

Massey Ferguson®

1533 / 1540
Compact Tractor

WORKSHOP SERVICE MANUAL 4283359M1

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01 - General Information

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GENERAL

INTRODUCTION

This service manual has been prepared with the latest service information available at the time of publication. Read the service manual carefully before doing any service on the machine. This manual is one of the most important tools available to the service technician.

Right-hand and left-hand, as used in this manual, is determined by facing the direction the machine will travel when in use.

The photos, illustrations, and data used in this manual were current at the time of printing, but due to possible production changes, your machine can vary slightly. The Manufacturer reserves the right to redesign and change the machine as necessary without notification.



WARNING: Some pictures in this manual show the machine with shields or guards removed to allow for a better view of the subject of the picture. All shields and guards must be in position before operating the machine.

TO THE DEALERS

This manual was developed to provide the best possible information, technical support and service to the customer. Review the Table of Contents and basic layout to become familiar with locations of pertinent information such as maintenance table, specifications and etc.

REPLACEMENT PARTS

To receive efficient service, always remember to give the dealer the following information:

- Correct part description or part number.
- Model number of your machine.
- Serial number of your machine.

UNITS OF MEASUREMENT

Measurements are given in metric units followed by the equivalent in US units. Hardware sizes are given in millimeters for metric hardware and inches for U.S. hardware.

TABLE OF CONTENTS

A Table of Contents is in the front of this manual. The Table of Contents shows the divisions. The individual divisions also have a Table of Contents.

PAGE NUMBERS

All page numbers are made of two numbers separated by a dash, such as 01-25. The number before the dash is the division number. The number following the dash is the page number in that division. Page numbers will be at the lower right or left of each page.

General

TRACTOR IDENTIFICATION

Model/Serial Numbers

FIG. 1: Chassis number (1) is stamped in right side of front frame.

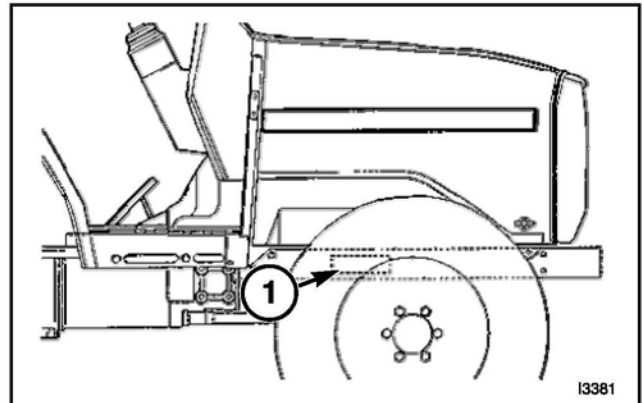


FIG. 1

FIG. 2: Engine model number (1) is cast on right side of engine block, below the injection pump.

Engine serial number (2) is stamped into cylinder block, below engine model number.

Engine Serial Number

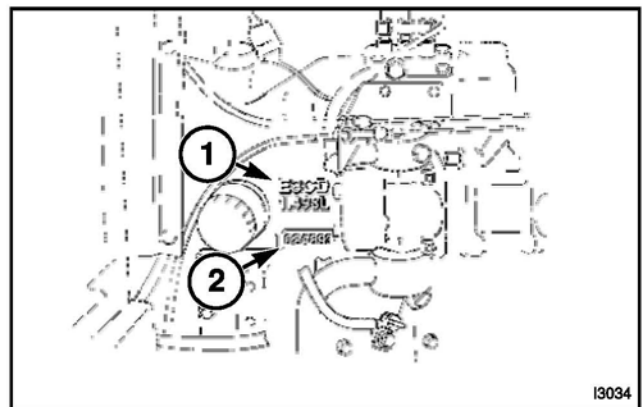


FIG. 2

FIG. 3: The tractor identification plate (1) is located below the operator's seat.

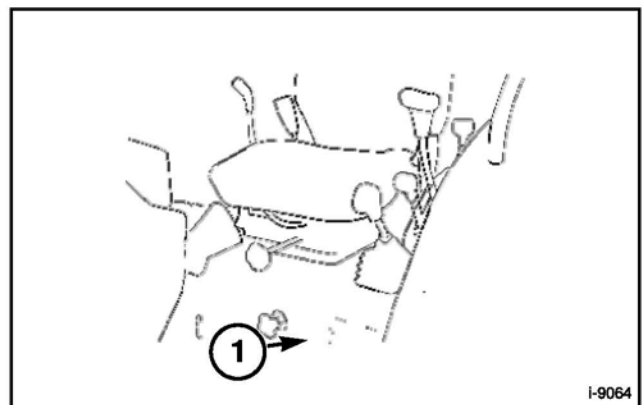


FIG. 3

FIGS. 4–6: The identification plate contains model number and tractor serial number.



FIG. 4

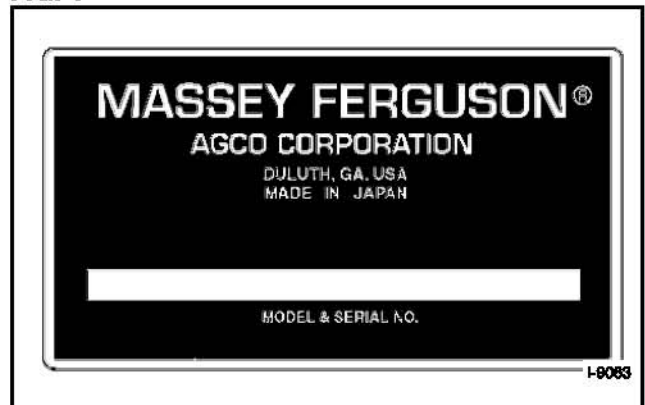


FIG. 5



FIG. 6

NOTES

SPECIFICATIONS AND CAPACITIES

GENERAL DIMENSIONS

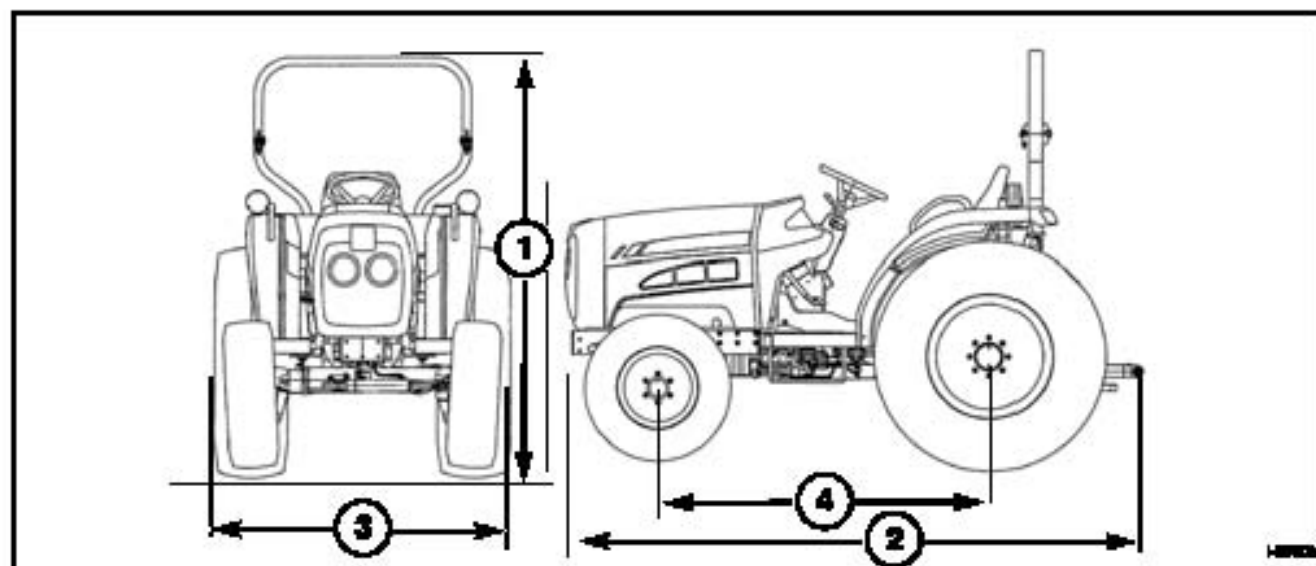


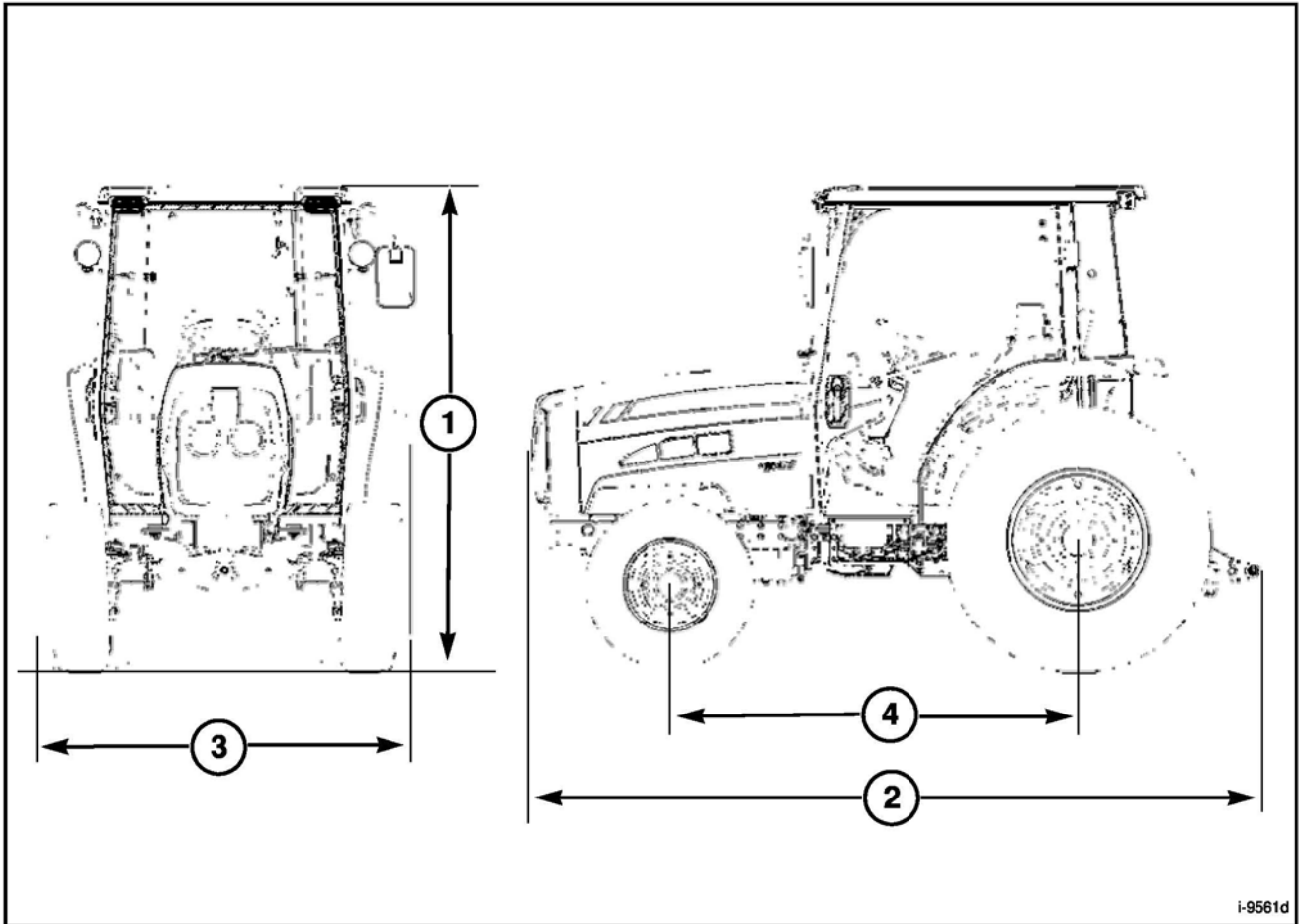
FIG. 7

FIG. 7: Non Cab Tractor Dimensions.

General Dimensions

Overall Height (1).....	2208 mm (87 in)
Overall Length (2).....	3070 mm (121 in)
Minimum Width (3)	
(Ag Tires)	1690 mm (66.1 in)
(Turf Tires).....	1548 mm (61 in)
Wheelbase (4)	
33 Horsepower	1770 mm (70 in)
40 Horsepower	1770 mm (70 in)
Ground Clearance (Ag Tires).....	390 mm (14 in)
Front Wheel Tread	
2WD.....	1120 mm (44.1 in)
33 Horsepower 4WD.....	1130 to 1271 mm (44 to 50 in)
40 Horsepower 4WD.....	1130 to 1271 mm (44 to 50 in)
Turning Radius	
With Brakes.....	2500 mm (98 in)
Without Brakes	3100 mm (122 in)
Weight	
33 Horsepower (4wd).....	1375 kg (3031 lb)
40 Horsepower (4wd).....	1380 kg (3058 lb)

Specifications And Capacities



i-9561d

FIG. 8

FIG. 8: Cab Tractor General Dimensions.

Overall Height (1) (Ag Tires).....	2220 mm (87.4 in)
Overall Length (2)	3070 mm (121 in)
Minimum Width (3)	
Ag Tires.....	1565 mm (62 in)
Turf Tires	1530 mm (60 in)
Wheelbase (4)	
33 Horsepower	1770 mm (70 in)
40 Horsepower	1930 mm (76 in)
Ground Clearance (Ag Tires).....	360 mm (14 in)
Weight	
33 Horsepower	1535 kg (3384 lb)
40 Horsepower	1823 kg (4023 lb)
Front Wheel Tread	1130 to 1271 mm (44 to 50 in)
Rear Wheel Tread.....	1190 to 1495 mm (47 to 59 in)
Turning Radius With Brake.....	2500 mm (98 in)

Specifications And Capacities

Engine Oil

Use the appropriate SAE viscosity. Oil must meet or exceed MIL-L-46152 requirements, API Service CC.

Capacity (Crankcase and Filter).....	4.7 liters (5.0 US qt)
25 degrees C (78 degrees F).....	SAE 30W, 10W-30
Below 0 degrees C (32 degrees F).....	SAE 20W, 10W-30
0 to 25 degrees C (32 to 78 degrees F).....	SAE 20W, 10W-30

15W-40 may be used in ambient temperatures above -10 degrees C (14 degrees F).

Initial Oil and Filter Change.....	50 hours
Oil and Filter Change, Thereafter.....	Every 100 hours

Engine Coolant

Freezing Protection (Original Factory Fill).....	-34 degrees C (-30 degrees F)
Recommended Coolant.....	50/50 mixture ethylene glycol and water
System Capacity.....	7.6 liters (8.0 US qt)

Fuel Tank

Capacity.....	50.0 liters (13.2 US gals)
Fuel Recommended, Above 4° C (39° F).....	No. 2 or No. 2-D
Fuel Recommended, Below 4° C (39° F).....	No. 1 or No. 1-D

Transmission & Differential Housing (Including Hydraulic System)

Capacity.....	31 liters (8.2 US gals)
Recommended Lubricant.....	Permatran III or 821XL
Recommended Change Interval.....	First 50 hours, every 300 hours thereafter

Front Axle (4 WD)

Capacity (Common Reservoir).....	7.5 liters (1.9 US gals)
Recommended Lubricant.....	Permatran III or 821XL
Recommended Change Interval.....	First 50 hours, every 300 hours thereafter

Grease Fittings

Grease Interval (All Fittings).....	Every 50 hours
Recommended Grease.....	Lithium multi-purpose grease EP2

NOTE: Change intervals stated above are for normal usage. Due to adverse operating conditions, that may be experienced (extremely dusty or muddy), change intervals may need to be more frequent.

Specifications And Capacities

Engine

Make.....	Iseki Diesel
Model	
33 Horsepower	E3CD
40 Horsepower	E3CDT
Type.....	Indirect injection, overhead valve
Aspiration	Natural
Displacement	
33 Horsepower	2197 cu cm (134.05 cu in)
40 Horsepower	2955 cu cm (180.29 cu in)
Number of Cylinders.....	3
Bore	
33 Horsepower	84 mm (3.30 in)
40 Horsepower	84 mm (3.30 in)
Stroke	
33 Horsepower	92.4 mm (3.64 in)
40 Horsepower	100 mm (3.94 in)
Engine Horsepower (Gross)	
33 Horsepower @ 2600 rpm.....	35.4 kw (47.5 hp)
40 Horsepower @ 2500 rpm.....	38.9 kw (52.1 hp)
PTO Horsepower (Estimate)	
Power Shuttle / Electronic Transmissions	
33 Horsepower @ 568 PTO rpm	19.4 kw (26.0 hp)
40 Horsepower @ 568 PTO rpm	23.1 kw (31.0 hp)
PTO Horsepower (Estimate)	
Hydrostatic Transmission	
33 Horsepower @ 568 PTO rpm	18.3 kw (24.5 hp)
Firing Order	1-3-2
Compression	
33 Horsepower	21.7-1
40 Horsepower	21.7-1
Low Idle Speed	
33 Horsepower	980 to 1020 rpm
40 Horsepower	980 to 1020 rpm
Valve Clearance (Cold) - Intake	0.35 mm (.014 in)
Air Cleaner	Dual stage, dry element
Engine Cooling	Liquid, forced circulation
Cold Starting Aid.....	Glow plugs (4)

Specifications And Capacities

Transmission

Type

Primary

Power Shuttle..... 4-speed synchronized

Synchroshuttle 4-speed constant mesh

Range

Power Shuttle and Electronic 3-speed sliding mesh

Synchroshuttle 2-speed constant mesh

Mechanical Shuttle Elector-Hydraulic control with multi plates, wet disc, 95% reverse reduction

Gear Speeds

All Synchroshuttle 8 gears forward, 8 reverse

All Powershuttle 12 gears forward, 12 reverse

Clutch 240 mm (9.4 in)

Front Wheel Drive Ratio 1.61184

Hydrostatic

Primary..... Infinite

Range..... 3-speed sliding mesh

Gear and Motor Speeds..... 3 forward, 3 reverse

Clutch None

Power Take Off (PTO)

Type..... Independent, engine driven

Clutch Hydraulically engaged, multi-plate wet disc

Rear PTO Shaft

Output Clockwise rotation

Engine Speed @ 540 PTO rpm 2430 rpm

Rear PTO; Six Spline Shaft Diameter..... 35 mm (1.375 in)

Engine Speed @ 540 PTO rpm 2430 rpm

Mid-PTO Shaft (Option)

Shaft Size (15 Spline)..... 25.4 mm (1.00 in)

Output Clockwise rotation

Mid-PTO Speed @ 2600 Engine rpm..... 1916 rpm

Specifications And Capacities

Hydraulics

Steering System

Type.....	Hydrostatic
Pump.....	Separate engine-mounted gear pump
Maximum Output	
33 Horsepower Synchroshuttle and Hydrostatic	18.5 lpm (4.9 US gpm)
40 Horsepower Powershuttle	22.7 lpm (6.0 US gpm)
Pressure Relief Valve Setting.....	7848 kPa (1138 psi)

Main Hydraulic System

Pump.....	Engine-mounted
Maximum Output	
33 Horsepower.....	34.4 lpm (9.1 US gpm)
40 Horsepower.....	34.4 lpm (9.1 US gpm)
Pressure Relief Valve Setting.....	15,692 kPa (2276 psi)

Rear Linkage

Type.....	Three-point hitch
Size	Category I
Lift Capacity Measured at Ball Ends.....	1270 kg (2800 lb)
Measured at 24 Inches.....	1150 kg (2535 lb)

Electrical System

System Voltage.....	12 volt, negative (-) ground
Battery cca @18° C (0° F).....	630
Charging	
Non Cab.....	40 amp alternator with internal regulator/rectifier
Cab.....	40 amp alternator with internal regulator/rectifier

Capacities

Engine Crankcase with Filter.....	4.7 liters (5.0 US qts)
Transmission.....	31.0 liters (8.2 US gals)
Fuel Tank.....	40.0 liters (10.6 US gals)
Cooling System.....	6.7 liters (7.1 US qt)
Front Drive Axle (4WD only).....	7.5 liters (7.9 US qt)

Maximum Axle Loading

Front Axle Capacity 1540 4WD.....	1800 kg (3968 lb)
Rear Axle Capacity 1540 4WD	1800 kg (3968 lb)
Total Capacity 1540 4WD.....	3000 kg (6614 lb)

LUBRICATION / FILL POINTS

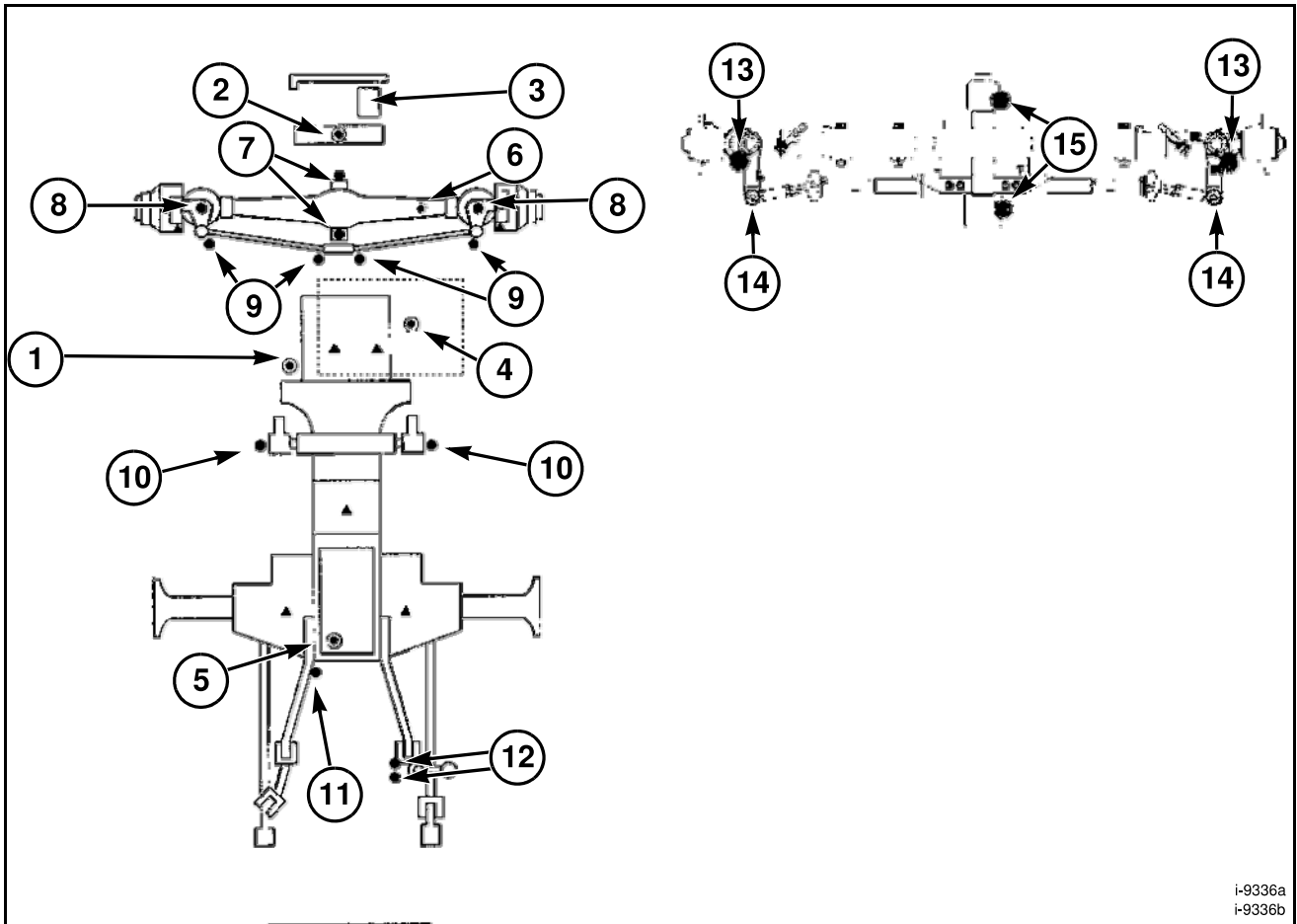


FIG. 9

FIG. 9: General layout of lubrication, fill and drain locations on Tractor:

Ref	Description	Type
1	Crankcase	Engine Oil
2	Engine Radiator	Coolant
3	Radiator Overflow Reservoir	Coolant
4	Fuel Tank	Diesel Fuel
5	Rear Housing	Hydraulic Oil
6	4WD Axle	Hydraulic Oil
7	Axle Pivots (4WD)	Grease
8	Front Spindles (4WD)	Grease
9	Tie Rod Ends (4WD)	Grease
10	Brake Pivots	Grease

Ref	Description	Type
11	Assist Cylinder	Grease
12	Leveling Crank	Grease
13	Front Spindles (4WD)	Grease
14	Tie Rod Ends (2WD)	Grease
15	Axle Pivots (2WD)	Grease

Specifications And Capacities

PERIODIC INSPECTION AND MAINTENANCE CHART

Daily	50 hr	150 hr	300 hr	Yearly	Maintenance Point(s)	Maintenance Required
•					All controls and switches	Inspect and repair
•					All fasteners and hardware	Check and tighten
•					Hoses, fan belt, and wiring	Inspect and repair
	•				Grease fittings	Lubricate
•					Engine oil level	Check and replenish
	(*)	•			Engine oil and filter	Replace
•					Transmission oil level	Check and replenish
	(*)		•		Transmission oil and filter	Replace and clean
		•			Front axle oil level (4WD)	Check and replenish
	(*)		•		Front axle oil (4WD)	Replace
•					Air screens	Clean of debris
•					Radiator screens	Clean of debris
•					Radiator coolant level	Check and replenish
				•	Radiator coolant	Drain, flush and replace
•					Fan belt tension	Check and adjust
•					Air cleaner	Clean
	•				Air cleaner elements	Inspect, clean or replace
•					Fuel tank level	Fill
•					Fuel filter sediment bowl	Inspect and clean
			•		Fuel filter element	Replace and bleed

Items marked (*) indicate initial service interval only. Subsequent (later) intervals marked "•". Intervals above are for normal usage. Severe operating conditions (wet, dusty, etc.), or when previous servicing has indicated need for more frequent action, intervals may need to be more often.

Specifications And Capacities

Daily	50 hr	150 hr	300 hr	Yearly	Maintenance Point(s)	Maintenance Required
	•				Battery and cables	Check, clean and tighten
	•				Battery charge indicator	Check
•					Lights and flashers	Check and repair
•					Clutch pedal free-play	Check and adjust
•					Brake adjustment and balance	Check and adjust
•					Tire pressure and condition	Check and adjust
•					Wheel bolt torque	Check and tighten
			•		Front wheel alignment	Check and adjust
•					Steering free-play	Check and repair
			•		Front axle end-float (4WD)	Check and adjust
		•		•	Clutch housing plug	Inspect

Items marked (*) indicate initial service interval only. Subsequent (later) intervals marked "•". Intervals above are for normal usage. Severe operating conditions (wet, dusty, etc.), or when previous servicing has indicated need for more frequent action, intervals may need to be more often.

NOTES

PRECAUTIONS FOR DISASSEMBLY

GENERAL PRECAUTIONS FOR DISASSEMBLY AND INSTALLATION

Before Operation

Always be safety conscious in selecting clothes to wear and suitable tools to use.

Before disassembly, be sure that you familiarize yourself with the assembled condition for subsequent reference in assembly.

Keep parts, and tools in proper order during operations.

When servicing electrically charged parts, be sure to disconnect the negative battery terminal.

To prevent oil or water leaks, use the liquid gasket as required.

When assembling disassembled parts, discard used gaskets, O-rings, or oil seals and install new ones.

When lifting tip only the front or rear part of the tractor, be sure to wedge the grounded wheels.

When the tractor is jacked up, be sure to support the entire tractor with a stand. Lifting it up with jack only is a dangerously unstable procedure.

When replacing parts, use authorized genuine Massey Ferguson, AGCO and Challenger parts only. Massey Ferguson, AGCO and Challenger assumes no responsibility for accidents, operating problems or damage caused by the use of imitation parts. Also, the use of unauthorized parts will result in relatively poor machine performance.

Precautions To Be Followed When Installing Standardized Parts

Roller or ball bearings

When a bearing is installed in a housing by the outer race, use an installer, which is specially designed to push only the outer race and vice versa.

The installer must be designed to install the bearing on the shaft in a parallel position

When installing a bearing which appears the same on both sides, install it so that the face which has the identification number faces in a direction for easy visual identification. All bearings which are to be installed in the transmission case should be placed so that their identification number faces outward.

If a shaft or a hole where a bearing is to be installed has an inner seat the bearing should be pushed in completely until it is seated.

Bearings should turn smoothly.

Oil seals

Oil seal installer should not deform the oil seals.

During installation, be careful not to damage the lips, and assure that it is pushed in parallel to the shaft or hole.

When oil seals are installed, there should be no turnover of the lips nor dislocation of the springs.

When a multi-lip seal is installed, the grooves between lips should be filled with grease.

Use a lithium-based grease.

There should not be oil or water leaks past the new seals.

O-rings

O-rings should be coated with grease before installing.

Installed O-rings should have no slack or twist.

Installed O-rings should maintain proper tightness.

Precautions for Disassembly

Snap rings

FIG. 10: Snap ring installers should be designed so as not to permanently deform the snap rings (1).

Installed snap rings should be seated securely in the groove.

Be careful not to overload the snap ring to the extent that it is permanently deformed.

How to install the snap ring:

When installing a snap ring, install it as shown in the figure with its round edge turned toward the part to be retained. This round edge is formed when the snap ring is pressed out.

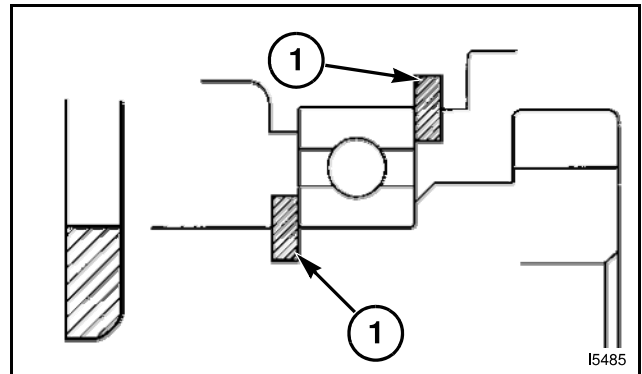


FIG. 10

Spring (roll) pin

FIG. 11: Spring pins should fit tightly.

Spring pins should be installed so that their seams face the direction from which the load is applied.

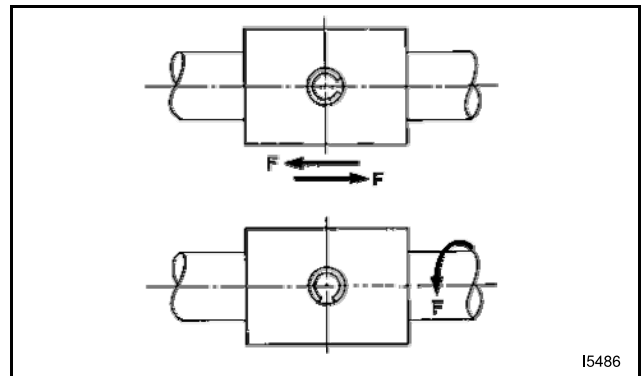


FIG. 11

Cotter pins

FIG. 12: When installed, cotter pins should be bent securely at the ends as shown in the figure.

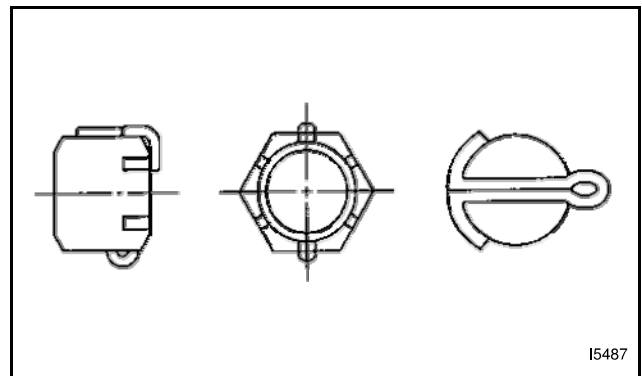


FIG. 12

Bolts and Nuts

Special bolts are installed at several locations, so be sure not to interchange them with other bolts.

Bolts and nuts should be tightened to their specified torque using a torque wrench.

When locking the bolts or nuts with wire pay particular attention to winding direction. To hold the bolt tight.

When locking the bolts or nuts with a tab lock washer. Bend the tab against the hex, to provide secure locking.

When locking bolts and nuts with an adhesive apply the adhesive on the thread and tighten securely.

Apply a sealant to parts which have any possibility of oil leaks, such as stud bolts and threaded holes.

Each lock nut must be tightened securely.

When tightening bolts and nuts, refer to the tightening torque table in introduction section.

Grease Fittings

After installation, each grease fitting should be filled with grease.

When installing 45 degree or 90 degree grease fittings be sure to turn the fitting in a direction that will provide easy access for a grease gun.

Other Precautions

Be sure not to damage any finished surfaces or parts.

Always refrain from forcing installation.

Each lever knob should be installed coated with an adhesive.

Each contact surface should be coated with an adhesive and tightened evenly with bolts. Adhesive coated surfaces should be installed within 30 minutes after application of the adhesive.

The contact surfaces should be flawless and free from foreign matter. Ensure all grease is removed prior to application of the adhesive.

Precautions for applying adhesives:

- The surface or the thread where an adhesive is to be applied should be completely free of chips.
- The surface of the thread where an adhesive is to be applied should be completely free of oils.

Precautions for Disassembly

NOTES

STANDARD TORQUE CHART

STANDARD TORQUE CHART

TORQUE CHART FOR METRIC FASTENERS (ZINC COATED)						
Nominal Size in mm	Strength Class- ISO 4.6 (4T)		Strength Class- ISO 8.8 (7T)		Strength Class- ISO 10.9 (9T)	
	Torque Nm (lbf ft)		Torque Nm (lbf ft)		Torque Nm (lbf ft)	
	Min.	Max.	Min.	Max.	Min.	Max.
M3	0.5 (0.3)	0.7 (0.5)	1.3 (0.9)	1.7 (1.3)	1.8 (1.3)	2.4 (1.8)
M4	1.2 (0.9)	1.6 (1.2)	3.1 (2.3)	4.1 (3.0)	4.3 (3.2)	5.7 (4.2)
M5	2.2 (1.6)	3.0 (2.2)	6.0 (4.4)	8.0 (5.9)	8.5 (6.3)	1.5 (8.5)
M6	4.0 (2.9)	5.0 (3.7)	10 (7.4)	14 (10.3)	14 (10.3)	20 (14.8)
M8	9.5 (7.0)	12.5 (9.2)	25 (18.4)	35 (26)	36 (26)	46 (34)
M10	19 (14)	25 (18)	50 (37)	70 (52)	72 (53)	96 (71)
M12	33 (24)	43 (32)	90 (66)	120 (89)	120 (89)	160 (118)
M16	84 (62)	110 (81)	200 (148)	260 (192)	300 (221)	40 (295)
M20	160 (118)	210 (155)	420 (310)	560 (413)	600 (443)	800 (590)
M24	280 (207)	360 (266)	720 (531)	860 (634)	1000 (738)	1300 (959)
M30	540 (398)	720 (531)	1400 (1033)	1800 (1328)	2100 (1549)	2800 (2065)
M36	950 (700)	1250 (922)	2500 (1844)	3300 (2434)	3600 (2655)	4800 (3540)

Standard Torque Chart

TORQUE CHART FOR INCH FASTENERS (ZINC COATED)						
Nominal Size	Strength Class- SAE 2 (plain head)		Strength Class- (SAE 5)		Strength Class- (SAE 8)	
	Torque Nm (lbf ft)		Torque Nm (lbf ft)		Torque Nm (lbf ft)	
	Min.	Max.	Min.	Max.	Min.	Max.
1/4	6.8 (5)	8.1 (6)	10.8 (8)	15 (11)	16.2 (12)	21.7 (16)
5/16	13.5 (10)	16.2 (12)	22 (16)	30 (22)	31 (23)	42 (31)
3/8	24 (18)	28 (21)	39 (29)	53 (39)	56 (41)	75 (55)
7/16	41 (30)	46 (34)	64 (47)	85 (63)	91 (67)	121 (89)
1/2	61 (45)	70 (52)	99 (73)	131 (97)	140 (103)	185 (137)
5/8	122 (90)	142 (105)	198 (146)	263 (194)	279 (206)	371 (274)
3/4	217 (160)	250 (185)	350 (258)	464 (342)	495 (365)	658 (485)
7/8	-	-	569 (420)	759 (560)	800 (590)	1071 (790)
1	-	-	847 (625)	1119 (825)	1200 (885)	1580 (1165)
1-1/8	-	-	1051 (775)	1390 (1025)	1681 (1240)	2224 (1640)
1-1/4	-	-	1491 (1100)	1966 (1450)	2386 (1760)	3159 (2330)
1-1/2	-	-	2576 (1900)	3390 (2500)	4121 (3040)	5437 (4010)

NOTE: Torques are for rigid joints, or joints meeting the following conditions:

Damage will not occur to joined members of an assembly.

It is desirable to use a higher clamping force.

Fastener threads are NOT lubricated prior to assembly.

The following conditions will require a torque value different than stated above:

Reduced torque required; non-parallel clamping surfaces, thick or highly compressible gaskets are used, or when a higher torque may damage joined assemblies.

Clip nuts, weld nuts, self-tapping hardware, or any condition that causes reduced thread engagement will warrant a torque less than stated above.

Special torque values, stated in this manual, must be strictly adhered to as stated in the specific operation.

NOTE: A number of special torques are used in assembly of tractors. See list.

CONVERSION TABLE

CONVERSION TABLES

	MULTIPLY:	BY:	TO GET: MULTIPLY	BY:	TO GET:
LINEAR	inches feet yards miles inches microinches	x 25.4 x 0.3048 x 0.9144 x 1.6093 x 2.54 x 0.0254	= millimeters (mm) = meters (m) = meters (m) = kilometers (km) = centimeters (cm) = intimaters (um)	x 0.03937 x 3.281 x 1.0936 x 0.6214 x 0.3937 x 39.37	= inches = feet = yards = miles = inches = micrometers
AREA	inches ² inches ² feet ² yards ² acres	x 645.16 x 6.4516 x 0.0929 x 0.8361 x 0.4047	= millimeters ² (mm ²) = centimeters ² (cm ²) = meters ² (m ²) = meters ² (m ²) = hectometers ² (hm ²) = hectares (ha)	x 0.00155 x 0.155 x 10.764 x 1.196 x 2.471	= inches ² = inches ² = feet ² = yards ² = acres
VOLUME	inches ³ inches ³ inches ³ quarts gallons feet ³ feet ³ fluid oz. yards ³ teaspoons cups bushel bushel	x 16387 x 16.387 x 0.01639 x 0.94635 x 3.7854 x 28.317 x 0.02832 x 29.57 x 0.7646 x 4.929 x 0.2366 x 35.239 x 0.03524	= millimeters ³ (mm ³) = centimeters ³ (cm ³) = liters = liters = liters = liters = meters ³ (m ³) = milliliters (ml) = meters ³ (m ³) = milliliters (ml) = liters = liters = meters ³ (m ³)	x 0.000061 x 0.06102 x 61.024 x 1.0567 x 0.2642 x 0.03531 x 35.315 x 0.03381 x 1.3080 x 0.2029 x 4.227 x 0.02838 x 28.378	= inches ³ = inches ³ = inches ³ = quarts = gallons = feet ³ = feet ³ = fluid oz. = yards ³ = teaspoons = cups = bushels = bushels
MASS	ounces (av) pounds (av) tons (2000 lbs) tons (2000 lbs) tons (long) (2240 lbs)	x 28.35 x 0.4536 x 907.18 x 907.18 x 1016.05	= grams (g) = kilograms (kg) = kilograms (kg) = metric tons (t) = kilograms (kg)	x 0.03527 x 2.2046 x 0.001102 x 1.1023 x .000984	= ounces (av) = pounds (av) = tons (2000 lbs) = tons (2000 lbs) = tons (long) (2240 lbs)
FORCE	ounces - f (av) pounds - f (av) kilograms - f	x 0.278 x 4.488 x 9.807	= newtons (N) = newtons (N) = newtons (N)	x 3.597 x 0.2248 x 0.10197	= ounces - f (av) = pounds - f (av) = kilograms - f

Conversion Table

	MULTIPLY:	BY:	TO GET: MULTIPLY	BY:	TO GET:
PRESSURE OR STRESS	pounds/sq. in.	x 6.895	= kilopascals (kPa)	x 0.145	= pounds/sq. in.
	pounds/sq. in.	x 0.0689	= bar	x 14.503	= pounds/sq. in.
POWER	horsepower	x 0.746	= kilowatts (kW)	x 1.34	= horsepower
	ft - lbf/min.	x 0.0226	= watts (W)	x 44.25	= ft - lbf/min.
TORQUE	pound - inches	x 0.11298	= newton-meters (N.m)	x 8.851	= pound-inches
	pound - feet	x 1.3558	= newton-meters (N.m)	x 0.7376	= pound-feet
VELOCITY	miles/hour	x 1.6093	= kilometers/hour (km/h)	x 0.6214	= miles/hour
	feet/sec.	x 0.3048	= meters/sec. (m/s)	x 3.281	= feet/sec.
	kilometers/hr.	x 0.27778	= meters/sec. (m/s)	x 3.600	= kilometers/hr.
	miles/hours	x 0.4470	= meters/sec. (m/s)	x 2.237	= miles/hour
<p>TEMPERATURE</p> <p> $^{\circ}\text{Celsius} = 0.556 (^{\circ}\text{F} - 32)$ $^{\circ}\text{Fahrenheit} = (1.8^{\circ}\text{C}) + 32$ </p>					
D-10000A					

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Compact Tractor**

**WORKSHOP SERVICE MANUAL
4283359M1**

02 - Engine

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COOLING SYSTEM

RADIATOR LOCATION



CAUTION: DO NOT remove radiator cap when engine is hot. Rotate cap slowly to release pressure. Then cap can be safely removed.

FIG. 1: Cooling system is filled at factory with anti-freeze solution to protect engine and radiator to -34 degrees C (-29 degrees F). Cooling level must be maintained to 12 mm (0.50 in) below the filler neck opening (1).

Make sure the radiator, radiator screen and grill screens are clean to permit maximum cooling. Use compressed air or water to clean, but use care when cleaning the radiator to prevent cooling fin damage.

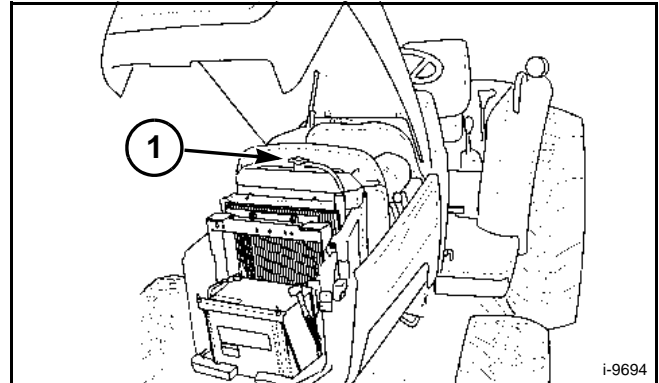


FIG. 1

FIG. 2: Drain cock (1) will drain coolant from cylinder block and radiator. Drain cock is located on right side of engine. Coolant must be replaced if the coolant becomes contaminated with rust or sludge. Loosening radiator cap will assist draining.

NOTE: Flush inside of radiator and engine block prior to replacing coolant.

Check condition of hoses, belt and clamps and replace as necessary.

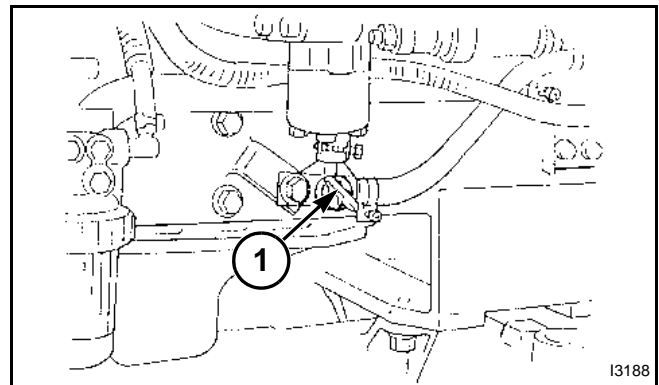


FIG. 2

Cooling System

Fan Belt

FIG. 3: Correct fan belt tension helps to insure adequate coolant flow through cylinder block and radiator. Belt is correctly tensioned when belt deflection is approximately 12 mm (0.50 in) as shown at (1) when thumb pressure is exerted at center of belt span.



CAUTION: Due to muffler position, allow to cool before checking or adjusting fan belt tension.

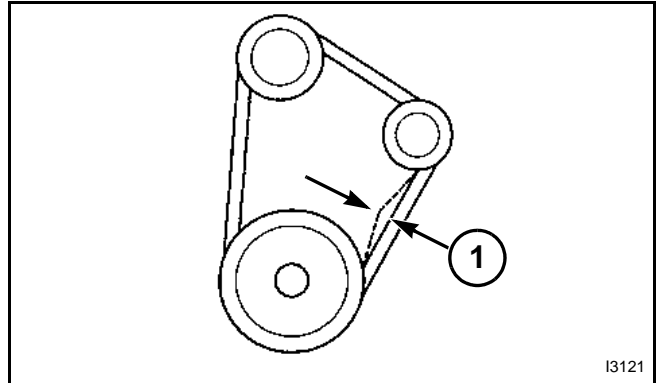


FIG. 3

FIG. 4: To adjust belt tension, loosen alternator pivot bolt and nut (1) and tensioning bracket bolt (2). Pull outward on top of alternator to correctly tension belt and tighten bolt first and then tighten pivot bolt.

IMPORTANT: Do not pry against alternator housing or pulley. Carefully pry against alternator mounting flange to prevent damage.

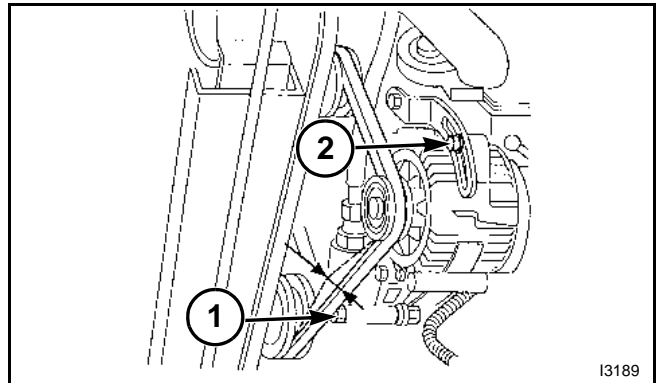


FIG. 4

Thermostat

FIG. 5: The thermostat is rated at 75 to 78 degrees C (167 to 172 degrees F).

- (1) Water Outlet Pipe
- (2) Thermostat
- (3) Housing Gasket
- (4) O-ring
- (5) Thermostat Housing
- (6) Flange Bolt

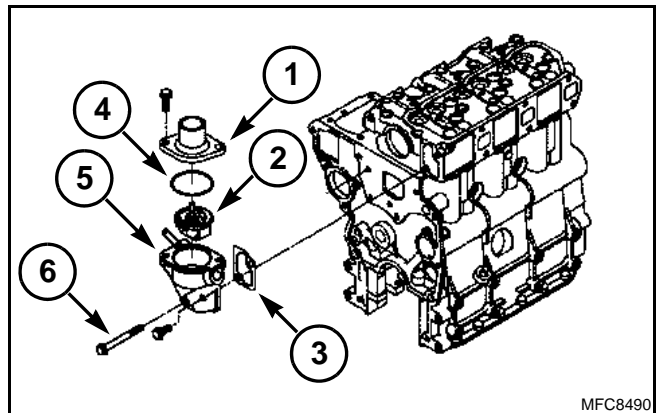
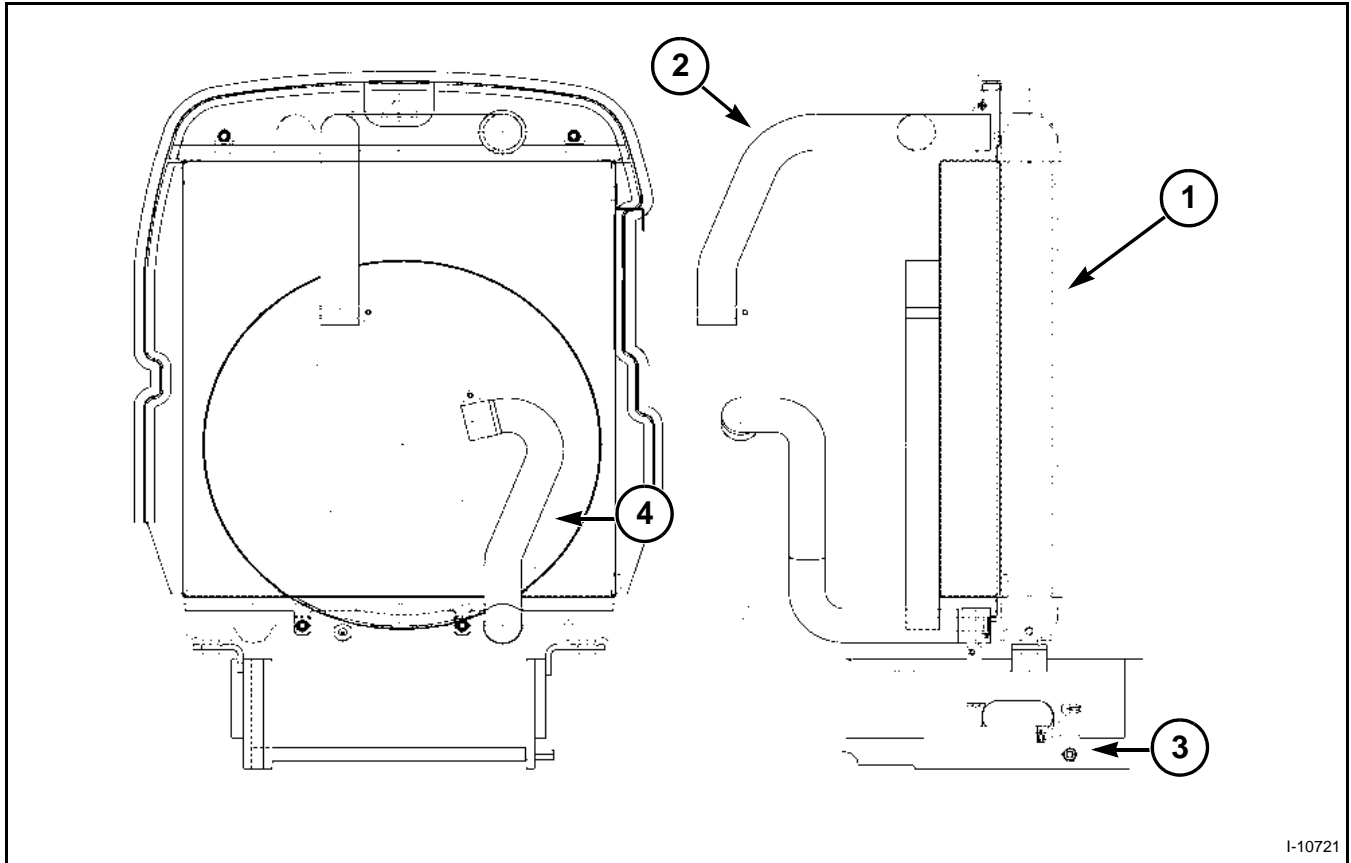


FIG. 5

RADIATOR



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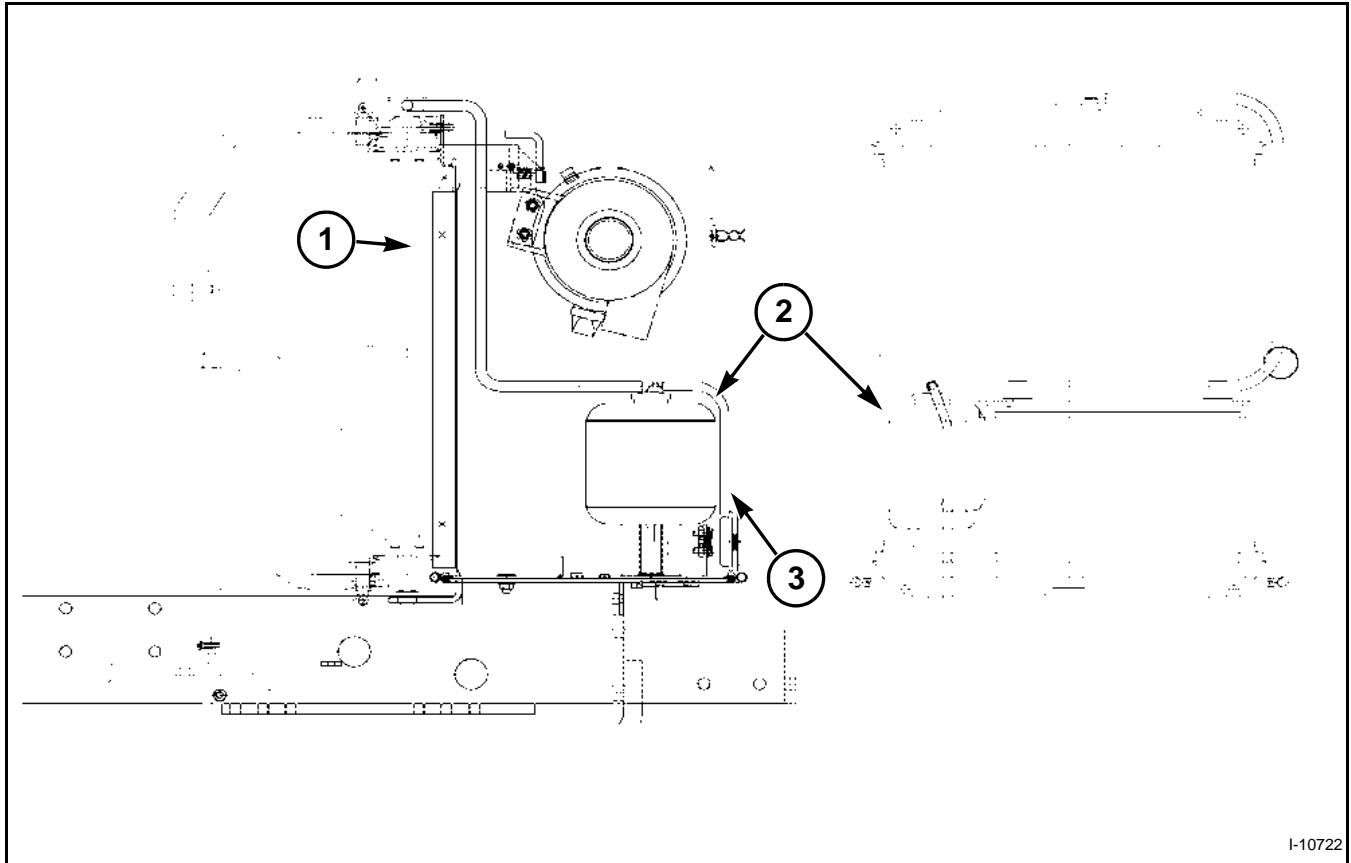
FIG. 6

FIG. 6: Radiator Components

- (1) Radiator
- (2) Upper Hose of Radiator
- (3) Drain Cock
- (4) Lower Hose of Radiator

Cooling System

RESERVE TANK SYSTEM



I-10722

FIG. 7

FIG. 7: Reserve Tank Components

- (1) Radiator
- (2) Reserve Tank (Capacity 1.1 liter (0.30 gal))
- (3) Overflow Hose

FIG. 8: Reserve Tank Description

- (1) When water temperature rises
- (2) When water temperature drops

Reserve tank play a role to keep quantity of coolant of the main radiator be always filled up

1. When water temperature rises

When water temperature rises, internal pressure of the radiator rises.

Coolant water flows out into reserve tank by the pressure.

Coolant water flows out from the overflow hose when water temperature rises.

2. When water temperature drops

When water temperature drops, internal pressure of the radiator drops.

The internal of radiator main body become negative pressure and coolant is drawn up from reserve tank and comes back to the radiator main body.

3. Fill the coolant water

There is a surface between LOW and FULL of reserve tank when it is low temperature.

When quantity of coolant water is lower than LOW remarkably, confirm quantity of coolant water of radiator.

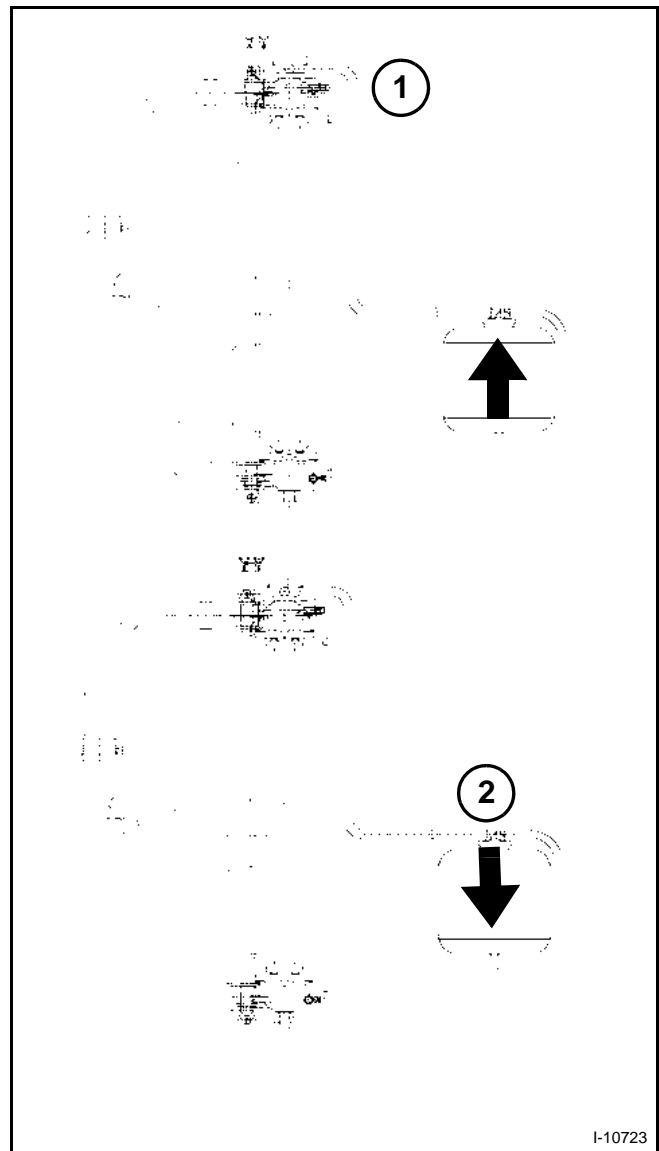


FIG. 8

NOTES

FUEL SYSTEM

FUEL TYPE

Use only clean diesel fuel of correct grade. Introduction of water or dirt into fuel tank or other portion of fuel system can cause repeated plugging of fuel filter and possible injection pump and injector damage.

NOTE: Refer to the fuel injection system for more detailed information on servicing the fuel system.

Fuel Filter

FIGS. 9–10: Fuel filter assembly (1) is located at right side of engine, and is used to strain impurities from fuel before fuel reaches injection pump. Fuel filter incorporates valve (2) to aid in filter servicing.

Check filter bowl for accumulation of sediment or water and clean as required.

To replace fuel filter element or clean sediment, turn fuel valve to OFF position (handle to front).

Carefully loosen spanner nut (1). Remove nut, sediment bowl (6) and O-ring (4). Sediment bowl can be cleaned at this time. Pull downward on filter element (3) and discard. Examine small O-ring (5) in filter head and replace as necessary. Install new element, pushing upward until seated.

Install sediment bowl O-ring, and nut. Tighten nut and wipe up spilled fuel.

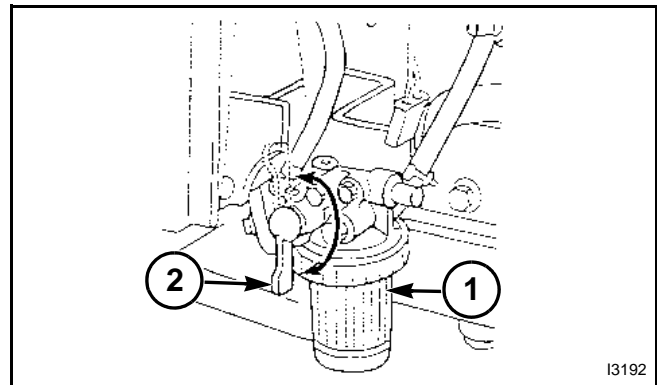


FIG. 9

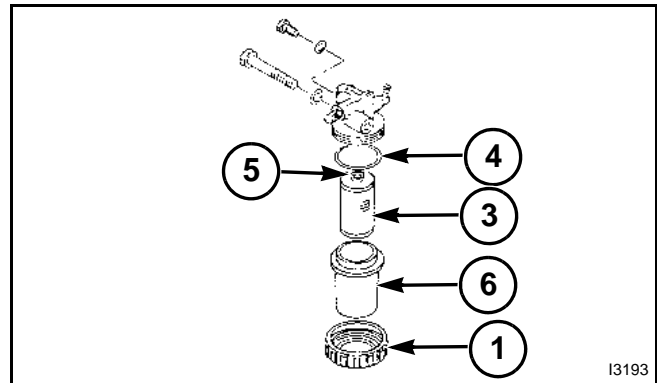
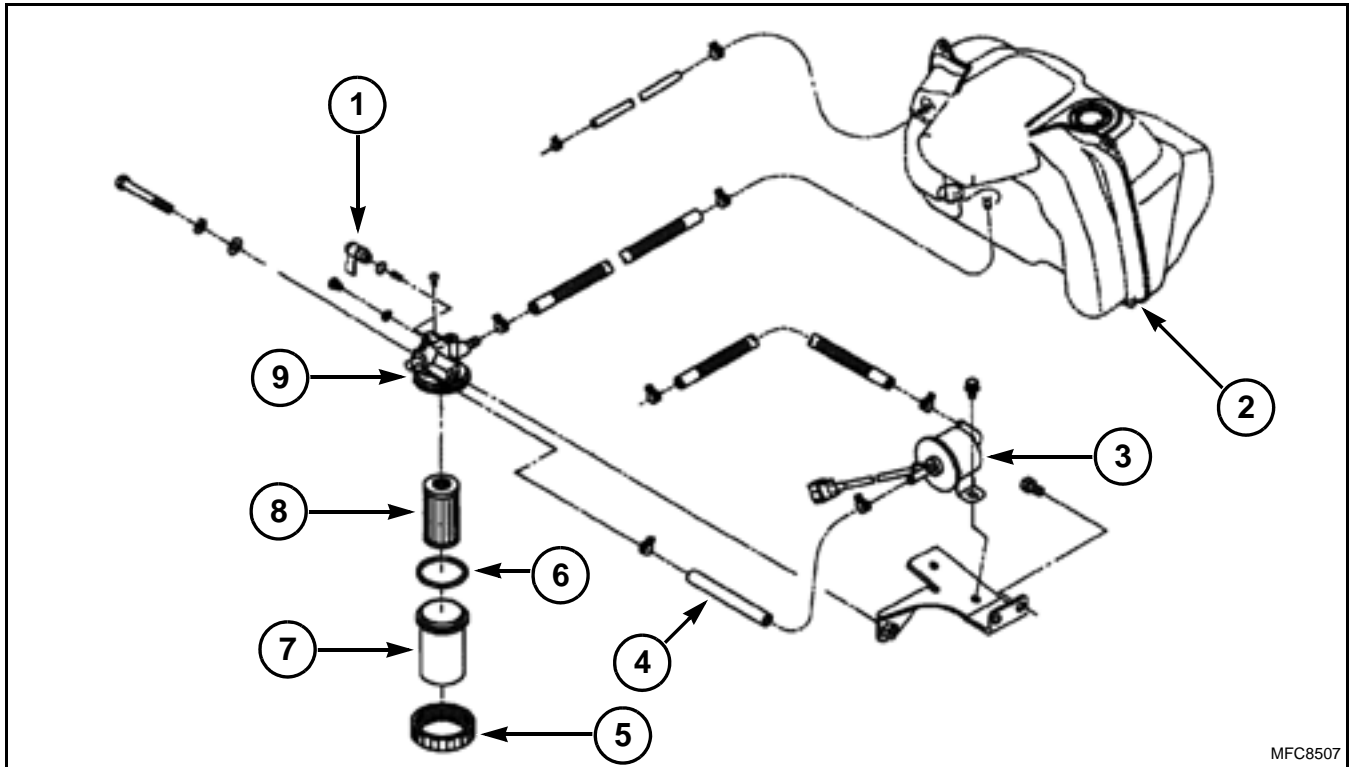


FIG. 10

Fuel System

Fuel Pump



MFC8507

FIG. 11

FIG. 11: Fuel Pump Components

- (1) Lever
- (2) Fuel Tank
- (3) Fuel Pump Assembly
- (4) Hose 110
- (5) Ring Nut
- (6) O-ring
- (7) Cup
- (8) Element
- (9) Fuel Filter Assembly

Fuel Pump Specifications

Rated Voltage	12V
Operating Current	1.5 Amps or less
Delivery	400 cu cm/min (0.1 gal/min)
Cutt off pressure	0.37 bar (5.4 psi)

Air-Bleeding Procedure

FIGS. 12–13: Fuel system must be bled of air after the following:

- Emptied fuel tank.
- Removal of fuel filter or fuel piping.
- Engine has not run for extended period of time, or, engine starts and stops (or fails to start) after short period of operation.

To bleed air from fuel systems using following procedure:

If engine still fails to start, pressure injection lines, 5, can be loosened where they attach to injectors. Turn engine over several times, until fuel spurts, out then tighten lines and stop engine.

- Fill fuel tank (1) until full.
- Turn fuel filter valve (2) to OPEN or ON position.
- Loosen filter air-bleeding screw (3) and let air bubbles out.
- Loosen air-bleeding screw (4) for fuel injection pump and let air bubbles out of the pump.



CAUTION: CAUTION: Fuel emitted from injection lines is high pressure. Keep hands and face away when engine is cranked. Clean all spilled fuel following air-bleeding procedure(s).

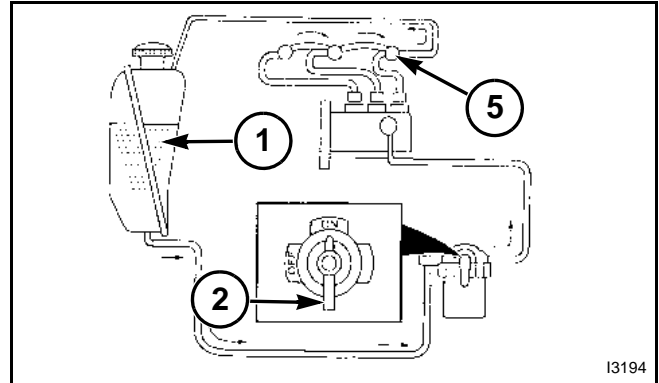


FIG. 12

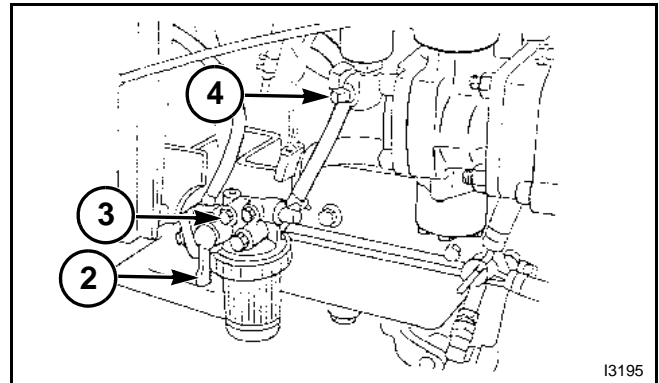


FIG. 13

Throttle Lever

FIG. 14: Hand throttle lever should remain in position selected by operator. Through normal use, friction against lever may decrease, causing lever to move out of selected position. Turn adjusting nut (1) as required to retain throttle lever in position selected.

NOTE: Throttle lever friction adjustment is accessed by removing steering column cover and instrument panel.

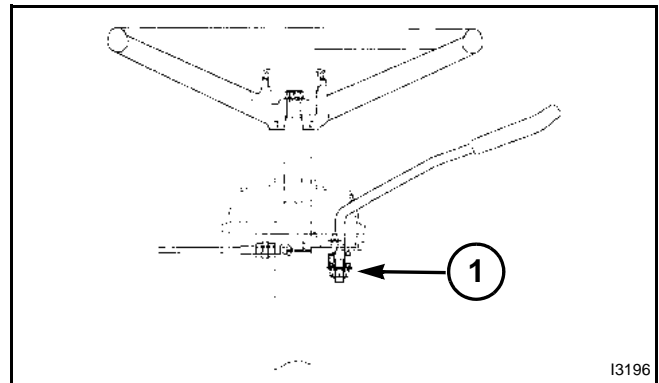
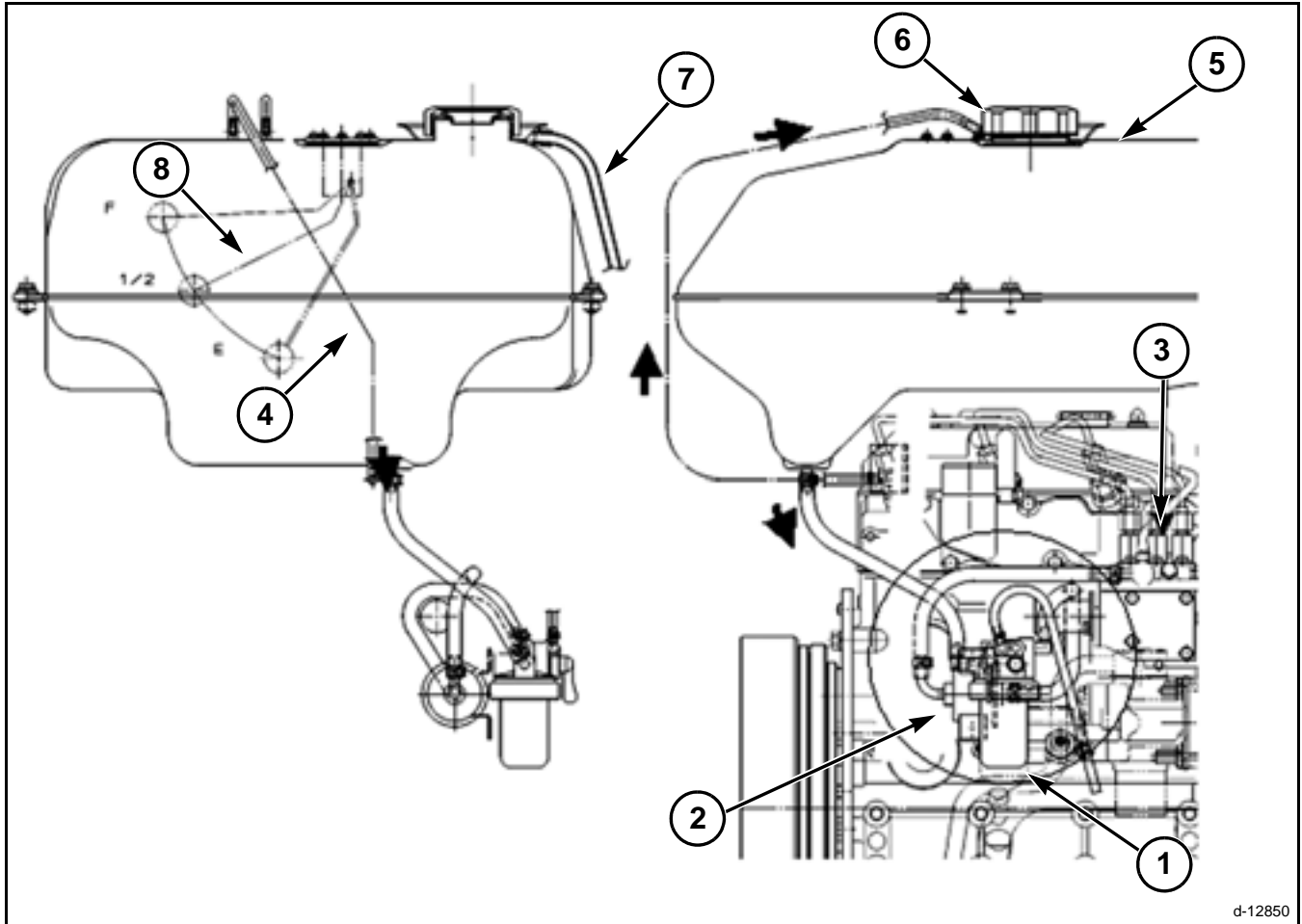


FIG. 14

Fuel System

FUEL SYSTEM



d-12850

FIG. 15

FIG. 15: Fuel System

- (1) Fuel filter
- (2) Fuel Pump
- (3) Injection Pump
- (4) Fuel Return Hose
- (5) Fuel Tank
- (6) Fuel Cap
- (7) Overflow
- (8) Fuel Gage

AIR SYSTEM

ENGINE AIR CLEANER

IMPORTANT: Never operate engine with air filter removed.

FIGS. 16–18: The engine air cleaner, is located above engine. To gain access remove right side panel.

The dust ejector (2) should be squeezed to open and allow dust to drop out daily. This will reduce amount of material which collects on main filter.

To service main filter, release retaining band (1) over air cleaner and pull air cleaner inlet tube to rear to release it from retaining hooks. Then turn the air cleaner out for servicing.

Release clips (3) and remove element (4). Examine element and seals for damage and brittleness. If element is damaged in any way it must be replaced.

NOTE: Engine air filter has a seal ring. Fit it correctly when installing.

Air Filter element (4) may be cleaned (if in serviceable condition) using following procedures:

Using compressed air not to exceed 2 bar (30 psi) from inside element, remove loose dirt, grass, chaff, etc. Be careful not to damage element pleats with air flow.

If outer element is coated with oil or soot:

- Prepare solution of warm water and non-foaming detergent.
- Soak element for thirty minutes.
- Agitate element in solution until oil and soot are loosened.
- Rinse element until rinse water is clear.
- Allow element to completely dry. Do not dry by using compressed air or heat.
- After cleaning (or washing) element examine for pin holes, punctures, or tears. If element paper, canister or seal show any signs of physical damage, element must be replaced.

NOTE: Replace element which has already been washed five times.

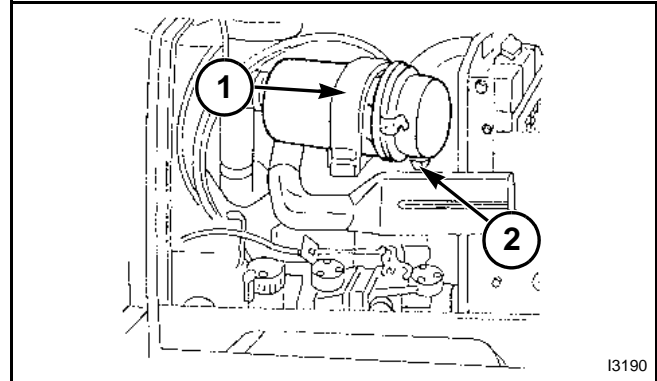


FIG. 16

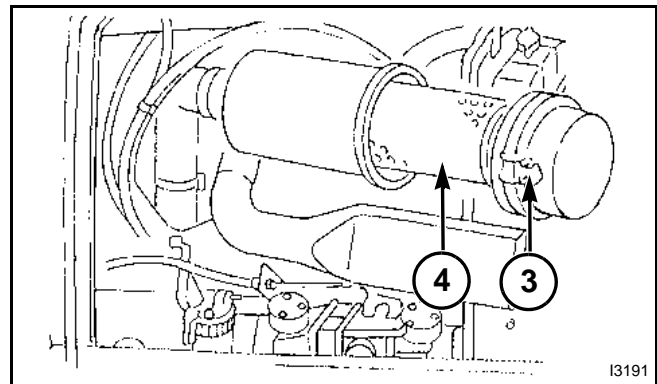


FIG. 17

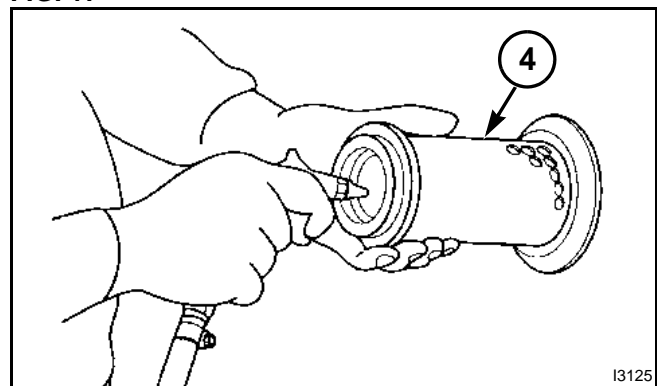


FIG. 18

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SERVICE MANUAL

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OPERATION CHART

DISASSEMBLY AND ASSEMBLY OF MAJOR COMPONENTS

Separate At	To Service
Axle Bracket	Front Axle 4WD Differential Gears 4WD Final Case
Engine	Flywheel Clutch
Clutch	Input Shaft 4WD Drive Shaft Hydrostat Unit
Front Transmission <i>NOTE: Requires removing cab or platform.</i>	Mid-PTO System PTO Change System Input Gears Main Shift Gears Range Shift Gears 4WD Shift Gears PTO Shift Gears Drive Pinion
Rear Transmission <i>NOTE: Does not require removing cab or platform.</i>	PTO Shaft Ring Gear (Differential System)
Rear Axle	Differential Lock (Right Hand) Axles Final Reduction Gears Brake System
Cylinder Case	Control Valve Rear PTO Shaft Lift Arms

NOTES

SERVICE ACCESS

COMPONENT ACCESS

Opening/Closing Hood/Side Covers

FIG. 1: To release the hood, move the open/close lever (1) in the direction shown by the arrow.

Open the hood by lifting up the front of the hood (2).

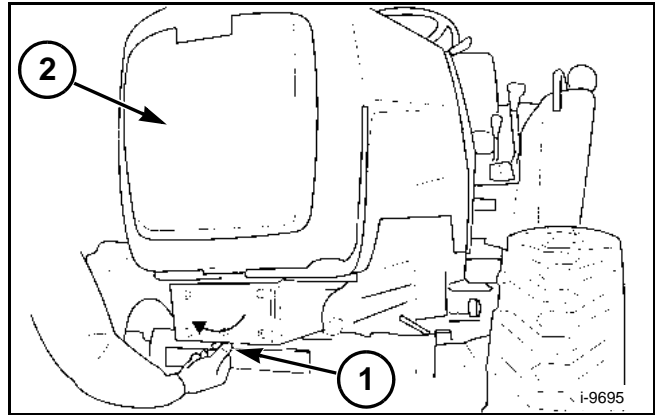


FIG. 1

FIG. 2: Support the hood with the stand (1).

To close, lift the hood, disengage the pin from the stand and lower the hood. The hood is locked in place when the lever is pressed.



CAUTION: Make sure the lock pin of the stand is placed in notch (2) when opening the hood. If the pin is not placed in notch, hood may fall down suddenly.

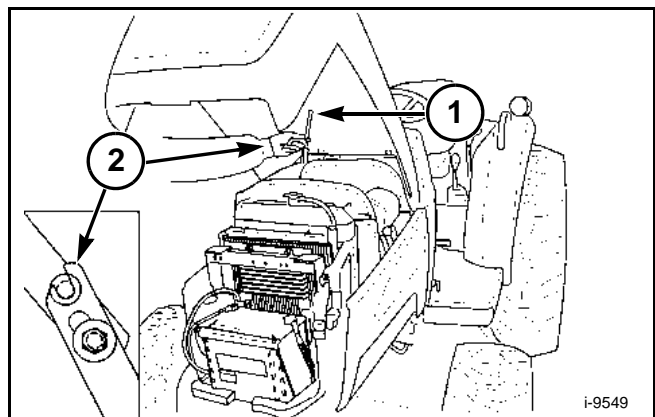


FIG. 2

Removing/Installing Side Covers

FIG. 3: The hood must be open to open a side cover (1). Open a side cover by pulling out the upper portion. Once a cover is open, the hood may be lowered. Open the hood to close the cover.

Remove a side cover by slipping the cover off the two hinges on the bottom.

When installing a side cover, place the cover on the hinges at the bottom, and push on the top.

The muffler is adjacent to the left side cover. Make sure to allow the muffler to cool before removing the side cover.

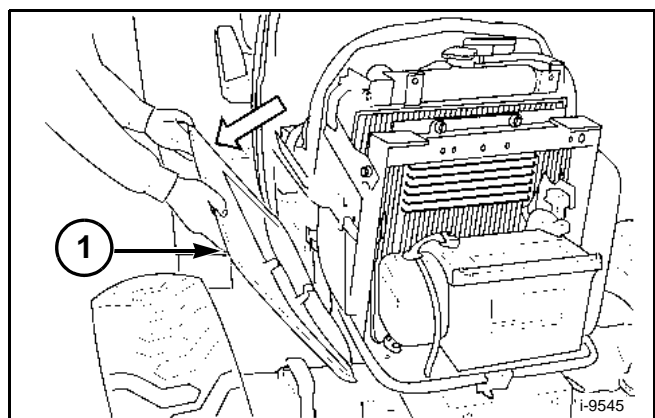


FIG. 3

NOTES

REMOVAL OF FRONT AXLE

REMOVAL OF FRONT AXLE

FIGS. 4–5: 4 wheel drive only - Remove bolt,(1) from the 4wd shaft shield. Loosen clamp,(2) holding telescoping driveshaft shield tubes. Slide tubes together to expose couplers and snap rings. Move snap rings and couplers (3) towards the center of the shaft. Remove the 4wd shaft.

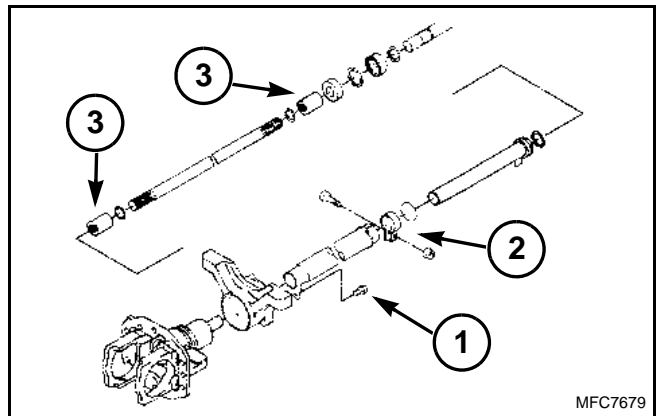


FIG. 4

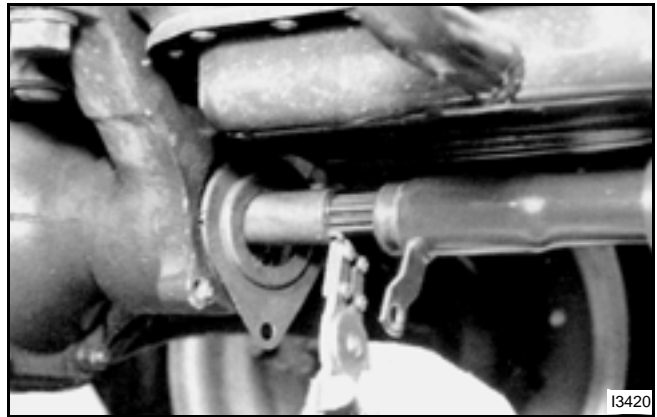


FIG. 5

Removal of Front Axle

FIGS. 6–7: Raise the front of the tractor slightly with an overhead hoist and support the front of the tractor frame with a suitable jack stand. Put a floor jack or suitable jack stands under the front axle. Remove the rear axle pivot (1) and front axle pivot (2) from the front frame.

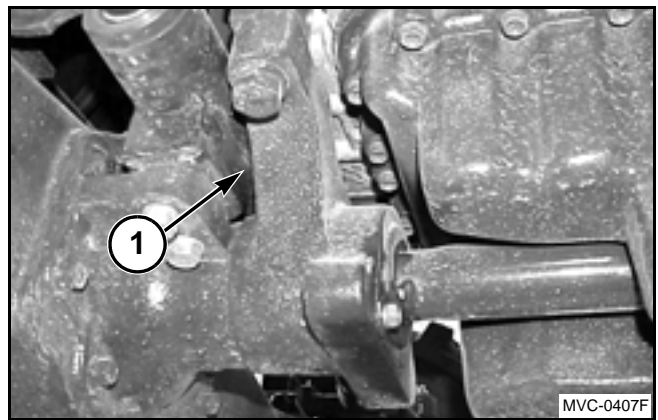


FIG. 6

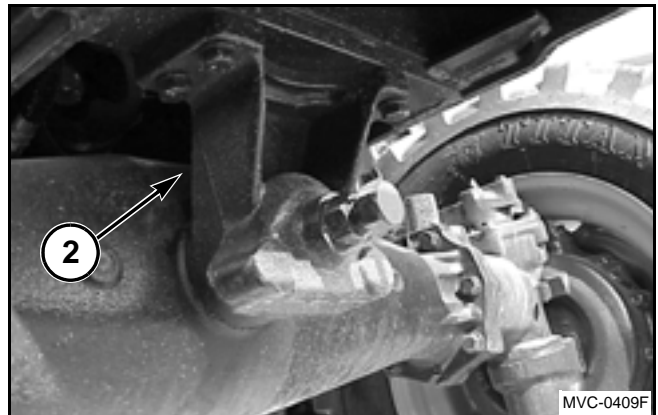


FIG. 7

FIGS. 8–9: Lower the front axle enough to disconnect the power steering lines at either the cylinders or the steering orbitrol. Raise the front of the tractor or lower the front axle and roll the axle out from under the tractor.

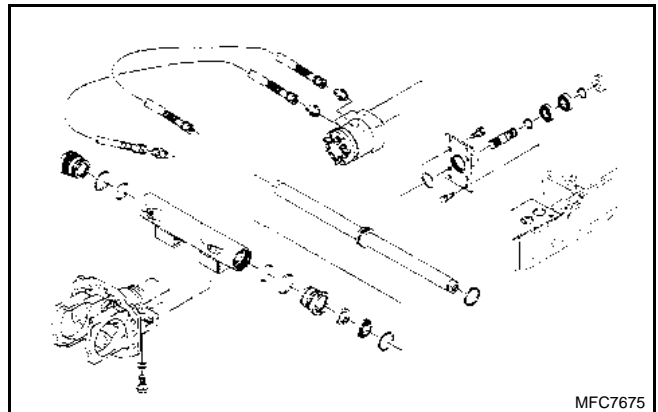


FIG. 8



FIG. 9

FIG. 10: Reassembly

Install the front axle with the following precautions.

NOTE: Do not stretch the steering cylinder hoses.

Use loctite on the front axle pivot hardware and torque to 118 to 137 Nm (88 to 101 lbf ft).

Adjust front axle endplay from 0 to 0.2 mm (0 to 0.008 in).



FIG. 10

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