNESS WITH TRANSMISSION 20 WAY BLACK CONNECTOR
X25	LATERAL CONSOLE HARNESS WITH FRONT WHEEL DRIVE 6 WAY CONNECTOR (INSIDE LATERAL CONSOLE)
X26-X26A	LATERAL CONSOLE HARNESS WITH HEATING UNIT OPTIONAL AIR CONDITIONER 3 AND 4 WAY CONNECTORS
X27	LATERAL CONSOLE HARNESS WITH ENGINE DAMPER TO AIR CONDITIONER 2 WAY CONNECTOR
X28	ENGINE HARNESS WITH HYDRAULIC AND TRANSMISSION SWITCH 3 WAY CONNECTOR
X29	ENGINE HARNESS WITH TRANSMISSION SWITCH AND SENSOR 5 WAY CONNECTOR
X30	MAIN FRONT HARNESS WITH OPTIONAL LIFT SHOCK DAMPENER 2 WAY CONNECTOR
X31	MAIN FRONT HARNESS WITH OPTIONAL MOLD BOARD FLOAT R.H. AND R.L. 3 WAY CONNECTOR
X32	MAIN FRONT HARNESS WITH OPTIONAL FRONT BLADE BOARD FLOAT 2 WAY CONNECTOR
X33	MAIN FRONT HARNESS WITH OPTIONAL RIPPER OR SCARIFIER 1 WAY CONNECTOR
X34	FRONT CONSOLE HARNESS WITH OPTIONAL FRONT LOWER WASHER PUMP 1 WAY CONNECTOR
X35	TRANSMISSION HARNESS WITH OPTIONAL DUEL POWER 2 WAY CONNECTOR
X36	TRANSMISSION HARNESS 2 WAY CONNECTOR TO CALIBRATION
X37	TRANSMISSION HARNESS 2 WAY JUMP CONNECTOR TO CALIBRATION
X38	TRANSMISSION HARNESS 3 WAY CONNECTOR TO COMPUTER DIAGNOSE FUNK TRANSMISSION (INSIDE LATERAL CONSOLE)
X39	HYDRAULIC AND SWITCH SENSOR TRANSMISSION HARNESS WITH RESTRICTION FILTER TRANSMISSION 1 WAY CONNECTOR
X40	TRANSMISSION HARNESS WITH PARKING BRAKE 3 WAY CONNECTOR
X41	TRANSMISSION HARNESS WITH FRONT WHEEL DRIVE 2 WAY CONNECTOR (INSIDE LATERAL CONSOLE)
X42	LATERAL CONSOLE HARNESS WITH AIR SUSPENSION SEAT OPTIONAL 2 WAY CONNECTOR
J4	SUMP GEAR SELECTOR CONNECTOR 9 WAY
J6	TRANSMISSION CONNECTOR 31 WAY





1	2	3	4	5	6	7	8	9	10	11	12

CHARGING GUIDE FOR BATTERIES OTHER THAN MAINTENANCE FREE BATTERIES

Recommended Rate* and Time for Fully Discharged Battery

Battery Capacity - See Reserve Capacity under Specifications	Slow Charge	Fast Charge
80 Minutes or Less	10 Hours at 5 Amperes 5 Hours at 10 Amperes	2.5 Hours at 20 Amperes 1.5 Hours at 30 Amperes
Above 80 to 125 Minutes	15 Hours at 5 Amperes 7.5 Hours at 10 Amperes	3.75 Hours at 20 Amperes 1.5 Hours at 50 Amperes
Above 125 to 170 Minutes	20 Hours at 5 Amperes 10 Hours at 10 Amperes	5 Hours at 20 Amperes 2 Hours at 50 Amperes
Above 170 to 250 Minutes	30 Hours at 5 Amperes 15 Hours at 10 Amperes	7.5 Hours at 20 Amperes 3 Hours at 50 Amperes
Above 250 Minutes	24 Hours at 10 Amperes	6 Hours at 40 Amperes 4 Hours at 60 Amperes

*Initial rate for standard taper charger

PREPARING A DRY CHARGED BATTERY FOR USE

1. Remove the caps from the battery.
2. Fill each cell to the top of the separators with electrolyte. This will permit the volume of electrolyte to increase when heated by charging the battery.
3. Install the caps on the battery. If the battery in your machine must have nonspill caps, install the nonspill caps. See Specifications in Section 4002 to find if the battery in your machine must have nonspill caps.
4. Connect a battery charger to the battery.
5. Charge the battery at 30 amperes until the specific gravity is 1.250 or more and the temperature of the electrolyte is at least 15.5°C (60° F).
6. If necessary, fill each cell with electrolyte until the electrolyte is just below split ring at the bottom of the cell opening.

Inspection and Testing of the Stator

STEP 30

Look for burned insulation on the coils of the stator. This is an indication of a short circuit. Install a new stator.

STEP 31

B9064319M

Touch the leads of the ohmmeter to each lead from the stator and the common connection. The readings must be as specified, see below. If the readings are not as specified, a new stator must be installed.

45 Ampere Alternator . . . . . 0.20 to 0.24 ohms

STEP 32

B9064322M

Touch the leads of the ohmmeter to each lead from the stator and the frame. If a reading shows continuity, a new stator must be installed.

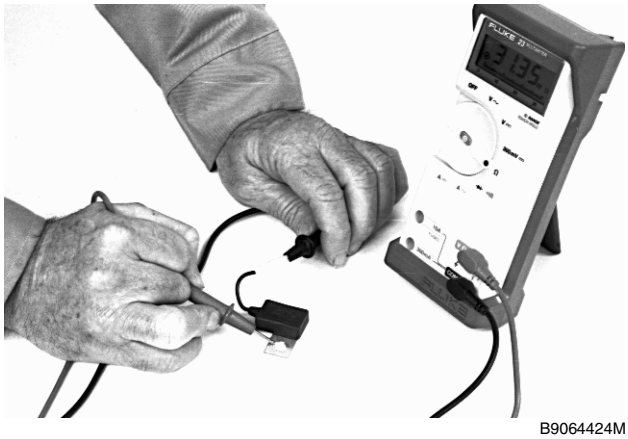
STEP 33

B9064502M

Use a high watt soldering iron and rosin core solder to solder the leads of the stator to the rectifier bridge.

Testing the Capacitor

STEP 34



B9064424M

Touch the leads of the ohmmeter to the capacitor as shown. The reading will initially approach zero ohms, then gradually increase to an open circuit as the capacitor is charged. If there is no indication of resistance, a new capacitor must be installed. The capacitor is used to reduce radio noise.

STEP 35

Touch the terminal to the bracket to discharge the condenser.

STEP17
Remove wheel lean knuckle.

STEP 18
Remove seals from wheel lean knuckle.

STEP 19
Remove seals and needle roller bearing from the front axle

STEP 20
Remove bearing from wheel lean arm.

NOTES

13. Install seal gland bushing over the spool end with a twisting motion. Tap the bushing in place with a rubber hammer. Make sure the bushing is flush against the bearing race.

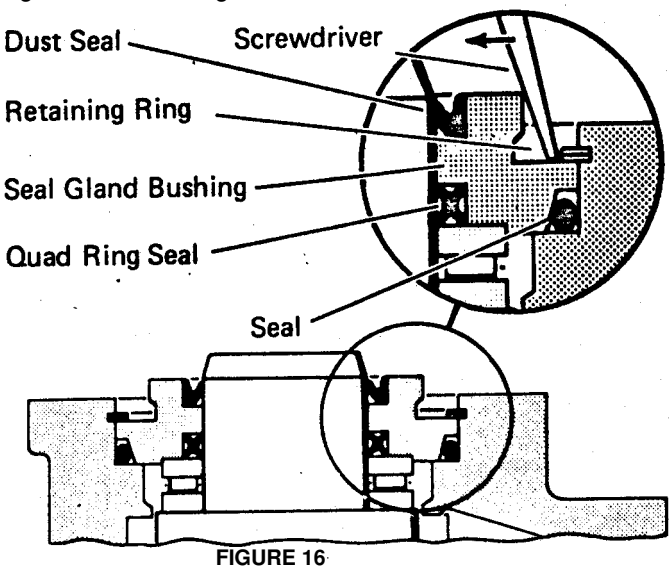


FIGURE 16

14. Install retaining ring (see Fig. 15-16) in housing. After installing ring, tap on ring end to pry with screwdriver around entire circumference of ring to property seat ring in groove.

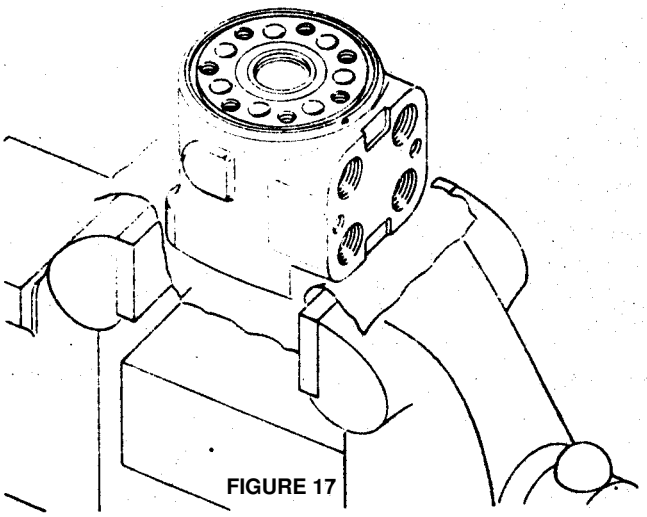


FIGURE 17

15 Clamp housing in vise, as shown in Fig. 17. Clamp lightly on edges of mounting area. Do not over tighten jaws.

Note: Check to insure that the spool and sleeve are flush or slightly below the 14 hole surface of the housing.

Attention: Clean the upper surface of the housing by wiping with the palm of clean hand. Clean each of the flat surfaces of the meter section parts in a similar way when ready for reassembly. Do not use cloth or paper to clean surfaces.

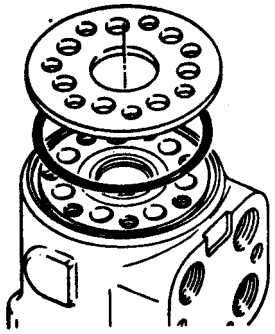


FIGURE 18

16. Install seal in housing, see Fig. 18.

17. Install spacer plate. Align bolts holes in spacer plate with tapped holes in housing.

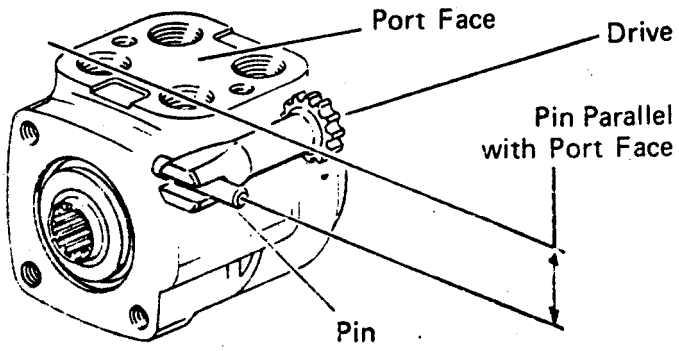


FIGURE 19

SOLENOID VALVE OPERATION

Before troubleshooting the electric circuit of the valve, the chart shows what solenoids are charged when that gear is selected.

DF SERIES EIGHT SPEEDS FORWARD AND FOUR REVERSE

DF 8/4

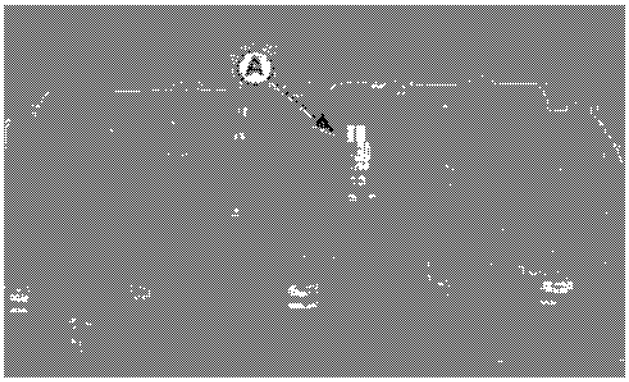
Gear Engage	Solenoid Charged
F 8th	2 and D
F 7th	1 and D
F 6th	2 and B
F 5th	1 and B
F 4th	2 and C
F 3rd	1 and C
F 2nd	2 and A
F 1st	1 and A
Neutral	
R 1st	3 and A
R 2nd	3 and C
R 3rd	3 and B
R 4th	3 and D

POWERSHIFT TROUBLESHOOTING-INTERNAL DISCONNECT MODELS ONLY

Symptom	Problem	Solution
865 All wheel drive will not engage.	Solenoid stuck open. Voltage applied all the time.	Repair or replace solenoid. Check wiring diagram and connecters.
	Damaged or missing disconnect retainer spring.	Replace or install disconnect retainer spring.
	Bleed port blocked.	Check for proper installation of gasket and solenoid cap or contamination.
865 All wheel drive will not disengage.	No power to solenoid, solenoid inoperative.	Check for electric power to solenoid - check wiring and connecters if O.K., replace solenoid.
	Check valve installed backwards.	Install check valve properly.

6. Temperature sensor

The temperature sensor (A) is used to determine transmission fluid temperature.



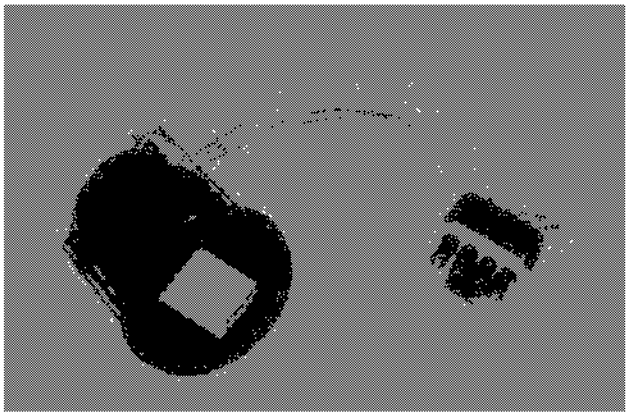
SIGNAL DESCRIPTION	SENSOR PIN	TRANS CONNECTOR PIN	TCU PIN
TEMPERATURE SENSOR	A	J6-25	J1-C3
TEMPERATURE SENSOR GND	B	J6-24	J1-D1

7. Gear/diagnostic indicator or "CCD display"

The TCU and gear/diagnostic indicator can be used on both 12 and 24 volt applications.

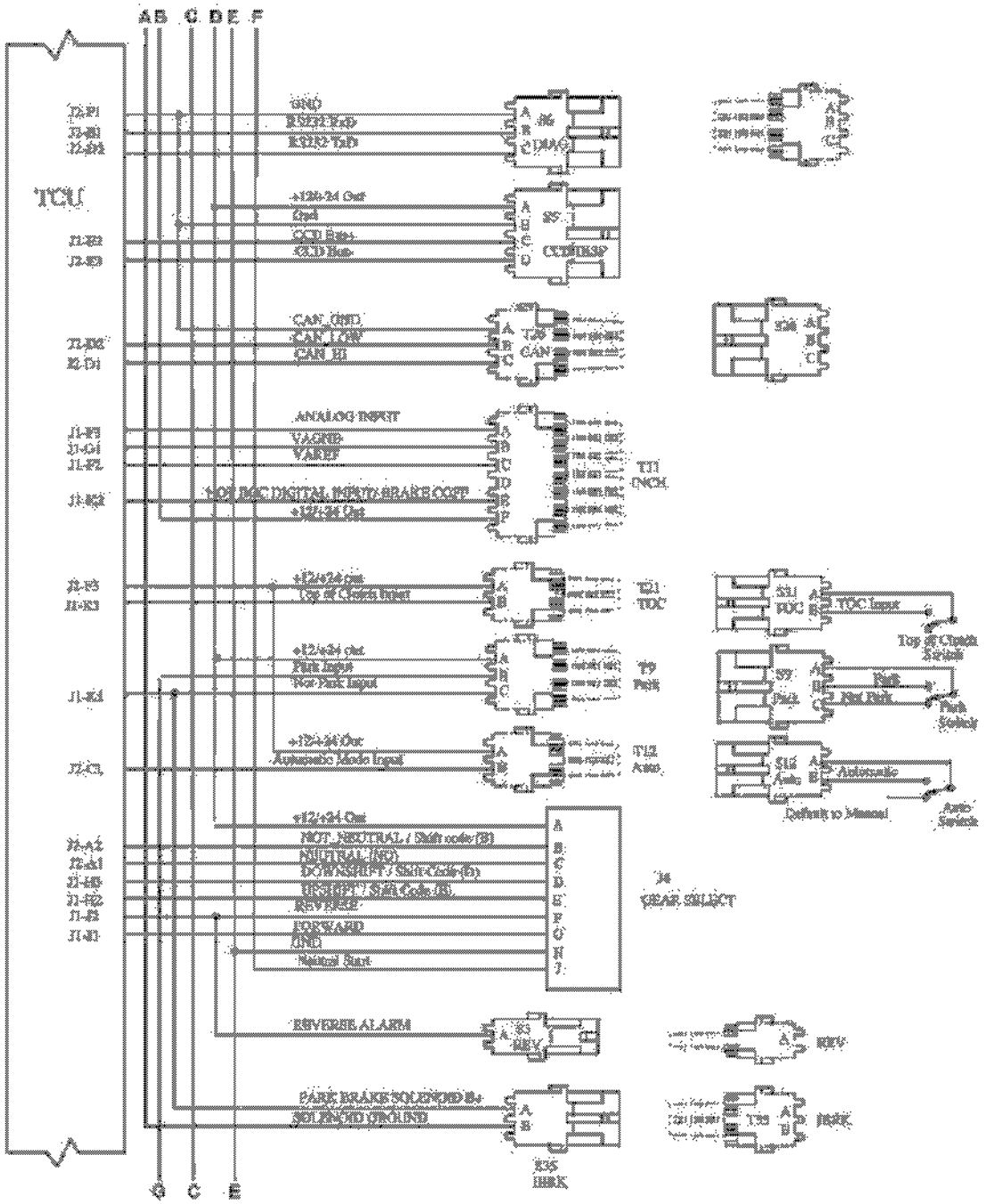
CONNECTOR PINOUT

SIGNAL DESCRIPTION	CONNECTOR AND PIN	TCU PIN
+12V/+24V	S5-A	J3-A1
GROUND	S5-B	J2-F1
CCD BUS+	S5-C	J2-E2
CCD BUS-	S5-D	J2-E3



NOTE: Mounting requires a 2 inch diameter hole with 88.9 mm (3.5 in) clearance behind the front face.

TRANSMISSION WIRING HARNESS 2 OF 4



NOTE: The letters G,C,E link to the next page.
Wiring harness is + 24Volts grader 845 / 865

Diagnostic Code: 88

Probable Cause: PARK (input pin J2-B3) and REVERSE (input pin J1-J2) are simultaneously active at TCU.

Diagnostic Code: 89

Probable Cause: PARK (input pin J2-B3) and NOT PARK (input pin J1-K1) are simultaneously passive at TCU.

Diagnostic Code: 90

Probable Cause: PARK (input pin J2-B3) and NOT PARK (input pin J1-K1) are simultaneously active at TCU.

Diagnostic Code: 91

Probable Cause: Seat switch (input pin J2-C3) and NEUTRAL (input pin J2-A1) are simultaneously passive at TCU.

Diagnostic Code: 92

Probable Cause: Engine speed is at or near manufacturer's warranty void level.

Diagnostic Code: 93

Probable Cause: CARRIER CAB and UPPER CAB inputs are simultaneously active at TCU.

Diagnostic Code: 94

Probable Cause: CARRIER CAB and UPPER CAB inputs are simultaneously passive at TCU.

Diagnostic Code: 95

Probable Cause: NEUTRAL (input pin J2-A1) is passive while switching cab modes.

Diagnostic Code: 96

Probable Cause: Upper cab mode selected but transmission gear is not a legal gear range for upper cab mode.

Diagnostic Code: 97

Probable Cause: Upper cab mode selected but FORWARD NEUTRAL and REVERSE inputs are all passive at TCU.

Diagnostic Code: 98

Probable Cause: WHEELS-UP (input pin J1-H1) and WHEELS-DOWN (input pin J1-H2) are both active.

Diagnostic Code: 99

Probable Cause: Attempt to change wheels-up wheels-down mode while in an out-of-neutral condition.

Diagnostic Code: 100

Probable Cause: Sump temperature (input on J1-C3) is too low for calibration.

Diagnostic Code: 101

Probable Cause: Engine speed is too high for calibration.

Diagnostic Code: 102

Probable Cause: Engine speed is too low for calibration.

Diagnostic Code: 103

Probable Cause: Output speed detected during calibration.

Diagnostic Code: 104

Probable Cause: No cylinder speed detected during calibration.

Diagnostic Code: 105

Probable Cause: Incorrect forward cylinder speed ratio during calibration.

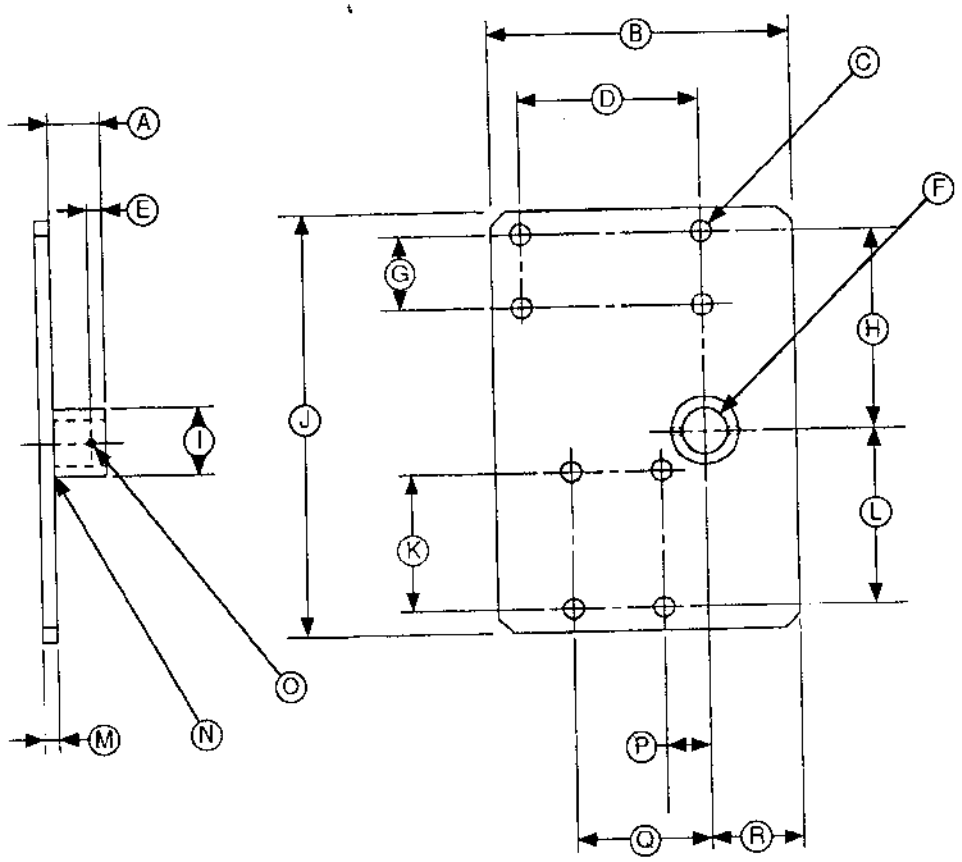
Diagnostic Code: 106

Probable Cause: Incorrect reverse cylinder speed ratio during calibration.

Diagnostic Code: 107

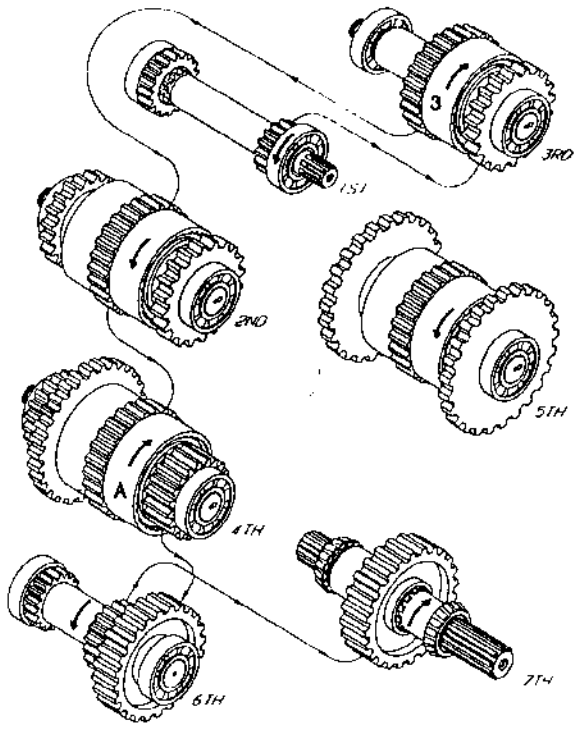
Probable Cause: Cylinder speed will not drop below the start count speed.

ASSEMBLY STAND PLATE

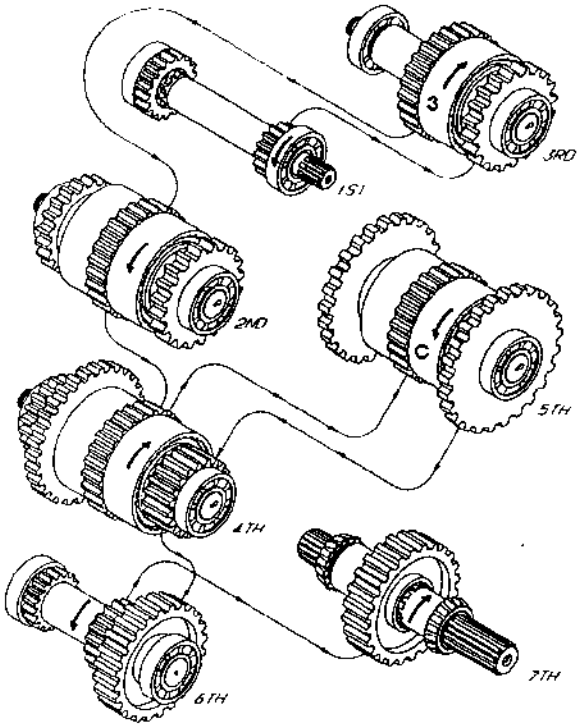


A—1.75 in. (44.45mm)
B—9.96 in. (252.98mm)
C—8X 11/16 Drill Through
D—5.984 in. (151.993mm)
E—.5 in. (12.7mm)
F—1.500—1.505 in. (38.1—38.227mm)
G—2.362 in. (59.994mm)
H—6.48 in. (164.59mm)
I—2.25 in. (57.15mm)
J—13.875 in. (352.425mm)
K—4.528 in. (115.011mm)
L—5.84 in. (148.33mm)
M—.5 in. (12.7mm)
N—.25 (6.35) radius in corner
O—17/64 Drill Through as Shown
P—1.46 in. (37.08mm)
Q—2.992 in. (75.996mm)
R— 3.00 in. (76.2mm)

8-4 POWER FLOW REVERSE SPEEDS



R1 Gear - 3A



R2 Gear - 3C

-UN-10DEC93

YZ742

CLUTCH CALIBRATION: EIGHT FORWARD SPEEDS AND FOUR REVERSE

Transmissions Eight Forward Speeds and Four Reverse.

IMPORTANT: Attempting to calibrate with sump temperature below minimum calibration temperature (90˚F) will trigger the "warm-up" mode. This mode will show "---" on the display as the transmission warms to the minimum calibration temperature at which time the calibration process will automatically begin. Temperatures below 50˚F will result in "sump temperature too cold" error 100.

1. Bring the transmission oil temperature up to 140˚ to 160˚F (60˚ to 71˚C) for optimum calibration.

2. With the vehicle ignition off, apply the park brake.

3. Plug a jumper plug (which connects pin A to pin B) in the calibration plug (s16) on the vehicle harness.

IMPORTANT: Any errors that appear during calibration will cause the procedure to terminate, and you will have to start the calibration over from the beginning.

4. Power up the TCU by turning on the vehicle ignition. The display should show "CAL".

5. Start and hold the engine speed at 1600 RPM. The engine governor must hold the engine speed ± 50 RPM.

6. Move the shift handle to the Forward position.

7. During the first few seconds of the calibration process, the display will show "---" while testing the cylinder speed and response.

8. At this time the Clutch calibration process starts.

a. Directional and Speed Clutch Holds. The display will show **C1H, C2H, C3H, CAH, CBH, CCH** and **CDH** while acquiring the respective "hold" time of each clutch.

b. Directional and Speed Clutch Fills. The display will show **C1F, C2F, C3F, CAF, CBF, CCF** and **CDF** while acquiring the respective "fill" time of each clutch.

9. The display will show **END** when the routine is finished. At that time move the shift handle back to the Neutral position.

10. Shut the vehicle's ignition OFF, which will power down the TCU.

11. Remove the jumper plug from the calibration plug (S16).

The calibration is complete.

J1 CONNECTOR

NOTE: Connector pinouts reference wiring harness diagram in this group always reference the vehicle manufacturers wiring harness diagram for your application.

CONNECTOR PINOUT

A1—Main battery 1 (TCU Power, +24V)
A2—Ground 1
A3—Output magnetic pickup sensor input (frequency input)
B1—Engine magnetic pickup sensor input (frequency input)
B2—Cylinder magnetic pickup sensor input (frequency input)
B3—Spare magnetic pickup sensor input (frequency input)
C1—F Flow (input)
C2—Magnetic pickup sensor ground
C3—Temperature sensor (analog voltage input)
D1—Temperature sensor ground
D2—Rear-steer HI (voltage reference output)
D3—Rear-steer position (analog voltage input)
E1—Rear-steer LO (voltage reference output)
E2—Load sense HI (voltage reference output)
E3—Load sense (analog voltage input)

"Input" and "Output" are defined relative to the TCU.

F1—Load sense LO (voltage reference output)
F2—Inching pedal HI (voltage reference output)
F3—Inching pedal position (analog voltage input)
G1—Inching pedal LO (voltage reference output)
G2—Spare ground
G3—Spare ground
H1—Spare ground
H2—UPSHIFT (Shift code E), (digital input)
H3—DOWNSHIFT (Shift code D), (digital input)
J1—FORWARD (digital input)
J2—REVERSE (digital input)
J3—Spare input (digital input)
K1—NOT PARK (digital input)
K2—NOT BOTTOM OF CLUTCH (digital input)
K3—TOP OF CLUTCH (digital input)

Mating connector for J1 is:

- Metri-Pack 150 series 30 way sealed P2S connector
- Delphi/Packard part number: 12034398
- Mating terminals for J1 are Delphi/Packard terminals: 12103881
- Tighten connector to TCU 0.8—1.5 N·m (7.1—13.3 lb-in)

PROPORTIONAL VALVES

CONNECTOR PINOUT

SIGNAL DESCRIPTION	TRANSMISSION CONNECTOR PIN	TCU PIN
SOLENOID 1	J6-2	J3-A3
SOLENOID 1 RETURN	J6-1	J3-B1
SOLENOID 2	J6-3	J3-B2
SOLENOID 2 RETURN	J6-15	J3-B3
SOLENOID 3	J6-4	J3-C1
SOLENOID 3 RETURN	J6-19	J3-C2
SOLENOID 4	J6-5	J3-C3
SOLENOID 4 RETURN	J6-6	J3-D1
SOLENOID A	J6-10	J3-D2
SOLENOID A RETURN	J6-17	J3-D3
SOLENOID B	J6-12	J3-E1
SOLENOID B RETURN	J6-11	J3-E2
SOLENOID C	J6-23	J3-E3
SOLENOID C RETURN	J6-22	J3-F1
SOLENOID D	J6-8	J3-F2
SOLENOID D RETURN	J6-7	J3-F3

Transmission Eight Speeds Forward and Four Reverse

GEAR ENGAGED	ACTIVE SOLENOIDS
F 8th	2 and D
F 7th	1 and D
F 6th	2 and B
F 5th	1 and B
F 4th	2 and C
F 3rd	1 and C
F 2nd	2 and A
F 1st	1 and A
Neutral	
R 1st	3 and A
R 2nd	3 and C
R 3rd	3 and B
R 4th	3 and D

Diagnostic Code: 179

Probable Cause Code: Solenoid 12 cannot drop to requested current.

Probable Cause: Short to positive in circuit from output pin J3-J1 to return pin J3-J2.

Diagnostic Code: 180

Probable Cause Code: Solenoid 13 cannot drop to requested current.

Probable Cause: Short to positive in circuit from output pin J3-J3 to return pin J3-K1.

Diagnostic Code: 198

Probable Cause: CCD communications link failure between master TCU and slave TCU (CCD BUS- (J2-E3) and CCD BUS+ (J2-B2)).

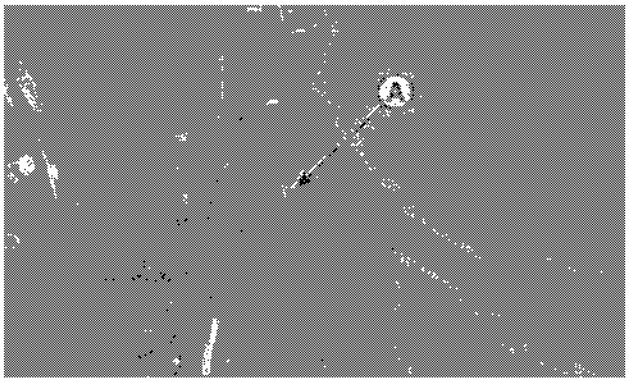
Diagnostic Code: 199

Probable Cause: This is a non-functional base TCU. No application specific software has been programmed into it.

REMOVE WIRING HARNESS

1. Loosen nut (A).

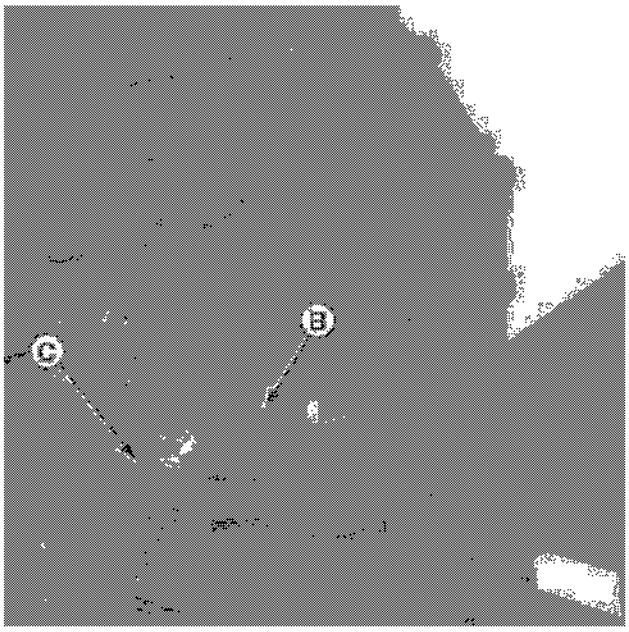
NOTE: Tag all wiring connectors for identification before removing wiring harness.



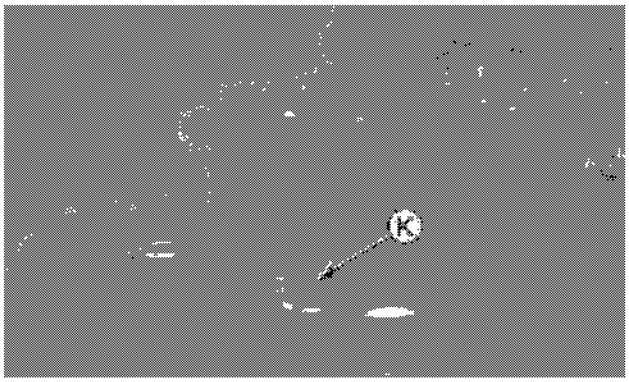
2. Unfasten all weather pack connectors (B).

3. Remove wiring harness (C).

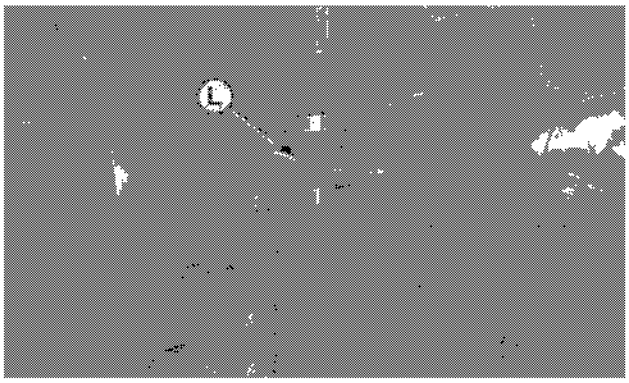
4. Inspect for wear and damage.



10. Tighten nut (K) to 190 N·m (140 lb-ft).

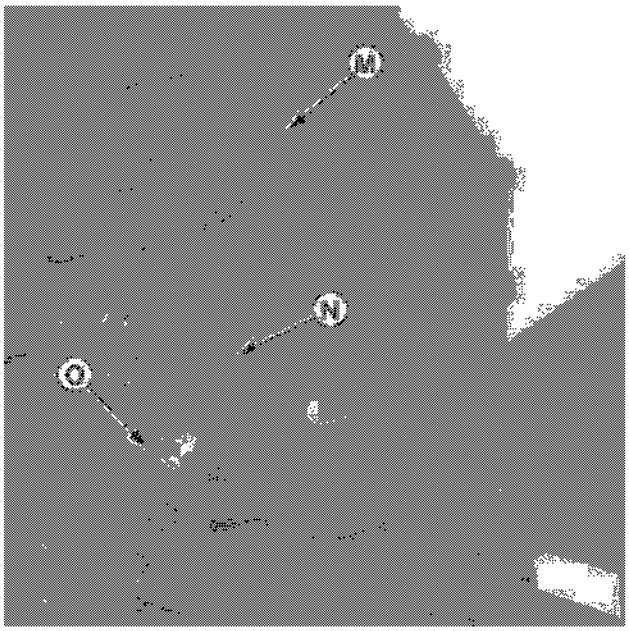


11. Tighten nut (L) to 190 N·m (140 lb-ft).



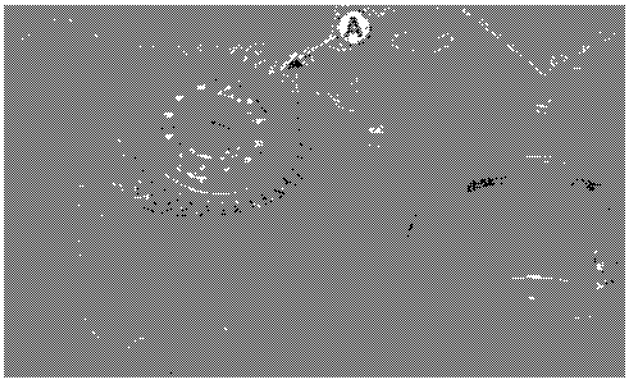
12. Move wiring harness bracket (M) back in place and tighten two cap screws (N) 87 N·m (64 lb-ft).

13. Install wiring harness (O). Be sure to route the harness away from moving parts, Make connections as they were before disassembly.

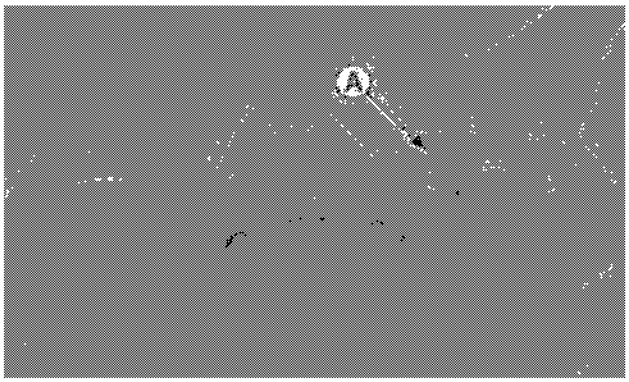


REMOVE AND DISASSEMBLE IDLER GEARS AND BEARING ASSEMBLY

1. Remove charge pump idler gear assembly (A) though charge pump ports.



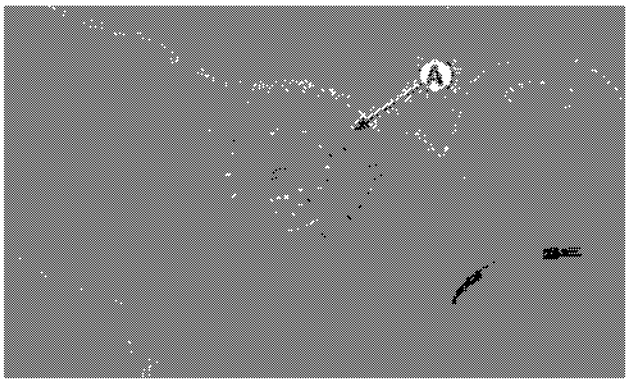
2. Remove auxiliary pump drive idler gear and bearing assembly (A) through the auxiliary pump drive port.



NOTE: Both right and left idler gear and bearing assemblies are disassembled in the same way.

CAUTION: Wear safety glasses when removing or installing snap rings.

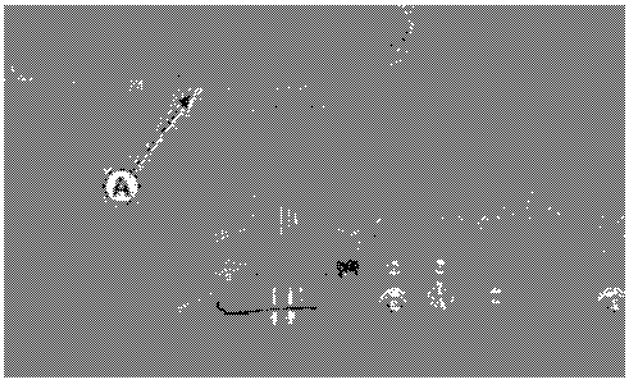
3. Remove snap ring (A).



REMOVE AND DISASSEMBLE INPUT SHAFT ASSEMBLY

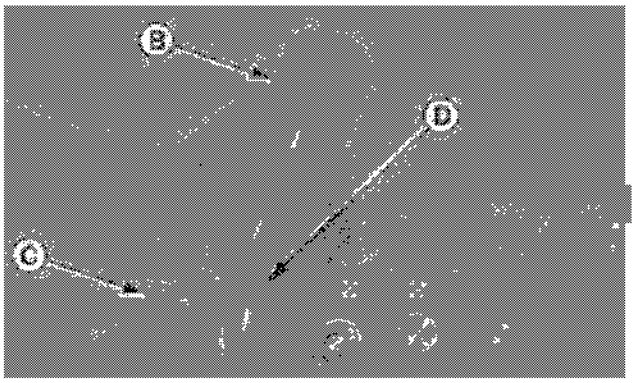
CAUTION: Be sure the input shaft assembly (B) does not come up with the input housing assembly (A). It could fall and cause damage or personal injury.

CAUTION: The input bearing will usually come up with the input housing assembly. Do not let it fall out before it can be safely removed.



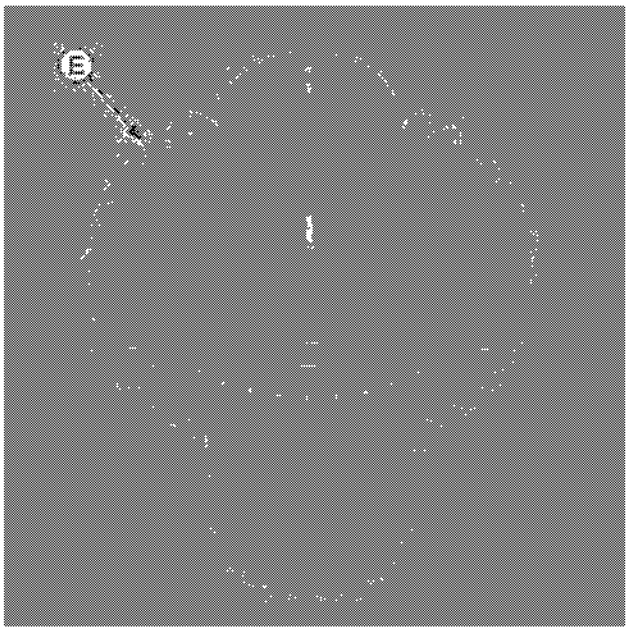
1. Remove the input housing assembly (A).

CAUTION: Do not allow the coupling shaft (D) to fall if it comes up with the input shaft assembly.



2. Lift input shaft assembly (B) from bearing retainer (C).

3. Place input assembly (E) with snap ring up.



Control Valve

OTHER MATERIAL

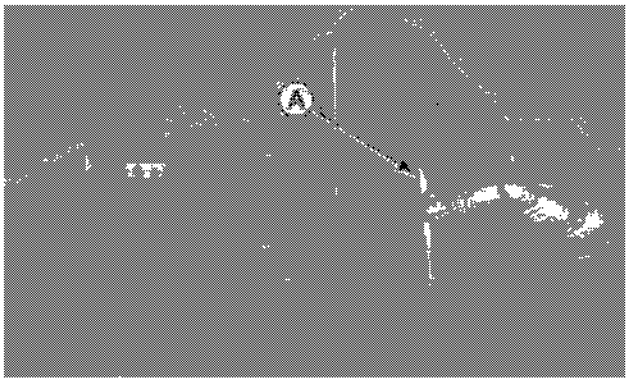
Number	Name	Use
	Transmission Fluid	All moving parts and o-rings.

SPECIFICATIONS

Item	Measurement	Specification
Control valve-to-front housing cap screw (27).	Torque	40 N·m (30 lb-ft)
Proportional valve nut-to-proportional solenoid assembly (8).	Torque	1.7—2.8 N·m (15—25 lb-in)
7/16-20 plug-to-valve housing (12).	Torque	12 N·m (9 lb-ft)
9/16-18 plug-to-valve housing (2).	Torque	25 N·m (18 lb-ft)
Temperature sensor-to-valve housing.	Torque	16 N·m (12 lb-ft)
Proportional valve-to-valve housing (8).	Torque	16—20 N·m (12—15 lb-ft)
Main regulator assembly-to-valve housing.	Torque	142 N·m (105 lb-ft)
Relief valve assembly-to-valve housing.	Torque	102 N·m (75 lb-ft)
Valve assembly	Weight	25 Kg (55 lbs)

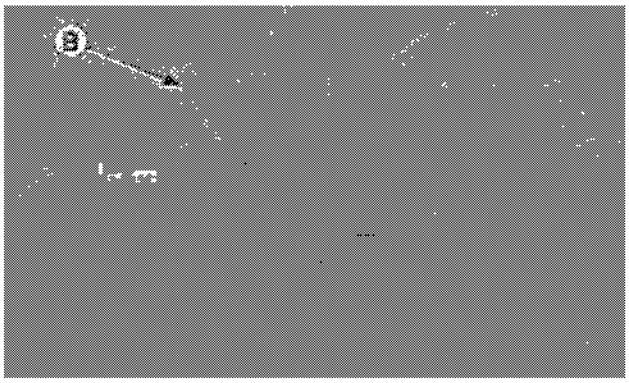
INSTALL GASKETS AND PLATE TO FRONT HOUSING TO FRONT HOUSING VALVE SURFACE

IMPORTANT:There are two (2) gaskets and a plate that go between the valve assembly and front housing. The first gasket is cut out to the shape of the casting on the front housing. The second gasket is cut out to the shape of the metal plate and has a boot-like shape cut out of it.



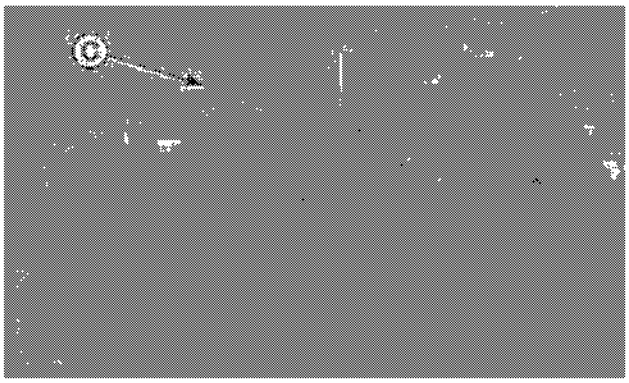
NOTE: Guide pins used are bolts with heads removed. Guide pins length will need to be long enough for removal after placing valve housing assembly onto front housing.

1. Install two guide pins (A).



IMPORTANT: Gasket must match opening in front housing.

2. Place and fit new gasket (B) onto front housing using guide pins (A) as holders.

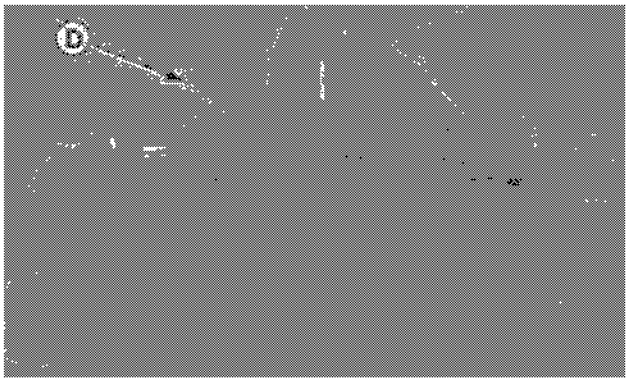


IMPORTANT: Opening in plate must match opening in gasket.

3. Place plate (C) over the guide pins and onto gasket (B).

IMPORTANT: Cut out opening in gasket must match opening in plate.

4. Place new gasket (D) over guide pins onto plate (C).

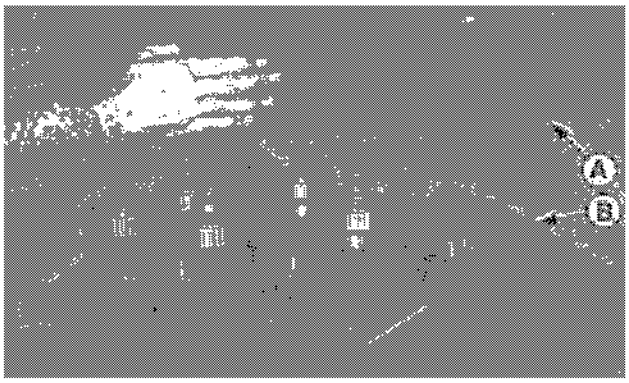


REMOVE FRONT HOUSING

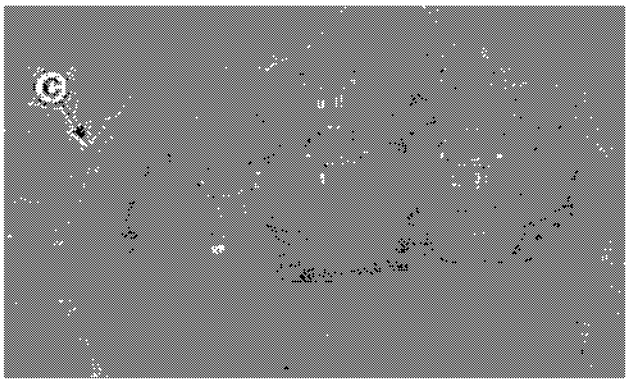
IMPORTANT: Pry on the housings to loosen the gasket seal, use lugs provided on the front and rear housings.

CAUTION: The front housing assembly weighs approximately 120 Kg (265 lbs.) Do not allow any part of the body under the front housing assembly.

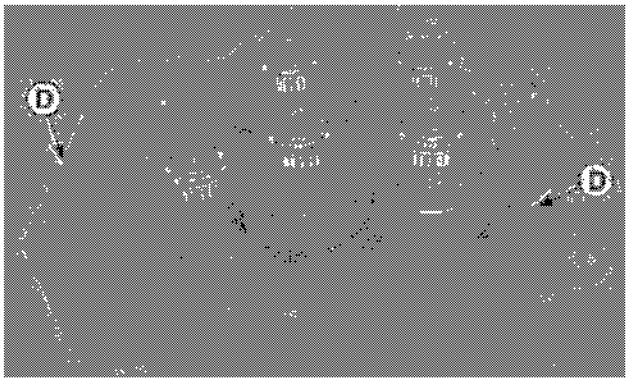
1. Remove front housing.



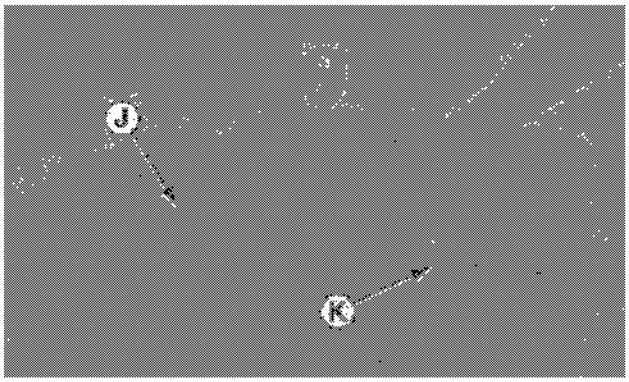
2. Remove and discard gasket (C).



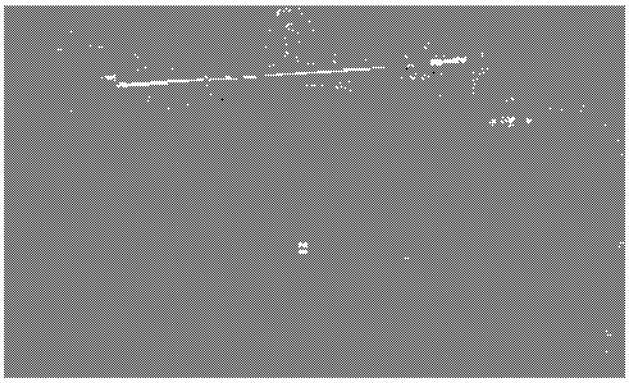
3. Check for two dowel pins (D).



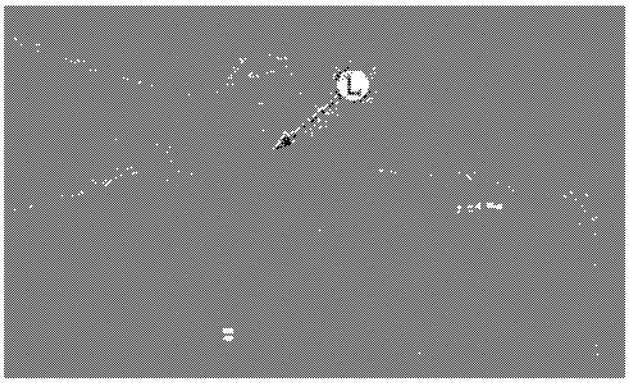
6. Install cap screws (J) and wiring harness bracket (K).



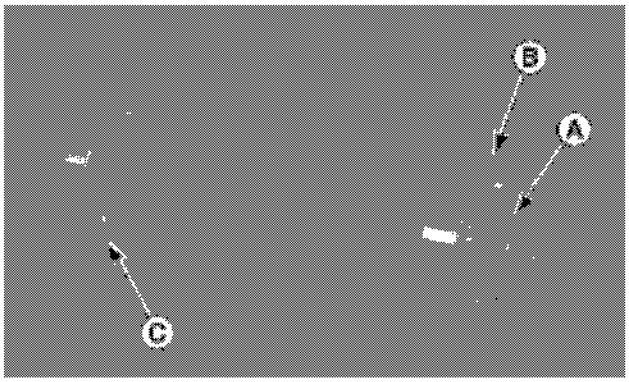
7. Tighten cap screws to 87 N·m (64 lb-ft).



8. Remove lifting tool (L).



DISASSEMBLE FIRST STAGE ASSEMBLY



1. Remove and discard Seal Ring (A).
2. Remove Bearing (B).
3. Remove Bearing (C).
4. Inspect first stage shaft assembly (C).

ASSEMBLE FIRST STAGE ASSEMBLY

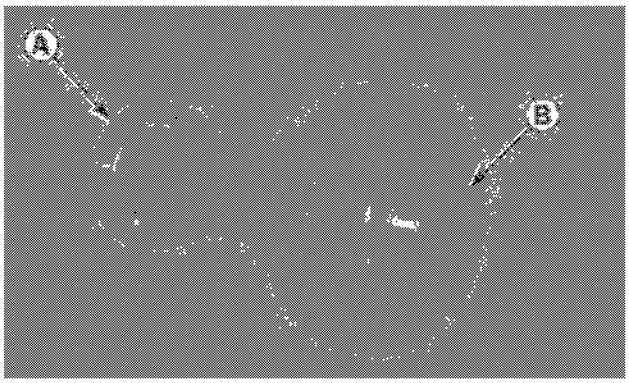
NOTE: Press only on inner race of bearing.

1. Install new bearing (B).
2. Install new bearing (C).

NOTE: Refer to Sizing Seal Rings in this group.

3. Install new seal ring (A).
4. Lubricate ball bearings.

DISASSEMBLE SIXTH STAGE ASSEMBLY



1. Remove ball bearing (A).
2. Remove bearing inner race (B).

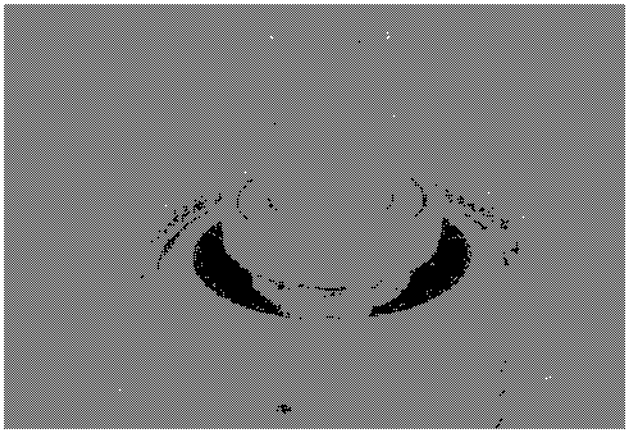
ASSEMBLE SIXTH STAGE ASSEMBLY

1. Install new ball bearing (A).
2. Install new bearing inner race (B).
3. Lubricate all bearings with clean transmission fluid.

CAUTION: Wear eye protection when removing snap ring.

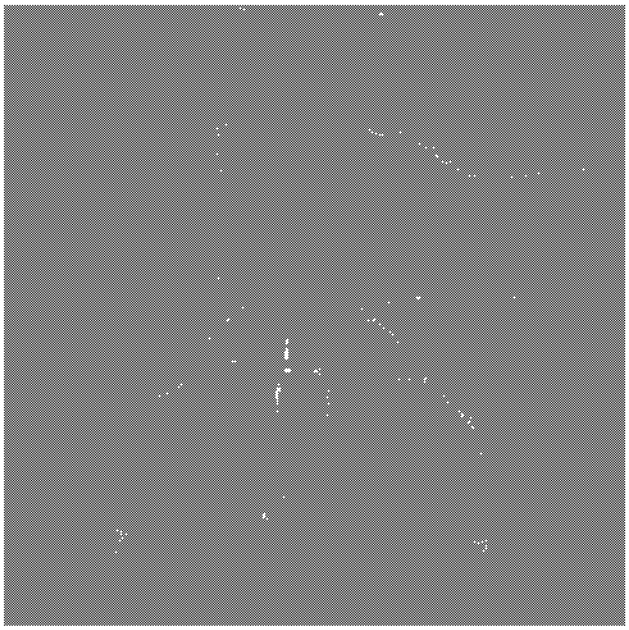
11. Remove snap ring (A).

IMPORTANT: * Fourth stage clutch gear (clutch A) must use special bearings. Use only approved bronze caged bearings.



** Application dependent*

18. Press new bearing, seal side down, until bearing contacts shoulder of shaft.



19. Install clutch gear assembly (A).

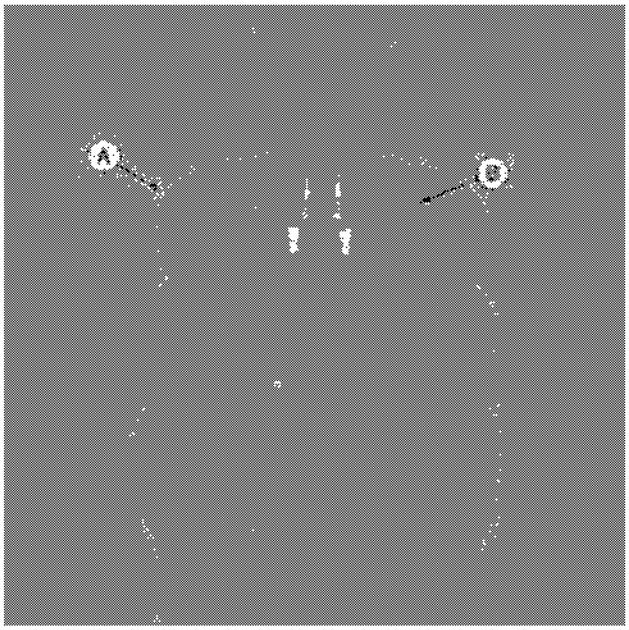
IMPORTANT: Place steel ruler or sight across gear face (A) to check if clutch gear is install properly. Sighting or steel ruler will be below snap ring groove in cylinder shaft.

IMPORTANT: * Fourth stage clutch gear (clutch A) must use special bearings. Use only approved bronze caged bearings.

20. Place new bearing (B) on shaft, start bearing into the clutch gear assembly.

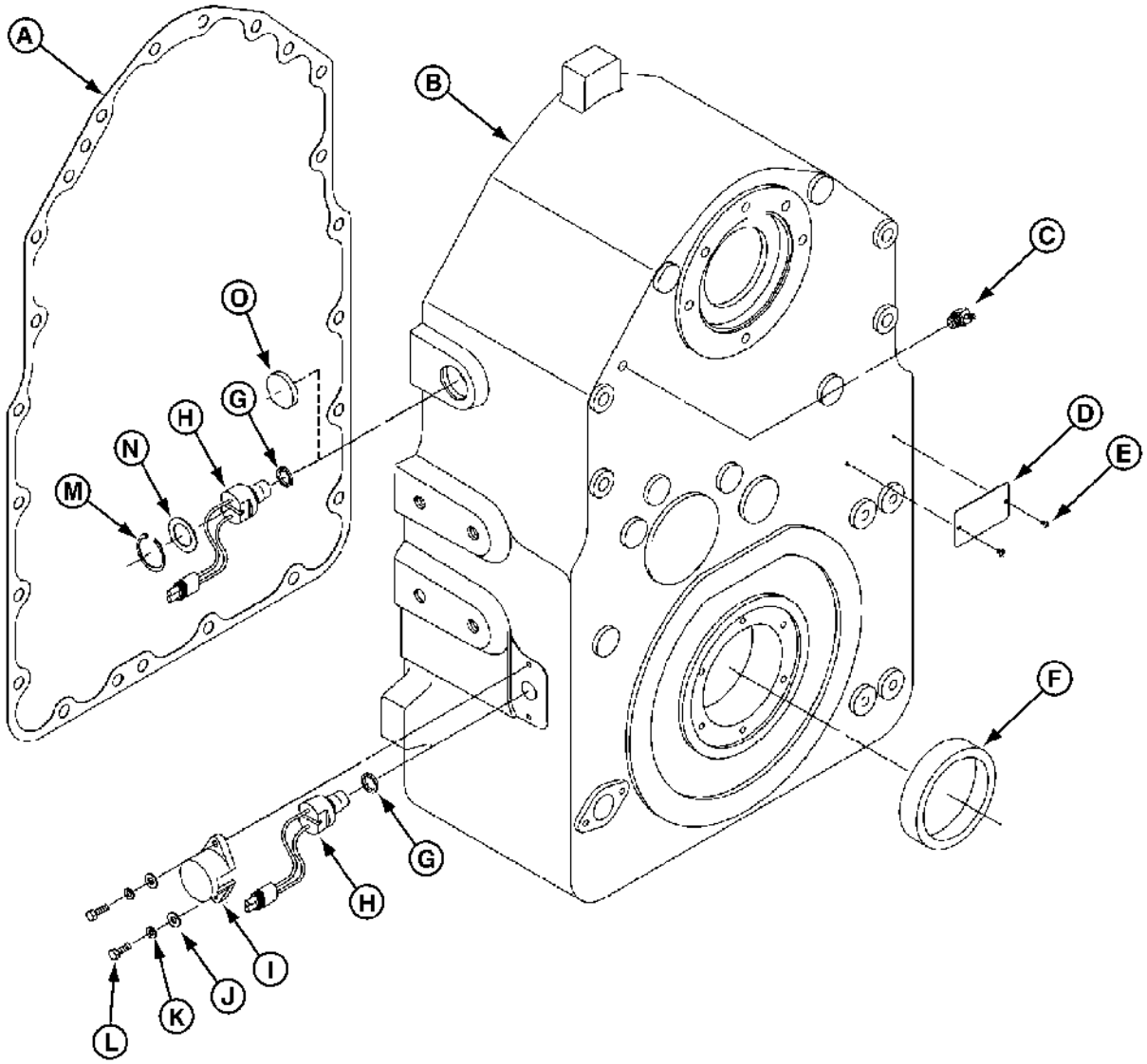
IMPORTANT: Start bearing into clutch gear. DO NOT press bearing below snap ring groove in shaft. Pressing bearing too far into gear will preload bearing. This will cause the bearing to fail.

21. PARTIALLY install bearing into clutch gear hub assembly.



** Application dependent*

REAR HOUSING COMPONENT IDENTIFICATION (DF150)



A—Gasket
B—Rear Housing (DF 150)
C—Elbow
D—Identification Plate
E—Drive Screw (2 used)
F—Bearing Cup
G—O-ring (2 used)
H—Magnetic Pickup Sensor
I—Cover
J—Washer (2 used)
K—Lock Washer (2 used)
L—Cap Screw M6x20 8.8 (2 used)
M—Snap Ring
N—Flat Washer
O—Plug (If Magnetic Pickup Sensor Not Used)

10. Align bearing retainer bolt holes with bolt hole circle in the rear housing.

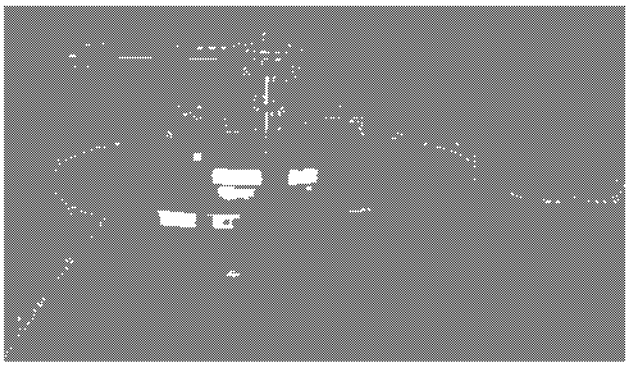
11. Install cap screws.

12. Tighten cap screws to 25 N·m (18 lb-ft).

13. Install yoke, O-ring, washer and cap screw.

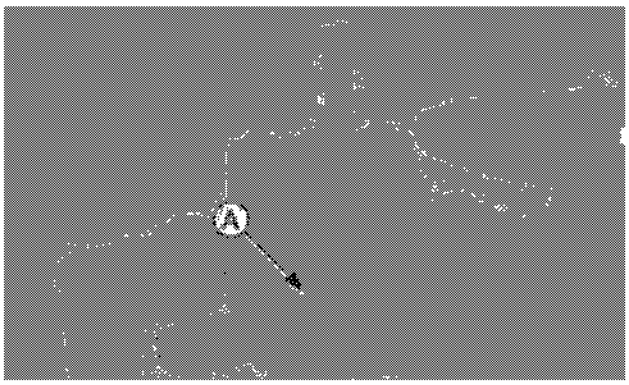
14. Tighten cap screw to 215 N·m (159 lb-ft).

NOTE: Refer to group 55 for installation of brake calipers.



INSTALL BRAKE PADS

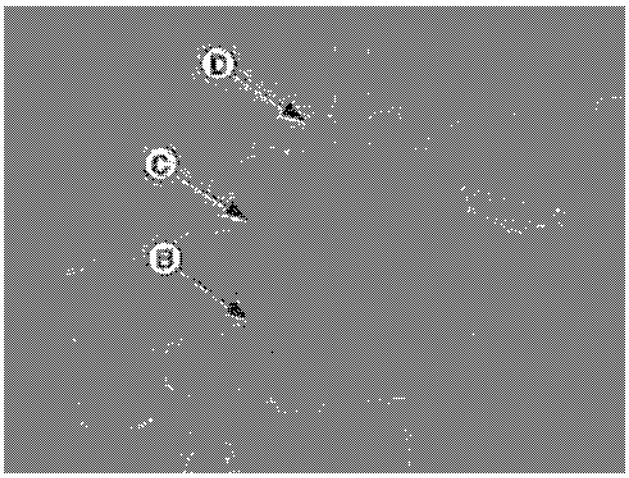
NOTE: There are two pins located in the lower brake pad area (A) of the brake assembly. Brake pads have two holes that locate on pins.



1. Install brake pad (B) spring behind brake assembly.

2. Install brake Pad (C) with spring behind threaded shaft of brake assembly.

3. Install actuating pins (D) to locate top brake pad.



4. Swing brake assembly onto disk brake.

5. Install cap screws.

6. Tighten cap screw 87 N·m (64 lb-ft).

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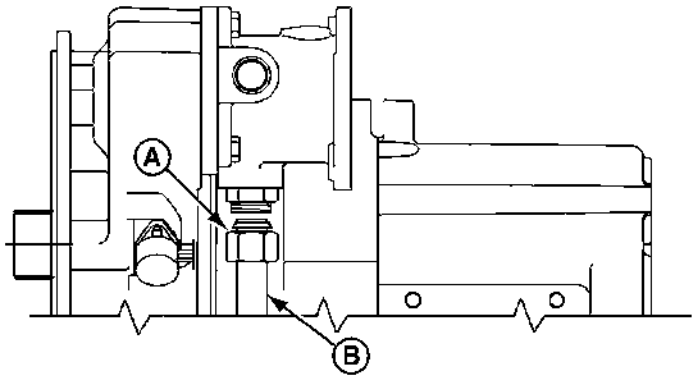
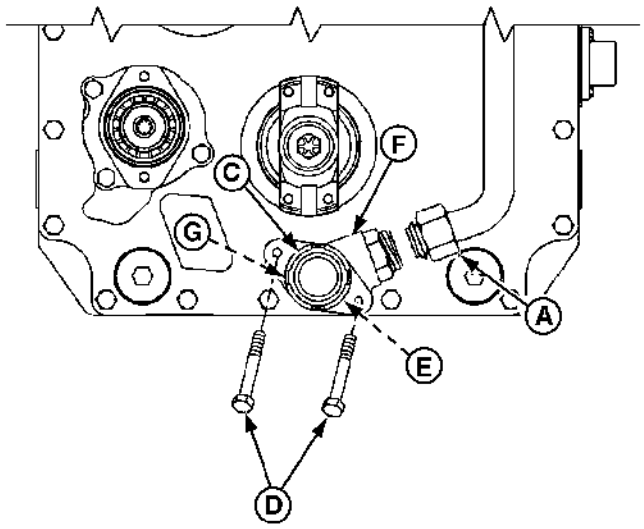
DISASSEMBLE SUCTION TUBE GROUP

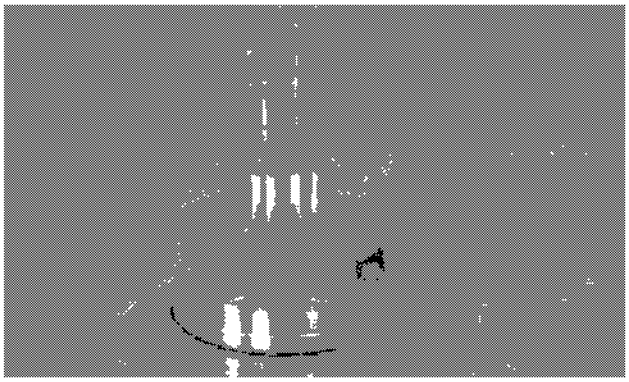


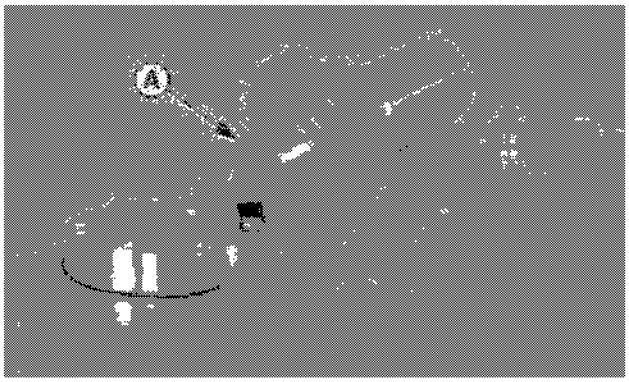


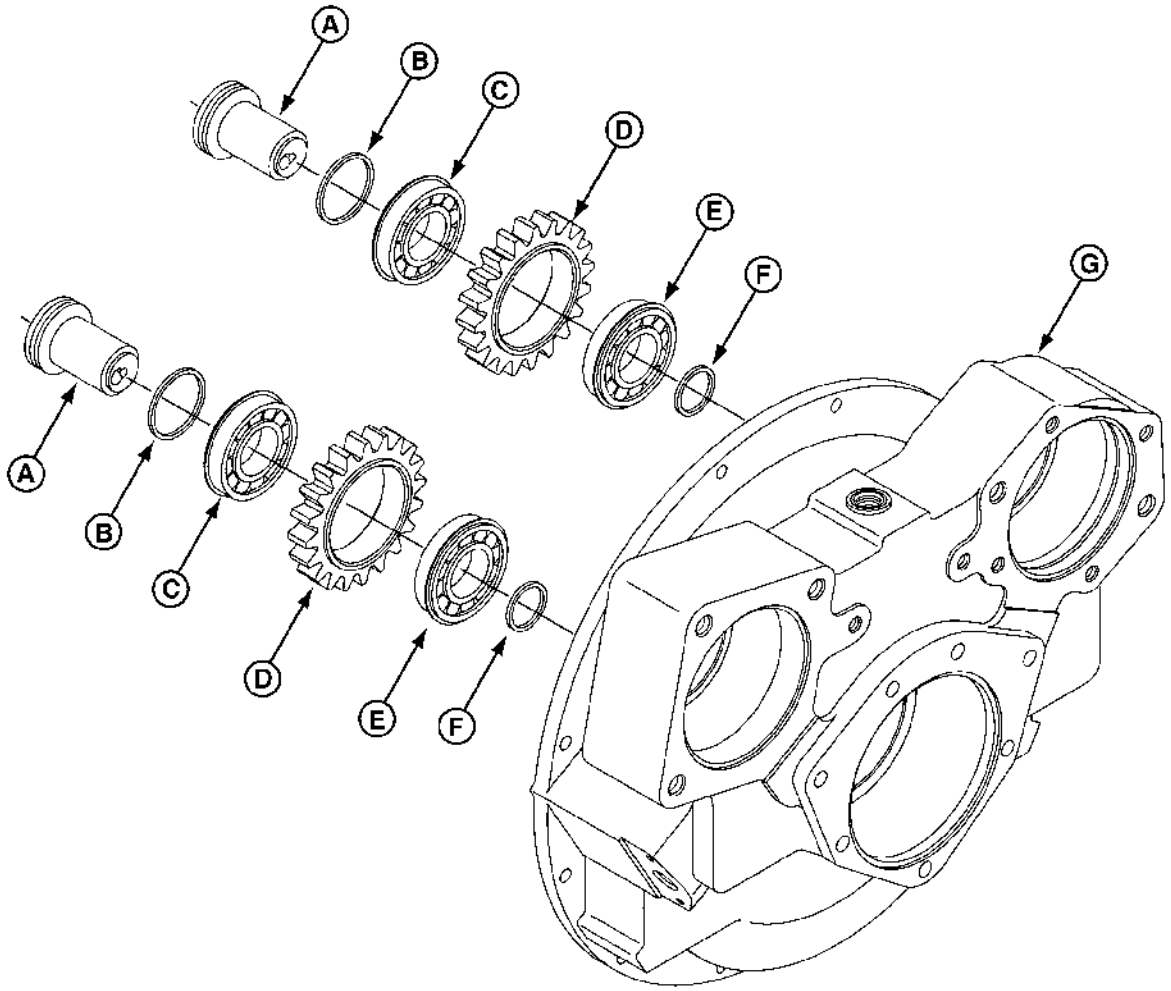
A—O-ring fitting (2 used)
B—Suction tube
C—Suction screen assembly
D—Cap screw (2 used)
E—Gasket
F—Suction manifold
G—O-ring

1. Lift input housing carefully from transmission. The direct drive input assembly should stay with transmission.

2. Remove input assembly (A).







A—Idler shaft (2 used)
B—O-ring (2 used)
C—Bearing (2 used)
D—37T Idler gear (2 used)
E—Bearing (2 used)
F—O-ring (2 used)
G—Input housing

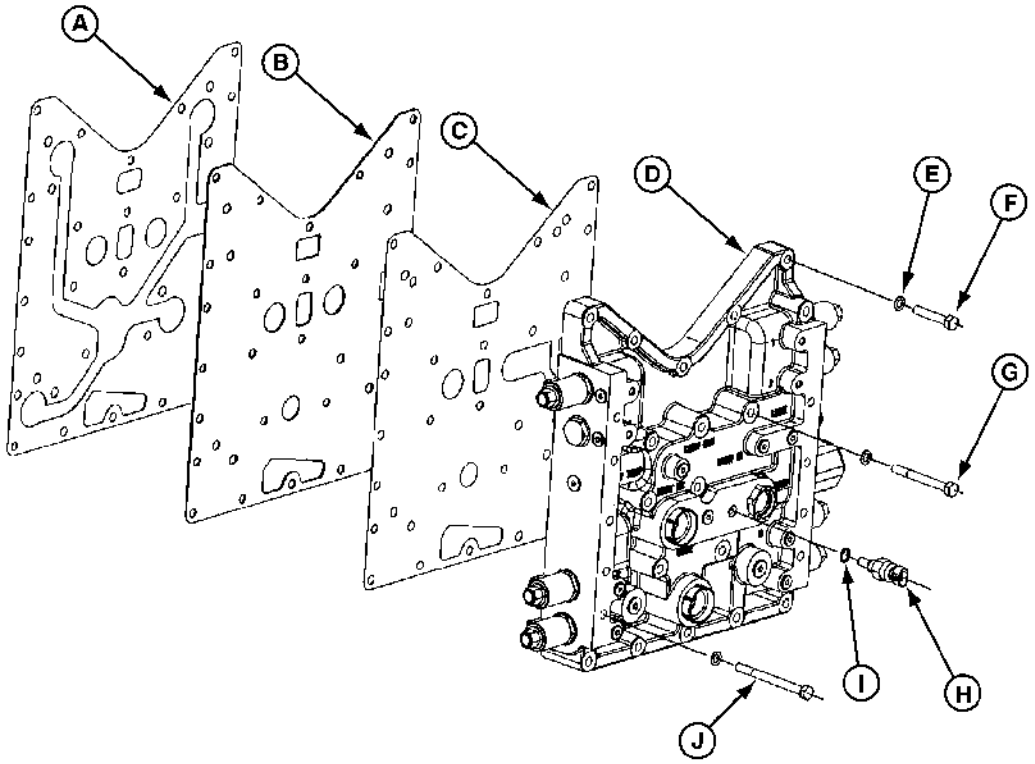
OTHER MATERIAL

Name	Use
Transmission Fluid	All moving parts and o-rings.

SPECIFICATIONS

Item	Measurement	Specification
Control valve-to-front housing cap screw (27).	Torque	40 N·m (30 lb-ft)
Proportional valve nut-to-proportional solenoid assembly (8).	Torque	1.7—2.8 N·m (15—25 lb-in)
7/16-20 plug-to-valve housing (12).	Torque	12 N·m (9 lb-ft)
9/16-18 plug-to-valve housing (2).	Torque	25 N·m (18 lb-ft)
Temperature sensor-to-valve housing.	Torque	16 N·m (12 lb-ft)
Proportional valve-to-valve housing (8).	Torque	16—20 N·m (10—15 lb-ft)
Main regulator assembly-to-valve housing.	Torque	142 N·m (105 lb-ft)
Relief valve assembly-to-valve housing.	Torque	102 N·m (75 lb-ft)

INSTALL CONTROL VALVE GROUP

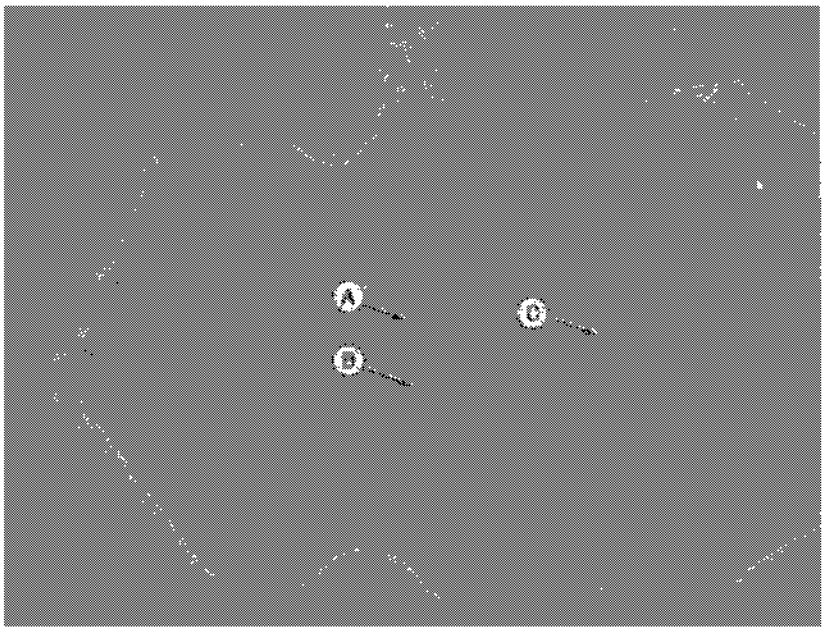


A—Gasket
B—Plate
C—Gasket
D—Valve Assembly
E—Flat Washer (27 used)
F—Cap screw M8x45 10.9 (5 used)
G—Cap screw M8x75 10.9 (13 used)
H—Temperature Sender
I—O-ring
J—Cap screw M8x90 10.9 (9 used)

IMPORTANT: The gaskets and metal plate must be installed correctly. The first gasket is cut out to the shape of the casting on the front housing. The second gasket is cut out to the shape of the metal plate and has a boot-like shape cut out of it.

1. Install gasket (A).
2. Install plate (B).
3. Install gasket (C).
4. Install valve assembly (D).
5. Install cap screws (F), (G) and (J) and washers (E). Observe tightening sequence and torque specifications given in this section.

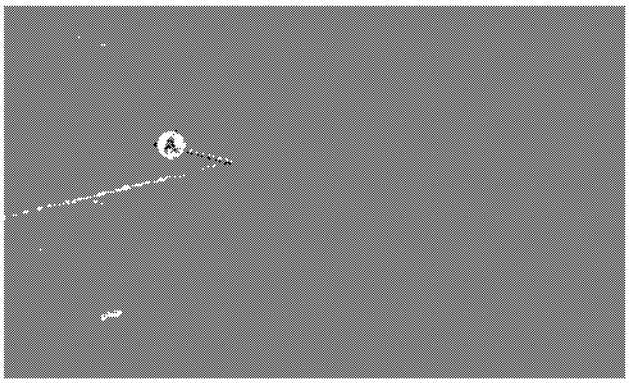
DISASSEMBLE FRONT HOUSING



A—Lube relief valve **B—Bore sleeve (4)** **C—Bearing cup**

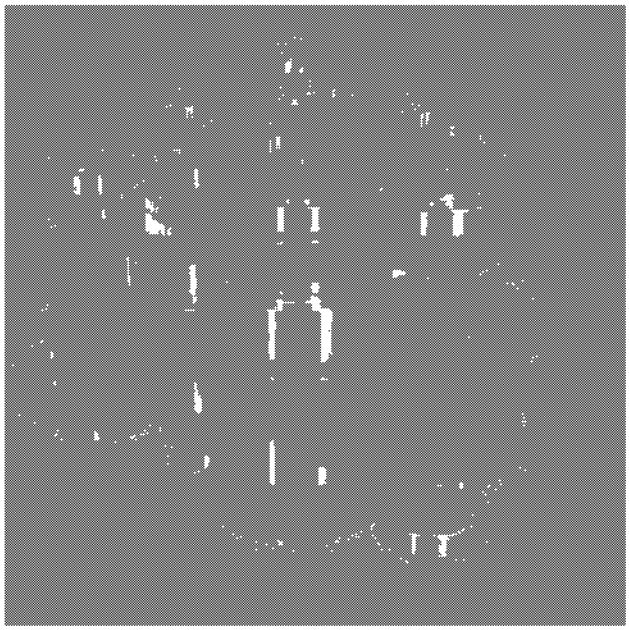
REMOVE BORE SLEEVES

1. Inspect bore sleeves (A) for wear or damage.



NOTE: See Section 6002, special tools.

2. Remove bore sleeves from front side of front housing.



5. Place stages on work table.

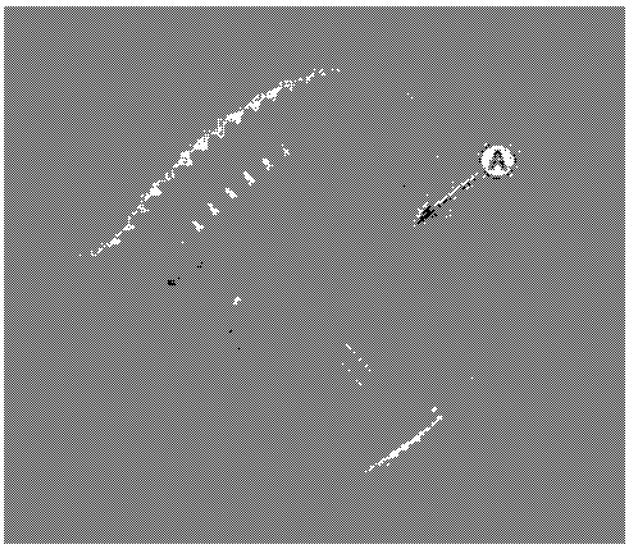
CAUTION: Place clutch stage assemblies in center of work table to prevent personal injury.

6. Remove lift tool from clutch stage assemblies.

NOTE: O-ring (A) is on the directional clutched only. Speed clutcheswill not have an o-ring.

9. Remove o-ring (A).

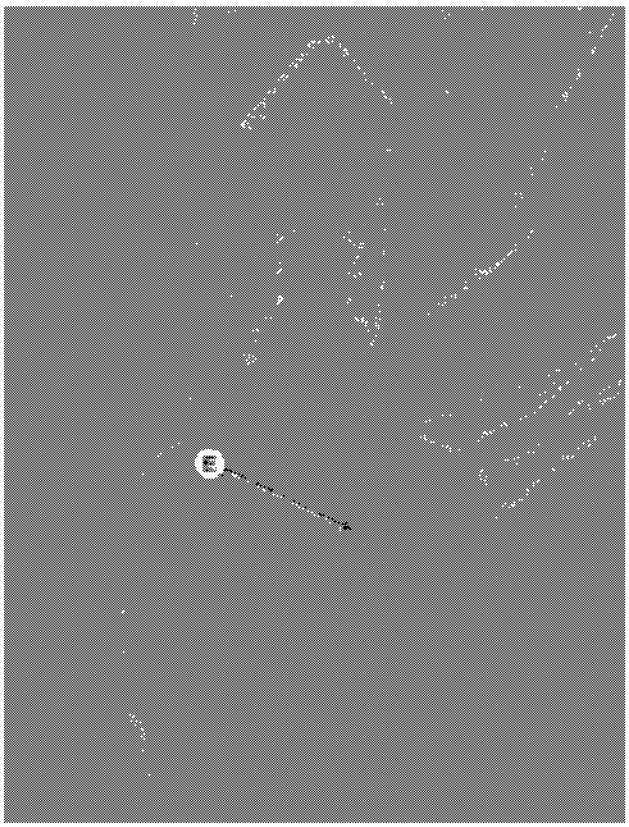
10. Inspect for wear and damage.

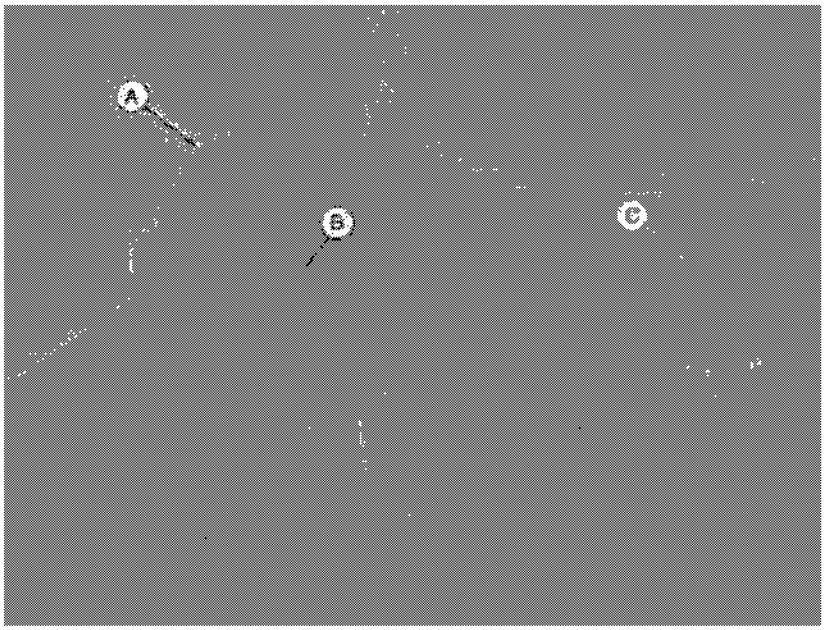


8. Compress clutch return springs.

9. Install retaining ring (E).

10. Release pressure on clutch return springs slowly, be sure snap ring retainer is properly positioned.





IMPORTANT: Both stage assemblies and rear housing must be level. If either is at an angle binding will occur and/or damage will occur.

4. Install stage assemblies.

5. Move locks (B) away from shaft grooves and remove bolt (C) from lifting tool (A).

6. Remove lifting tool carefully from stage assemblies to avoid damage to seal rings.

INSTALL BEARING RETAINER (PRELIMINARY INSTALLATION, PRIOR TO SETTING BEARING END PLAY OUTPUT SHAFT)

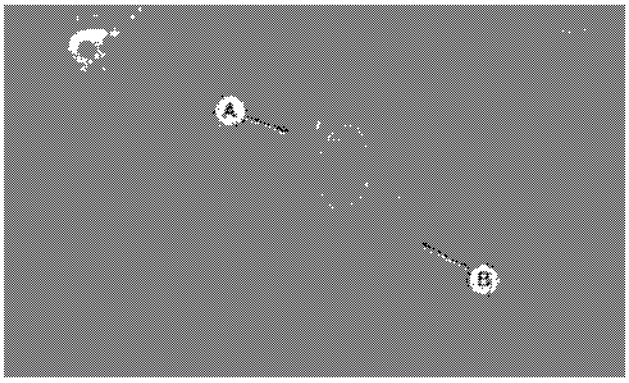
NOTE: Use all original shims and one additional .25 mm (.010 in) shim onto bearing retainer for setting end play of the output seventh stage.

1. Place shims on bearing retainer.

2. Install bearing retainer with shims.

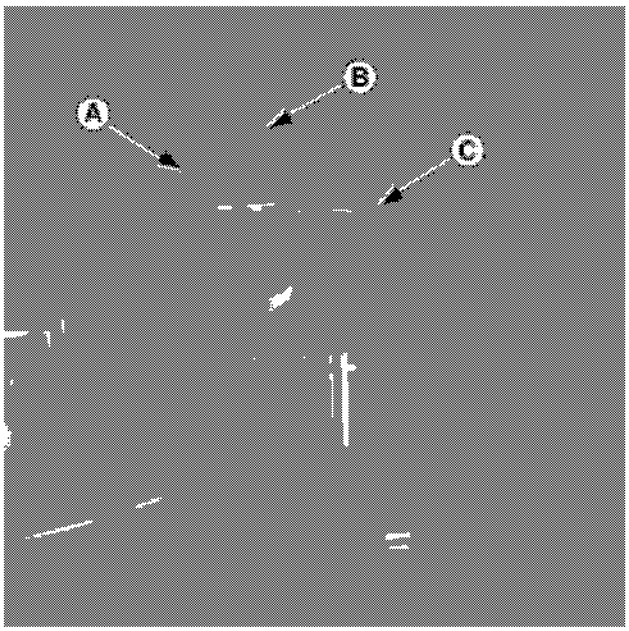
3. Install cap screws (A) through bearing retainer (B) into rear housing.

4. Tighten cap screws but do not tighten to final torque.

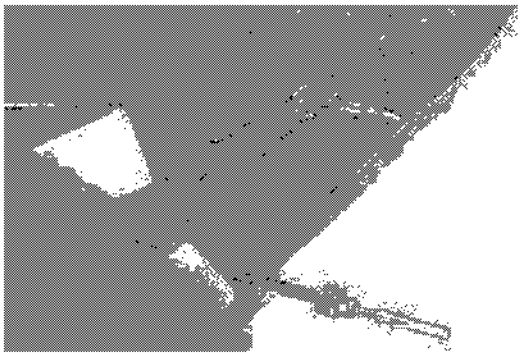


REMOVE BRAKE PADS

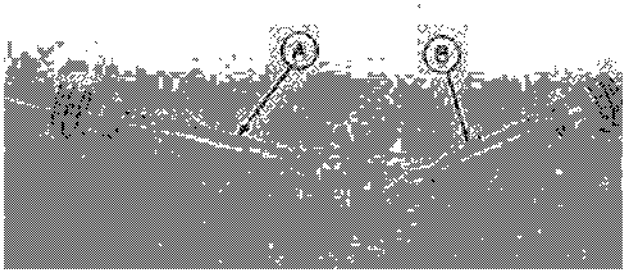
1. Remove Cotter pin (A).
2. Remove Adjusting nut (B).
3. Remove operating lever (C).



4. Secure cable seal to contact as shown, using Terminal Applicator.

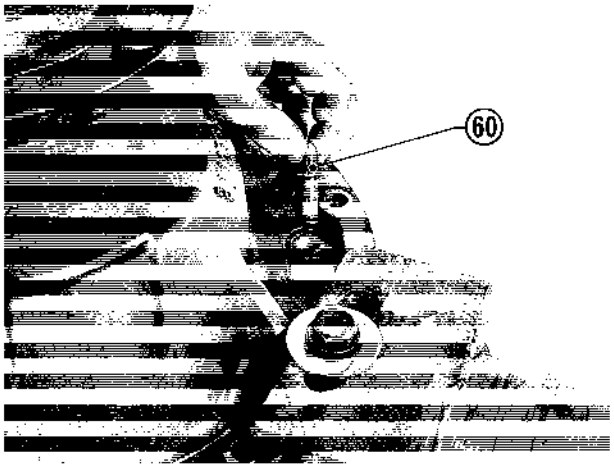


IMPORTANT: Proper contact installation for "sleeve" (A) and "pin" (B) are shown.



STEP 7

Remove tank port and pressure port nipples (60).

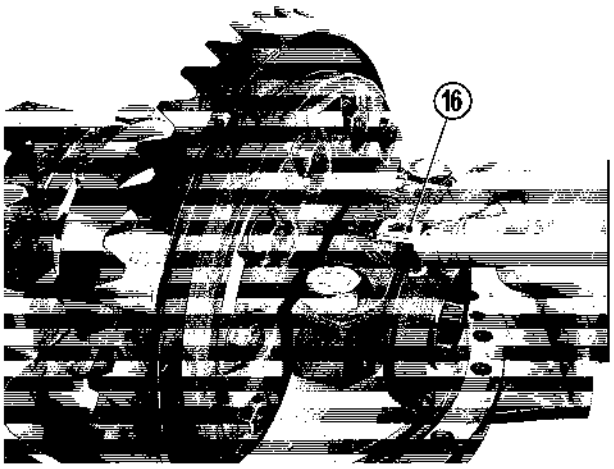


STEP 8

Remove adjusting nut lock capscrew (15).

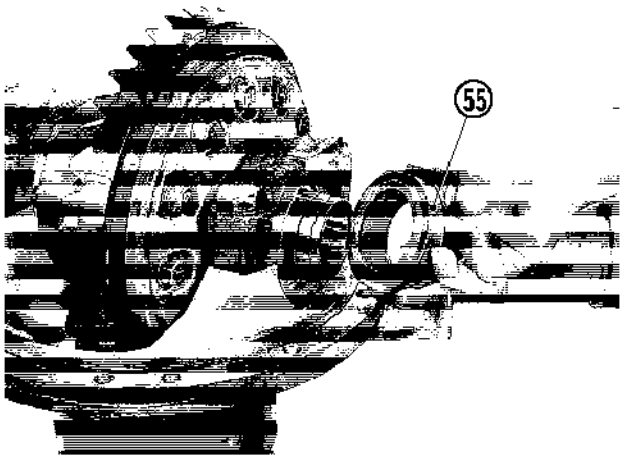
STEP 9

Remove adjusting nut lock (16).



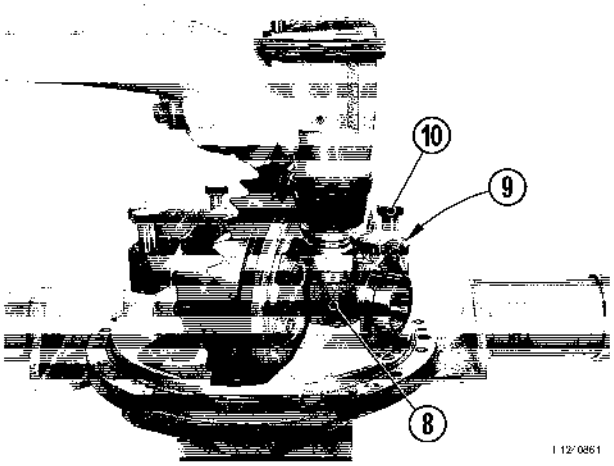
STEP 10

Remove seal retainer (55).



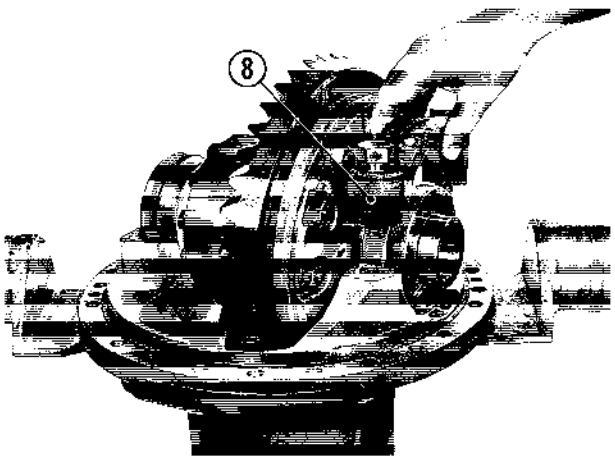
STEP 11

Mark differential caps (8) for reassembly. Remove cap (8), capscrews (10) and washers (9).

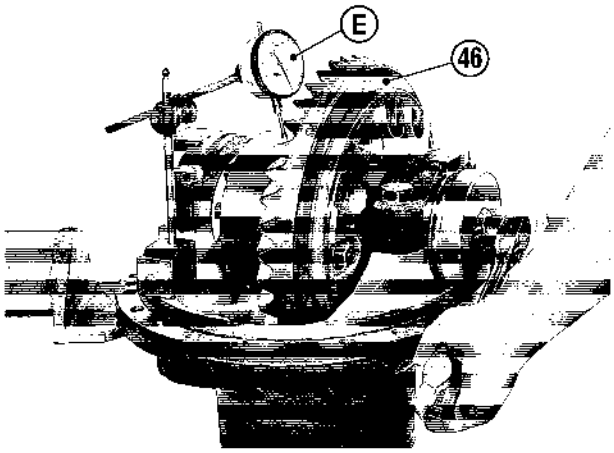


STEP 12

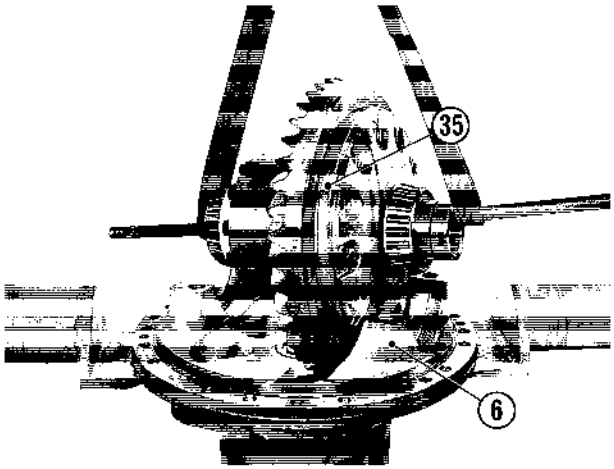
Remove differential caps (8).



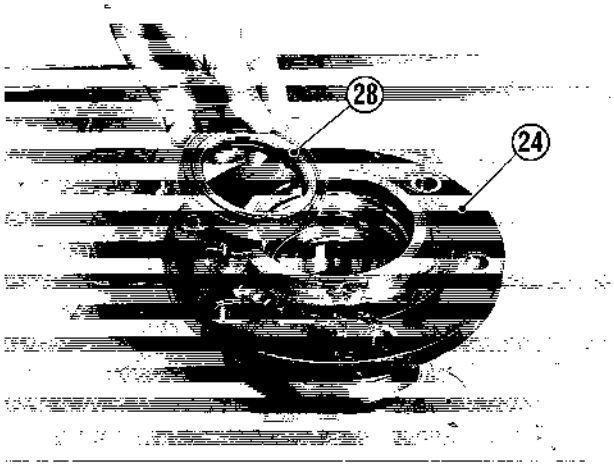
STEP 67 Use a dial indicator "**E**" as shown. Move ring gear (46) by loosening one adjusting nut (18) and tightening opposite adjusting nut. Adjust position until gear backlash is to backlash specifications of .009" (0.23 mm) to .013" (0.33 mm) for new ring gear set, or adjust to backlash noted at disassembly for used gears.
When proper backlash is achieved, tighten opposite adjusting nut (18) to set preload on taper bearings. Using only thumb and forefinger, move ring gear. When ring gear becomes difficult to move, preload on bearing is set.



STEP 69 Remove differential assembly (35) from carrier (6).



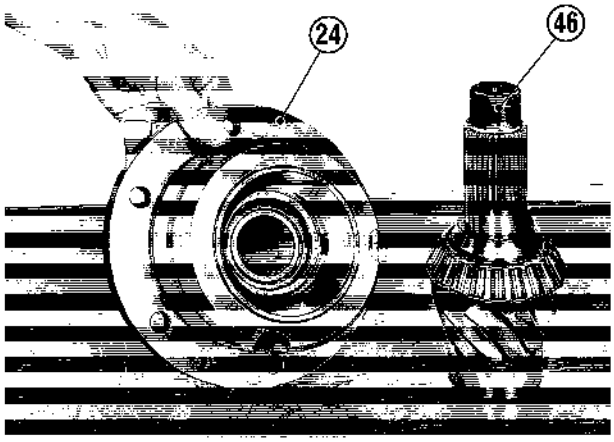
STEP 71 Apply Loctite #515 to outer diameter of the pinion oil seal (28).
Press seal (28) in pinion bearing cage (24) with lip of seal in.



RING GEAR TO PINION MOUNTING DISTANCE PROCEDURE

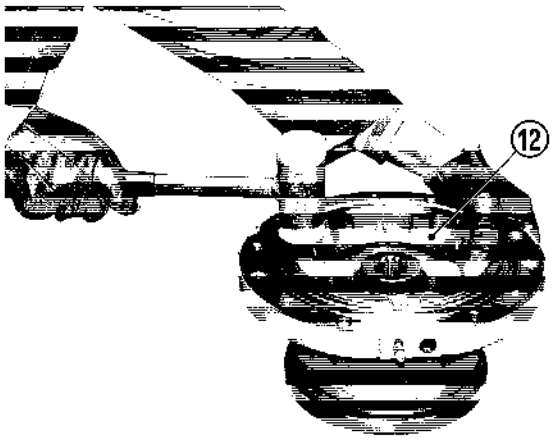
STEP 68 IF MOUNTING DISTANCE PINION SETTING GAUGE "**E**" IS USED, FOLLOW INSTRUCTIONS SUPPLIED WITH GAUGE.
USE THE FOLLOWING PROCEDURE WHEN A PINION SETTING GAUGE "**E**" IS NOT AVAILABLE.
Check ring and pinion gear (46) for proper tooth contact. Paint ring gear with a gear tooth marking compound. When ring and pinion gears are rotated, the compound is squeezed away by the contact of the teeth, leaving bare areas the exact size, shape and location of the contacts. As a rule, painting about 10 or 12 teeth is sufficient for checking purposes.
Sharper impressions may be obtained by applying a small amount of resistance to the ring gear with a flat steel bar and using a wrench to rotate the pinion. Gears should be rotated, under slight load, until ring gear has turned at least one revolution in both directions.
Check tooth contact pattern on drive side (convex side) of ring gear teeth. Coast side will automatically correct when drive side pattern is correct. Refer to gear tooth contact chart. If proper tooth contact pattern is not as shown, readjust backlash or, add to or subtract from shim pack (73) between bearing cage flange and differential housing.
Addition of or subtraction of shims should be made in small increments until proper contact is established.
After optimum tooth contact is made, the differential and pinion must be removed from the carrier, this will allow for proper sealing measures at reassembly.

STEP 70 Remove pinion and cage assembly (24) from carrier. Remove flange (24) from pinion. Remove pinion (46) from pinion bearing cage (24).



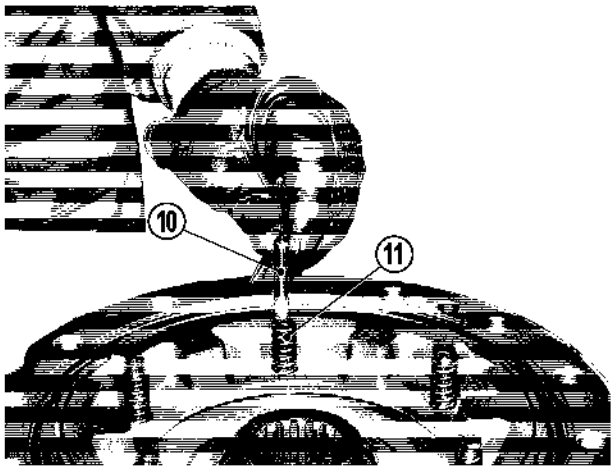
STEP 72 Install grease seal (29) with lip of seal up.

STEP 111 Lubricate the O-rings and install the complete piston (12). Orient piston and drive it to its end of stroke with a plastic hammer.



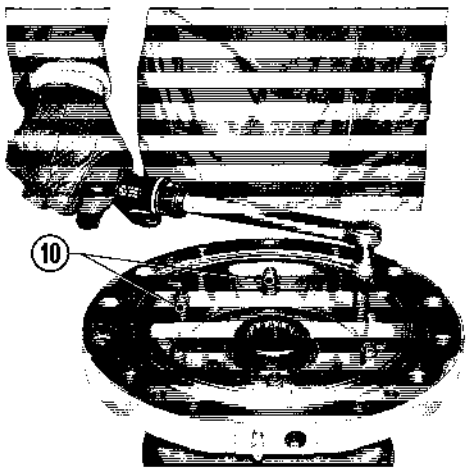
STEP 112 Position springs (11), apply Loctite 242 to screw thread (10) and tighten adjusting bolts.

NOTE. Tighten adjusting bolts (10) with a standard wrench, using the alternate and criss-cross methods.



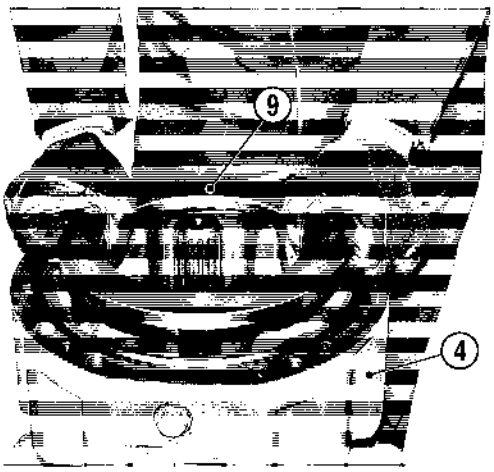
STEP 113

Lock adjusting bolts (10) with a dynamometric wrench set to 10 ± 15 Nm (7.4 - 11 lb.ft).

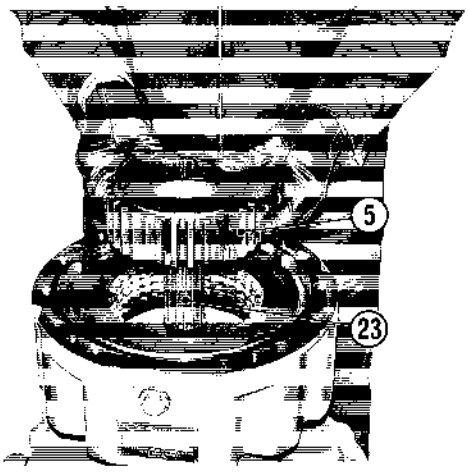


STEP 114

Fit the spacer (9) in the stub axle (4).

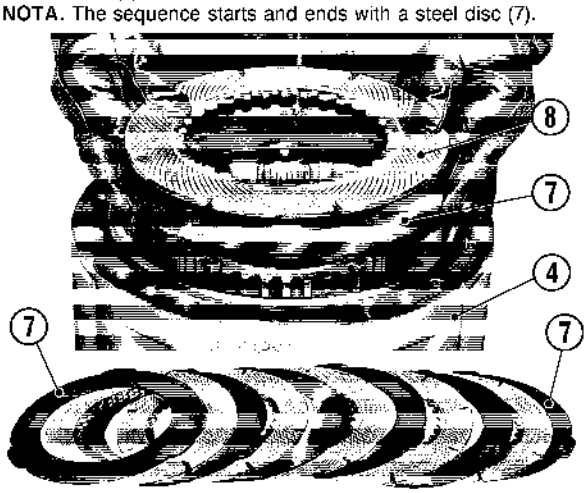


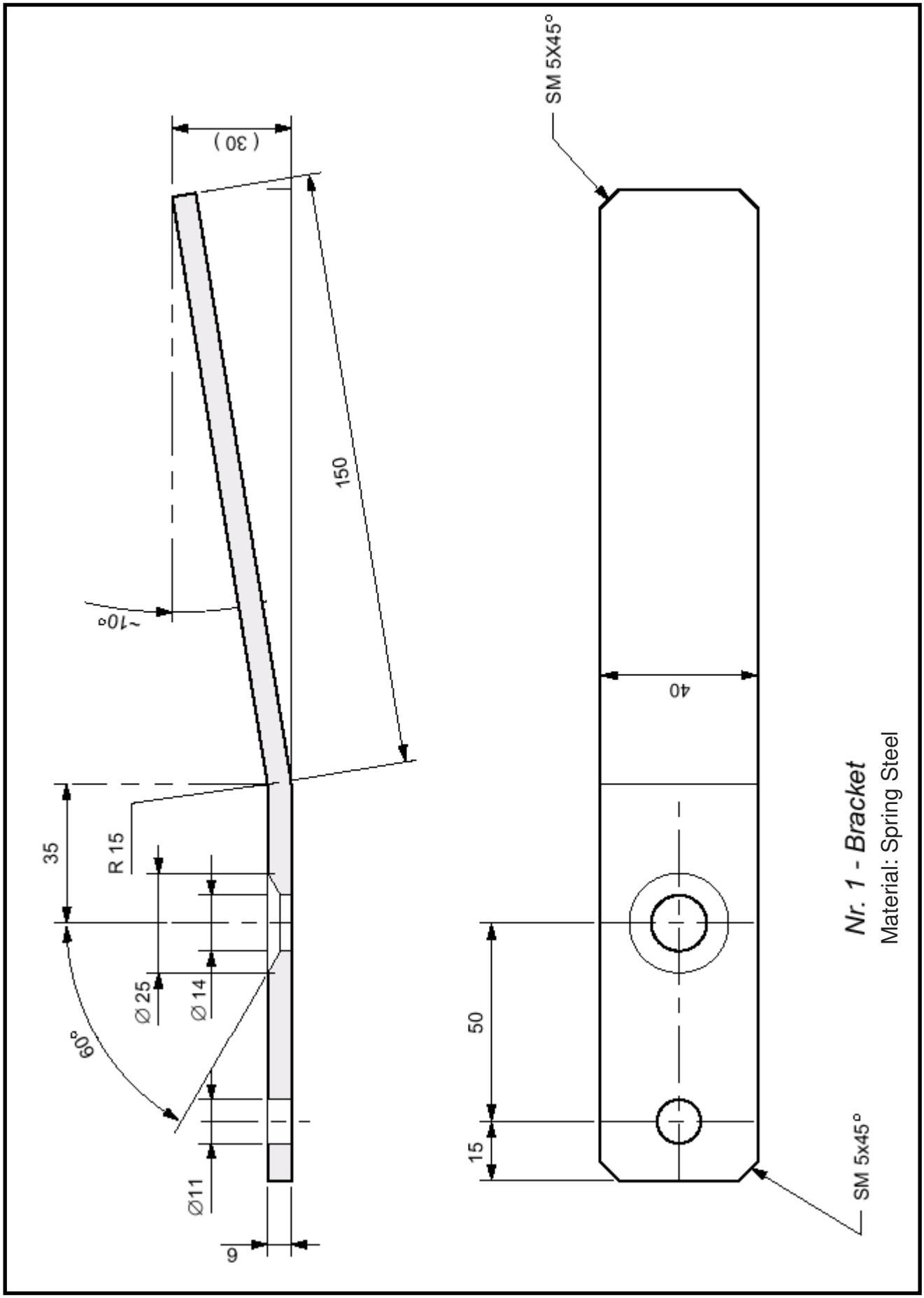
STEP 115 Fit the driving coupling (5) on the half shaft (23).

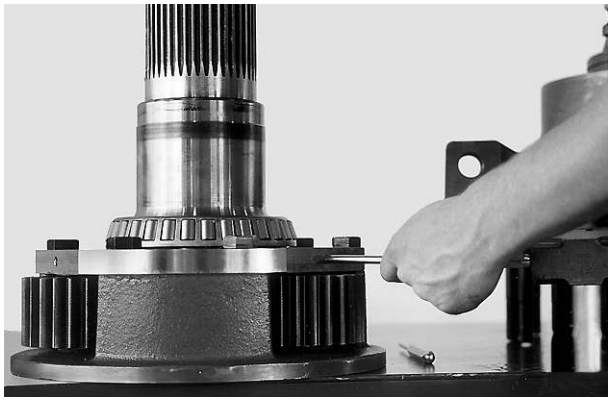


STEP 116 Lubricate the brake discs (8) and fit them into the stub axle (4) starting with a steel disc (7) and a brake disc (8).

NOTA. The sequence starts and ends with a steel disc (7).

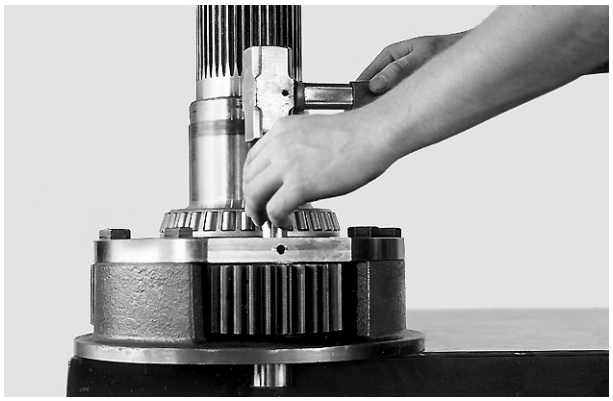



SM 5X45°
(30)
150
~10°
35
R 15
Ø 25
Ø 14
60°
Ø11
6
40
50
15
SM 5x45°
Nr. 1 - Bracket
Material: Spring Steel



STEP 6

Remove the elastic pin.

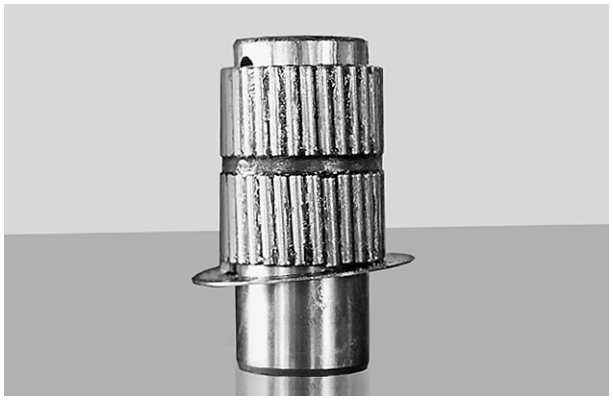


STEP 7

Remove the gear pin.

STEP 8

Remove the planetary gear.

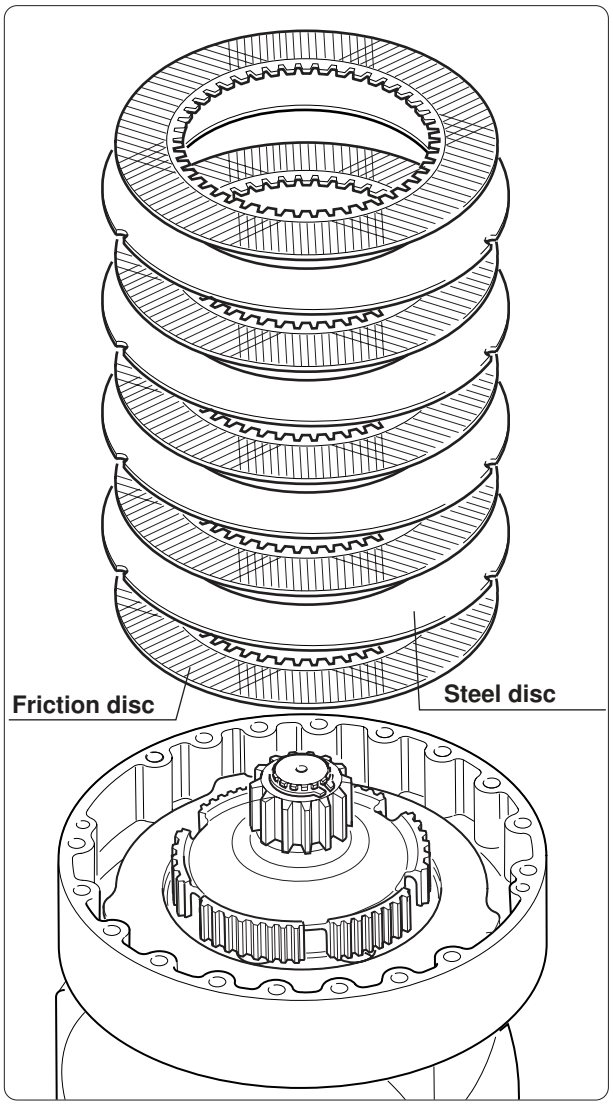


STEP 9

Check needle bearings, pins, side gears and if worn replace.

STEP 35

Compress return spring and install retainer. Use the same procedure on the others



Reassemble the half-shaft assy: insert first a friction disk (inner teeth), a steel disc and alternate friction discs and steel discs.

STEP 65

Reassembly of bevel pinion and adjustment

Prior to the installation of the bevel pinion in the differential support, it is necessary to measure the dimensions to define the thickness of the shim to be placed between the head bearing and the shoulder in the relevant seal in the differential. Measure the dimension of the crown wheel center line at the shoulder of the head bearing, designated as "A", positioning a cylinder on the caps, then feel in an accurate manner the gap to which it is necessary to add the radius 62.5 mm (2.461 in) of the differential bearing.
Example: A = dimension measured + 62.5 mm or (2.46 in)
in this case:
A = 162.60 + 62.50 = 225.10 mm
A = 6.402 + 2.461 = 8.863 in

NOTE: Use tube O.D. ~ 60 mm (2.4") x 280mm (11")

STEP 66

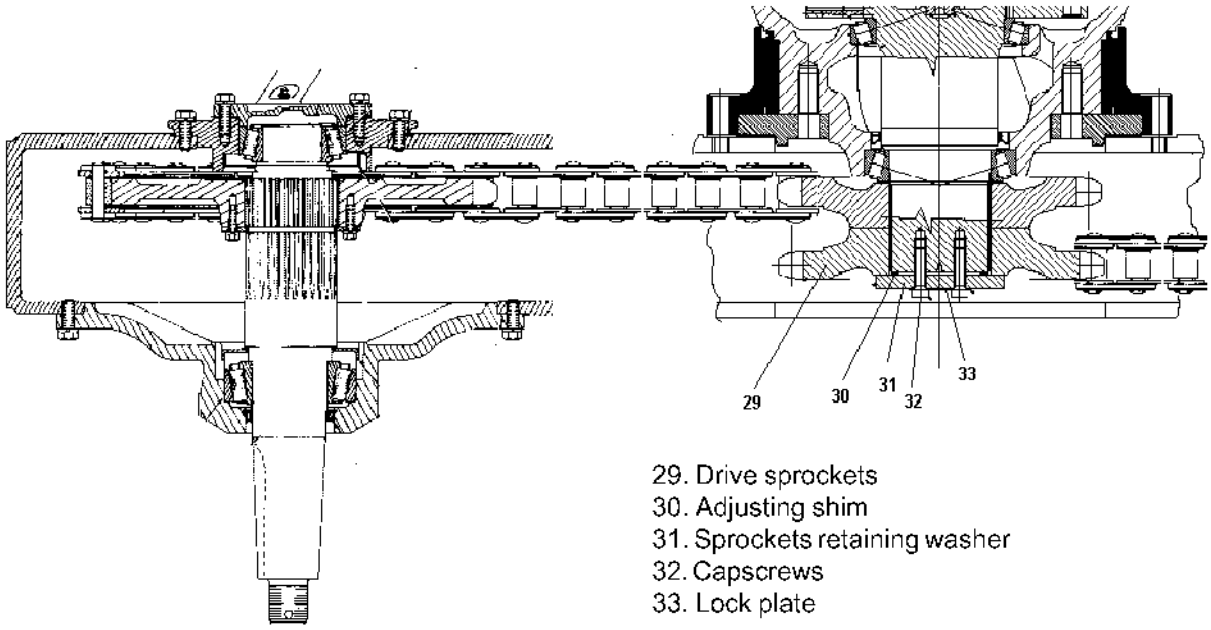
On the front of the head of the each bevel pinion, and number with mark (+ -) is stamped or marked. This number, in tenth of millimeter, indicates the deviation from the theoretical dimension (184 mm) (7.244 in) under the head of the pinion from the center line of the crown gear.
Example: -1 = 0,10 mm (0.004 in)
in this case
B = theoretical 184.00 mm - 0.10 = 183.90 mm
B = theoretical 7.244 in - 0.004 = 7.240 in

GENERAL DESCRIPTION

TANDEMS

Driving sprockets, which are splined to the rear axle shafts, transfer power through heavy roller driving chains to the wheel shaft sprockets which are attached to the wheel shafts. Wheel shafts are supported by inner and outer bearing retainers.

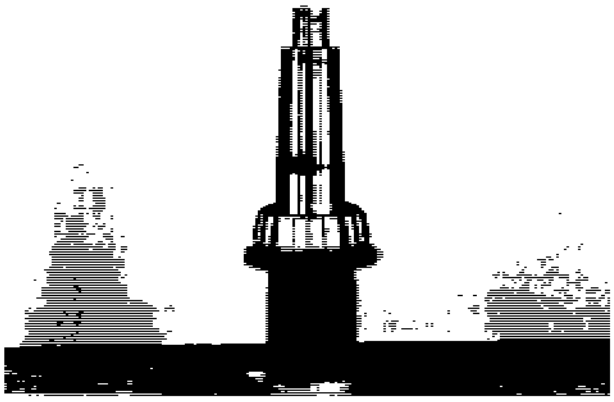
Each tandem assembly oscillates and pivots on a tandem hub bushing, located in the hub.



29. Drive sprockets
30. Adjusting shim
31. Sprockets retaining washer
32. Capscrews
33. Lock plate

Install the splined sprocket onto the shaft. Torque the capscrews to 61 ~ 68 Nm (45 ~ 50 ft lb.).

Install bearing seal and bearing onto the shaft. Heat the bearing to 121°C (250°F). Be sure the bearing is seated onto the shaft.

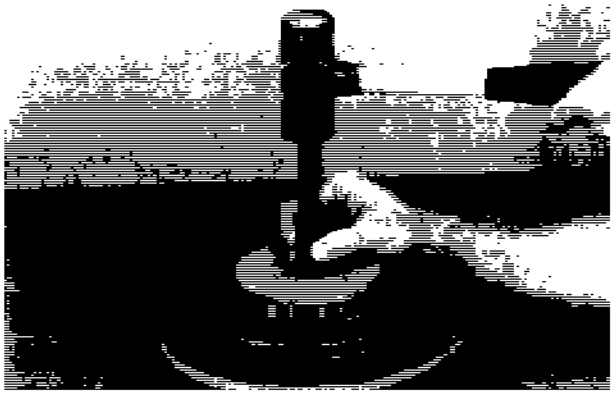


Remove the bearing race from the retainer using master bearing and seal driver kit P/N 75300850.

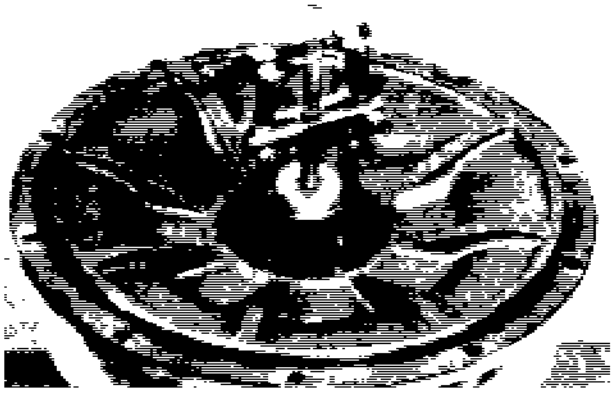
⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or nonferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

Install bearing with tool P/N 75300850.



Remove bearing race from the wheel shaft bearing retainer with puller set.



TANDEM CASE OSCILLATION ADJUSTMENT PROCEDURES

DETERMINATION OF THE SHIM PACK (SP)

- Clean all the parts, hub, thrust washer 363 x 440 mm (14.29 x 17.32in), tandem retaining plate & thrust washer 380 x 440mm (14.96 x 17.32in) and and assemble them per the sketch in the vertical position.

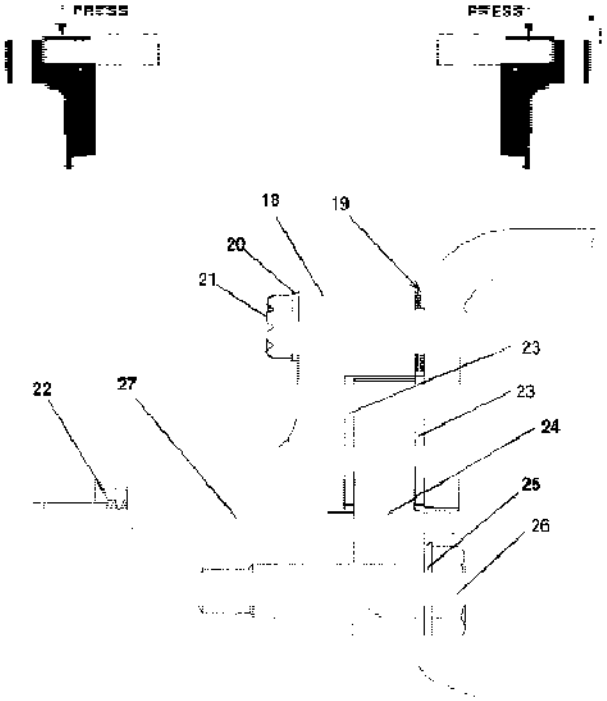
- Measure the clearence "X"in six (6) equally spaced points.

Use the largest dimension found = X.

- Establish the shim pack(19) "SP"(mm) = X + (0.15 ~0.20mm).

"SP"(in) = X + (.006 ~.008 in).

Assemble the external seal (22) and hub (18).



Install thrust washer (23) with a thin coating of graphite grease.

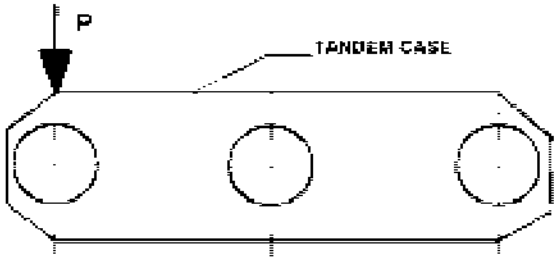
Assemble tandem retaining plate (24), washer (25) and capscrews (26). Torque the capscrews to 450 ~ 480 Nm (333 ~ 355 lb ft.) .

Apply lock wire to retaining capscrews, see figure.

Assemble the tandem case on the axle using the parts and the shims, covering the cleaned part surfaces with a thin coating of graphite grease.

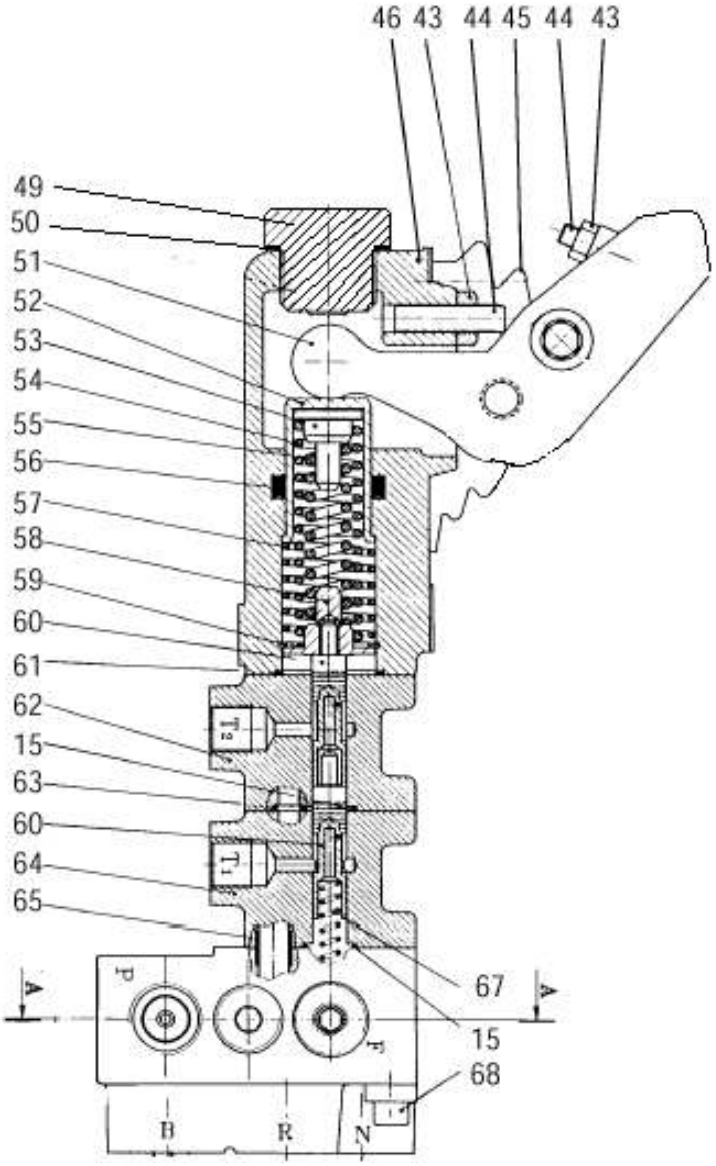
After assembly, torque all the hub capscrews (21) to 280 ~ 320 Nm (207 ~ 236 lb ft.) .

The tandem case should pivot on the axle with a force (P) of 70 to 150 kg (150 ~ 330 lb), applied at the center of one of the wheels.

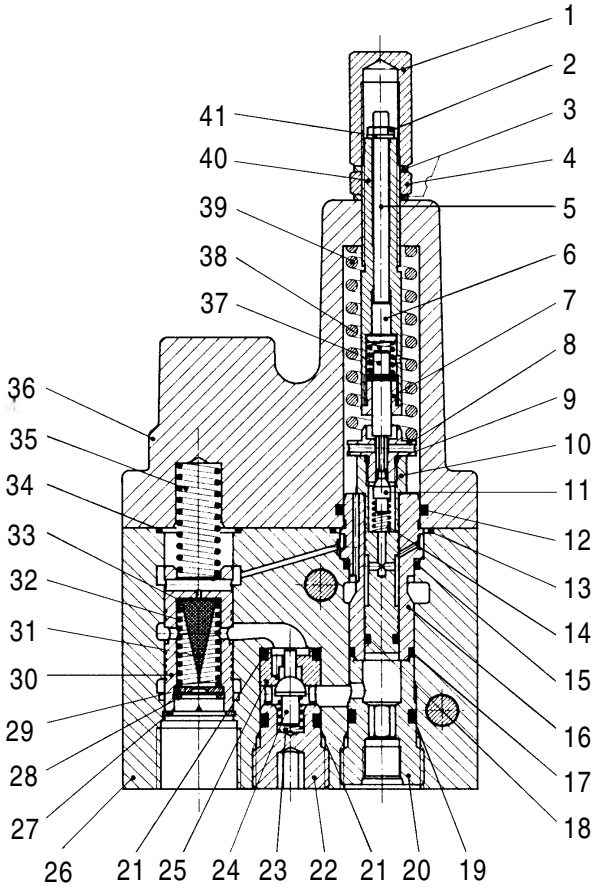


TROUBLE	PROBABLE CAUSE	REMEDIES
Brakes low pressure indicator on panel stays ON.	Accumulators recharge pressure lower than the nominal value. Oil leakages from brake pedal valve.	Repair or replace pressure valve.
Delayed braking and / or pedal return	Brake valve pressure / flow insufficient.	Check that the brakes system tubes are not clogged. High viscosity of the hydraulic fluid.
Braking pressure not constant	Pressure in accumulators not correct.	Check for correct accumulator pressure; if necessary, operate the adjuster on the cylindrical head of the accumulator charge valve.
Continuous recharge of the accumulators	Accumulators with too low or too high nitrogen precharge.	Check nitrogen pressure in accumulators.
Feeding pump always under pressure	Worn pump. Dirt in the valve.	Repair or replace pump. Careful check of the valve (correct sliding of the cad seats.
Accumulators don't charge	Contamination in the priority valve.	Check the sliding of all sports, mainly of the inlet valve. Check the hydraulic connection.
Brakes remain applied	Uncorrectet discharge. Non return of the pedal.	 Check that the pedal stop adjuster allows backlash between return and operating piston. Eliminate possible contamination in the valve.

BRAKE PEDAL DISASSEMBLY - ASSEMBLY



SECTION A - A



BLEEDING OF BRAKES SYSTEM

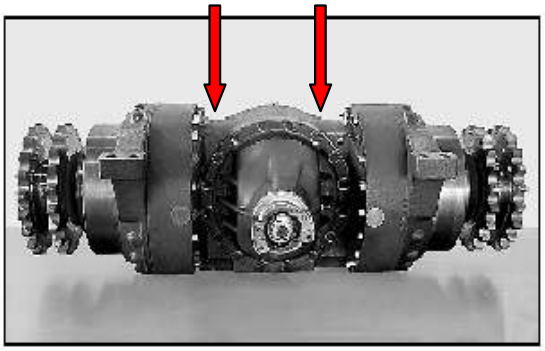
It is necessary to bleed the brakes system whenever one of following occurs:

- after changing the hydraulic oil;

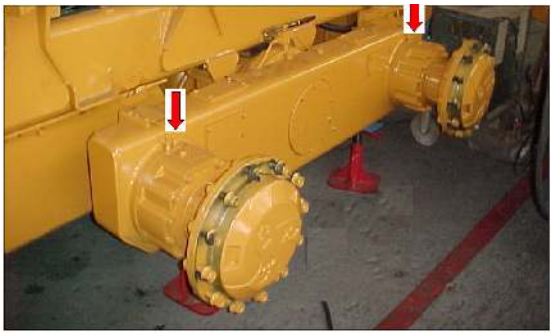
- after air has penetrate the system, due to leakage in the hydraulic system;

- after disconnecting or replacing any component of the system.

To bleed the system proceed as described below (the operation requires two people):



Axle limited slip brakes system bleeding 2 plugs.



Differential lock axle brake system bleeding 4 plugs.

WARNING:

The brakes are inoperative when undergoing maintenance or repair operations.
place the machine on a flat surface and block the wheels.

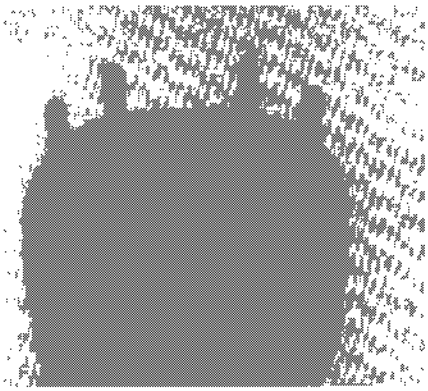
- place the machine on a flat surface, start the engine and park brake ON;
- with engine idling, one operator loosens the bleeding plug (see figure) and the other operator pushes the brake valve pedal;
- tighten the bleeding plug before releasing the pedal;
- repeat the operation until all the air is expelled from the system (the fluid must flow without air bubbles);
- repeat the same operation on the other axle.

DISASSEMBLING AND ASSEMBLY OF THE PUMP

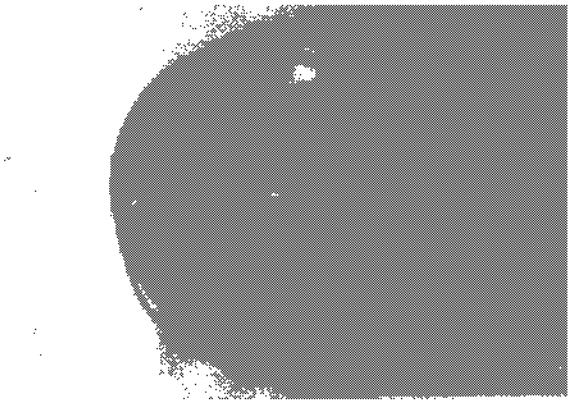
Unfasten and remove the eight nuts and washers of the tap bolts.

Remove the front cover. Label the intersection of the teeth of the driven and drive gear with a marker before removing them off the pump. Carefully remove the drive gear off the pump and put it on a work bench.

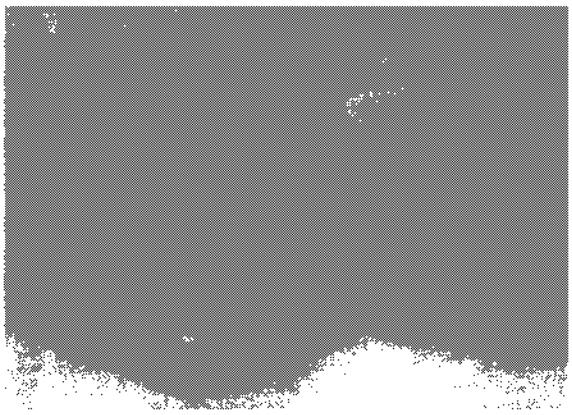
Remove the drive gear off the pump and put it on a smooth surface.



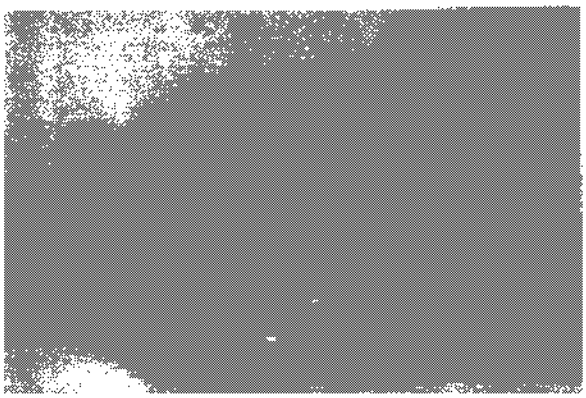
Remove the rotor entirely.



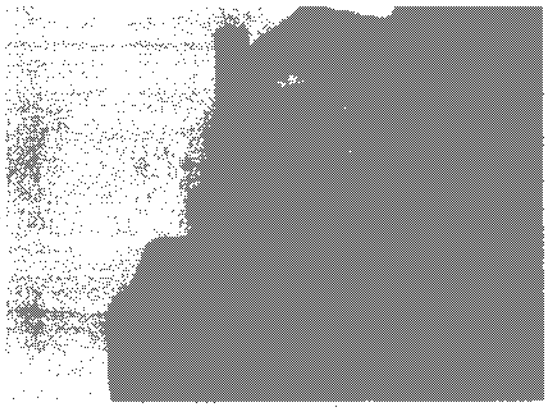
Remove the O-ring.



Remove the bearings of the roller bearings.



Using a roller bearing extractor, remove the roller bearings from the casing.

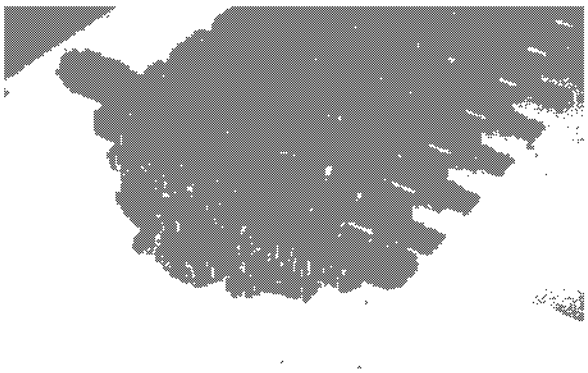


Remount the seal using the proper tool.

Put the retainer ring back on its place.

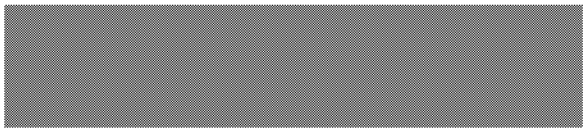
With a tubular tool, place the lock correctly in its housing.

The control valve of the service pressure is mounted on an independent block; it is a piloted type and can be adjusted by means of a screw.



Pressure control valve out of the distributor.

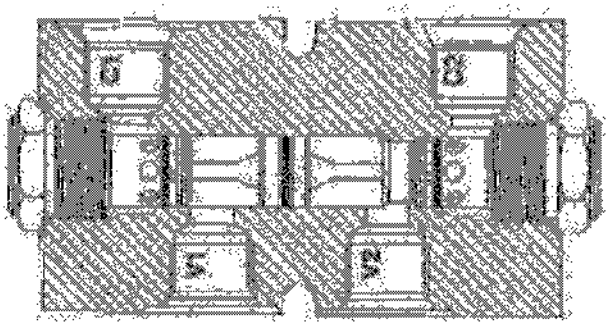
Pressure control valve removed; here you can see the pilot piston with its respective spring and also the nut and the screw for pressure adjustment.



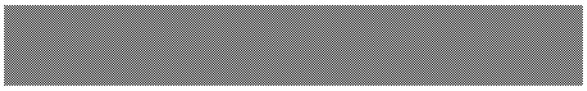
Safety valve of the blade lift circuit; it is adjusted to 1.500 PSI. The distributor has two valves of this type, one for each blade lift cylinder.

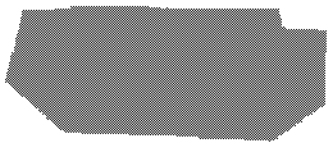
DUAL CHECK VALVE

This valve allows flow from the V ports to the C ports, while blocking flow from the C ports to the V ports when pressure is applied at opposite V port.

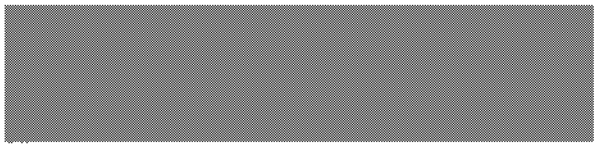


Retainer valve of wheel lean.

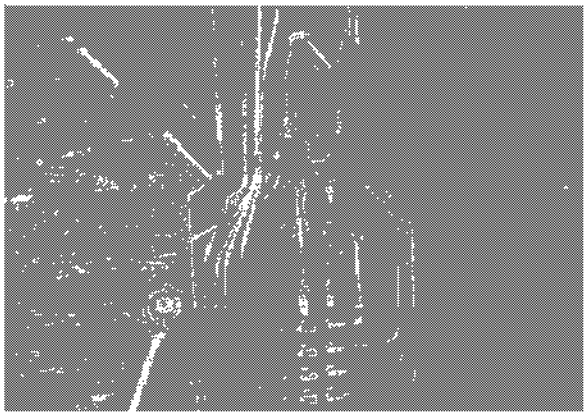


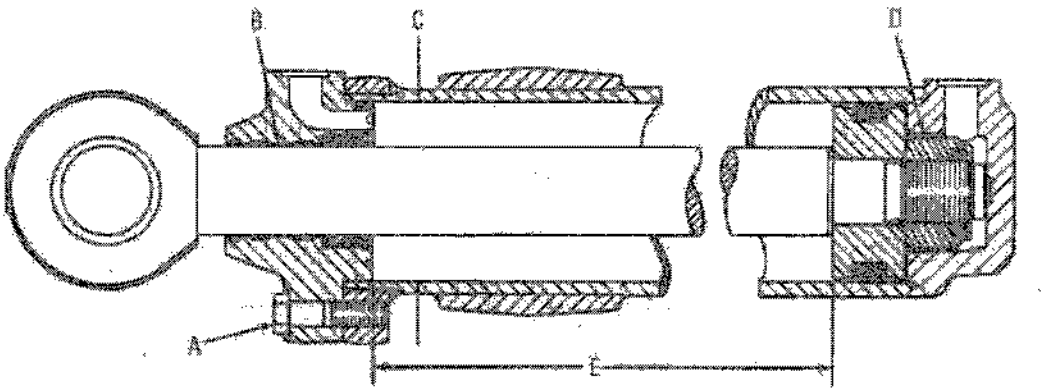


The retainer valve of the wheels is a simple valve, that has a safety system. It is composed of a piston and two one-way valves.



The retainer valve of the wheel lean is located on the upper part of the frame support.





RIPPER CYLINDER

A. Torque cylinder head capscrews to ..... 216 -235 Nm (159.3 - 173.3 lb.ft)

B. Cylinder head rod bore I.D ..... 60.800 - 61.000 mm (2.394 - 2.402 in)
Piston rod O.D. ..... 59.960 – 60.000 (2.361 - 2.362 in)

C. Cylinder I.D. ..... 120.120 - 120.260 mm (4.729 - 4.735 in)
Piston O.D. ..... 117.950 - 118.090 mm (4.644 - 4.649 in)

D. Lubricate and torque piston rod locknut to ..... 2196 - 2393 Nm (1620 - 1765 lb.ft)

E. Stroke of the piston rod ..... 478 mm (18.8 in)

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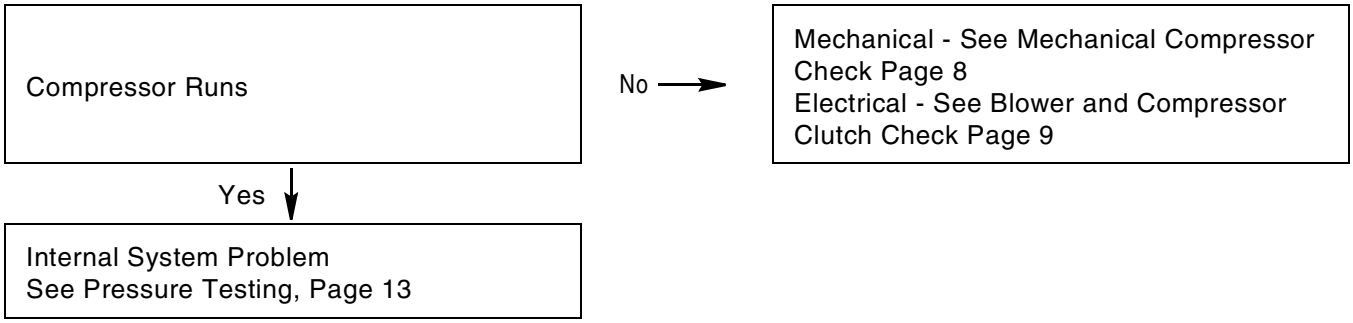
TROUBLESHOOTING

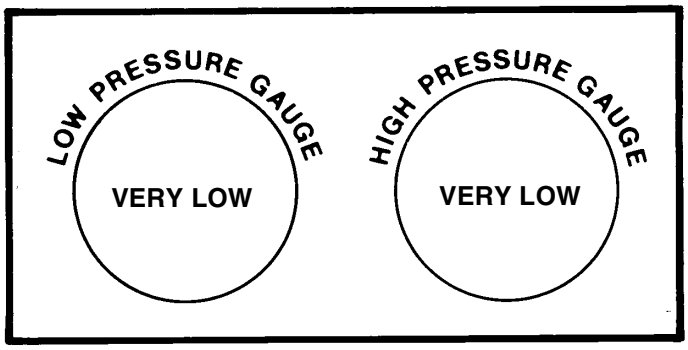
Perform a visual inspection of the machine. Check the following and correct as necessary:

1. - Obtain service history if possible.
2. - Is compressor drive belt in place and tensioned?
3. - Are grille screens, fan blades, condenser, air filter, and evaporator unobstructed?
4. - Are there any sharp bends or kinks in the hoses?
5. - Are there heavy accumulations of oil, or oily dust around the fittings, indicating refrigerant leakage?
6. - Are air ducts undamaged, sealed properly and in position?
7. - Condensate drain hoses and check valves present and unobstructed?

Problem: No Cooling



PROBLEM: NO COOLING



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SEE PRESSURE - TEMPERATURE CHART ON PAGE 14

Indication of No Refrigerant or Low Refrigerant Charge:

A. Discharge air from evaporator warm.

B. Compressor does not run, or cycles off rapidly after start-up.

Yes →

1. Leak test the system, see Page 11. It may be necessary to add refrigerant. See Section 9003.
2. Evacuate and reclaim remaining refrigerant from system. See Section 9003.
3. Repair system leaks as needed. Follow the given repair procedure.
4. Check level of oil in compressor - possible for compressor to have an oil loss.
5. Remove air and moisture from the system. Replace Receiver-Drier. See Section 9004.
6. Charge system with new refrigerant. See Section 9003.
7. Continue performance test for other possible problems.

SCREWS AND TUBE CONNECTIONS TORQUE CHART

TUBING SIZE	3/8 inch		1/2 inch	5/8 inch	
THREAD SIZE	M10 -1.25	5/8-18	3/4-18 OR 3/4-16	7/8-18 OR 7/8-14	1-14
STEEL TO STEEL	31-36 Nm	31-36 Nm	40-46 Nm	45-52 Nm	45-52 Nm
ALUMINUM TO BRASS	10-14 Nm	10-14 Nm	24-30 Nm	30-37 Nm	45-52 Nm

NOTE: *When tightening air conditioning hose or pipe fittings, a second wrench serving as support must be used.*

IMPORTANT: *Special care is required when tightening the fittings on the compressor, condenser and evaporator since these connections are easily distorted.*

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NOTES

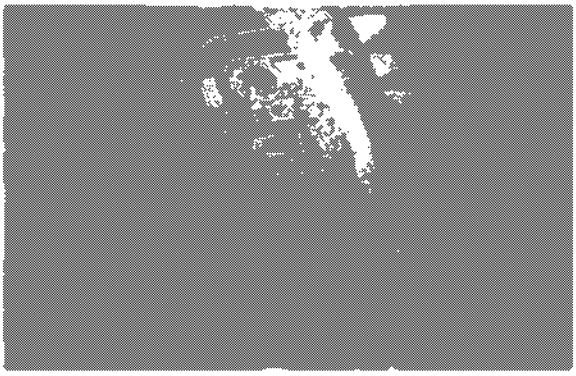
Remove capscrews connecting ball housing to the tractor frame.

Installation is the reverse of removal with the exception of measuring shim pack gap on the cylinders. Measure the gap between the ball and socket with the capscrews tightened to final torque. Add the specified dimension.

If the circle guides or wear plates have to be replaced place the moldboard upon the ground. Turn off electrical master switch.

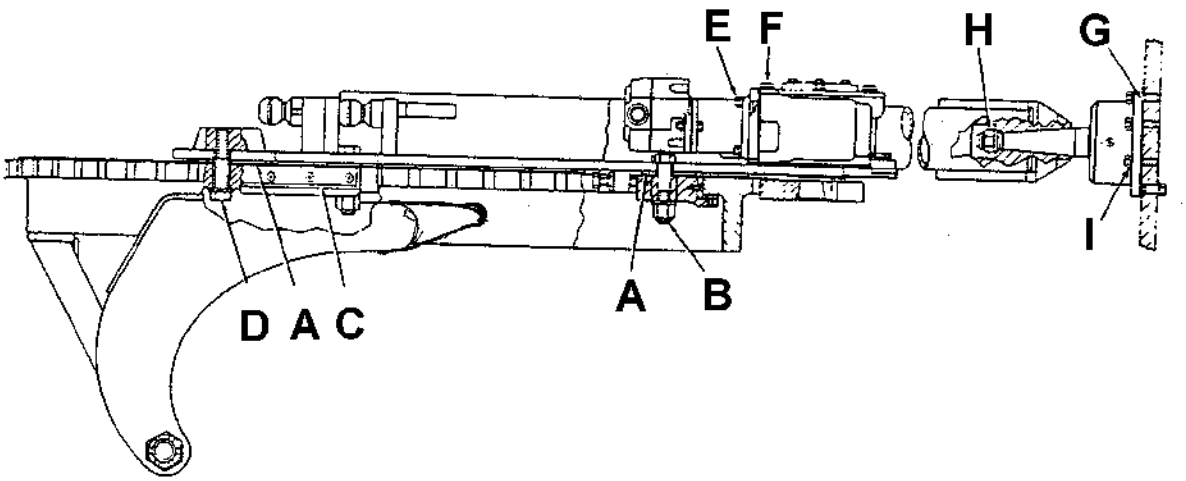
WARNING

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



Remove bolts holding guides in position.

DRAWBAR & CIRCLE



DRAWBAR AND CIRCLE TURN

Adjust shims (A) to provide 1.5 mm (0.06 in.) vertical clearance between wear plates and circle guide.

With circle against front circle guide adjust capscrews(B) to provide 8-15 mm (0.03 - 0.06 in) clearance between the circle and each circle guide. Torque capscrews (B) to 1080 Nm (800 ft.lbs)
Adjust rear guides (C) to provide 0.7mm (0.03 in) maximum horizontal clearance the circle and each rear guide.
Torque capscrews (D) to 1080 Nm (800 ft.lbs).
NOTE: Rotate circle 360^0 to check free clearance.

Torque capscrews (E) to 122 - 136 Nm (90 - 100 ft.lbs)
Torque capscrews (F) to 570 - 585 Nm (420 - 430 ft.lbs)
Adjust shims (G) to provide 0.00 - 0.25 mm 0.000 - 0.010 in) end play between ball and socket.
Torque nut (H) to 810 Nm (600 ft.lbs).
NOTE: Do not apply lubricant to circle guide shoe liners or wear surface of circle.
Torque capscrews (I) to 245 - 325 Nm (180 - 240 ft.lbs)

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