2450, 2550 REPAIR MANUAL

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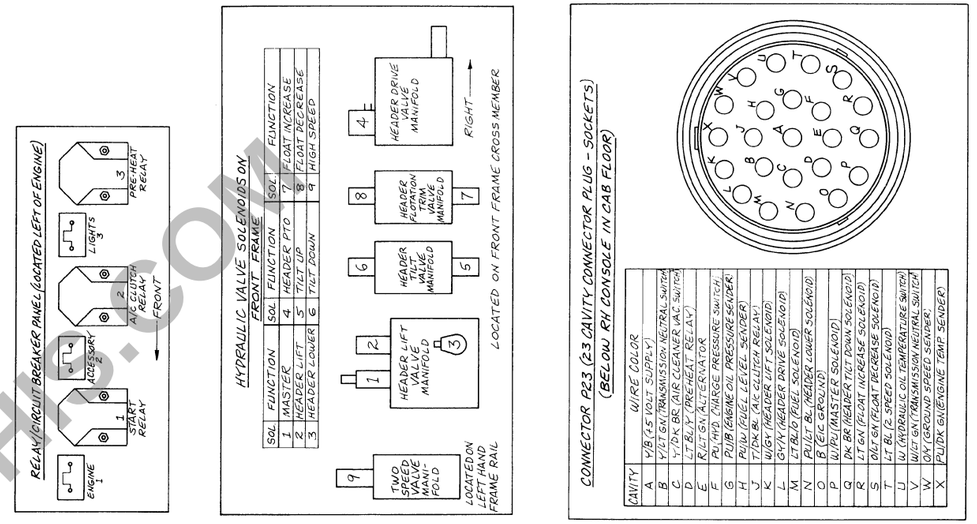
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Diagram #1 – 2450's below S/N 589507
2550's below S/N 581661



MODELS 2450/2550 ELECTRICAL COMPONENT LOCATION CHARTS

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DIRECT CURRENT (D.C.) - A flow of electrons moving in the same direction along a conductor from a point of high voltage potential to one of lower voltage potential.

FUSE - A device used to protect electrical components from excessive current flow.

OHM - The standard unit for measuring the resistance to the flow of an electrical current.

OHMMETER - An instrument for measuring the electrical resistance in an electrical component or circuit. Ohmmeters should not be connected to components/circuits that have a voltage potential present.

OPEN CIRCUIT - An open circuit occurs when a circuit is broken interrupting the flow of current through the circuit.

RELAY - An electrical device which can open or close its electrical contacts when the relay's control coil is electrically activated or deactivated. Relays have "control" and "load" circuits which may be separated or interconnected.

RESISTANCE - The resistance to the flow of current in an electrical component. Resistance is measured in ohms.

SHORT CIRCUIT - A path in an electrical circuit/component which allows the current to be diverted to a lower voltage potential before the current has completed its intended path through the electrical circuit/component. This can occur when a part comes in contact with another part that is at a different voltage potential. This can occur either in the same circuit/component, another circuit/component, or a part that is a common circuit/component for many circuits, such as the frame of a vehicle (which is the lower voltage potential circuit, or "ground" circuit of most of the circuits).

SOLENOID - An electrical coil used to produce a magnetic field to attract or repel an iron armature usually to actuate a device.

SPECIFIC GRAVITY - Used to measure the percentage of sulfuric acid (relative to the percentage of water) in a battery cell. Measuring the specific gravity in a battery will help measure the amount of electrical charge in the cell. Specific gravity can be measured using a hydrometer.

SWITCH - An electrical device used to open, close, or change the path of an electrical circuit.

VOLT - A unit used to define the amount of electrical potential. A voltage potential difference is necessary to produce a flow of current in an electrical circuit/component. The amount of voltage potential in an electrical circuit/component is similar to the amount of pressure in a hydraulic system.

VOLTMETER - An instrument for measuring the electrical potential difference that is present across two points of an electrical circuit/component. Voltmeters are connected to points that are electrically (in) parallel to the circuit/component where the voltage potential difference is to be measured.

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GENERAL ELECTRICAL

INTRODUCTION

The electrical system has been divided into the following areas:

General Electrical

Electronic Instrument Cluster

Air Conditioning Electrical System

Light Electrical Systems

Engine Electrical Systems

Charging Electrical System

Electrohydraulic Electrical Systems

Wiring Diagrams

Each section has a description of the electrical circuit, a schematic of the circuit, and diagnostic test procedures based on the symptom(s) that a system demonstrates.

In some cases, the failure you experience may be intermittent. When experiencing these type of symptoms, find the test procedure that deals with the symptom that you are experiencing and says "Does Not Function."

All test procedures assume that all mechanical items such as filters, oil pressures, etc., have been checked and verified and the problem is electrical.

Read all the introductory information before starting any test procedure. Next look through the test procedures and locate the symptom being experienced. Use that test procedure to locate and correct the problem. Follow the steps as instructed. Do not skip steps unless instructed to do so in the test procedures.

Prepare the machine for the test by following the pretest instructions. Perform the test and observe the results. Perform the indicated corrective action. Continue through the test procedure until the problem is corrected, then return the system to an operational condition (replace shields, etc.).

DEFINITION OF TERMS

ALTERNATING CURRENT (A.C.) - A flow of electrons which reverses its direction of flow at regular intervals in a conductor. An alternating current is usually accompanied by an alternating voltage.

ALTERNATOR - An electrical device which is similar to a (Direct Current) generator but produces an alternating current and voltage. An alternator requires an electrical component (usually a rectifier device) to change its A.C. output to the D.C. power used in most farm implement applications.

AMMETER - An instrument that measures the flow of electrical current in amperes. Ammeters are connected in series with the circuit to be tested.

AMPERE (AMP) - A unit of measure of the flow of current in a circuit. The ampere is used to measure the electrical current flow in a circuit similar to measuring the flow rate in a hydraulic system by using "gallons per minute."

CIRCUIT - A defined path through various electrical components through which electrical current can flow from a higher voltage potential, through the various components, to a lower voltage potential.

CIRCUIT BREAKER - A device to protect an electrical component from current overloads.

COLD RATING (CCA) - A measure of a battery's current output at low temperature, usually 0° F (17.78° C). This output is often measured in Cold Cranking Amps (CCA).

CONTINUITY - Unbroken path through an electrical component through which electrical current can flow.

CURRENT - The flow of electricity through an electrical component. Current is measured in amperes.

DIODE - An electrical device that will allow current to pass through itself in one direction only, similar to the function of a check valve in a hydraulic system.

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Diagnostics

A software diagnostic tool is integrated within the EIC to test selected power input circuits, output circuits, and switches. In addition, error codes will be displayed for a failure of selected circuits. To check a potential circuit failure or retrieve stored error codes, you will need to enter the diagnostic mode.

Enter the diagnostic mode by using the following sequence:

1. Turn the ignition key to the off position.
2. Depress and hold switch S2 (open book symbol).
3. Turn the ignition key to the on position.
4. After the display goes out and the software revision level is displayed, example (R01.00), release switch S2 (open book symbol).

The EIC is now in the diagnostic mode, and the following circuits can be checked: (Refer to individual circuits test procedures in the following sections of this manual for specific checks of these circuits).

"ELECTRONIC INSTRUMENT CLUSTER ELECTRICAL SYSTEM"

Ground Speed Circuit

Display Scroll

"ENGINE ELECTRICAL SYSTEMS"

Air Filter Switch

Fuel Level Gauge Sender

Engine Coolant Sender

Engine Oil Pressure Sender

Not in Neutral Circuit

"ELECTROHYDRAULIC ELECTRICAL SYSTEMS"

Hydrostatic Pressure Switch

Seat Switch

Header Raise

Header Lower

Header Tilt Up

Header Drive Engage

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TESTING THE ALTERNATOR

Most alternator charging system tests can be performed with one setup using the VA5 tester. Turn the carbon pile knob fully counterclockwise to ensure there will be no load on the battery. Set the voltmeter range knob to the 16-volt scale. The test selector knob must be in the ALT-REG position. Place the inductive pickup clamp on one of the positive cables of the left side battery with the arrow pointing toward the battery. Connect the small red lead to the large red lead and clamp to the battery positive terminal. Connect the small black lead to the large black lead and clamp to the battery negative terminal. The ammeter should be adjusted to zero.

The following test procedures should be performed in sequence as presented to eliminate possible faults, before proceeding to the next step.

After the VA5 tester is connected properly, the voltmeter should read battery voltage, 12.40 volts or higher. If the battery voltage is not to specification, recharge the batteries.

Operate the windrower engine at 2200 RPM and turn on all electrical accessories. Adjust the carbon pile on the VA5 tester to obtain maximum current output and record the voltage.

If the output current is 85 ± 10 amps, and the voltage is 13.0 to 15.0 volts, the alternator is okay.

If the output is low, bypass the voltage regulator by grounding the field winding. Place a screwdriver in the test hole, 1.

NOTE: The tab on the voltage regulator is within 0.75″ (19 mm) of the casting surface. Do not put the screwdriver in the test hole more than 1″ (25.4 mm).

If the output goes to 85 ± 10 amps, replace the voltage regulator. See “Alternator - Disassembly” in this section.

If the output does not go to 85 ± 10 amps, the alternator must be removed for further testing.

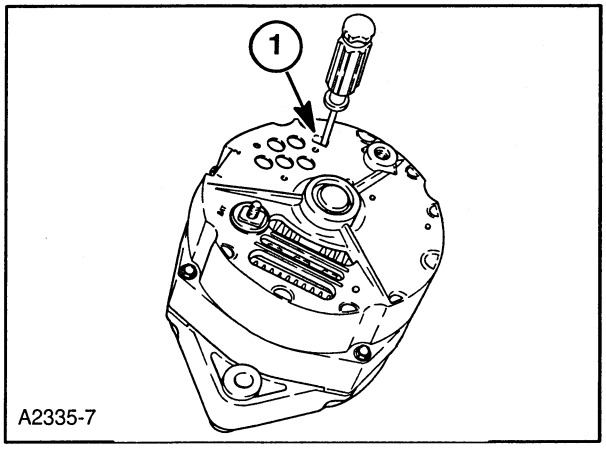


Figure 1-58

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FUSES

Fuses protect electrical parts from overload. Use the correct size fuse, as specified, for the circuits. Use of higher rated or slow-blow fuses could cause damage to components.

A fuse panel is located in a compartment on the right-hand side of the windrower cab. To gain access to the fuse panel, remove the three cap screws, 1, and remove access panel, 2.

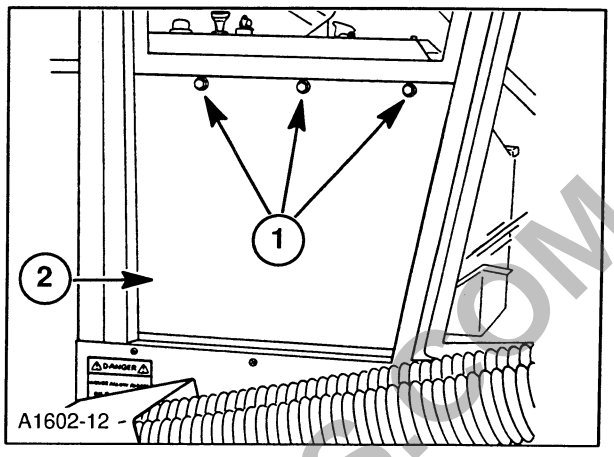


Figure 1-4

The fuse panel is located at 1.

The fuses used are SAE automotive-type fuses. Purchase replacement fuses from the New Holland Parts System to be sure the correct type of fuse is used.

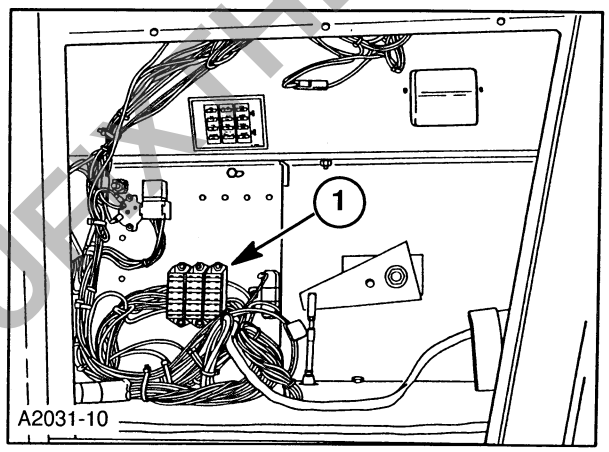


Figure 1-5

DIODES

Diodes permit electrical current to flow in one direction but not the other. Diodes are used in the electrohydraulic system so that one wire can be used with more than one circuit to control a solenoid coil. Diodes also prevent arcing at the contact points of the relays and momentary switches.

Diodes can fail in either an open condition, in which no power passes in either direction, or a closed condition in which power flows in both directions. Failures usually occur due to overload or by short circuits.

IMPORTANT: Do not short wires to ground to determine if power is available (spark test). This will cause diodes to fail.

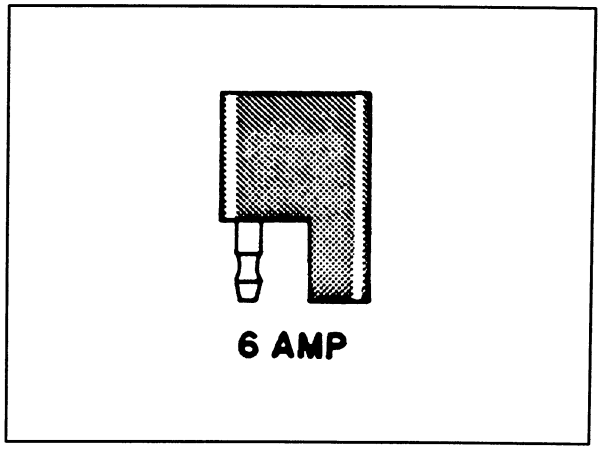


Figure 1-6

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EIC POWER

The Electronic Instrument Cluster power circuit is shown in Figures 1-12 and 1-13.

Operation

Refer to Figure 1-12 and Figure 1-13.

There are two power sources for the EIC. One source is a switched source that turns on and off with the key switch, and the other source is an unswitched source which does not turn on and off with the key switch.

The unswitched power source provides power for memory retention when the key is off.

Main Power Switched

Power originates at the battery and proceeds through the R battery cable to the starter. From there power continues through the R wire to the 40-amp main engine circuit breaker. From the 40-amp engine main circuit breaker, power continues through a R/W wire in the frame main wire harness to the start relay. From the start relay, power continues through a R/W in the frame main wire harness, to pin U of connector P9. From here power continues through a R/W wire in the cab main wire harness to the key switch "BAT" terminal.

When the key switch is turned on, power from the "IGN" terminal of the key switch follows the O/R wire in the cab main wire harness to the EIC switched fuse.

On all Model 2450 headers and Model 2550 headers below serial number 606631, the EIC switched fuse is a 5-amp fuse and feeds power to the EIC through a LTGN/Y wire to pin 12 of connector P2 at the EIC.

On Model 2550 headers above serial number 606630, the EIC switched fuse is a 10-amp fuse and feeds power to the EIC through an O/LTBL wire to pin 12 of connector P2 at the EIC.

Main Power Unswitched

Power originates at the battery and proceeds through the R battery cable to the starter. It continues through the R wire to the 40-amp main engine circuit breaker. From the engine main circuit breaker, power follows a R wire in the frame main wire harness to the 20-amp accessory circuit breaker and a R/T wire from this circuit breaker to pin W connector P9. Power then follows a R/T wire in the cab main wire harness to the preheat 5-amp fuse. Here the R/T wire junctions and continues to the 5-amp EIC unswitched fuse. From this fuse, power continues through the R/LTBL wire to pin 14 of connector P2 at the EIC.

Troubleshooting

Before attempting to troubleshoot a problem, review the information under the "General Troubleshooting" heading in this section along with the material in the "General Electrical" portion of this section.

Operate the machine and observe the problem. Match the problem to one of the headings on the following charts. Follow the systematic step-by-step instructions in the chart to locate and correct the problem. Follow all the instructions carefully.

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ENGINE FUEL SOLENOID

Model 2450
Model 2550 below serial number 606631

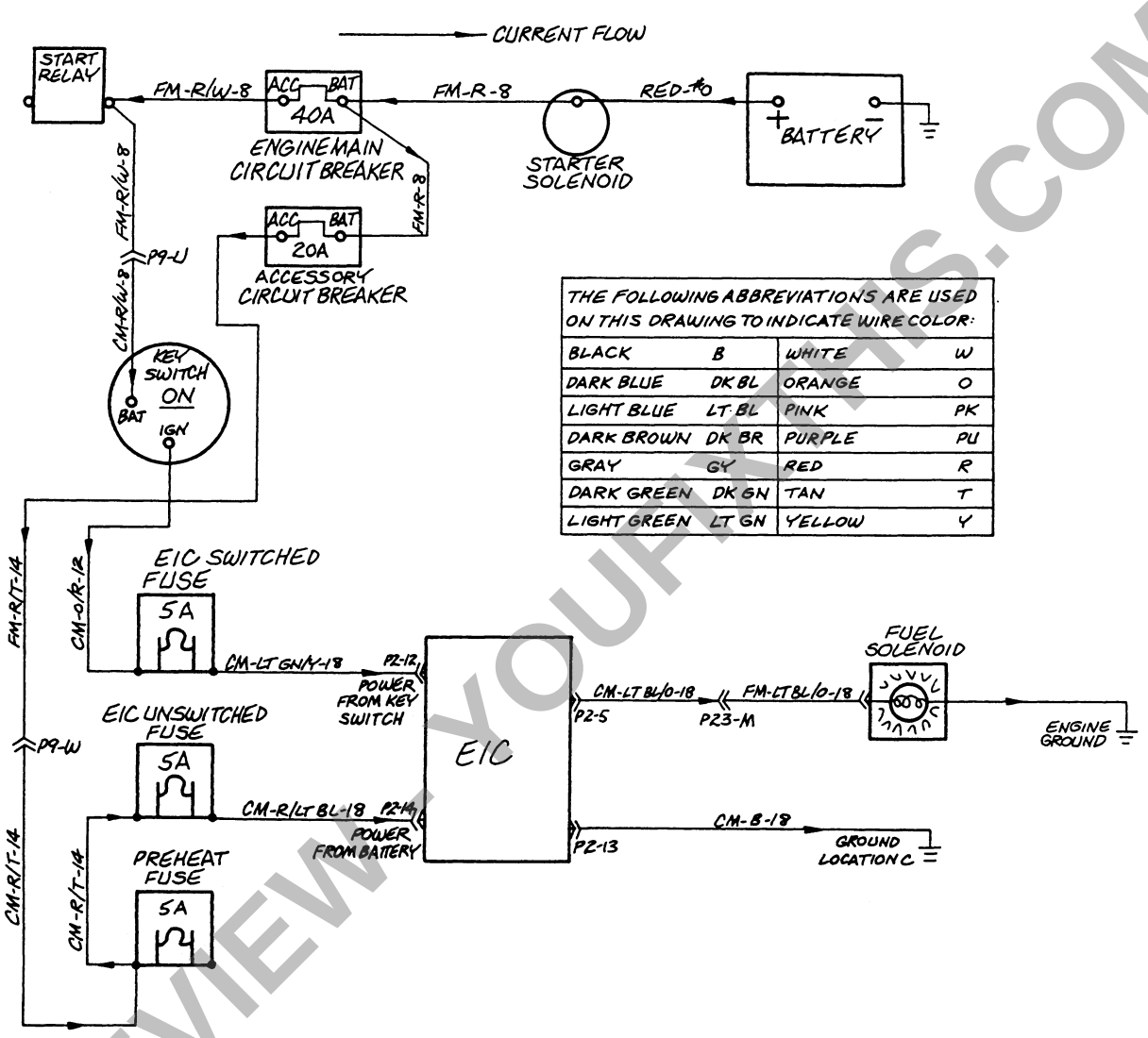


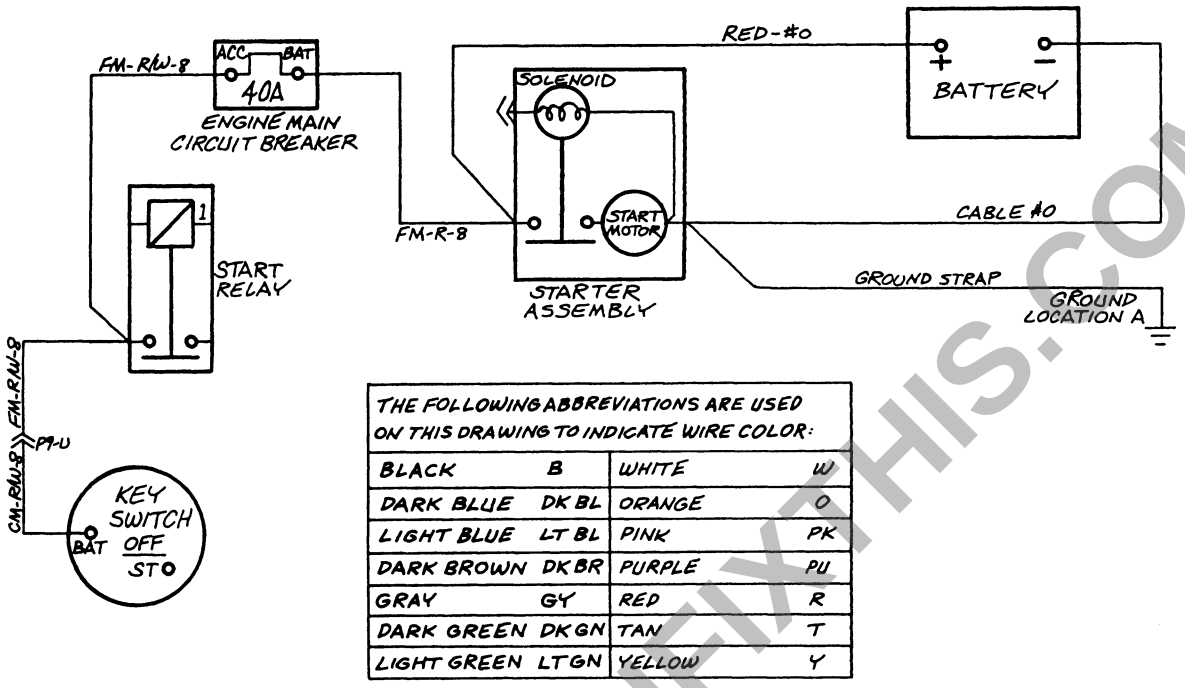
Figure 1-39

ENGINE FUEL SOLENOID CIRCUIT

The engine fuel solenoid circuit is shown in Figures 1-39 and 1-40. Power comes from connector P2 pin 5 of the EIC through the LTBL/O wire of the cab main wire harness through pin M of connector P23 and continues along the LTBL/O wire in the frame main wire harness to the engine fuel solenoid. Power continues through the solenoid to ground to the engine.

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ENGINE STARTING MOTOR MAIN POWER CIRCUIT



THE FOLLOWING ABBREVIATIONS ARE USED ON THIS DRAWING TO INDICATE WIRE COLOR:			
BLACK	B	WHITE	W
DARK BLUE	DK BL	ORANGE	O
LIGHT BLUE	LT BL	PINK	PK
DARK BROWN	DK BR	PURPLE	PU
GRAY	GY	RED	R
DARK GREEN	DK GN	TAN	T
LIGHT GREEN	LT GN	YELLOW	Y

Figure 1-47

OPERATION

Main Power

Power originates at the battery, proceeds through the R battery cable to the starter. From there power continues through the R wire to the 40-amp main engine circuit breaker. From the 40-amp engine main circuit breaker, power continues through a R/W wire in the frame main wire harness to the start relay. From the start relay, power continues through a R/W wire in the frame main wire harness, to pin U of connector P9. From here power continues through a R/W wire in the cab main wire harness to the key switch “BAT” terminal.

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R & R header raise/lower, head tilt-up/down, flotation trim increase/decrease, two-speed increase, or header drive engage solenoid valve coil 0.25

R & R frame main wire harness 4.00

R & R cab main wire harness 4.00

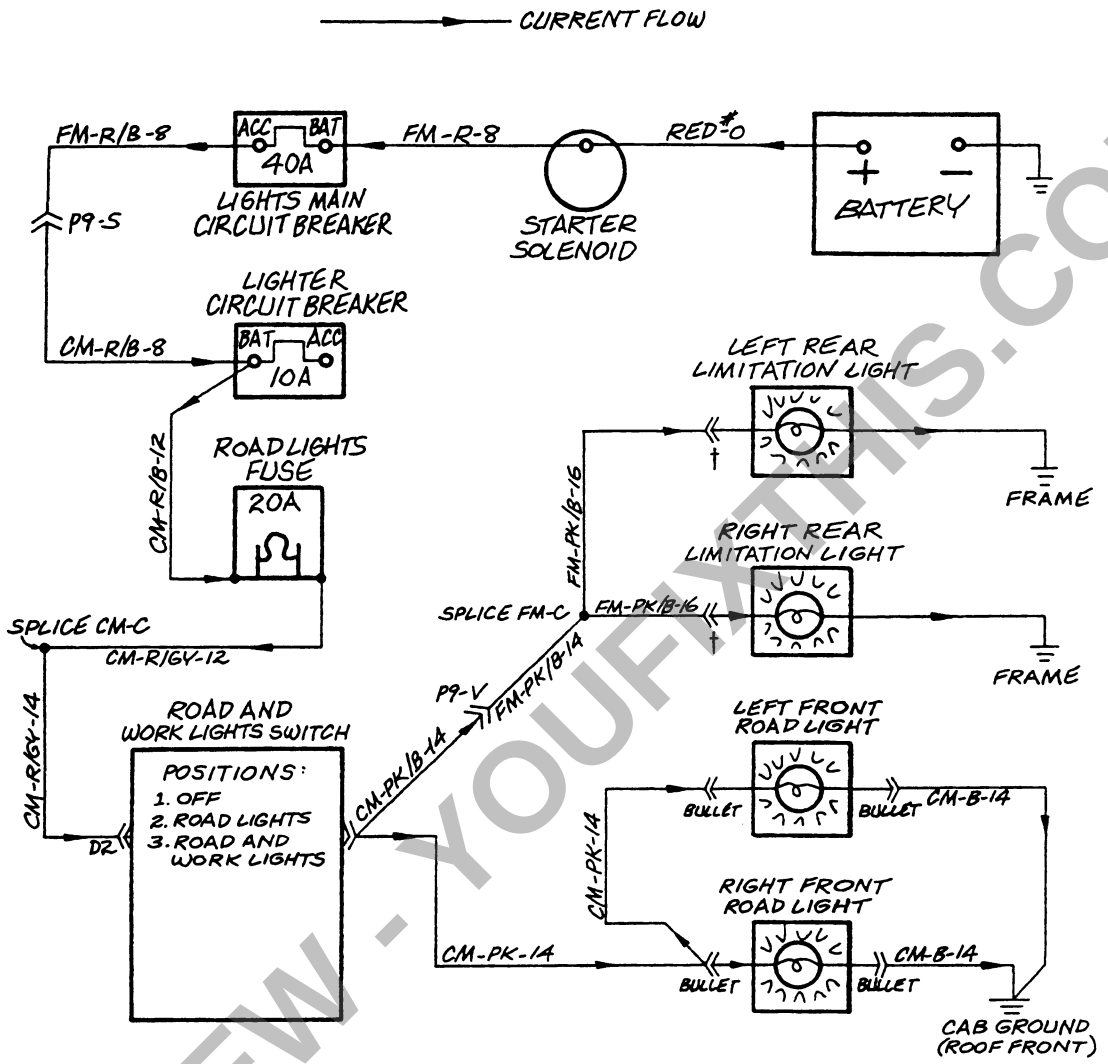
R & R cap optional wire harness 1.50

R & R frame optional wire harness 0.75

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ROAD LIGHTS CIRCUIT ACTIVATED



THE FOLLOWING ABBREVIATIONS ARE USED ON THIS DRAWING TO INDICATE WIRE COLOR:			
BLACK	B	WHITE	W
DARK BLUE	DK BL	ORANGE	O
LIGHT BLUE	LT BL	PINK	PK
DARK BROWN	DK BR	PURPLE	PU
GRAY	GY	RED	R
DARK GREEN	DK GN	TAN	T
LIGHT GREEN	LT GN	YELLOW	Y

†CONNECTORS AT BASE OF RADIATOR

Figure 1-26

Road Lights Activated Circuit

When the light switch is pulled out one notch, power goes through the light switch and out terminal R. Power from terminal R follows the PK wire in the cab main wire harness to the two front road lights. Power follows the PK/B wire in the cab main wire harness, through pin V of connector P9, and continues through a PK/B wire in the frame main wire harness to the two rear limitation taillights.

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STEP	PRETEST INSTRUCTIONS	TEST	RESULT	PROBABLE CAUSE AND CORRECTION
6.	Key off.	Check for battery voltage at the R/W wire of the start relay.	Battery voltage. No or low battery voltage.	Go to step 8. Go to next step.
7.	Key off.	Check for battery voltage at the R/W wire of the 40-amp engine main circuit breaker.	Battery voltage. No or low voltage.	Open circuit or poor connection of the R/W wire between the start relay and the 40-amp engine main circuit breaker. Repair or replace. Go to next step.
8.	Key off.	Reset the 40-amp engine main circuit breaker. Check for battery voltage at the R/W terminal.	Battery voltage. No or low battery voltage.	Circuit OK. Circuit breaker defective.
9.	FNR lever in park position and steering wheel centered. Turn key clockwise to start position.	Check for battery voltage at the W/DKBL wire of the start relay.	Battery voltage. No or low battery voltage.	Start relay defective. Replace. Go to next step.
10.	FNR lever in park position, and steering wheel centered. Turn key clockwise to start position.	Check for battery voltage at the W/DKBL wire of the neutral start switch.	Battery voltage. No or low battery voltage.	Open circuit or poor connection of the W/DKBL wire between the neutral start switch and the start relay. Repair or replace. Go to next step.

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STEP	PRETEST INSTRUCTIONS	TEST	RESULT	PROBABLE CAUSE AND CORRECTION
9.	Engine off, key switch on. Depress the header float increase side of header flotation trim switch.	Check for battery voltage at the LTGN wire at the header flotation increase diode.	Battery voltage.	Open circuit or poor connection between connector P23 and the header flotation increase diode. Repair or replace.
			No or low battery voltage.	Refer to "Only Two-Speed and Flotation Trim Circuits Do Not Function."

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HEADER DRIVE VALVE: HYDRAFORCE

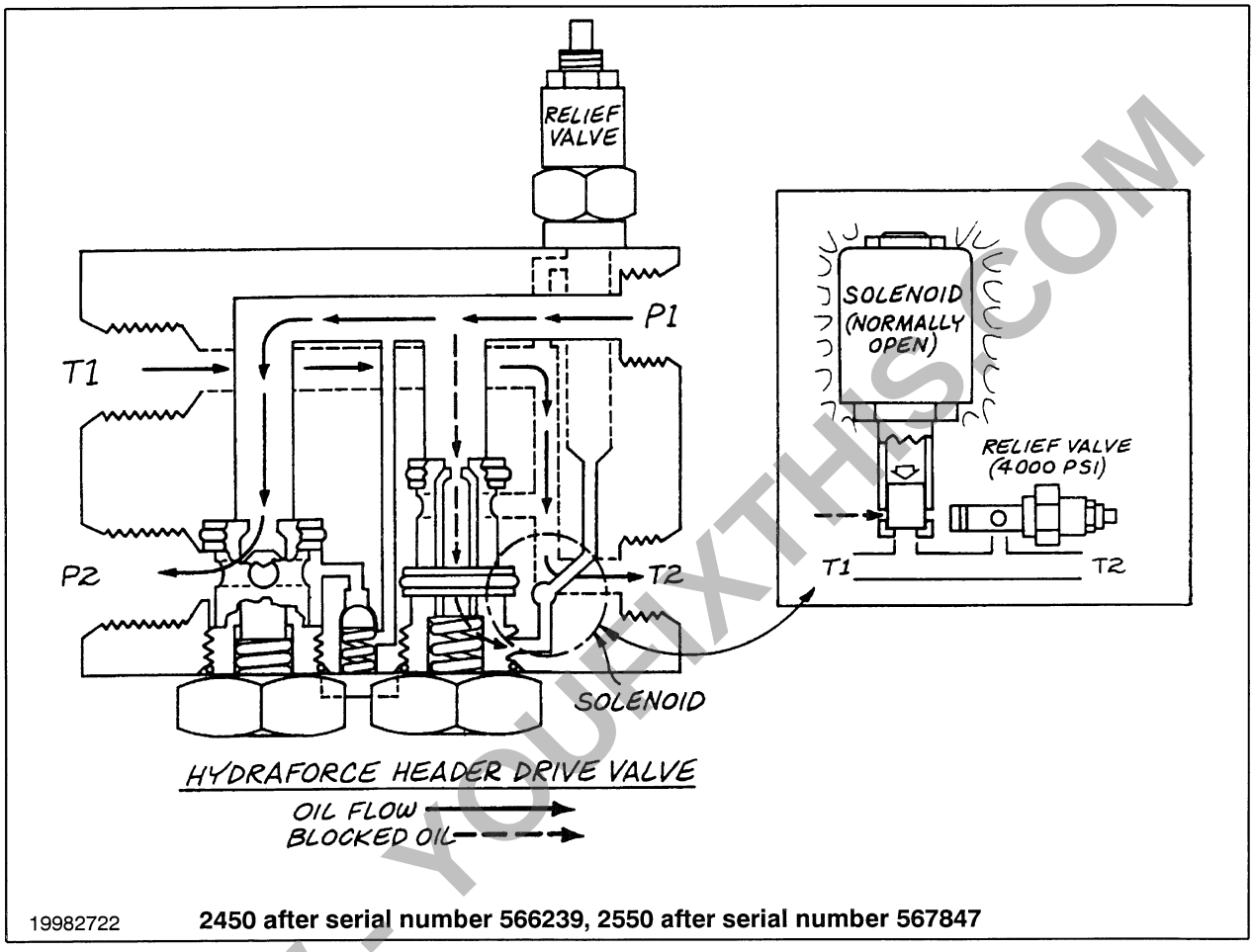


Figure 2-17

VALVE OPERATION (HEADER RUNNING)

Switching on the header drive energizes the solenoid valve, closing it and blocking flow from behind the shuttle valve. Because there is no flow through the orifice, the pressure equalizes and the spring closes the shuttle valve. Oil from the pump forces the motor check valve open, turning the header drive motor. Oil returning from the motor flows through the header drive valve (from port T1 to T2) and into the hydraulic oil cooler.

Switching off the header drive opens the header valve solenoid, allowing oil to bypass the motor. The motor check valve closes, stopping the header from coasting.

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Header Will Not Stay Up

STEP	PRETEST INSTRUCTIONS	TEST	RESULT	PROBABLE CAUSE AND CORRECTION
1.	Apply power at lower solenoid coil after a raise	Check for power at lower solenoid coil after a raise	Power No power	Go to electrical troubleshooting in Section 1 Go to next step
2.	Remove lower solenoid valve	Check for being stuck or dirt under check valve seat	Valve stuck Dirt under seat Valve OK	Replace Clean Go to next step
3.		Check for hose or lift cylinder leak	Hose leak Cylinder leak	Repair Repack or replace

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Neutral Standing Adjustment

NOTE: If the drive wheels are not in synch, adjust the steering creep first.

Adjust the forward and reverse creep as follows:

1. Block both drive wheels off the ground.
2. Start the engine and run it at full throttle, cycling the transmission a few times. Return the FNR lever to neutral and leave the engine at full throttle for 10 to 15 seconds.
3. For forward creep, loosen the jam nuts, 1, on the rear side of the block, 2. Tighten the nut, 3, on the front side of the block.
4. For backward creep, loosen the jam nuts, 3, on the front side of the block, 2. Tighten the nut, 1, on the rear side of the block.
5. Lock the jam nuts. When properly adjusted, the block should not have looseness from forward to rear, but should move freely. The washers on either side of the block should turn freely.

   NOTE: Do not clamp the nuts tightly to the block as this will cause the steering wheel to bind and become difficult to turn. Use the pairs of nuts on each side of the block to lock each other in place.

WARNING: BE SURE TO LOCK THE JAM NUTS TOGETHER. FAILURE TO DO SO WILL CAUSE THE STEERING WHEEL TO LOCK UP UNEXPECTEDLY.

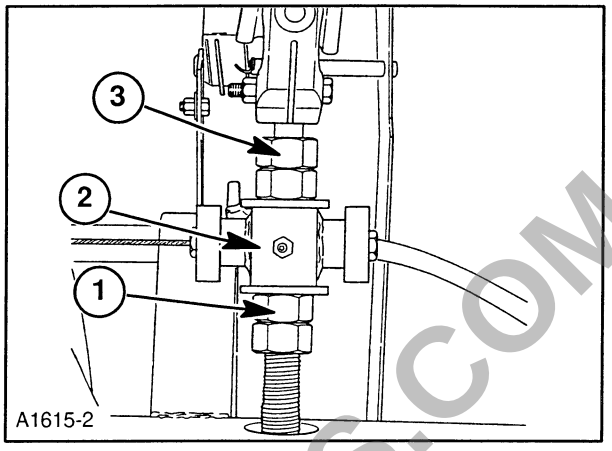


Figure 3-18

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9. Remove the bearing retaining ring, 1, from the motor housing. Remove the shaft and bearing assembly, 2.

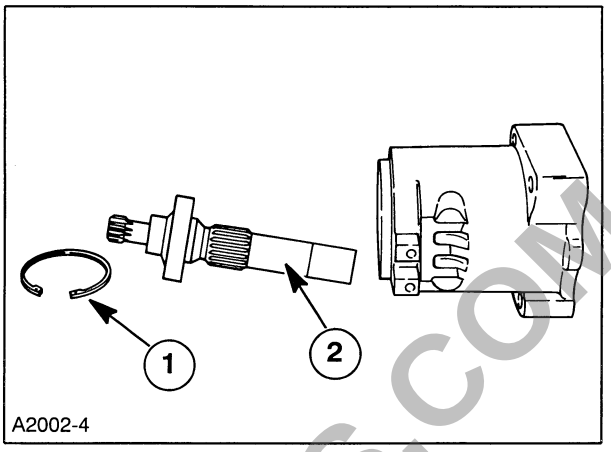


Figure 3-78

10. Remove the retaining ring, 1, from the shaft and press the shaft out of the bearing.
11. Remove the second retaining ring, 2, from the shaft.

Reconditioning and Replacement of Parts

1. After disassembly, thoroughly clean all parts in a suitable solvent.
2. Replace the shaft seal and all gaskets.
3. Replace all parts with damage, nicks, unusual or excessive wear, or discoloration.
4. Remove the shaft needle bearing from the end cap using a suitable puller. Do not damage the valve plate surface of the end cap.
5. Press a new needle bearing, 1, into the end cap using a suitable press pin. When installed correctly, the bearing cage will protrude 2.41 - 2.67 mm (0.095″ - 0.105″) from the valve plate surface of the end cap to serve as a pilot for the valve plate.

   NOTE: When installing the needle bearing, the printed (numbered) end of the bearing cage must face the press pin.

6. Press the valve plate locating spring pin, 2, into the end cap until it protrudes 4.19 mm - 4.70 mm (0.165″- 0.185″) from the valve plate surface of the cap.

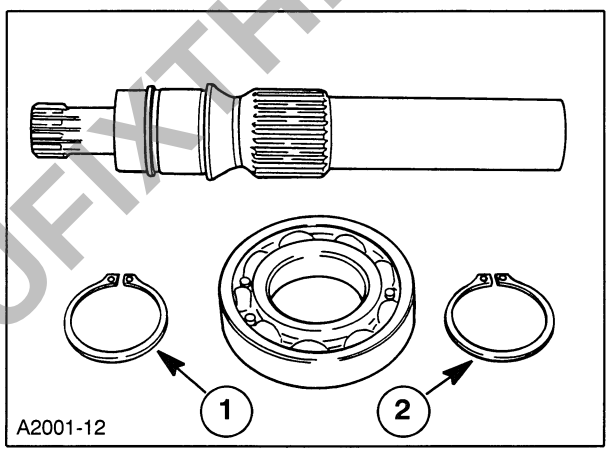


Figure 3-79

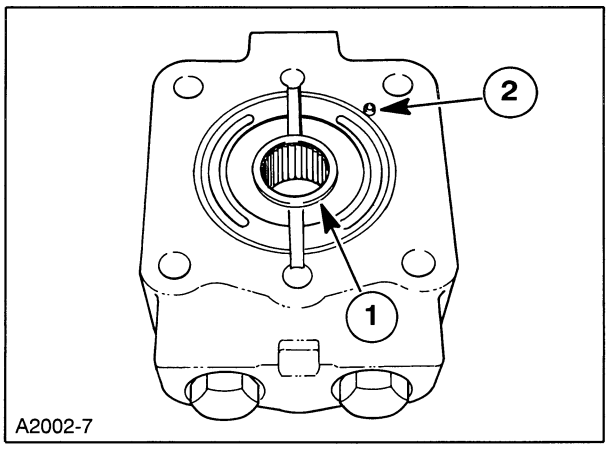


Figure 3-80

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8. Remove the bearing nut lock screw, 1.

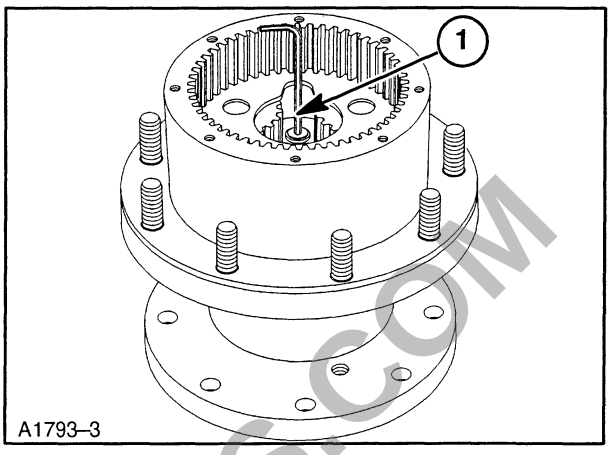


Figure 4-18

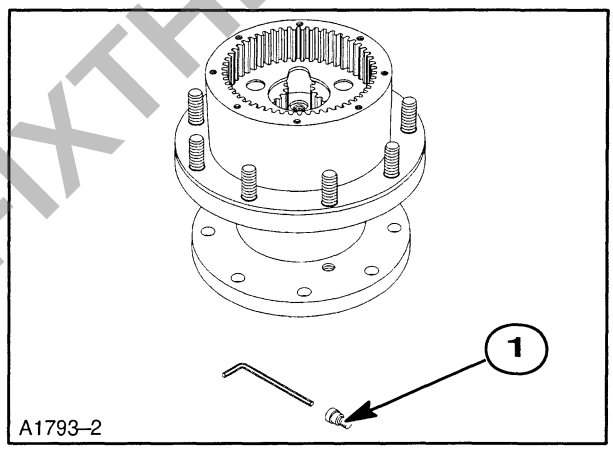


Figure 4-19

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16. Remove the poly V drive belt by installing a 3/4″ socket and breaker bar, 1, over the nut on the tensioning idler and prying upwards. With the tension removed from the poly V-belt, slip it off the alternator pulley.

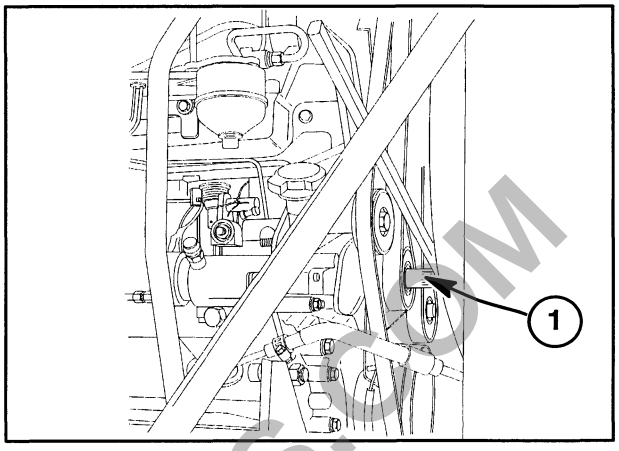


Figure 6-10

17. Remove the two lower cap screws, 1, and upper cap screws from the air conditioning compressor. Leave all air conditioning connections tight. Support the compressor by tying it back away from the engine.

WARNING: DO NOT DISCONNECT AIR CONDITIONING LINES. THE SYSTEM REMAINS PRESSURIZED EVEN WHEN THE ENGINE IS NOT RUNNING.

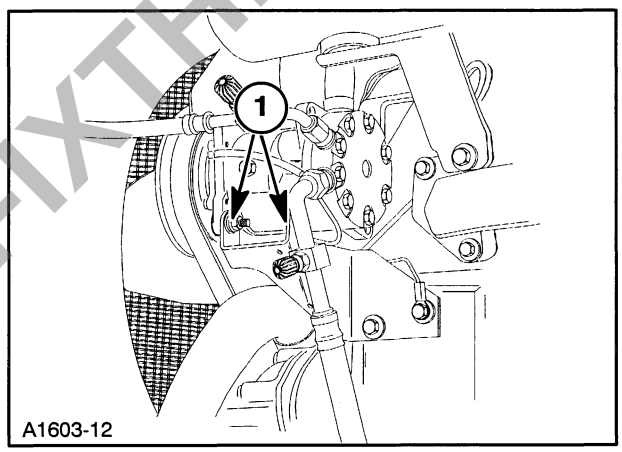


Figure 6-11

18. Remove the six bolts from the fan shroud, 1. Position the shroud over the fan.

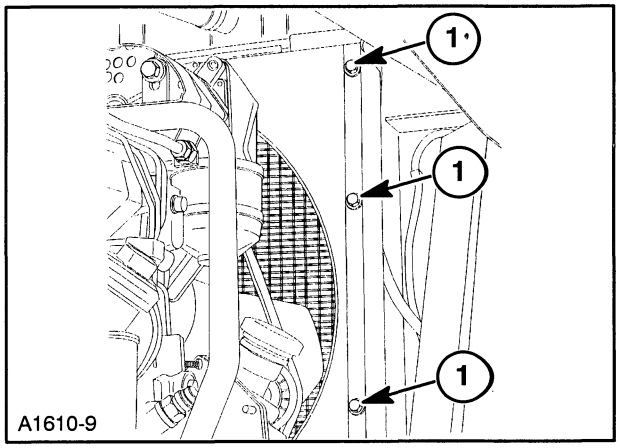
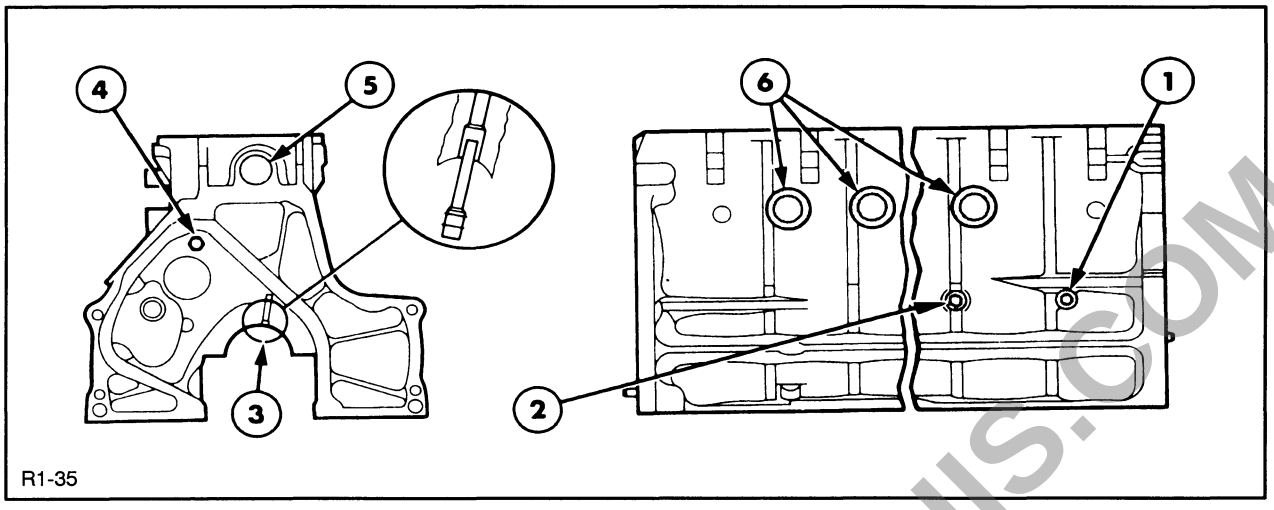


Figure 6-12

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Cylinder Block Core Plug and Sensor Ports, Rear and Right Side

Figure 6-97

a. Plug (1) tighten to 24 - 34 N·m (18 - 25 ft. lbs.). Use sealant E.

b. Plug (2) tighten to 8 - 14 N·m (6 - 10 ft. lbs.). Use sealant E.

c. Oil Jets (3) replace with new if damaged. Apply only engine oil on reassembly, do not use sealant.

d. Plug (4) tighten to 54 - 81 N·m (40 - 60 ft. lbs.).

e. Plug (5) drive into block. Use sealant G.

f. Plug (6) drive into block. Use sealant G.

CYLINDER BORE

1. Check the cylinder bore for scuffing or rings around the ring travel area. Irregularities can be felt by running a finger over the surface. To check out-of-roundness, wear, or taper, use a telescopic gauge, 1.

   Measure lengthwise, A-to-B and C-to-D, and compare dimensions. Variances between the readings will indicate "taper."

   Measure crosswise, C-to-D, and compare dimensions lengthwise. A-to-B, variances will indicate an out-of-round condition.

GREASE AND SEALANTS

Code	Number	Name
A	NLG1 Grade 2	Grease
B	ESF-M1C43-A	Grease-Silicone Light Consistency
C	ESE-M4G194-B	Sealer-Anaerobic Low Strength
D	ESE-M4G195-A	Sealer-Silicone
E	SP-M4G9112-A	Sealer-Polyester Urethane
F	SP-M4G9112-C	Sealer-Polyester Urethane
G	ESE-M4G217-A	Sealer-Anaerobic
J	SP-M2G9121-B	Sealer-RTV Silicone Rubber
K	82995772	Thread and Stud Lock
L	82995771	Flexible Gasket Sealant

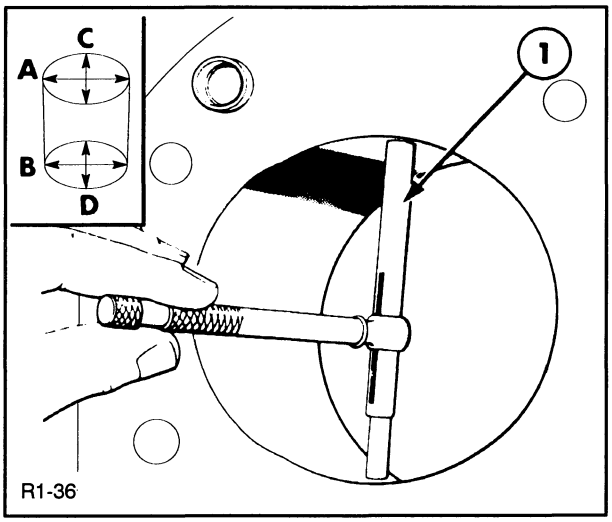


Figure 6-98

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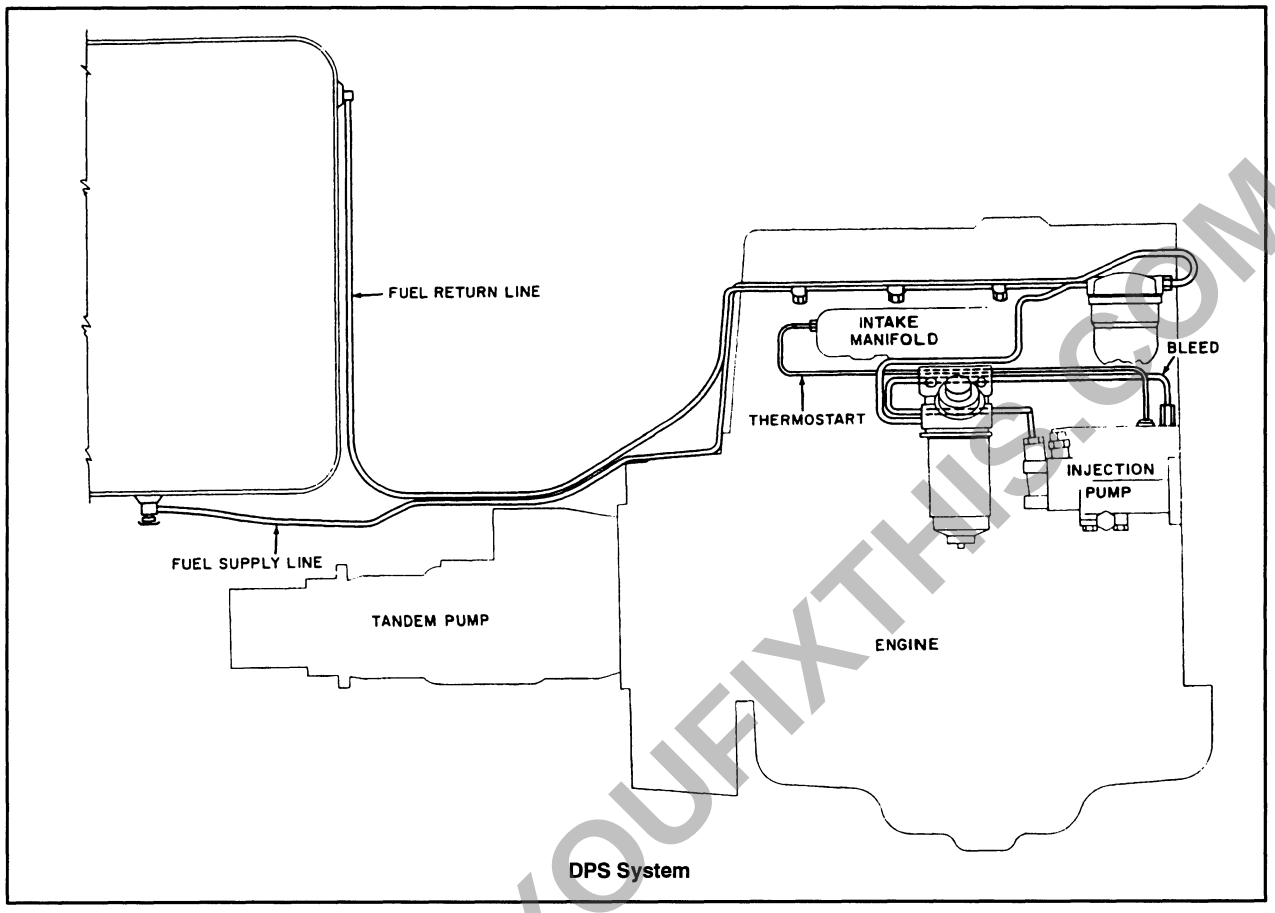


Figure 6-153

FUEL LINES

Removal

1. Close the shutoff valve to the fuel supply line at the fuel tank.
2. Remove the hose clamps at both ends and remove the fuel lines.

IMPORTANT: When removing fuel lines, cap all open connections to keep out dirt. Before reconnecting fuel lines, flush them with clean diesel fuel.

NOTE: Figure 6-153 shows a DPS fuel system. The fuel lines between the tank and the sedimenter or leak-off line are similar for the DP200 system.

Installation

1. Reinstall the fuel lines and tighten the retaining hardware.
2. Inspect the lines and joints for leaks. Leaks and aeration will impair engine performance.

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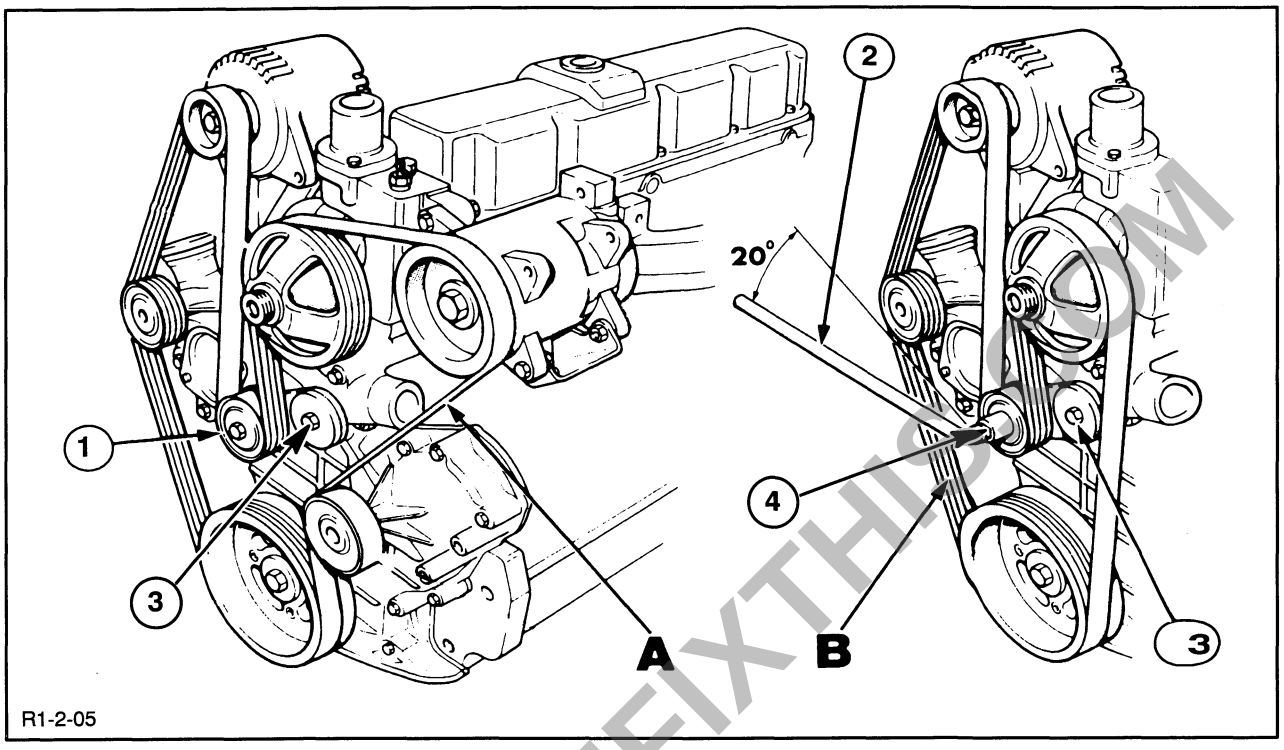


Figure 6-209

A Fan Belt with Air Conditioning

B Fan Belt without Air Conditioning

FAN BELT TENSIONER

Removal

1. To remove the fan belt, put a breaker bar or socket wrench, 2, on the tensioner assembly, 1, and gently lever up the tensioner pulley. Remove the fan belt from the tensioner pulley and allow the tensioner to return to its untensioned position.

   If necessary, remove the belt from the engine now.

2. Remove the tensioner from the pump by loosening and removing the center attaching bolt, 3.

Inspection and Repair

1. Inspect the tensioner spring load with the tensioner still mounted to the front cover. Place a "break-back" torque bar pre-set to 70 - 85 N·m (52 - 63 ft. lbs.) on the pulley-attaching bolt, 4. Raise the lever through an arc of 20° maximum. If the torque bar does not "break" within the range, replace the tensioner assembly.

2. With the belt removed, the tensioner pulley should rotate freely by hand. If not, replace it.

Reassembly

1. Install a new pulley if required and tighten the attaching bolt to 46.5 - 60 N·m (34.5 - 44 ft. lbs.).

2. To reassemble the arm assembly, position the tensioner onto the water pump, fit the mounting bolt through the assembly, and tighten the bolt to 46.5 - 60 N·m (34.5 - 44 ft. lbs.).

3. Replacement of the fan belt is the reverse of the removal procedure.

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With the system running, the pressure on the bottom of the diaphragm drops rapidly. This allows the valve to open and send liquid refrigerant to the lower evaporator tubes, where it begins to vaporize.

The compressor suction draws the vaporized refrigerant out of the top of the evaporator at the top tube where it passes the temperature sensor.

Cooling reduces pressure in the temperature sensor and begins to close the expansion valve. Superheating in the evaporator raises the pressure and opens the expansion valve. This allows more refrigerant to flow.

At high pressure, the diaphragm flexes upward and pulls the thermal element and pushrod away from the ball seat of the expansion valve. The expansion valve spring forces the ball onto the tapered seat and the liquid refrigerant flow decreases.

At low pressure, the diaphragm flexes downward and opens the expansion valve to provide the required pressure and refrigerant flow.

An internal sensing element, 1, produces the required pressure on top of the pressure sensing diaphragm, 2.

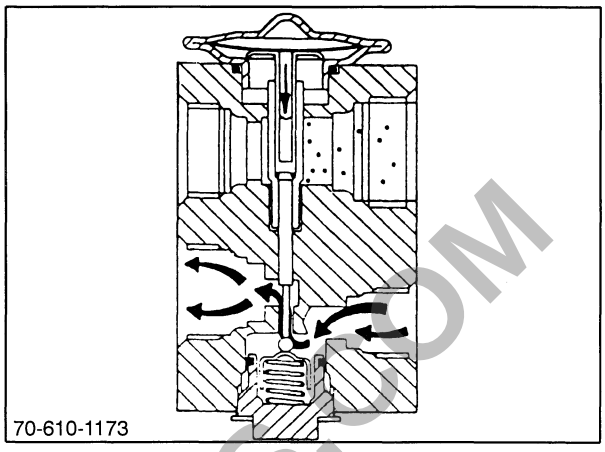


Figure 7-18

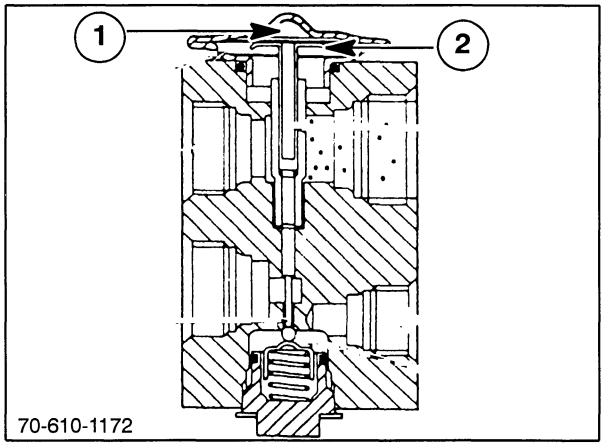


Figure 7-19

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