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Eclipse
Technical/Repair Manual
Floating Head Models
118F 122F

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® Eclipse™ greens 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

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How to Use This Manual

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

Read each section in 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 with in 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

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Chapter 1

Safety

1

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1

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.

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

Gen-Set Models

See Figures 1-1 and 1-2.

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

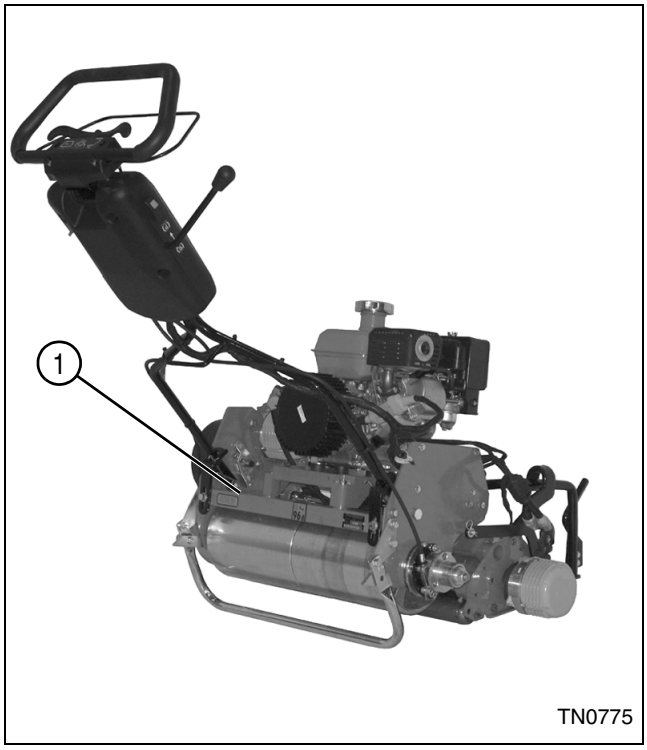


Figure 1-1

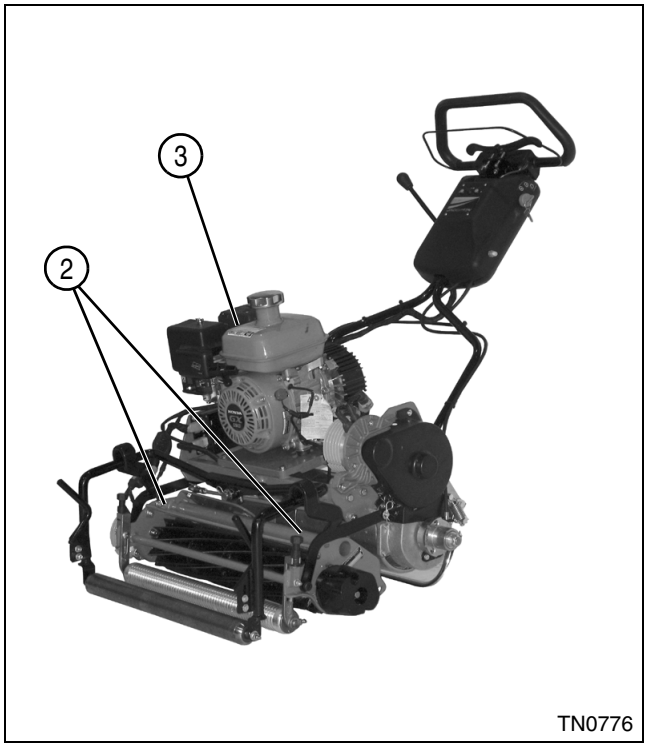
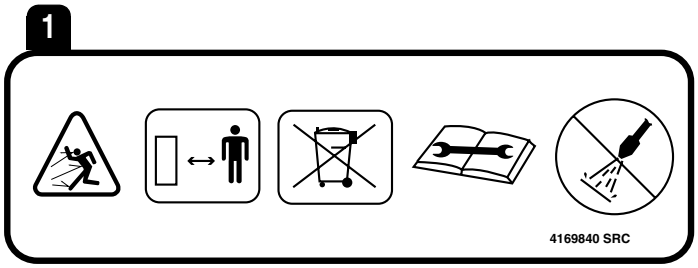
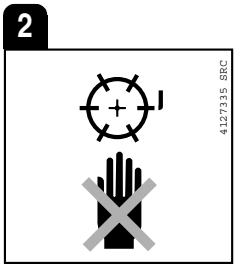
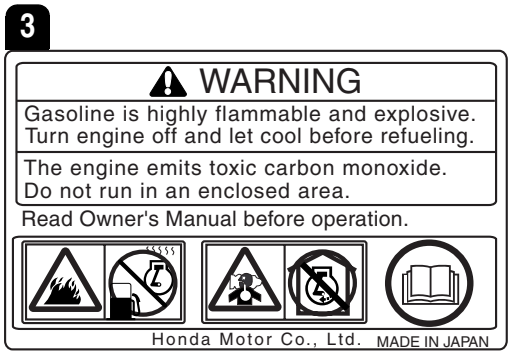


Figure 1-2







Battery Pack Models

See Figures 1-3 and 1-4.

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

1

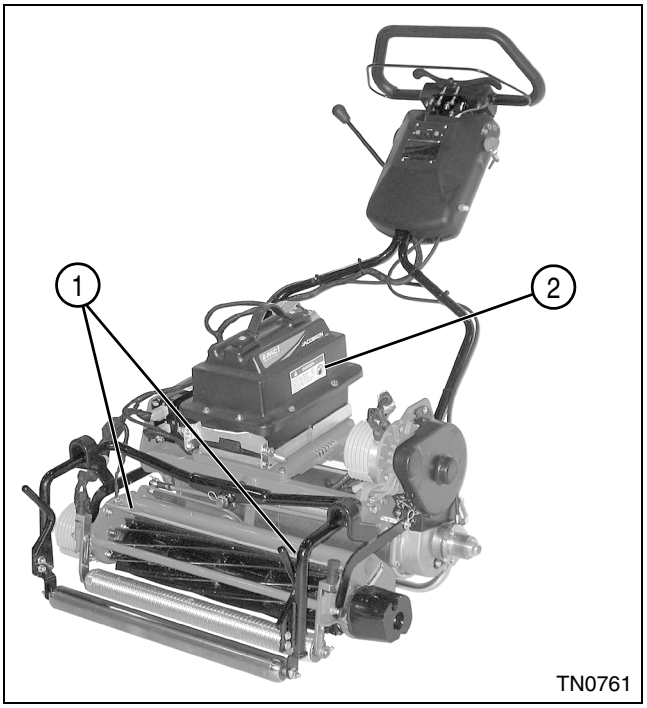


Figure 1-3

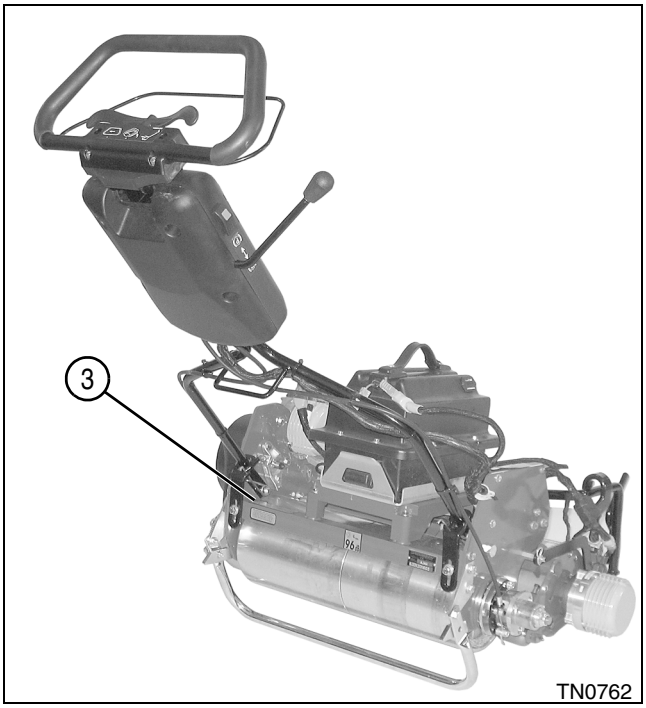
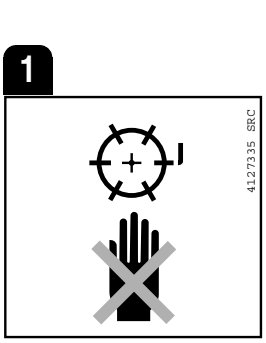
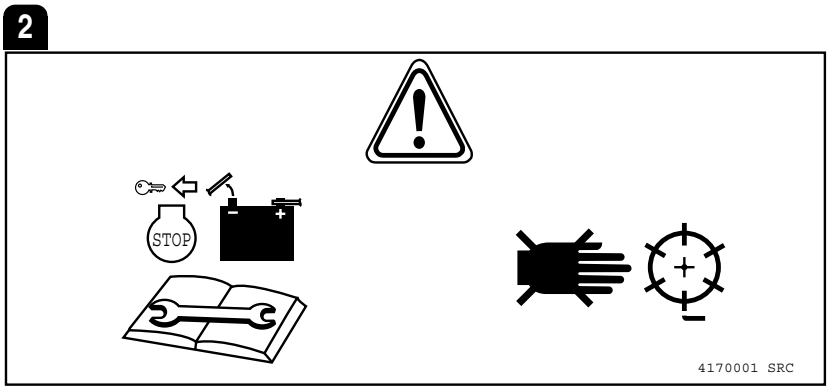
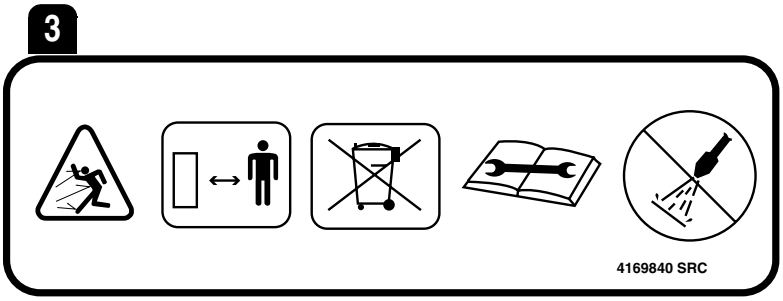


Figure 1-4







Inspect Safety Labels

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

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

Battery Pack Models

See Figures 1-5 through 1-7.

WARNING

Before cleaning, adjusting, or repairing this equipment, disengage reel drive switch, engage park brake, move key switch to the OFF position, and remove key to prevent injuries.

When performing maintenance other than adjustments that require the reel and/or traction drive motors to be running, disconnect the battery pack plug to prevent accidental motor engagement and bodily injury.

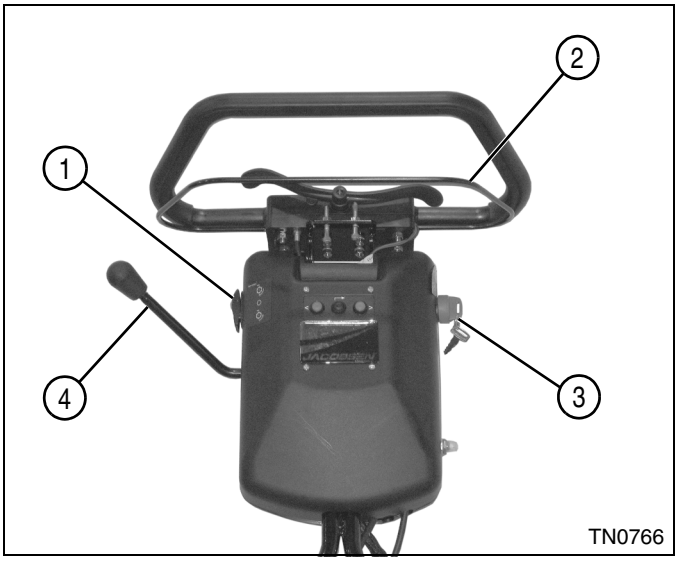


Figure 1-5

1. Release the Operator Presence Control (OPC) bail (2).
2. Engage the park brake lever (4).
3. Disengage the reel drive switch (1).
4. Move key switch (3) to the OFF position and remove key.

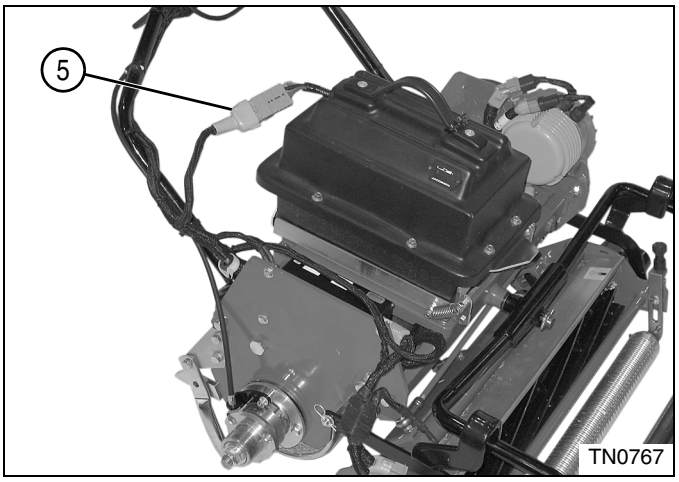


Figure 1-6

5. Disconnect battery pack connector (5).

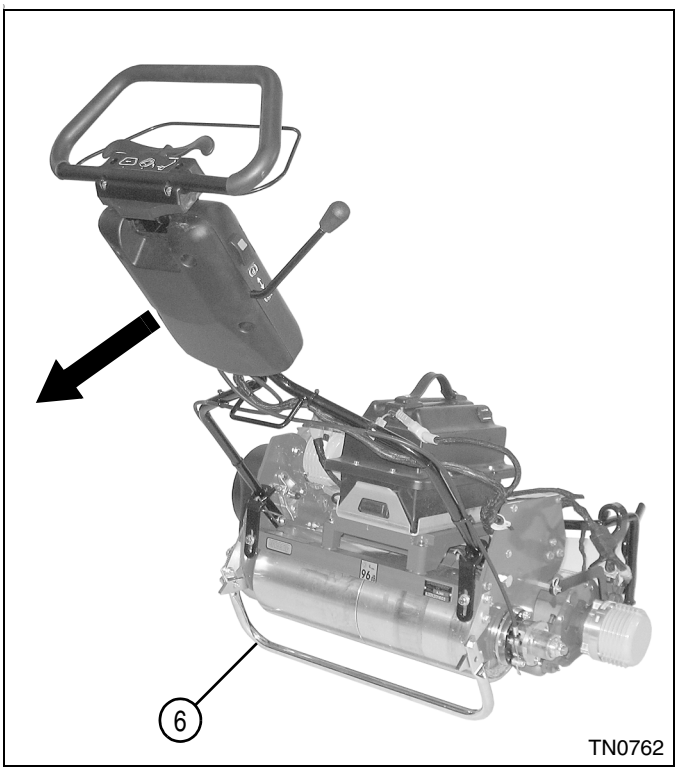


Figure 1-7

6. Lower and hold the kickstand (6) against the ground and pull the mower back until the mower rests securely on the kickstand.

Gen-Set Models

See Figures 1-8 through 1-10.

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 gen-set connector, remove the spark plug wire, and place the wire away from the plug to prevent accidental starting and bodily injury.

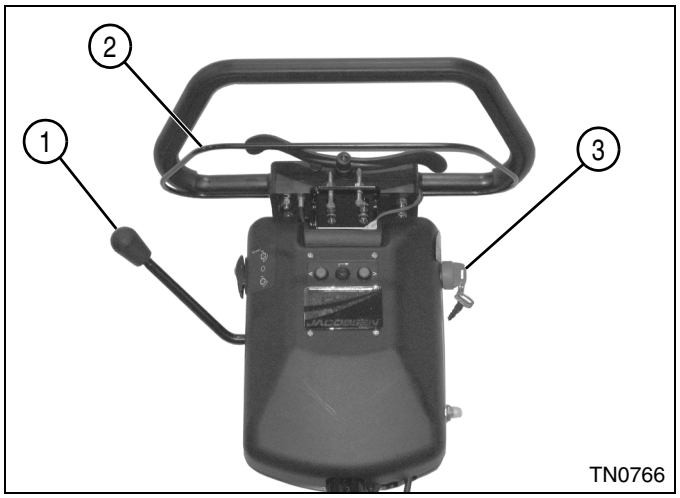


Figure 1-8

1. Release the Operator Presence Control (OPC) bail (2).
2. Engage the park brake lever (1).
3. Move key switch (3) to the OFF position and remove key.

Figure 1-9

4. Move engine on/off switch (5) to OFF position.
5. Close fuel shutoff valve (4).

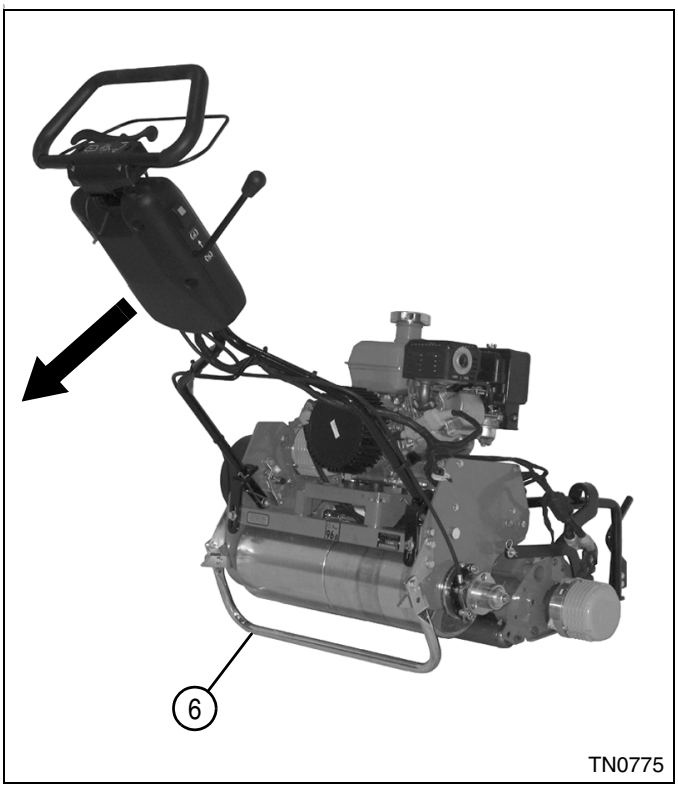


Figure 1-10

6. Lower and hold the kickstand (6) against the ground and pull the mower back until the mower rests securely on the kickstand.

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 the 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, do not exceed an air pressure rating of 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 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 Electrical Components Safely

WARNING

Always disconnect the negative terminal first and positive terminal last. Connect the 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 and 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 them 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.

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Chapter 2

Specifications and General Information

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Mower Identification

See Figure 2-1.

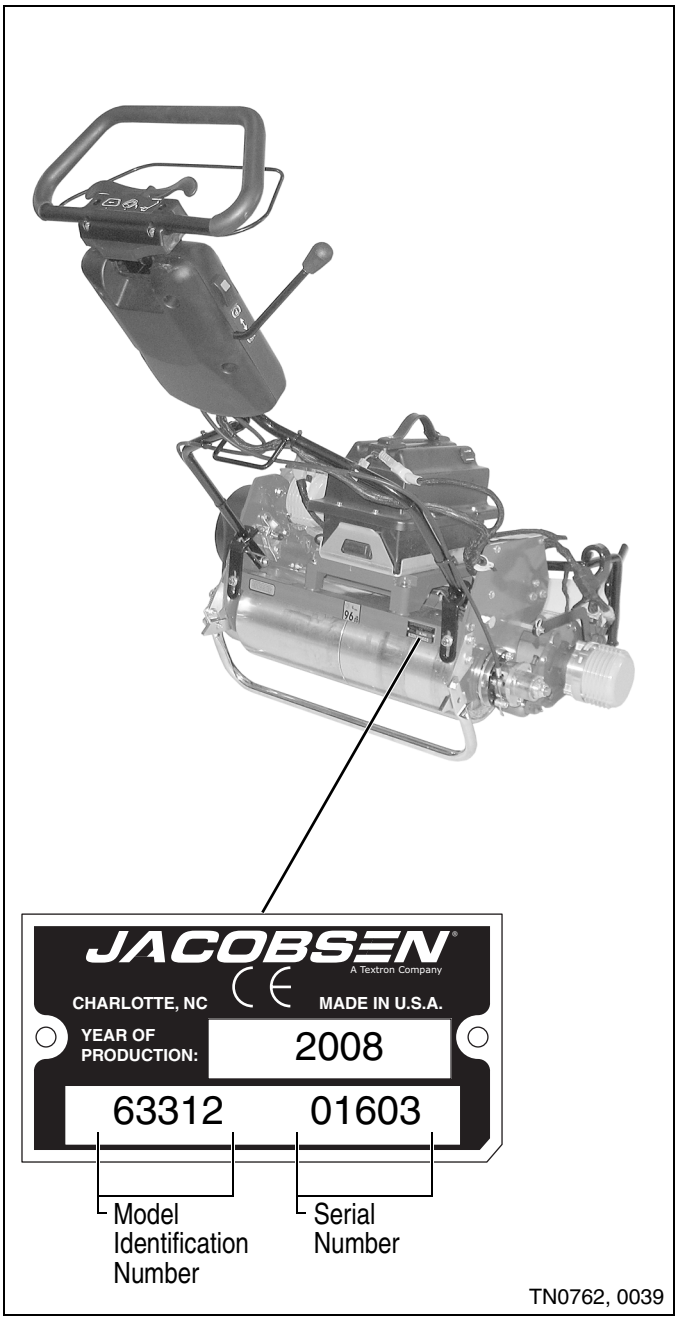


Figure 2-1

Serial Number

An identification plate like the one shown, listing the serial number, is attached to the rear frame.

Always provide the serial number of the unit when ordering replacement parts or requesting service information.

Model Identification Number

63301

Eclipse™ 118F Gen-Set powered (11-blade, 18-inch floating head reel) with InCommand™ control system, Operator Presence Control (OPC), brakes, and kickstand.

63314

Eclipse™ 118F Battery Pack powered (11-blade, 18-inch floating head reel) with InCommand™ control system, Operator Presence Control (OPC), brakes, and kickstand.

63303

Eclipse™ 122F Gen-Set powered (11-blade, 22-inch floating head reel) with InCommand™ control system, Operator Presence Control (OPC), brakes, and kickstand.

63312

Eclipse™ 122F Battery Pack powered (11-blade, 22-inch floating head reel) with InCommand™ control system, Operator Presence Control (OPC), brakes, and kickstand.

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.

If the machine requiring service is equipped with an accessory kit, see **Section 10, "Accessories"** for troubleshooting, removal, repair, and installation procedures.

Cutting Unit Identification

See Figure 2-2.

Figure 2-2

Serial Number

An identification plate like the one shown, listing the serial number, is attached to the reel left side frame.

Always provide the serial number of the cutting unit when ordering replacement parts or requesting service information.

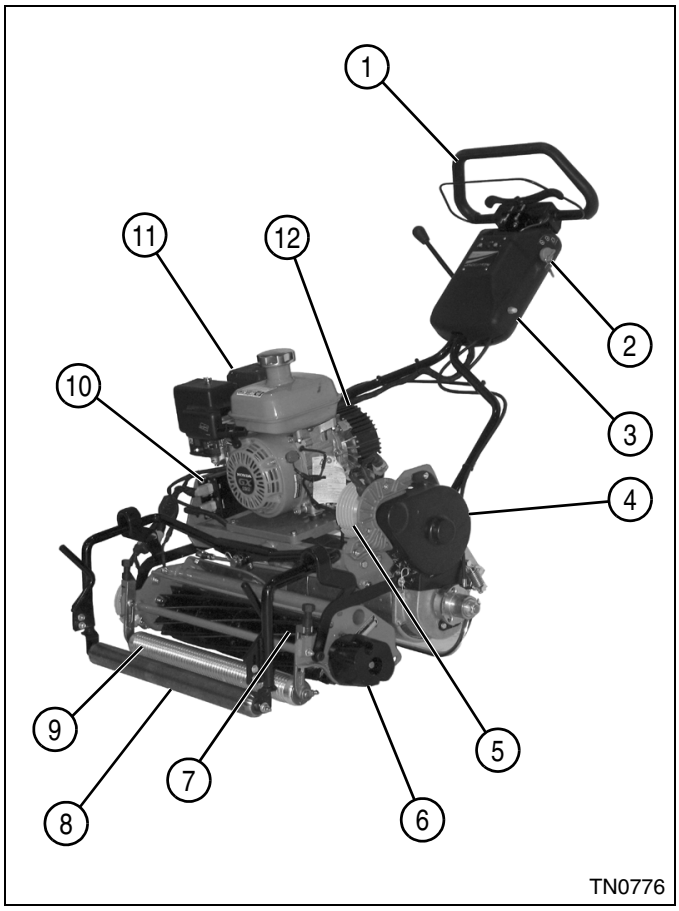
Component Location

Gen-Set Models

See Figures 2-3 and 2-4.

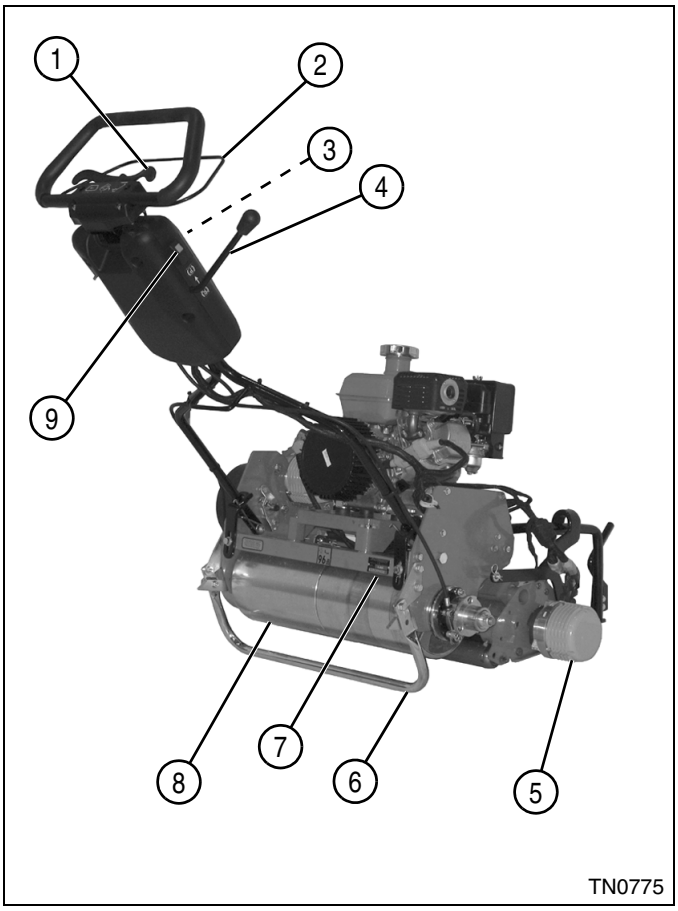
CAUTION

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



1	Operator Handle	7	Reel
2	Key Switch	8	Floating Head Frame Roller
3	25A Circuit Breaker	9	Front Roller
4	Belt Cover	10	Controller
5	Traction Drive Motor	11	Engine
6	Reel Counterweight	12	Gen-Set

Figure 2-3: Component Location—Front



1	Speed Control Paddle	5	Reel Drive Motor
2	Operator Presence Control (OPC) Bail	6	Kickstand
3	LCD Controls and Display	7	Product Identification Plate
4	Park Brake Lever	8	Traction Drum
		9	Reel Drive Switch

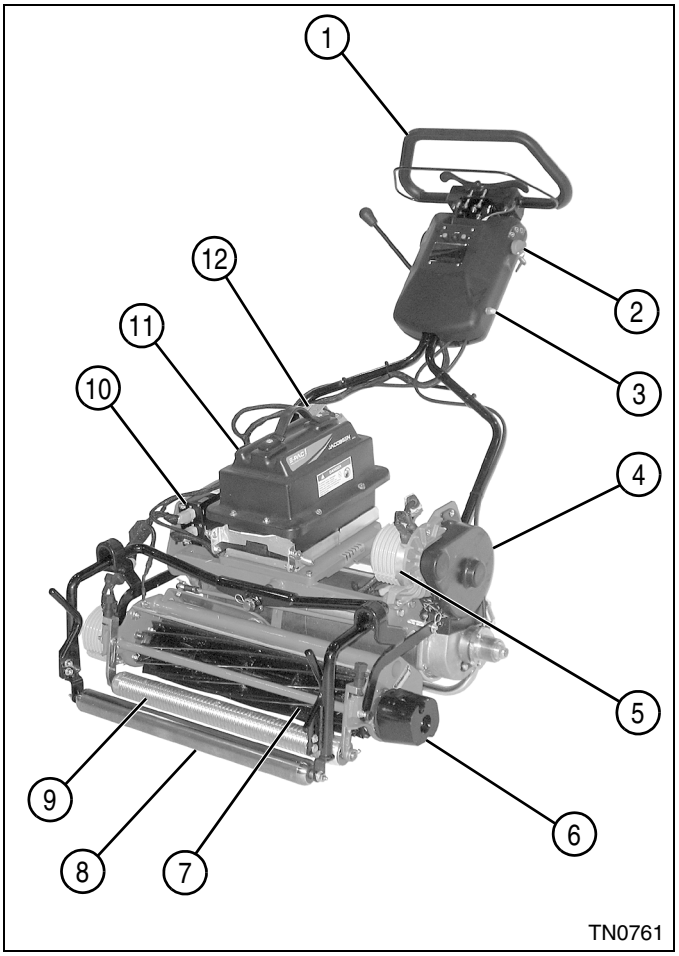
Figure 2-4: Component Location—Rear

Battery Pack Models

See Figures 2-5 and 2-6.

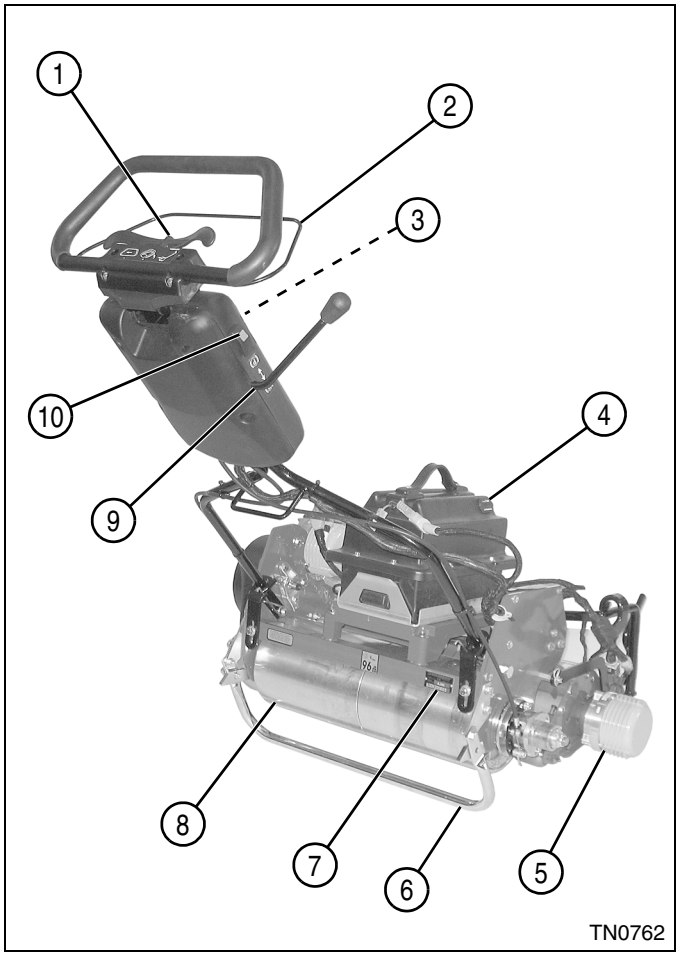
CAUTION

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



1	Operator Handle	7	Reel
2	Key Switch	8	Floating Head Frame Roller
3	25A Circuit Breaker	9	Front Roller
4	Belt Cover	10	Controller
5	Traction Drive Motor	11	Battery Pack
6	Reel Counterweight	12	Battery Pack Connector

Figure 2-5: Component Location—Front



1	Speed Control Paddle	6	Kickstand
2	Operator Presence Control (OPC) Bail	7	Product Identification Plate
3	LCD Controls and Display	8	Traction Drum
4	Battery Power Meter	9	Park Brake Lever
5	Reel Drive Motor	10	Reel Drive Switch

Figure 2-6: Component Location—Rear

Specifications

Quick Reference Specifications

Power Train		
Traction (Transfer) Drive Belt Maximum Deflection with 3.5—6.3 Pounds (1.59—2.86 kg) of Force Applied at the Midpoint Between Pulleys.	in. (mm)	0.14 (3.5)
Traction (Final) Drive Belt Maximum Deflection with 12.5—15.2 Pounds (5.5—7.4 kg) of Force Applied at the Midpoint Between Pulleys.	in. (mm)	0.10 (2.5)

Brakes		
Park Brake Lever Actuating Force	lb (kg)	10 (4.5)
Park Brake Band—Anchor Pin Center-to-Center Distance (Park Brake Released)	in. (mm)	1.50 (38)

Cutting Unit		
Flat Surface Height at the Front of the Bedknife (Minimum)	in. (mm)	1/32 (0.8)
Reel-to-Bedknife Gap	in. (mm)	0.001—0.003 (0.025—0.076)
Reel Side-to-Side Clearance (Reel Bearing Pre-Load)	in. (mm)	0.040 (1.27)

Accessories		
Solid Tube Roller Lock Nut Torque	lb-ft (N•m)	10—30 (13.5—40.6)
Solid Tube Roller Rotational Resistance	lb-in. (N•m)	0—1 with No End Play (0—0.11 with No End Play)
Transport Tire Air Pressure	psi (kPa)	6—8 (41—55)

General Specifications

Electrical Power	
Removable Battery Pack	Four 12-Volt, Sealed Lead Acid Batteries, Wired in Series, with Battery Gauge and Protective Box
Gen-Set	Nominal 48 VDC
Motors	48-Volt, Brushless, Keyed Shaft
Motor Power Rating hp (kW)	0.75 (0.54)
Motor Operating Speed rpm	2200 (Factory Setting)
Motor Rotation	Counterclockwise (Facing Shaft)

Mower	
Height-of-Cut Range in. (mm)	1/16—7/16 (1.6—11.1)
High-Profile Cut Yield in. (mm)	5/32 (3.96)
Low-Profile Cut Yield in. (mm)	1/8 (3.17)
Tournament Cut Yield in. (mm)	3/32 (2.38)
Super Tournament Cut Yield in. (mm)	1/16 (1.58)
Reel Diameter in. (mm)	5 (127)
Reel Composition	Hardened High-Manganese Carbon Steel
Width of Cut in. (cm)	18 (457), 22 (557.5)

Traction and Reel Drive System	
Reel Drive	Independent Motor
Traction Drive	Belt Driven via Independent Motor
Traction Reduction Ratio	15.15:1
Differential	Full Automotive Type, Housed in Traction Drum
Rear Drive Drum Composition	Machined Aluminum Alloy
Travel Speed mph (km/h)	0.75—3.4 (1.21—5.47)
Transport Wheels (Optional)	(2) Bi-Directional, Pneumatic, 11 x 4 Goodyear Softrac

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.

Inch Fastener Torque Values

AMERICAN NATIONAL STANDARD FASTENERS											
SIZE	UNITS	GRADE 5		GRADE 8		SIZE	UNITS	GRADE 5		GRADE 8	
		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	315 (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	4.6		8.8		10.9		12.9		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 (910	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)

Lubricant Specifications

Grease

Lubricate fittings with grease that meets or exceeds NLGI Grade 2 LB specifications. Apply grease with a manual grease gun; fill slowly until grease begins to seep out. Do not use a compressed-air grease gun.

Synthetic Lubricants

Synthetic grease is a suitable alternative lubricant, provided it meets or exceeds NLGI Grade 2 LB specifications. Apply synthetic grease with a manual grease gun; fill slowly until grease begins to seep out. Do not use a compressed-air grease gun.

Lubricant Storage

Use of clean lubricants is essential to efficient operation of equipment.

- Always store lubricants in approved, clean containers.
- Store containers in an area free from dirt, filings, moisture, and other contaminants.
- Clearly mark containers for easy identification of contents.
- Always dispose of used containers properly.

Avoid Mixing of Lubricants

Avoid mixing different brands or types of oil. Lubricants are specifically manufactured to meet certain specifications and performance standards.

Mixing different brands or types of lubricants can reduce the functionality of certain additives and interfere with the performance of the lubricant, resulting in possible equipment damage.

Operational Checks

WARNING

Never attempt to operate the machine unless you have read the Operator's Manual and know how to operate all controls correctly.

The operational check procedures are meant to verify the correct operation of the control systems. Before placing the mower back into service, all checks should be performed to ensure that each system is working properly.

Park Brake Check

See Figure 2-7.

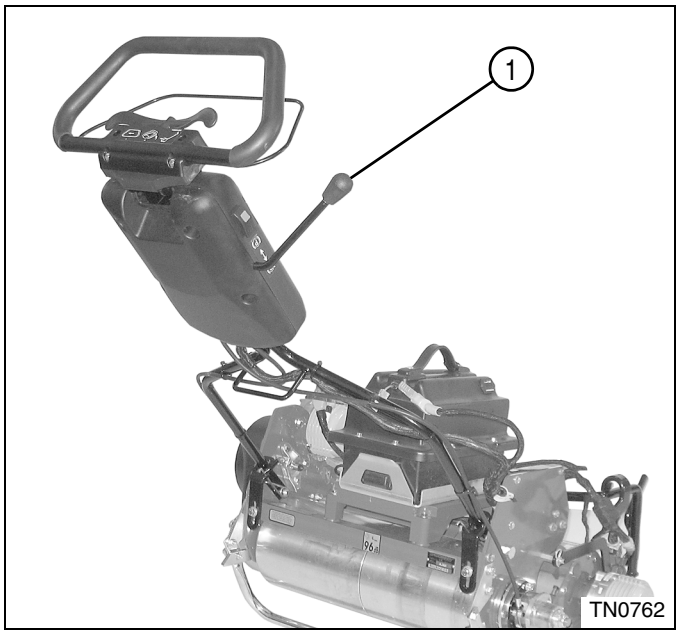


Figure 2-7

1. Connect a spring scale to the park brake lever (1).
2. Pull the spring scale to engage the park brake and record the reading.

A properly adjusted park brake will require 10 lb (4.5 kg) of force to engage.

If the park brake does not meet specification, adjust or repair the brake system as needed before returning the mower to service. (See "Park Brake Check and Adjustment" on page 7-4.)

Key Switch Check

See Figures 2-8 through 2-10.

The unit is equipped with a key switch to stop the traction and reel drive motors from the operator's position.

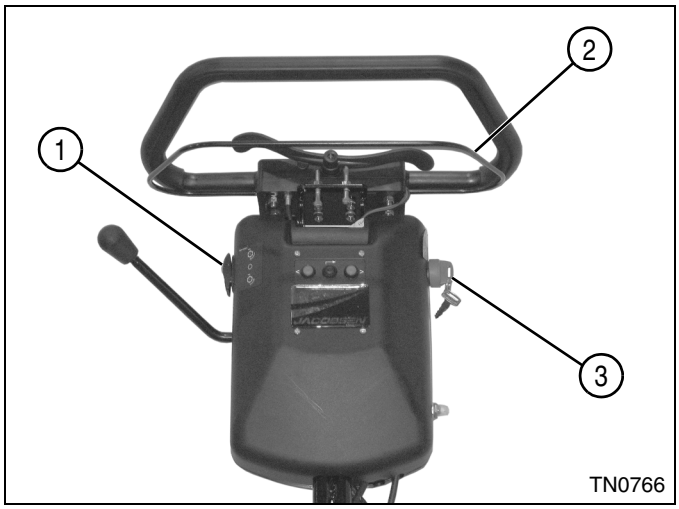


Figure 2-8

1. Place the mower securely on the kickstand and move the reel drive switch (1) to the OFF position.
2. Move the key switch (3) to the START/ON position.
3. **Gen-Set Models:** Move the key switch (3) to the ON position, start the engine, then move key switch to the start position to power-up the controller.
4. Slide the Operator Presence Control (OPC) bail (2) to the left and engage the traction drive.
5. Move the key switch (3) to the OFF position. The traction drive will stop.

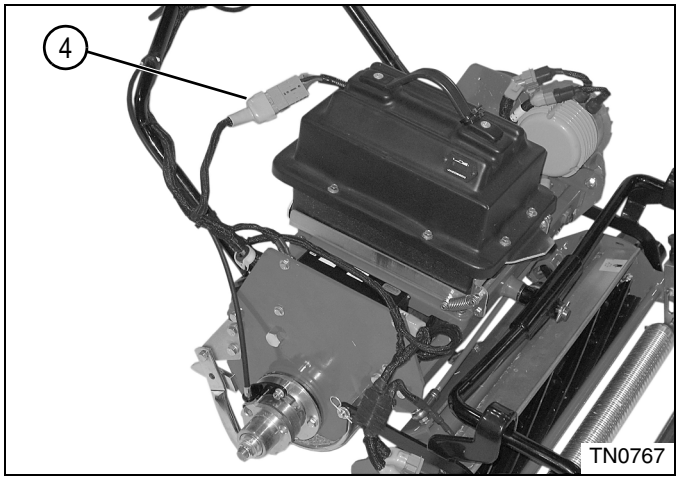


Figure 2-9: Battery Pack Models

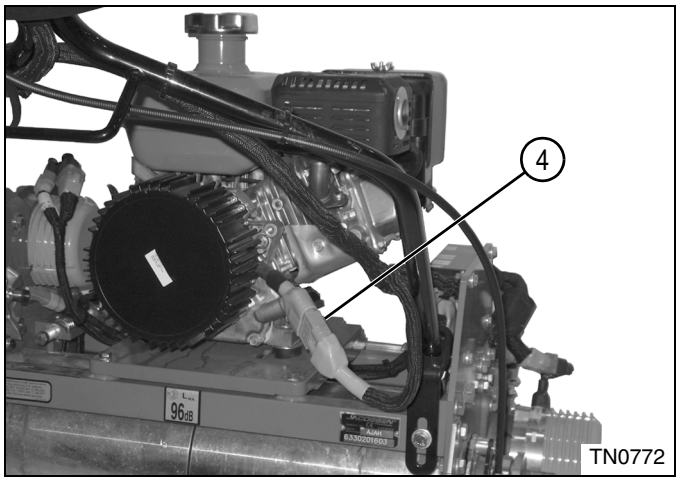


Figure 2-10: Gen-Set Models

If the traction drive does not stop, disconnect the battery pack/gen-set connector (4) to stop the traction drive and immediately repair the system.

Operator Presence Control (OPC) System Check

See Figures 2-11 and 2-12.

WARNING

Never operate equipment with the Operator Presence Control (OPC) system disconnected or malfunctioning. Do not disconnect or bypass any switch.

The OPC system is intended to protect the operator and others from injury by stopping the reel and drive mechanism as soon as the operator releases the OPC bail.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

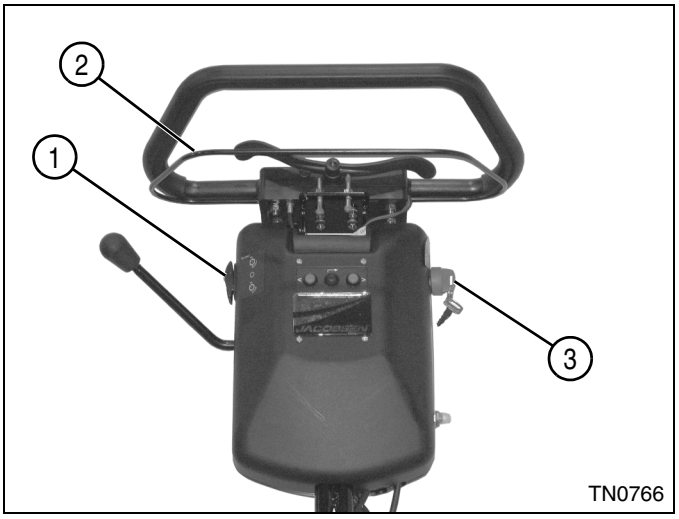


Figure 2-11

2. Move the reel drive switch (1) to the OFF position.
3. Move the key switch (3) to the START/ON position.
4. **Gen-Set Models:** Move the key switch (3) to the ON position, start the engine, then move key switch to the start position to power-up the controller.

   Does the drive mechanism engage before the OPC bail is engaged?

   YES *Move key switch to the OFF position immediately and repair the system.*
5. Slide OPC bail (2) to the left and engage.

   Traction drive motor will be energized, and traction drum will begin to turn.

   Does the traction drive engage?

   NO *Move key switch to the OFF position immediately and repair the system.*
6. Release the OPC bail.

   Bail will disengage, and traction drive will stop.

   Does the traction drive continue turning after the OPC bail is released?

   YES *Move the key switch to the OFF position immediately and repair the system.*

Reel Drive Switch Check

See Figure 2-12.

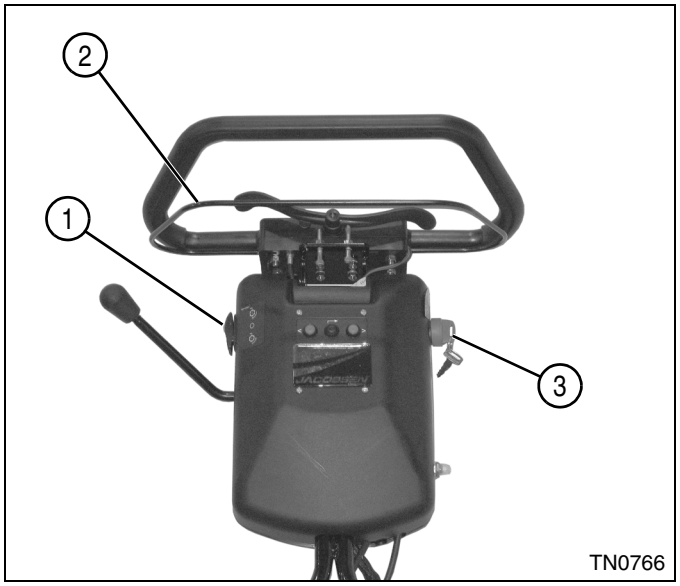


Figure 2-12

1. Place the mower securely on the kickstand.
2. Move key switch (3) to the START/ON position.
3. **Gen-Set Models:** Move the key switch (3) to the ON position, start the engine, then move key switch to the start position to power-up the controller.
4. Move reel drive switch (1) to the ON position.
5. Slide the Operator Presence Control (OPC) bail (2) to the left and engage.

   Reel will begin to turn.

   Does the reel spin?

   NO *Move the key switch to the OFF position immediately and repair the system.*
6. Release the OPC bail.

   Reel will stop.

   Does the reel continue to turn after the OPC bail is released?

   YES *Move the key switch to the OFF position immediately and repair the system.*

Backlap Switch Check

See Figures 2-13.

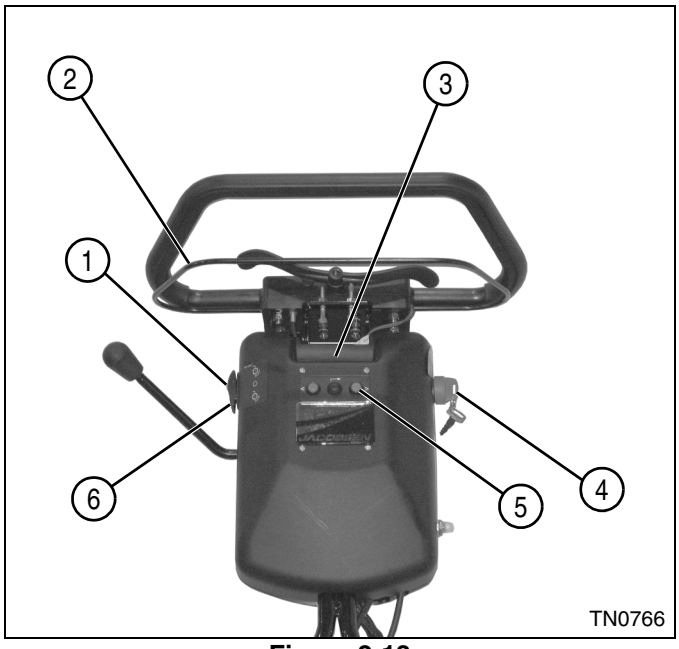


Figure 2-13

1. Place the mower securely on the kickstand.
2. Move key switch (4) to the ON position and enter mechanic mode on the LCD display (3). (See “LCD Display—Modes” on page 4-28.)
3. **Gen-Set Models:** Move the key switch (4) to the ON position, start the engine, then move key switch to the start position to power-up the controller. Enter mechanic mode on the LCD display (3). (See “LCD Display—Modes” on page 4-28.)
4. Disengage reel drive switch lock (1) and move reel drive switch (6) to the backlap position. The LCD display will show backlap option YES or NO.
5. Use orange button (5) to choose YES.
6. Slide the Operator Presence Control (OPC) bail (2) to the left and engage, then immediately release.

   Reel will begin to turn.

   Does the reel spin backwards?

   YES *Go to next step.*

   NO *Move the key switch to the OFF position immediately and repair the system.*
7. Engage and release OPC bail.

   Reel will stop.

   Does reel stop spinning?

   NO *Move the key switch to the OFF position immediately and repair the system.*

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Chapter 3

Engine

3

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Specifications

General Engine Specifications

Engine		Eclipse 118, 122, 126
Manufacturer/Model		Honda/GX120
Engine Type		4-Stroke, Overhead Valve, Single Cylinder
Displacement	cu in. (cc)	7.3 (118)
Bore x Stroke	in. (mm)	2.4 x 1.7 (60 x 42)
Cooling System		Forced Air
Ignition System		Transistorized Magneto
PTO Shaft Rotation		Counterclockwise
Recommended Spark Plug		BPR6ES (NGK) W20EPR-U (ND)
Spark Plug Gap	in. (mm)	0.028—0.031 (0.7—0.8)

Troubleshooting

This troubleshooting chart will cover basic engine troubleshooting information. A separate engine manual, prepared by the engine manufacturer, is supplied with this machine. Refer to the engine manufacturer's manual for further engine troubleshooting information.

Condition	Probable Cause	Remedy
Engine does not start.	Choke not set properly.	Refer to the engine manual for correct choke usage.
	Fuel tank empty.	Fill fuel tank with fresh, clean gasoline.
	Fuel shutoff valve closed.	Open shutoff valve.
	Engine on/off switch in OFF position.	Move engine on/off switch to ON position.
	Key switch in OFF position.	Move key switch to ON position.
	Engine problem.	Refer to the engine manual.
	Loose or corroded engine on/off switch harness connector.	Check engine on/off switch harness connector. (See "Harness Connector Identification" on page 4-9.)
	Loose or corroded ignition coil harness connector.	Check ignition coil harness connector. (See "Harness Connector Identification" on page 4-9.)
Engine is hard to start, runs erratically, stalls, looses power, or stops.	Choke not set properly.	Refer to the engine manual for correct choke usage.
	Dirty or incorrect fuel.	Drain fuel tank and fill fuel tank with fresh, clean gasoline.
	Loose wire connections.	Check wiring connections.
	Air intake clogged.	Refer to the engine manual for air cleaner service information.
	Spark plug worn, dirty, or improperly gapped.	Refer to the engine manual for spark plug service information.
	Vent in fuel filler cap plugged.	Clean fuel filler cap.

Repair

Engine

Removal

See Figures 3-1 and 3-2.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

Figure 3-1

NOTE

Label all wires before disconnecting to ensure correct installation.

2. Disconnect engine harness wire connectors (1).
3. Disconnect ground wire ring terminal (2).

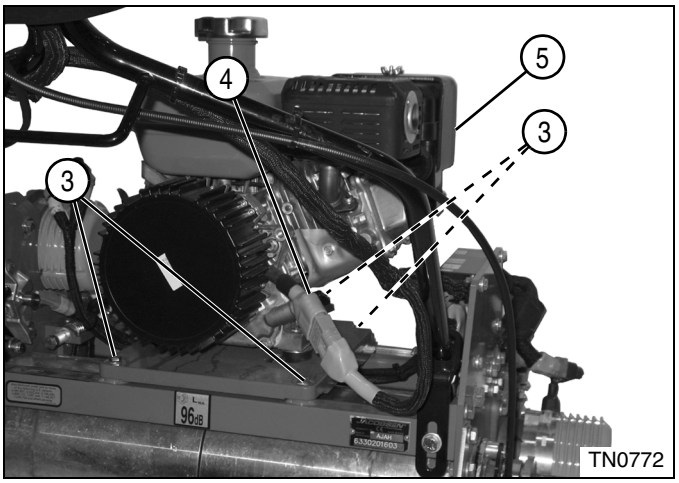
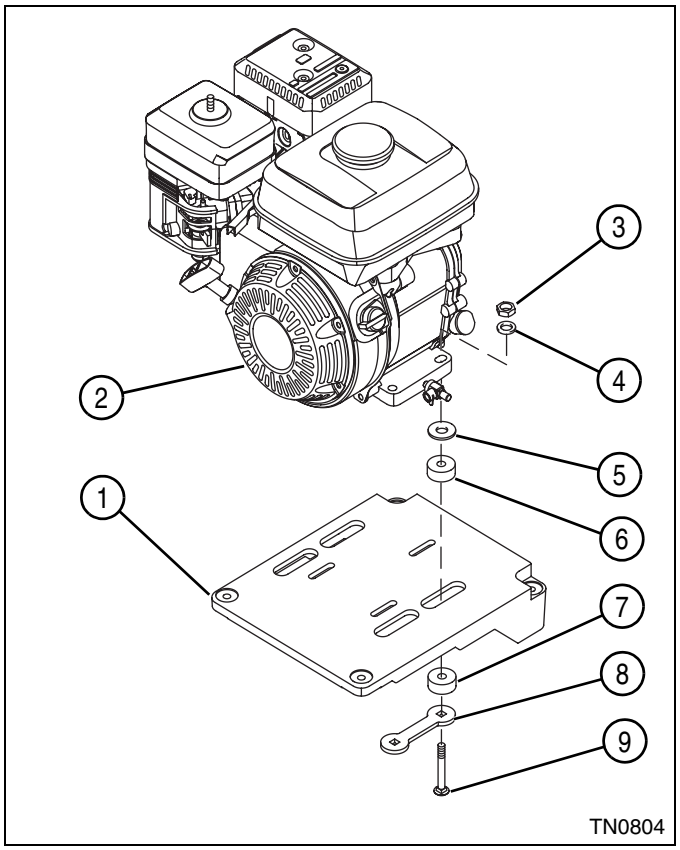


Figure 3-2

4. Disconnect gen-set harness connector (4).
5. Remove four cap screws and lockwashers (3).
6. Remove engine and mount plate (5) as an assembly.

Disassembly and Assembly

See Figure 3-3.



1	Mount Plate	6	Upper Isolator (4 used)
2	Engine Assembly	7	Lower Isolator (4 used)
3	Nut (4 used)	8	Isolator Plate (2 used)
4	Lock Washer (4 used)	9	Carriage Bolt (4 used)
5	Flat Washer (4 used)		

Figure 3-3

Installation

Installation Note

Install engine by reversing the order of removal.

Chapter 4

Electrical

4

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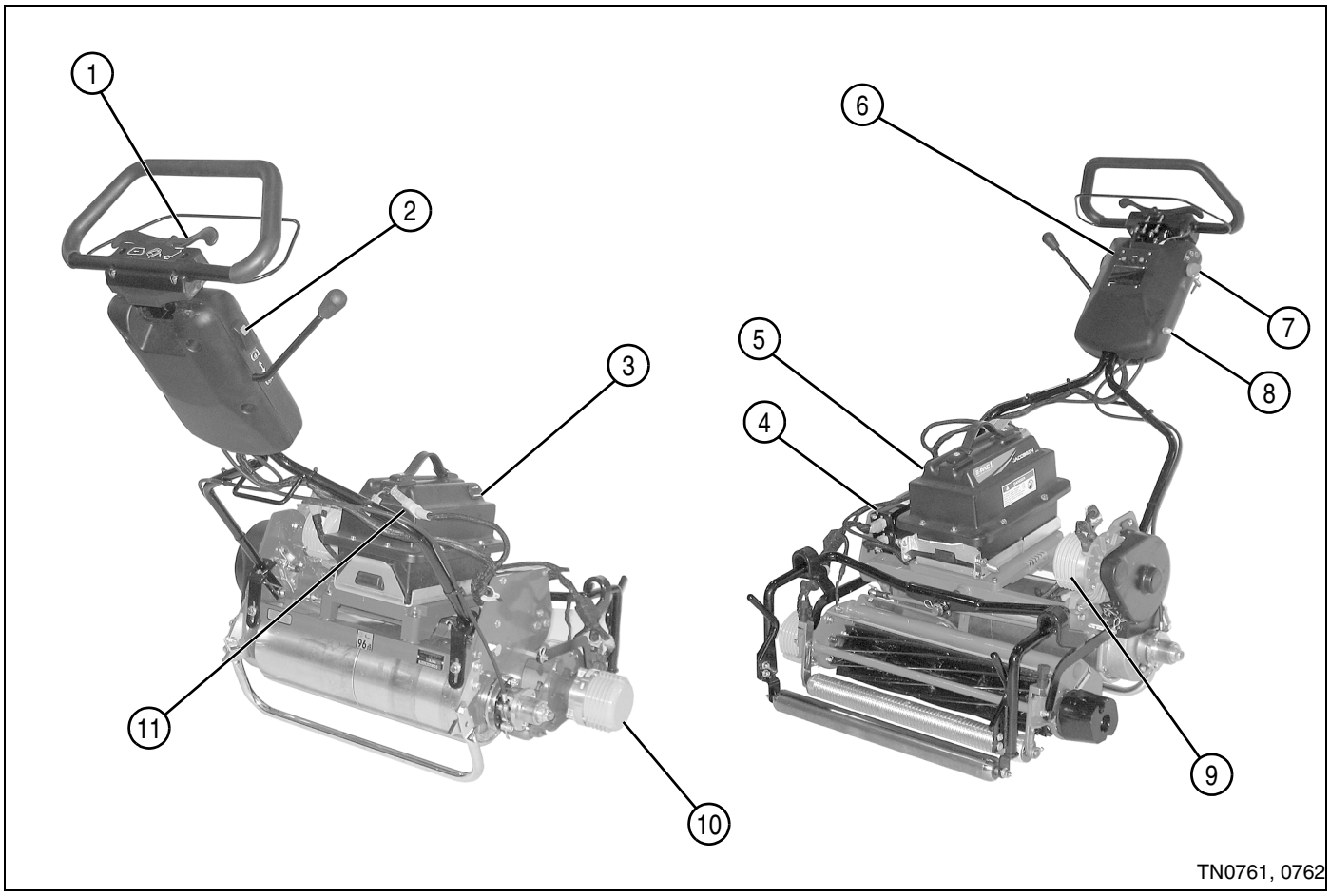
Component Location

Battery Pack Models

CAUTION

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



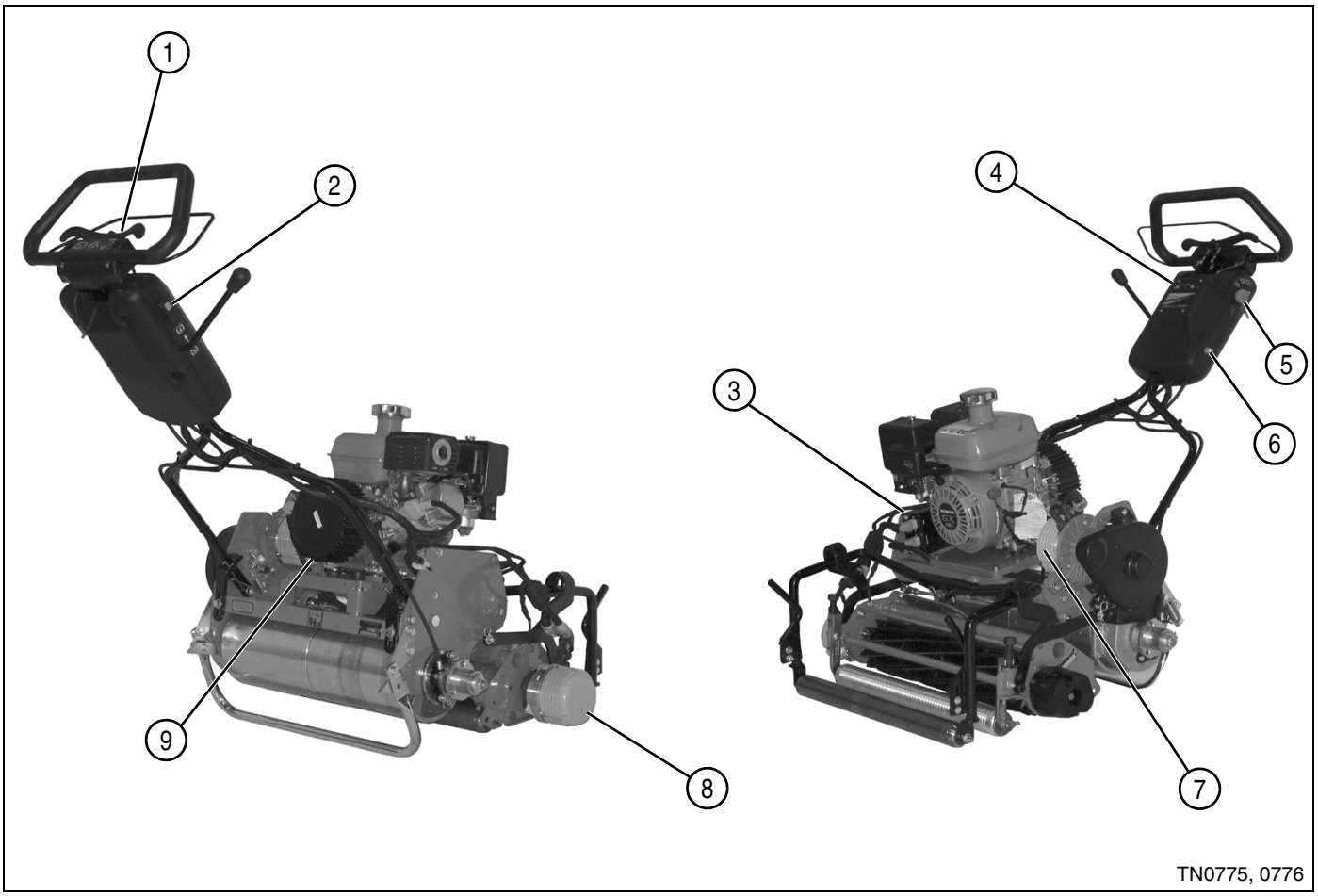
1	Speed Control Paddle	7	Key Switch
2	Reel Drive Switch	8	25A Circuit Breaker
3	Battery Power Meter	9	Traction Drive Motor
4	Control Module	10	Reel Drive Motor
5	Battery Pack	11	Battery Pack Connector
6	LCD Display and Controls		

Figure 4-1

Gen-Set Models

CAUTION

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



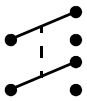
1	Speed Control Paddle	6	25A Circuit Breaker
2	Reel Drive Switch	7	Traction Drive Motor
3	Control Module	8	Reel Drive Motor
4	LCD Display and Controls	9	Gen-Set
5	Key Switch		

Figure 4-2

Electrical Component Symbols

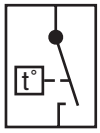
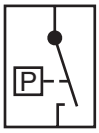
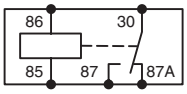
The following symbols are used in the electrical schematics to represent various electrical components.

Switches[1]

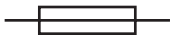
	Single Pole, Single Throw (SPST)		Double Pole, Single Throw (DPST)
	Single Pole, Double Throw (SPDT)		Double Pole, Double Throw (DPDT)

1 *The sample switch symbols shown are just a few of the many switch configurations. Switches are designated by the number of "poles" (circuits controlled) and "throws" (actuator positions). Unless otherwise specified, switches are shown in the "Normally Open" (N.O.) position.*

Switching Devices

	Temperature Switch		Pressure Switch
	Relay		

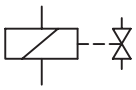
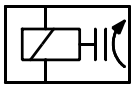
Circuit Protection Devices

	Fuse		Circuit Breaker

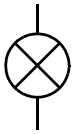
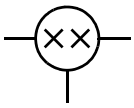
Motors and Generating Devices

	Electric Motors (may also include “AC” or “DC”)		Stator
	Alternator		

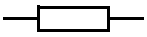
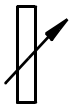
Actuating Devices

	Solenoid Valve		PTO Clutch

Lights

	Single-Element Light		Dual-Element Light

Miscellaneous Symbols

	Enclosure (cabinet, housing, etc.)		Wires (crossing but not connected)
	Ground (to earth)		Wiring Connections
	Ground (to chassis)		Coil
	Direct Current (DC) (as shown on an oscilloscope)		Battery
	Alternating Current (AC) (as shown on an oscilloscope)		Diode
	Resistor		Pin and Socket Connector
	Potentiometer		

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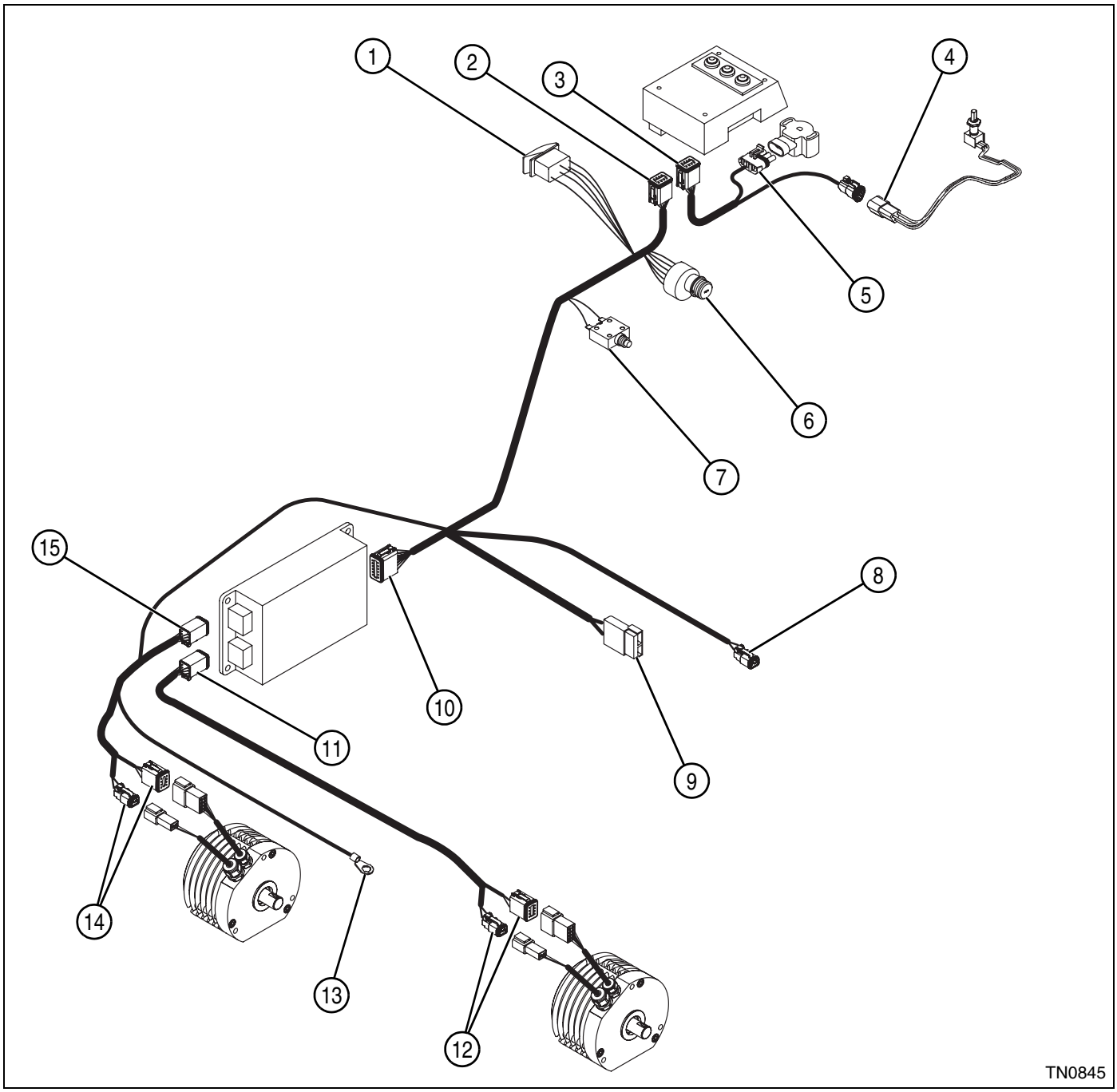
Harness Connector Identification

See Figure 4-3.



1	Reel Drive Switch Connector (S2)	9	Battery Pack/Gen-Set Connector (PM1)
2	LCD Display Connector (J4)	10	Control Module Connector (J1)
3	LCD Display Connector (J5)	11	Control Module Connector (J2)
4	Speed Control Paddle Connector (R1)	12	Traction Drive Motor Connectors (M1)
5	OPC Bail Connector (R2)	13	Floating Head Ground Terminal
6	Key Switch Connector (S1)	14	Reel Drive Motor Connectors (M2)
7	Circuit Breaker Connector (CB1)	15	Control Module Connector (J3)
8	Light Kit Switch Connector (S4)		

Figure 4-3

Main Schematic

See Figures 4-4 and 4-5.

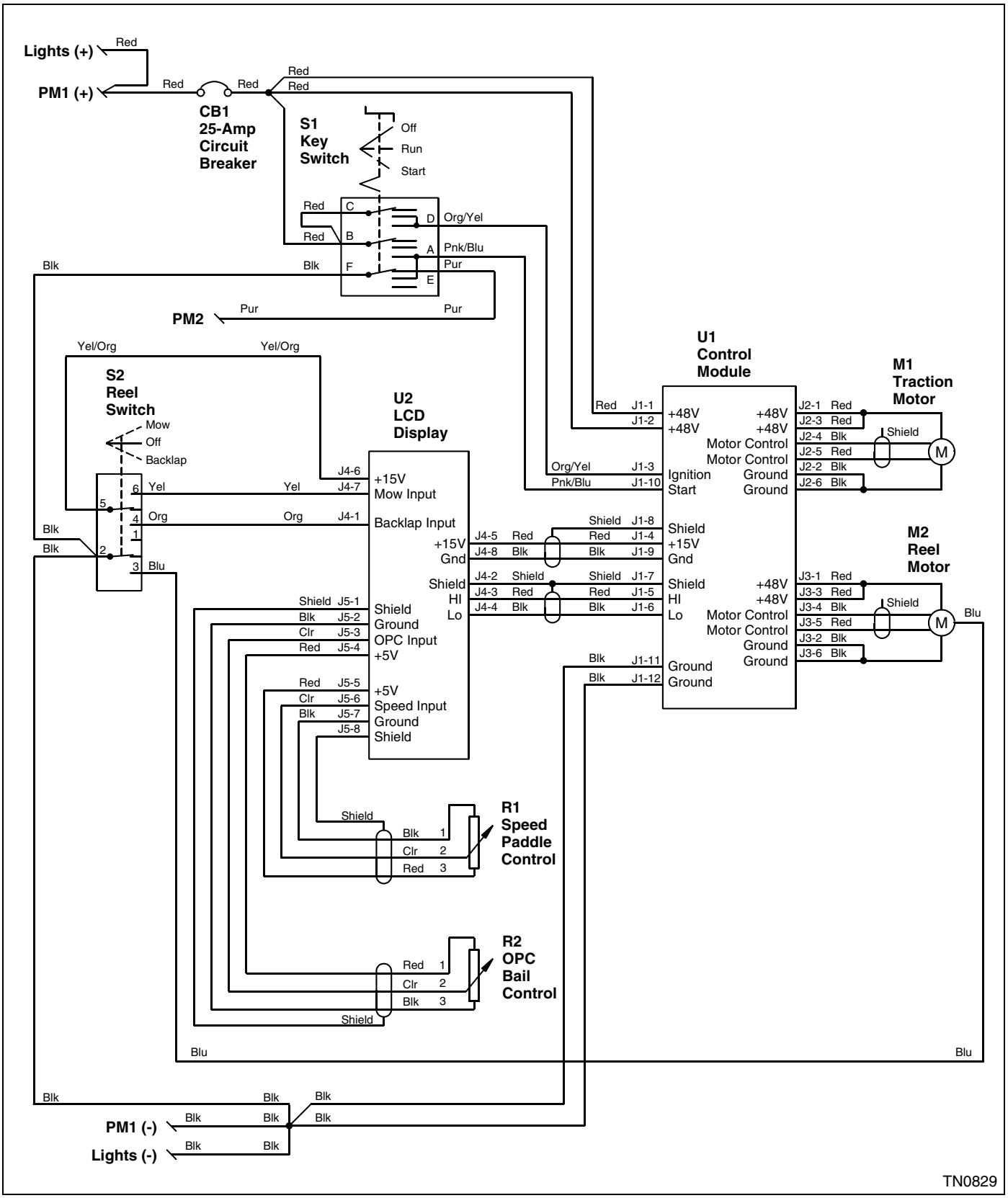


Figure 4-4

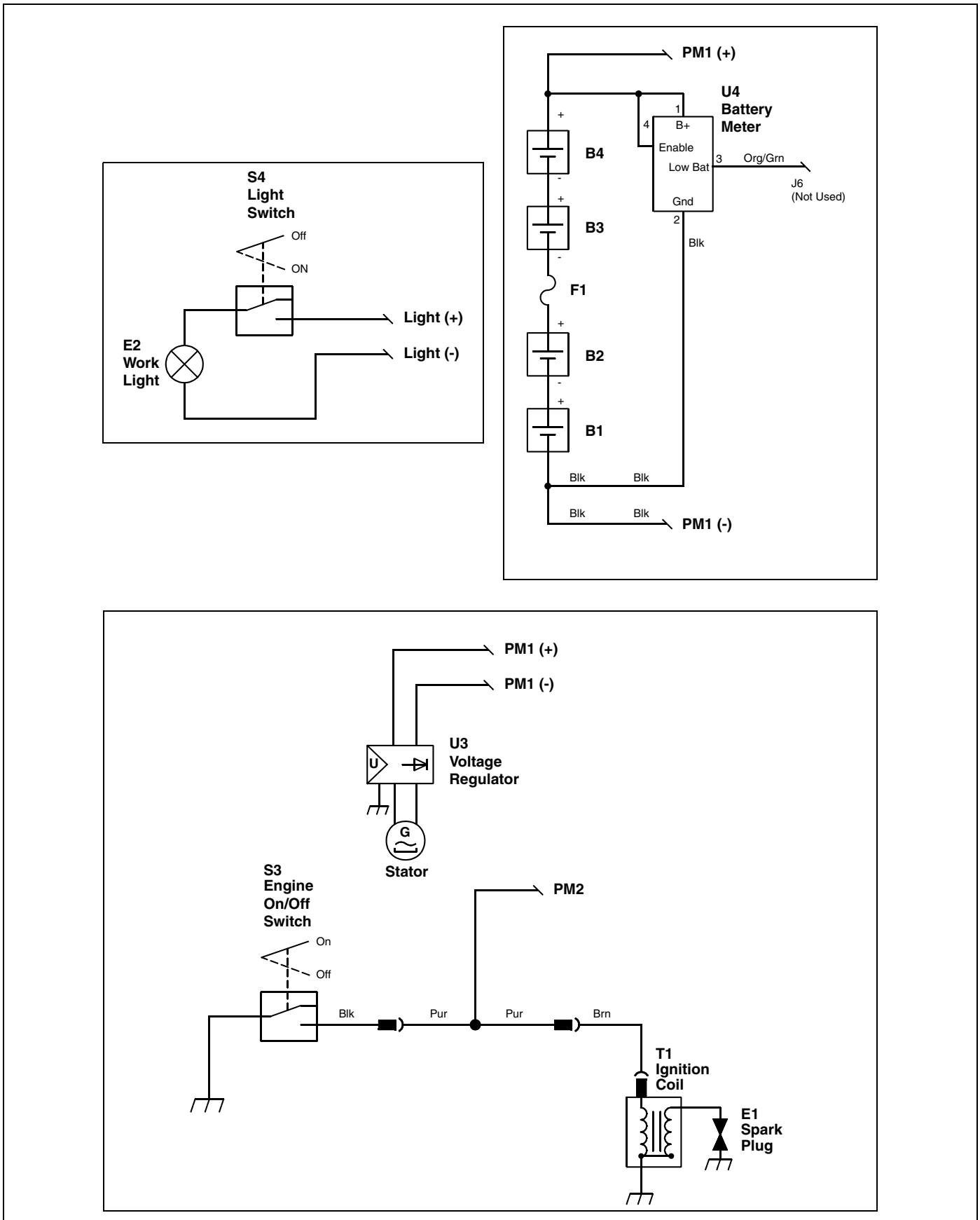

S4
Light
Switch
Off
ON
Light (+)
Light (-)
E2
Work
Light
PM1 (+)
U4
Battery
Meter
1
4
B+
Enable
Low Bat
3
Org/Grn
J6
(Not Used)
Gnd
2
Blk
B4
B3
F1
B2
B1
Blk
Blk
Blk
Blk
PM1 (-)
PM1 (+)
PM1 (-)
U3
Voltage
Regulator
U
G
Stator
S3
Engine
On/Off
Switch
On
Off
PM2
Blk
Pur
Pur
Brn
T1
Ignition
Coil
E1
Spark
Plug

Figure 4-5

Theory and Diagnostic Information

48-Volt Power Circuit—Theory of Operation

48-Volt Power Circuit Components

Battery Pack—If Equipped

The battery pack consists of four 12-VDC sealed lead acid batteries (B1—B4) wired in series. The battery pack is equipped with a battery gauge to monitor charge status. The battery pack is protected with a 50-amp fuse (F1).

Gen-Set—If Equipped

The gen-set consists of a stator, rotor, and an internal voltage regulator. When the rotor magnets spin past the stator coils, the magnetic field creates AC voltage which flows to the voltage regulator. The voltage regulator then converts the AC voltage to DC, and maintains voltage at or near 48 VDC.

Circuit Breaker

The power-up circuit is protected with a 25-amp circuit breaker (CB1). Battery pack current flows through the circuit breaker before reaching any other component.

Key Switch

The key switch (S1) is a three-position switch, used to operate the control module.

Control Module

The control module (U1) manages all machine functions, using input data from the drive motors and LCD display.

48-Volt Power Circuit Operation—Battery Pack

See Figure 4-6.

With the key switch in the OFF position, voltage is available to the 25-amp circuit breaker from the battery pack. From the 25-amp circuit breaker, voltage is available to key switch terminals B and C, and control module connector J1 terminals 1 and 2. Voltage is also available to the work light connector positive terminal.

48-Volt Power Circuit Operation—Gen-Set

See Figure 4-7.

With the key switch in the RUN position, and the engine running, voltage is available to the 25-amp circuit breaker from the generator. From the 25-amp circuit breaker, voltage is available to key switch terminals B and C, and control module connector J1 terminals 1 and 2. Voltage is also available to the work light connector positive terminal.

Ignition Shutoff Circuit Operation—Gen-Set

See Figure 4-8.

With the key switch in the OFF position, ground is provided to the ignition coil. When the ignition coil is grounded, it is prevented from producing spark and the engine cannot operate.

48-Volt Power Circuit Schematic—Battery Pack

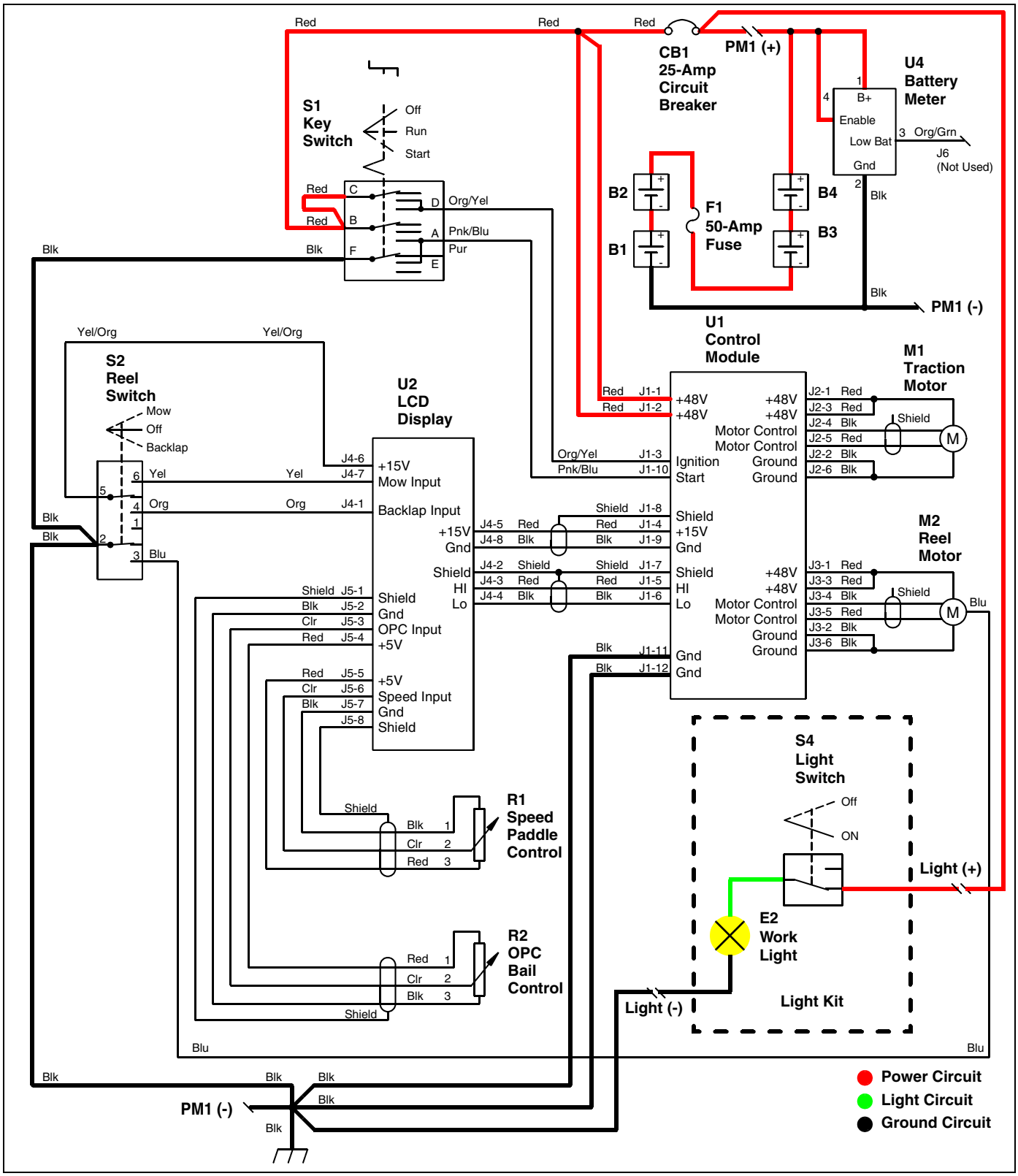


Figure 4-6

48-Volt Power Circuit Schematic—Gen-Set

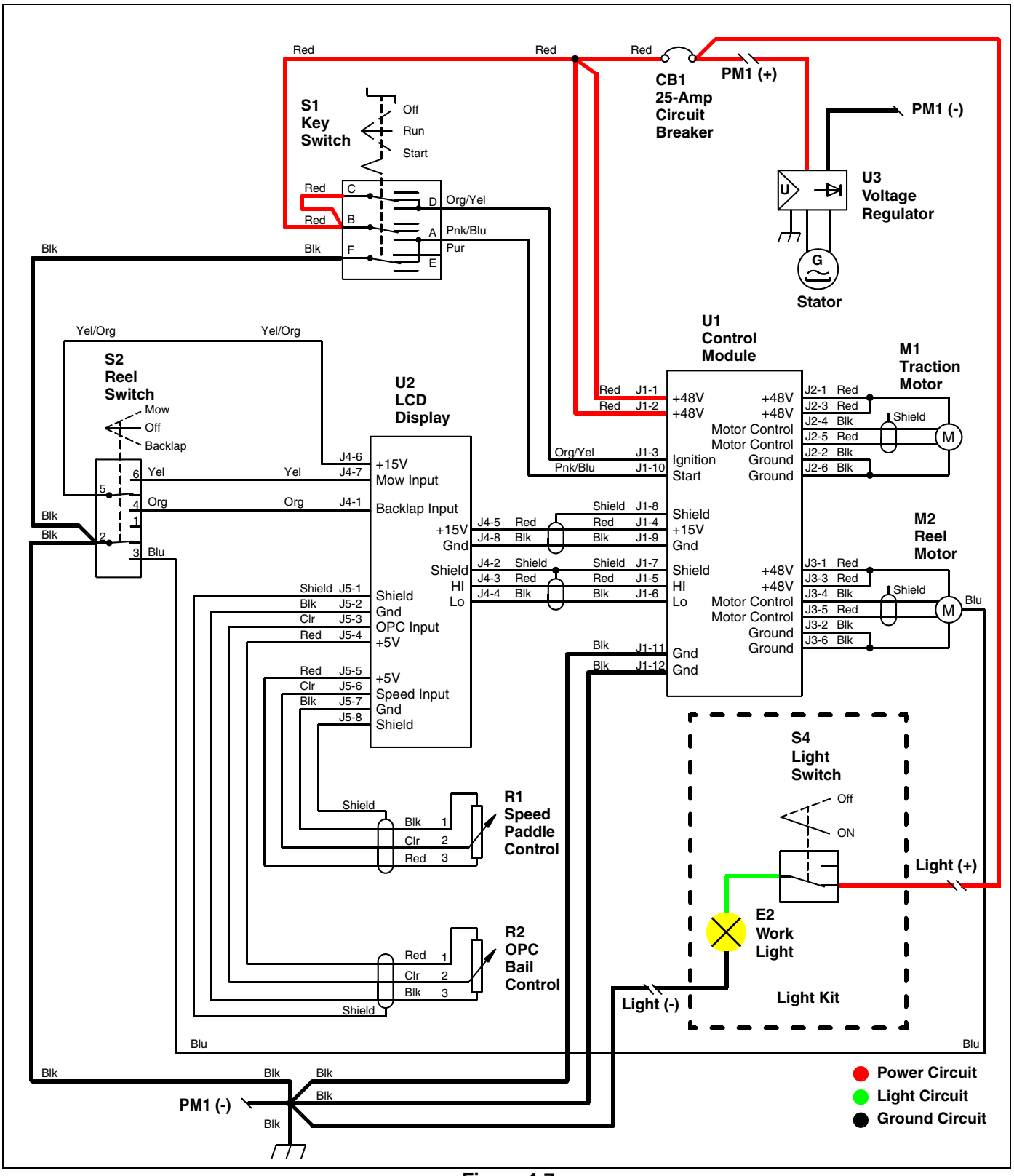


Figure 4-7

Ignition Shutoff Circuit Schematic—Gen-Set

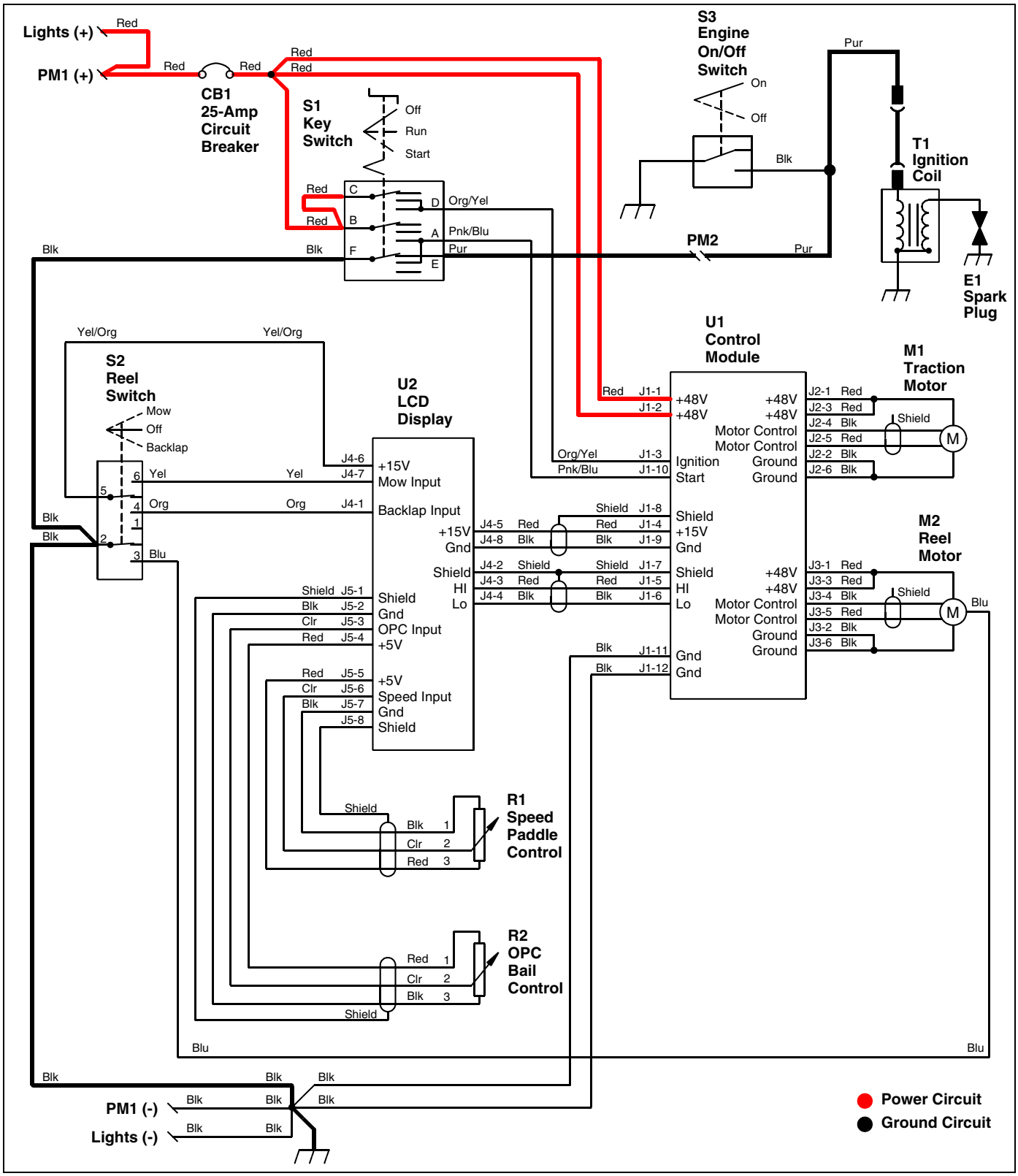


Figure 4-8

Power-Up Circuit—Theory of Operation

Power-Up Circuit Components

Gen-Set—If Equipped

The gen-set consists of a stator, rotor, and an internal voltage regulator. When the rotor magnets spin past the stator coils, the magnetic field creates AC voltage which flows to the voltage regulator. The voltage regulator then converts the AC voltage to DC, and maintains voltage at or near 48 VDC.

Battery Pack—If Equipped

The battery pack consists of four 12-VDC sealed lead acid batteries (B1—B4) wired in series. The battery pack is equipped with a battery gauge to monitor charge status. The battery pack is protected with a 50-amp fuse (F1).

Circuit Breaker

The power-up circuit is protected with a 25-amp circuit breaker (CB1). Battery pack current flows through the circuit breaker before reaching any other component.

Key Switch

The key switch (S1) is a three-position switch, used to operate the control module.

Control Module

The control module (U1) manages all machine functions, using input data from the drive motors and LCD display.

LCD Display

The LCD display (U2) gathers input from the OPC control, speed paddle control, and reel switch, and sends information based on these inputs to the control module.

Power-Up Circuit Operation

See Figure 4-9.

Voltage is available to the 25-amp circuit breaker from the battery pack or gen-set (engine running). From the 25-amp circuit breaker, voltage is available to key switch terminals B and C, and control module connector J1 terminals 1 and 2.

When the key switch is moved to the RUN position, current flows between key switch terminals C and D to control module connector J1 terminal 3. With current flowing to terminal 3, the ignition input becomes active.

When the key switch is moved to the START position, the ground signal provided to control module connector J1 terminal 10 is interrupted, and replaced with current from key switch terminals B and A. With current flowing to connector J1 terminal 10, the start input becomes active. With the ignition and start inputs active, the control module powers up. The control module now provides 15 volts to the LCD display, powering up the LCD display.

When the key switch is released to the RUN position, current continues to flow to the ignition input, while a ground signal is returned to the start input. With current flowing to the ignition input, the control module and LCD display will continue to operate until the key switch is moved to the OFF position.

Power-Up Circuit Schematic

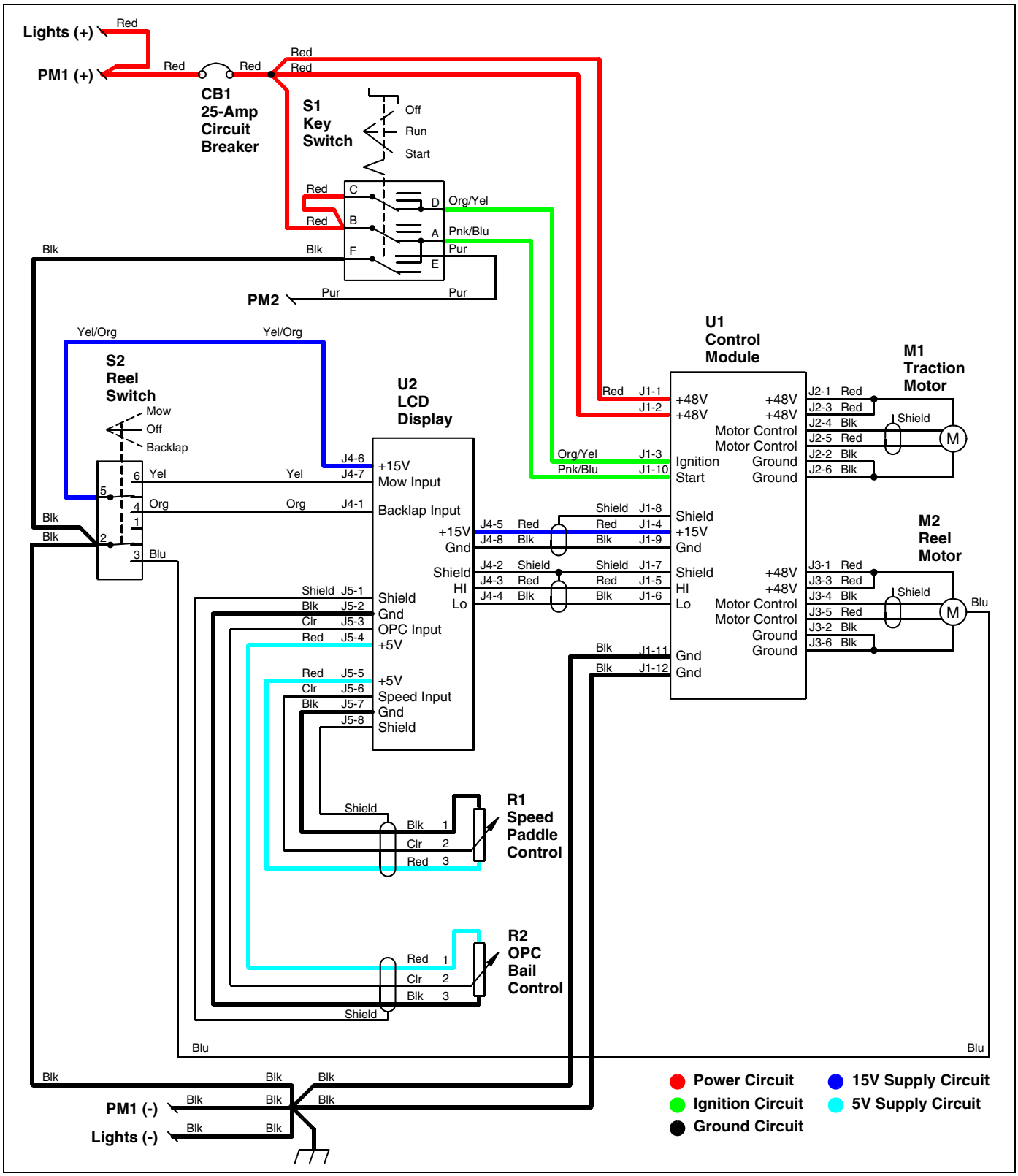


Figure 4-9

Traction Drive Circuit—Theory of Operation

Traction Drive Circuit Components

Speed Paddle Control

The speed paddle control (R1) sends a voltage signal from 0—5 VDC to the LCD display.

OPC Control

The OPC control (R2) sends a voltage signal from 0—5 VDC to the LCD display.

LCD Display

The LCD display (U2) gathers input from the OPC control, speed paddle control, and reel switch, and sends information based on these inputs to the control module.

Control Module

The control module (U1) manages all machine functions, using input data from the drive motors and LCD display.

Traction Drive Motor

The traction drive motor (M1) receives current, ground, and input data from the control module.

Traction Drive Circuit Operation

See Figure 4-10.

Voltage is provided from LCD display +5V to speed paddle control terminal 3. The LCD display also provides ground to speed paddle control terminal 1.

When the speed paddle control is adjusted, a signal is provided from speed paddle control terminal 2 to the LCD display speed input.

Voltage is provided from LCD display +5V to OPC bail control terminal 1. The LCD display also provides ground to OPC bail control terminal 3.

When the OPC bail control is adjusted, a signal is provided from OPC bail control terminal 2 to the LCD display OPC input.

The LCD display then communicates the information received from the speed paddle and OPC bail controls to the control module through the Hi and Lo data lines.

The control module provides voltage to traction motor from control module +48V terminals, and ground is provided by the ground terminals. The control module regulates traction motor rpm through the motor control lines, based on data received from the speed paddle control.

The control module motor control lines are also used to monitor motor amperage draw. In the event of an amperage overage (a draw of 30 amps for 1 second), the control module will disrupt current flow to the traction motor and communicate a fault to the LCD display.

Traction Drive Circuit Schematic

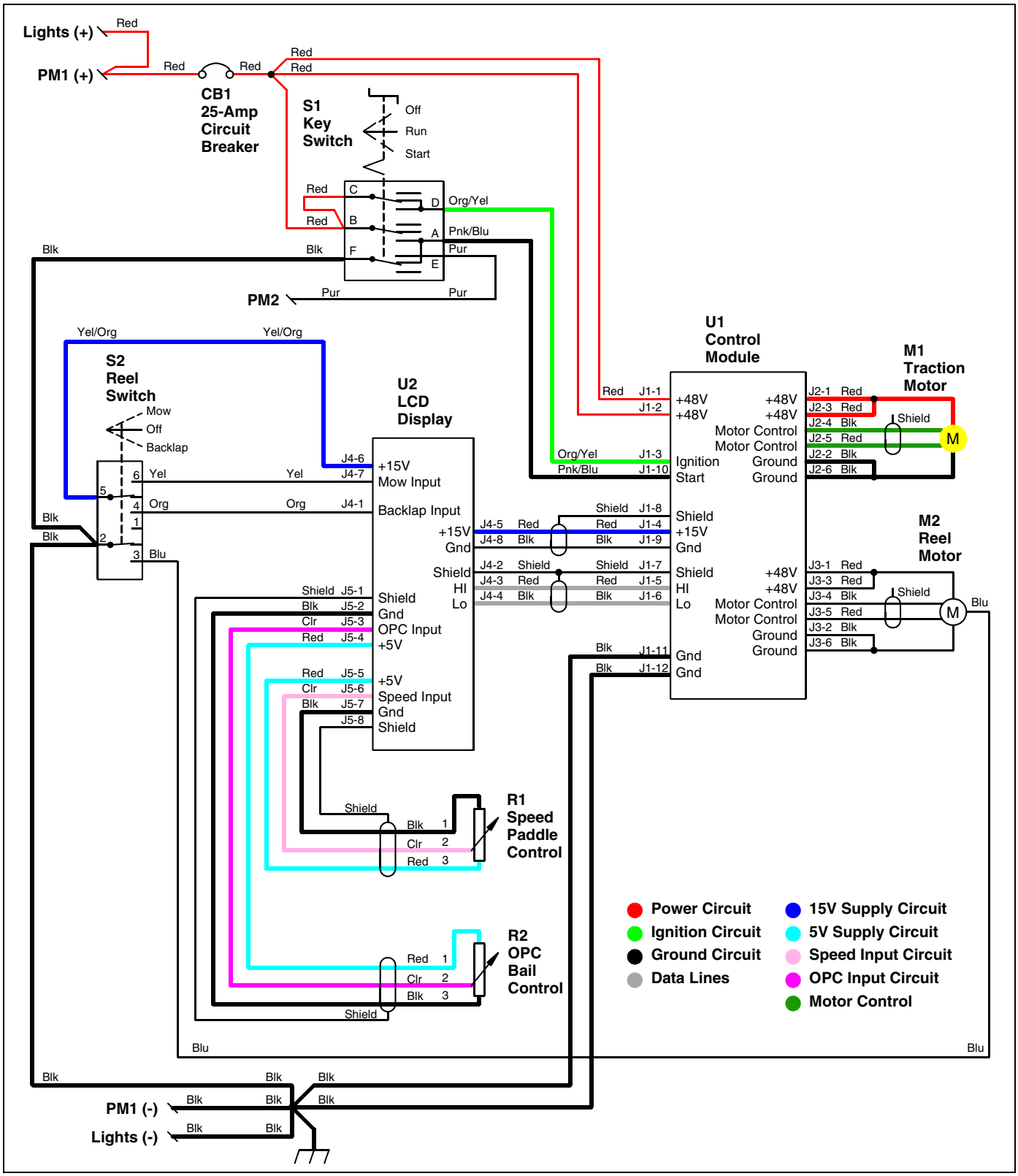


Figure 4-10

Reel Drive Circuit—Theory of Operation

Reel Drive Circuit Components

OPC Control

The OPC control (R2) sends a voltage signal from 0—5 VDC to the LCD display.

Reel Switch

The reel switch (S2) is a three-position switch, used to control the LCD display mow input and backlap terminals.

LCD Display

The LCD display (U2) gathers input from the OPC control, speed paddle control, and reel switch, and sends information based on these inputs to the control module.

Control Module

The control module (U1) manages all machine functions, using input data from the drive motors and LCD display.

Reel Drive Motor

The reel drive motor (M2) receives current, ground, and input data from the control module.

Reel Drive Circuit Operation

See Figure 4-11.

Voltage is provided from LCD display +5V to OPC bail control terminal 1. The LCD display also provides ground to OPC bail control terminal 3.

When the OPC bail control is adjusted, a signal is provided from OPC bail control terminal 2 to the LCD display OPC input.

Voltage is supplied from LCD display +15V terminal to the reel switch. When the reel switch is in the MOW position, current flows between reel switch terminals 5 and 6 to the LCD display mow input terminal and activates the mow input. With the mow and OPC inputs active, the LCD display then communicates the information control module through the Hi and Lo data lines.

The control module now provides voltage to the reel motor from control module +48V terminals and ground is provided by the ground terminals. The control module regulates reel motor rpm through the motor control lines, based on preset data received from the LCD display.

The control module motor control lines are also used to monitor motor amperage draw. In the event of an amperage overage (30 amps for 1 second), the control module will disrupt current flow to the reel motor and communicate a fault to the LCD display.

Reel Drive Circuit Schematic

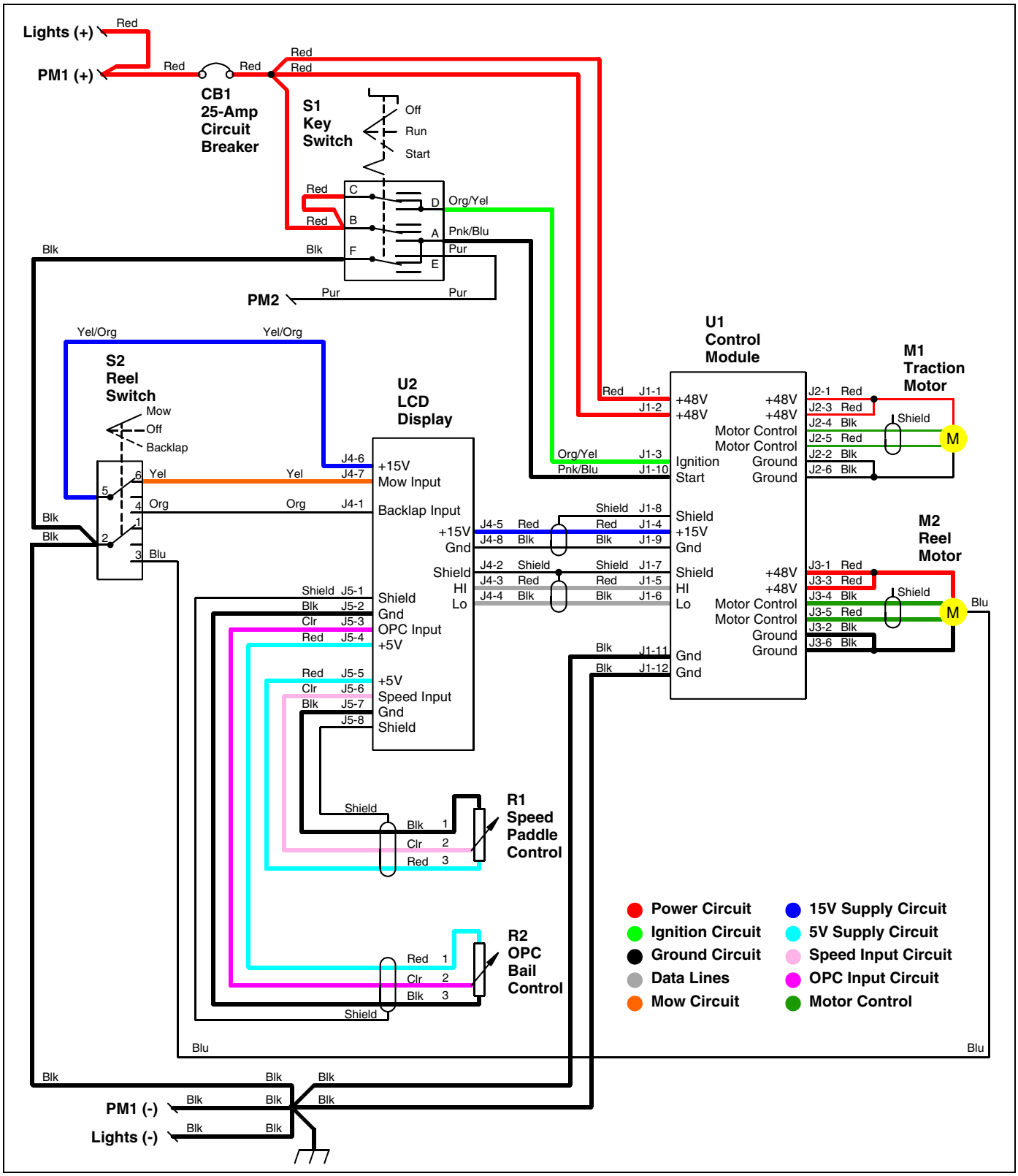


Figure 4-11

Backlap Drive Circuit—Theory of Operation

Backlap Drive Circuit Components

OPC Control

The OPC control (R2) sends a voltage signal from 0—5 VDC to the LCD display.

Reel Switch

The reel switch (S2) is a three-position switch, used to control the LCD display mow input and backlap terminals.

LCD Display

The LCD display (U2) gathers input from the OPC control, speed paddle control, and reel switch, and sends information based on these inputs to the control module.

Control Module

The control module (U1) manages all machine functions, using input data from the drive motors and LCD display.

Reel Drive Motor

The reel drive motor (M2) receives current, ground, and input data from the control module.

Backlap Drive Circuit Operation

See Figure 4-12.

IMPORTANT

Backlap operation requires the LCD display to be set to superintendent mode. (See "LCD Display—Modes" on page 4-28.)

When the LCD display is set to the superintendent mode, and the reel switch is in the backlap position, current flows between reel switch terminals (5 and 4) to the LCD display backlap input, and activates the backlap input. At the same, time ground is provided from reel switch terminal 3 to the reel drive motor direction input.

With the LCD display in superintendent mode and the backlap input active, the LCD display prompts the operator whether to continue with the backlap function. If the operator responds by selecting "yes", the LCD display prompts the operator to engage and release the OPC bail control to start the backlapping process. The LCD display then communicates the information to the control module through the Hi and Lo data lines.

With ground provided to the reel drive motor direction input, the control module operates the reel drive motor in the reverse direction.

Backlap Drive Circuit Schematic

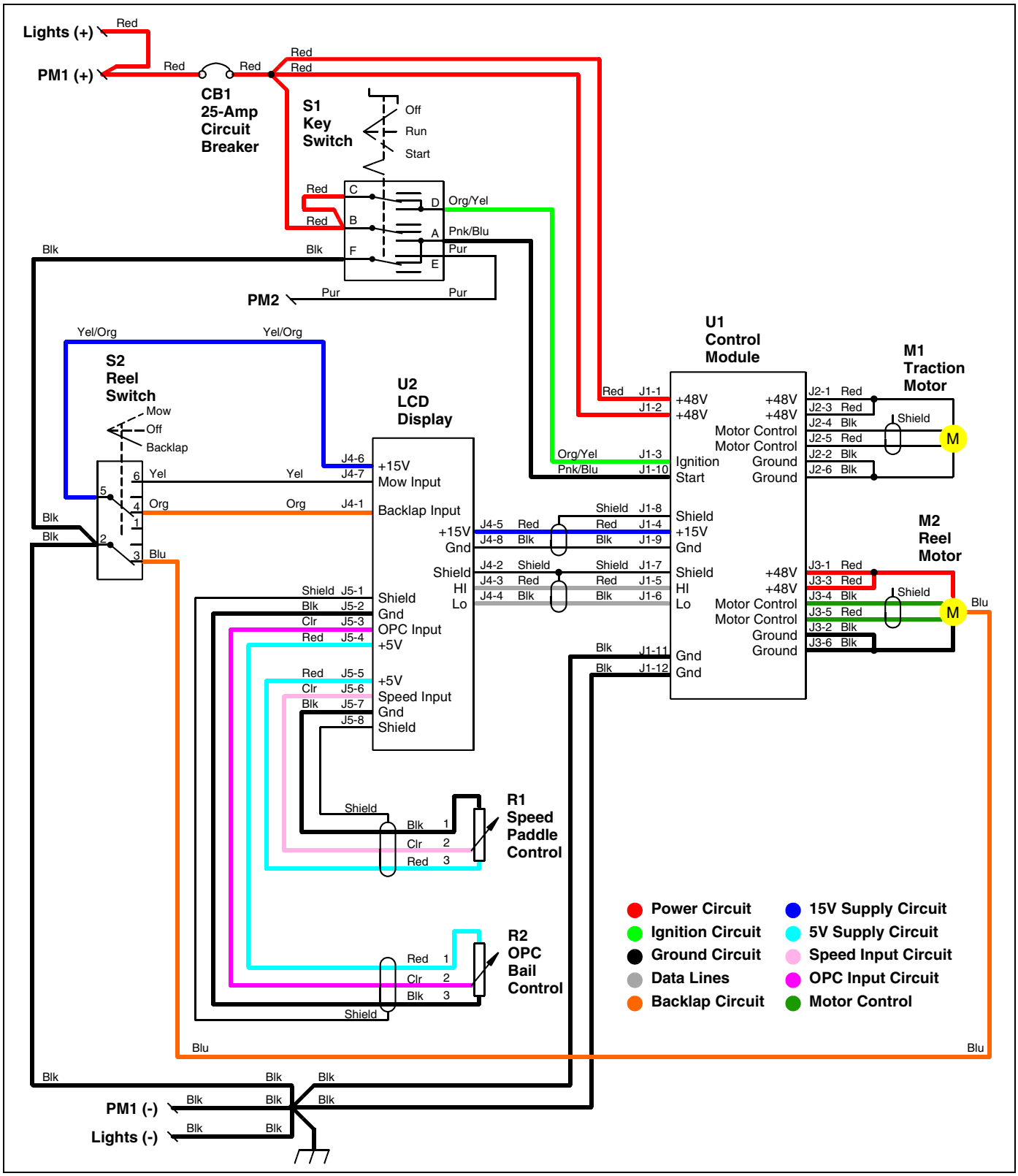


Figure 4-12

Troubleshooting

Symptom: Machine will not power up.

Probable Cause	Remedy
Faulty battery pack.	Test battery pack. (See “Battery Pack Test” on page 4-34.)
Faulty battery pack fuse.	Test fuse. (See “Battery Pack Fuse Test” on page 4-37.)
Faulty circuit breaker.	Test circuit breaker. (See “Circuit Breaker Test” on page 4-37.)
Faulty power circuit.	Measure voltage between battery (B4) positive terminal and ground. Measure voltage between control module connector (J1) terminals 1 and 2 and ground. Voltage must be approximately 48 VDC.
Open ground circuit.	Check continuity between battery (B1) negative terminal and control module connector (J1) terminals 11 and 12. Continuity must be indicated.
Faulty key switch.	Test key switch. (See “Engine On/Off Switch” on page 4-35.)
Faulty key switch power circuit.	Measure voltage between battery (B4) positive terminal and ground. Measure voltage between key switch (S1) terminal A and ground. Voltage must be approximately 48 VDC.
Faulty switch circuit.	Measure voltage between key switch (S1) terminal B and ground. Measure voltage between control module connector (J1) terminal 3 and ground. Voltage must be approximately 48 VDC.
	Measure voltage between key switch (S1) terminal C and ground. Measure voltage between control module connector (J1) terminal 10 and ground. Voltage must be approximately 48 VDC.
Faulty control module.	Test control module. (See “Control Module Test” on page 4-41.)
Faulty control module power circuit.	Measure voltage between battery (B4) positive terminal and ground. Measure voltage between control module connector (J1) terminals 1 and 2 and ground. Voltage must be approximately 48 VDC.
Open control module ground circuit.	Check continuity between battery (B1) negative terminal and control module connector (J1) terminals 11 and 12. Continuity must be indicated.
Faulty LCD display.	Test LCD display. (See “LCD Display Test” on page 4-40.)
Faulty LCD power circuit.	Measure voltage between control module connector (J1) terminal 4 and ground. Measure voltage between LCD display connector (J4) terminal 5 and ground. Voltage must range between 11.25 and 15 VDC.
Open LCD display ground circuit.	Check continuity between control module connector (J1) terminal 9 and LCD display connector (J4) terminal 8. Continuity must be indicated.

Symptom: Traction drive will not engage.

Probable Cause	Remedy
Faulty OPC bail control.	Test OPC bail control. (See “OPC Bail Control Test” on page 4-40.)
Faulty OPC bail control power circuit.	Measure voltage between LCD display connector (J5) terminal 4 and ground. Measure voltage between OPC bail control connector (R2) terminal 1 and ground. Voltage must be approximately 5 VDC.
Open OPC bail control ground circuit.	Check continuity between LCD display connector (J5) terminal 2 and OPC bail control connector (R2) terminal 3. Continuity must be indicated.
Faulty OPC bail control input circuit.	Measure voltage between LCD display connector (J5) terminal 3 and ground. Measure voltage between OPC bail control connector (R2) terminal 2 and ground. Voltage must range between 0 and 5 VDC.
Faulty speed paddle control.	Test speed paddle control. (See “Speed Paddle Control Test” on page 4-39.)
Faulty speed paddle control power circuit.	Measure voltage between LCD display connector (J5) terminal 5 and ground. Measure voltage between speed paddle control connector (R1) terminal 3 and ground. Voltage must be approximately 5 VDC.
Open speed paddle control ground circuit.	Check continuity between LCD display connector (J5) terminal 7 and speed paddle control connector (R1) terminal 1. Continuity must be indicated.
Faulty speed paddle control input circuit.	Measure voltage between LCD display connector (J5) terminal 6 and ground. Measure voltage between speed paddle control connector (R1) terminal 2 and ground. Voltage must range between 0 and 5 VDC.
Faulty LCD display.	Test LCD display. (See “LCD Display Test” on page 4-40.)
Faulty LCD display data line.	Measure voltage between LCD display connector (J4) terminal 3 and ground. Measure voltage between control module connector (J1) terminal 5 and ground. Voltage must be approximately 2.5 VDC.
	Measure voltage between LCD display connector (J4) terminal 4 and ground. Measure voltage between control module connector (J1) terminal 6 and ground. Voltage must be approximately 2.5 VDC.
Faulty LCD display data return line.	Check continuity between LCD display connector (J4) terminal 2 and control module connector (J1) terminal 7. Continuity must be indicated.
Faulty control module.	Test control module. (See “Control Module Test” on page 4-41.)
Faulty traction drive motor.	Test traction drive motor. (See “Traction Drive Motor Test” on page 4-38.)

Symptom: Reel drive will not engage.

Probable Cause	Remedy
Faulty reel drive switch.	Test reel drive switch. (See “Reel Drive Switch Test” on page 4-37.)
Faulty reel drive switch power circuit.	Measure voltage between LCD module connector (J4) terminal 6 and ground. Measure voltage between reel drive switch connector (S2) terminal 3 and ground. Voltage must range between 11.25 and 15 VDC.
Faulty reel drive switch input circuit.	Check continuity between LCD module connector (J4) terminal 7 and reel drive switch connector (S2) terminal 2. Continuity must be indicated.
Faulty OPC bail control.	Test OPC rotary switch. (See “OPC Bail Control Test” on page 4-40.)
Faulty OPC bail control power circuit.	Measure voltage between LCD module connector (J5) terminal 4 and ground. Measure voltage between OPC bail control connector (R2) terminal 1 and ground. Voltage must be approximately 5 VDC.
Open OPC bail control ground circuit.	Check continuity between LCD module connector (J5) terminal 2 and OPC bail control connector (R2) terminal 3. Continuity must be indicated.
Faulty OPC bail control input circuit.	Measure voltage between LCD module connector (J5) terminal 3 and ground. Measure voltage between OPC bail control connector (R2) terminal 2 and ground. Voltage must range between 0 and 5 VDC.
Faulty LCD display.	Test LCD display. (See “LCD Display Test” on page 4-40.)
Faulty LCD power circuit.	Measure voltage between control module connector (J1) terminal 4 and ground. Measure voltage between LCD display connector (J4) terminal 5 and ground. Voltage must be 15 VDC.
Open LCD display ground circuit.	Check continuity between control module connector (J1) terminal 9 and LCD module connector (J4) terminal 8. Continuity must be indicated.
Faulty LCD display data line.	Measure voltage between LCD display connector (J4) terminal 4 and ground. Measure voltage between control module connector (J1) terminal 6 and ground. Voltage must be approximately 2.5 VDC.
	Measure voltage between LCD display connector (J4) terminal 4 and ground. Measure voltage between control module connector (J1) terminal 6 and ground. Voltage must be approximately 2.5 VDC.
Faulty LCD display data return line.	Check continuity between LCD display connector (J4) terminal 2 and control module connector (J1) terminal 7. Continuity must be indicated.
Faulty control module.	Test control module. (See “Control Module Test” on page 4-41.)
Faulty reel drive motor.	Test reel motor. (See “Reel Drive Motor Test” on page 4-39.)

Symptom: Backlap drive will not engage.

Probable Cause	Remedy
LCD display not set to superintendent mode.	Set LCD to superintendent mode. (See “LCD Display—Modes” on page 4-28.)
Reel drive switch not in backlap position.	Perform proper backlap procedure. (See “Backlapping Procedure” on page 8-16.)
Faulty reel drive switch.	Test reel drive switch. (See “Reel Drive Switch Test” on page 4-37.)
Faulty reel drive switch power circuit.	Measure voltage between LCD module connector (J4) terminal 6 and ground. Measure voltage between reel drive switch connector (S2) terminal 5 and ground. Voltage must range between 11.25 and 15 VDC.
Faulty reel drive switch backlap input circuit.	Check continuity between LCD module connector (J4) terminal 1 and reel drive switch connector (S2) terminal 4. Continuity must be indicated.
Faulty OPC bail control.	Test OPC rotary switch. (See “OPC Bail Control Test” on page 4-40.)
Faulty OPC bail control power circuit.	Measure voltage between LCD module connector (J5) terminal 4 and ground. Measure voltage between OPC bail control connector (R2) terminal 1 and ground. Voltage must be approximately 5 VDC.
Open OPC bail control ground circuit.	Check continuity between LCD module connector (J5) terminal 2 and OPC bail control connector (R2) terminal 3. Continuity must be indicated.
Faulty OPC bail control input circuit.	Measure voltage between LCD module connector (J5) terminal 3 and ground. Measure voltage between OPC bail control connector (R2) terminal 2 and ground. Voltage must range between 0 and 5 VDC.
Faulty LCD display.	Test LCD display. (See “LCD Display Test” on page 4-40.)
Faulty LCD power circuit.	Measure voltage between control module connector (J1) terminal 4 and ground. Measure voltage between LCD display connector (J4) terminal 5 and ground. Voltage must be 15 VDC.
Open LCD display ground circuit.	Check continuity between control module connector (J1) terminal 9 and LCD module connector (J4) terminal 8. Continuity must be indicated.
Faulty LCD display data line.	Measure voltage between LCD display connector (J4) terminal 4 and ground. Measure voltage between control module connector (J1) terminal 6 and ground. Voltage must be approximately 2.5 VDC.
	Measure voltage between LCD display connector (J4) terminal 3 and ground. Measure voltage between control module connector (J1) terminal 5 and ground. Voltage must be approximately 2.5 VDC.
Faulty LCD display data return line.	Check continuity between LCD display connector (J4) terminal 2 and control module connector (J1) terminal 7. Continuity must be indicated.
Faulty control module.	Test control module. (See “Control Module Test” on page 4-41.)
Faulty reel drive motor.	Test reel motor. (See “Reel Drive Motor Test” on page 4-39.)

Symptom: Reel spins the wrong direction in backlap mode.

Probable Cause	Remedy
Faulty reel drive switch.	Test reel drive switch. (See “Reel Drive Switch Test” on page 4-37.)
Faulty backlap ground circuit.	Check continuity between reel switch (S2) terminal 3 and reel motor (M2) connector blue wire. Continuity must be indicated.
Faulty reel motor control input.	Test reel motor. (See “Reel Drive Motor Test” on page 4-39.)

LCD Display—Modes

See Figure 4-13.

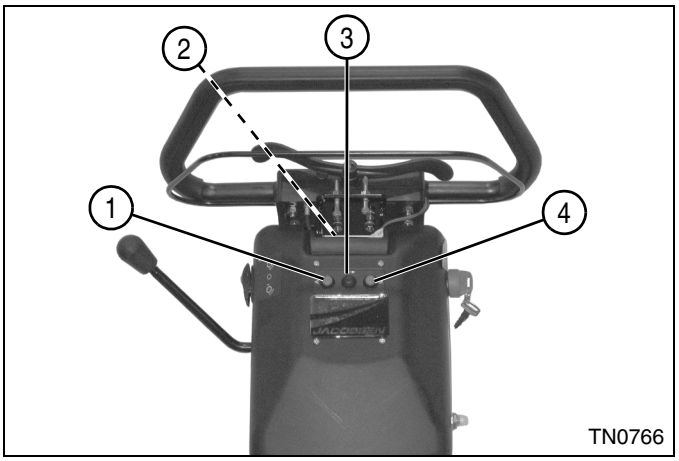


Figure 4-13

The LCD display (2) shows machine values for the operation of the Eclipse. The orange buttons (1 and 4) are used to toggle between display settings, or to increase or decrease setting values. The black button (3) is used to select, reset, or navigate within values.

The LCD display operates in one of three main modes:

- Operator Mode (default) is used to view operational values and component fault displays. Operator mode is view only; operational settings cannot be changed.
- Mechanic Mode (PIN required) is used to track hours between service periods. This mode is also used to monitor specific system data, relevant to service, and set the machine maximum travel speed. The PIN to access mechanic mode is 0123.
- Superintendent Mode (PIN required) is used to set and adjust all functional values, calibrate system controls, and monitor all system data. Superintendent mode allows full access to machine settings and options not available to users in other display modes. The superintendent PIN is 6789.

Component Fault Modes

The LCD display is equipped to alert the user of a component fault via an audible alarm and/or a component fault display.

WARNING

To prevent personal injury, release OPC bail, disengage reel drive, move key switch to the OFF position, and disconnect battery pack connector before checking for obstructions in reel or traction drive systems.

Low Voltage

LOW BATTERY
42.0 VDC

Battery Pack Models: A low-battery display screen is shown, and an audible alarm will sound when system voltage drops below 42 VDC. Press the black button to silence the audible alarm. The reel motor will not operate with system voltage below 42.0 VDC.

Check battery pack; charge or replace as needed. (See “Battery Pack” on page 4-42.)

Gen-Set Models: The same display and audible alarm will be used to indicate low voltage output from the gen-set. Press the black button to silence the audible alarm. The reel motor will not operate with system voltage below 42.0 VDC.

Test gen-set output. (See “Gen-Set Output Test” on page 4-34.)

Overvoltage/Check Voltage

OVERVOLTAGE
CHECK VOLTAGE

An overvoltage/check voltage display screen is shown, and an audible alarm will sound when system voltage reaches 60 VDC. Press the black button to silence the alarm. The controller will shut down after 60 seconds if the overvoltage condition remains uncorrected.

Test gen-set output. (See “Gen-Set Output Test” on page 4-34.)

Reel Motor Fault

A reel motor fault screen will be displayed if reel motor current draw exceeds 30 amps for more than one second.

A reel motor fault will also be displayed if the reel motor circuit is shorted to ground.

Check reel drive motor; repair or replace as needed. (See “Reel Drive Motor” on page 4-46.)

Traction Motor Fault

A traction motor fault screen will be displayed if the traction drive motor exceeds 22 amps for more than one second.

A traction motor fault will also be displayed if the traction motor circuit is shorted to ground.

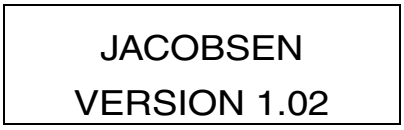
Check traction drive motor; repair or replace as needed. (See “Traction Drive Motor” on page 4-47.)

Viewing Operational Values and System Data

Operational values and system data can be viewed in both mechanic and superintendent modes.

Use the orange buttons to navigate the system data menu. Use the black button to select or accept. The system data display menu includes the following screens:

Standard Start Screen

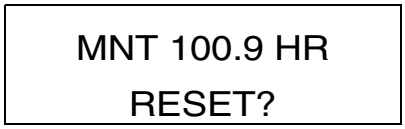


Press and hold both the orange buttons during the start screen to change display modes.

Enter PIN

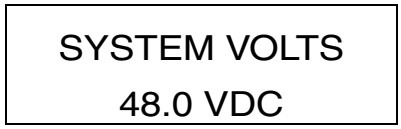
Enter the desired PIN at this screen.

Maintenance Hours



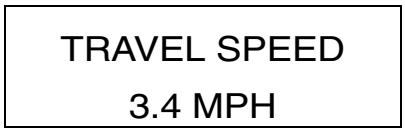
The maintenance hours screen displays the machine hours of operation since the last machine maintenance. Press the black button to reset maintenance hours.

System Volts



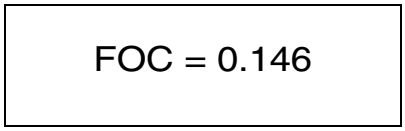
The system volts screen displays the total system voltage.

Travel Speed



The travel speed screen displays the travel speed of the mower.

FOC (Frequency of Clip)

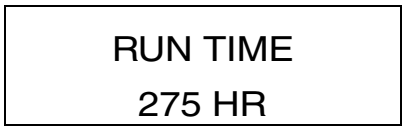


The FOC screen displays the frequency of clip setting.

Reel Speed

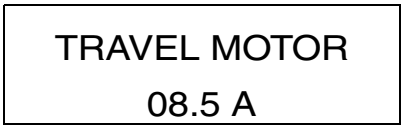
The reel speed screen displays the reel rotation speed.

Run Time



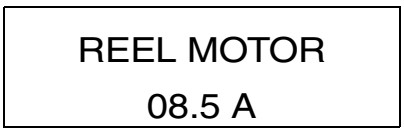
The run time screen displays the total hours of machine operation.

Travel Motor



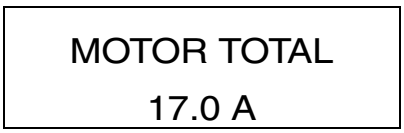
The travel motor screen displays the traction motor amperage draw.

Reel Motor



The reel motor screen displays the reel motor amperage draw.

Motor Total



The motor total screen displays the motor's combined total amperage draw.

Setting Operational Values

IMPORTANT

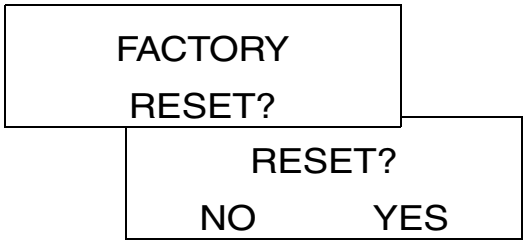
Max mow and reel speed will not be fully functional unless FOC is set at zero.

Operational values can be set only in superintendent mode.

Start engine, if equipped, and move the key switch to the START/ON position. Press and hold the orange buttons while the start screen (Jacobsen Version X.XX) is displayed. Enter the superintendent PIN 6789, and press the black button.

Use the orange buttons to navigate the menu and the black button to select or accept.

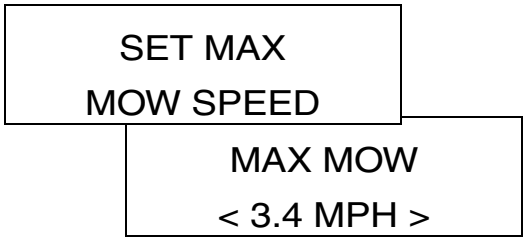
Factory Reset



The factory reset screen displays the option to reset the maximum mow speed, reel speed, and display units to the factory defaults. Press the black button to reset factory settings.

The reset screen confirms the decision to reset factory defaults. Press the left orange button to cancel. Press the right orange button to confirm.

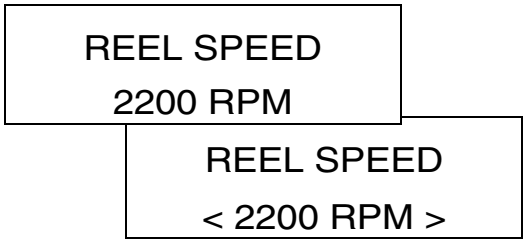
Set Max Mow Speed



The set maximum mow speed screen provides the option to set the maximum travel speed.

Press the black button to change the setting. Use the orange buttons to increase or decrease the maximum mow speed value. Press the black button to accept.

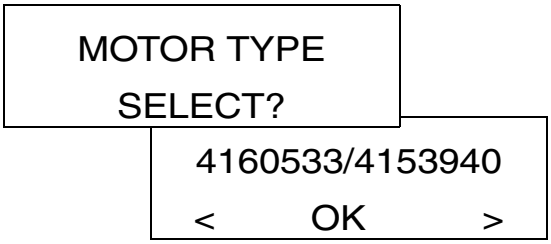
Reel Speed



The reel speed screen displays the reel rotation speed. Press the black button to set reel speed.

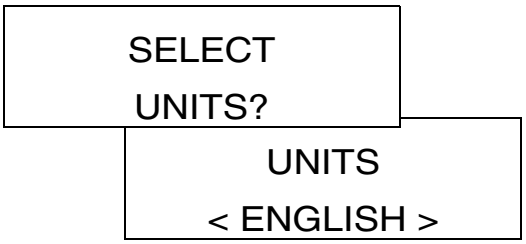
The reel speed value screen displays the option to set the maximum reel speed. Use the orange buttons to increase or decrease reel speed setting. Press the black button to accept.

Motor Type Select



The motor type select screen displays the option to change the drive motor model used. Refer to the machine parts book to determine the drive motors used for your application. Press the orange buttons to change the part number to your application. Press the black button to accept.

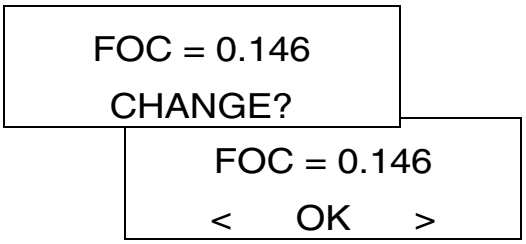
Select Units



The select units screen displays the option to change the display units. Press the black button to change display units.

The units screen displays the option to set the display units. Use the orange buttons to change the setting. Press the black button to accept.

Change FOC (Frequency of Clip)

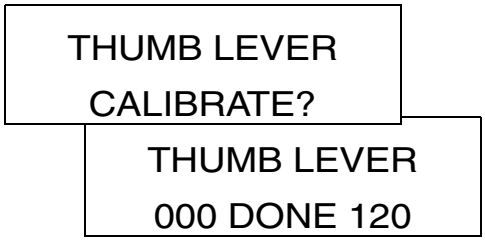


The change FOC screen displays the option to change the frequency of clip value. FOC is adjustable between 0.087 and 0.178. The factory default FOC is 0.146.

Traction drum speed is limited when FOC setting is between 0.087 and 0.146. Reel speed is limited when FOC setting is between 0.146 and 0.178.

Press the orange buttons to increase or decrease value. Press the black button to accept.

Speed Paddle Calibration



NOTE

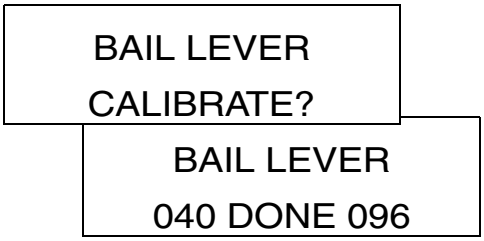
Adjust speed paddle stops before performing calibration procedure. (See “Speed Paddle Stop Adjustment” on page 6-3.)

The thumb lever calibrate screen displays the option to calibrate the speed paddle potentiometer setting. Press the black button to calibrate the speed paddle.

The thumb lever value screen displays the minimum and maximum values for the speed paddle potentiometer. Move the speed paddle through its entire range of movement to determine minimum and maximum values. The values will change as the speed paddle is moved. Press the black button to accept.

4

OPC Bail Lever Calibration



The bail lever calibrate screen displays the option to calibrate the OPC bail rotary switch values. Press the black button to calibrate the OPC bail.

The bail lever screen displays the minimum and maximum values for the OPC bail rotary switch. Move the OPC bail lever through its entire range of movement to determine the minimum and maximum values. The values will change as the OPC bail lever is moved. The minimum and maximum values must have a difference of 20 or more. Press the black button to accept.

Backlap Function

Refer to the cutting unit section for detailed backlapping operation. (See “Backlapping Procedure” on page 8-15.)

Component Testing

Electrical System and Component Testing

WARNING

Before cleaning, adjusting, or repairing this equipment, disengage reel drive switch, engage park brake, move key switch to the OFF position, and remove key to prevent injuries.

When performing maintenance other than adjustments that require the reel and/or traction drive motors to be running, disconnect the battery pack/gen-set plug to prevent accidental motor engagement and bodily injury.

General Information

Repair of the electrical system, for the most part, is limited to the replacement of defective components or wiring. Wiring diagrams are provided in this section for troubleshooting and/or testing the electrical system. Specific component testing and replacement information, where applicable, is also provided in this section.

In addition to testing a suspected faulty component, it may be necessary to check for shorts or breaks in the wiring to the component. A common method of testing wires or circuits is to perform a continuity check as described in the following tests.

NOTE

Before performing any component or wiring tests, check for corrosion and loose or missing connections.

If a component (switch, relay, etc.) is removed for testing or replacement, be sure to identify and label all wires so that the component can be installed correctly.

Continuity Test

Required Tools or Equipment
Digital Multimeter, Ohmmeter, or Continuity Tester

1. Identify and locate the wire or component to be checked using the electrical schematic.

NOTE

Some meters may have a continuity tester setting that uses a buzzer to indicate continuity. See the meter operator's manual for more information.

2. If using a multimeter, set it to read ohms or set meter to continuity setting.
3. Disconnect the ends of the wire being tested.
4. Touch meter leads to the ends of the wire or to the terminals of the component to be tested.

   Does meter read less than 0.5 ohm, and/or does the buzzer sound?

   YES *The wire is good.*

   NO *Proceed to step 5.*
5. Use a known good jumper wire of the correct gauge to bypass the wire in question.
6. Test the function of the circuit.

   Does the circuit now operate properly?

   YES *Replace the wire.*

   NO *Continue testing other wires and components in the circuit.*

Resistance Test

Required Tools or Equipment
Digital Multimeter or Ohmmeter

1. Identify and locate the wire or component to be checked using the electrical schematic.

NOTE

On some meters it will be necessary to select an ohms scale. Select an appropriate range for the component being tested. Refer to the specifications listed in the component test procedure.

2. If using a multimeter, set it to read ohms.
3. Isolate (disconnect) the component to be tested from the circuit to prevent a false reading through the circuit.
4. Connect the meter leads to the terminals of the component being tested. Check the component test procedure for specifications and additional test conditions.

   Does the resistance through the component match the specified value listed in the test procedure?

   YES *The component is good.*

   NO *Replace the component.*

Battery Pack Test

Required Tools or Equipment
Digital Multimeter

IMPORTANT

- **Battery pack must be fully charged before beginning test.**
- **Be sure machine is securely parked on kickstand.**
- **Be sure to back bedknife away from reel before beginning test.**
- **During testing, the total amperage draw should be 6.5 ± 0.5 amps.**

1. Park the mower safely.
(See “Park Mower Safely” on page 1-5.)
2. Back bedknife away from reel.
(See “Bedknife-to-Reel Adjustment” on page 8-15.)
3. Open battery pack cover. (See “Battery Pack” on page 4-42.)

WARNING

- **Conduct battery test in a secured environment.**
- **Be sure the area is clear of all bystanders.**
- **Do not leave the machine unattended during the test procedure.**
- **Clear the test area of all tools and debris.**
- **Failure to follow safety guidelines could result in death or serious injury.**

4. Move the key switch to the START/ON position.
5. Engage the reel drive switch, increase the machine speed, and engage the Operator Presence Control (OPC) bail lever.

   Operate the machine at full speed until system voltage decreases to approximately (42 VDC).

   When system voltage reaches 42 VDC the reel drive motor will be disengaged by the control module.
6. Using a multimeter, with the traction drive still engaged, check the battery voltage level of each battery.

   Battery voltage will vary slightly from one battery to the next.

   The average voltage reading should not vary more than 1.5 VDC from the highest measurement.
7. Disengage the OPC bail lever, move the key switch to the OFF position, and disconnect the battery pack connector.

   Do all batteries test within 1.5 VDC of the highest reading?

   YES *The batteries are good.*

   NO *Battery is faulty; replace the battery.*
8. Install the battery pack cover.
(See “Battery Pack” on page 4-42.)
9. Adjust bedknife-to-reel contact.
(See “Bedknife-to-Reel Adjustment” on page 8-15.)

Gen-Set Output Test

See Figures 4-14 through 4-16.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

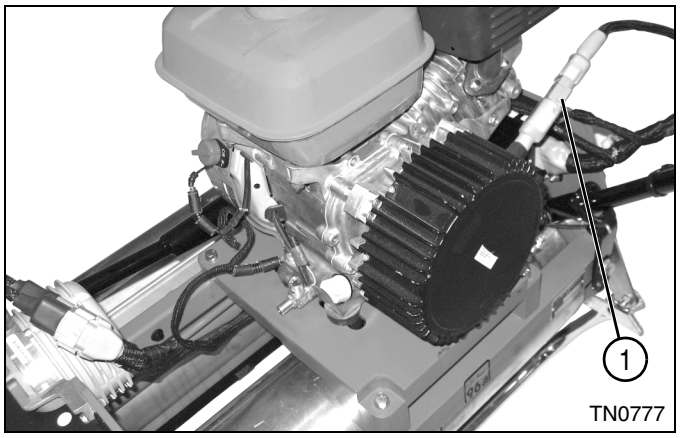


Figure 4-14

2. Disconnect gen-set connector (1).

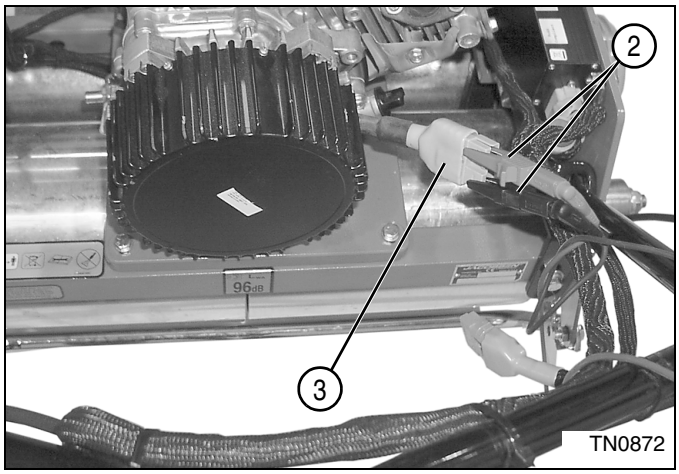


Figure 4-15

3. Connect multi-meter leads (2) to gen-set connector (3). Start engine and allow it to reach normal operating temperature.
4. Move throttle lever to full speed and check generator output.

   Is generator output 59 VDC?

   YES *Output voltage is correct. Test complete.*

   NO *Adjust engine rpm. Proceed to step 5.*

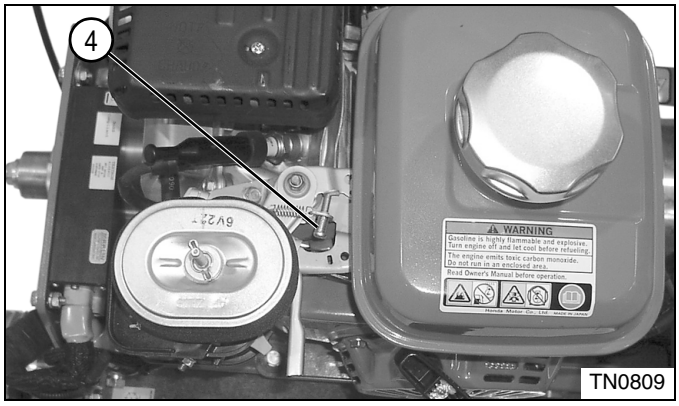


Figure 4-16

5. Adjust engine speed stop screw (4) clockwise to decrease engine speed and voltage output, and coutnerclockwise to increase engine speed and voltage output.
6. Adjust as needed until voltage output reads 59VDC.

Engine On/Off Switch

See Figures 4-17 and 4-18.

Required Tools or Equipment
Digital Multimeter, Ohmmeter, or Continuity Tester

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

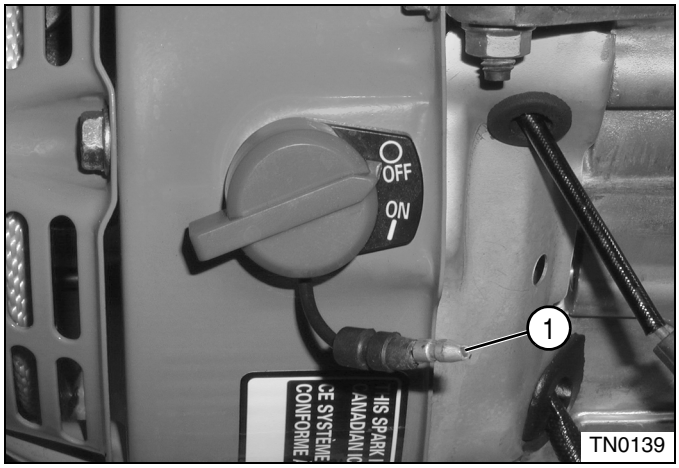


Figure 4-17

2. Disconnect engine on/off switch wire (1).
3. Remove the blower housing from the engine. (Refer to engine manual.)

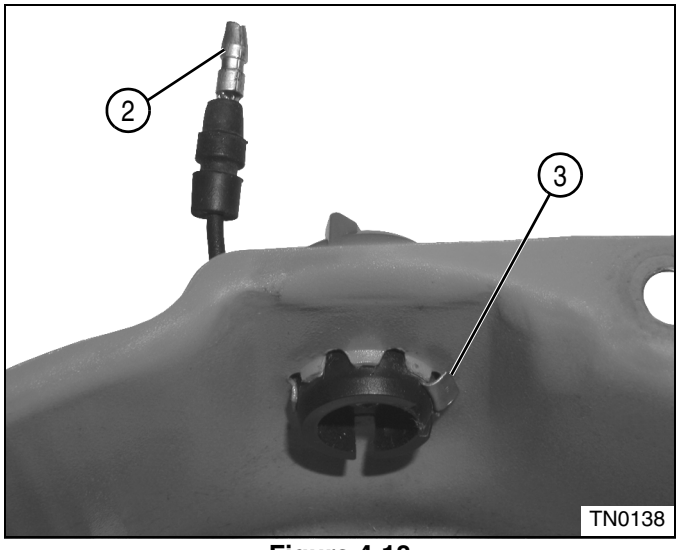


Figure 4-18

4. Connect test leads between engine on/off switch wire (2) and grounding tab (3).

5. Move engine on/off switch to the ON position and check for continuity.

   Is continuity indicated?

   YES *The switch is faulty; replace the switch.*

   NO *Proceed to step 6.*

6. Move engine on/off switch to the OFF position and check for continuity.

   Is continuity indicated?

   YES *The switch is good.*

   NO *The switch is faulty; replace the switch.*

Key Switch Test

See Figure 4-19.

Required Tools or Equipment
Digital Multimeter, Ohmmeter, or Continuity Tester

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)
3. Remove key switch. (See “Key Switch” on page 4-45.)

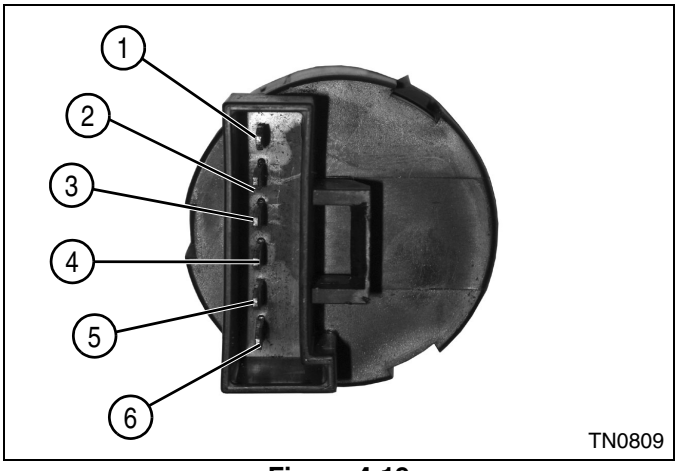


Figure 4-19

4. Move key switch to the OFF position.
5. Check continuity between terminals (5 and 6).

   Is continuity indicated?

   YES *Proceed to step 8.*

   NO *The key switch is faulty.*

6. Move key switch to the RUN position. Check continuity between terminals (3 and 4).

   Is continuity indicated?

   YES *Proceed to step 8.*

   NO *The key switch is faulty.*

7. With key switch in the RUN position, check continuity between terminals (1 and 6).

   Is continuity indicated?

   YES *Proceed to step 8.*

   NO *The key switch is faulty.*

8. Move the key switch to the START position. Check continuity between terminals (1 and 2).

   Is continuity indicated?

   YES *Proceed to step 9.*

   NO *The key switch is faulty; replace the switch.*

9. With key switch in the START position, check continuity between terminals (3 and 4).

   Is continuity indicated?

   YES *The key switch is good.*

   NO *The key switch is faulty; replace the switch.*

10. Install key switch. (See “Key Switch” on page 4-45.)
11. Install rear half of handle cover. (See “Handle Cover” on page 6-3.)

Circuit Breaker Test

See Figure 4-20.

Required Tools or Equipment
Digital Multimeter, Ohmmeter, or Continuity Tester

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)
3. Remove circuit breaker. (See “Circuit Breaker” on page 4-46.)

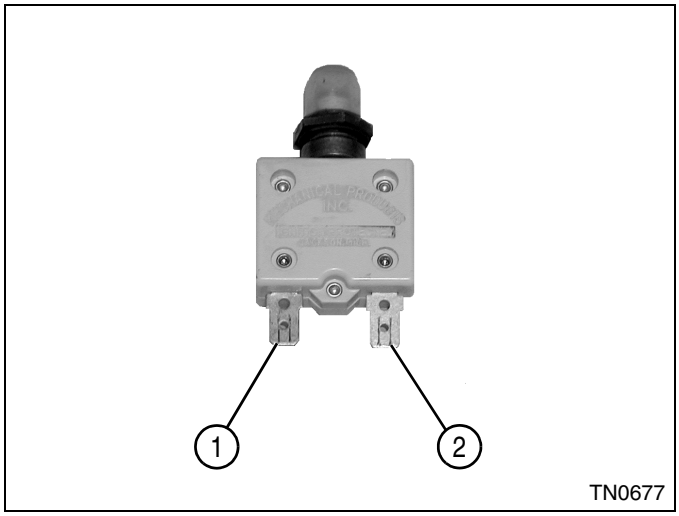


Figure 4-20

NOTE

Be sure circuit breaker is reset prior to testing.

4. Check for continuity between terminals (1 and 2).

   Is continuity indicated?

   YES *Circuit breaker is good.*

   NO *Circuit breaker is faulty; replace the circuit breaker.*

5. Install circuit breaker. (See “Circuit Breaker” on page 4-46.)
6. Install rear half of handle cover. (See “Handle Cover” on page 6-3.)

Battery Pack Fuse Test

See Figure 4-21.

Required Tools or Equipment
Digital Multimeter, Ohmmeter, or Continuity Tester

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove battery pack. (See “Battery Pack” on page 4-42.)
3. Remove battery pack fuse. (See “Battery Pack Fuse” on page 4-44.)

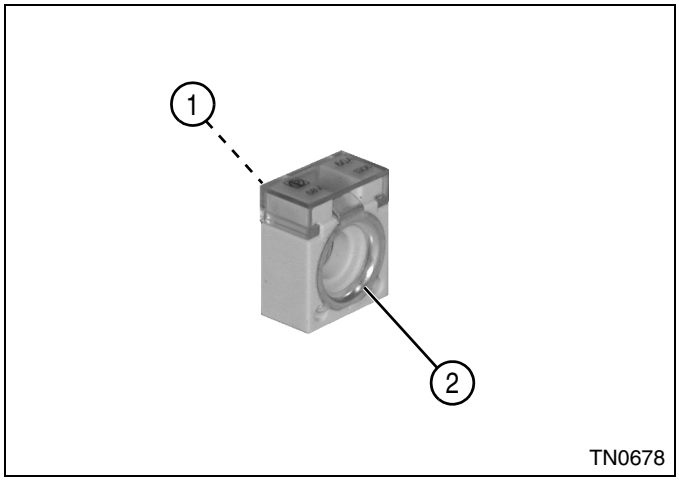


Figure 4-21

4. Check continuity between ring terminals (1 and 2).

   Is continuity indicated?

   YES *Battery pack fuse is good.*

   NO *Battery pack fuse is faulty; replace the battery pack fuse.*

5. Install battery pack fuse. (See “Battery Pack Fuse” on page 4-44.)
6. Install battery pack. (See “Battery Pack” on page 4-42.)

Reel Drive Switch Test

See Figure 4-22.

Required Tools or Equipment
Digital Multimeter, Ohmmeter, or Continuity Tester

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)

3. Remove reel drive switch. (See “Reel Drive Switch” on page 4-46.)

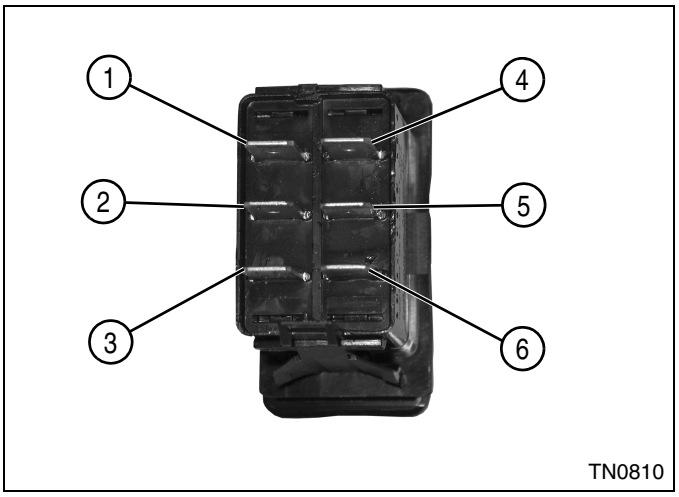


Figure 4-22

4. Move reel drive switch to the MOW position.
5. Check continuity between terminals (2 and 3).

   Is continuity indicated?

   YES *Proceed to step 6.*

   NO *Reel drive switch is faulty; replace the reel drive switch.*

6. With reel drive switch in the MOW position, check continuity between terminals (5 and 6).

   Is continuity indicated?

   YES *Proceed to step 7.*

   NO *Reel drive switch is faulty; replace the reel drive switch.*

7. Move reel drive switch to the BACKLAP position.
8. Check continuity between terminals (1 and 2).

   Is continuity indicated?

   YES *Proceed to step 8.*

   NO *Reel drive switch is faulty; replace the reel drive switch.*

9. With reel drive switch in the BACKLAP position, check continuity between terminals (4 and 5).

   Is continuity indicated?

   YES *Reel drive switch is good.*

   NO *Reel drive switch is faulty; replace the reel drive switch.*

10. Install reel drive switch. (See “Reel Drive Switch” on page 4-46.)
11. Install rear half of handle cover. (See “Handle Cover” on page 6-3.)

Traction Drive Motor Test

See Figure 4-23.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

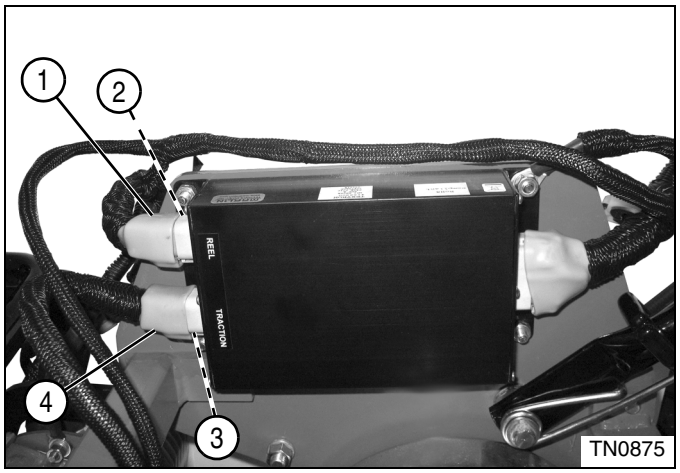


Figure 4-23

2. Disconnect traction drive motor harness connector (4) and reel drive motor harness connector (1).
3. Connect traction drive motor harness connector (4) to controller reel port (2). Do not connect reel drive motor harness connector.
4. Move key switch to the START/ON position. Engage reel drive switch and Operator Presence Control (OPC) bail.

   Does traction drive motor engage?

   YES *Traction drive motor is good.*

   NO *Traction drive motor is faulty; replace traction drive motor.*

5. Disengage OPC bail and reel drive switch. Move key switch to the OFF position.
6. Disconnect traction drive motor harness connector (4) from controller reel port (2).
7. Connect reel drive motor harness connector (1) to controller reel port (2).
8. Connect traction drive motor harness connector (4) to controller traction port (3).

Reel Drive Motor Test

See Figure 4-24.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Back bedknife away from reel. (See “Bedknife-to-Reel Adjustment” on page 8-15.)

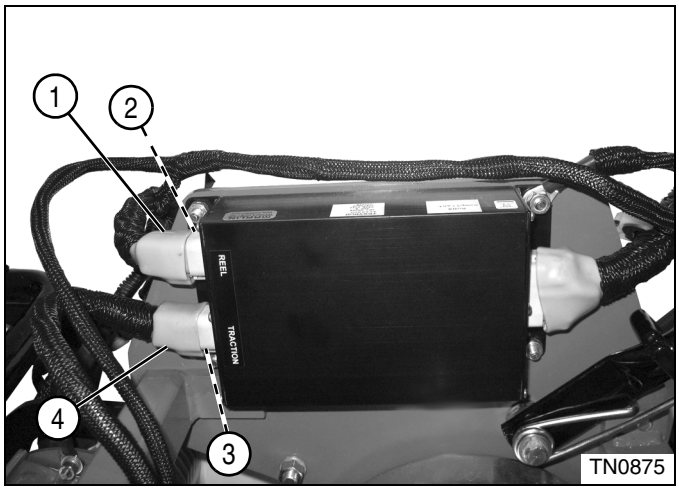


Figure 4-24

3. Disconnect traction drive motor harness connector (4) and reel drive motor harness connector (1).
4. Connect reel drive motor harness connector (1) to controller traction port (3). Do not connect traction drive motor harness connector.
5. Move key switch to the START/ON position, engage Operator Presence Control (OPC) bail, and increase machine speed with speed paddle.

   Does reel drive motor engage?

   YES *Reel drive motor is good.*

   NO *Reel drive motor is faulty; replace reel drive motor.*
6. Disengage OPC bail and move key switch to the OFF position.
7. Disconnect reel drive motor harness connector (1) from controller traction port (3).
8. Connect reel drive motor harness connector (1) to controller reel port (2).
9. Connect traction drive motor harness connector (4) to controller traction port (3).
10. Adjust bedknife-to-reel contact. (See “Bedknife-to-Reel Adjustment” on page 8-15.)

Speed Paddle Control Test

See Figure 4-25.

Required Tools or Equipment
Digital Multimeter or Ohmmeter

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove handle and Operator Presence Control (OPC) bail. (See “Handle and OPC Bail” on page 6-9.)
3. Remove speed paddle potentiometer. (See “Speed Paddle Control” on page 4-49.)

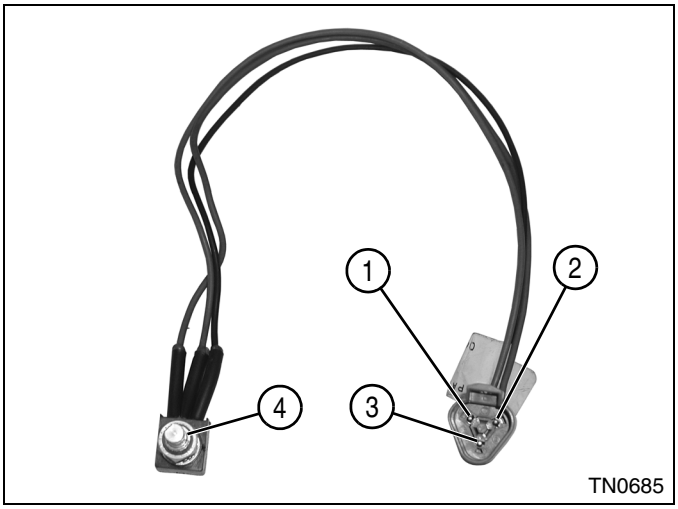


Figure 4-25

4. Measure resistance between terminals (2 and 3). Resistance must range between 3710 and 6890 ohms.

   Is resistance measurement within specification?

   YES *Proceed to step 5.*

   NO *Speed paddle potentiometer is faulty; replace speed paddle potentiometer.*
5. Measure resistance between terminals (1 and 2) while rotating stem (4). Low end resistance must range between 18.9 and 35.1 ohms. High end resistance must range between 3710 and 6890 ohms.

   Is resistance measurement within specification?

   YES *Proceed to step 6.*

   NO *Speed paddle potentiometer is faulty; replace speed paddle potentiometer.*

6. Measure resistance between terminals (1 and 3) while rotating stem (4). Low end resistance must range between 18.9 and 35.1 ohms. High end resistance must range between 3710 and 6890 ohms.

   Is resistance measurement within specification?

   YES *Speed paddle potentiometer is good.*

   NO *Speed paddle potentiometer is faulty; replace speed paddle potentiometer.*

7. Install speed paddle potentiometer. (See “Speed Paddle Control” on page 4-49.)
8. Install handle and OPC bail. (See “Handle and OPC Bail” on page 6-9.)
9. If speed paddle potentiometer was replaced, perform calibration procedure. (See “Speed Paddle Calibration” on page 4-31.)

OPC Bail Control Test

See Figure 4-26.

Required Tools or Equipment
Digital Multimeter or Ohmmeter

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove handle cover. (See “Handle Cover” on page 6-3.)
3. Remove Operator Presence Control (OPC) bail control. (See “OPC Bail Control” on page 4-51.)

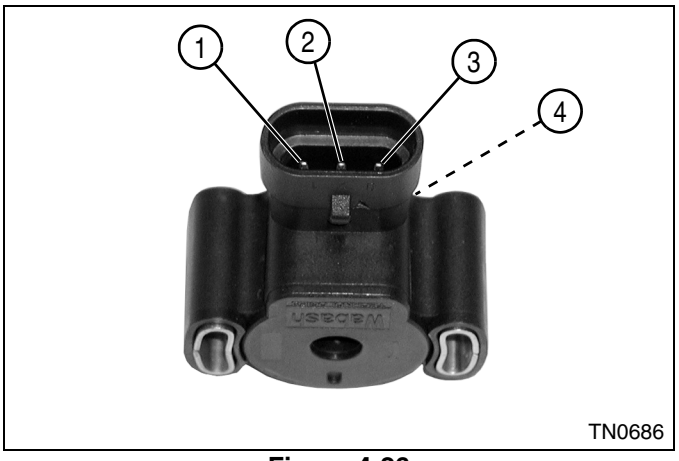


Figure 4-26

4. Measure resistance between terminals (1 and 3). Resistance must range between 3640 and 6760 ohms.

   Is resistance measurement within specification?

   YES *Proceed to step 5.*

   NO *OPC bail control is faulty; replace OPC bail control.*

5. Measure resistance between terminals (1 and 2) while rotating stem (4). Low end resistance must range between 770 and 1430 ohms. High end resistance must range between 4060 and 7540 ohms.

   Is resistance measurement within specification?

   YES *Proceed to step 6.*

   NO *OPC bail control is faulty; replace OPC bail control.*

6. Measure resistance between terminals (2 and 3) while rotating stem (4). Low end resistance must range between 1190 and 2210 ohms. High end resistance must range between 4410 and 8190 ohms.

   Is resistance measurement within specification?

   YES *OPC bail control is good.*

   NO *OPC bail control is faulty; replace OPC bail control.*

7. Install OPC bail control. (See “OPC Bail Control” on page 4-51.)
8. Install handle cover. (See “Handle Cover” on page 6-3.)

LCD Display Test

Required Tools or Equipment
Digital Multimeter or Continuity Tester

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

NOTES

- *Inspect LCD display for loose or corroded connectors.*
- *Use schematic to verify power supply and module ground.*
- *Refer to “LCD Display—Modes” on page 4-28 for information pertaining to the proper operation of the LCD display.*

2. Start engine, if equipped, and move key switch to the START/ON position.

   Does LCD display illuminate and enter operator mode?

   YES *LCD display is good.*

   NO *LCD display is faulty; replace LCD module.*

Control Module Test

Required Tools or Equipment
Digital Multimeter or Continuity Tester

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

NOTES

- *Inspect control module for loose or corroded connectors.*
- *Use schematic to verify power supply and control module ground.*

2. Remove suspected faulty controller, and connect to a known good machine. Be sure all connectors and ground terminals are connected.
3. Move key switch to the ON position, start engine, if equipped, and move key switch to the START/ON position. Engage Operator Presence Control (OPC) bail and reel drive switch. Increase machine speed with speed paddle.

   Does known good machine operate properly?

   YES *Control module is good.*

   NO *Control module is faulty; replace control module.*

Component Removal and Installation

Battery Pack

Removal and Installation

See Figure 4-27.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

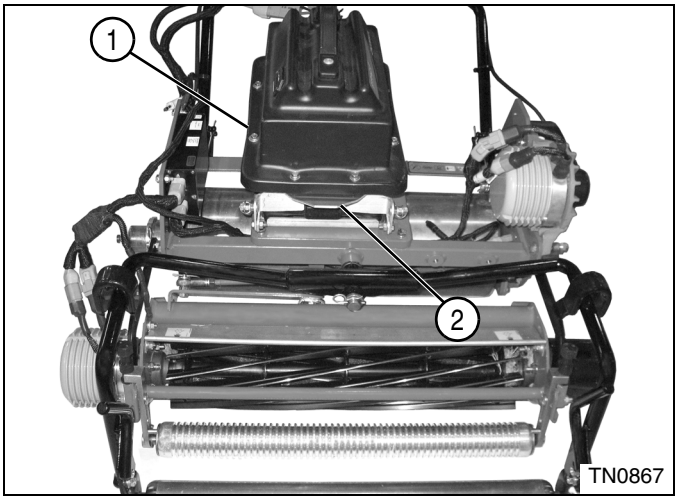


Figure 4-27

2. Press down on spring plate (2) and remove battery pack (1).

Installation Note

Install the battery pack by reversing the order of removal.

Disassembly

See Figures 4-28 through 4-30.

WARNING

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

Figure 4-28

1. Remove eight screws (1) and straps (2).
2. Open battery pack cover (3). Do not remove at this time.

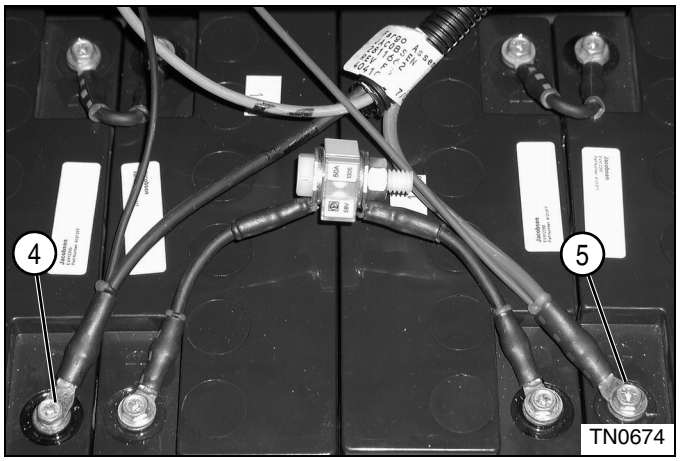


Figure 4-29

NOTE

Label all wires before disconnecting to ensure correct installation.

3. Disconnect main harness negative lead (4).
4. Disconnect main harness positive lead (5).

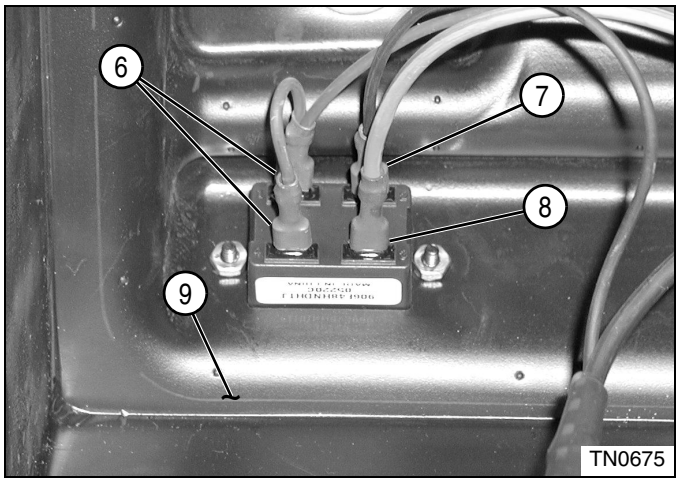


Figure 4-30

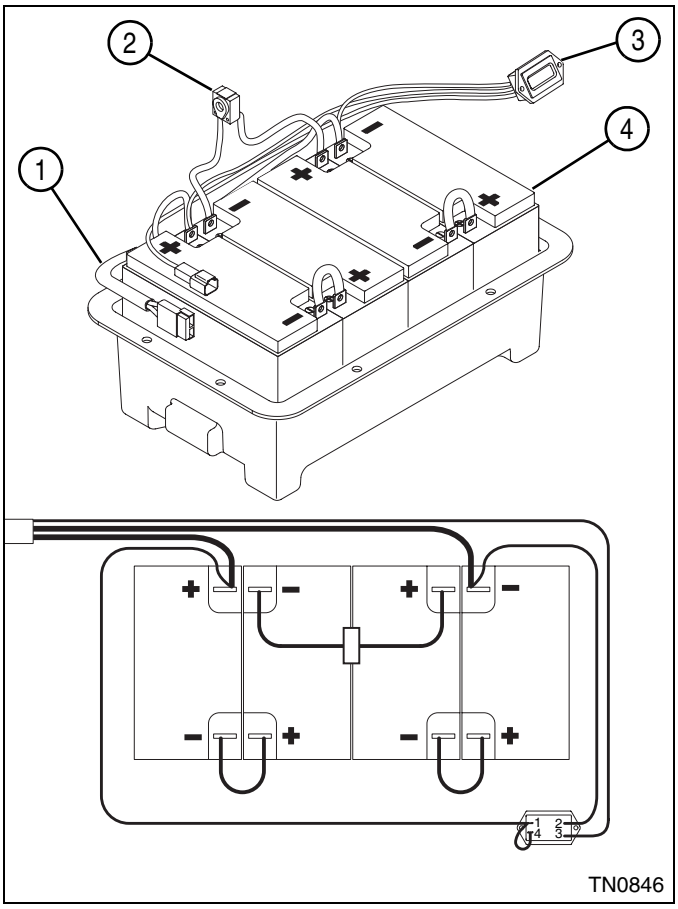
5. Disconnect battery gauge positive leads (6).
6. Disconnect battery gauge negative lead (7).
7. Disconnect battery gauge signal wire lead (8).
8. Remove battery pack cover (9).

Disassembly Note

Disconnect remaining wire leads, as needed, to service individual batteries.

Assembly

See Figure 4-31.



1	Main Harness	3	Battery Gauge
2	Fuse	4	Battery (4)

Figure 4-31: Battery Pack Wiring Diagram

Assembly Notes

- *Connect wire leads as noted during removal.*
- *Assemble the battery pack by reversing the order of removal.*

Battery Gauge

Removal and Installation

See Figure 4-32.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove battery pack cover. (See “Battery Pack” on page 4-42.)

NOTES

Label all wires before disconnecting to ensure correct installation.

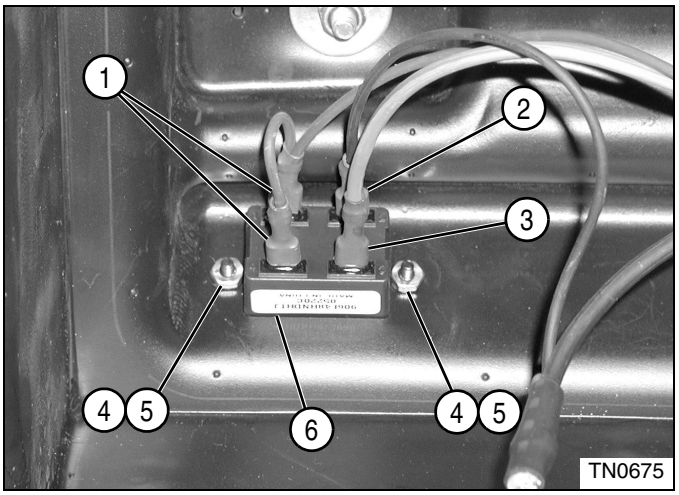


Figure 4-32

3. Disconnect battery gauge positive leads (1).
4. Disconnect battery gauge negative lead (2) and signal wire lead (3).
5. Remove screws (4), nuts (5), and battery gauge (6).

Installation Notes

- *Install the battery gauge by reversing the order of removal.*
- *Install battery pack cover. (See “Battery Pack” on page 4-42.)*

Battery Pack Fuse

Removal and Installation

See Figure 4-33.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove battery pack cover. (See “Battery Pack” on page 4-42.)

NOTE

Label all wires before disconnecting to ensure correct installation.

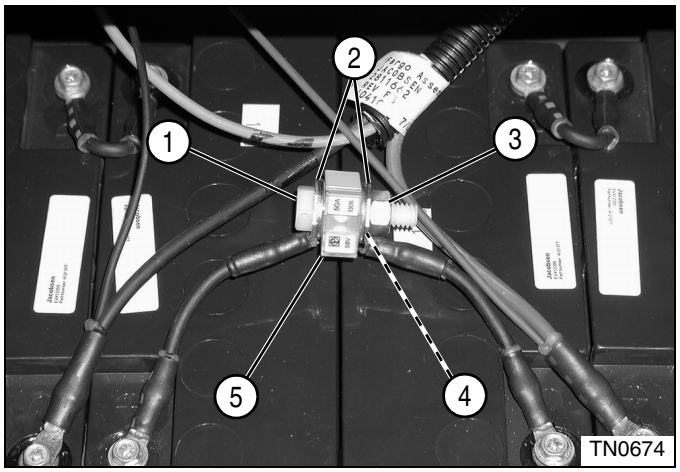


Figure 4-33

3. Remove nylon screw (1), flat washers (2), lock washer (4), and nut (3).
4. Remove fuse (5).

Installation Notes

- *Install the battery pack fuse by reversing the order of removal.*
- *Torque nut (3) to 25 lb-in. (2.82 N•m).*
- *Install battery pack cover. (See “Battery Pack” on page 4-42.)*

Generator

Removal and Installation

See Figures 4-34 through 4-36.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

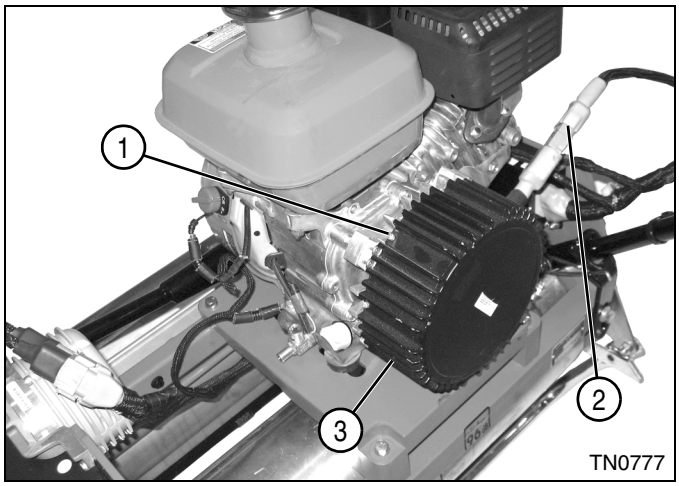


Figure 4-34

2. Disconnect gen-set connector (2).
3. Remove six screws (1) and generator cover (3).

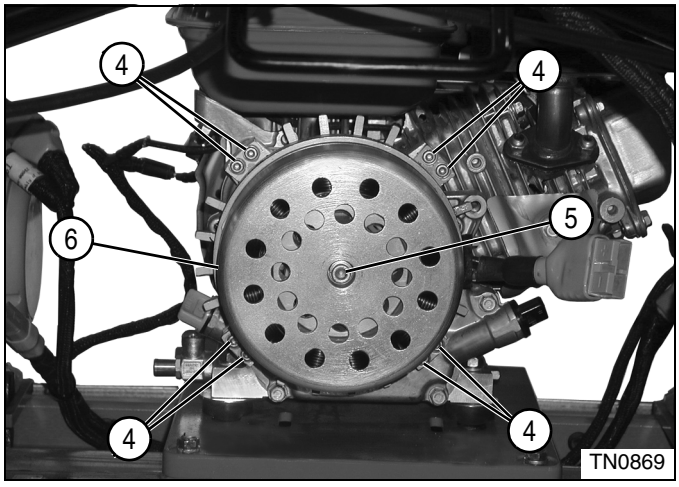


Figure 4-35

4. Remove eight socket-head cap screws and lock washers (4).
5. Remove cap screw and lock washer (5), and generator assembly (6).

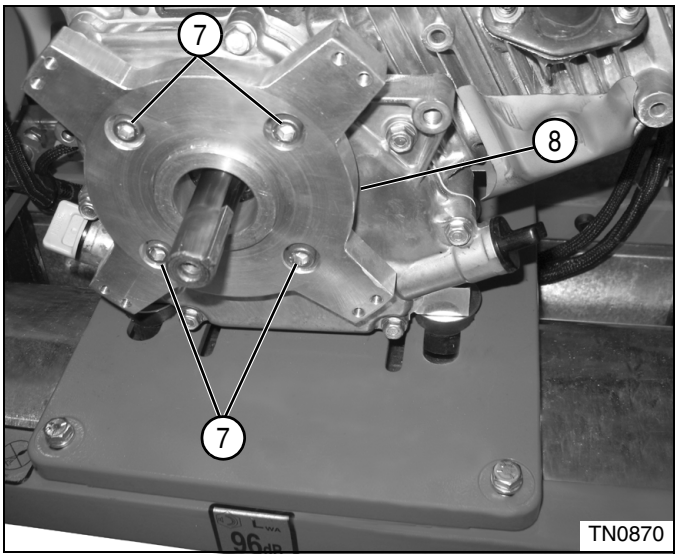


Figure 4-36

6. Remove four socket-head screws and lock washers (7).
7. Remove adapter plate (8).

Installation Note

- *Install the generator by reversing the order of removal.*
- *Be sure to align crankshaft key when installing generator.*

Key Switch

Removal and Installation

See Figure 4-37.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)

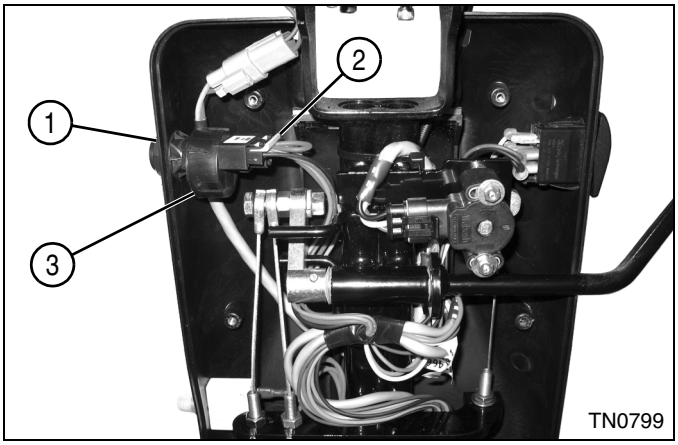


Figure 4-37

3. Disconnect key switch connector (2).

4. Remove key switch nut (1) and key switch assembly (3).

Installation Notes

- *Install the key switch by reversing the order of removal.*
- *Install rear half of handle cover. (See "Handle Cover" on page 6-3.)*

Circuit Breaker

Removal and Installation

See Figure 4-38.

1. Park mower safely. (See "Park Mower Safely" on page 1-5.)

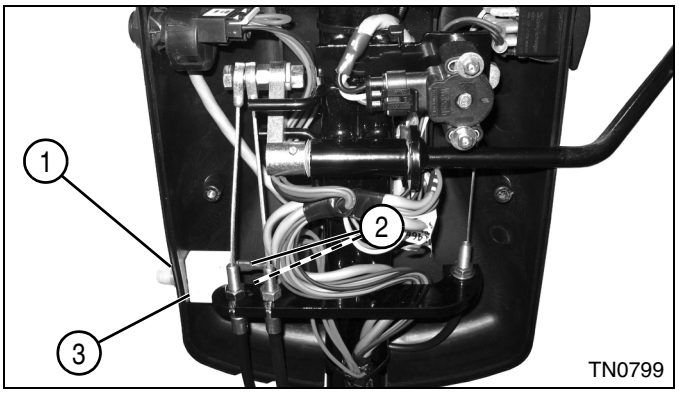


Figure 4-38

NOTE

Record location of wire connectors before disconnecting.

2. Disconnect circuit breaker wire connectors (2).
3. Remove circuit breaker retaining nut (1) and circuit breaker assembly (3).

Installation Note

Install the circuit breaker by reversing the order of removal.

Reel Drive Switch

Removal and Installation

See Figure 4-39.

1. Park mower safely. (See "Park Mower Safely" on page 1-5.)

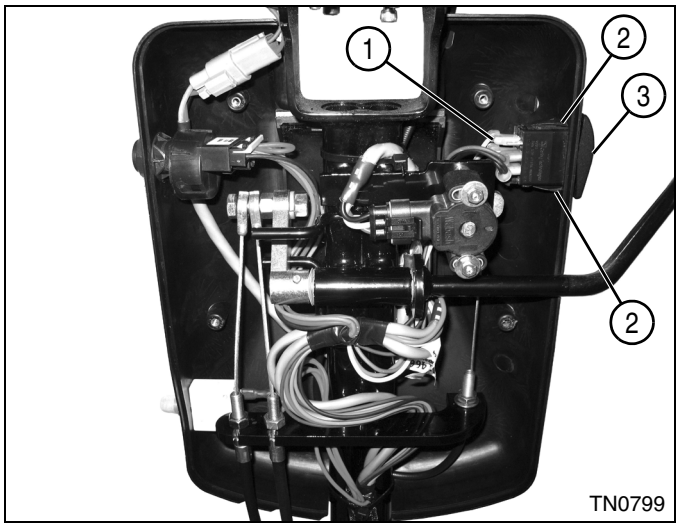


Figure 4-39

NOTE

Record location of wire connectors before disconnecting.

2. Disconnect reel drive switch wire connectors (1).
3. Depress mounting tabs (2) and remove reel drive switch (3).

Installation Note

Install the reel drive switch by reversing the order of removal.

Reel Drive Motor

Removal and Installation

See Figures 4-40 and 4-41.

Required Materials
NLGI Grade 2 Lithium Grease

1. Park mower safely. (See "Park Mower Safely" on page 1-5.)

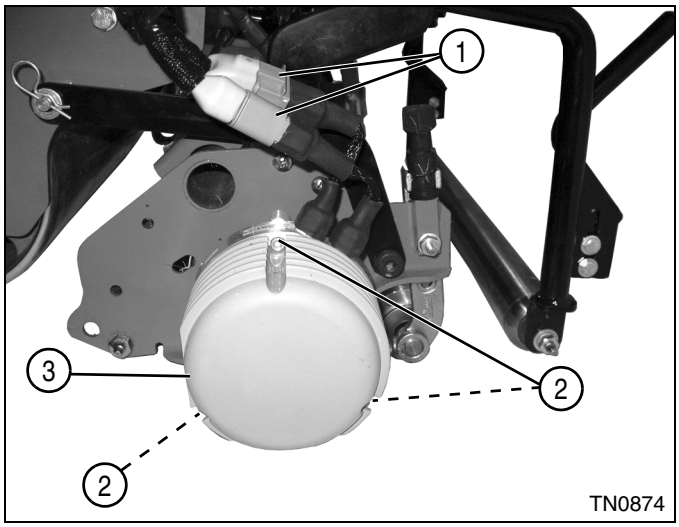


Figure 4-40

2. Disconnect reel drive motor harness connectors (1).
3. Remove three screws (2) and reel drive motor (3).

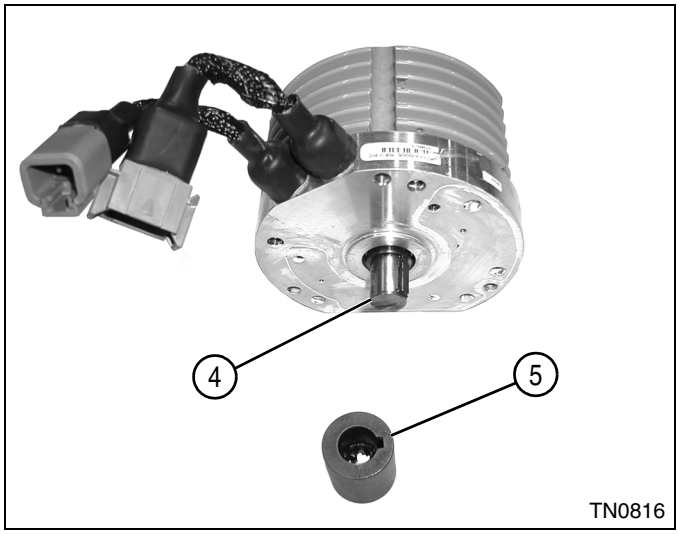


Figure 4-41

4. Remove coupler (5) from reel drive motor shaft (4).

Installation Notes

- *Install the reel drive motor by reversing the order of removal.*
- *Coat the reel drive motor shaft (4) with NLGI Grade 2 Lithium Grease before installing coupler (5).*

Traction Drive Motor

Removal

See Figures 4-42 through 4-45.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

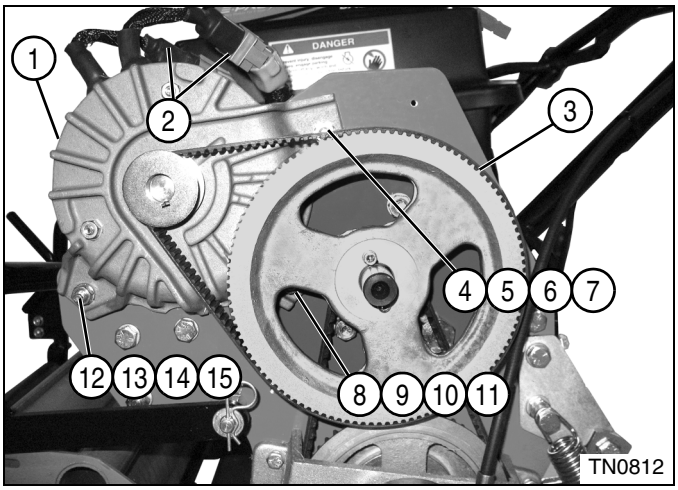


Figure 4-42

2. Disconnect traction drive motor connectors (2).
3. Remove belt cover. (See “Traction Drive Belt Cover” on page 5-7.)
4. Remove nut (4), lock washer (5), flat washer (6), and cap screw (7).
5. Remove nut (8), lock washer (9), flat washer (10), and cap screw (11).
6. Remove nut (12), lock washer (13), flat washer (14), cap screw (15), and transfer belt (3).
7. Remove traction drive motor and mount assembly (1).

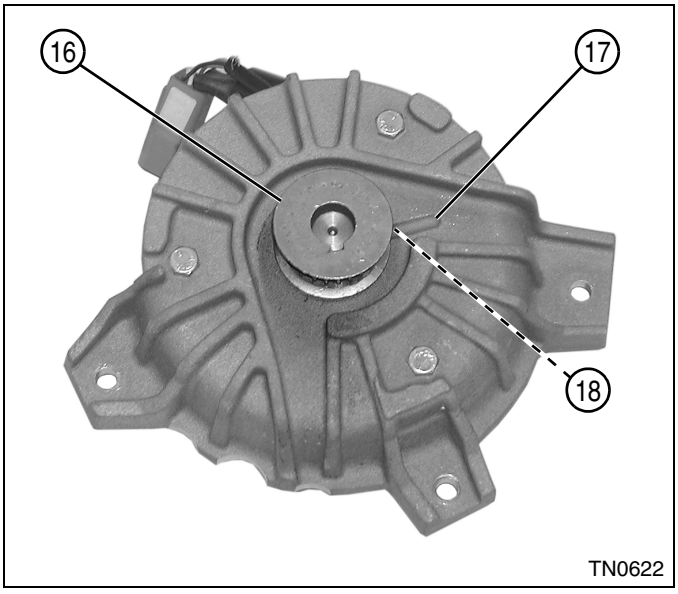


Figure 4-43

8. Rotate pulley (16) until set screw (18) is aligned with groove (17).
9. Loosen set screw (18).

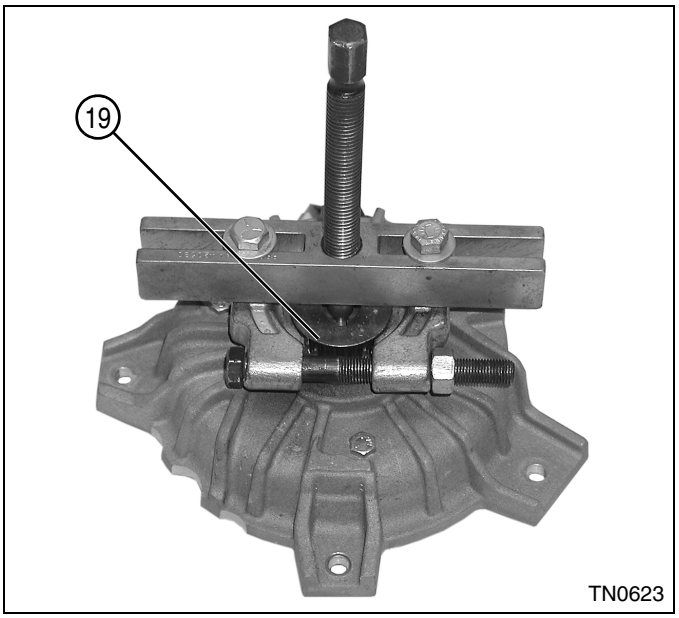


Figure 4-44

10. Remove pulley (19) using a knife-edge puller.

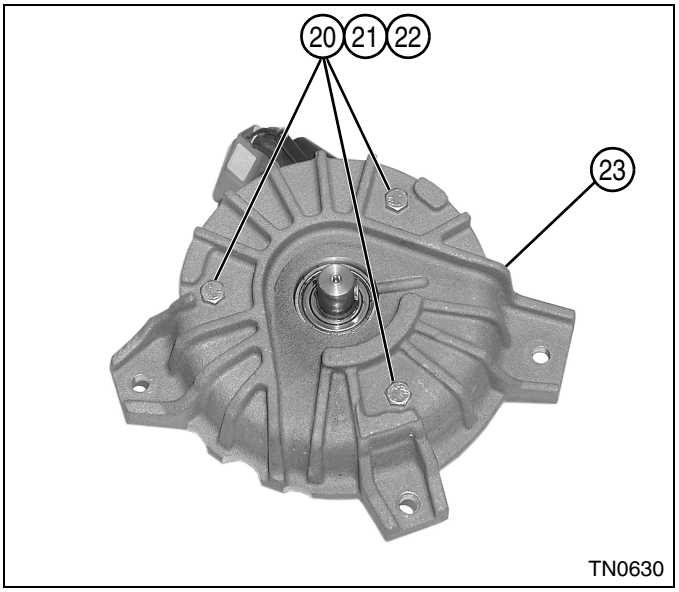


Figure 4-45

11. Remove screws (20), lock washers (21), nuts (22), and motor mount assembly (23).

Installation

See Figures 4-46 through 4-49.

Required Materials
Loctite® 242 (Blue) Thread Sealant

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

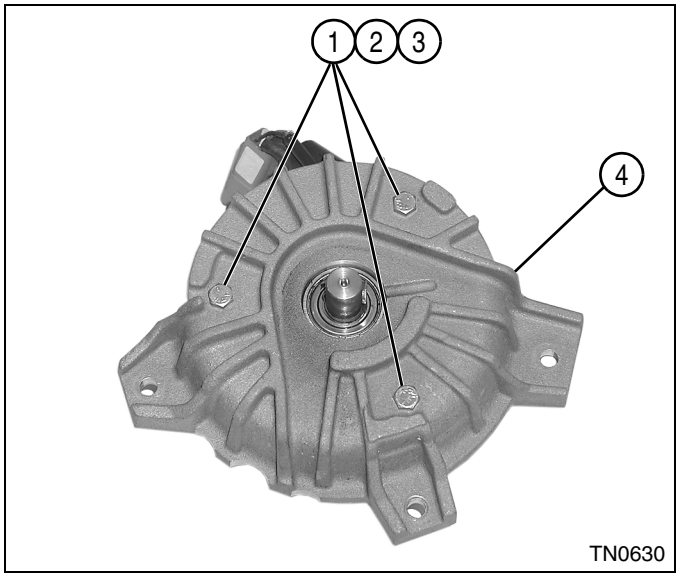


Figure 4-46

2. Install motor mount assembly (4) using three screws (1), lock washers (2), and nuts (3).

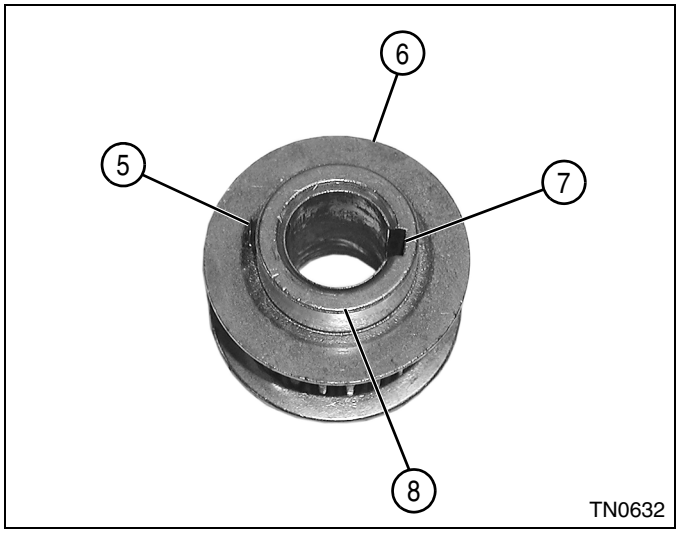


Figure 4-47

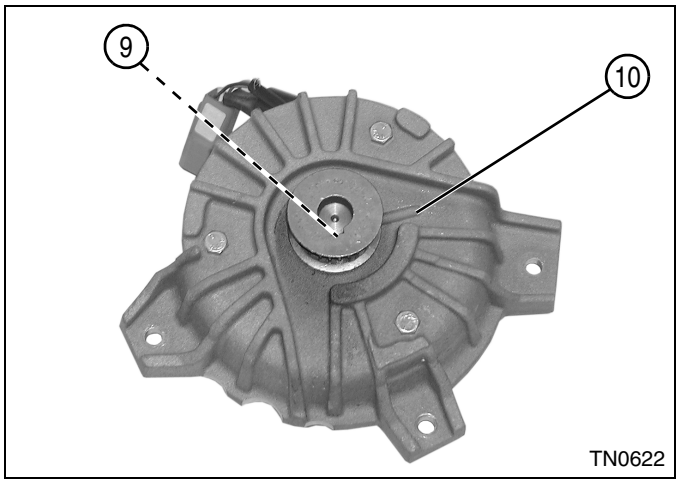


Figure 4-48

3. Apply Loctite® 242 (Blue) Thread Sealant to set screw (5) and install until flush with the inside diameter of pulley (6).
4. Align relief (7) with keyway (9). Press pulley (6) onto motor shaft until shoulder (8) bottoms out.
5. Align set screw (5) with groove (10). Tighten set screw (5).

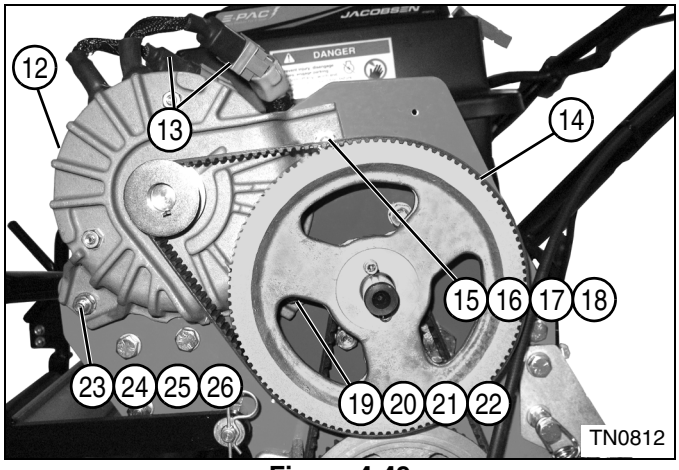


Figure 4-49

6. Install traction drive motor and mount assembly (12), and transfer belt (14), using screw (23), flat washer (24), lock washer (25), and nut (26). Do not tighten at this time.
7. Install screw (19), flat washer (20), lock washer (21), and nut (22). Do not tighten at this time.
8. Install screw (15), flat washer (16) lock washer (17), and nut (18).
9. Adjust transfer belt tension. (See “Traction Drive Belt Tension Check and Adjustment” on page 5-5.)
10. Connect traction drive motor connectors (13).
11. Tighten all hardware.
12. Install belt cover. (See “Traction Drive Belt Cover” on page 5-7.)

Speed Paddle Control

Removal and Installation

See Figure 4-50.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)
3. Remove handle and Operator Presence Control (OPC) bail. (See “Handle and OPC Bail” on page 6-9.)

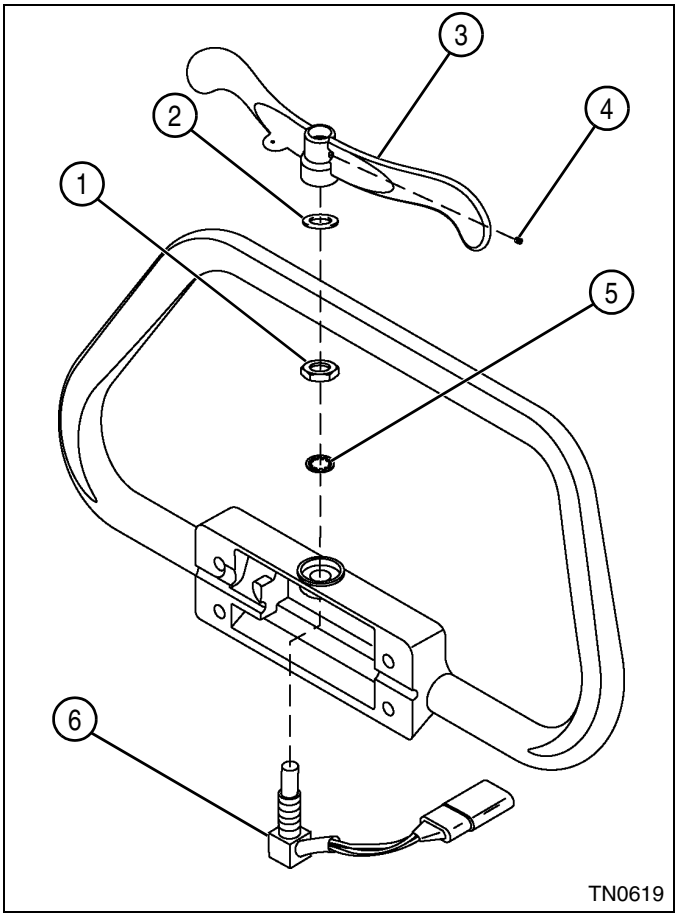


Figure 4-50

4. Loosen set screw (4). Remove speed paddle (3) and spring washer (2).
5. Remove jam nut (1), star washer (5), and potentiometer (6).

Installation Note

Install the potentiometer by reversing the order of removal.

LCD Display

Removal and Installation

See Figure 4-51.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove handle cover. (See “Handle Cover” on page 6-3.)

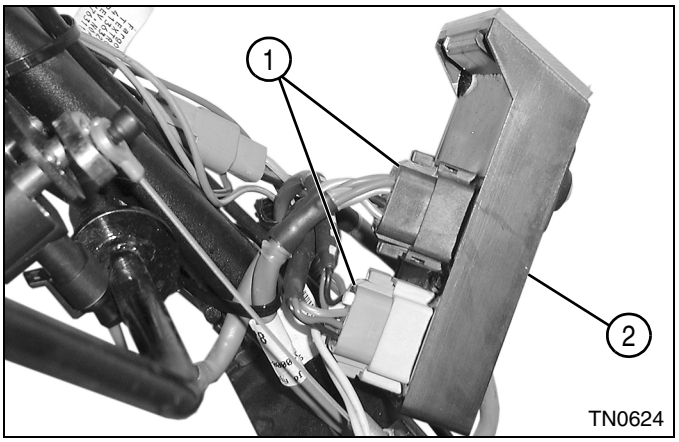


Figure 4-51

NOTE

Record location of wire harness connectors before disconnecting.

3. Disconnect wire harness connectors (1) and remove LCD display (2).

Installation Note

Install the LCD display by reversing the order of removal.

Control Module

Removal and Installation

See Figure 4-52.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

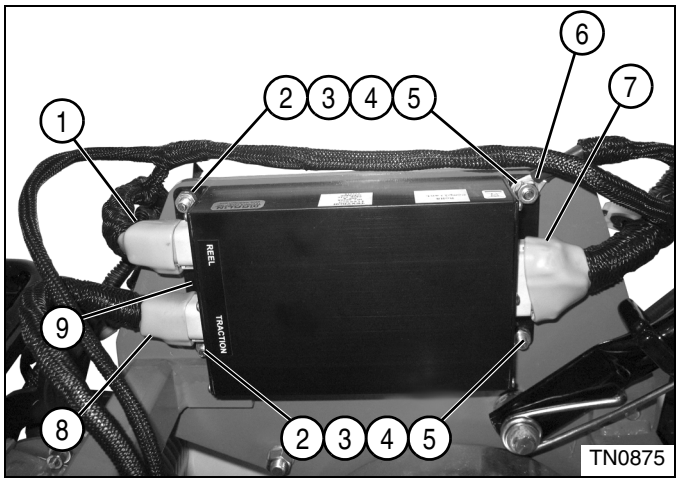


Figure 4-52

2. Disconnect wire harness connectors (1, 7, and 8).
3. Remove screws (2), flat washers (3), lock washers (4), nuts (5), ground wire (6), and controller (9).

Installation Note

Install the controller by reversing the order of removal.

Battery Tray and Mount Plate

Removal

See Figures 4-53 and 4-54.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove battery pack. (See “Battery Pack” on page 4-42.)

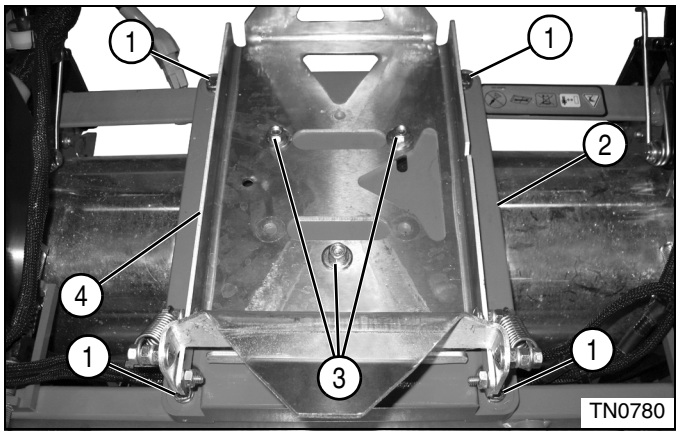


Figure 4-53

3. Loosen nuts (3) and slide battery tray (4) to gain access to cap screws and lock washers (1).
4. Remove four cap screws and lock washers (1) and mount plate (2).

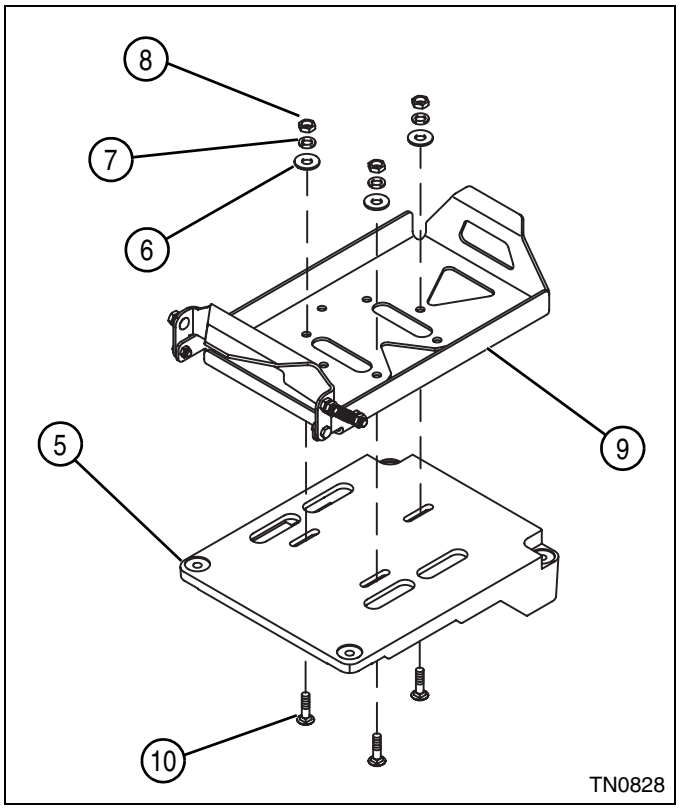


Figure 4-54

5. Remove nuts (8), lock washers (7), and flat washers (6) from carriage bolts (10).
6. Remove battery tray (9) from mount plate (5).

Disassembly and Assembly

See Figure 4-55.

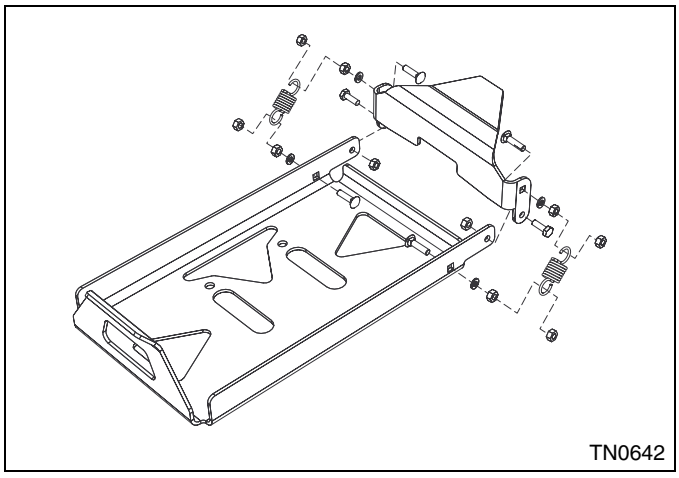


Figure 4-55

Assembly Note

Inspect springs for wear prior to assembly.

Installation

Installation Note

Install the battery tray and mount plate by reversing the order of removal.

OPC Bail Control

Removal and Installation

See Figures 4-56 through 4-58.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove handle cover. (See “Handle Cover” on page 6-3.)

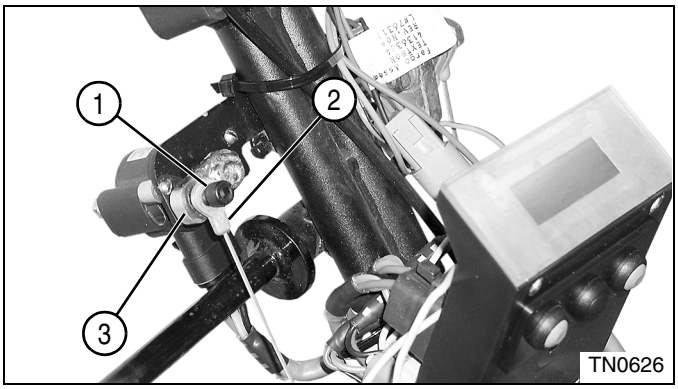


Figure 4-56

3. Remove screw (1) and OPC cable end (2) from pivot arm (3).

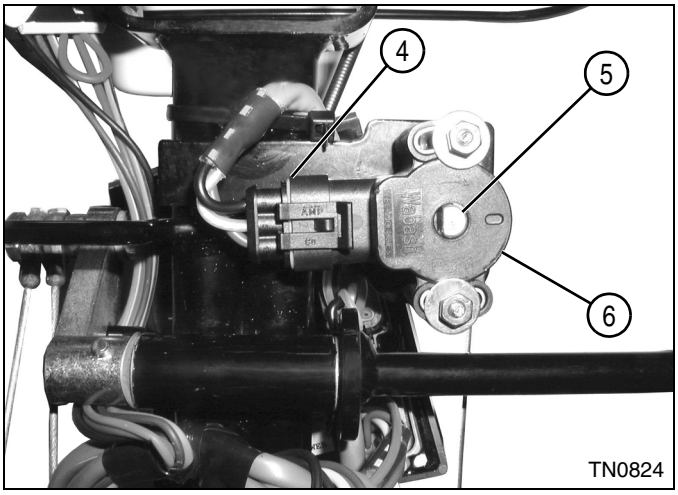


Figure 4-57

4. Disconnect wire harness connector (4).
5. Using a punch, carefully drive pivot arm (5) out of OPC bail control (6).

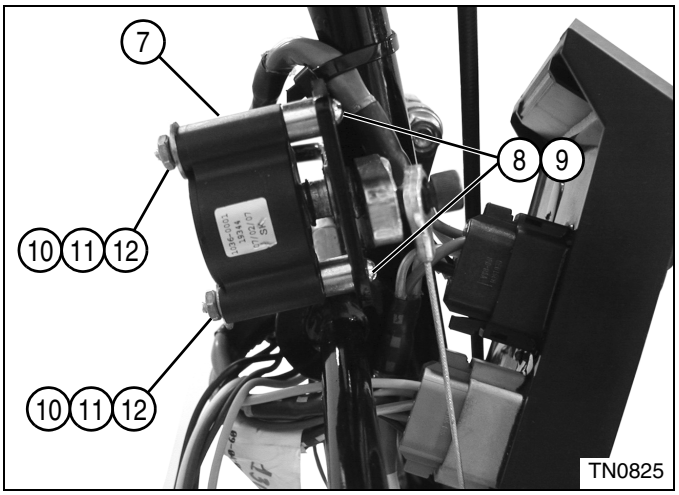


Figure 4-58

6. Remove two screws (8), spacers (9), nuts (10), lock washer (11), flat washers (12), and OPC bail control (7).

Installation Notes

- *Install OPC bail control by reversing the order of removal.*
- *Be sure OPC bail control is not binding before tightening fasteners. Check for free range of movement after tightening.*
- *Calibrate OPC bail control. (See “OPC Bail Lever Calibration” on page 4-32.)*

Chapter 5

Power Train

5

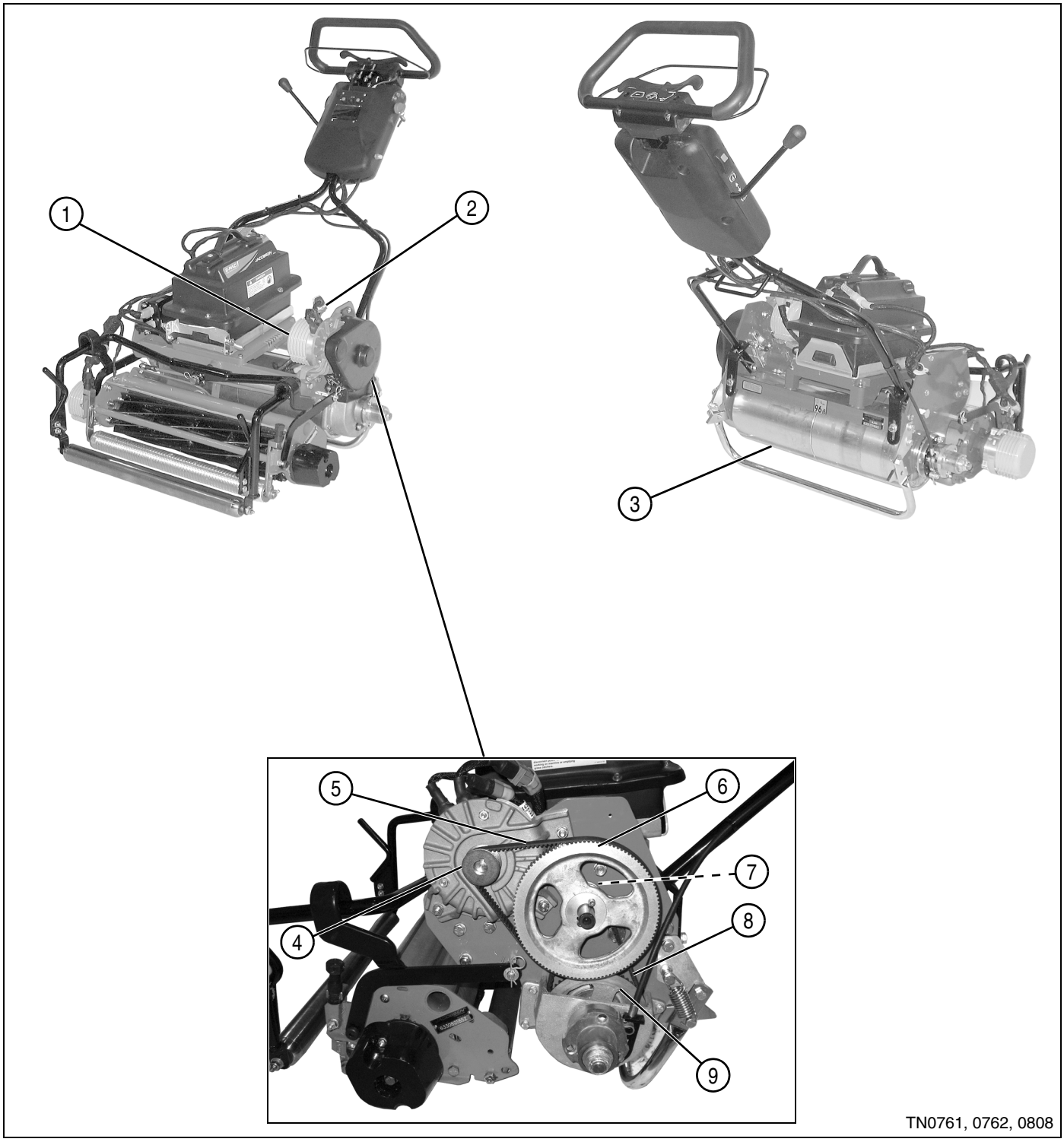
JACOBSEN
A Textron Company

Specifications

Adjustments		
Traction Drive (Transfer) Belt Maximum Deflection with 3.5—6.3 Pounds (1.59—2.86 kg) of Force Applied at the Midpoint between Pulleys	in. (mm)	9/64 (3.5)
Traction Drive (Final) Belt Maximum Deflection with 12.5—15.2 Pounds (5.5—7.4 kg) of Force Applied at the Midpoint between Pulleys	in. (mm)	1/10 (2.5)

Component Location

See Figure 5-1.



1 Traction Drive Motor
2 Traction Drive Motor Harness Connector
3 Traction Drum/Differential Assembly
4 Traction Drive Motor Pulley
5 Traction Drive Belt (Transfer)
6 Traction Drive (Outer Transfer) Pulley
7 Traction Drive (Inner Transfer) Pulley
8 Traction Drive Belt (Final Drive)
9 Traction Drive (Traction Drum) Pulley

Figure 5-1: Power Train Component Location

Troubleshooting

Condition	Probable Cause	Remedy
Traction drive does not engage when OPC bail is engaged.	System voltage too low.	Check battery pack voltage.
	Park brake engaged.	Release park brake. (Refer to Operator's Manual.)
	Speed paddle setting is too low.	Increase machine speed. (Refer to Operator's Manual)
	OPC cable damaged.	Replace OPC cable. (See "OPC Cable" on page 6-9.)
	OPC rotary switch malfunction.	Check OPC rotary switch. (See "OPC Bail Control Test" on page 4-40.)
	Traction drive belts not tensioned properly.	Adjust traction drive belt tension. (See "Traction Drive Belt Tension Check and Adjustment" on page 5-5.)
	Traction drive belts worn, stretched, or damaged.	Replace drive belt(s). (See "Traction Drive Belts" on page 5-7.)
	Key damaged or missing on traction drive motor shaft.	Repair or replace key as needed. (See "Traction Drive Motor" on page 4-47.)
	Key damaged or missing on traction drum shaft pulley.	Repair or replace key as needed. (See "Traction Drive Drum and Bearing Housing Assembly" on page 5-10.)
	Traction drum differential damaged.	Repair or replace differential assembly.
Traction drive does not reach full speed.	Traction drive belts not tensioned properly.	Check traction drive belt tension. (See "Traction Drive Belts" on page 5-7.)
	Traction drive belts worn, stretched, or damaged.	Replace drive belt(s). (See "Traction Drive Belts" on page 5-7.)
Traction drive pulls to one side.	Traction drum differential damaged.	Repair or replace differential assembly. (See "Differential Assembly" on page 5-17.)
	Park brake cable not adjusted properly or not fully releasing.	Adjust park brake cable. (See "Park Brake Check and Adjustment" on page 7-4.)
	Traction drum bearing binding, worn, or damaged.	Replace traction drum bearing. (See "Traction Drive Drum and Bearing Housing Assembly" on page 5-10 and "Traction Drum Left Bearing Housing" on page 5-11 or "Traction Drum Right Bearing Housing" on page 5-13.)

Adjustments

Traction Drive Belt Tension Check and Adjustment

Check Procedure

See Figures 5-2 and 5-3.

NOTICE

To prevent damage to the belts, do not twist, fold, bend, or overtighten the belts.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove the traction drive belt cover. (See “Traction Drive Belt Cover” on page 5-7.)

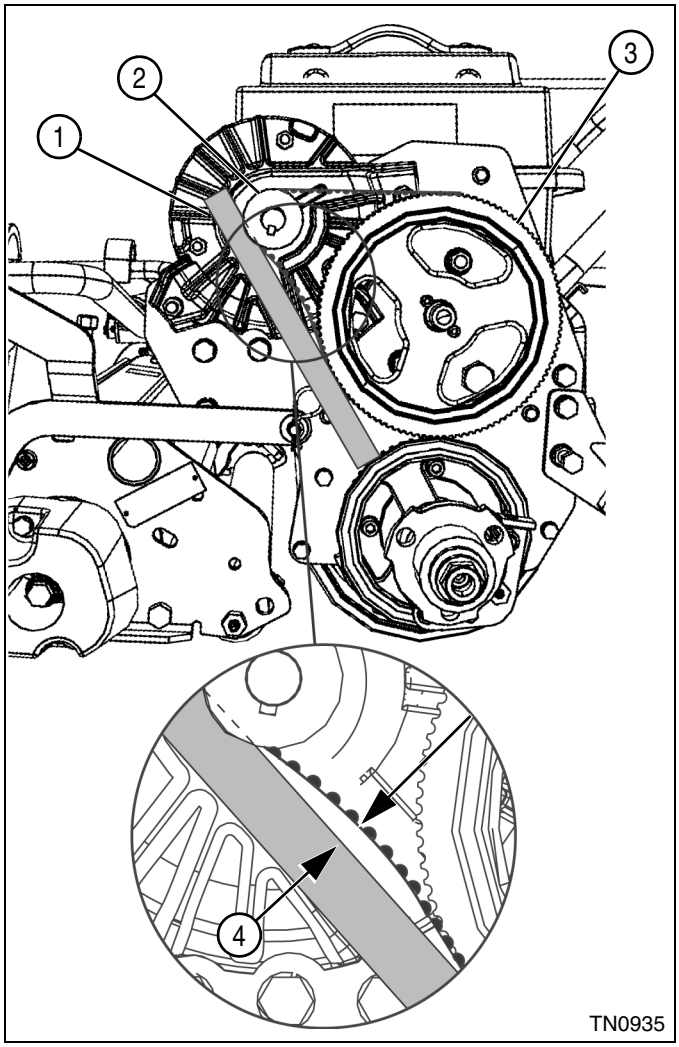


Figure 5-2

3. Place a straightedge (1) against the traction drive outer (transfer) pulley (3) and traction motor drive pulley (2).
4. Apply approximately 3.5—6.3 pounds (1.59—2.86 kg) of force at the midpoint of the traction drive (transfer) belt. The belt should deflect 9/64 inch (3.5 mm) (4).

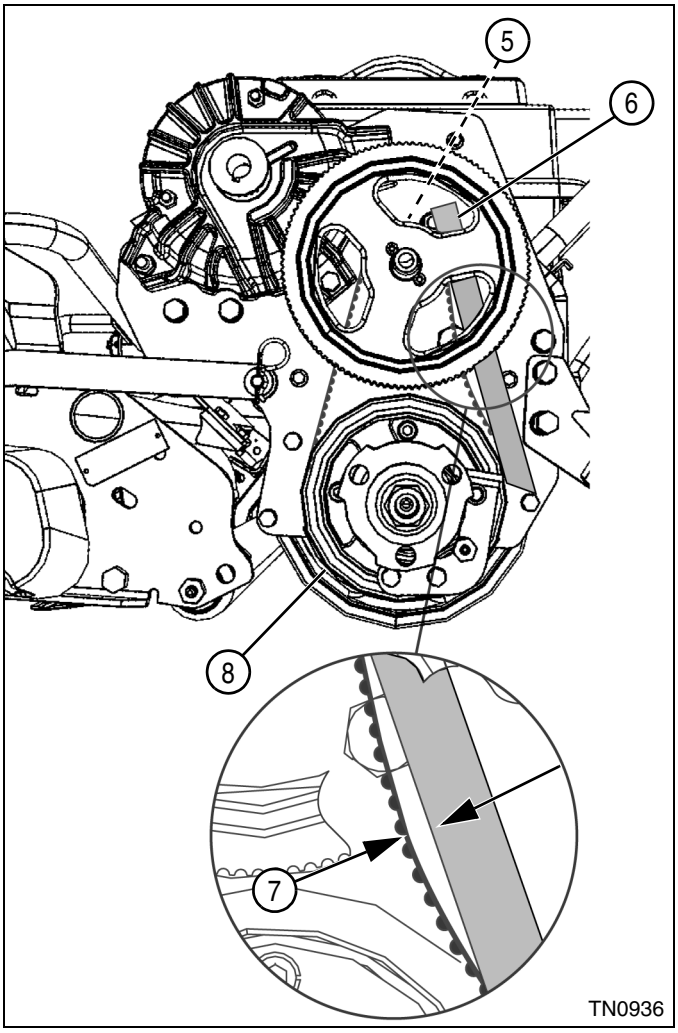


Figure 5-3

5. Place a straightedge (6) against the traction drive (inner transfer) pulley (5) and traction drive (traction drum) pulley (8).
6. Apply approximately 12.5—15.2 pounds (5.5—7.4 kg) of force at the midpoint of the traction drive (final drive) belt. The belt should deflect 1/10 inch (2.5 mm) (7).

Are both belts within specification?

YES *No adjustment is necessary. Install the traction drive belt cover. (See “Traction Drive Belt Cover” on page 5-7.)*

NO *Proceed to “Adjustment Procedure.”*

Adjustment Procedure

See Figures 5-4 and 5-5.

Required Tools and Materials
Height-of-Cut Gauge Bar
5/16-18 x 1” Hex Screw
5/16-18 Hex Nut

NOTE

Minor adjustments to the traction drive (transfer) belt can be made by pivoting the traction drive motor mount assembly. If belt cannot be tensioned to specification, proceed with the following procedure.

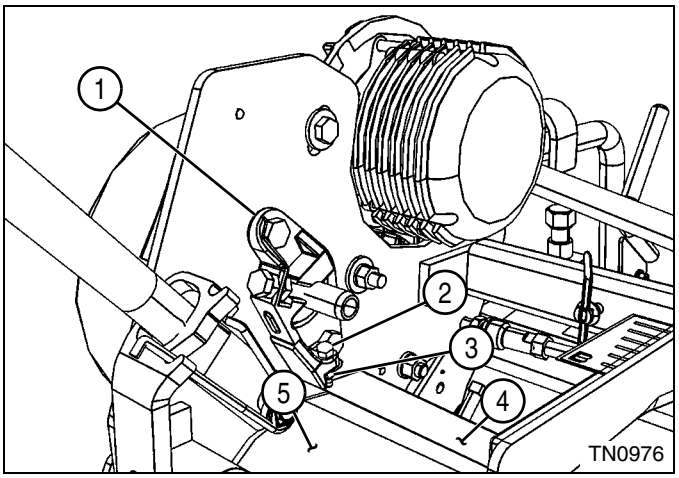


Figure 5-4

1. Install a 5/16-18 x 1” hex screw (2) and nut (3) in the bottom of the bearing bracket (1).
2. Place the height-of-cut gauge bar (4) between the traction drum (5) and hex screw (2).

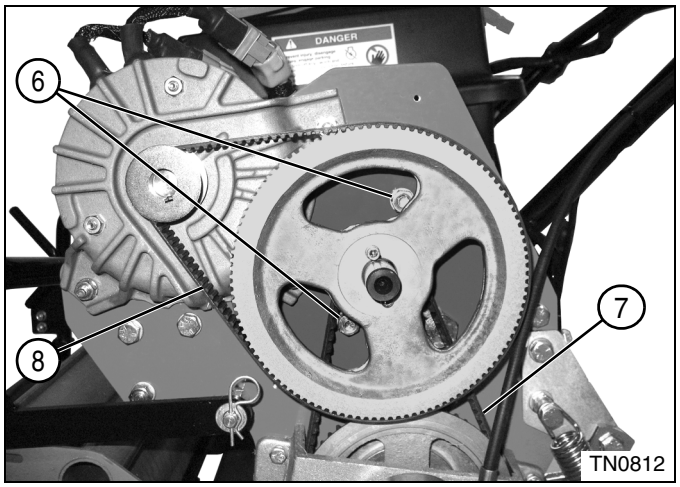


Figure 5-5

3. Loosen nuts (6).
4. Tighten hex screw (2) until the traction drive (final drive) belt (7) deflects 1/10 inch (2.5 mm) when 12.5—15.2 pounds (5.5—7.4 kg) of force is applied at the midpoint of the belt.
5. Tighten hex screw (2) until the traction drive (transfer) belt (8) deflects 9/64 inch (3.5 mm) when 3.5—6.3 pounds (1.59—2.86 kg) of force is applied at the midpoint of the belt.
6. Tighten nuts (6).
7. Remove the height-of-cut gauge bar (4), hex screw (2), and nut (3).
8. Install the traction drive belt cover. (See “Traction Drive Belt Cover” on page 5-7.)

Repair

Traction Drive Belt Cover

Removal and Installation

See Figure 5-6.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove transport wheels (if equipped). (See “Transport Wheels (Optional)” on page 9-2.)
3. Remove wheel hubs and bearings. (See “Wheel Hubs and Bearings” on page 9-3.)

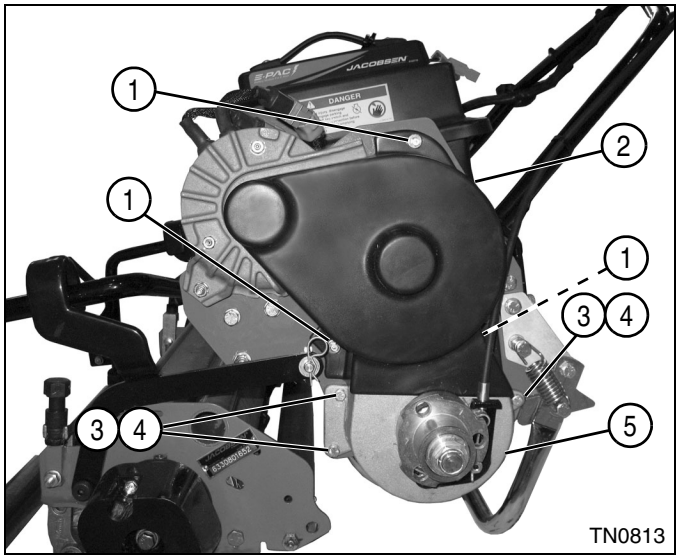


Figure 5-6

4. Remove three screws (1) and upper belt cover (2).
5. Remove three screws (3), lock washers (4), and lower belt cover (5).

Installation Note

Install the traction drive belt cover by reversing the order of removal.

Traction Drive Belts

Removal

See Figures 5-7 and 5-8.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove the traction drive belt cover. (See “Traction Drive Belt Cover” on page 5-7.)

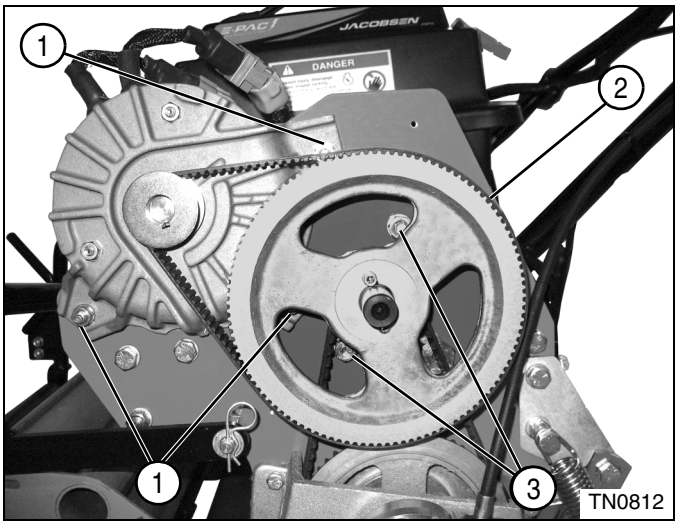


Figure 5-7

3. Loosen traction drive motor mount screws (1) and remove traction drive (transfer) belt (2).
4. Loosen bearing bracket nuts (3).

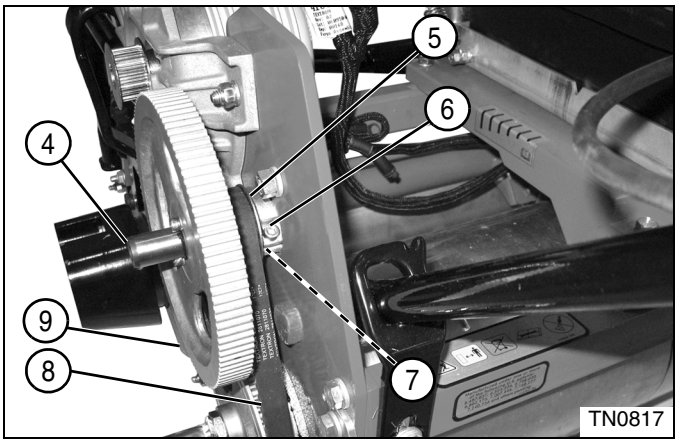


Figure 5-8

NOTE

Record the number of shims used (if any) to ensure correct installation.

5. Loosen socket-head screw (6) and remove outer transfer pulley (9), inner transfer pulley (5), shaft (4), and shims (7) as an assembly.
6. Remove traction drive (final drive) belt (8).

Component Inspection

See Figures 5-9 through 5-11.

Outer Transfer Pulley

Required Materials
Lubriplate® Marine Grease

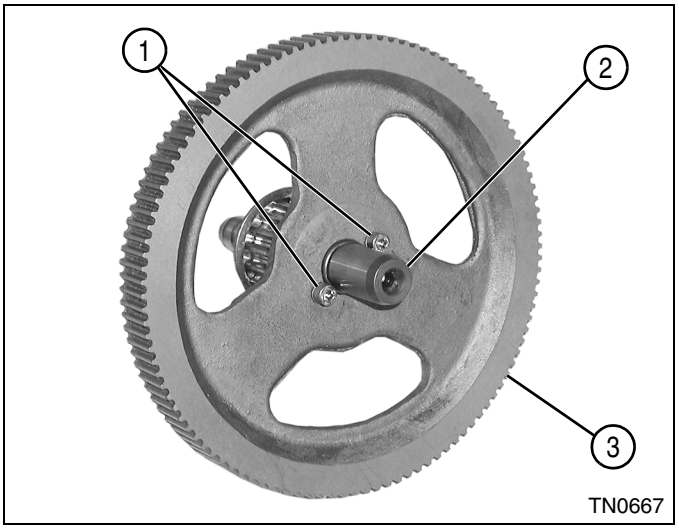


Figure 5-9

1. Remove socket-head screws (1) and slide shaft (2) out of outer transfer drive pulley (3).

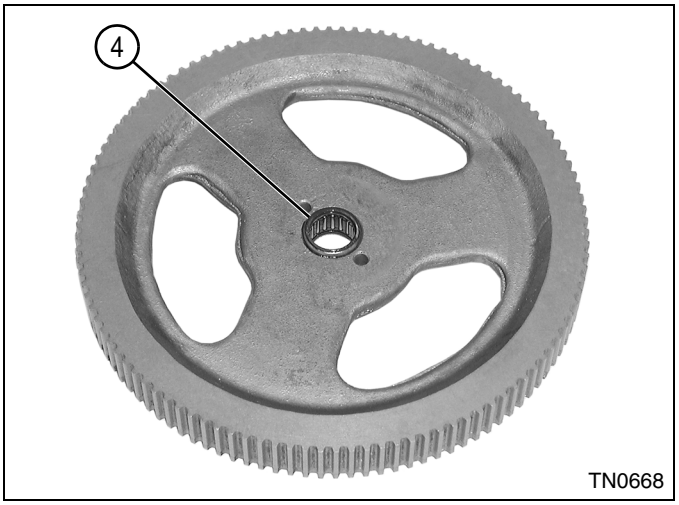


Figure 5-10

2. Inspect the needle bearing (4) for signs of wear or damage. Replace as needed.
3. Lubricate the bearings with Lubriplate® Marine Grease before installing the pulley on shaft.

Inner Transfer Pulley

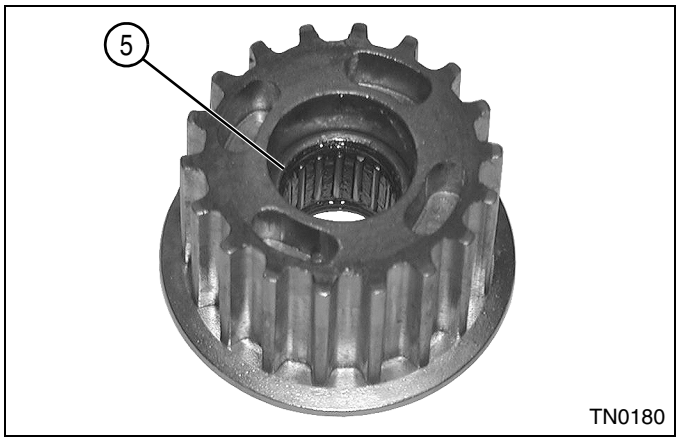


Figure 5-11

4. Inspect the needle bearing (5) for signs of wear or damage. Replace as needed.
5. Lubricate the bearing with Lubriplate® Marine Grease before installing the pulley on shaft.

Installation

See Figures 5-12 through 5-15.

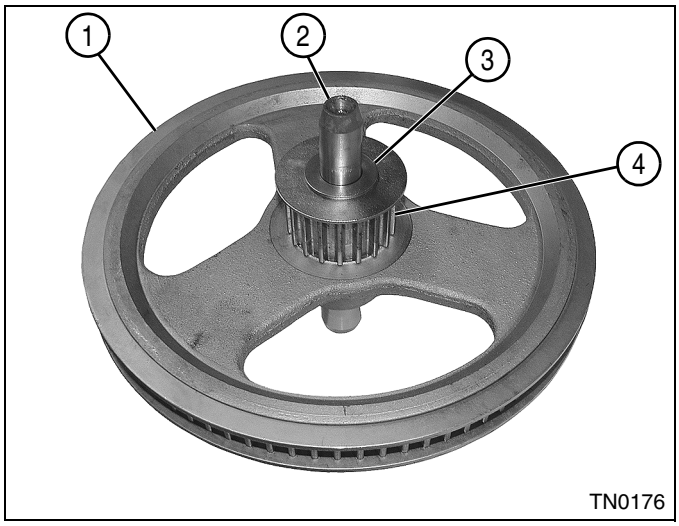


Figure 5-12

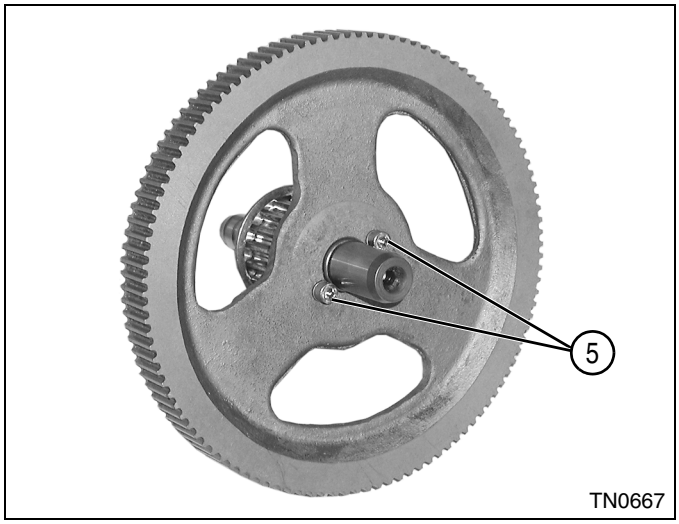


Figure 5-13

1. Assemble the outer transfer pulley (1), inner transfer pulley (4), shims (3), and shaft (2), using socket-head screws (5).

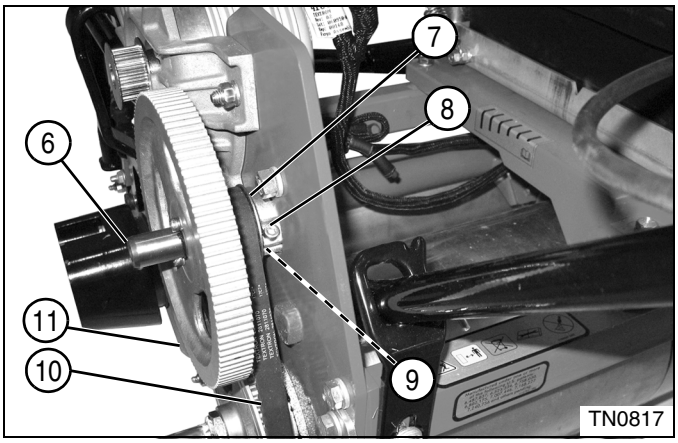


Figure 5-14

2. Install traction drive (final drive) belt (10).

NOTE

Be sure to guide traction drive (final drive) belt (10) over inner transfer pulley (7) while installing transfer pulley/shaft assembly.

3. Install shims (9), inner transfer pulley (7), outer transfer pulley (11), and shaft (6) as an assembly.
4. Tighten socket-head screw (8).

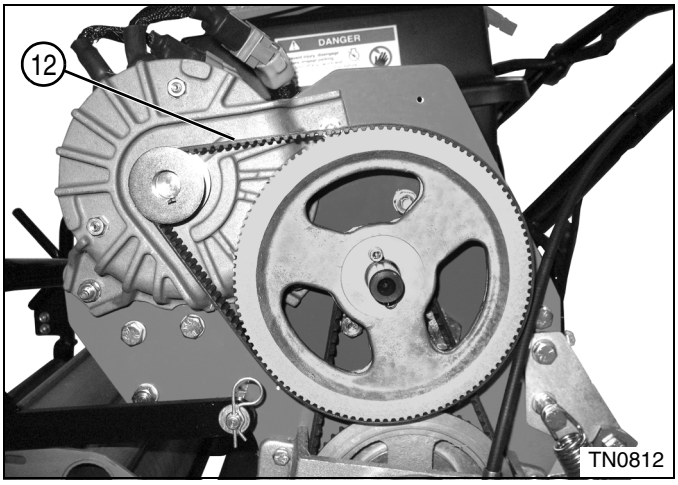


Figure 5-15

5. Install traction drive (transfer) belt (12).
6. Adjust the belt tension. (See “Traction Drive Belt Tension Check and Adjustment” on page 5-5.)
7. Install traction drive belt cover. (See “Traction Drive Belt Cover” on page 5-7.)
8. Install left-side hub and bearing. (See “Wheel Hubs and Bearings” on page 9-3.)

Traction Drive Drum and Bearing Housing Assembly

Removal and Installation

See Figures 5-16 through 5-19.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove traction drive belts. (See “Traction Drive Belts” on page 5-7.)
3. Remove right-side brake band. (See “Park Brake Band” on page 7-6.)

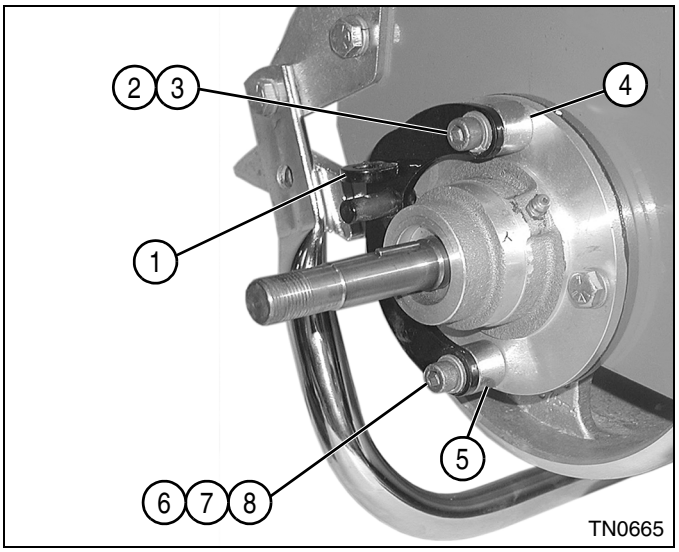


Figure 5-16

4. Remove socket-head screw (6), lock washer (7), spacer (5), and nut (8) from the brake bracket (1).
5. Remove socket-head screw (2), lock washer (3), and spacer (4), and remove brake bracket (1).

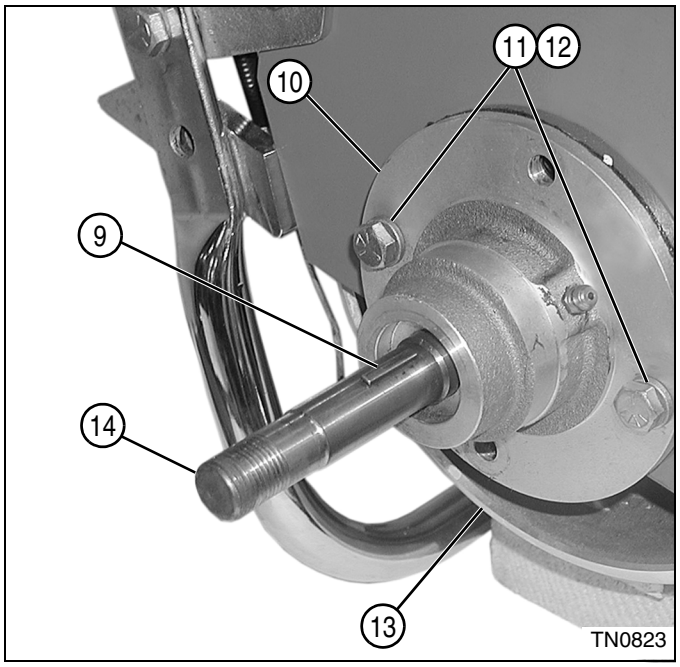


Figure 5-17

6. Support the traction drive drum (13).
7. Remove key (9) from traction drum shaft (14).
8. Remove two screws (11) and lock washers (12) from bearing housing (10).

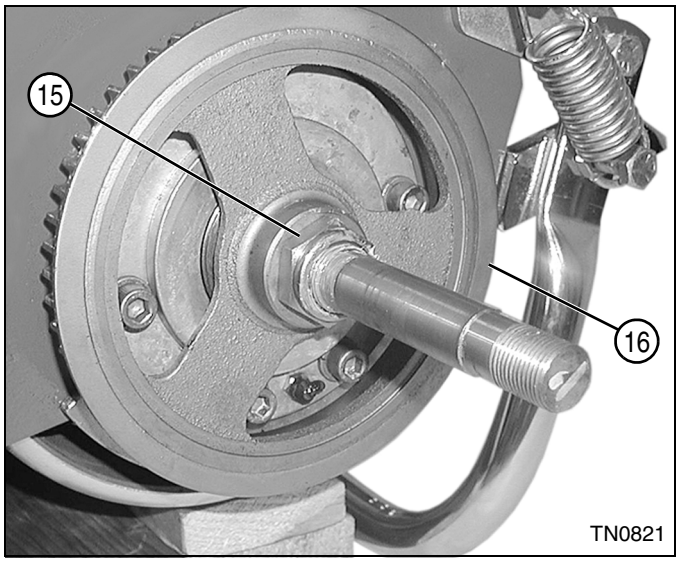


Figure 5-18

9. Remove nut (15) and pulley (16).

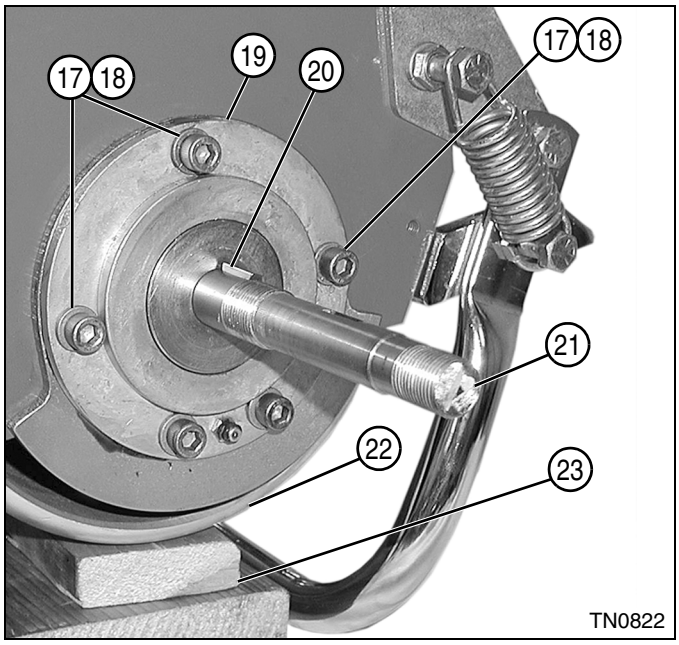


Figure 5-19

10. Remove key (20) from traction drum shaft (21).
11. Remove three socket-head screws (17) and lock washers (18) from bearing housing (19).
12. Remove support blocks (23) and lower the traction drum assembly (22).
13. Lift the mower and remove the traction drum assembly (22).

Installation Note

Installation is done by reversing the order of removal.

Traction Drum Left Bearing Housing

Removal

See Figures 5-20 through 5-24.

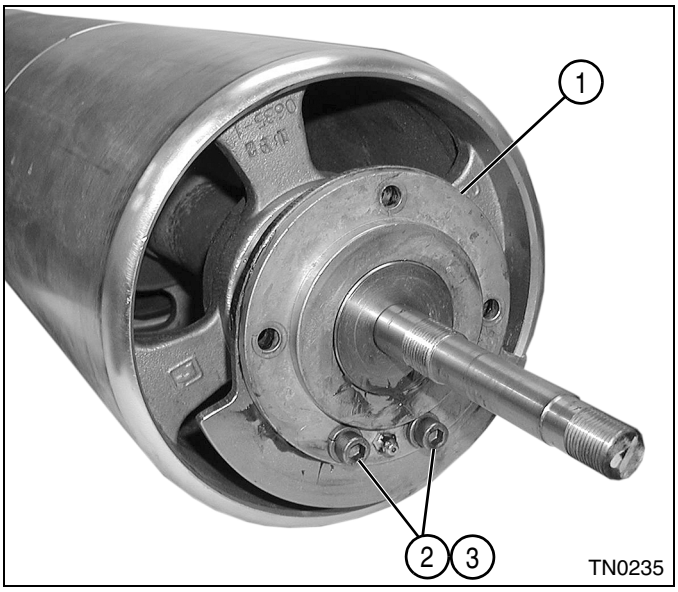


Figure 5-20

1. Remove two socket-head screws (2) and lock washers (3), and remove the seal cover (1).

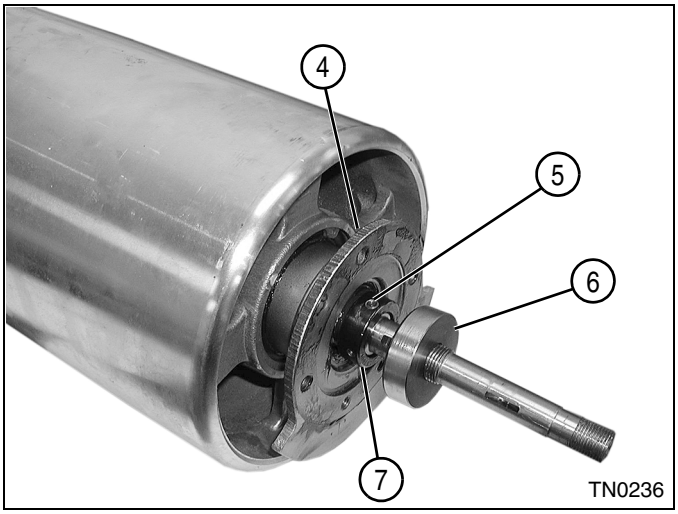


Figure 5-21

2. Remove spacer (6).
3. Loosen set screw (5) and remove locking collar (7).
4. Remove bearing housing (4).

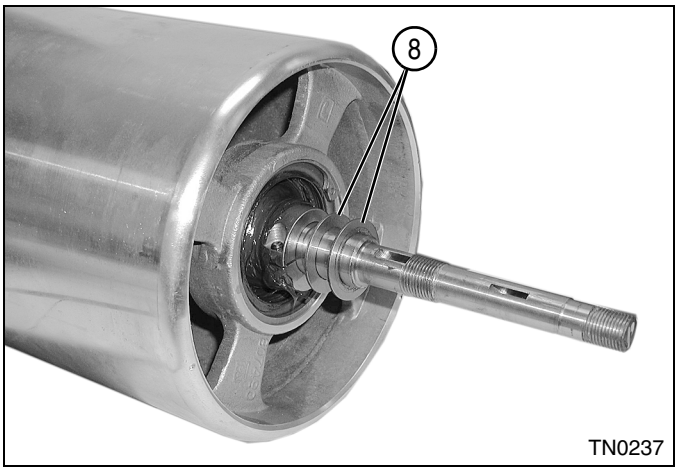


Figure 5-22

5. Remove two washers (8).

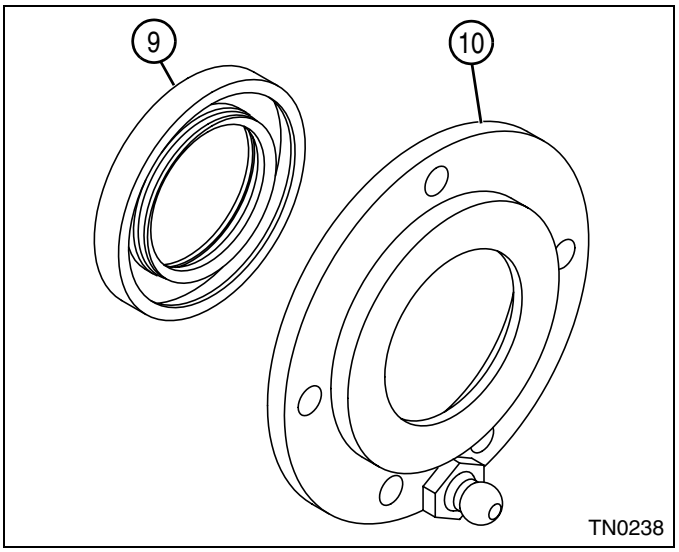


Figure 5-23

6. Remove grease seal (9) from the seal cover (10).

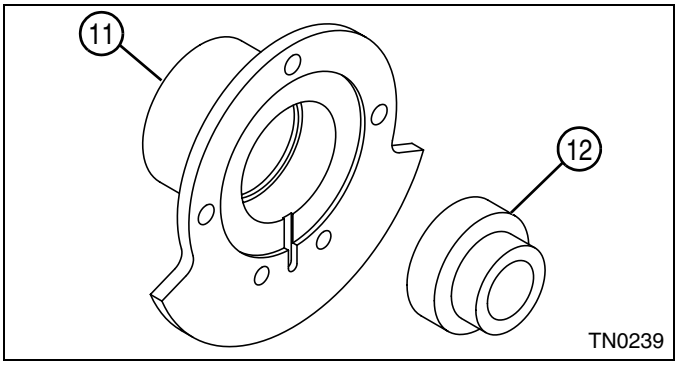


Figure 5-24

7. Inspect bearing (12) for wear or damage. Remove the bearing from the bearing housing (11) only if it is necessary to replace the bearing.

Installation

See Figures 5-25 through 5-29.

Required Materials
Loctite® Aviation Gasket Sealer (Loctite P/N 30516)

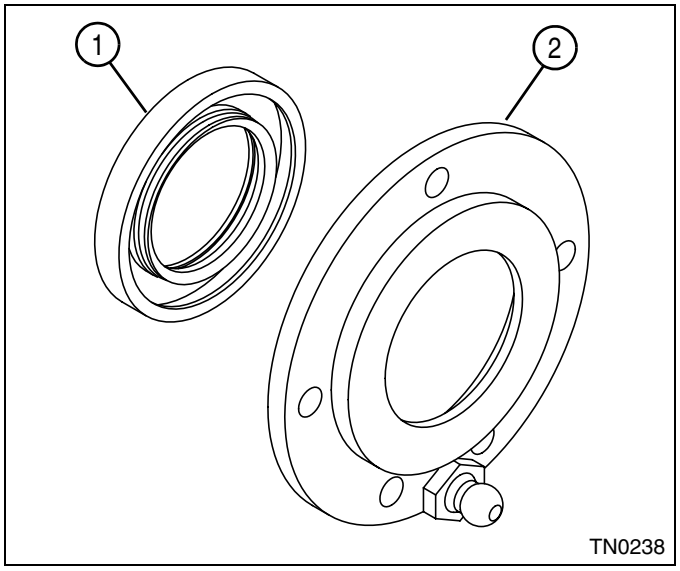


Figure 5-25

1. Install a new grease seal (1) in the seal cover (2).

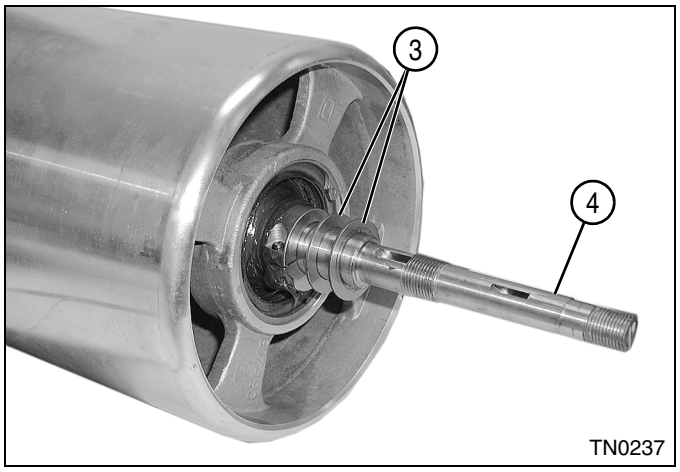


Figure 5-26

2. Install two washers (3) on the traction drum shaft (4).

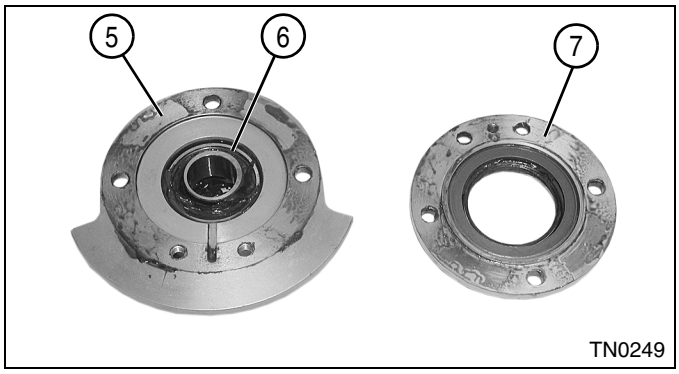


Figure 5-27

3. Clean the mating surfaces of the seal cover (7) and bearing housing (5), and apply a thin film of Loctite® Aviation Gasket Sealer to the mating surfaces.
4. Pack bearing (6) with NLGI Grade 2 grease before installation.

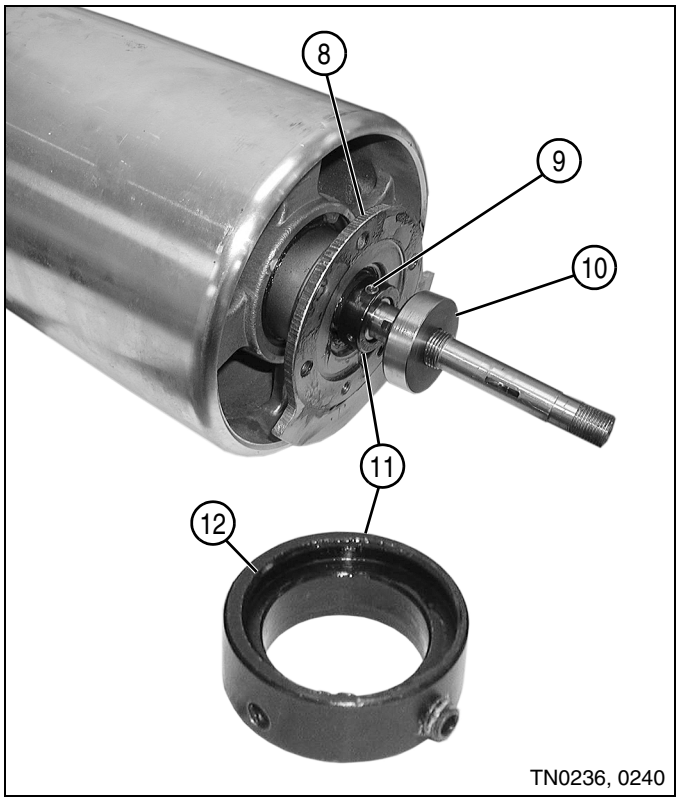


Figure 5-28

5. Install bearing housing (8).
6. Install locking collar (11) with the recessed side (12) toward the bearing. Tighten the set screw (9).
7. Install spacer (10).

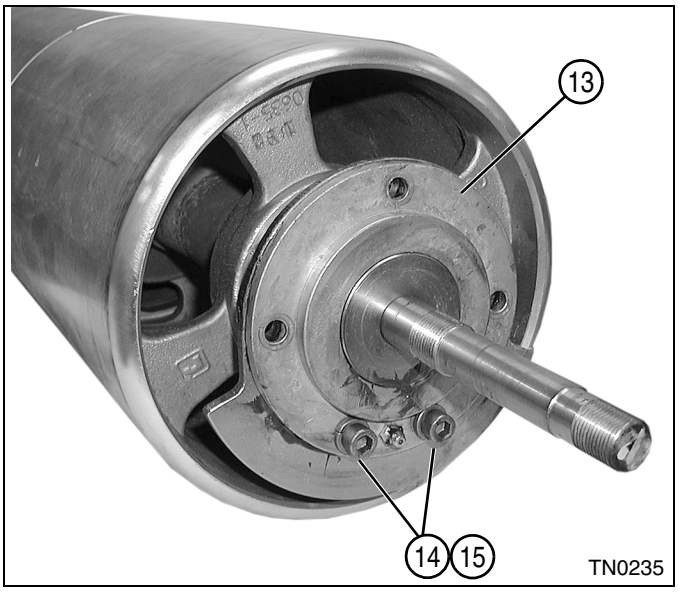


Figure 5-29

8. Install seal cover (13) using two socket-head screws (14) and lock washers (15).

Traction Drum Right Bearing Housing

Removal

See Figures 5-30 through 5-34.

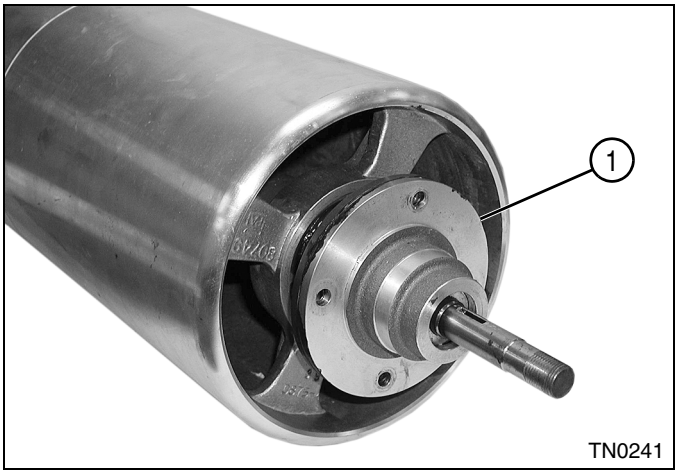


Figure 5-30

1. Remove the seal cover (1).

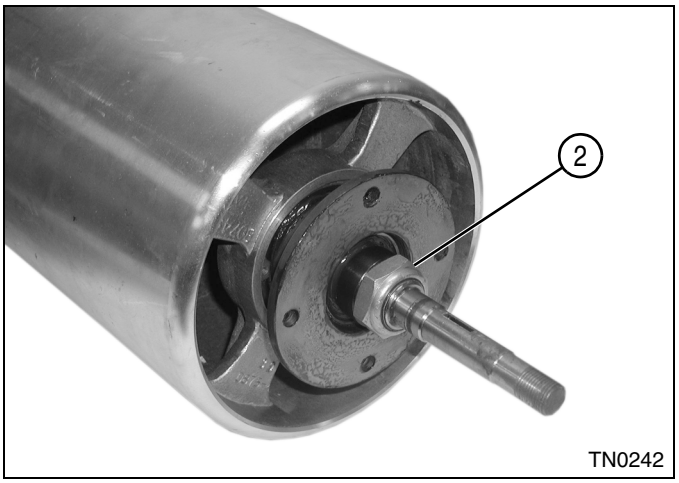


Figure 5-31

2. Remove nut (2)

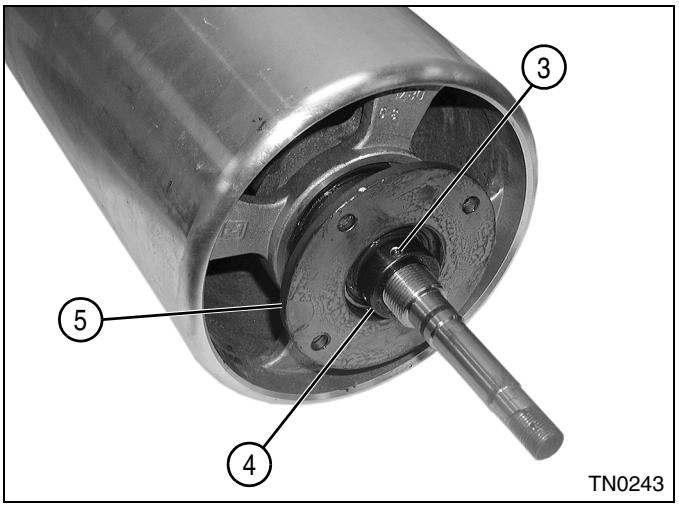


Figure 5-32

3. Loosen set screw (3) and remove the locking collar (4).
4. Remove bearing and housing assembly (5).

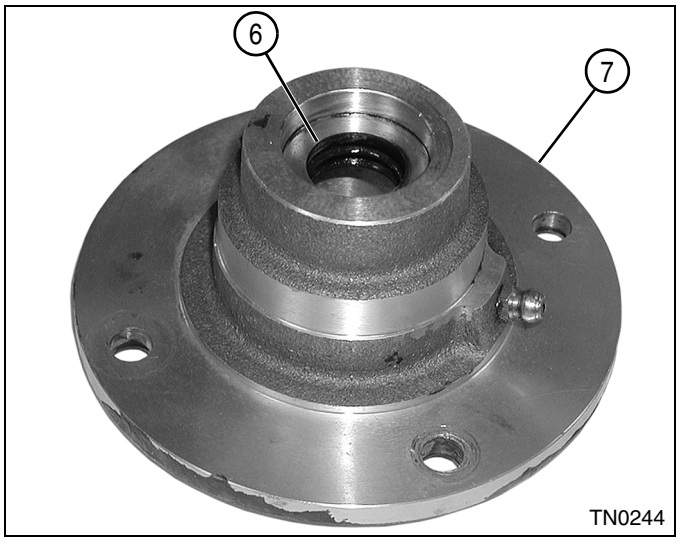


Figure 5-33

5. Remove grease seal (6) from the seal cover (7).

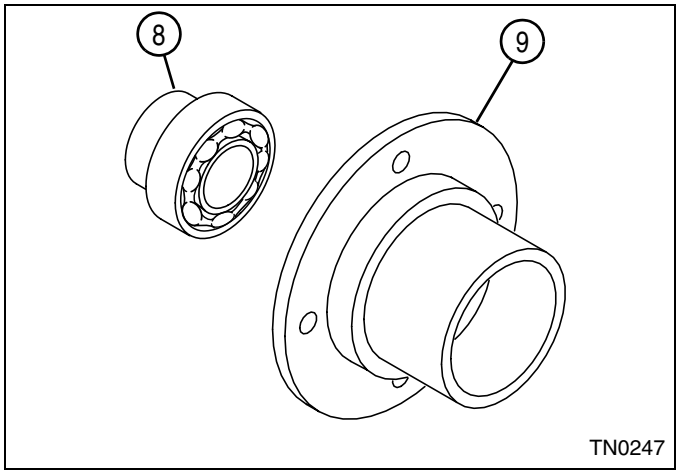


Figure 5-34

6. Inspect bearing (8) for wear or damage. Remove the bearing from the bearing housing (9) only if it is necessary to replace the bearing.

Installation

See Figures 5-35 through 5-39.

Required Materials
Loctite® Aviation Gasket Sealer (Loctite P/N 30516)

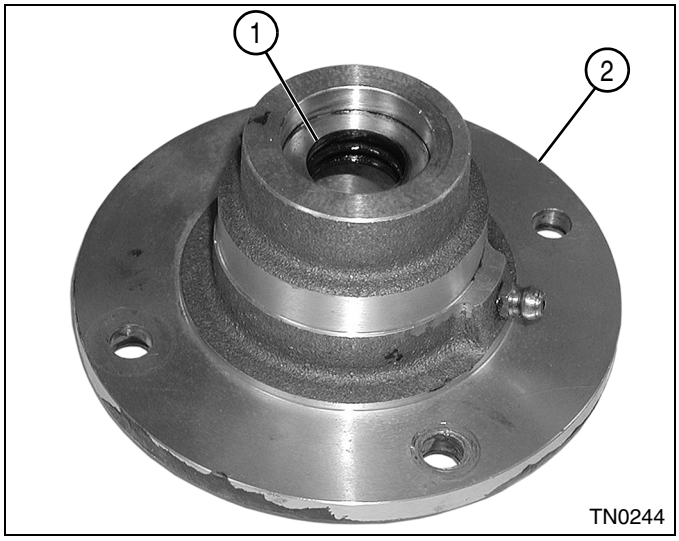


Figure 5-35

1. Install a new grease seal (1) in the seal cover (2).

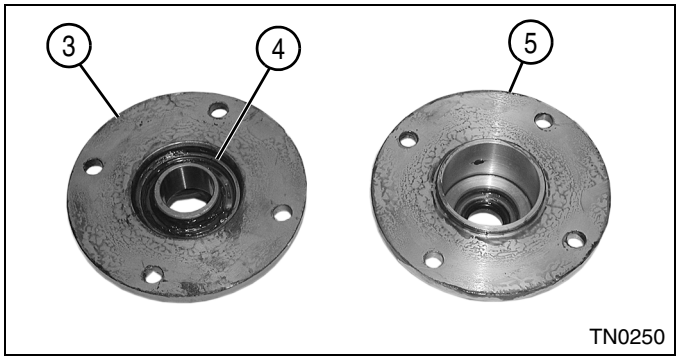


Figure 5-36

2. Clean the mating surfaces of the seal cover (5) and bearing housing (3), and apply a thin film of Loctite® Aviation Gasket Sealer to the surfaces.
3. Pack bearing (4) with NLGI Grade 2 grease before installation.

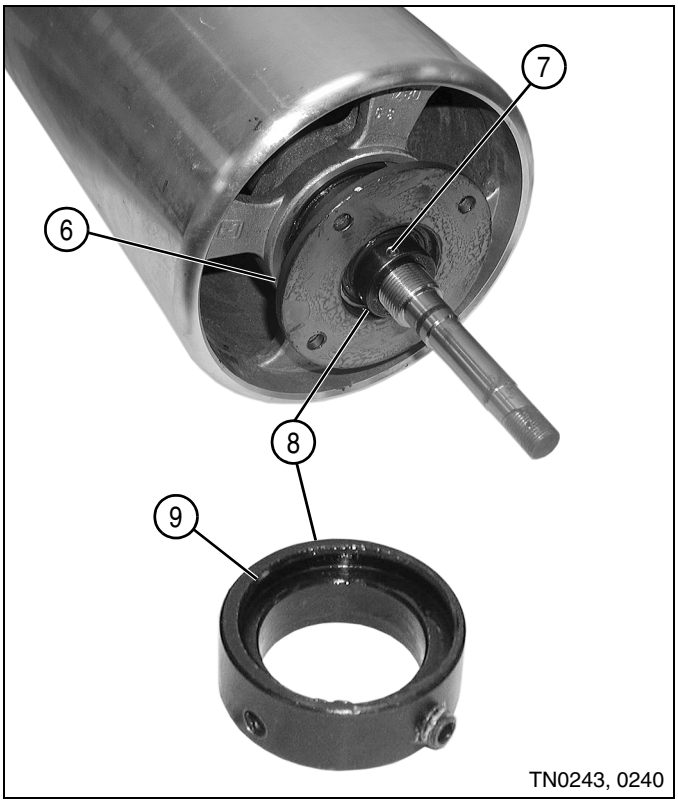


Figure 5-37

4. Install bearing and housing assembly (6).
5. Install locking collar (8) with the recessed side (9) toward the bearing. Tighten the set screw (7).

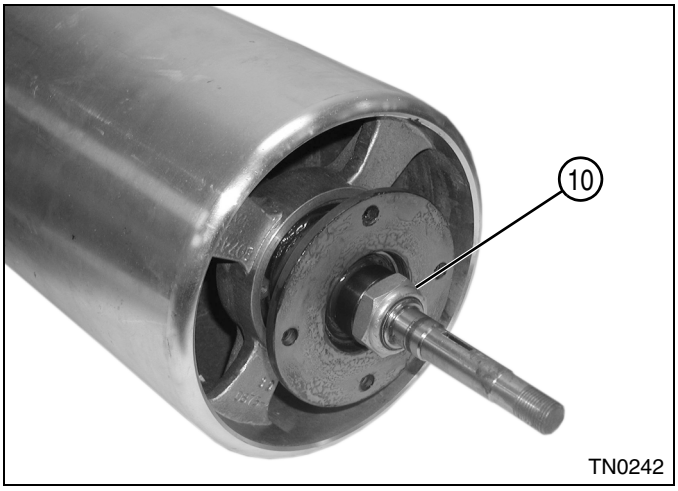


Figure 5-38

6. Install nut (10). Tighten until nut just contacts bearing.

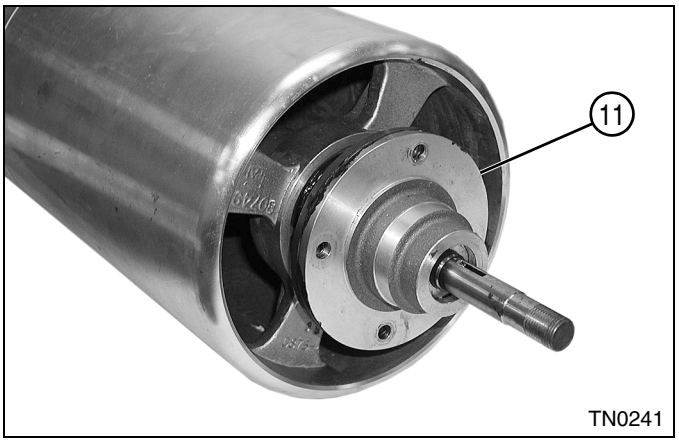


Figure 5-39

7. Install the seal cover (11).

Traction Drum Assembly

Removal and Installation

See Figure 5-40.

NOTE

The right and left traction drum assemblies are removed and installed the same way. Right drum shown.

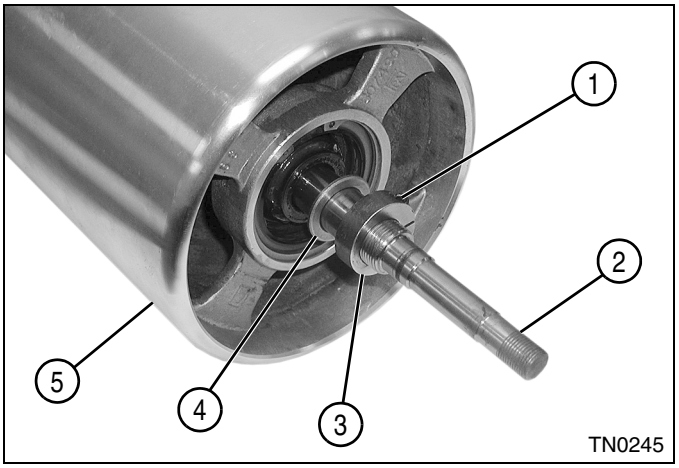


Figure 5-40

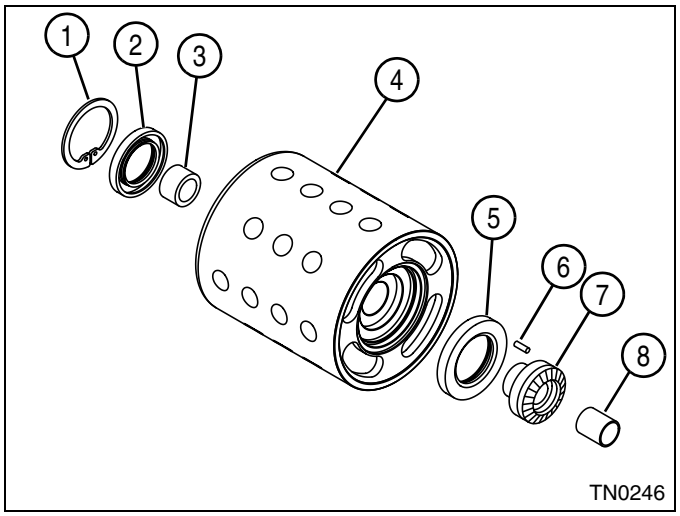
1. Loosen the socket-head screw (1) and remove locking collar (3) from the traction drum shaft (2).
2. Remove washer (4).
3. Remove drum assembly (5) from traction drum shaft (2).

Installation Notes

- *Install the traction drum by reversing the order of removal.*
- *Tighten non-pulley side nut until it just contacts bearing.*
- *Tighten pulley nut to 30–35 lb-ft (40.6–47.4 N•m)*

Disassembly and Assembly

See Figure 5-41.



1	Retaining Ring	5	Grease Seal
2	Grease Seal	6	Pin (Press Fit)
3	Bushing (Press Fit)	7	Differential Gear
4	Roller	8	Bushing (Press Fit)

Figure 5-41

1. Remove retaining ring (1), grease seal (2), and bushing (3) from roller (4).
2. Remove differential gear (7) from roller (4).
3. Inspect bushing (8). Replace as needed.
4. Remove grease seal (5).

Assembly Notes

- *Assembly is done by reversing the order of disassembly.*
- *Install new grease seals (2 and 5).*
- *Apply NLGI Grade 2 grease to the differential gear teeth (7) and bushings (3 and 8) before assembly.*

Differential Assembly

Disassembly and Assembly

See Figure 5-42.

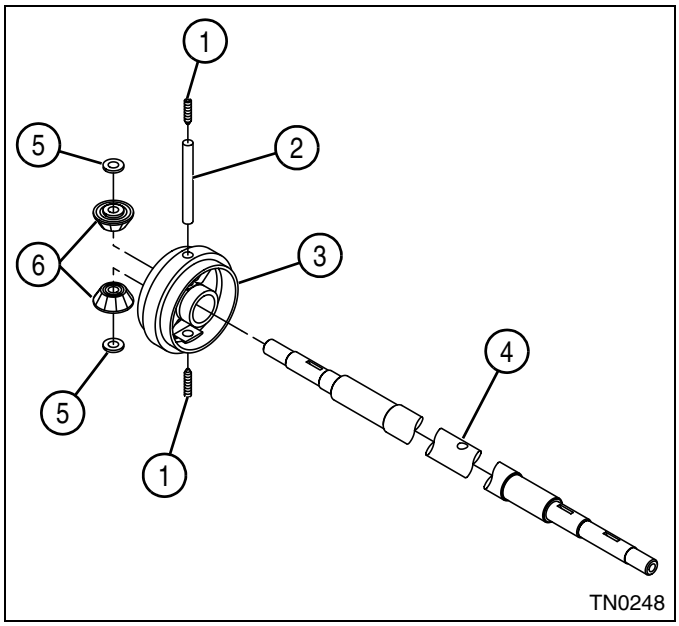


Figure 5-42

1. Remove two set screws (1), pinion shaft (2), two thrust washers (5), and pinion gears (6) from differential (3).
2. Remove differential (3) from the traction drum shaft (4).

Assembly Notes

- *Assembly is done by reversing the order of disassembly.*
- *Apply NLGI Grade 2 grease to the pinion gear teeth before assembly.*

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Chapter 6

Handle and Controls

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Adjustments

Handle Height Adjustment

See Figure 6-1.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

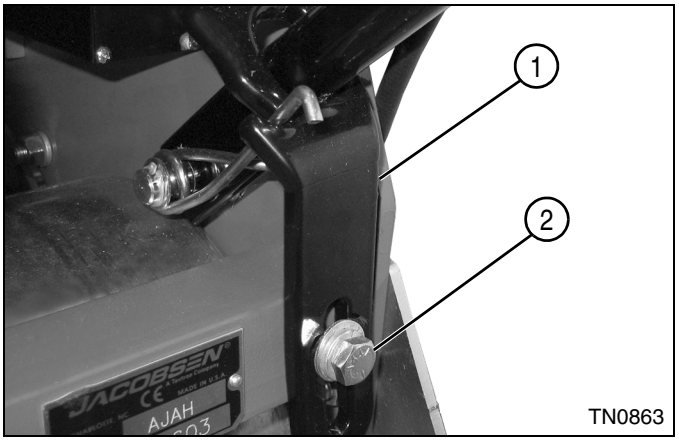

Figure 6-1

2. Loosen screws (2) on both sides of mower and adjust handle stops (1) evenly until desired handle height is obtained.
3. Tighten screws (2).

Operator Presence Control (OPC) Cable Adjustment

See Figures 6-2 and 6-3.

NOTE

Initial OPC cable adjustments are made at the mounting bracket, prior to the OPC cable calibration procedure.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove the handle cover. (See “Handle Cover” on page 6-3.)
3. Remove handle and OPC bail. (See “Handle and OPC Bail” on page 6-8.)

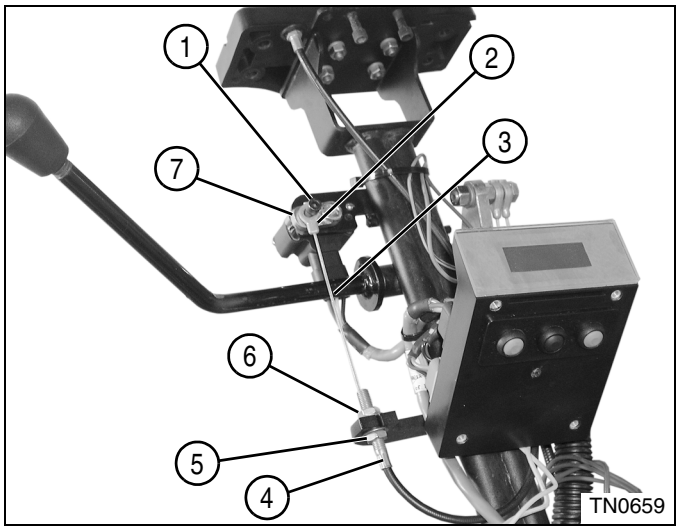

Figure 6-2

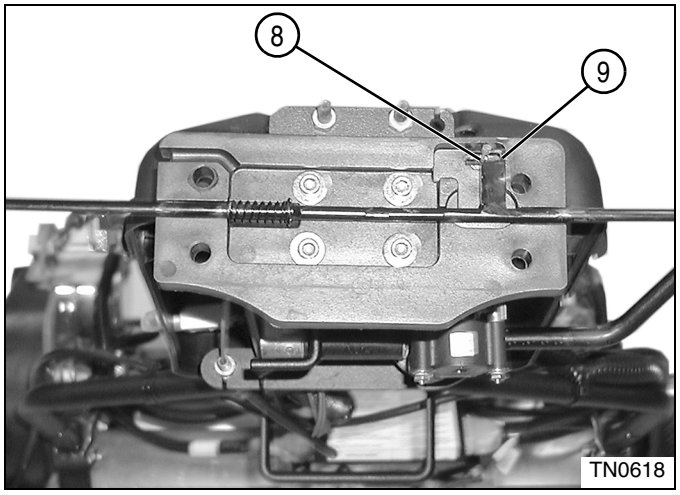

Figure 6-3

4. Remove socket-head screw (1).
5. Pull OPC cable (3) until cable end (8) is contacting OPC bail (9).

NOTE

Be sure OPC cable (3) does not move while adjusting cable sheath (4).

6. Loosen nut (6) and adjust cable sheath (4) using nut (5).
7. Adjust cable sheath (4) until cable eyelet (2) aligns with the threaded hole in pivot arm (7).
8. Tighten nut (6), and install cable eyelet (2) using socket-head screw (1).
9. Install handle and OPC bail. (See “Handle and OPC Bail” on page 6-8.)
10. Install handle cover. (See “Handle Cover” on page 6-3.)
11. Calibrate OPC bail. (See “OPC Bail Lever Calibration” on page 4-32.)

Speed Paddle Stop Adjustment

See Figure 6-4.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

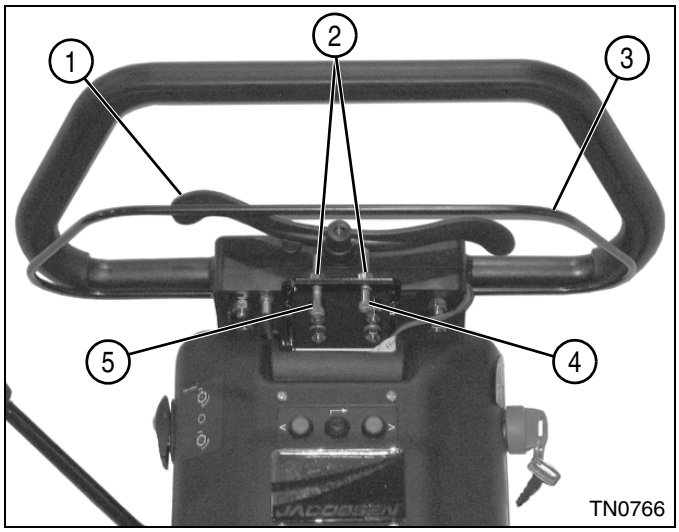

Figure 6-4

2. Loosen nuts (2).
3. Adjust positive paddle stop screw (4) until speed paddle (1) is in a comfortable position, while set at full max (+) speed.
4. Power-up machine and engage operator presence control (OPC) bail (3) and traction drive.
5. Adjust negative paddle stop screw (5) so traction drum rotates as slowly as possible without stopping, while speed paddle is in full slow (–) speed position.
6. Tighten nuts (2), and recheck settings.
7. Calibrate speed paddle. (See “Speed Paddle Calibration” on page 4-31.)

Repair

Handle Cover

Removal

See Figures 6-5 through 6-7.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

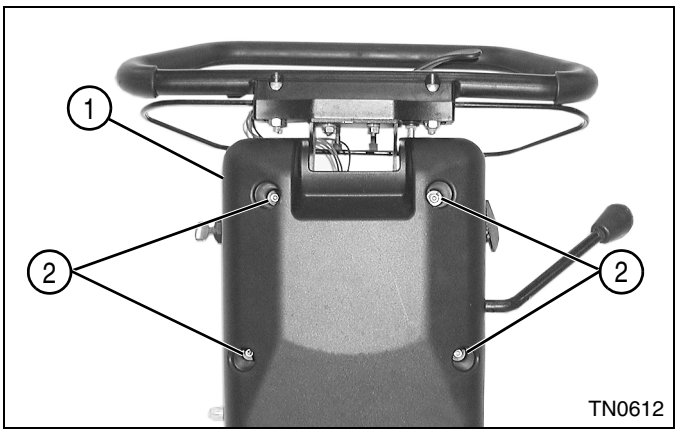

Figure 6-5

2. Remove four socket-head screws (2) and rear half of cover (1).

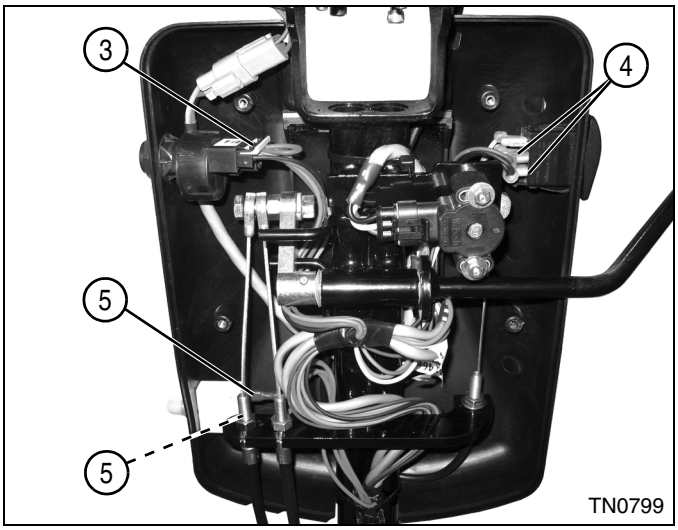

Figure 6-6

NOTE

Record location of wire and connectors before disconnecting.

3. Disconnect key switch wire connector (3).
4. Disconnect reel drive switch wire connectors (4).
5. Disconnect circuit breaker wire connectors (5).

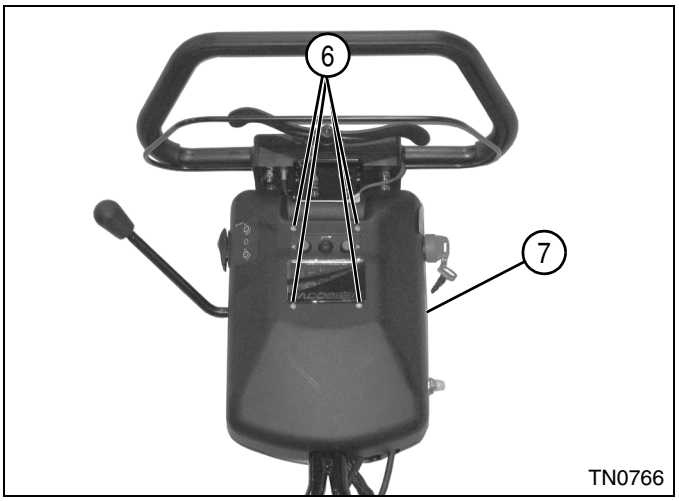

Figure 6-7

6. Remove four screws and washers (6) and front half of handle cover (7).

Installation

See Figures 6-8 through 6-10.

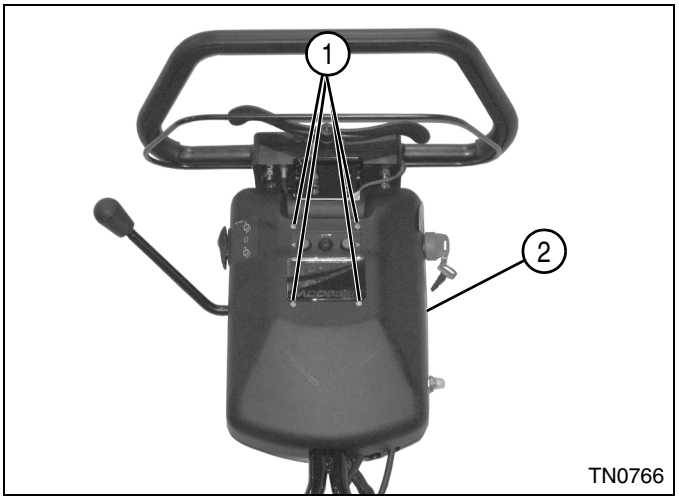

Figure 6-8

1. Install front half of handle cover (2) and four screws and washers (1).

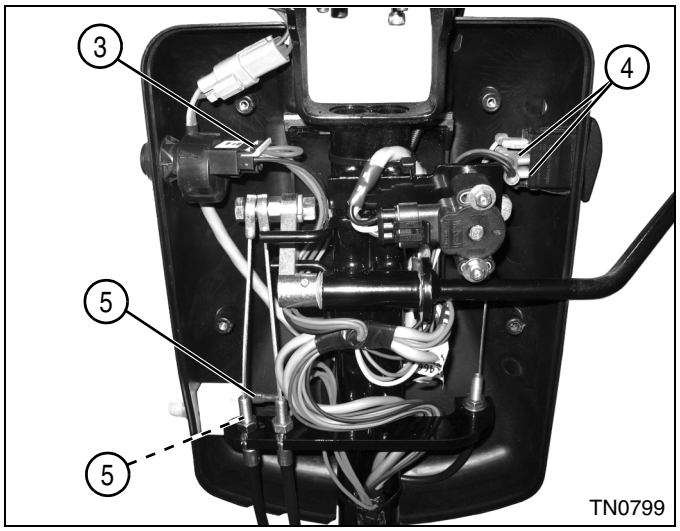

Figure 6-9

2. Connect circuit breaker wire connectors (5).
3. Connect reel drive switch wire connectors (4).
4. Connect key switch wire connector (3).

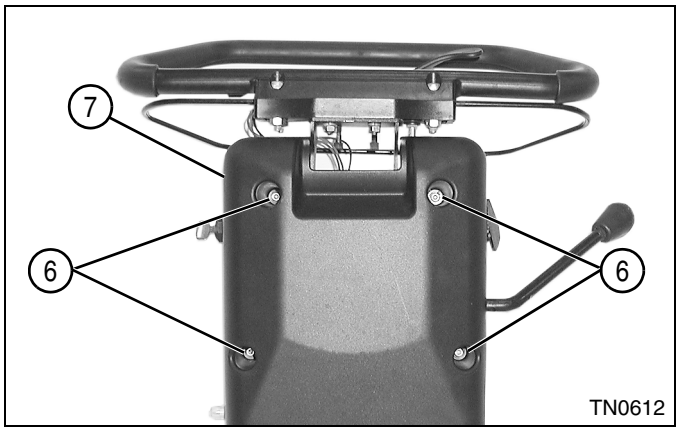

Figure 6-10

NOTE

Align park brake cables and main wire harness with openings in covers before tightening cover screws.

5. Install rear half of cover (7) to front half using four socket-head screws (6).

Handle Assembly

See Figures 6-11 through 6-15.

Removal

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Disconnect both park brake cables at brake bands. (See “Park Brake Cable” on page 7-5.)

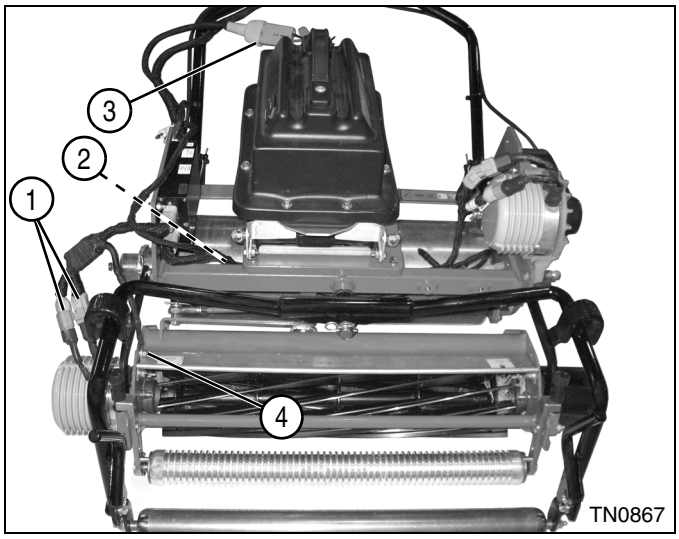

Figure 6-11

3. Disconnect battery pack connector (3).
4. Disconnect reel motor connectors (1).
5. Disconnect ground lead terminal (4).
6. Remove harness tie (2).

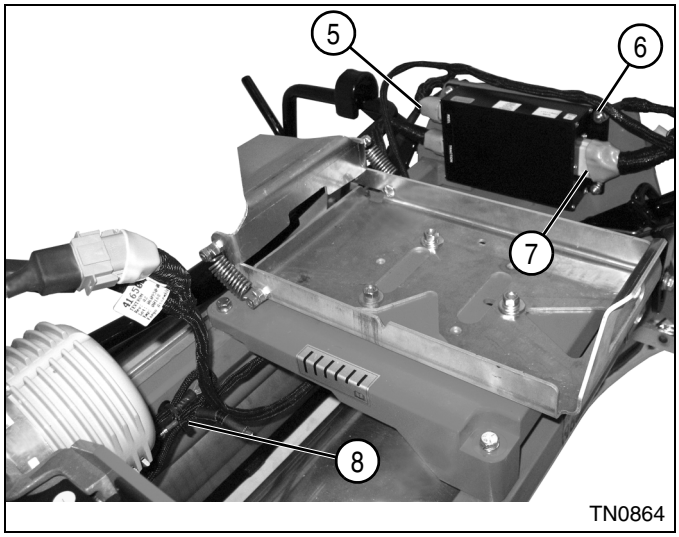

Figure 6-12

7. Disconnect reel harness connector (5) and main harness connector (7).
8. Disconnect ground lead terminal (6).
9. Remove harness tie (8).

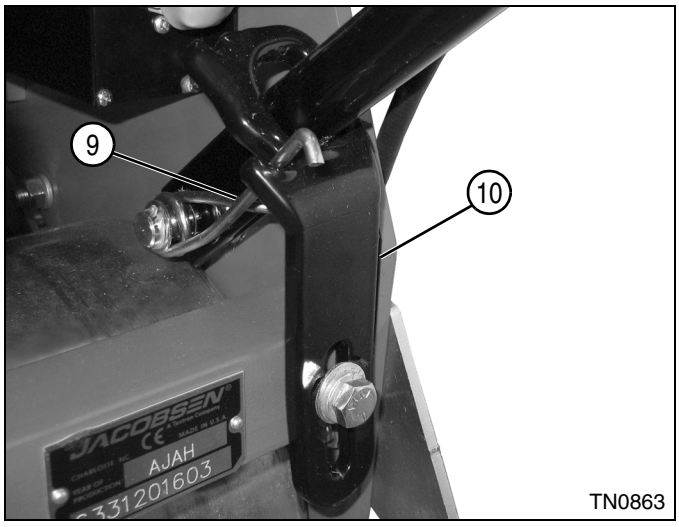

Figure 6-13

10. Disconnect torsion spring (9) from handle stop (10).

NOTE

Support handle assembly before removing mounting hardware.

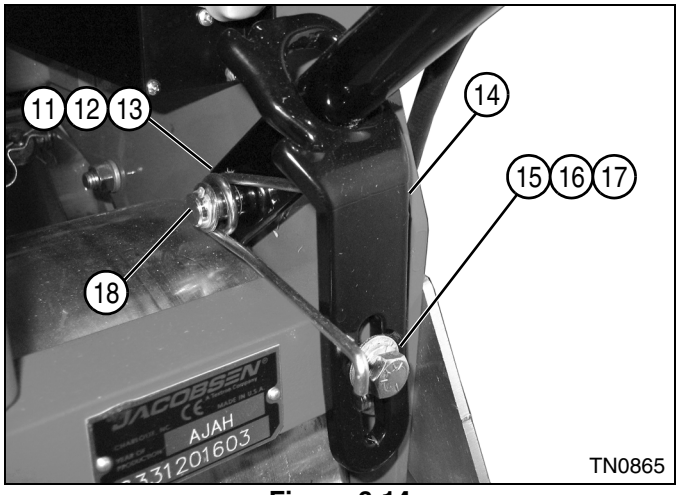

Figure 6-14

11. Remove screw (15), lock washer (16), and washer (17) from handle stop (14).
12. Remove retaining ring (11), washer (12), and torsion spring (13) from stud (18).

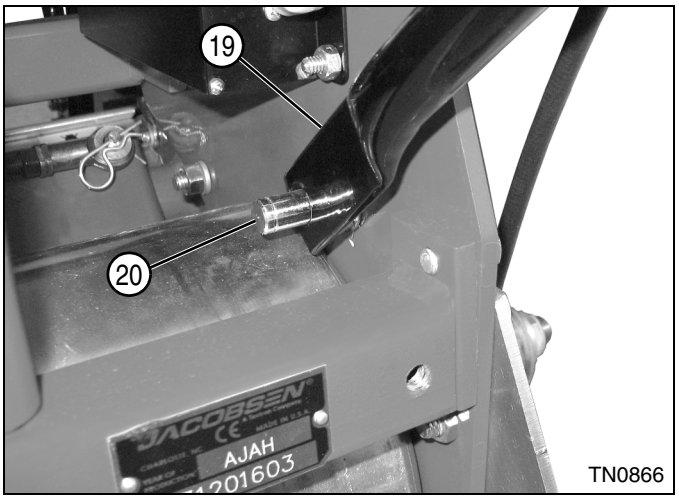

Figure 6-15

13. Remove handle assembly by pressing in on handle tube (19) until end of tube clears stud (20). Repeat procedure for the opposite side of handle.

Installation

See Figures 6-16 through 6-21.

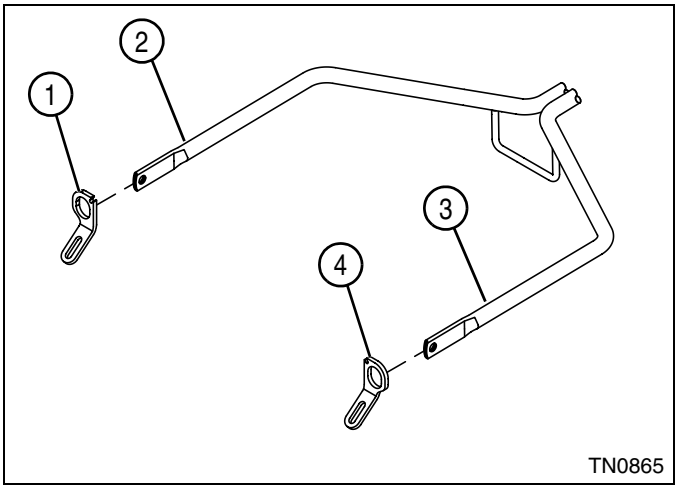

Figure 6-16

1. Slide right (1) and left (4) handle stops over handle tubes (2 and 3).

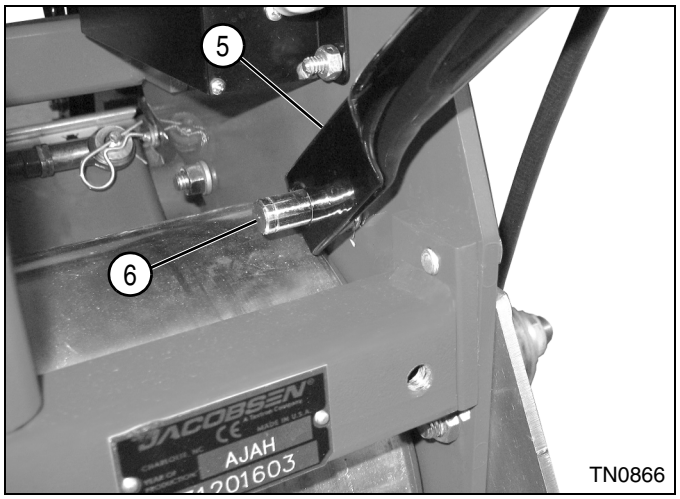

Figure 6-17

2. Slide one handle tube (5) onto stud (6). Repeat procedure for the opposite side of handle.
3. Support handle assembly.

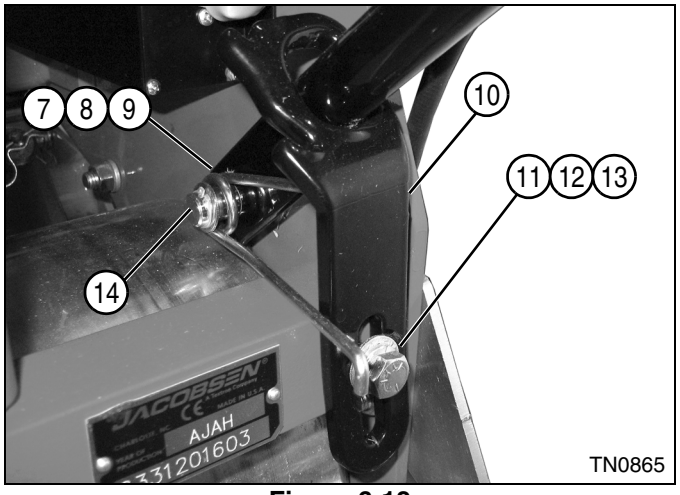

Figure 6-18

NOTES

- *Support handle assembly until mounting hardware is installed.*
- *Steps 4 through 6 apply to both sides of the handle assembly.*

4. Install torsion spring (7), washer (8), and retaining ring (9) on stud (14).
5. Secure handle stop (10) to frame at desired height, using screw (11), lock washer (12), and washer (13).

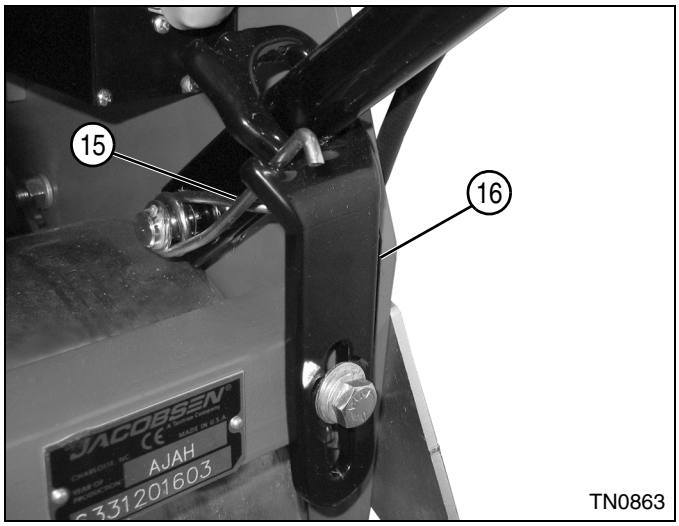

Figure 6-19

6. Connect torsion spring (15) to handle stop (16).

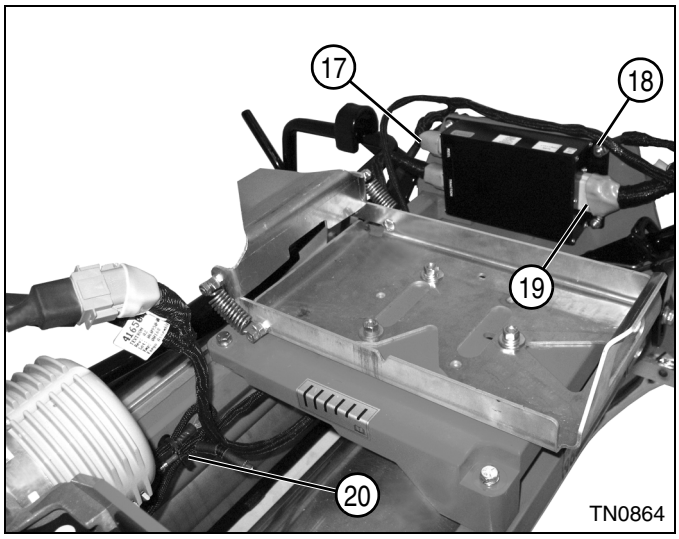

Figure 6-20

7. Install harness tie (20).
8. Connect ground lead terminal (18).
9. Connect reel harness connector (17) and main harness connector (19).

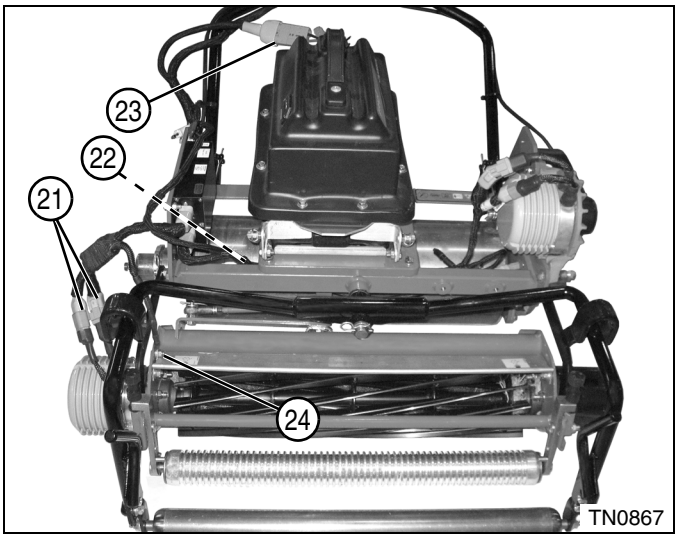

Figure 6-21

10. Connect battery pack connector (23).
11. Connect reel motor connectors (21).
12. Connect ground lead terminal (24).
13. Install harness tie (22).
14. Connect both park brake cables to brake bands. (See “Park Brake Cable” on page 7-5.)
15. Check brake cable adjustment. Adjust as needed. (See “Park Brake Check and Adjustment” on page 7-4.)

Handle and OPC Bail

Removal

See Figures 6-22 through 6-24.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)

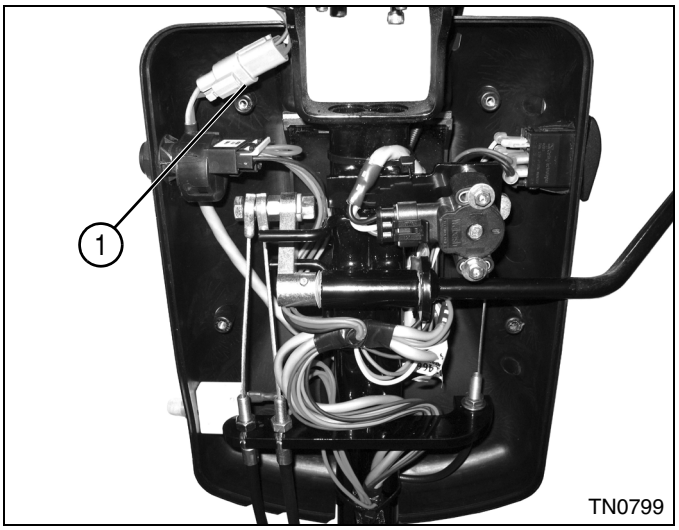

Figure 6-22

3. Disconnect potentiometer harness connector (1).

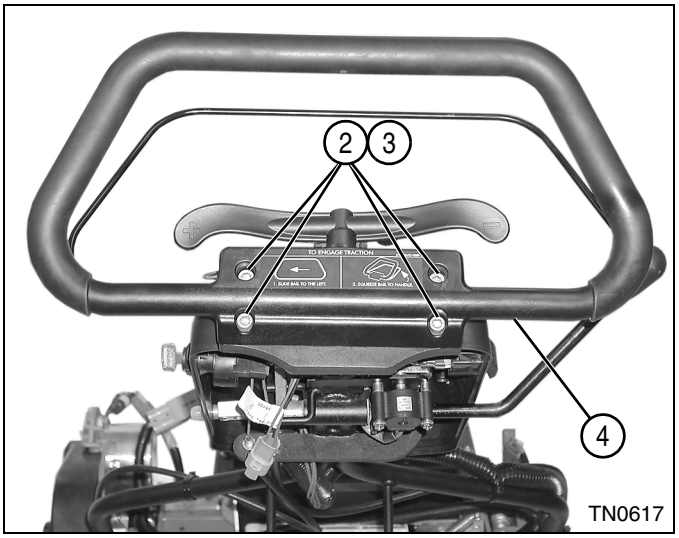

Figure 6-23

4. Remove four nuts (2) and socket-head screws (3).
5. Remove handle assembly (4).

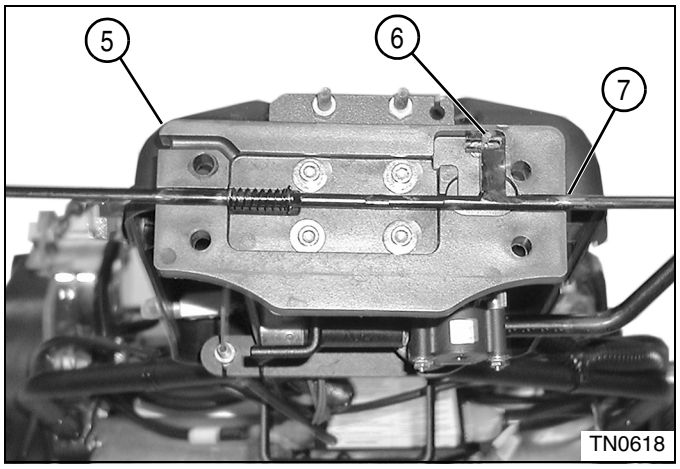

Figure 6-24

6. Disconnect cable end (6) from Operator Presence Control (OPC) bail (7).
7. Remove OPC bail (7) from tilt plate (5).

Installation

See Figures 6-25 through 6-27.

Required Materials
Lubriplate® Grease

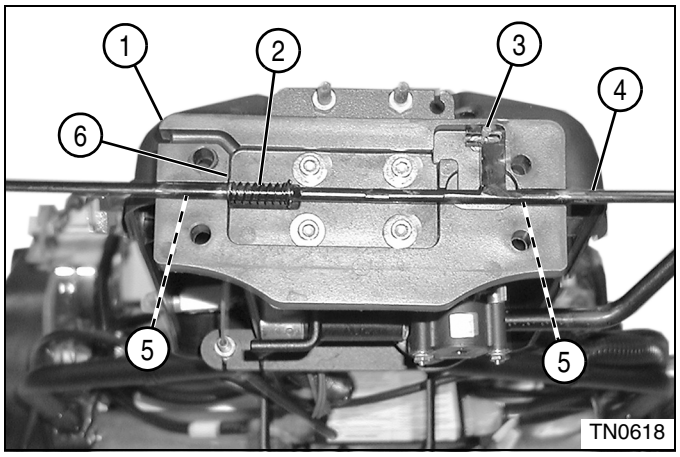

Figure 6-25

1. Apply a thin film of Lubriplate® grease to OPC bail grooves (5) of tilt plate (1) and spring (2) on OPC bail (4).
2. Install end of cable (3) into slot in OPC bail (4) and install OPC bail into tilt plate (1). Make sure end of spring (2) is flush against edge of opening (6) in tilt plate.

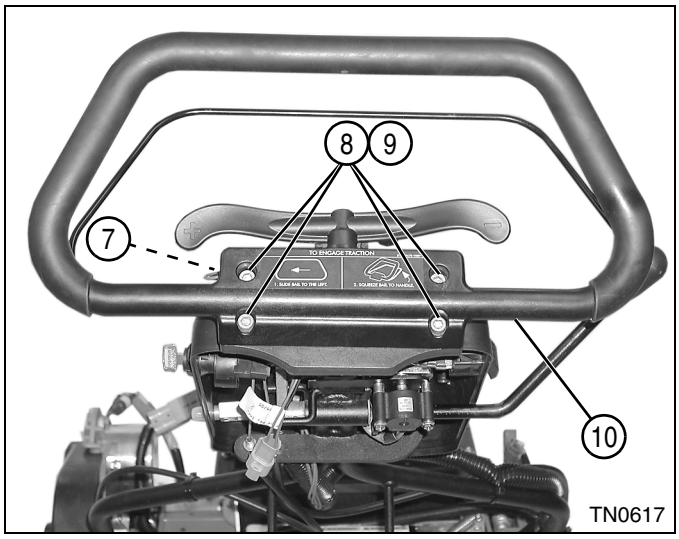

Figure 6-26

NOTE

Be sure potentiometer wires are routed through passage (7) to prevent pinching wires.

3. Install handle assembly (10) and secure with four socket-head screws (8) and nuts (9).

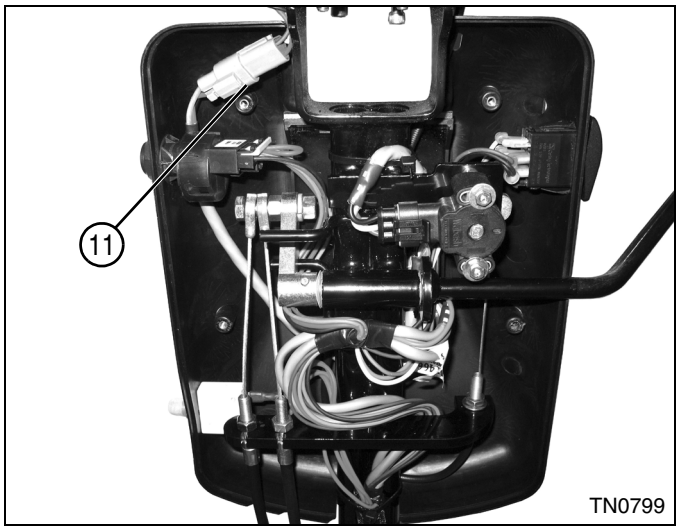

Figure 6-27

4. Connect potentiometer harness connector (11).
5. Install rear half of handle cover. (See “Handle Cover” on page 6-3.)

OPC Cable

Removal and Installation

See Figure 6-28.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove handle cover. (See “Handle Cover” on page 6-3.)
3. Remove handle and Operator Presence Control (OPC) bail. (See “Handle and OPC Bail” on page 6-8.)

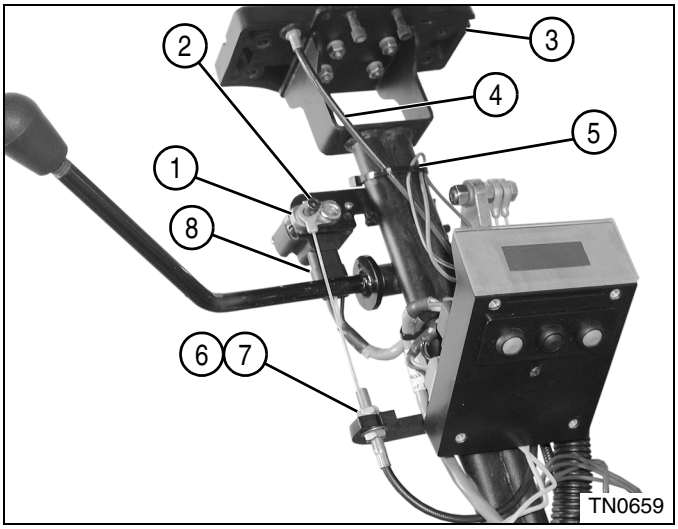

Figure 6-28

4. Disconnect rotary switch connector (8).
5. Remove socket-head screw (2) and cable eyelet (1).
6. Remove nut (6) and washer (7).
7. Remove cable tie (5), and remove OPC cable (4) from tilt plate (3).

Installation Notes

- *Install the OPC cable by reversing the order of removal.*
- *Adjust OPC cable. (See “Operator Presence Control (OPC) Cable Adjustment” on page 6-2.)*

Speed Paddle

Removal and Installation

See Figure 6-29.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

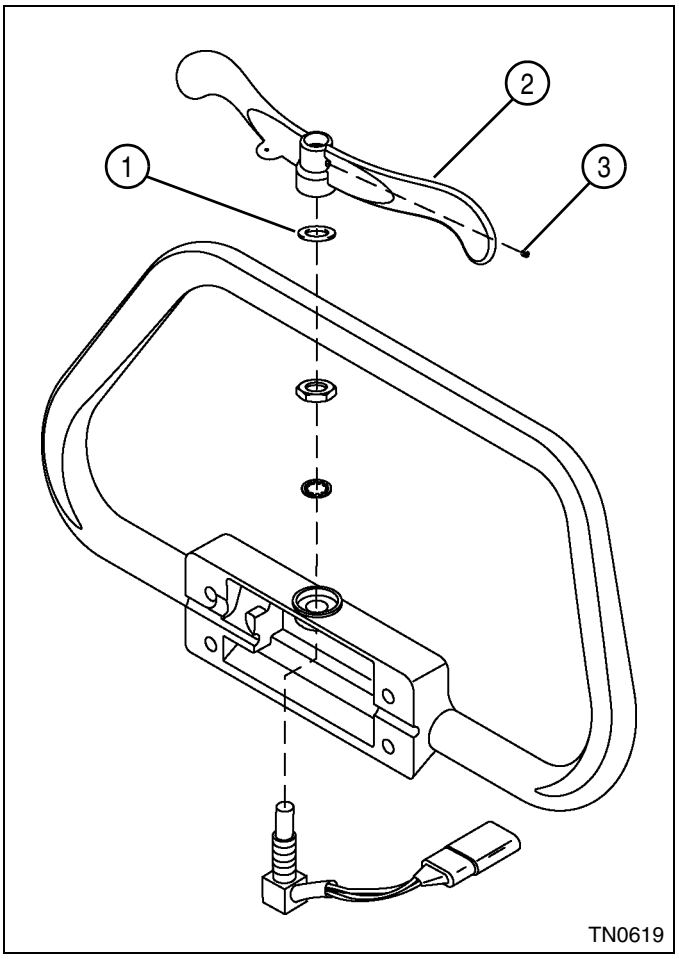

Figure 6-29

2. Loosen set screw (3), and remove speed paddle (2) and spring washer (1).

Installation Note

Install speed paddle by reversing the order of removal.

Brake Control Lever

Removal

See Figure 6-30.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Release park brake.
3. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)

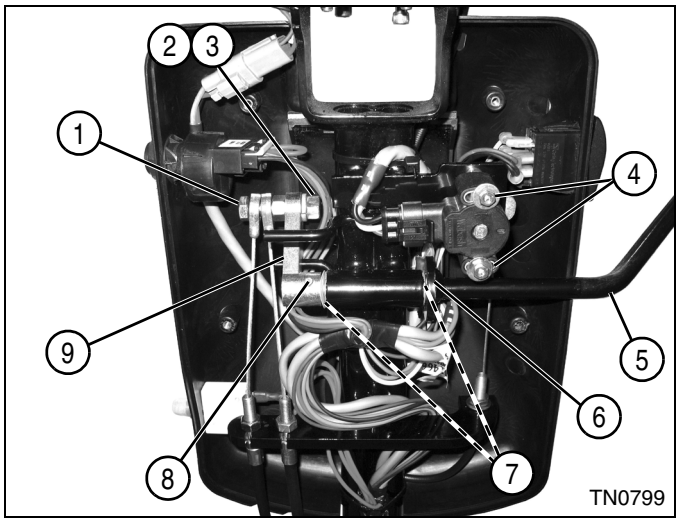

Figure 6-30

4. Remove nut (2), lock washer (3), and screw (1) from brake lever arm (9).
5. Using a punch, drive out pin (8) and remove lever arm (9).

NOTE

Loosen rotary switch fasteners (4) to create clearance while removing brake lever (5).

6. Slide brake lever (5) out and remove spring washer (6).
7. Inspect flanged bushings (7). Remove and replace as needed.

Installation

See Figure 6-31.

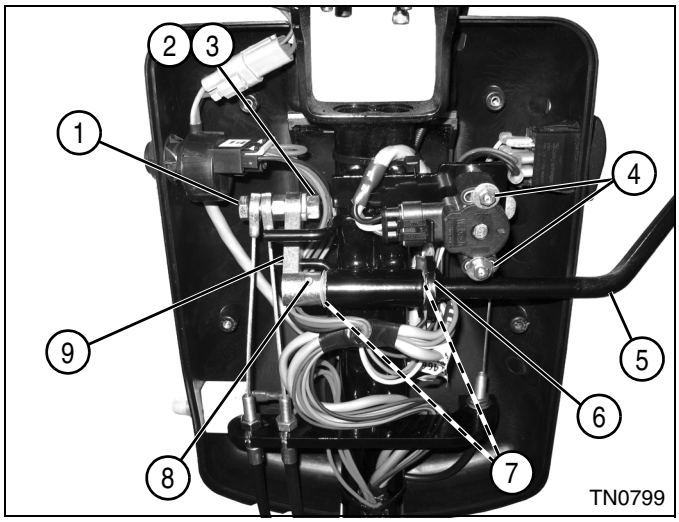

Figure 6-31

1. Install flanged bushings (7).
2. Install spring washer (6) over end of brake lever (5), and install lever into flanged bushings (7).
3. Install lever arm (9) onto brake lever shaft, and secure by driving pin (8) through lever arm and shaft.

NOTE

Tighten rotary switch fasteners (4) after brake lever (5) has been installed.

4. Install screw (1) in lever arm (9) using lock washer (2) and nut (3).
5. Check and adjust park brake as needed. (See “Park Brake Check and Adjustment” on page 7-4.)
6. Install rear half of handle cover. (See “Handle Cover” on page 6-3.)

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Chapter 7

Brakes

7

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Specifications

Brakes		
Park Brake Lever Actuating Force	lb (kg)	10 (4.5)
Park Brake Band—Anchor Pin Center-to-Center Distance (Park Brake Released)	in. (mm)	1.50 (38)

Troubleshooting

Condition	Probable Cause	Remedy
Park brake does not engage when lever is engaged.	Park brake cables not adjusted properly.	Adjust park brake cables. (See “Park Brake Check and Adjustment” on page 7-4.)
	Park brake cables damaged.	Replace park brake cables. (See “Park Brake Cable” on page 7-5.)
	Park brake bands worn.	Replace park brake bands. (See “Park Brake Band” on page 7-6.)
Park brake does not hold mower.	Park brake cables not adjusted properly.	Adjust park brake cables. (See “Park Brake Check and Adjustment” on page 7-4.)
	Park brake bands worn.	Replace park brake bands. (See “Park Brake Band” on page 7-6.)
	Park brake bands contaminated.	Replace park brake bands. (See “Park Brake Band” on page 7-6.)
	Wheel hub damaged/roll pin(s) missing.	Repair/replace wheel hub. (See “Wheel Hubs and Bearings” on page 9-3.)
	Traction drum differential gears damaged.	Repair/replace differential assembly. (See “Differential Assembly” on page 5-17.)
Excessive brake wear.	Park brake cables not adjusted properly/not releasing fully.	Adjust park brake cables. (See “Park Brake Check and Adjustment” on page 7-4.)

Checks and Adjustments

Park Brake Check and Adjustment

NOTE

Right-side brake assembly shown; left-side assembly is similar.

See Figures 7-1 through 7-4.

Check Procedure

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove transport wheels (if equipped). (See “Transport Wheels (Optional)” on page 9-2.)
3. Disengage park brake.

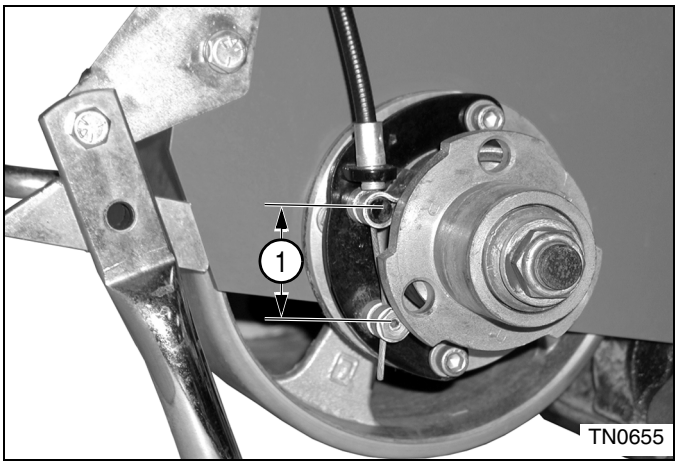

Figure 7-1

4. Measure distance (1) between center of park brake band pins. When correctly adjusted, distance should be 1.50 in. (38 mm).

   Repeat step 4 to check brake on other side of mower.

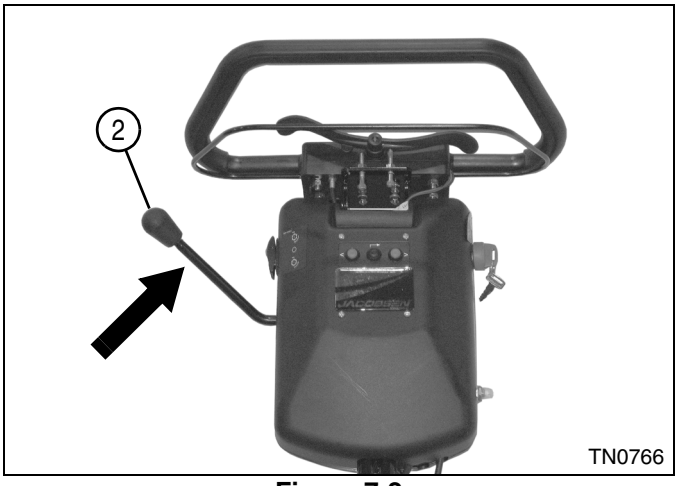

Figure 7-2

5. Attach a scale to top of brake lever (2). Record force required to engage park brake. A properly adjusted brake requires 10 lb (4.5 kg) pull to engage brake.
6. If brakes do not meet specifications, proceed to “Adjustment Procedure.”

Adjustment Procedure

Minor park brake adjustments are made at the handle.

1. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)

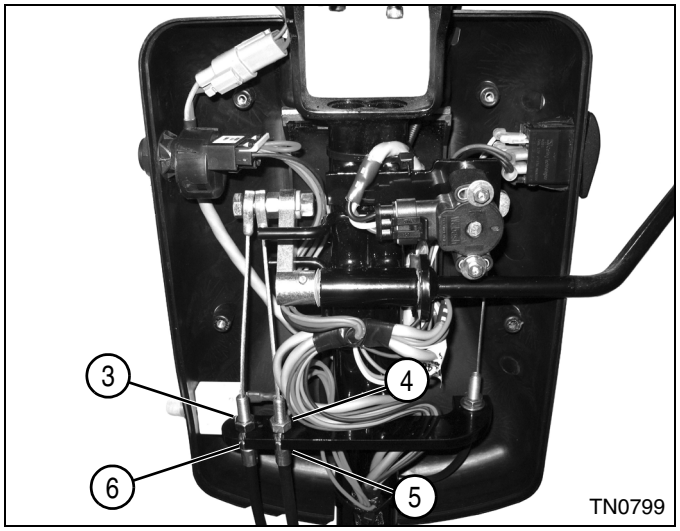

Figure 7-3

2. Loosen jam nuts (3 and 4). Turn nuts (5 and 6) to adjust brake cable, then tighten nuts (3 and 4).

   If adjustments cannot be made at the cable, make the adjustment at the brake bands.

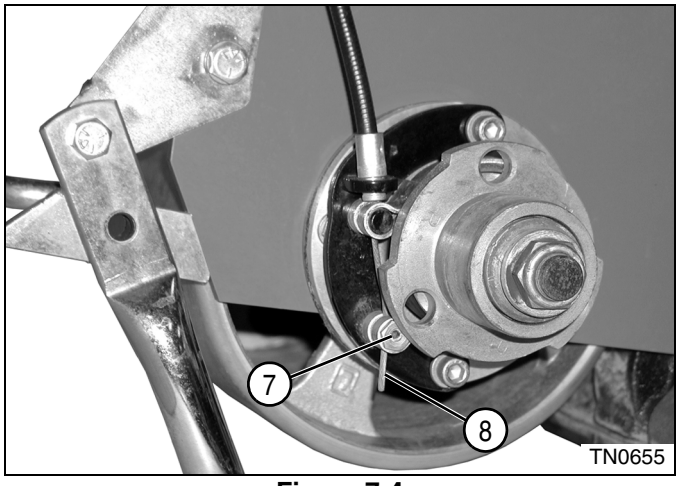

Figure 7-4

3. Loosen set screw (7) and pull cable (8) to obtain desired brake tension. Tighten set screw (7).
4. Repeat “Check Procedure.”

5. Install rear half of handle cover. (See “Handle Cover” on page 6-3.)
6. Install transport wheels (if equipped). (See “Transport Wheels (Optional)” on page 9-2.)

Repair

Park Brake Cable

Removal

See Figures 7-5 through 7-7.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove transport wheels (if equipped). (See “Transport Wheels (Optional)” on page 9-2.)
3. Release park brake.
4. Remove rear half of handle cover. (See “Handle Cover” on page 6-3.)

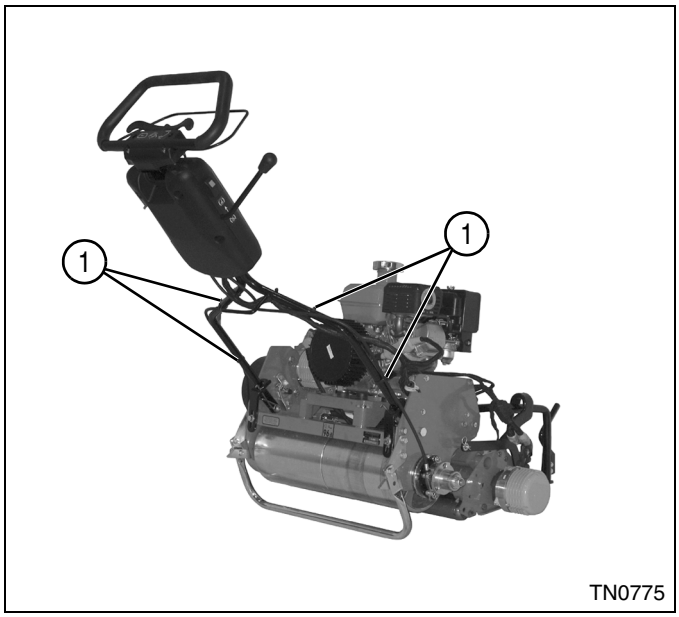

Figure 7-5

NOTE

Record position of cable ties before removing to ensure correct installation.

5. Remove cable ties (1).

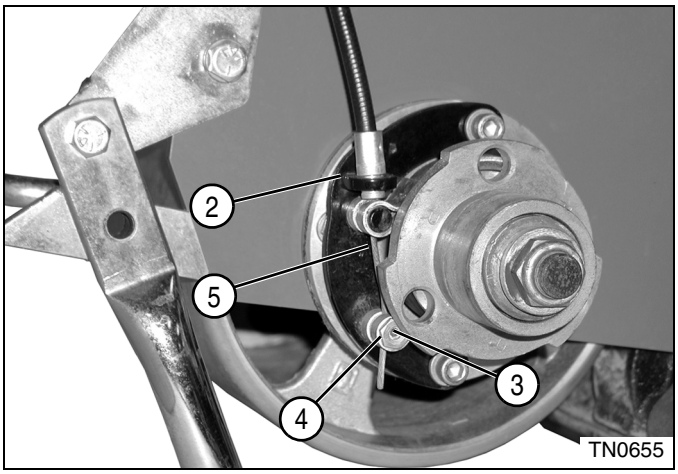

Figure 7-6

6. Loosen set screw (3) and remove brake cable (5) from lower brake band pin (4) and bracket (2).
7. Remove lower brake band pin (4).

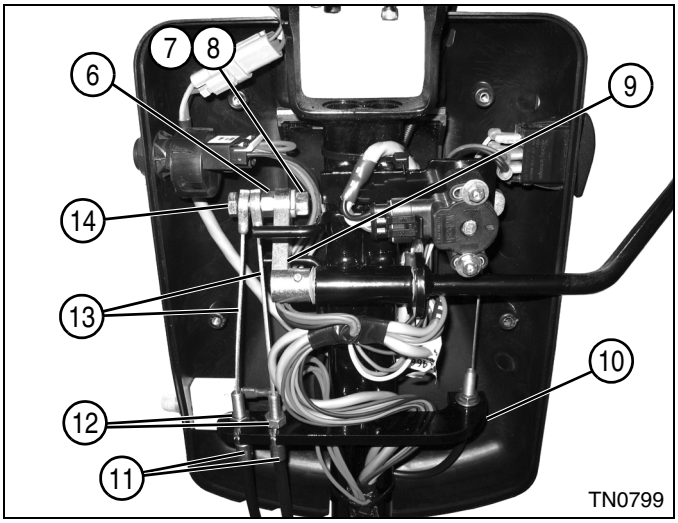

Figure 7-7

8. Remove nut (7), lock washer (8), and screw (14) from brake lever arm (9).
9. Remove nut (6) from screw (14) and remove brake cables (13).
10. Remove jam nuts (12) from brake cable sheaths (11), and slide brake cable sheaths down and remove from bracket (10).

Installation

See Figures 7-8 and 7-9.

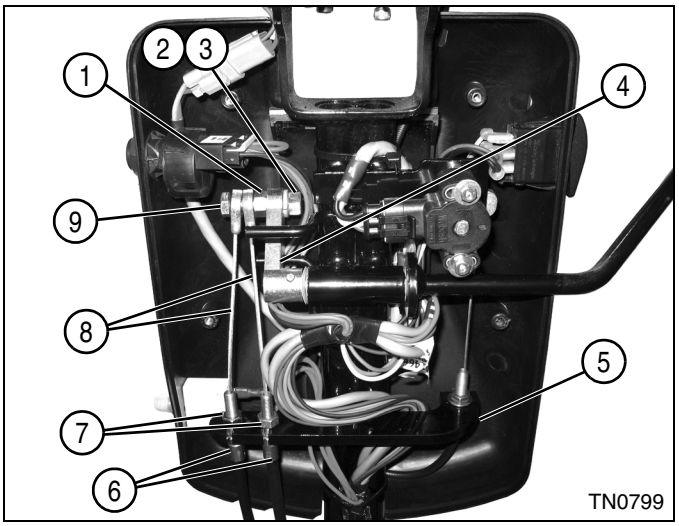

Figure 7-8

1. Slide brake cable sheaths (6) into bracket (5) and secure with jam nuts (7).
2. Install screw (9) through cables (8) and install nut (1).
3. Install screw (9) on brake lever arm (4) and secure using lock washer (2) and nut (3).

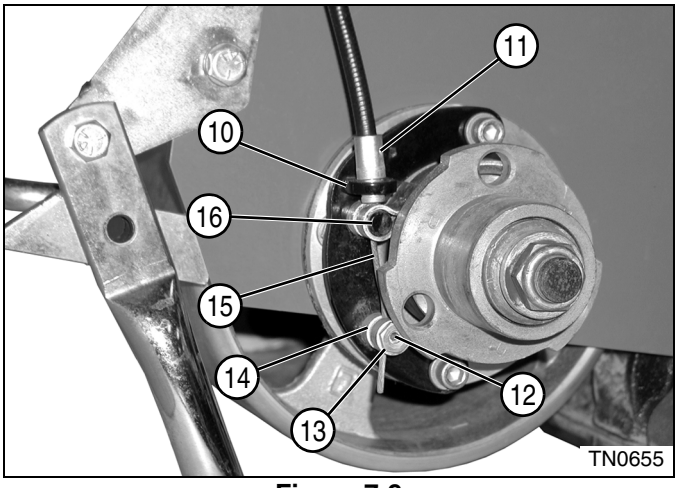

Figure 7-9

4. Install lower brake band pin (13) into brake band (14).
5. Route end of brake cable (15) through bracket (10), upper brake band pin (16), and lower brake band pin (13).
6. Position brake band so upper brake band pin (16) rests against end of cable sheath (11).
7. Move free end of brake band until distance between center of park brake band pins (13 and 16) is approximately 1.50 in. (38 mm). Tighten set screw (12).
8. Check brake adjustment. (See “Park Brake Check and Adjustment” on page 7-4.)

Park Brake Band

Removal

See Figure 7-10.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove transport wheels (if equipped). (See “Transport Wheels (Optional)” on page 9-2.)
3. Release park brake.

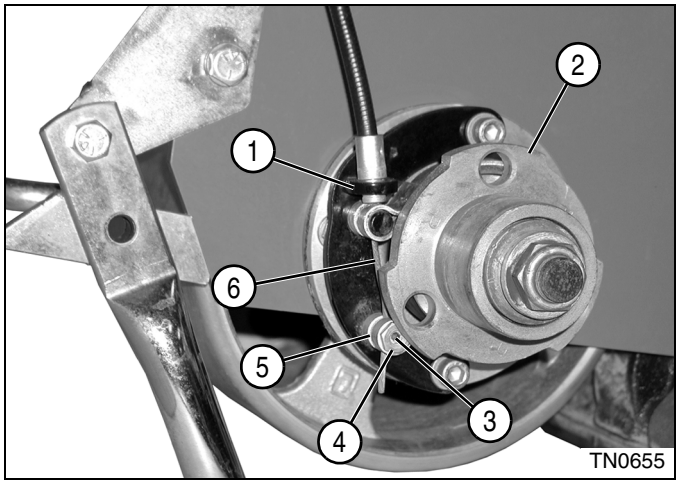

Figure 7-10

4. Loosen set screw (3) and remove brake cable (6) from lower brake band pin (4) and bracket (1).
5. Remove lower brake band pin (4).
6. Remove wheel hub (2). (See “Wheel Hubs and Bearings” on page 9-3.)
7. Remove brake band (5) from bracket.

Installation

See Figures 7-11 and 7-12.

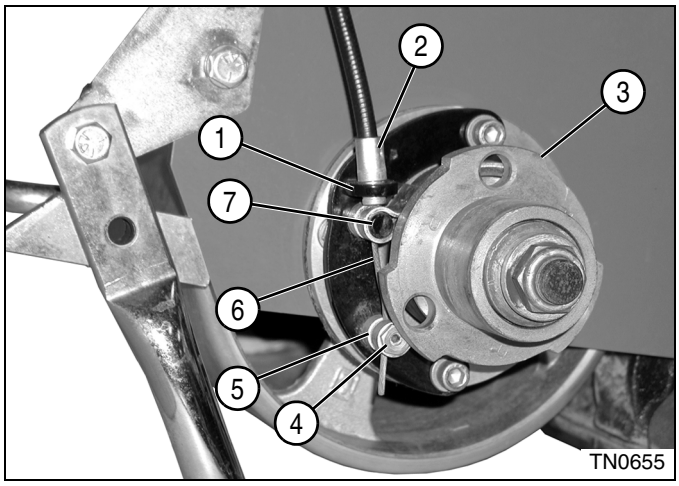

Figure 7-11

1. Install park brake band (5) on bracket (1).
2. Install wheel hub (3). (See “Wheel Hubs and Bearings” on page 9-3.)
3. Install lower brake band pin (4) into brake band (5).
4. Route end of brake cable (6) through bracket (1), upper brake band pin (7), and lower brake band pin (4).
5. Position brake band so upper brake band pin (7) rests against end of cable sheath (2).

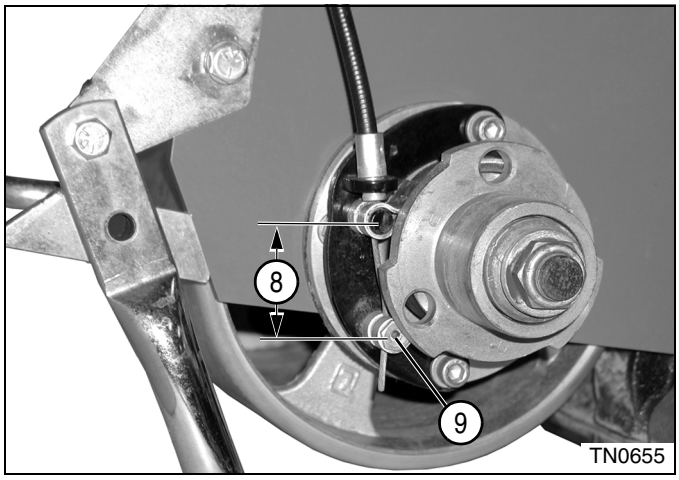

Figure 7-12

6. Move free end of brake band until distance between center of park brake band pins (8) is approximately 1.50 in. (38 mm). Tighten set screw (9).
7. Check brake adjustment. (See “Park Brake Check and Adjustment” on page 7-4.)

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Chapter 8

Cutting Unit

8

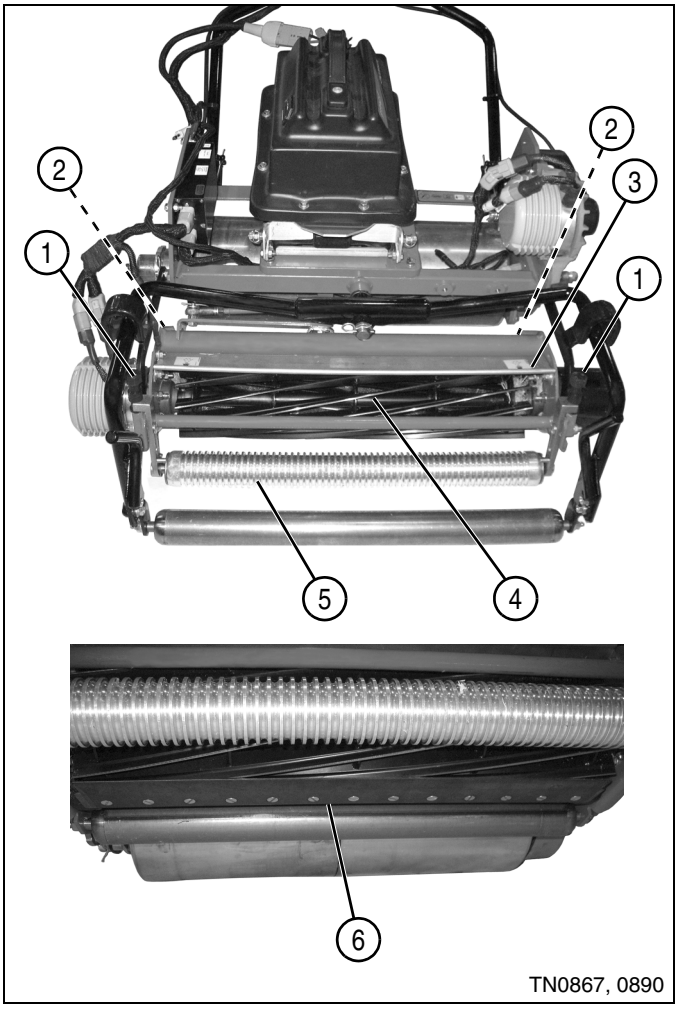
JACOBSEN
A Textron Company

Specifications

Adjustments		
Flat Surface Height at the Front of the Bedknife (Minimum)	in. (mm)	1/32 (0.8)
Reel-to-Bedknife Gap	in. (mm)	0.001—0.003 (0.025—0.076)
Reel Side-to-Side Clearance (Reel Bearing Pre-Load)	in. (mm)	0.040 (1.27)

Component Location

See Figure 8-1.



1	Roller Height Adjuster (2)	4	Reel
2	Bedknife Adjuster (2)	5	Cutting Unit Front Roller
3	Grass Shield	6	Bedknife/Shoe Assembly

Figure 8-1

Troubleshooting

Cutting unit troubleshooting is broken down into two areas: Quality of Cut Appearance and Mechanical.

Quality of Cut Appearance Troubleshooting, as the name states, evaluates the mower's performance by the visual appearance of the cut delivered by the mower.

Undesirable patterns and other conditions noted may be caused by various mechanical, environmental (variations in turf, grass conditions, weather, etc.), or operating conditions.

Mechanical Troubleshooting is related to operational problems that may or may not be related to quality of cut problems (reel drive does not engage, etc.).

Quality of Cut Troubleshooting

Factors That Affect Cut Appearance

In most cases, information provided by the user/customer will provide the basis for the repairs and adjustments that are required; however, it is recommended that a "test cut" be performed to evaluate the mower's performance before beginning repairs.

An area should be available where "test cuts" can be made. This area should provide known and consistent turf conditions to allow accurate evaluation of the mower's performance.

Another "test cut" should be performed after the completion of the repairs and/or adjustments to verify the mower's performance.

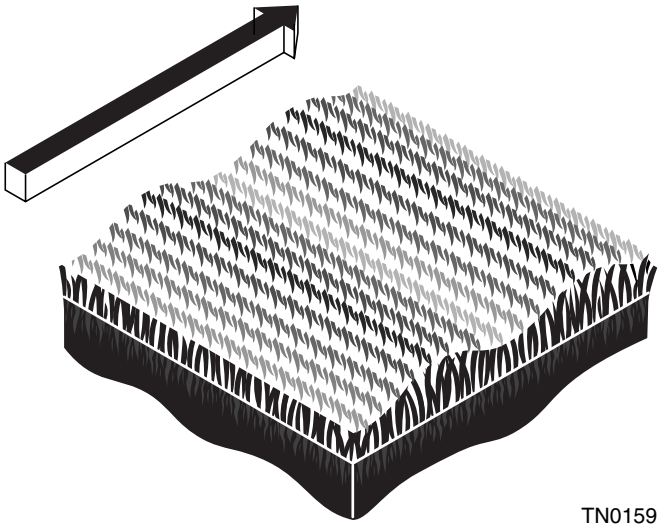
Before performing a "test cut" to diagnose cut appearance and mower performance, the following items should be verified to ensure an accurate "test cut."

1. Traction (Drive) Speed
2. Reel Bearing Condition and Pre-Load (End Play) Adjustment
3. Reel and Bedknife Sharpness
4. Bedknife Alignment to Reel
5. Reel-to-Bedknife Contact
6. Height of Cut
7. Bedknife Application (Correct Bedknife)
8. Roller and Roller Bearing Condition
9. Reel Speed
10. Frequency of Clip (FOC)

Definition of Terms

The following terms are used to describe various cut appearance symptoms.

Washboarding



TN0159

NOTE: One cutting unit width shown. Arrow indicates direction of travel.

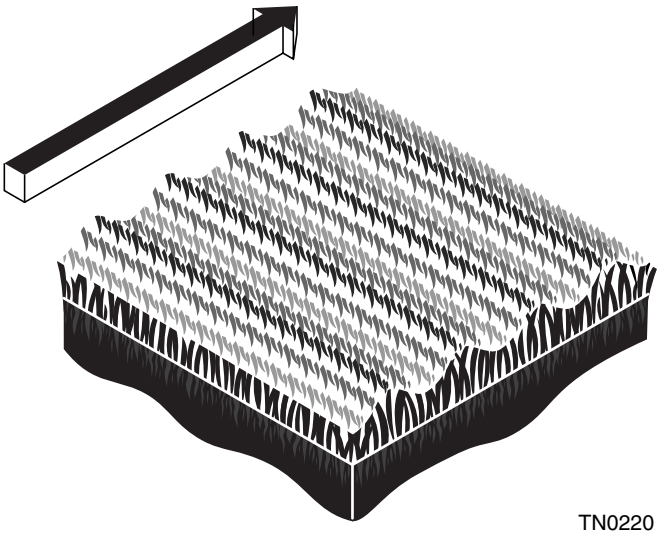
Washboarding is a cyclical pattern of varying cutting heights, resulting in a wave-like cut appearance. In most cases, the wave tip-to-tip distance is approximately 6—8 in. (15—20 cm). Color variation (light-to-dark) may also be noticed.

This condition is usually caused by a rocking motion in the cutting unit(s). This condition is found mostly on mowers with multiple (suspended) cutting units, but other causes in walk-behind mowers can produce the same result.

Washboarding may also be caused by variations in the turf.

Probable Cause	Remedy
Mowing (ground) speed is too fast.	Reduce mowing (ground) speed.
Grass build-up on roller.	Clean the roller and use scrapers or brushes.
Roller is out of round.	Replace front roller. (See “Cutting Unit Front Roller” on page 10-2.)
Mowing in the same direction.	Change mowing direction regularly.
Use of a groomer on cleanup pass.	Groomers should be used only in a straight line.
Battery pack tray adjusted too far back.	Adjust battery pack tray. (See “Battery Tray Fore/Aft Adjustment” on page 8-14.)
Engine/gen-set adjusted too far back.	Adjust engine forward on mount plate. (See “Engine Fore/Aft Adjustment” on page 8-14.)

Marcelling



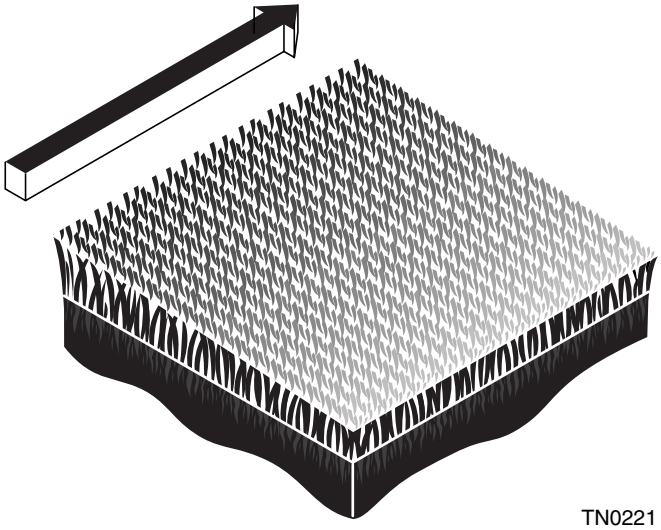
TN0220

NOTE: One cutting unit width shown. Arrow indicates direction of travel.

Marcelling, like washboarding, is a cyclical pattern of varying cutting heights, resulting in a wave-like cut appearance. In most cases, the wave tip-to-tip distance is 2 inches (5 cm) or less.

Probable Cause	Remedy
Mowing (ground) speed is too fast.	Reduce mowing (ground) speed.
HOC (height-of-cut) setting is too low for the machine's capability.	Confirm proper HOC range for reel/bedknife combination.
Reel speed too slow.	Check/set reel speed rpm. Refer to the Operator's Manual.
Frequency of clip (FOC) too low.	Adjust FOC. (See "Change FOC (Frequency of Clip)" on page 4-31.)

Step Cutting



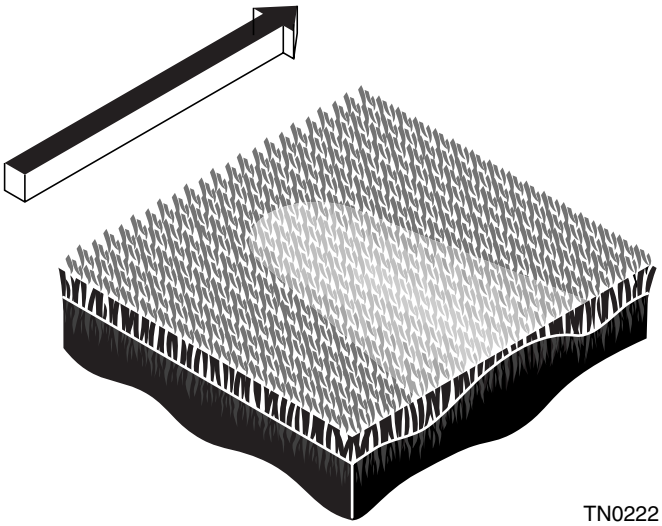
TN0221

NOTE: One cutting unit width shown. Arrow indicates direction of travel.

Step cutting occurs when grass is cut taller on one side of the reel than the other. This is usually caused by mechanical wear or an incorrect roller adjustment.

Probable Cause	Remedy
HOC (height-of-cut) settings are different from one side of the reel to the other.	Check HOC adjustment. (See “Height-of-Cut Adjustment” on page 8-16.)
Worn roller bearings.	Check/replace roller bearings. (See “Cutting Unit Front Roller” on page 10-2.)
Worn reel bearings.	Check/replace/adjust reel bearings. (See “Reel Bearing Pre-Load Adjustment” on page 8-17.)
Reel-to-bedknife contact is different from one side of the cutting unit to the other.	Check reel to bedknife contact. (See “Bedknife-to-Reel Adjustment” on page 8-13.)

Scalping

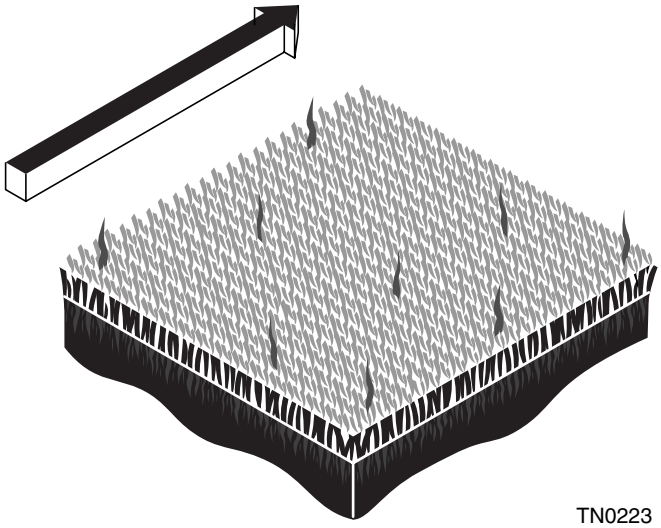


NOTE: One cutting unit width shown. Arrow indicates direction of travel.

Scalping is a condition in which areas of grass are cut noticeably shorter than the surrounding areas, resulting in a light green or even brown patch. This is usually caused by an excessively low height-of-cut setting and/or uneven turf.

Probable Cause	Remedy
HOC (height-of-cut) settings are lower than normal.	Check and adjust the HOC settings. (See “Height-of-Cut Adjustment” on page 8-16.)
Turf too uneven for the mower to follow.	Try a different mowing direction.
Incorrect bedknife for HOC.	Install correct bedlknife for desired HOC. (See “Bedknife” on page 8-19.)
Cutting too much grass at one time.	Mow more often.

Stragglers



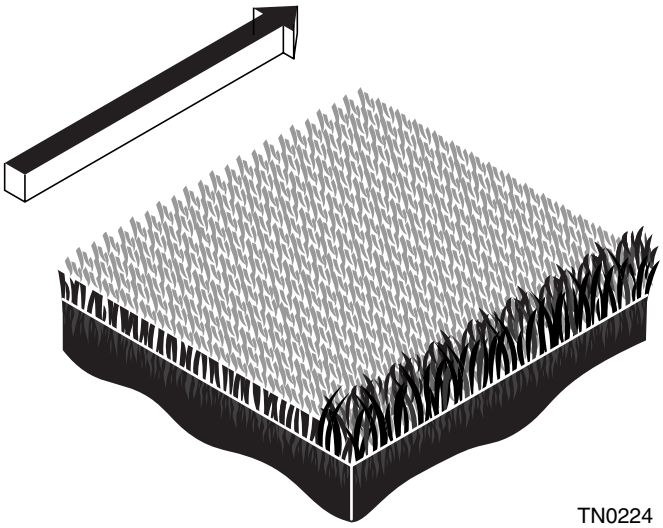
TN0223

NOTE: One cutting unit width shown. Arrow indicates direction of travel.

Stragglers are scattered blades of uncut or poorly cut grass.

Probable Cause	Remedy
Bedknife improperly adjusted.	Adjust bedknife. (See “Bedknife-to-Reel Adjustment” on page 8-13.)
Dull cutting edges.	Sharpen reel and bedknife.
Mowing (ground) speed is too fast.	Reduce mowing (ground) speed.
Incorrect roller.	Install correct roller for application. (See “Cutting Unit Front Roller” on page 10-2.)
Grass is too tall.	Mow more often.
Mowing in the same direction.	Change mowing direction regularly.

Streaks

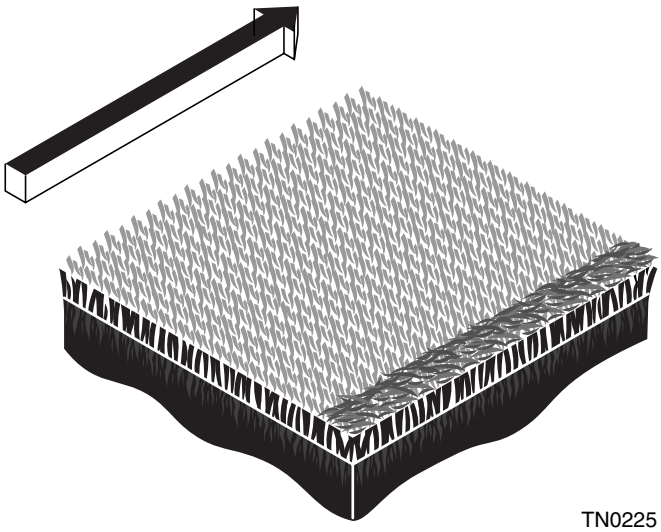


NOTE: One cutting unit width shown. Arrow indicates direction of travel.

A streak is a line of uncut grass. This is usually caused by a nicked or bent bedknife.

Probable Cause	Remedy
Damaged bedknife.	Replace bedknife. (See “Bedknife” on page 8-19.)
Damaged or unevenly worn reel.	Inspect reel. Replace as needed. (See “Reel Assembly” on page 8-26.)
Loose or missing bedknife fasteners.	Check bedknife screws: Tighten loose screws; replace missing screws. (See “Bedknife” on page 8-19.)
Incorrect roller.	Install correct roller for application. (See “Cutting Unit Front Roller” on page 10-2.)
Bedknife is matting the grass down.	Install correct bedknife for application. (See “Bedknife” on page 8-19.)

Windrowing

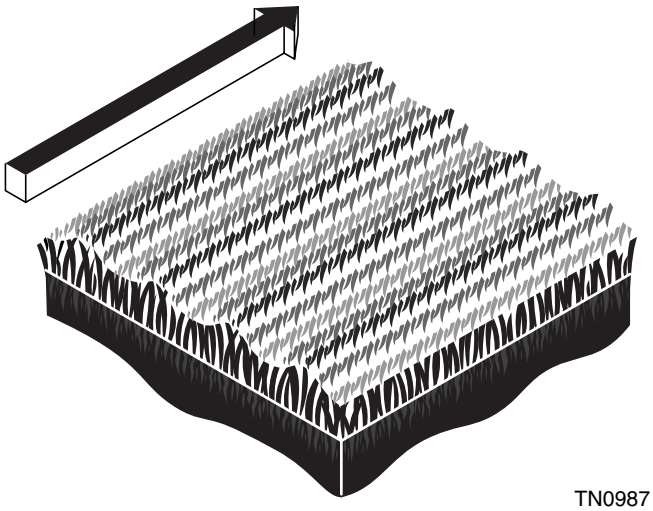


NOTE: One cutting unit width shown. Arrow indicates direction of travel.

Windrowing is the deposit of clippings concentrated at one end of the cutting unit, forming a line in the direction of travel.

Probable Cause	Remedy
Grass is too tall.	Mow more often.
Mowing while turf is damp.	Mow when turf is dry.
Grass built up on roller.	Clean rollers; use roller brushes or scrapers.
Improperly adjusted scraper.	Adjust scraper. (See “Scraper Blade Assembly” on page 10-9.)

Rifling or Tramlining



TN0987

NOTE: One cutting unit width shown. Arrow indicates direction of travel.

Rifling or tramlining is a pattern of varying cutting heights, resulting in a wave-like cut appearance, usually due to heavy contact points across the reel and/or bedknife.

Probable Cause	Remedy
Reel and/or bedknife unevenly worn.	Inspect bedknife and reel. Grind or replace as needed. (See “Reel and Bedknife Inspection” on page 8-13.)

Mechanical Troubleshooting

Cutting Unit

Condition	Probable Cause	Remedy
Reel drive does not engage when Operator Presence Control (OPC) bail is engaged.	System voltage too low.	Check system charge. (See “Battery Pack Test” on page 4-34.)
	Reel drive switch not engaged.	Engage reel drive switch. (Refer to Operator’s Manual.)
	Reel drive motor harness connector not connected.	Connect reel drive motor harness connector. (See “Reel Drive Motor” on page 4-46.)
	Reel drive motor harness not connected at controller.	Connect reel drive motor harness at controller. (See “Control Module” on page 4-50.)
	OPC cable misadjusted.	Adjust OPC cable. (See “OPC Cable” on page 6-9.)
	Reel drive switch faulty.	Test reel drive switch. (See “Reel Drive Switch Test” on page 4-37.)
	OPC rotary switch faulty.	Test OPC rotary switch. (See “OPC Bail Control Test” on page 4-40.)
	Reel drive motor faulty.	Test/replace reel drive motor. (See “Reel Drive Motor Test” on page 4-39.)
Reel drive does not reach full speed.	Reel drive motor faulty.	Test/replace reel drive motor. (See “Reel Drive Motor Test” on page 4-39.)
	Bedknife-to-reel contact too tight.	Check bedknife-to-reel adjustment. (See “Bedknife-to-Reel Adjustment” on page 8-13.)

Checks and Adjustments

Reel and Bedknife Inspection

See Figure 8-2.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

CAUTION

To prevent personal injury and damage to the cutting edges, handle the reel with extreme care.

2. Check the reel bearings for end play or radial play. If there is any abnormal movement of the reel, up and down or side to side, adjust or replace components as needed. (See “Reel Bearing Pre-Load Adjustment” on page 8-17.)

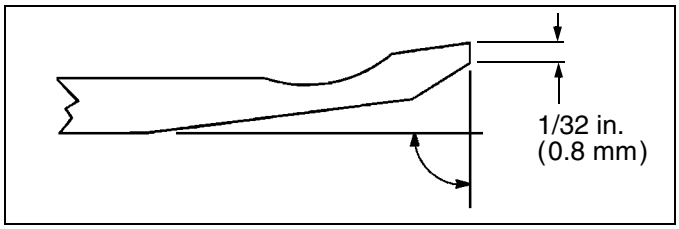


Figure 8-2

3. Inspect the reel blades and bedknife to ensure good sharp edges without bends or nicks.
   a. The cutting edges of the reel blades and bedknife must be sharp, free of burrs, and show no signs of rounding off.
   b. The bedknife and bedknife shoe must be securely tightened. The bedknife must be straight and sharp.
   c. A flat surface of 1/32 in. (0.8 mm) minimum must be maintained on the front face of the bedknife. Use a standard flat file to dress the bedknife.
4. If wear or damage is beyond the point where the reel or bedknife can be corrected by the lapping process, it must be reground.
5. Proper reel-to-bedknife adjustment is critical. A gap of 0.001—0.003 in. (0.025—0.076 mm) must be maintained across the entire length of the reel and bedknife.
6. The reel must be parallel to the bedknife. An improperly adjusted reel will lose its sharp edges prematurely and may result in serious damage to the reel and bedknife.
7. Grass conditions will also affect the adjustment.
   a. Dry, sparse conditions will require a wider gap to prevent heat build-up and damage to the reel and bedknife.
   b. High-quality grass with a good moisture content requires a closer gap (near zero).

Bedknife-to-Reel Adjustment

See Figures 8-3 through 8-5.

1. Inspect reel and bedknife before performing adjustment. (See “Reel and Bedknife Inspection” on page 8-13.)

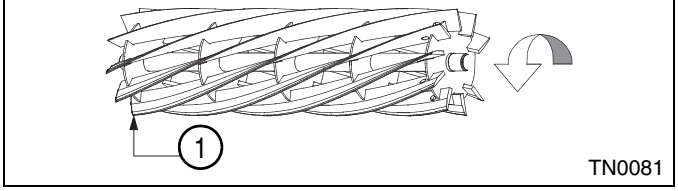


Figure 8-3

2. Start adjustment at the leading edge (1) of the reel, followed by the trailing edge. The leading edge of the reel blade is the edge that passes over the bedknife first during normal reel rotation.

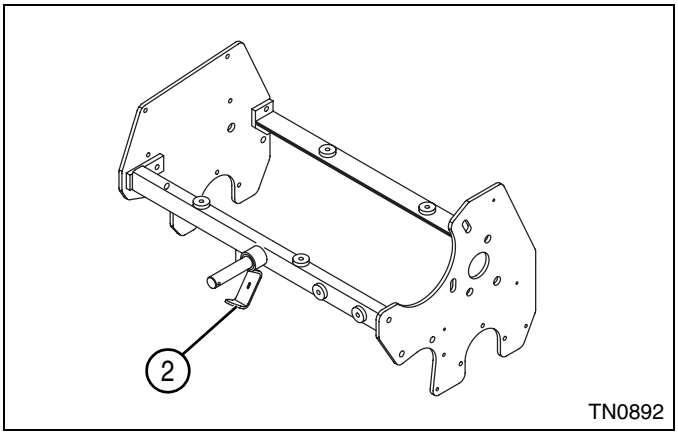


Figure 8-4

NOTICE

Gen-Set Power Modules: Do not leave the mower tipped back for an extended length of time or oil may migrate into the combustion chamber.

3. Additional access to bedknife adjusting hardware can be obtained by pressing the limit bracket (2) away from the reel as the mower is tipped back. This allows the back side of the reel to pivot down and away from the frame.

8

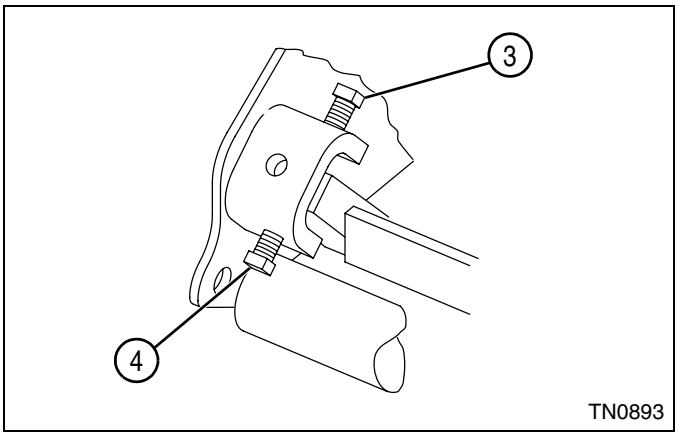


Figure 8-5

CAUTION

To prevent personal injury and damage to cutting edges, handle the reel with extreme care.

4. Use adjusters (3 and 4) to adjust gap. Loosen bottom adjuster (4) and turn top adjuster (3) down (clockwise) to close gap.
   a. Slide a feeler gauge or shim stock 0.001—0.003 in. (0.025—0.075 mm) between the reel blade and the bedknife. Do not turn the reel.
   b. Adjust the trailing edge of the reel in the same manner, then recheck the adjustment at the leading edge.
   c. When the reel and bedknife are properly adjusted, the reel will spin freely and will cut a piece of newspaper along the full length of the reel when the paper is held at 90° to the bedknife.
5. Return mower to upright position. Limit bracket (2) is spring loaded and should latch into bracket on reel.

8

Battery Tray Fore/Aft Adjustment

See Figure 8-6.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove battery pack. (See “Battery Pack” on page 4-42.)

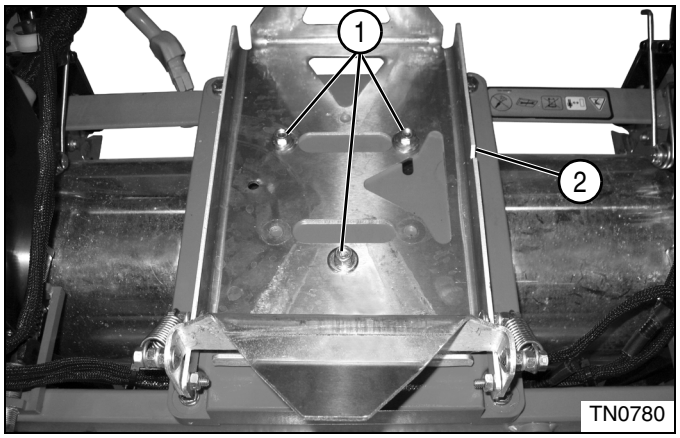


Figure 8-6

3. Loosen nuts (1) and slide battery tray (2) forward to increase the weight over the front roller.
4. Move battery tray (2) back to decrease the weight over the front roller.
5. Tighten nuts (1) and install battery pack. (See “Battery Pack” on page 4-42.)

Engine Fore/Aft Adjustment

See Figure 8-7.

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)

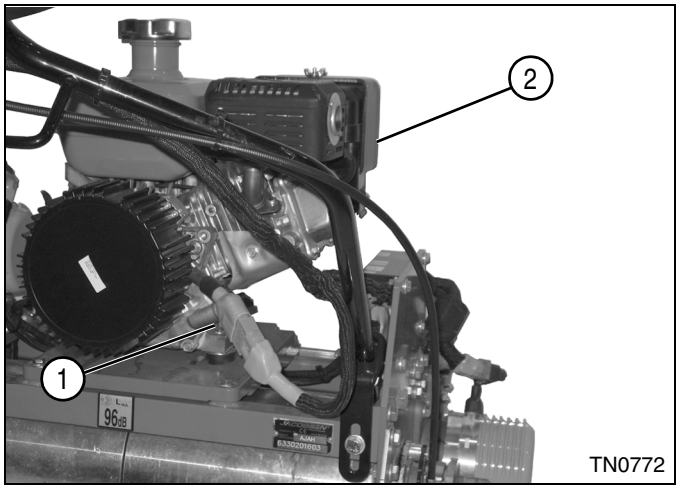


Figure 8-7

2. Loosen four engine mount nuts (1) and slide engine assembly (2) forward to increase the weight over the front roller.
3. Move engine assembly (2) back to decrease the weight over the front roller.
4. Tighten engine mount nuts (1).

Backlapping Procedure

See Figure 8-8.

Whenever a reel and bedknife have been ground, or a new reel and/or bedknife have been installed, the assembled reel should be backlapped.

Required Tools and Materials
• Lapping Compound (150 Grit) • Long-Handled Brush

1. Check for damage to the bedknife and reel blades. (See “Reel and Bedknife Inspection” on page 8-13.)
2. Determine if backlapping or grinding will restore the proper cutting edge.
3. For optimum performance, use a bedknife grinder to touch up the blade, then reassemble and adjust the bedknife to the reel. (See “Bedknife-to-Reel Adjustment” on page 8-13.)

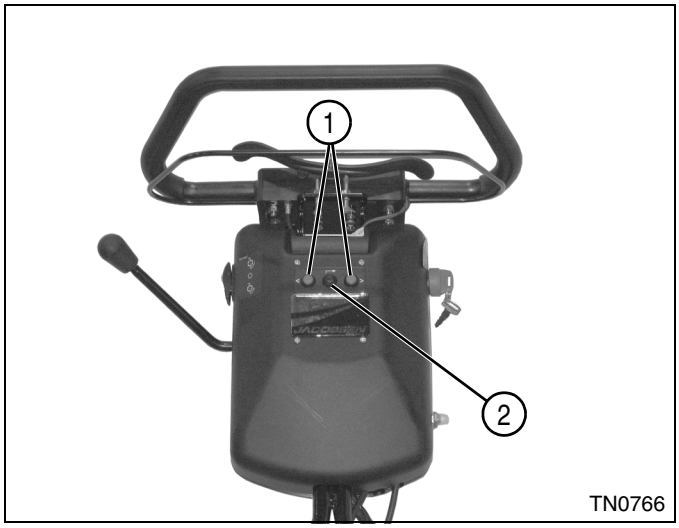


Figure 8-8

4. Start engine, if equipped, and power-up LCD display.
5. Press and hold orange buttons (1) to access enter PIN screen.

ENTER PIN?
6789

Enter PIN 6789 and press black button (2). The LCD is now in Superintendent mode.

6. Move reel drive switch to the backlap position.

BACKLAP?
YES NO

The backlap yes/no screen will be displayed.

7. Use the orange button to select yes.

ENGAGE BAIL
AND RELEASE

The LCD display will prompt the operator to engage and release the operator presence control (OPC) bail.

8. Engage and release the OPC bail.

NOTE

Once initiated, the backlap function can be ended by engaging the OPC bail, moving the reel drive switch, or moving the key switch to the OFF position.

BACKLAP 5 MIN
< 50% >

The reel will begin to rotate backward, and the LCD will display the backlap speed screen.

9. Use the black buttons to increase or decrease the reel speed between 10—100%.
10. Apply lapping compound with a long-handled brush along the entire length of the reel (150 grit or finer is recommended).
11. Continue lapping and at the same time make a fine adjustment on the reel and bedknife until there is a uniform clearance along the full length of the cutting edges.
12. Move the reel drive switch to the off position, stop engine, if equipped, and move key switch to the OFF position. Disconnect the gen-set/battery pack connector.
13. Carefully and thoroughly remove all lapping compound from reel and bedknife before running the reel in forward direction.

Height-of-Cut Adjustment

See Figure 8-9.

Required Tools
Height-of-Cut Gauge Bar (Jacobsen P/N 158568)

NOTE

Make sure the bedknife is properly adjusted before adjusting the cutting height. (See "Bedknife-to-Reel Adjustment" on page 8-13.)

1. Park the mower safely. (See "Park Mower Safely" on page 1-5.)
2. Retract the kickstand and allow the mower to rest on the traction roller or transport wheels.
3. Tip mower back on traction drum or tires. Support the mower to prevent it from tipping

NOTICE

Gen-Set Power Modules: Do not leave the mower tipped back for an extended length of time or oil may migrate into the combustion chamber.

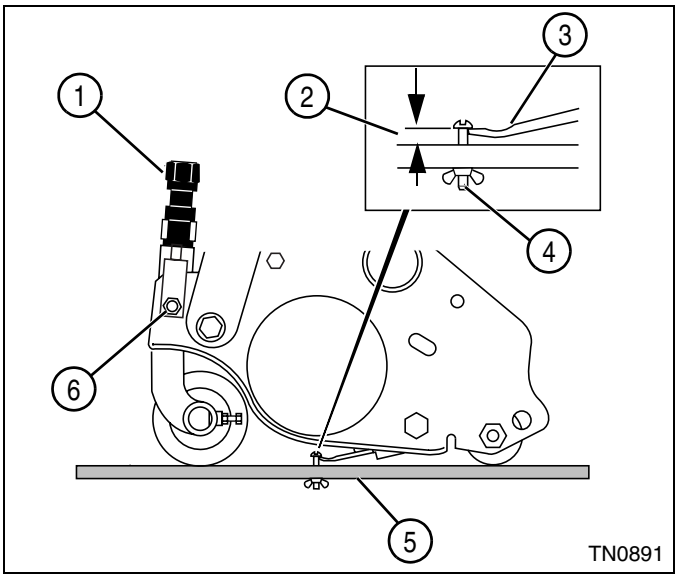


Figure 8-9

4. Loosen nuts (6) on both sides just enough to allow knob (1) to raise the front roller or turf groomer. Raise both sides an equal amount.
5. Set gauge screw (4) to the desired cutting height (2). Measure from the gauge bar (5) to the underside of the screw head (4), then tighten wing nut to lock the adjustment.
6. Place gauge bar between front roller and traction roller, near the outer end of the rollers.
7. Slide screw head over bedknife (3) and adjust knob (1) so roller just contacts the gauge bar. Tighten nut (6).
8. Repeat steps 6 and 7 on the opposite end of the reel, then tighten nuts (6). Recheck and readjust the cutting height if necessary.

Reel Bearing Pre-Load Adjustment

See Figures 8-10 through 8-14.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Back bedknife away from reel. (See “Bedknife-to-Reel Adjustment” on page 8-13.)

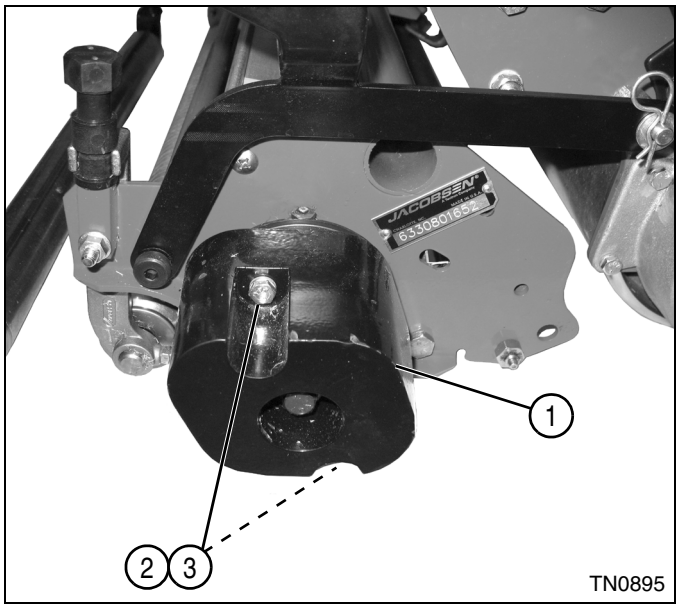


Figure 8-10

3. Remove two socket-head screws (2) and lock washers (3). Remove counterweight (1).

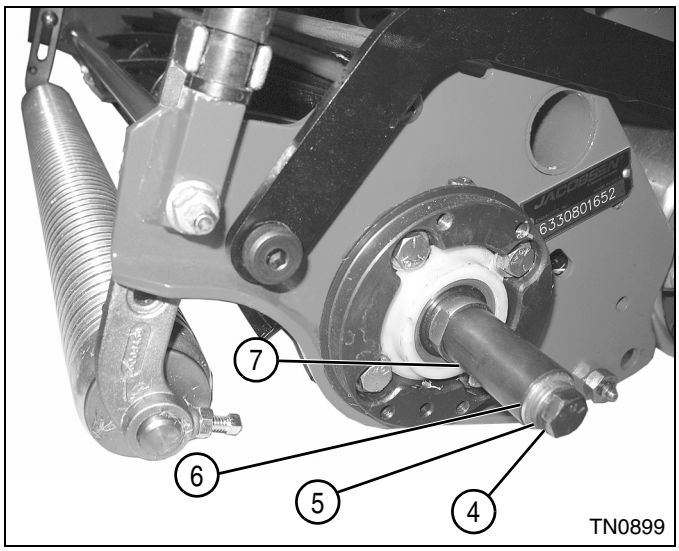


Figure 8-11

4. Remove screw (4), lock washer (5), and washer (6).
5. Remove spacer (7).

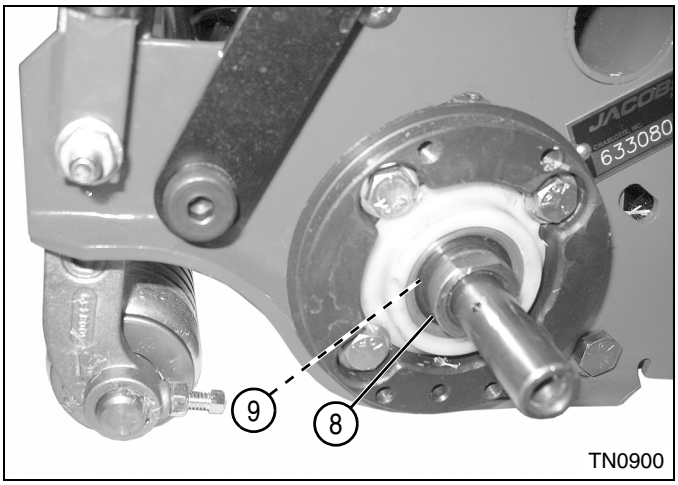


Figure 8-12

6. Tighten adjuster nut (8) until the spring (9) is completely collapsed, then back the nut 2—3 turns, or until there is 0.040 in. (1.27 mm) side-to-side movement of the reel.

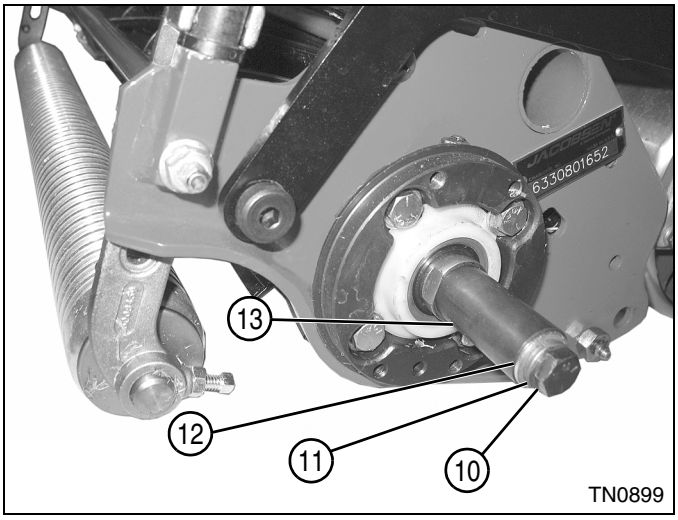


Figure 8-13

7. Install spacer (13), washer (12), lock washer (11), and screw (10).

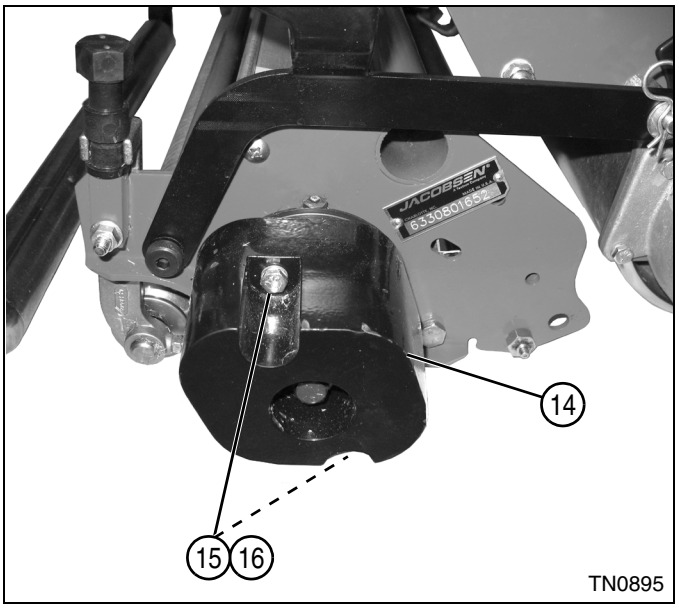


Figure 8-14

8. Install counterweight (14) and two socket-head screws (15) and lock washers (16).
9. Adjust bedknife-to-reel contact. (See “Bedknife-to-Reel Adjustment” on page 8-13.)

Repair

Cutting Unit

Removal and Installation

See Figures 8-15 and 8-16.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Retract the kickstand and allow the mower to rest on the traction roller or transport wheels.

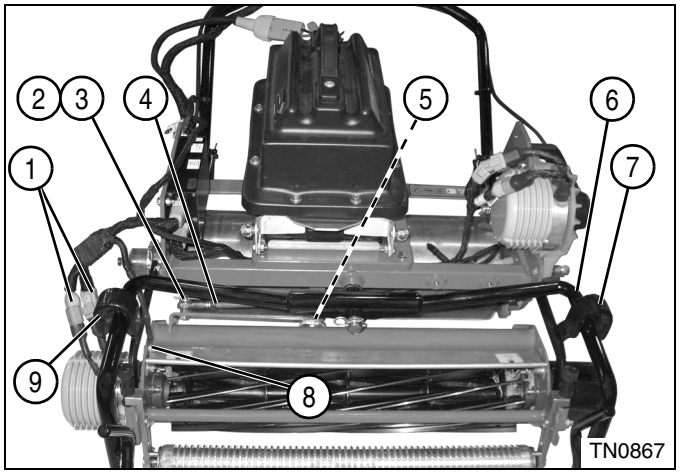


Figure 8-15

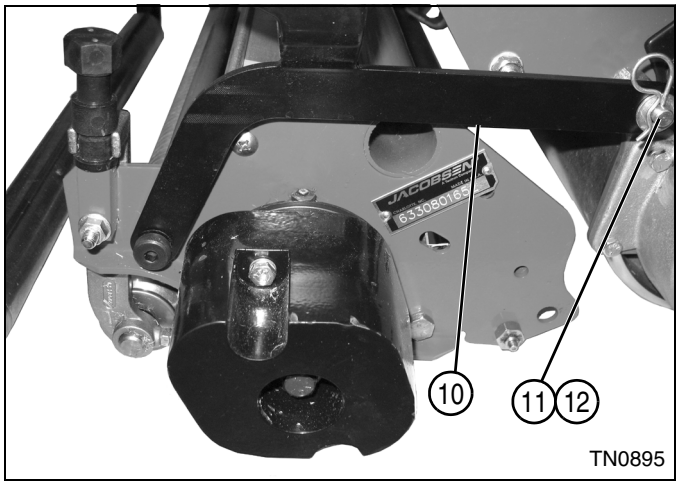


Figure 8-16

3. Disconnect reel motor electrical connectors (1) and ground lead terminal (8).
4. Remove clip (2) and washer (3).
5. Disconnect rod (4).
6. Remove clips (11) and washers (12) from both sides of the mower.
7. Disconnect arms (10) from both sides of the mower.
8. Disconnect arms (7 and 9) from roller mount (6).

9. Push the limit bracket (5) in and tip mower back on traction drum or tires. Support the mower to prevent it from tipping.
10. Remove cutting unit.

Installation Note

Install the cutting unit by reversing the order of removal.

Grass Shield

Removal and Installation

See Figures 8-17 and 8-18.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

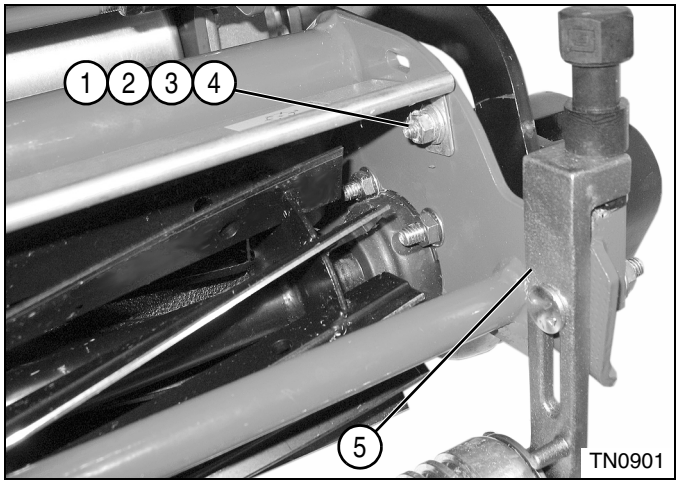


Figure 8-17

2. Remove cutting unit front roller (5). (See “Cutting Unit Front Roller” on page 8-28.)
3. Remove nuts (1), lock washers (2), flat washers (3), and screws (4) from both sides of the mower.

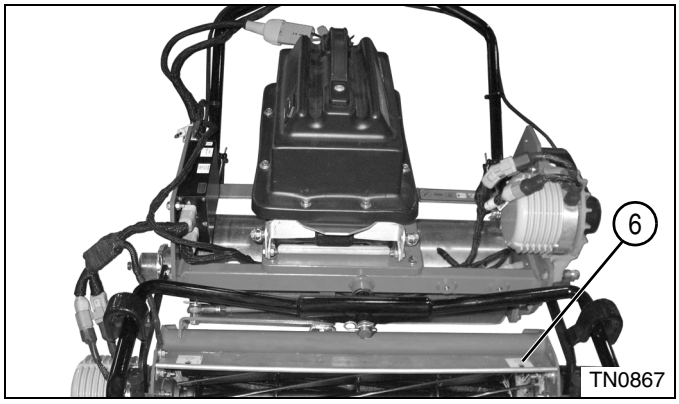


Figure 8-18

4. Pull grass shield (6) forward.

Installation Note

Install the grass shield by reversing the order of removal.

Bedknife

Removal and Installation

See Figure 8-19.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Tip mower back on traction drum or tires. Support the mower to prevent it from tipping.

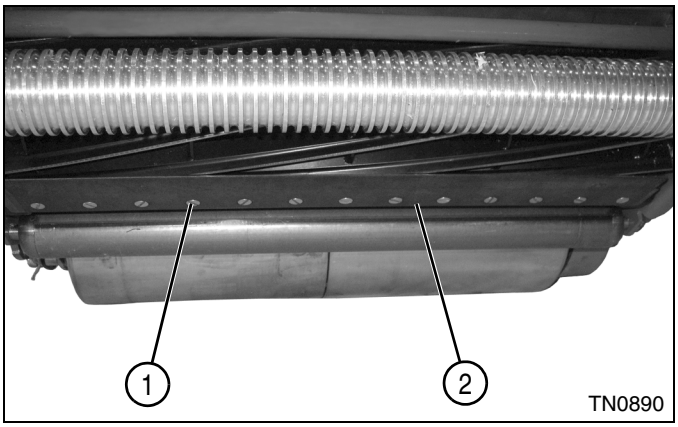


Figure 8-19

3. Remove 13 flat-head screws (1) and remove the bedknife (2).

Installation Notes

- *Install the bedknife by reversing the order of removal.*
- *Adjust bedknife-to-reel contact.*
  (See “Bedknife-to-Reel Adjustment” on page 8-13.)

8

Bedknife Shoe

Removal

See Figures 8-20 through 8-22.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove cutting unit from mower. (See “Cutting Unit” on page 8-18.)

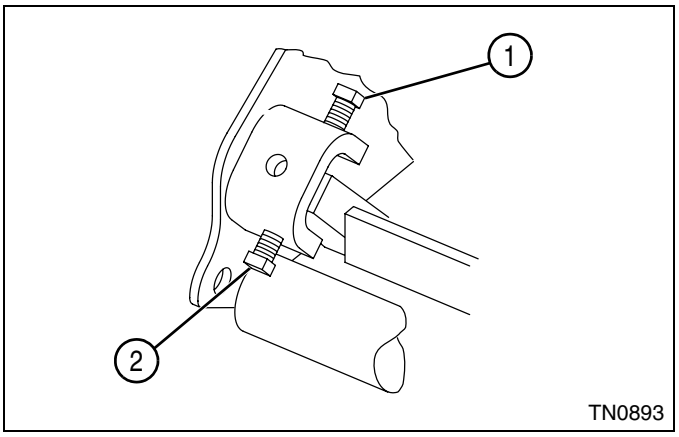


Figure 8-20

NOTE

Steps 3 through 5 apply to both sides of the mower.

3. Loosen bedknife adjuster screws (1 and 2).

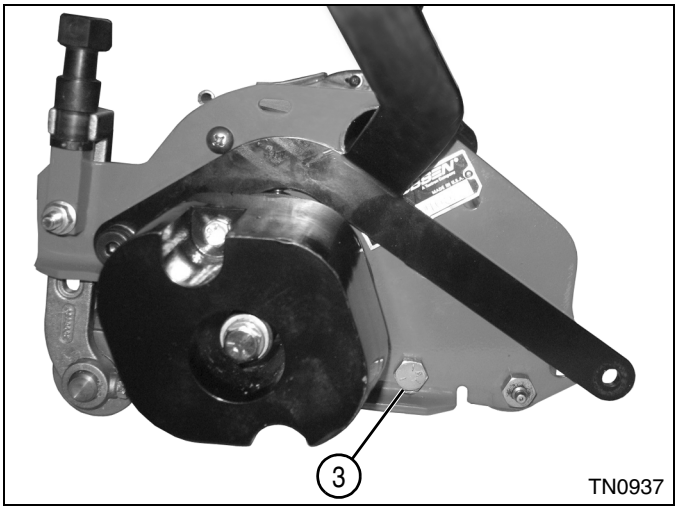


Figure 8-21

4. Remove the bedknife shoe mounting screws (3).

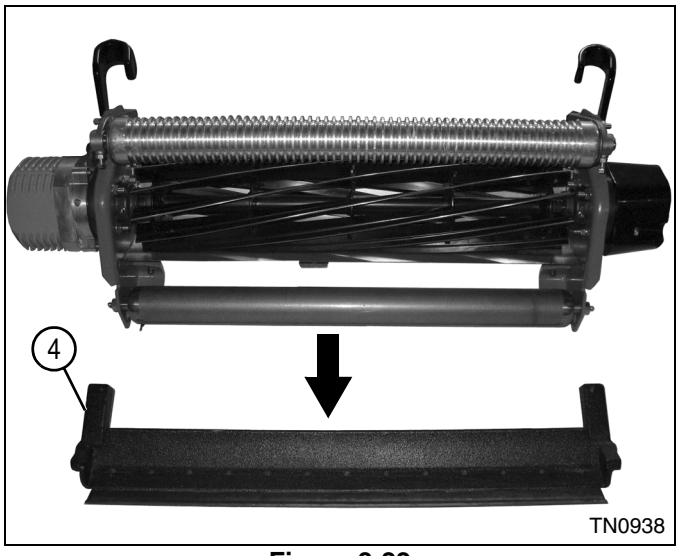


Figure 8-22

5. Remove the bedknife shoe assembly (4).

Installation

See Figures 8-23 through 8-25.

Required Materials
Anti-Seize Compound

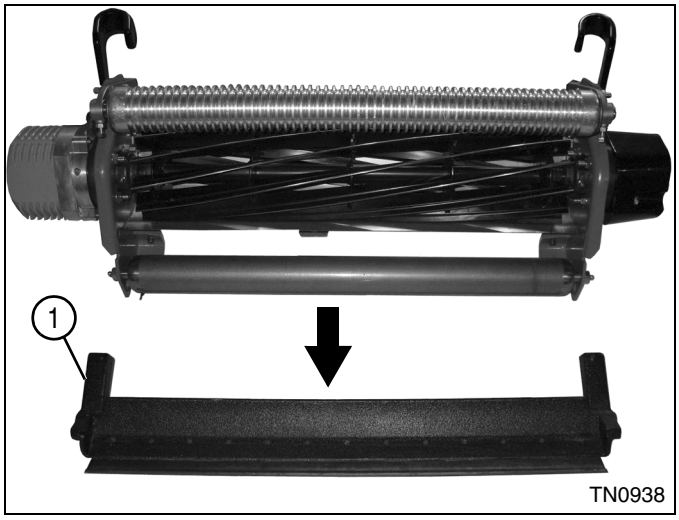


Figure 8-23

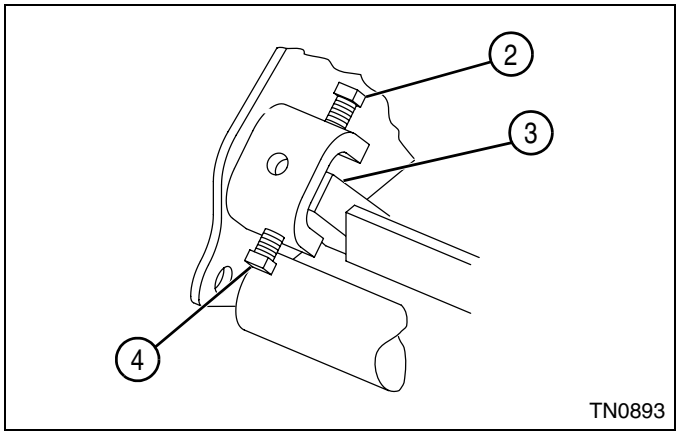


Figure 8-24

NOTE

Steps 1 through 3 apply to both sides of the mower.

1. Install the bedknife shoe assembly (1), positioning the top of the bedknife shoe (3) between the two adjuster screws (2 and 4).

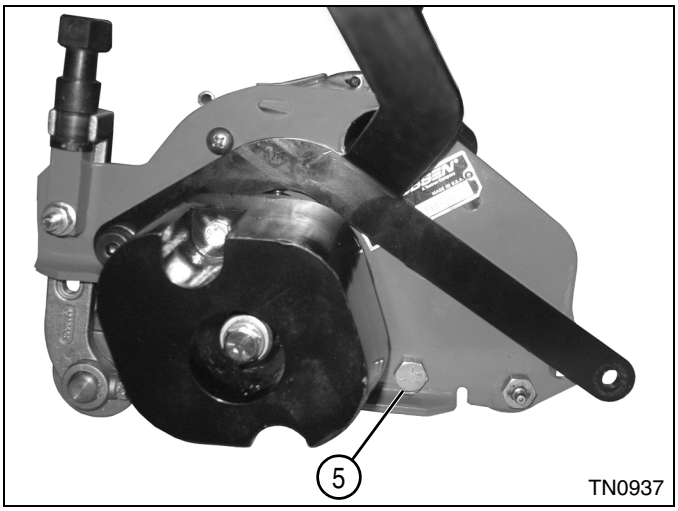


Figure 8-25

NOTES

Apply anti-seize compound to the threads of the bedknife shoe mounting screws (5) before installing.

2. Install the bedknife shoe mounting screws (5) in the frame and bedknife shoe.
3. Adjust bedknife. (See “Bedknife-to-Reel Adjustment” on page 8-13.)
4. Install the cutting unit to mower. (See “Cutting Unit” on page 8-18.)

Right Reel Bearing Housing Assembly

Removal

See Figures 8-26 through 8-28.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove cutting unit from mower. (See “Cutting Unit” on page 8-18.)
3. Remove cutting unit front roller. (See “Cutting Unit Front Roller” on page 8-28.)
4. Remove grass shield. (See “Grass Shield” on page 8-19.)
5. Remove reel drive motor. (See “Reel Drive Motor Test” on page 4-39.)

8

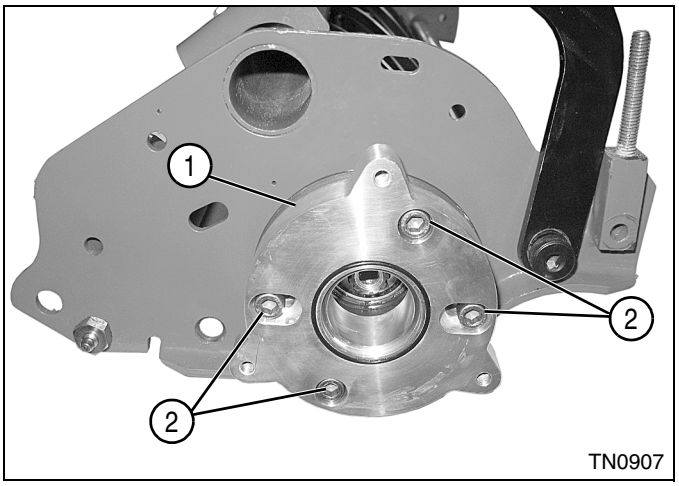


Figure 8-26

6. Remove socket-head screws (2) and adapter plate (1).

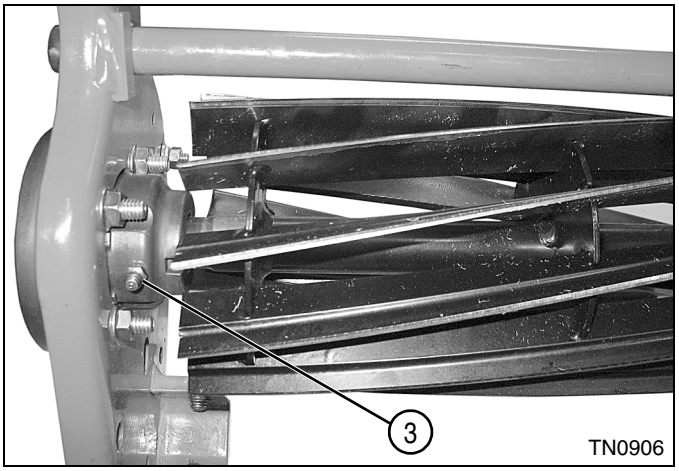


Figure 8-27

7. Remove grease fitting (3).

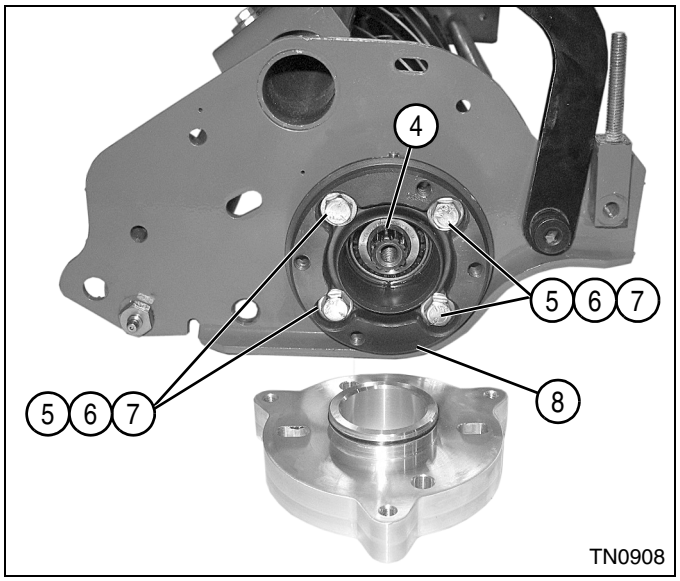
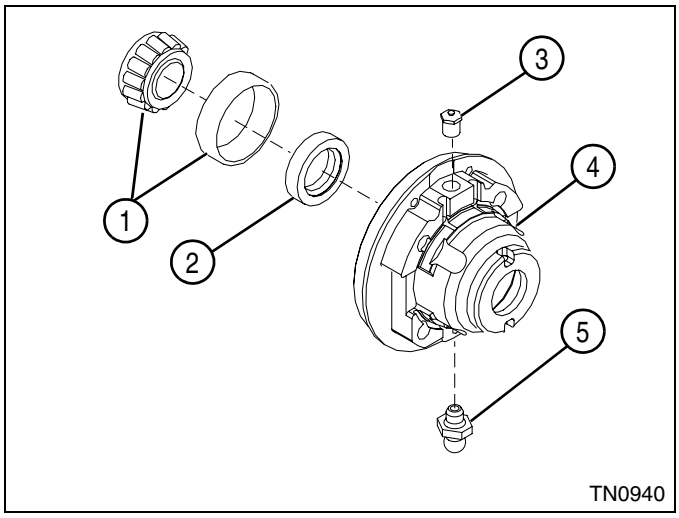


Figure 8-28

8. Remove snap ring (4).
9. Remove screws (5), washers (6), and nuts (7).
10. Using a puller, remove reel bearing housing assembly (8).
11. Inspect the reel shaft for wear or damage. Replace reel if needed. (See “Reel Assembly” on page 8-26.)

Disassembly and Assembly

See Figure 8-29.



1	Bearing Cup and Cone	4	Reel Bearing Housing
2	Grease Seal	5	Grease Fitting
3	Vent Fitting		

Figure 8-29

Assembly Notes

- *Install a new grease seal (2).*
- *Inspect the bearing cup and cone (1) for wear or damage. Replace as needed.*
- *Pack bearing (1) with NLGI Grade 2 lithium grease before assembly.*
- *Apply NLGI Grade 2 lithium grease to the lips of the grease seal (2).*

Installation

See Figures 8-30 through 8-32.

Required Materials
Loctite® 242 (Blue) Thread Sealant

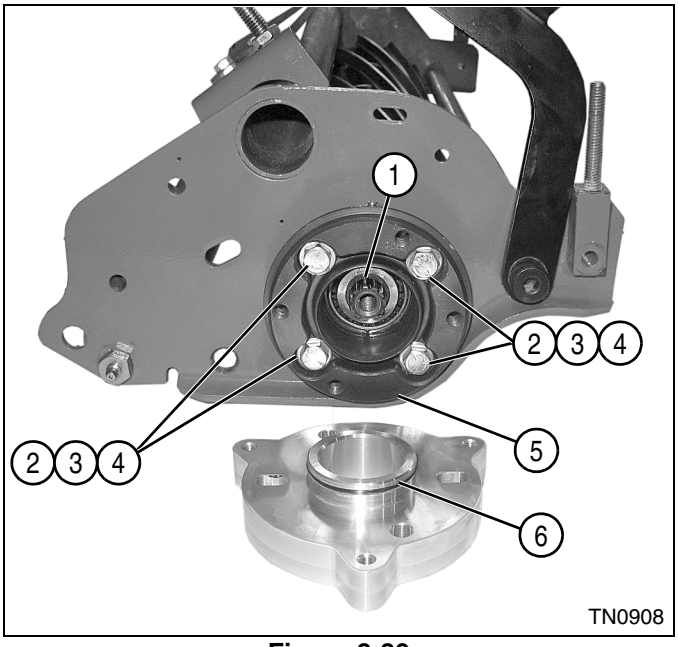


Figure 8-30

NOTE

Always use new O-rings and seals.

1. Install reel bearing housing assembly (5).
2. Install snap ring (1).
3. Install screws (2), washers (3), and nuts (4).
4. Install O-ring (6) and lubricate with NLGI Grade 2 lithium grease.

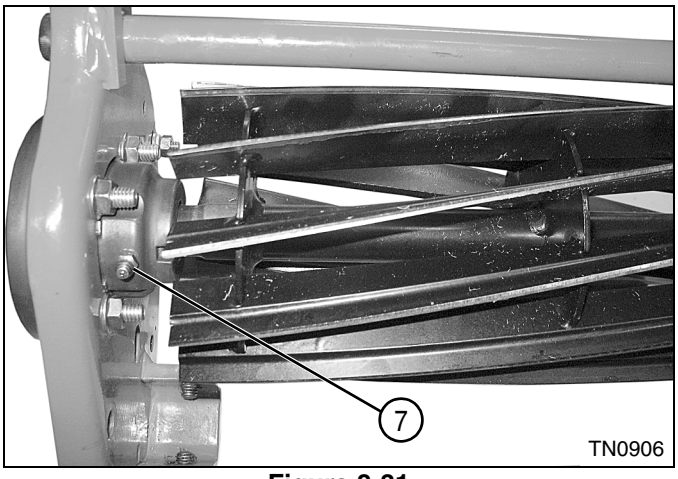


Figure 8-31

5. Install grease fitting (7).

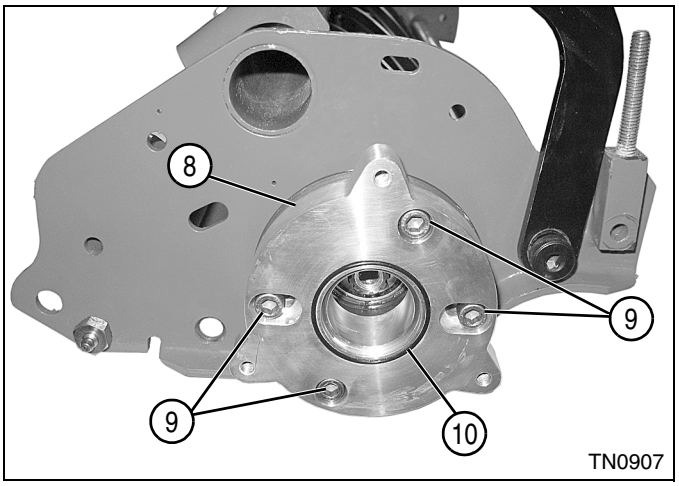


Figure 8-32

NOTE

Apply Loctite 242 (Blue) to the threads of socket-head screws (9) before installing.

6. Install adapter plate (8) using socket-head screws (9).
7. Install O-ring (10) and lubricate with NLGI Grade 2 lithium grease.
8. Install reel drive motor. (See “Reel Drive Motor Test” on page 4-39.)
9. Apply grease to grease fitting (7).
10. Install grass shield. (See “Grass Shield” on page 8-19.)
11. Install cutting unit front roller. (See “Cutting Unit Front Roller” on page 8-28.)
12. Install cutting unit to mower. (See “Cutting Unit” on page 8-18.)

Left Reel Bearing Housing Assembly

Removal

See Figures 8-33 through 8-35.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove cutting unit from mower. (See “Cutting Unit” on page 8-18.)
3. Remove cutting unit front roller. (See “Cutting Unit Front Roller” on page 8-28.)
4. Remove grass shield. (See “Grass Shield” on page 8-19.)

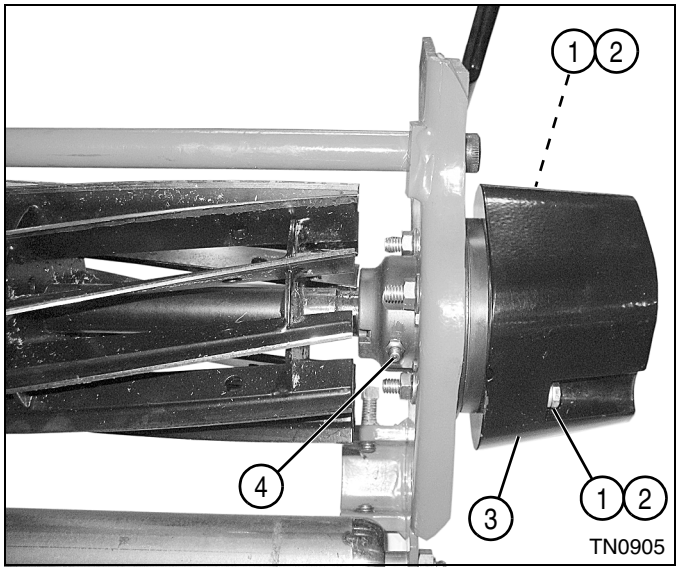


Figure 8-33

5. Remove grease fitting (4).
6. Remove screws (1) and washers (2).
7. Remove counterweight (3).

8

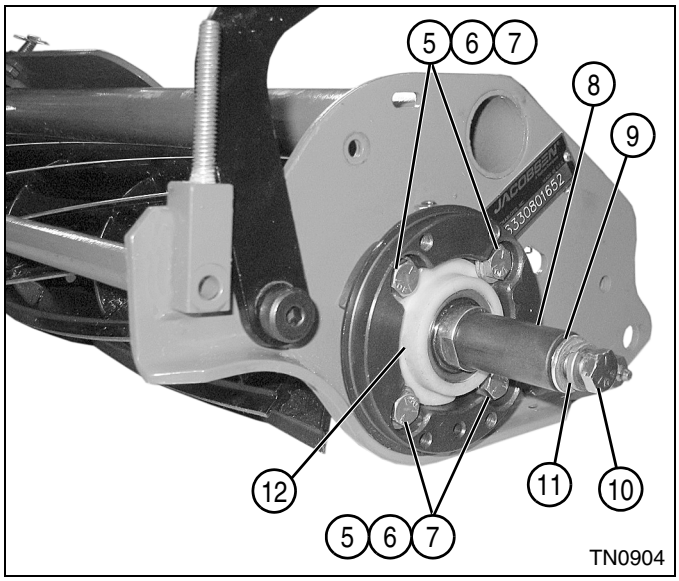


Figure 8-34

8. Remove screw (10), lock washer (11), washer (9), and spacer (8).
9. Remove screws (5), washers (6), and nuts (7).
10. Remove seal (12).

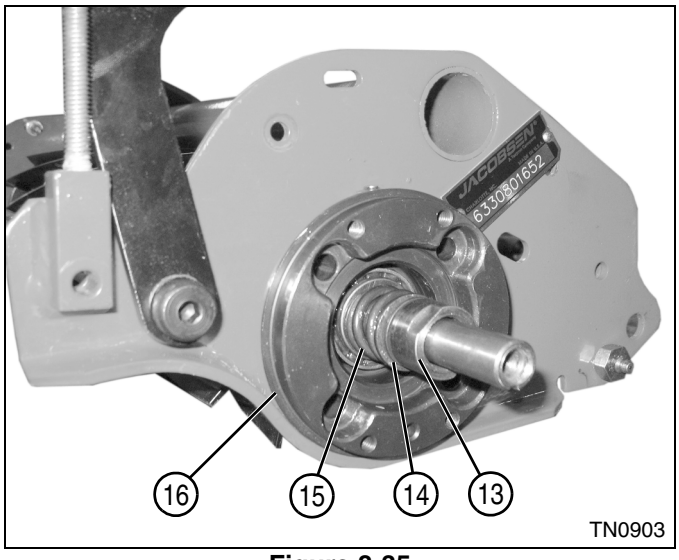
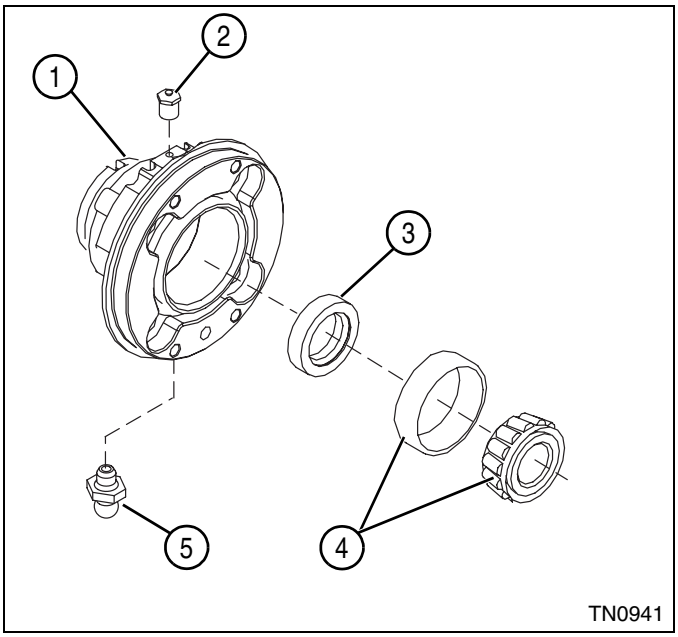


Figure 8-35

11. Remove nut (13).
12. Remove washer (14) and spring (15).
13. Using a puller, remove reel bearing housing assembly (16).
14. Inspect the reel shaft for wear or damage. Replace reel if needed. (See “Reel Assembly” on page 8-26.)

Disassembly and Assembly

See Figure 8-36.



1	Bearing Housing	4	Bearing Cup and Cone
2	Vent Fitting	5	Grease Fitting
3	Grease Seal		

Figure 8-36

Assembly Notes

- *Clean and inspect the bearing cup and cone (4) for wear and damage. Replace as needed.*
- *Pack bearing (4) with NLGI Grade 2 lithium grease before assembly.*
- *Install a new grease seal (3).*
- *Apply NGLI Grade 2 lithium grease to the lips of the grease seal (3).*

8

Installation

See Figures 8-37 through 8-39.

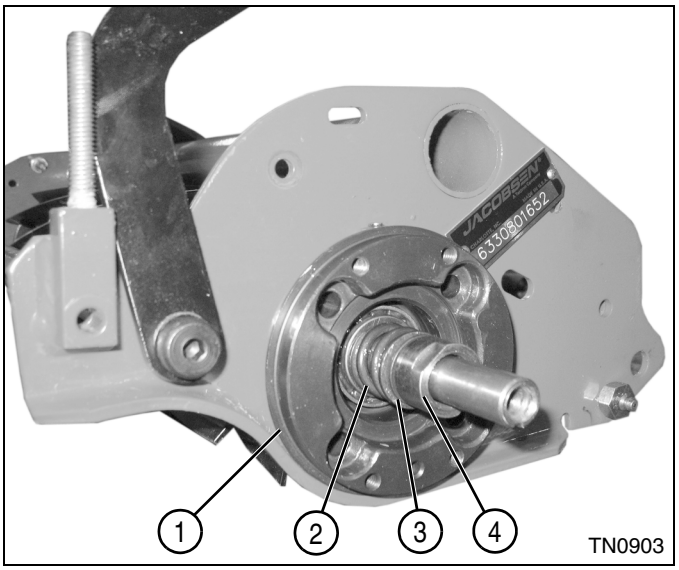


Figure 8-37

1. Install reel bearing housing assembly (1).
2. Install spring (2), washer (3), and nut (4).

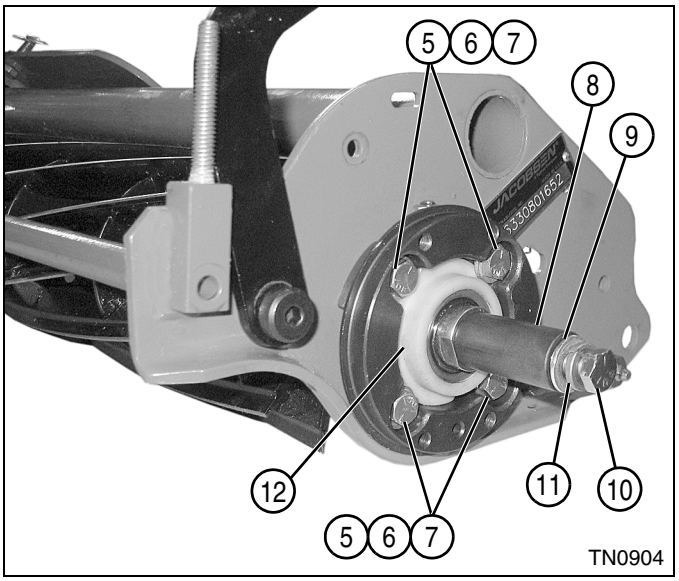


Figure 8-38

3. Install seal (12) using screws (5), washers (6), and nuts (7).
4. Adjust the reel bearing pre-load. (See “Reel Bearing Pre-Load Adjustment” on page 8-17.)
5. Install spacer (8), washer (9), lock washer (11), and screw (10).

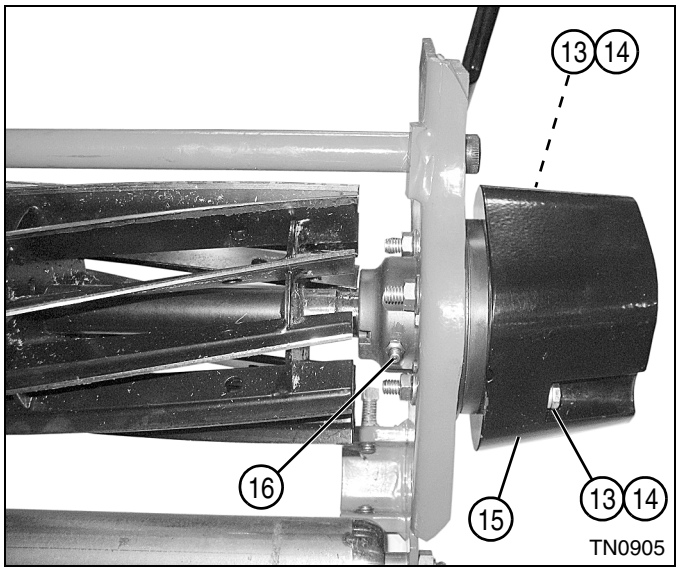


Figure 8-39

6. Install counterweight (15) using screws (13) and washers (14).
7. Install grease fitting (16).
8. Apply grease to grease fitting (16).
9. Install grass shield. (See “Grass Shield” on page 8-19.)
10. Install cutting unit front roller. (See “Cutting Unit Front Roller” on page 8-28.)
11. Install cutting unit to mower. (See “Cutting Unit” on page 8-18.)

Reel Assembly

Removal

See Figure 8-40.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Remove cutting unit from mower. (See “Cutting Unit” on page 8-18.)
3. Remove bedknife shoe assembly. (See “Bedknife Shoe” on page 8-20.)
4. Remove cutting unit front roller. (See “Cutting Unit Front Roller” on page 8-28.)
5. Remove grass shield. (See “Grass Shield” on page 8-19.)
6. Remove left reel bearing housing assembly. (See “Left Reel Bearing Housing Assembly” on page 8-24.)
7. Remove right reel bearing housing assembly. (See “Right Reel Bearing Housing Assembly” on page 8-21.)

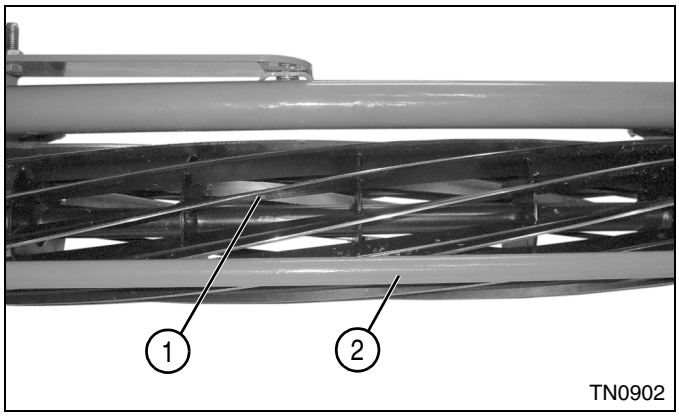


Figure 8-40

CAUTION

To prevent personal injury and damage to the cutting edges, handle the reel with extreme care.

8. Remove the reel (1) from the frame (2).

Installation

See Figure 8-41.

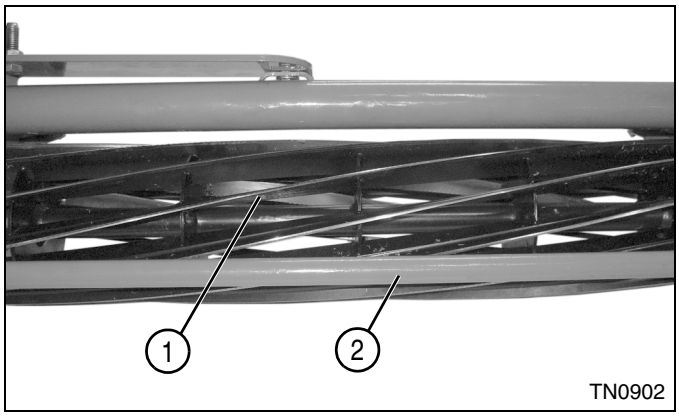


Figure 8-41

CAUTION

To prevent personal injury and damage to the cutting edges, handle the reel with extreme care.

1. Install reel (1) into frame (2).
2. Install the right reel bearing housing. (See “Right Reel Bearing Housing Assembly” on page 8-21.)
3. Install the left reel bearing housing. (See “Left Reel Bearing Housing Assembly” on page 8-24.)
4. Adjust the reel bearing pre-load. (See “Reel Bearing Pre-Load Adjustment” on page 8-17.)
5. Install grass shield. (See “Grass Shield” on page 8-19.)
6. Install cutting unit front roller. (See “Cutting Unit Front Roller” on page 8-28.)
7. Install bedknife shoe assembly. (See “Bedknife Shoe” on page 8-20.)
8. Install cutting unit to mower. (See “Cutting Unit” on page 8-18.)

Floating Head

Removal and Installation

See Figures 8-42 and 8-43.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Retract the kickstand and allow the mower to rest on the traction roller or transport wheels. Support the mower to prevent it from tipping.

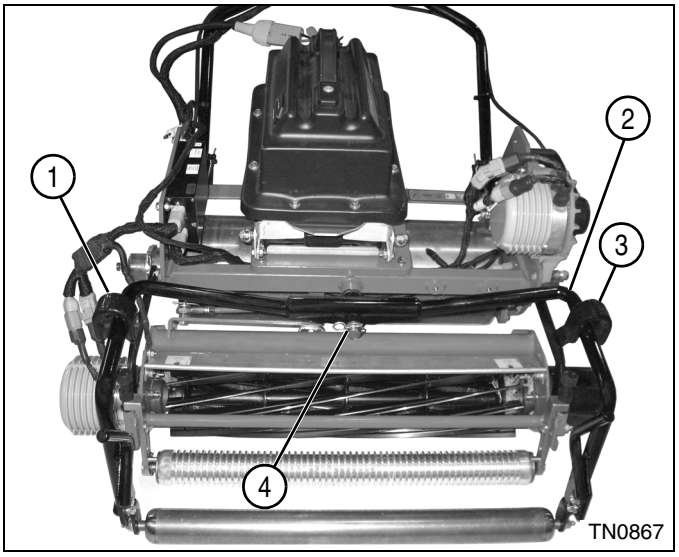


Figure 8-42

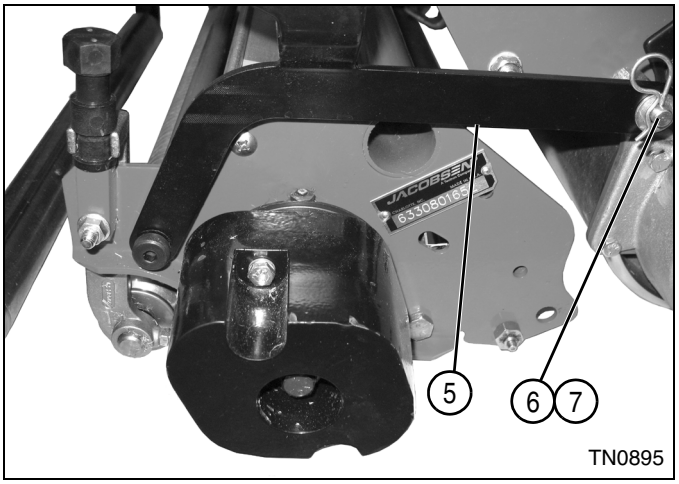


Figure 8-43

3. Remove clips (6) and washers (7) from both sides of mower.
4. Disconnect arms (5) from both sides of mower.
5. Disconnect arms (1 and 3) from floating head (2).
6. Remove clip (4).
7. Remove floating head (2).

Installation Note

Install the floating head by reversing the order of removal.

Cutting Unit Front Roller

Removal and Installation

See Figure 8-44.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Tip mower back on traction drum or tires. Support the mower to prevent it from tipping.

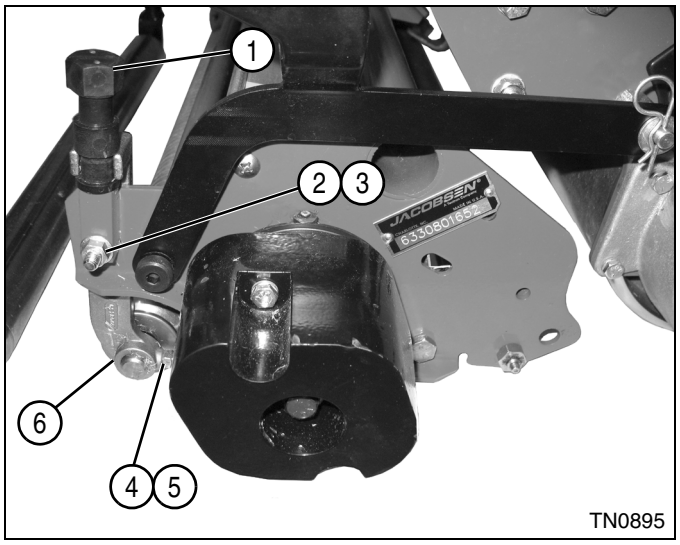


Figure 8-44

3. Remove nuts (2) and screws (3) from both sides of the mower.
4. Remove adjuster knobs (1) from both sides of the mower.
5. Remove the cutting unit front roller assembly (6).
6. Loosen jam nuts (4) and screws (5) from both sides of the mower. Remove roller from height-of-cut brackets.

Installation Note

Install the cutting unit front roller assembly by reversing the order of removal.

Cutting Unit Rear Roller

Removal and Installation

See Figure 8-45.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Tip mower back on traction drum or tires. Support the mower to prevent it from tipping.

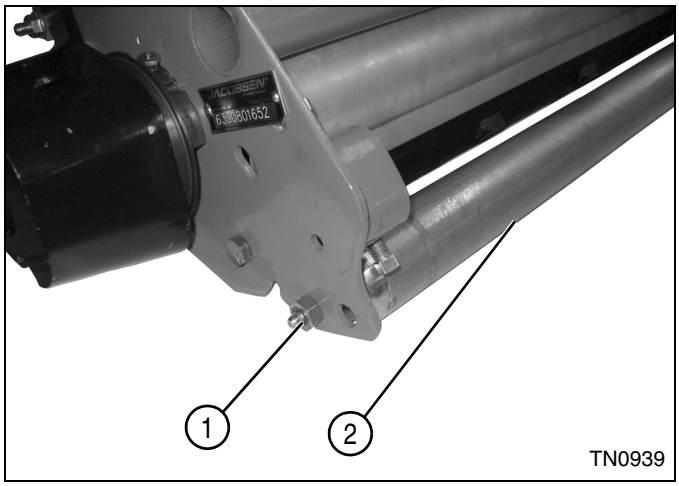


Figure 8-45

3. Remove screws (1) from both sides of the mower.
4. Remove cutting unit rear roller (2).

Installation Note

Install the cutting unit rear roller by reversing the order of removal.

Floating Head Roller

Removal and Installation

See Figure 8-46.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Tip mower back on traction drum or tires. Support the mower to prevent it from tipping.

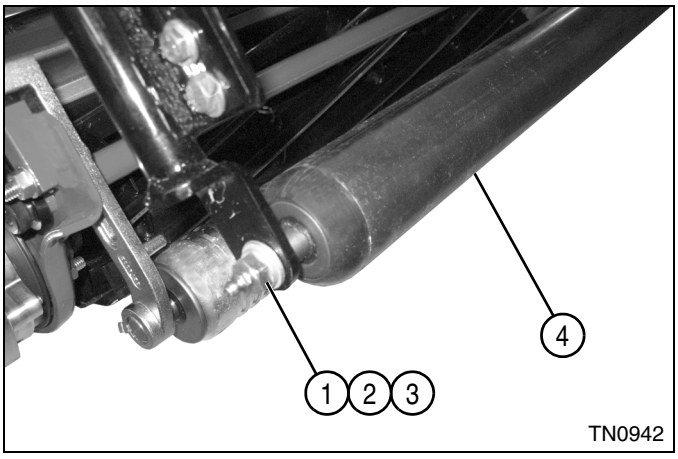


Figure 8-46

3. Remove screws (1), lock washers (2), and washers (3) from both sides of the mower.
4. Remove floating head roller (4).

Installation Note

Install the floating head roller by reversing the order of removal.

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Chapter 9

Miscellaneous

9

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Specifications

Transport Tires		
Transport Tire Air Pressure	psi (kPa)	6—8 (41—55)

Repair

Transport Wheels (Optional)

Removal and Installation

See Figures 9-1 and 9-2.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

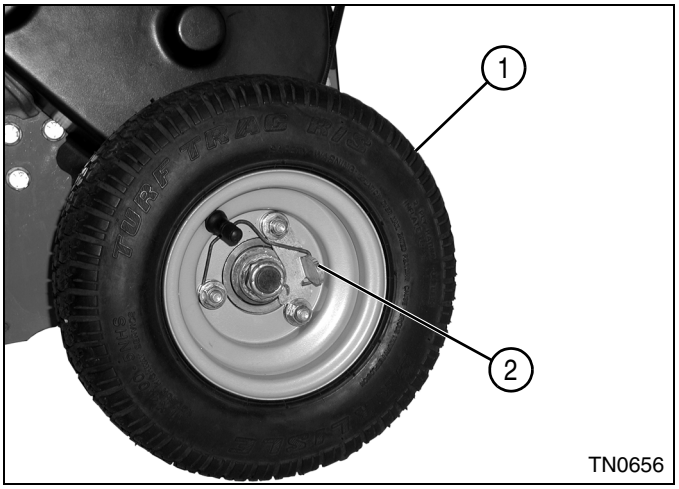


Figure 9-1

2. **To Remove Wheels:** Pull retaining clip (2) away from the hub and pull wheel (1) off hub.

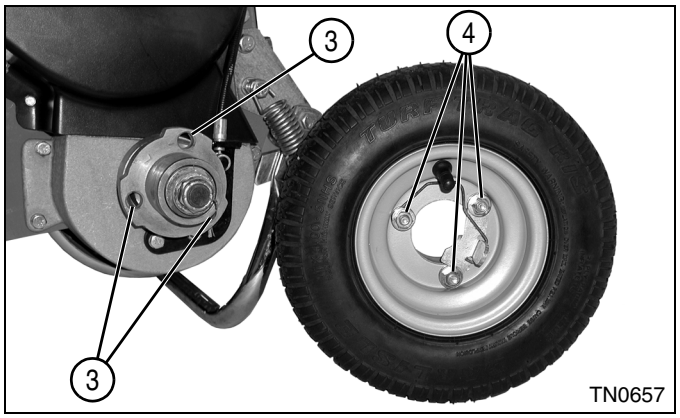
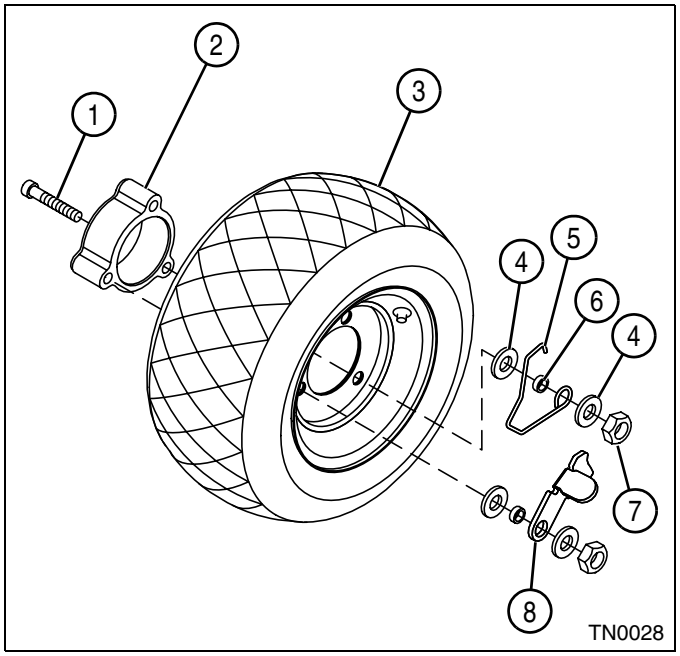


Figure 9-2

3. **To Install Wheels:** Set the park brake, pull the retaining clip back and hold. Place the wheel on the hub and turn the wheel backwards until studs (4) on the rear of wheel line up with holes in the hub (3). Push the wheel in and release the retaining clip.

Disassembly and Assembly

See Figure 9-3.



1	Socket-Head Screw (3)	5	Spring
2	Spacer	6	Spacer (3)
3	Wheel and Tire Assembly	7	Lock Nut
4	Flat Washer (6)	8	Latch

Figure 9-3

Wheel Hubs and Bearings

Removal

See Figures 9-4 and 9-5.

NOTE

The hub assemblies are unique to each side and are marked "L" and "R." Do not exchange them side-for-side.

1. Park the mower safely. (See "Park Mower Safely" on page 1-5.)
2. Remove the transport wheels (if equipped). (See "Transport Wheels (Optional)" on page 9-2.)

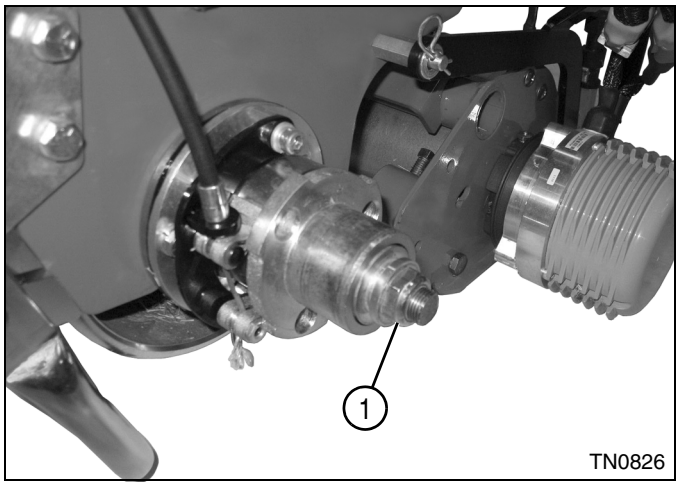


Figure 9-4

3. Remove lock nut (1) from the transport roller shaft.

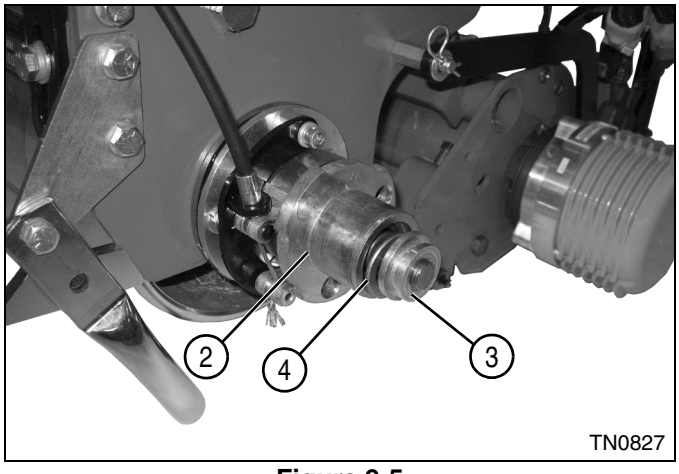


Figure 9-5

4. Remove latching collar (3), bushing (4), and hub assembly (2).

Disassembly

See Figure 9-6.

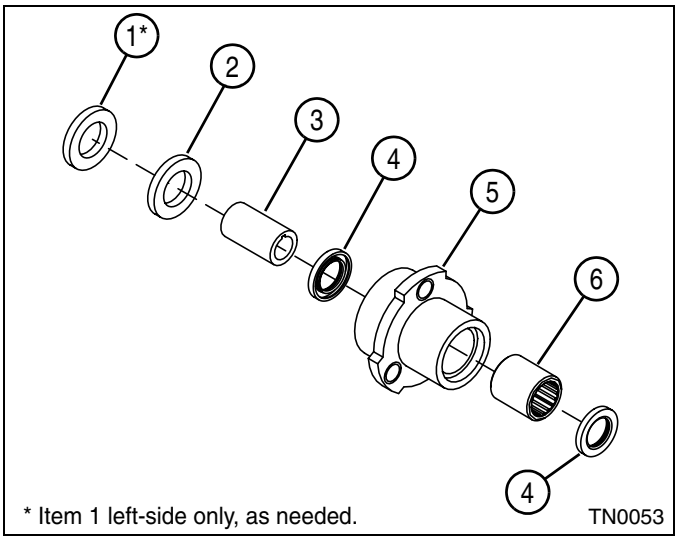


Figure 9-6

1. Remove washer (1), bushing (2), and clutch sleeve (3) from hub (5).
2. Remove seals (4) and bearing (6).

Assembly

See Figures 9-7 and 9-8.

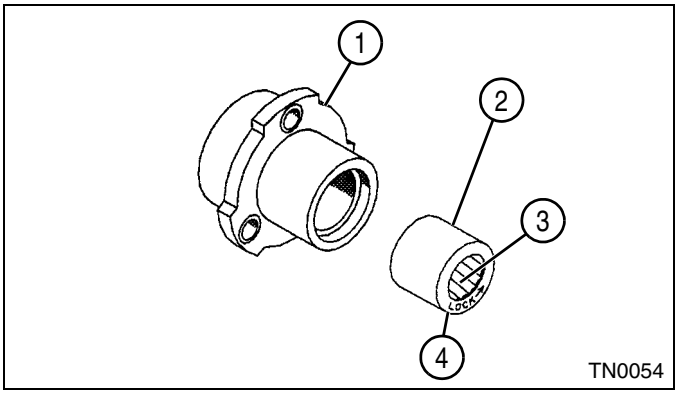


Figure 9-7

1. Apply lithium grease NLGI Grade 2 to the wheel bearing rollers (3).

NOTE

The bearing used in the wheel hub is directional and must be installed in the correct direction of rotation.

2. Install bearing (2) in the hub (1):

   Right Wheel Hub: Install the bearing with the word "LOCK" and arrow (4) stamped on it facing the OUTSIDE of the hub housing.

   Left Wheel Hub: Install the bearing with the word "LOCK" and arrow (4) stamped on it facing the INSIDE of the hub housing.

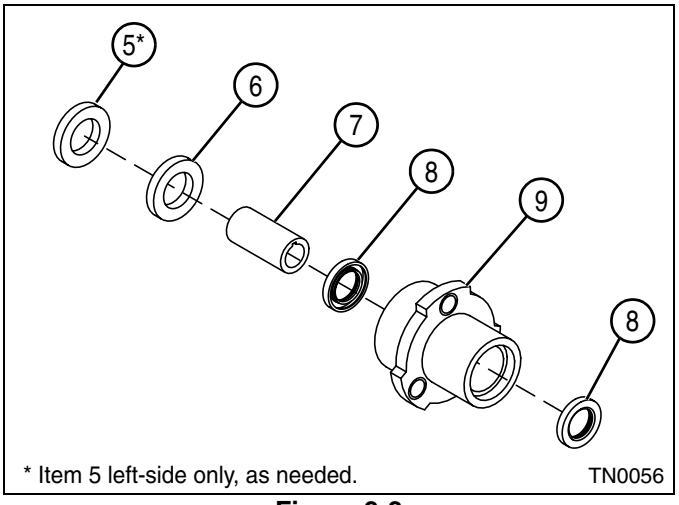


Figure 9-8

NOTE

Always use new seals.

3. Apply a thin film of lithium grease NLGI Grade 2 to the lips of the seals (8).
4. Using a seal driver, install seals (8) in the wheel hub (9).
5. Install clutch sleeve (7) into seals (8) and bearing (2).
6. Install bushing (6) and washer (5) over the clutch sleeve (7).

Installation

See Figures 9-9 through 9-11.

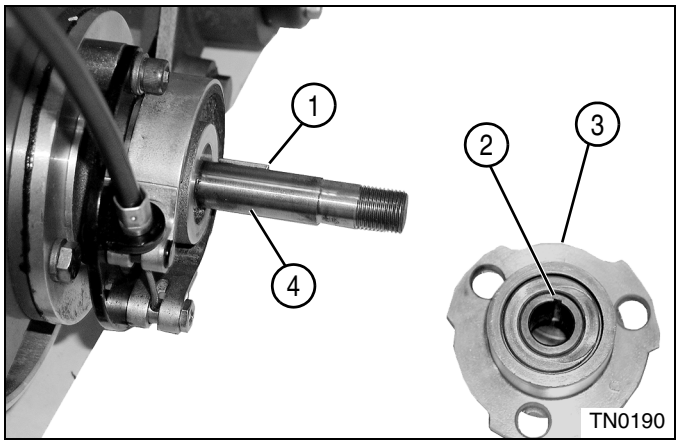


Figure 9-9

1. Align the groove (2) in the hub (3) with the keyway (1) in the transport roller shaft (4), and install the hub assembly on the shaft.

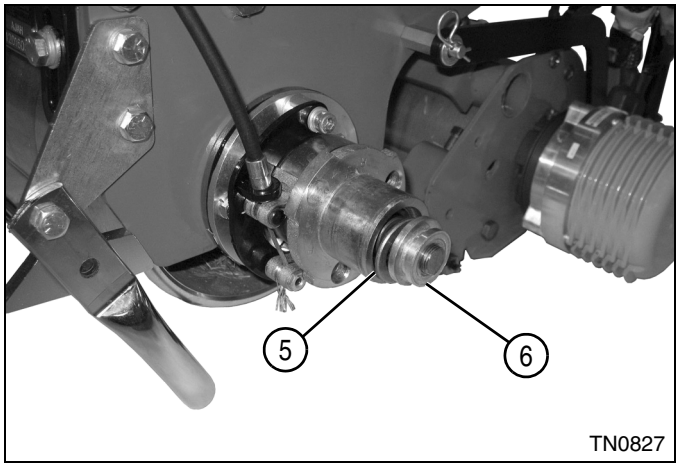


Figure 9-10

2. Install bushing (5) and latching collar (6).

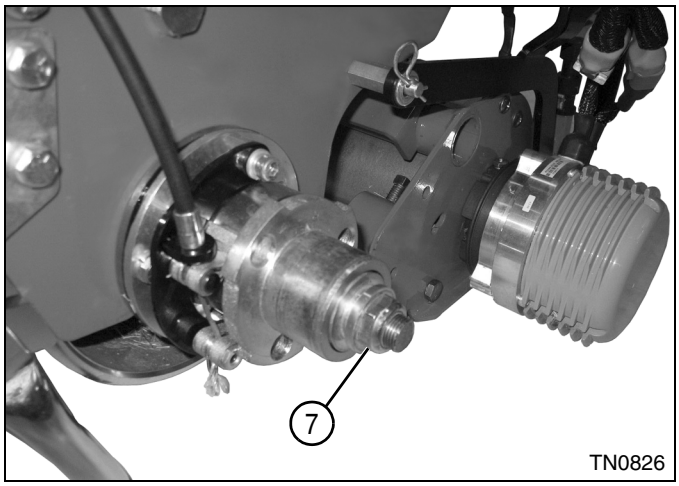


Figure 9-11

3. Install a new lock nut (7) on the transport roller shaft.
4. Install the transport wheels (if equipped). (See “Transport Wheels (Optional)” on page 9-2.)

Kickstand

Removal and Installation

See Figures 9-12 and 9-13.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Retract the kickstand and allow the mower to rest on the traction roller or transport wheels.

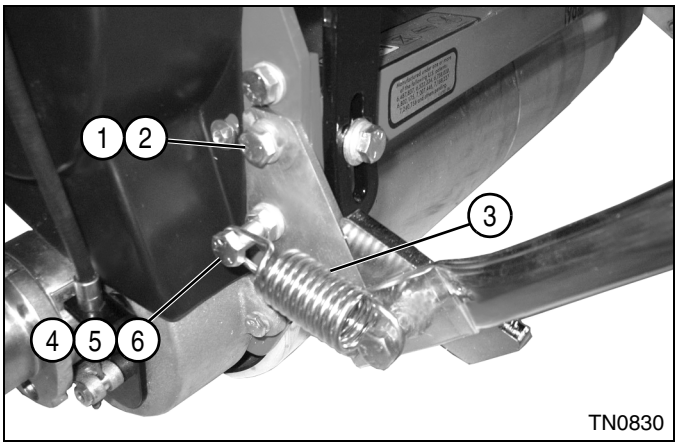


Figure 9-12: Left Side

3. Remove spring (3).
4. Remove screw (1) and lock washer (2).
5. Remove screw (4), lock washer (5), and nut (6).

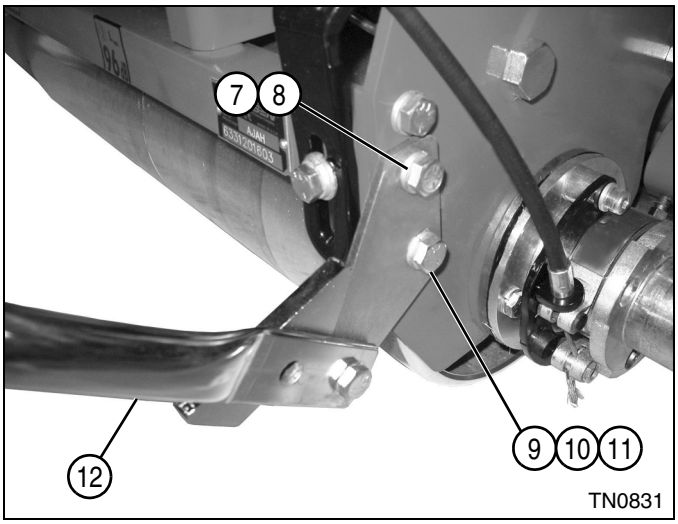


Figure 9-13: Right Side

6. Remove screw (7) and lock washer (8).
7. Remove screw (9), lock washer (10), and nut (11).
8. Remove kickstand assembly (12).

Installation Note

Install the kickstand by reversing the order of removal.

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Chapter 10

Accessories

10

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Specifications

Assembly and Disassembly		
Solid Tube Roller Lock Nut Torque	lb-ft (N•m)	10—30 (13.5—40.6)
Solid Tube Roller Rotational Resistance	lb-in. (N•m)	0—6 with No End Play (0—0.68 with No End Play)

Repair

Cutting Unit Front Roller

Removal

See Figure 10-1.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Tip mower back on traction drum or tires. Support the mower to prevent it from tipping.

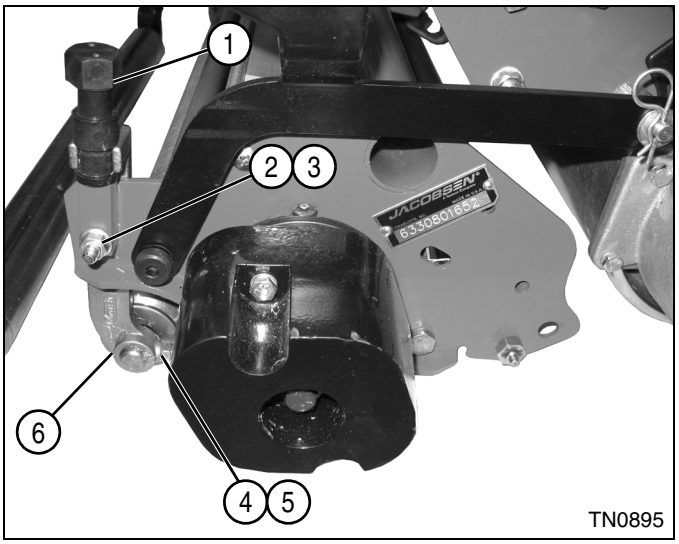

Figure 10-1

3. Remove nuts (2) and screws (3) from both sides of the mower.
4. Remove adjuster knobs (1) from both sides of the mower.
5. Remove the cutting unit front roller assembly (6).
6. Loosen jam nuts (4) and screws (5) from both sides of the mower. Remove the roller from height-of-cut brackets.

Disassembly—Solid Rollers

See Figure 10-2.

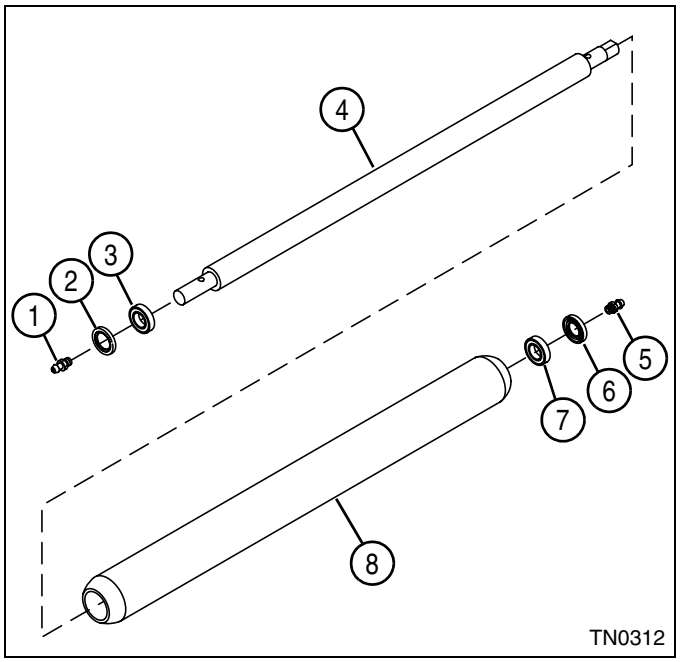

Figure 10-2

1. Remove grease fittings (1 and 5) from the roller shaft (4).
2. Support one end of the roller (8), allowing enough free space for the seal (6) and bearing (7) to exit the roller (8).
3. Apply pressure to the other end of the roller shaft (4) until the seal (6) and bearing (7) are clear of the roller (8).
4. Repeat steps 2 and 3 to remove the seal (2) and bearing (3) from the other end of the roller (8).

10

Assembly—Solid Rollers

See Figures 10-3 through 10-7.

Required Materials
Permatex® Anaerobic Sealer (or equivalent)

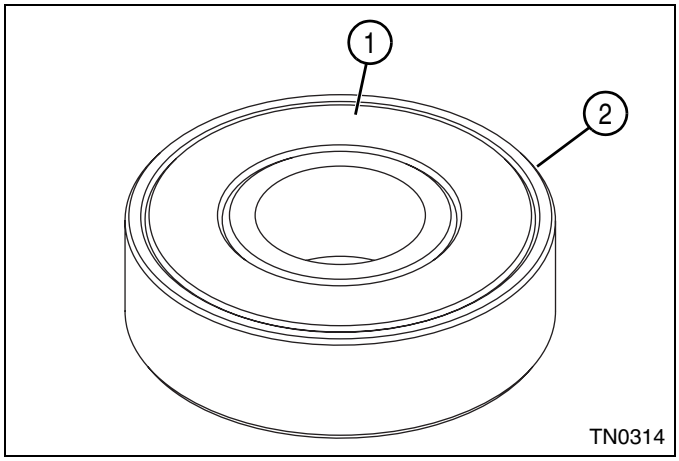

Figure 10-3

1. Remove the shield (1) from one side of each new bearing (2).

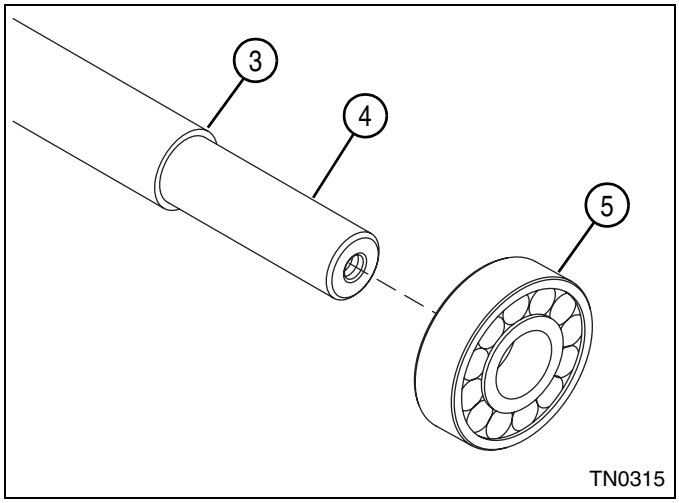

Figure 10-4

2. Pack the bearing (5) with a good grade of general-purpose grease before installation.
3. Install one bearing (5) on the roller shaft (4) with the shielded side toward the step (3) on the shaft. Press the bearing on the shaft until it rests against the step.

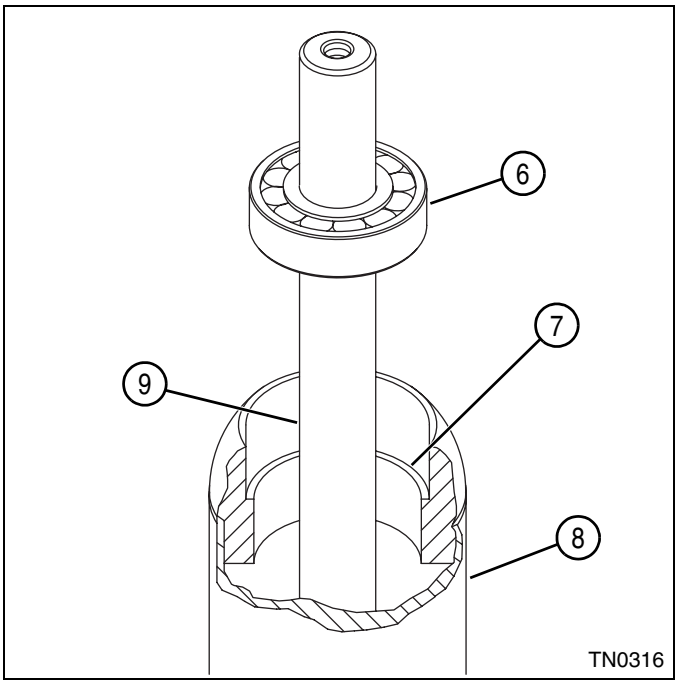

Figure 10-5

4. Install the roller shaft (9) with bearing (6) into the roller (8) until the bearing is seated against the shoulder (7) in the roller.

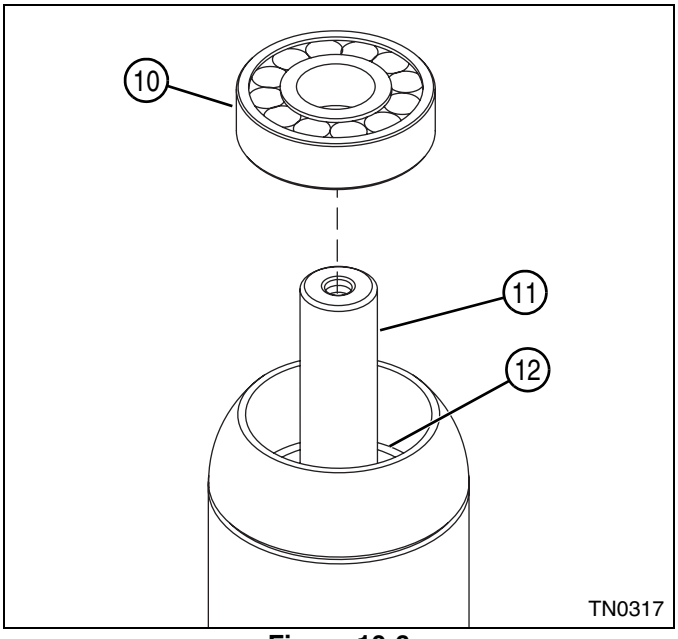

Figure 10-6

5. Pack the bearing (10) with a good grade of general-purpose grease before installation.
6. Install bearing (10) over the other end of the roller shaft (11), with the sealed side toward the inside of the roller. Seat the bearing against the shoulder (12).

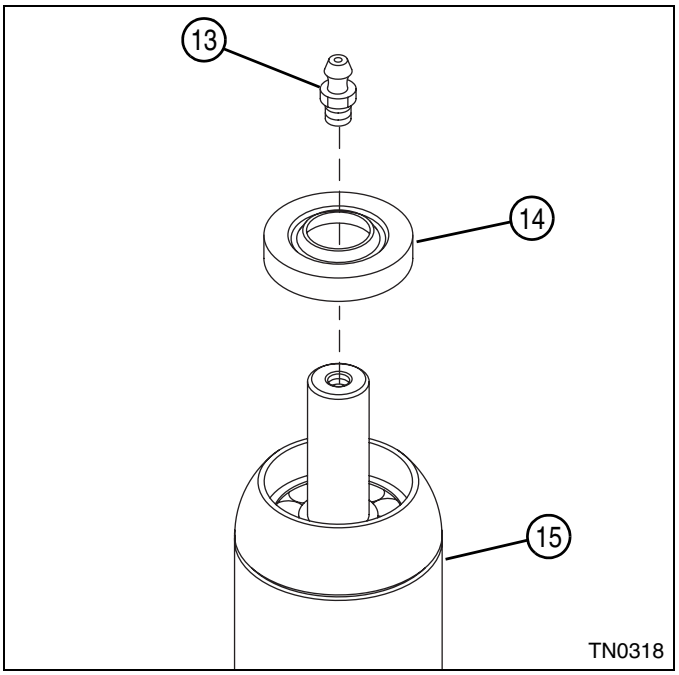

Figure 10-7

NOTE

Always use new grease seals for installation.

7. Apply a thin film of Permatex® Anaerobic Sealant (or equivalent) to the outside diameter of the new grease seal (14). Install the grease seals into each end of the roller (15).
8. Install the grease fittings (13) in both ends of the roller shaft.

Disassembly—Solid Tube and Grooved Rollers

See Figure 10-8.

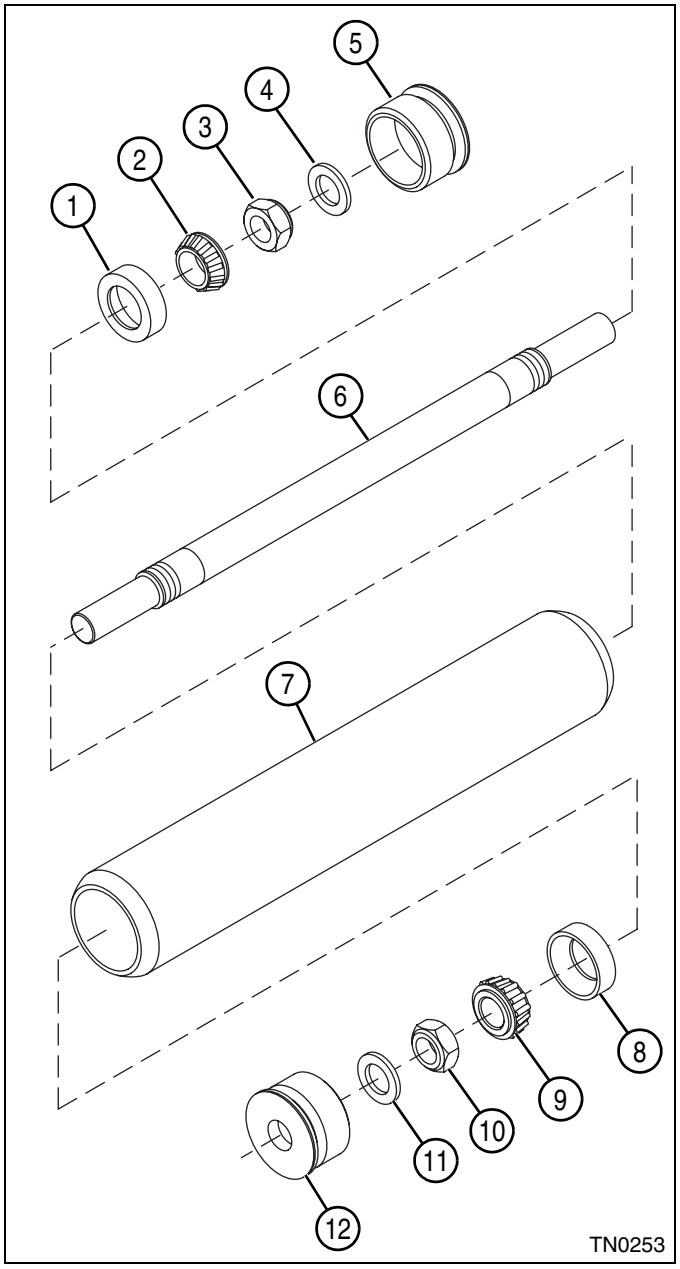

Figure 10-8

NOTE

Solid tube roller shown; grooved roller is similar.

1. Using a puller, remove the adapter seals (5 and 12) from both ends of the roller assembly.
2. Remove lock nuts (3 and 10) and bearings (2 and 9) from both ends of the roller assembly.
3. Remove the roller shaft (6).

4. Inspect the bearings (2 and 9). If replacement is required, use a blind hole bearing puller to remove the bearing cups (1 and 8) from both ends of the roller (7).
5. Remove grease seals (4 and 11) from the adapter seals (5 and 12).

Assembly—Solid Tube and Grooved Rollers

See Figure 10-9.

Required Materials
Permatex® Anaerobic Sealer (or equivalent)

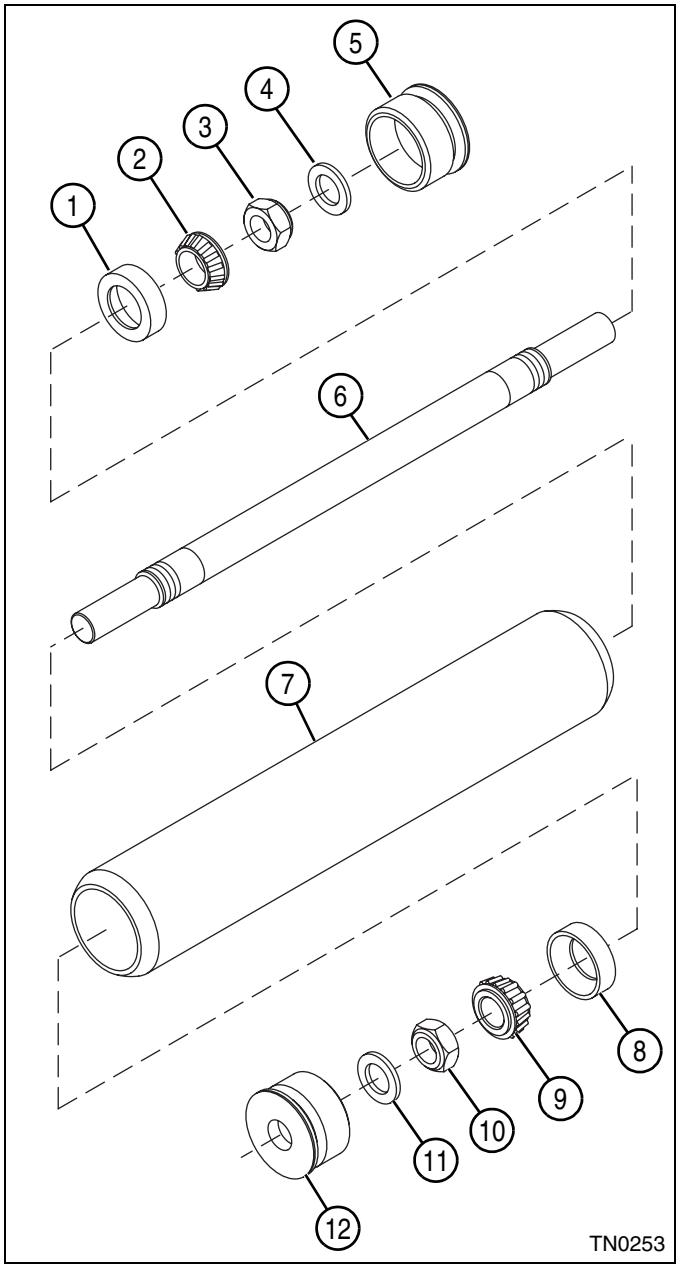

Figure 10-9

NOTE

Always use new grease seals for installation.

1. Apply a thin film of Permatex® Anaerobic Sealant (or equivalent) to the outside diameter of the new grease seals (4 and 11), and install the grease seals in the adapter seals (5 and 12).

NOTE

Bearings and bearing cups should always be replaced as a set.

2. If removed, press new bearing cups (1 and 8) in the roller (7).
3. Pack the bearings (2 and 9) with NLGI Grade 2 lithium grease before installation.
4. Install the roller (7) and bearings (2 and 9) on the roller shaft (6). Center the roller on the shaft, and install lock nuts (3 and 10). Tighten lock nuts to 10—30 lb-ft (13.5—40.6 N•m) to seat the bearings.
5. Check the rotational resistance of the roller on the shaft. The resistance should be 0—1 lb-in. (0—0.11 N•m) with no end play. Adjust the lock nuts as needed.
6. Apply a thin film of Permatex® Anaerobic Sealant (or equivalent) to the outside diameter of the adapter seals (5 and 12). Install (press) the adapter seals (5 and 12) in the roller (7).

Disassembly—Grooved Disc Roller

See Figure 10-10.

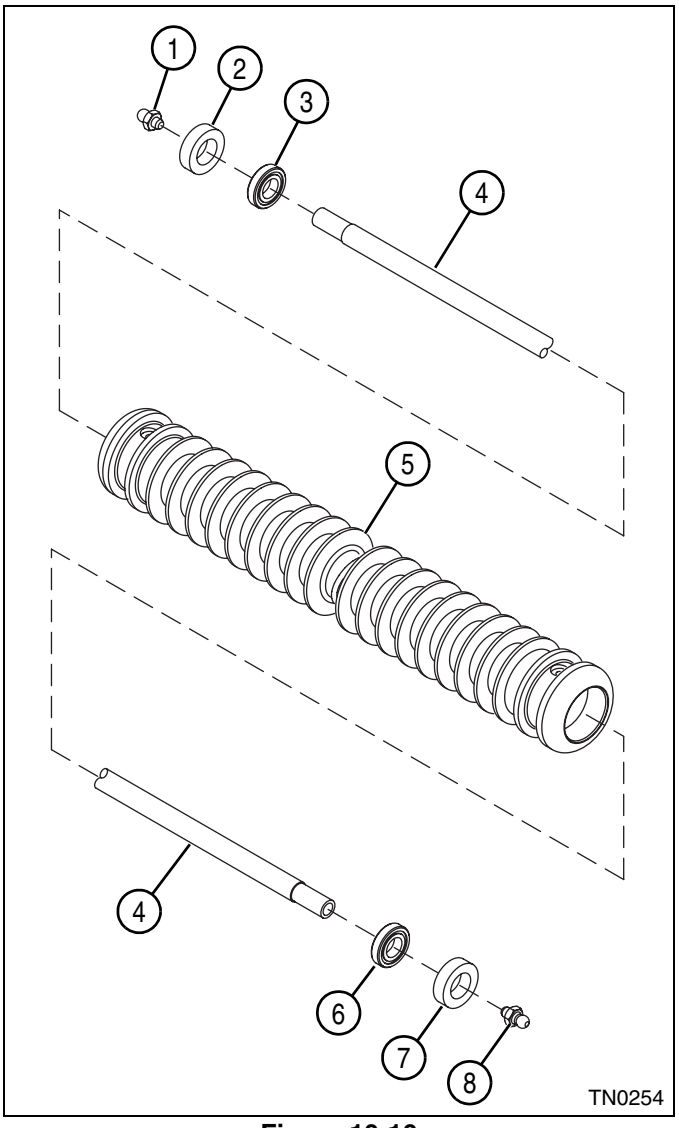

Figure 10-10

1. Remove grease fittings (1 and 8) from the roller shaft (4).
2. Support one end of the roller (5), allowing enough free space for seal (2) and bearing (3) to exit the roller (5).
3. Apply pressure to the other end of the roller shaft (4) until the seal (2) and bearing (3) are clear of the roller (5).
4. Repeat steps 2 and 3 to remove the seal (7) and bearing (6) from the other end of the roller (5).

Assembly—Grooved Disc Roller

See Figure 10-11.

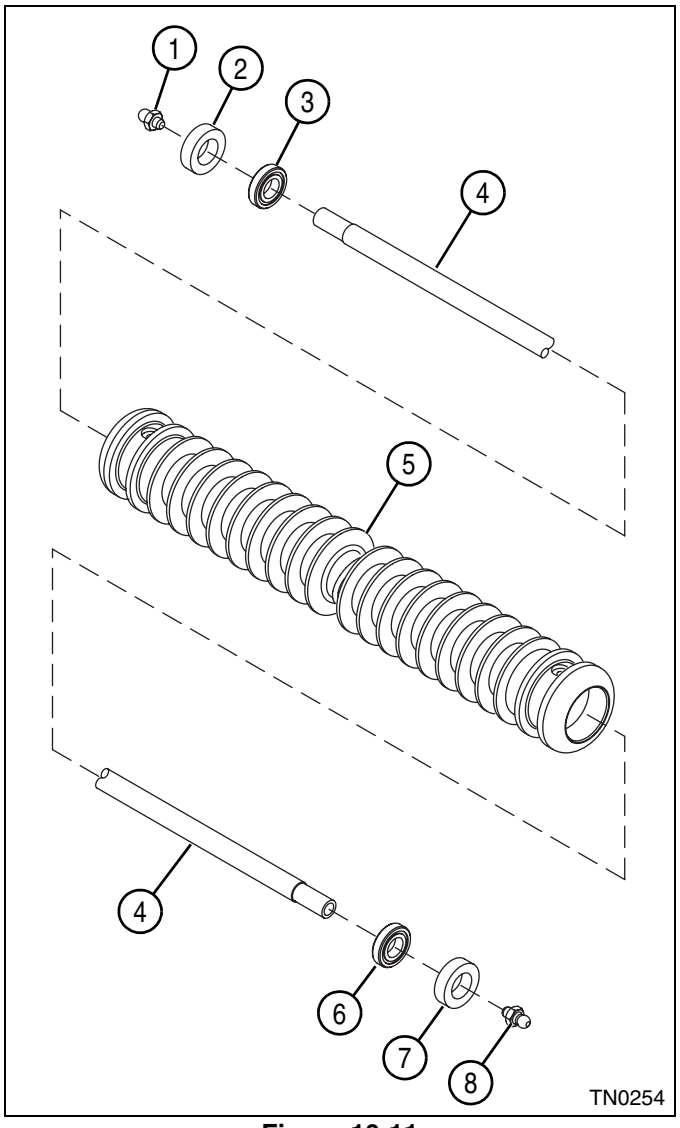

Figure 10-11

1. Install bearing (3) in the roller (5).
2. Install the roller shaft (4) into the roller (5) and bearing (3).
3. Install bearing (6) into the roller (5).

NOTE

Always use new grease seals for installation.

4. Install new grease seals (2 and 7) in the roller (5).
5. Install both grease fittings (1 and 8) in the roller shaft (4).
6. Apply a good grade of general-purpose grease to both grease fittings (1 and 8). Apply grease slowly to prevent damaging the grease seals.

Disassembly—Grooved Segmented Roller

See Figures 10-12 and 10-13.

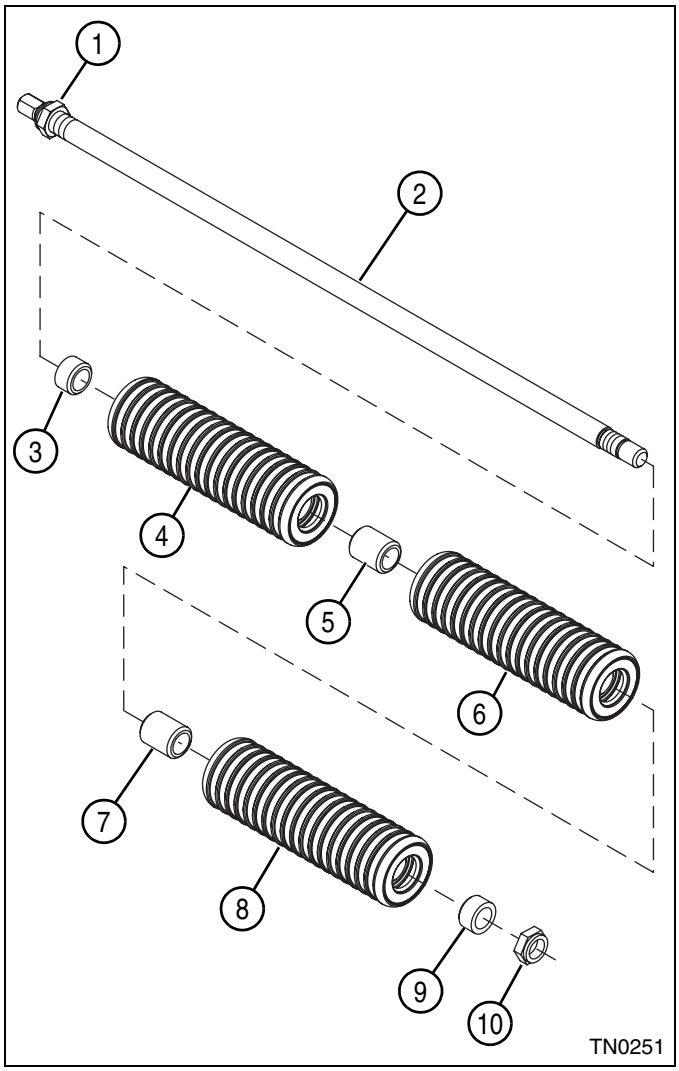

Figure 10-12

1. Remove hex-jam, nylon-insert nut (10) from the roller shaft (2) while holding the nut (1) at the other end of the shaft.
2. Remove short spacer (9) and roller segment assembly (8).
3. Remove long spacers (5 and 7) and roller segment assemblies (4 and 6).
4. Remove short spacer (3) from roller shaft (2).

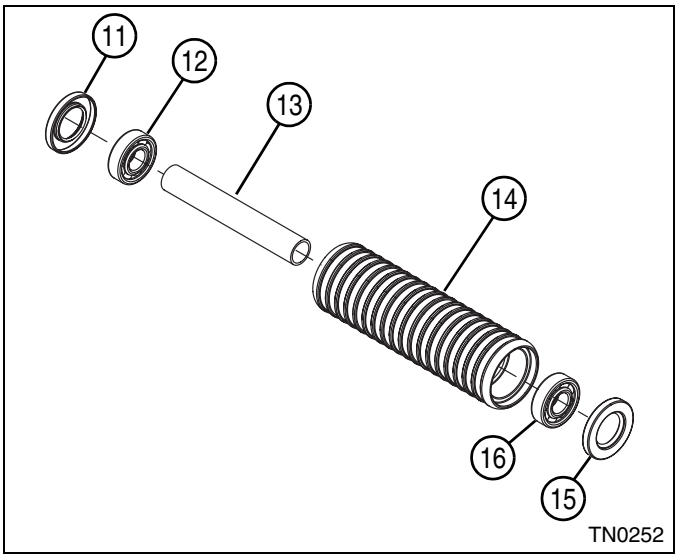

Figure 10-13

NOTE

All three roller segment assemblies are disassembled in the same way.

5. Remove grease seals (11 and 15), ball bearings (12 and 16), and spacer (13) from the roller segment (14).

Assembly—Grooved Segmented Roller

See Figures 10-14 and 10-15.

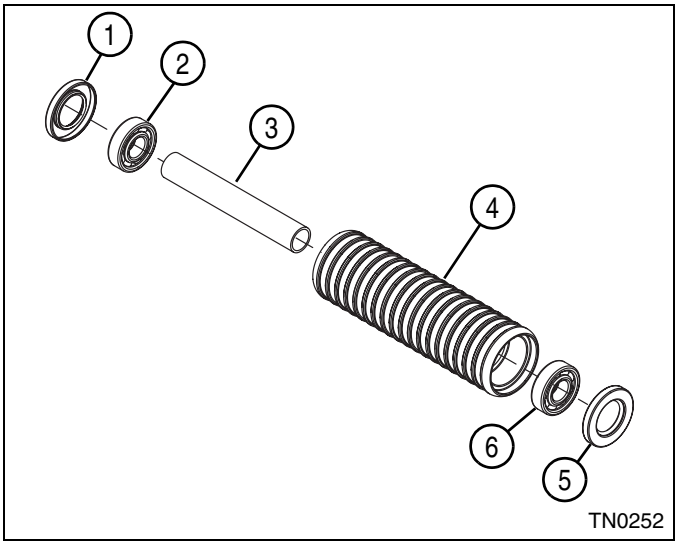

Figure 10-14

NOTES

- *All three roller segment assemblies are assembled in the same way.*
- *Always use new grease seals for installation.*

1. Install a ball bearing (2) and a new grease seal (1) in one end of the roller segment (4).

2. Apply NLGI Grade 2 grease to the inside of the spacer (3), and install the spacer (3) into the roller segment (4).
3. Install a ball bearing (6) and grease seal (5) in the other end of the roller segment (4).
4. Apply NLGI Grade 2 grease to the lips of the grease seals (1 and 5).

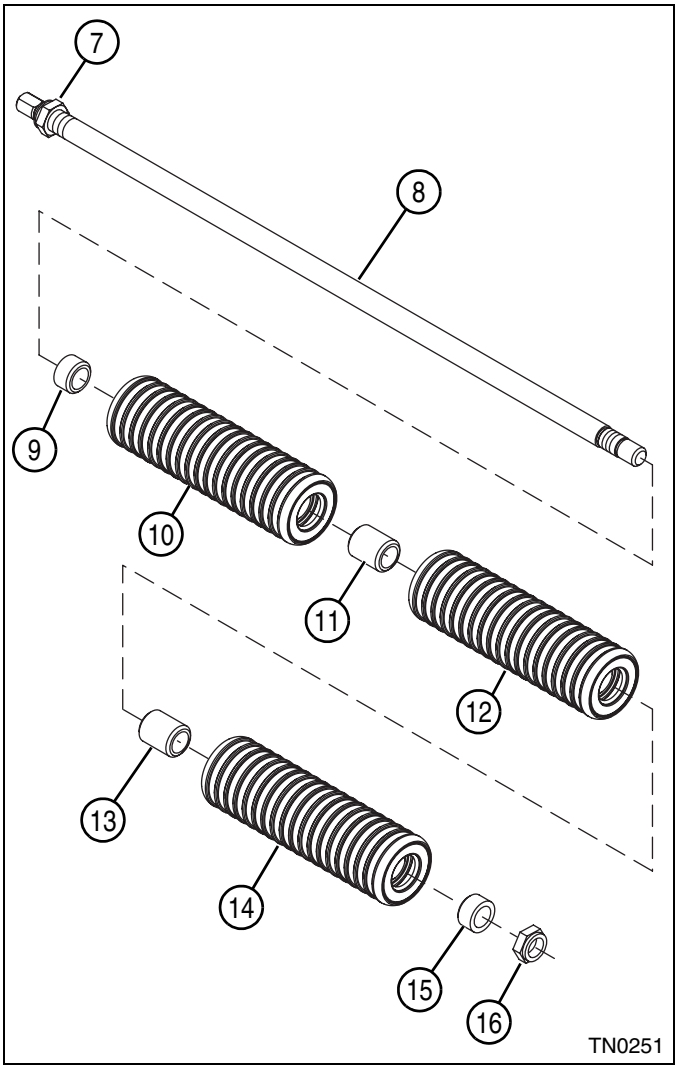

Figure 10-15

5. Apply a thin film of NLGI Grade 2 grease to the outside diameter of the short spacer (9), and install the spacer on the roller shaft (8) with the bevel facing away from the nut (7).
6. Install the roller segment assemblies (10, 12, and 14) on the roller shaft (8), placing a long spacer (11 and 13) between each of the roller segments.
7. Apply a thin film of lithium grease NLGI Grade 2 to the inside diameter of the short spacer (15) on the roller shaft (8).
8. Install hex-jam, nylon-insert nut (16) on the roller shaft (8).

Installation

See Figure 10-16.

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)

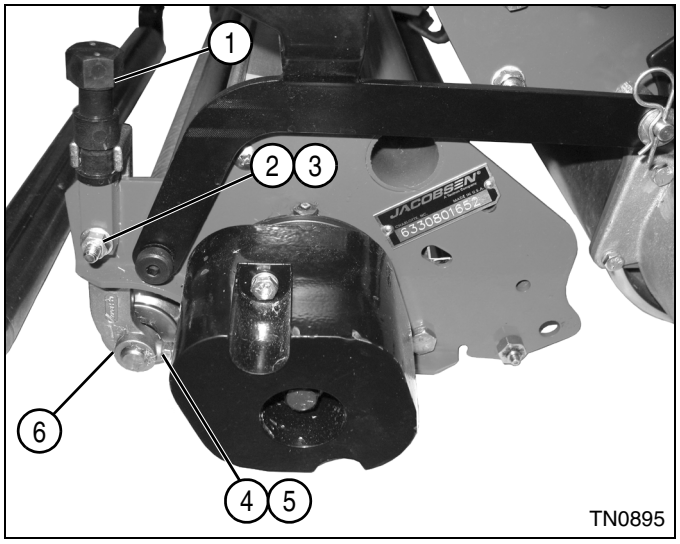

Figure 10-16

2. Install height-of-cut brackets to roller. Tighten screws (4) and jam nuts (5).
3. Install the cutting unit front roller assembly (6).
4. Install adjuster knobs (1) to both sides of the mower.
5. Install screws (2) and nuts (3) to both sides of the mower.
6. Adjust height-of-cut. (See “Height-of-Cut Adjustment” on page 8-16.)

Scraper Blade Assembly

Removal and Installation

See Figure 10-17.

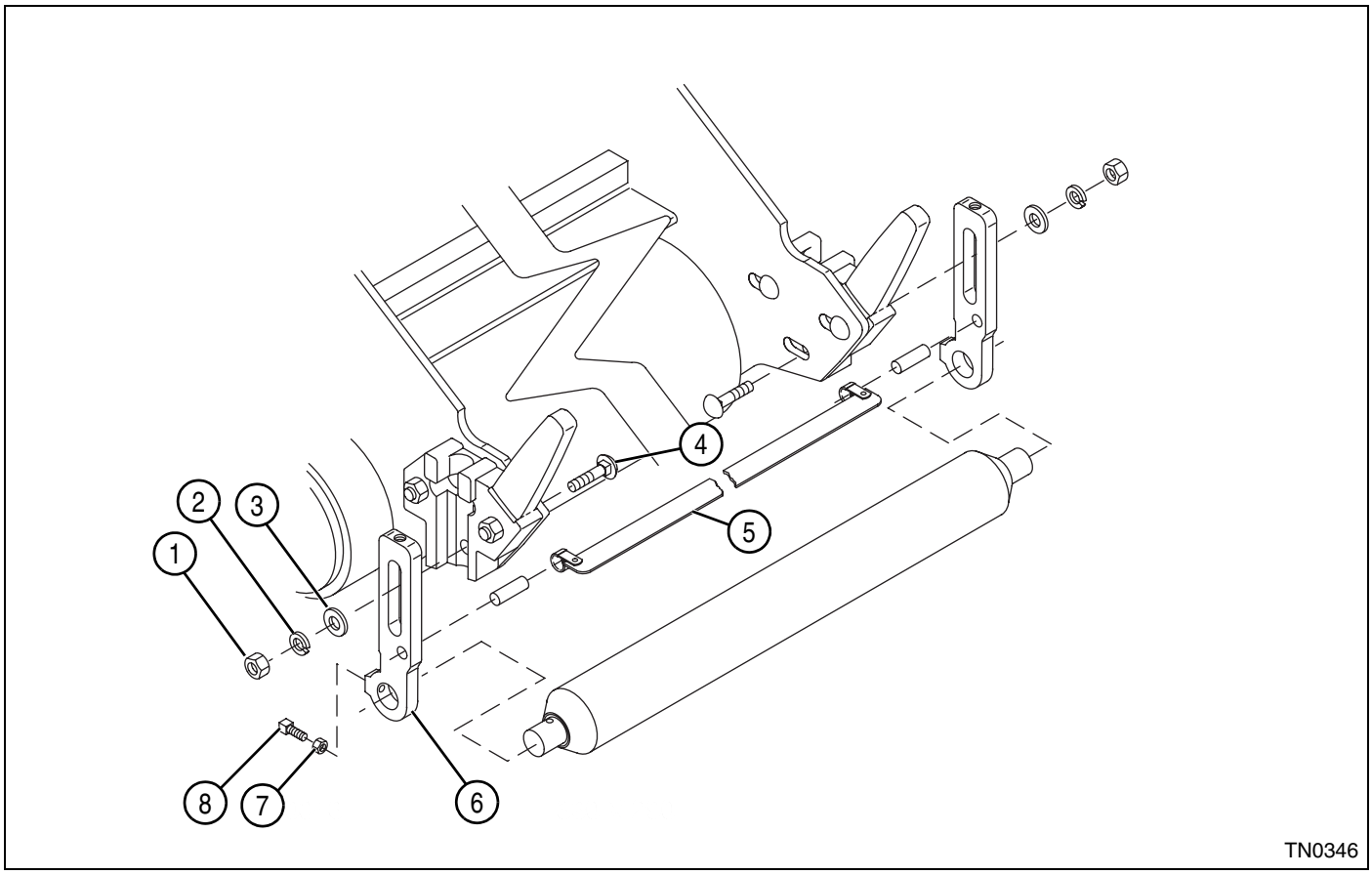

Figure 10-17

1. Park the mower safely. (See “Park Mower Safely” on page 1-5.)
2. Retract the kickstand and allow the mower to rest on the traction roller or transport wheels.
3. Place blocks under the frame to remove weight from the front roller.

NOTE

Only one adjuster bracket must be removed to remove the scraper blade assembly. Either side can be removed.

4. Loosen jam nut (7) and square-head bolt (8).
5. Remove nut (1), lock washer (2), flat washer (3), and carriage bolt (4) from adjuster bracket (6).
6. Remove adjuster bracket (6).
7. Remove scraper assembly (5).

Installation Notes

- *Install the scraper assembly by reversing the order of removal.*
- *Adjust height-of-cut. (See “Height-of-Cut Adjustment” on page 8-17.)*

Light Kit Assembly

Removal and Installation

See Figure 10-18.

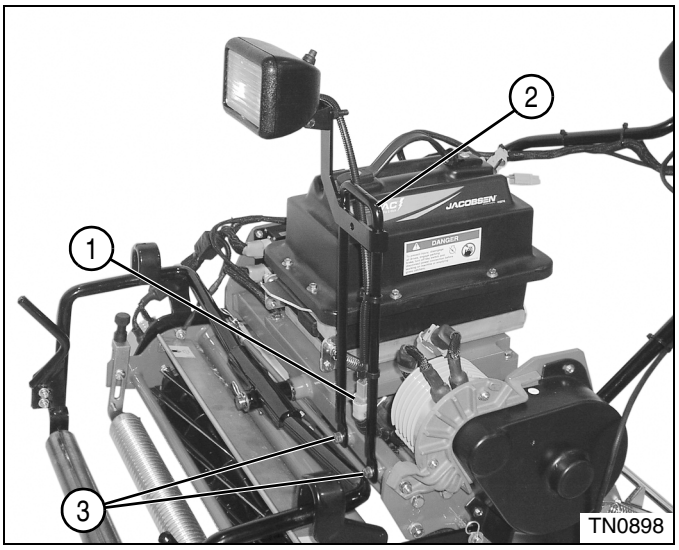

Figure 10-18

1. Park mower safely. (See “Park Mower Safely” on page 1-5.)
2. Disconnect work light harness connector (1).
3. Remove cap screws and lock washers (3) and work light bracket assembly (2).

Installation Note

Install light kit by reversing the order of removal.

Push Brush Assembly

Disassembly and Assembly

See Figure 10-19.

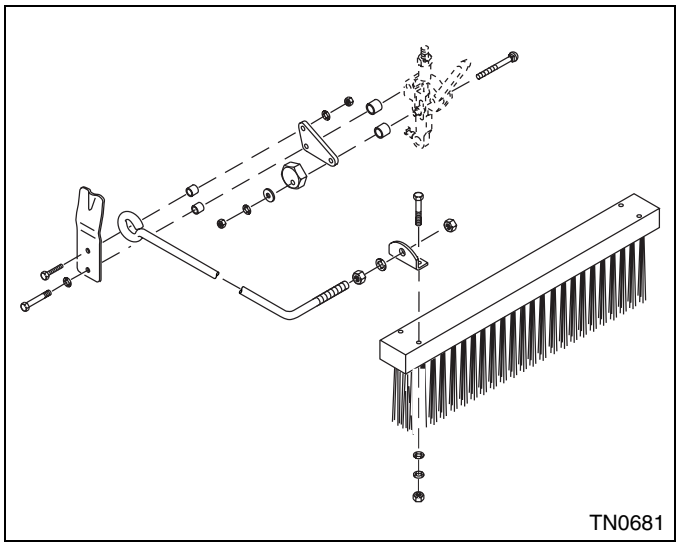

Figure 10-19

NOTE

Disassemble and replace parts as needed. Install parts in the reverse order of removal.

Numerics

A

B

C

IX

D

E

F

G

IX

H

I

K

L

M

O

IX

P

Q

R

S

IX

T

W

IX

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