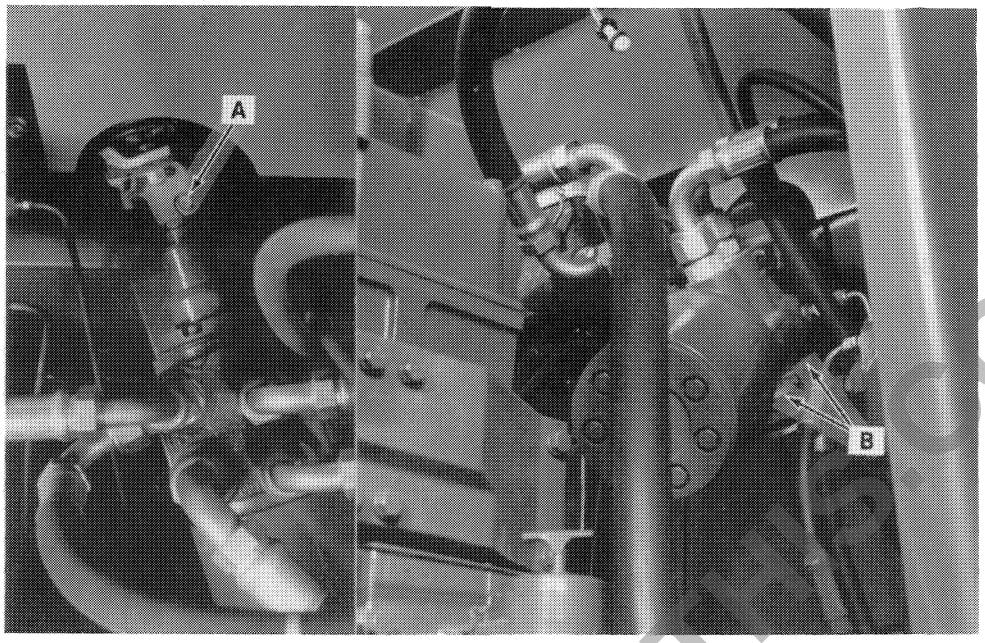
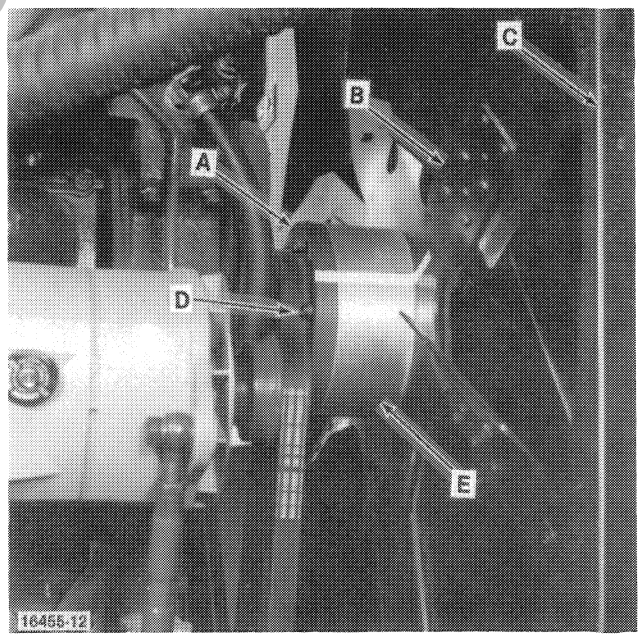


Steering Motor **Figure 1-30**
A Cap screw
B Cap screws

32. Remove the steering valve by removing the cap screw, A, Figure 1-30, from the steering valve shaft. Remove the four cap screws, B, holding the valve to the support bracket.

    NOTE: Record the location of the isolation washers and isolation bushings. Tie the steering valve and hoses away from the engine.

33. Mark the cooling fan, B, Figure 1-31, spacer, E, and fan hub, A, for proper indexing during reassembly. Remove the six cap screws, D, and remove the fan and spacer. Remove the six cap screws supporting the fan shroud, C, on each side. Remove the shroud.



Cooling Fan **Figure 1-31**
A Hub
B Cooling fan
C Shroud cap screws
D Cap screws
E Spacer

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SECTION 3
ELECTRICAL SYSTEM

DESCRIPTION AND OPERATION

The 1156 tractor electrical system is a 12-volt negative ground type consisting of four 825 CCA, 12-volt batteries, a 100-amp alternator, 800-amp starter, connecting wiring and various electrical devices. For convenience, all relays, fuses, and circuit breakers are located in one compartment in the cab.

SPECIAL TOOLS

The special tools that are required for this section are:

- VA-5 tester
- Multi-meter
- 12-volt test lamp

TROUBLESHOOTING — BASIC

Before any electrical components are replaced or repaired, there are basic items that must be checked and verified.

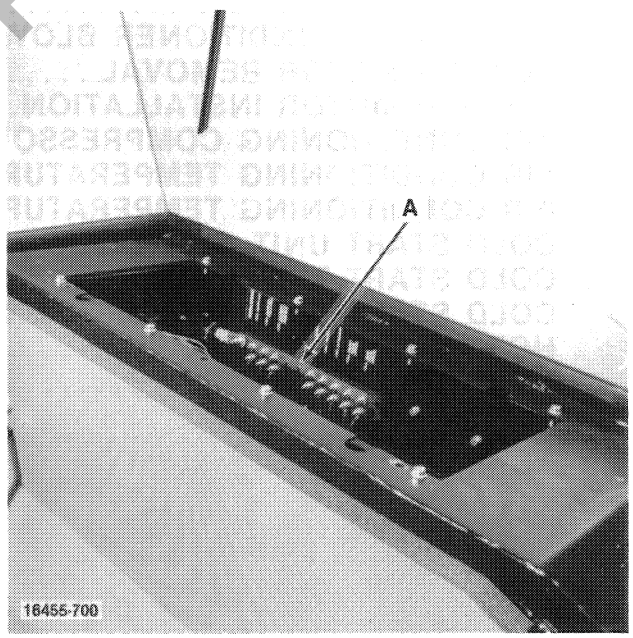
- Alternator belt - adjusted
- Battery cables - tight, corrosion free
- Starter - cables tight, corrosion free
- Wiring connectors - coupled, corrosion free
- Neutral switches - adjusted and operating correctly
- Ground connections - tight and corrosion free
- Batteries - full of fluid and fully charged
- Fuses - not blown

The above items should be checked as a routine service practice prior to extensive diagnostic procedures. The illustrations that follow show the location of various important parts of the electrical system. Refer to these illustrations or schematics when troubleshooting any of the electrical circuits.

Figures 3-1 to 3-19 are circuit breakers, fuses, relays, terminal blocks, schematics, and diagrams associated with the 1156 tractor. The schematics and diagrams will aid in locating and troubleshooting electrical failures.

The circuit breakers, fuse box, relays, (except alternator relay) and rear terminal block are located behind the operator's seat under the Velcro fastened cover.

EIC = Electronic Instrument Cluster
MIC = Mechanical Instrument Cluster

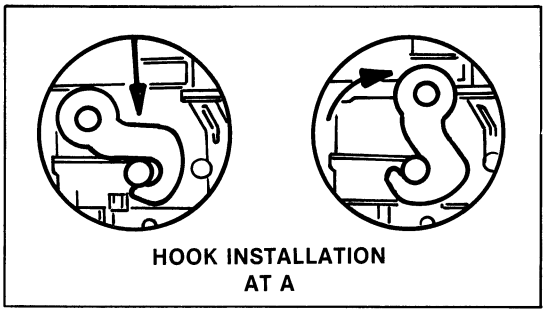


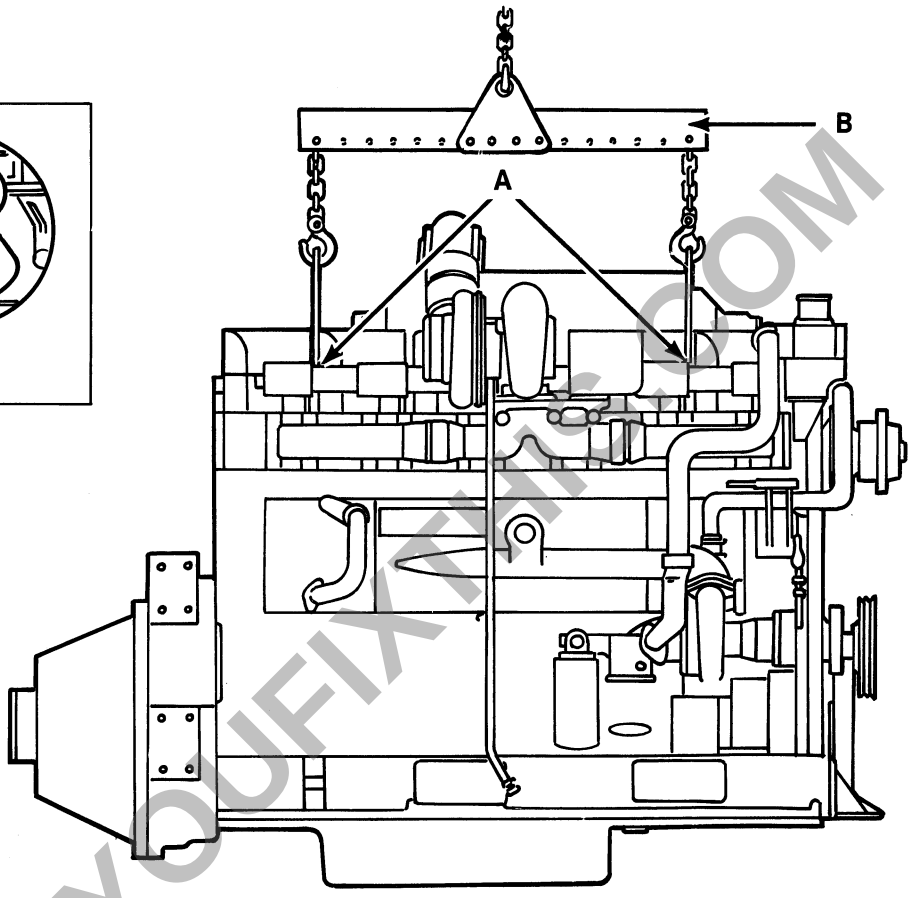
Circuit Breakers **Figure 3-1**
A Circuit Breakers

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BASIC ENGINE





Engine Lifting
A Lifting hooks
B Lift fixture

Figure 1-4

ENGINE MOUNT REPLACEMENT

NOTE: The lift fixture, Figure 1-4 is available from the Cummins Engine Distributor as tool number ST1286 for the hooks and ST1258 for the lift bar.

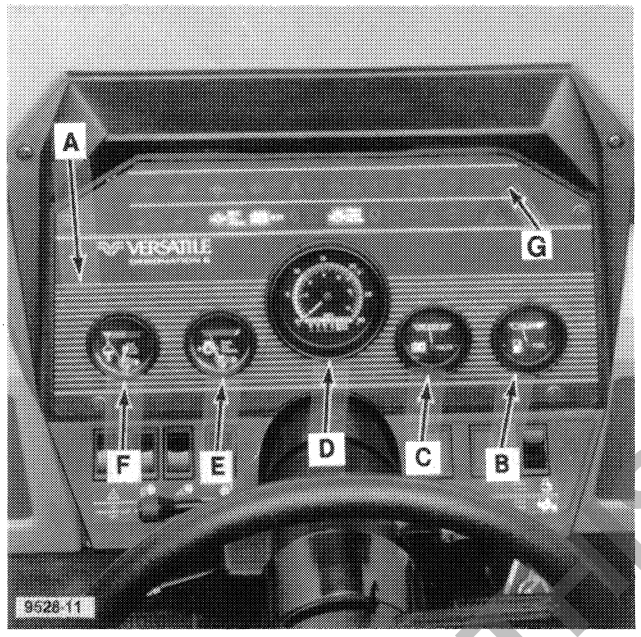
Front Mounting Pads
Refer to Figure 1-4A, Detail A:

WARNING: DO NOT PUT FINGERS BETWEEN THE FRAME AND ENGINE MOUNT. USE A TOOL TO REMOVE AND POSITION THE ISOLATOR PADS.

1. Engage the articulation lock and the parkbrake. Chock the wheels. Refer to "Safety Operation and General Information".
2. Install the engine lifting hooks Figure 1-4. Place an overhead hoist into position ready to raise the front of the engine.
3. Remove the engine mount locknuts F, isolator washers E, and lower isolators D, Figure 1-4A.
4. Raise the engine 1/2" (12 mm) and place safety stands under the engine.
5. Remove the capscrews A, isolator washers B, and top isolator pads C.
6. Replace the top isolator washers B, and isolator pads C. Position the new pads so they are properly centered for maximum vibration dampening and install the cap screws A.

   NOTE: Always replace the isolator pads as a set.

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Mechanical Instruments **Figure 3A-20**

A Mechanical cluster
B Fuel gauge
C Voltmeter
D Tachometer/speedometer
E Oil pressure gauge
F Coolant temperature gauge
G Warning lamps

MECHANICAL GAUGES — TROUBLESHOOTING

If a gauge should stop working, there are several items that should be shecked prior to replacement.

- Check fuses
- Check all electrical connections
- Check and clean battery cables
- Check battery state of charge
- Check the corresponding sender, sensor or switch. See "Senders, Sensors and Switch Replacement" this section.

NOTE: The coolant temperature and the oil pressure gauges do not have a sender, sensor or switch. The coolant temperature gauge uses a capillary tube that is not repairable. The oil pressure gauge uses a small oil line that connects directly to the gauge.

Troubleshooting the sender, sensor or switch is the same as for the electronic instrument cluster except the gauge should go to maximum deflection if the electrical lead is grounded. This will also prove out the gauge.

If it is suspected that a sender, sensor or switch is open, the only sure way to prove this condition is to replace the unit. The fuel gauge, B, Figure 3A-20, provides an indication of the level of fuel in the tank. There is also a mechanical gauge built into the fuel gauge sender. To remove the sender, see "Sender, Sensor and Switch Replacement" this section.

The voltmeter, C, Figure 3A-20, indicates the state of charge of the battery. The voltmeter will normally operate in the green range, which is 12 to 15 volts.

The tachometer, D, Figure 3A-20, indicates engine speed or tractor speed. The outside set of numbers indicates engine RPM x 100. The inside set of numbers indicates tractor speed in MPH. The tachometer also incorporates an hour meter. The tachometer recieves a signal from a sensor on the flywheel housing.

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TROUBLESHOOTING

The troubleshooting chart lists most problems related to the engine systems. For more detailed troubleshooting information, contact your local Cummins Distributor.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Engine does not start	• Water in fuel • Dirty fuel filters/lines • External fuel leaks/air in lines • Faulty fuel shutoff solenoid • Wrong fuel/poor grade fuel • Fuel system not primed • Faulty cold start	Drain water. Change filter. Tighten fittings. Refer to "Electrical" Section 3. Drain and refill. Prime system. Refer to "Cold Start" Troubleshooting
Engine starts, runs poorly	• Water in fuel • Dirty fuel filters/lines • External fuel leaks/air in lines • Dirty injector nozzles • Faulty fuel shutoff solenoid • Wrong fuel/poor grade fuel • Fuel system not primed • Faulty muffler	Drain water. Replace filters. Repair leaks and prime system Refer to Cummins engine repair manual. Repair or replace. Drain and replace. Prime system. Repair or replace.

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SPECIFICATIONS

Fuel Specifications

WARNING: DO NOT MIX GASOLINE OR ALCOHOL WITH DIESEL FUEL. THIS MIXTURE CAN CAUSE AN EXPLOSION.

Fuel Oil

Cummins diesel engines have been developed to take advantage of the high energy content and generally lower cost of No. 2 Diesel Fuels. Experience has shown that a Cummins diesel engine will also operate satisfactorily on No. 1 fuels or other fuels within the following specifications.

Recommended Fuel Oil Properties:

Viscosity (ASTM D-445)	1.3 to 5.8 CentiStoke [1.3 to 5.8 mm^2 Per Second] at 104° [40°C].
Cetane Number (ASTM D-613)	40 minimum except in cold weather or in service with prolonged low loads, a higher cetane number is desirable.
Sulfur Content (ASTM D-129 or 1552)	Not to exceed 0.1% by weight.
Water and Sediment (ASTM D-1796)	Not exceed 0.1% by weight.
Carbon Residue (Ransbottom ASTM D-524 or D-189)	Not to exceed 0.25% by weight on 10% residue.
Flash Point (ASTM D-93)	125°F [52°C] minimum. Certain marine registries require higher flash points.
Density (ASTM D-287)	30 to 42°F [-1 to 6°C] A.P.I. at 60°F [16°C] (0.816 to 0.876 Sp. Gr.)
Cloud Point (ASTM D-97)	10°F [-12°C] below lowest temperature expected to operate at.
Active Sulfur-Copper Strip-Corrosion (ASTM D-130)	Not to exceed No. 2 rating after 3 hours at 122°F [50°C]
Ash (ASTM D-482)	Not to exceed 0.02% by weight.
Distillation (ASTM D-86)	The distillation curve should be smooth and continuous. At least 90% of the fuel should evaporate at less than 680°F [360°C]. All of the fuel should evaporate at less than 725°F [385°C].

Fuel System

Maximum Allowable Restriction to Pump (at rated power):

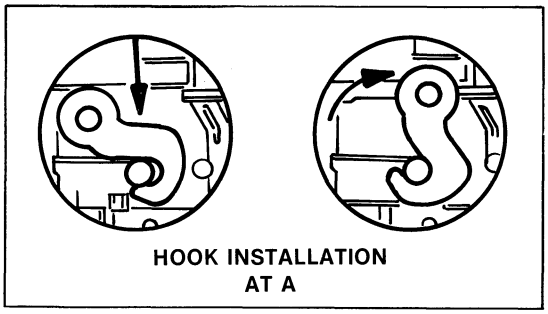
- With Clean Filter .....4 inches Hg (100 mm Hg)
- With Dirty Filter .....8 inches Hg (200 mm Hg)

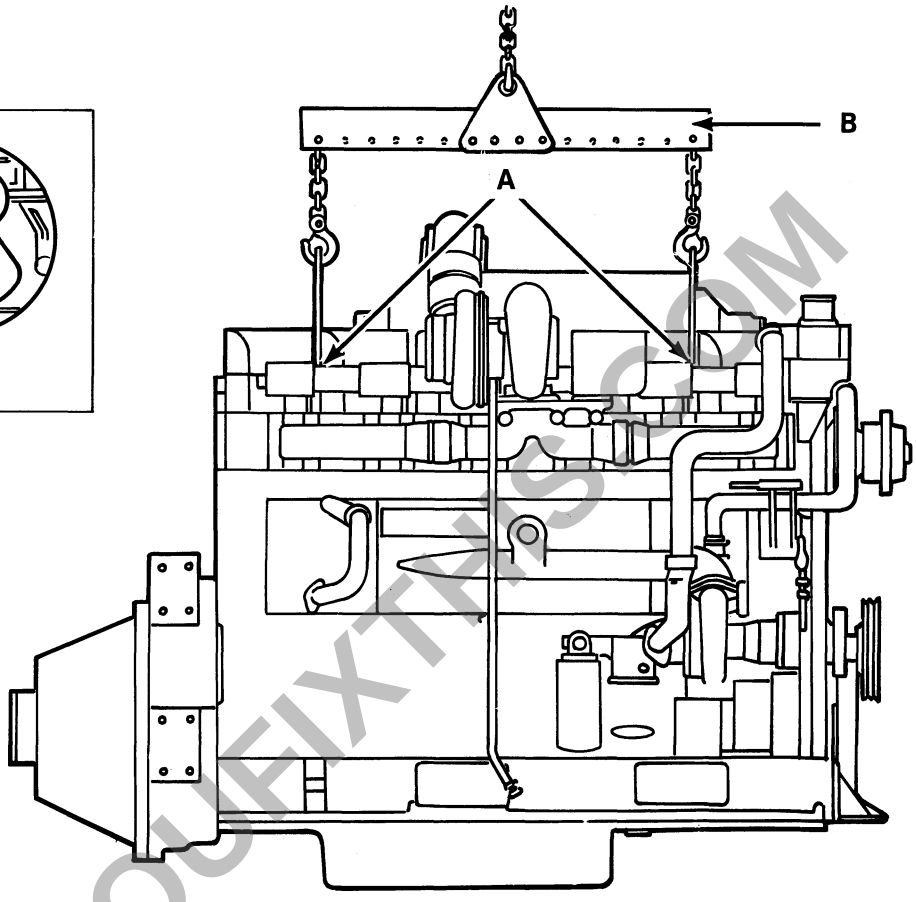
Maximum Allowable Return Line Restriction .....2.5 inches Hg (63 mm Hg)

Maximum Allowable Return Line Restriction with Check Valves and/or Overhead Tanks .....6.5 inches Hg (165 mm Hg)

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Engine Removal
A Lifting hooks
B Lift fixture

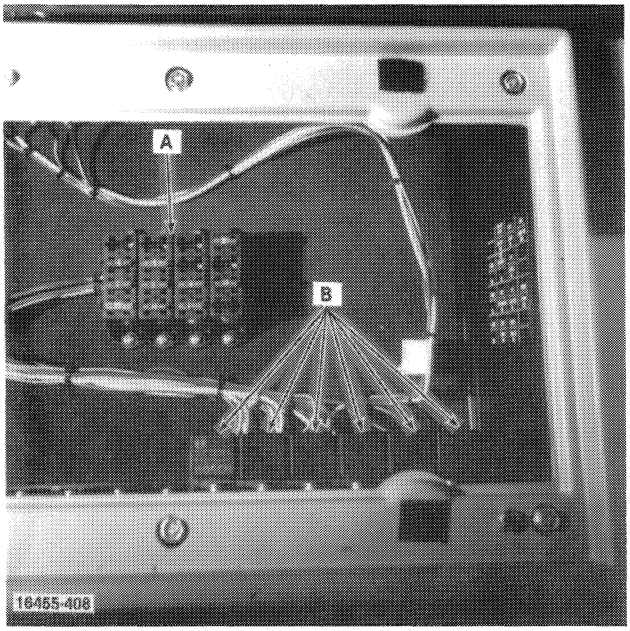
Figure 1-32

34. Install the lifting hooks, A, Figure 1-32, to No. 1 and No. 5 cylinder head lift points. Attach the lifting fixture, B, to the lifting hooks.

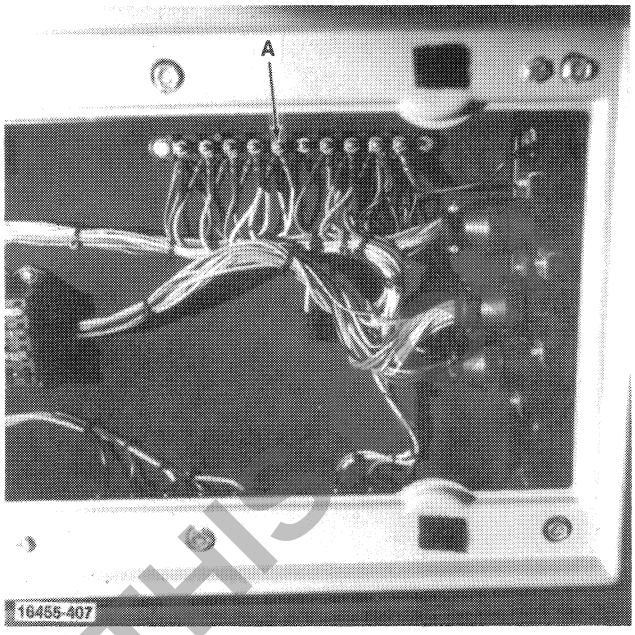
NOTE: The lift fixture, A, Figure 1-32, is available from the Cummins Engine Distributors as tool number, ST1286 for the hooks and ST1258 for the lift bar.

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Fuse Box and Relays **Figure 3-2**
A Fuse box
B Relays



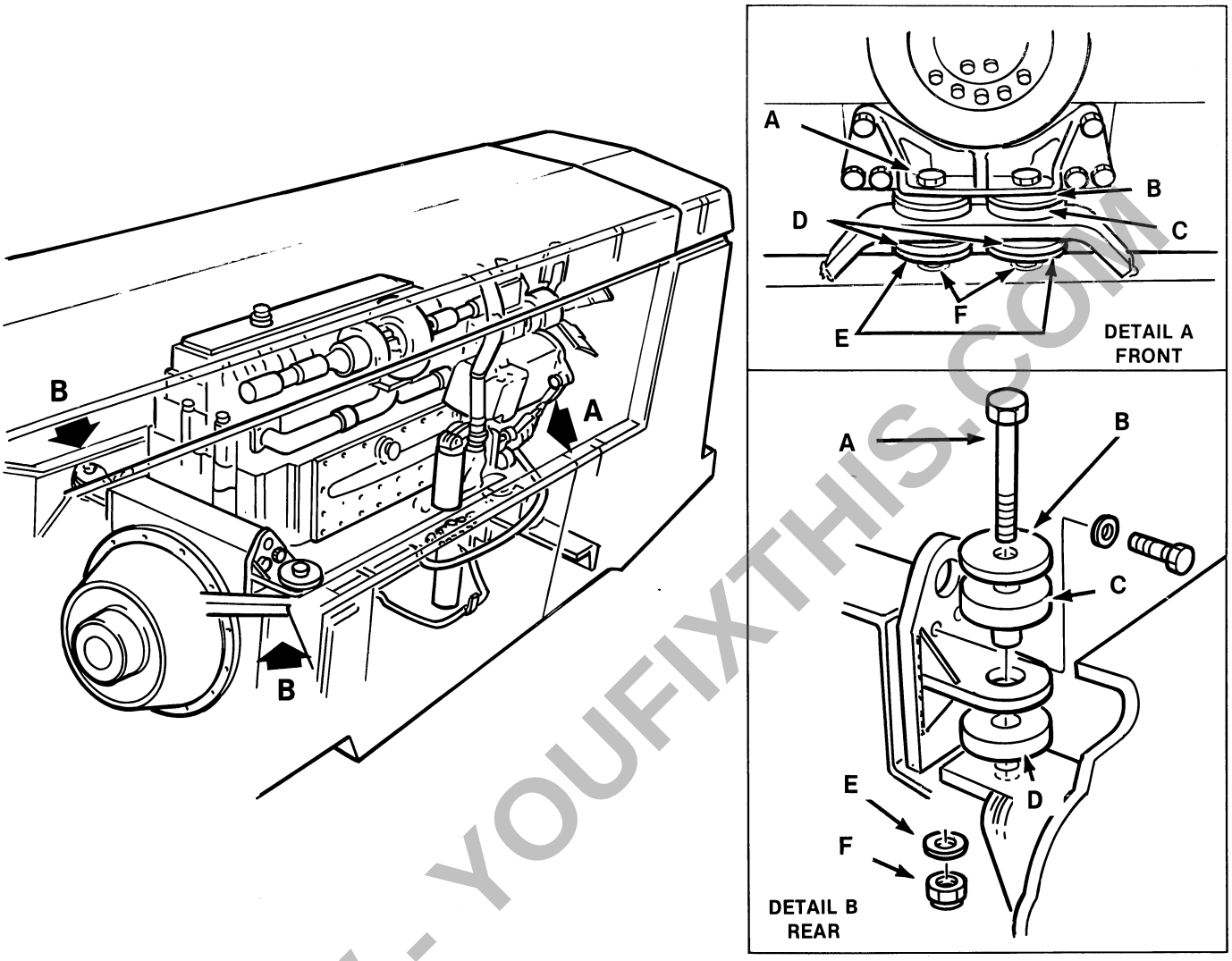
Rear Terminal Block **Figure 3-3**
A Rear terminal block



Front Terminal Block **Figure 3-4**
A Front terminal block

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Engine Mounts **Figure 1-4A**

Front Detail "A"

A	Cap screws	D	Lower isolators
B	Washers	E	Isolator washers
C	Isolator pads	F	Locknuts

Rear Detail "B"

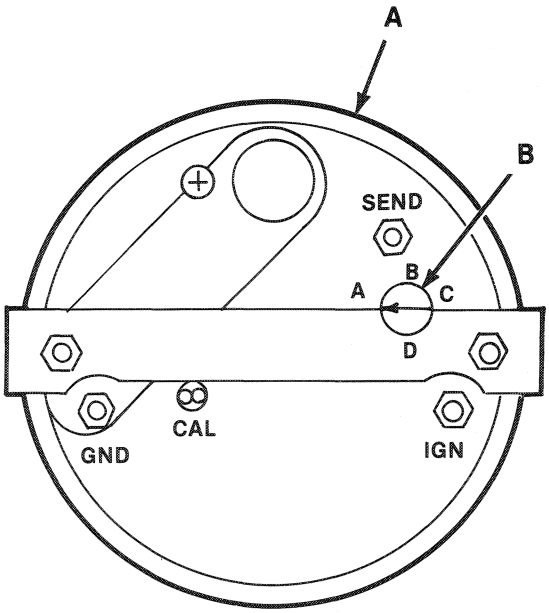
A	Cap screw	D	Isolator pad
B	Isolator washers	E	Washer
C	Upper isolators	F	Locknut

7. Remove the safety stands and lower the engine.
8. Install the lower isolators D, isolator washers E, and locknuts F. Torque the locknuts to 75 lbs.-ft. (95 N·m)

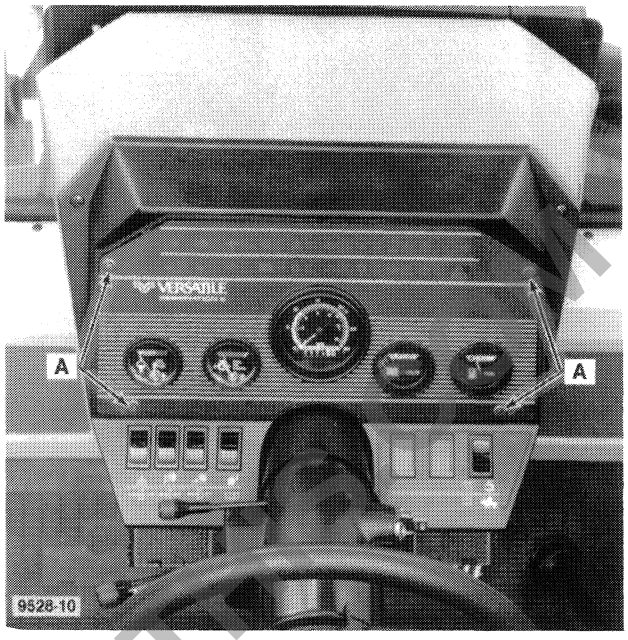
Rear Mounting Pads
Refer to Figure 1-4A, Detail B:

1. Engage the articulation lock and the parkbrake. Chock the wheels. Refer to "Safety Operation and General Information."
2. Install the engine lifting hooks Figure 1-4. Place an overhead hoist into position ready to raise the rear of the engine.
3. Remove the engine mount locknuts F, plain washers E, cap screws A, isolator washers B, and top isolators C.
4. Raise the engine up 1/2" (12 mm) and place safety stands under the engine.
5. Replace the lower isolator pads, D. Position the new pads so they are properly centered for maximum vibration dampening.

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Tachometer (Back Side) **Figure 3A-21**
A Tachometer
B Switch



Mechanical Instrument Cluster **Figure 3A-22**
A One-quarter turn fasteners

The tachometer must be calibrated for the tires installed on the tractor. Using the Ground Speed Switch Setting Chart, find the tire size and rotate switch, B, Figure 3A-21, to the proper position.

Ground Speed Switch Setting Chart

Tire Size	Switch Setting
30.5 x 32 R1 & Radial	C
30.5 x 32 R2 & LS-2	C
12-20.8 x 42 R1	A
12-20.8 x 42 Radial	A
20.8 x 42 R1	A
20.8 x 42 R2 Radial	A
24.5 x 32 R1	C
24.5 x 32 Radial	C

The oil pressure gauge, E, Figure 3A-20, provides information on the engine oil pressure. The gauge, during normal operation, will stay in the green area which represents 30 PSI(2.1 bar) to 60 PSI (4.1 bar).

The coolant temperature gauge, F, Figure 3A-20, indicates the coolant temperature. The gauge will, during normal operation, stay in the green area which represents a temperature range of 160°F (71°C) to 205°F (96°C).

The warning lamps, G, Figure 3A-20, will be illuminated if certain conditions exist. The critical engine functions such as oil pressure and coolant temperature will cause the individual warning lamps to flash and the audio alarm to sound if they fall below specifications.

MECHANICAL INSTRUMENT CLUSTER — REMOVAL

1. Disconnect the battery ground cables.
2. Turn the four one-quarter turn fasteners, A, Figure 3A-22, on the cluster until released.
3. Lift the cluster out far enough to uncouple the electrical connectors but not to damage the temperature gauge capillary tube.
4. Remove and cap the oil line, E, Figure 3A-24, from the oil pressure gauge. With the instrument cluster removed, but capillary tube still connected, the warning lamp bulbs, A, Figure 3A-23, can be easily replaced.

   If it is necessary to replace the lamp module:

5. Remove two screws, B, Figure 3A-23, raise the lamp module and uncouple the multi-pin connector. Remove the lamp module.

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COLD START TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	REMEDY
Engine will not start.	• Cylinder empty • Cylinder not seated • Capillary tube plugged • Atomizer plugged • Atomizer directed incorrectly • Ground cable clamp loose. • Solenoid defective • Defective valve • Defective Thermoguard™	Replace. Tighten. Clean or replace. Clean or replace. Aim spray correctly against the intake manifold airflow. Tighten. Replace. Replace. Replace.
Excess smoke at idle	• Dirty fuel filters/lines • Dirty injector nozzles • Wrong fuel/poor grade of fuel	Replace filters. Refer to Cummins Engine Repair Manual. Drain and replace
Excess smoke under load	• Dirty fuel filters/lines • Dirty injector nozzles • Wrong fuel/poor grade fuel • Restricted air intake • Restricted air filters • High exhaust back pressure • Faulty muffler • Air intake leak • Faulty turbocharger	Replace filters. Refer to Cummins Engine Repair Manual. Drain and replace. Remove restriction. Replace filters. Repair or replace muffler. Repair or replace muffler. Detect leak and repair. Repair or replace. Refer to Cummins Engine Repair Manual
Loss of/or low power	• Dirty fuel filters/lines • External fuel leaks/air in lines • Plugged fuel tank vent • Dirty injector nozzles • Throttle linkage not adjusted • Wrong fuel/poor grade fuel • Internal fuel leak • Restricted air intake • Restricted air filters • High exhaust back pressure • Air intake leak • Faulty turbocharger • Oil level too high	Clean fuel system. Repair leaks and prime system. Clean vent. Refer to Cummins Engine Repair Manual. Adjust linkage Drain and replace fuel Repair leak. Remove restriction. Replace filters. Repair or replace muffler. Detect leak and repair. Repair or replace, refer to Cummins Engine Repair Manual Lower level.
Low engine rpm	• Dirty fuel filters/lines • External fuel leaks/air in lines • Throttle linkage not adjusted	Replace filters. Tighten lines. Adjust.

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SENDERS, SENSORS AND SWITCHES — REPLACEMENT

Coolant Temperature Sensor

The coolant temperature sensor, A, Figure 3A-3, is located below the thermostat housing, B, on the right front side of the engine.

Bar#	Temperature (Degree F)	Sensor Resistance (ohms)
1	158	458
2	158 to 166	458 to 394
3	166 to 174	394 to 340
4	174 to 182	340 to 294
5	182 to 190	294 to 256
6	190 to 198	256 to 223
7	198 to 206	223 to 195
8	206	195

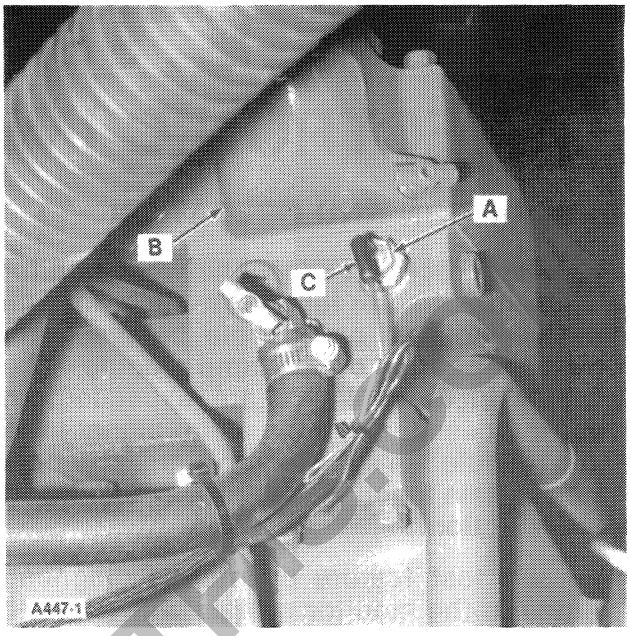
When the voltage on the sensor falls to less than 1.67 volts (206F or 97C), the 8th bar comes on and the critical alarm will sound. When the engine RPM is above 500, "STOP" and the bar graph are flashed slowly onthe display and the stop control output is activated.

This input is checked by a diagnostic routine which checks for a shorted sensor. If it is detected the bar graph is flashed rapidly if RPM is above 500. If the RPM is below 500, then the bar graph is flashed and "SH-CR" is put on digital display. The coolant temperature 1st bar is always on; either continuous, or flashing in case of failure.

Short Circuit = Sensor Resistance less than 53 ohms.

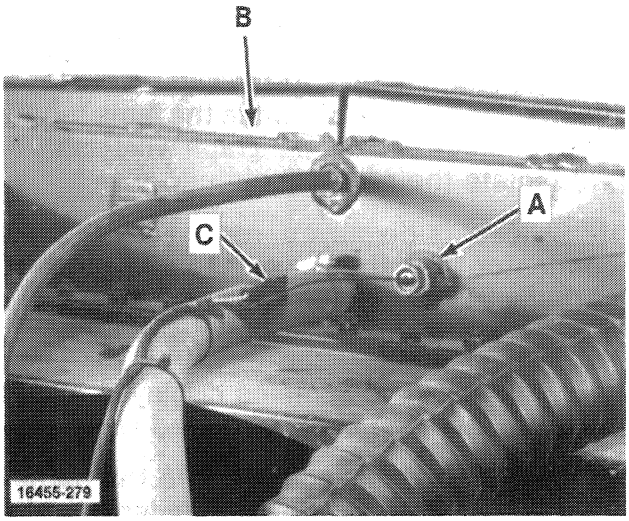
To replace the coolant temperature sensor, drain the coolant from the radiator. Remove the electrical lead, C, Figure 3A-3, and unscrew the sensor. Place a small amount of thread sealant on the threads and reinstall the sensor. Reattach the electrical lead and refill the radiator with coolant.

The coolant level switch, A, Figure 3A-4, is located at the top engine side of the radiator, B. If the coolant level goes below the switch, the indicator in the lamp module will go on.



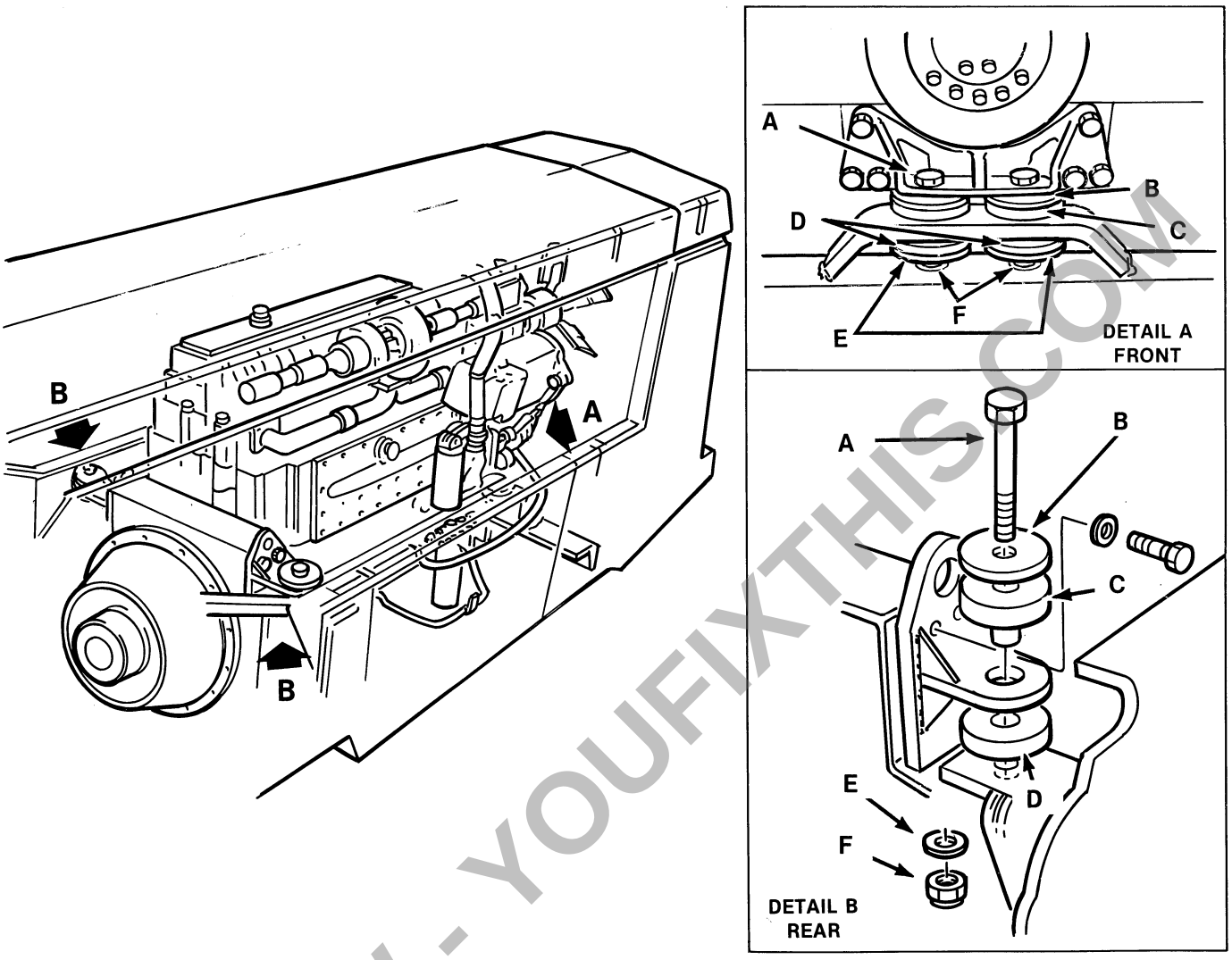
Coolant Temperature Sender **Figure 3A-3**
A Sender
B Thermostat housing
C Electrical lead

To replace the coolant level switch, drain the radiator until the level is below the switch. Disconnect the electrical connector, C. Unscrew the switch. Apply a small amount of thread sealant to the new switch and thread it into the radiator. Couple the electrical connector, C, and refill the radiator.



Coolant Level Switch **Figure 3A-4**
A Switch
B Radiator
C Electrical connector

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Engine Mounts

Front Detail "A"

A Cap screws
B Washers
C Isolator pads
D Lower isolators
E Isolator washers
F Locknuts

Rear Detail "B"

A Cap screw
B Isolator washers
C Upper isolators
D Isolator pad
E Washer
F Locknut

Figure 1-33

35. Remove the front and rear engine mount cap screws and isolator hardware, (Detail A & B), Figure 1-33.

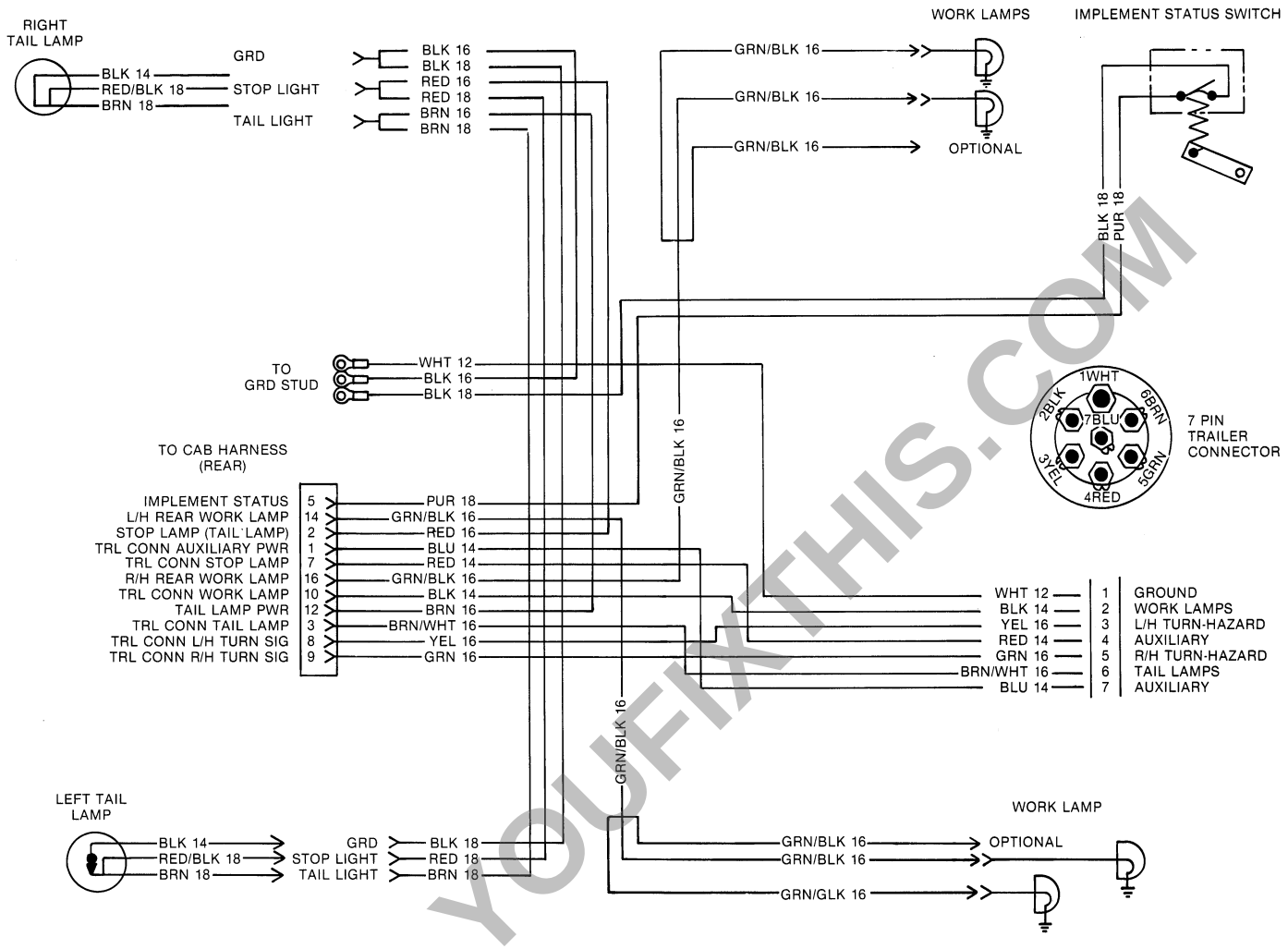
36. Position and attach a suitable lifting hoist to the engine lift fixture, and slowly lift the engine up and forward. Use care during removal to prevent any damage to the components within the frame.

37. If required, remove the clutch housing assembly from the engine. See Section 4, Clutch, for details.

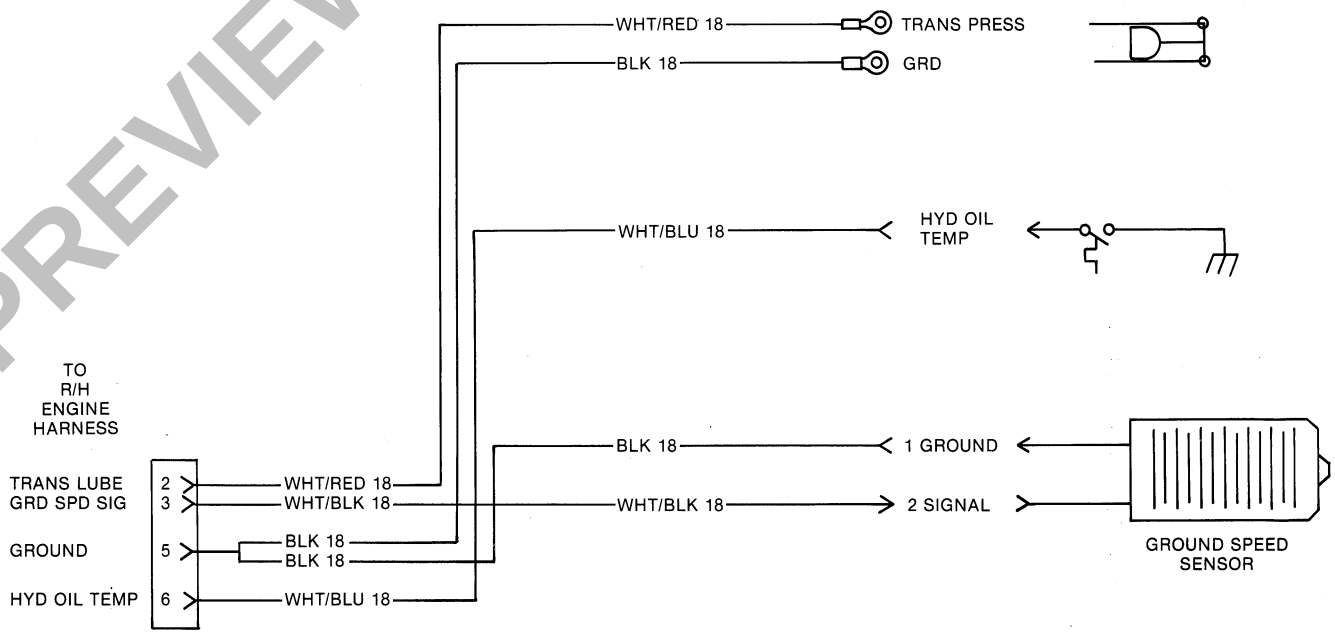
WARNING: USE A HOIST AND LIFT FIXTURE WITH AT LEAST 6000 lb. (2700 kg) CAPACITY. RAISE THE ENGINE SLOWLY TO PREVENT DAMAGE.

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(F) Rear Harness W/EIC Figure 3-9

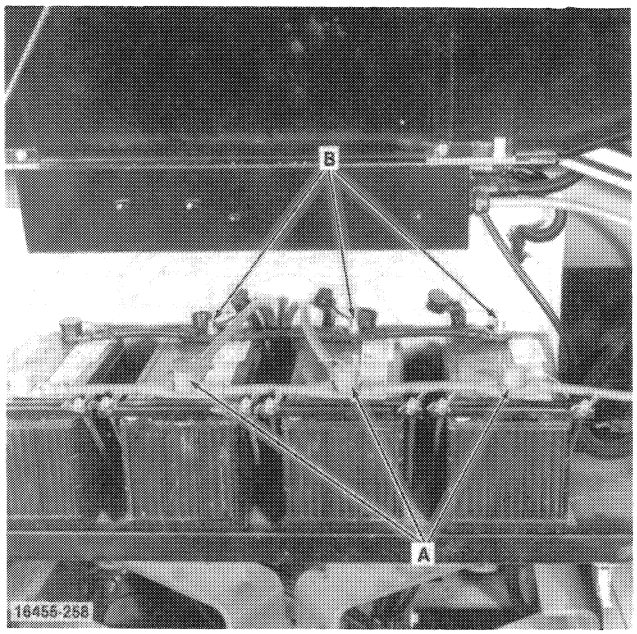


(D) Transmission Harness W/EIC Figure 3-10



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Batteries **Figure 1-5**
A Positive cables
B Negative cables - ground



Oil Pan **Figure 1-6**
A Drain plug

NOTE: Always replace the isolator pads as a set.

6. Remove the safety stands and lower the engine.

7. Install the upper isolators C, isolator washers B, capscrews A, flat washers E, and locknuts F. Torque the locknuts to 75 lbs.-ft. (95 N·m)

ENGINE REMOVAL AND REPLACEMENT

WARNING: SET THE PARKBRAKE, CHOCK THE WHEELS, ENGAGE ARTICULATION LOCK, AND DISCONNECT THE BATTERY BEFORE STARTING WORK ON THE ENGINE.

1. Disconnect the three battery ground cables B, Figure 1-5, and then disconnect the three positive cables A.

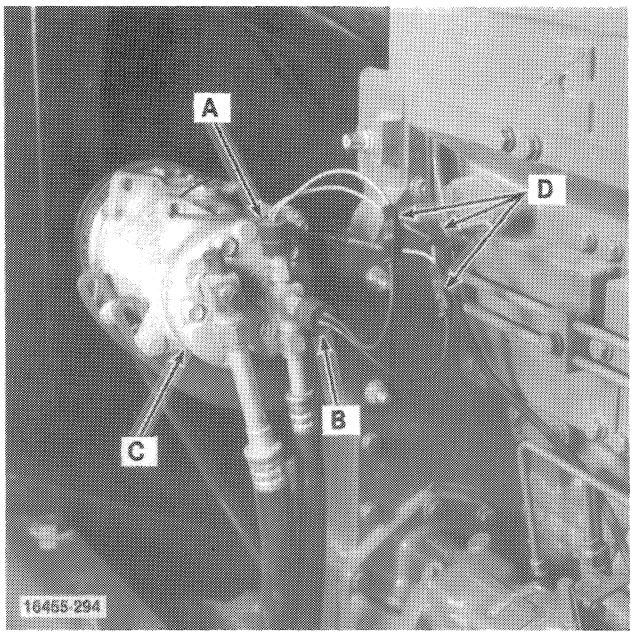
2. Remove the drain plug A, Figure 1-6 and drain the engine oil. Allow 10 minutes to drain completely and install the drain plug. Torque to 65 lbs.-ft. (80 N·m).

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SYMPTOM	POSSIBLE CAUSE	REMEDY
Excess fuel consumption	• Dirty fuel filters/lines • External fuel leaks/air in lines • Dirty injector nozzles • Wrong fuel/poor grade fuel • Internal fuel leak • Restricted air intake • Restricted air filters • High exhaust back pressure • Faulty turbocharger • Oil level too high	Replace filters. Tighten lines. Refer to Cummins Repair Manual. Drain and replace. Repair leak. Remove restriction. Replace filters. Repair or replace muffler. Repair or replace, refer to Cummins Repair Manual. Lower oil level.
Poor deceleration	• Dirty fuel filters/lines • External fuel leaks/air in lines • Throttle linkage not adjusted	Clean fuel system. Repair leaks and prime system Adjust.
Erratic idle speed	• External fuel leaks/air in lines • Plugged fuel tank vent • Throttle linkage not adjusted • Wrong fuel/poor grade fuel • Internal fuel pump governor malfunction.	Repair leaks and prime system. Clean vent. Adjust. Drain and refill. Refer to Cummins repair manual.
Surging at governed rpm	• Internal fuel pump govenor malfunction. • External fuel leaks/air in lines • Throttle linkage not adjusted	Refer to Cummins repair manual. Repair leaks and prime system. Adjust.
Engine stalls	• External fuel leaks/air in lines • Plugged fuel tank vent • Faulty fuel shutoff solenoid • Throttle linkage not adjusted • Wrong fuel/poor grade fuel • Internal fuel leak	Repair leaks and prime system Clean vent. Replace. Adjust. Drain and refill. Repair leak.
Dilution of oil	• Wrong fuel/poor grade fuel • Internal fuel leak • Internal coolant leak • Wrong grade oil	Drain and refill. Repair leak. Repair leak. Drain and refill.
High operating temperature	• Wrong fuel/poor grade fuel • High exhaust back pressure • Faulty water pump • Insufficient coolant • Faulty thermostats • External coolant leak • Dirty radiator externally or internally • Improper coolant mix • Oil level too high • Oil level too low	Drain and refill. Repair or replace muffler. Repair or replace pump. Add coolant. Replace. Repair leak. Remove and clean at authorized radiator repair shop. Drain and refill with proper mixture. Lower oil level. Add oil.

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A/C High/Low Pressure Switches **Figure 3A-5**

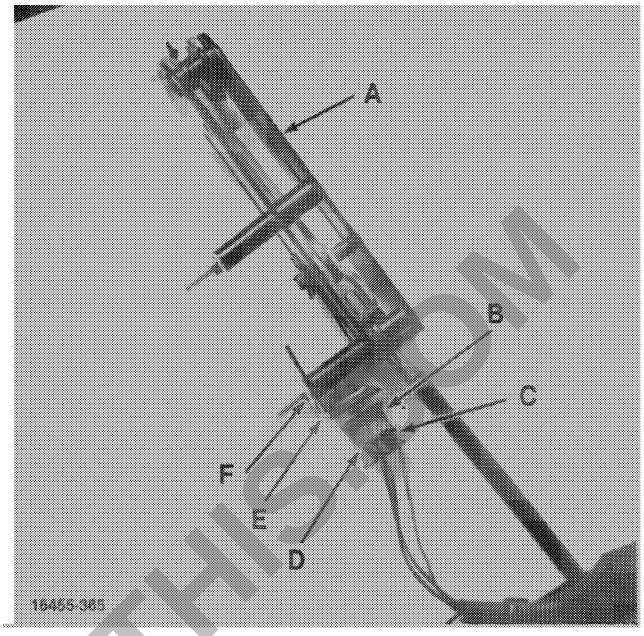
A	High pressure switch	C	A/C compressor
B	Low pressure switch	D	Electrical connectors

A/C High and Low Pressure Switch

The A/C high pressure switch, A, Figure 3A-5, and the A/C low pressure switch, B, are located on the rear of the A/C compressor, C. If the pressure in the A/C system fluctuates enough (high or low) the high or low pressure switches will open the circuit turning off the compressor clutch and turning on the A/C indicator in the lamp module.

To replace a high or low pressure switch, discharge the air conditioning system. See "Discharging the System" in this manual.

Disconnect the corresponding electrical connector, D. Unscrew the switch. Thread the new switch into place and tighten. Couple the electrical connector. Recharge the air conditioning system. See "Recharging the System" in this manual.



Parking Brake Switch **Figure 3A-6**

A	Parking brake handle	D	Electrical lead
B	Switch	E	Switch bracket
C	Electrical lead	F	Nuts

Parking Brake Switch

The parking brake switch, B, Figure 3A-6, is located on the parking brake handle, A, along side of the seat. When the parking brake is on, the switch is closed and the indicator in the lamp module is turned on.

To replace the parking brake switch, rotate the seat 30° counterclockwise to make the switch more accessible. Disconnect the electrical leads, C and D, Figure 3A-6. Remove two nuts, F, and remove the switch and bracket. Remove the jam nuts and the switch.

Inspect the switch depressor to be sure it is L-shaped and will contact the switch. Reattach the switch to the bracket. Reassemble the switch and bracket to the parking brake assembly. Adjust the switch and/or bracket so the brake lamp goes off coincidently with the parking brake.

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SAFETY, OPERATION AND GENERAL INFORMATION

SAFETY PRECAUTIONS

Practically all service work involves the need to drive the tractor. The Operator's Manual, supplied with each tractor, contains detailed safety precautions relating to driving, operating and servicing. These precautions are as applicable to the service technician as they are to the operator, and should be read, understood and practiced by all personnel.

Prior to undertaking any maintenance, repair, overhaul, dismantling or re-assembly operations, whether within a workshop facility or out "in the field," consideration should be given to factors that may have an effect upon safety, not only upon the mechanic carrying out the work, but also upon bystanders.

PERSONAL CONSIDERATIONS

- Loose clothing can cause accidents. Check to see that you are suitably clothed.
- Some jobs require special protective equipment.
- **Skin Protection**
  Used motor oil may cause skin cancer. Follow work practices that minimize the amount of skin exposed and the length of time used oil stays on skin.
- **Eye Protection**
  The smallest eye injury may cause loss of vision. Injury can be avoided by wearing eye protection when engaged in chiselling, grinding, welding, and painting.
- **Breathing Protection**
  Fumes, dust and paint spray are unpleasant and harmful. These can be avoided by wearing respiratory protection.
- **Hearing Protection**
  Loud noise may damage your hearing, and the greater the exposure the worse the damage. If the noise is excessive, wear ear protection.
- **Hand Protection**
  It is advisable to use a protective cream before work to prevent irritation and skin contamination. After work clean your hands with soap and water. Solvents may harm the skin.
- **Foot Protection**
  Substantial or protective footwear with reinforced toe-caps will protect your feet from falling objects. Additionally, oil-resistant soles will help to avoid slipping.
- **Special Clothing**
  For certain work it may be necessary to wear flame or acid-resistant clothing.
- Avoid injury through incorrect handling of components. Make sure you are capable of lifting the object. If in doubt get help.

EQUIPMENT CONSIDERATIONS

- **Machine Guards**
  Before using any machine, check to be sure that the machine guards are in position and serviceable. These guards not only prevent parts of the body or clothing from coming in contact with the moving parts of the machine, but also ward off objects that might fly off the machine and cause injury.
- **Lifting Appliances**
  Be sure that lifting equipment, such as chains, slings, lifting brackets, hooks and eyes are thoroughly checked before use. If in doubt, select stronger equipment than is necessary.

  Never stand under a suspended load or a raised implement.
- **Compressed Air**
  The pressure from a compressed air line is often higher than 100 psi (6.9 bar). It is perfectly safe if used correctly. Misuse may cause injury.

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Never use compressed air to blow dust, filings and dirt away from your work area unless the correct type of nozzle is fitted and eye protection is used.

Compressed air is not a cleaning agent, it will only move dust, from one place to another. Look around before using an air hose as bystanders may get grit into their eyes, ears or skin.

- **Hand Tools**
  Many cuts, abrasions and injuries are caused by defective tools. Never use the wrong tool for the job, as this generally leads either to some injury or to a poor job.

  Never use:

  — A hammer with a loose head or split handle.
  — Spanners or wrenches with splayed or worn jaws.
  — Spanners or files as hammers; or drills, clevis pins or bolts as punches.

For removing or replacing hardened pins use a copper or brass drift rather than a hammer alone.

For dismantling, overhaul and assembly of major and sub components, always use the Special Service Tools recommended. They will reduce the work effort, labor time and the repair cost.

Always keep tools clean and in good working order.

- **Electricity**
  Electricity has become so familiar in day to day usage, that its potentially dangerous properties are often overlooked. Misuse of electrical equipment can endanger life.

  Before using any electrical equipment — particulary portable appliances — make a visual check to make sure that the cable is not worn or frayed and that the plugs and sockets are intact. Make sure you know where the nearest isolating switch for your equipment is located.

GENERAL CONSIDERATIONS

- **Solvents**
  Use only cleaning fluids and solvents that are known to be safe. Certain types of fluids can cause damage to components, such as seals, and can cause skin irritation. Solvents should be checked that they are suitable not only for the cleaning of components and individual parts, but also that they do not affect the personal safety of the user.

- **Housekeeping**
  Many injuries result from slipping or tripping on, objects or material left lying around by a careless worker. Prevent these accidents from occurring. If you notice a hazard, don't ignore it — remove it.

  A clean, hazard-free place of work improves the surroundings and daily environment for everybody.

- **Fire**
  Fire has no respect for persons or property. The destruction that a fire can cause is not always fully realized. Everyone must be constantly on guard.

  — Extinguish matches, cigars, and cigarettes, before throwing them away.
  — Work cleanly, disposing of waste material into proper containers.
  — Locate the fire extinguishers and find out how to operate them.
  — Do not panic — warn those near and raise the alarm.
  — Do not allow or use an open flame near the fuel tank, battery or component parts.

- **First Aid**
  In the type of work that mechanics are engaged in, dirt, grease, and fine dusts settle upon the skin and clothing. If a cut, abrasion or burn is disregarded, it may be found that a septic condition has formed within a short time. What appears at first to be trivial could become painful and injurious. It only takes a few minutes to have a fresh cut dressed, but it will take longer if you neglect it. Make sure you know where the First Aid box is located.

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PURGING FUEL LINES AND HOSES

1. Disconnect suction hose, L, Figure 2-7, from the fuel pump and filter, B. Purge the hose with compressed air to remove any obstructions.
2. Remove one of the filler caps, D, from the tank. Disconnect the fuel supply hose, E, from the fuel filter and apply compressed air through the line towards the tank.
3. Listen for air bubbling in the tank. This indicates the line is clear.
4. Install the fuel tank filler cap, connect the supply line, E, to the filter and install suction hose, L, to the pump and filter.
5. Start the engine. If the engine still runs improperly, stop the engine and remove the fuel return line, A, at the engine.
6. Remove one of the filler caps, D. Purge the fuel return line with compressed air toward the fuel tank. A hissing sound in the tank indicates the line is clear.

PRIMING THE SYSTEM OR TRACTOR RUNS OUT OF FUEL

If the tractor has been standing unused for a period of time, it may be necessary to prime the fuel system if the tractor will not start.

1. Remove the fuel filter, B, Figure 2-7, and fill it with clean fuel.

   IMPORTANT: Fuel poured directly into the filter will not be cleaned by the filter and go directly into the fuel pump. Be sure that the fuel is clean.
2. Remove the suction line, L, from the fuel pump and squirt clean fuel onto the gears inside the pump.
3. Fill the suction line with fuel and install it at the fuel pump.
4. Check and fill the tanks with fuel.
5. Start the engine. If the engine fails to start, refer to the Troubleshooting part of this section.

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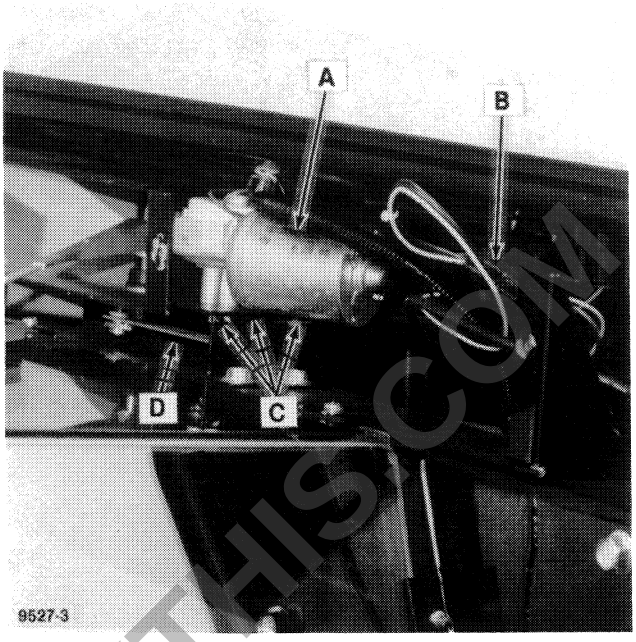
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Connect a test lamp to a good ground, (the BLK 16 on the blower switch), and probe the WHT/BLU lead on the wiper switch, C, Figure 3E-19. If a 12-volt signal is NOT present, check the cab harness roof for an open circuit. If a 12-volt signal is present, turn the switch to the "LO" position. If the wiper motor does not operate, probe the WHT/BRN 18 lead. If a 12-volt signal is present, replace the wiper motor. If a 12-volt signal is NOT present, replace the switch.

If the windshield washer will not operate, determine that the reservoir is full of fluid (not frozen) and that the front wiper operates. If so probe the GRN/WHT 18 at the washer pump. If a 12-volt signal is present, replace the pump. If a 12-volt signal is NOT present, examine the harness for an open circuit.

FRONT WIPER MOTOR — REMOVAL

1. Remove four screws and remove the wiper motor cover from the cab front.
2. Uncouple the wire connector, B, Figure 3E-20.
3. Remove the shaft nut, D, Figure 3E-20, and the drive arm.
4. Remove the three cap screws, C, attaching the motor to the wiper bracket.
5. Remove the wiper motor.



Front Wiper Motor **Figure 3E-20**

A Wiper motor
B Electrical connector
C Cap screws
D Nut

FRONT WIPER MOTOR — INSTALLATION

1. Place the motor, A, Figure 3E-20, on the wiper bracket and secure with three cap screws, C.
2. Place the drive arm, washer, and nut, D, on the wiper motor shaft.
3. Recouple the electrical connector, B.
4. Replace the wiper motor cover.

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8. Install the rail plate, D, to the base with the cap screws and lock washers and tighten securely.

9. Install ball, N, adjuster pin, M, and setscrew, L, in the base.

10. Adjust the setscrew to obtain desired shift effort and lock with thread lock sealant.

11. Install the gearshift assembly in the cab floor.

12. Install and adjust linkage as described under Gearshift Linkage Adjustment.

GEARSHIFT LINKAGE ADJUSTMENT

1. With the tractor parked on a level surface, the engine stopped and the parkbrake engaged,put the gearshift lever in neutral.

2. Inspect connecting pins, bushings, rods, etc. in the linkage to determine if there are any worn, broken or bent parts and replace, as required, before making any adjustments.

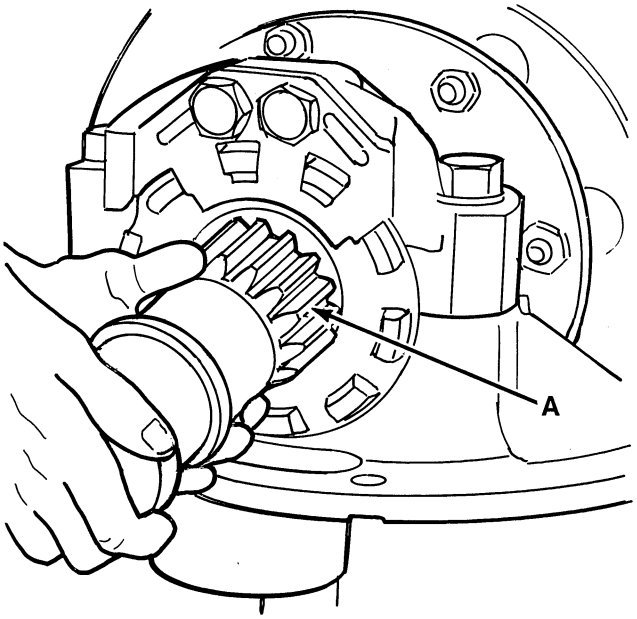
3. To adjust the gearshift linkage, place the main shift lever and the arm on the transmission side cover in each shift position (i.e. 1st, 2nd, and reverse) Adjust the appropriate upper linkage rods in each gear by turning the rod until the rod, L, and bushings, N, Figure 5-49, can be inserted freely at the transmission shift levers. Secure with a washer, O, and cotter pin.

4. Check that the gearshift lever selects all gears properly, M.

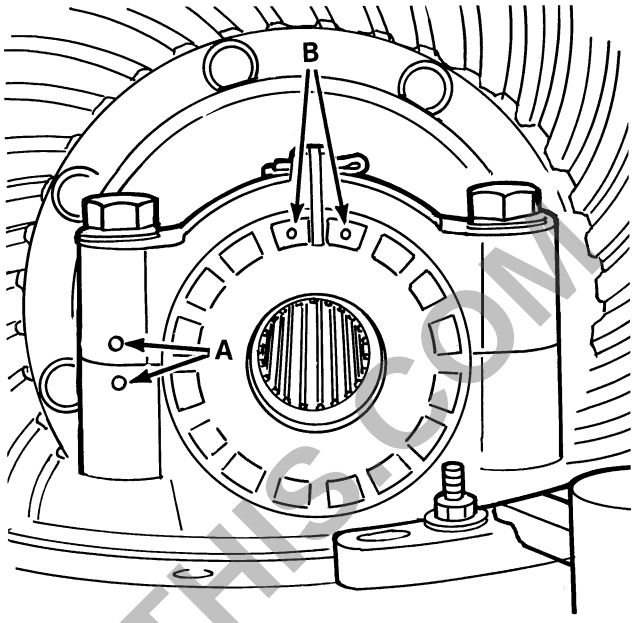
   NOTE: Only the upper linkage rods have adjustable clevis ends at the gearshift end. Adjustment will require disassembly at the gearshift pivot assembly, Figure 5-53, to permit turning the rods, see Step 1 under "Gearshift Lever".

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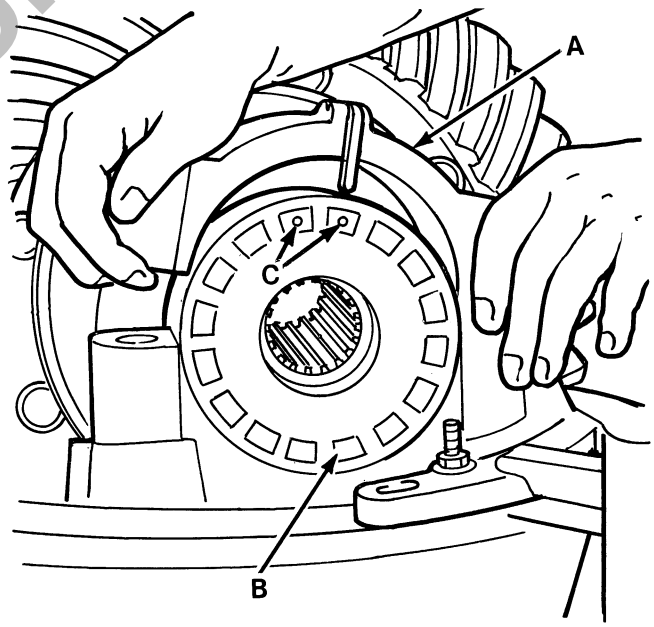
Removing Sliding Clutch Collar **Figure 7-54**
A Sliding clutch collar



Bearing Cap and Adjuster **Figure 7-55**
A Reference marks on cap
B Reference marks on adjuster

WARNING: WHEN USING A DRIFT, PUNCH OR SIMILAR TOOL, WEAR SAFETY GLASSES.

3. Disengage the shift fork yoke, C, Figure 7-53, from the sliding collar and remove the collar, A, Figure 7-54, and shift fork.
4. Punch mark the bearing adjusters and bearing caps at A and B, Figure 7-55, for reference during assembly.
5. On the tooth side of ring gear, Figure 7-56, cut the lock wire and remove the bearing cap screws. Remove the cap, A, and adjuster, B.



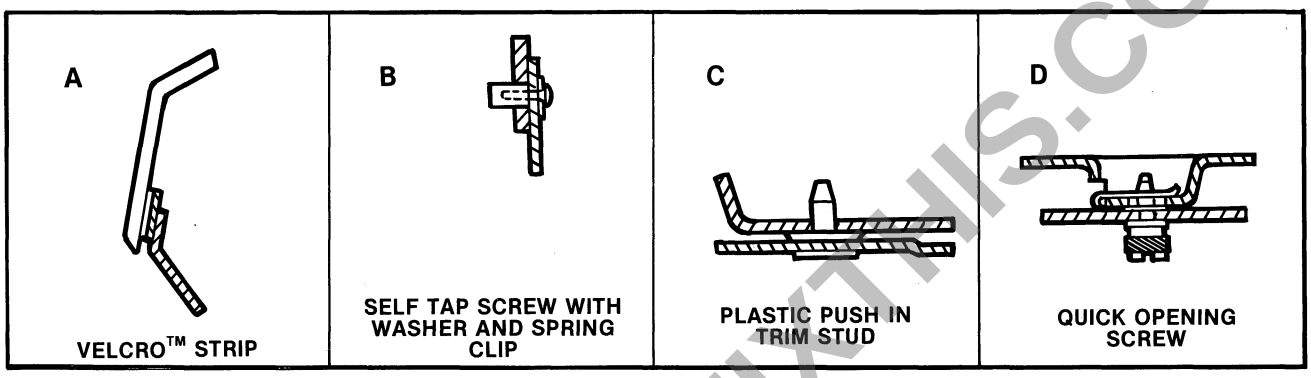
Removing Bearing Cap **Figure 7-56**
A Bearing cap — tooth side of ring gear
B Bearing adjuster
C Reference marks

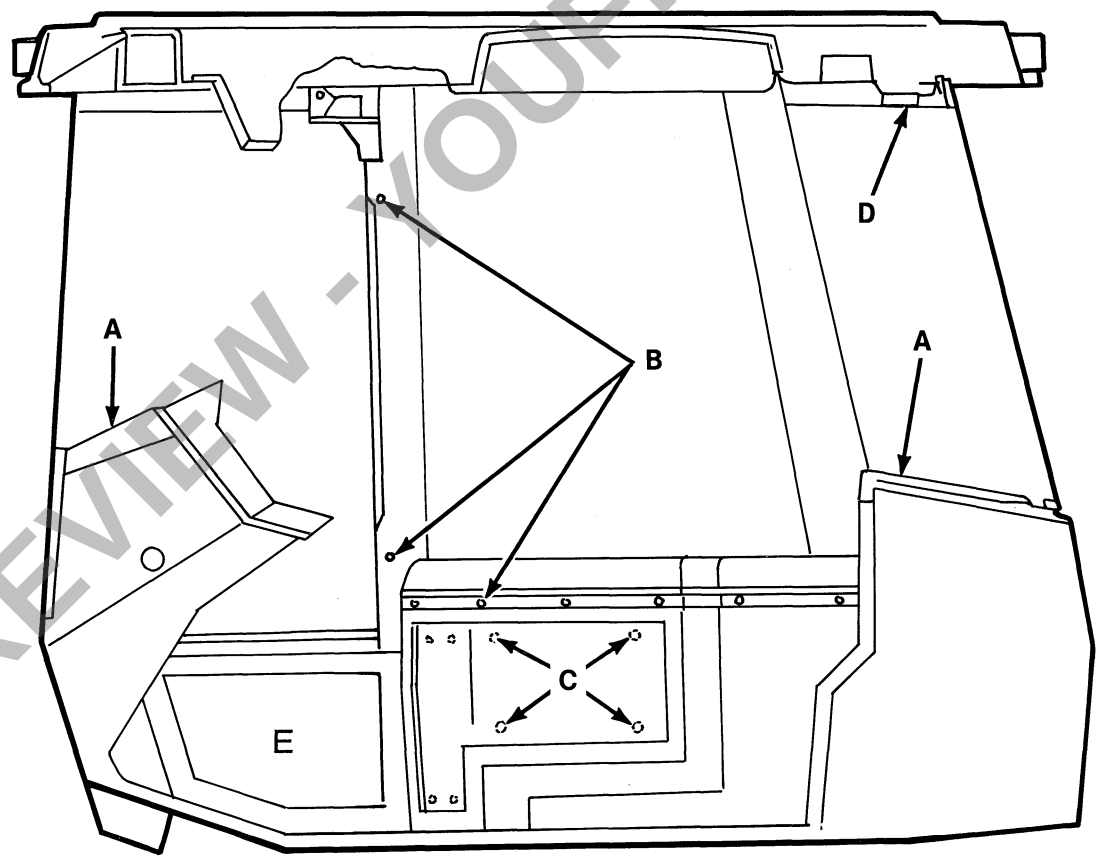
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CAB INSULATION PANELS AND TRIM

Cab trim and insulation panels are held in place with several types of fasteners, i.e. self tapping screws, push-in plastic fasteners, quick opening screws or adhesive as shown in Figure 11-9. Insulation panels covering areas where access is required for service are held in place with the trim panels. The access panels over the steering column housing and the fuse panel are held in place with Velcro™ fasteners. Inspection of the panels and trim will indicate the type of fastener being used and the best method for removing. See Figure 11-9.





Cab Trim Installation **Figure 11-9**

A Velcro™ strip
B Washer with self-tap screw or spring clip
C Plastic push-in trim stud
D Quick opening screw
E Adhesive

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