FORD

Service Manual

FORD
NEW HOLLAND

1715 Tractor

Supplement to 1320, 1520, 1720 Repair Manual

FOREWORD

Only components that are unique to the 1715 tractor will be contained in this manual. For all other components of the tractor, refer to the 1520 sections of the 13-15-1720 Repair Manual #40132030.

The material contained in this Manual was correct at the time of going to print, but Ford New Holland, Inc. policy is one of continuous improvement and the right to change prices, specifications, equipment or design at anytime without notice is reserved. All data in this Manual is subject to production variations, so overall dimensions and weights should be considered as approximate only and the illustrations do not necessarily depict the unit to standard build specification.

FORD NEW HOLLAND, INC.

PRODUCTION DATE CODES AND SERIAL NUMBERS

The Tractor Identification Plate is located on the left side of the transmission case on the Ford 1715 Tractor and is stamped with the following information:

Production Identification Number — Two letter prefix followed by the Tractor Serial Number.

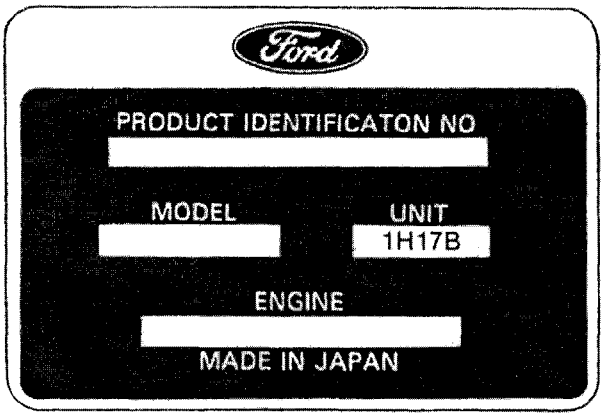
Whenever effecting repair or overhaul this relevant information should be noted and used when referring to Service Bulletins and/or the Parts Catalog.

Model — Production Model Code

Unit — Production Unit Date Code*

Engine — Serial Number and Engine Production Date Code

TRACTOR IDENTIFICATION PLATE

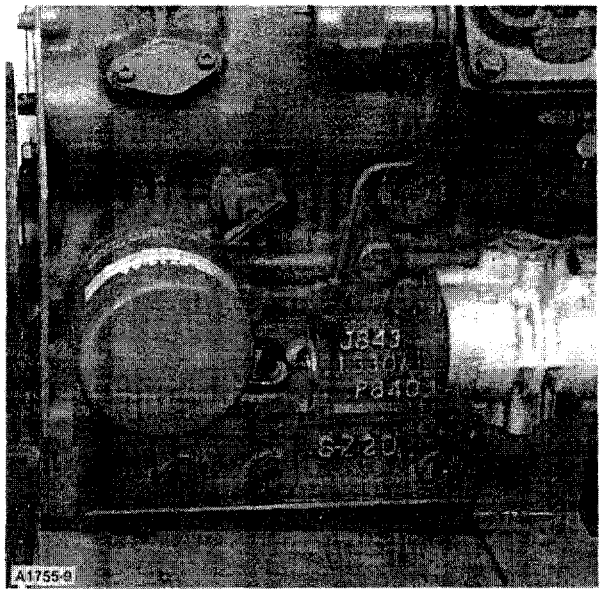


First Number YEAR	First Letter MONTH	Second Number DAY OF MONTH	Second Letter PRODUCTION SHIFT
0 — 1990 1 — 1991 2 — 1992 3 — 1993	A—Jan. G—July B—Feb. H—Aug. C—March J—Sept. D—April K—Oct. E—May L—Nov. F—June M—Dec.	01/28/29/30/31	A—Midnight B—Day C—Afternoon

*Example of Production Unit Date Code 1 H 17 B

Year of Final Assembly 1991	Month of Year August	Day of Month (Seventeen)	Shift Period Day

SECTION 1
ENGINE SYSTEMS
ENGINE

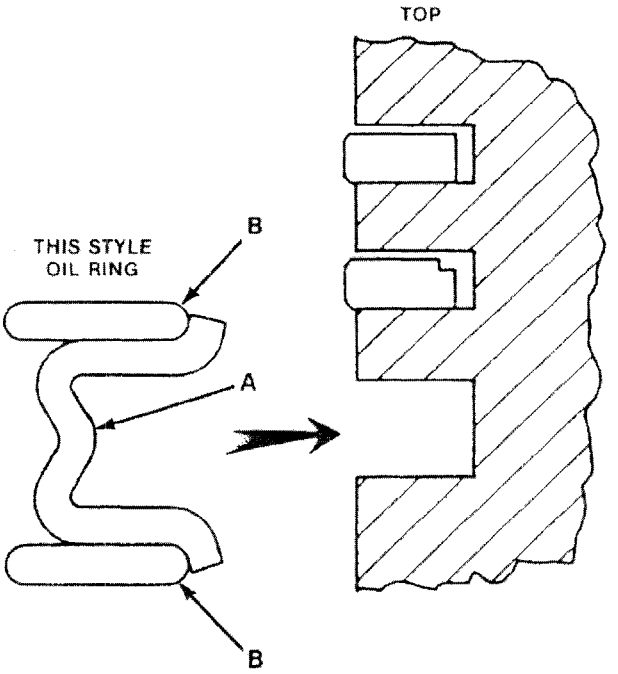


Engine Model Number **Figure 1-1**

DESCRIPTION AND OPERATION

The 1715 tractor is equipped with a three-cylinder in-line engine. It is a four cycle, overhead valve liquid cooled, parent cylinder bored engine. The engine is identified by a code number cast into the lower right side of the cylinder block, Figure 1-1.

Engine Identification	Tractor Model	Horsepower
J843	1715	26.0

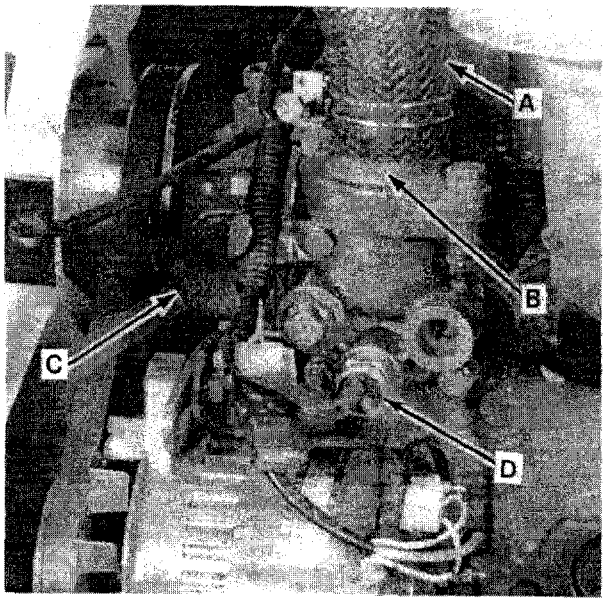


Piston Oil Ring Installation **Figure 1-2**
A Spacer
B Rail

PISTON ASSEMBLY

1. Assemble the pistons and connecting rods with the matching marks on the rods on the same side as the trade name "SHIBAURA" embossed on the inside of the piston skirt. Install the piston pin and retaining rings.
2. A three ring piston is used in this engine, Figure 1-2. Notice the location of each ring and the proper assembly of the oil ring.
3. Using a suitable ring expander tool, install the piston rings positioning the ring gaps at approximately 120° from each other. Do not position a ring gap over the piston pin bore.

COOLING SYSTEM



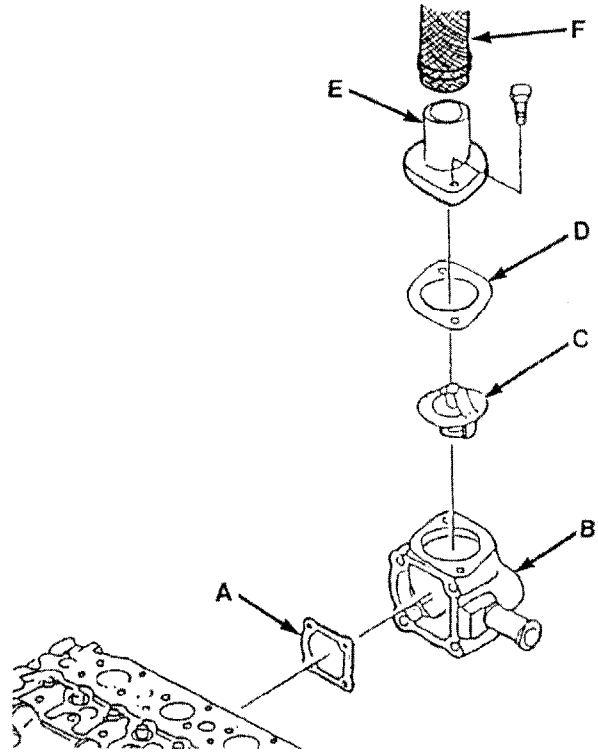
Thermostat Housing Removal **Figure 1-3**

A. Upper radiator hose
B. Thermostat housing
C. Bypass hose
D. Temperature switch

The 1715 tractor has the same cooling system as the 1520 tractor except for the thermostat housing, B, Figure 1-3, which has a different configuration. The thermostat, C, operates at a higher temperature range.

THERMOSTAT — REMOVAL (Refer to Figure 1-4)

1. Remove the radiator cap.
2. Open the coolant drain cock, located on the right side of the tractor engine compartment, and collect the coolant in a clean container.
3. Remove the radiator hose, F, and thermostat cover, E, from the thermostat housing, B.
4. Remove the thermostat, C, and gasket, D, from the thermostat housing.



Thermostat Removal **Figure 1-4**

A. Gasket
B. Thermostat housing
C. Spring
D. Gasket
E. Thermostat cover
F. Radiator hose

THERMOSTAT — INSTALLATION

Clean the gasket surfaces and install new gaskets as required.

Installation of the thermostat generally follows the removal procedure in reverse.

NOTE: Adjust the alternator belt tension to obtain 3/16" (5 mm) deflection with a force of 11 lbs. (5 kg).

Fill the radiator to the proper level with the correct grade and quantity of antifreeze mixture.

Start the engine and run it for several minutes. Check for coolant leaks.

SPECIFICATIONS

General Specifications

Tractor Model	1715
Engine Model	J843
Number of Cylinders	3
Bore x Stroke	3.31 x 3.15 in. (84 x 80 mm)
Displacement	81.1 cu. in. (1330 cc)
Compression Ratio	22:1
Rated Speed	2600 rpm
Muffler	Vertical
Firing Order	1-2-3
Idle Speed	850 ± 50 rpm
Maximum No Load Speed	2800 ± 50 rpm
Cylinder Arrangement	In-line Vertical
Valve Arrangement	Overhead

Cylinder Block

Bore	
Standard	3.307-3.308 in. (84-84.019 mm)
Maximum	3.354 in. (85.2 mm)
Head Surface Warp	
Standard	0.002 in. (0.05 mm)
Maximum	0.005 in. (0.12 mm)
Re-Bore Size	
0.020 oversize 0.5 mm	3.315-3.334 in. (84.2-84.7 mm)
0.040 oversize 1.0	3.334-3.354 in. (84.7-85.2 mm)

Cylinder Head

Head Warp	
Standard	0.002 in. (0.05 mm)
Maximum	0.005 in. (0.12 mm)
Valve Seat Width	
Standard	0.063-0.071 in. (1.6-1.8 mm)
Maximum	0.098 in. (2.5 mm)
Valve Seat Sink	
Standard	0.0334-0.0453 in. (0.85-1.15 mm)
Maximum	0.071 in. (1.8 mm)
Valve Angle	45°

Piston — 1715

Diameter
- Standard ..... 3.303 in. (83.913-83.928 mm)
- Minimum ..... 3.295 in. (83.7 mm)

Bore Clearance
- Standard ..... 0.0034-0.0041 in. (0.088-0.106 mm)
- Maximum ..... 0.0118 in. (0.3 mm)

Piston Pin Bore
- Standard ..... 0.984-0.9843 in. (24.999-25.003 mm)
- Maximum ..... 0.0985 in. (25.0 mm)

Piston Pin Clearance
- Standard ..... 0.0-0.0002 in (−0.00+0.005 mm)
- Maximum ..... 0.0008 in. (0.02 mm)

Available Oversizes ..... 0.020 in. & 0.040 in. (0.5 mm & 1.0 mm)

Piston Pin

Diameter
- Standard ..... 0.984-0.9843 in. (24.996-25.0 mm)
- Maximum ..... 0.9834 in. (24.98 mm)

Pin-to-Bushing Clearance
- Standard ..... 0.0004-0.001 in. (0.01-0.25 mm)
- Maximum ..... 0.0031 in. (0.08 mm)

Piston Ring

End Gap
- 1st Compression
  - Standard ..... 0.008-0.014 in. (0.2-0.35 mm)
  - Maximum ..... 0.03937 in. (1.0 mm)
- 2nd Compression
  - Standard ..... 0.008-0.016 in. (0.20-0.40 mm)
  - Maximum ..... 0.0397 in. (1.0 mm)

Oil
- Standard ..... 0.008-0.016 in. (0.20-0.40 mm)
- Maximum ..... 0.03937 in. (1.0 mm)

Piston Ring — 1715

Compression Ring to Groove Side Clearance
- 1st Compression
  - Standard ..... 0.0027-0.0043 in. (0.07-0.11 mm)
  - Maximum ..... 0.010 in. (0.25 mm)
- 2nd Compression
  - Standard ..... 0.0015-0.0031 in. (0.04-0.08 mm)
  - Maximum ..... 0.010 in. (0.25 mm)

Oil Ring to Groove Side Clearance
- Standard ..... 0.0008-0.0024 in. (0.02-0.06 mm)
- Maximum ..... 0.006 in. (0.15 mm)

Ring Width
- 1st Compression ..... 0.079 in. (2.0 mm)
- 2nd Compression ..... 0.059 in. (1.5 mm)

Oil ..... 0.157 in. (4.0 mm)

Connecting Rod

Rod Twist
- Standard ..... 0.003 in. (0.08 mm)
- Maximum ..... 0.008 in. (0.2 mm)

Rod Bend
- Standard ..... 0.0020 in. (0.05 mm)
- Maximum ..... 0.0060 in. (0.15 mm)

Connecting Rod Side Play
- Standard ..... 0.004-0.012 in. (0.1-0.3 mm)
- Maximum ..... 0.028 in. (0.7 mm)

Crankshaft Bearing Clearance
- Standard ..... 0.001-0.003 in. (0.035-0.085 mm)
- Maximum ..... 0.008 in. (0.2 mm)

Crankshaft

Journal Diameter
- Standard ..... 2.281-2.282 in. (57.957-57.97 mm)
- Minimum ..... 2.259 in. (57.4 mm)

Crankshaft

Crankpin Diameter
- Standard ..... 1.730-1.731 in. (43.96-43.97 mm)
- Minimum ..... 1.708 in. (43.4 mm)

Runout
- Standard ..... 0.0012 in. (0.03 mm)
- Maximum ..... 0.0024 in. (0.06 mm)

Endplay
- Standard ..... 0.004-0.016 in. (0.1-0.4 mm)
- Maximum ..... 0.019 in. (0.5 mm)

Thrust Washer Thickness
- Standard ..... 0.116-0.118 in. (2.95-3.0 mm)
- Minimum ..... 0.110 in. (2.8 mm)

Cylinder Block Bearing Diameter
- Standard - ID x OD ..... 2.283 x 2.441 in. (58 x 62 mm)
- Maximum - ID ..... 2.289 in. (58.14 mm)

Journal to Cylinder Block Bearing Clearance
- Standard ..... 0.0017-0.0045 in. (0.044-0.116 mm)
- Maximum ..... 0.008 in. (0.2 mm)

Main Journal Regrind Size
- 0.010 undersize (0.25 mm) ..... 2.271-2.272 in. (57.707-57.720 mm)
- 0.020 undersize (0.50 mm) ..... 2.262-2.263 in. (57.457-57.470 mm)

Crankpin Regrind Size
- 0.010 undersize (0.25 mm) ..... 1.721-1.722 in. (43.714-43.725 mm)
- 0.020 undersize (0.50 mm) ..... 1.711-1.712 in. (43.464-43.475 mm)

Center Bearing to Crankshaft Clearance
- Standard ..... 0.0017-0.0040 in. (0.044-0.102 mm)
- Maximum ..... 0.0079 in. (0.2 mm)

Camshaft — 1715

Cam Height — Valve
- Standard: 1.341-1.343 in. (34.065-34.12 mm)
- Minimum: 1.327 in. (33.7 mm)

Bend
- Standard: 0.001 in. (0.03 mm)
- Maximum: 0.004 in. (0.1 mm)

Cam Height — Fuel
- Standard: 1.651-1.656 in. (41.94-42.06 mm)
- Minimum: 1.646 in. (41.8 mm)

Valves

Stem Diameter — Intake
- Standard: 0.2738-0.2744 in. (6.955-6.97 mm)
- Minimum: 0.271 in. (6.89 mm)

Stem Diameter — Exhaust
- Standard: 0.273-0.274 in. (6.94-6.95 mm)
- Minimum: 0.269 in. (6.84 mm)

Guide Clearance — Intake
- Standard: 0.001-0.002 in. (0.03-0.06 mm)
- Maximum: 0.008 in. (0.2 mm)

Guide Clearance — Exhaust
- Standard: 0.002-0.003 in. (0.04-0.065 mm)
- Maximum: 0.010 in. (0.25 mm)

Valve Margin
- Standard: 0.0364-0.0423 in. (0.925-1.075 mm)
- Maximum: 0.0197 in. (0.5 mm)

Valve Lash: 0.008 in. (0.2 mm)

Valve Spring — Free Height
- Standard: 1.378 in. (35 mm)
- Minimum: 1.319 in. (33.5 mm)

Valve Spring — Squareness
- Standard: 0.047 in. (1.2 mm)
- Maximum: 0.079 in. (2.0 mm)

Valves — 1715

Valve Spring — Compressed Height
- Standard: 17.86 lbs. (8.1 kg)@30.4 mm
- Maximum: 15.43 lbs. (7 kg)@30.4 mm

Valve Timing — Intake
- Open Before TDC: 10°
- Close After BDC: 46°

Valve Timing — Exhaust
- Open Before TDC: 46°
- Close After BDC: 16°

Push Rods

Length: 6.854-6.870 in. (174.1-174.5 mm)

Diameter: 0.248 in. (6.3 mm)

Rocker Arm

Shaft Diameter
- Standard ..... 0.4587-0.4594 in. (11.65-11.668 mm)
- Minimum ..... 0.456 in. (11.57 mm)

Shaft to Rocker Clearance
- Standard ..... 0.0013-0.0027 in. (0.032-0.068 mm)
- Maximum ..... 0.008 in. (0.2 mm)

Lubrication System

Pressure Relief Valve
- Opening Pressure ..... 35-50 psi (2.4-3.4 bar)

Rotor to Vane Clearance
- Standard ..... 0.0004-0.006 in. (0.01-0.15 mm)
- Maximum ..... 0.010 in. (0.25 mm)

Rotor to Cover Clearance
- Standard ..... 0.004-0.006 in. (0.1-0.15 mm)
- Maximum ..... 0.008 in. (0.20 mm)

Rotor to Case Clearance
- Standard ..... 0.006-0.009 in. (0.15-0.22 mm)
- Maximum ..... 0.012 in. (0.30 mm)

Cooling System

Type of system ..... Pressurized liquid w/recirculating bypass

Water Pump
- Type ..... Centrifugal
- Drive ..... V-belt
- Belt Deflection (Tension) ..... 7/16 to 9/16 inch (10 to 15 mm) when 20-25 lbs. (9-11 kg) is applied midway between pulleys

Fan Diameter ..... 13.39 in. (340 mm)

Thermostat
- Starts to Open ..... 180°F (82°C)
- Fully Open ..... 203°F (95°C)

Radiator Cap Pressure Rating ..... 13 psi (0.9 bar)

Coolant ..... Ethylene glycol and water in a 50/50 mixture

Capacity ..... Liters - 5.6 Qts. U.S. - 5.9 Qts. Imp. - 4.9

Bolt Torque Values

Description	
Connecting Rod Caps	36.2-39.8 ft.-lbs. (49.0-53.9 Nm)
Flywheel Bolts	43.4-50.6 ft.-lbs. (59.0-69.0 Nm)
Main Bearing Holders	36.2-39.8 ft.-lbs. (49.0-53.9 Nm)
Bearing Holder Retaining Bolts (M10)	36.2-39.8 ft.-lbs. (49.0-53.9 Nm)
Rear Bearing Cover Plate Retaining Bolts	9.4-12.3 ft.-lbs. (12.7-16.7 Nm)
Tachometer Drive Shaft Plate	6.5-9.4 ft.-lbs. (8.8-12.7 Nm)
Crankshaft Pulley Nut	202.5-245.9 ft.-lbs. (274.4-333.2 Nm)
Oil Pump Relief Valve	43.4-50.6 ft.-lbs. (58.8-68.6 Nm)
Front Mounting Bolts	3.62-5.06 ft.-lbs. (4.9-6.86 Nm)
Injection Pump Delivery Valve Holder	28.9-32.5 ft.-lbs. (39.2-44.1 Nm)
Engine Oil Transfer Tube Banjo Bolts	7.2-9.4 ft.-lbs. (9.8-12.7 Nm)
Head Bolts	65.1-68.7 ft.-lbs. (88.2-93.1 Nm)

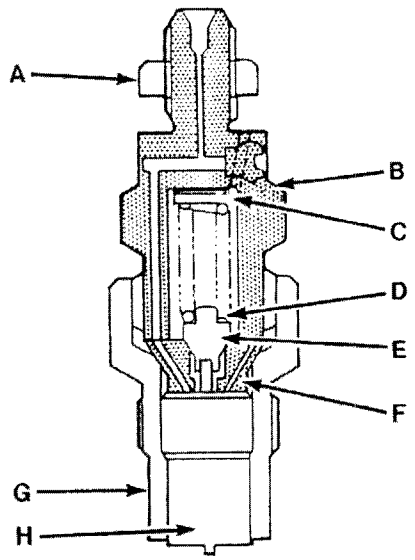
Metric Bolt Torque Specifications

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Pounds-Feet	Newton-Meters	Pitch (mm)	Pounds-Feet	Newton-Meters
M6	4T	1.0	3.6— 5.1	4.9— 6.9	—	—	—
	7T		6.1—8.3	8.3—11.3			
	10T		8.7—11.6	11.8—15.7			
M8	4T	1.25	9.4—12.3	12.7—16.7	1.0	11.2—14.8	15.2—20.1
	7T		16.6—21.0	22.6—28.4		19.5—25.3	26.5—34.3
	10T		21.0—26.8	28.4—36.3		22.4—29.7	30.4—40.2
M10	4T	1.5	18.8—24.6	25.5—33.3	1.25	21.0—26.8	28.4—36.3
	7T		32.5—41.2	44.1—55.9		36.2—46.3	49.0—62.8
	10T		39.8—51.4	53.9—69.9		42.7—54.2	57.9—73.5
M12	4T	1.75	27.5—34.7	37.3—47.1	1.25	31.8—40.5	43.1—54.9
	7T		48.5—61.5	65.7—83.4		55.0—69.4	74.5—94.1
	10T		68.0—85.4	92.2—116		73.1—93.3	99.0—127
M14	4T	2.0	46.3—59.3	62.8—80.4	1.5	51.4—64.4	69.6—87.3
	7T		76.7—96.9	104—131		86.1—109	117—148
	11T		102—129	139—175		108—137	147—186
M16	4T	2.0	63.6—81.0	86.3—110	1.5	67.3—84.6	91.3—115
	7T		110—136	149—184		116—142	157—192
	11T		152—188	206—255		163—199	221—270
M18	4T	2.0	83.9—104	114—141	1.5	95.9—120	313—163
	7T		145—174	196—235		170—206	131—279
	11T		203—246	275—333		221—271	299—368
M20	4T	2.5	106—132	144—179	1.5	127—156	172—211
	7T		177—213	240—289		203—246	275—333
	11T		268—325	363—441		293—358	397—485

SPECIAL TOOLS

	Tool No.
Seal Protector — Timing Gear Cover — Crankshaft	FNH 01584
Driver — Piston Pin	FNH 01585
Valve Guide Seal — Installer	FNH 01587
Driver Handle — Use With Tools FNH 01585 & FNH 01587	FNH 07778
Adaptor — Compression Test	FNH 00120
Engine Oil Pump Installer	FNH 00117
Engine Oil Pump Remover	FNH 11097
Engine Oil Pressure Test Fitting	FNH 00011

SECTION 2
FUEL SYSTEM
INJECTORS



Injector Assembly **Figure 2-1**

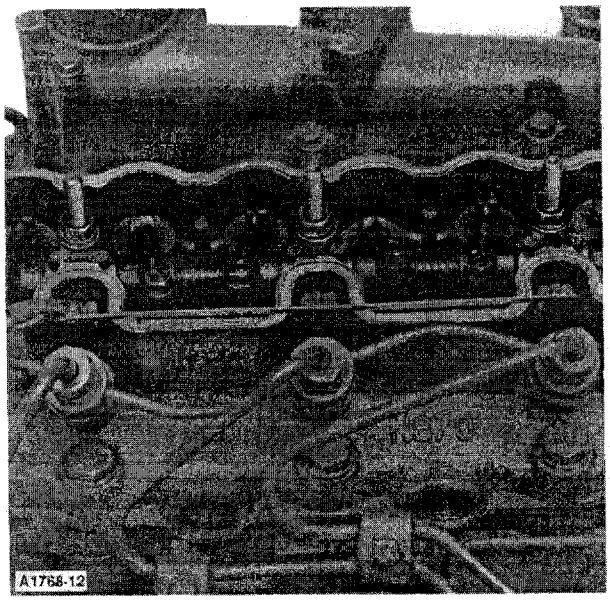
A	Nut	E	Push rod
B	Body	F	Distance piece
C	Shim	G	Nozzle nut
D	Spring	H	Nozzle assembly

DESCRIPTION AND OPERATION

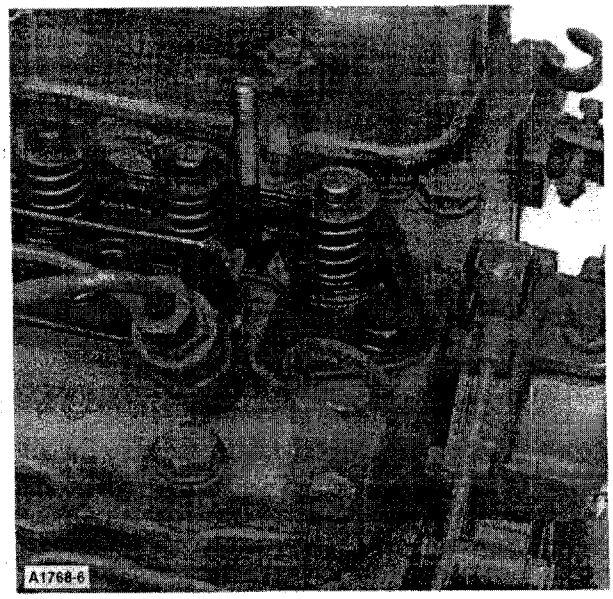
Throttle type injectors are used in all engine applications. The injectors have a 0.039 in. (1.0 mm) single orifice and are set at 2150 psi (148 bar).

The pressure adjustment is made by adding or deleting shims, C, Figure 2-1, from the top of the injector pressure adjusting spring. The throttle type injectors have an injection angle of 4°. The injection pipes are 0.055 in. (1.4 mm) inside diameter and are the same length for each cylinder to keep the injection intervals in time.

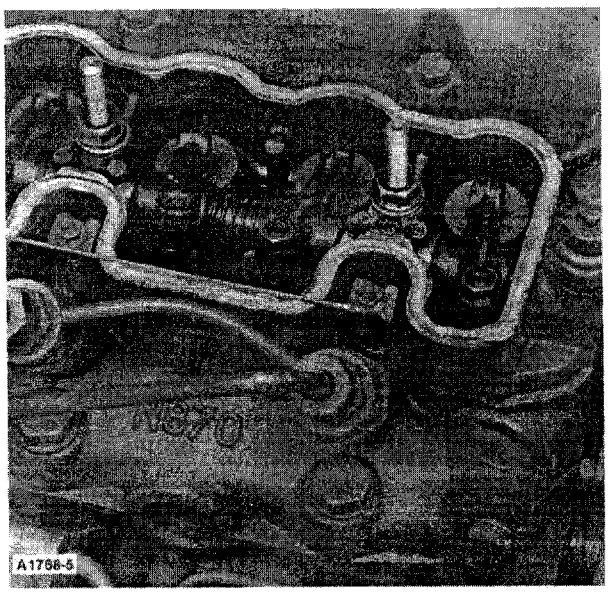
INJECTION PUMP



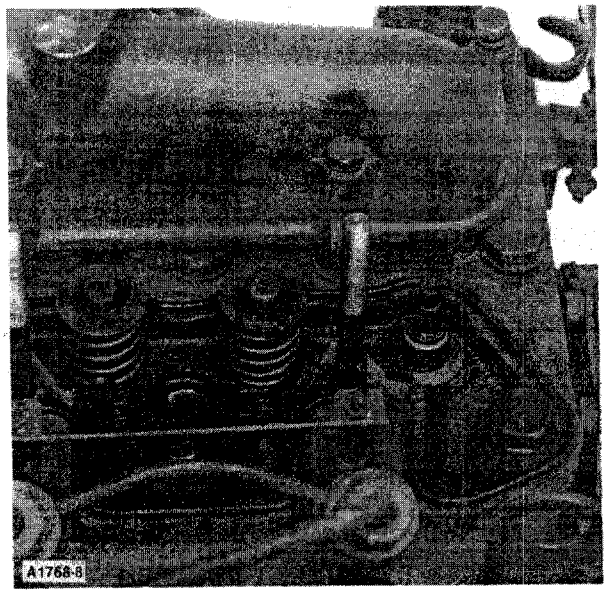
Top of Engine Figure 2-2



No. 1 Cylinder Valves Figure 2-4



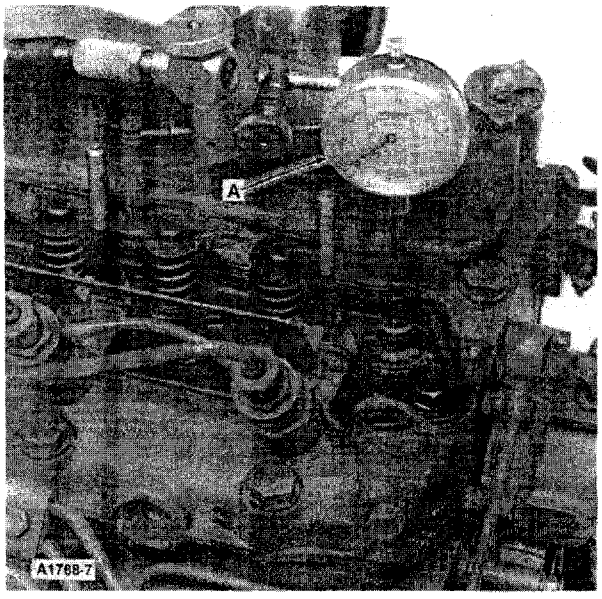
Valve Rocker Arms Figure 2-3



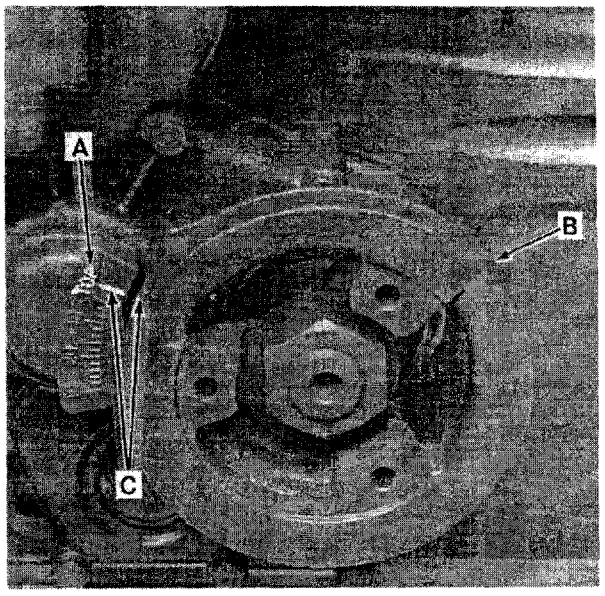
Intake Valve Spring Removed Figure 2-5

INJECTION PUMP SPILL TIMING PROCEDURES

1. Remove the valve cover from the top of the engine, Figure 2-2.
2. Find top dead center of the No. 1 cylinder piston travel. (No. 1 is the closest cylinder to the engine fan.) No. 1 cylinder must be on the compression stroke. (Intake and exhaust rocker arms will be loose.) Figure 2-3.
3. Remove the rocker arm housing and rocker arm assembly from the engine, Figure 2-4.
4. Remove the keepers and spring from No. 1 cylinder intake valve, Figure 2-5.



Dial Indicator **Figure 2-6**
A. Dial indicator



"Top" Mark **Figure 2-7**
A. "Top" mark
B. Crankshaft pulley
C. Timing marks

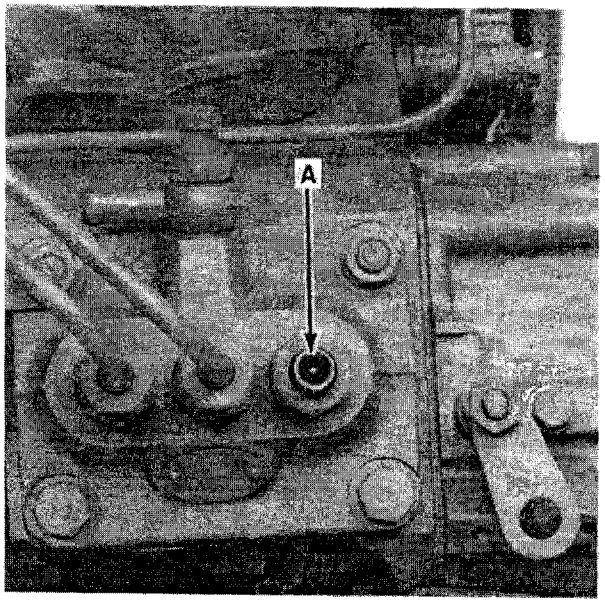
5. To verify true top dead center of piston travel, install a dial indicator, A, Figure 2-6, on the valve stem. Be sure the valve stem is sitting on top of the piston. Rotate the crankshaft until the indicator needle reverses direction. The point the needle reverses direction is true top dead center. At this time verify that the timing mark on the crankshaft pulley, B, Figure 2-7, is in-line with the "TOP" mark, A, on the timing scale.

   If the mark on the crankshaft pulley is not in-line with the "TOP" mark, verify piston top dead center. If the pulley mark is slightly off, remark the pulley and proceed.

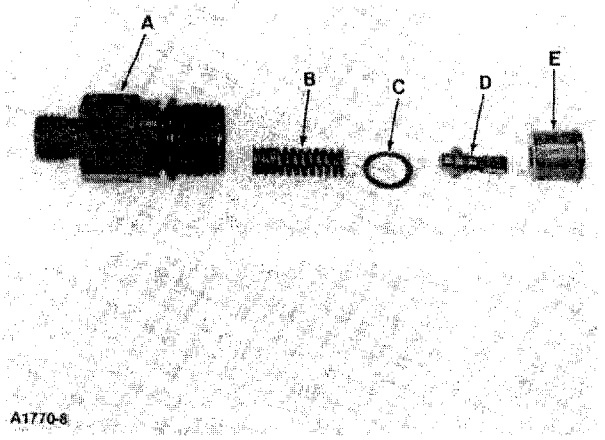
   NOTE: Color the timing mark on the crankshaft pulley and appropriate marks on the timing scale to increase visibility.

6. Reinstall the valve spring, keepers, rocker arm assembly, housing and valve cover.

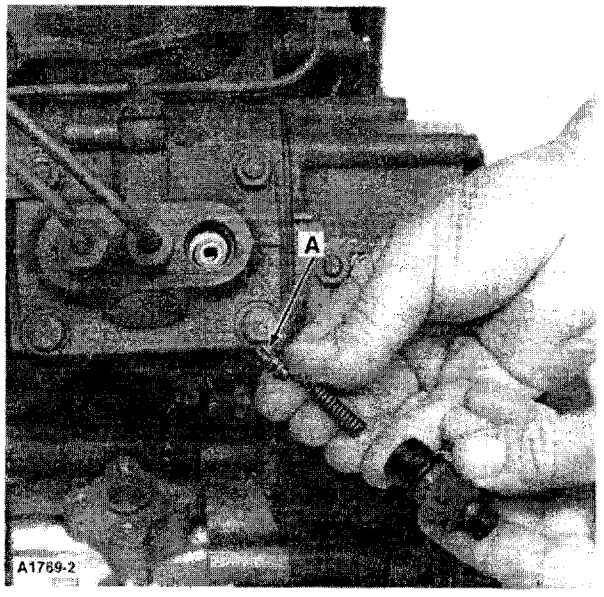
7. Shut off the fuel supply to the injection pump at the fuel filter.



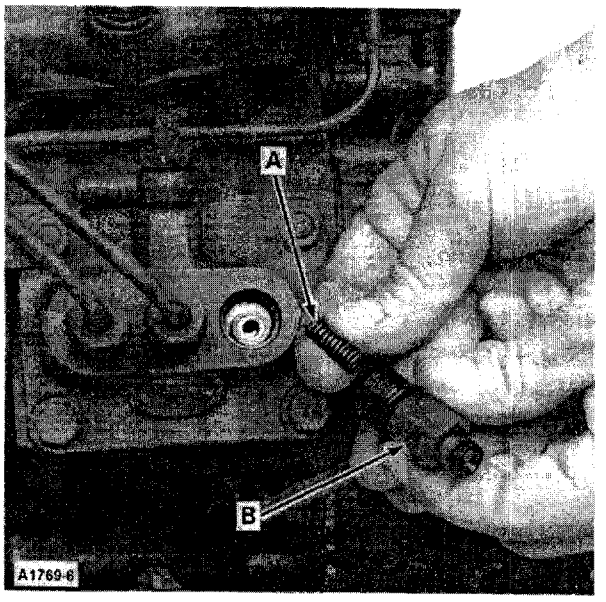
No. 1 Injection Pump Port **Figure 2-8**
A. No. 1 injection pump port



Delivery Valve Parts Identification **Figure 2-10**
A. Holder
B. Spring
C. Washer
D. Piston
E. Delivery valve seat



Delivery Valve Piston **Figure 2-9**
A. Piston



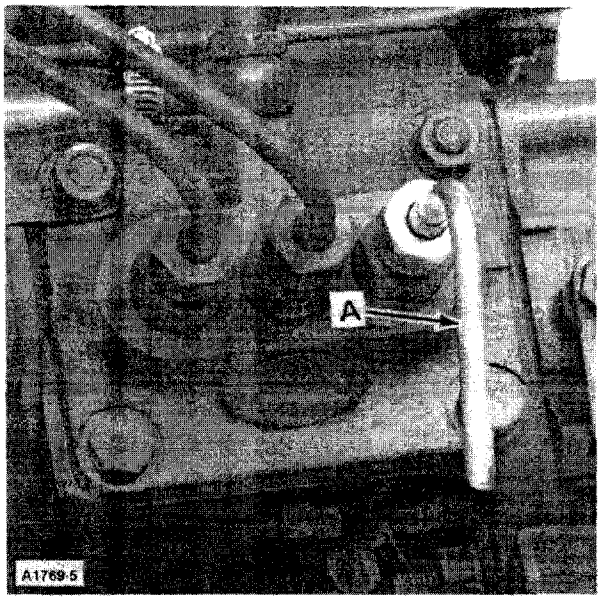
Spring and Holder Assembly **Figure 2-11**
A. Spring
B. Holder

8. Remove the No. 1 injection line, Figure 2-8.

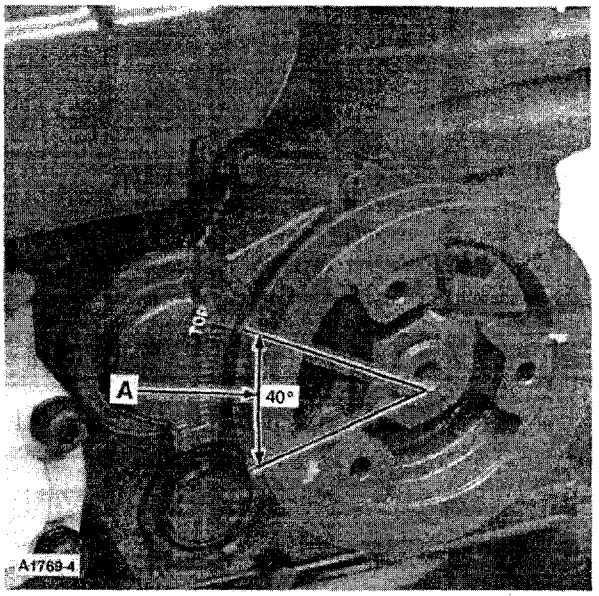
9. Remove the delivery valve piston, A, Figure 2-9, from No. 1 delivery valve.

10. Refer to Figure 2-10, for parts identification.

11. Reinstall the spring, A, Figure 2-11, and holder, B, into the injection pump, and tighten the holder securely.

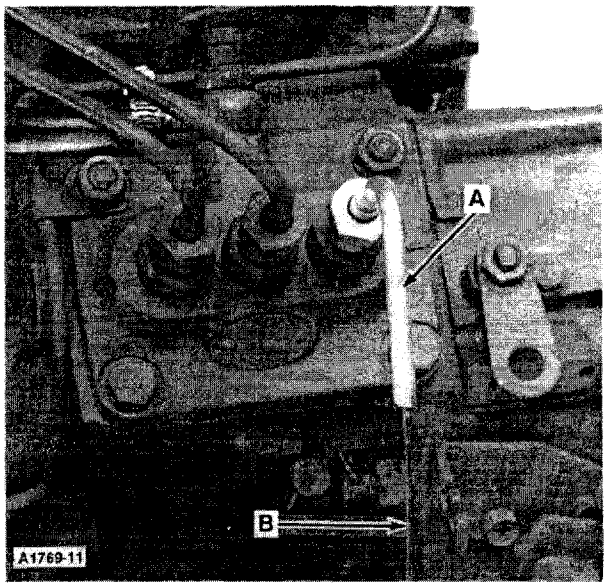


Spill Tube **Figure 2-12**
A. Spill tube

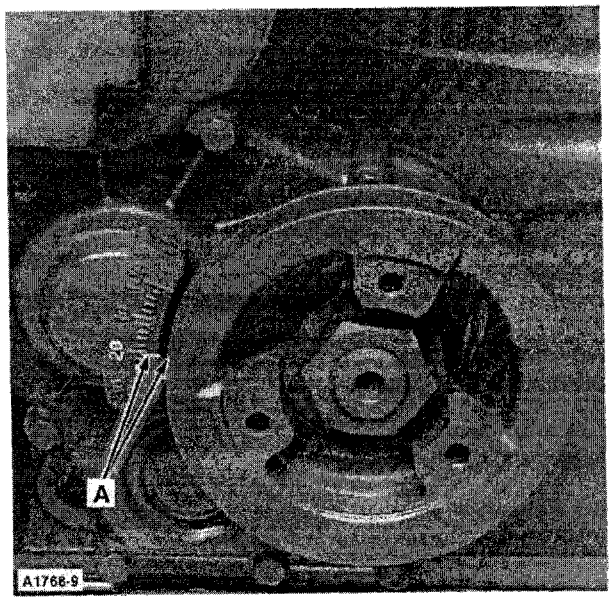


Crankshaft Rotated **Figure 2-13**
A. 40°

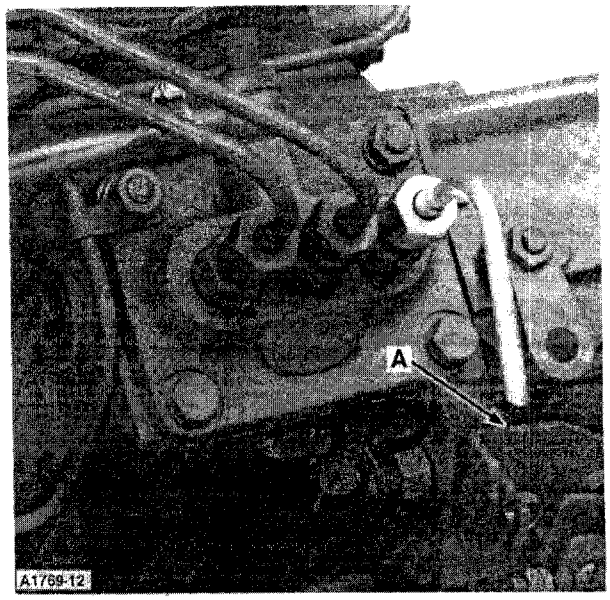
12. Fabricate a spill tube, A, Figure 2-12, from a discarded injection line and install the tube on the No. 1 port on the injection pump.
13. Move the throttle to the wide open position.
14. Rotate the crankshaft counterclockwise (viewed from the front of the engine) approximately 40 degrees, Figure 2-13.
15. Turn on the fuel supply to the injection pump. Fuel, A, Figure 2-14, should flow out of spill tube, B, on the No. 1 cylinder port.



Fuel Flow **Figure 2-14**
A. Fuel flow
B. Spill tube



Timing Marks **Figure 2-15**
A. Timing marks



Fuel Not Flowing **Figure 2-16**
A. No fuel flow

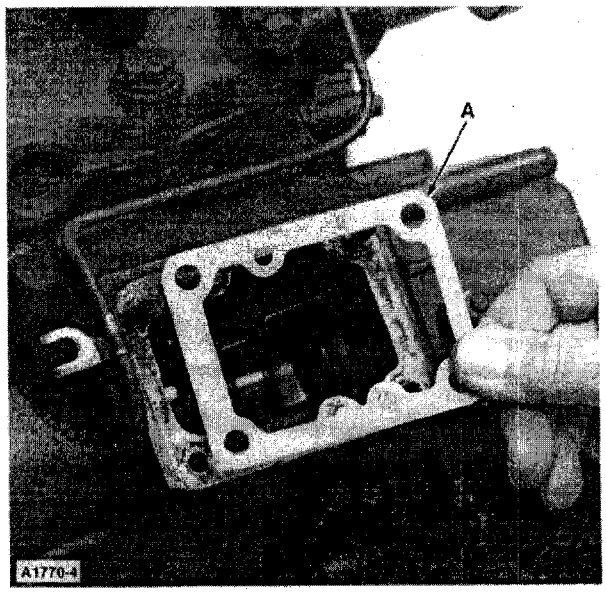
16. Rotate the crankshaft clockwise. When the timing mark on the crankshaft pulley is in-line with the 21 to 23 degree marks on the timing scale, A, Figure 2-15, fuel should stop flowing from the spill tube, as shown in Figure 2-16.

17. If fuel does not stop flowing at the appropriate timing mark, the injection pump timing must be adjusted by adding or removing shims, A, Figure 2-17, located between the injection pump and engine block.

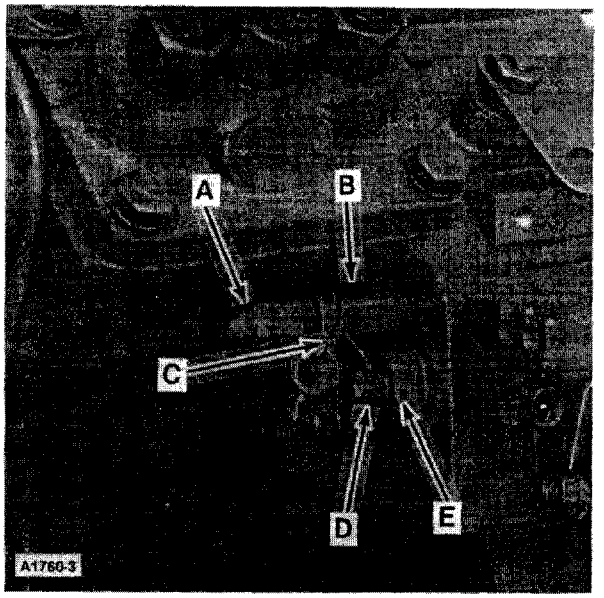
18. Adding shims will retard the pump timing and removing shims will advance the pump timing.

    NOTE: A shim thickness of 0.010" (0.25 mm) will change the pump timing by 1 degree.

19. Assemble all components that were removed from the engine and fuel system.



Injection Pump Shims **Figure 2-17**
A. Shims



Smoke Screw and High Idle Adjustment Figure 2-18

A. Acorn nut
B. Jam nut
C. Seal wire
D. High idle screw
E. Jam nut

SMOKE SCREW ADJUSTMENT PROCEDURE

Refer to Figure 2-18

1. Cut the seal wire, C, from the smoke screw assembly.
2. Loosen long jam nut, B.
3. To determine the correct fuel adjustment, have the engine at operating temperature. Starting at low idle position, accelerate the engine to high idle. During this acceleration you should observe a slight amount of black exhaust smoke. If the smoke is not present, turn the acorn nut, A, counterclockwise to increase the fuel and smoke. If the smoke is excessive, turn the acorn nut clockwise to decrease the fuel and smoke. The correct adjustment is only obtained by smoke observation and acceleration performance.
4. Tighten the long jam nut, B.

NOTE: If the smoke screw is turned excessively in the clockwise direction, a lack of engine rpm and a flat acceleration will be present.

If the smoke screw is turned excessively in the counterclockwise direction, excessive smoke will be present and engine damage may occur due to an overfuel condition.

HIGH IDLE ADJUSTMENT

Refer to Figure 2-18

1. Cut the seal wire, C, from the high idle adjustment screw, D.
2. Loosen jam nut, E.
3. Turn the adjustment screw, D, counterclockwise to increase rpm and clockwise to decrease rpm. Determine the correct high idle position by the tachometer reading on the tractor. The 1715 tractor engine should have a high idle (no load) speed of 2800 rpm.
4. Tighten jam nut, E.
5. Install a new seal wire.

SPECIFICATIONS

Fuel Injection Pump (Field check)

Use the following standards when checking, adjusting or rebuilding the fuel injection pump.

Standards for Injection Pump Adjustment

Model of Engine

J843

Pump Assembly Item No.

No. 104135-3010 Model 1715

Standards for Adjusting the Injection Pump

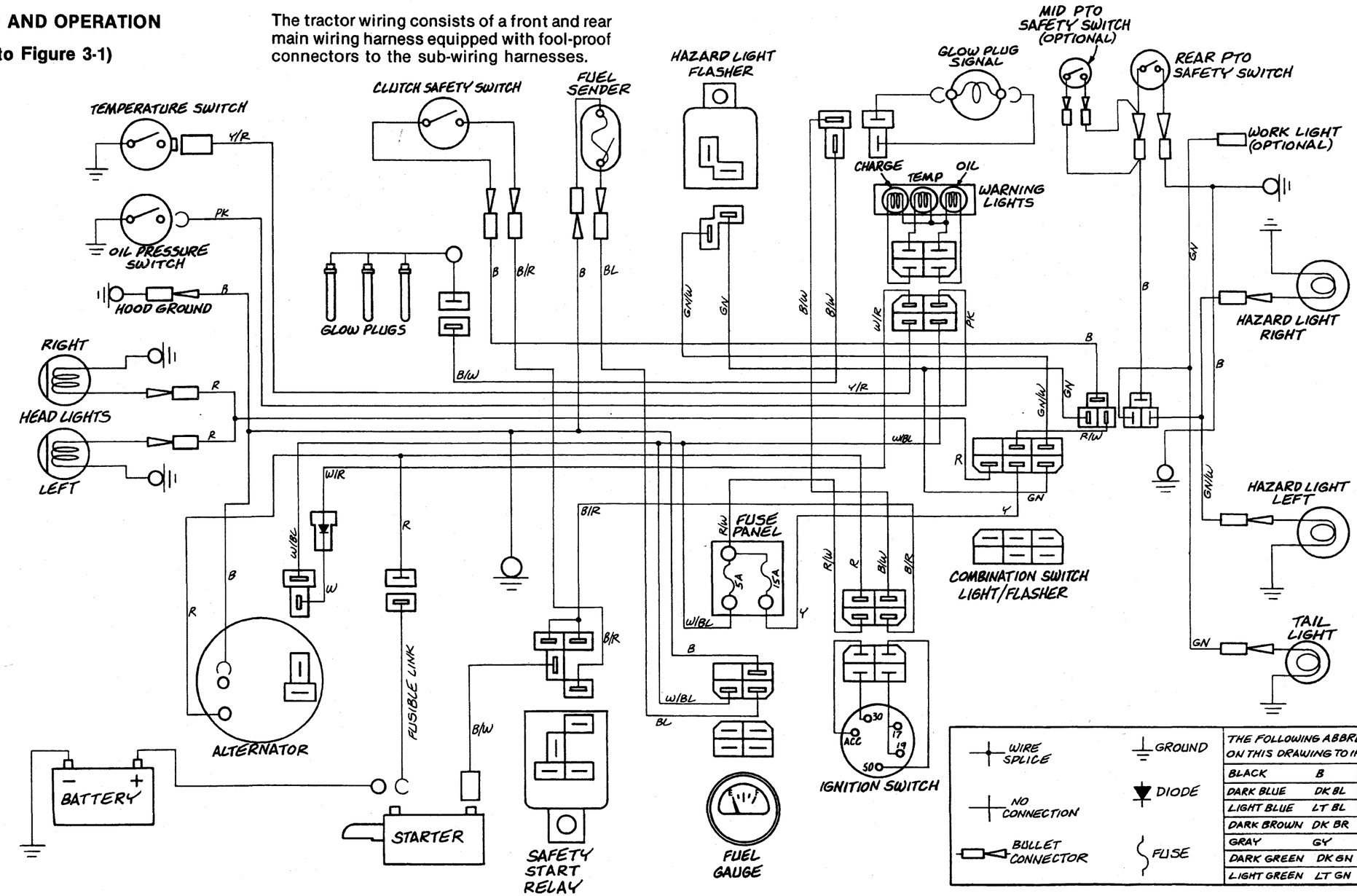
1. Rotating direction . . . . Clockwise when observed from the driving side
2. Nozzle NPDN4PDN117
3. Nozzle holder 1051481170
4. Nozzle valve opening pressure: . . . . . 2150 ± 71 psi (148 bar)
5. Injection pipe: 0.55 in. x 0.236 in. O.D. x 13.4 in. length (1.4 mm x 6 mm O.D. x 340 mm length)
6. Oil flowing pressure . . . . . 2.8 psi (0.19 bar)
7. Test oil . . . . . Light oil

SECTION 3
ELECTRICAL SYSTEM

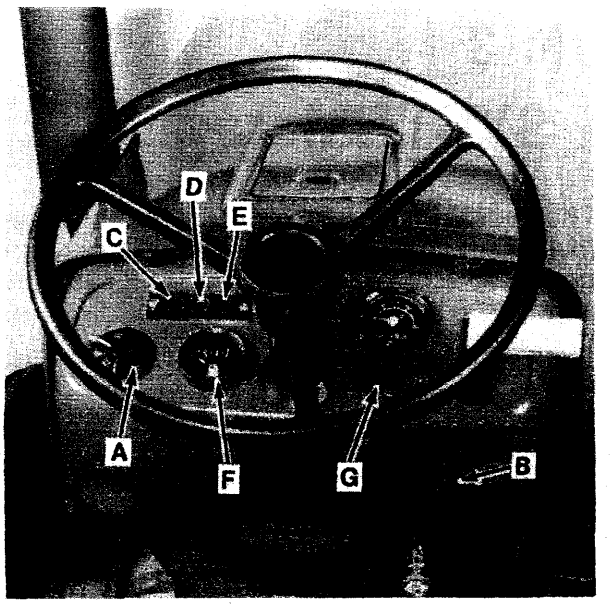
DESCRIPTION AND OPERATION

Wiring (Refer to Figure 3-1)

The tractor wiring consists of a front and rear main wiring harness equipped with fool-proof connectors to the sub-wiring harnesses.



Electrical Diagram — Figure 3-1



Instrument Panel **Figure 3-2**

A Combination switch (headlamp/flasher)
B Key start switch
C Alternator warning lamp
D Temperature warning lamp
E Engine oil pressure warning lamp
F Fuel gauge
G Glow plug indicator

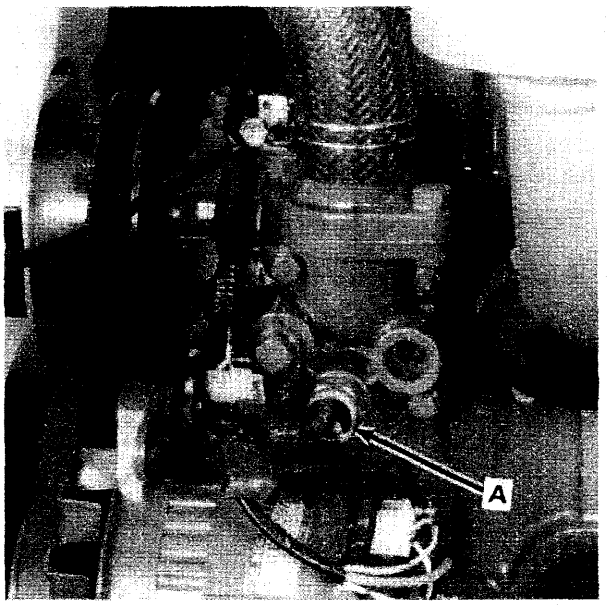
Headlamp Switch

The headlamp switch, A, Figure 3-2, is a dial switch. Turn the dial counterclockwise to turn the switch off. Turning the dial clockwise energizes the headlamps and tail lamps. The lamp switch also energizes the flasher switch when in the "ON" position.

Flasher Warning Switch

The flasher warning lamp switch is combined with the headlamp switch, A, Figure 3-2, and is located on the instrument panel.

NOTE: The headlamp switch must be in the "ON" position before the flasher will operate.



Coolant Temperature Switch **Figure 3-3**

A Coolant temperature switch

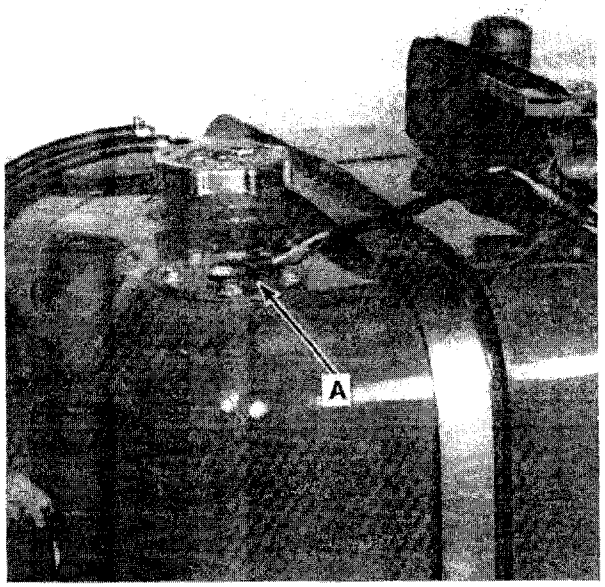
Coolant Temperature Switch

The coolant temperature switch, A, Figure 3-3, senses coolant overheating, which closes the switch and illuminates the warning lamp, D, Figure 3-2, on the instrument panel.

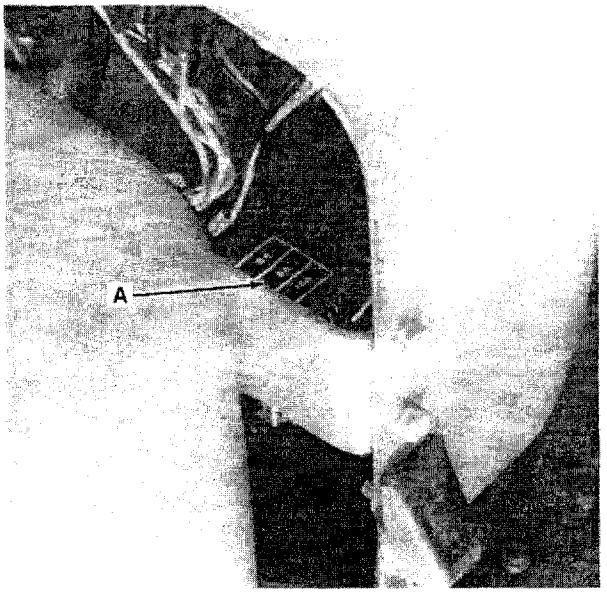
Oil Pressure Switch

The oil pressure switch is located on the top front side of the engine. The switch opens under normal oil pressure and closes at low oil pressure to illuminate the warning lamp, E, Figure 3-2, on the instrument panel.

The warning lamp should illuminate when the key switch is turned on and go out when the engine is started. If the lamp does not go out, check the engine oil level first before checking for a malfunction of the switch and engine oil pump.



Fuel Tank Sender **Figure 3-4**
A Fuel Tank Sender



Fuse Box **Figure 3-5**
A Fuse box

Fuel Gauge Sender

The fuel level sensor unit, A, Figure 3-4, is mounted on the top of the fuel tank. The sensor float moves up and down with the fuel level in the tank while changing the resistance in the fuel gauge circuit. The pointer indicates the fuel level in the tank.

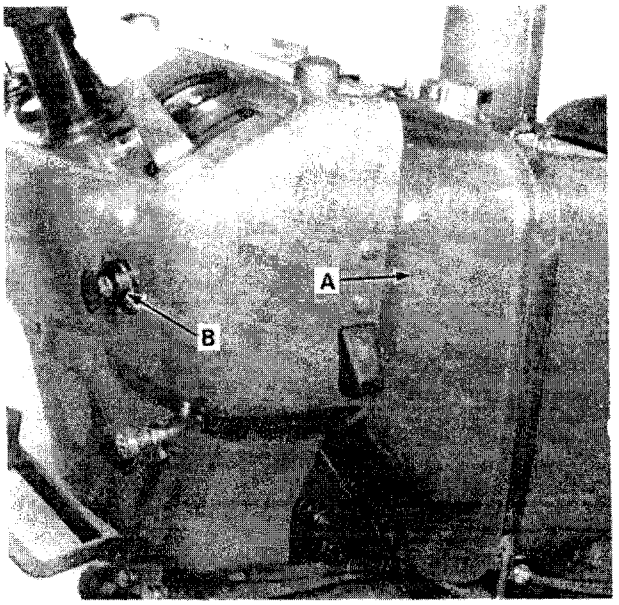
The fuel gauge, F, Figure 3-2, is located on the instrument panel.

FUSES

The fuse box, A, Figure 3-5, is located on the back side of the instrument panel.

One 15 amp fuse protects the headlamp and hazard circuits and the fuel gauge.

One 5 amp fuse protects the warning lamps and alternator.



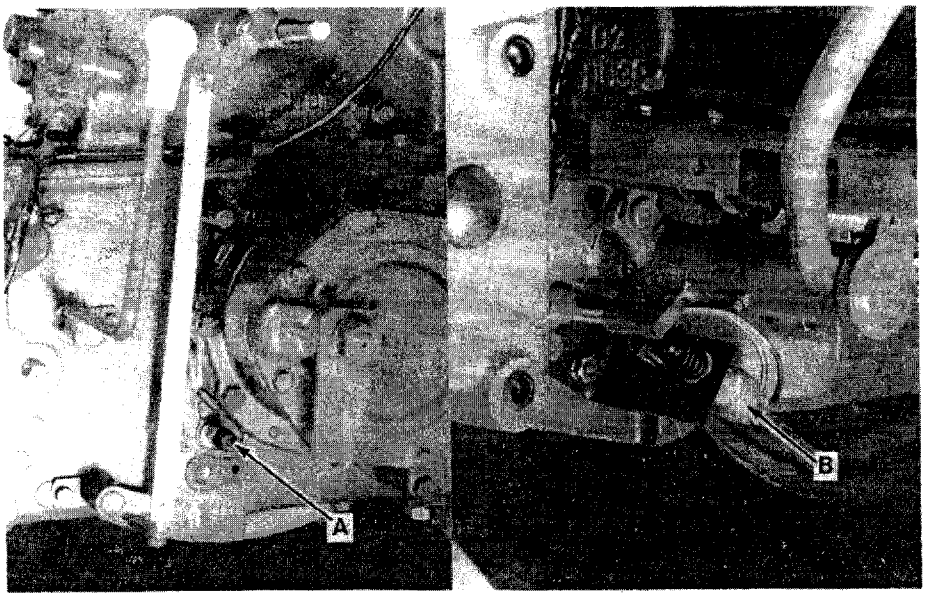
Key Start Switch **Figure 3-6**
A Fuel tank
B Key start switch

KEY START SWITCH — REMOVAL

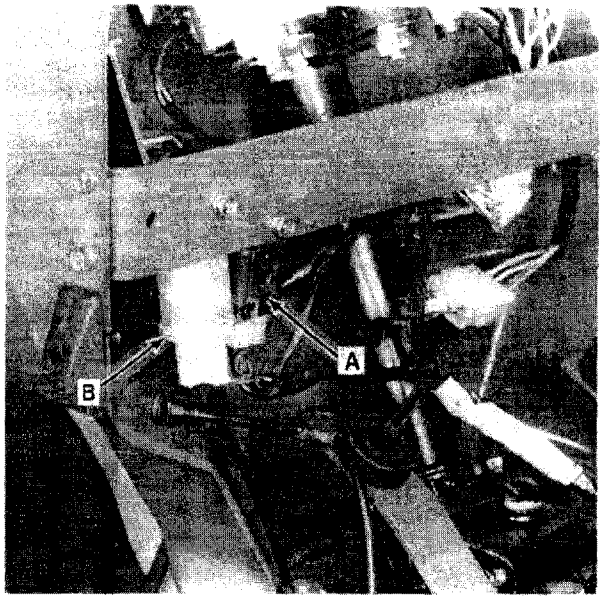
1. Remove the fuel tank, A, Figure 3-6.
2. Remove the retaining nut and the switch, B.

KEY START SWITCH — INSTALLATION

1. Position the switch in the rear hood and secure with a nut, Figure 3-6.
2. Install the fuel tank.



Neutral Start Switches **Figure 3-7**
A Neutral start switch — PTO
B Neutral start switch — clutch pedal



Starting Relay **Figure 3-8**
A Starting relay
B Flasher relay

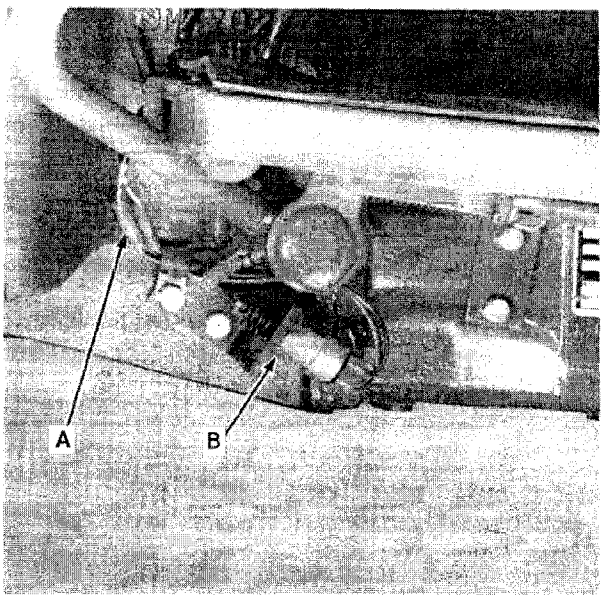
NEUTRAL START SWITCHES

The neutral start switches open and close the circuit between the key start switch and the starting relay switch, A, Figure 3-8.

The relay switch is located on the back side of the instrument panel bracket. The neutral switches are normally open and are closed by positioning the PTO lever in neutral and fully depressing the clutch pedal.

Neutral Start Switch — Removal (Clutch Pedal)
Refer to Figure 3-9

1. Disconnect the wire connectors, A.
2. Unscrew the jam nut, B, and remove the switch assembly.



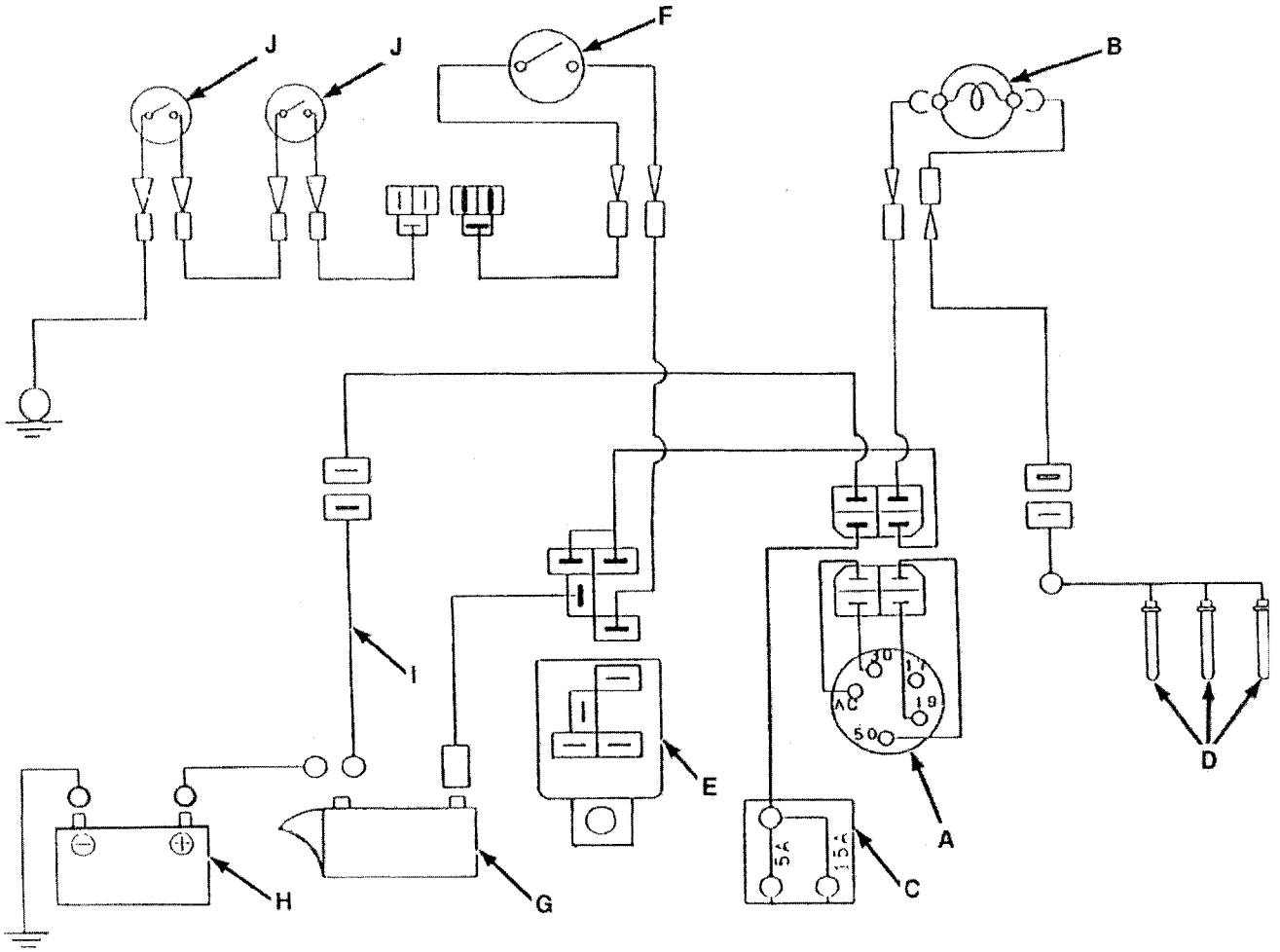
Neutral Start Switch — Removal (Clutch Pedal) **Figure 3-9**
A Electrical connector
B Jam nut

Neutral Start Switch — Installation (Clutch Pedal)

1. Position the switch in the bracket and thread in until approximately flush with the inside of the bracket.
2. Adjust the switch as follows:
   A. Connect an ohmmeter across the switch terminals.
   B. Fully depress the clutch pedal.
   C. With the clutch pedal depressed, move the switch forward until the ohmmeter indicates that the switch contacts are closed.
3. Tighten the jam nut.
4. Recouple the electrical connector.

Neutral Start Switch — Operation

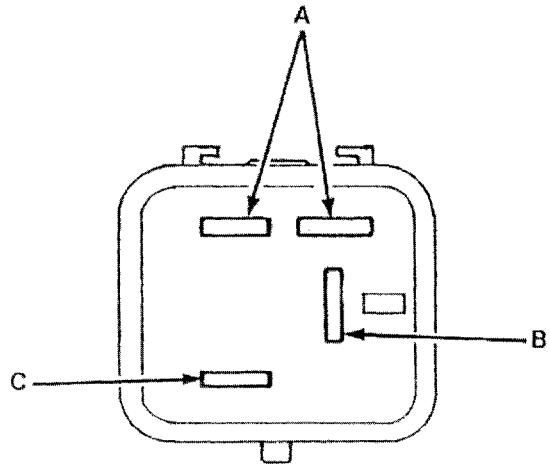
Refer to Figure 3-10 for Neutral Start Switch Operation



Neutral Start Switch Operation

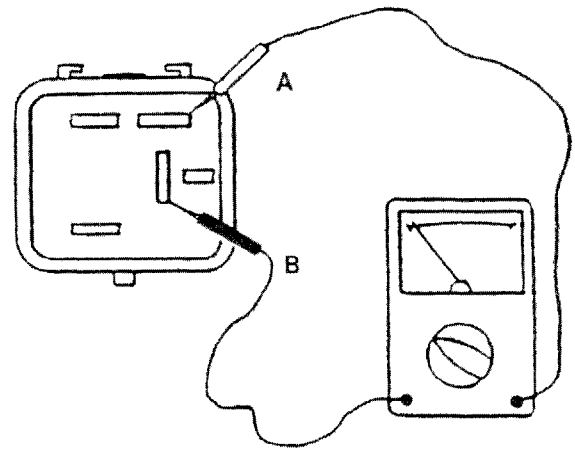
Figure 3-10

A	Key start switch	D	Glow plugs	G	Starter	J	PTO safety start switches
B	Glow plug indicator	E	Starter relay	H	Battery		
C	Fuse box	F	Transmission neutral start switches	I	Fusible link		



Relay Terminal Identification **Figure 3-11**

A From key start switch "Terminal 50"
B To starter motor
C From safety start switches



Relay Switch Check (Without Battery) **Figure 3-12**

A Terminal No. 1 relay contact
B Terminal No. 2 relay contact

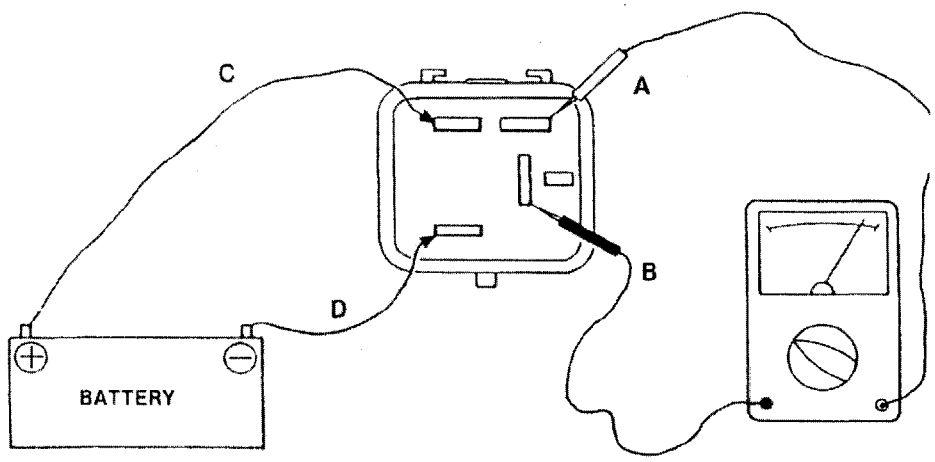
RELAY — REMOVAL

1. Remove the fuel tank.
2. Disconnect the relay wiring, Figure 3-8.
3. Remove the relay mounting bolt and the relay.

RELAY — INSPECTION

Check the relay contact switch as follows:

1. Identify the terminals of the relay as shown in Figure 3-11.
2. Using an ohmmeter, connect the ohmmeter leads to the relay terminals marked A and B, and observe the ohmmeter reading, Figure 3-12.



Relay Switch Check (With Battery) **Figure 3-13**

A Terminal No. 1 relay contact
B Terminal No. 2 relay contact
C Relay terminal from key start switch (positive battery terminal test)
D Relay terminal from safety start switches (negative battery terminal test)

Test Results

High resistance reading = Good.

Low resistance reading = Faulty contacts — replace relay.

If a high resistance reading is observed, use jumper wires and connect the relay to the battery and recheck the contact switch operation as follows:

1. Connect the battery positive lead to the relay terminal marked C, and the negative lead to relay terminal D, Figure 3-13.
2. Using the ohmmeter connected across terminals A and B, recheck the contact switch operation.

Test Results

Low resistance reading = Good.

High resistance reading = Faulty relay — replace.

Installation

Installation follows the removal procedure in reverse.

SPECIFICATIONS

Battery

Amp-Hr. Capacity	70
Voltage	12
No. of Cells	6
Ground Polarity	Negative

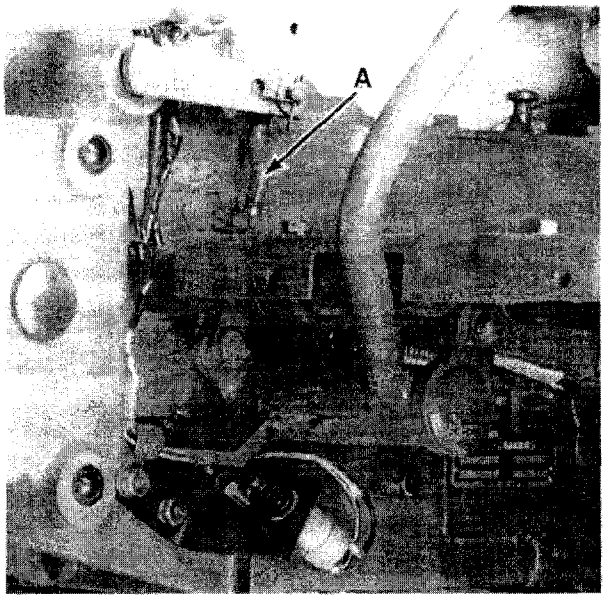
Starter Motor

Clutch	Overrunning
Current Draw	
No Load	130 Amp.
RPM — No Load Bench Test	4000
Armature Shaft — Max. Runout	0.002 in. (0.05 mm)
Commutator Runout	0.002 in. (0.05 mm)
Commutator Diameter — Minimum	1.26 in. (32 mm)
Commutator — Insulation Minimum Depth	0.008 in. (0.2 mm)
Brush Minimum Length	0.433 in. (11 mm)

Alternator

Model	Mitsubishi
Rating	35 Amps at 12 Volts Max
Rotor Coil Resistance	3-4 ohm at 68°F (20°C)
Stator Coil Resistance	0.14 ohm at 68°F (20°C)
Slip Ring — Std. Diameter	1.299 in. (33 mm)
Slip Ring Wear Limit	1.276 in. (32.4 mm)
Brush Length	
Std	0.71 in. (18 mm)
Wear Limit	0.315 in. (8 mm)
Drive Belt Tension	0.19 in. (5 mm)

SECTION 4
CLUTCH SYSTEM



Clutch Free-Play Adjustment **Figure 4-1**
A Adjustment rod

CLUTCH FREE-PLAY ADJUSTMENT

The only single clutch adjustment required is to check the clutch pedal free travel. This is the amount of pedal movement from the fully released position to the point where resistance is first encountered.

1. Remove the cotter pin securing the adjustment rod, A, Figure 4-1, to the bell crank.
2. Lengthen or shorten the clevis to obtain 0.79-1.18 in. (20-30 mm) of free-play in the pedal travel.
3. Reposition the adjustment rod to the bellcrank and secure with a new cotter pin.

CLUTCH LINKAGE COMPONENTS — OVERHAUL

Remove the clutch pedal linkage using Figure 4-1 as a reference. The remaining components are identical to the 1520 Tractor. Use the 13, 15, and 1720 Repair Manual #40132030 as a reference.

SPECIFICATIONS

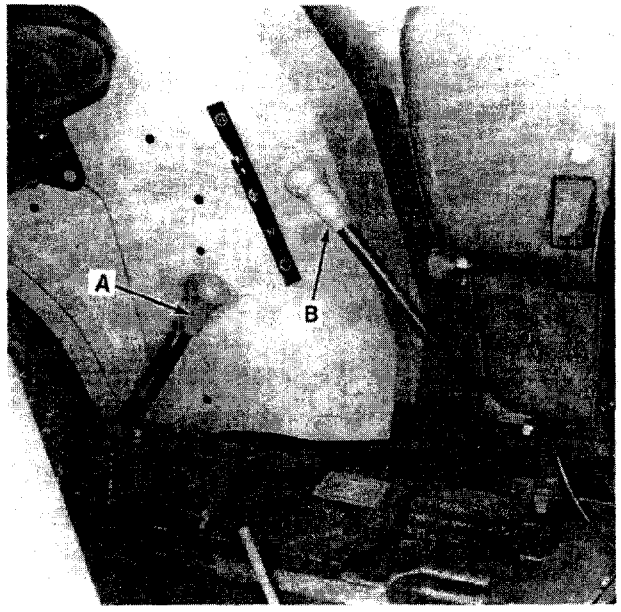
ITEM	SINGLE CLUTCH
No. of Clutch Plates	**1 (2 Facings)**
Standard clutch pedal free-play	0.79-1.18 in. (20-30 mm)
Maximum allowable free-play	1.57 in. (40 mm)

Bolt Torques

Flywheel Mounting Bolts . . . . 43.4-51 lbs.-ft. (59-69 N·m)

Clutch Mounting Bolts . . . . . 16.6-21 lbs.-ft. (22.6-28.4 N·m)

SECTION 5
TRANSMISSION SYSTEM



Shift Levers **Figure 5-1**

A Range shift lever
B Main shift lever

DESCRIPTION AND OPERATION

The standard 9 x 3 gear transmission is a three range gearbox with each range having three forward and one reverse speed, for a total of nine forward and three reverse speeds.

Two gearshift levers control the operation of the transmission.

The range selector lever, A, Figure 5-1, controls operation of the range transmission.

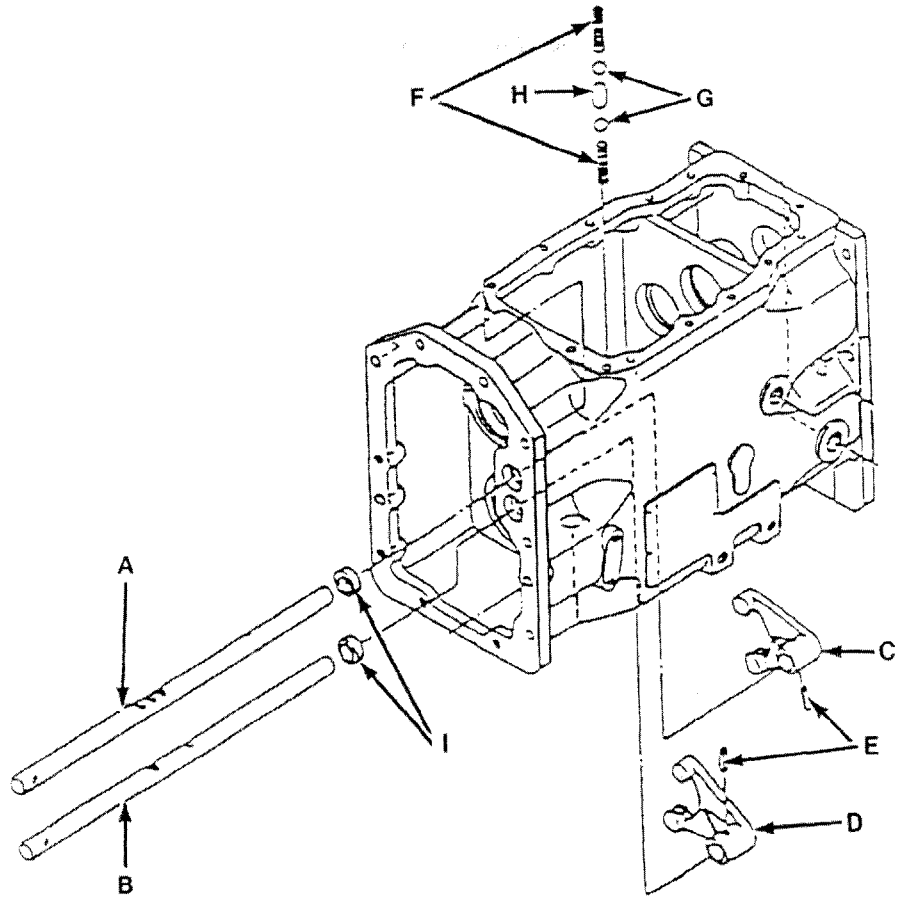
The main shift lever, B, controls the three forward and one reverse speeds of the main transmission.

Transmission Oil Fill **Figure 5-2**

A Fill plug
B Dipstick

The transmission housing is a part of a common oil reservoir which provides gear lubricant for the differential, transmission, and hydraulic system. The oil used is FNH 134 or equivalent.

The oil fill plug, A, Figure 5-2, is located on the rear of the hydraulic lift cover. The oil level dipstick, B, is located on the transmission cover.



Main Gear Shaft Rod Removal **Figure 5-3**

A	Shifter rod (2-R)	D	Shifter fork (1-3)	G	Detent ball
B	Shifter rod (1-3)	E	Roll pin	H	Balk pin
C	Shifter fork (2-R)	F	Detent spring	I	Oil seals

MAIN GEARSHIFT ROD — REMOVAL
Refer to Figure 5-3

1. Remove the upper detent spring, F. Using a small pencil type magnet, remove the detent ball, G.

2. Drive the roll pin, E, out of the shift fork, C.

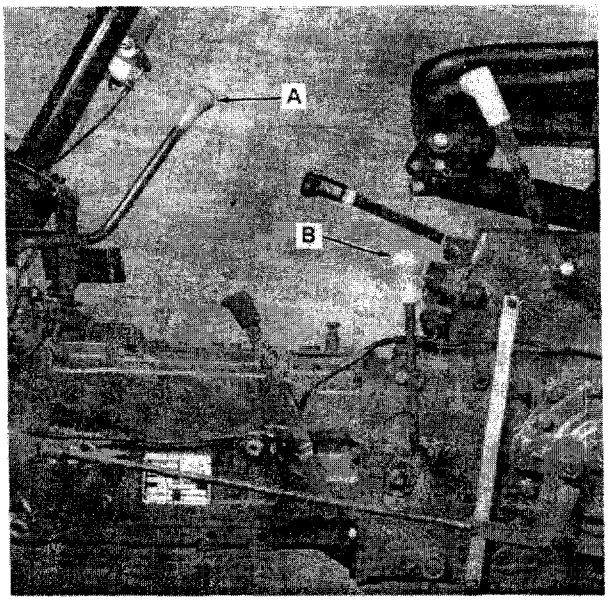
3. Remove the top shift rod, A, sliding it forward out of the housing. Remove the fork, C, and interlock (balk) pin, H.

NOTE: The lower shift rod must be in neutral before the upper shift rod can be removed.

4. Drive the roll pin out of the second shift fork, D, and slide the shift rod forward out of the housing.

NOTE: Use care not to lose the detent spring and ball as they will be expelled with considerable force when released by the shift rod.

5. Remove the lower detent ball, G, and spring, F.



Shift Levers **Figure 5-4**

A Main shift lever
B Range shift lever

SHIFT LEVERS

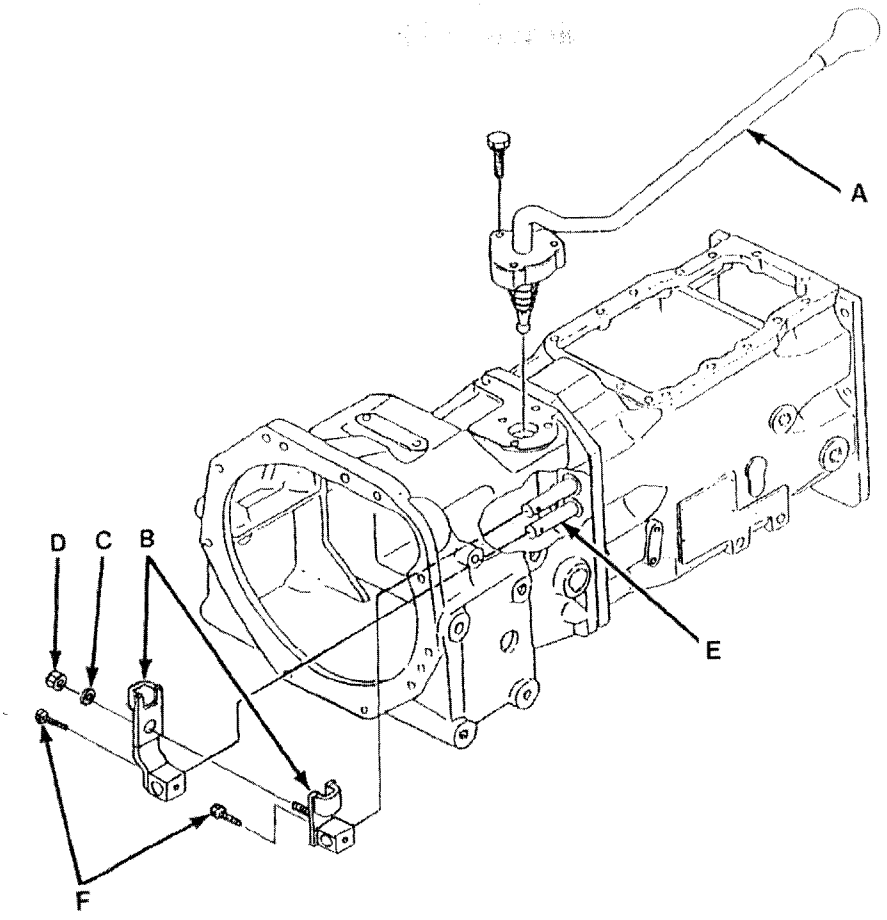
The transmission utilizes two shift levers.

The main transmission shift lever, A, Figure 5-4, is mounted on the clutch housing and controls the three forward and one reverse main gear speeds.

The range gear shift lever, B, Figure 5-4, is located to the left of the operator's seat and controls high, low and mid-range gear ratios of the main transmission.

MAIN TRANSMISSION SHIFT LEVER — OVERHAUL

Remove the retaining bolts, the lever, A, Figure 5-5, and the cover from the clutch housing as an assembly



Shift Linkage **Figure 5-5**

A	Shift lever	C	M10 flat washer	E	Shift rods
B	Shift arms	D	M10 locknut	F	Retaining bolt

ADJUSTMENT OF SHIFT ARMS

1. Install shift arms, B, on rods, E. Secure with bolts, F.

2. Install flat washer, C, and locknut, D, on the stud of the shift arm. Tighten locknut, D, until a gap of 0.080" (2 mm) is obtained between the two shift arms.

SPECIFICATIONS

9 x 3 Gear Transmission

Gear Backlash ..... 0.0016-.0063 in. (0.04-0.16 mm)
Wear Limit ..... 0.0236 in. (0.6 mm)
Clearance Between Slide Gear and Shifter Fork ..... 0.008-0.016 in. (0.2-0.4 mm)
Wear Limit ..... 0.0394 in. (1.0 mm)
Clearance Between Shifter Rod and Housing Bearing ..... 0.0012-0.0039 in. (0.03-0.1 mm)
Wear Limit ..... 0.0018 in. (0.3 mm)

BOLT TORQUE SPECIFICATIONS

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Pounds-Feet	Newton-Meters	Pitch (mm)	Pounds-Feet	Newton-Meters
M6	4T	1.0	3.6— 5.1	4.9— 6.9	—	—	—
	7T		6.1—8.3	8.3—11.3			
	10T		8.7—11.6	11.8—15.7			
M8	4T	1.25	9.4—12.3	12.7—16.7	1.0	11.2—14.8	15.2—20.1
	7T		16.6—21.0	22.6—28.4		19.5—25.3	26.5—34.3
	10T		21.0—26.8	28.4—36.3		22.4—29.7	30.4—40.2
M10	4T	1.5	18.8—24.6	25.5—33.3	1.25	21.0—26.8	28.4—36.3
	7T		32.5—41.2	44.1—55.9		36.2—46.3	49.0—62.8
	10T		39.8—51.4	53.9—69.9		42.7—54.2	57.9—73.5
M12	4T	1.75	27.5—34.7	37.3—47.1	1.25	31.8—40.5	43.1—54.9
	7T		48.5—61.5	65.7—83.4		55.0—69.4	74.5—94.1
	10T		68.0—85.4	92.2—116		73.1—93.3	99.0—127
M14	4T	2.0	46.3—59.3	62.8—80.4	1.5	51.4—64.4	69.6—87.3
	7T		76.7—96.9	104—131		86.1—109	117—148
	11T		102—129	139—175		108—137	147—186
M16	4T	2.0	63.6—81.0	86.3—110	1.5	67.3—84.6	91.3—115
	7T		110—136	149—184		116—142	157—192
	11T		152—188	206—255		163—199	221—270
M18	4T	2.0	83.9—104	114—141	1.5	95.9—120	313—163
	7T		145—174	196—235		170—206	131—279
	11T		203—246	275—333		221—271	299—368
M20	4T	2.5	106—132	144—179	1.5	127—156	172—211
	7T		177—213	240—289		203—246	275—333
	11T		268—325	363—441		293—358	397—485

SECTION 6
POWER TAKE-OFF SYSTEMS

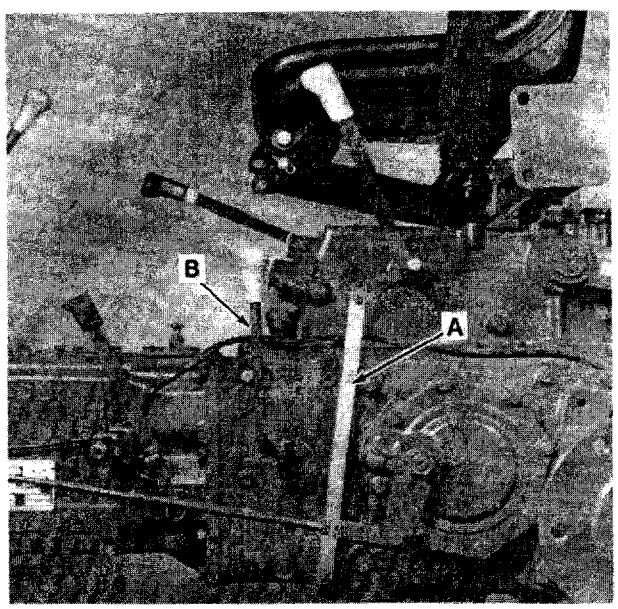
POWER TAKE-OFF SHIFTER — REMOVAL

Remove the link, A, Figure 6-1.

SPECIFICATIONS

Bolt Torque Specifications

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Pounds-Feet	Newton-Meters	Pitch (mm)	Pounds-Feet	Newton-Meters
M6	4T	1.0	3.6— 5.1	4.9— 6.9	—	—	—
	7T		6.1—8.3	8.3—11.3			
	10T		8.7—11.6	11.8—15.7			
M8	4T	1.25	9.4—12.3	12.7—16.7	1.0	11.2—14.8	15.2—20.1
	7T		16.6—21.0	22.6—28.4		19.5—25.3	26.5—34.3
	10T		21.0—26.8	28.4—36.3		22.4—29.7	30.4—40.2



Power Take-Off Shift Linkage Removal **Figure 6-1**
A Link
B Range gearshift

SECTION 7
DIFFERENTIAL — REAR AXLE AND BRAKE SYSTEMS

SPECIFICATIONS

DIFFERENTIAL ASSEMBLY

Clearance Between Differential Pinion and Pinion Shaft ..... 0.004 in. (0.1 mm)
Allowable Limit ..... 0.020 in. (0.5 mm)

Differential Gear Thrust Washer Thickness ..... 0.047 in. (1.2 mm)
Allowable Limit ..... 0.035 in. (0.9 mm)

Differential Gear and Differential Pinion Backlash ..... 0.004-0.012 in. (0.1-0.3 mm)
Allowable Limit ..... 0.020 in. (0.5 mm)

Drive Pinion Pre-load ..... 15.4-19.8 lbs. (7-9 kg)

Drive Pinion and Ring Gear Backlash ..... 0.004-0.006 in. (0.1-0.15 mm)
Allowable Limit ..... 0.012 in. (0.3 mm)

BRAKES

Brake Discs
Lining Groove Depth ..... 0.004 in. (0.1 mm)
Allowable Limit ..... 0.0 in. (0.0 mm)

Stators Level Difference
Allowable Limit ..... 0.004 in. (0.1 mm)

Clearance of Pedal Shaft and Bushing ..... 0.002-0.014 in. (0.05-0.35 mm)
Allowable Limit ..... 0.039 in. (1.0 mm)

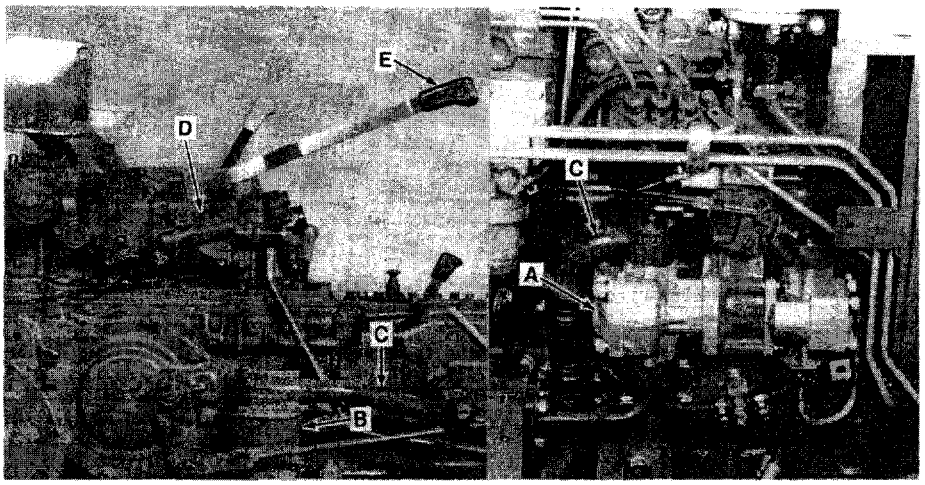
Brake Pedal Free-Play ..... 1.38-1.77 in. (35-45 mm)

BOLT TORQUES

Ring Gear and Differential Cage Housing Bolts ..... 36.0-47.0 lbs.-ft. (49.0-64.0 N·m)

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Pounds-Feet	Newton-Meters	Pitch (mm)	Pounds-Feet	Newton-Meters
M8	4T	1.25	9.4—12.3	12.7—16.7	1.0	11.2—14.8	15.2—20.1
	7T		16.6—21.0	22.6—28.4		19.5—25.3	26.5—34.3
	10T		21.0—26.8	28.4—36.3		22.4—29.7	30.4—40.2
M10	4T	1.5	18.8—24.6	25.5—33.3	1.25	21.0—26.8	28.4—36.3
	7T		32.5—41.2	44.1—55.9		36.2—46.3	49.0—62.8
	10T		39.8—51.4	53.9—69.6		42.7—54.2	57.9—73.5
M12	4T	1.75	27.5—34.7	37.3—47.1	1.25	31.8—40.5	43.1—54.9
	7T		48.5—61.5	65.7—83.4		55.0—69.4	74.5—94.1
	10T		68.0—85.4	92.2—116		73.1—93.3	99.0—127

SECTION 8
HYDRAULIC SYSTEM



Hydraulic Pump and Filter **Figure 8-1**

A Pump
B Filter
C Suction line
D Control valve
E Control lever

DESCRIPTION AND OPERATION

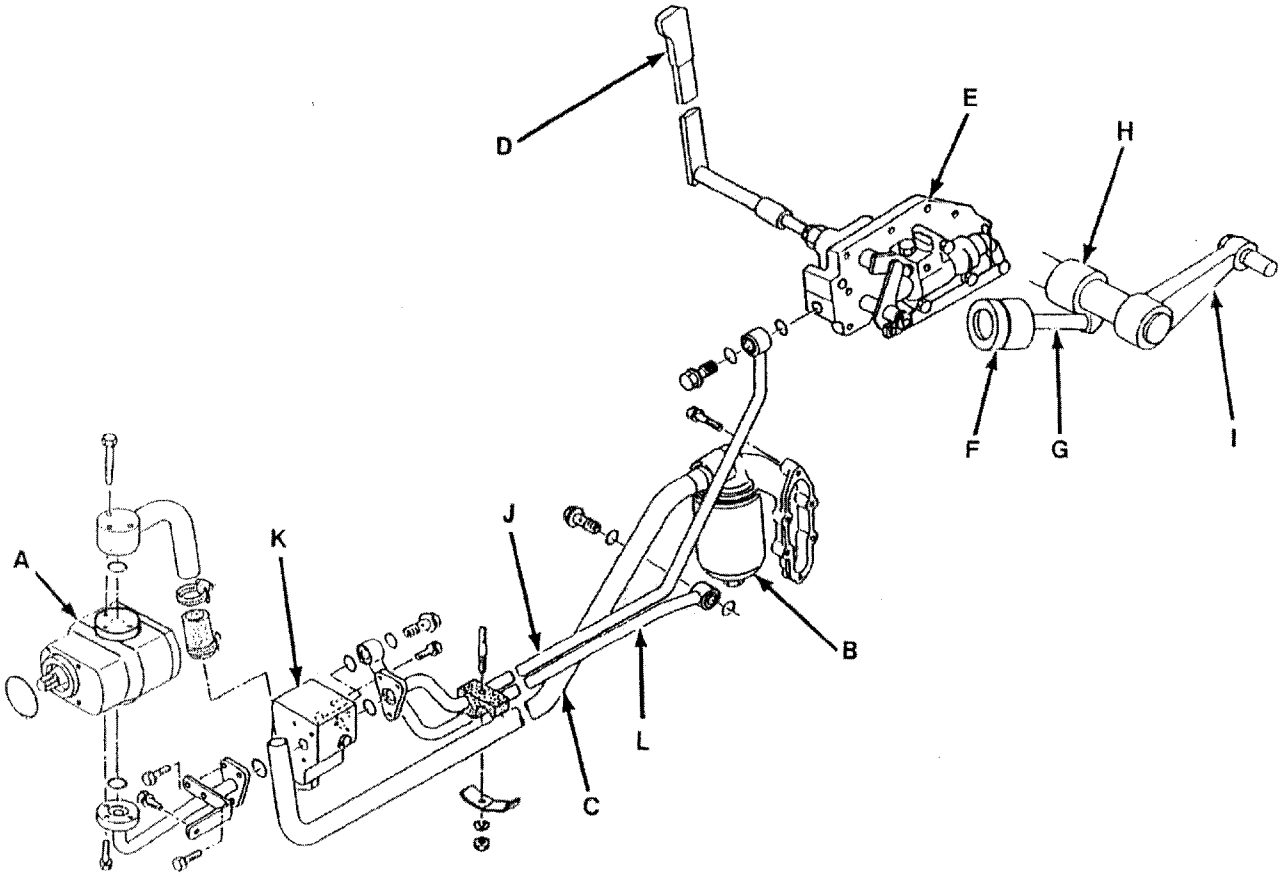
The hydraulic position control is standard equipment on the Model 1715 tractor.

The hydraulic system consists essentially of an oil reservoir, hydraulic pump, lift cylinder and piston, control valve and lift links.

The rear axle center housing and transmission housing serve as a common oil reservoir that supplies oil to the hydraulic pump.

The hydraulic pump supplies oil to the system control valve. The control valve, when operated, effects raise, neutral or lowering action of the lift arms.

The hydraulic pump is mounted on the right side of the engine, Figure 8-1, and is driven by the engine oil pump gear located on the front of the engine block.



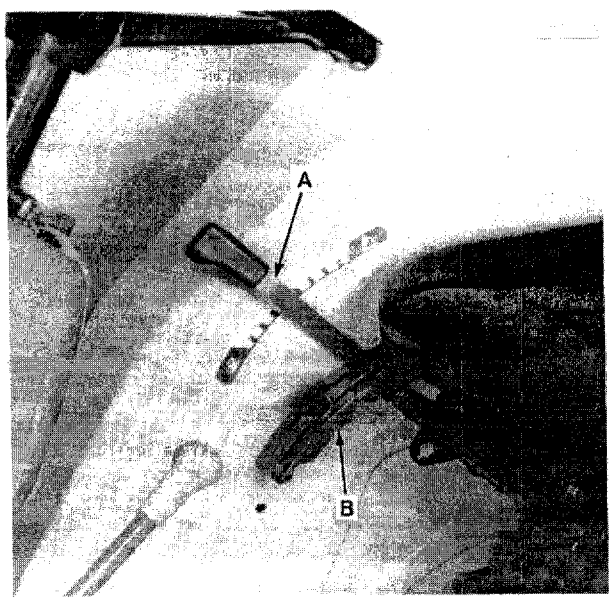
Hydraulic System Components

A	Hydraulic pump	E	Control valve	H	Ram arm	K	System relief — diverter valve manifold
B	Inlet filter	F	Piston	I	Lift arm	L	Return to sump
C	Suction tube	G	Piston rod	J	High pressure tube		
D	Control valve lever						

Figure 8-2

The oil is pressurized by the hydraulic pump and flows through the combination relief-diverter valve manifold, K, Figure 8-2, mounted on the right side of the tractor, and to the control valve, E, which is located inside the hydraulic lift cover assembly.

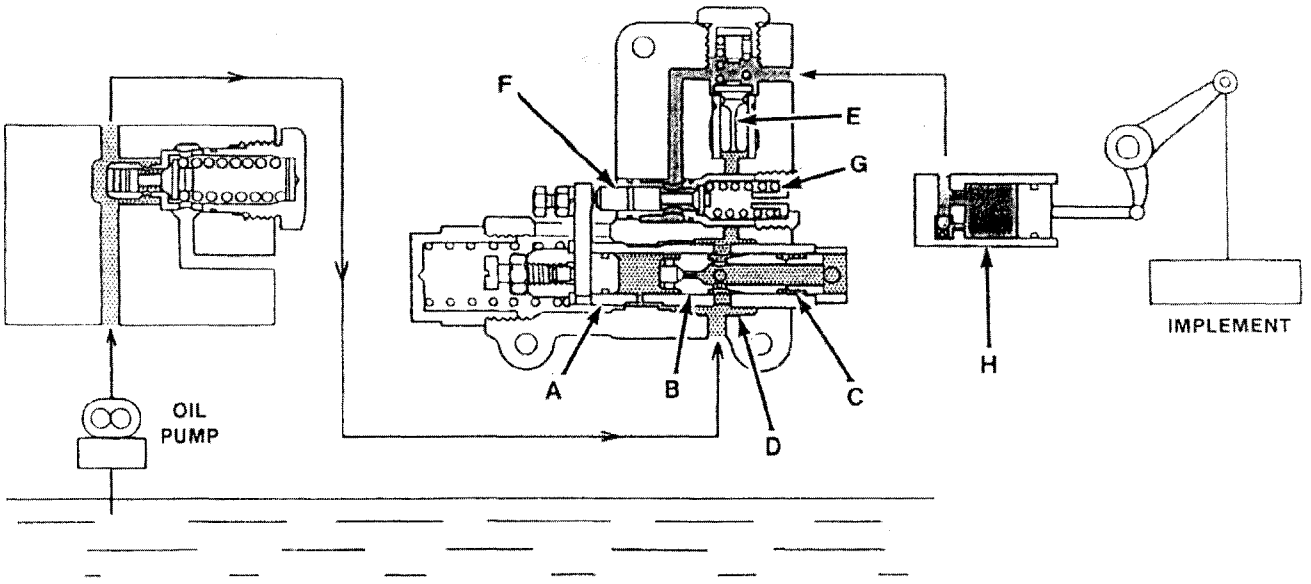
The hydraulic system is controlled by a single lever, A, Figure 8-3. An adjustable stop on the quadrant provides a reference for returning the control lever to a preset position.



Control Lever

A Lever
B Guide

Figure 8-3



Oil Flow — Neutral Position

Figure 8-4

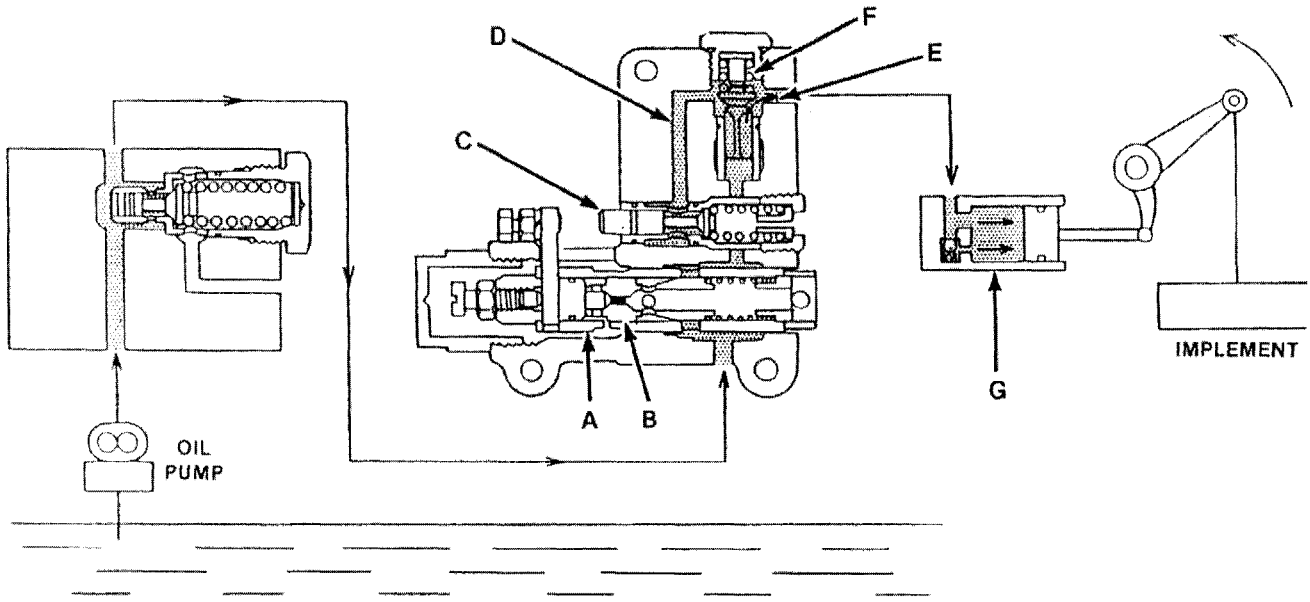
A Control valve spool
B Plunger
C Plunger spring
D Oil passage ports
E Check valve
F Lowering valve spool
G Lowering valve spool spring
H Lift cylinder

OIL FLOW CONTROL SYSTEM

Neutral Position
Refer to Figure 8-4

In the neutral position the control valve spool, A, is centered in the valve body. Oil from the hydraulic pump is directed through a small passage in the valve spool to the rear face of the control valve plunger, B. The oil pressure moves the plunger compressing the plunger spring, C, and aligns the passages, D, in the control valve and plunger. Oil flows from the pump through the passages, D, and returns to sump.

Oil trapped in the lift cylinder, under pressure caused by the weight of the implement on the lift arms, exerts pressure on the cylinder side of the check valve, E, keeping it in a closed position. The lowering valve spool, F, positioned by the spring, G, retains the oil in the lift cylinder and maintains the implement in a fixed position.



Oil Flow — Raise Position

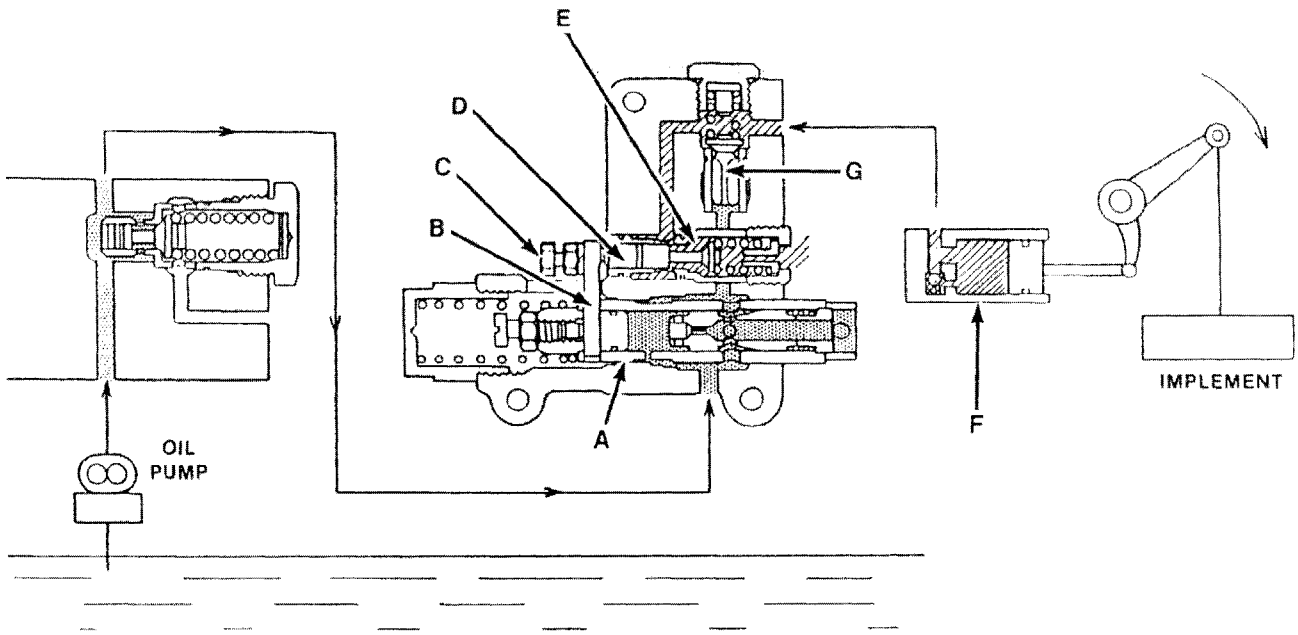
Figure 8-5

A Control valve spool
B Plunger
C Lowering valve spool
D Check valve oil passage
E Check valve
F Check valve spring
G Lift cylinder

Raising Position
Refer to Figure 8-5

When the position control lever is moved to the "raise" position, the control valve spool, A, is moved inward (rearward). The oil passages in the control valve spool and plunger, B, are no longer aligned and oil flows around the control valve and lowering valve spool, C, through passage, D, to the check valve, E. The oil pressure against the check valve overcomes the check valve spring, F, and lift cylinder oil static pressure on the check valve, raising the check valve off its seat and allowing oil to flow to the lift cylinder to raise the implement.

When the oil pressure in the system exceeds 2135 psi (150 bar), the relief valve opens and oil is returned to sump.



)il Flow — Lowering Position (Position Control Valve)

Figure 8-6

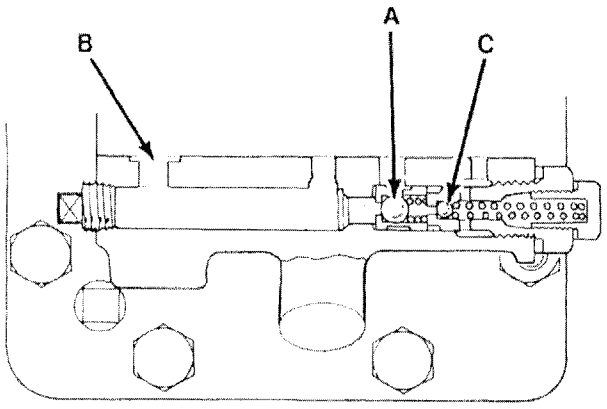
\	Control valve spool	C	Adjusting bolt	E	Lowering valve seat	G	Check valve
3	Pin	D	Lowering valve spool	F	Lift cylinder		

.owering Position
Refer to Figure 8-6

When the position control lever is moved to he "lowering" position, the control valve spool, A, is moved forward (outward). The pin, 3, and adjusting bolt, C, attached to the control valve spool, also moves forward and contacts the lowering valve spool, D, pushing it off its seat, E.

Oil from the pump flows through the passages in the control valve spool and plunger and returns to sump as in the neutral position.

Oil in the lift cylinder, F, flows through a passage past the check valve, G, to the lowering valve spool and seat and returns to sump permitting the implement to lower.



High Pressure Safety Valve **Figure 8-7**

A Check ball
B Inlet passage
C Safety valve

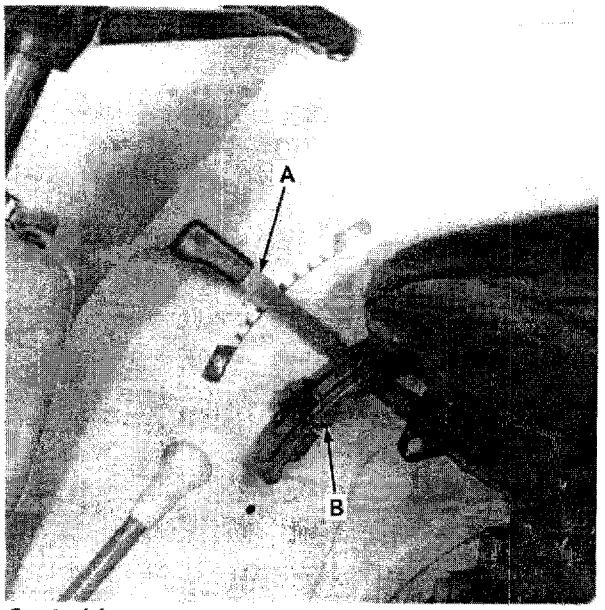
High Pressure Safety Valve
Refer to Figure 8-7

The high pressure safety valve, C, is located in the cylinder head and protects the lift cylinder against shock loads. When the cylinder pressure exceeds 3625 ± 290 psi (250 ± 20 bar), the safety valve opens and allows the cylinder oil to escape to sump.

LINKAGE OPERATIONS
Refer to Figure 8-8

The single lever hydraulic system, consists of the single quadrant control lever, A, connected by internal linkage to the control valve spool and, when moved, determine a raise, lower, or neutral condition for the hydraulic system.

The single lever control is used to maintain mounted implements at a constant height relative to the tractor. The lift arms respond to the movement of the control lever, A. The rod connected to the lift arm, actuates the feedback links to move the control valve spool to the neutral position when the desired height is achieved.

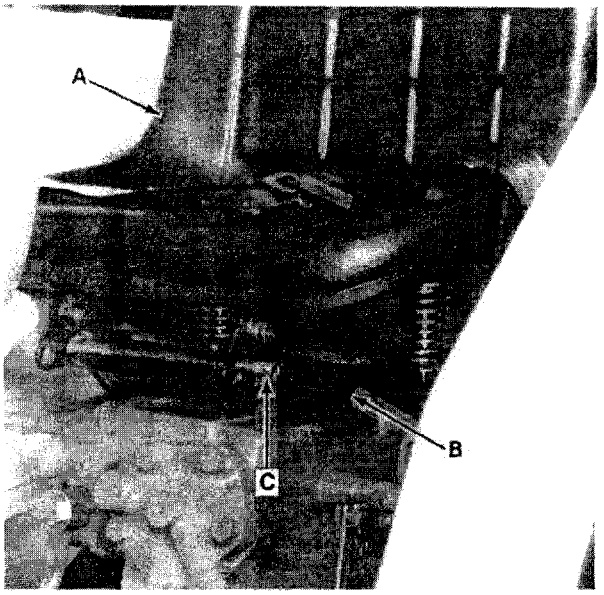


Control Lever **Figure 8-8**

A Lever
B Guide

LIFT CYLINDER ASSEMBLY — REMOVAL

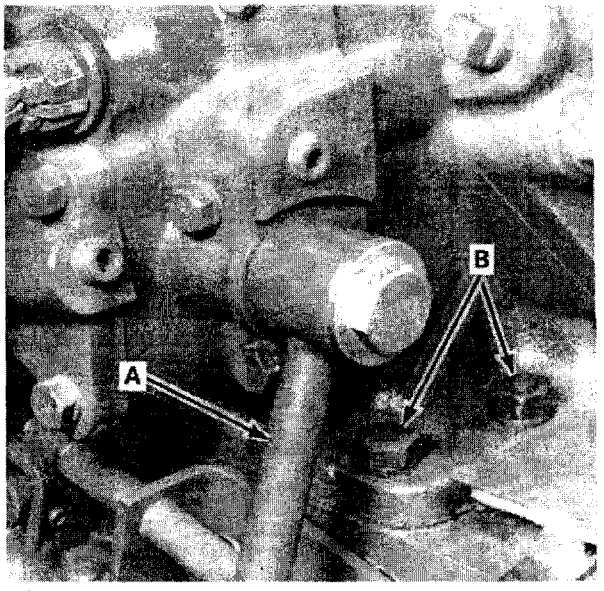
1. Before removing the lift cover assembly, discharge the oil from the lift cylinder by lowering the lift links to their lowest position.
2. Disconnect the wiring harness at the fenders.
3. Remove the hydraulic control lever grip, Figure 8-8.
4. Remove the lever guide, B, from the right fender.



Seat Removal **Figure 8-9**

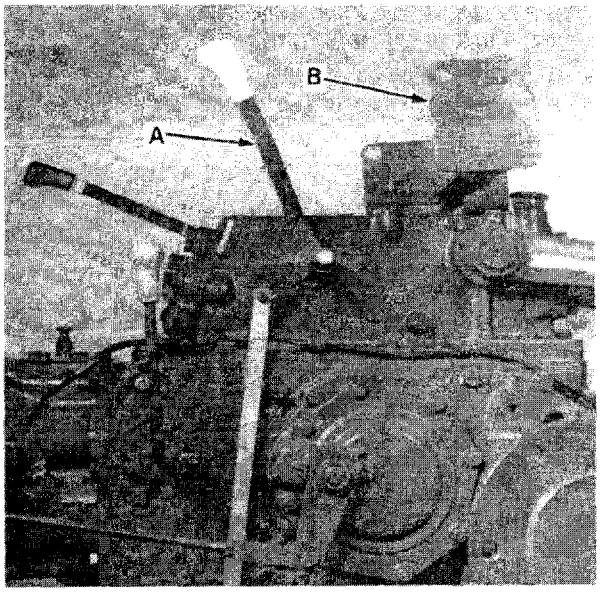
A Seat
B Track assembly
C Pin

5. Remove the pin, C, Figure 8-9, and the seat, A, from the suspension assembly.
6. Remove the track assembly, B.
7. Disconnect the high pressure line, A, from the lift cover, Figure 8-10.



Lift Cover Removal **Figure 8-10**

A High pressure line
B Lift cover retaining bolt and nut



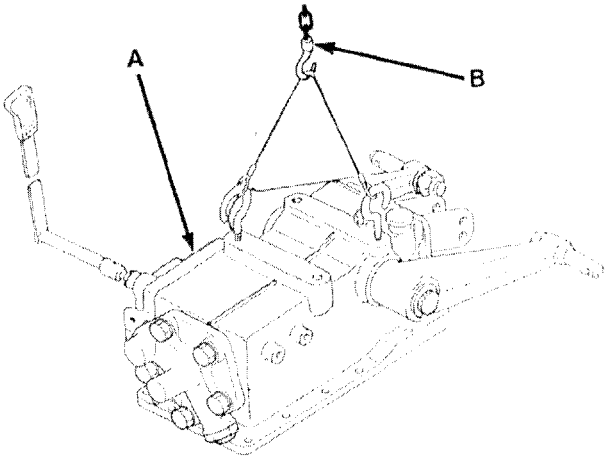
Shifter Linkage Removal **Figure 8-11**

A PTO shift lever
B Frame

8. Remove the PTO shift lever, A, Figure 8-11.
9. Remove the frame, B, from the lift cover.
10. Remove the lift cover retaining bolts and nuts.

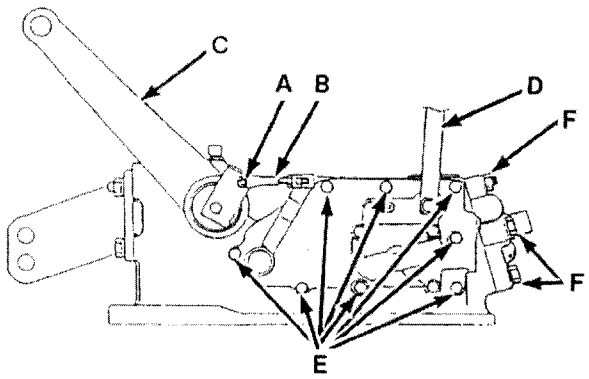
    NOTE: Bolts of different length are used at various locations. Observe the bolt lengths as removed, for ease of assembly.

11. Using a suitable overhead hoist, B, Figure 8-12, remove the lift cover, A, from the tractor.



Lift Cover Removal **Figure 8-12**

A Lift cover assembly
B Hoist



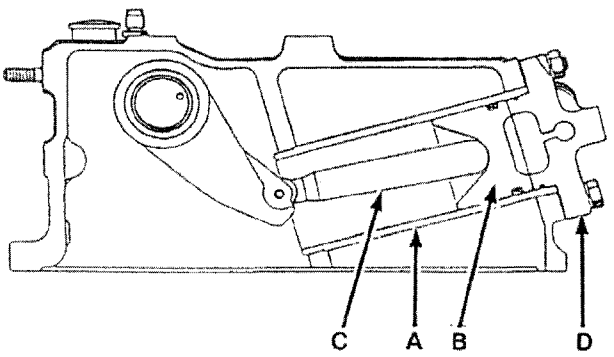
Lift Cover Disassembly **Figure 8-13**

A Pin
B Position control rod
C Lift arms
D Control lever
E Valve cover bolts
F Cylinder head retaining bolts

LIFT CYLINDER ASSEMBLY — DISASSEMBLY
Refer to Figure 8-13

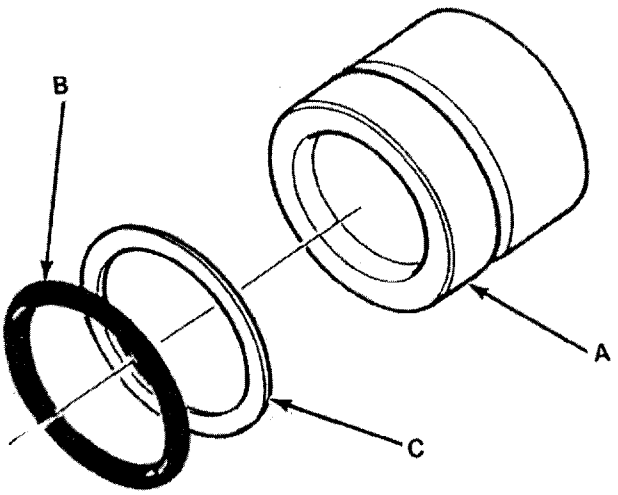
1. Remove the pin, A. Remove the position control rod, B, from the lift arm, C.
2. Remove the control lever grip.
3. Remove the valve cover bolts, E. Remove the cover and valve as an assembly.
4. Remove the cylinder head attaching bolts, F, and remove the cylinder head assembly from the lift cover.

For the remainder of the disassembly procedure, consult the 13, 15, and 1720 Repair Manual #40132030.



Cylinder Assembly **Figure 8-14**

A Cylinder "liner"
B Piston
C Piston rod
D Cylinder head

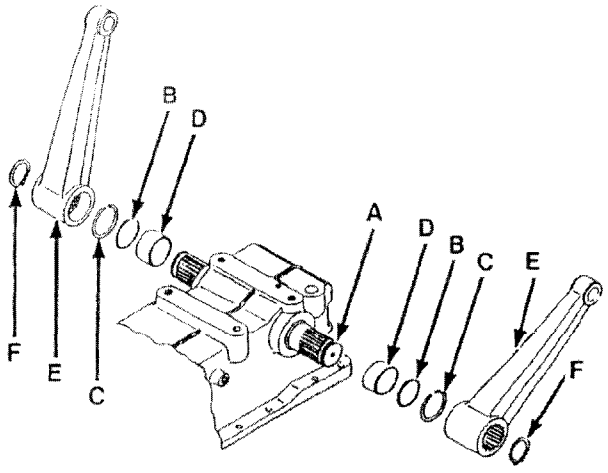


Hydraulic Piston Assembly **Figure 8-15**

A Piston
B O-ring
C Back-up ring

LIFT CYLINDER ASSEMBLY — ASSEMBLY
Refer to Figure 8-14

1. Clean all parts in a suitable solvent and air dry.
2. Lubricate all parts, including o-rings and seals, with clean hydraulic oil during assembly.
3. Install the cross shaft in the cover while correctly positioning the ram arm.
4. Install the cylinder liner, A, in the lift cover housing. Be sure to position the piston rod, C, inside the cylinder liner during installation.
5. Install the o-ring, B, Figure 8-15, and back-up ring, C, on the piston, A. Position the piston through the head opening. Exercise care not to damage the o-ring and back-up ring during installation.
6. Using a new o-ring and gasket, install the cylinder head, D, Figure 8-14, and tighten the bolts to the specified torque. See "Specifications".



Lift Arm Assembly **Figure 8-16**

A	Cross shaft	D	Bushings
B	O-ring	E	Lift arm (R & L)
C	Spring washer	F	Snap ring

7. Using a new o-ring, install the o-ring, spring washer, lift arm and snap ring on each side, Figure 8-16.

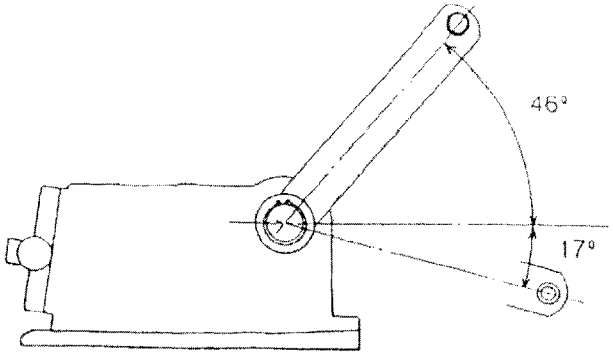
   NOTE: Be sure to align the reference marks scribed at the time of disassembly. If no scribe marks are present, install the lift arms positioned as shown in Figure 8-17.

8. Install the lift cover assembly on the tractor. Tighten the bolts to the specified torque. See "Specifications".

9. Install the top link bracket assembly, control linkage and hydraulic line following the removal procedure in reverse.

   NOTE: Observe and follow the linkage and main spring adjustment procedure described in the 13, 15, 1720 Repair Manual #40132030.

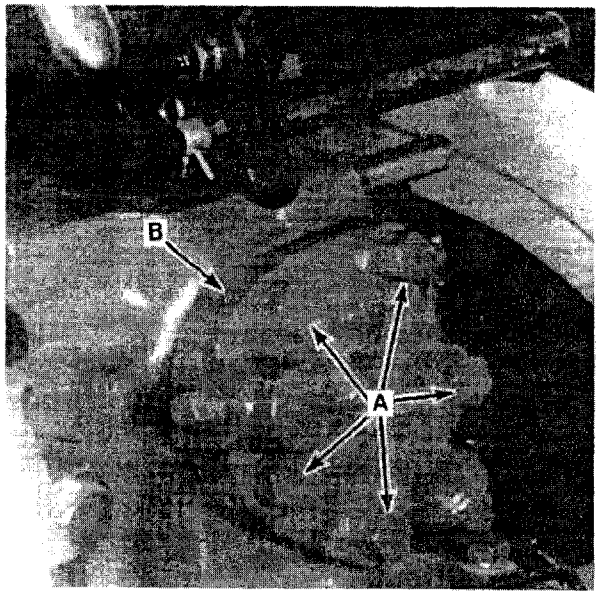
10. Be sure to reinstall seat belts on tractors equipped with ROPS.



Lift Arm Assembly — Angle of Travel **Figure 8-17**

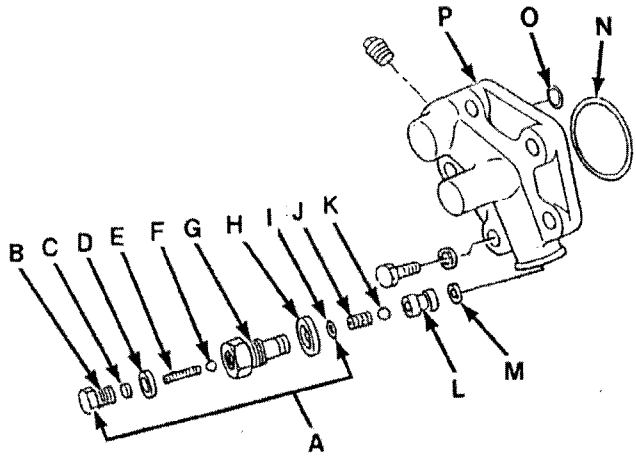
CYLINDER HEAD — REMOVAL
Refer to Figure 8-18

Remove the cylinder head retaining bolts, A, and remove the cylinder head, B, from the lift cover.



Cylinder Head Removal **Figure 8-18**

A	Cap screws
B	Cylinder head



Safety Valve Components — Figure 8-19

A	Safety valve assembly	F	Ball (relief valve)	L	Guide
B	Bolt	G	Valve body	M	Gasket
C	Shim	H	Seal	N	O-ring
D	Seal washer	I	O-ring	O	O-ring
E	Spring	J	Spring	P	Cylinder head
		K	Ball (check valve)		

Check Valve — Disassembly
Refer to Figure 8-19

1. Remove the safety valve, A, as an assembly.
2. Remove the check valve spring, J, ball, K, guide, L, and gasket, M.

SAFETY RELIEF VALVE — DISASSEMBLY
Refer to Figure 8-19

1. Remove the bolt, B, and shims, C.

   NOTE: Observe the quantity of shims, C, used between the spring and guide bolts.

2. Remove the spring, E, and ball, F, from the valve body, G.

Inspection

1. Wash all valve components in a suitable solution and air dry.
2. Inspect the valve seats for excess wear or damage.
3. Inspect the balls for excess wear or damage.
4. Inspect the springs for excess wear or chipping.

SAFETY RELIEF VALVE — ASSEMBLY

1. Lubricate all valve components with clean hydraulic oil during assembly.
2. Use Figure 8-19, as a guide and assemble the safety valve.

SPECIFICATIONS

Hydraulic Pump
- Type ..... Gear
- Pump Capacity ..... 6.35 gpm (24.9 Lpm)
- Hydraulic Oil ..... FNH 134
- Pump Speed ..... 2115 rpm
- Engine Speed ..... 2500 rpm

System Relief Valve Setting ..... 2130 ± 70 psi (147 ± 5 bar)

Lift Cylinder Diameter ..... 2.76 in. (70 mm)

Maximum Lift Capacity ..... 2865 lbs. (1280 kg.)

Safety Valve Setting ..... 3625 ± 290 psi (250 ± 20 bar)

Remote Control Valve Relief Valve Setting ..... 1607 + 71 - 0 psi (111 + 4.5 - 0 bar)

Flow Control — Cylinder Head ..... 48.5-61.5 lbs.-ft. (65.7-83.4 N·m)
Hydraulic Pump Bolts ..... 16-20 lbs.-ft. (22-28 N·m)

BOLT TORQUE SPECIFICATIONS

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Pounds-Feet	Newton-Meters	Pitch (mm)	Pounds-Feet	Newton-Meters
M8	4T	1.25	9.4—12.3	12.7—16.7	1.0	11.2—14.8	15.2—20.1
	7T		16.6—21.0	22.6—28.4		19.5—25.3	26.5—34.3
	10T		21.0—26.8	28.4—36.3		22.4—29.7	30.4—40.2
M10	4T	1.5	18.8—24.6	25.5—33.3	1.25	21.0—26.8	28.4—36.3
	7T		32.5—41.2	44.1—55.9		36.2—46.3	49.0—62.8
	10T		39.8—51.4	53.9—69.6		42.7—54.2	57.9—73.5
M12	4T	1.75	27.5—34.7	37.3—47.1	1.25	31.8—40.5	43.1—54.9
	7T		48.5—61.5	65.7—83.4		55.0—69.4	74.5—94.1
	10T		68.0—85.4	92.2—116		73.1—93.3	99.0—127

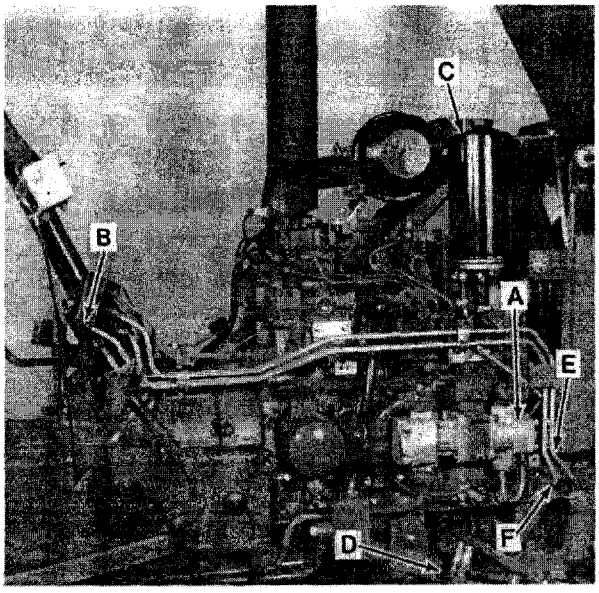
Flow Control — Cylinder Head ..... 48.5-61.5 lbs.-ft. (65.7-83.4 N·m)
Hydraulic Pump Bolts ..... 16-20 lbs.-ft. (22-28 N·m)

SPECIAL TOOLS

Tool No.

Hose — 7/16 - 20 FJIC SW x Disconnect Fitting
7/16 - 20 MJIC x 16" long ..... FNH 07099
Gauge, 5000 psi ..... FNH 02028
Adaptor Fitting Straight 7/16 - 20 MJIC x 3/8 m BSPP ..... FNH 07560

SECTION 9
STEERING SYSTEMS
POWER STEERING — FRONT WHEEL DRIVE



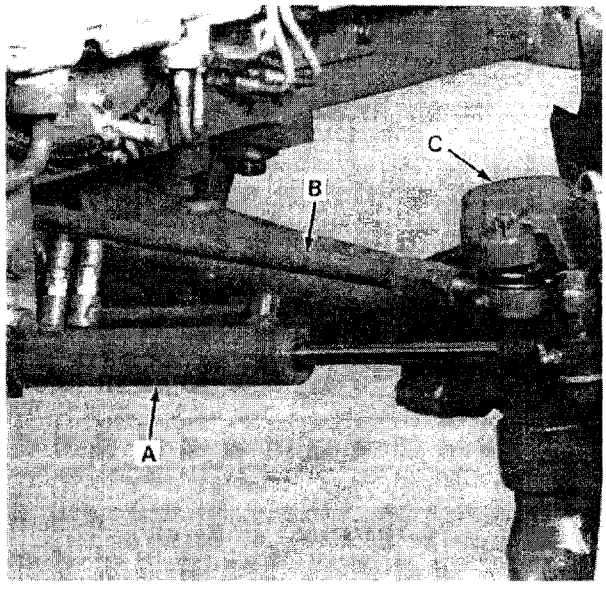
Power Steering System — FWD **Figure 9-1**

A	Pump	D	Cylinder
B	Control valve	E	P/S line
C	Reservoir/filter	F	P/S line

DESCRIPTION AND OPERATION

The power steering system used on the Model 1715 FWD tractor is a fully hydraulic power steering system.

The system consists of a power steering control valve, pump, reservoir, cylinder assembly and tubing, Figure 9-1.

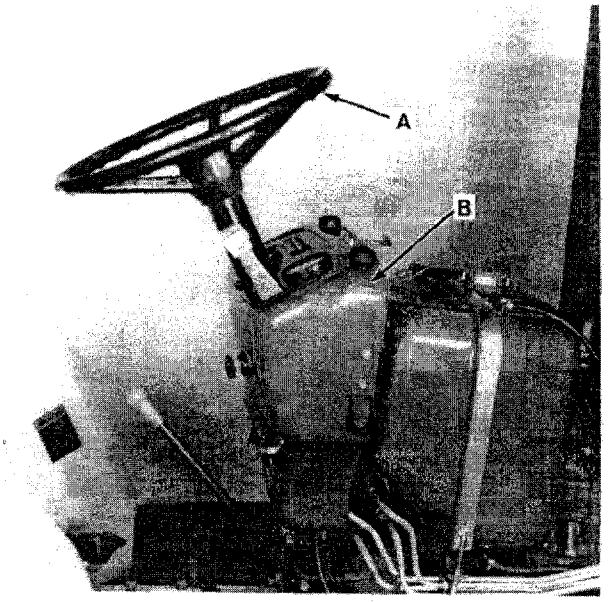


Power Steering Cylinder **Figure 9-2**

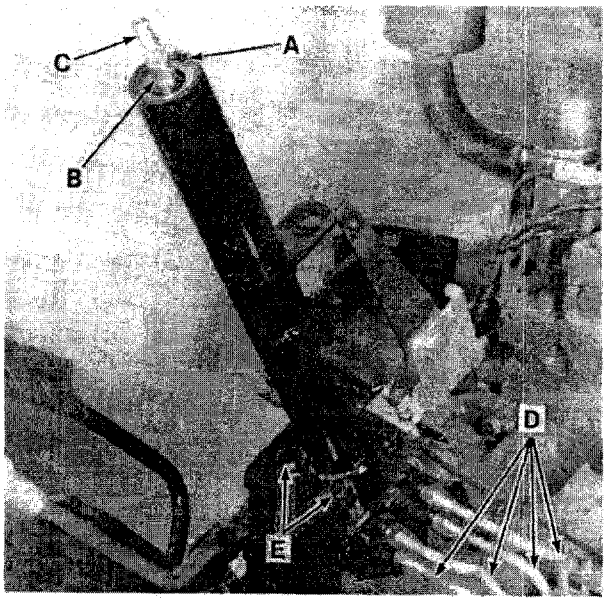
A	Cylinder	C	Steering arm
B	Tie rod		

POWER STEERING CYLINDER
Refer to Figure 9-2

The power steering cylinder is mounted transversely under the tractor with the cylinder end pinned to a fixed member and the rod end attached to the steering arm.



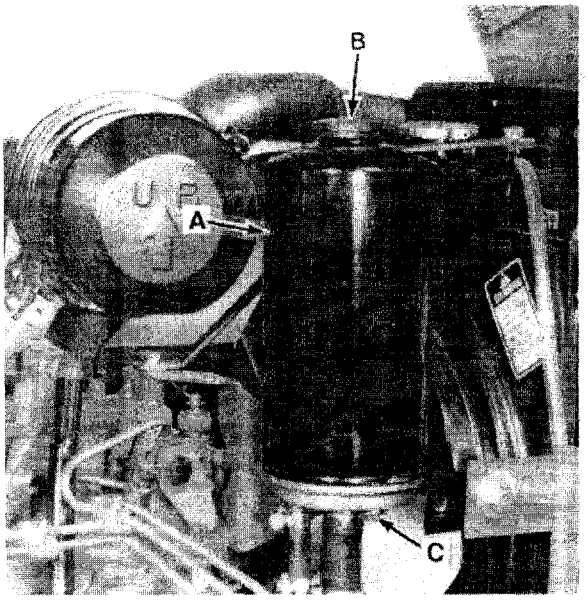
Power Steering Control Valve Removal **Figure 9-3**
A Steering wheel
B Instrument panel



Control Valve **Figure 9-4**
A Snap ring
B Rubber bushing
C Steering shaft
D P/S tubes
E Mounting bolts

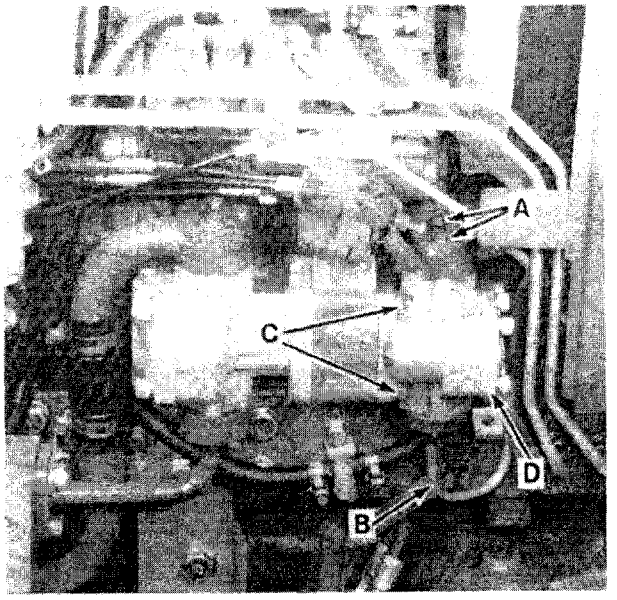
CONTROL VALVE REMOVAL

1. Remove the steering wheel, A, Figure 9-3.
2. Remove the fuel tank from the tractor.
3. Disconnect the wiring harness connectors from the instrument panel, key start switch and rear harness assembly and remove the instrument panel, B, Figure 9-3.
4. Remove the snap ring, A, and oil seal, B, Figure 9-4.
5. Gently pull the steering shaft upward and remove from the top of the column.
6. Disconnect the power steering tubes, D, Figure 9-4, from the valve body and move them clear of the valve.
7. Remove the four valve mounting bolts, E.
8. Lower the control valve and remove out the bottom from the left side of the tractor.



S Reservoir **Figure 9-5**

Reservoir/filter
Filler cap
C Drain plug



P/S Pump **Figure 9-6**

A Suction tube
B Pressure tube
C Mounting nuts
D P/S pump

POWER STEERING PUMP AND RESERVOIR

Pump Removal

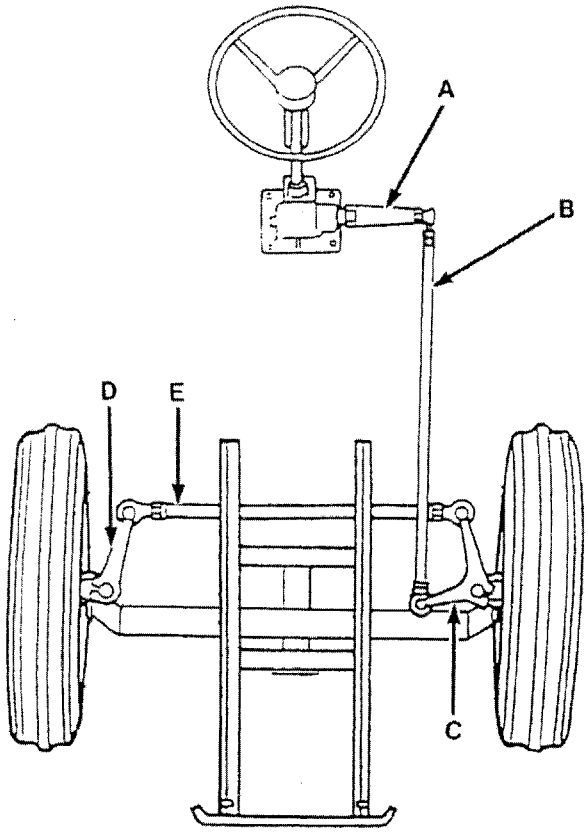
1. Remove the reservoir tank dipstick-filler cover, B, Figure 9-5. Remove the plug, C, from the bottom of the reservoir/filter and drain the oil.

2. Remove the suction tube bolts, A, Figure 9-6.

3. Remove the pressure tube, B, from the bottom of the pump.

4. Remove the through bolts, C, and remove the pump from the front cover.

MANUAL STEERING SYSTEM



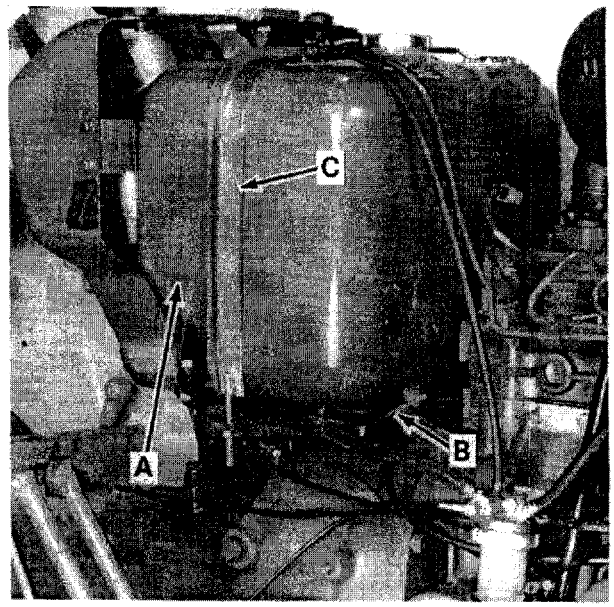
Manual Steering System **Figure 9-7**

A Pitman arm
B Drag link
C Spindle arm (left)
D Spindle arm (right)
E Tie rod

DESCRIPTION AND OPERATION

Manual steering is standard equipment on the Model 1715 two wheel drive tractor.

The steering gear assembly is mounted on the top of the transmission clutch housing. The steering gear is connected to the front wheels by a single steering pitman arm, A, and drag link, B, Figure 9-7. The drag link is connected to the left front wheel spindle arm, C. The left and right front wheel spindle arms are connected together by a tie rod assembly, E.



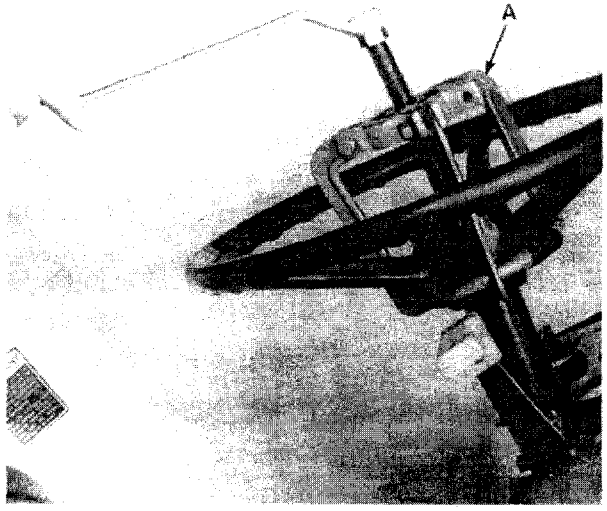
Fuel Tank Removal **Figure 9-8**

A Fuel tank
B Fuel tank support
C Fuel tank banding

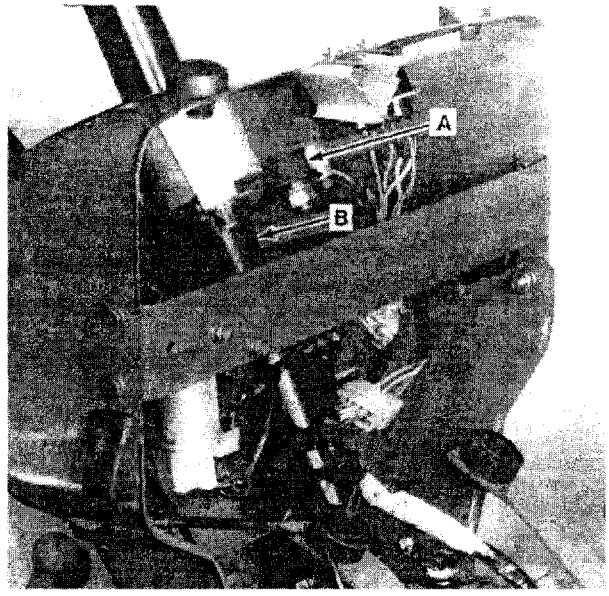
MANUAL STEERING SYSTEM — OVERHAUL

Removal

1. Disconnect the negative battery terminal at the battery.
2. Close the fuel shut-off valve.
3. Disconnect the fuel inlet line at the filter and seal the openings.
4. Disconnect the fuel return line at the top of the fuel tank.
5. Loosen the banding nuts and remove the fuel tank, Figure 9-8.



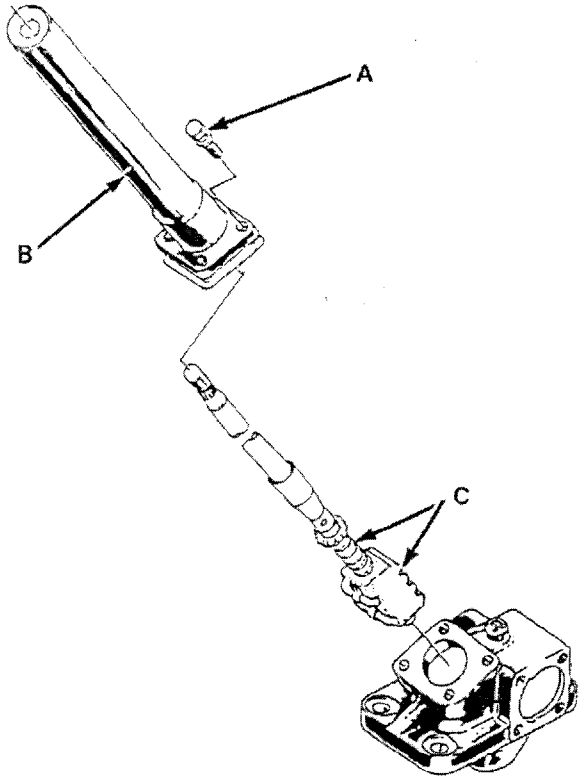
Steering Wheel **Figure 9-9**
A Puller



Steering Column Mount **Figure 9-10**
A Mount B Column

6. Remove the steering wheel center cap, nut and washer.
7. Using a suitable puller, remove the steering wheel, Figure 9-9.
8. Disconnect the proof meter cable.
9. Disconnect the wiring harness at the instrument panel.
10. Remove the upper column rubber mount, A, Figure 9-10.
11. Remove the instrument panel support bolts, A, Figure 9-11.
12. Remove the instrument panel and throttle linkage.
13. Remove the pitman arm retaining nut and washer.
14. Scribe an assembly reference mark on the pitman arm and sector shaft.
15. Using a suitable puller, remove the pitman arm from the sector shaft.
16. Remove the steering gear mounting bolts and remove the steering gear assembly.

Instrument Panel Mount **Figure 9-11**
A Mount



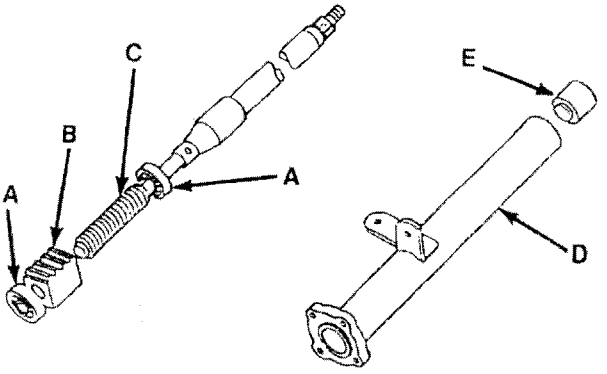
Ball Nut and Shaft Removal **Figure 9-12**

A Bolts
B Housing
C Shaft assembly

Ball Nut and Shaft — Removal

1. Remove the four column mounting bolts, A, Figure 9-12.
2. Remove the column housing, B, and shaft assembly, C, as a unit.
3. Separate the column housing from the shaft assembly.

   NOTE: Use care not to damage the recirculating ball tube. Do not disassemble the ball nut and ball tube.



Steering Shaft Upper Bushing **Figure 9-13**

A Ball bearings
B Ball nut
C Worm gear
D Housing
E Bushing

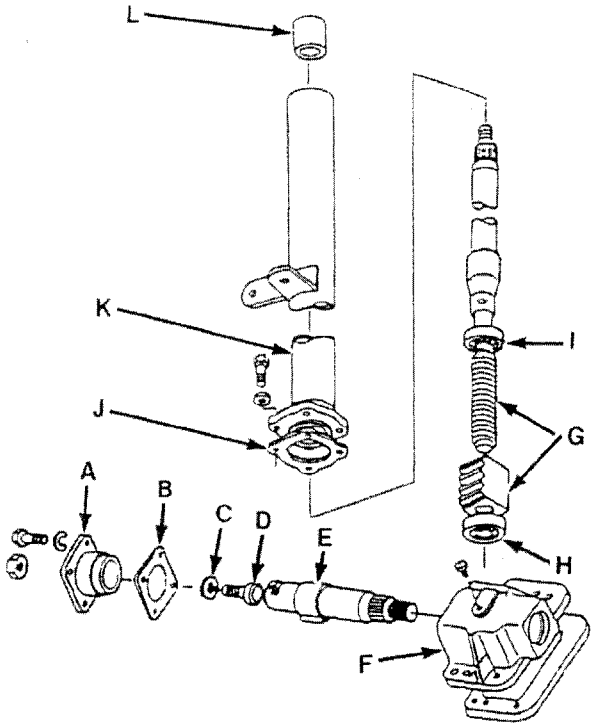
Ball Nut and Shaft — Inspection Refer to Figure 9-13

Inspect the steering shaft upper column bushing, E, for excess wear or damage. Replace the bushing, if damaged.

Inspect the steering shaft ball bearings, A. Replace bearings showing excess wear or uneven rotation when turned by hand.

Inspect the gear, C, and ball nut, B, for excess wear or damage. If necessary, replace the ball nut and shaft as an assembly only.

On assembly, install new seals and gaskets.



Manual Steering Assembly **Figure 9-14**

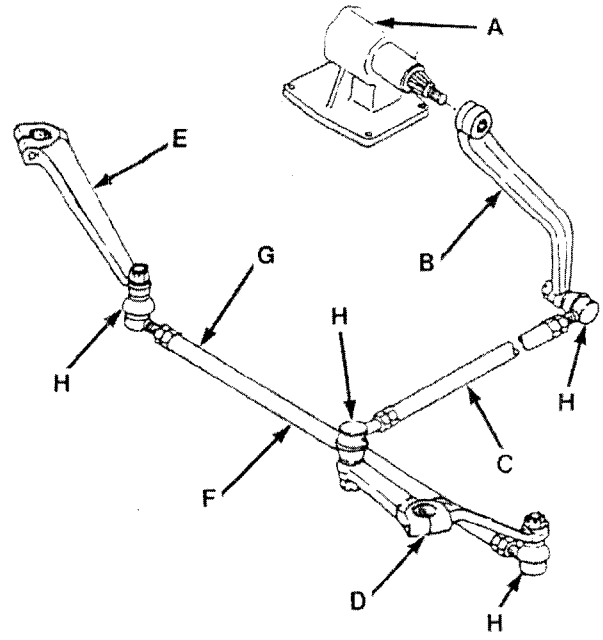
A	Cover assembly	H	Ball bearing
B	Gasket	I	Ball bearing
C	Shim	J	Shim
D	Adjusting bolt	K	Column housing
E	Sector shaft	L	Bushing
F	Gear case		
G	Ball nut and shaft assembly		

Ball Nut and Shaft — Assembly and Installation
Refer to Figure 9-14

1. Assemble the steering shaft into the column housing and position it onto the steering gear case.

   NOTE: Install the original shims, J, between the column housing and gear case.

2. Install the column mounting bolts and tighten to specifications.



Steering Linkage Components **Figure 9-15**

A	Gearbox assembly	E	Spindle arm (right)
B	Pitman arm	F	Tie rod tube
C	Drag link	G	Tie rod
D	Spindle arm (left)	H	Ball joint end

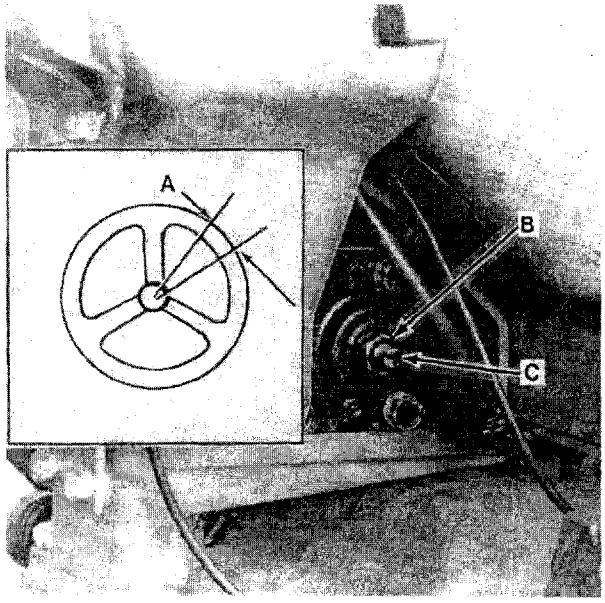
Steering Linkage
Refer to Figure 9-15

The steering linkage is serviced using conventional repair procedures.

Replace any worn or damaged parts as required.

After assembly, adjust the toe-in as described under "Adjustments".

Lubricate the linkage and check for proper operation.



Steering Wheel Free Travel Adjustment **Figuer 9-16**

A Steering wheel free travel
B Adjusting bolt locknut
C Adjusting bolt

ADJUSTMENTS

Steering Gear
Refer to Figure 9-16

Optimum free travel of the steering wheel is 3/4-1-1/8 in. (20-30 mm) measured at the outer rim of the steering wheel.

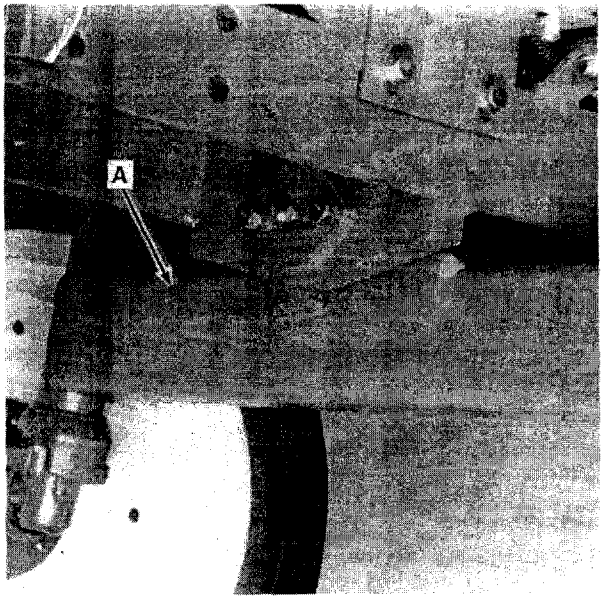
If the free travel exceeds 2.0 inches (50 mm) adjust the sector shaft to ball nut clearance as follows:

1. Loosen the adjusting bolt locknut, B.
2. Turn the adjusting bolt, C, clockwise to reduce free-play travel and counterclockwise to increase free-play.
3. After completing the free-play adjustment, retighten the locknut.

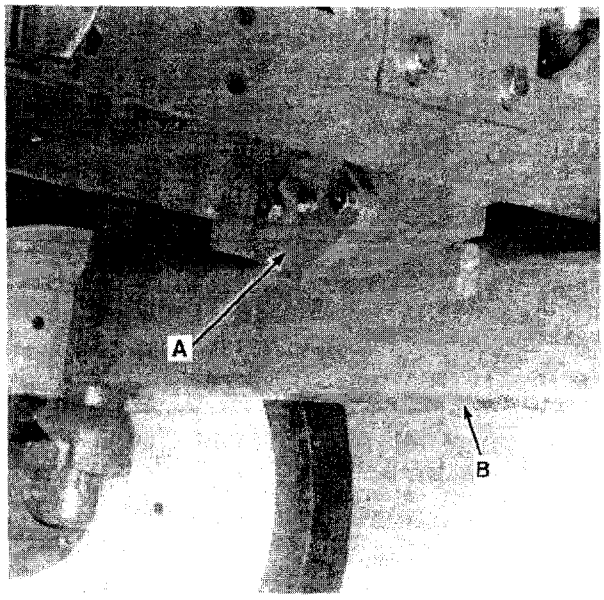
SPECIFICATIONS

Type Steering	Ball Nut
Reduction Ratio	18:9
Minimum Turning Radius - 2WD	8.4 ft. (2.55 m)
Steering Wheel Free-Play	3/4 — 1-1/8 in. (20-30 mm)
Steering Shaft Pre-Load	3.75 — 9.92 lbs. (1.7 — 4.5 kg)

SECTION 10
FRONT AXLE AND RELATED PARTS
TWO WHEEL DRIVE



Front Axle **Figure 10-1**
A Axle

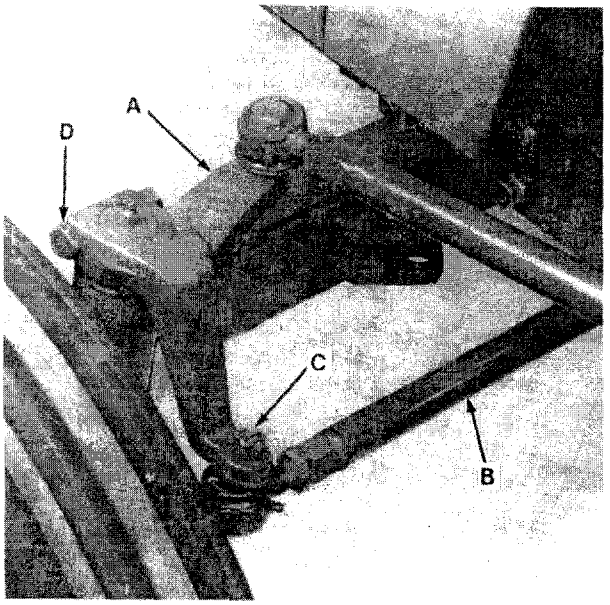


Front Axle Pivot — 2WD **Figure 10-2**
A Support assembly
B Axle assembly

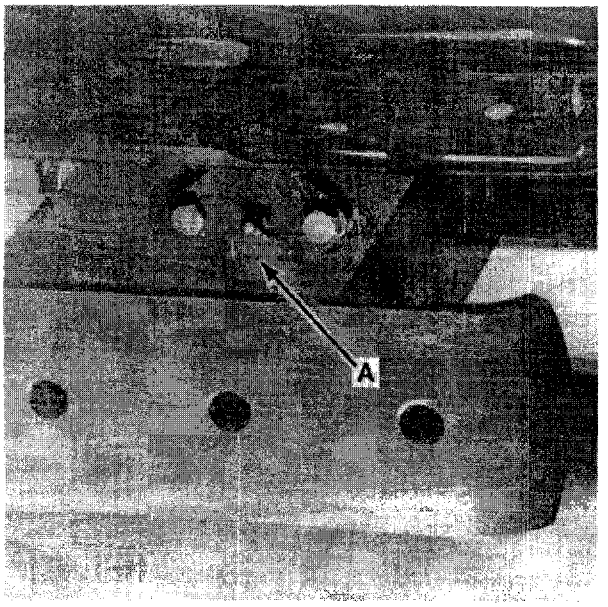
DESCRIPTION AND OPERATION

A non-adjustable front axle is standard equipment on the Model 1715 tractor, Figure 10-1.

The center section is mounted to the engine support, Figure 10-2, by a pivot shaft. The axle rotates on the pivot shaft, thereby maintaining the tractor chassis in a level position and ensuring stable operation even on irregular ground.



Steering Linkage Removal **Figure 10-3**
A Spindle arm
B Tie rod
C Tie rod castellated nut
D Clamp bolt



Front Axle Pivot **Figure 10-4**
A Casing — front

STEERING LINKAGE — REMOVAL

NOTE: Check the axle end play prior to removal from the support.

1. Remove the front wheels from the axle hubs.
2. Remove the castellated nut and remove the tie rod ball joint pin from the spindle arms, Figure 10-3.
3. Remove the spindle assembly.

SPINDLE — REMOVAL AND DISASSEMBLY

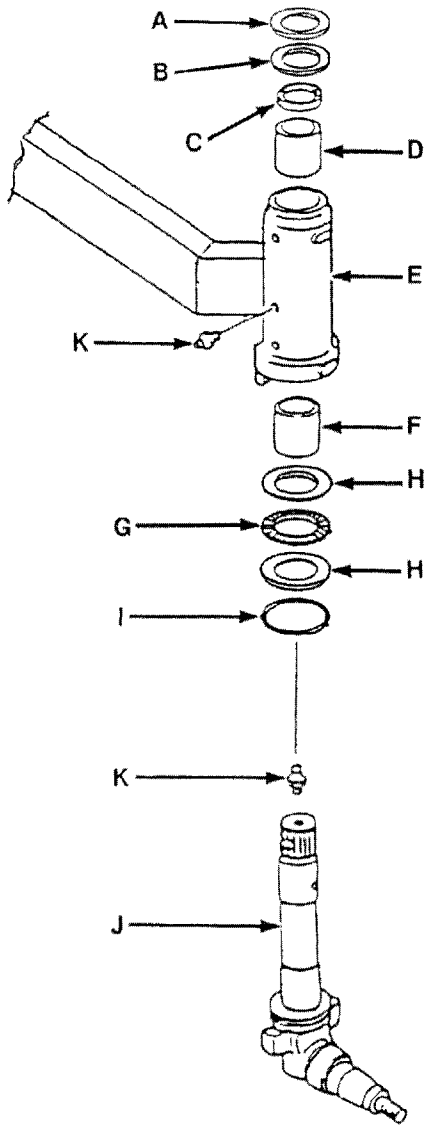
1. Remove the spindle arm clamp bolts, D, Figure 10-3.
2. Withdraw the spindle arms from the spindle.
3. Remove the spindle from the axle.
4. Remove the thrust bearing, thrust washers and o-ring seal from the spindle.

SPINDLE — INSPECTION AND REPAIR

1. Clean all parts in a suitable solvent and air dry.
2. Check the end play of the front axle pivot shaft, Figure 10-4.

   If the axle pivot end play is excessive, add shims in the front bearing holder as required. See "Specifications," for end play specifications.
3. Measure the pivot pin bearing journal diameter and the bushing inside diameter and determine the working clearance. Replace the bushings if the clearance is excessive. See "Specifications".
4. Check the front wheel hub bearings for wear or damage. Replace bearings exhibiting uneven rotation when rotated by hand.

   Replace the bearing race if the bearing is replaced.
5. Replace the oil seal during assembly.
6. Check the spindle bushings for excess wear or damage. Replace bushings using a suitable driver.



Front Axle Spindle Components — 2WD **Figure 10-5**

A	Shim	G	Needle bearing
B	Spacer	H	Thrust washer
C	Oil seal	I	O-ring
D	Bushing	J	Spindle
E	Outer axle	K	Grease fitting
F	Bushing		

7. Inspect the spindle thrust bearings for excess wear or damage. Replace as required, Figure 10-5.

8. Replace oil seals and o-ring seals during assembly.

9. Inspect the spindle shank and axle bearing journals for excess wear or damage. Replace if required.

SPINDLE — ASSEMBLY

1. Lubricate all components during assembly.

2. Assemble the spindle assembly as shown, Figure 10-5.

   NOTE: Apply grease to the spindle and bushing areas on assembly.

3. Using a suitable installer, install the oil seal being sure to position the seal with the lips facing upward.

4. Lubricate the mating surfaces and install the spindle arms.

5. Install the spindle clamp bolt and tighten to the specified torque.

6. Pack the wheel hub bearings with grease and assemble the front wheel hub onto the axle.

7. Tighten the axle nut slowly while rotating the hub until the hub begins to drag. Then back off the nut to the next castellation. Install the cotter pin.

8. Install the cap along with a new gasket.

9. Position the front axle to the support assembly and install the front and rear pivot bearing holders, or cover as required, see Figure 10-4.

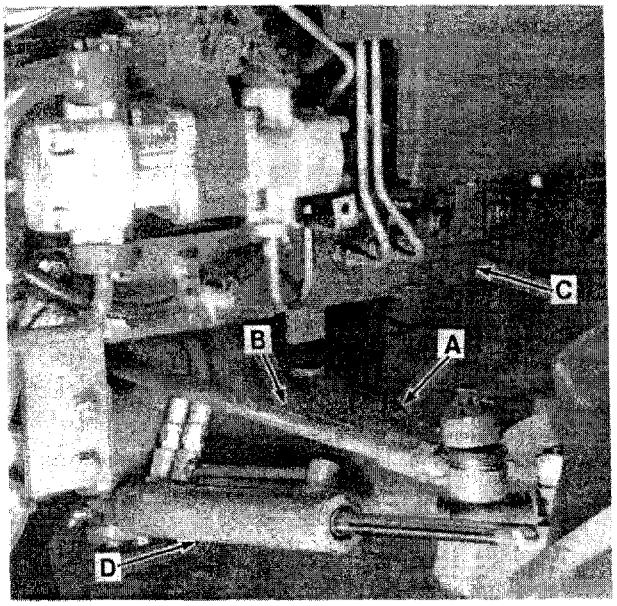
10. Using a suitable installer, install the oil seals being sure to position the seal lips facing outward from the casing.

11. Assemble the axle assemblies to the center section.

12. Install the front wheels and tighten the wheel nuts to the specified torque.

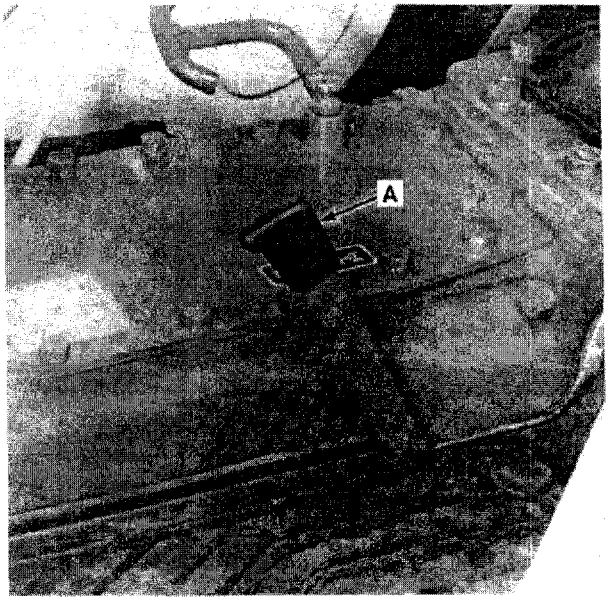
13. Postion the tie rods ends to the spindle arms. Secure with the castle nut and cotter pin.

FOUR WHEEL DRIVE



Front Axle Assembly — FWD **Figure 10-6**

A Axle assembly
B Tie rod
C Support
D Power steering cylinder



Front Wheel Drive Control Lever **Figure 10-7**

A Lever

DESCRIPTION AND OPERATION

The four wheel drive is optional equipment.

The four wheel drive system uses the same supporting system as the two wheel drive models.

The four wheel drive front axle is not adjustable and the front wheels are not to be reversed.

The four wheel drive tread setting for agricultural tires is:

1715 ..... 42.6 in. (108 cm)

The front wheel tie rod assembly is adjustable for toe-in adjustments.

The power steering cylinder, D, is located between the front axle and steering arm, Figure 10-6.

The front wheel drive is controlled by a lever, as shown in Figure 10-7.

SPECIFICATIONS

TWO WHEEL DRIVE

King Pin Inclination (fixed)	8°
Toe-In	0-3/16 in. (0-0.5 mm)
Caster (fixed)	0°
Camber (fixed)	3°
Pivot Shaft to Bushing Clearance	0.001-0.006 in. (0.02-0.15 mm)
Wear Limit	0.012 in. (0.3 mm)
Front Axle End Play — Maximum	0.008 in. (0.2 mm)
Shims Available	0.008 in. (0.2mm) 0.020 in. (0.5 mm)

FOUR WHEEL DRIVE

Differential Pinion Gear to Pinion Shaft Clearance	0.004 in. (0.1 mm)
Differential Pinion Gear Thrust Washer Thickness	0.047 in. (1.2 mm)
Differential Side Gear to Pinion Gear Backlash	0.004-0.006 in. (0.1-0.15 mm)
Drive Pinion Bearing Pre-Load	29-37 lbs. pull (13-17 kg)
Differential Housing Pivot Trunnion to Bushing Clearance	
Front	0.001-0.007 in. (0.02-0.2 mm)
Maximum	0.014 in. (0.35 mm)
Rear	0.001-0.006 in. (0.02-0.16 mm)
Maximum	0.014 in. (0.35 mm)
King Pin Inclination (fixed)	10°
Camber (fixed)	2°
Final Pinion Gear to Bevel Gear Backlash	0.008-0.016 in. (0.2-0.4 mm)
Front Axle Pivot End Play	0.012 in. (0.3 mm)
Maximum	0.023 in. (0.6 mm)
Front Wheel Toe-In	0-3/16 in. (0-5 mm)

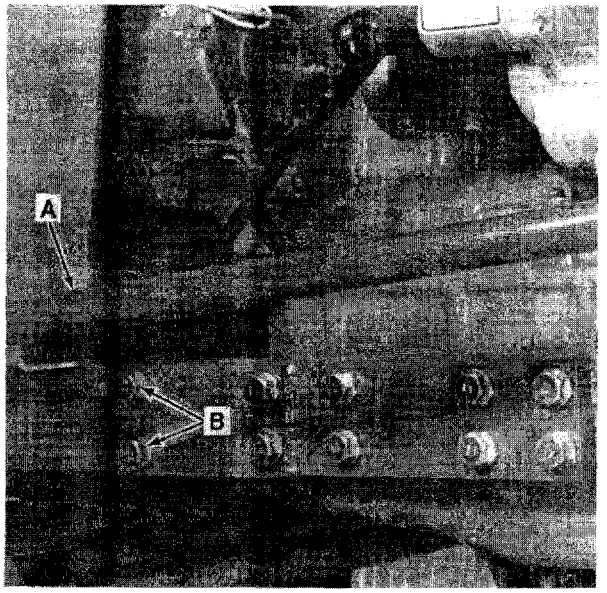
SECTION 11
WHEELS AND TIRES
SPECIFICATIONS

TIRE INFLATION

Front Tire Size		Inflation Pressure
4.00 x 15	4PR F2	20-44 psi (1.40-3.08 bar)
5.50-16	4PR F2	20-36 psi (1.40-2.50 bar)
6-14	4PR R1	8-28 psi (0.55-1.95 bar)
7-14	4PR R1	8-26 psi (0.55-1.80 bar)
23 x 8.50-12	4PR R3	8-24 psi (0.55-1.70 bar)
25 x 8.50-14	4PR R3	8-20 psi (0.55-1.40 bar)
Rear Tire Size		**Inflation Pressure**
9.5-24	4PR R1	12-20 psi (0.83-1.40 bar)
11.2-24	4PR R1	12-18 psi (0.83-1.25 bar)
13.6-16	4PR R3	12-14 psi (0.83-0.97 bar)

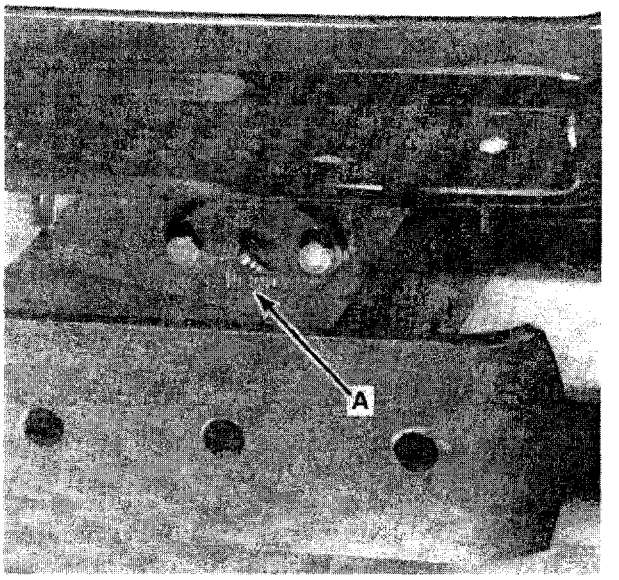
NOTE: Do not under-inflate or over-inflate the tires. Do not exceed the maximum inflation pressure listed.

SECTION 12
SEPARATING THE TRACTOR



Front Axle Removal — Two Wheel Drive **Figure 12-1**

A Drag link
B Bolts, pivot bearing — rear



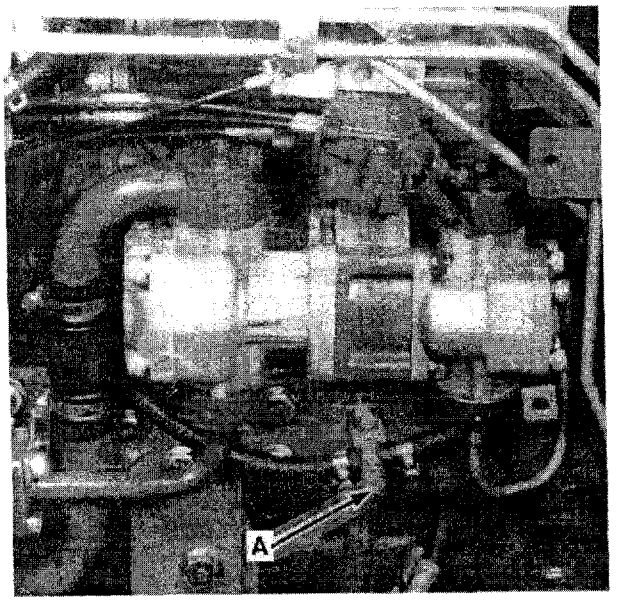
Front Axle Pivot **Figure 12-2**

A Casing — front

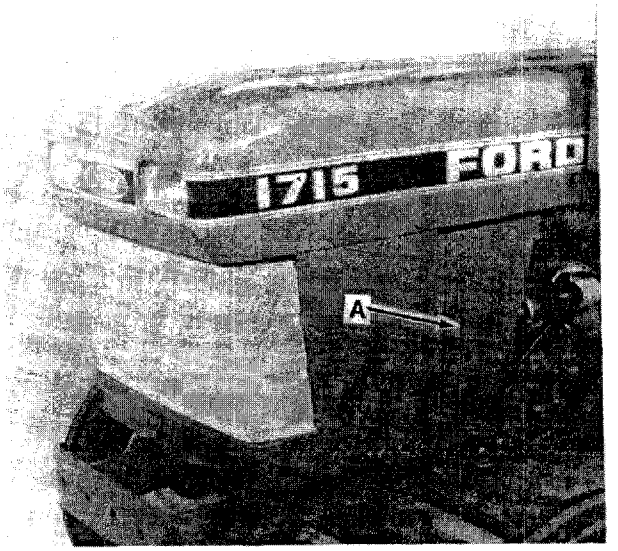
FRONT AXLE REMOVAL

Two Wheel Drive

1. Disconnect the drag link from the steering arm, Figure 12-1.
2. Place a floor jack and safety jack stands under the transmission housing to support the weight of the front end of the tractor.
3. Remove the axle pivot front bearing casing, A, Figure 12-2.
4. Remove the axle pivot rear support retaining bolts, B, Figure 12-1.
5. Gently raise the tractor front end, at the same time separating the axle pivot from the front support. Then gently roll the front axle assembly forward out from under the tractor.



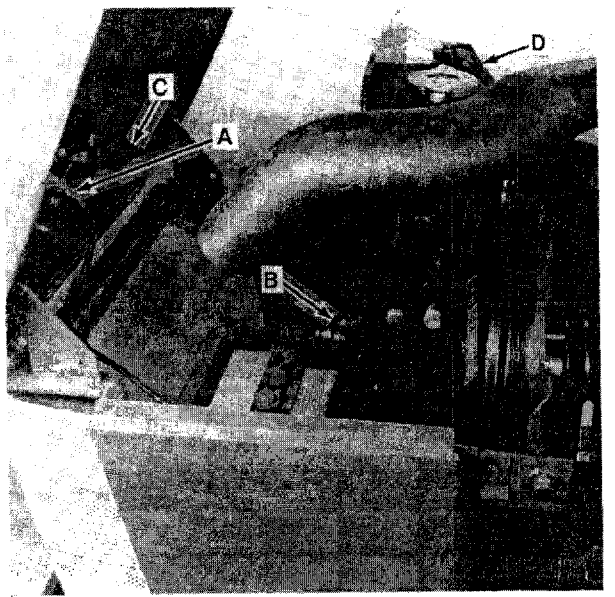
Radiator and Block Drain — FWD **Figure 12-3**
A Drain cock



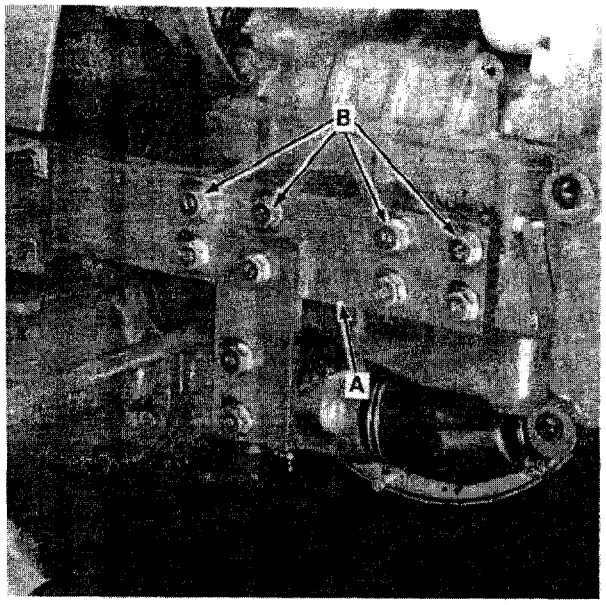
Engine Side Covers Removal **Figure 12-4**
A Side cover

SEPARATING THE TRACTOR BETWEEN THE FRONT AXLE SUPPORT AND ENGINE

1. Drain the coolant into a clean container, Figure 12-3, (radiator and block).
2. Open the hood and remove the side covers, Figure 12-4.
3. Disconnect the headlamp wiring connectors, Figure 12-5.
4. Disconnect the battery ground strap.
5. Remove the hood pivot pin cotter pins and remove the hood, Figure 12-5.
6. Loosen the upper and lower radiator hose clamps and remove the hoses from the radiator.
7. Remove the radiator upper brace, Figure 12-5.
8. On FWD models, disconnect the power steering tubes, A, from the front axle support and cap all openings.
9. On FWD models, disconnect the FWD drive shaft.
10. Using a floor jack and safety stands under the clutch housing, raise the tractor to support the weight of the front end.



Hood Removal **Figure 12-5**
A Headlamp connectors
B Battery ground strap
C Pivot pins — hood
D Radiator support



Separating the Tractor Between the Front Axle and Engine **Figure 12-6**

A Engine support rails
B Mounting bolts (8 ea. side)

11. Remove the bolts from each side of the support rails, Figure 12-6.

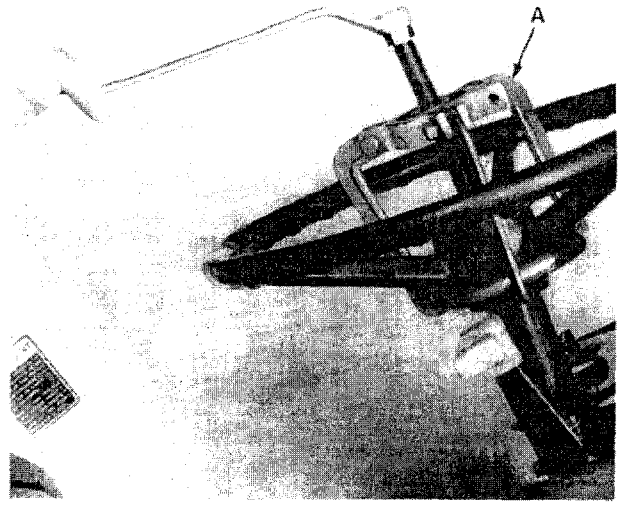
12. Carefully roll the front axle assembly away from the tractor.

nstallation

nstallation generally follows the removal pro- ;edure in reverse.

'ighten all bolts to the specified torque.

;ee "Specifications".



Steering Wheel **Figure 12-7**

A Puller

SEPARATING THE TRACTOR BETWEEN THE ENGINE AND TRANSMISSION CLUTCH HOUSING

1. Open the hood and remove the side covers, Figure 12-5.

2. Disconnect the battery negative cable, Figure 12-5.

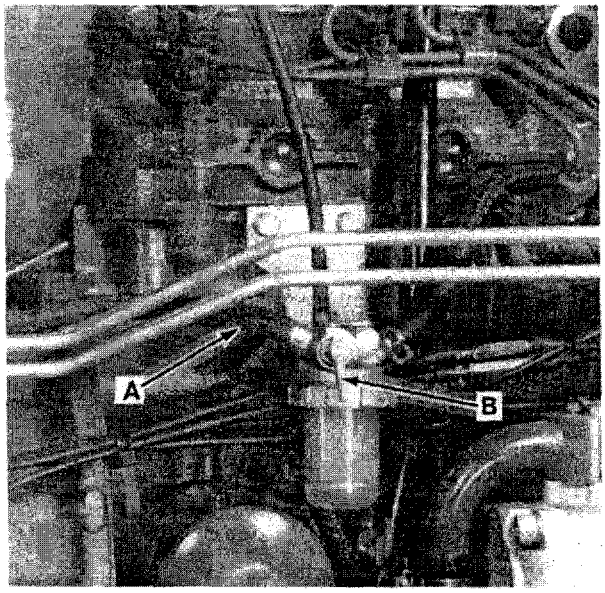
3. Disconnect the headlamp wiring connectors, Figure 12-5.

4. Remove the hood pivot pin cotter pins and remove the hood.

5. Remove the steering wheel, Figure 12-7.

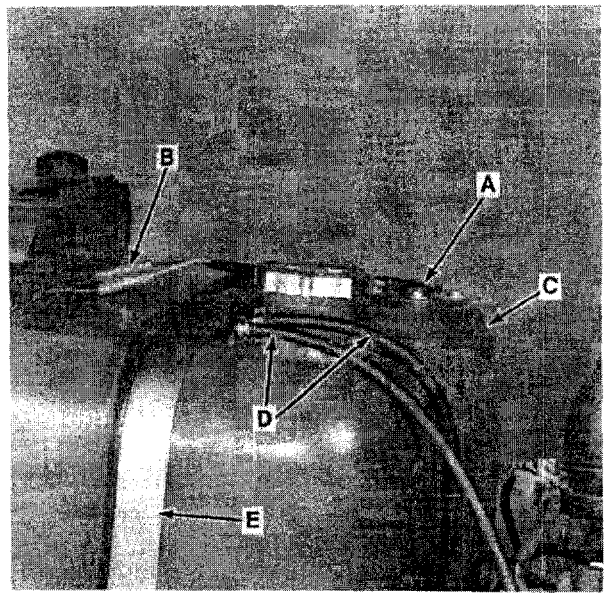
6. Remove the throttle control cables from the injection pump lever.

7. Remove the engine stop cable from the stop lever.



Fuel Shut-Off **Figure 12-8**

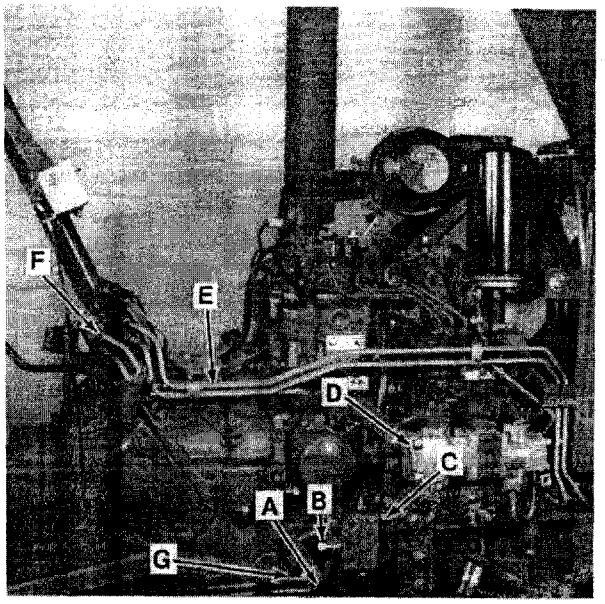
A Fuel line
B Fuel shut-off



Fuel Tank Removal **Figure 12-9**

A Fuel gauge sender
B Wire connectors
C Fuel tank
D Fuel return lines
E Retaining band

8. Remove the fuel hose, A, from the fuel shut-off valve and filter. Drain the fuel into a clean container, Figure 12-8.
9. Disconnect the fuel gauge sender wires, B, Figure 12-9.
10. Disconnect the fuel return lines, D, Figure 12-9, from the fuel tank, C.
11. Remove the fuel tank retaining band, E, Figure 12-9.
12. Remove the fuel tank from the tractor.
13. Disconnect the wiring harness connectors from the instument panel, key start switch and rear harness assembly.
14. Remove the instrument panel with the wiring harness connected.



ydraulic Tube Removal — FWD **Figure 12-10**

- A Hydraulic oil return tube
- B Pressure tube
- C Diverter valve manifold assembly
- D Suction tube
- E Power steering tubes
- F Power steering control valve
- G Hose clamp

15. Remove the oil return line, A, Figure 12-10, from the tractor.

16. Remove the hydraulic system pressure tube, B, and the diverter valve manifold, C, as an assembly, Figure 12-10, from the tractor.

17. Remove the hydraulic suction tube, D, from the tractor, Figure 12-10.

18. On FWD models, disconnect the four power steering oil tubes from the control valve, Figure 12-10.

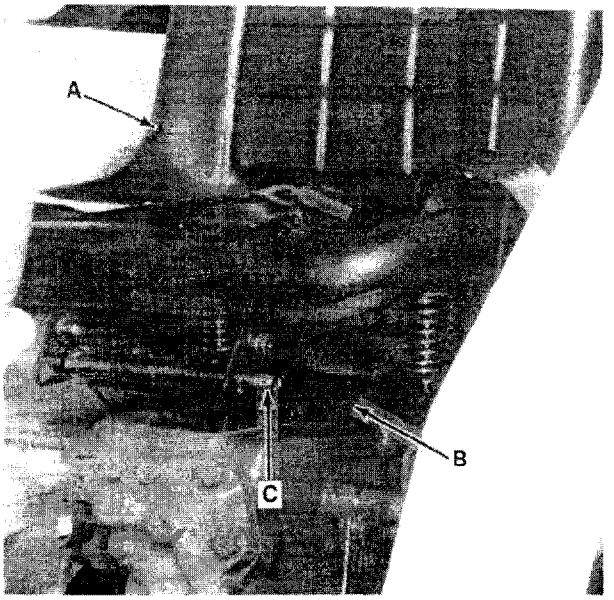
19. Disconnect the starter motor wiring from the starter.

20. Remove the starter motor assembly.

21. Support the transmission housing with a floor jack.

22. Support the engine with a hoist and chain at the brackets on top of the engine.

23. Remove the engine to transmission buckle-up bolts and carefully separate the engine from the transmission.



Seat Removal **Figure 12-11**

- A Seat
- B Track assembly
- C Pin

TRANSMISSION REMOVAL AND INSTALLATION

Removal

1. Separate the engine from the transmission clutch housing.

2. Drain the transmission, rear axle and hydraulic system. Collect the oil in a clean container. See Operator's Manual.

3. Remove the seat and track assembly, Figure 12-10.

4. Remove the brake and clutch pedal return spring.

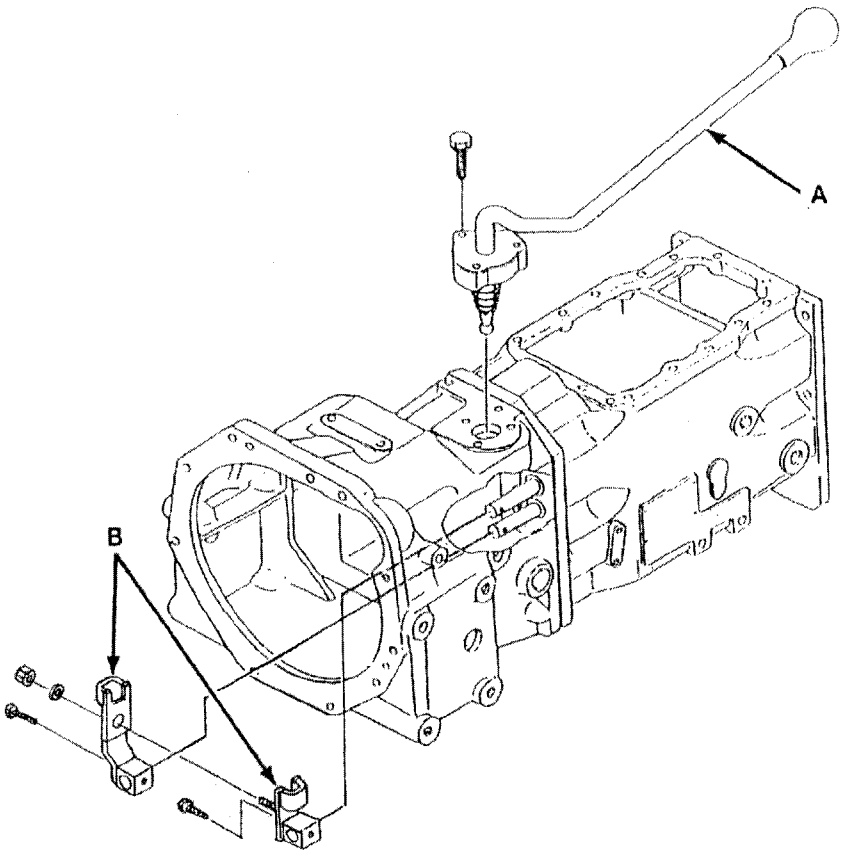
5. Disconnect the foot throttle cable from the pedal.

6. Remove the right and left step plates.

7. Disconnect the rear wiring harness from the transmission case.

8. If equipped with a remote control valve, remove the valve, mounting stand and tubing as an assembly.

9. Disconnect and remove the brake pedal control rods from each side.



Clutch Housing Removal **Figure 12-12**
A Shift lever
B Shift arms

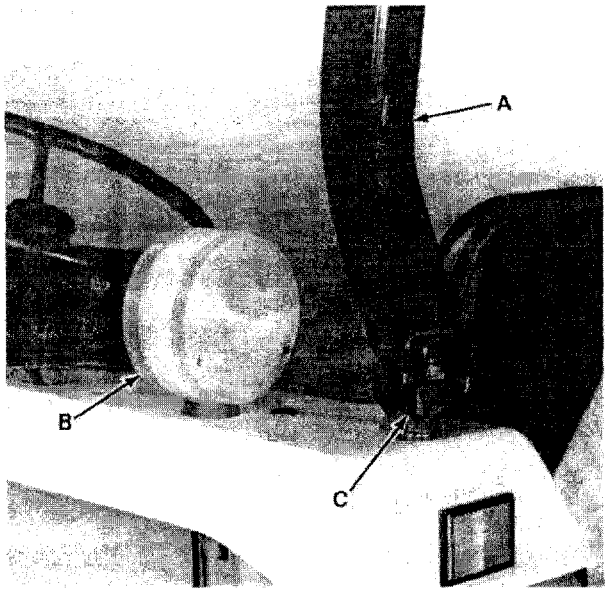
10. Remove the shift lever, A, Figure 12-12, from the clutch housing.
11. Remove the clutch housing to transmission buckle-up bolts.
12. Remove the shift arm retaining bolts from the shifter rods. Disconnect the shift arms, B, Figure 12-12, from the shifter rods.
13. Using a heavy rubber mallet, loosen the clutch housing mating joint.

    NOTE: The steering column need not be removed for this operation.
14. Remove the transmission cover.
15. Remove the hydraulic lift cover.
16. Remove the internal buckle-up bolt.
17. Attach an overhead hoist to the transmission case.
18. Remove the external buckle-up bolts.
19. Using a heavy rubber mallet, loosen the transmission case mating joint and slide the transmission foward off of the dowel pins.

Installation

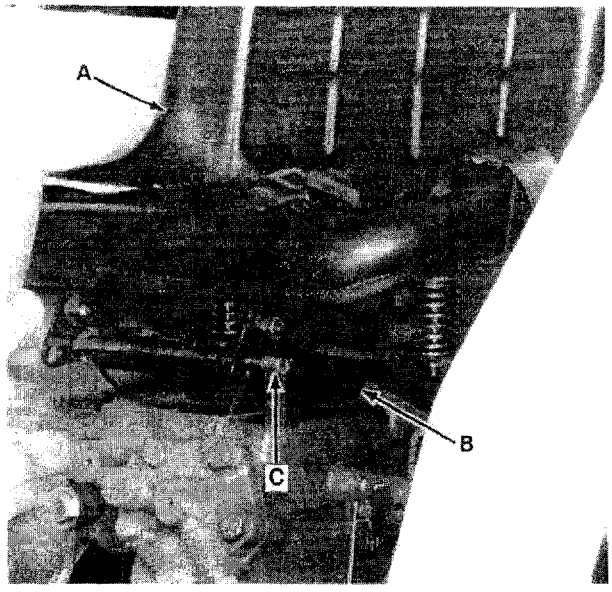
Installation generally follows the removal procedure in reverse order.

During installation, coat the transmission, clutch housing and rear axle center housing mating surfaces with liquid gasket sealer. Use caution to prevent excess sealer from entering the inside of the housing and contaminating the hydraulic oil supply.



Roll Bar Removal **Figure 12-13**

A Roll bar
B Flasher warning lamp
C Tail lamp

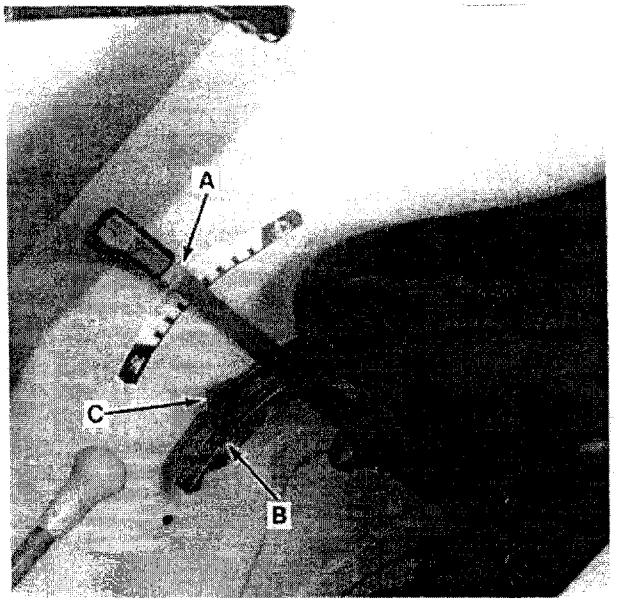


Seat Removal **Figure 12-14**

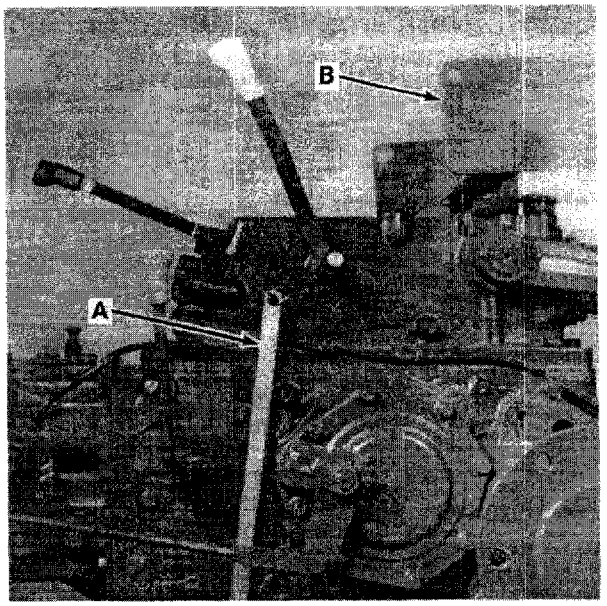
A Seat
B Track assembly
C Pin

REAR AXLE AND CENTER HOUSING — REMOVAL AND INSTALLATION

1. Drain the oil from the transmission, rear axle and hydraulic systems. Collect it in a clean container.
2. Remove the seat and track assembly, Figure 12-14.
3. Place wedge blocks between the engine side rails and front axle to prevent the engine from tipping.
4. Place blocking on both sides of the front wheels.
5. Place a safety jack stand under the transmission.
6. Remove the rear wheels.
7. Disconnect the wiring to the tail lamp, C, Figure 12-13, and flasher warning lamp, B.

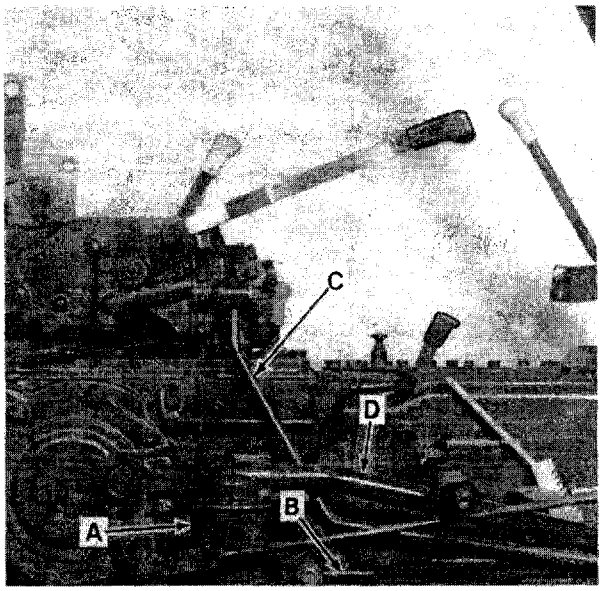


Hydraulic Control Levers **Figure 12-15**
A Lever
B Guide
C Knob



PTO Shift Linkage Removal **Figure 12-16**
A Shift linkage
B Frame

8. Remove the hydraulic control lever grips, Figure 12-15.
9. Remove the lever guide, B, Figure 12-15, from the right fender.
10. Remove both fenders.
11. Remove the roll bar assembly.
12. Remove the PTO shift linkage, Figure 12-16, from the lift cover.
13. Remove the brake and clutch pedal return springs from the step plates.
14. Disconnect the foot throttle pedal cable from the pedal.
15. Remove the step plates.
16. Remove the frame from the lift cover, Figure 12-16.



Rear Axle Center Housing Removal **Figure 12-17**

A Filter and flange assembly
B Oil return tube
C Oil pressure tube
D Suction tube

17. Remove the hydraulic system oil return tube, B, Figure 12-17.
18. Remove the hydraulic system pressure tube, C, from the lift cover.
19. Remove the suction tube, D, Figure 12-17.
20. Remove the hydraulic filter and mounting flange as an assembly, Figure 12-17.
21. Remove the hydraulic lift cover.
22. Remove the transmission cover.
23. Remove the internal buckle-up bolt.
24. Attach an overhead hoist to the rear axle and center housing assembly.
25. Remove the external buckle-up bolts and gently remove the rear axle assembly from the transmission.

Installation

Installation generally follows the removal procedure in reverse order.

During installation, coat the transmission and center housing mating surfaces with liquid gasket sealer. Use caution to prevent excess sealer from entering the inside of the housing and contaminating the hydraulic oil supply.

SPECIFICATIONS

Lubricant

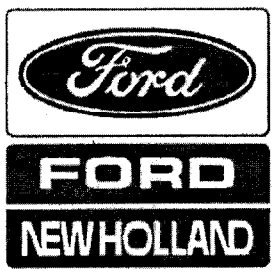
Transmission, Rear Axle and Hydraulic System - Oil ..... FNH 134

Front Axle ..... FNH 134

Ford Sealant (Gasket Eliminator) ..... FNH L51831 or Loctite® Gasket Eliminator 518

METRIC BOLT TORQUE SPECIFICATIONS

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Pounds-Feet	Newton-Meters	Pitch (mm)	Pounds-Feet	Newton-Meters
M6	4T 4T 4.8	1.0	3.6— 5.1	4.9— 6.9	—	—	—
	7T 7T 8T 8.8		6.1—8.3	8.3—11.3			
	10T 10T 11T		8.7—11.6	11.8—15.7			
M8	4T	1.25	9.4—12.3	12.7—16.7	1.0	11.2—14.8	15.2—20.1
	7T		16.6—21.0	22.6—28.4		19.5—25.3	26.5—34.3
	10T		21.0—26.8	28.4—36.3		22.4—29.7	30.4—40.2
M10	4T	1.5	18.8—24.6	25.5—33.3	1.25	21.0—26.8	28.4—36.3
	7T		32.5—41.2	44.1—55.9		36.2—46.3	49.0—62.8
	10T		39.8—51.4	53.9—69.9		42.7—54.2	57.9—73.5
M12	4T	1.75	27.5—34.7	37.3—47.1	1.25	31.8—40.5	43.1—54.9
	7T		48.5—61.5	65.7—83.4		55.0—69.4	74.5—94.1
	10T		68.0—85.4	92.2—116		73.1—93.3	99.0—127
M14	4T	2.0	46.3—59.3	62.8—80.4	1.5	51.4—64.4	69.6—87.3
	7T		76.7—96.9	104—131		86.1—109	117—148
	11T		102—129	139—175		108—137	147—186
M16	4T	2.0	63.6—81.0	86.3—110	1.5	67.3—84.6	91.3—115
	7T		110—136	149—184		116—142	157—192
	11T		152—188	206—255		163—199	221—270
M18	4T	2.0	83.9—104	114—141	1.5	95.9—120	313—163
	7T		145—174	196—235		170—206	131—279
	11T		203—246	275—333		221—271	299—368
M20	4T	2.5	106—132	144—179	1.5	127—156	172—211
	7T		177—213	240—289		203—246	275—333
	11T		268—325	363—441		293—358	397—485



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