# NEW HOLLAND

## Repair Manual – Series 40 and Series S Tractors

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**OIL PUMP**

| | |
|---|---|
| Rotor Clearance | 0.001–0.006 in (0.025–0.15mm) |
| Rotor to Pump Housing Clearance | 0.006–0.011 in (0.15–0.28mm) |
| Rotor End Play | 0.001–0.0035 in (0.025–0.089mm) |
| Pump Gear to Camshaft Gear Backlash | 0.016–0.022 in (0.40–0.56mm) |

**OIL FILTER SUPPORT**

| | |
|---|---|
| Relief Valve, Operating Pressure | 55–60 lbf/in² (379–414 kpa) |
| Flow Rate | 15–16.6 imp gals/min (18–20 US gals/min) |

| Temperature | Oil Viscosity and Type | API Classification | Engine Oil & Filter Change Period (hours) | |
|---|---|---|---|---|
| | | | 4 CYL | 6 CYL |
| Below –12°C ( 10°F ) | Low Ash, SAE 5W Supplement 1 or Low Ash | SF/CC | 150 | 150 |
| | SAE 5W/20 Supplement 1 | SF/CC | 150 | 150 |
| | or SAE 10W–30 | SF/CD | 150 | 150 |
| –12°C to 4° C (10°F to 40°F) | Low Ash, SAE 10W Series 3 or SAE 10W–30 | SF/CD<br>SF/CD | 300<br>300 | 300<br>300 |
| 0°C to 32°C (32°F to 90°F) | Low Ash, SAE 20W Series 3 or SAE 10W–30 | SF/CD<br>SF/CD | 300<br>300 | 300<br>300 |
| Above 24°C (75°F) | Low Ash, SAE 30W Series 3 | SF/CD | 300 | 300 |

**NOTE:** *When using diesel fuel with a sulphur content below 1.0% Series 3 diesel engine oil with an A.P.I. classification of CC may be used instead of CD oil, but the oil and filter interval must be reduced to 150 hours .*

*When using diesel fuel with a sulphur content between 1% and 1.3% use only oils listed above but reduce the oil and filter change period to every 50 hours .*

**ENGINE OIL CAPACITIES (Less Oil Filter)**

| Model | Imp Qts | U.S Qts | Litres |
|---|---|---|---|
| 4 CYL | 10.0 | 12.00 | 11.6 |
| 6 CYL | 17.6 | 21.12 | 20.0 |

**ENGINE OIL CAPACITIES (With Oil Filter)**

| Model | Imp Qts | U.S Qts | Litres |
|---|---|---|---|
| 4 CYL | 11.5 | 13.8 | 13.6 |
| 6 CYL | 19.3 | 23.2 | 22.0 |

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| PROBLEM | POSSIBLE CAUSES | REMEDY |
|---|---|---|
| **Low transfer pressure** | 1. Regulating valve inner seal damaged | 1. Renew seal |
| | 2. Regulating spring or piston missing | 2. Renew spring or piston |
| | 3. Incorrect regulating spring | 3. Install correct spring |
| | 4. Worn or damaged transfer pump blades | 4. Renew damaged unit |
| | 5. Faulty transfer pump seal | 5. Renew seal |
| | 6. Loose or incorrectly tightened end plate | 6. Tighten or renew damaged unit |
| | 7. Faulty washers on head locking and head locating screws | 7. Renew washers |
| | 8. Damaged seals on head locating fitting | 8. Renew seals |
| **High transfer pressure** | 1. Sticking regulator piston | 1. Repair or renew piston |
| | 2. Incorrect regulating spring – too strong | 2. Install correct spring |
| | 3. Test bench operating on pressure feed | 3. Check maximum pressure feed |
| | 4. Regulating spring guide installed upside down | 4. Install correctly |
| | 5. Incorrect regulating spring guide | 5. Install correct guide |
| | 6. Regulating sleeve installed upside down | 6. Install correctly |
| **Low and fluctuating transfer pressure** | 1. Regulating sleeve inner gasket faulty | 1. Renew gasket |
| | 2. One transfer pump blade chipped | 2. Renew unit |
| **Low advance reading** | 1. Low transfer pressure | 1. Inspect and repair transfer pump |
| | 2. Too many shims installed | 2. Shim correctly |
| | 3. Spring too stiff, incorrect type installed | 3. Install correct spring |
| | 4. Sticking advance piston | 4. Repair or renew piston |
| | 5. Sticking cam ring | 5. Repair or renew cam ring |
| | 6. Excessive clearance between advance piston and housing | 6. Install new components |
| | 7. Leaking advance gasket | 7. Renew gasket |

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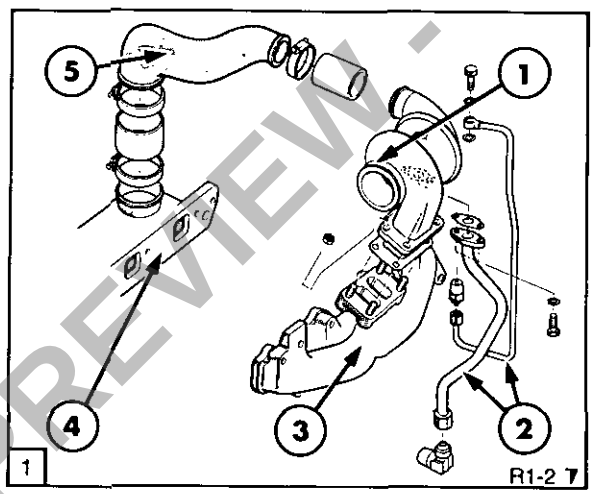
| SYMPTONS | POSSIBLE CAUSES |
|---|---|
| **Turbocharger rotating assembly binding or dragging** | 1. Damaged compressor wheel<br>2. Damaged turbine wheel<br>3. Compressor or turbine wheel rubbing on housing due to worn bearings, shaft journals, or bearing bores<br>4. Excessive dirt build up in compressor (housing or wheel)<br>5. Excessive carbon build up behind turbine wheel<br>6. Sludged or coked centre housing (check engine lubrication system) |

## C. OVERHAUL

### Removal

1. Remove the engine side panels.
2. Remove exhaust muffler.
3. Loosen and detach the top hood.
4. Disconnect the air cleaner to the turbocharger tube, and the turbocharger to intake manifold tube, by loosening the tube hose clamps, Figure 1.




Turbocharger Assembly

1. Turbocharger Housing
2. Oil feed and Return Pipes
3. Exhaust Manifold
4. Inlet Manifold
5. Inlet Hoses and Tubes

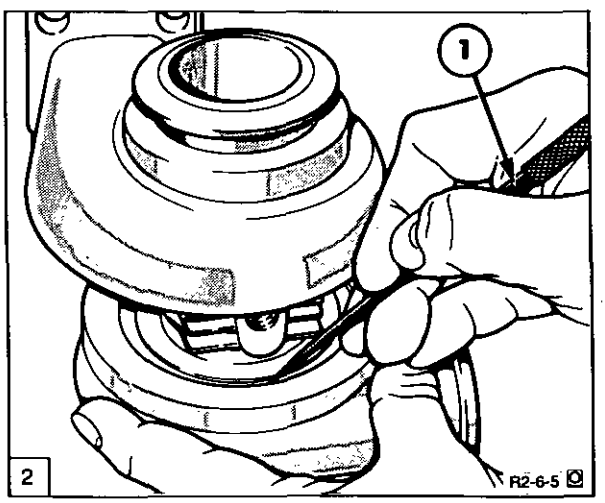
5. Disconnect the oil supply and return tubes from the turbocharger. Cap the ends of the tubes and the oil ports of the turbocharger to prevent entry of foreign material, therefore, preventing future bearing failures.

**NOTE:** *Before removing and cleaning the unit look for signs of oil and, or gas leakage, also wheel damage which may not be evident after cleaning.*

6. Remove the turbocharger and gasket from the exhaust manifold. Cover the opening in the exhaust manifold to prevent the entry of dirt, which could cause damage to the turbine wheel blades after installation and start up.

### Disassembly

1. Clean the exterior of the turbocharger using a non caustic cleaning solvent to remove accumulated surface matter before disassembly.




Scribing of Turbocharger Housing

1. Scribe

2. Mark the compressor housing, turbine housing and centre housing with a punch or scribe to facilitate orienting the housings during re–assembly, Figure 2.

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## Diagram 9
## Main Rear Harness – SLE Models with Cab, with AEIC

1. P.T.O. Speed Switch
2. Instrument Harness Connector (J1)
3. Extension Harness Connector (C1)
4. P.T.O. Module (Relay V–VI)
5. Thermostart Relay (VII)
6. Harness Connector (C4)
7. Diagnostic Connector (D1)
8. Engine Harness Connector (E1)
9. Fuse Panel (FS)
10. Battery
11. Keystart Switch (KS)
12. P.T.O. Switch
13. Indicator Lamp

| Key To Colours | |
|---|---|
| B – Black | G – Green |
| N – Brown | LG – Light Green |
| LN – Tan | U – Blue |
| S – Slate | TQ – Turquoise |
| R – Red | P – Purple |
| O – Orange | K – Pink |
| Y – Yellow | W – White |

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# PART 3
# ELECTRICAL SYSTEM
## Chapter 6
## BATTERY


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| B | BATTERY – MAINTENANCE AND TESTS | 1 |
| C | SPECIFICATIONS | 5 |


### A. BATTERY DESCRIPTION AND OPERATION

The Series 40 range of tractors feature a 12 volt, negative ground, lead acid type battery, of six cell construction.

A single 107 ampere hour at 20 hours, 800 c.c.a, (cold cranking amps) battery is the standard specified battery for all models, with the option of an additional battery, connected in parallel, of the same specification being available.

The battery for all with cab and 7840, 8240 and 8340 with and less cab models is located on a swing out tray located under the right hand foot steps. Less cab 5640, 6640 and 7740 models have the battery situated on a fixed tray bolted to the right hand side of the transmission in either a low or high mount location, depending on tractor specification.

The battery has four major functions:

- To provide a source of current for starting, lighting and instrumentation.
- To help control the voltage in the electrical system.
- To furnish current when the electrical demands exceed the alternator output.
- To support quiescent loads from radio and micro processor memory.

The battery is constructed in such a manner that each cell contains positive and negative plates placed alternatively next to each other. Each positive plate is separated from a negative plate by a non–conducting porous envelope separator. If any of the positive plates should make contact with negative plates within a cell, the cell will short circuit and suffer irreparable damage. All of the positive plates are welded to a bus–bar, forming a positive terminal and all of the negative plates are welded to a similar bus–bar forming a negative terminal.

Each positive plate is composed of a lead grid with lead peroxide pasted into the grid openings. The negative plates are composed of a lead grid with spongy lead pasted into the grid openings.

The plates are submerged in a liquid electrolyte solution of diluted sulphuric acid.

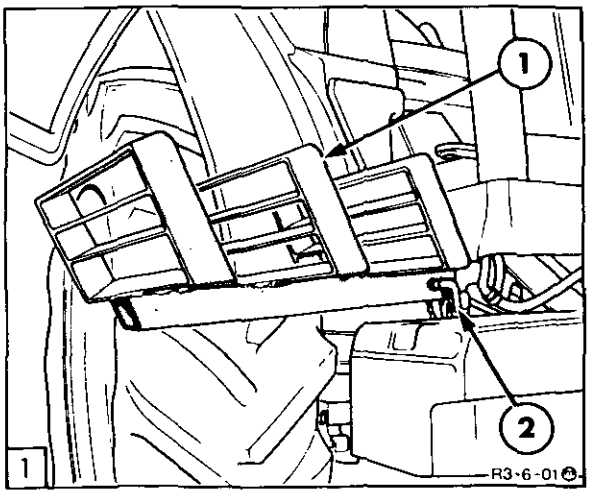
### B. BATTERY MAINTENANCE AND TESTS

#### REMOVAL

1. All with cab and 7840, 8240 and 8340 with and less cab models:
   Remove the 'R' clip and withdraw the securing pin from the top of the steps. Raise the steps and replace the securing pin in the hole provided to hold the steps in the raised position, replace the 'R' clip.

2. Remove the thumb screw from below the toolbox, and remove the toolbox.

3. Remove the securing pin to the right of the battery tray and swing the tray out towards the engine.




Right Hand Footsteps (where fitted)

1. Steps in Raised Position
2. Securing Pin

The following instructions apply for battery removal of all models:

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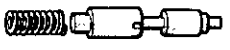
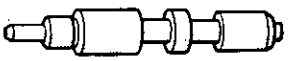
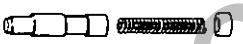
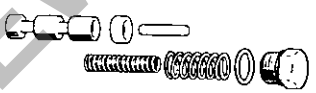
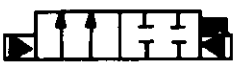
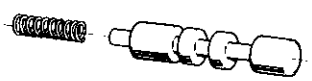
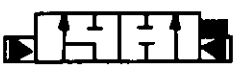
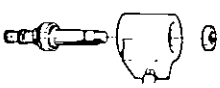
| VALVE (Quantity) | IDENTIFICATION | SYMBOL | FUNCTION |
|---|---|---|---|
| FWD Selector |  | | Solenoid operated – Pressure disengages FWD |
| Clutch Selector (2) | | | C1/C2 & C3/C4 Solenoid operated when powershifting. Pressure operated to dump when FNR lever is in neutral or clutch fully depressed |
| Vent Delay (4) | | | Vent valves (V1, V2, V3, V4) restrict releasing clutch oil pressure drop until engaging clutch pressure is 10 bar, provides smooth shifting. |
| Neutral Dump | | | Solenoid operated when FNR lever in neutral or clutch fully depressed. Pressure operates C1/C2 and C3/C4 valves to dump and C1/C2 sequencing valve to cut off oil to C1/C2 clutches |
| Lube Shut–Off | | | Decreases lube to C1/C2 clutches when in neutral |
| Feathering |  | | Mechanically and hydraulically operated to control engagement of C3 and C4 Clutches. |
| Pulse Width Modulating | | | Provides controlling / balancing pressure to feathering valve when C3 or C4 is being engaged or during powershifting |
| Safety Start |  | | Prevents drive engagement on start up until clutch pedal is cycled |
| Lube Proportioning | | | Proportions lube oil to clutches. Equally distributed in neutral, during clutch engagement valve directs higher proportion to engaged clutch |
| C1 and C2 Sequencing |  |  | Provides fully regulated oil to C1/C2 clutches as pedal is released from fully depressed position, ensures C1/C2 is fully engaged before C3/C4 are feathered. |
| Lube Combining |  |  | Combines lube oil with regulated pressure oil for C3/C4 clutches during feathering |
| Creeper Selector |  | | Solenoid operated provides pressure to engage creeper gear |

Table 2 – Control Valve Spool Identification

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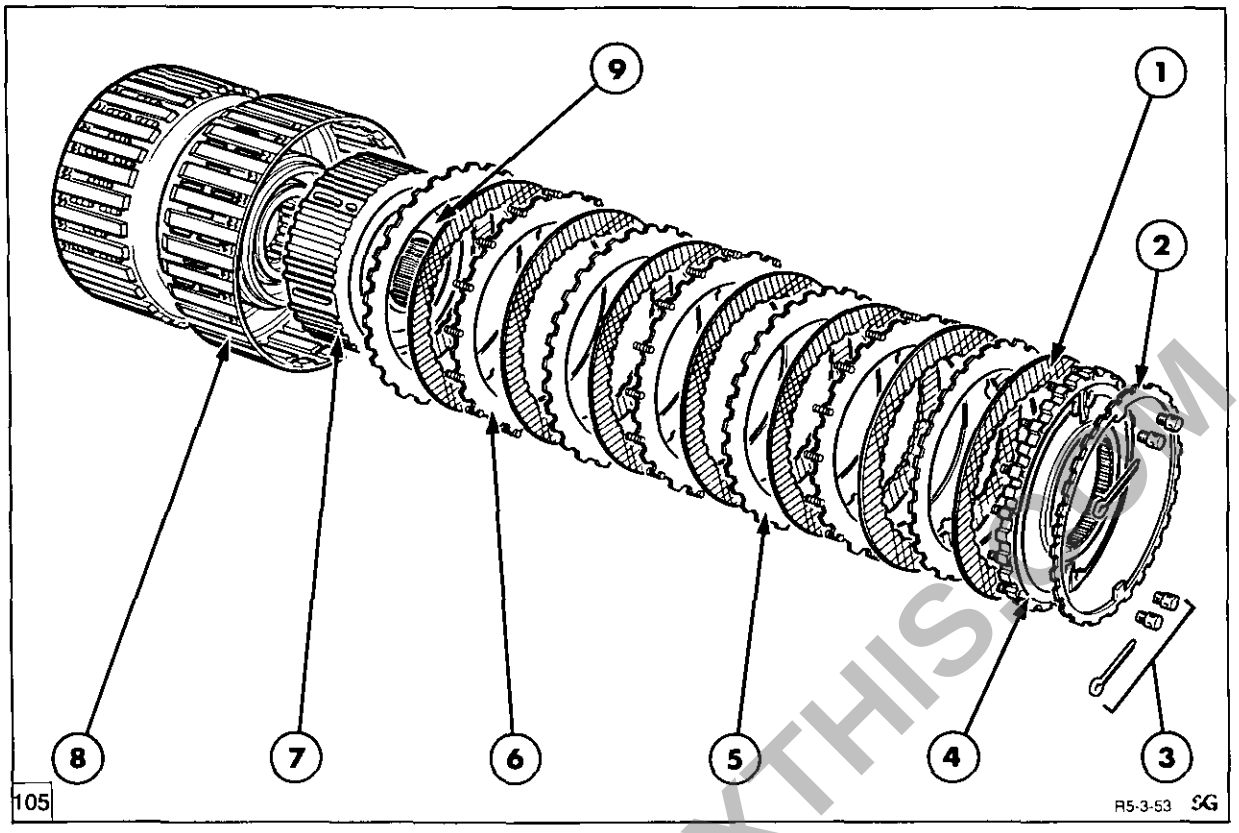


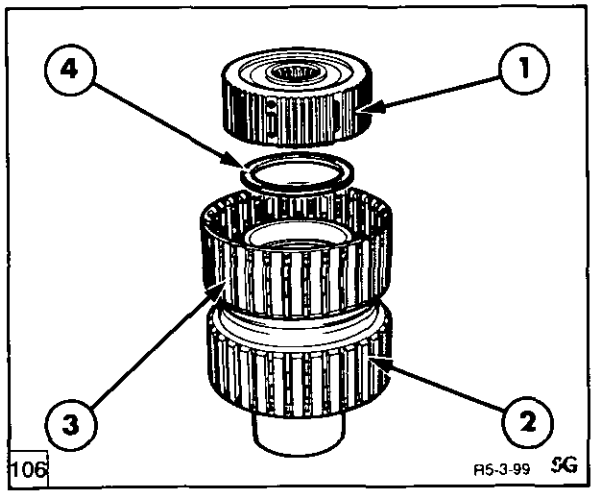

C3 Clutch Friction and Separator Plates – Assembly Order

1. Friction Plates
2. Pressure Plate Locking Ring
3. Locking Ring Retaining Screws and Split Pin
4. Pressure Plate
5. Steel Plates x 4
6. Steel Plates with Separator Springs x 3
7. C3 Clutch Hub
8. C3/C4 Clutch Housing
9. Polyimide Thrust Washer (one each side of hub located in stepped recesses)

6. Repeat the above procedure on the C4 clutch. With this clutch, again the hub must not be installed and note that the pressure plate is retained by a snap ring. See the exploded view of this clutch in Figure 110.

7. Disassemble both the C3 and C4 clutches, removing the pressure plates, separator plate and friction plates. Keep the C3 and C4 clutch components matched to the respective clutches. Continue with the following re–assembly procedure.

8. Assemble the polyimide thrust washers, items 20 and 21, Figure 98, to the inner and outer stepped recesses on the C3 clutch hub. Retain the washer with petroleum jelly and install the clutch hub into the clutch housing, Figure 106.




*C3 Clutch Hub and Polyimide Thrust Washer* Installation

1. Hub (note recess for polyimide thrust washer)
2. C4 Clutch End
3. C3 Clutch End
4. Polyimide Thrust Washer

9. Install the separator plates and friction plates in order as shown in Figure 105, to the C3 clutch.

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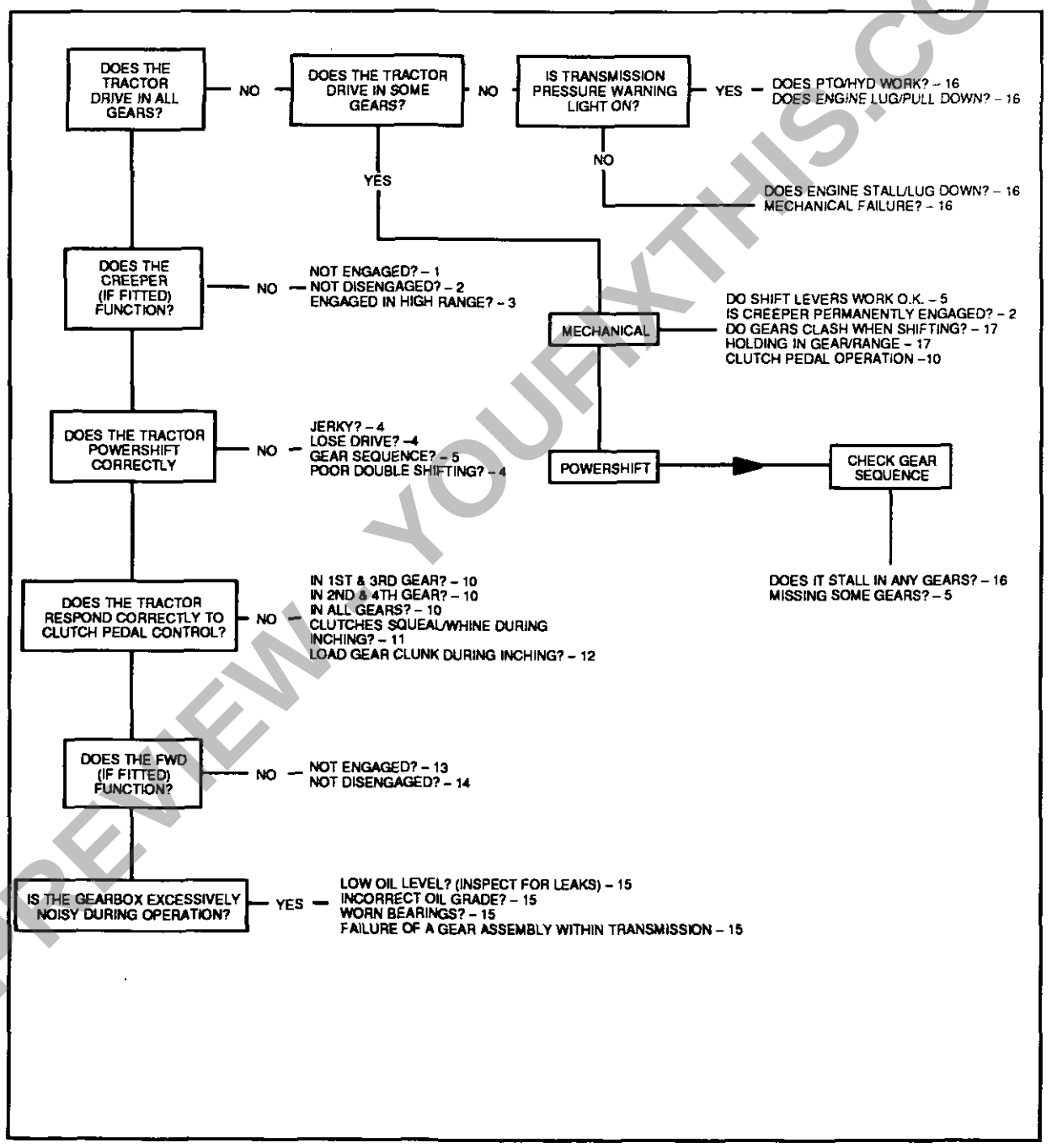
## Fault Finding

To determine the area of a transmission fault test drive the tractor and note the operation. Refer to the fault finding chart below. Follow the chart to the end of the respective fault line, the number at the end of the fault line refers to the appropriate, detailed, fault finding flow chart. Always start at the beginning of a flow diagram and go through each test procedure before going onto the next test, do not assume a component or circuit is correct without testing.

## FAULT FINDING FLOW CHART

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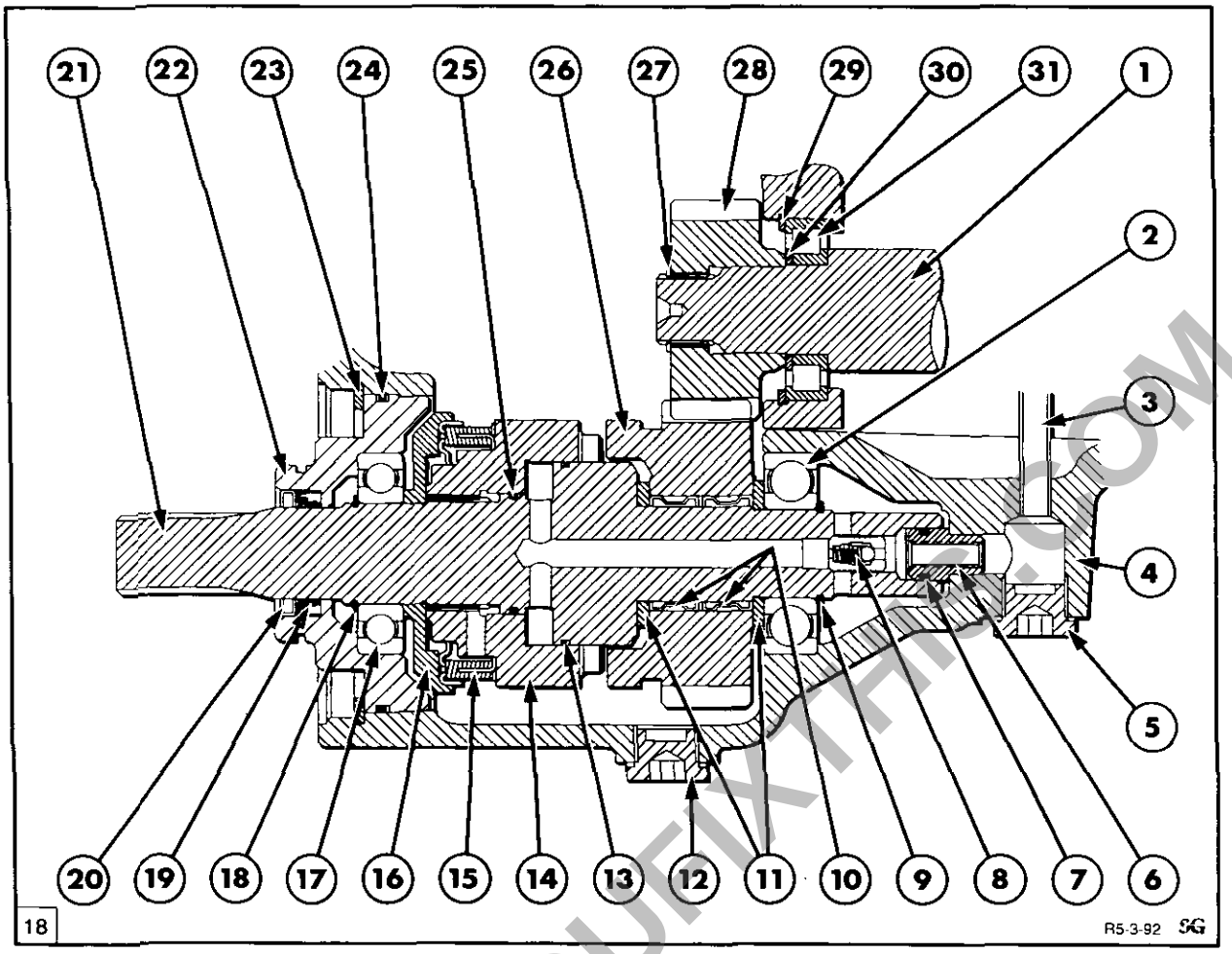


Front Wheel Drive Output Assembly – Sectional View

1. Shaft (from transmission output)
2. Output Shaft Rear Bearing
3. Oil Pressure Supply Tube
4. Transmission Housing
5. Plug (Pressure Supply)
6. Oil Transfer Tube
7. Oil Transfer Tube Polyamide Seal
8. Pilot Valve Assembly
9. Bearing Retaining Snap Ring
10. Needle Roller Bearings
11. Steel Washers
12. Transmission Drain Plug
13. Outer Piston Seal
14. Sliding Clutch Half
15. Engagement Spring Assembly
16. Spring Keeper
17. Output Shaft Front Bearing
18. Snap Ring
19. Oil Seal
20. Output Shaft
21. Dust Seal
22. Cover Plate
23. Cover Plate Retaining Snap Ring
24. Cover Plate 'O' Ring Seal
25. Inner Piston Seal
26. Clutch Half/Gear
27. Snap Ring
28. Drive Gear (from transmission output)
29. Bearing Thrust Washer
30. Snap Ring
31. Bearing Assembly

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## E. SPECIFICATIONS, TIGHTENING TORQUES AND SPECIAL TOOLS

### SPECIFICATIONS

| | | |
|---|---|---|
| Planetary Gear Set Free Play | 0.004–0.020 in<br>(0.10–0.51 mm) | |
| Planetary Gear Set Free Play<br>*Shims Available* | 0.013 in. (0.33 mm)<br>0.032 in. (0.81 mm) | |
| Planetary Cover to Housing Shimming Gap | 0.046–0.060 in.<br>(1.17–1.52 mm) | |
| Planetary Gear Set Free Play Shimming Chart | Average Planetary cover to Housing Gap | Shim Thickness to be added |
| | 0.001–0.013 in. (0.025–0.33mm) | 0.045in. (1.14mm) |
| | 0.014–0.026in. (0.34–0.66mm) | 0.032in. (0.81mm) |
| | 0.027–0.032in. (0.67–0.81mm) | 0.026in. (0.66mm) |
| | 0.033–0.045in. (0.82–1.14 mm) | 0.013in. (0.33mm) |
| | 0.046–0.0060in. (1.15–1.52mm) | None |
| Dual Power System Pressures | 220–260 lbf.in$^2$<br>(15.2–17.9 bar) | |
| Lubrication System Pressure | Run lubrication pressure test, a pressure within the following range should be recorded.<br>73–123 lbf.in$^2$ (5.0–8.5 bar) | |

### TIGHTENING TORQUES

| Components | lbf.ft | Nm |
|---|---|---|
| Control Valve Spool Plug | 28 | 38 |
| Control Valve Body Retaining Bolts | 32 | 44 |
| Planetary Housing Retaining Bolts | 77 | 105 |
| Planetary Cover Retaining Bolts | 35 | 47 |
| Lubrication Tube Connector | 13 | 17.5 |
| Pressure Line Control Tube Connector | 9 | 12 |

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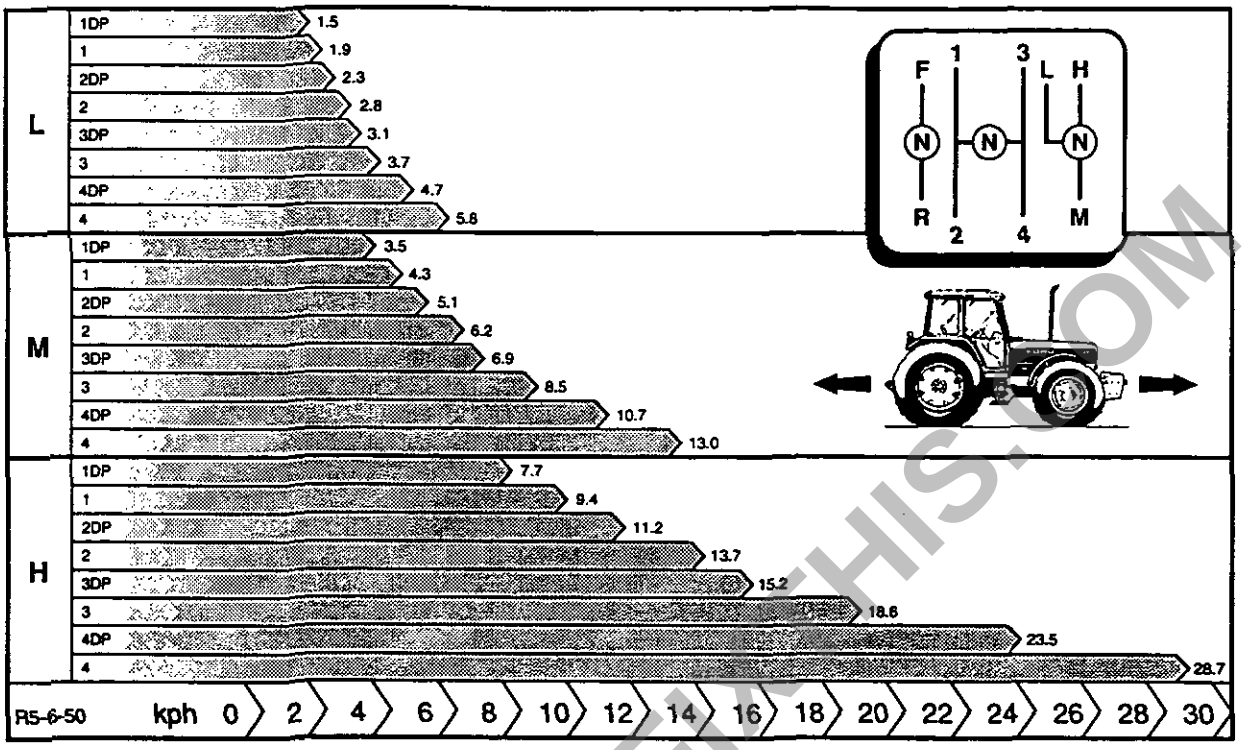
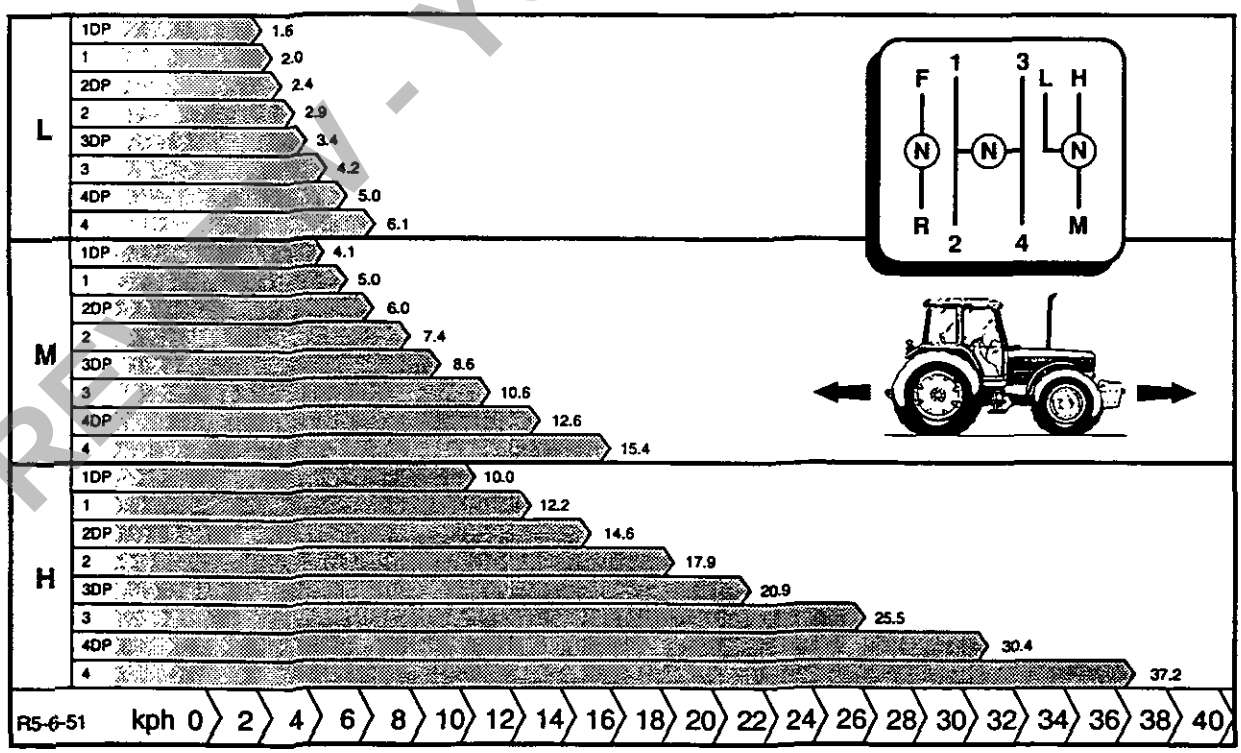
## GROUND SPEEDS – 12x12 DUAL POWER TRANSMISSIONS AT MAXIMUM RATED ENGINE SPEED




30 kph Transmissions
L = Low Range M = Medium Range H = High Range
UD = Underdrive




40 kph Transmissions
L = Low Range M = Medium Range H = High Range
UD = Underdrive

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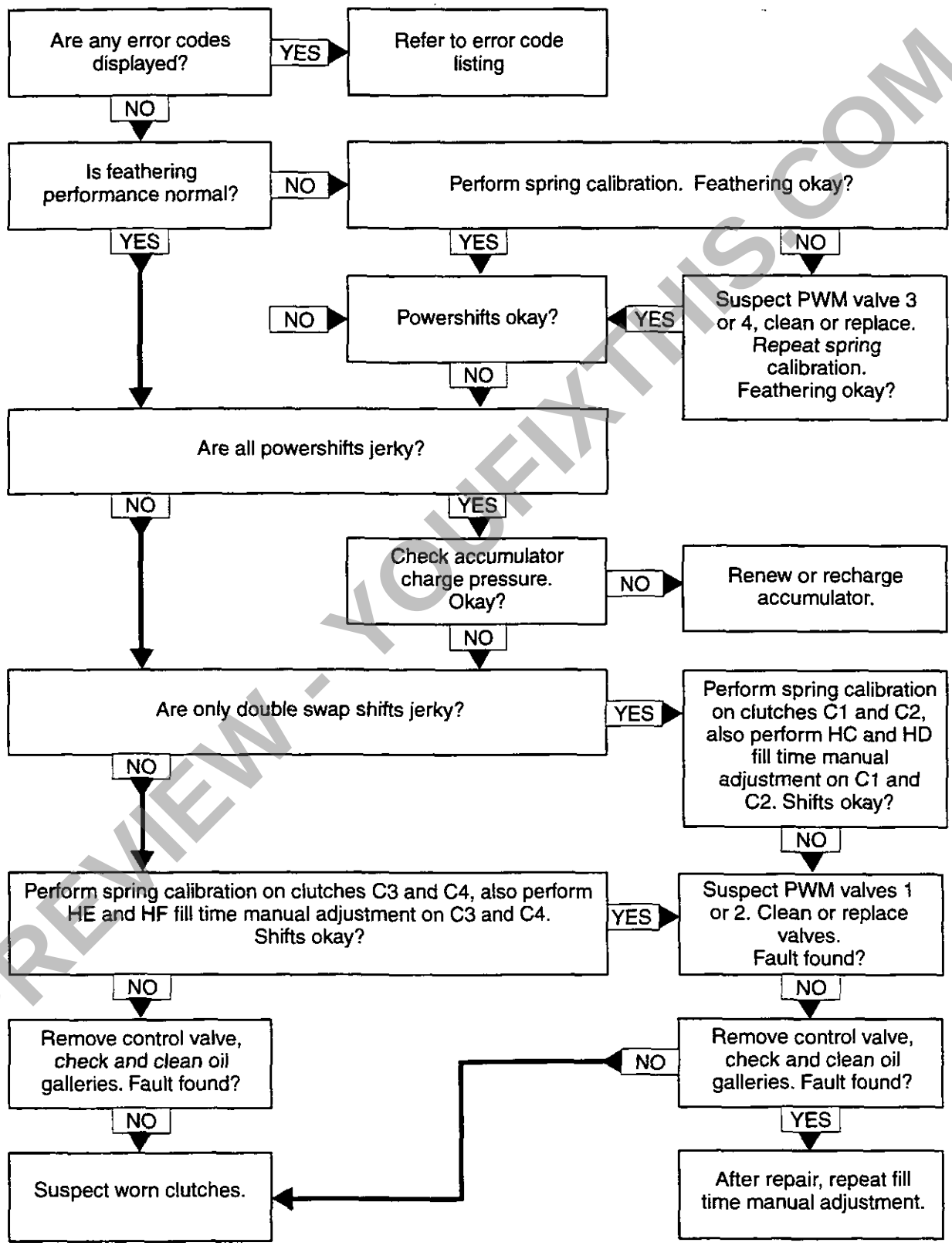
**Diagram 3: The powershifts are not smooth or the tractor loses drive between powershifts (in work, tractor stops or could be jerky)**

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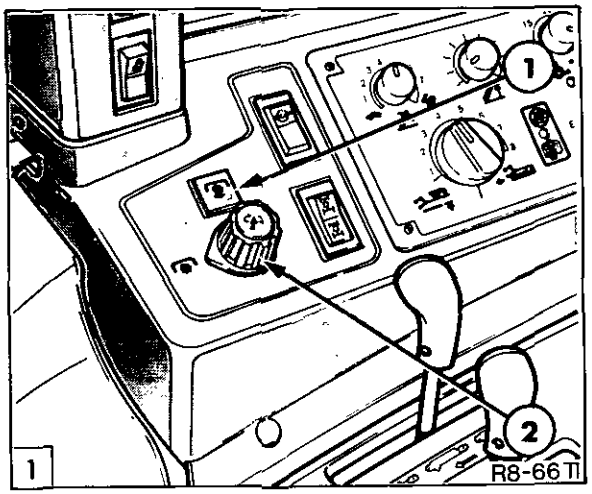
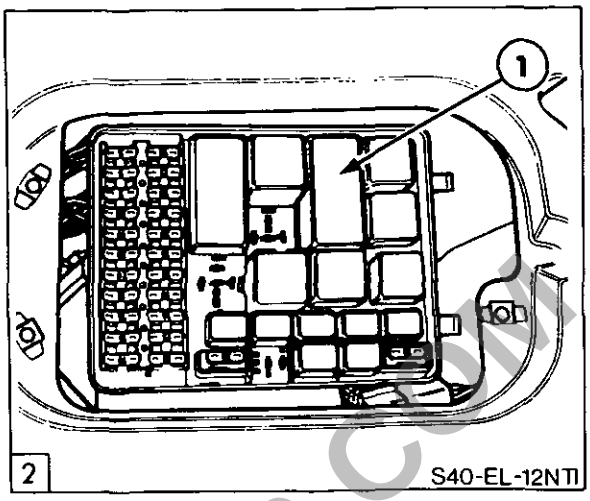
## D. SOLENOID OPERATED PTO CLUTCH AND CONTROL VALVE– DESCRIPTION AND OPERATION




PTO Selector

1. PTO Warning Light
2. PTO Selector Knob




Fuse Box

1. PTO Control Module (blue)

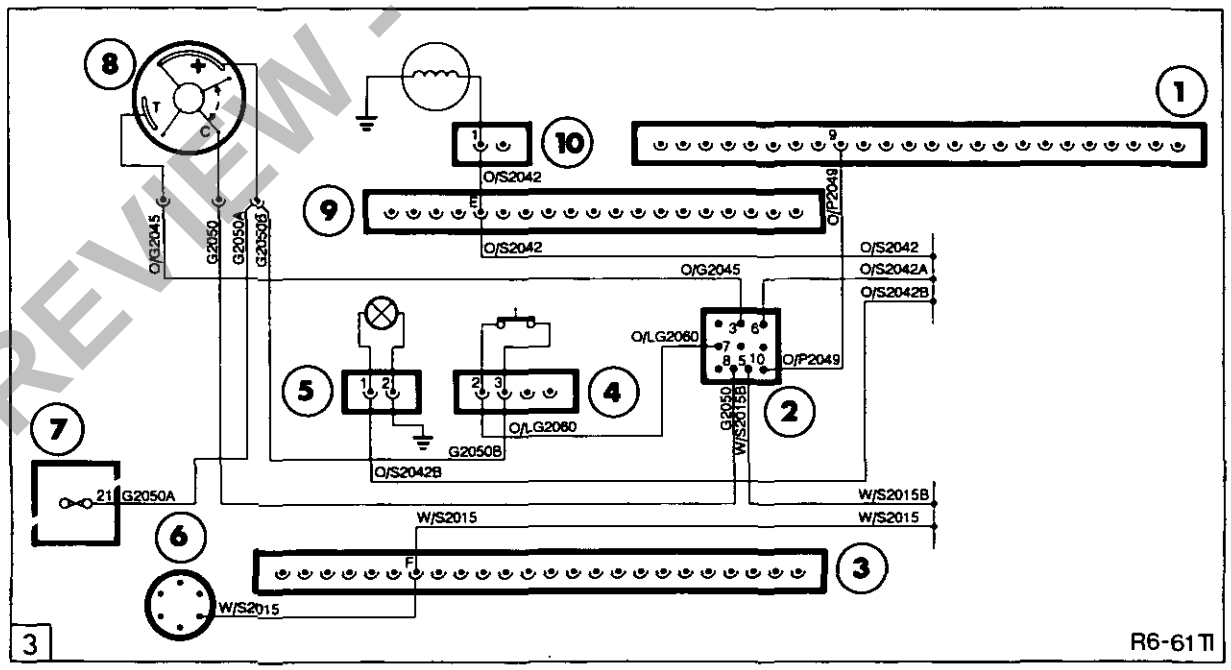
Tractors installed with a solenoid operated PTO clutch can be identified by the unique PTO selector knob, Figure 1. The PTO clutch is engaged by depressing and turning the knob fully clockwise.

To allow the PTO to function, the control module located in the fuse box, Figure 2, **must** receive a signal from the alternator. The module also includes an inbuilt safety feature preventing the PTO from being engaged inadvertently.

When the engine is running a signal from the alternator 'powers up' pin 5 of the control module. Refer to Figure 3.

Initially when the selector knob is rotated to engage the PTO, the '+' terminal is connected to terminal 'T' and 12 Volts is supplied to Pin 3 in the module.

As the switch is fully rotated to the 'ON' position, terminal '+' and terminal 'C' are connected and 12 volts is supplied to pin 8 on the module.




PTO Control Valve Solenoid Operating Circuit

1. Instrument Connector J2
2. PTO Control Module
3. Main Harness Connector E1
4. 540/1000 Speed Selector Switch
5. PTO Warning Light
6. Alternator
7. 5 Amp Fuse No 21
8. PTO Switch
9. Extension Harness Connector C1
10. PTO Solenoid and Connector

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2. Inspect the lever and rod assembly of 'S' models, ensure the rod is not bent.

3. Inspect the ratchet mechanism of the handbrake lever, SL and SLE models and the ratchet teeth of the footbrake pedal of the S model. Replace if the teeth are worn.

**INSTALLATION (All Models)**

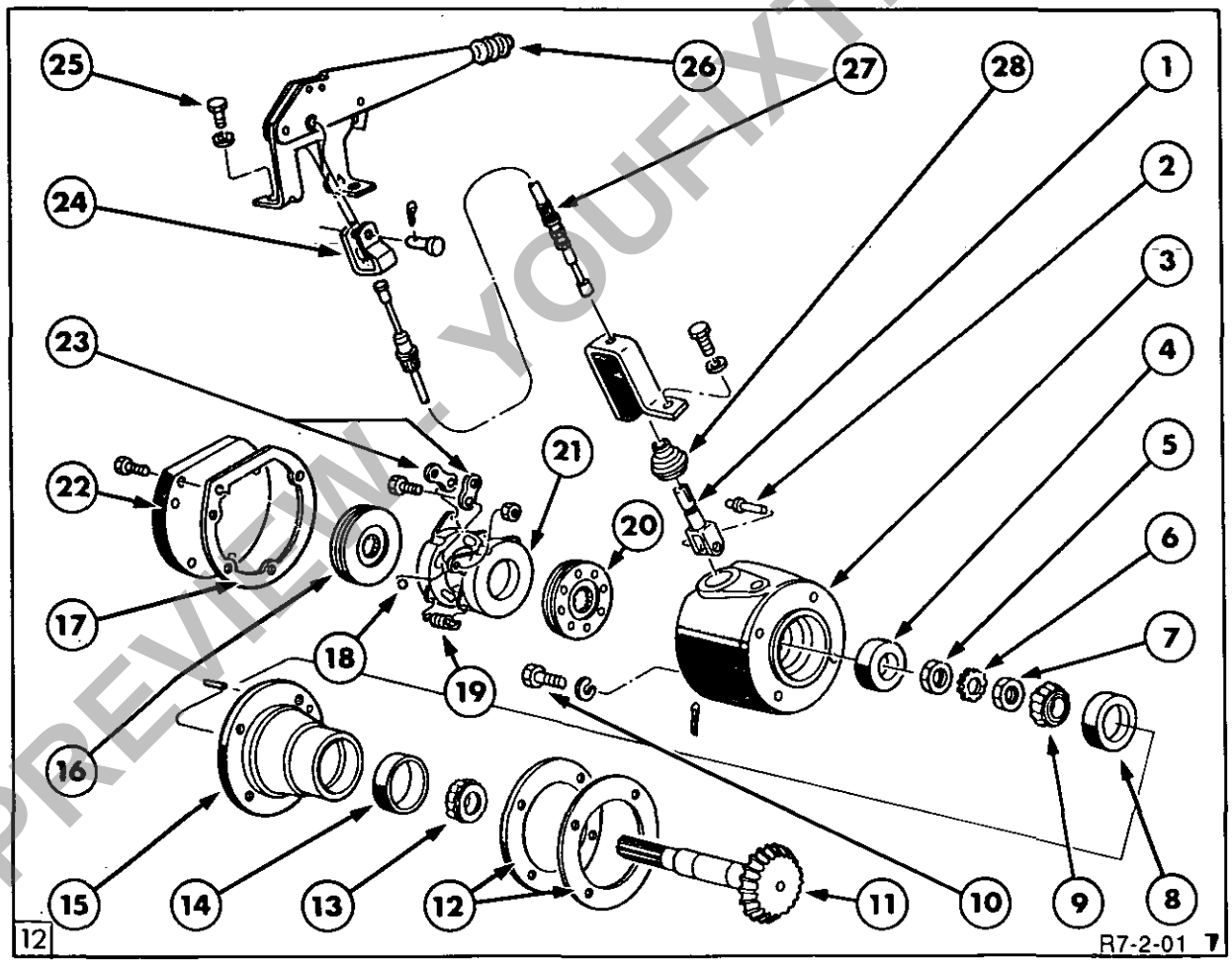
Installation of all the handbrake components is the reverse of the removal procedure observing the following points:

- Tighten the handbrake lever to floor securing bolts to a torque of 33 lbf.ft (45 Nm)
- Ensure the cable is routed correctly, avoiding moving components and without any sharp bends. Secure as required using nylon straps.
- If split pins have been removed always replace with new items.
- Ensure the footbrakes are correctly adjusted and then adjust the handbrake. Adjustment procedures are detailed in Section C of this Chapter.

**TRANSMISSION HANDBRAKE ASSEMBLY**

**Removal**

1. Chock the rear wheels and release the handbrake.
2. Slacken the cable adjuster and disconnect the cable.
3. Remove the retaining bolts and withdraw the brake housing cover plate.
4. Withdraw the outer friction disc from the housing.




Transmission Handbrake Assembly

1. Control Rod
2. Rod Retaining pin
3. Brake Housing
4. Oil Seal
5. Locknut
6. Lock Washer
7. Adjusting Nut
8. Bearing Cup
9. Cone and Roller Assembly
10. Housing Retaining Bolt
11. Driven Shaft
12. Shims
13. Cone and Roller Assembly
14. Bearing Cup
15. Retainer Assembly
16. Outer Brake Disc
17. Outer Cover Gasket
18. Actuating Disc Steel Ball
19. Actuator Spring
20. Inner Brake Disc
21. Actuator Assembly
22. Outer Cover
23. Actuator Links
24. Cable Clevis
25. Retaining Bolt
26. Handbrake Lever
27. Single Operating Cable
28. Control Rod Seal

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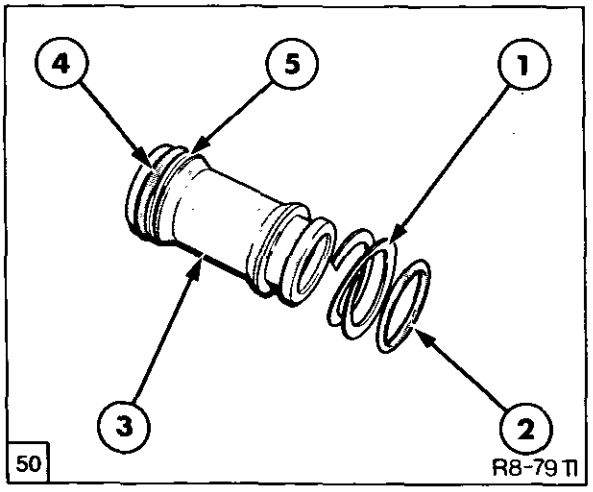
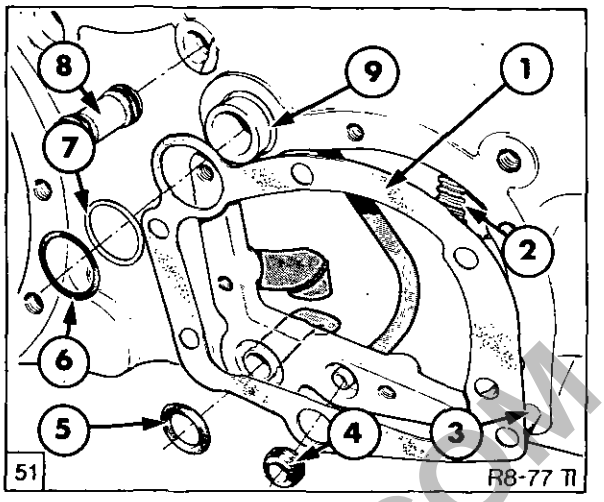
## INSTALLATION

Installation follows the removal procedure in reverse. During installation observe the following:–




Transfer Tube

1. Washer
2. 'O' Ring
3. Tube
4. 'O' Ring
5. Washer




Preparation for Installing Pump

1. Gasket
2. Idler Gear
3. Dowel
4. Seal (PTO Feed Tube)
5. Seal (Steering Pump Intake Tube)
6. 'O' Ring
7. Washer
8. Transfer Tube
9. Charge Pump Intake Tube (Retained with a Wire Ring)

- Fit new seals and washers to the transfer tube Figure 50.

**NOTE:** *There are two designs of transfer tube. The tube shown in Figure 50 is that for tractors installed with a hydraulic lift assembly. On those special builds where a hydraulic lift assembly is not fitted the transfer tube is blanked off at one end.*

- Ensure seals and washers on the steering, charge pump and PTO tubes in rear axle centre housing are correctly fitted. Refer to Figure 51.

**NOTE:** *The charge pump intake tube is locked in position in the rear axle centre housing by a wire locking ring attached to the end of the tube.*

- Ensure steering pump intake tube is correctly located.

- Push the transfer tube into the rear axle centre housing, fit a new gasket and install the pump.

- Tighten all bolts to the correct torque. See Specifications Section E.

- Refill the rear axle/transmission with 13.3 Imp Galls (16.0 US Galls, 60.6 Litres) of oil to Ford Specification ESN M2C 134 D.

Pressure test the pump after installation as described in Section D and test drive tractor for correct operation.

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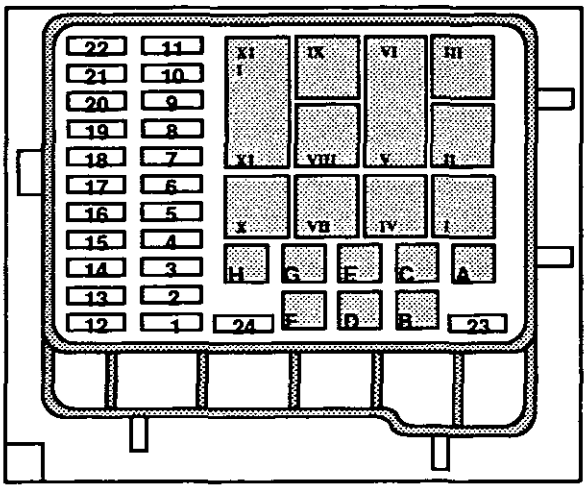
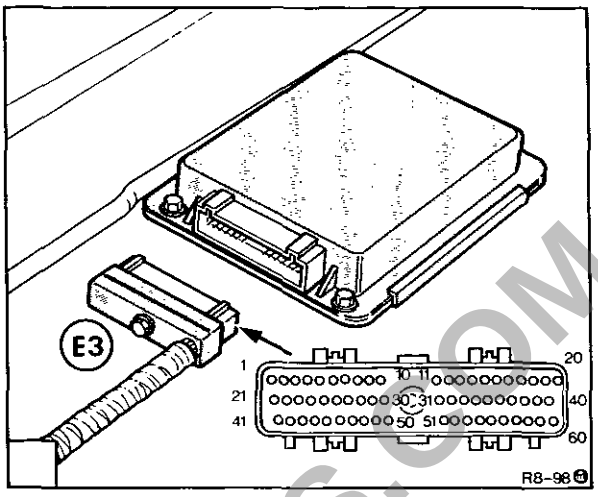
## Error Code 56 Hydraulic Lift Disabled due to Failure

For EDC wiring diagram and connector location refer to end of this Section




Fuse Panel




Micro Computer Connector

*This error code will be displayed if the micro computer detects that the hydraulic lift arms are lowering when a lower command has not been given.*

Start the tractor and position the hydraulic lift so that the implement position display reads approximately 50.
Remove fuse No 14 and start the tractor engine
**Do the hydraulic lift arms move?**

**YES** → Overhaul hydraulic control valve and inspect spools for sticking in lowering position

**NO**

With fuse 14 removed, disconnect micro computer connector **E3**. Check for short circuit between **E3–33** (K/R) and tractor chassis
**Short circuit?**

**YES** → Locate and repair short circuit

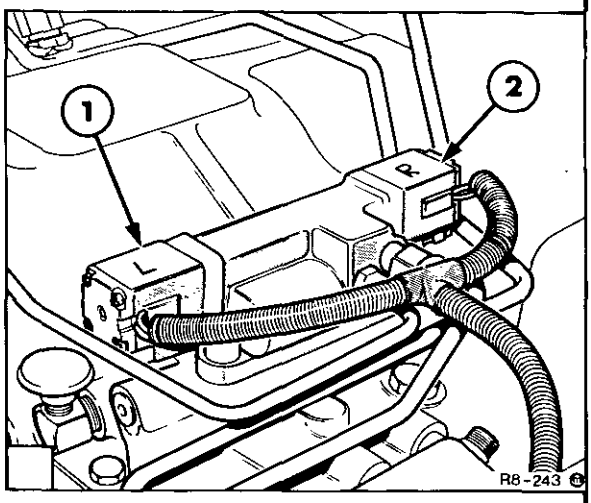
**NO**

*If error code 56 is occurring intermittently and the* hydraulic lift arms appear to lower at the time the error occurs, check for intermittent short circuit between **E3–33** (K/R) and tractor chassis
**Intermittent short circuit found?**

**YES** → Locate and repair short circuit

**NO**

Check that the hydraulic control valve lower solenoid wires are not rubbing against the solenoid case causing a short circuit




Hydraulic Control Valve Solenoids

1. Lower Solenoid
2. Raise Solenoid

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## ASC SELECTOR VALVE SIZES

| Colour | Inches | mm |
|---|---|---|
| Green | 0.6247–0.6244 | 15.8674–15.8598 |
| Yellow | 0.6244–0.6241 | 15.8598–15.8521 |
| Blue | 0.6241–0.6238 | 15.8521–15.8445 |
| White | 0.6238–0.6235 | 15.8445–15.8369 |
| Blue/White | 0.6235–0.6232 | 15.8369–15.8293 |

## CONTROL VALVE SIZES

| Colour | Inches | mm |
|---|---|---|
| Orange | 0.5928–0.5927 | 15.057–15.055 |
| Green | 0.5926–0.5925 | 15.052–15.050 |
| Yellow | 0.5923–0.5921 | 15.044–15.039 |
| Blue | 0.5921–0.5919 | 15.039–15.034 |
| White | 0.5919–0.5917 | 15.034–15.029 |

## CONTROL VALVE BUSHING SIZES

| Colour | Inches | mm |
|---|---|---|
| Green/White | 1.0014–1.0012 | 25.436–25.430 |
| Orange | 1.0012–1.0010 | 25.430–25.425 |
| Green | 1.0010–1.0008 | 25.425–25.420 |
| Yellow | 1.0008–1.0006 | 25.420–25.415 |
| Blue | 1.0006–1.0004 | 25.415–25.410 |
| White | 1.0004–1.0002 | 25.410–25.405 |
| Blue\White | 1.0002–1.0000 | 25.405–25.400 |

## VALVE SETTINGS

Lift Cylinder Relief Valve 2850–3050 lbf/in² (197–210 bar)

## GASKET SEALER

Gasket Sealer FP119 (Loctite 515) to Specification ESE–M4G234–A1

## SPECIAL TOOLS

| TOOL | V.L. CHURCHILL | FNH PART No (America Only) |
|---|---|---|
| Control Valve Bush Installer | FT. 8510 | FNH 02191 |
| Control Valve Bush Locator | FT. 8510–3 | FNH 10090 |
| Extension Tool | FT. 8510–1D | FNH 02191 |
| Guide and Stop Adaptor | FT. 8510–1K | FNH 02191 |
| Setting Gauge | FT. 8527 | FT. 8527 |
| Control valve Setting Tool | | FNH 00014 |

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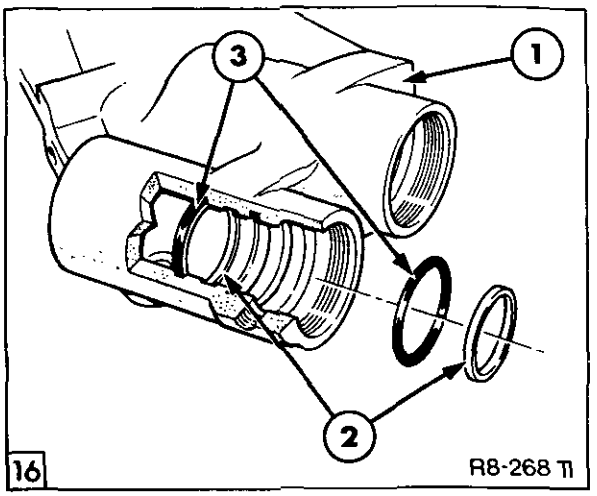


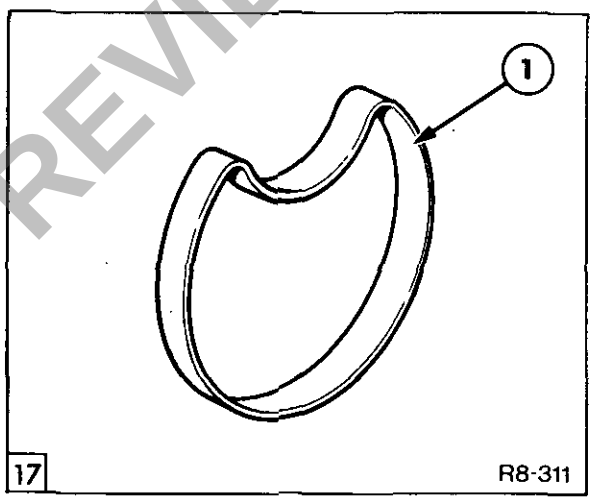

Slipper Seals

1. Coupler Housing
2. Slipper Seals
3. 'O' Rings

3. Remove the two 'O' ring and slipper seals from the coupler housing, Figure 16.

## RE–ASSEMBLY

Inspect components for wear or damage and replace all seals which are serviced.




Shaping Slipper Seal

1. Re–assemble the coupler using the disassembly procedure in reverse.

2. Lightly oil two new 'O' ring seals and install into the coupler housing grooves.

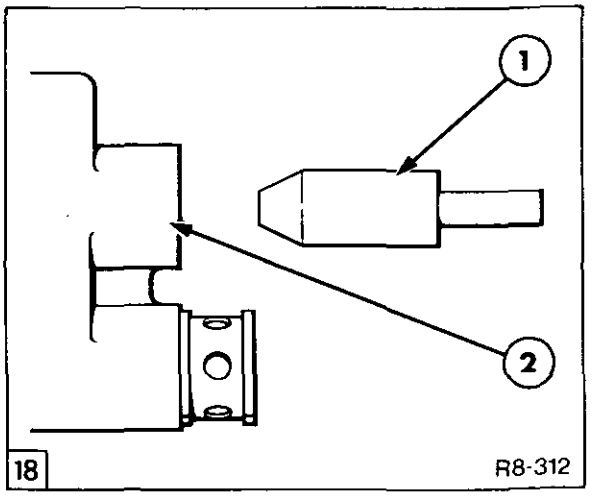
3. Shape the new slipper seals as shown in Figure 17 and locate inside 'O' ring seals. Use a clean finger to smooth the seals into position.

4. Where available insert slipper seal tool No FT 8611, into the housing and rotate back and forth. This operation slightly stretches and seats the seals in order that the coupling can be installed.

5. Lightly oil coupler and carefully install into the housing.

**NOTE:** *Extreme care must be exercised as the coupler engages and slightly expands the slipper seal. This is particularly important if the slipper seal tool is not available.*

6. Tighten the sleeve to a torque of 60 lbf ft (82 Nm).




Seating Slipper Seals

1. Slipper Seal Tool No FT 8611
2. Coupler Housing

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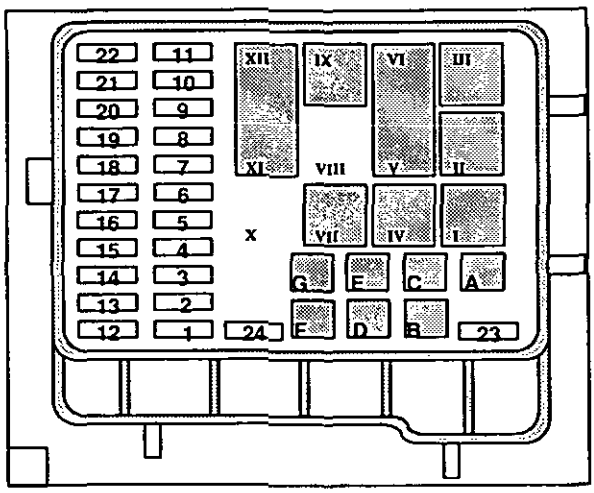
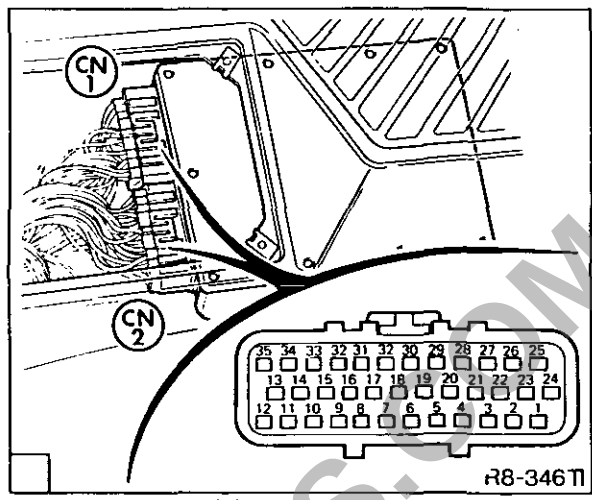
## Error Code 57 EDC Microprocessor Failure

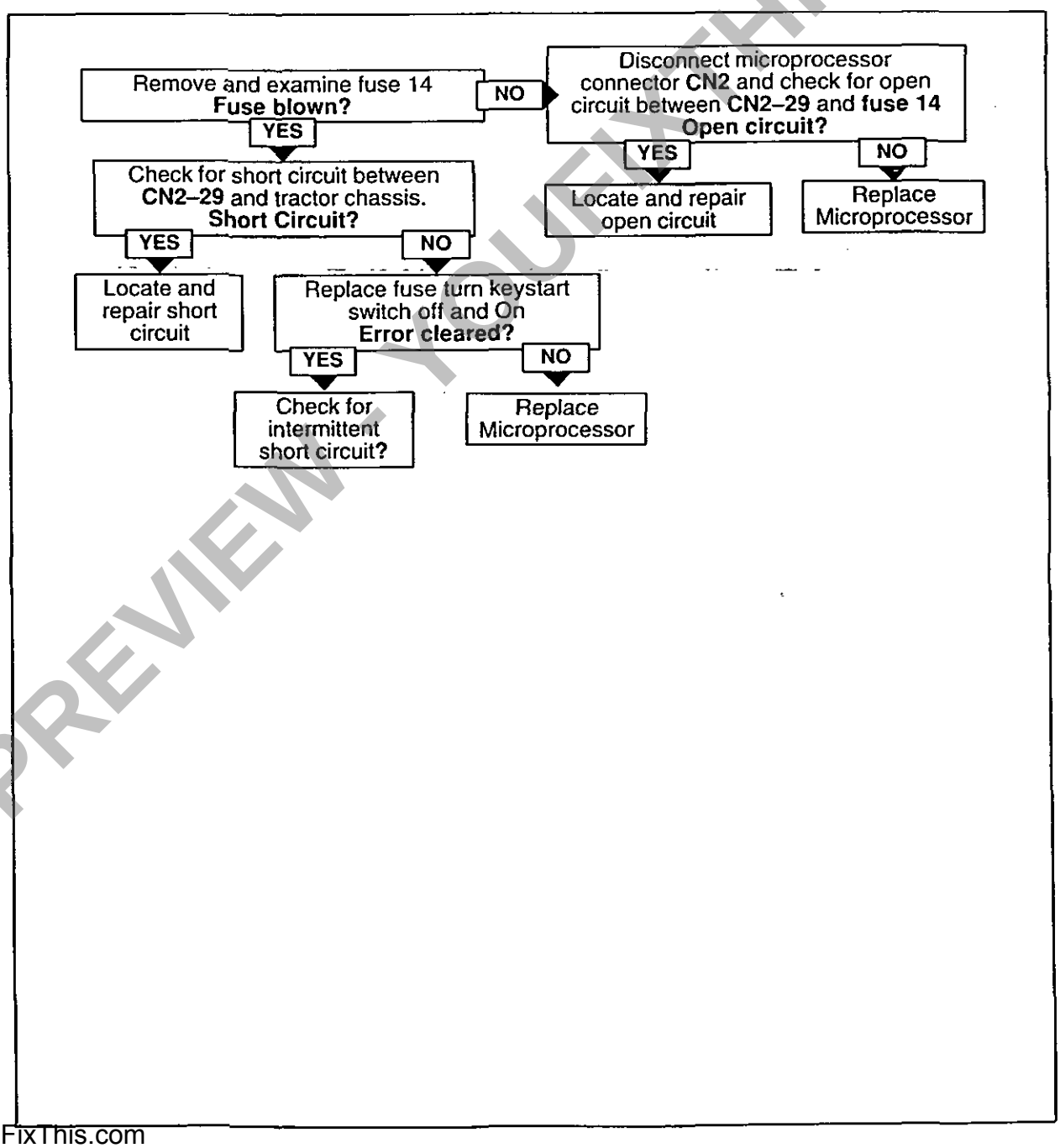
For EDC wiring diagram and connector location refer to end of this Section




Fuse Panel




Microprocessor

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These pumps driven by the PTO idler gear, pressurise the steering column operated steering motor. The pressurised oil from the steering motor drives the axle mounted double acting steering cylinder.

The steering motor is similar across the vehicle range and is bolted to a bracket within the steering console and connected to the steering column by a splined shaft.

The steering column, dependent upon models is adjustable for varying angles of tilt and height.

On two wheel drive units the steering cylinder is bolted at one end to the front axle beam and at the other to an eye on the track rod.

On four wheel drive units the steering cylinder is bolted to the rear of the axle casing and both ends of the piston rod are connected to the steering arms by a short track rod.

On both cylinders the piston is mounted centrally on the piston rod, so presenting an equal area of the piston to pressured oil during left or right turns.

The pressure relief valve for the system is contained within the steering motor itself.

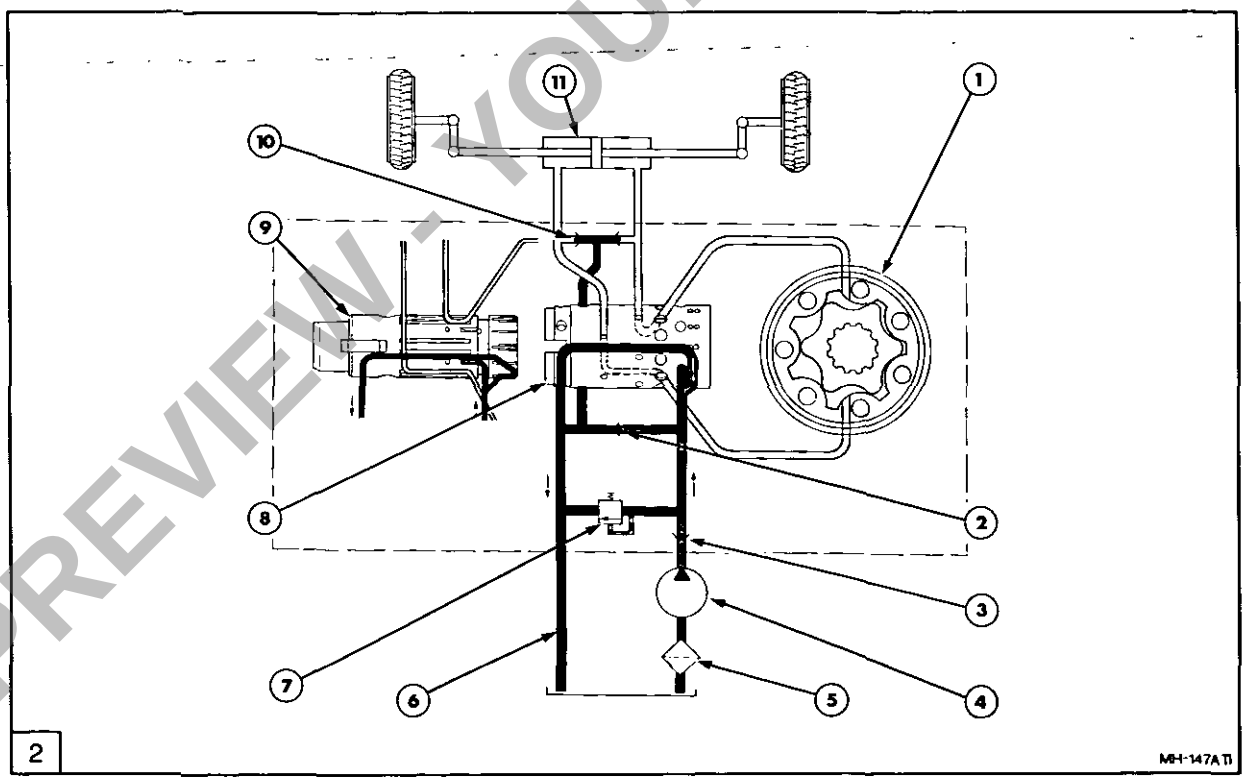
## OPERATION

Oil is drawn from the rear axle and into the pump through a filter, pressurised by the rotation of the gears, and expelled through the pump outlet port to the steering motor. The pressurised oil when received at the steering motor is directed to the steering actuating cylinder when the steering wheel is turned.

The steering motor incorporates a metering unit which regulates the volume of oil supplied to the cylinder so that it is proportional to the angular movement of the steering wheel. The metering unit in combination with suction valves also allows the steering to be operated **MANUALLY** without pressurised oil being supplied from the pump.

The system is fully hydrostatic and as such there is no mechanical connection between the steering column and the steering wheels.

### Neutral Position




Steering Operation Schematic – Neutral Position

1. Metering Unit
2. Check Valve
3. Non Return Valve
4. Pump
5. Filter
6. Return via Cooling and Lubrication
7. Pressure Relief Valve
8. Control Valve Sleeve
9. Control Valve Spool
10. Suction Valves
11. Steering Cylinder

Suction Oil

Return Oil (Restricted by cooling and Lubrication)

Trapped Oil

Pump Oil

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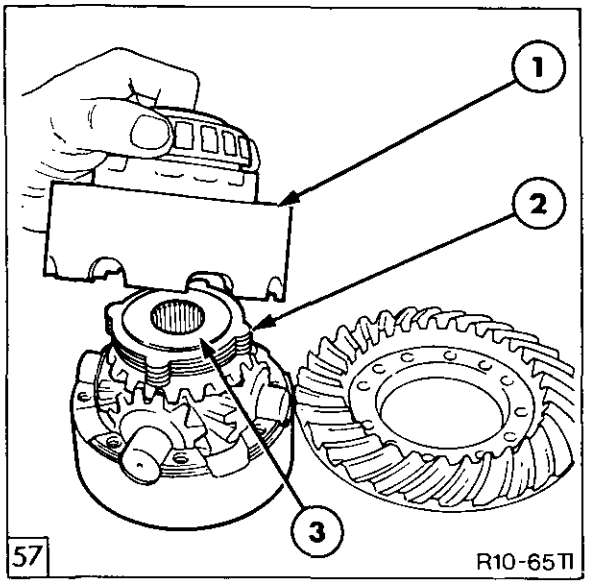
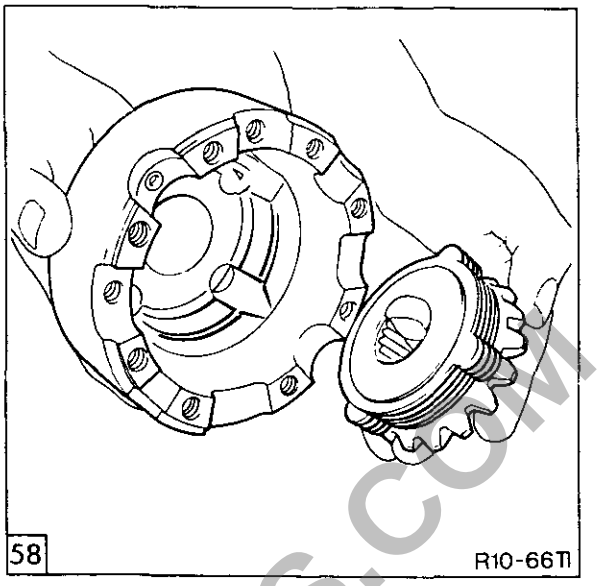
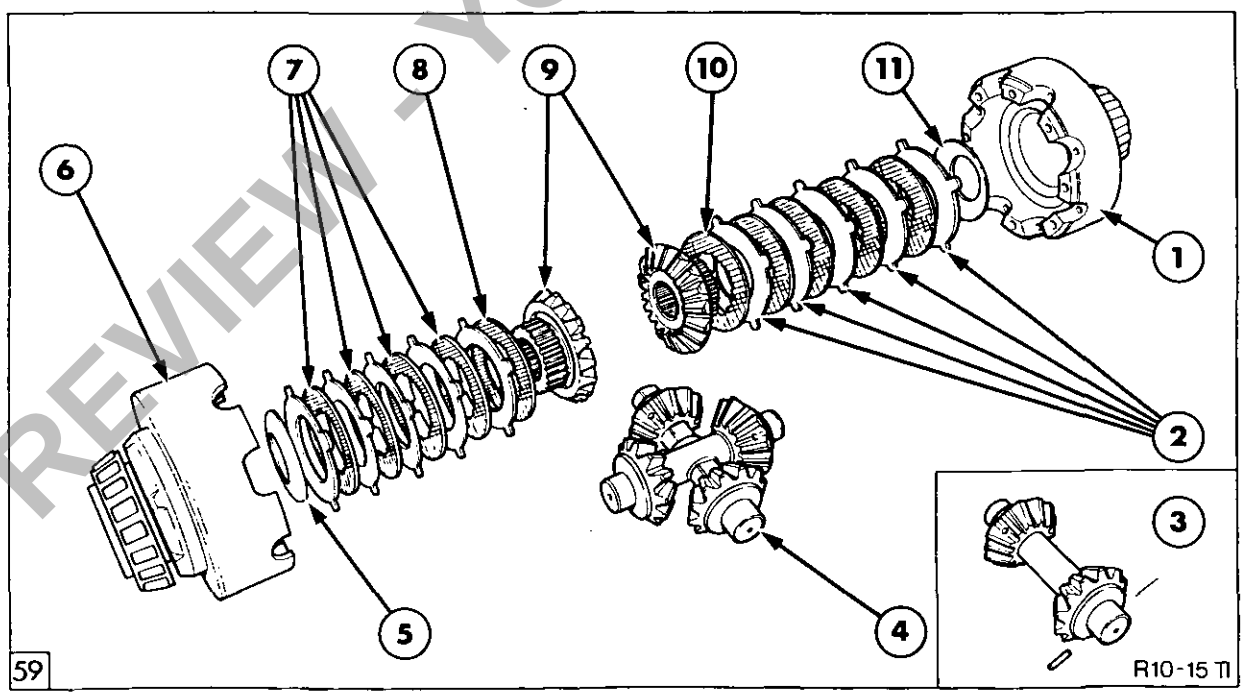



Differential Disassembly

1. Differential Housing
2. Differential Plates
3. Belleville Washer (Where fitted)




Differential Side Gear Removal




Limited Slip Differential Components

1. Differential Housing
2. Steel Plate
3. Differential Gear Assembly (Standard Axle)
4. Differential Gear Assembly (Heavy Duty Axle)
5. Belleville Washer (Where fitted)
6. Differential Housing
7. Friction Plates
8. Thrust/Friction Plate
9. Side Gears
10. Thrust/Friction Plate
11. Belleville Washer (Where fitted)

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## C. SYSTEM COMPONENTS – DESCRIPTION AND OPERATION

### REFRIGERANT

To achieve the absorption and the release of heat which is, in essence, the function of an air conditioning system, requires the use of a suitable "refrigerant" - a liquid that has a relatively low temperature boiling point, plus certain desirable safety and stability features.

The refrigerant currently used in the air conditioning systems of Series 40 Tractor is refrigerant R-12. (Trade name include Freon 12, Arcton 12, Genetron 12 and Freeze 12).

In the future Series 40 tractors will incorporate R–134A refrigerant and the Service technician should check the Decal on the compressor to determine the type of refrigerant used.

**NOTE:** *To help protect the environment legislation has been introduced in most territories banning the release into the atmosphere of CFC refrigerants,including R12. All service procedures contained in this manual can be carried out without the need to release refrigerant into the atmosphere.*

In order to prevent the incorrect type of refrigerant being charged to the system the schrader type service valves fitted to the tractor and necessary to connect up refrigerant recovery, evacuation and recycling/recharging equipment will be of two different sizes as recognised and specified by the air conditioning industry.

**WARNING:** *R–12 refrigerant is* ***not compatible*** *with R–134A refrigerant.* ***Do not*** *attempt to replace R12 refrigerant with R–134A refrigerant or test the system using gauges or equipment previously used with R134A as damage to the system will result.*

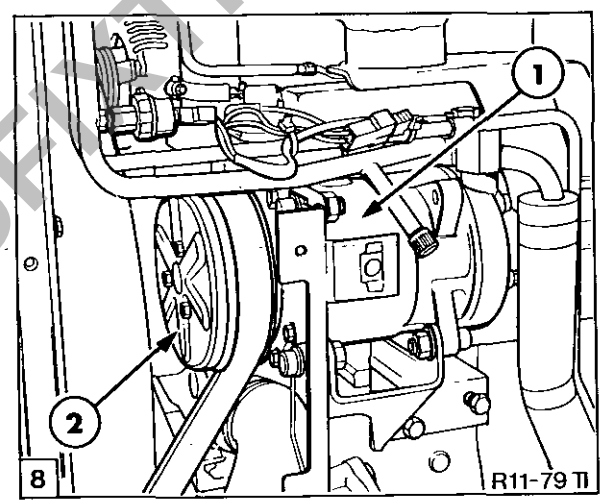
R-12 is refrigerant is stable at all operating temperatures and able to absorb great quantities of heat.

The boiling point of R-12 is - 21.7° F (-30.1° C) at atmospheric pressure.

If the pressure is increased, R-12 will readily vaporize to absorb heat at temperatures between 11° F (-11.7° C) at 15 lbf/in$^2$ (1.03 bar) and 32° F (0° C) at 30 lbf/in$^2$ (2.07 bar) in the evaporator.

At higher pressures, R-12 will condense and give off heat at temperatures between 130° F (54.4° C) at 180 lbf/in$^2$ (12.4 bar) and 150° F (66.6° C) at 230 lbf/in$^2$ (15.85 bar) in the condenser.

### COMPRESSOR PUMP




Air Conditioning Compressor

1. Air Conditioning Compressor
2. Electromagnetic Clutch

The tractor air conditioning unit compressor pump is mounted on the left hand side of the engine and is belt driven by the crankshaft pulley, Figure 8.

The compressor separates the low and high pressure sides of the system and is basically a pump which has two functions:

(1) To raise the refrigerant temperature by compression to a higher degree of temperature than the ambient (outside air) temperature.

(2) To circulate the required volume of refrigerant through the system.

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## CYLINDER HEAD SERVICING

### Disassembly

1. Drain the refrigerant oil from the compressor into a clean calibrated container. Measure and record the quantity of oil obtained. This information is required during installation of the new or overhauled unit.

2. Remove the six cylinder head bolts and using a hide mallet, gently tap the cylinder head free. The use of a gasket scraper may also be required to free cylinder the cylinder head from the compressor body.

3. If the valve plate and/or cylinder head are to be reused, carefully remove the gasket using a suitable scraper.

4. Gently pry the valve plate free from the cylinder block and remove the gasket.

5. Inspect the valve plate for damage.

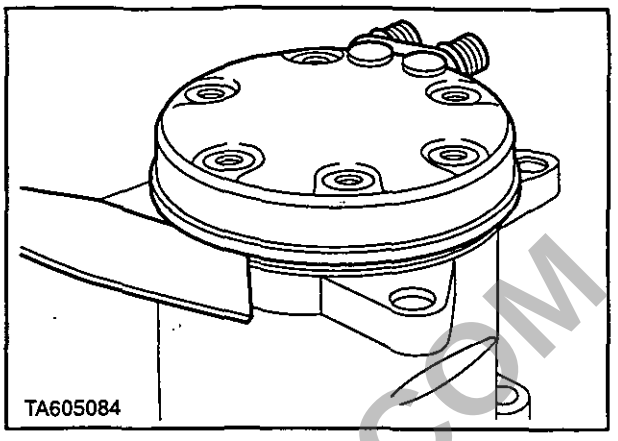
### Reassembly

1. Coat the top of the valve plate with clean refrigerant oil and reassemble the cylinder head using the reverse of the disassembly procedure.

2. When installing the gaskets and valve plate ensure they are correctly positioned over the locating pins in the cylinder block.

3. Install the cylinder head bolts and tighten using the sequence shown in Figure 38. Torque initially to 20Nm (14lbf.ft) then finally to 32Nm (24 lbf.ft).

4. When the overhaul is complete add to the compressor a volume of oil equivalent to that drained prior to disassembly.

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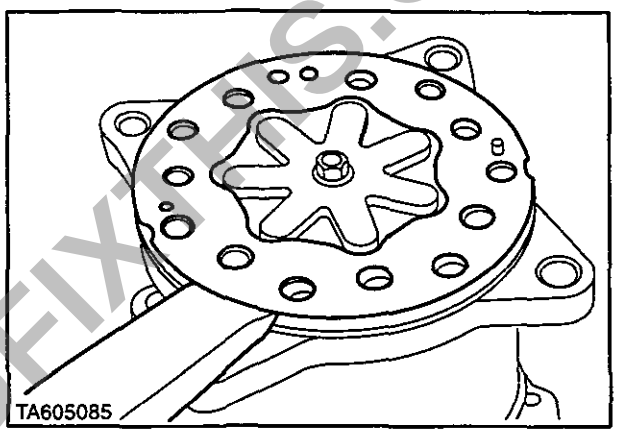


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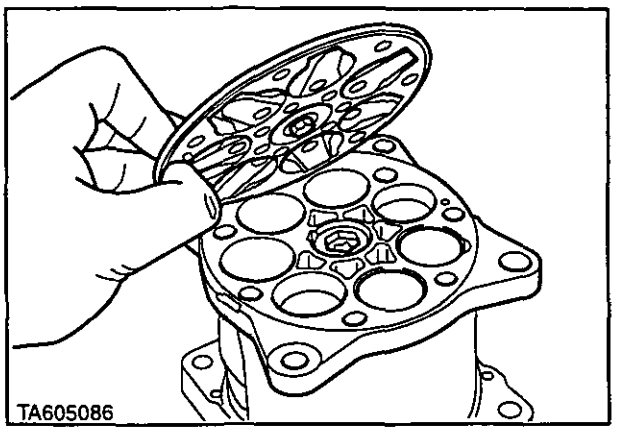


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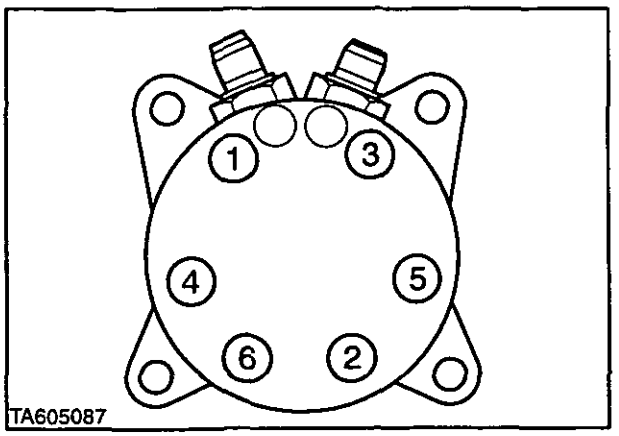


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