FORD
NEW HOLLAND

SE4840 REPAIR MANUAL

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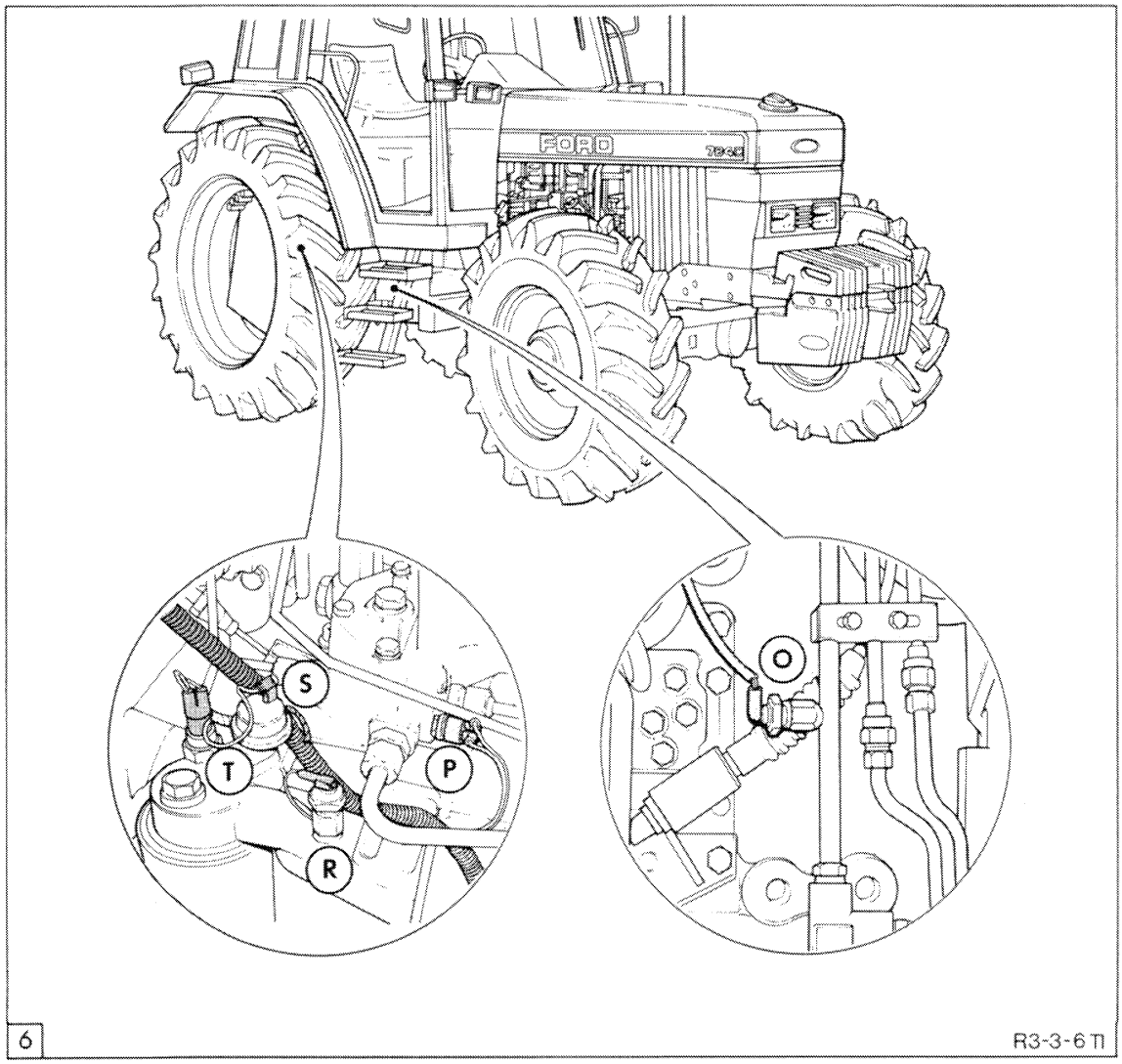
PRINTED IN ENGLAND

TRANSMISSION SWITCHES (Variable Displacement Piston Pump)

With reference to Figure 6



6 R3-3-6 TI

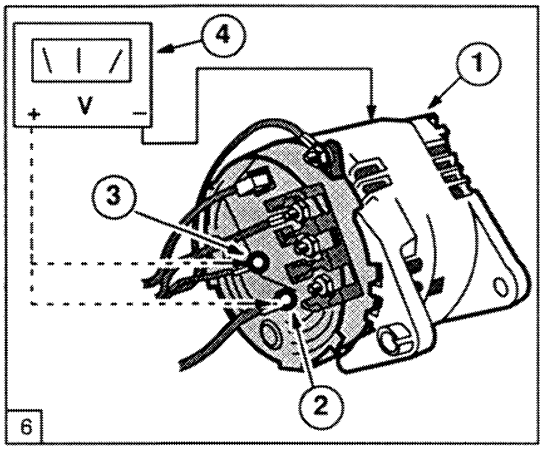
O. STEERING OIL / LUBRICATION PRESSURE SWITCH (Light 8, Figure 3)
Operates when the pressure in the steering return / transmission lubrication circuit falls below 0.8 bar (12 lbf.in^2). A normally closed switch which is held open when pressure exceeds that detailed above, when the switch closes the warning light is illuminated.

P. TRANSMISSION PRESSURE SWITCH (Light 8, Figure 3)
Operates when the pressure for the 16x16 transmission circuit falls below 15 bar (215 lbf.in^2). A normally closed switch which is opened when the pressure exceeds 16.8 bar (245 lbf.in2), when the switch closes, the warning light is illuminated.

R. CHARGE PRESSURE SWITCH (Light 7, Figure 3)
Operates when the charge pressure for the variable displacement piston pump falls below 0.8 bar (12 lbf.in^2). A normally closed switch which is held open when pressure exceeds that detailed above, when the switch closes a warning light flashes.

S. STEERING OIL FILTER RESTRICTION SWITCH (Light 6, Figure 3)
The switch is normally open and closes when the vacuum created by the oil being drawn into the filter exceeds 16 in.Hg. (406 mm.Hg.).

T. TRANSMISSION OIL LOW TEMPERATURE SWITCH
The low temperature switch prevents the filter restriction/low pressure light illuminating when the oil temperature is below 40°C (104°F). The switch is



Alternator Wire Connections

1. Alternator Frame
2. B+ terminal
3. D+ Terminal
4. Voltmeter

1. Disconnect the battery

2. Disconnect the B+ and D+ terminals from the alternator.

3. Reconnect the battery and turn the key start on but do not start the engine. Connect a voltmeter between each terminal and earth (ground). Battery voltage should be registered.

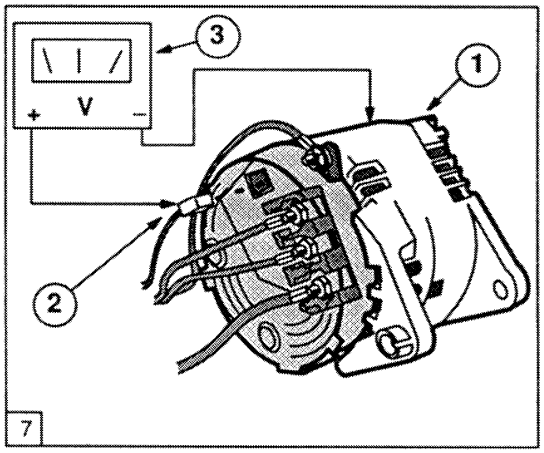
If battery voltage is not registered a continuity fault in the external cable circuitry must be traced and remedied, refer to the circuit diagram shown in Figure 4.

4. Connect the D+ terminal, warning lamp (brown/yellow) wire, to earth (ground). The warning lamp should illuminate.

5. Disconnect the battery and reconnect the removed alternator cable connections to the alternator.

NOTE: *If the warning lamp fails to illuminate when the cable is reconnected to the alternator, a fault is indicated in the alternator regulator or rotor circuits. Ensure that the D+ terminal is clean and then conduct the alternator component tests as detailed in this section.*

2. Battery Temperature Sensor Circuit Test



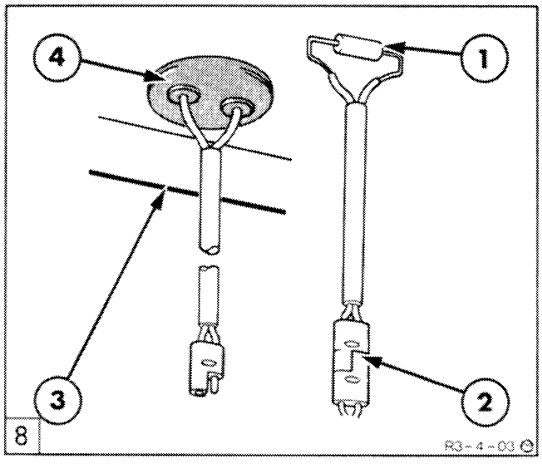
Battery Temperature Sensor Circuit Test

1. Alternator Frame
2. Sensor Lead
3. Voltmeter

1. Disconnect the battery temperature sensor connector. Connect a volt meter between the sensor lead and earth (ground). Battery voltage should be registered.

If battery voltage is not registered, disconnect the harness to sensor plug and connect a 205 ohm resistor (55 amp alternator) or an 11000 ohm resistor (100 amp alternator) across the plug terminal, Figure 8.

NOTE: *it is recommended that a permanent test piece be made by removing the plug and leads from an old sensor unit and connecting the appropriate resistor as shown in Figure 8.*



Connection of Test Resistor

1. Resistor
2. Harness to Sensor Plug
3. Battery Tray
4. Temperature Sensor

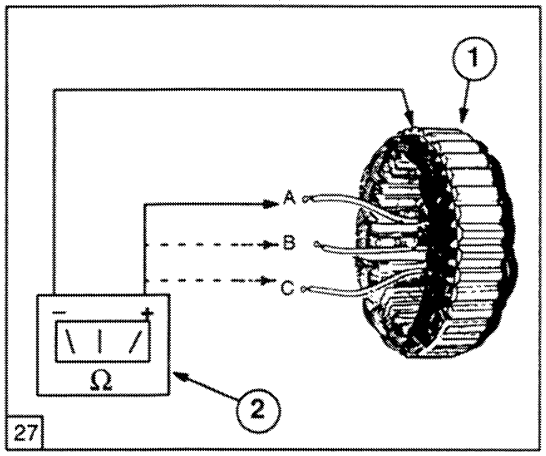
If battery voltage is now registered the sensor unit is faulty (open circuit) and must be replaced.

If battery voltage is not registered a continuity fault in the external circuitry must be traced

1. Check the insulation of each pair of windings to each other and then each pair to the alternator casing. There should be no continuity between the three pairs of windings and no continuity to the casing. If any reading other than open circuit is indicated in any test it will be necessary to replace the stator and housing assembly.

Stator Test – Insulation 55 Amp Alternator

With reference to Figure 27



Stator Insulation Testing 55 Amp Alternator

1. Stator Assembly
2. Ohmmeter

1. Check the insulation of each winding to the alternator casing. There should be no continuity between the winding and the casing. If any reading other than open circuit is indicated it will be necessary to replace the stator assembly.

Rotor Test

Prior to performing component tests on the rotor the following slip ring inspection should be carried out.

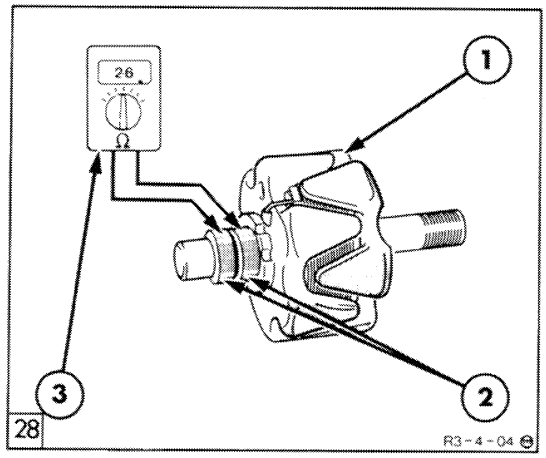
1. Ensure the slip rings are clean and smooth. If necessary the slip rings may be cleaned with a petrol moistened cloth. If the slip rings are burnt and require re–finishing use very fine glass paper (not emery cloth) and wipe clean.

NOTE: *Ensure the re–finishing glass paper is sufficiently fine to produce a highly polished slip ring surface otherwise excessive brush wear will occur.*

2. If the slip rings are excessively worn a new rotor must be installed.

Rotor Field winding Continuity

with reference to Figure 28



Rotor Field Winding Continuity Test

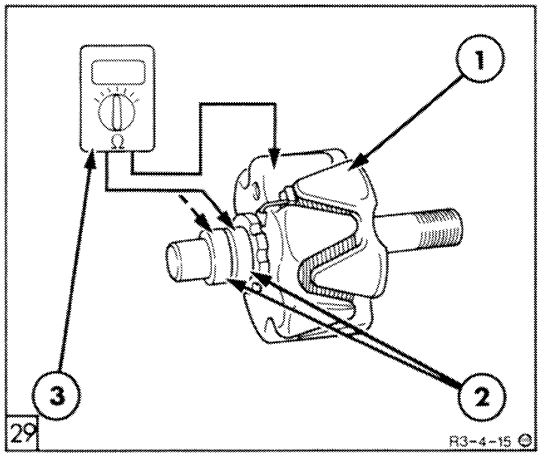
1. Rotor
2. Slip Rings
3. Ohmmeter

1. Connect an ohmmeter between the two slip rings. The resistance should read 2.6 ohms at 20°C.

If the resistance is outside of the specification renew the rotor.

Rotor Field Winding Insulation

With reference to Figure 29.



Rotor Field Winding Insulation Test

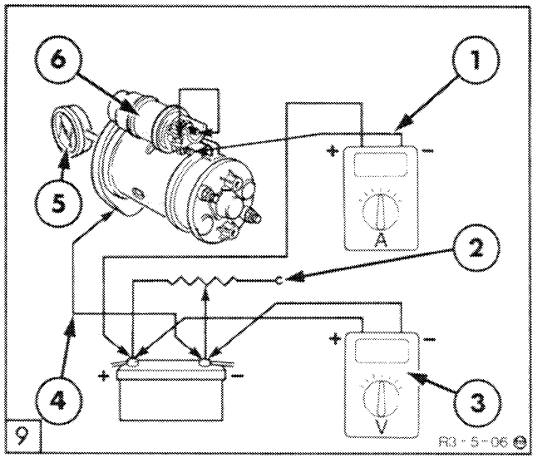
1. Rotor Assembly
2. Slip Rings
3. Ohmmeter

1. Using an ohmmeter test between each of the slip rings and the rotor poles. An infinity reading should be indicated in each case. If any resistance reading is indicated the rotor assembly must be replaced.

RE–ASSEMBLY

1. Re–assembly of the starting motor follows the disassembly procedure in reverse.

Prior to installation, the armature end play must be checked and the starting motor no load function must be tested.



Starting Motor No–Load Test

1. Ammeter
2. Variable Load Resistor
3. Voltmeter
4. Jumper Cable
5. Hand Tachometer
6. Jumper Lead

Checking the Armature End Play:

1. Secure the starting motor in a vice equipped with soft jaws and attach a dial indicator to the drive end housing flange. Locate the dial indicator pointer on the end of the armature shaft.

2. Lever the armature fully forward and zero the dial indicator. Lever the shaft fully rearwards and record the gauge reading.

3. The gauge reading should not exceed 0.4mm (0.015in). If the reading is greater, inspect the armature assembly and the brush end plate assembly for wear. Replace worn components as required and recheck the end play.

Starting Motor No–Load Test:

With reference to Figure 9.

NOTE: *A fully charged battery and a battery starter tester (high rate discharge tester) with a carbon pile (variable load resistor) should be used to perform this test.*

1. Secure the starting motor in a vice equipped with soft jaws.

2. Connect the battery negative cable to the starting motor mounting flange.

3. Connect a short jumper lead between the solenoid battery and solenoid switch terminals.

4. Connect a voltmeter positive lead to the battery positive terminal, the voltmeter negative lead to the battery negative terminal, the ammeter positive lead to the battery positive terminal and the ammeter negative lead to the solenoid battery or starting motor terminal.

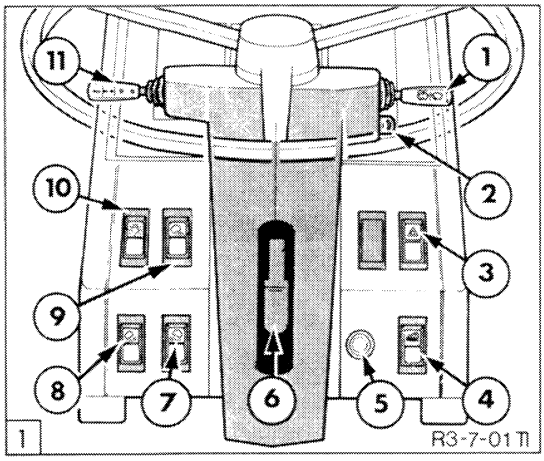
5. Hold a hand tachometer on the end of the armature shaft. Actuate the starting motor by adjusting the carbon pile to give 11.7 volts. When the armature rotates between 7500 and 8500 rev/min. the maximum current draw should not exceed 160 amperes.

6. If the starting motor does not perform to specification, check for grounded field coils, a rubbing armature or a distorted armature shaft.

PART 3
ELECTRICAL SYSTEMS
Chapter 7
ELECTRICS – GENERAL

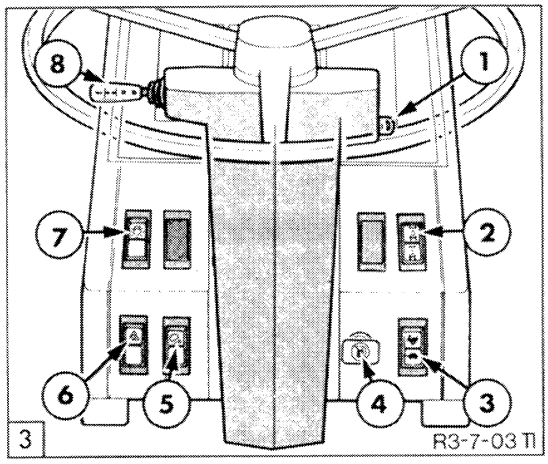
Section		Page
A.	HAND CONTROLS AND SWITCHES,	1
B.	ACCESSORY SOCKETS AND ROTATING BEACON	5
C.	FRONT AND REAR WIPER MOTORS	7
D.	FUSIBLE LINKS	8
E.	HARNESS CONNECTOR LOCATIONS	8

A. HAND CONTROLS AND SWITCHES



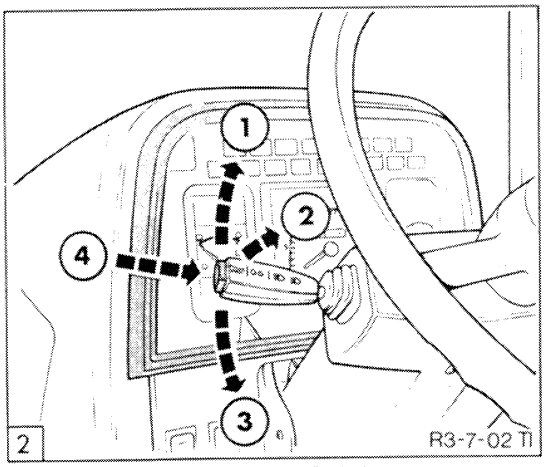
Hand Controls and Switches – SL and SLE Models

1. Windshield Wiper/Washer Control
2. Key–start Switch
3. Hazard Warning Lights Switch
4. Creeper Gear Selector Switch
5. Cigarette Lighter
6. Steering Column Tilt/Telescope Lock Lever
7. Lower Front Worklamp Switch
8. Rear Worklamp Switch
9. Upper Front Worklamp Switch
10. Tractor Lights Switch
11. Multi–function Switch



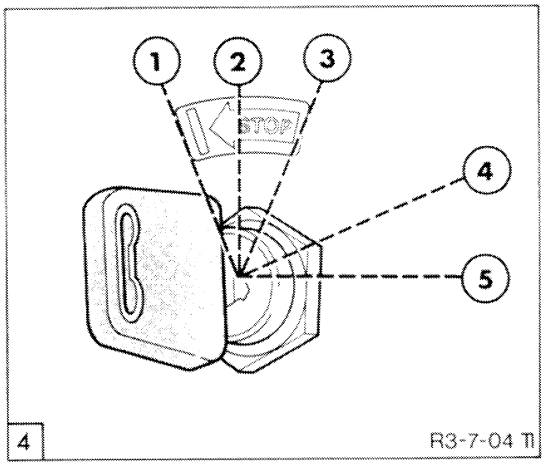
Hand Controls and Switches – S Models

1. Key–start Switch
2. Four Wheel Drive Switch
3. Dual Power Switch
4. Engine Stop Control
5. Worklamp Switch
6. Hazard Warning Lights Switch
7. Tractor Lights Switch
8. Multi–function Switch



Multi–function Switch

1. Right Turn Signal
2. Headlamp Main/Dipped Beam and Flash
3. Left Turn Signal
4. Horn



Key Start Switch

1. Thermostart Heater On
2. Electrical Equipment Off
3. Accessories On
4. Warning Lights and Instruments On
5. Starting Motor Operates

PART 4
CLUTCHES

Chapter 1
CLUTCHES

Section		Page
A	DESCRIPTION AND OPERATION	1
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C	CLUTCH ADJUSTMENT	3
D	CLUTCH OVERHAUL – MECHANICAL OPERATION	4
E	CLUTCH OVERHAUL – HYDRAULIC OPERATION	6
F	CLUTCH PILOT BEARING AND PTO DRIVE PLATE	10
G	SPECIFICATIONS, TIGHTENING TORQUES AND SPECIAL TOOLS	11

A. DESCRIPTION AND OPERATION

The Series 40 range of tractors utilises two methods of clutch operation.

The clutch system of the 12x12 Synchro–Shift transmission is a hydraulically operated single plate clutch with a 13 in. (330 mm) non asbestos dry friction disc, ceramettalic on 8240 and 8340 models, designed for high durability and low effort operation. The clutch is conventionally located at the front of the transmission, connecting the engine to the transmission input shaft. The hydraulic actuation is provided with a simple master/slave cylinder arrangement. This provides self adjustment of the clutch system to maintain optimum clutch performance. The pressure plate is a diaphragm spring type also self adjusting and requiring no maintenance.

The clutch system of the 8x2 non synchromesh transmission is a mechanically operated system with a single non asbestos dry friction disc clutch plate of 13 in. (330 mm) diameter. The pressure plate is of the same diaphragm spring type used in the 12x12 transmission.

The 16x16 transmission does not use a conventional clutch arrangement. Engine power is transmitted to the transmission via a damper assembly attached to the engine flywheel. The function and operation of the clutch pedal is described in detail in Part 5, Chapter 1 of this Repair Manual.

Operation

The principle of clutch operation is the same whether the clutch is Hydraulically or mechanically operated.

In the clutch 'engaged' position the spring loaded pressure plate forces the clutch disc into contact with the engine flywheel.

The frictional contact between the clutch disc material and the surfaces of the flywheel and pressure plate enables drive from the flywheel to be transmitted via the clutch disc to the input shaft of the transmission.

A clutch operating pedal is either connected mechanically, by a rod and lever, or hydraulically to a release bearing. The release bearing contacts the operating fingers of the pressure plate.

Depression of the clutch pedal causes the release bearing to move forward and depress the pressure plate release fingers, thus drawing the pressure plate away from the clutch disc and releasing the disc from contact with the flywheel. The frictional drive from the engine to the transmission is thereby disconnected.

When the clutch pedal is released a spring returns the pedal to its free position and the release bearing is drawn away from the release levers of the pressure plate assembly.

The main springs of the pressure plate assembly then re–assert pressure on the pressure plate moving it towards the friction disc and into contact with the flywheel, re–establishing the drive between engine and gearbox.

G. SPECIFICATIONS, TIGHTENING TORQUES AND SPECIAL TOOLS

SPECIFICATIONS

Components	5640/6640/7740/7840	8240 & 8340
Disc Assembly Type	13in (330 mm) Single Disc Dry Plate	
Material	Organic Non Asbestos	Cera–metallic
Pressure Plate Assembly Type	Belleville (diaphragm) Spring (Self Adjusting – No Maintenance)	
Release Bearing Type	Mechanically Operated with 8x2 (16x4) Transmissions Hydraulically Operated with 12x12 Transmission	
Clutch Pedal Free Play Adjustment – (Mechanically Operated Clutch Only)	1.1 – 1.6 in (28 – 41 mm)	
Transmission Input Shaft Lubricant	Non Fibrous Lithium Base Grease	
Hydraulic Clutch oil	Ford Specification ESN–M6C59–A	
Master Cylinder Push Rod to Plunger Clearance	0.6 mm (0.024 in) Minimum	

TIGHTENING TORQUES

Components	lbf.ft	Nm
Clutch Cover to Flywheel Bolts	26	35
Clutch Pedal Operating Rod Turnbuckle Locknut	25	34
P.T.O. Drive Plate Bolts	95	129
Cross shaft Release Bearing fork Retaining Bolt	35	47
Hydraulic Slave Cylinder Retaining Bolts	18	25
Master Cylinder Retaining Bolts	17	23
Hydraulic Tube Connections	16	22

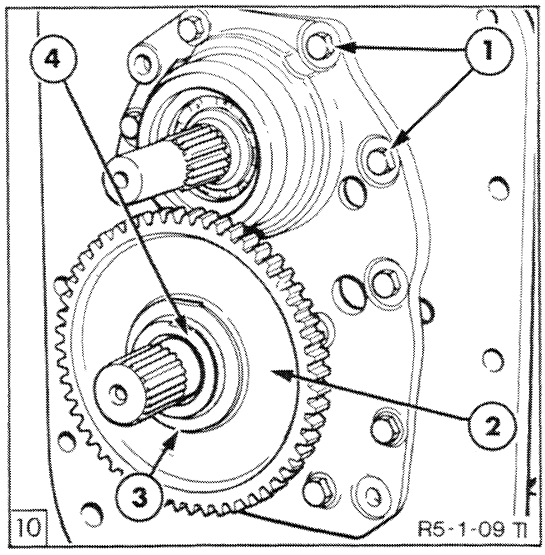
E. COMPLETE TRANSMISSION OVERHAUL

DISASSEMBLY

1. Remove the clutch operating mechanism, clutch release hub support, Dual Power transmission (where fitted), front support plate and main drive input shaft assembly as previously described in this Chapter.

2. Remove the shift levers and cover assembly as previously outlined in this Chapter, together with the safety starter switch from the high/low shift rail.

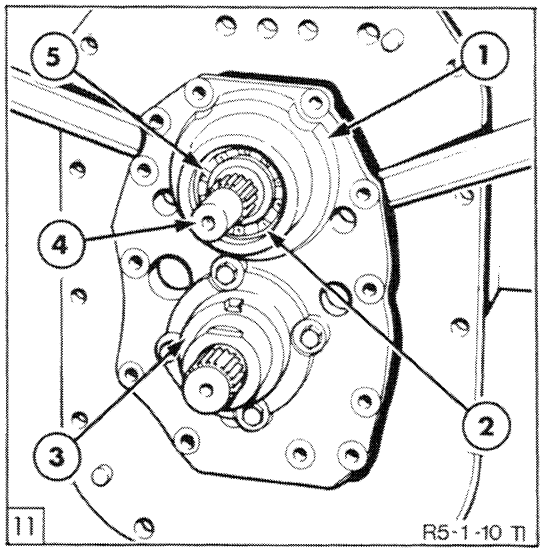
3. Remove the snap ring, the thrust washer and the hydraulic pump idler gear, located on the output shaft retainer, Figure 10.



Hydraulic Pump Idler Gear Installation

1. Rear Support Plate Retaining Bolts
2. Hydraulic Pump Idler Gear
3. Thrust Washer
4. Snap Ring

4. Remove the rear support plate retaining bolts and using a soft faced mallet drive the forward end of the P.T.O. drive shaft rearwards. This will separate the rear support plate from the transmission casing. If necessary, lever the rear support plate from the casing and withdraw the plate complete with the P.T.O. drive shaft, Figure 11.



Rear Support Plate Removal

1. Rear Support Plate
2. Bearing Retaining Snap Ring
3. Output Shaft Bearing Retainer
4. P.T.O. Drive Shaft
5. P.T.O. Drive Shaft Bearing

5. Remove the snap ring retaining the P.T.O. drive shaft rear bearing and drive the shaft and bearing out of the support plate.

6. Remove the bolts securing the output shaft retainer to the rear support plate and withdraw the retainer and shims from the rear support plate.

7. Partially withdraw the secondary countershaft assembly until the front bearing is out of the location. Lift the secondary countershaft to allow the output shaft assembly to be removed from the rear compartment, Figure 12, followed by removal of the secondary countershaft.

and 0.0034 (0.086 mm)

NOTE: *Shims are available in thicknesses of 0.003 in., 0.005 in. and 0.012 in. (0.076 mm, 0.127 mm and 0.305 mm).*

(vi) Having selected the correct shims, install the bearing retainer, with the oil slot to the top, shims and bolts. Tighten the bolts to 32 lbf.ft (44 Nm). Re–position the dial indicator gauge and re–check for end play.

6. Install the hydraulic pump idler gear, thrust washer and snap ring.

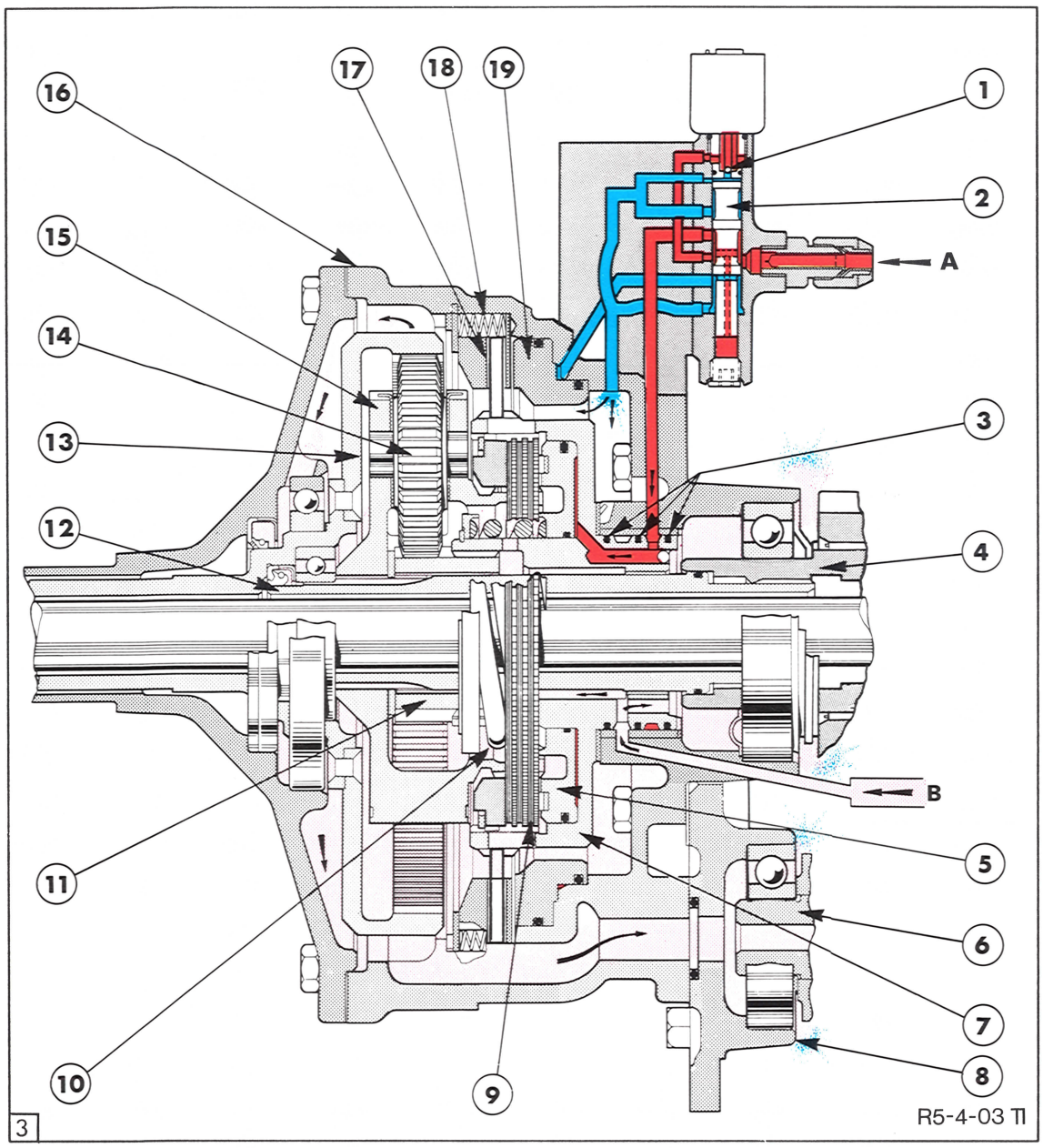
Re–assembly of the front end components follows the procedure detailed in Section D of this Chapter.

Installation of the shift levers and cover and the safety start switch follows the procedure detailed in Section C of this Chapter.

INSTALLATION

1. Re–connect the transmission to the engine and rear axle, see "SEPARATING THE TRACTOR".

2. Refill the transmission/rear axle with the correct grade and quantity of oil, meeting Ford New Holland specification ESN–M2C134–D.



Oil Flow to Direct Drive Clutch

Pressure Oil

Lubrication Oil

Reservoir and Exhaust Oil

1. Pilot Valve
2. Control Valve Spool
3. Sealing Rings
4. Transmission Input Shaft
5. Direct Drive Clutch Piston
6. Transmission Countershaft
7. Direct Drive Clutch Housing
8. Hub Support Plate
9. Direct Drive Clutch Plates
10. Direct Drive Clutch Piston Return Spring
11. Sun Gear
12. Centre Shaft
13. Ring Gear and Input Shaft
14. Pinion
15. Planetary Carrier
16. Planetary Housing
17. Underdrive Clutch Plate
18. Underdrive Clutch Piston Return Springs
19. Underdrive Clutch Piston

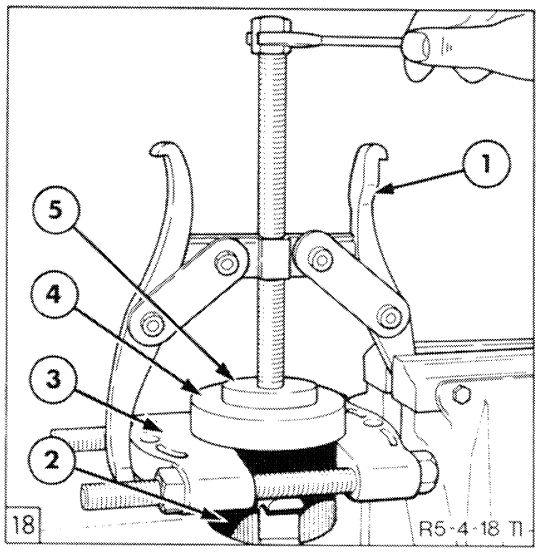
IMPORTANT: *Note the order in which the clutch plates were removed.*

4. Remove the piston return springs, locating dowel pins and rear plate.

5. Place an air hose nozzle in the pressure supply port of the control valve housing and carefully blow out the underdrive piston.

IMPORTANT: *Position the planetary housing so that the underdrive piston cannot cause injury when expelled.*

6. Remove the inner and outer seals from the piston.



Removing Clutch Release Bearing from Hub

1. Puller, Tool No. 1002 or 9198
2. Hub
3. Pulling Attachment, Tool No. 951 or 9190
4. Release Bearing
5. Step Plate, Tool No. 630–S/10 or 9210/10

Control Valve Assembly

With reference to Figure 17.

1. Remove the plug located in the control valve at the opposite end to the solenoid.

2. Remove the solenoid and pilot valve assembly.

3. Remove the control valve spool.

INSPECTION AND REPAIR

1. Clean all parts in a suitable solvent and dry thoroughly with a dry, lint–free cloth or compressed air.

2. Examine the lubrication inlet tube, the pressure inlet tube and the lubrication oil tube for damage or distortion. Discard any defective tubes.

3. Examine the control valve solenoid cable for damage or loose connections.

4. Examine the clutch release hub and bearing for excessive wear or damage. If necessary, remove the bearing from the hub with Pulling Attachment, Tool No. 951 or 9190, Step Plate, Tool No. 630–S/10 or 9210/10 and either a press or Puller, Tool No. 1002 or 9198, see Figure 18. Press a new bearing onto the hub ensuring the thrust face of the bearing faces away from the shoulder on the hub.

5. Pack the recess in the bearing hub bore with a high melting point grease.

6. Inspect the clutch release fork for cracks or excessive wear and replace as necessary.

7. Examine the cross–shaft and lever for distortion or excessive wear and install a new assembly, if damage is evident. Inspect the shaft bushings for excessive wear and replace if found to be defective. Bushings should be driven into the housing until they are flush with the outside edges of the cross–shaft locating bores.

PART 5
TRANSMISSION SYSTEM
Chapter 5
REDUCTION GEARBOX ASSEMBLY

Section		Page
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B	REDUCTION GEARBOX – OVERHAUL	5
C	SPECIFICATIONS, TIGHTENING TORQUES AND SPECIAL TOOLS	9

A. REDUCTION GEARBOX – DESCRIPTION AND OPERATION

The reduction gearbox, which is available as an option on the 8x2, with or less dual power, non–synchromesh transmission, provides an extra reduction ratio below the standard low range. The reduction being obtained through the use of an epicyclic gear set which is mounted on the transmission output shaft.

When installed the reduction gearbox provides an additional creep range of four forward and one reverse speed, which increases the total number of ratios available to twelve forward and three reverse. On transmissions fitted with dual power, an additional eight forward and two reverse speeds are provided increasing the total ratios available to 24 forward and six reverse.

Alternative epicyclic gear sets are available for the reduction gearbox to give a reduction ratio below the low range of either 5.7:1 or 10.0:1 as required.

All reduction gearboxes consist basically of an epicyclic gear set mounted in place of the transmission output shaft gear used on the standard transmission.

A cross section of the reduction gearbox is shown in Figure 1.

The epicyclic gear set consists of:

(i) An outer ring gear which is fixed in relation to the transmission housing.

(ii) Planetary gears mounted in the carrier, the rear gear teeth engaging the outer ring gear.

(iii) The carrier, which has teeth formed on the outside diameter to act as the output shaft gear.

(iv) Intermediate ring gear which engages the front teeth of the planetary gears.

(v) The coupling, which is splined to and drives the output shaft, which may engage the carrier or intermediate ring gear.

The coupling is moved by means of the selector fork and gear shift rail.

In the neutral position, as shown in Figure 1, the coupling does not engage any component of the reduction gear set and so the coupling and output shaft cannot be driven.

The transmission low range is selected by sliding the gear shift rail rearwards to the detent position adjacent to neutral. The movement of the rail, through the selector fork, causes the coupling to engage the reduction gear set carrier. Power is now transmitted from the secondary countershaft, via the carrier and coupling to the output shaft. The carrier has the same number of gear teeth on the outside diameter as the output shaft gear utilised on standard transmission, therefore, the ground speeds obtained in the low range are identical to those of a standard transmission.

The creep range is selected by sliding the gear shift rail and fork further rearward to the final detent position. The coupling is moved by the selector fork inside the carrier assembly to engage the intermediate ring gear. Power is now transmitted from the secondary countershaft to the coupling via the planetary gear set.

The planetary gear set is designed so that the carrier is driven and causes the planetary gears to rotate with the rear teeth engaged in the stationary ring gear. The forward teeth of the planetary gears engage and drive the intermediate ring gear at reduced speed. The coupling, which now engages the intermediate ring gear, therefore, drives the output shaft at a reduced speed to obtain the required creep range.

PART 6
POWER TAKE–OFF

Chapter 1
INDEPENDENT POWER TAKE OFF SYSTEMS

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A.	POWER TAKE OFF (PTO) SYSTEMS –DESCRIPTION AND OPERATION	1
B.	MECHANICALLY OPERATED PTO CLUTCH AND CONTROL VALVE –DESCRIPTION AND OPERATION	5
C.	MECHANICALLY OPERATED PTO CLUTCH AND CONTROL VALVE–OVERHAUL	9
D.	SOLENOID OPERATED PTO CLUTCH AND CONTROL VALVE –DESCRIPTION AND OPERATION	13
E	SOLENOID OPERATED PTO CLUTCH AND CONTROL VALVE –OVERHAUL	19
F.	PTO SHAFTS AND GEARS–OVERHAUL	27
G	PTO–FAULT FINDING AND SPECIFICATIONS	35

A. POWER TAKE–OFF (PTO) SYSTEMS–DESCRIPTION AND OPERATION

The power take off (PTO) enables engine power to be transferred directly to mounted or trailed equipment via a splined shaft at the rear of the tractor, Figure 1.

PTO driven equipment is designed to operate using either a 6 or 21 splined output shaft at a specified output shaft speed.

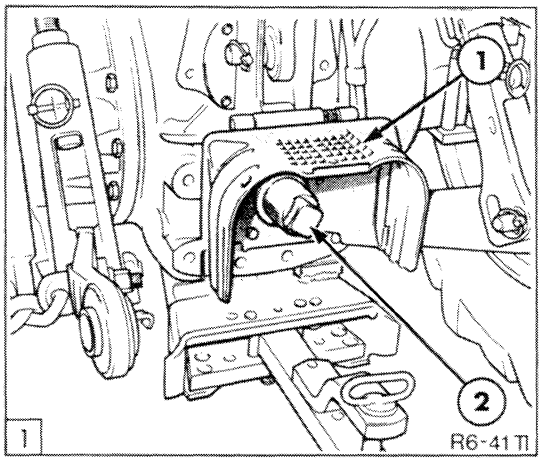
The output shaft speed must be restricted to 540 rev/min for equipment designed for use with the 6 splined shaft and 1000 rev/min for equipment designed for use with the alternative 21 splined shaft.

The types of PTO system available on Series 40 tractors fall into the following three categories:–

Single speed PTO, using the standard 6 splined output shaft for operation at 540 rev/min.

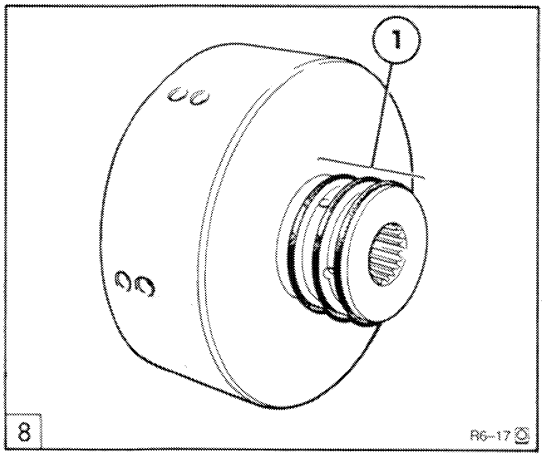
Two–speed non shiftable PTO with interchangeable 6 and 21 splined output shafts.

Two–speed shiftable PTO enabling the 6 splined output shaft to be operated at 540 rev/min at two separate engine speeds and an alternative 21 splined output shaft for operation at 1000 rev/min.



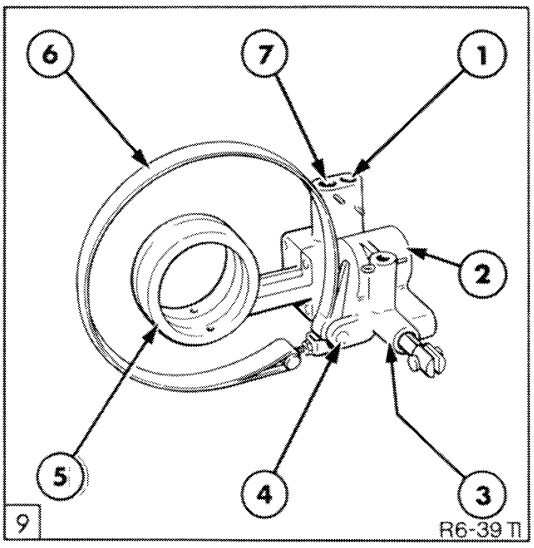
PTO Shaft

1. PTO Guard
2. PTO Shaft



Clutch Assembly Sealing Rings

1. Cast Iron Sealing Rings (3 off)



PTO Control Valve and Brake Band

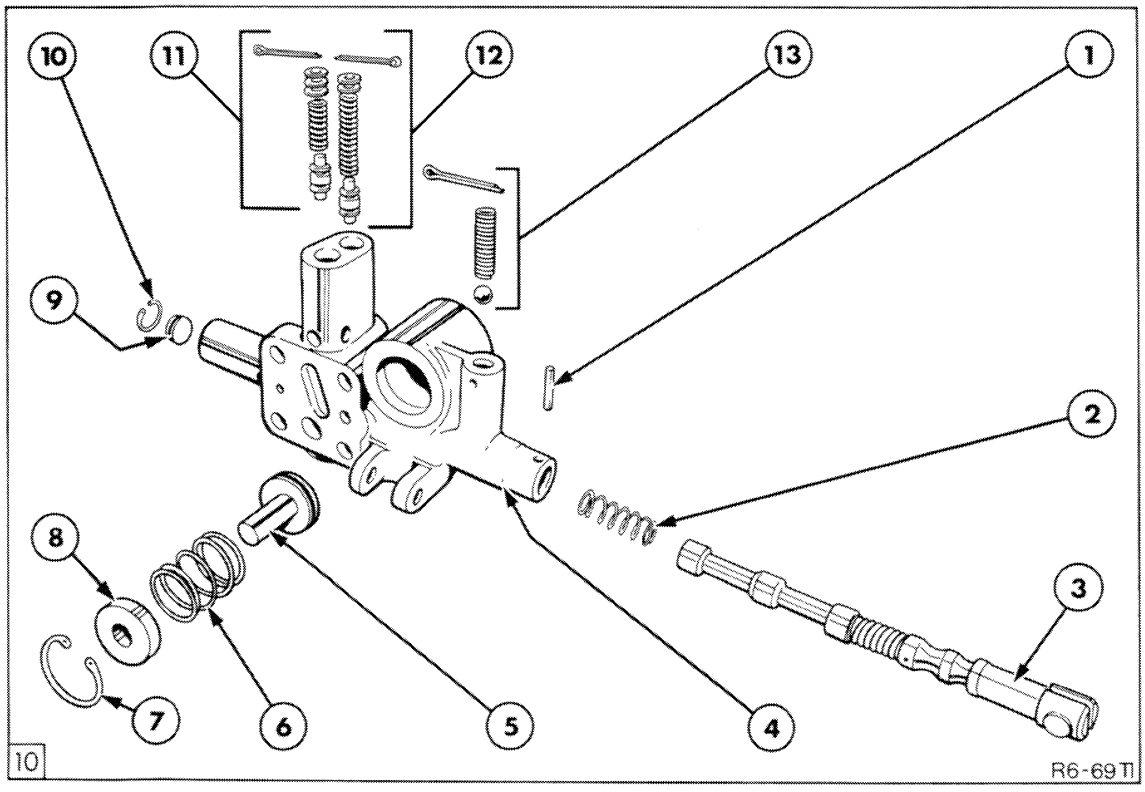
1. Pressure Regulating Valve
2. Brake Cylinder
3. Valve Body
4. Brake Band Securing Pin
5. Clutch Support
6. Brake Band
7. Cooler/Lubrication Circuit Relief Valve

4. Examine the cast iron sealing rings on the clutch housing, Figure 14. Replace if worn or damaged.

5. Disassemble clutch brake band assembly, Figure 9.

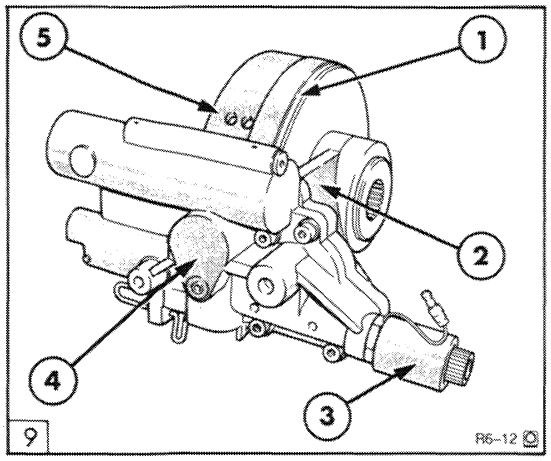
6. Separate clutch support from valve body.

7. With reference to Figure 10, disassemble clutch control valve components.



PTO Clutch Control Valve and Brake Components

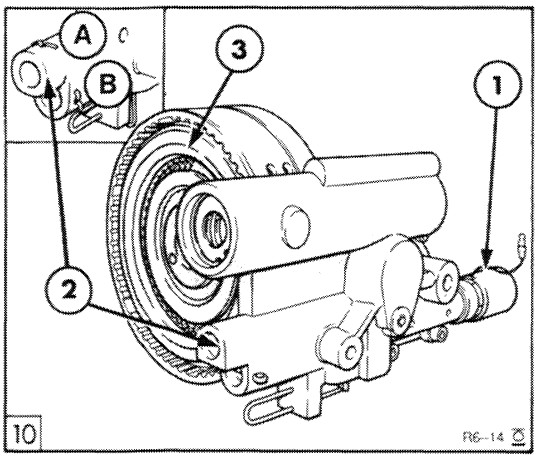
1. Split Pin
2. Spring
3. Control Valve Spool
4. Control Valve Body
5. Brake/Piston
6. Return Spring
7. Snap Ring
8. Guide
9. Plug (chamfer facing spring)
10. Snap Ring
11. Cooler/Lubrication Circuit Relief Valve
12. Pressure Regulating Valve
13. Detent Ball and Spring



PTO Clutch and Valve Assembly

1. Brake Band
2. Clutch Support
3. Solenoid
4. Valve Body
5. Clutch Housing

8. Remove PTO clutch, valve and hub assembly, Figure 9.



PTO Clutch and Valve Assembly

1. Solenoid
2. Valve Body
3. Clutch Pack

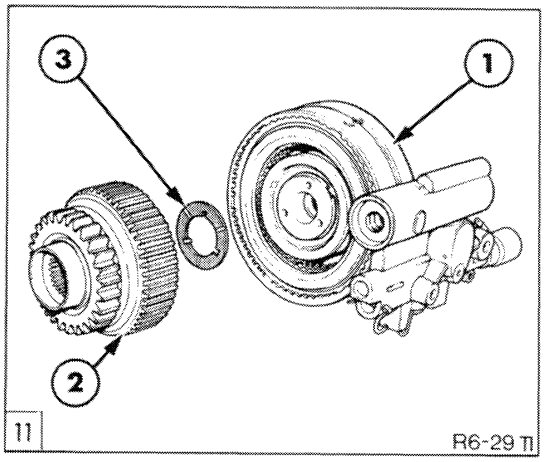
A* Lubrication Circuit Relief Valve
B* Low Pressure Regulating Valve
* Tractors Installed with Fixed Displacement Gear Type Pump Only

9. Identify type of PTO clutch and valve assembly installed, Figure 10.

NOTE: *Tractors installed with the CCLS hydraulic pump are not fitted with the low pressure regulating and lubrication circuit relief valve in bores 'A' and 'B'.*

The bore for valve 'A' is empty and bore 'B' contains a plug retained with one single split pin.

***Do Not** install the incorrect type of PTO valve assembly into a tractor.*

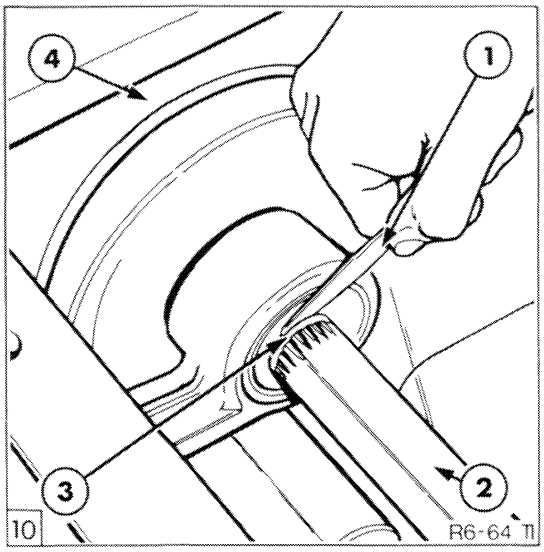


PTO Clutch and Valve Assembly

1. Clutch
2. Hub
3. Thrust Washer

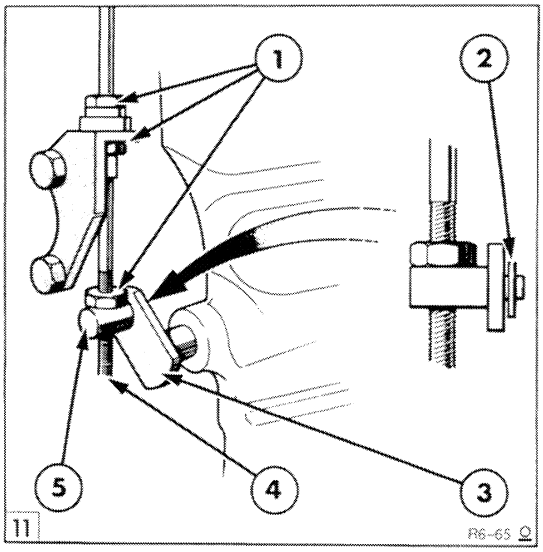
10. Remove hub and retrieve thrust washer, Figure 11.

11. Slide clutch from clutch support.



Measuring Upper Shaft End Float

1. Feeler Gauge
2. Rear Shaft
3. Front Snap Ring
4. PTO Clutch Housing



Cable Assembly

1. Locknuts
2. Snap Ring
3. Lower Shift Lever
4. Thread
5. Pivot

Rear Shaft End Float Adjustment

1. Using feeler gauge check upper shaft end float, Figure 10.

2. Remove/add shims Item 14, Figure 8 between rear snap ring and front bearing to achieve end float of 0.018–0.040 in (0.46–1.0 mm).

TWO SPEED SHIFTABLE PTO SHAFTS AND GEARS

REMOVAL

1. Drain rear axle and transmission.

2. Move the shift lever to 540 rev/min position and disconnect cable, Figure 11.

3. Remove rear PTO shaft using same procedure described for non–shiftable PTO shafts and gears.

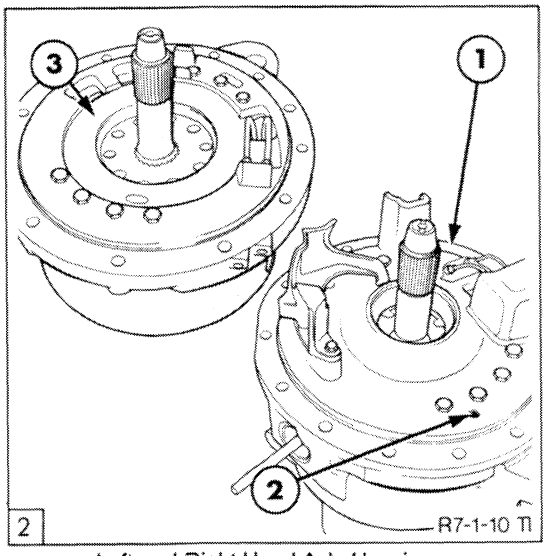
4. Where fitted remove drawbar/auto pick–up hitch.

5. Remove sump cover.

6. From within the axle centre housing remove shift fork locking bolt. Refer to Figure 13.

7. Support the shift fork and withdraw the lower shift lever from centre housing. Remove fork.

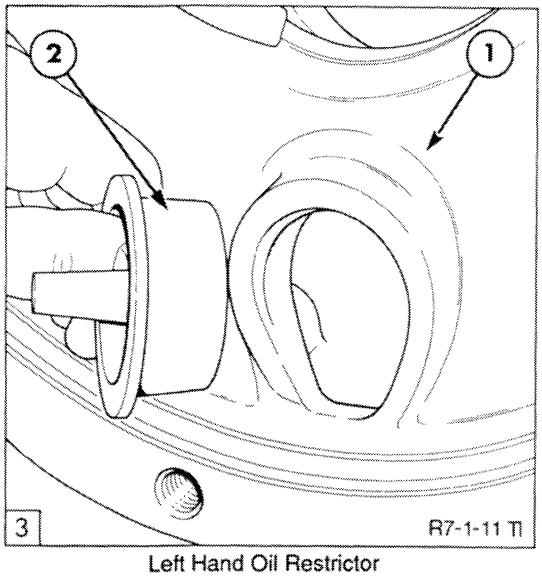
The inner ends of the outer axle shaft are splined into the planetary gear carrier. The axle shafts are supported by a taper roller bearing mounted in each axle housing.



Left and Right Hand Axle Housings

1. Right Hand Axle Housing
2. Oil Restrictor
3. Left Hand Axle Housing

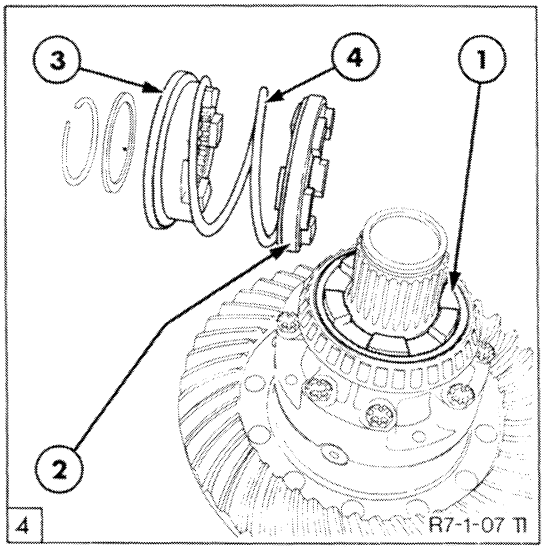
The oil provided for the I.P.T.O. and hydraulic systems is also used for lubricating the rear axle components. The differential and ring gear assembly is partially immersed in the oil to splash feed the bearings and bushings.



Left Hand Oil Restrictor

1. Rear Axle Centre Housing
2. Plastic Plug

DIFFERENTIAL LOCK



Differential Lock Exploded View

1. Differential Case
2. Differential Lock Adaptor
3. Differential Lock Coupling
4. Spring

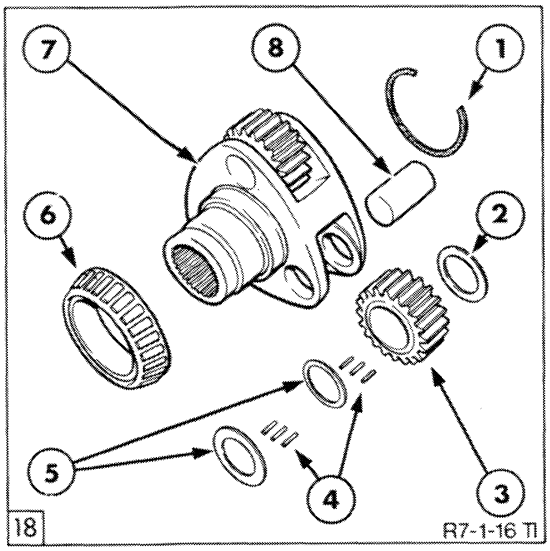
When a tractor fitted with a conventional differential assembly is working in soft soil and one wheel starts to slip, all the drive is then transmitted to that wheel and traction ceases.

To overcome this slippage a differential lock is fitted on all Series 40 tractors.

The differential lock mounted to the left hand side of the crown wheel can be engaged to connect one of the side gears to the differential case assembly. This action locks the differential assembly together and provides a direct drive to both wheels.

The lock assembly consists of a sliding coupling, an adaptor and a fork and lever assembly. The sliding coupling is splined onto the protruding end of the side gear, Figure 4.

The adaptor is positioned between the coupling and the left hand differential case. A spring positioned between the coupling and the adaptor ensures the coupling only engages with the adaptor when required and the drive teeth on the adaptor and the differential case are not permanently engaged.



Planet Gear Carrier Assembly

1. Retaining Ring
2. Thrust Washer
3. Planet Gear
4. Rollers
5. Thrust Washers
6. Cone and Roller Assembly (S Model Only)
7. Carrier
8. Planet Gear Shaft

NOTE: *Retain the needle rollers located between the planet gear shafts and the gears for use during reassembly.*

5. Use slide hammer, Tool No. 943S and puller, Tool No. 943, to remove the bearing cup located within the axle housing.

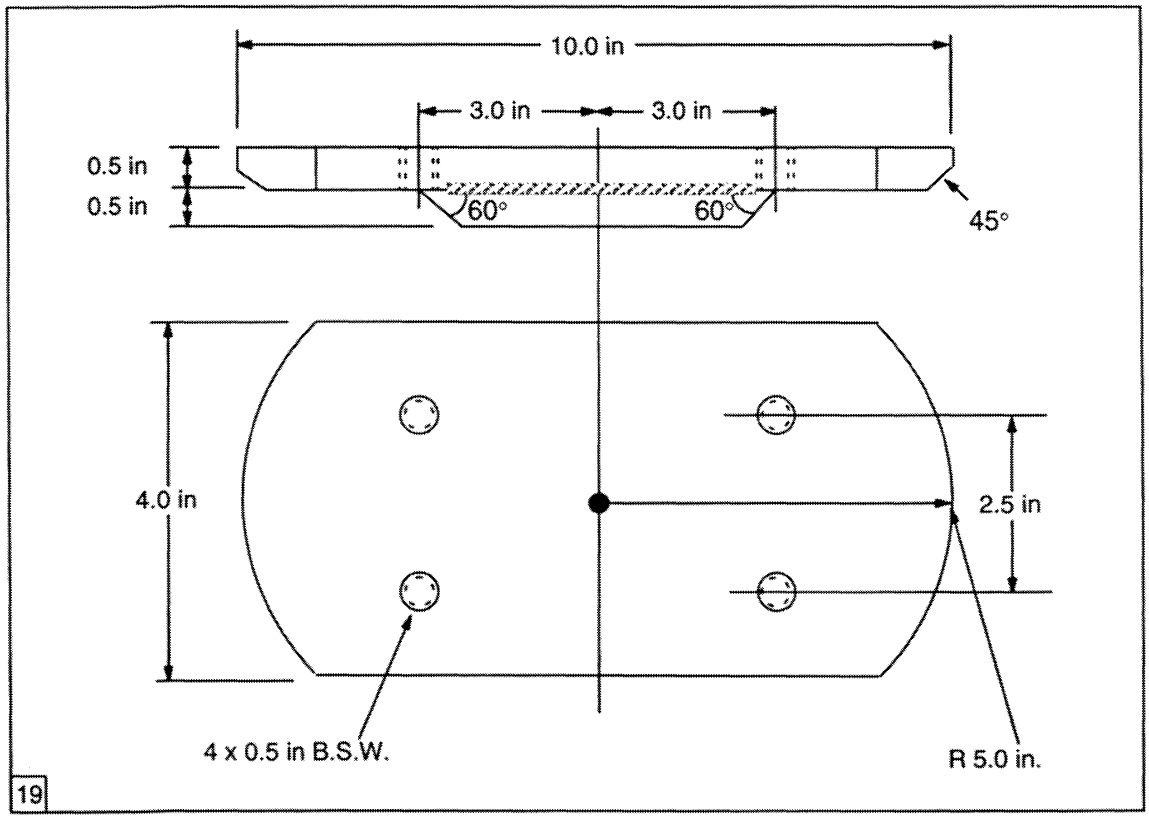
INSPECTION AND REPAIR

1. Clean and inspect all items for damage and excessive wear. Install new components where necessary.

2. If the planetary ring gear requires replacement observe the following procedure:

- Remove the axle shaft from the housing.

- Fabricate a suitable plate, as shown in Figure 19, to be used in conjunction with the sliding ends of Tool No. FT4500. Insert the tool sliding ends behind the ring gear and tighten the locknuts, Figure 20.



Ring Gear Removal Adaptor Plate

4. When the correct pre–load is obtained tighten the locknut and bend tabs on the lockwasher or stake the nut as required.

Table 3:

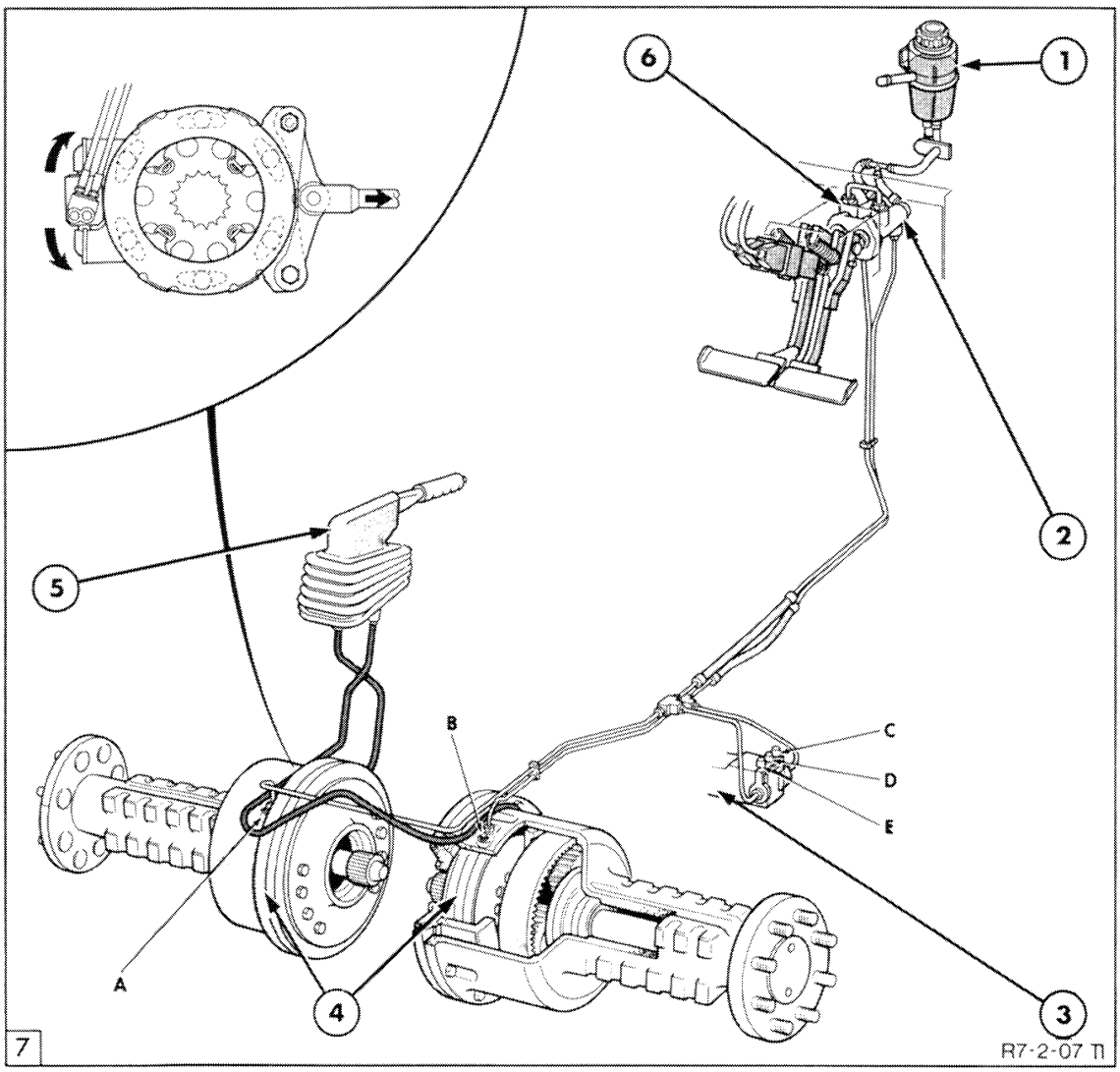
Using Gauge, Tool No. FT.4602 10–17 lb.in (1.1–1.9 Nm)
Using a Spring Pull Gauge 13–23 lbf. (5.9–10.5 Kgf.)

5. Re–check the pre–load.

H. SPECIFICATIONS, TIGHTENING TORQUES AND SPECIAL TOOLS

SPECIFICATIONS

MODEL (Transmission)	**56/66/7840** (8x2/16x4)	**56/66/77/7840** (12x12)	**56/66/77/7840** (16x16)	**82/8340** (16x16)
Rear Axle General :				
Planetary Gears	3	3	3	4
Ratios Spiral Bevel	5.286	5.625		
Planetary	4.5	6.0		
Overall	23.786	33.75		
Pitch Dia, Spiral Bevel	13.13 in (333.5mm)			13.5 in (342.9mm)
Axle Shaft Diameter	2.7 in (68.58mm)			3.02 (76.5mm)
Differential Lock	Mechanical	Electro Hydraulic		
Draw Bar Pull lbs	9000	9500	9500	11700
kgms	(4082)	(4309)	(4309)	(5306)
Load Capacity lbs	12000	13800	13800	16800
kgms	(5443)	(6260)	(6260)	(7620)
Oil Specification	ESN–M2C134–D			
Oil Quantity				
Imp. Gallons	14.5	12.5	13.3	
U.S. Gallons	17.4	15.0	16.0	
Litres	66.0	56.8	60.6	



Braking System Component Layout

1. Reservoir
2. Right Hand Brake Master Cylinder
3. Trailer Brake Valve (where Fitted)
4. Brake Assemblies
5. Handbrake
6. Left Hand Brake Master Cylinder

A,B,C,D,E Brake Bleed Screws

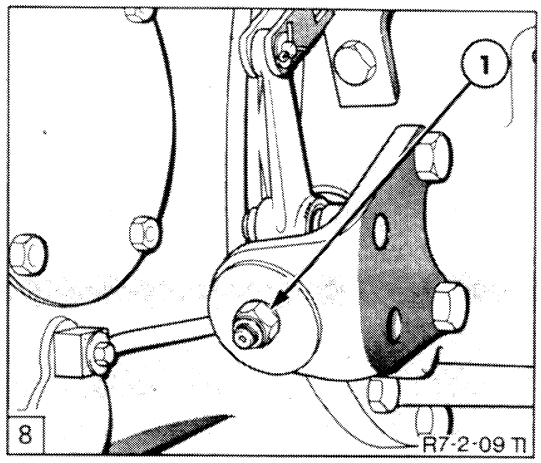
BRAKE ADJUSTMENT

Footbrake – SL/SLE Models

1. Ensure that the handbrake cable adjustment is not affecting the footbrake adjustment. Slacken handbrake cables if necessary.

2. Raise the vehicle and support on stands.

3. On one side of the tractor tighten the adjuster nut until the wheel just locks, Figure 8. Back off the adjuster by one revolution and ensure that the wheel is free to rotate. Repeat the operation for the other wheel.



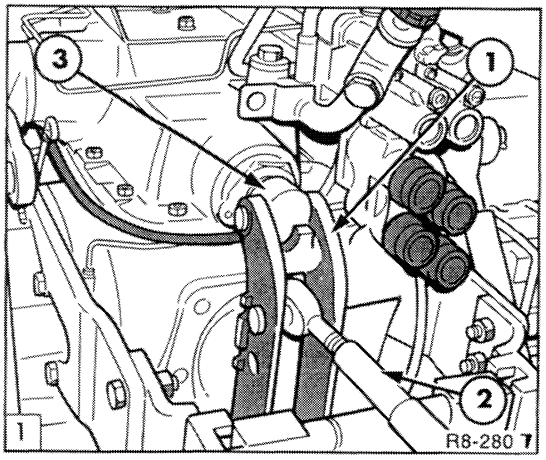
SL/SLE Model Footbrake Adjustment

1. Adjuster Nut

PART 8
HYDRAULIC SYSTEMS
Chapter 4
HYDRAULIC LIFT ASSEMBLY WITH TOP LINK SENSING

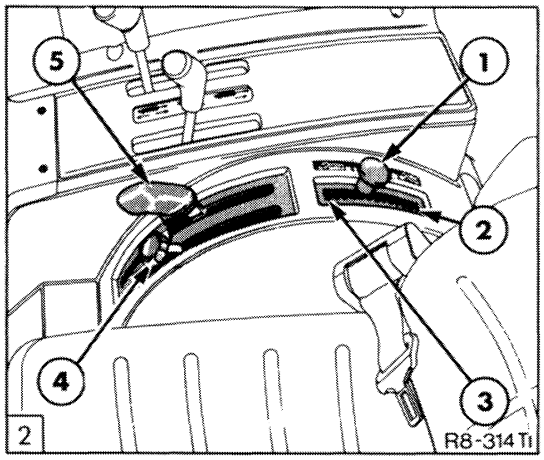
Section		Page
A.	DESCRIPTION AND OPERATION	1
B.	HYDRAULIC COMPONENTS AND CIRCUITS	5
C.	COMPONENT OVERHAUL	18
D.	HYDRAULIC LIFT ASSEMBLY – OVERHAUL	20
E.	INTERNAL LINKAGE ADJUSTMENTS	29
F.	EXTERNAL HYDRAULIC CONTROL LINKAGE	34
G.	FAULT FINDING	35
H.	SPECIFICATIONS	37

A. DESCRIPTION AND OPERATION



Three Point Linkage

1. Rocker
2. Top Link
3. Draft Control Yoke



Hydraulic Control Levers

1. Selector Lever
2. Position Control Setting
3. Draft Control Setting
4. Adjustable Stop
5. Lift Control Lever

'Top Link Sensing' defines a hydraulic system where draft signals applied to an implement are sensed and transmitted mechanically to the hydraulic lift draft control mechanism by the 'Top Link' of the three–point linkage, Figure 1.

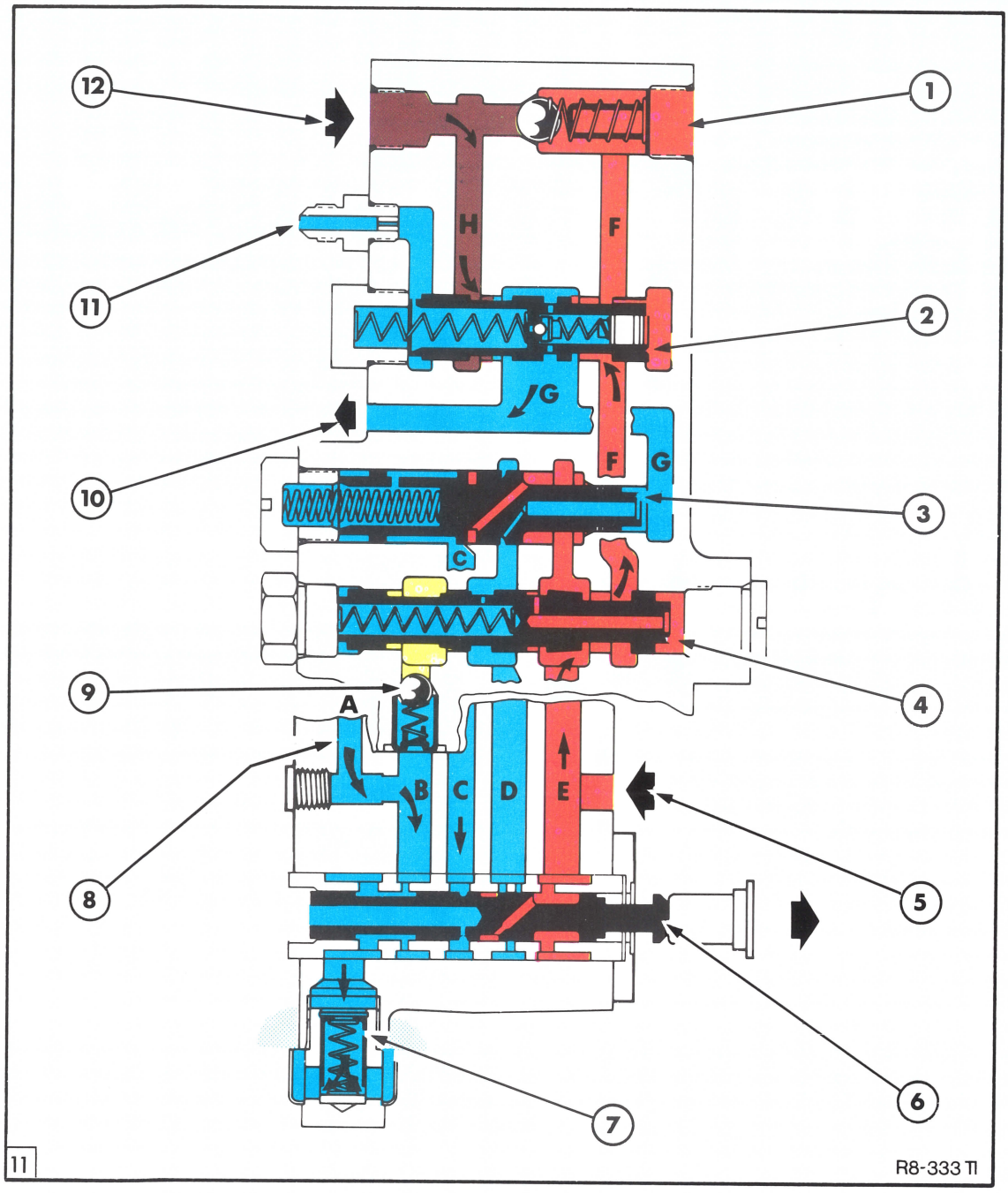
This method of sensing draft loadings differs from that of the electronic draft control system where draft forces applied to an implement are sensed electronically using load sensing pins in the lower lift links.

Implements attached to the 3 point linkage can be operated in either 'Draft' or 'Position' control using the levers positioned by the side of the drivers seat, Figure 2.

The lift control lever raises or lowers the hydraulic lift to the desired position and the selector lever enables the selection of full position control or draft control as required.

Full draft control is selected when the lever is positioned fully forward and full position control when the lever is moved fully rearwards.

The sensitivity of draft control is adjusted by the position of the selector lever. As the lever is moved away from full draft control selection to full position control the degree of draft sensitivity reduces accordingly.



Oil Flow in Lowering
(Tractors with Fixed Displacement Hydraulic Pump)

Main Pump Pressure Oil

Auxiliary Pump Oil

Exhaust Oil

Trapped Oil

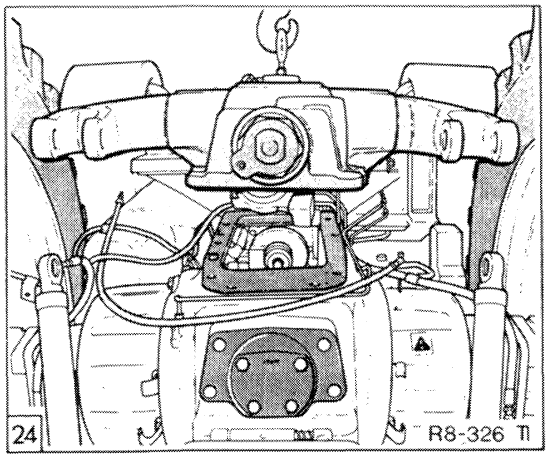
1. To Remote Valves
2. Combining Valve (Sequencing Valve)
3. Unload Valve
4. Flow Control Valve
5. From Main Pump
6. Control Valve
7. Exhaust Valve
8. To Lift Cylinder
9. Check Valve
10. To Reservoir
11. Remote Valve Pilot Line (Load Sense Line)
12. From Auxiliary Pump

GALLERY A, To Lift Cylinder and Auxiliary Services Valve (where fitted)

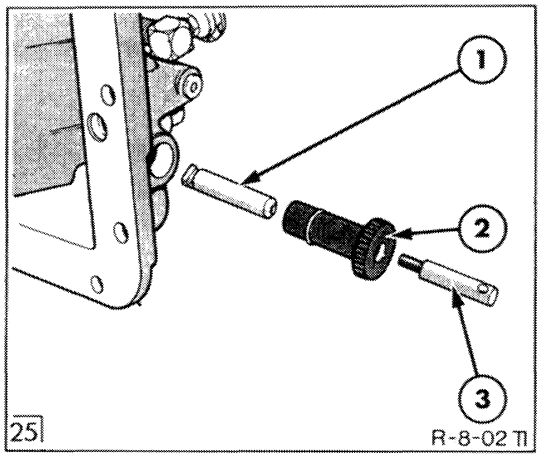
GALLERY E, Main Pump Supply

GALLERY H, Auxiliary Pump Supply

GALLERY G, Return to Sump



Removing Hydraulic Lift Cover



ASC Valve Selector Linkage (where fitted)

1. Selector Valve Stem
2. Knob
3. Control Linkage Connector

8. Disconnect assist rams hoses (where fitted).

9. Disconnect assist rams and lift rods from hydraulic lift arms.

10. Disconnect and remove remote control valve(s).

11. Remove trailer brake coupler and feed tube (where fitted).

12. Disconnect and remove priority valve pack/unload valve as fitted. Refer to Figure 15 and Figure 18.

    NOTE: *On tractors fitted with the priority valve pack be careful that the auxiliary pump supply check valve spring and ball is not ejected when disconnecting the remote valve supply tube.*

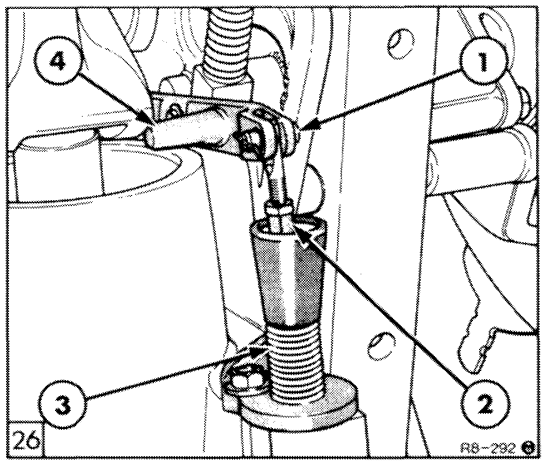
13. If the hydraulic lift assembly is being removed in order to overhaul the lift cylinder, it is recommended that the cylinder retaining bolts are **loosened** before removing the lift assembly from the tractor. **Do Not** remove these bolts.

14. Remove the lift cover retaining bolts and using suitable lifting equipment remove hydraulic lift assembly from the tractor, Figure 24.

DISASSEMBLY

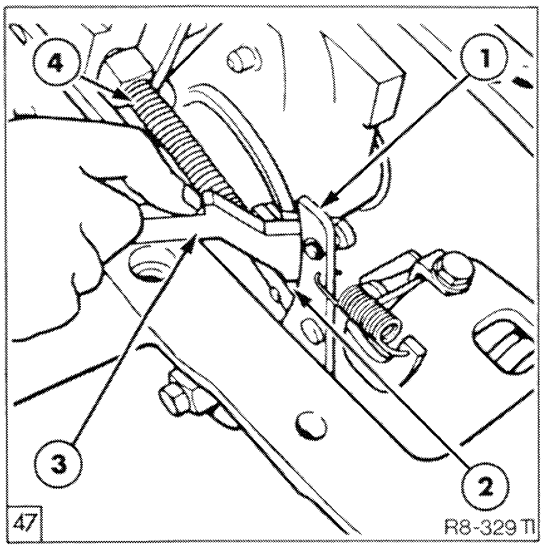
1. Unscrew ASC control linkage connector, pull knob from lift cover and remove selector valve stem, Figure 25.

2. Disconnect and remove control valve turnbuckle, Figure 26.



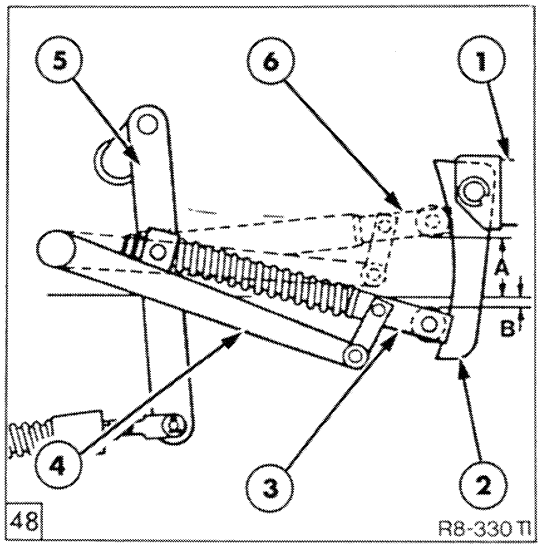
Control Valve Turnbuckle

1. Clevis Pin
2. Turnbuckle Assembly
3. Control Valve
4. Lever (Part of Control Rod, Roller and Lever Assembly)



Setting Control Rod Roller for Draft Control

1. Selector Link
2. Control Rod Roller
3. Setting Gauge, Tool No. FT.8527
4. Control Rod



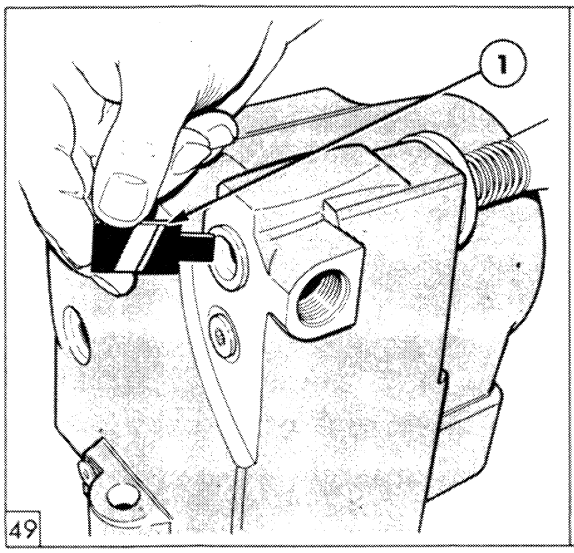
Control Rod Roller Settings for Draft and Position Control

A. 1.95 in (49.5 mm)
B. 0.03 in (0.76 mm)
1. Draft Control Mainspring Plunger
2. Selector Link
3. Control Rod and Roller Assembly in Position Control Setting
4. Selector Arm
5. Actuating Lever
6. Control Rod and Roller Assembly in Draft Control Setting

6. Apply Loctite 271 thread sealant to turnbuckle threads.

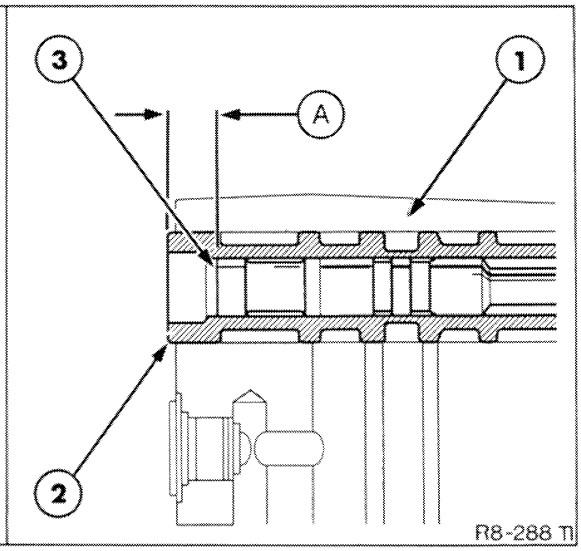
7. Position control valve setting tool onto end of the control valve bush and adjust **control valve turnbuckle** until end of spool just touches the tool. When this occurs the spool will be set at 0.46 in (11.7 mm) from the end of the bushing. Refer to Figure 49.

8. Tighten turnbuckle locknut and recheck setting.



Adjusting Control Valve

1. Setting Tool FNH 00014 or Locally Manufactured Tool



Control Valve Adjustment

Control Valve Spool Setting

A. 0.46 in (11.7 mm)
1. Lift Cylinder
2. Control Valve Bushing
3. Control Valve Spool

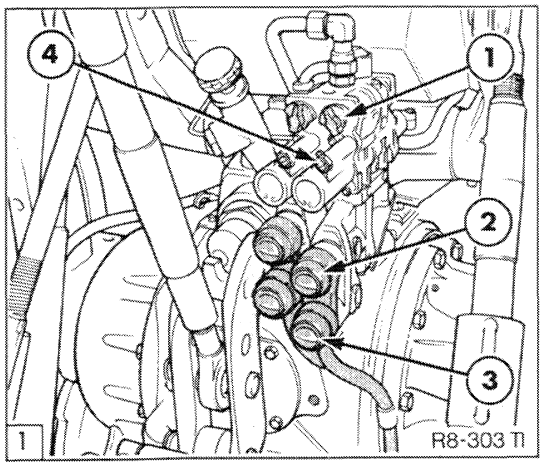
PART 8

HYDRAULIC SYSTEMS

Chapter 7
REMOTE CONTROL VALVES

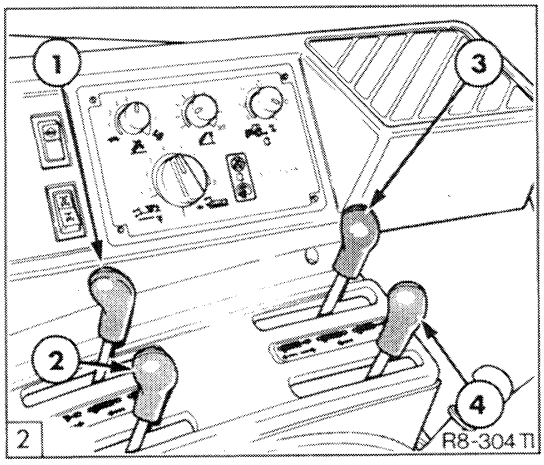
Section		Page
A.	REMOTE CONTROL VALVES–DESCRIPTION AND OPERATION	1
B.	OVERHAUL	19
C.	PRESSURE TESTING	26
D.	SPECIFICATIONS	27

A. REMOTE CONTROL VALVES–DESCRIPTION AND OPERATION



Remote Control Valve Installation

1. Flow Control Knob
2. Lift Coupler
3. Lower Coupler
4. Detent Screw



Remote Control Valve Levers
(SLE Model Shown)

1. Lever For Right Hand Side Outer Valve (I–Green)
2. Lever For right Hand Side Inner Valve (II–Blue)
3. Lever For Left Hand Side Inner Valve (III–Tan)
4. Lever For Left Hand Side Outer Valve (IIII–Black)

DESCRIPTION

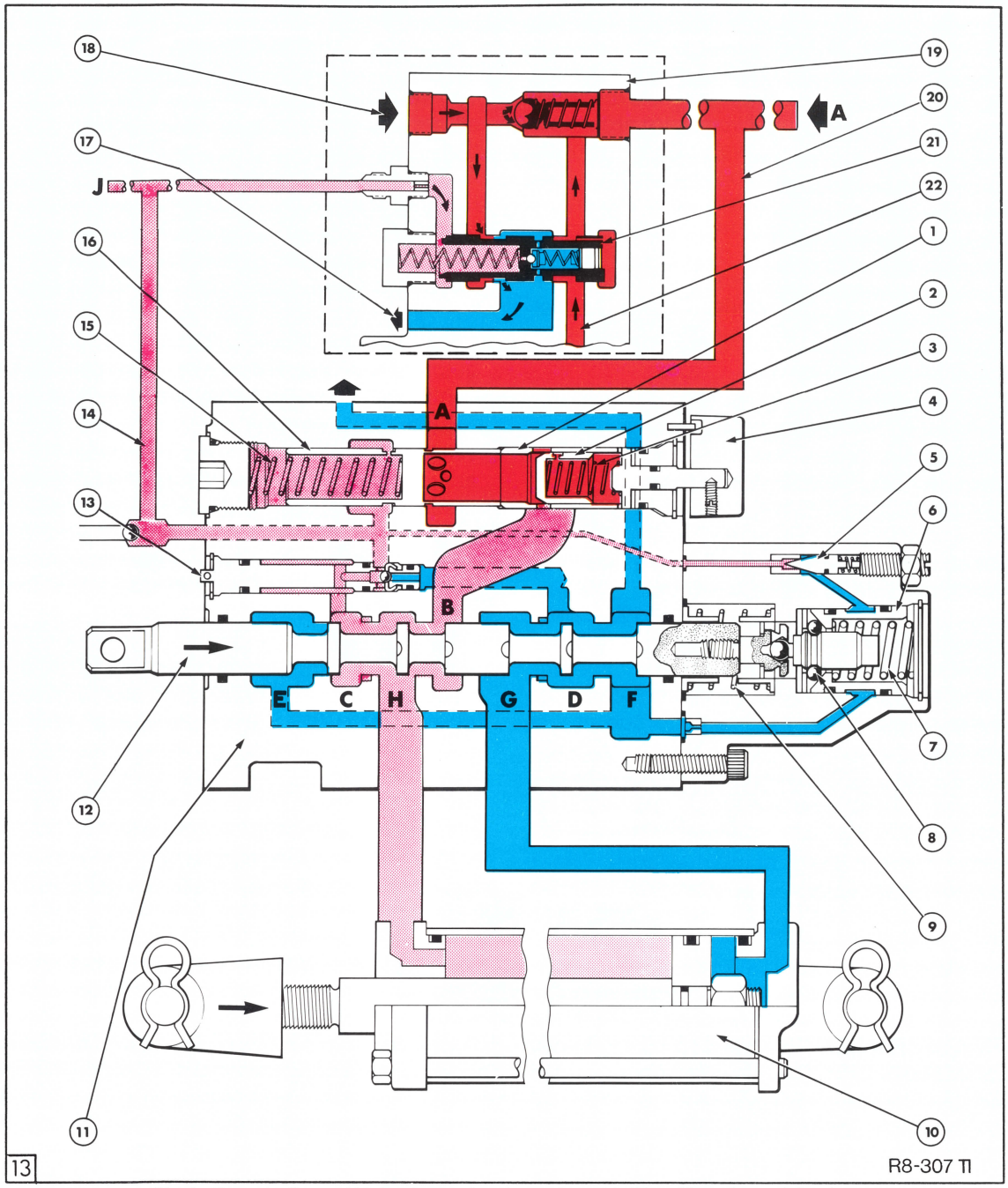
Ford Series 40 Tractors may be fitted with the optional closed centre load sensing remote control valves for the operation of external hydraulic services.

Remote valves are available to operate external hydraulic services, eg hydraulic cylinders and motors. Up to four remote control valves may be installed and are located at the rear of the tractor, Figure 1. The valves are mounted directly onto quick release couplers which are designed to give unrestricted flow and low back pressure.

The valves are operated by levers located by the side of the drivers seat. Refer to Figure 2.

Each remote control valve has four operating positions, as follows:–

Pull a lever back from the neutral position to extend the cylinder to which it is connected. Push the lever forward, past neutral, to retract the cylinder. Pushing the lever fully forward, beyond the 'retract' position, will select 'float' which will permit the cylinder to extend or retract freely, thereby allowing equipment such as scraper blades to float and follow the ground contour.



Single Remote Control Valve Operation–Lowering with Slow Flow Control Setting

Pump Pressure Oil | Reduced Oil Flow | Exhaust Oil

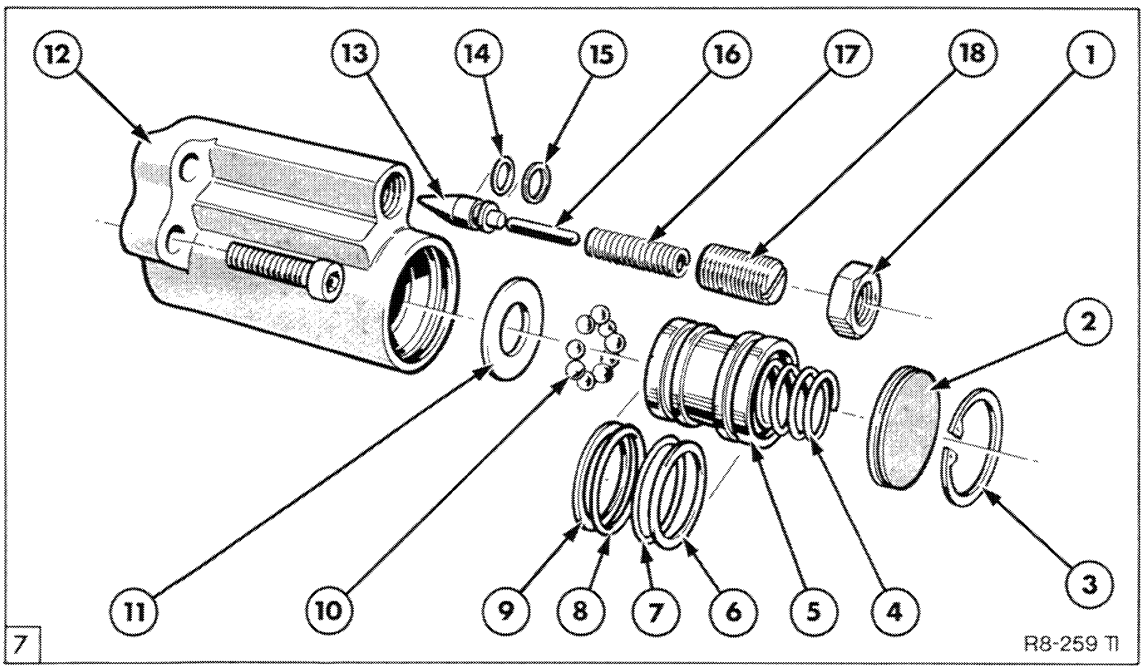
1. Flow Control Restrictor
2. Load Check Valve
3. Check Valve Spring
4. Flow Control Knob
5. Detent Regulating Valve
6. Detent Spool
7. Detent Plunger and Spring
8. Detent Balls
9. Centering Spring
10. External Cylinder
11. Valve Body
12. Control Valve Spool
13. Shuttle Check Valve
14. Load Sense Line (Pilot Line)
15. Flow Control Spring
16. Flow Control Spool
17. Return to Sump*
18. Auxiliary Pump Supply*
19. Hydraulic Priority Valve Assembly*
20. Supply to Remote Valve
21. Combining (Sequencing) Valve*
22. Main Pump Supply via Combining Valve*

*Tractors with Fixed Displacement Hydraulic Pump Only

For Tractors Fitted with Variable Displacement CCLS Hydraulic Pump

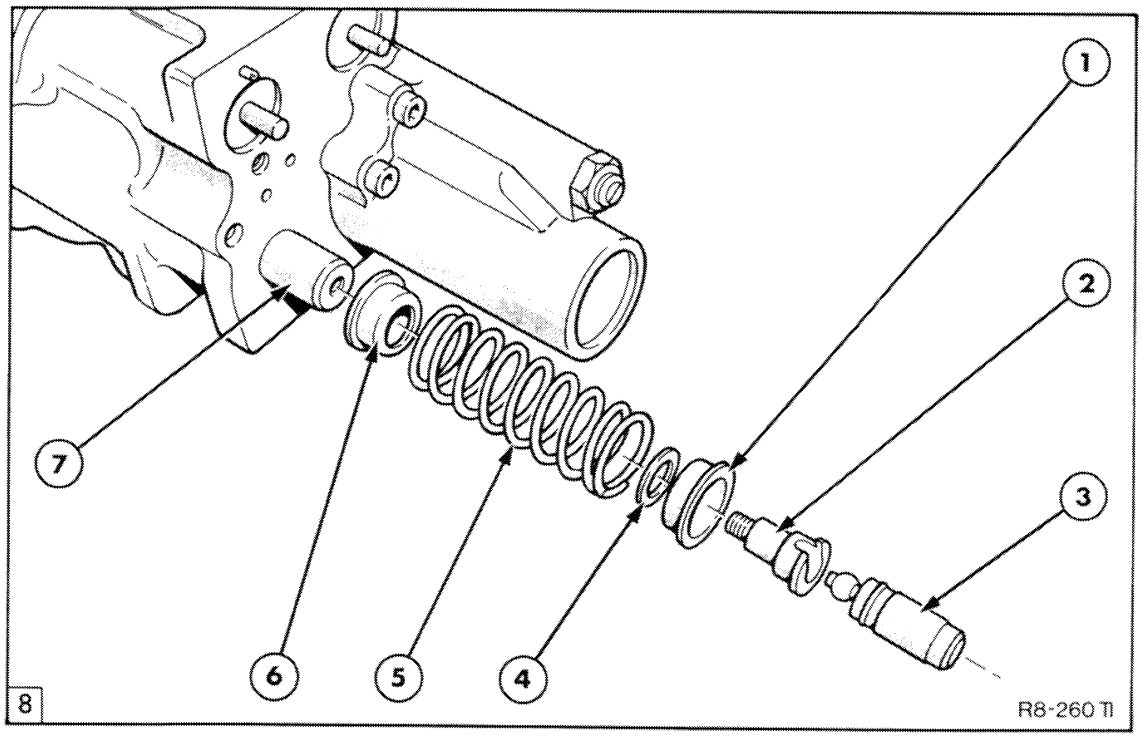
A = CCLS Pump Supply

J = CCLS Pump Load Sensing Line



Detent Mechanism

1. Lock Nut
2. End Cap
3. Snap Ring
4. Spring
5. Detent Spool
6. Back–up Ring
7. 'O' Ring
8. 'O' Ring
9. Back–up Ring
10. Detent Balls
11. Washer
12. Detent Housing
13. Valve
14. 'O' Ring
15. Back–up Ring
16. Rod
17. Spring
18. Adjuster



Centering Spring Assembly

1. Retainer
2. Shaft
3. Detent Plunger
4. Washer
5. Spring
6. Retainer
7. Main Spool

C. SPECIFICATIONS

MAXIMUM LIFT CAPACITY

Tractors with Fixed Displacement Gear Type Hydraulic Pump @ 2650 lbf/in² (183 bar)

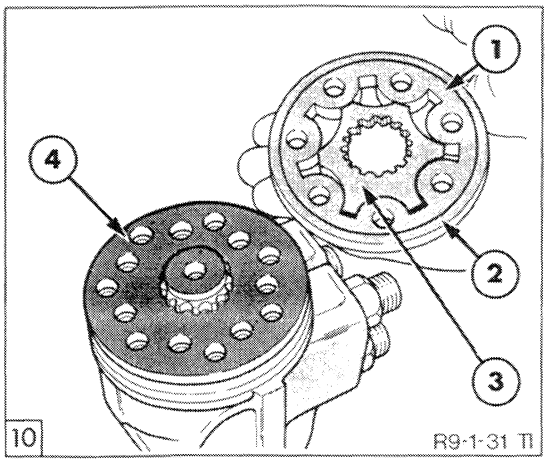
Test results to OECD criteria–links horizontal

		5640	6640	7740	7840	8240	8340
Without Assist Rams							
at link ends	lb	6350	6350	n/a	n/a	n/a	n/a
	kg	2880	2880	n/a	n/a	n/a	n/a
24 in. to rear of link ends	lb	4910	4910	n/a	n/a	n/a	n/a
	kg	2227	2227	n/a	n/a	n/a	n/a
With One Assist Ram							
at link ends	lb	9370	9370	9370	9370	9370	9370
	kg	4250	4250	4250	4250	4250	4250
24 in. to rear of link ends	lb	7080	7080	7080	7080	7080	7080
	kg	3211	3211	3211	3211	3211	3211
With Two Assist Rams							
at link ends	lb	n/a	n/a	12300	12300	12300	12300
	kg	n/a	n/a	5579	5579	5579	5579
24 in. to rear of link ends	lb	n/a	n/a	9420	9420	9420	9420
	kg	n/a	n/a	4273	4273	4273	4273

Tractors with Fixed Displacement Gear Type Hydraulic Pump @ 2385 lbf/in² (164 bar)

Test results to SAE criteria–links horizontal

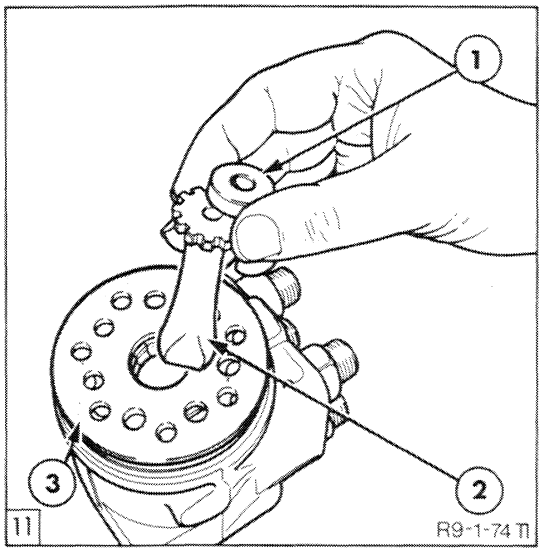
		5640	6640	7740	7840	8240	8340
Without Assist Rams							
24 in. to rear of link ends	lb	4200	4200	n/a	n/a	n/a	n/a
	kg	1905	1905	n/a	n/a	n/a	n/a
With One Assist Ram							
24 in. to rear of link ends	lb	6210	6210	6210	6210	6210	6210
	kg	2817	2817	2817	2817	2817	2817
With Two Assist Rams							
24 in. to rear of link ends	lb	n/a	n/a	8240	8240	8240	8240
	kg	n/a	n/a	3728	3728	3728	3728



Metering Unit Removal

1. End Plate
2. 'O' Ring
3. Rotor
4. Manifold Plate

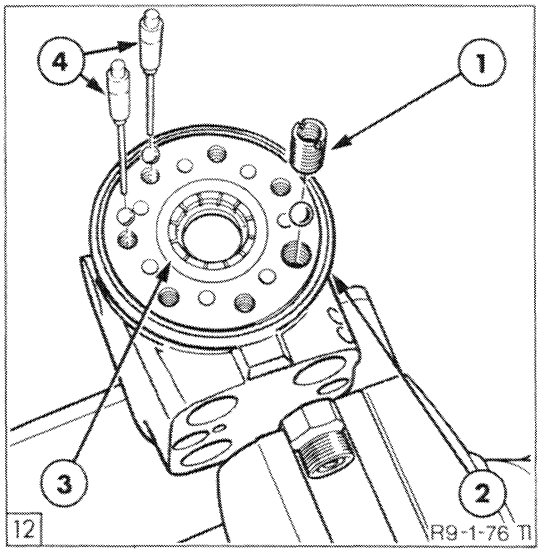
4. Remove metering unit, valve plate and 'O' ring seals, note mating surfaces for correct re–assembly, Figure 10.



Rotor Drive Removal

1. Spacer
2. Drive Link
3. Housing

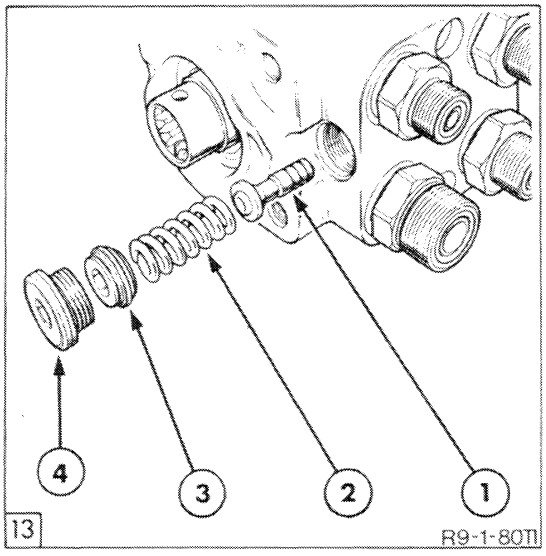
5. Lift out rotor drive-shaft, Figure 11.



Suction and Check Valve

1. Check Valve Retainer
2. Housing
3. Control Valve
4. Suction Valves

6. Unscrew the check valve retainer, Figure 12 and shake out the check and suction valves.

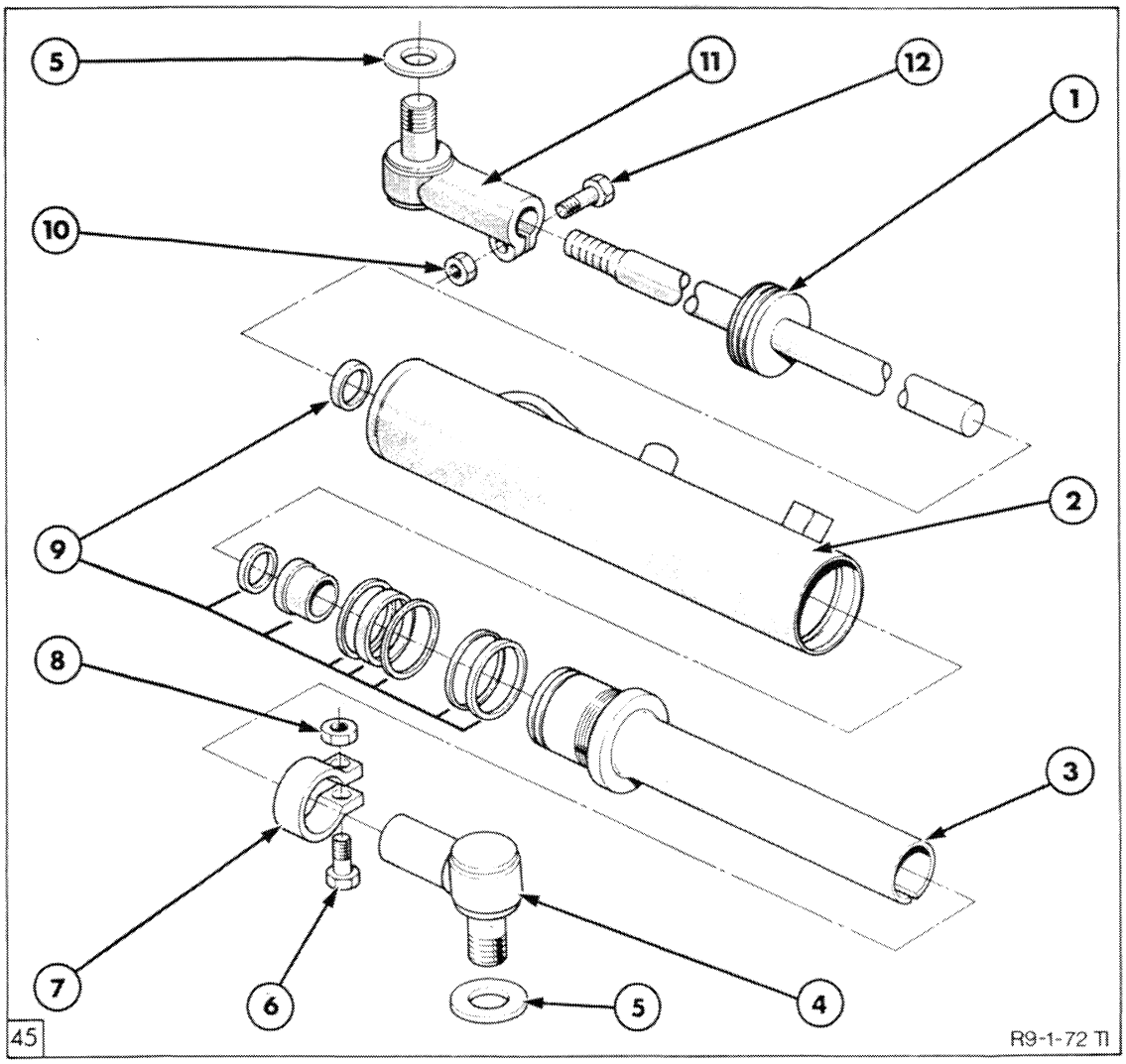


Relief Valve

1. Relief Valve
2. Spring
3. Adjuster
4. Plug

7. Remove the relief valve assembly, Figure 13.

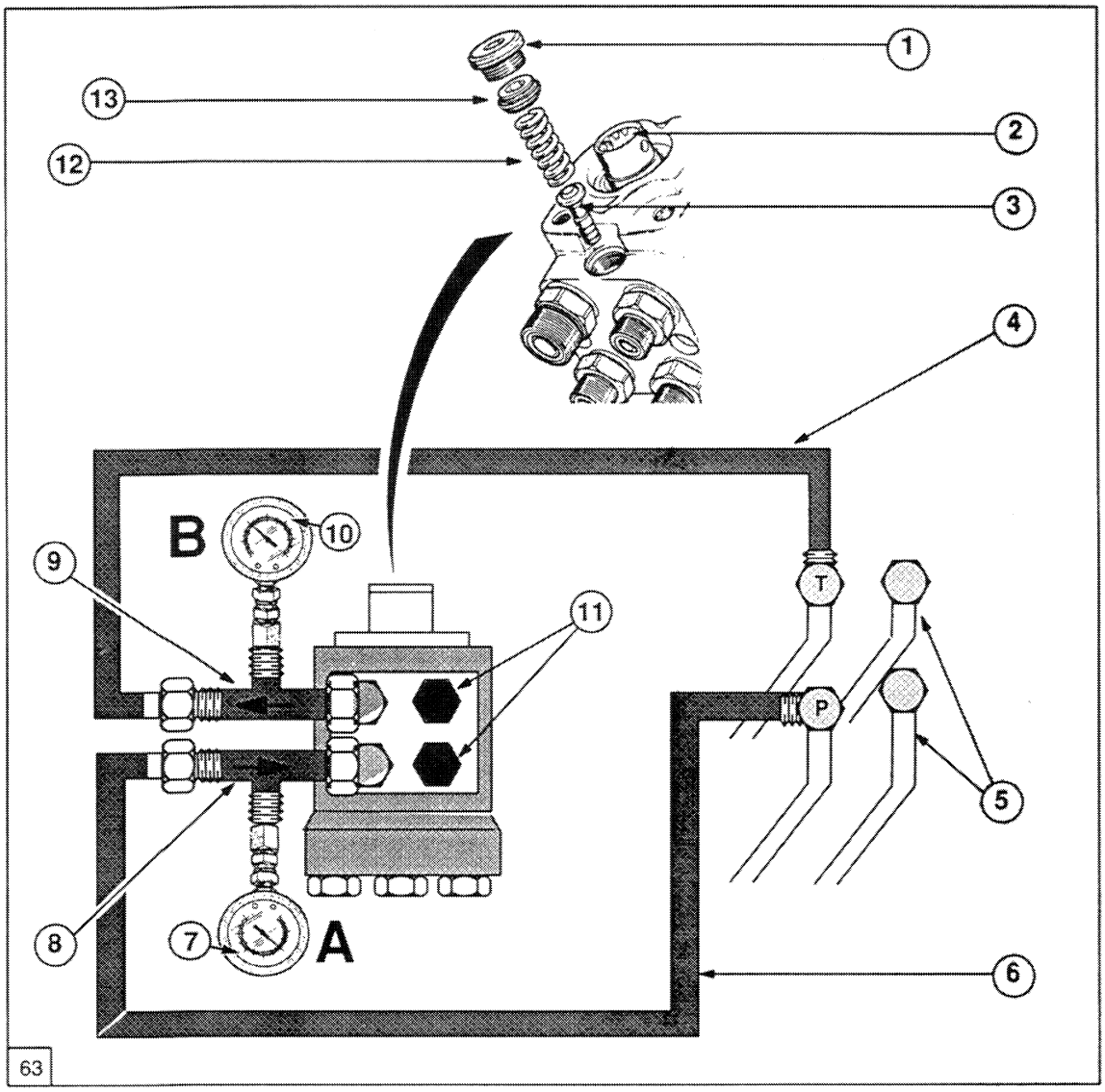
IMPORTANT: *The relief valve must be set to the correct pressure setting on re–assembly.*



Steering Cylinder Assembly

1. Piston and Rod Assembly
2. Cylinder
3. Extension Tube
4. Track Rod End
5. Dust Washer
6. Clamp Bolt
7. Clamp
8. Nut
9. Seal Kit items*
10. Nut
11. Track Rod End
12. Clamp Bolt

* Seal Kit Consists of:–
Rod Seals and Bushing
Piston Seals
Gland Seals



Steering Motor Relief Valve Adjustment

1. Plug
2. Steering Shaft
3. Relief Valve
4. Fabricated Steering Motor Output Hose
5. Tractor Tubes to Steering Cylinder
6. Fabricated Hose for Pump Supply to Steering Motor
7. Pressure Gauge 0–5000lbf.in²
8. Size 8 ORS Swivel Running Tee
9. Size 10 ORS Swivel Running Tee
10. Pressure Gauge 0–500lbf.in²
11. Size 6 ORS Blanking Cap
12. Spring
13. Adjuster

Relief Valve Adjustment – All Models

With reference to Figure 63.

NOTE: *To adjust the steering system relief valve it is necessary to remove the steering motor from the steering bracket, to gain access to the hexagon headed adjusting screw.*

1. Disconnect the steering motor from the steering bracket, as detailed in Section C of this Chapter, and remove from the tractor.

2. Fabricate suitable test hoses to connect from the tractor pressure and return tubes. Connect the hoses into locally procured tee pieces and install pressure gauges. Start the engine and idle between 1450 and 1500 rev/min. Run the tractor until the transmission oil reaches normal working temperature of approximately 68°C (155°F).

3. With the engine running, turn the steering motor shaft to obtain full lock. The pressure gauge reading at point 'A' should read 2350 lbf.in² (162 bar) on 2wd models and 2750 lbf.in² (190 bar) on 4wd models. The gauge pressure at point 'B' should be in the region of 250 lbf.in² (17 bar).

4. To establish actual (differential) pressure subtract gauge 'B' reading from the gauge 'A' reading. The differential

RE–ASSEMBLY

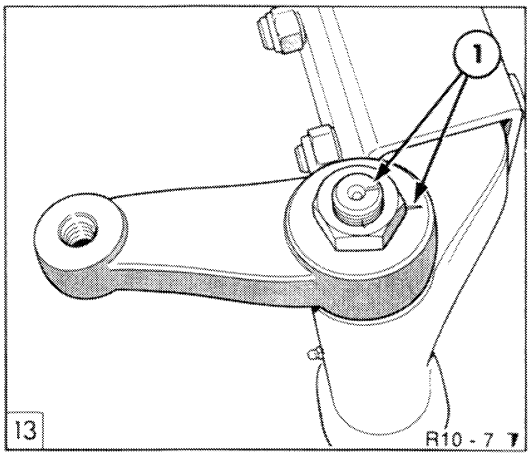
1. Position spacer on wheel spindle. Ensure chamfered edge of spacer faces down, Figure 12.

2. Position bearing on spindle with manufacturers name facing upwards.

3. Pack spindle thrust bearing with grease to specification ESA–M1C75–B or ESEN–M1C137–A and install on spindle.

4. Install spindle into axle extension. Ensure spindle rotates freely in the bushes.

5. Install a new felt dust seal

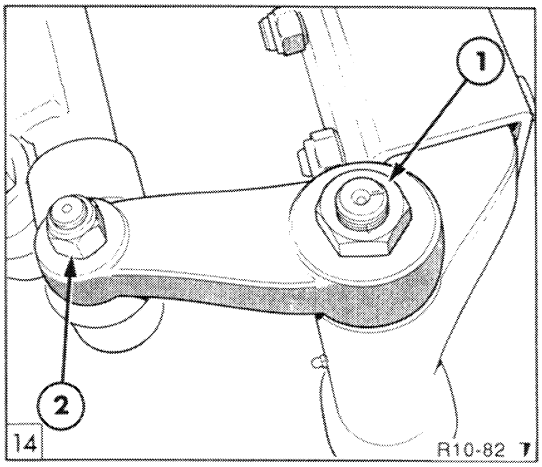


Spindle and Track Control Arm Alignment

1. Alignment Marks

6. Position arm onto the spindle ensuring the marks on both the arm and spindle are aligned, Figure 13.

7. Tighten the spindle nut to a torque of 360–440 lbf ft (488–597 Nm). To prevent the nut from loosening during normal operation deform the protruding thread adjacent to the nut.



Track Control Rod Installation

1. Spindle Arm
2. Track Control Rod Ball Joint

8. Reconnect track control rod and tighten ball joint, Figure 14, to the correct torque as follows:–
   56\66\7840 Tractors
   133–170 lbf in (180–236 Nm)
   82\8340 Tractors
   200–240 lbf in (270–325 Nm)

9. After re–assembly check front wheel track adjustment. Refer to Page 3.

AXLE CENTRE BEAM AND FRONT SUPPORT OVERHAUL

REMOVAL

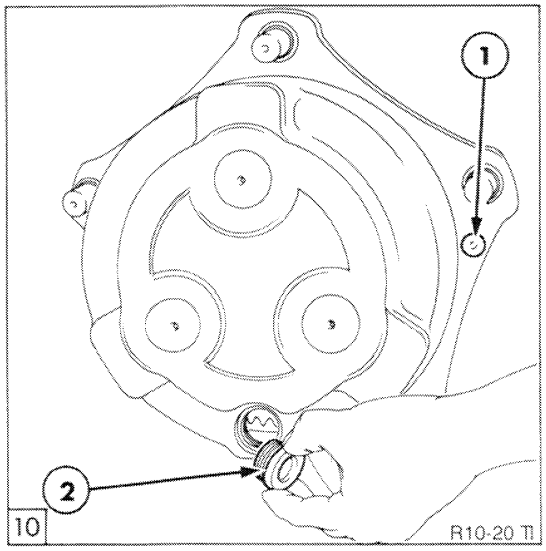
1. Position the front wheels straight ahead.

2. Disconnect and remove steering cylinder.

3. Raise the front of the tractor and position safety stands under the engine and remove front wheels.

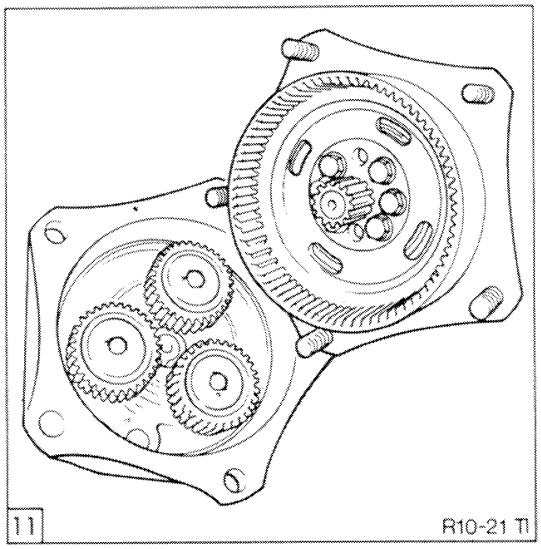
4. Support axle centre beam assembly to remove weight from support pin.

C. HUB ASSEMBLY, SWIVEL HOUSING AND AXLE SHAFT – OVERHAUL



Preparation For Hub Removal

1. Retaining Screw (2)
2. Filler/Drain Plug



Planetary Carrier Removed
(Heavy Duty Axle)

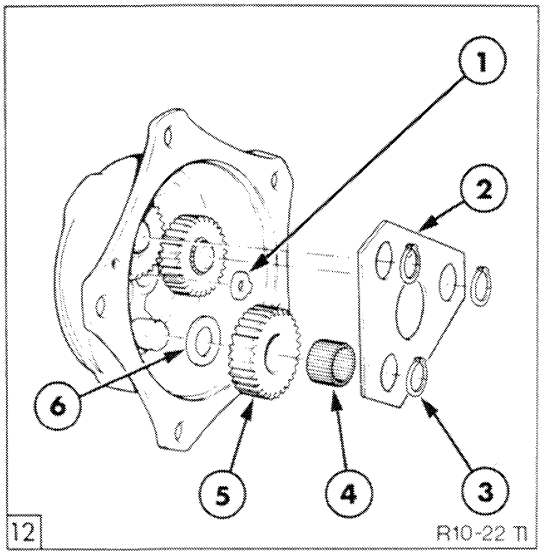
REMOVAL

1. Jack up tractor, support front axle and remove road wheel.

2. Position hub filler/drain plug at its lowest point and drain oil, Figure 10.

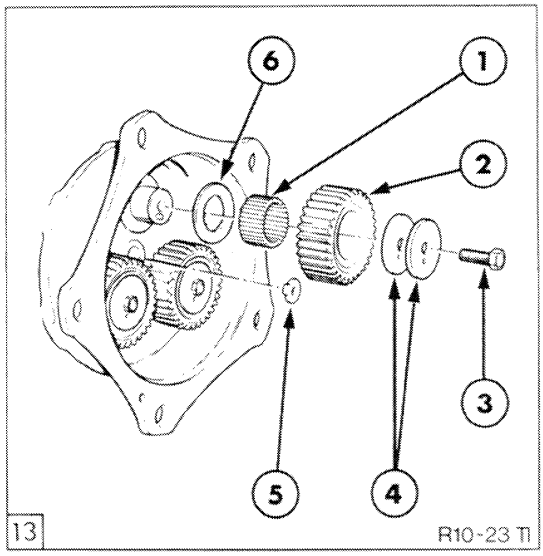
3. Remove planetary carrier retaining screws and using soft mallet remove carrier from the hub, Figure 11.

4. Overhaul planetary reduction gear carrier with reference to Figure 12 and Figure 13. Use Loctite 638 to hold the tabbed thrust washer in position.



Planetary reduction Components
709–Standard Axle

1. Tabbed Thrust Washer
2. Retaining Plate
3. Snap Ring
4. Needle Roller Bearings
5. Planetary Gear
6. Drive Shaft Thrust Washer



Planetary Reduction Components
709–Heavy Duty Axle

1. Needle Roller Bearings
2. Planetary Gear
3. Retaining Bolt (Torque 58 lbf ft, 79 Nm)
4. Thrust Washers
5. Tabbed Thrust Washer
6. Drive Shaft Thrust Washer

6. If differential assembly is to be overhauled prise pinion shaft oil seal from differential housing, Figure 43.

7. If differential assembly is to be overhauled use pinion nut wrench FT3168 to loosen the pinion retaining nut.

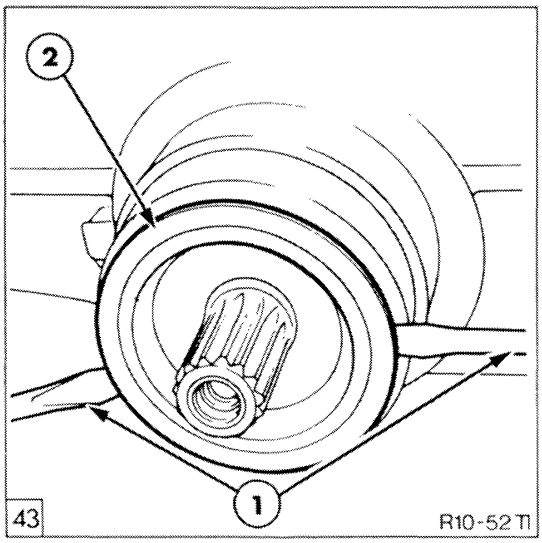
8. Jack up front of tractor and securely support tractor with stands positioned beneath the engine to transmission buckle up flange and also under the cast engine sump, as additional support.

NOTE: *Do not support the vehicle on the engine sump only. Always place a piece of wood across the stand to spread the load across the sump pan.*

9. Remove front wheels.

10. Support axle with trolley jack positioned under centre of axle or alternatively use other suitable lifting equipment.

11. Remove front and rear axle support bolts, Figure 44 and Figure 45.

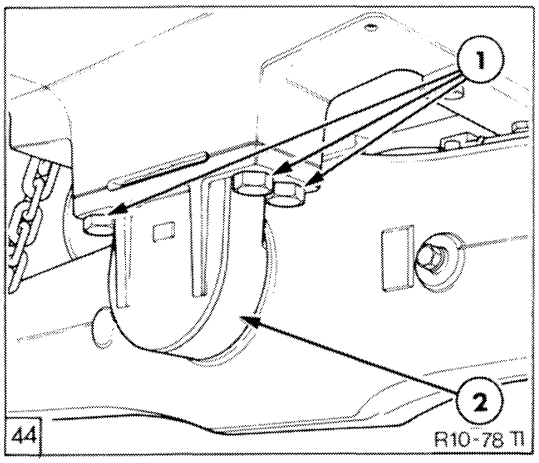


Pinion Shaft Oil Seal Removal

1. Screwdrivers
2. Oil Seal

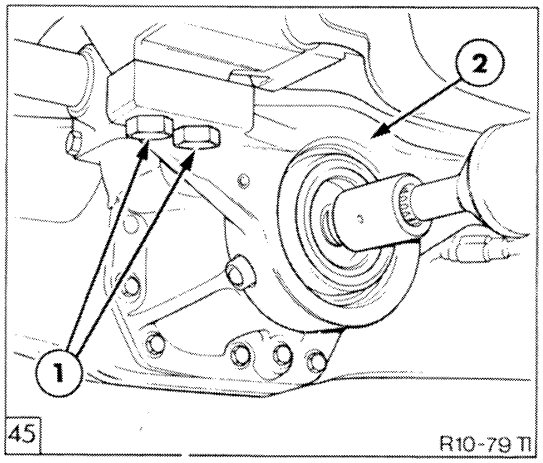
12. Carefully lower axle to ground.

13. Position axle in suitable stand in order to perform disassembly.



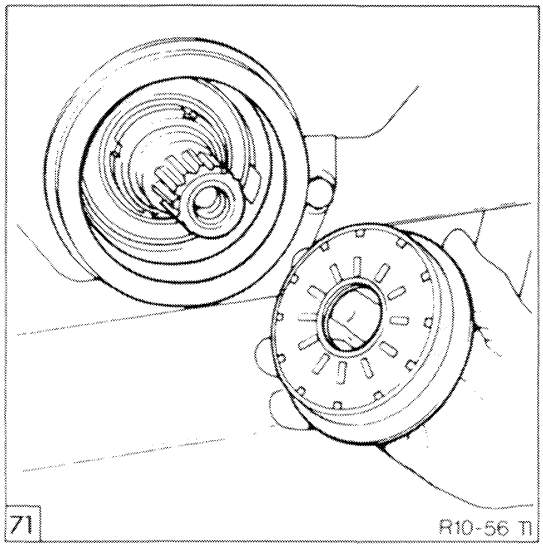
Front Support Pillar Retaining Bolts

1. Retaining Bolts
2. Support Pillar

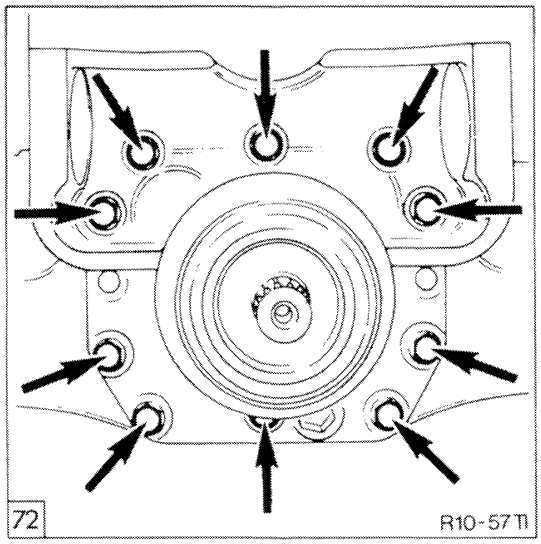


Rear Support Retaining Bolts

1. Retaining Bolts
2. Support Pillar

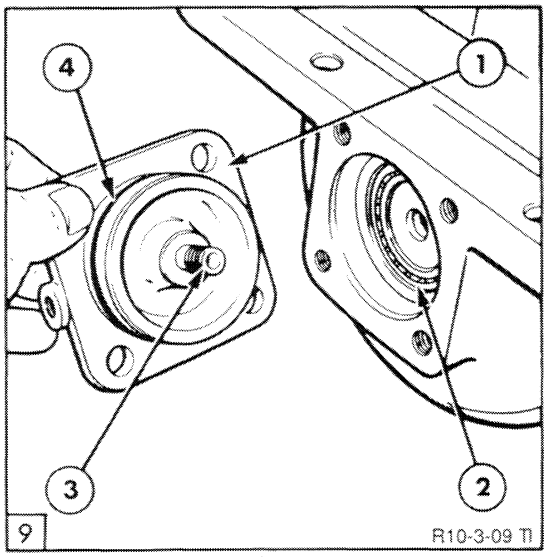


Pinion Shaft Oil Seal



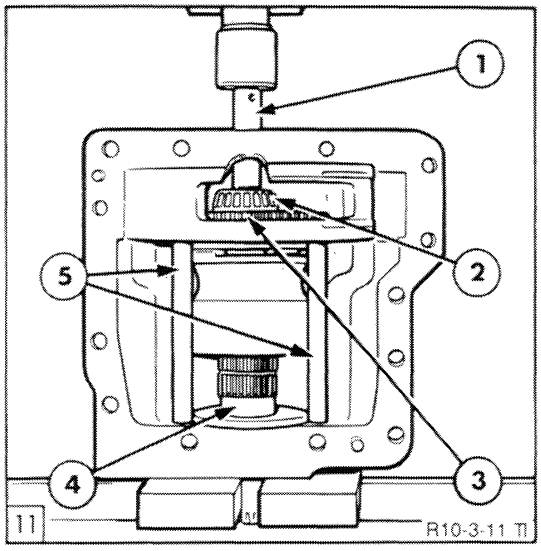
Differential Support Casing Retaining Bolts

5. Tighten bearing cap bolts to a torque of 196 lbf ft (266 Nm).
6. Recheck pinion backlash and install locking tabs, Figure 70. Tighten the tab retaining bolts to a torque value of 9 lbf.ft (12 Nm).
7. Install new pinion shaft oil seal, Figure 71.
8. Ensure the locating dowels in differential casing are correctly inserted. If removed install new dowels using loctite 638.
9. Apply loctite 510 liquid gasket to mounting face of housing and install onto axle. Tighten housing bolts to a torque of 125 lbf ft (169 Nm), Figure 72.
10. Install hubs, swivel housing and axle drive shaft as detailed in Section C.
11. Refill axle and hubs with oil to specification ESN–M2C134–D.
12. Install steering cylinder and axle onto tractor. Refer to Sections B and D.



Removing Output Shaft Rear End Plate

1. End Plate
2. Bearing Assembly
3. Oil Transfer Tube
4. 'O' Ring Seal

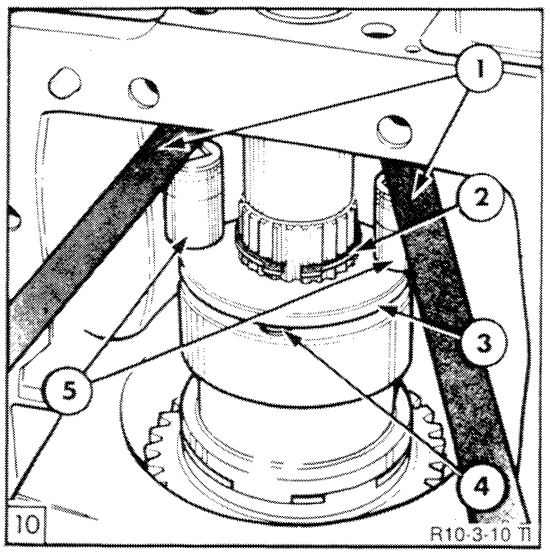


Removing Output Shaft Rear Bearing

1. Adaptor
2. Bearing
3. Driven Gear
4. Output Shaft
5. Support Rods

5. Remove the output shaft end plate. Collect and identify the shims positioned between the plate and the bearing outer track, Figure 8.

6. Remove the rear end plate, Figure 9. Remove the short oil transfer tube from the shaft, if this remained in the shaft.



Levering Clutch Spring Keeper Plate Against Clutch Springs

1. Levers
2. Snap Ring
3. Keeper Plate
4. Clutch Spring (4 off)
5. Distance Pieces

7. Gently drive the output shaft forward and backward and remove the front and rear bearing outer tracks.

8. With the aid of an assistant, lever the clutch spring keeper against the clutch springs, Figure 10, to release the load on the snap ring, remove the snap ring.

9. Remove the four clutch springs.

10. Position two suitable lengths of steel rod or tube between the drive gear and the front of the casing so that the shaft may be pressed through the driven gear, Figure 11. Remove the bearing.