



***When Performance Matters.***<sup>™</sup>

**LF 550<sup>™</sup> and LF 570<sup>™</sup>  
Lightweight Fairway Mowers  
Technical/Repair Manual  
67978, 67979, 67980,  
67981, 67982, 67983**

***CUSTOMERCARE***

[jacobsen.com](http://jacobsen.com)





***When Performance Matters.***<sup>™</sup>

**LF 550<sup>™</sup> and LF 570<sup>™</sup>  
Lightweight Fairway Mowers  
Technical/Repair Manual  
67978, 67979, 67980,  
67981, 67982, 67983**



**WARNING:** If incorrectly used, this machine can cause severe injury. Those who use and maintain this machine should be trained in its proper use, warned of its dangers, and should read the entire manual before attempting to set up, operate, adjust, or service the machine.



# Foreword

---

## General

This manual provides detailed information and procedures to safely repair and maintain the following:

Jacobsen LF 550™ and LF 570™ lightweight fairway mowers and associated accessory attachments

This manual is intended to introduce and guide the user through the latest factory-approved troubleshooting and repair techniques and practices.

Before you attempt to troubleshoot or make repairs, you must be familiar with the operation of this machine. Refer to the operator's manual and parts manual for specific information on these topics.

THE INFORMATION CONTAINED IN THIS MANUAL IS BASED ON MACHINES MANUFACTURED UP TO THE TIME OF PUBLICATION. JACOBSEN RESERVES THE RIGHT TO CHANGE ANY OF THIS INFORMATION WITHOUT NOTICE.

## California Proposition 65 Warning



### WARNING

**Certain vehicle components contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.**

## Trademark Acknowledgement

Jacobsen acknowledges the following trademarks for company names or products mentioned within this publication:

Lubriplate® is a trademark of Fiske Brothers Refining Co.

Loctite® and Permatex® are trademarks of Henkel Corporation.

**JACOBSEN**  
A Textron Company

### How to Use This Manual

This manual is designed to provide multiple ways to locate and access repair information.

Read each section in its entirety before beginning a procedure. Proper understanding of machine operation and components is the key to successful diagnostics and repair.

Make use of special information features within this manual in order to be better prepared to perform repairs. Always follow manual procedures and safety guidelines. Never take shortcuts.

### Table of Contents

Major machine components or topics of interest are separated into specific chapters. Each manual lists these chapters in a main Table of Contents.

### Chapter Table of Contents

Each chapter begins with a detailed table of contents related to the specific machine component or system.

Use the chapter table of contents to find specific component or procedural information.

### Index

An alphabetical Index is located at the back of the manual.

Use the Index to find specific components and related procedures.

### Required Tools and Materials

Some procedures will require the use of specific tools and/or materials. These tools and/or materials will be listed for reference, prior to beginning a procedure.

### Specifications

Near the beginning of each chapter is a specifications listing. This listing contains any specifications contained within the chapter.

### Quick Reference Specifications

A list of all machine specifications can be found in Chapter 2 Specifications and General Information. This is a list of all specifications from each chapter, combined and listed in one place for easy reference.

### Warnings and Cautions

Warning and Caution indicators are located throughout the manual at specific points of interest. These notices are given to prevent personal injury, death, and/or equipment damage. Always heed these notices, and practice common sense when performing any maintenance or repair procedure.

### Notes

Special notes are given in order to draw attention to detailed instructions. These notes are intended to give further important information regarding the machine and/or a step in a procedure.

### Troubleshooting

Troubleshooting charts are provided in each chapter to aid in the diagnostic process. Use these suggestions to aid in identifying a potential mechanical or machine adjustment problem.

# Table of Contents

<b>Safety</b>	<b>1</b>
<b>Specifications and General Information</b>	<b>2</b>
<b>Engine</b>	<b>3</b>
<b>Electrical</b>	<b>4</b>
<b>Hydrostatic Power Train</b>	<b>5</b>
<b>Hydraulics</b>	<b>6</b>
<b>Steering</b>	<b>7</b>
<b>Cutting Units</b>	<b>8</b>
<b>Accessories and Miscellaneous Repair</b>	<b>9</b>





Introduction .....	1-2
Prepare for the Job .....	1-2
Safety Notices .....	1-2
Safety Label Locations .....	1-2
Inspect Safety Labels .....	1-6
Keep Work Area Clean .....	1-6
Keep Work Area Well Ventilated .....	1-6
Use Proper Eye and Face Protection .....	1-6
Park Mower Safely .....	1-6
Use Lifting Equipment Safely .....	1-7
Support Machine Securely .....	1-7
Use Compressed Air and Air Tools Safely .....	1-7
Service Tires Safely .....	1-8
Handle Fuel Safely .....	1-8
Store Volatile and Hazardous Materials Safely .....	1-8
Handle Chemical Products Safely .....	1-9
Service Hydraulic System Safely .....	1-9
Service Cooling System Safely .....	1-9
Service Electrical Components Safely .....	1-10
Dispose of Waste Materials Safely .....	1-10

## Introduction

Safety is the most important element of any repair procedure. Knowledge of the procedure to be performed and safe work habits are essential to preventing death, personal injury, or property damage. Use the following statements as a common-sense guide to proper work and tool-use habits.

1

## Prepare for the Job

Preparation is essential to complete a procedure in a safe and efficient manner.

- Wear proper clothing. Loose or baggy clothing could become tangled in moving parts.
- Use eye/face protection. Always use proper eye/face protection to protect your eyes from flying debris or chemical splatters.
- Wear protective footwear. Wear safety shoes (steel-toe) to protect your feet from falling objects.
- Use gloves when handling parts. Parts may have sharp edges or may be hot.
- Remove jewelry prior to servicing electrical systems.
- Prepare proper tools and equipment. Always use the correct tool for the job. Improper or homemade tools can cause injury or machine damage.
- Prepare needed parts and materials. Gather the needed parts and materials before beginning the procedure.
- Allow machine to cool. Many components can get hot during operation. Be sure to allow enough time for components to cool before beginning service.
- Prepare proper work-space lighting. A well-lit work area can make the job easier.
- Follow procedures and safety warnings. Service procedures are written to be as safe and efficient as possible. Never take shortcuts.
- Be prepared for emergencies. Accidents can happen, even under the best conditions. Fire extinguishers and first aid kits should be well maintained and easily accessible.

## Safety Notices

Throughout this manual, the following key safety words will be used to alert the reader of potential hazards. Become familiar with these words and their meaning. Take all precautions to avoid the hazards described.



This safety alert symbol is used to alert you to potential hazards.



### DANGER

Indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.



### WARNING

Indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.



### CAUTION

Indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury and property damage. It may also be used to alert against unsafe practices.

### NOTICE

Indicates a potentially hazardous situation which, if not avoided, **MAY** result in property damage. It may also be used to alert against unsafe practices.

## Safety Label Locations

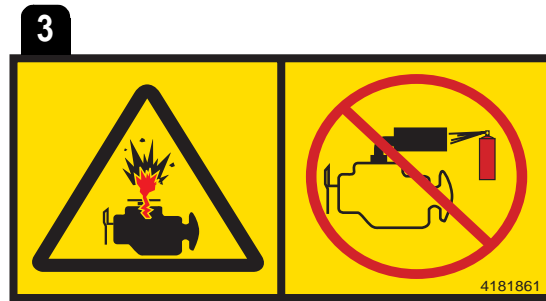
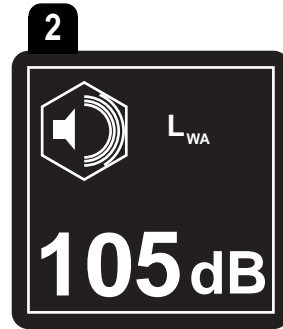
Become familiar with machine safety labels and locations. The following illustrations show safety label locations on the machine.

See Figure 1-1.



Figure 1-1

1





1



## Inspect Safety Labels

Safety labels are critical to the safe operation of the mower. Inspect the mower for any damaged, missing, or unreadable labels. Replace labels as needed before placing the mower back in service.

### 1 Keep Work Area Clean

A clean, organized, well-lit work area is important to promote safe working conditions.

- Keep floor clean of debris and clear of parts and tools.
- Clean up any spilled fuel, oil, and/or chemicals immediately.
- Store all air hoses and electrical cords properly when not in use.

## Keep Work Area Well Ventilated



### WARNING

Never operate the engine without proper ventilation; exhaust fumes can be fatal if inhaled.

Certain test and adjustment procedures require the engine to be running. Be sure work area is well ventilated; never run the engine in an enclosed area.

## Use Proper Eye and Face Protection



### WARNING

Always use approved personal protection equipment. Avoid workplace hazards by wearing properly maintained, approved eye and face protection. Failure to use appropriate protection equipment may result in death or serious injury.

Always wear eye protection while in a shop environment.

- Safety Glasses: Safety glasses offer a minimum level of protection from flying debris.
- Face Shields: Face shields are often used along with safety glasses to offer a higher level of protection when sparks and flying debris are present.
- Vented Goggles: Goggles offer side protection not offered by safety glasses alone.
- Unvented Goggles: Unvented goggles offer protection from chemical splashes and vapors.

## Park Mower Safely

See Figures 1-2 and 1-3.



### WARNING

Before cleaning, adjusting, or repairing this equipment, disengage all drives, engage park brake, and stop engine to prevent injuries.

When performing maintenance other than adjustments that require the engine to be running, disconnect the battery negative cables to prevent accidental starting and bodily injury.

1. Park the mower on a solid, level surface.

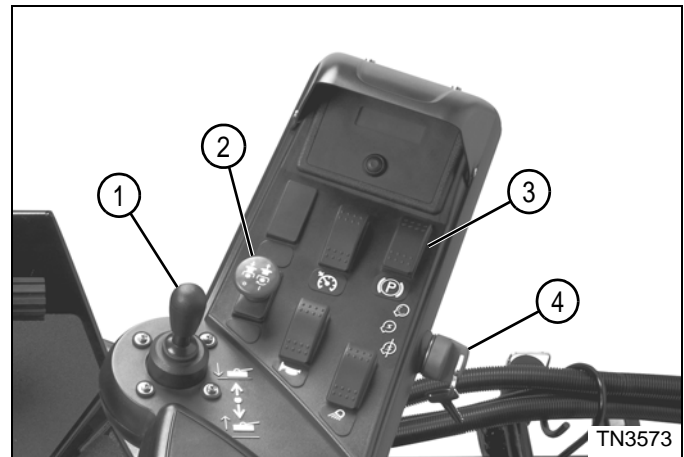


Figure 1-2

2. Disengage the cutting units by pushing the mow switch (2).
3. Lower the cutting units by moving the raise/lower switch (1) forward.

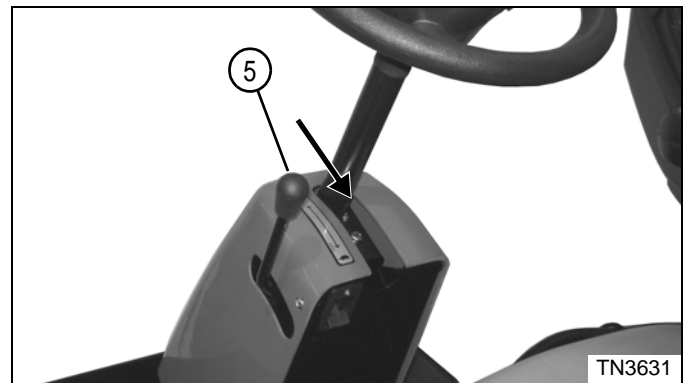


Figure 1-3

4. Reduce throttle to idle by moving the throttle lever (5) rearward.
5. Engage park brake switch (3) and rotate key switch (4) fully counterclockwise to off position.

**NOTICE**

- Permanent damage to the turbocharger may occur if the engine is shut down without allowing the turbocharger time to cool.
- To prevent damage, operate the engine with no load and at half throttle for 3 to 5 minutes before shutting off engine.

6. Remove key from key switch.

**Use Lifting Equipment Safely****WARNING**

Always check the lifting capacity and condition of hoists, slings, cables, or chains before use. Using underrated or worn lifting components can result in death or serious injury.

- Always use a lifting device with a lifting capacity greater than the weight of the item being lifted.
- Secure the load to the lifting device using cables, chains, or slings rated to handle the load being lifted. Fasteners being used to connect lifting devices must be strong enough to handle the load. Also be sure the mounting point of load is strong enough to handle the load.
- When using a lifting device, always connect the load so it is balanced.
- Always use a lifting device on a hard, level surface.
- Lower the lifting device to the lowest point before moving. Move the load slowly.
- Always support the load as soon as possible; never leave a load suspended in mid-air.

**Support Machine Securely****WARNING**

- Support the machine using properly rated jackstands. Never work under a machine supported only by a jack.
- Do not use wood or concrete blocks to support the machine. Failure to properly support the machine may result in death or serious injury.

**Use Compressed Air and Air Tools Safely****WARNING**

Always wear approved eye and ear protection while using compressed air. Misuse of compressed air could result in death or serious injury.

- When using air nozzles, air pressure should not exceed 30 psi (206.8 kPa).
- Never direct air nozzles or tools at a person.
- Never point air nozzles directly at skin.
- Compressed air is a useful tool when used in a safe manner.
- Always use eye and ear protection while using compressed air and air tools.
- When using air tools, do not exceed the air pressure rating for the tool.
- When using an impact wrench, always use approved impact sockets. Never use standard sockets on an impact wrench.
- Disconnect the air supply before changing air tool attachments.
- Never point air nozzles or air tools at another person.
- Always maintain air tools properly.

## Service Tires Safely



### WARNING

An inflated tire contains explosive force. Use care when handling wheels and tires.

- Always wear safety glasses or goggles.
- Use proper lifting methods when working with wheels and tires.
- When working on an inflated tire, never position yourself directly over the work area.
- When dismounting or mounting tires, use a wheel holder or tire machine. Use proper tire mounting tools and equipment. Never use screwdrivers or makeshift tools to force a tire on or off a wheel.
- Be sure tire irons and mounting tools are free of grease and oil. Grip them firmly.
- Inspect wheel parts for rust, damage, or distortion. Never use wheels that are out-of-round, rusted, or cracked.
- Never hammer on wheels with a steel hammer. Use rubber-covered hammers.
- When inflating tires, always use an inflation cage. Always stand away from the valve stem.
- Use accurate, tested inflation gauges to set air pressures.

## Handle Fuel Safely

Handle fuel with care—it is highly flammable.



### WARNING

- Never remove the fuel cap from the fuel tank, or add fuel, when the engine is running or while the engine is hot.
- Do not smoke when handling fuel. Never fill or drain the fuel tank indoors.
- Do not spill fuel. Clean spilled fuel immediately.
- Never handle or store fuel containers near an open flame or any device that may create sparks and ignite the fuel or fuel vapors.
- Be sure to reinstall and tighten fuel cap securely.
- Use an approved container; the spout must fit inside the fuel filler neck. Avoid using cans and funnels to transfer fuel.

Store fuel according to local, state, or federal ordinances and recommendations from your fuel supplier.

Never overfill or allow the tank to become empty.

Use clean, fresh fuel.

Do not fill above the fuel filler neck.

## Store Volatile and Hazardous Materials Safely

Store volatile materials (gasoline, diesel fuel, oil, etc.) in approved containers that are clearly marked. Containers should be stored in an approved safety cabinet away from possible sources of ignition. Storage areas and cabinets should be well ventilated to prevent the possible build-up of fumes.



## Handle Chemical Products Safely



### WARNING

Exposure to chemical products could result in serious injury. Handle chemical products with care. Refer to the chemical manufacturer's Material Safety Data Sheet (MSDS) for information regarding health hazards, safe handling, and emergency response procedures.

Routine service often requires the use of various chemical products, including lubricants and cleaning solutions. Many of these chemicals are flammable and can pose health risks if not handled properly.

- Never mix chemicals. Mixing chemicals can produce toxic or explosive results.
- Follow the manufacturer's recommendations for safe usage and handling of the product.
- Various materials may pose a health hazard if used incorrectly. A Material Safety Data Sheet (MSDS) contains important information regarding proper handling and health hazards, as well as emergency response procedures. Contact the chemical manufacturer to obtain an MSDS for the chemical product.

## Service Hydraulic System Safely



### WARNING

The hydraulic system is under pressure, and the oil may be hot!

- Always allow the machine to cool completely before performing service.
- Always relieve pressure in the hydraulic system before performing service.
- Always use appropriate safety equipment and clothing to protect exposed skin and eyes from high-pressure oil.
- Tighten all connections to proper specifications before applying pressure.
- Never use bare hands to check for leaks! Oil under pressure can penetrate the skin, and can cause gangrene within a few hours if not properly removed. Use a piece of cardboard to check for leaks.

Failure to follow appropriate safety precautions may result in death or serious injury.

Always dispose of used hydraulic oil properly. (See "Dispose of Waste Materials Safely" on page 1-10.)

## Service Cooling System Safely



### WARNING

Engine coolant is hot and under pressure! Allow the cooling system to cool completely before performing service.

Rotate the filler cap 1/2-turn counterclockwise and allow pressure to vent before removing filler cap.

Failure to follow appropriate safety precautions may result in death or serious injury.



### WARNING

Contact with anti-freeze can damage your skin. Use gloves when working with anti-freeze. If you come in contact with anti-freeze, wash it off immediately.

Always dispose of used engine coolant properly. (See "Dispose of Waste Materials Safely" on page 1-10.)

## Service Electrical Components Safely



### WARNING

**Always disconnect the negative terminal first and positive terminal last. Connect positive terminal first and negative terminal last. Use care when testing live circuits to prevent arcing. Arcing could result in death or serious injury.**

- Disconnect the battery negative (–) cable before removing or installing electrical components. Always connect the battery negative (–) cable last.
- Certain test and adjustment procedures must be performed with the battery connected. Use care to prevent arcing when working on live circuits or components. Arcing can cause component damage and could ignite flammable materials.

## Dispose of Waste Materials Safely

Routine service can produce waste products such as used oil, coolant, grease, and used batteries.

If not handled properly, these materials can pose a threat to the environment.

Collect fluids in well-marked, approved storage containers. Some waste fluids can react with certain types of plastics. Make sure the fluid to be stored is compatible with the storage container. Never use food or beverage containers to store waste fluids.

### IMPORTANT

**Never dispose of waste fluids by pouring on the ground, down sewer drains, or into any body of water.**

- Dispose of waste fluids properly at approved local recycling centers. If recycling facilities are not available, contact your local community for the correct disposal procedure for waste fluids.
- Dispose of old batteries properly. Battery electrolyte contains sulfuric acid and other hazardous materials. Never place an old battery in the trash. Batteries must be disposed of in a manner consistent with EPA and/or local regulations.

## Specifications and General Information

---

<b>Machine Identification</b> .....	<b>2-2</b>
Machine Serial Number .....	2-2
Engine Serial Number .....	2-2
Optional Machine Accessories .....	2-2
<b>Component Location</b> .....	<b>2-3</b>
<b>Specifications</b> .....	<b>2-4</b>
Quick Reference Specifications .....	2-4
<b>Standard Torque Values</b> .....	<b>2-13</b>
Inch Fastener Torque Values .....	2-13
Metric Fastener Torque Values .....	2-13
<b>Hydraulic Hose, Tube, and Fitting General Instructions</b> .....	<b>2-14</b>
O-Ring Installation .....	2-14
Hydraulic Hose Installation .....	2-14



## Machine Identification

### Machine Serial Number

See Figures 2-1 and 2-2.



Figure 2-1

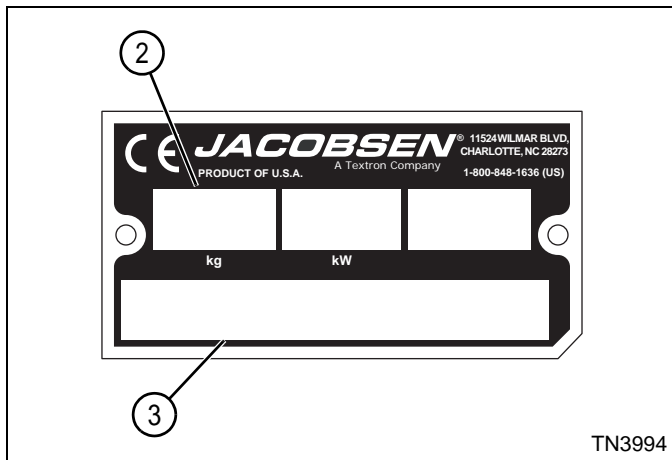


Figure 2-2

A machine identification plate (1) listing the serial number (3) and machine weight (2) is attached to the frame of the mower and is located just ahead of the rear axle on the right side. Always provide the serial number of the machine when ordering replacement parts or requesting service information.

## Engine Serial Number

See Figure 2-3.

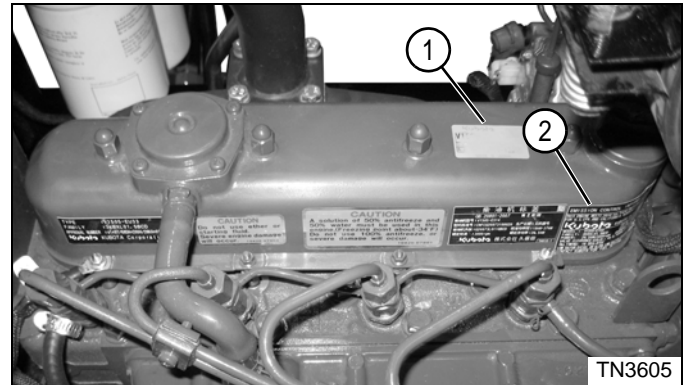


Figure 2-3

The engine serial number plate (1) is attached to the top of the rocker arm cover. The plate also includes the engine model number and the engine code number. An engine data tag (2) is attached to the top of the rocker arm cover. The tag includes information on valve adjustment specifications, injector timing, engine idle speed, and engine displacement.

## Optional Machine Accessories

This manual is structured to cover all basic machine components and repair. The addition of accessories can affect certain troubleshooting, adjustment, and repair procedures.

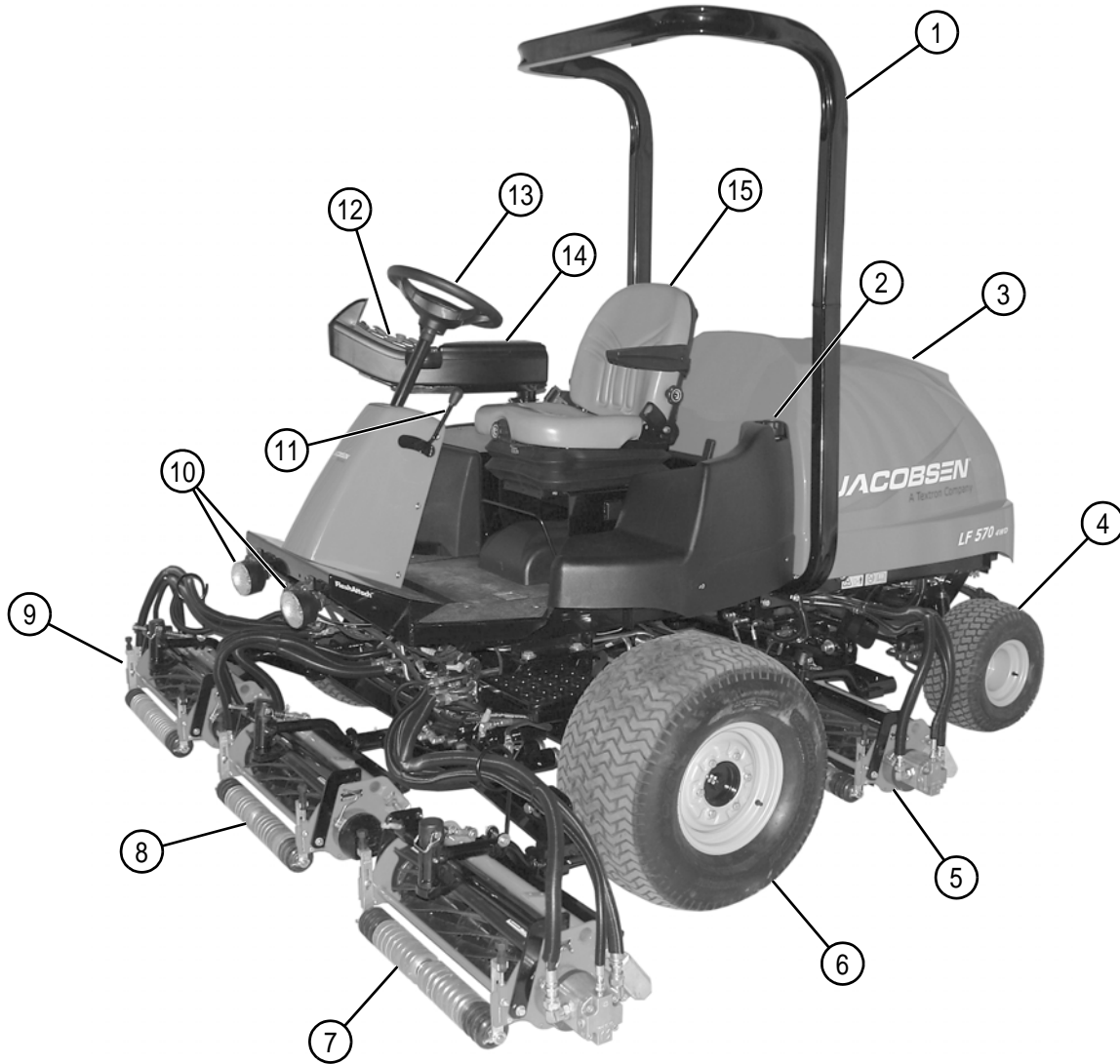
## Component Location

See Figure 2-4.



### CAUTION

Become familiar with operator controls, machine components, and correct operating procedures before beginning repair procedures.



TN3586

- |   |                        |    |                          |    |                  |
|---|------------------------|----|--------------------------|----|------------------|
| 1 | OPS                    | 6  | Left Front Wheel         | 11 | Throttle Lever   |
| 2 | Hydraulic Oil Tank     | 7  | Left Front Cutting Unit  | 12 | Instrument Panel |
| 3 | Hood                   | 8  | Center Cutting Unit      | 13 | Steering Wheel   |
| 4 | Left Rear Wheel        | 9  | Right Front Cutting Unit | 14 | Armrest Assembly |
| 5 | Left Rear Cutting Unit | 10 | Work Lights              | 15 | Seat             |

**Figure 2-4: Component Location**

# Specifications

## Quick Reference Specifications

### Engine

General Engine Specifications		
Manufacturer/Models		Kubota <sup>®</sup> Interim Tier 4/Stage IIIA V1505-E3B
		Kubota <sup>®</sup> Interim Tier 4/Stage IIIA V1505-T-E3B
Engine Type		4-Stroke, Diesel
Fuel Requirement		No. 2-D Diesel Fuel (Cetane Rating 45)
Number of Cylinders/Configuration		4, In-Line
Displacement	cu in. (cc)	91.41 (1498)
Bore x Stroke	in. (mm)	3.07 x 3.09 (78 x 78.4)
Power Output—V1505-E3B	hp (kW)	35.5 (26.5) @ 3000 rpm
Power Output—V1505-T-E3B	hp (kW)	44.2 (33.0) @ 3000 rpm
Firing Order		1-3-4-2
Compression Ratio		23:1
Injection Timing (Before T.D.C.)		17°
Cooling System		Liquid Cooled
Cooling System Capacity—V1505-E3B (Engine Only)	qt (L)	2.4 (2.3)
Cooling System Capacity—V1505-T-E3B (Engine Only)	qt (L)	3 (2.8)
Idle Speed		1200 rpm
Maximum Speed (No Load)		3150 rpm
Engine Oil Capacity	qt (L)	7.1 (6.7)
Alternator		12 volt, 40 amp
Dry Weight—V1505-E3B	lb (kg)	242.5 (110.0)
Dry Weight—V1505-T-E3B	lb (kg)	251.3 (114.0)

Repair Specifications		
Muffler Tailpipe Mounting Screw	lb-ft (N·m)	35–40 (47.5–54.2)

**Electrical**

<b>Test Specifications</b>		
Resistance Across Solenoid Coil— Front Mow Solenoid Coil at 68° F	ohms	5.3 ± 10%
Resistance Across Solenoid Coil— Front Backlap Coil at 68° F	ohms	5.3 ± 10%
Resistance Across Solenoid Coil— Rear Mow Solenoid Coil at 68° F	ohms	5.3 ± 10%
Resistance Across Solenoid Coil— Rear Backlap Coil at 68° F	ohms	5.3 ± 10%
Resistance Across Solenoid Coil— Raise Solenoid Coil at 68° F	ohms	5.3 ± 10%
Resistance Across Solenoid Coil— Lower Solenoid Coil at 68° F	ohms	5.3 ± 10%
Resistance Across Solenoid Coil— Brake Solenoid Coil at 68° F	ohms	9 ± 10%
Resistance Across Solenoid Coil— Traction Solenoid Coil at 75° F	ohms	23
Resistance Across Fuel Shutoff Pull-In Coil at 68° F	ohm	0.5 ± 10%
Resistance Across Fuel Shutoff Hold-In Coil at 68° F	ohms	15 ± 10%
Traction Pedal Adjustment Value		200–205
Reel Level Proximity Switch Adjustment Lift Arm Angle	degrees	17 ± 1
Reel Level Proximity Switch to Lift Arm Air Gap	in. (mm)	0.118–0.196 (3–5)

<b>Repair Specifications</b>		
Solenoid Nut Torque	lb-ft (N·m)	10 (13.6)
Brake Solenoid Nut Torque	lb-in. (N·m)	33–53 (4–6)

**2**

## SPECIFICATIONS AND GENERAL INFORMATION

### Hydrostatic Power Train

Test Specification		
Traction Pump Flow	gpm (lpm)	38.3 (145) at 3150 rpm
Forward System Relief Pressure— Machine Serial Numbers Ending 1651 Through 2499	psi (bar)	3625 ± 10% (250 ± 10%) at 3150 rpm
Forward System Relief Pressure— Machine Serial Numbers Ending 2500 and Up	psi (bar)	4350 ± 10% (300 ± 10%) at 3150 rpm
Reverse System Relief Pressure	psi (bar)	3625 ± 10% (250 ± 10%) at 3150 rpm
Charge Pressure	psi (bar)	315 ± 10% (22 ± 10%) at 3150 rpm
Hydrostatic Leakage Percentage Ranges		0–10% = Good 11–20% = Marginal 21% and Beyond = Bad

Repair Specification		
Drive Shaft Mounting Screw Torque	lb-ft (N·m)	35–40 (47–54)
Traction Pump—Test Port Fitting Torque	lb-ft (N·m)	17 (23)
Traction Pump—Return Tube Fitting Torque	lb-ft (N·m)	80 (108)
Traction Pump—Charge Filter Tube Fitting Torque	lb-ft (N·m)	60 (81)
Traction Pump—Ports “A” and “B” Fitting Torque	lb-ft (N·m)	100 (135)
Traction Pump—System Relief Valves Torque	lb-ft (N·m)	130 (176)
Traction Pump—Charge Pressure Relief Screw Torque	lb-ft (N·m)	80 (108)
Traction Pump—Tow Valve Torque	lb-ft (N·m)	15 (20)
Traction Pump—Front Cover Screw Torque	lb-ft (N·m)	43 (58)
Traction Pump—Cover Plate Screw Torque	lb-ft (N·m)	57 (77)
Traction Pump—Auxiliary Pad Screw Torque	lb-ft (N·m)	32 (43)
Traction Pump—Case Outlet Plug Torque	lb-ft (N·m)	85 (115)
Traction Pump—Plug Torque	lb-ft (N·m)	15 (20)
Traction Pump—Servo Piston Cover Plug Torque	lb-ft (N·m)	27 (37)
Traction Pump—Servo Piston Cover Screw Torque	lb-ft (N·m)	11 (15)
Traction Pump—Seal Nut Torque	lb-ft (N·m)	27 (37)
Traction Pump—EDC Mounting Screw Torque	lb-ft (N·m)	10 (14)
Traction Pump—Filtration Cover Screw Torque	lb-ft (N·m)	22 (30)
Traction Pump—Filtration Cover Plug Torque	lb-ft (N·m)	27 (37)
Brake Release Valve—Coil Nut Torque	lb-in. (N·m)	33–53 (4–6)
Brake Release Valve—Ports “ST” and “BR” Fitting Torque	lb-ft (N·m)	17 (23)
Brake Release Valve—CHG and DRN Ports Fitting Torque	lb-ft (N·m)	17 (23)
Brake Release Valve—Direction Control Valve Torque	lb-ft (N·m)	30–35 (40.7–47.5)
Brake Release Valve—Direction Control Valve Nut Torque	lb-in. (N·m)	40–60 (4.5–6.8)
Brake Release Valve—Coil Nut Torque	lb-in. (N·m)	35–53 (4–6)
Brake Release Valve—Solenoid Valve Torque	lb-ft (N·m)	26–30 (35.3–40.7)
Brake Release Valve—Relief Valve Torque	lb-ft (N·m)	20–25 (27.1–33.9)



**SPECIFICATIONS AND GENERAL INFORMATION**

<b>Repair Specification</b>		
Brake Release Valve—Check Valve Torque	lb-ft (N·m)	20–25 (27.1–33.9)
4WD Valve—Ports “LRF,” “LRR,” “RRF,” and “RRR” Fitting Torque	lb-ft (N·m)	110 (149)
4WD Valve—Ports “LF” and “RF” Fitting Torque	lb-ft (N·m)	110 (149)
4WD Valve—DRN Port Fitting Torque	lb-ft (N·m)	25 (34)
4WD Valve—REV Port Fitting Torque	lb-ft (N·m)	160 (217)
4WD Valve—Check Valve Torque	lb-ft (N·m)	30–35 (40.7–47.5)
4WD Valve—Hot Oil Shuttle Torque	lb-ft (N·m)	30–35 (40.7–47.5)
4WD Valve—Relief Valve Torque	lb-ft (N·m)	30–35 (40.7–47.5)
Front Wheel Motor—Mounting Screw Torque— Machine Serial Numbers Ending 1651 Through 2499	lb-ft (N·m)	85–95 (115–129)
Front Wheel Motor—Mounting Flange-to-Bearing Housing Screw Torque— Machine Serial Numbers Ending 1651 Through 2499	lb-ft (N·m)	27 (37)
Front Wheel Motor—Case Drain and Brake Release Port Fitting Torque— Machine Serial Numbers Ending 1651 Through 2499	lb-ft (N·m)	15 (20)
Front Wheel Motor—Inlet and Outlet Port Fitting Torque— Machine Serial Numbers Ending 1651 Through 2499	lb-ft (N·m)	110 (149)
Front Wheel Motor—End Cover Screw Torque— Machine Serial Numbers Ending 1651 Through 2499	lb-ft (N·m)	52 (70)
Front Wheel Motor—Mounting Nut Torque— Machine Serial Numbers Ending 2500 and Up	lb-ft (N·m)	90 (122)
Front Wheel Motor—Case Drain Fitting Torque— Machine Serial Numbers Ending 2500 and Up	lb-ft (N·m)	30 (41)
Front Wheel Motor—Brake Release Port Fitting Torque— Machine Serial Numbers Ending 2500 and Up	lb-ft (N·m)	17 (23)
Front Wheel Motor—Inlet and Outlet Port Fitting Torque— Machine Serial Numbers Ending 2500 and Up	lb-ft (N·m)	90 (122)
Front Wheel Motor—Bearing Support Rotation Torque— Machine Serial Numbers Ending 2500 and Up	lb-ft (N·m)	8.85 ± 30% (12 ± 30%)
Front Wheel Motor—Valving Cover-to-Cam Ring Screw Torque— Machine Serial Numbers Ending 2500 and Up	lb-ft (N·m)	61 ± 10% (83 ± 10%)
Front Wheel Motor—Brake Housing-to-Valving Cover Screw Torque— Machine Serial Numbers Ending 2500 and Up	lb-ft (N·m)	107 ± 10% (145 ± 10%)
Front Axle—Mounting Screw Torque	lb-ft (N·m)	185–225 (251–305)
Rear Wheel Motor—Mounting Screw Torque	lb-ft (N·m)	90–100 (122–136)
Rear Wheel Motor—Inlet and Outlet Port Fitting Torque	lb-ft (N·m)	90 (122)
Rear Wheel Motor—Case Drain Fitting Torque	lb-ft (N·m)	15 (20)
Rear Wheel Motor—Housing Screw Torque	lb-ft (N·m)	36–37 (49–50)

**2**

## SPECIFICATIONS AND GENERAL INFORMATION

### Hydraulics

Test Specifications		
Front Cutting Units Pump Flow	gpm (lpm)	6.8 (25.7) at 3150 rpm
Rear Cutting Units Pump Flow	gpm (lpm)	6.8 (25.7) at 3150 rpm
Lift/Steer Pump Flow	gpm (lpm)	6.8 (25.7) at 3150 rpm
Hydraulic Leakage Percentage Ranges		0–10% = Good 11–20% = Marginal 21% and Beyond = Bad
Lift/Steer Relief Valve Pressure Setting	psi (bar)	1450 ± 10% (100 ± 10%)
Lower Relief Valve Pressure Setting	psi (bar)	450 ± 10% (31 ± 10%)
Reel Motor Forward Relief Valve Pressure Setting	psi (bar)	1167 ± 10% (81 ± 10%)
Reel Motor Reverse Relief Valve Pressure Setting	psi (bar)	1167 ± 10% (81 ± 10%)
Reel Motor Case Drain Rate		Less than 1 pint (0.47 L) per minute

Repair Specifications		
Gear Pump—Rear Cover-to-Pump Body Bolt Torque	lb-ft (N·m)	33 (45)
Gear Pump—Test Fitting Torque	lb-ft (N·m)	32.9 (44.6)
Gear Pump—Tee Fitting Torque	lb-ft (N·m)	55 (74.6)
Gear Pump—Outlet Port Fitting Torque	lb-ft (N·m)	55 (74.6)
Gear Pump—Inlet Port Fitting Torque	lb-ft (N·m)	32.9 (44.6)
Lift Valve—Coil Nut Torque	lb-ft (N·m)	10 (13.5)
Lift Valve—Relief Valve Torque	lb-ft (N·m)	24–26 (32.5–35.3)
Lift Valve—Check Valve Torque	lb-ft (N·m)	19–21 (25.8–28.5)
Lift Valve—Port “P” and Front Side Port “T” Fitting Torque	lb-ft (N·m)	60 (81.4)
Lift Valve—Port “G” Fitting Torque	lb-ft (N·m)	17 (23)
Lift Valve—Ports “1,” “2,” “3,” “8,” “9,” and “10” Fitting Torque	lb-ft (N·m)	17 (23)
Lift Valve—Ports “4” and “6” Fitting and One-Way Restrictor Torque	lb-ft (N·m)	17 (23)
Lift Valve—Rear Side Port “T” Fitting Torque	lb-ft (N·m)	60 (81.4)
Reel Valve—Coil Nut Torque	lb-ft (N·m)	10 (13.5)
Reel Valve—Flow Control Torque	lb-ft (N·m)	24–26 (32.5–35.3)
Reel Valve—Ports “A” and “B” Fitting Torque	lb-ft (N·m)	60 (81.4)
Reel Valve—Port “G” Fitting Torque	lb-ft (N·m)	17 (23)
Reel Valve—Port “P” Elbow Fitting Torque	lb-ft (N·m)	80 (108.5)
Reel Valve—Port “T” Fitting Torque	lb-ft (N·m)	60 (81.4)
Hydraulic Oil Tank Capacity	gal (L)	14 (53)
Center and Rear Lift Cylinder Rod Nut Torque	lb-ft (N·m)	50 (67.8)
Left and Right Front Cylinder Rod Nut Torque	lb-ft (N·m)	50 (67.8)

**Steering**

<b>Test and Adjustment Specifications</b>		
Rear Axle Alignment Toe-In Measurement	in. (mm)	0.030–0.090 (0.8–2.3)
Rear Axle Steering Arm-to-Steering Stop Measurement	in. (mm)	0.030–0.090 (0.8–2.3)
Rear Axle Assembly End Play	in. (mm)	0.010–0.060 (0.25–1.5 mm)

<b>Repair Specifications</b>		
Steering Wheel Nut	lb-ft (N·m)	25–30 (34–41)
Steering Unit End Cover-to-Housing Screw Torque	lb-ft (N·m)	20–24 (27–33)
Throttle Arm Screw Torque	lb-in. (N·m)	100 (11.3)
Throttle Stop Carriage Bolt Torque	lb-in. (N·m)	157 (17.7)
Steering Cylinder Ball Joint-to-Steering Arm Torque	lb-ft (N·m)	80–110 (108–149)
Tie Rod Ball Joint-to-Steering Arm Torque— 2WD Cutting Units	lb-ft (N·m)	30–35 (41–47)
Tie Rod Ball Joint-to-Steering Arm Torque— 4WD Cutting Units	lb-ft (N·m)	80–110 (108–149)
Steering Arm-to-Motor Mount Screw Torque	lb-ft (N·m)	90–100 (122–136)
Rear Axle Assembly Jam Nut Torque	lb-ft (N·m)	80–110 (108–149)



## SPECIFICATIONS AND GENERAL INFORMATION

### Cutting Units

Checks and Adjustments		
Reel Bearing Pre-Load	in. (mm)	0.040 (1.0)
Bedknife Front Face Height	in. (mm)	0.060 (1.5)
Bedknife Front Face Angle	degrees	5
Bedknife Top Face Angle (Rear Relief)	degrees	8–10
Reel Blade Relief Angle	degrees	45
Bedknife-to-Reel Gap	in. (mm)	0.001–0.003 (0.025–0.076)

2

Repair Specifications		
Reel Drive Motor—Rear Cover-to-Body Retaining Screw Torque—5-Inch Cutting Unit	lb-ft (N·m)	18.5 (25)
Reel Drive Motor with -4 ORFS Case Drain—Case Drain Fitting Torque—5-Inch Cutting Unit	lb-ft (N·m)	11 (14.9)
Reel Drive Motor with -6 ORFS Case Drain—Case Drain Fitting Torque—5-Inch Cutting Unit	lb-ft (N·m)	17 (23)
Reel Drive Motor—IN/OUT Port Fittings—5-Inch Cutting Unit	lb-ft (N·m)	60 (81.3)
Reel Drive Motor—Rear Cover-to-Body Retaining Screw Torque—7-Inch Cutting Unit	lb-ft (N·m)	33 (45)
Reel Drive Motor with -4 ORFS Case Drain—Case Drain Fitting Torque—7-Inch Cutting Unit	lb-ft (N·m)	11 (14.9)
Reel Drive Motor with -6 ORFS Case Drain—Case Drain Fitting Torque—7-Inch Cutting Unit	lb-ft (N·m)	17 (23)
Reel Drive Motor—IN/OUT Port Fittings—7-Inch Cutting Unit	lb-ft (N·m)	60 (81.3)
Bedknife Backing Mounting Screw Torque—5-Inch Cutting Unit	lb-ft (N·m)	25–37 (33.9–50.2)
Bedknife Backing Mounting Screw Torque—7-Inch Cutting Unit	lb-ft (N·m)	30–33 (40.7–44.7)
Bedknife Mounting Screw Torque	lb-in. (N·m)	90–120 (10.2–13.6)
Reel Bearing Housing Assembly Mounting Screw Torque—5-Inch Cutting Unit	lb-ft (N·m)	18–22 (24.4–29.8)
Reel Bearing Assembly Coupler Screw Torque—7-Inch Cutting Unit	lb-ft (N·m)	30–33 (40.7–44.7)
Reel Bearing Assembly Mounting Screw Torque—7-Inch Cutting Unit	lb-ft (N·m)	30–33 (40.7–44.7)
Front and Rear Roller Lock Nut Initial Torque	lb-in. (N·m)	10–30 (13.6–40.7)
Front and Rear Roller Rotational Torque	lb-in. (N·m)	3–7 (0.3–0.8)
Rear Roller Mounting Screw Torque—5-Inch Cutting Unit	lb-ft (N·m)	16–24 (21.7–32.5)
Rear Roller Mounting Screw Torque—7-Inch Cutting Unit	lb-ft (N·m)	30–33 (40.7–44.7)

**Accessories and Miscellaneous**

<b>OPS Mounting Hardware</b>		
Mounting Hardware Torque	lb-ft (N·m)	80–90 (108–122)

<b>Fuel Tank</b>		
Capacity	gal (L)	17 (64.4)

<b>Work Light</b>		
Work Light Adjustment Bolt	lb-in. (N·m)	60–75 (6.8–8.5)

<b>Front Tires</b>		
Size		26.5 x 14-12
Type		4-Ply
Air Pressure	psi (bar)	10–12 (0.69–0.83)
Mounting Bolt Torque— Machine Serial Numbers Ending 1651 Through 2499	lb-ft (N·m)	85–95 (115–129)
Mounting Lug Nut Torque— Machine Serial Numbers Ending 2500 and Up	lb-ft (N·m)	90 (122)

<b>Rear Tires</b>		
Size— Machine Serial Numbers Ending 1651 Through 2499		18 x 9.5-8
Size— Machine Serial Numbers Ending 2500 and Up		20 x 10-8
Type		4-Ply
Air Pressure	psi (bar)	10–12 (0.69–0.83)
2WD Units Lug Nut Torque	lb-ft (N·m)	85–95 (115–129)
4WD Units Mounting Bolt Torque	lb-ft (N·m)	90–100 (122–136)

<b>Front Wheel Hub</b>		
Castle Nut Torque	lb-ft (N·m)	375–425 (508–576)

<b>Rear Wheel Hub</b>		
2WD Castle Nut Torque		Just tight enough to remove bearing play
4WD Castle Nut Torque	lb-ft (N·m)	175–225 (237–305)

<b>Mower Speed</b>		
Transport	mph (km/h)	0–12 (0–19)
Mowing	mph (km/h)	0–8 (0–13)
Reverse	mph (km/h)	0–5 (0–8)

**2**

## SPECIFICATIONS AND GENERAL INFORMATION

Weights and Dimensions		
Overall Weight	lb (kg)	67978 (LF 550, 2WD): 2837 (1287) 67979 (LF 550, 4WD): 2960 (1343) 67981 (LF 570, 2WD): 3135 (1422) 67982 (LF 570, 4WD): 3274 (1485) 67980 (LF 550 Turbo, 4WD): 2974 (1349) 67983 (LF 570 Turbo, 4WD): 3284 (1490)
Overall Cutting Width	in. (mm)	100 (2540)
Overall Width	in. (mm)	Mow: 115 (2921) Transport: 87 (2210)
Overall Height with OPS	in. (mm)	89 (2261)
Overall Length	in. (mm)	LF 550/550 Turbo: 120 (3048) LF 570/570 Turbo: 121 (3073)

2

## Standard Torque Values

### NOTICE

All torque values included in these charts are approximate and are for reference only. Use of these torque values is at your sole risk. Jacobsen is not responsible for any loss, claim, or damage arising from the use of these charts.





Extreme caution should always be used when using any torque value.

### NOTE





Jacobsen uses Grade 5 plated bolts as standard, unless otherwise noted. When tightening plated bolts, use the value given for lubricated.

2

## Inch Fastener Torque Values

AMERICAN NATIONAL STANDARD FASTENERS											
SIZE	UNITS					SIZE	UNITS				
		Lubricated	Dry	Lubricated	Dry			Lubricated	Dry	Lubricated	Dry
#6-32	in-lb (Nm)	–	20 (2.3)	–	–	7/16-14	ft-lb (Nm)	37 (50.1)	50 (67.8)	53 (71.8)	70 (94.9)
#8-32	in-lb (Nm)	–	24 (2.7)	–	30 (3.4)	7/16-20	ft-lb (Nm)	42 (56.9)	55 (74.6)	59 (80.0)	78 (105)
#10-24	in-lb (Nm)	–	35 (4.0)	–	45 (5.1)	1/2-13	ft-lb (Nm)	57 (77.2)	75 (101)	80 (108)	107 (145)
#10-32	in-lb (Nm)	–	40 (4.5)	–	50 (5.7)	1/2-20	ft-lb (Nm)	64 (86.7)	85 (115)	90 (122)	120 (162)
#12-24	in-lb (Nm)	–	50 (5.7)	–	65 (7.3)	9/16-12	ft-lb (Nm)	82 (111)	109 (148)	115 (156)	154 (209)
1/4-20	in-lb (Nm)	75 (8.4)	100 (11.3)	107 (12.1)	143 (16.1)	9/16-18	ft-lb (Nm)	92 (124)	122 (165)	129 (174)	172 (233)
1/4-28	in-lb (Nm)	85 (9.6)	115 (13.0)	120 (13.5)	163 (18.4)	5/8-11	ft-lb (Nm)	113 (153)	151 (204)	159 (215)	211 (286)
5/16-18	in-lb (Nm)	157 (17.7)	210 (23.7)	220 (24.8)	305 (34.4)	5/8-18	ft-lb (Nm)	128 (173)	170 (230)	180 (244)	240 (325)
5/16-24	in-lb (Nm)	173 (19.5)	230 (26.0)	245 (27.6)	325 (36.7)	3/4-10	ft-lb (Nm)	200 (271)	266 (360)	282 (382)	376 (509)
3/8-16	ft-lb (Nm)	23 (31.1)	31 (42.0)	32 (43.3)	44 (59.6)	3/4-16	ft-lb (Nm)	223 (302)	298 (404)	15 (427)	420 (569)
3/8-24	ft-lb (Nm)	26 (35.2)	35 (47.4)	37 (50.1)	50 (67.8)	7/8-14	ft-lb (Nm)	355 (481)	473 (641)	500 (678)	668 (905)

## Metric Fastener Torque Values

METRIC FASTENERS										
SIZE	UNITS									Non-Critical Fasteners into Aluminum
		Lubricated	Dry	Lubricated	Dry	Lubricated	Dry	Lubricated	Dry	
M4	Nm (in-lb)	–	–	–	–	–	–	3.83 (34)	5.11 (45)	2.0 (18)
M5	Nm (in-lb)	1.80 (16)	2.40 (21)	4.63 (41)	6.18 (54)	6.63 (59)	8.84 (78)	7.75 (68)	10.3 (91)	4.0 (35)
M6	Nm (in-lb)	3.05 (27)	4.07 (36)	7.87 (69)	10.5 (93)	11.3 (102)	15.0 (133)	13.2 (117)	17.6 (156)	6.8 (60)
M8	Nm (in-lb)	7.41 (65)	9.98 (88)	19.1 (69)	25.5 (226)	27.3 (241)	36.5 (323)	32.0 (283)	42.6 (377)	17.0 (150)
M10	Nm (ft-lb)	14.7 (11)	19.6 (14)	37.8 (29)	50.5 (37)	54.1 (40)	72.2 (53)	63.3 (46)	84.4 (62)	33.9 (25)
M12	Nm (ft-lb)	25.6 (19)	34.1 (25)	66.0 (48)	88.0 (65)	94.5 (70)	125 (92)	110 (81)	147 (108)	61.0 (45)
M14	Nm (ft-lb)	40.8 (30)	54.3 (40)	105 (77)	140 (103)	150 (110)	200 (147)	175 (129)	234 (172)	94.9 (70)

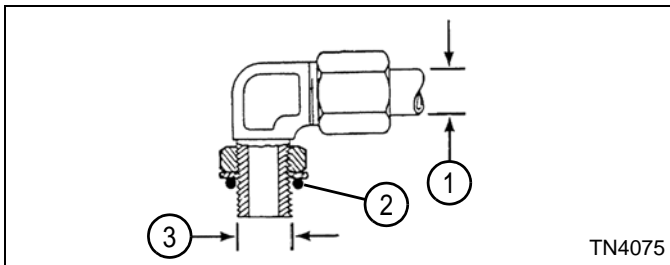
## Hydraulic Hose, Tube, and Fitting General Instructions

### O-Ring Installation

- Always install new O-rings.
- On hoses with O-ring fittings, make sure O-rings are properly seated before tightening.
- O-rings should be lubricated with the fluid to be used in the system prior to assembly.

2

### Boss Fitting O-Ring Installation



1 Tubing O.D. or Hose I.D. 2 O-Ring 3 Thread Size

### Replacement O-Rings for O-Ring Boss Fittings

Tubing O.D. or Hose I.D.	Thread Size	Jacobsen Part Number
1/8	5/16-24	459290
3/16	3/8-24	459291
1/4	7/16-20	339896
5/16	1/2-20	459293
3/8	9/16-18	339897
1/2	3/4-16	339898
5/8	7/8-14	339899
3/4	1-1/16-12	339900
7/8	1-3/16-12	459296
1	1-5/16-12	339901
1-1/4	1-5/8-12	339902
1-1/2	1-7/8-12	339903
2	2-1/2-12	459300

### O-Ring Seal Kits



TN4097

- SAE Boss O-Ring Kit Jacobsen PN 5002452
- O-Ring Face Seal (ORS) O-Ring Kit PN 5002454
- Common O-Ring Sizes Kit PN 5002453

### Replacement O-Rings for ORS (Face Seal) Fittings

ORS (Face Seal) Tube Size	ORS (Face Seal) O-Ring Size	Jacobsen Part Number
4	11	339908
6	12	339909
8	14	339910
10	16	339911
12	18	339912
16	21	339913
20	25	339914
24	29	339915

### Hydraulic Hose Installation

Hold the fixed portion of the hose coupling with one wrench; use a second wrench to tighten or loosen the hose nut. This will avoid damaging the fitting seal. When tightening a hose, do not permit the hose to twist; hold the hose in a normal straight position.

When installing hoses, place fittings at angles to avoid contact with fixed parts when turning. Make sure hoses are assembled to proper "A" and "B" ports on components.

### Hydraulic Hose and Tube Torque Values

Size		lb-ft		N-m	
Dash	Fractional	Min	Max	Min	Max
-4	1/4	10	12	14	16
-6	3/8	18	20	24	27
-8	1/2	32	40	43	54
-10	5/8	46	56	60	75
-12	3/4	65	80	90	110
-16	1	92	105	125	240
-20	1-1/4	125	140	170	190
-24	1-1/2	150	180	200	246



---

<b>Specifications</b> .....	<b>3-2</b>
General Engine Specifications .....	3-2
Repair Specifications .....	3-2
<b>Component Location</b> .....	<b>3-3</b>
Kubota V1505 .....	3-3
<b>Checks and Adjustments</b> .....	<b>3-5</b>
Purging the Fuel System .....	3-5
<b>Repair</b> .....	<b>3-6</b>
Fan Belt .....	3-6
Air Cleaner Assembly .....	3-7
Muffler and Exhaust Assembly .....	3-8
Exhaust Manifold—Naturally Aspirated Engine .....	3-9
Exhaust Manifold and Turbocharger .....	3-9
Radiator/Hydraulic Oil Cooler .....	3-10
Engine Oil Cooler (Turbocharger Engine Only) .....	3-12
Thermostat .....	3-12
Fuel Filter .....	3-13
Fuel Pump .....	3-14
Engine .....	3-15
Engine Service .....	3-18

## Specifications

### General Engine Specifications

Engine		
Manufacturer/Models		Kubota <sup>®</sup> Interim Tier 4/Stage IIIA V1505-E3B
		Kubota <sup>®</sup> Interim Tier 4/Stage IIIA V1505-T-E3B
Engine Type		4-Stroke, Diesel
Fuel Requirement		No. 2-D Diesel Fuel (Cetane Rating 45)
Number of Cylinders/Configuration		4, In-Line
Displacement	cu in. (cc)	91.41 (1498)
Bore x Stroke	in. (mm)	3.07 x 3.09 (78 x 78.4)
Power Output—V1505-E3B	hp (kW)	35.5 (26.5) @ 3000 rpm
Power Output—V1505-T-E3B	hp (kW)	44.2 (33.0) @ 3000 rpm
Firing Order		1-3-4-2
Compression Ratio		23:1
Injection Timing (Before T.D.C.)		17°
Cooling System		Liquid Cooled
Cooling System Capacity—V1505-E3B (Engine Only)	qt (L)	2.4 (2.3)
Cooling System Capacity—V1505-T-E3B (Engine Only)	qt (L)	3 (2.8)
Idle Speed		1200 rpm
Maximum Speed (No Load)		3150 rpm
Engine Oil Capacity	qt (L)	7.1 (6.7)
Alternator		12 volt, 40 amp
Dry Weight—V1505-E3B	lb (kg)	242.5 (110.0)
Dry Weight—V1505-T-E3B	lb (kg)	251.3 (114.0)

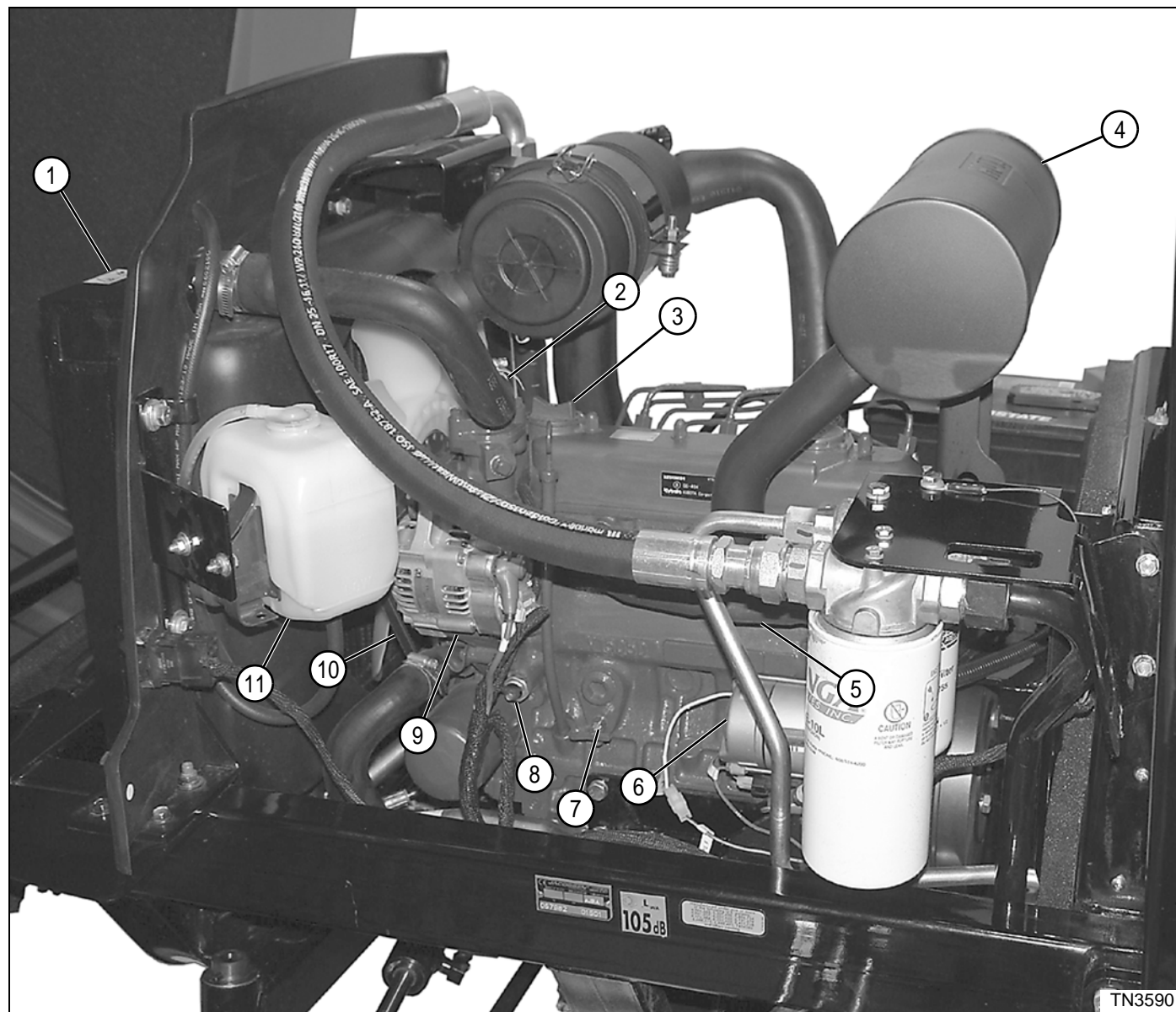
### Repair Specifications

Specification		
Muffler Tailpipe Mounting Screw	lb-ft (N-m)	35–40 (47.5–54.2)

## Component Location

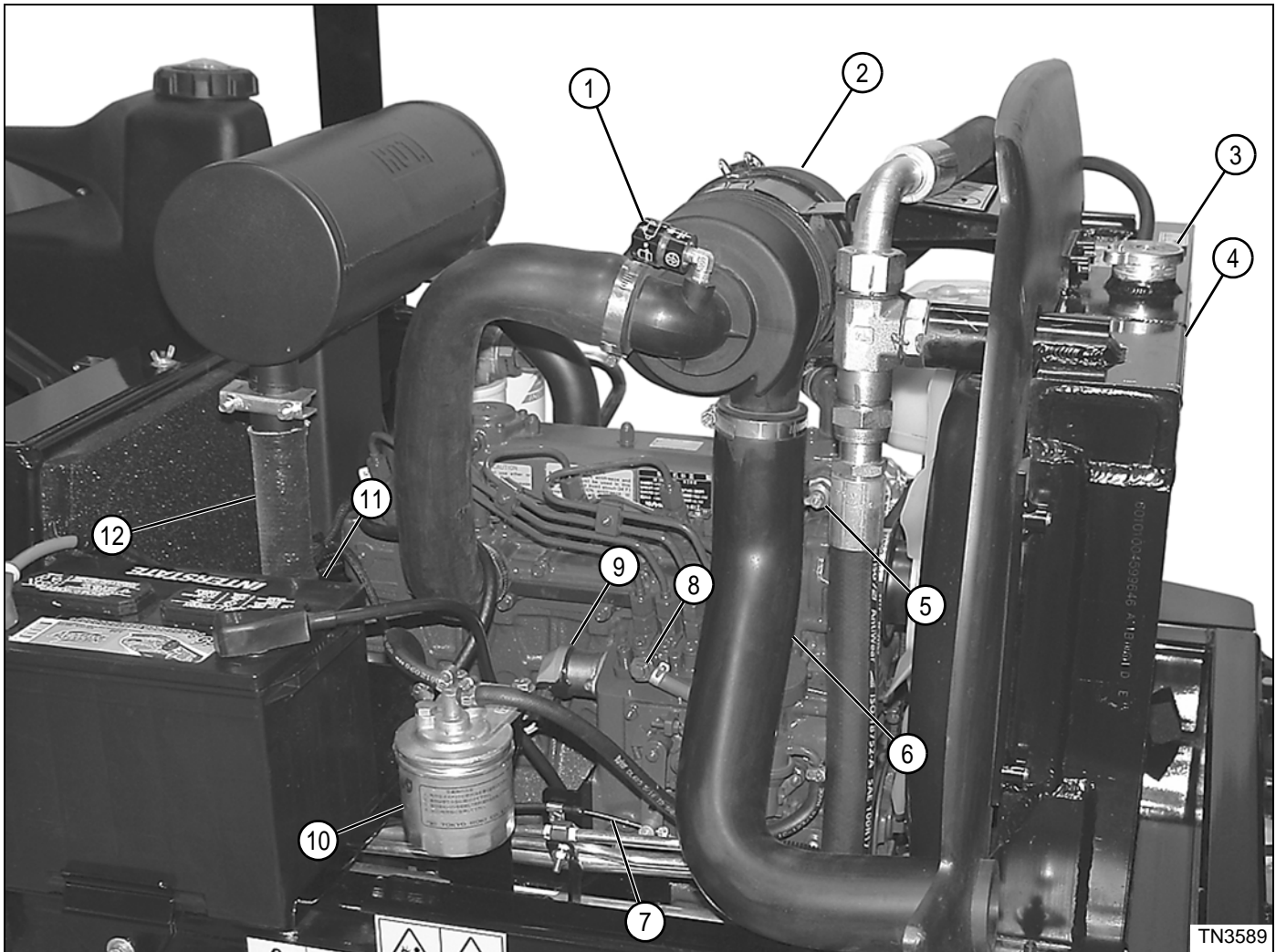
### Kubota V1505

See Figures 3-1 and 3-2.



- |   |                               |    |                            |
|---|-------------------------------|----|----------------------------|
| 1 | Radiator/Hydraulic Oil Cooler | 7  | Engine Coolant Drain Valve |
| 2 | Thermostat                    | 8  | Engine Oil Pressure Switch |
| 3 | Engine Oil Fill Cap           | 9  | Alternator                 |
| 4 | Muffler                       | 10 | Fan Belt                   |
| 5 | Exhaust Manifold              | 11 | Coolant Overflow Bottle    |
| 6 | Starter Motor                 |    |                            |

**Figure 3-1: Component Location—Right Side**



- |   |                                    |    |                       |
|---|------------------------------------|----|-----------------------|
| 1 | Air Cleaner Indicator              | 7  | Throttle Cable        |
| 2 | Air Cleaner Assembly               | 8  | Air Vent Screw        |
| 3 | Engine Coolant Filler/Pressure Cap | 9  | Fuel Shutoff Solenoid |
| 4 | Radiator/Hydraulic Oil Cooler      | 10 | Fuel Filter           |
| 5 | Engine Temperature Sensor          | 11 | Battery               |
| 6 | Air Intake Hose                    | 12 | Insulating Sleeve     |

**Figure 3-2: Component Location—Left Side**

## Checks and Adjustments

### Purging the Fuel System

#### Adjustment

See Figures 3-3 through 3-5.



#### CAUTION

Do not purge fuel system when engine is hot.

#### NOTE

Fuel system will need to be purged of air whenever fuel filter or fuel lines are removed, fuel tank is completely emptied, or engine has not been used for an extended time.

1. Park the mower safely. (See "Park Mower Safely" on page 1-6.)
2. Raise the hood.

#### NOTE

Be sure fuel tank is filled with clean, fresh diesel fuel and that the fuel outlet shutoff valve on bottom of fuel tank is open before performing a purge of fuel system. Place a suitable container under filter to catch fuel that will flow from air vent screw hole.

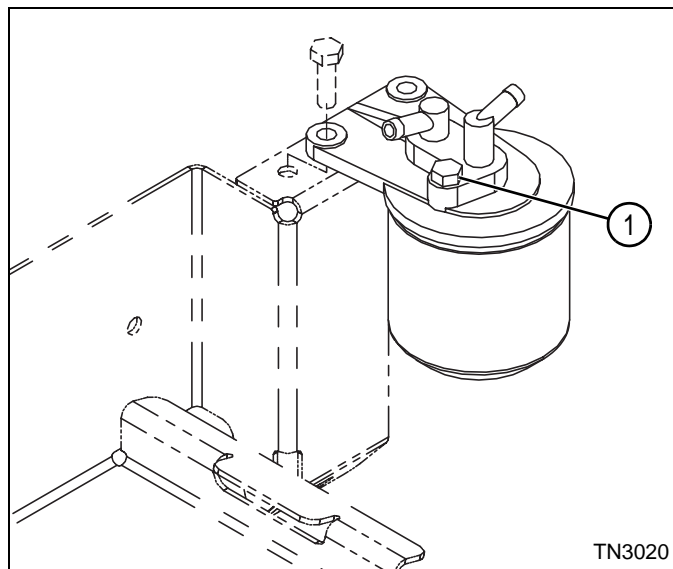


Figure 3-3

3. Loosen air vent screw (1) at top of filter by turning it counterclockwise two turns.



#### WARNING

The engine may start during this process. Be careful of injury due to moving components. If the engine starts, continue purging the fuel system.

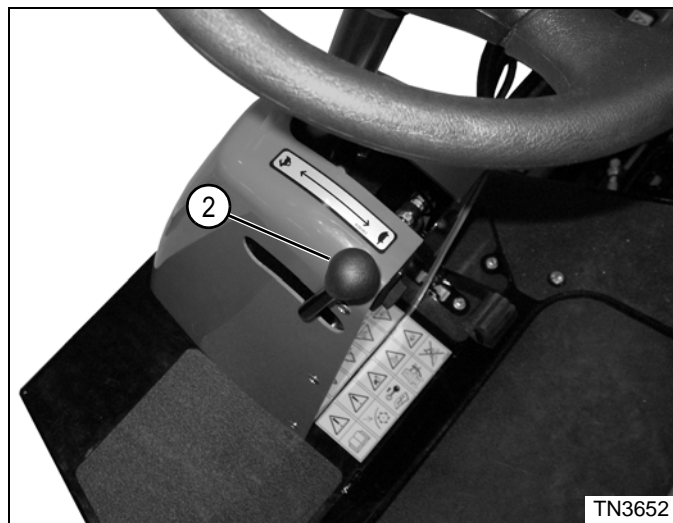


Figure 3-4

4. Place throttle control lever (2) in slowest position, and crank engine over for approximately 10 seconds.
5. When bubbles no longer appear in fuel coming out of air vent screw hole, tighten air vent screw.
6. Turn ignition switch to off position.

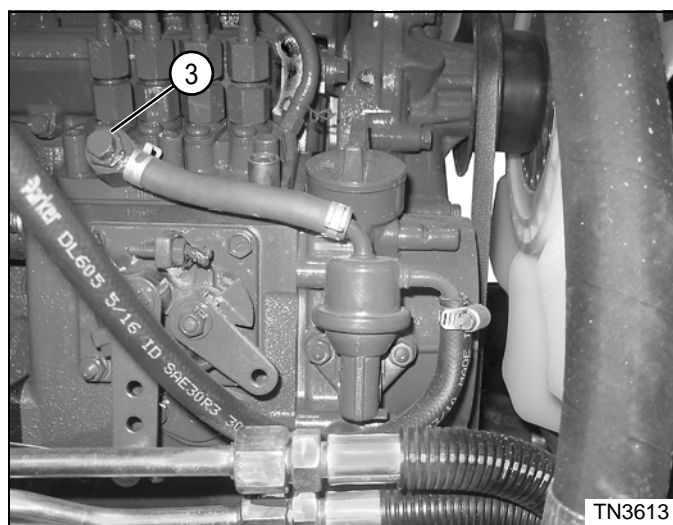


Figure 3-5

7. Loosen air vent screw (3) on fuel pump by turning it counterclockwise two turns.



**WARNING**

The engine may start during this process. Be careful of injury due to moving components. If the engine starts, continue purging the fuel system.

8. Crank engine over for approximately 10 seconds.
9. When bubbles no longer appear in fuel coming out of air vent plug hole, tighten air vent plug.
10. Turn ignition switch to off position.

3

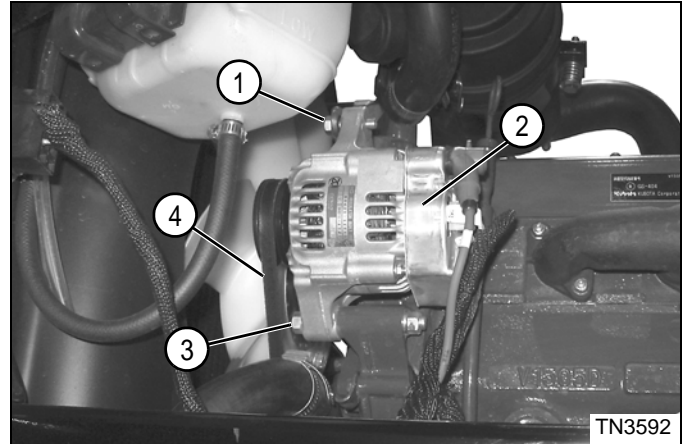
## Repair

### Fan Belt

#### Removal and Installation

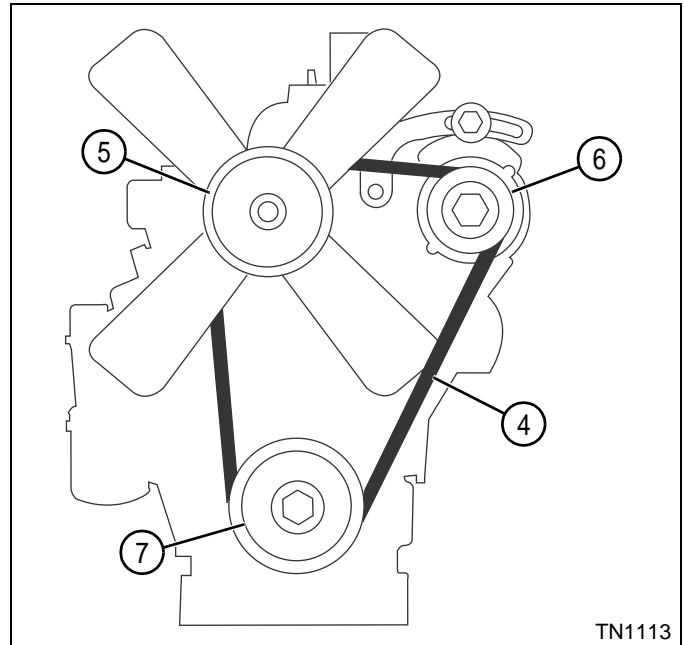
See Figures 3-6 and 3-7.

1. Park the mower safely. (See “Park Mower Safely” on page 1-6.)
2. Raise the hood.
3. Disconnect battery negative (-) cable at battery.



**Figure 3-6**

4. Loosen screws (1 and 3) and push alternator (2) toward engine to loosen fan belt (4).



**Figure 3-7**

5. Remove fan belt (4) from alternator (6), engine coolant pump (5), and crankshaft pulley (7).



### Installation Notes

- Install fan belt by reversing order of removal.
- Adjust belt tension by loosening alternator mounting screws (1 and 3) and pulling alternator (2) against belt (4) until proper tension is achieved.
- Measure belt tension at midpoint between pulleys. Adjust alternator belt to 0.25–0.313 in. (6 to 8 mm) deflection with a tension of 20 lb (89 N).
- See engine manufacturer's manual for further information.

## Air Cleaner Assembly

### Removal and Installation

See Figures 3-8 through 3-10.



### CAUTION

- Do not open the air cleaner assembly for inspection and cleaning until the air filter restriction gauge indicates an air filter restriction. Removing the air filter increases the possibility of dust, dirt, and contaminants entering the engine.
- Do not remove the air filter with the engine running.

### NOTES

- Air filter on this engine is a dry type; never apply oil to this air filter.
  - Naturally aspirated engine shown; turbocharged engine is similar.
1. Park the mower safely. (See "Park Mower Safely" on page 1-6.)
  2. Raise the hood.

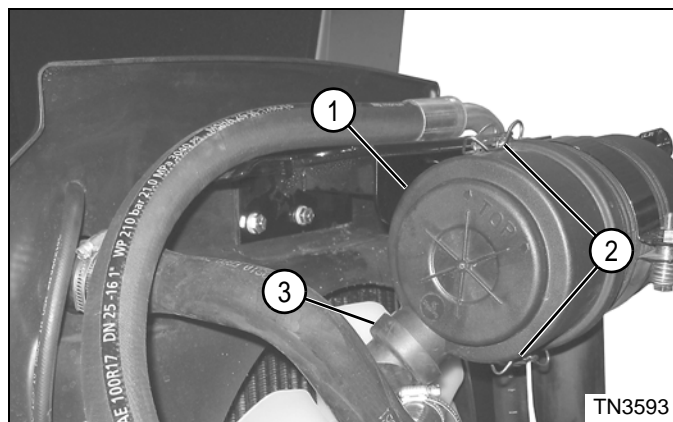


Figure 3-8

### NOTE

Note orientation of air inlet (3) before removing air filter dust cap (1) to ensure correct installation.

3. Release retaining clips (2) and remove air filter dust cap (1).
4. Using damp, lint-free cloths, thoroughly clean inside of dust cap.

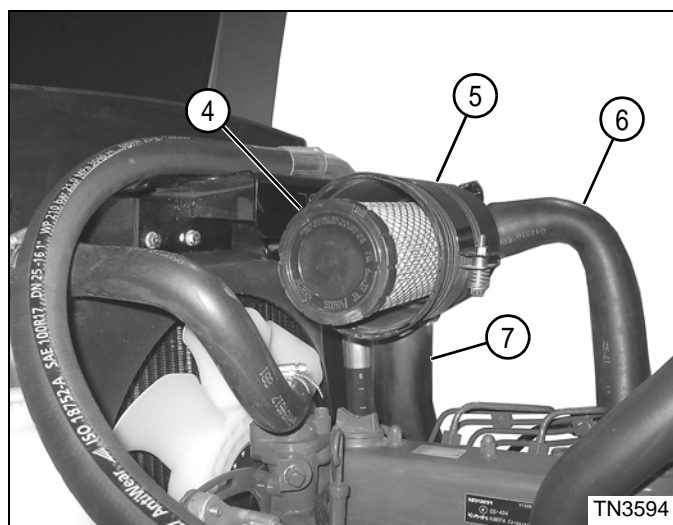


Figure 3-9

5. Pull air filter element (4) from filter housing (5). Using damp, lint-free cloths, clean inside of filter housing.
6. Inspect air intake hoses (6 and 7) for wear or damage, and replace as necessary.

## ENGINE

### Installation Notes

- Install air cleaner assembly by reversing order of removal.
- Install dust cap with air inlet (3) located at bottom of assembly.

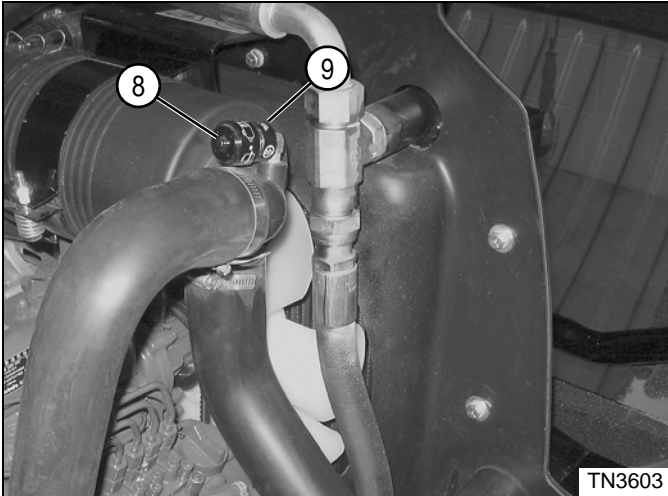


Figure 3-10

- Reset air filter indicator by pressing button (8) on end of indicator (9).

## Muffler and Exhaust Assembly

### Removal

See Figure 3-11.



### CAUTION

Do not attempt to service the exhaust system when the engine is hot. Serious personal injury can occur.

1. Park the mower safely. (See "Park Mower Safely" on page 1-6.)
2. Allow engine to cool completely.
3. Raise the hood.

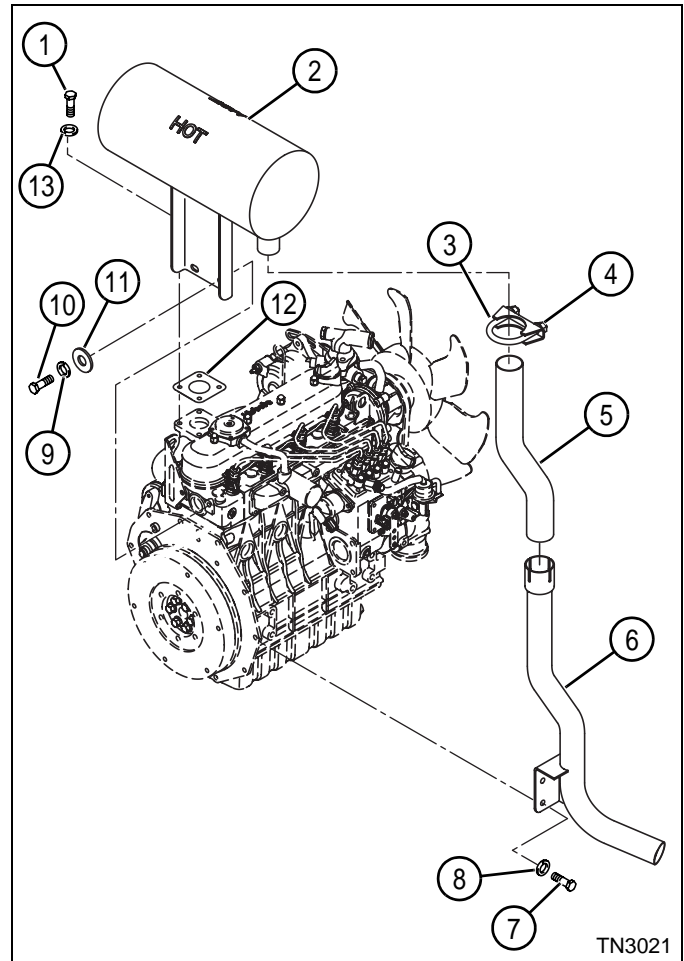


Figure 3-11

4. Remove two nuts (4) from U-bolt (3).
5. Remove two screws (7) and two lock washers (8).
6. Disengage and remove insulating sleeve (5) and tailpipe (6).
7. Remove two screws (10), two lock washers (9), and two flat washers (11).
8. Remove four screws (1) and lock washers (13).
9. Remove muffler (2) and gasket (12).

### Installation

#### NOTE

Install new gasket during installation.

1. Install gasket (12).
2. Install muffler (2) and install, but do not tighten, four screws (1) and four lock washers (13).
3. Install, but do not tighten, two screws (10), two lock washers (9), and two flat washers (11).
4. Tighten four screws (1)
5. Tighten two screws (10).



6. Install insulating sleeve (5), tailpipe (6), and U-bolt (3), and install, but do not tighten, two nuts (4).
7. Install two screws (7) and two lock washers (8). Tighten screws (7) to 35–40 lb-ft (47.5–54.2 N·m).
8. Tighten two nuts (4).

## Exhaust Manifold—Naturally Aspirated Engine

### Removal and Installation

See Figure 3-12.

#### WARNING

Engine components will become hot during operation. Allow engine components to cool before performing service. Failure to follow safety recommendations may result in injury.

1. Park the mower safely. (See “Park Mower Safely” on page 1-6.)
2. Allow engine to cool completely.
3. Raise the hood.
4. Remove muffler and exhaust assembly. (See “Muffler and Exhaust Assembly” on page 3-8.)

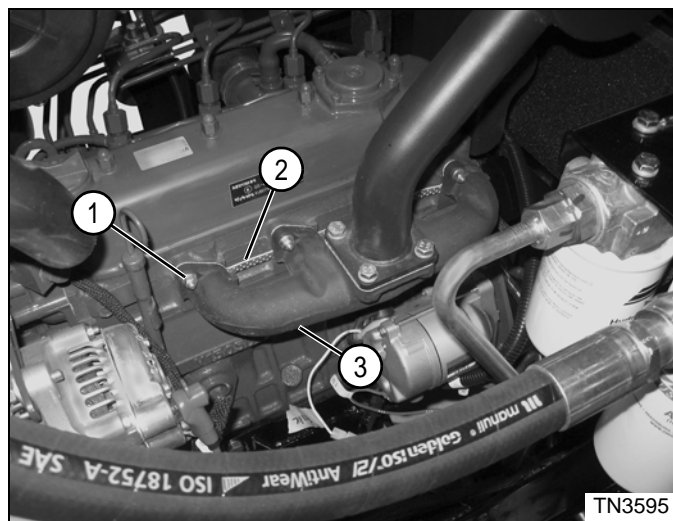


Figure 3-12

5. Remove eight nuts (1).
6. Remove exhaust manifold (3) and exhaust manifold gasket (2).

#### Installation Notes

- Clean gasket surfaces.
- Use new gaskets during installation.
- Install exhaust manifold by reversing order of removal.

## Exhaust Manifold and Turbocharger

### Removal and Installation

See Figure 3-13.

#### WARNING

Engine components will become hot during operation. Allow engine components to cool before performing service. Failure to follow safety recommendations may result in injury.

1. Park the mower safely. (See “Park Mower Safely” on page 1-6.)
2. Allow engine to cool completely.
3. Raise the hood.
4. Remove muffler and exhaust assembly. (See “Muffler and Exhaust Assembly” on page 3-8.)

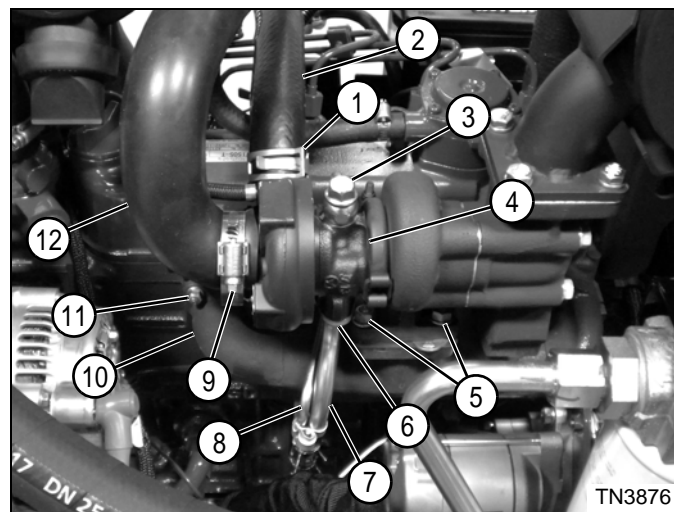


Figure 3-13

5. Loosen hose clamps (9 and 1), and remove hoses (12 and 2) from turbocharger (4).
6. Remove banjo fitting bolt (3) from turbocharger.
7. Disconnect oil feed tube (8) from engine oil pressure switch.
8. Remove two screws (6) from turbocharger.
9. Remove oil return tube (7).
10. Remove screws (5), and remove turbocharger.
11. Remove eight nuts (11) and remove exhaust manifold (10).

#### Installation Notes

- Clean gasket surfaces.
- Use new gaskets during installation.
- Install exhaust manifold and turbocharger assembly by reversing order of removal.

## Radiator/Hydraulic Oil Cooler

### Removal

See Figures 3-14 through 3-19.



### WARNING

Never remove the radiator cap when the coolant is hot. The engine must be shut down and cooled before the radiator cap is removed. Very hot coolant will be sprayed from the radiator if the cap is loosened before the engine has cooled. Serious personal injury can occur.

1. Park the mower safely. (See “Park Mower Safely” on page 1-6.)
2. Allow engine to cool completely.
3. Raise the hood.

### NOTES

- The engine coolant capacity (engine only) for non-turbo models is 2.4 qt (2.3 L) and 3 qt (2.8 L) for turbo models. Have suitable containers that can hold up to 5 qt (4.7 L) when draining engine coolant.
  - The hydraulic oil tank capacity is 14 gal (53 L). Have suitable container(s) that can hold up to 15 gal (57 L) when draining hydraulic oil.
4. Drain engine cooling system.
  5. Drain hydraulic oil system. (See “Hydraulic Oil Tank—Drain Procedure” on page 6-52.)

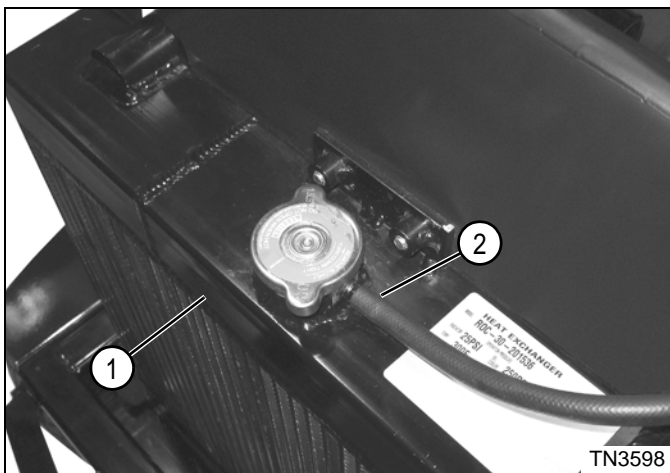


Figure 3-14

### NOTE

Label all hoses before removing to ensure correct installation.

6. Disconnect overflow hose (2) from radiator/hydraulic oil cooler (1).

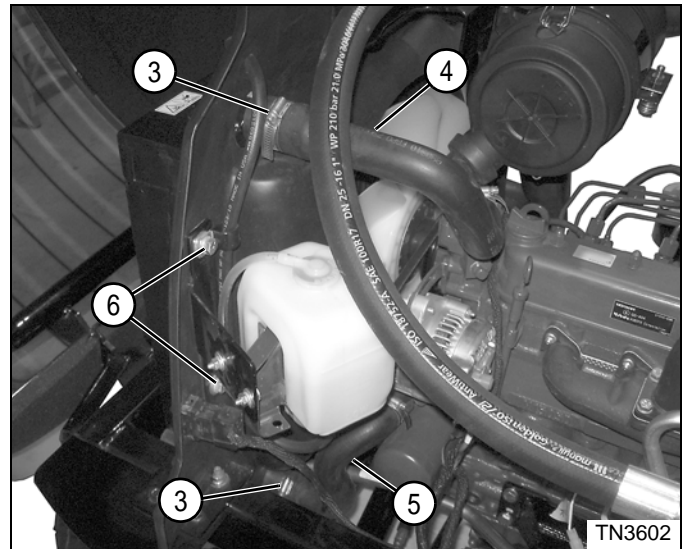


Figure 3-15

7. Loosen hose clamps (3) and disconnect upper hose (4) and lower hose (5) from radiator/hydraulic oil cooler.
8. Remove overflow bottle bracket screws (6) from radiator fan shroud. Set overflow bottle assembly aside.

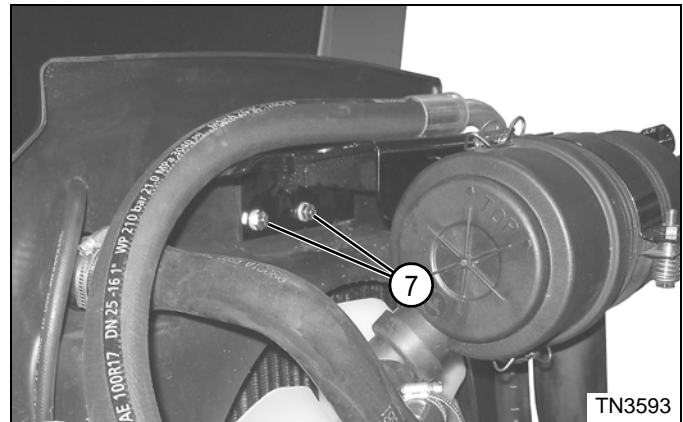


Figure 3-16

9. Remove air filter housing bracket screws (7).

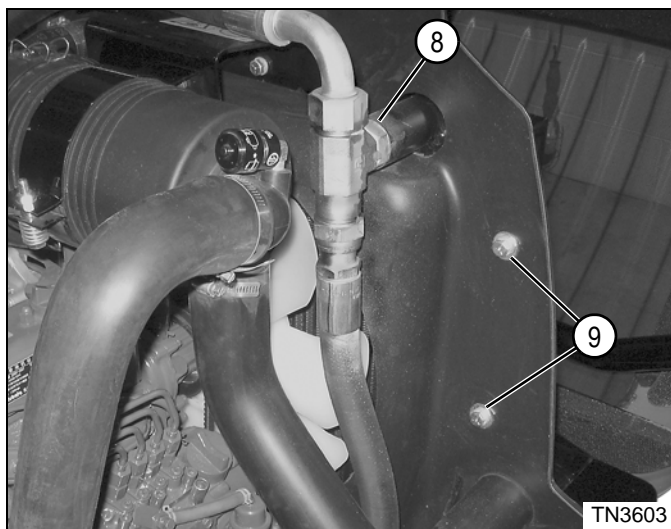


Figure 3-17

**NOTE**

Plug hoses after disconnecting to prevent loss of hydraulic oil.

10. Disconnect upper hydraulic hose (8) from radiator/hydraulic oil cooler.
11. Remove screws (9).

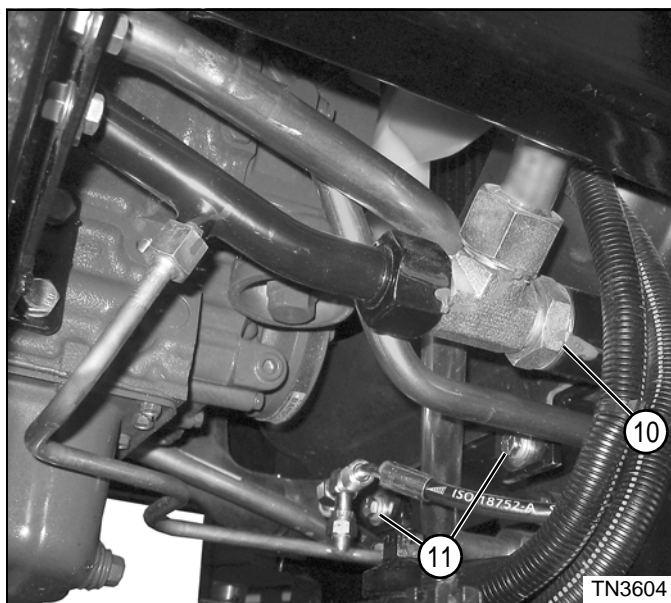


Figure 3-18

12. Disconnect lower hydraulic hose (10) from bottom of radiator/hydraulic oil cooler.
13. Remove screws (11).

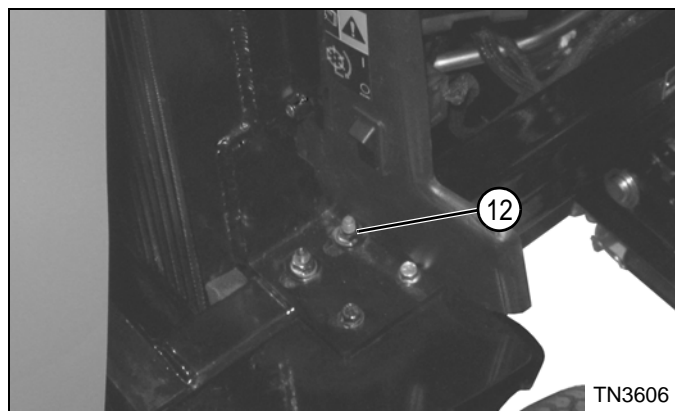


Figure 3-19

14. Remove four radiator/hydraulic cooler mounting bracket nuts (12).
15. Carefully remove radiator/hydraulic cooler from mount.

**NOTE**

Dispose of fluids properly at approved local recycling centers. If recycling facilities are not available, contact your local environmental department for correct disposal procedure of fluids.

**Installation**

1. With lower radiator hose removed from radiator, flush inside of radiator with fresh water.
2. Install radiator/hydraulic oil cooler by reversing order of removal.
3. Fill radiator with clean water and ethylene glycol based antifreeze mixed for coldest ambient temperature.
4. Install radiator cap and start engine following instructions in "Safety and Operation Manual."

**CAUTION**

Allow the engine coolant to completely cool before removing the radiator cap. Hot coolant sprayed from the cap can cause serious personal injury.

5. When engine reaches normal operating temperature, check and fill coolant overflow reservoir to hot full level.



## Engine Oil Cooler (Turbocharger Engine Only)

### Removal and Installation

See Figure 3-20.

1. Park the mower safely. (See "Park Mower Safely" on page 1-6.)
2. Allow engine to cool completely.

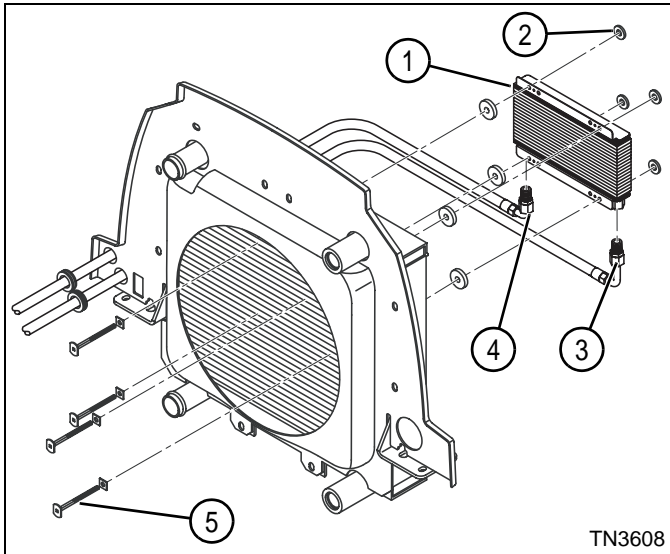


Figure 3-20

### NOTES

- Label all hoses before disconnecting to ensure correct installation.
  - Plug hoses after disconnecting to prevent loss of engine oil.
3. Disconnect hoses (3 and 4) from engine oil cooler (1).
  4. Remove four clips (2) from four ties (5).
  5. Remove engine oil cooler.

### Installation Note

Install engine oil cooler by reversing order of removal.

## Thermostat

### Removal and Installation

See Figure 3-21.

1. Park the mower safely. (See "Park Mower Safely" on page 1-6.)
2. Allow engine to cool completely.
3. Raise the hood.



### WARNING

Engine coolant is hot and under pressure! Allow the cooling system to cool completely before performing service.

Rotate the filler cap 1/2 turn counterclockwise and allow pressure to vent before removing filler cap.

4. Drain approximately 0.5 qt (0.5 L) of coolant from engine cooling system into a clean, safe container.
5. Remove air cleaner assembly. (See "Air Cleaner Assembly" on page 3-7.)

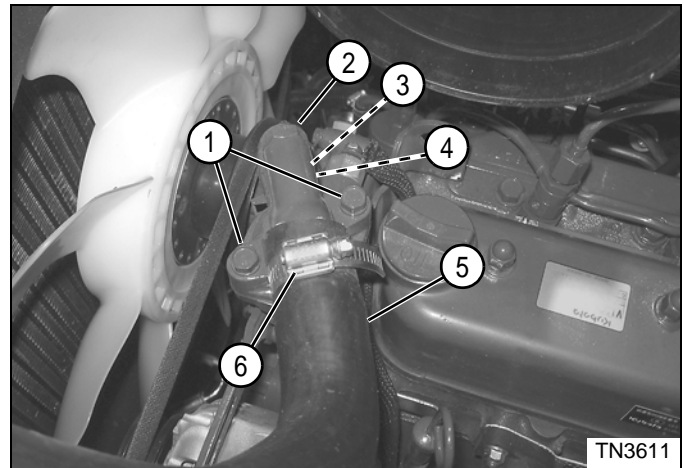


Figure 3-21

6. Loosen hose clamp (6) and remove hose (5) from thermostat housing (2).
7. Remove two screws (1).
8. Remove thermostat housing (2), gasket (3), and thermostat (4).

### Installation Notes

- Clean gasket surface.
- Use a new gasket during installation.
- Install thermostat by reversing order of removal.
- Fill radiator with clean water and ethylene glycol based antifreeze mixed for coldest ambient temperature.

## Fuel Filter

### Removal and Installation

See Figures 3-22 through 3-24.



#### CAUTION

Diesel fuel is highly flammable—handle with care. Use an approved container with a spout that will fit inside the fuel filler neck. Avoid using unapproved containers to transport fuel. Keep all fuel containers clean and closed when not in use.

1. Park the mower safely. (See “Park Mower Safely” on page 1-6.)
2. Allow engine to cool completely.
3. Disconnect battery negative (–) cable at battery.

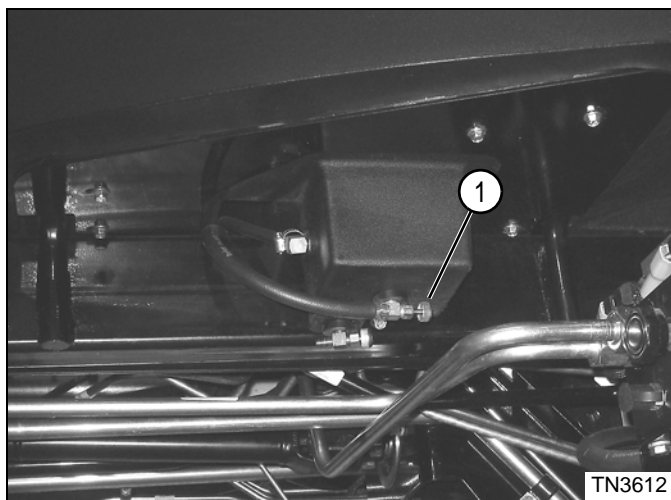


Figure 3-22

4. Turn fuel outlet shutoff valve (1) clockwise to close valve.

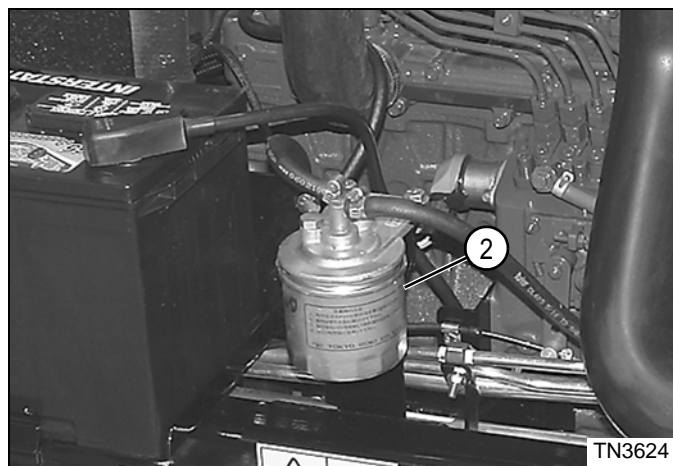


Figure 3-23

5. Thoroughly clean fuel filter (2) and area surrounding fuel filter.
6. Turn fuel filter counterclockwise to remove it. Drain excess fuel into an appropriate container.



#### CAUTION

Dispose of fuel properly. Contact the local environmental department for instructions on disposing of unwanted fuel products.

7. Clean inside and outside of fuel filter head.
8. Lightly lubricate fuel filter seal with clean oil, and install. Tighten filter hand tight plus one-half turn.

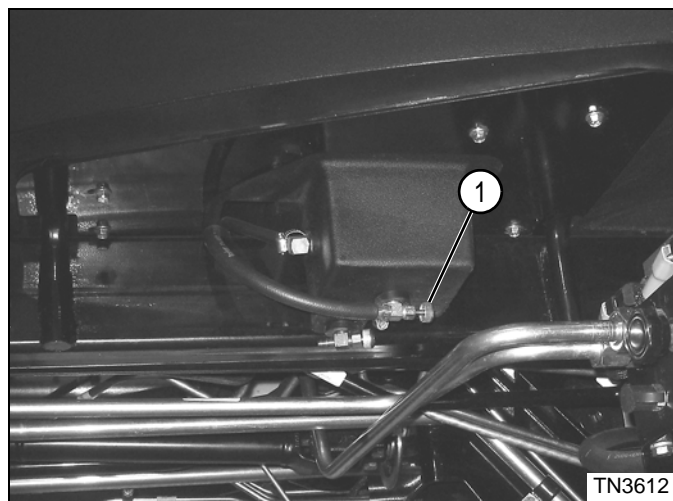


Figure 3-24

9. Turn fuel outlet shutoff valve (1) counterclockwise to open valve.
10. Purge air from fuel system. (See “Purging the Fuel System” on page 3-5.)

## Fuel Pump

### Removal and Installation

See Figures 3-25 through 3-27.



#### CAUTION

Diesel fuel is highly flammable—handle with care. Use an approved container with a spout that will fit inside the fuel filler neck. Avoid using unapproved containers to transport fuel. Keep all fuel containers clean and closed when not in use.

#### NOTE

Naturally aspirated engine shown; turbocharged engine is similar.

1. Park the mower safely. (See “Park Mower Safely” on page 1-6.)
2. Allow engine to cool completely.
3. Disconnect battery negative (–) cable at battery.

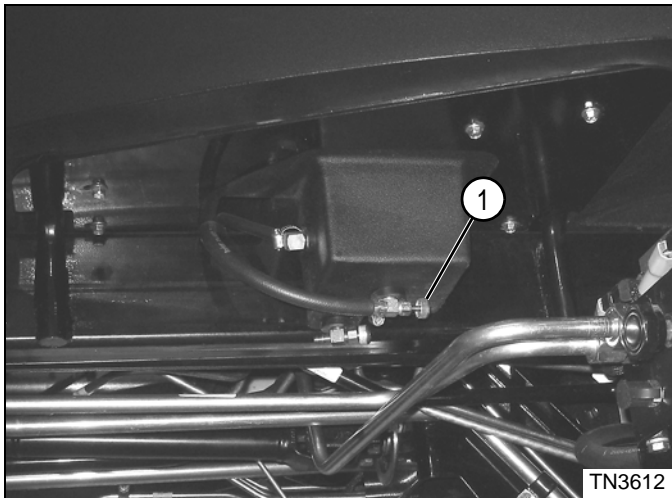


Figure 3-25

4. Turn fuel outlet shutoff valve (1) clockwise to close valve.

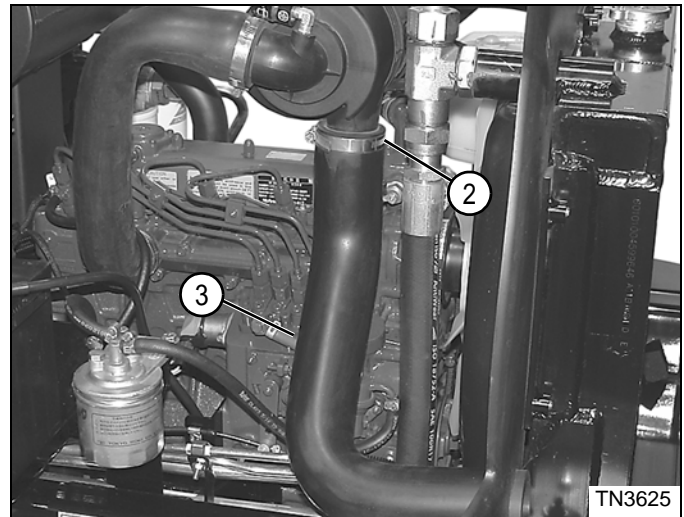


Figure 3-26

5. Loosen hose clamp (2) and remove air cleaner intake hose (3).

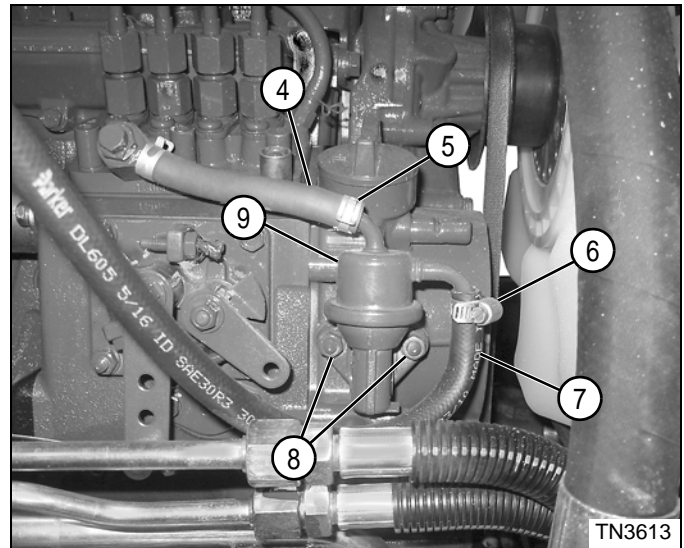


Figure 3-27

6. Place a suitable container under fuel pump (9) to catch fuel that will flow from fuel hoses.
7. Loosen hose clamp (5) and disconnect hose (4) from fuel pump.
8. Loosen hose clamp (6) and disconnect hose (7) from fuel pump.
9. Remove two nuts (8).
10. Remove fuel pump.

#### Installation Note

Install fuel pump by reversing order of removal.

## Engine

### Removal and Installation

See Figures 3-28 through 3-36.

#### NOTE

*Naturally aspirated engine shown; turbocharged engine is similar.*

1. Park the mower safely. (See "Park Mower Safely" on page 1-6.)
2. Allow engine to cool completely.
3. Disconnect battery negative (-) cable at battery.
4. Drain engine oil.
5. Remove engine oil cooler (turbo models only). (See "Engine Oil Cooler (Turbocharger Engine Only)" on page 3-12.)
6. Remove radiator/hydraulic cooler. (See "Radiator/Hydraulic Oil Cooler" on page 3-10.)
7. Remove drive shaft. (See "Drive Shaft" on page 5-60.)
8. Remove muffler and exhaust assembly. (See "Muffler and Exhaust Assembly" on page 3-8.)

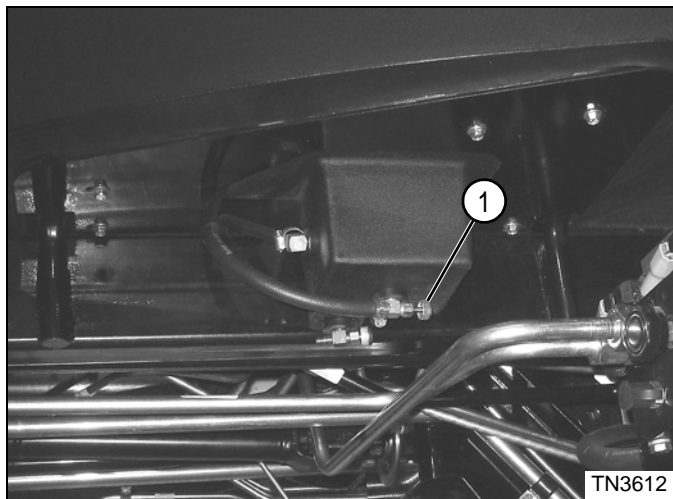


Figure 3-28

9. Turn fuel outlet shutoff valve (1) clockwise to close valve.

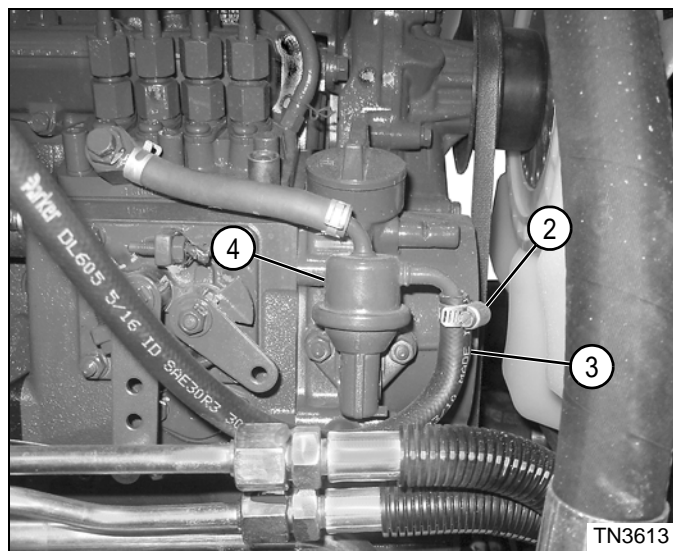


Figure 3-29

10. Loosen hose clamp (2) and disconnect hose (3) from fuel pump (4).

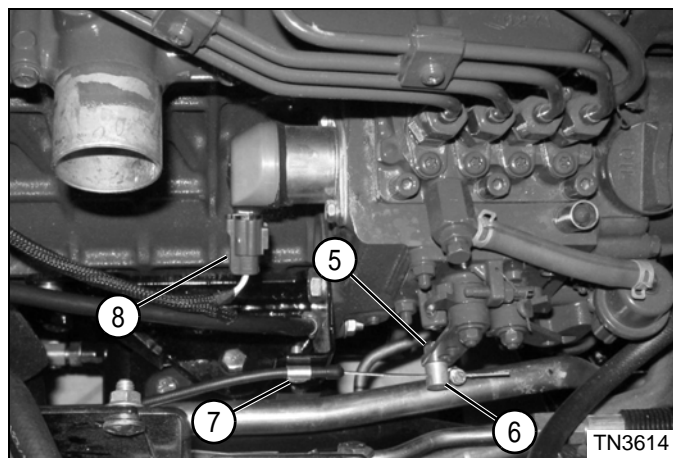


Figure 3-30

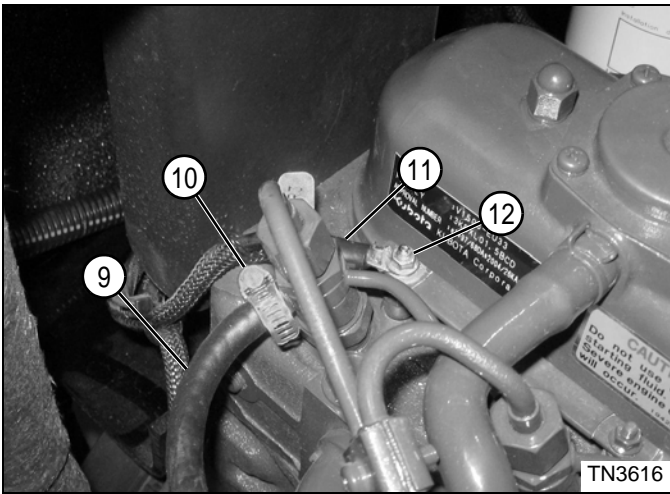
11. Remove throttle cable hold-down bolt (7).
12. Remove nut (5) from throttle cable wire stop (6).

#### NOTE

*Label all wires before disconnecting to ensure correct installation.*

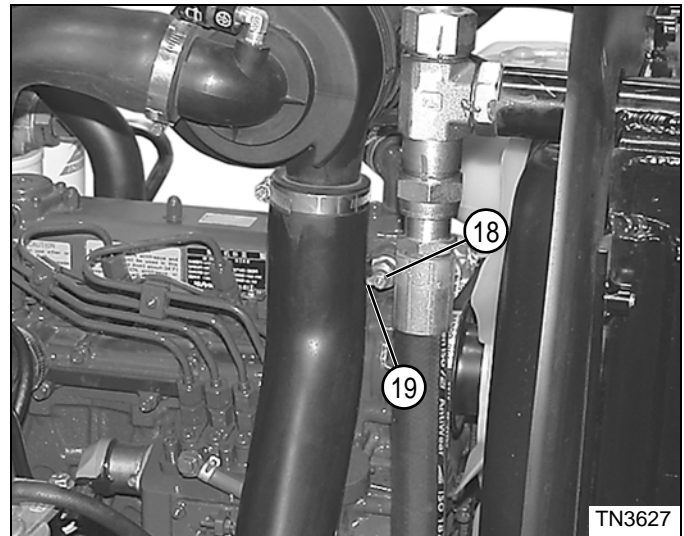
13. Disconnect wire connector (8).





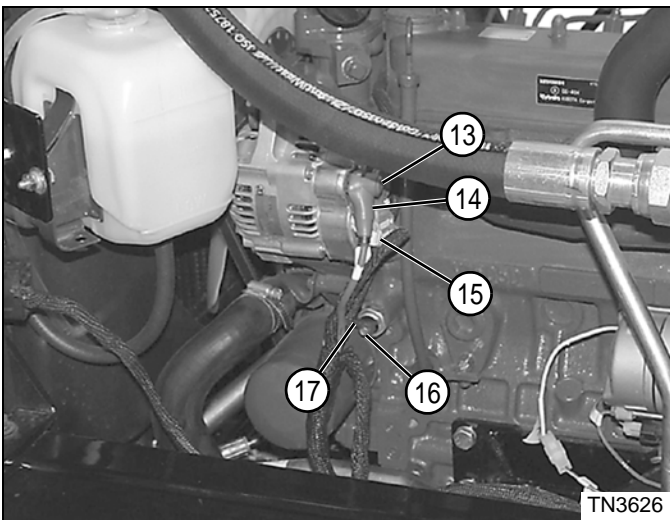
**Figure 3-31**

- 14. Unscrew hose clamp (10).
- 15. Disconnect fuel return line (9).
- 16. Remove nut (12). Disconnect glow plug wire (11).



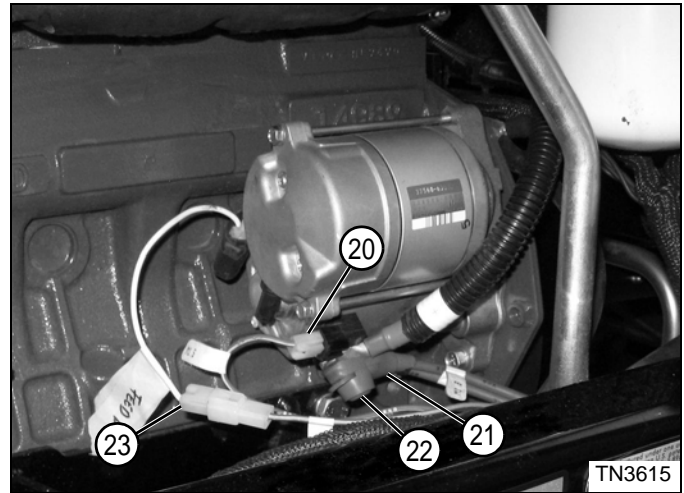
**Figure 3-33**

- 20. Remove nut (18) and disconnect engine temperature sensor wire (19).



**Figure 3-32**

- 17. Remove nut (13) and disconnect battery cable (14) at alternator.
- 18. Disconnect wire connector (15).
- 19. Remove screw (16) and disconnect engine oil pressure switch wire (17).



**Figure 3-34**

- 21. Remove nut (22) and disconnect starter battery cable (21).
- 22. Disconnect two wire connectors (20 and 23).

3



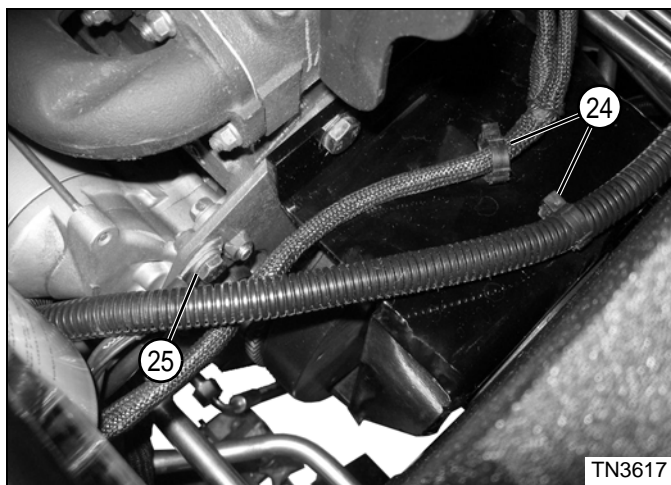


Figure 3-35

- 23. Unlatch wire harness clamps (24).
- 24. Remove bolt (25).


**WARNING**

Prevent personal injury. Use a properly rated lifting device. Always be sure the load is balanced before lifting.

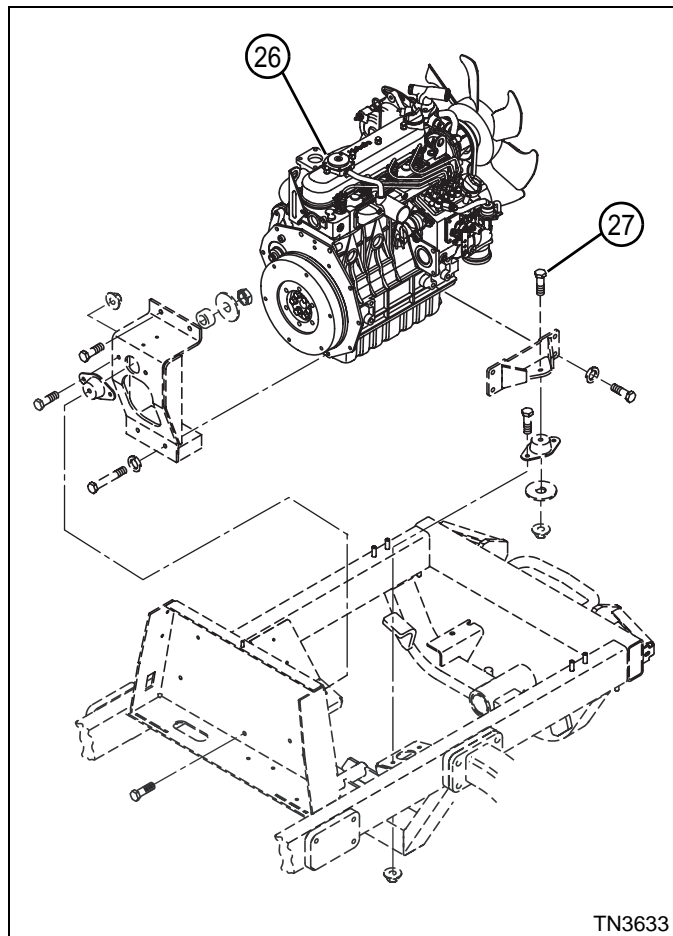


Figure 3-36

- 25. Using an engine hoist, support engine (26) and remove three engine mounting bolts (27).
- 26. Check for any connected wires and components.
- 27. Carefully remove engine from machine.
- 28. Place engine on a suitable stand or workbench that will support full weight in a safe manner while preventing damage to engine.

**NOTE**

*If engine is being replaced, some components must be removed and installed on new engine. See "Parts and Maintenance Manual" for additional information and illustrations.*

### Installation Notes

- *Inspect engine mounts, and replace if necessary.*
- *Install engine by reversing order of removal.*
- *If necessary, remove components from engine and install components on new engine.*
- *Apply dielectric grease (Jacobsen PN 365422) to any wire connectors disconnected.*
- *Use new exhaust gasket when installing exhaust system.*
- *Fill radiator with clean water and ethylene glycol based antifreeze mixed for coldest ambient temperature.*
- *Replace engine oil filter and fill engine with oil.*
- *Purge air from fuel system. (See "Purging the Fuel System" on page 3-5.)*

3

### Engine Service

A separate engine manual, prepared by engine manufacturer, is supplied with this machine. Refer to engine manufacturer's manual for all engine-related service.

Proper attention to engine manufacturer's manual directions will ensure maximum service life of engine.