VERSATILE

NEW HOLLAND

Service Manual

Tractor
150, 160

40015011

Reprinted

FOREWORD

This service manual provides instructions for troubleshooting, removal, inspection, replacement and overhaul of 1977, 1978, 1979, 1980 and 1981 Model 150 VERSATILE® Tractor components.

The service manual should be used in conjunction with the parts manual for the specific model year.

A table of contents precedes each section providing detailed coverage of the information contained within that section. The index at the end of the book should ease location of specific information, and an up-to-date list of Perkins Distributors is provided following the index.

REVISIONS AND ADDITIONS

The purpose of a loose-leaf service manual is to enable us to keep the book updated.

When changes are made, pages will be forwarded to you marked either as replacement or additional pages.

Replacement pages will carry the same page number as the original. Discard the original page and insert the replacement page in its place. Added pages will carry the original page number plus an alphabetical suffix. Insert these pages after the existing page.

Please complete the feedback page at the back of the book and return it to Versatile Farm Equipment Company. Such information will help us improve our service manuals in the future.

Safety

This section contains general safety precautions which should be thoroughly studied and practiced by all service personnel.

GENERAL SAFETY

1. Mount a fire extinguisher near the service area. Maintain it as recommended by the manufacturer.
2. Never operate the tractor in a closed building. If it is absolutely necessary to do so, be sure the building is well ventilated.
3. Always keep sleeves, jackets or other clothing relatively tight and belted. Loose clothing might catch in moving tractor parts.
4. Never jump from the tractor cab. Always use steps and handholds when mounting and dismounting tractor.
5. Park the tractor on a level, clear area before beginning any maintenance procedure. Shut down the engine and remove the ignition key; apply parkbrake; chock the front and back or at least two wheels. Ensure that all operating controls are in neutral. Always disengage the PTO clutch and three-point hitch. Engage articulation lock (1981 Model).
6. Always lower implements to the ground when leaving equipment.
7. Always operate tractor controls from the operator's seat.

TRANSPORT SAFETY

1. Use a trailer having a carrying capacity of at least 12 000 lb (5 500 kg) to haul the tractor.
2. Securely chain the tractor to the trailer; block the wheels and engage the parkbrake to prevent tractor movement. Engage articulation lock (1981 Model).

JACKING SAFETY

1. Select a jack strong enough to carry the load. The minimum required jack capacity is five tons (4.5 t).
2. Stabilize the tractor by putting transmission into gear, engaging the parkbrake, and chocking the wheels securely. Engage the articulation lock (1981 Model).
3. To prevent jackknifing, use two hoists or two floor jacks to lift the rear frame.
4. Put the jack securely under the axle tube, frame or drawbar where it is strong enough to support the lifted weight.
5. Use a heavy block as a base for the jack if working on the ground. It should be long enough to keep the jack from tipping, sinking or shifting. Any additional blocking should be under the jack.
6. Jack up the front and/or rear frame just enough to install steel safety stands under the axle tubes or frame.
7. Check the jack position after it has started to lift. Lower the jack immediately if it starts to lean. Reset the jack; block the tractor more securely and lift again.
8. Keep the tractor stable by not raising it so high that it will slide off the jack handle.
9. Put support stands under the tractor. Lower the jack and let the tractor rest on the stands. This provides solid support for the tractor when the jack is removed.

HOIST SAFETY

1. Use a chain hoist and frame to lift the tractor. The minimum hoist capacity required is five tons (4.5 t); for the A-frame or overhead support, five tons (4.5 t); and for the support stands, three tons (2.7 t).
2. Protect yourself from injury as the tractor is being raised by doing the following:
   a. Do not stand on the tractor as you are lifting.

b. Keep hands away from pinch points where the chain links tighten or the chain is against the tractor frame.

c. Do not let the tractor swing and strike personnel or the frame as it leaves the ground.

d. Keep support stands nearby and place under the tractor when the necessary height is reached.

e. Do not go under a tractor supported by a chain hoist. Place support stands under the tractor before working under it.

f. Engage articulation lock (1981 Model).

3. Extreme care must be exercised when hoisting, lowering or moving any component of the transmission.

MAINTENANCE SAFETY

1. Shut down the engine before repairing tractor.
2. Be alert when approaching the tractor while it is running, especially the PTO, articulation joint and three-point hitch.
3. Engage articulation lock during overhaul operations (1981 Models).
4. Never oil, grease or adjust the tractor while it is in motion. Never run engine while the tractor is being adjusted, cleaned or repaired.
5. Before repairing any hydraulic system component, shut down engine and move all implement controls forward and backward several times to remove pressure. Disconnect any component that may be connected to the hoses.
6. Wear a face shield or goggles to protect your eyes and heavy gloves to protect your hands when searching for hydraulic leaks or charging the air conditioning system.
7. Escaping hydraulic oil under pressure can penetrate the skin, causing severe personal injury. Use a piece of cardboard or wood when searching for leaks. If injured by escaping hydraulic oil, get immediate medical attention.
8. Do not smoke and avoid open flames when filling the batteries.
9. Shut down the engine and remove the ignition key before disconnecting or servicing PTO drivelines.
10. Do not remove the cooling system pressure cap while the engine is hot. Cool engine to less than 165° F (74° C).
11. Stop engine before making any linkage adjustments.
12. Welding fuel tanks is dangerous and not recommended.
13. Repair adhesive is easily flammable. Keep the adhesive and its vapors from heat, sparks and flame.
14. During adhesive use, and until the vapor is gone, avoid using spark producing electrical equipment. Keep the container closed when not in use.
15. Use adhesive only in a well-ventilated area.

FUEL AND FLUID SAFETY

1. Do not smoke and avoid open flame when:
   a. Filling the fuel tanks
   b. Filling the batteries
   c. Working near a disassembled air conditioning system. Refrigerant vapor and flame combined produce lethal phosgene gas.

2. Add coolant to the radiator only when the engine is stopped. Turn the radiator slightly to relieve pressure before completely removing the cap.

3. Do not use an open pail or can for transporting fuel. Use only an approved container manufactured for that purpose.

4. If clothes are splashed with fuel, change immediately. Fuel-soiled clothes are an extreme fire hazard.

5. Dispose of all fuel-soaked rags. Do not leave them lying around a work area where they may be exposed to flame, spark or cigarette smoking.

LOADER SAFETY

1. Keep children away from the loader operation area.

2. Keep bucket low when transporting a load.

3. Do not load, raise bucket and articulate tractor simultaneously.

4. Lower the loader arms, stop engine and engage parkbrake before leaving the operator's seat.

5. Never leave loader with bucket raised. When not in use, bucket should rest on the ground. Hydraulic hoses can rupture under pressure causing loader to collapse.

6. Never operate loader with frayed or damaged hoses or leaking fittings.

7. Never stand or work under the raised bucket.

8. Never allow anyone to ride in the loader bucket.

9. Raise and lower loader slowly to prevent tipping.

10. Keep bucket low when backing down ramps and slopes.

SECTION 2: ENGINE SYSTEMS

Table of Contents

SECTION 2: ENGINE SYSTEMS

1 Introduction

The 150 Tractor has a Perkins four cylinder, 236 cu in., 71 hp engine. This section discusses the engine and related sub-systems. For more detailed overhaul procedures, refer to the Perkins Workshop Manual available from the following Perkins distributors, or contact one of the Perkins dealers listed at the manual back.

AUSTRALIA

Perkins Engines Division
P.O. Box 156
Dandenong, Victoria 3175
Australia
Telephone: 792-0431
Telex: AA 30816
Cables: 'Perkoil'

BRAZIL

Motores Perkins S.A.
Caixa Postal 30.028
c Sao Paulo
Estado de Sao Paulo
Brazil
Telphone: 443-1499
Telex: 23715
Cables: 'Perkoil' Sao Paulo

CANADA

Perkins Engines Canada Ltd.
7 Meridian Road
Rexdale, Ontario
Canada
Telephone: 677-4960
Telex: 0221225
Cables: 'Perkoil' Toronto

FRANCE

Moteurs Perkins S.A.
55 Boulevard Ornano
93203 Saint-Denis
France
Telephone: 243-04:40
Telex: 62251 Saint-Denis
Cables: 'Perkoil' Paris

GREAT BRITAIN

Perkins Engines Limited
Peterborough
England
PE1 5NA
Telephone: Peterborough 67474
Telex: 32132
Cables: 'Perkoil' Peterborough

ITALY

Motori Perkins S.p.A.
22100 Como-Camerlata
Via Pasquale Paoli 9/A
Italy
Telephone: 504885
Telex: 38063
Cables: 'Perkoil' Camerlata

UNITED STATES

Perkins Engines Inc.
P.O. Box 283
24175 Research Drive
Farmington, Michigan 48024
U.S.A.
Telephone: 313-477-3900
Telex: 023-5300
Cables: 'Perkoil' Farmington

1.1 GENERAL

Because of the close integration between the engine and certain engine systems, some repetition of information is unavoidable. Refer to the specific subsection for more detailed information.

1.2 SPECIFICATIONS

1.2.1 Fluids and Capacities

SYSTEM	TYPE OF FLUID	CAPACITY
Engine Oil	5W20/10W30 CC CE	8.5 qt US (8 L)
Coolant	1:1 glycol/water mixture	17 qt US (16 L)
Fuel Oil	No. 2 diesel	34 gal US (120 L)

Cooling System Pressure . . . . . 7 psi (49 kPa)

Oil Pressure . . . . . 30 to 60 psi (200 to 410 kPa)

1.2.2 Torque Values

Front Engine Mounts . . . . . 50 lbf ft (68 N·m)

Rear Engine Mounts . . . . . 90 lbf ft (122 N·m)

Driveline Capscrews . . . . . 25 to 27 lbf ft (34 to 37 N·m)

Battery Cable Terminal Nuts . . . . . 5 to 10 lbf ft 7 to 13 N·m)

Air Cleaner Mounting Nuts . . . . . 31 lbf ft (42 N·m)

Muffler Mounting . . . . . 31 lbf ft (42 N·m)

TABLE 2-1: Capscrew Torque

CAPSCREW SIZE	GRADE 5	GRADE 8
5/16 - 18 UNC	17 lbf ft (23 N·m)	25 lbf ft (34 N·m)
5/16 - 24 UNF	19 lbf ft (26 N·m)	27 lbf ft (37 N·m)
3/8 - 16 UNC	31 lbf ft (42 N·m)	44 lbf ft (60 N·m)
3/8 - 24 UNF	35 lbf ft (47 N·m)	50 lbf ft (68 N·m)
7/16 - 14 UNC	49 lbf ft (66 N·m)	70 lbf ft (95 N·m)
7/16 - 20 UNC	55 lbf ft (75 N·m)	78 lbf ft (106 N·m)
1/2 - 13 UNC	75 lbf ft (102 N·m)	106 lbf ft (144 N·m)
1/2 - 20 UNC	85 lbf ft (115 N·m)	120 lbf ft (163 N·m)

1.2.3 Filters

TABLE 2-2: Replacement Filters Part Numbers

	MODEL YEAR			
	1977	**1978**	**1980**	**1981**
Oil Filter	34778	34778	34778	34778
Primary Air Filter	362103V1	362103V1	51933	51933
Safety Air Filter	N/A	N/A	51934	51934
Fuel Filter	34827	34827	34827	34827

1.3 TROUBLESHOOTING

This is a guide for locating the correct troubleshooting chart. Use this chart when more than one system is involved.

PROBLEM		POSSIBLE FAULTY SYSTEM
Engine does not start	Subsection 6	Cold Start
	Subsection 4	Air Intake/Exhaust
	Subsection 2	Fuel
Excessive smoke under load	Subsection 2	Fuel
	Subsection 4	Air Intake/Exhaust
Loss of or no power	Subsection 2	Fuel
	Subsection 4	Air Intake/Exhaust
	Subsection 5	Lubrication
Excessive fuel consumption	Subsection 2	Fuel
	Subsection 4	Air Intake/Exhaust
Crankcase sludge	Subsection 5	Lubrication
	Subsection 3	Cooling
Dilution of oil	Subsection 2	Fuel
	Subsection 3	Cooling
Low oil pressure	Subsection 2	Fuel
	Subsection 5	Lubrication
	Subsection 3	Cooling
Coolant temperature high	Subsection 3	Cooling
	Subsection 4	Air Intake/Exhaust

1.4 ENGINE REPLACEMENT

CAUTION

SET PARKBRAKE. CHOCK FRONT AND REAR OF AT LEAST TWO WHEELS. PIN ARTICULATION LOCK (1981 MODEL).

NOTE

These procedures require two persons.

1.4.1 Special Tools and Equipment

1. Lifting hoist of two tons (2 tonnes) capacity
2. Torque wrench with 90 lbf ft (122 N·m) capacity
3. Engine stand
4. Hose caps

1.4.2 Removal

1. Remove four thumbscrews securing rear panel to tractor frame (Figure 2-1). Remove rear panel.
2. Remove grill screen.
3. Remove two locknuts at each fuel tank securing hood rear.
4. Remove capscrews, nuts and lockwashers from front mounting brackets on each side of hood.
5. Remove four screws from hood top.
6. Disconnect fuel tank breather hoses from breather. Cap hoses.
7. Remove air cleaner restriction gauge tube from hood right rear.
8. Loosen clamp and remove air cleaner extension with weathercap.
9. Remove hood.
10. Drain engine coolant through radiator petcock and drain port (Figure 2-2).
11. Remove upper and lower radiator hoses.
12. Disconnect fuel return line, running from filter to left tank, from filter. Cap and label.
13. Disconnect front ground cable at engine left front.
14. Disconnect battery ground cables at left rear of engine.
15. Disconnect cab heater return hose (Figure 2-2) and supply hose (Figure 2-3) at engine connections. Cap ends and label.
16. Disconnect suction hose at fuel lift pump. Cap end.
17. Remove three nuts securing exhaust pipe to manifold. Loosen clamp at muffler. Remove exhaust pipe.
18. Disconnect clamps at air cleaner outlet and engine air intake ports. Remove air intake tube (Figure 2-4).
19. Disconnect water temperature sender wire at sender, located at top rear of engine. Label.
20. Disconnect ether atomizer at engine air intake port. Put atomizer with cold start aid at right fuel tank.
21. Remove thermoguard from engine block (1981 Model).

WARNING

OPERATE HYDRAULIC CONTROLS SEVERAL TIMES TO RELIEVE PRESSURE IN HYDRAULIC LINES.

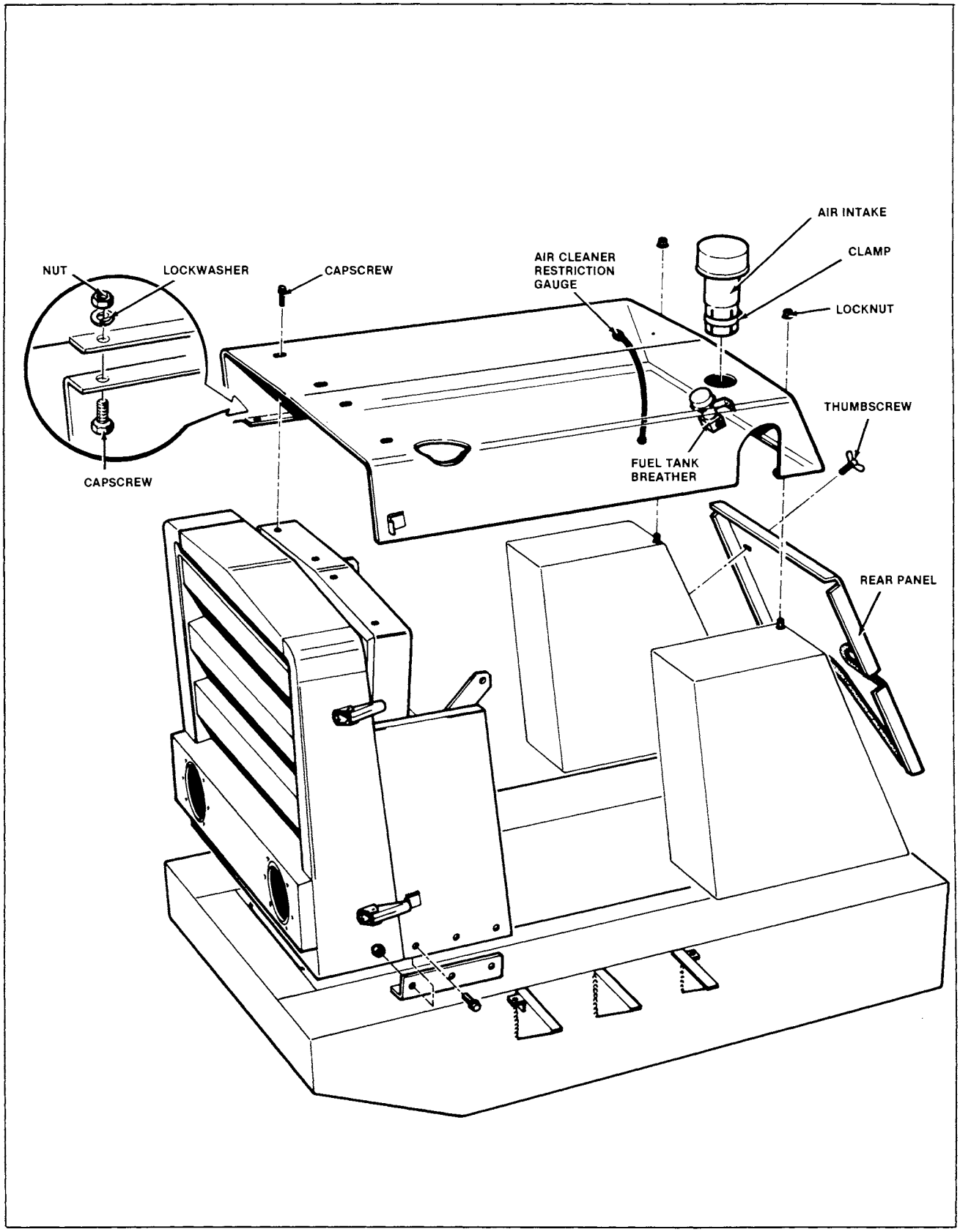

FIGURE 2-1: Hood Removal

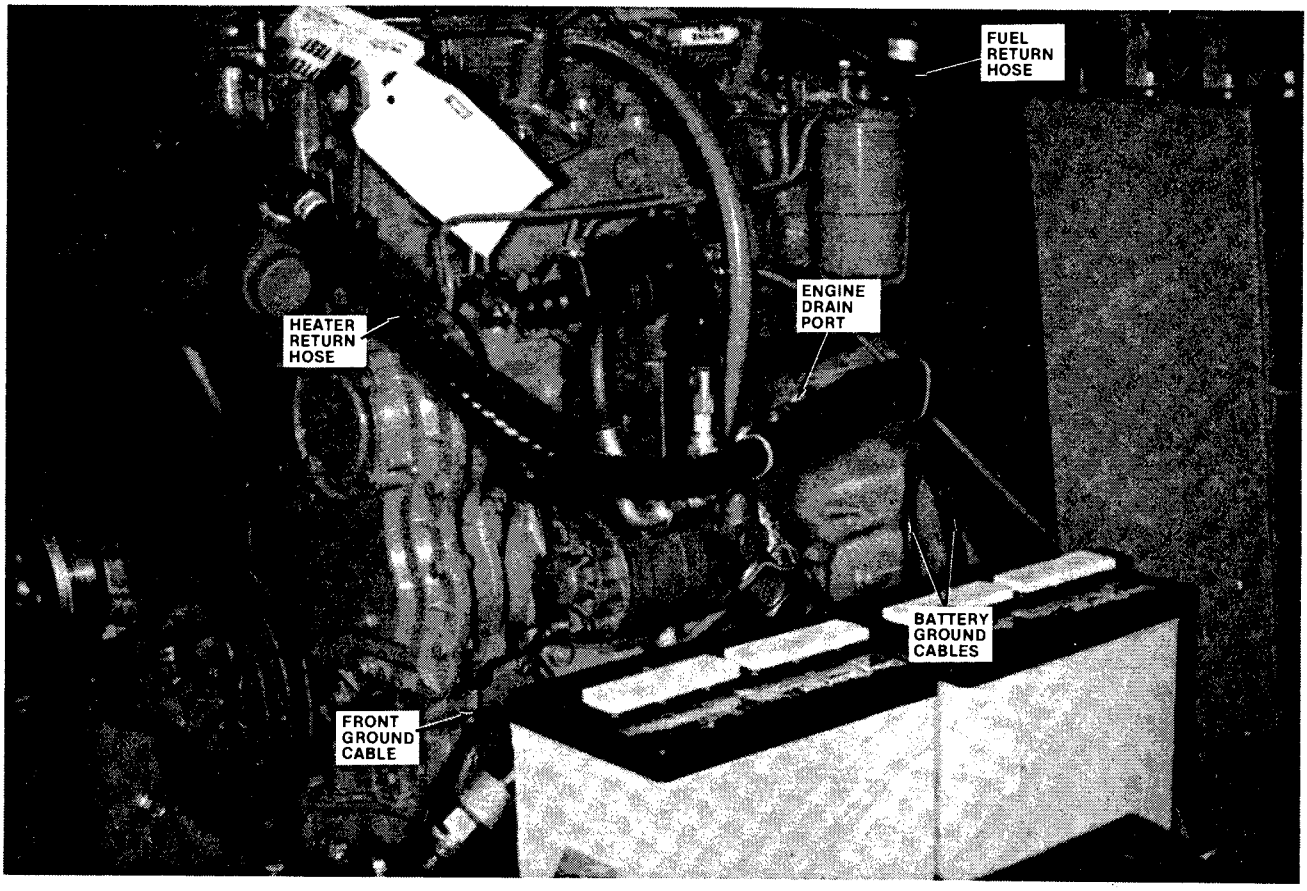

FIGURE 2-2: Engine Left Side

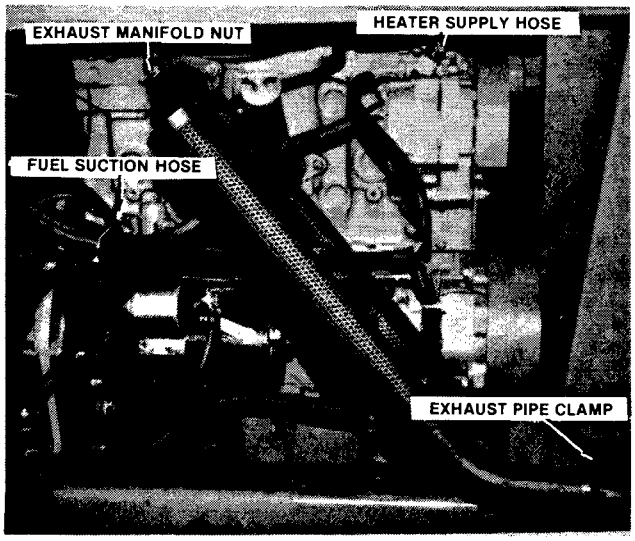

FIGURE 2-3: Engine Right Side

22. Disconnect hydraulic suction, implement and steering hoses from hydraulic pump. Cap ends and label. Elevate hoses clear of engine. Leave balance hose on hydraulic pump and pump with engine (Figure 2-5).

23. Disconnect cable at alternator. Label. Remove plug (Figure 2-6).

24. Disconnect compressor and carefully wire to frame, clear of engine. It is unnecessary to discharge air conditioning system or disconnect air conditioning lines at compressor.

25. Disconnect and label electrical leads at starter (Figure 2-7).

26. Disconnect oil pressure sending wire at sender. Label (Figure 2-8).

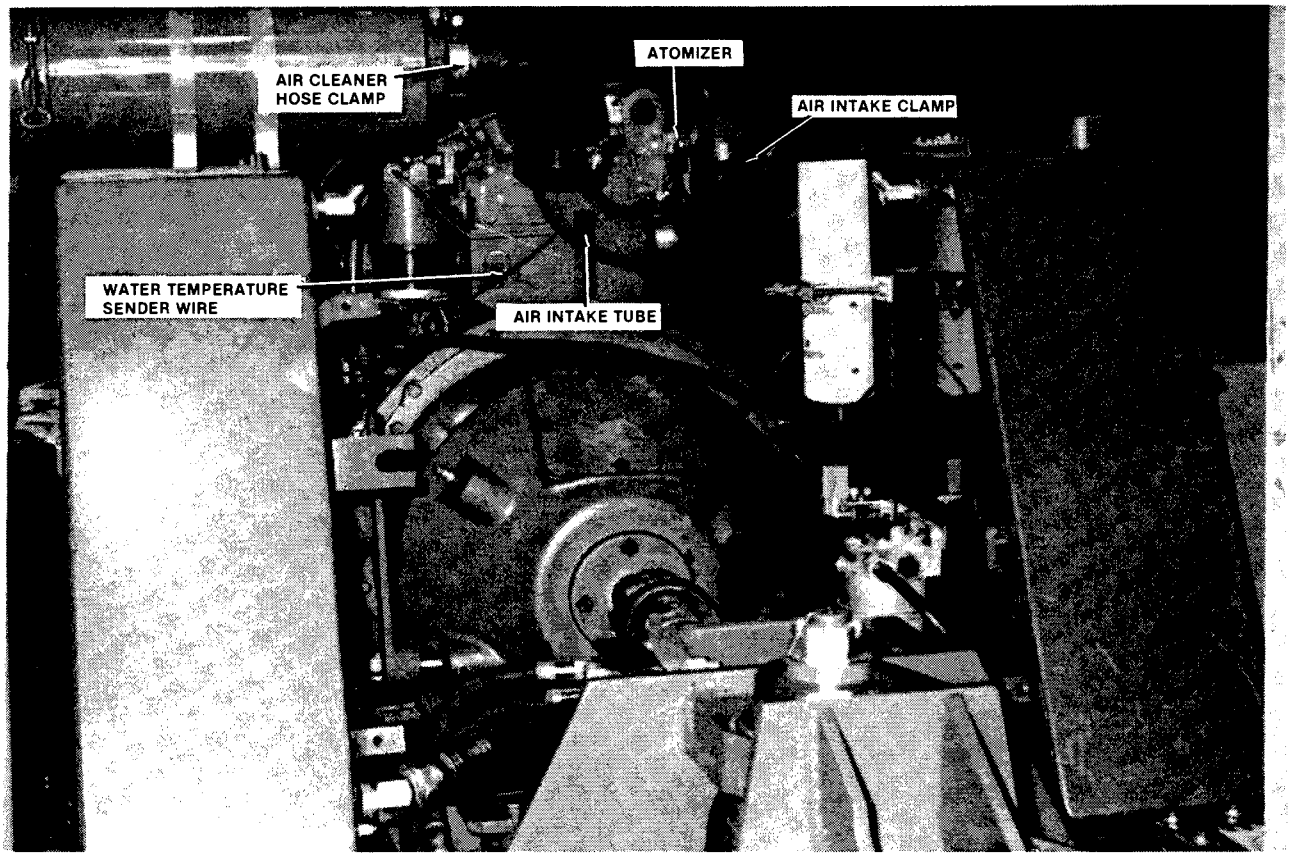

FIGURE 2-4: Engine Rear

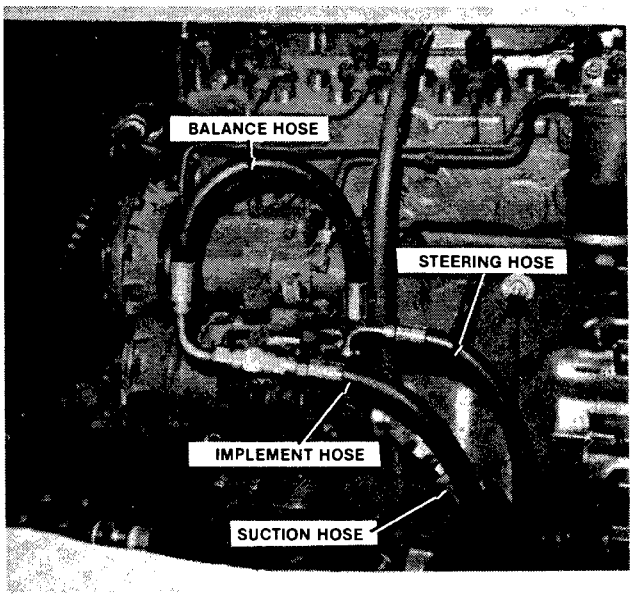

FIGURE 2-5: Hydraulic Pump Hoses

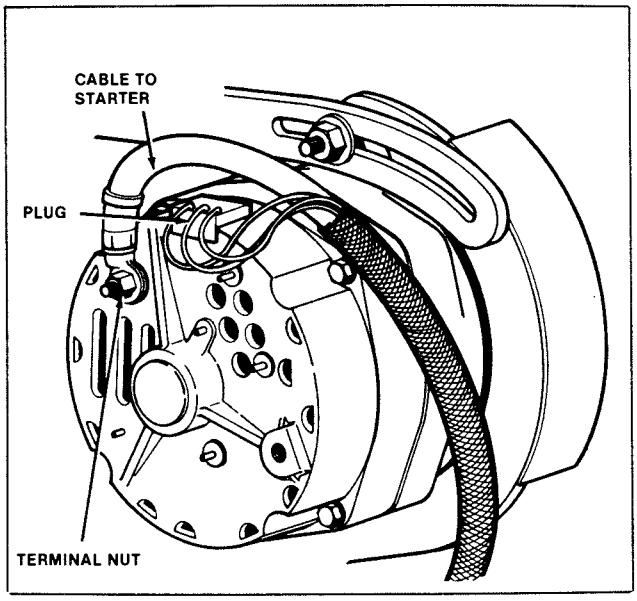

FIGURE 2-6: Alternator Wires

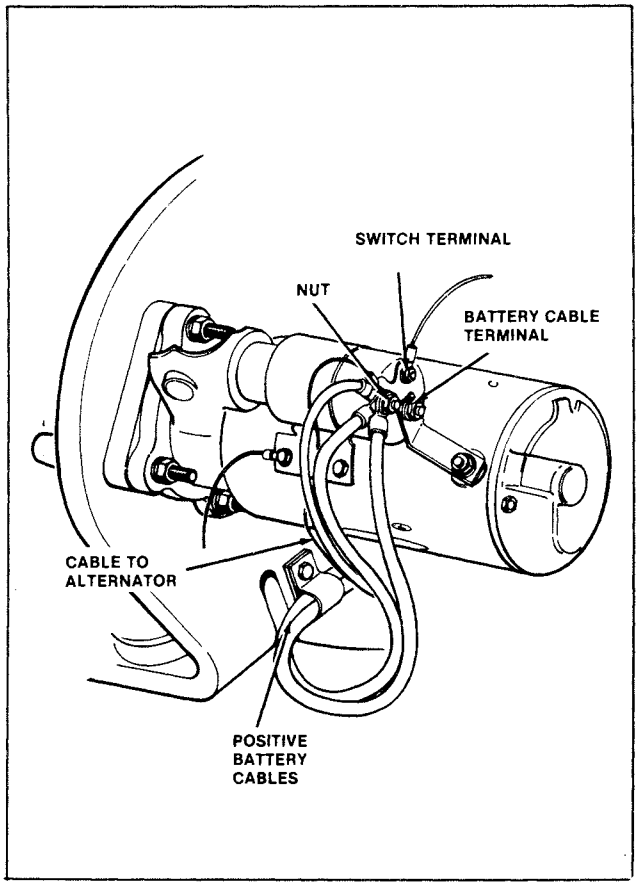

FIGURE 2-7: Starter Wires

27. Disconnect wire at fuel shut-off solenoid. Label.

28. Disconnect throttle cable at fuel injector pump. Label.

29. Disconnect PTO cable from its control lever (Figure 2-9).

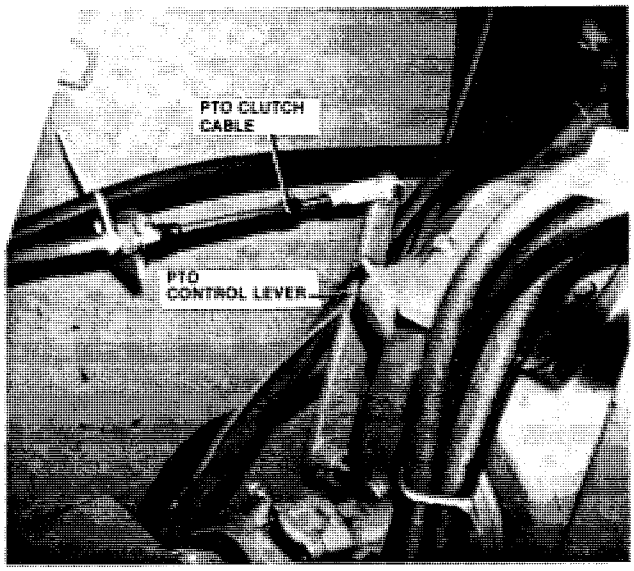

FIGURE 2-9: PTO Clutch Cable Disconnect

30. Remove four capscrews from constant velocity joint on PTO driveline (Figure 2-10).

31. Connect a two ton (2 tonne) hoist to front and rear engine lift points (Figure 2-11).

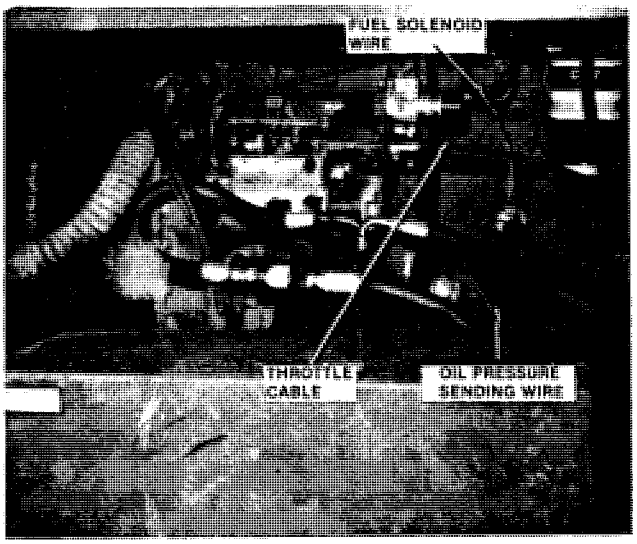

FIGURE 2-8: Fuel Solenoid

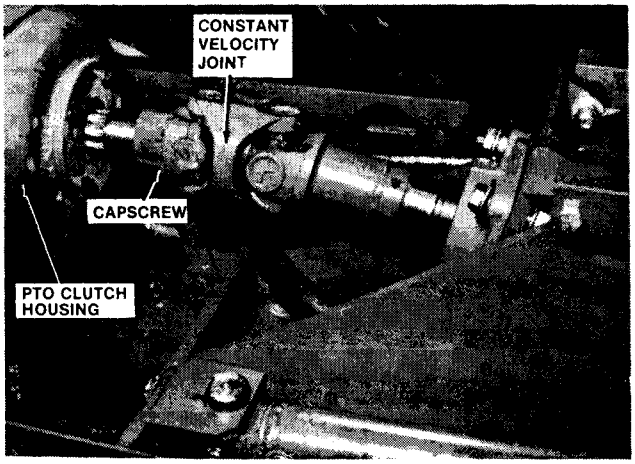

FIGURE 2-10: PTO Driveline Removal

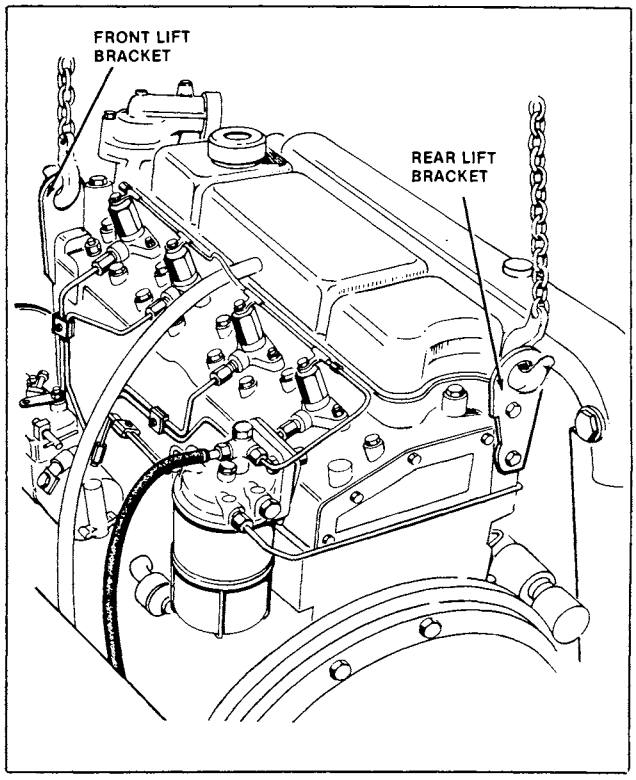

FIGURE 2-11: Engine Lift Points

32. Remove capscrews, washers, nuts and top isolator pads from the four engine mounts.

33. Using hoist, raise engine slightly and move back until front driveline is free of hydrostatic pump and fan is clear of shroud.

34. Raise engine and move to work area.

35. Remove lower isolator pads from frame.

1.4.3 Installation

1. Position engine over frame slightly back of mounting points. Lower engine and move engine forward until universal joint is two in. (50 mm) from splined shaft on hydrostatic pump.

2. Align female spline on universal joint with splined shaft from hydrostatic pump.

3. Carefully move engine forward until splines mesh. Front and rear engine mounting brackets should align with brackets on frame.

WARNING

DO NOT PUT FINGERS BETWEEN ENGINE MOUNTING BRACKET AND FRAME.

4. Position isolators with a piece of wood (Figure 2-12).

5. Lower engine.

6. Install bolts, upper isolators, washers and locknuts.

7. Torque front locknuts to 50 lbf ft (68 N·m) and rear locknuts to 90 lbf ft (122 N·m).

8. Remove hoist.

9. Install PTO driveshaft. Torque capscrews to 25 to 27 lbf ft (34 to 37 N·m).

10. Replace thermoguard at its engine block connection (1981 Model). Torque capscrews to 38 lbf ft (52 N·m).

11. Connect cold start atomizer at engine air intake port. Ensure nozzle points toward incoming air.

12. Connect throttle cable at injector pump.

13. Connect electric wire at fuel shut-off solenoid.

14. Connect PTO cable to its control lever.

15. Connect water temperature sender wire to sender.

16. Connect oil pressure sender wire to oil pressure sender.

17. Connect electrical leads to starter (Figure 2-7). Torque battery cable terminal nut to 5 to 10 lbf ft (7 to 13 N·m) and switch terminal nut to 16 to 30 lbf in. (1.8 to 3.4 N·m).

18. Mount air conditioning compressor. Tension V-belt to 3/16 in (4.75 mm) deflection.

Suggest:

If the above button click is invalid.

Please download this document

first, and then click the above link

to download the complete manual.

Thank you so much for reading

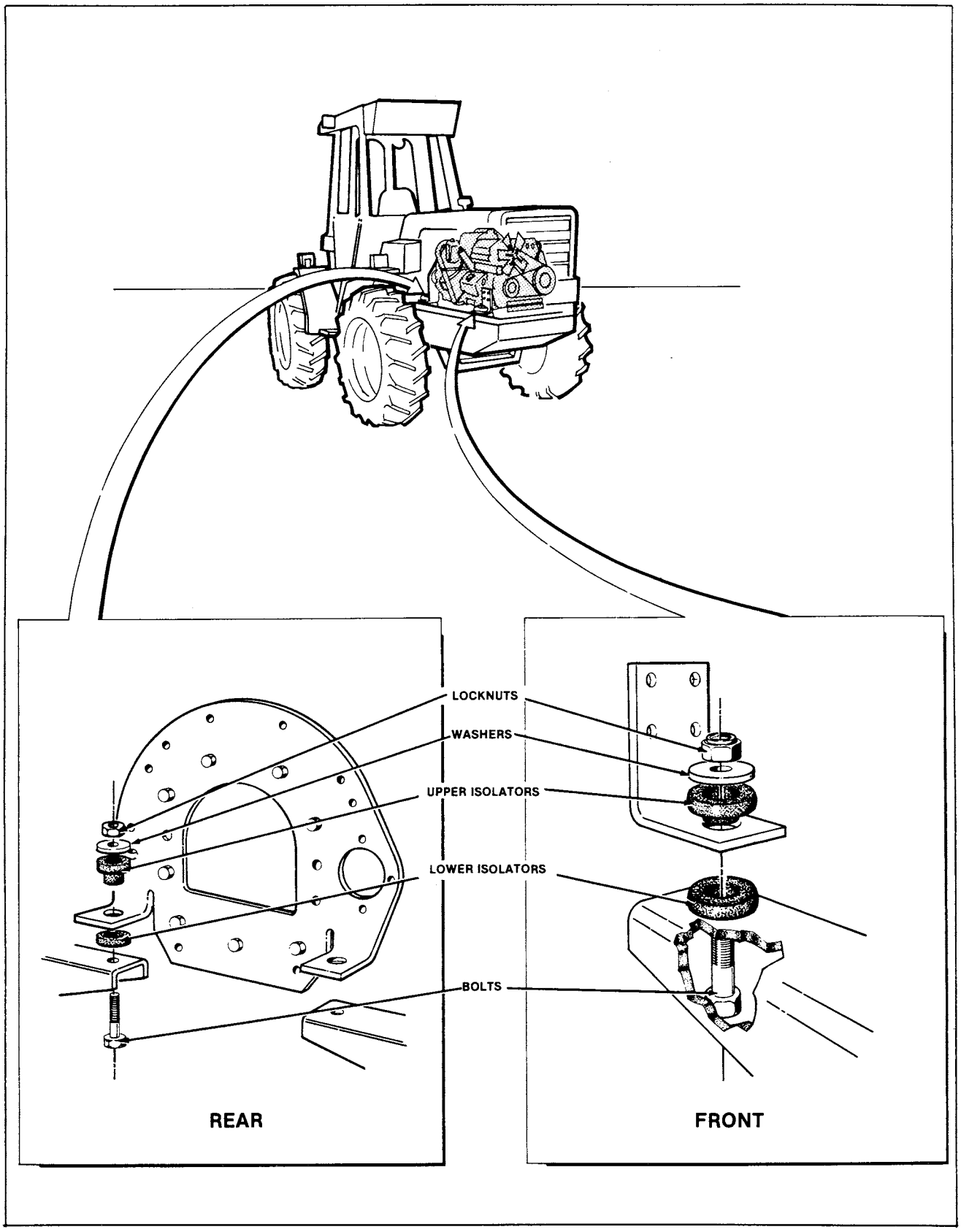

FIGURE 2-12: Engine Mount Assembly