SPECIAL TOOLS—Continued

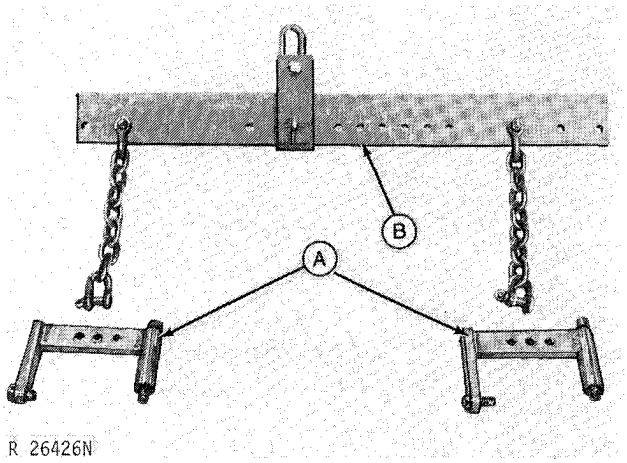
TOOL	NUMBER	USE
 R 26426N	A-JDE-63 Engine Lift Brackets*	To remove engine from 8440.
	B-JDG-23 Engine Lift Sling*	To lift engines.

Fig. 11-Engine Removal Tools

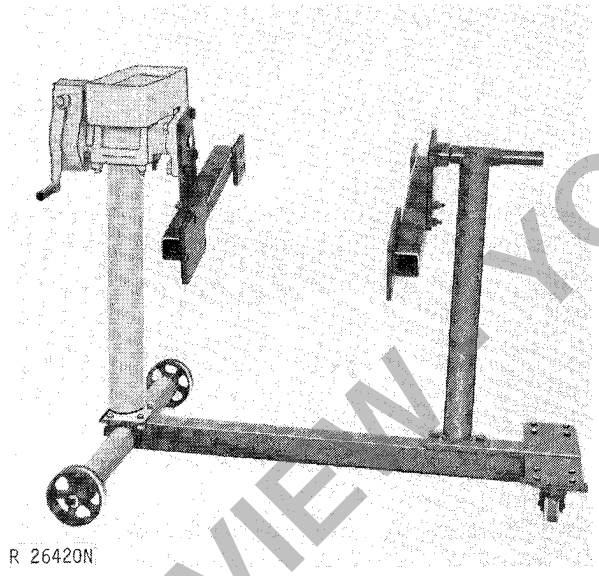
 R 26420N	D-05001ST Repair Stand*	To support engine after removal.

Fig. 12-Engine Repair Stand

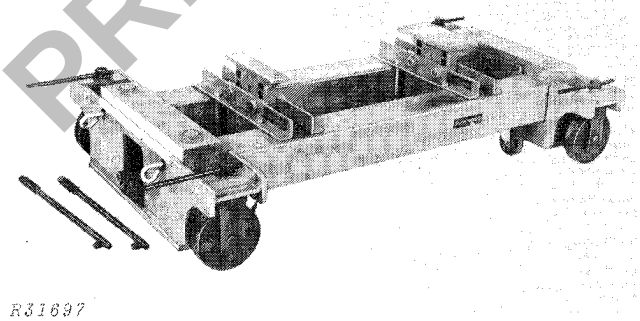
 R31697	D-05150ST Heavy Duty Rear Splitting Stand*	To support tractor.

Fig. 13-Rear Splitting Stand

**Order from Service Tools, Box 314, Owatonna MN 55060*

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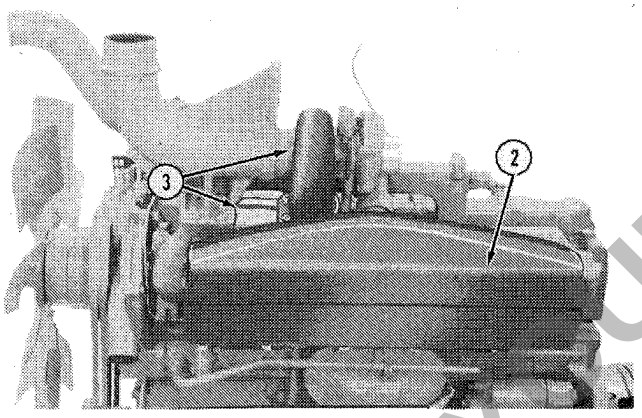
Group 05
ENGINE ACCESS

CYLINDER HEAD AND VALVES

Access

It is not necessary to remove engine to service cylinder head. If removal of engine is desired, see Section 10, Group 20.

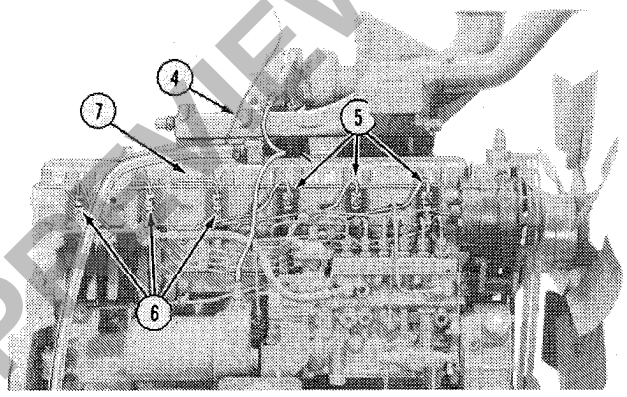
1. Remove engine as indicated in Section 10, Group 20.



R27479 N

Fig. 5—Left Side Removal Steps

2. Remove intercooler with intake manifold.
3. Remove turbocharger with exhaust manifold.



R27480 N

Fig. 6—Right Side Removal Steps

4. Remove water manifold.
5. Remove fuel lines.
6. Remove fuel injection nozzles.
7. Remove rocker arm cover as instructed in CTM-1, 6466 Engines.

CAMSHAFT

Access

NOTE: To service the camshaft, the engine normally need not be removed from the tractor.

1. Separate the tractor front end from engine.
2. Remove rocker arm cover.
3. Remove rocker arm assembly.
4. Remove push rods.
5. REmove damper and pulley.
6. Remove timing gear cover.
7. Remove camshaft as instructed in CTM-1, 6466 Engines.

PISTONS

Access

Under normal conditions the engine need not be removed from the tractor to service pistons, rods and liners. If engine removal is desirable, see Section 10, Group 25.

1. Remove cylinder head as described in Group 05.
2. Remove oil pan.

CRANKSHAFT, MAIN BEARINGS AND FLYWHEEL

Access

To inspect and repair crankshaft, main bearings and flywheel, engine must be removed from tractor.

1. Separate engine from clutch housing (10-25-9).
2. Remove engine from front end (10-25-14).
3. Refer to CTM-1, 6466 Engines for repair procedure.

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Crankshaft, Main Bearings and Flywheel—Continued

TOOL NUMBER	USE
A—D-01219AA Push Puller*	To remove crankshaft gear.
B—D-01222AA Pulling Legs*	
C—No. 630-9 Adapter* (From D-01212AA Set)	
D—D-01218AA Pulling Attachment*	

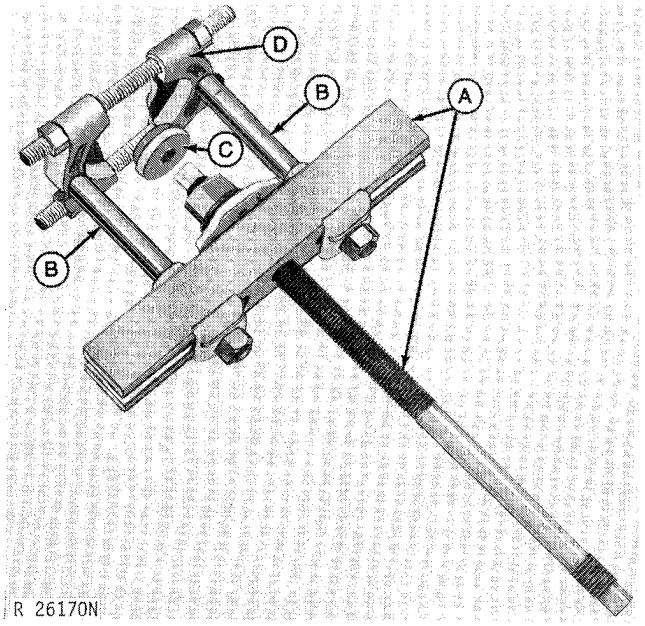


Fig. 12-Special Tools

A—JDE-34-1 Guide*	To install crankshaft rear wear sleeve and rear oil seal.
B—JDE-68 Driver*	

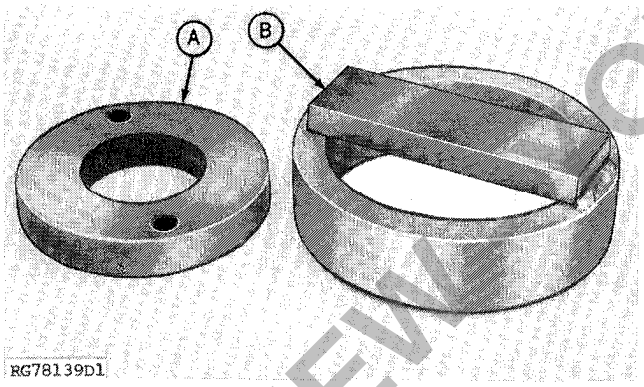


Fig. 13-Special Tools

A—JDH-7 Driver*	To install crankshaft gear.
B—JDE-3 Driver*	To install front wear sleeve.
C—No. 27522 Disk*	
D—No. 27537 Disk*	To install front oil seal.
E—No. 27488 Disk*	

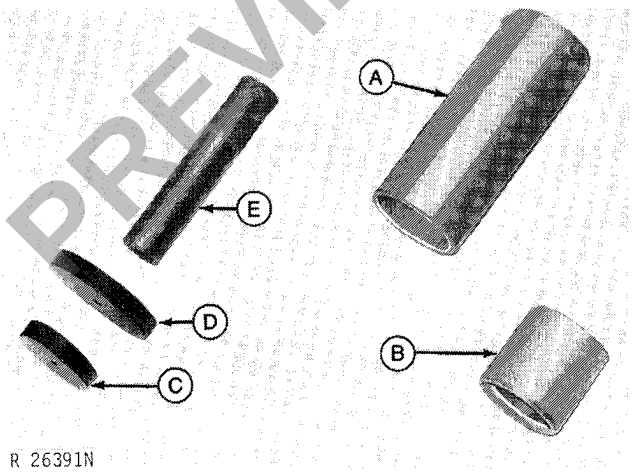
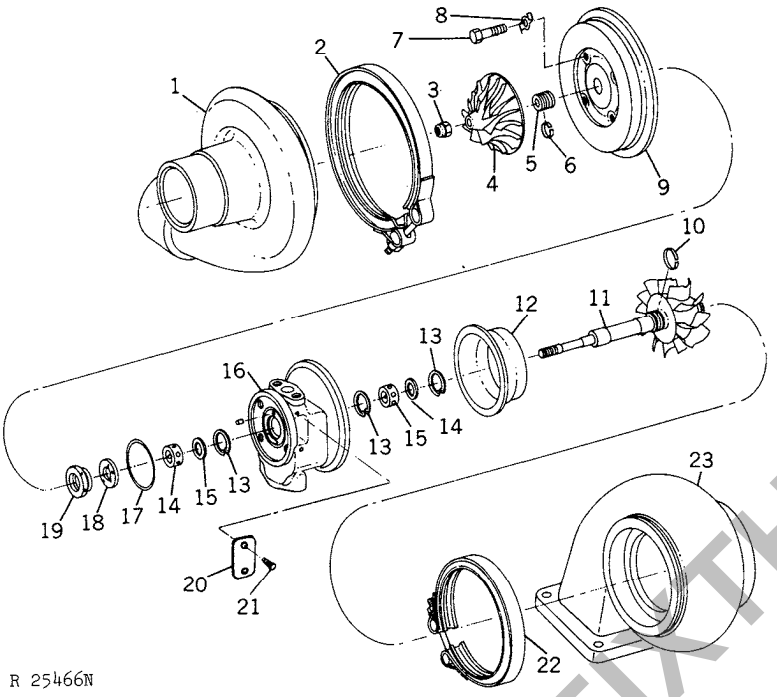


Fig. 14-Special Tools

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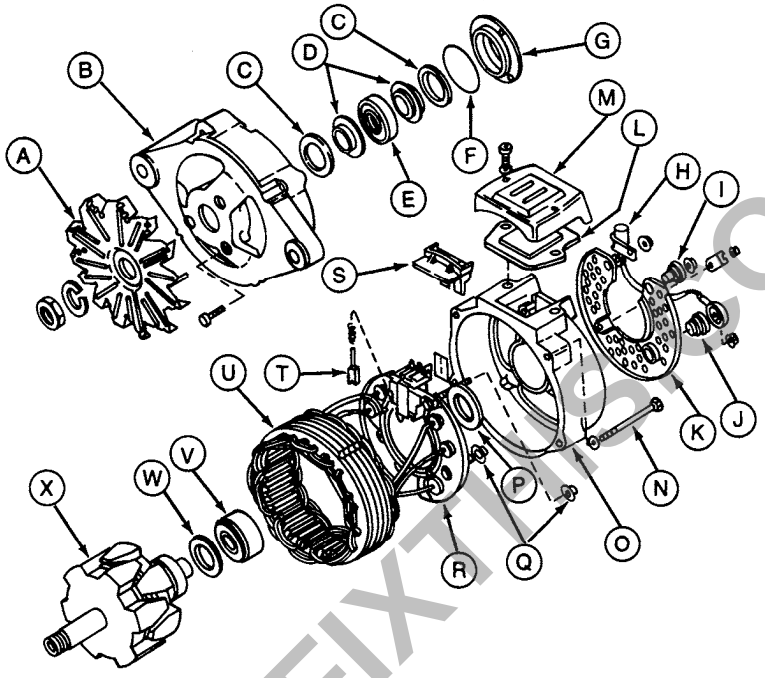
1—Compressor Housing
2—Clamp
3—Self-Locking Nut
4—Impeller
5—Thrust Spacer
6—Piston Ring
7—Bolt
8—Lock Plate
9—Back Plate Assembly
10—Piston Ring
11—Turbine Wheel Assembly
12—Wheel Shroud
13—Retaining Ring
14—Washer
15—Bearing
16—Center Housing
17—Seal Ring
18—Thrust Washer
19—Thrust Collar
20—Nameplate
21—Drive Screw
22—Clamp
23—Turbine Housing

Fig. 15-AiResearch TV-6102 Turbocharger

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REPAIR



R31563

A—Fan	G—Bearing Retainer	M—Regulator Cover	S—Insulator
B—Front Housing	H—Condenser	N—Thru Bolt (4 used)	T—Brush (2 used)
C—Felt Washer (2 used)	I—Insulating Bushing	O—Rear Housing	U—Stator
D—Collar (2 used)	J—Insulating Bushing	P—Felt Washer	V—Rear Bearing
E—Front Bearing	K—Rear Cover	Q—Insulating Bushings	W—Felt Washer
F—O-Ring	L—Voltage Regulator	R—Rectifier Bridge	X—Rotor

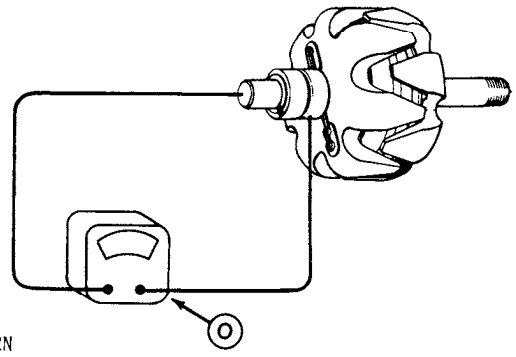
Fig. 3-Alternator

Bearings

IMPORTANT: Do not clean bearings in solvent.

Bearings (E and V, Fig. 3) may be reused if not damaged. Wipe bearings, bearing cavities, collars, and felt washers with a clean cloth. Coat bearing with a thin film of Chevron SRI-2 grease or its equivalent and place 1/4 to 1/2 teaspoon (1 to 2 cm^3) of same lubricant in bearing cavity.

Rotor



R 26532N

O—Ohmmeter

Fig. 4-Checking Rotor for Grounds

To check rotor for grounds, use an ohmmeter or test lamp to test for continuity between each slip ring and rotor shaft. Replace rotor if test shows continuity.

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QUAD-RANGE Planetary

TOOL NUMBER	USE
A—JDT-23-1	To protect clutch piston packing when installing piston in drum.
B—JDT-23-2	To protect brake piston packing when installing piston in housing.

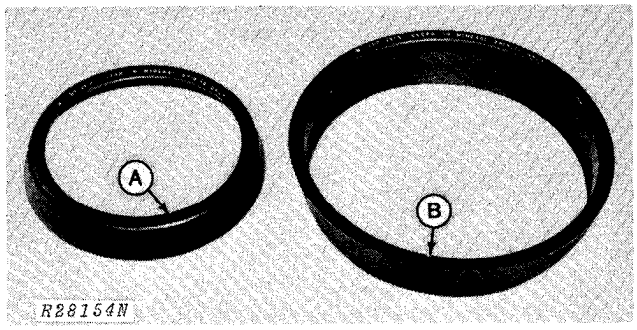


Fig. 3-Piston Installing Set

A—JDT-24	To compress clutch piston return spring washers during removal and installation of clutch piston.

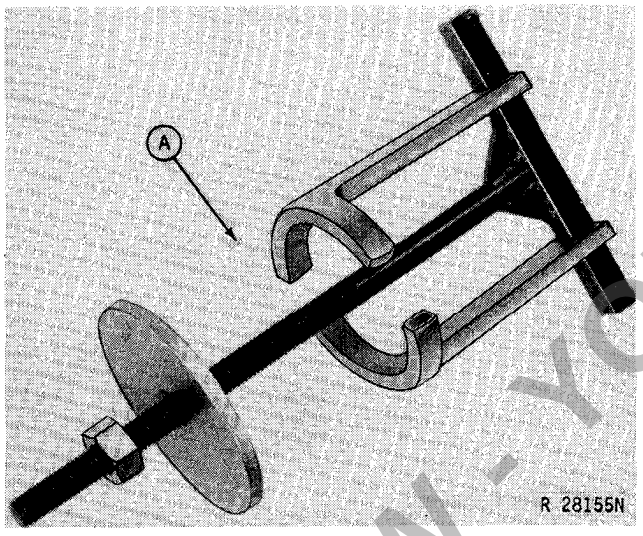


Fig. 4-Spring Washer Compressor

Other tools and materials required:

1/4 in. Allen wrench socket adapter or 1/4 in. hex bar stock 5 in. (125 mm) long to remove planetary attaching screws.

Planetary removal tool (See Fig. 29) to remove and install planetary from clutch housing.

TY4345 Pressure Regulator* or equivalent 60 psi (4.1 bar) (4.1 kg/cm²) Gauge (Do not use gauge supplied with TY4345 Pressure Regulator) 8 in. (204 mm) Length of 5/16 in. (8 mm) copper tubing	To check hi-lo shift point.

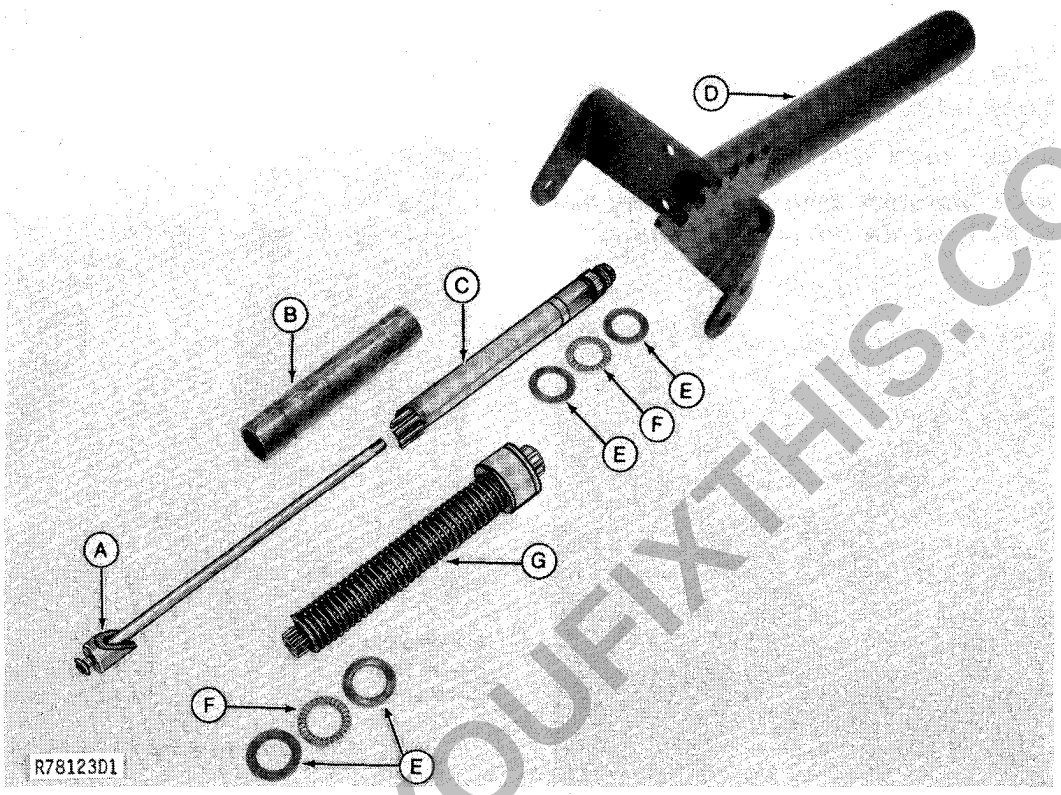
**Order from John Deere Parts*

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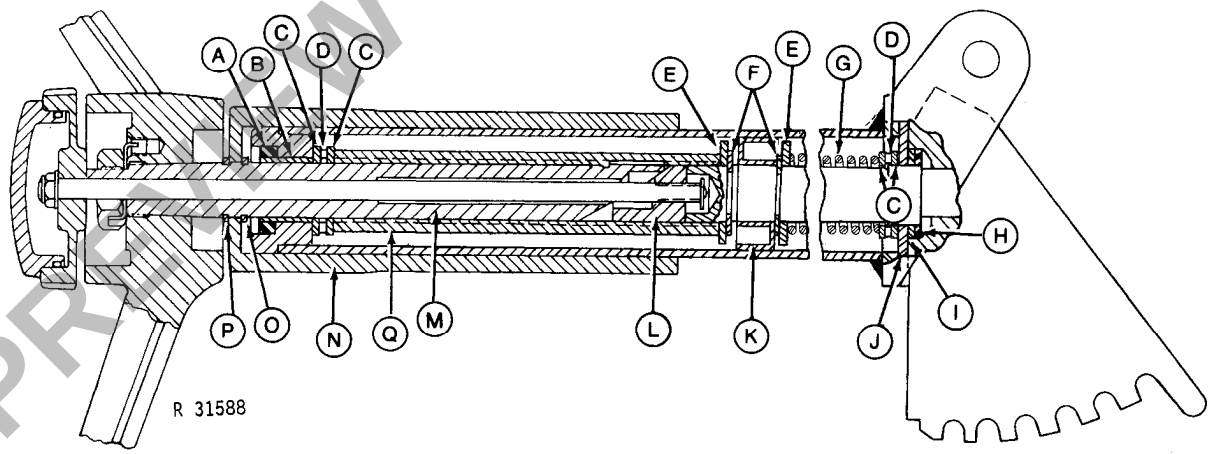
METERING PUMP AND STEERING COLUMN—Continued

Steering Shaft Inspection—Continued



A—Release Rod
B—Coupling
C—Upper Shaft
D—Steering Column
E—Thrust Washer
F—Needle Bearing
G—Lower Shaft Assembly

Fig. 8-Steering Shaft Assembly



A—Oil Seal
B—Bushing
C—Thrust Washer
D—Needle Bearing
E—Washer
F—Retaining Ring
G—Spring
H—Oil Seal
I —Washer
J—Plate
K—Bushing
L—Release Rod
M—Upper Shaft
N—Sleeve
O—Retaining Ring
P—Retaining Ring
Q—Coupling

Fig. 9-Cut-Away Steering Shaft Assembly

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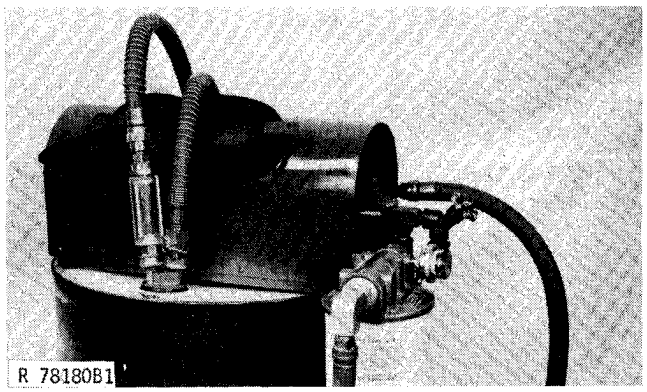
TOOL	NUMBER	USE
	*D-05155ST Oil transfer Unit	To facilitate oil handling

Fig. 8-Oil Transfer Unit

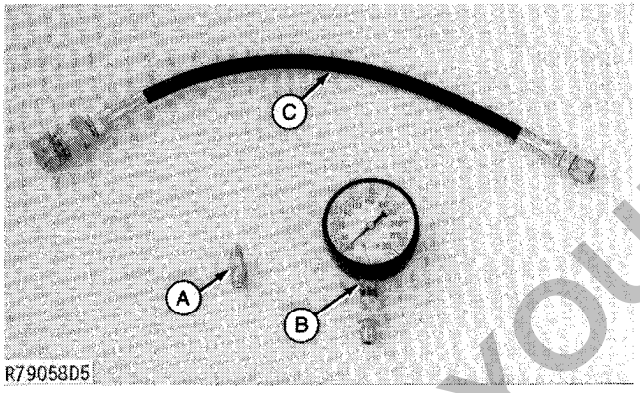
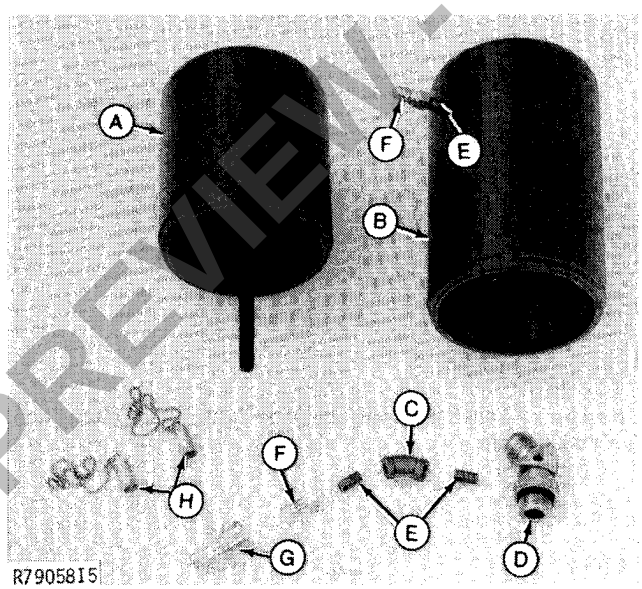
	*A—0700 (D-1) Fitting *B—6943 (0-300 psi) Gauge *C—2106 (D-19) Hose	Used with cleanup kit when checking pressure for filter restriction.

Fig. 9-Items from Universal Pressure Kit

	AR86240	Used in cleanup procedure to clean contaminated oil. Order through Parts Catalog.

A—Hydraulic Filter Cover
B—Clutch Filter Cover
C—45° Elbow
D—Special Elbow
E—Pipe Nipple (3 used)
F—Male Coupler (2 used)
G—Female Coupler
H—Dust Cap (2 used)

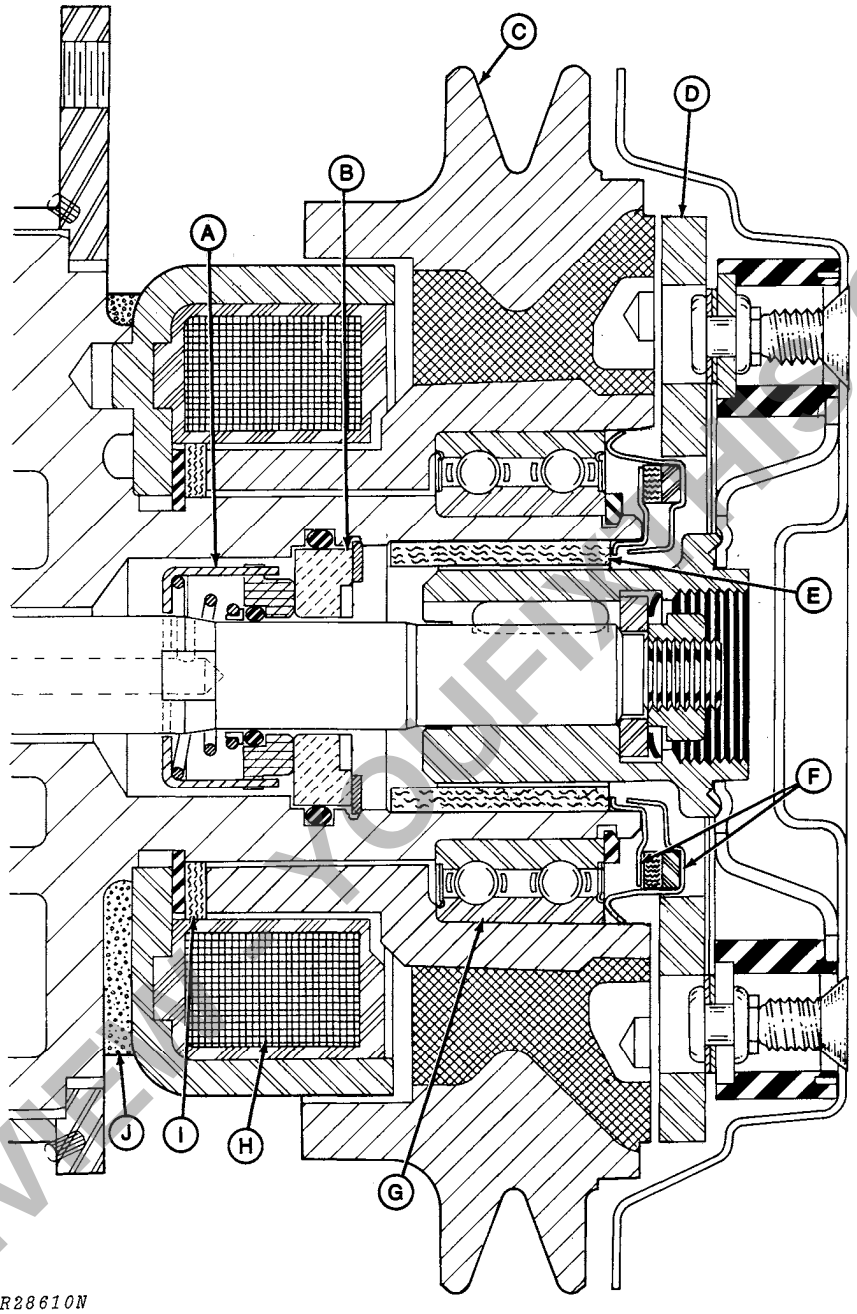
Fig. 10-Hydraulic Cleanup Kit

*Order from:
Service Tools
Box 314
Owatonna, MN 55060

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COMPRESSOR CLUTCH AND SHAFT SEAL ASSEMBLY



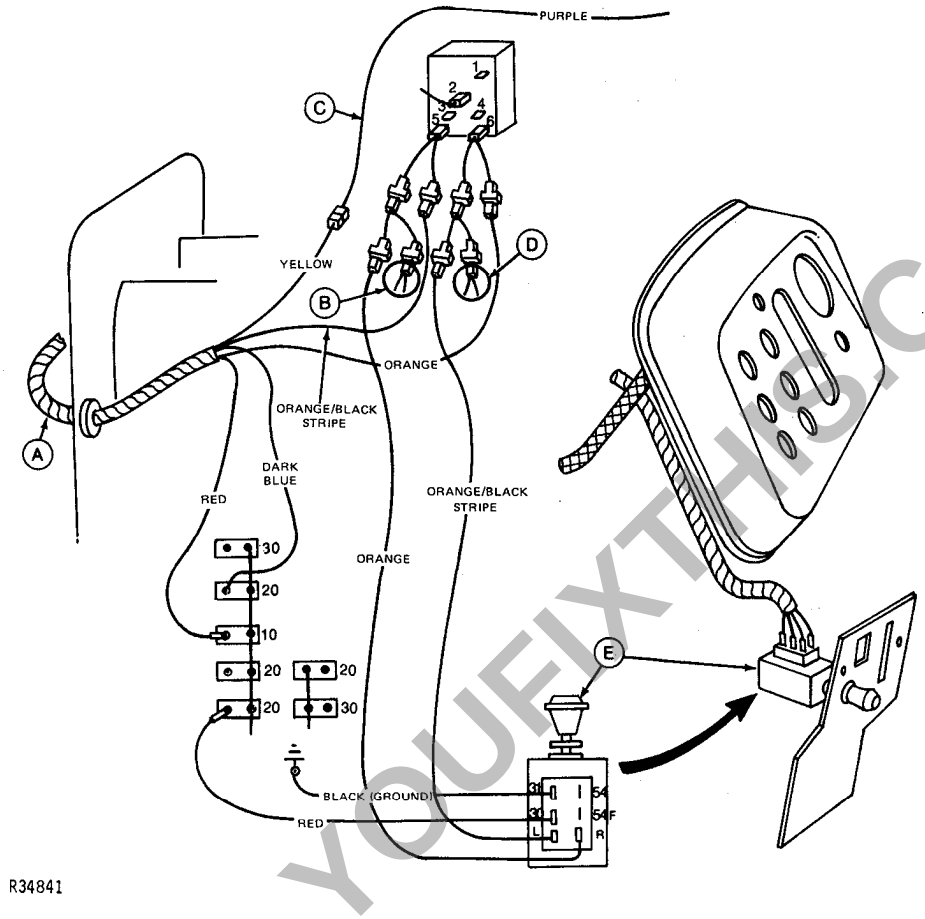
A—Shaft Seal
B—Seal Seat
C—Pulley
D—Hub and Drive Plate Assembly
E—Felt Seal
F—Pulley Bearing Front Shield
G—Pulley Bearing
H—Coil and Coil Housing Assembly
I —Felt Seal
J—Rubber Gasket

Fig. 5-Cross-Section of Compressor Clutch Assembly

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WIRE ROUTING—Continued

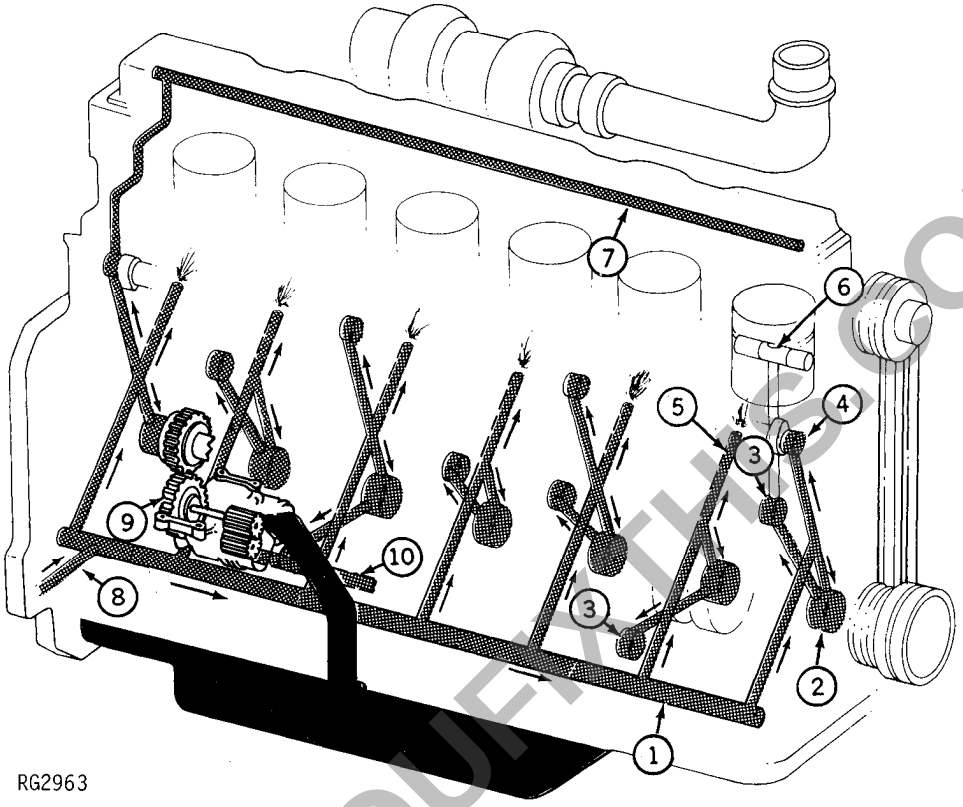


A—Wiring Harness
B—Former #3 Terminal Connection
C—Former #1 Terminal Connection
D—Former #4 Terminal Connection
E—Hazard Warning Switch

Fig. 4-Control Support Wiring

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1—Main Oil Gallery
2—Main Bearings (7)
3—Connecting Rod Bearings (6)
4—Camshaft Bushings (4)
5—Piston Cooling Orifices (6)
6—Connecting Rod Pin Bushings (6)
7—Rocker Arm Shaft
8—Inlet From Oil Pressure Regulating Valve Housing
9—Engine Oil Pump
10—Outlet to Oil Pressure Regulating Valve Housing
Engine Oil Pressure
Engine Oil Pan Oil

Fig. 3-Engine Oil Flow - Engine Serial No. (039937-)

1, 3, 5, and 7 main bearing fillets are also drilled to lubricate the four camshaft bushings (4). A drilled passage from the rear camshaft bushing through the cylinder block and cylinder head provides lubrication to the rocker arm shaft.

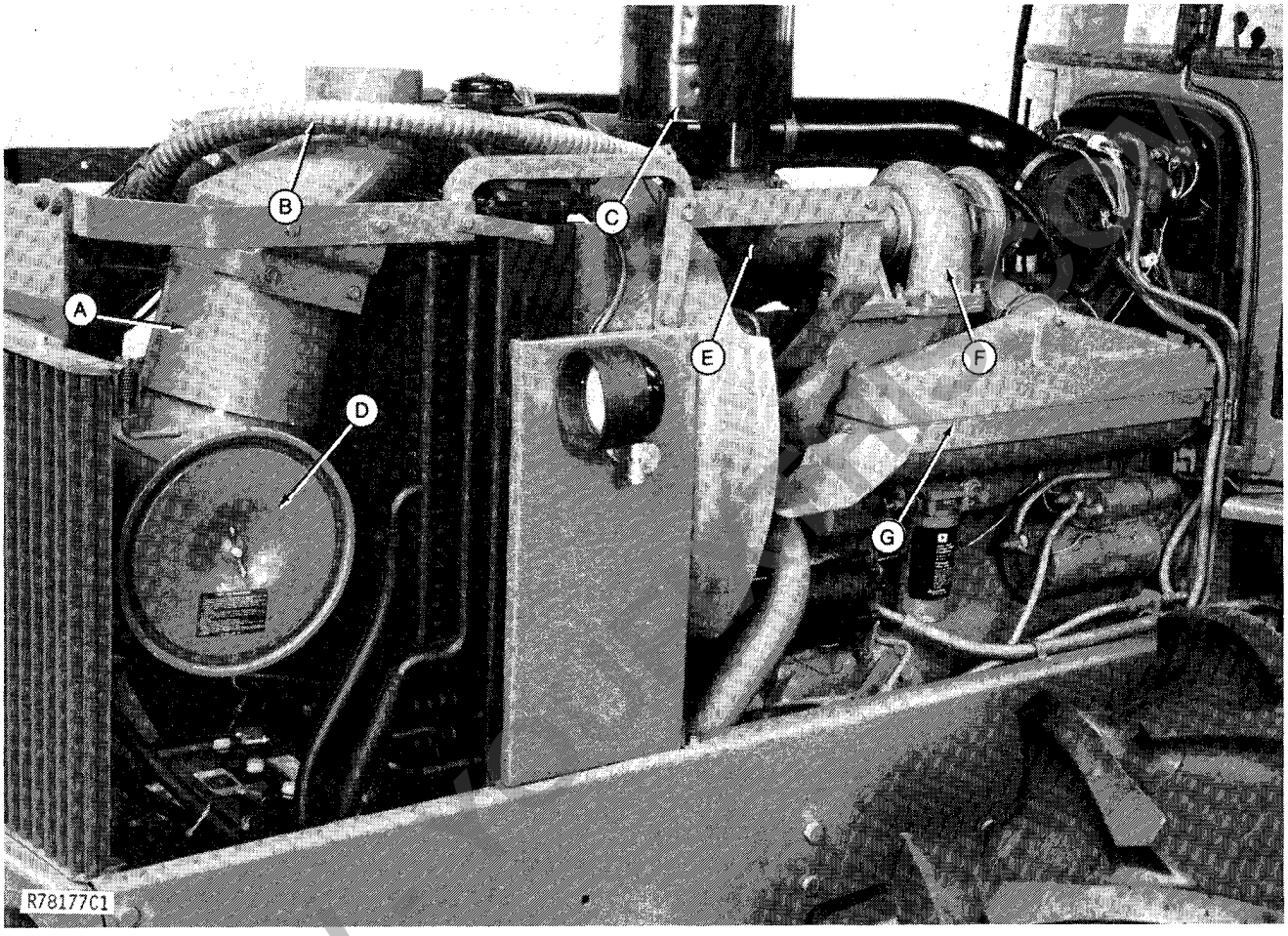
The piston cooling orifices (5) spray oil to cool pistons and liners and lubricate the connecting rod piston pin bushings through an oil cup (6) in the top of the connecting rod.

NOTE: Description of the lubrication system on engines equipped with a crankshaft-driven oil pump (Fig. 3) is given on opposite page and above.

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Group 05
AIR INTAKE SYSTEM



A—Pre-Cleaner
B—Suction Hose
C—Aspirator
D—Air Cleaner
E—Exhaust Elbow
F—Turbocharger
G—Intercooler

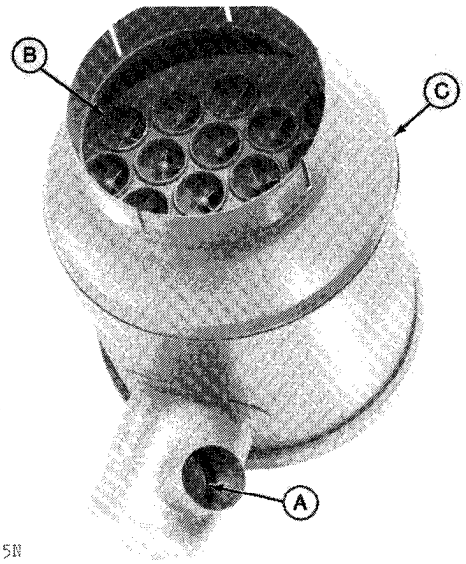
Fig. 1-Air Intake System (8640 Illustrated)

GENERAL INFORMATION

Outside air is drawn through the air intake pipe into the pre-cleaner (A, Fig. 1). Pre-cleaning is accomplished by specially designed tubes (Fig. 2) which separate the dust from the air by centrifugal action. The dust, along with a small amount of air is evacuated from the pre-cleaner by a suction hose (B, Fig. 1) to an aspirator (C) in the muffler. The air and dust is then exhausted up and out the muffler extension. After pre-cleaning, the rest of the air then goes through a dry-type primary filter element and a safety element in the air cleaner (D).

Engine exhaust, as it is expelled out the exhaust elbow (E), drives the turbocharger (F) to deliver a larger quantity of air to meet engine requirements than what could be delivered under naturally aspirated conditions (not turbocharged).

Intake air which has been compressed (and heated) by the turbocharger, flows around the intercooler (G) before entering the engine cylinders.



A—Valve
B—Deflectors
C—Pre-Cleaner Body

Fig. 2-Pre-Cleaner

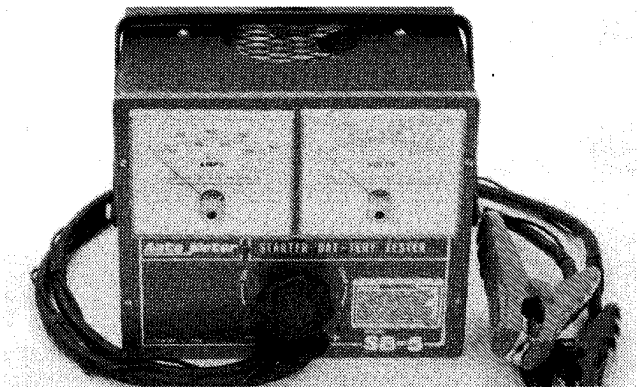
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SPECIAL TOOLS

General Information

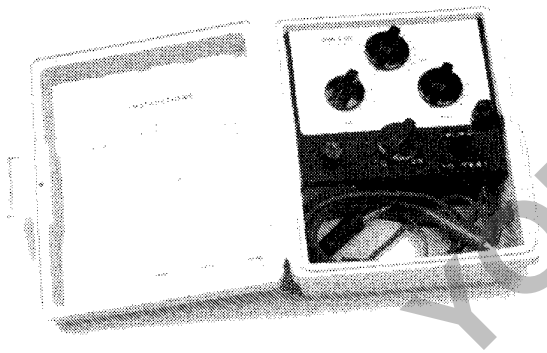
Tool	Use
JTO28001 Battery Tester	Test Batteries



RW1016 5

Fig. 2—JT28001 Battery Tester

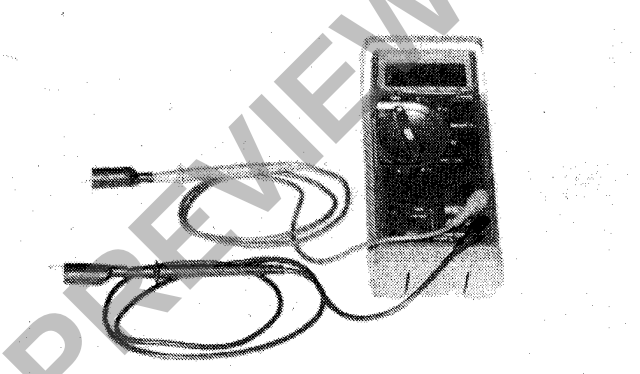
Tool	Use
JTO1633 Universal Gauge Tester	Test fuel gauge, water temperature gauge, engine oil pressure gauge, and their senders.



RW7658

Fig. 3—JTO1633 Universal Gauge Tester

Tool	Use
JTO5682 Analog/Digital Multimeter	Test any electrical components for voltage, resistance, or current draw.



RW1127 4

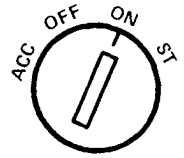
Fig. 4—JTO5682 Analog/Digital Multimeter

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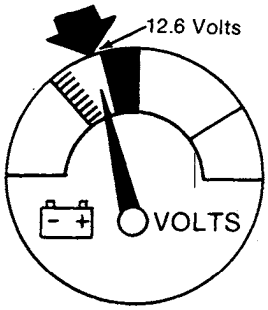
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A1 KEY SWITCH VOLTAGE TEST:

Transmission in "PARK"
Key switch "ON"



Voltmeter Pointer should be in upper LH green band or black band



Above or in Green:
Voltage OK

GO TO A2

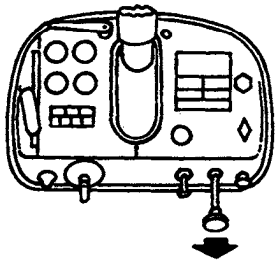
Below Green:
Voltage Low

GO TO A3

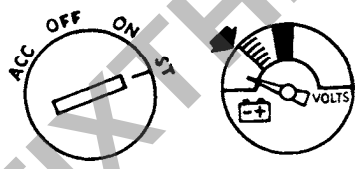
AH7;RW6662,RW6115 40U;240010 KX3 040882

A2 BATTERY LOAD TEST:

Transmission in "PARK". Hold Fuel Shut-off "OUT".



Hold key switch at "START". Starter should be cranking.



Engine Cranks Satisfactory:

OK. **GO TO SECTION 2 OPERATIONAL CHECKS**

Engine Doesn't Crank Satisfactory:

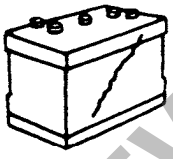
Not OK:

GO TO A3

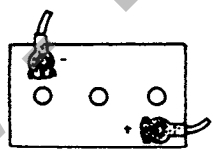
AH7;RW6116L,RW6117L 40U;240010 LX3 100183

A3 BATTERY INSPECTION

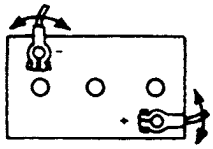
Check both batteries for:



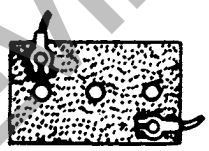
Cracked Case?



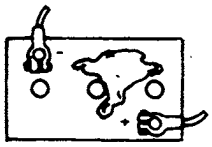
Corroded Terminals



Loose Terminals or Battery Posts?



Dirty Battery?



Damp Battery?

⚠ **CAUTION: Review safety precautions before testing or charging batteries.**

Correct all abnormal conditions.

Then. . .

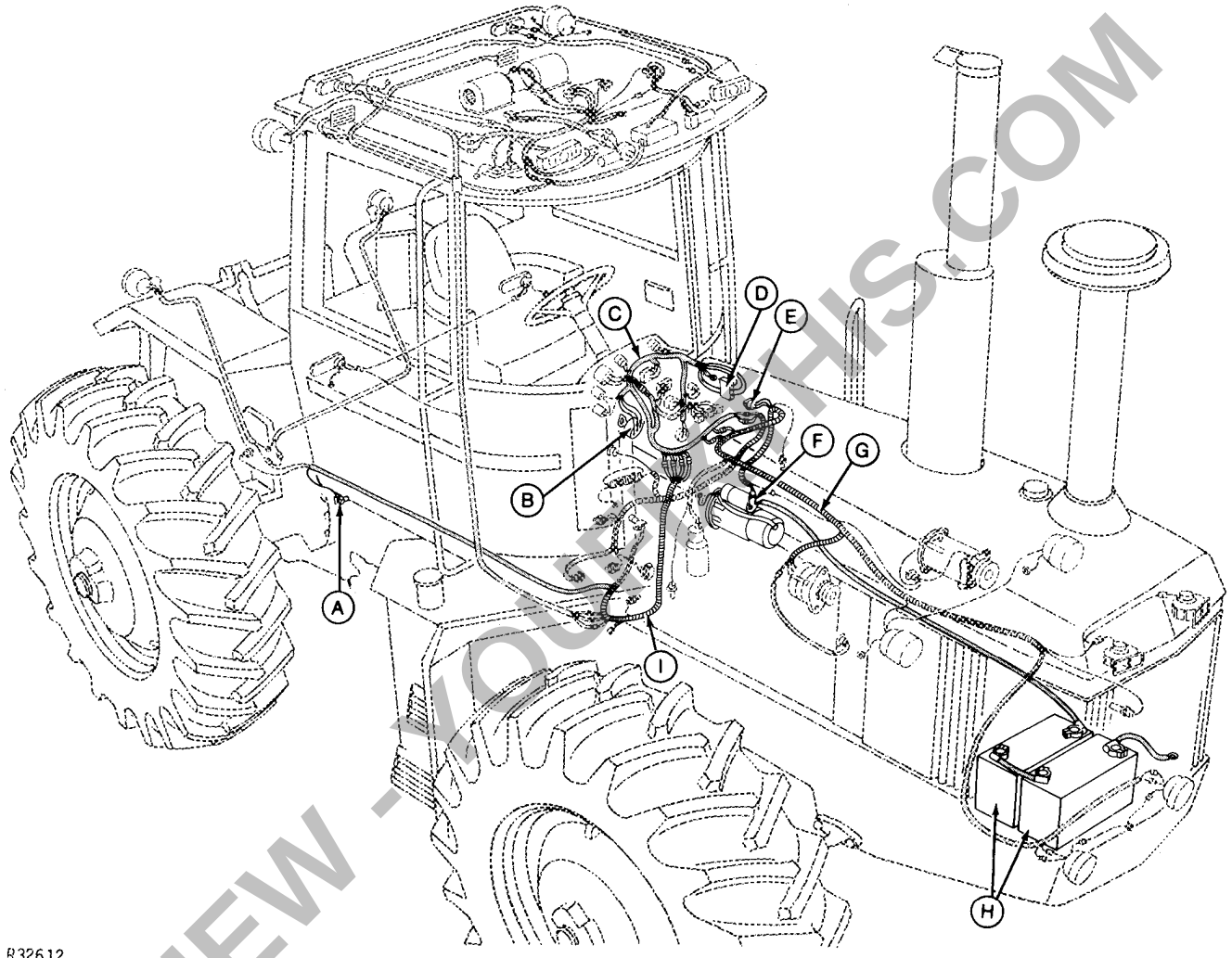
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Group 20
JOHN DEERE STARTING CIRCUIT

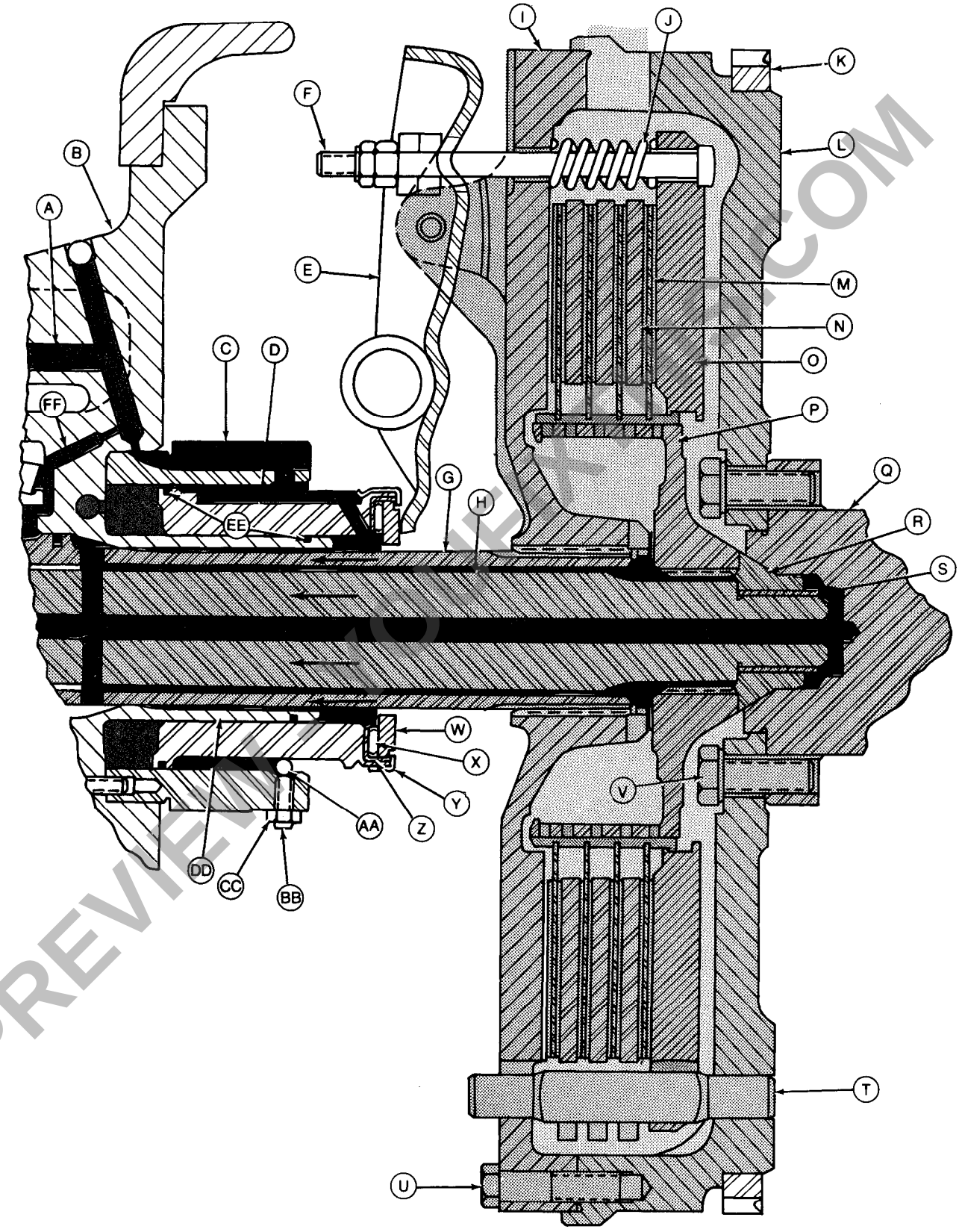


A—Neutral Start Switch
B—Key Switch
C—Instrument Harness
D—Circuit Breakers
E—Starter Circuit Relay
F—Starter
G—Engine Harness
H—Batteries
I —Bulkhead Harness

Fig. 1-Starting Circuit Components

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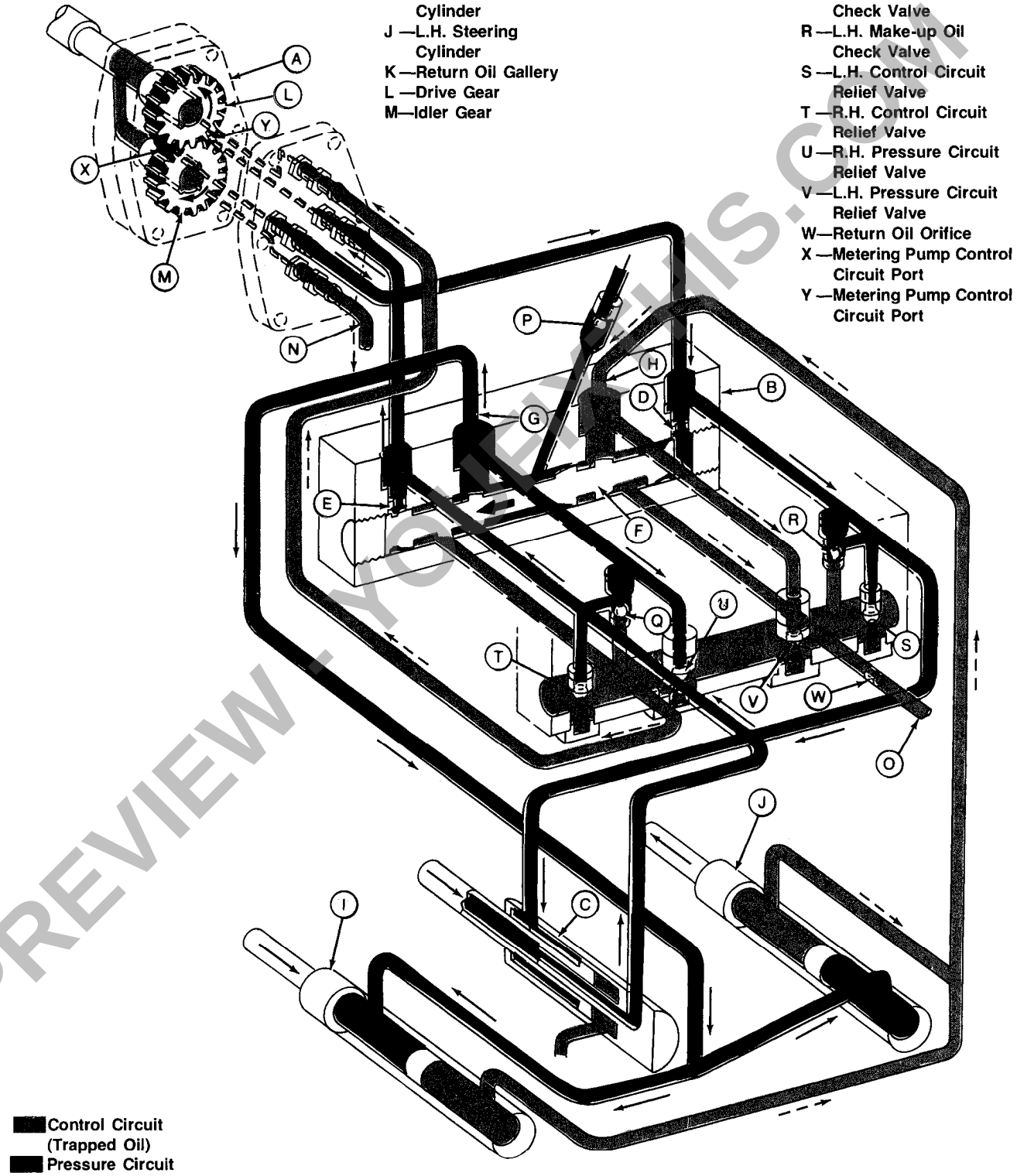
R31506C

Fig. 10-8440 Perma-Clutch Engaged

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A —Metering Pump
B —Steering Valve Housing
C —Feedback Cylinder
D —Orifice
E —Orifice
F —Steering Valve
G —Passage
H —Passage
I —R.H. Steering Cylinder
J —L.H. Steering Cylinder
K —Return Oil Gallery
L —Drive Gear
M—Idler Gear
N —Metering Pump Return Line
O —Steering Valve Return Line
P —Inlet Check Valve
Q —R.H. Make-up Oil Check Valve
R —L.H. Make-up Oil Check Valve
S —L.H. Control Circuit Relief Valve
T —R.H. Control Circuit Relief Valve
U —R.H. Pressure Circuit Relief Valve
V —L.H. Pressure Circuit Relief Valve
W—Return Oil Orifice
X —Metering Pump Control Circuit Port
Y —Metering Pump Control Circuit Port

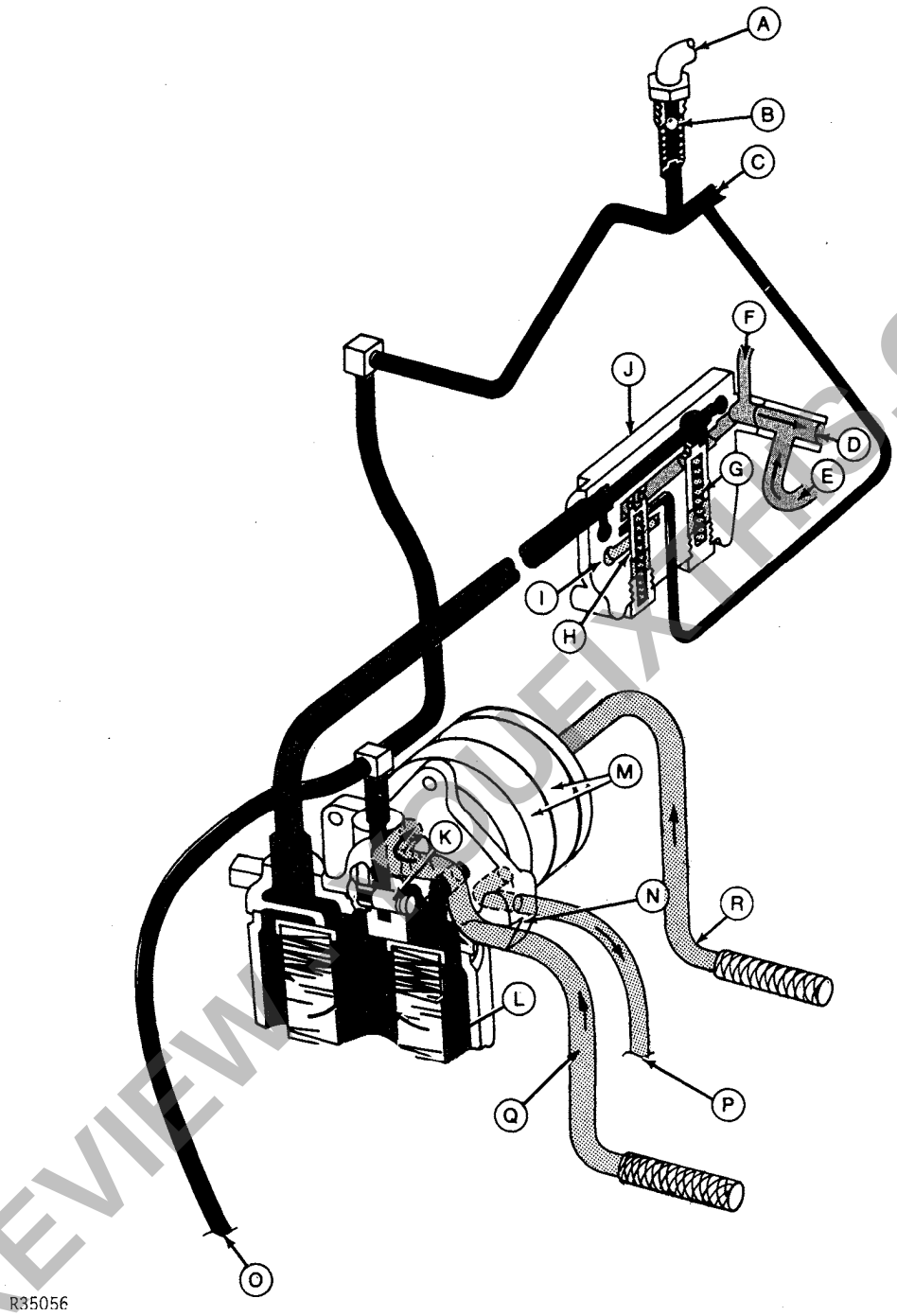


Control Circuit (Trapped Oil)
Pressure Circuit
Return Circuit

Fig. 7-Right Turn - Power

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A—From Oil Cooler
B—Oil Cooler Check Valve
C—To Lube Reduction Valve
D—To Main Hydraulic Pump
E—From Steering Valve
F—From Metering Pump
G—Pressure Regulating Valve
H—Cooler Relief Valve
I —To Main Reservoir
J —Pressure Regulating Valve Housing
K—Clutch Filter Relief Valve
L —Oil Filter
M—Clutch Oil and Oil Transfer Pumps
N—Clutch Filter Relief Valve Housing
O—To PTO Lube
P—Return To Reservoir
Q—FromTorque Divider Housing (Reservoir)
R—Transfer Pump Inlet
Regulated Transmission Control Oil
Charge Oil
Lube Pressure Oil
Pressure Free

Fig. 5-Charge Circuit Hydraulic Valves (System in Normal Operation)

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METRIC EQUIVALENTS TO CHART SPECIFICATIONS

PSI	Bar	PSI	BAR	GPM	L/M
3	0.20	135	9.3	0.125	0.42
4	0.27	145	10.1	0.500	1.8
5	0.3	170	11.7	1.000	3.6
6	0.4	175	12.1	1.500	5.4
7	0.5	180	12.4	2.000	8.2
9	0.6	195	13.4	5.000	18.9
10	0.7	300	20.7	9.500	35.9
12	0.8	500	34.5	10.000	37.9
18	1.2	1500	103.4	10.500	39.7
19	1.3	1600	110.3	11.500	43.5
22	1.5	1700	117.2	12.000	45.4
25	1.7	2000	137.9	15.500	58.6
28	1.9	2200	151.7	16.000	60.5
60	4.1	2250	155.1	17.000	64.3
105	7.2	2300	158.6	18.000	68.1
115	7.9	5000	344.7	23.000	87.1
				28.500	100.8

Temperature		Dimensions	
100°F	38°C	3/16 in.	4.762 mm
110°F	43°C	3/8 in.	9.525 mm
150°F	65.5°C	10 in.	254 mm
240°F	120°C		

SAFETY INSTRUCTIONS

CAUTION: Escaping fluid under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.

If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.

CAUTION: Keep hands away from moving parts. Shut engine off before checking lines near moving parts.

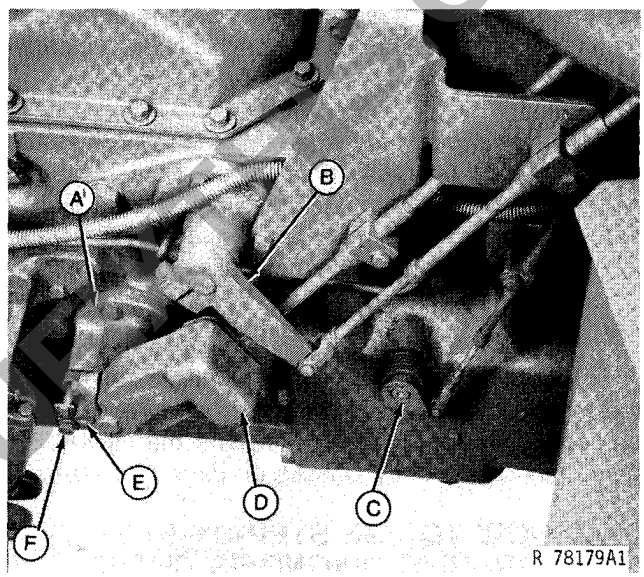
CAUTION: Before disconnecting lines, relieve all pressure. Before pressurizing system, be sure that all connections are tight.

CAUTION: To avoid personal injury from hot oil spills when installing test equipment, use the procedure on page 270-10-3 to drain oil cooler.

CAUTION: The following safety precautions MUST be followed to prevent personal injury or damage to test equipment:

1. Securely tie open end of jumper hose in the oil filler tube from selective control valve when heating hydraulic oil or flow testing clutch oil pump.

2. When checking the transmission oil control circuits for leakage, follow these steps to be sure transmission is in "disconnected".



A—Support
B—Change Arm
C—Park Arm
D—Range Arm
E—Normal Operating Hole
F—Tow Pin

Fig. 1-Transmission Linkage

A. With tractor engine shut-off, place shift lever at "PARK" on the console.

B. Chock wheels to prevent tractor from rolling.

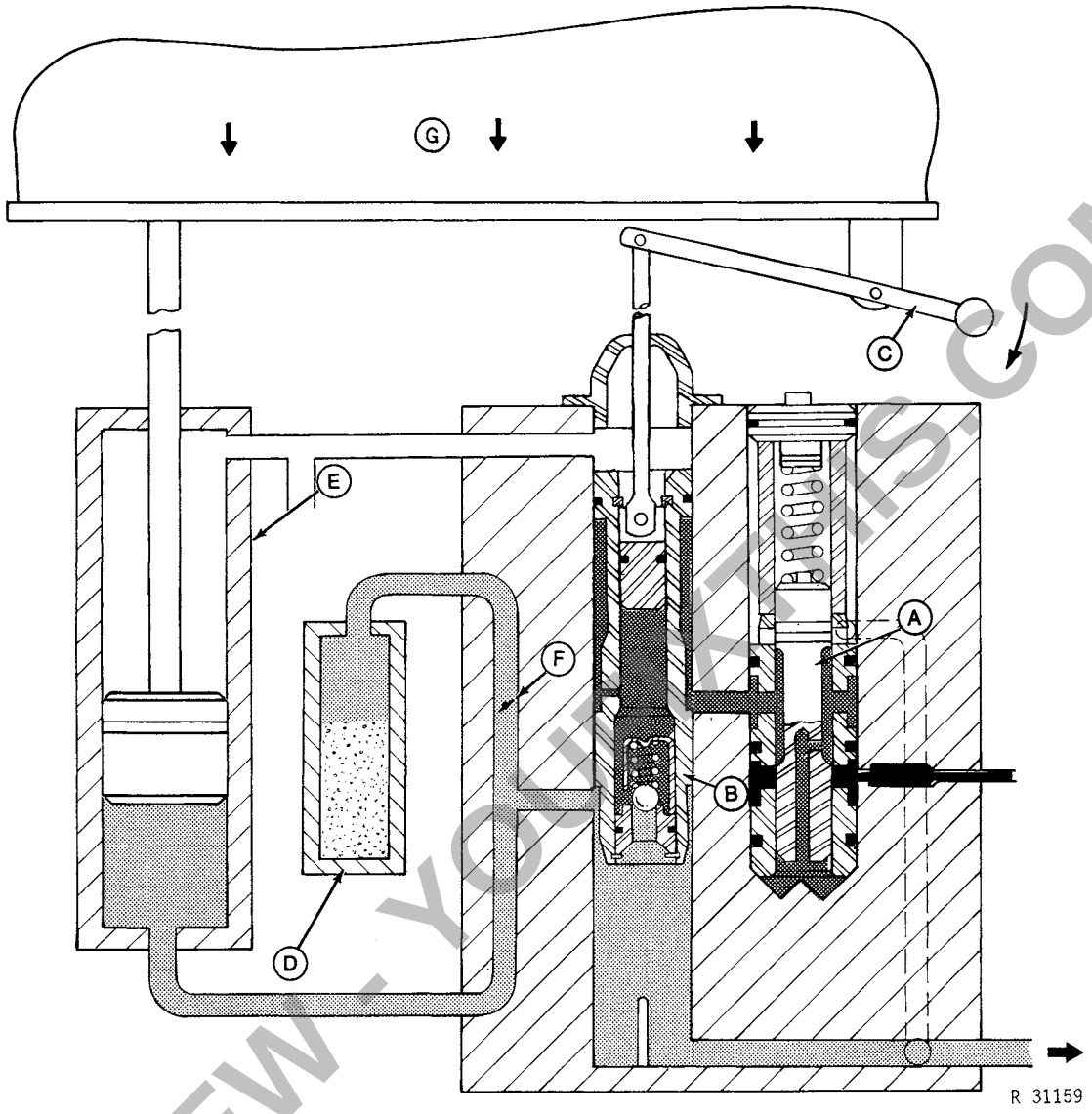
C. Remove cable from change arm (B).

D. The shift lever can now be moved for checking the 2-speed oil circuits.

E. Reconnect linkage before releasing tractor.

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A—Pressure Regulating Valve
B—Height Adjustment Valve
C—Height Adjustment Lever
D—Accumulator
E—Cylinder
F—Dampening Adjustment Valve
G—Seat
Pressure Oil
300 psi (20.7 bar) (21.1 kg/cm²) Oil
Pressure Free Oil

Fig. 2-Seat Being Lowered

When the height adjustment lever (C, Fig. 2) is pushed down to lower the seat, the height adjustment valve (B) is pulled up uncovering the passage to the hydraulic cylinder. Pressure oil in the cylinder is then allowed to discharge through the passage and on to sump.

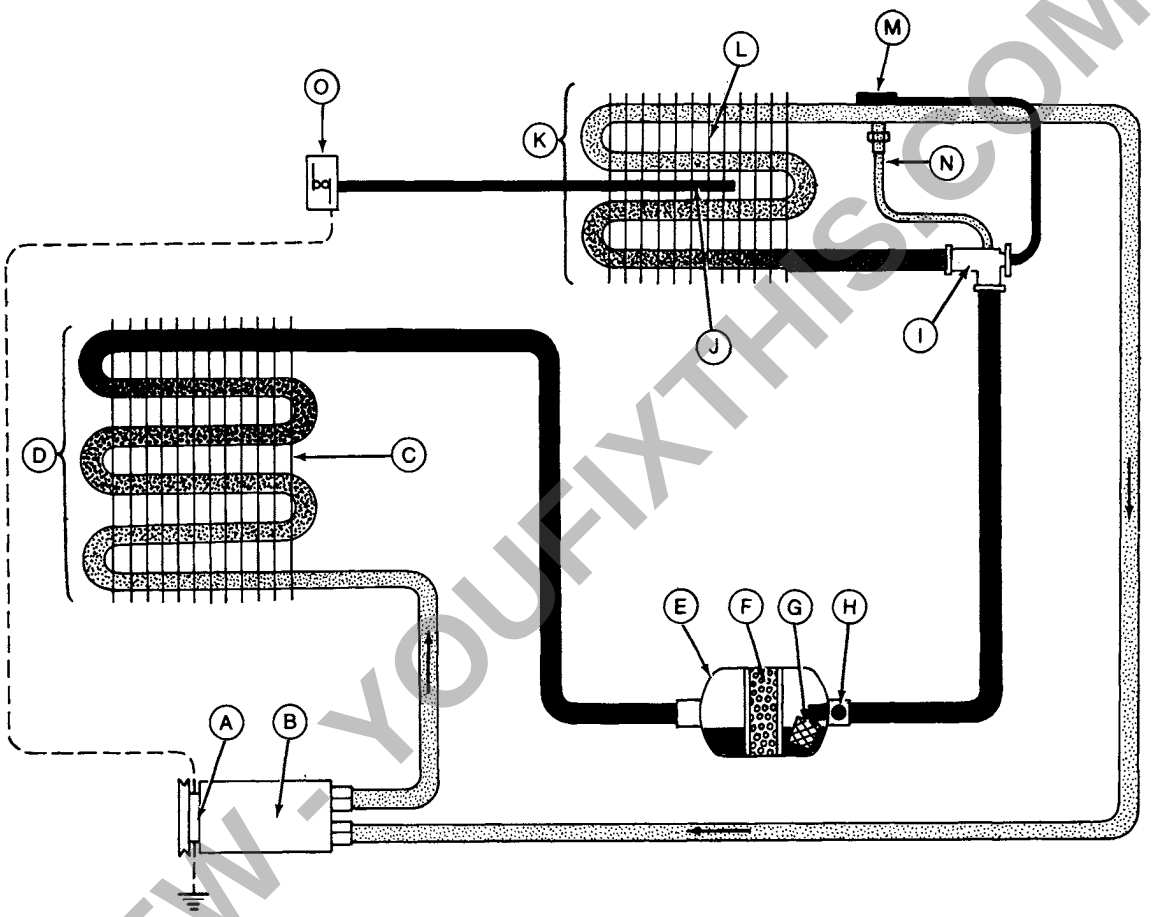
As the seat travels downward, it carries with it the height adjustment valve. When the large O.D. at the bottom of the valve covers the passage to the cylinder seat travel stops.

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Group 05
AIR CONDITIONING SYSTEM OPERATION

HOW THE SYSTEM WORKS



R 31541C

A—Magnetic Clutch
B—Compressor
C—Condenser
D—Heat Transfer From Refrigerant Gas To Outside Air At Condenser
E—Receiver-Dryer
F—Desiccant
G—Pickup Tube
H—Sight Glass
I —Expansion Valve
J —Sensing Tube
K—Heat Transfer From Cab Air To Refrigerant Gas At Evaporator
L —Evaporator
M—Temperature Sensing Tube
N—External Equalizer Line
O—Temperature Control Switch
High Pressure Liquid
High Pressure Gas
Low Pressure Liquid
Low Pressure Gas
Temperature Sensing Tube Gas

Fig. 1-Schematic of Air Conditioning System

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SECTION 220—8440 ENGINE OPERATION AND TESTS
- Group 00—Specifications and Special Tools
- Group 05—System Operation
- Group 10—System Tests and Diagnosis

SECTION 225—8640 ENGINE OPERATION AND TESTS
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- Group 10—System Tests and Diagnosis

SECTION 230—FUEL/AIR OPERATION AND TESTS
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Quad-Range Transmission—Continued

ITEM	MEASUREMENT	PART DIMENSION
Transmission Oil Pump—Cont.	Lug Width of Drive Gear	0.2834-0.2934 in. (7.198-7.452 mm)
	Clearance between pump body and gears	0.003-0.005 in. (0.08-0.13 mm)
	Clearance between pump manifold and gears	0.0017-0.0043 in. (0.043-0.109 mm)
	Drive shaft bore I.D. in pump body	1.0035-1.0045 in. (25.489-25.514 mm)
Transmission Drive Shaft	O.D. at Gear	1.0010-1.0016 in. (25.425-25.441 mm)
Lube Relief Valve Body	I.D.	0.6870-0.6880 in. (17.450-17.475 mm)
Outer Support Pivot Shaft	O.D.	0.8738-0.8758 in. (22.195-22.245 mm)
Park Lock Operating Lever Bushing	I.D.	0.5030-0.5040 in. (12.776-12.802 mm)
	O.D.	0.6890-0.6900 in. (17.501-17.526 mm)
Range Quadrant and Speed Quadrant Needle Bearing Race	I.D.	1.4995-1.5000 in. (38.097-38.100 mm)
	O.D.	1.7495-1.7500 in. (44.437-44.450 mm)
	Width	1.005-1.010 in. (25.52-25.65 mm)
Shifter Cam Shaft	End Play	0.002-0.007 in. (0.051-0.178 mm)

CAP SCREW	TORQUE SPECIFICATION
Countershaft Bearing Retainer-to-Case	35 ft-lbs (47 Nm) (4.7 kgm)
Drive Shaft Bearing Housing-to-Case	35 ft-lbs (47 Nm) (4.7 kgm)
Transmission Oil Pump-to-Case	20 ft-lbs (27 Nm) (2.7 kgm)
Lube Relief Valve Body-to-Manifold	85 ft-lbs (115 Nm) (11.5 kgm)

Differentials

SPRING	FREE LENGTH	WORKING LOAD
Differential Lock Control Valve	2.56 in. (65 mm)	1.31 in. at 9.5-11.5 lbs. (33.3 mm at 42-52 N)
Differential Lock Valve Plunger	2.28 in. (58 mm)	1.92 in. at 10.3-12.5 lbs. (48.8 mm at 458-556 N)

ITEM	MEASUREMENT	PART DIMENSION
Front Pivot Pin Bushing	I.D.	5.1280-5.1310 in. (130.251-130.327 mm)
Bushing Bore in Case	I.D.	5.3740-5.3760 in. (136.499-136.550 mm)

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PRECAUTIONS

When working on charging circuit, observe the following rules for your safety and prevention of damage to tractor:

Safety

1. Keep all sparks and flames away from batteries. Gas from battery electrolyte is highly flammable. Also avoid spilling electrolyte on yourself or on anything which could be damaged by the sulphuric acid.

2. Avoid sparks when connecting booster batteries or battery chargers. When possible, make last connection at a point away from batteries. Battery charger should be turned off before connecting or disconnecting.

3. When connecting batteries, always connect ground cable last. Disconnect it first.

4. When possible, disconnect battery ground cable before working on electrical system.

Prevention of Damage

1. Before connecting battery cables, be sure that battery and alternator connections are correct. Reverse polarity can cause permanent damage.

2. When connecting a booster battery, connect positive terminal of booster battery to positive terminal of left-hand battery. Then connect negative terminal of booster battery to tractor frame. Reverse polarity can cause permanent damage.

3. Never run engine with alternator or battery cables disconnected. Doing so might damage alternator or regulator.

4. Never short across or ground alternator terminals unless specifically recommended. Be careful to prevent grounding alternator wires when disconnected.

5. Never attempt to polarize an alternator.

6. Before using an electric welder on tractor, disconnect battery ground cable. Connect welder ground clamp as near as possible to the area being welded, and be sure it makes good electrical contact.

DIAGNOSIS AND TESTS

See Group 10 for all diagnosis of electrical system.

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