10014566-B

JACOBSEN

Safety, Operation, & Maintenance Manual

ECLIPSE 360 RIDING GREENS MOWER

LITHIUM BATTERY POWER

Product Code: 10029194
Series: CAG

⚠ WARNING

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 must read the entire manual before attempting to set up, operate, adjust, or service the machine.

GB

When Performance Matters.™

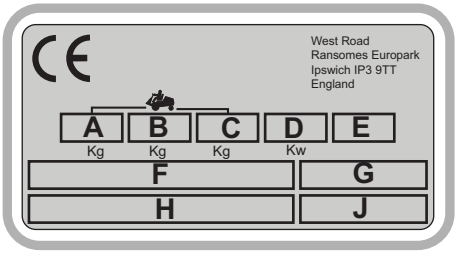
FOREWORD

This manual contains adjustment, maintenance, troubleshooting instructions, and parts list for your new machine. This manual should be stored with the equipment for reference during operation.

Before you operate your machine, you and each operator you employ should read the manual carefully in its entirety. By following the safety, operating, and maintenance instructions, you will prolong the life of your equipment and maintain its maximum efficiency.

If additional information is needed, contact dealer.

The serial plate is located on the rear frame rail. The manufacturer recommends you record these numbers below for easy reference.



SERVICE SUPPORT MATERIAL

Part No.	Description
10014563	Parts Manual
10014566	Safety, Operation & Maintenance Manual
4271491	Service Manual

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SAFETY

HOW TO OPERATE SAFELY

⚠ WARNING

EQUIPMENT OPERATED INCORRECTLY OR WITHOUT TRAINING CAN BE DANGEROUS.

Know the location and correct operation of controls. Operators without experience must receive instruction from another person that knows the correct operation of the equipment before you operate the mower.

Only use parts, accessories and attachments approved by Jacobsen.

Safe Operation

- Read the Operator's Manual and other training material. If the operator or technician can not read this manual, the owner is responsible to describe this material to the operators and technicians. Manuals in additional languages may be available on the Jacobsen or Ransomes Jacobsen website.
- Read all of the instructions for this mower carefully. Know the controls and the correct operation of the equipment.
- Children or persons who do not understand these instructions must not use the mower. The local regulations can limit the age of the operator.
- Never use a mower near persons, including children or animals.
- Remember that the operator or owner is responsible for accidents or hazards that occur to other persons or their property.
- Never carry passengers.
- Never allow persons to operate or service the mower or its attachments without correct instructions.
- Do not operate equipment while tired, sick or after you use alcohol or drugs.

Preparation

- When you operate the mower, wear correct clothing, slip resistant work shoes or boots, work gloves, hard hat, safety glasses and hearing protection. Long hair, loose clothing or jewelry can be caught in moving parts.
- Do not operate the equipment with the Interlock System disconnected or the system does not operate correctly. Do not disconnect or prevent the operation of any switch.
- Never operate equipment that is not in correct order or without decals, guards, shields, deflectors or other protective devices fastened.
- Inspect the mower before you operate the mower. Check the tire pressure, engine oil level, the radiator coolant level and the air cleaner indicator. Fuel is flammable. Use caution when you add the fuel to the mower.
- Operate the mower in daylight or in good artificial light. Use caution when you operate the mower during bad weather. Never operate the mower with lightning in the area.
- Inspect the area to select the accessories and attachments that are needed to correctly and safely do the job. Only use parts, accessories and attachments approved by Jacobsen.
- Be careful of holes in the terrain and other hazards that are not visible.
- Inspect the area where the equipment is operated. Remove all objects you can find before you operate. Be careful of obstructions above the ground (low tree limbs, electrical wires) and also underground obstacles (sprinklers, pipes, tree roots). Enter a new area carefully. Look for possible hazards.
- Inspect the cutting system before you start the mower. Make sure the blades are free to rotate. When you rotate one blade, other blades can rotate.

Operation

- Never operate the engine without enough ventilation or in an enclosed area. The carbon monoxide in the exhaust fumes can increase to dangerous levels.
- Never carry passengers. Keep other persons or animals away from the mower.
- Disengage all drives and engage the parking brake before you start the engine. Only start the engine with the operator in the seat. Never start the engine with persons near the mower.
- Keep your legs, arms and body inside the operator compartment while the mower is in operation. Keep your hands and feet away from the cutting units.
- Do not use on the slopes greater than the safe slope limit for the equipment.
- To guard against over turning or loss of control:
  - Operate the mower up and down on the face of slopes (vertically), but not across the face (horizontally).
  - Do not start or stop suddenly on slopes.
  - Decrease the speed when you operate on slopes or when you must turn. Use caution when you change direction. Turf condition can change the mower stability.
  - Use caution when you operate the mower near drop-offs, ditches or embankments.
  - Be careful of holes in the terrain and other hazards that are not visible.
- When you drive in the reverse direction, look behind you and down to make sure the path is clear. Do not operate the cutting units when you drive in the reverse direction.
- Use caution when you go near corners, trees or other objects that can prevent a clear view.
- Equipment must meet the current regulations to be driven on the public roads.
- Before you move across or operate on the paths or roads, turn off the PTO switch, lift the mowers and travel at decreased speed. Look for traffic.
- Stop the blades when the mower is on any surface that is not grass.
- Do not release the cut grass in the direction of persons or allow persons near the mower while in operation.
- Do not operate the mower with damaged guards or without safety devices in position.
- Do not change the engine governor setting or over-speed the engine. Never change or tamper with adjusters that are closed with a seal for the engine speed control.
- Before you leave the operator compartment, for any reason:
  - Disengage all the drives and lower attachments to the ground.
  - Engage the parking brake.
  - Stop the engine and remove the key.
- When you hit an object or mower starts to cause the vibration that is not normal, inspect the mower for damage and make repairs.
- Decrease the throttle setting before you stop the engine.
- Do not use this equipment for uses that the mower was not made for.

ROPS

- The ROPS is a safety device. Keep the ROPS in the vertical and locked position. Always use the seat belt when you operate the mower. Make sure the seat belt can be released quickly in an emergency.
- Only operate the mower with the ROPS in the folded position on flat and level surfaces when necessary. Do not operate the mower with the ROPS in the folded position on slopes, near sharp edges or near water. There is no roll over protection with the ROPS in the folded position.
- Check for clearance before you drive below objects. Do not contact tree branches, electrical wires or other objects with the ROPS.
- Do not use the seat belt with the ROPS in the folded position.
- Inspect the ROPS for damage. Keep the ROPS hardware fastened.
- Do not weld, drill, change or bend the ROPS. Replace a damaged ROPS. Do not try to correct a damaged ROPS.
- Do not remove the ROPS from the mower.
- Jacobsen must approve any changes to the ROPS.

Maintenance and Storage

- Before you clean, adjust or repair this equipment, push PTO switch to the OFF position, lower the cutting unit to the ground, engage the parking brake, stop the engine and remove the key.
- Make sure the mower is parked on a solid and level surface.
- Never work on a mower that is lifted only by the jack. Always use the jack stands.
- Never allow persons to service the mower or its attachments without correct instructions.
- When the mower is parked, put into storage or left without an operator, lower the cutting device unless a positive mechanical lock is used.
- When you put the mower on a trailer or put the mower in storage, close the fuel valve. Do not keep fuel near flames or drain the fuel inside a building.
- Disconnect the battery before you service the mower. Always disconnect the negative battery cable before the positive battery cable. Always connect the positive battery cable before the negative battery cable.
- Charge the battery in an area with good airflow. The battery can release hydrogen gas that is explosive. To prevent an explosion, keep any device that can cause sparks or flames away from the battery.
- Disconnect the battery charger from the power supply before you connect or disconnect the battery charger to the battery. Wear protective clothing and use insulated tools when you service the battery.
- Be careful and wear gloves when you check or service the cutting unit blades. Replace any damaged blades, do not try to correct a damaged blade.
- Keep your hands and feet away from parts that move. Do not adjust the mower with the engine in operation, unless the adjustment needs the engine in operation.
- Carefully release the pressure from components with stored energy.
- Keep the mower and the engine clean.
- Allow the engine to become cool before storage and always remove the ignition key.
- Keep all nuts, bolts and screws tight to make sure the equipment is in safe condition.
- Replace worn or damaged parts for safety. Replace damaged or worn decals. Only use parts, accessories and attachments approved by Jacobsen.
- To decrease the fire hazard, remove materials that burn from the engine, muffler, battery tray and fuel tank area.
- Disconnect the battery and controller connectors before you weld on this mower.

When you Put the mower on a trailer

- Be careful when you load or unload the mower on a trailer. Trailer must be wider than the mower and can carry the weight of the mower.
- Use a full-width ramp to load or unload the mower on a trailer.

- Use straps, chains, cables or ropes to fasten the mower to the trailer. Both front and rear straps must be sent down and toward sides of trailer.
- Make sure that all latches are correctly fastened.

IMPORTANT SAFETY NOTES

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

- 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.

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

For pictorial clarity, some illustrations in this manual may show shields, guards or plates open or removed. Under no circumstances should this equipment be operated without these devices securely fastened in place.

⚠ WARNING

The Interlock System on this mower prevents the mower from energizing unless the operator is in the seat, mow switch is OFF, and traction pedal is in Neutral. The mow, traction, and steering system will be disabled if the operator leaves the seat.

NEVER operate mower unless the Interlock System is working.

⚠ WARNING

- **Before leaving the operator's position for any reason:**
  - **Disengage mow switch.**
  - **Return traction pedal to Neutral until unit comes to a complete stop.**
  - Engage the parking brake. Parking brake light on LDU should be on.
  - **Lower all implements to the ground.**
  - **Shut down unit and remove the ignition key.**
- **Keep hands, feet, and clothing away from moving parts. Wait for all movement to stop before you clean, adjust or service the mower.**
- **Keep the area of operation clear of all bystanders and pets.**
- **Never carry passengers, unless a seat is provided for them.**
- **Never operate mowing equipment without the discharge deflector securely fastened in place.**

By following all instructions in this manual, you will prolong the life of your mower and maintain its maximum efficiency. Adjustments and maintenance should always be performed by a qualified technician.

If additional information or service is needed, contact your Authorized Jacobsen Dealer who is kept informed of the latest methods to service this equipment and can provide prompt and efficient service.

SPECIFICATIONS

HOW TO OPERATE SAFELY

⚠ WARNING

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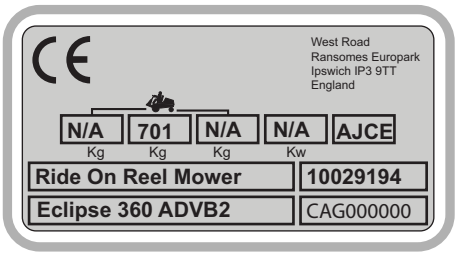
PRODUCT IDENTIFICATION

10009945G01.....Eclipse® 360,2WD, 48 volt battery power module.

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



BATTERY POWER MODULES

To ensure the longest battery life possible, the batteries are not fully charged when the machine is shipped. Fully charge the batteries prior to the first use for optimum range and performance.

System Voltage .....48 Volt DC
Batteries .....(5) 48 volt lithium ion battery modules.
Charger .....27.5 Amp, 48 Volt DC, input voltage 85-270 Volt AC, 50-60Hz.

CUTTING UNITS

Reel.....3 Reels, 22 in. (55.9 cm) wide.
Reel Diameter .....5 in. (12.7 cm)
Blade Options..... 7, 9, 11, or 15 blades
Cutting Width.....62 in. (157.5 cm)
Cutting Frequency.....Variable, **See See *Frequency of Cut*** on page 34.
Height of Cut Range.....1/16 to 7/16 in. (0.16 to 1.11 cm)

MOWER

Tires .....18 x 10.5 - 8 tubeless

SPECIFICATIONS

Pressure:
- Front ..... 16 psi (1.1 BAR)
- Rear ..... 20 psi (1.3 BAR)

Parking Brake ..... Automatic, mounted on drive motor

Drive Axle:
- Differential Type ..... Open
- Ratio 19.626:1
- Lubrication ..... 23 oz. (680 ml) Mobilfluid 424 or SAE 30 wt.

Drive Motor ..... 48 Volt AC

Steering:
- Type ..... Electric Power Steering
- Motor ..... 48 Volt AC Chain Drive

Speed:
- Mow ..... 1 - 5 mph (1.6 - 8.0 kph)
- Transport ..... 1 - 9 mph (1.6-14.5 kph)
- Reverse ..... 1 - 4.0 mph (6.4 kph)

VIBRATION LEVEL

The mower was tested for hand and arm vibration levels. The operator was in the normal position to drive the vehicle, with two hands on the steering mechanism. The engine was in operation and the cutting device was in rotation, while the mower was not moving.

The Machinery Safety Directive 2006/42/EC
By compliance to:
The Lawnmower Standard BS EN ISO 5395-3
Referenced to Hand/Arm: BS EN ISO20643:2008

Information Supplied for Physical Agents Directive 2002/44/EC
By reference to:
Hand/Arm Standards: BS EN ISO 5349-1 (2001)
BS EN ISO 5349-2 (2001)

Eclipse 360 Hand/Arm Acceleration Level	
	Maximum Left Hand or Right Hand Accelerations m/s^2
	Mean Value of X, Y, Z Aeq
Battery Powered Mowers	0.75 ± 0.6

The mower was tested for Whole Body vibration levels. The operator was in the normal position to drive the vehicle, with two hands on the steering mechanism. The cutting device was in rotation with the mower driven in a straight line at 6 Km/hr on a level and cut lawn.

The Machinery Safety Directive 2006/42/EC
By compliance to:
Whole Body EN1032:2003

Information Supplied for Physical Agents Directive 2002/44/EC
By reference to:
Whole Body Standards BS EN ISO 2631-1 (1997)

Eclipse 360 Whole Body Acceleration Level	
	Maximum Seat Pad Accelerations m/s^2
	Mean Value of X, Y, Z Aeq
Battery Powered Mowers	.341 ± 0.056

Weights and Dimensions

Dimensions:	**Inches**	**(cm)**
Length - Grass Catchers On	101	(256.5)
Height - Top of ROPS	79.3	(201.4)
Wheel Base	52	(132.1)
Width - Mowing Position	67.7	(172.0)
Width - Wheel	59	(150.0)
Turning Radius	18	(45.7)
Weights:	**Lb**	**(kg)**
Working Weight Less Operator		
Lithium	1564	(701)

SPECIFICATIONS

NOISE

The machine has been tested for sound pressure (Operator Ear) in accordance with:

The Machinery Safety Directive 2006/42/EC and Exposure Of Workers To The Risks Arising From Physical Agents (Noise) Directive 2003/10/EC

By compliance to:

The Lawnmower Standard BS EN ISO 5395:2013 and Sound Pressure Standard EN ISO 3746:2010

Measured Sound Pressure: 74dB(A) ± 1.24 LWA - Elite Lithium

Representative of worse case

The machine has been tested for sound power (Noise in the Environment) in accordance with:

The Machinery Safety Directive 2006/42/EC and Noise Emission In The Environment By Equipment For Use Out-doors Directive 2000/14/EC

By compliance to:

Sound Power Standard EN ISO 3744:1995

Measured Sound Power: 96.5 dB(A) ± 1.24 LWA - Elite Lithium

Representative of worse case.

ACCESSORIES & SUPPORT LITERATURE

Contact your area Jacobsen Dealer for a complete listing of accessories and attachments.

⚠ CAUTION

Use of other than Jacobsen authorized parts and accessories may cause personal injury or damage to the equipment.

Accessories

Traction Pedal Test Connector 4225240
Field Test Kit..... 4222802
Orange Touch-up Paint (12 oz. spray) 554598
Grass Catcher 4214180
Fine Bristle Brush 68536
Rear Roller Cleaner Brush 62818
Quick RollÊ (Set of 3) (Requires 4211921) .. 68664
Spiker (Set of 3) (Requires 4211921) 68665
Quick RollÊ or Spiker Mounting Kit 4211921
Traction Tire Kit 62817
Turf Groomer 1/4òSpacing..... 67966
Turf Groomer 1/2òSpacing..... 67968
Vertical Mower (Set of 3) 67138
Dew Whip Holder 62809
Tow Bar 62811
Premium Seat..... 62813
Clipping Deflector 62814
ROPS Mounted LED Light Kit 4214980
Discharger (Battery Units) 892857
ASM Catcher 22òw/notch 4239562
.25" X 5" X 22" GMR, LH DRV 067995
.5" X 5" X 22" GMR, LH DRV 067996
Kit Deflector Clipping E322 062814
Eclipse 360, 3WD CONV-KIT..... 10009781
Crating Option Eclipse 322..... 062816
Drive Groomer/Brush 5in Reel - LH ELEC 062900
Drive Groomer/Brush 5in Reel - LH HYD..... 062901
Groomer, 22in, 1/4in Spacing..... 062905
Groomer, 22in, 1/2in Spacing..... 062906
Brush, 22in, Herringbone, Stiff 062909
Brush, 22in, Herringbone, Medium..... 062910
Brush, 22in, Herringbone, Soft..... 062911
Front Roller, Grooved, 22in, 1/4in Spacing ... 062927
Front Roller, Grooved, 22in, 1/2in Spacing ... 062928
Front Roller, Solid, 22in. 062929
Kit, Quick Change, 18in/22in/26in 062934
Kit, Guide Wheels..... 062935
Receptacle, International - Kit 10022289

Reels

TrueSetÊ 7 Blade Reel 62830
TrueSetÊ 9 Blade Reel 62831

SPECIFICATIONS

TrueSetÊ 11 Blade Reel 62832
TrueSetÊ 15 Blade Reel.....62833
Reel Conversion Kit..... 4218680
Rollers
Grooved Front Roller.... 68527
Solid Roller 68530
Grooved Front Roller (Steel) 68613
Grooved Front Roller (Aluminum).....68614
High Cut Roller 15/16 in. 68634
Solid Tube Steel Roller with Scraper.....68641
Grooved Segmented Roller.....68673
Rear Roller Scraper..... 338735
Solid Tube Rear Roller 1004990
MagSystemÊ
Super Tournament MagSystem Kit.....4188500
Tournament MagSystem Kit 4158083
Brake Release Harness 4395866

Support Literature
Safety & Operation Manual 10014566
Parts & Maintenance Manual 10014563
Service & Repair Manual.....4271491

DECALS

DECALS

⚠ WARNING

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Only use parts, accessories and attachments approved by Jacobsen.

INSTRUMENT PANEL

Familiarize yourself with the following decals. They are critical to the safe operation of the mower. REPLACE DAMAGED DECALS IMMEDIATELY.

- Read operator's manual. Do not allow untrained operators to use machine.
- Keep shields in place and hardware securely fastened.
- Keep hands, feet, and clothing away from moving parts.
- Before you clean, adjust, or repair this equipment, disengage all drives, engage parking brake, and stop engine.
- Never carry passengers.
- Keep bystanders away.
- Do not use on slopes greater than 17°.

DECALS

Danger

To avoid injury when working with battery:

1.Always connect the black (-) ground last and remove it first.

2.Keep sparks and flames away, and avoid contact with acid.

To avoid injury when jumping battery:

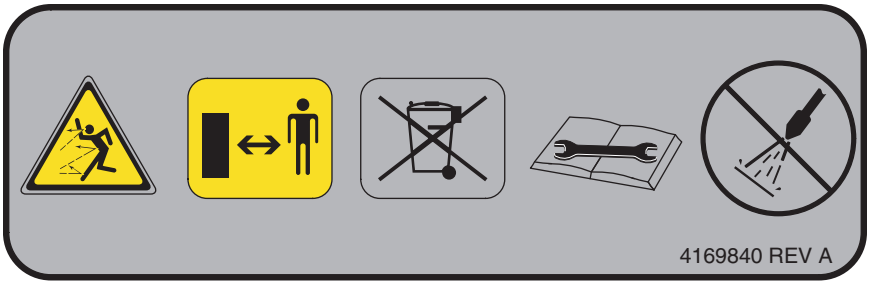
1.Connect positive (+) terminal to positive (+) terminal.

2.Connect negative (-) terminal on good battery to frame of vehicle that has dead battery.

Familiarize yourself with the following decals. They are critical to the safe operation of the mower. REPLACE DAMAGED DECALS IMMEDIATELY.

DANGER

To prevent injury, disengage all drives, engage parking brake, stop engine, and remove key before working on machine or emptying grass catchers.



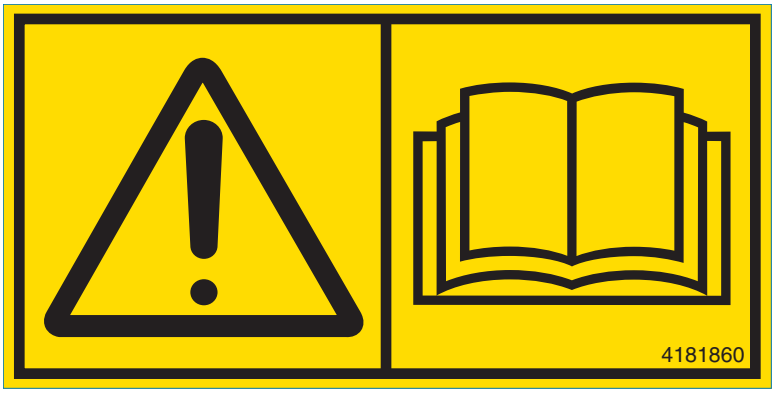
DANGER

•1. Keep a safe distance from the machine. Keep bystanders away.

•2. Properly dispose of components from this machine. Refer to local regulations for waste disposal and recycling.

•3. Refer to the manual for maintenance and service procedures.

•4. Do not spray water at electrical connectors, motors or controllers. Remove battery pack before pressure washing unit.



WARNING

Read all mower manuals before operating or performing any maintenance.

IMPORTANT

DO NOT USE STARTING ASSIST FLUIDS

Use of starting assist fluids in the air intake system may be potentially explosive or cause a “runaway” engine condition. This could result in serious engine damage.

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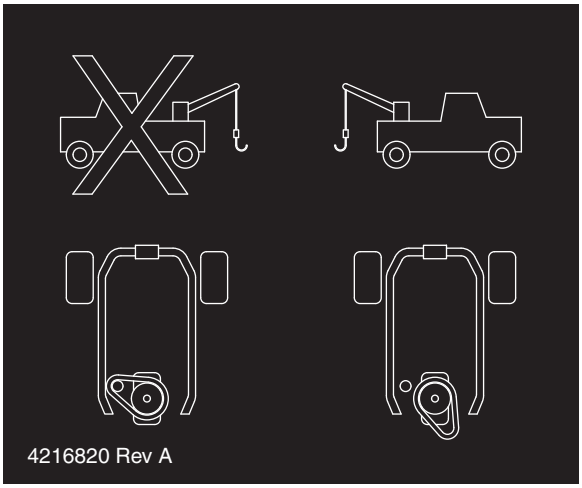

Disconnect Steering Chain before towing mower.

Notes:

CONTROLS

HOW TO OPERATE SAFELY

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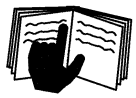
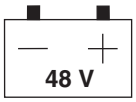
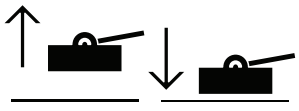
ICONS

Read Manual 	**48 VDC Battery** LDU Light 		**System** Off  On  Energize 	
Reel 	**Horn** 	**Lights** 	**Mow Switch** 	
System Power LDU Light 	**Parking Brake** LDU Light 	**System Fault** LDU Light 		
	Surface may be hot 	**Joystick** Raise Lower 		

⚠ WARNING

Never attempt to drive the mower unless you have read the Safety and Operation Manual and know how to operate all controls correctly.

Familiarize yourself with the icons shown above and what they represent. Learn the location and purpose of all of the controls and gauges before operating this mower.

INSTRUMENT PANEL

LCD Display Unit (LDU)

Used to display and set operating conditions. ***See LCD Display Unit (LDU)*** on page 25.

Mow Switch (B)

Enables and disables the three reel switches **(C, D and E)**, and switches lift system between service Mode and mow Mode. Push the rocker switch forward to enable the mowers, lower the reels to the one-touch position, and change the lift system to Mow Mode. Push down on the rear of the rocker switch to disable the mowers, raise reels to transport position, and change lift system to Service Mode. **See *Lift System*** on page 43 for lift system operation.

NOTE: Mower will not start with mow switch in the ON position.

Left Reel Switch (C)

Used to engage and disengage the left reel. Mow switch **(B)** must be in the ON (Push front of switch) position for switch to function. When left reel switch is moved to the OFF position, left reel will stop and raise to the crosscut position.

Center Reel Switch (D)

Used to engage and disengage the center reel. Mow switch **(B)** must be in the ON (Push front of switch) position for switch to function. When center reel switch is moved to the OFF position, center reel will stop and raise to the crosscut position.

Right Reel Switch (E)

Used to engage and disengage the right reel. Mow switch **(B)** must be in the ON (Push front of switch) position for switch to function. When right reel switch is moved to the OFF position, right reel will stop and raise to the crosscut position.

Horn Switch (F)

Used to sound the audible alarm. Switch is not active if system power switch is not in RUN position.

Light Switch (G)

Controls operation of the work lights. Press front of switch to turn lights ON. Press rear of switch to turn lights OFF. Switch is not active if system power switch is not in RUN position.

System Power Switch (H)

Used to energize the electrical system and start the hybrid engine if installed. Power switch has three positions, OFF, RUN, and START.

- **OFF Position** - Power to mower is turned off.
- RUN Position - Controllers active, normal operating mode. Traction controller does not activate until switch is moved to START position and returned to RUN.
- START Position - Used to activate the mow and traction system and start the hybrid engine if installed. ***See Starting*** on page 47

Parking Brake Switch (I)

Used to engage the electric motor brake. Rock the switch forward to engage the parking brake. Rock the switch rearward to release the parking brake.

Reel Raise/Lower Joystick (J)

Used to raise and lower the three reels. Lift system operates in two modes, service mode and mow mode. Individual reels will not lower if the corresponding reel switch is in the OFF position. **See *Lift System*** on page 43 for lift system operation.

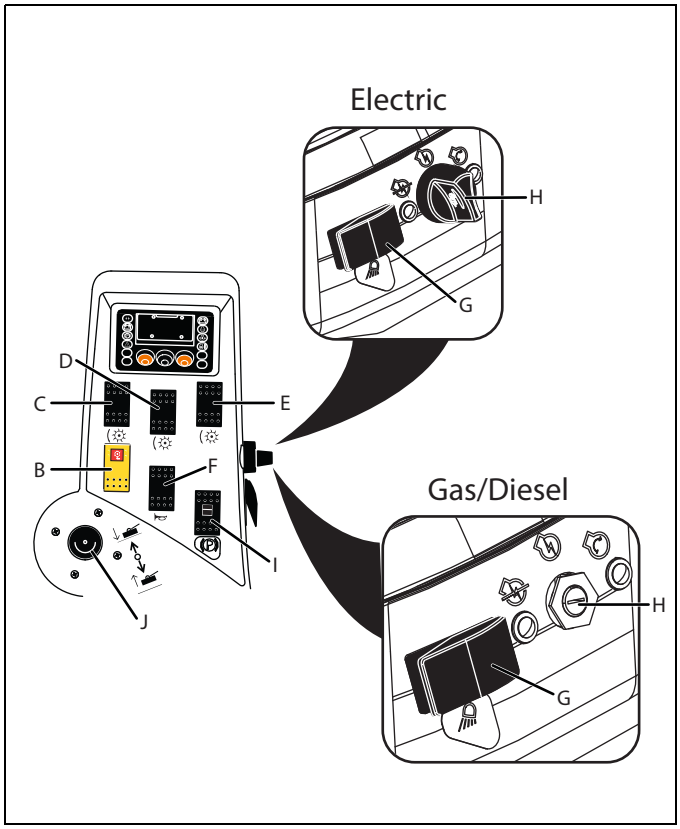


Fig. 1

OPERATOR CONTROLS

Forward Traction Pedal (K)

Press forward traction pedal down to move the mower forward. The further the pedal is pressed, the faster the mower will travel.

Reverse Traction Pedal (L)

Press reverse traction pedal down to move the mower in reverse. The further the pedal is pressed, the faster the mower will travel.

Steering Wheel Tilt Lever (M)

Push lever down to release steering column. Tilt column up or down to position desired. Release lever to lock steering column in place.

⚠ CAUTION

Never adjust tilt steering while mower is moving. Stop unit before adjusting.

Seat Adjustment Lever (N)

Pull lever up and slide seat forward or backward. Release lever to lock seat in place.

⚠ CAUTION

Never adjust seat while mower is moving. Stop unit before adjusting.

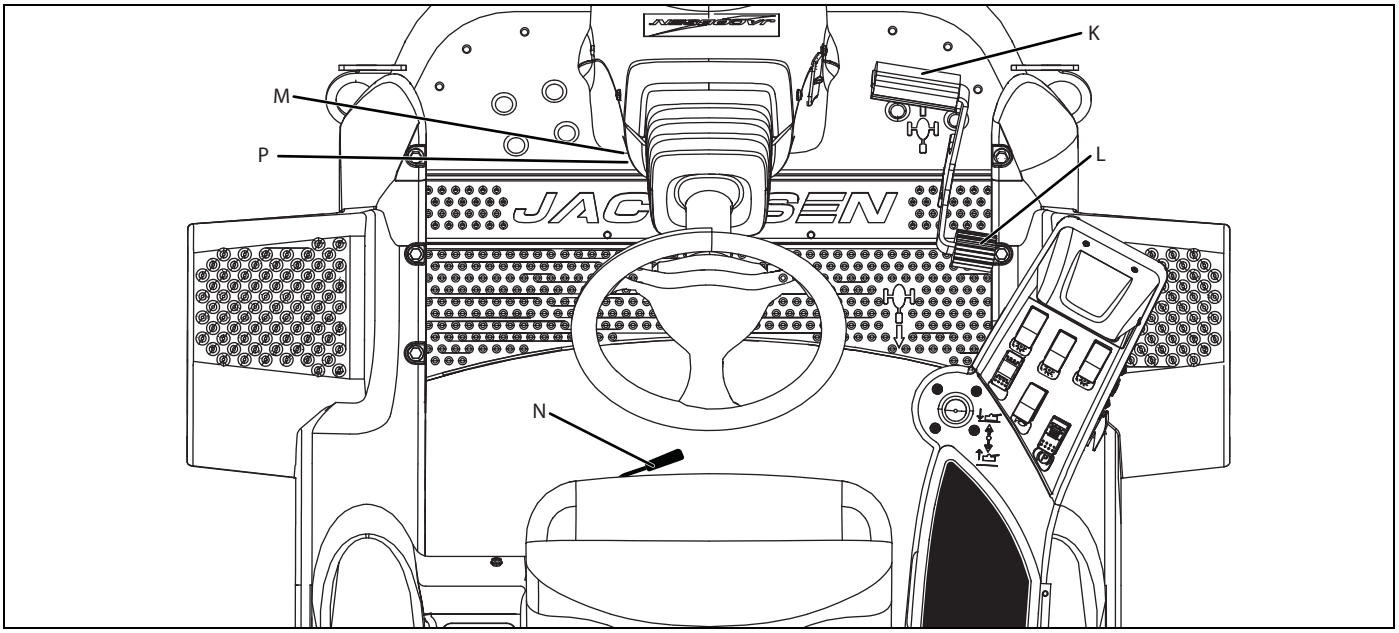


Fig. 2

OPERATOR CONVENIENCE

MCU Access Panel (R)

Remove thumbscrew and lift up on front of access panel to view MCU diagnostic lights. Always secure access panel with thumbscrew when operating.

Cup Holder (S)

Used to hold a beverage cup for the operator or may be used as additional storage pocket. Rubber portion of cup holder is removable for cleaning purposes.

Storage Compartment (T)

Used to store gloves and other necessary protective items for the operator.

Step (U)

Used to assist operator entering or exiting the operator's area.

Headlight (V)

Used to provide light when operating in the early morning or late evening. Light direction can be adjusted by the operator.

Pivoting Armrest (X)

Used to position armrest for operator comfort. Armrest will also pivot out of the way for entering or exiting on the right side of the mower. Armrest can also be adjusted to three different heights.

Center Reel Swing Arm Service Latch (Y)

Used to secure center reel swing arm in service position.

Center Reel Swing Arm Handle (AA)

Used to move center reel out from under mower for servicing. Raise center mower, remove grass catcher, unlatch arm to swing center reel out, and latch arm in service position **(Y)**. Do not operate mower without swing out arm securely latched in closed position.

Running Light (AB)

Light located under operator seat to provide illumination of center mower and floorboard. Light is always on with the system power switch **(H)** in the RUN position

Hood Latch (AC)

Lift handle up and rotate handle 180° counter-clockwise to unlatch hood. With hood closed rotate handle 180° clockwise to latch hood. Keep hood latched when operating mower.

Tie Down (AD)

Used to secure mower to trailer for transport.

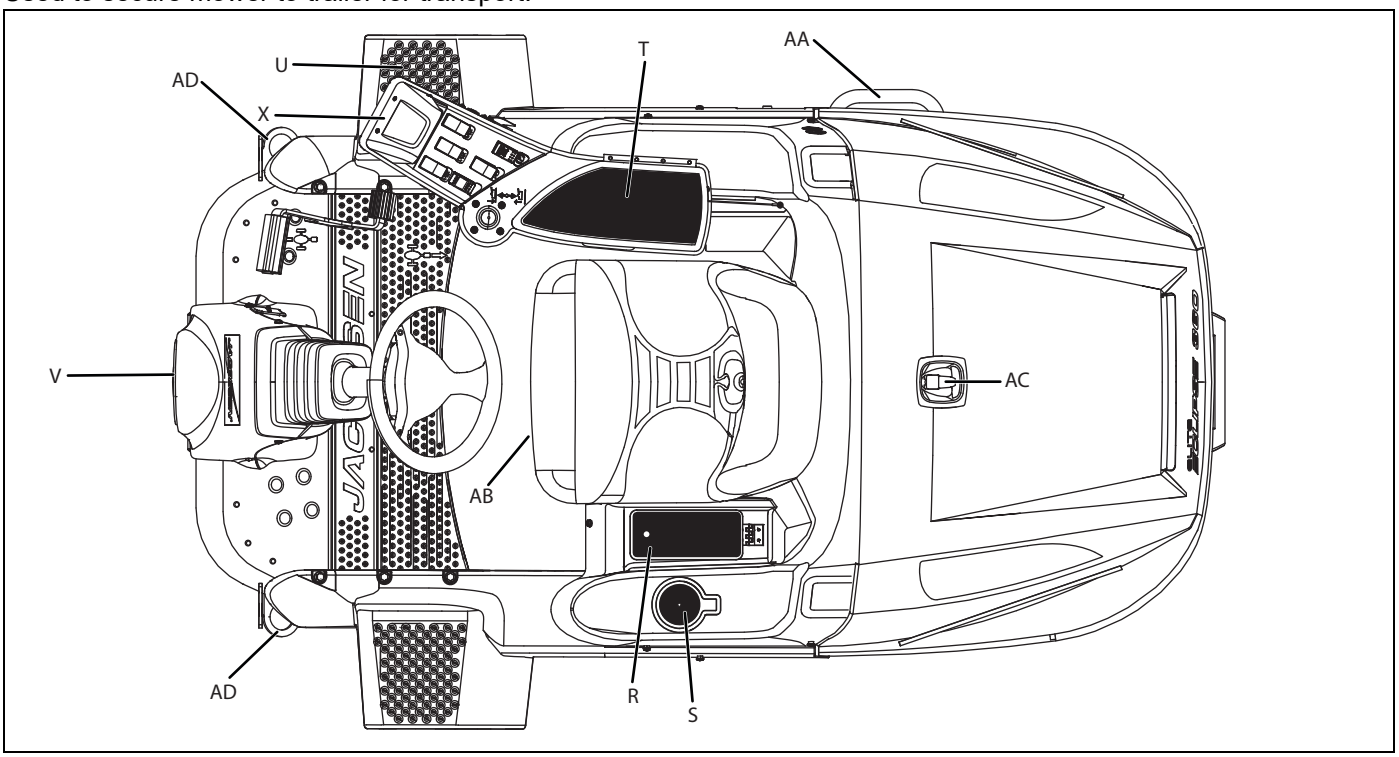


Fig. 3

LCD DISPLAY UNIT (LDU)

The LDU displays current functional values for the operation of the Eclipse mower, has indicator lights, and sounds audible warning alerts. The LDU operates in one of two modes, Operator Mode (Default) and Maintenance Mode. Use of Maintenance Mode requires a four digit pin number.

Press either of the orange buttons **(AM or AN)** to change screen display or change values. Push the right orange button **(AN)** to go forward in the display list or increase setting value, and push the left orange button **(AM)** to go back in the display list or decrease setting value. The black button **(AL)** is used to select, reset or change values.

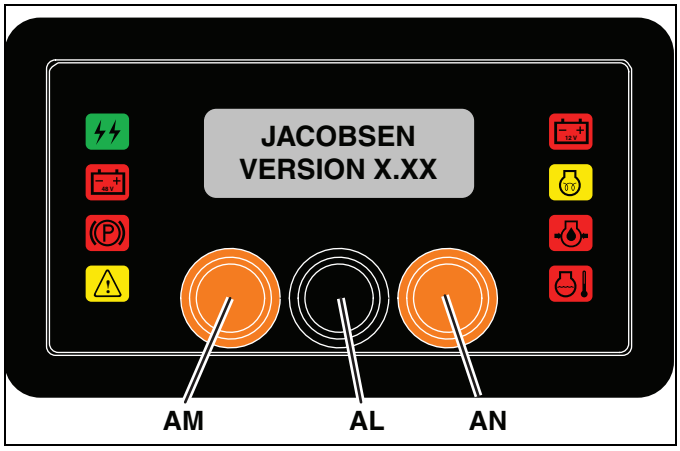


Fig. 4

Indicator Lights

The LDU has eight indicator lights to indicate system functions.

Power On Light: Green Power On light located on left side of the LDU indicates the controller system has power. A flashing Power On Light indicates controller systems has not been energized (started). A solid light indicates the unit is energized and in normal operation mode.

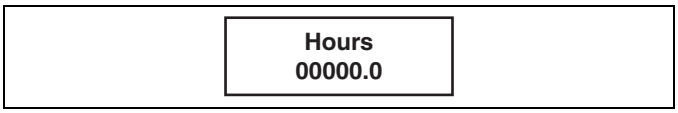
48V Light: Red 48V light located on left side of the LDU indicates system voltage is below 42 VDC or flashes when system voltage is above 59 VDC. Charge batteries or check generator output. LCD display will show corresponding message.

Parking Brake Light: Red parking brake light located on left side of the LDU indicates the parking brake system is engaged or brake pedal is fully pressed.

Fault Light: Yellow fault light located on left side of the LDU indicates the controller system has detected a fault. See fault message displayed on LCD.

DISPLAY OPERATING HOURS

To check operating hours when system power switch is in the OFF position, press the center (Black) button. Operating hours will be displayed for 1 minute.



START UP SCREEN

The Jacobsen start up screen will display for 5 seconds when the system power switch is turned from the OFF to the RUN position. The software version of the controllers is displayed under Jacobsen.

ALARM CODES

Refer to **See *LDU ERROR CODES*** on page 89 for a complete list of Eclipse error codes.

MOWER ATTACHMENT MODES

The Eclipse mower, when in Operator Mode, has six mower attachment sub-modes for operation.

The values listed below for each mode are the defaults, but they can be changed if desired in the Maintenance Mode. Any changes made, will replace the defaults saved for each mode, until a factory reset is selected.

The six modes are:

Mode 1 - 11 Blade Reel

Use this mode when 11 blade reels are installed. Reel motor operation is enabled, number of reel blades are set to 11, reel speed is set to 2200 rpm, and FOC is set to 0.16 in. (0.4064 cm).

Mode 2 - 9 Blade Reel

Use this mode when 9 blade reels are installed. Reel motor operation is enabled, number of reel blades are set to 9, reel speed is set to 2200 rpm, and FOC is set to 0.196 in. (0.4967 cm).

Mode 3 - Roller

This mode is used when the reels are removed and the optional Quick Roll™ greens rollers are installed. Reel motor operation is disabled.

Mode 4 - Verticut

This mode is used when optional verticut mowers are installed. Reel motor operation is enabled, 1800 rpm reel speed, and FOC is set to 0.

Mode 5 - Spiker

This mode is used when the reels are removed and optional spiker attachments are installed. Reel motor operation is disabled.

Mode 6 - Other

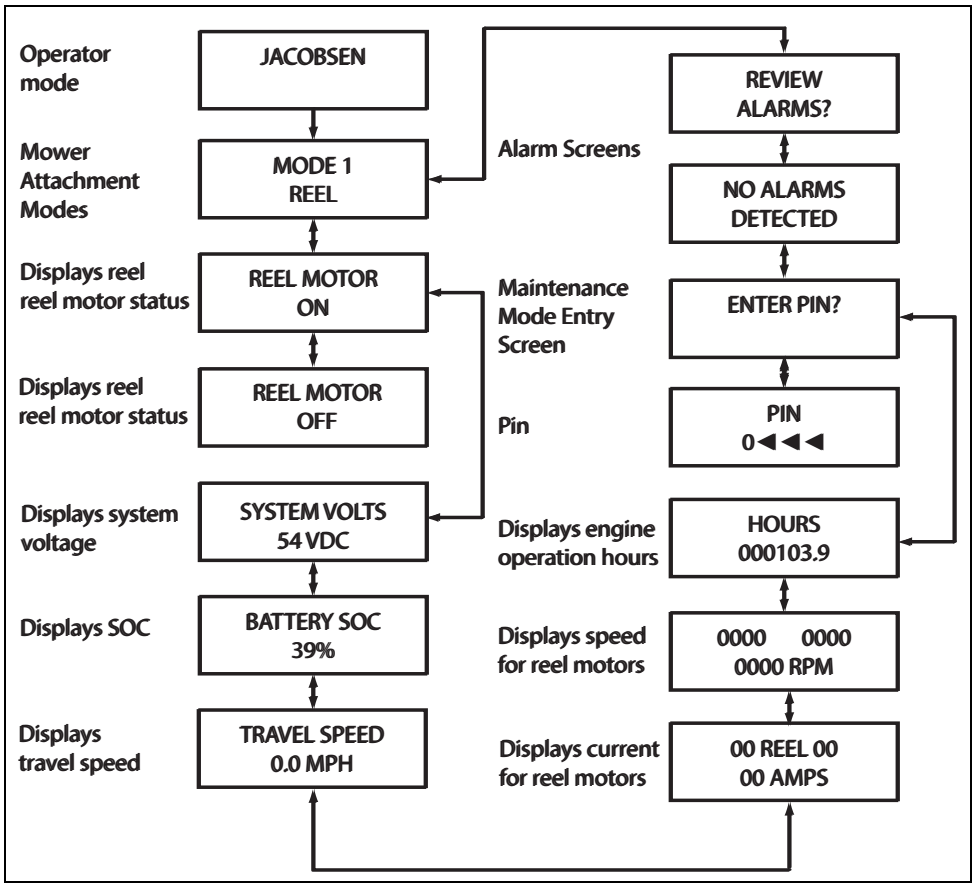
This mode is used when 7 blade reels, or an attachment other than those listed above are installed. Reel motor operation is enabled, reel speed is set to 2200 rpm, and FOC is set to 0. Number of reel blades, and FOC must be set manually.

Setting	Mode 1 Reel	Mode 2 Reel	Mode 3 Roller	Mode 4 Verticut	Mode 5 Spiker	Mode 6 Other
Reel Speed	2200 rpm	2200 rpm	0	1800 rpm	0	2200 rpm
Number of reel blades	11	9	0	0	0	0
FOC Setting	0.160 in. (0.4064 cm)	0.196 in. (0.4967 cm)	0	0	0	0
Reels Disabled s	No	No	Yes	No	Yes	No
Reel Motor Direction	CCW	CCW	CCW	CCW	CCW	CCW
Maximum Mow Speed	4 mph (6.4 kph)	4 mph (6.4 kph)	4 mph (6.4 kph)	4 mph (6.4 kph)	4 mph (6.4 kph)	4 mph (6.4 kph)
Maximum Transport Speed	9 mph (14.5 kph)	9 mph (14.5 kph)	9 mph (14.5 kph)	9 mph (14.5 kph)	9 mph (14.5 kph)	9 mph (14.5 kph)
Display Units	English	English	English	English	English	English

s This setting can not be changed in the maintenance mode. Another mower attachment mode must be selected to enable or disable reel motors. See Maintenance mode for changing mower attachment mode.

OPERATOR MODE

Operator mode is used by the operator to view attachment mode, system voltage information, travel speed, reel motor current, reel motor speed, switch status, operation hours, and stored alarms. Press the orange buttons **(AM and AN)** on the LDU to toggle between the different displays.



Mower Attachment Mode: Displays current mower attachment mode.

Reel Motor On/Off: Allows reel motor operation to be disabled for training purposes or practice cutting. Mow and lift system will function normally, with the exception of the reel motors operating. Press black button (AL) to toggle between reel on and off. LDU screen will be locked on REEL MOTORS OFF screen until reel motors are turned back on. Reel motors will also be enabled by cycling the system power switch.

NOTE: *Enabling reel motors on this screen will not enable reel motors in Mode 3 Roller or Mode 5 Spiker.*

System Volts: Displays the system voltage. Normal operating voltage is between 43 and 60.5 volts, depending on the power module installed. High or low voltage faults may occur of system voltage goes above 60.5 volts for 5 seconds or drops below 43 volts for ten seconds. Some machine functions may be disabled in cases of high or low system voltage.

Travel Speed: Displays speed mower is traveling. Travel speed may be limited due to Maximum Mow Speed and Travel Speed values set in Maintenance Mode, or to meet current FOC setting.

Reel Motor Current: The reel motor current screen is provided for the operator and mechanic to help identify problems before damage to the reel motor occurs. Notify maintenance personnel if one reel motor is drawing a higher current load than the other two motors. The screen displays the reel motor current for all three reels. The number in the upper left corner of the screen is for the left reel motor, the number in the upper right corner of the screen is for the right reel motor, and the number on the second row of the screen is for the center reel motor. A fault will occur if reel motor current is over 35 amps for 30 seconds.

Reel Motor Screen: The reel motor speed screen displays the reel motor speed for all three reels. The number in the upper left corner of the screen is for the left reel motor, the number in the upper right corner of the screen is for the right reel motor, and the number on the second row of the screen is for the center reel motor. All three reel motors should be operating within 50 rpm of each other.

Enter Pin? Screen: Used to enter Maintenance Mode. Enter the four digit pin number to access Maintenance Mode.

Alarms Screens: Used to view alarms stored in system memory. Alarm message will appear on the screen as they occur for a few seconds, and a beep may sound, depending on the fault encountered. The alarm is then stored in system memory until key switch is turned to off position.

MAINTENANCE MODE

Maintenance Mode is used by the superintendent to set and adjust all functional values for the Eclipse Mower. LCD displays available in Maintenance Mode are, mower attachment mode, system voltage, travel speed, reel motor current, reel motor speed, total hours on machine, actuator motor current, reel motor temperature, TCU/traction motor temperature, traction motor current, select display units, calibrate actuators, configure reel motor direction, software code revision levels, CAN status, switch status, maximum mow and travel speed, number of blades, fixed FOC, backlap, factory reset and alarm screens.

NOTICE

Any changes made to settings in the Maintenance Mode will not be active until the mower is powered off and restarted.

Changes made will also save settings in current mower attachment mode, unless factory reset is selected.

To enter Maintenance Mode, press either orange buttons **(AM or AN)** until **ENTER PIN?** screen is on the display and press the black button. Use the orange buttons **(AM or AN)** to select and the black button **(AL)** to enter the digits for the Maintenance Mode PIN.

NOTE: The PIN for Maintenance Mode is 0000.

NOTE: The Maintenance Mode PIN can be customized to a setting of your choice. Please contact your Jacobsen Dealer or Jacobsen Technical Support for complete instructions.

System voltage, travel speed, reel motor current draw and reel motor speed screens are the same as for Operator Mode. **See *Operator Mode*** on page 28.

For actuator calibration screens, **See *Lift Actuator Calibration*** on page 67.

For backlap screens, **See *Backlapping and Grinding*** on page 68.

Fixed Reel Speed

To set the fixed reel speed, the FOC setting must be set to 0, then press either of the orange buttons **(AM or AN)** on the LDU until the **SET REEL SPEED** screen is on the LCD display. Press the black button **(AL)** to enter set mode. Use the orange buttons to raise **(AN)** or lower **(AM)** the reel speed to the desired setting.

Fixed reel speed must be set between 1000 and 2200 rpm.

Actuator Motor Current

Displays the current draw for each actuator motor. The first number is for the left actuator motor, the second number is for the center actuator mower, and the third number is for the right actuator motor.

Reel Temperature

Displays the temperature for each reel motor. The number in the upper left corner of the screen is for the left reel motor, the number in the upper right corner of the screen is for the right reel motor, and the number on the second row of the screen is for the center reel motor.

TCU/Traction Motor Temperature

Displays the temperature of the TCU case and traction motor.

Traction Motor Current

Displays the traction motor current draw.

Maintenance Hours

To display maintenance hours, press either of the orange buttons **(AM or AN)** on the LDU until the maintenance hours screen is on the LCD display. To reset maintenance hours, press the black button **(AL)**.

Select Units

To set the display units, press either of the orange buttons **(AM or AN)** on the LDU until the **SELECT UNITS?** screen is on the LCD display. Press the black button **(AL)** to enter set mode. Use the orange buttons to select the desired setting.

- Units must be set to either English or metric.

CFG Reel Direction

To set reel rotation direction, press either of the orange buttons **(AM or AN)** on the LDU until the reel direction screen is on the LCD display. Press the black button **(AL)** to enter set mode. Set reel direction for each reel, pressing black button to change between each reel. Direction is viewed from front of motor shaft

- ReelCounter-Clockwise (CCW)
- Vertical MowerClockwise (CW) or CCW

Software Code Revision Level

Displays the revision level for software loaded for each controller. This information is shown on two screens. The software revision levels may be an aid for service technicians working on the mower.

- The first screen displays the software revision levels for the 3WD (If installed), TCU, and SCU.
- The second screen displays the software revision levels for the MCU, RCU, and LDU.

CAN Network Status

Displays the CAN (Controller Area Network) status for each of the controllers. A steady (non flashing) controller name indicates CAN traffic has been detected from controller within the last two seconds. A flashing controller name indicates CAN traffic has not been detected from controller.

Switch Status

Displays the current switch settings, and is used to diagnose switch problems. A status of 0 indicates the switch is in the OFF position. A status of 1 indicates the switch is in the ON position. Check the wiring and operation of any switch that is not displaying the correct status.

The switches are broken up into three sets of numbers, with a gap between each set.

- The first set of numbers displays the status of the left, center, and right reel switches **(C, D, and E)** on the instrument panel.
- The second set of numbers displays the status of the mow switch **(B)**, light switch **(F)**, horn switch **(G)**, and system power switch in start position **(H)**.
- The third set of numbers displays the status of the lower and raise switches that are part of the joystick **(J)**, and the seat switch.

Maximum Mow Speed

To set the maximum mow speed, press either of the orange buttons **(AM or AN)** on the LDU until the set **MAX MOW SPEED** screen is on the LCD display. Press the black button **(AL)** to enter set mode. Use the orange buttons to raise **(AN)** or lower **(AM)** the maximum mow speed to the desired speed. press the black button to set speed.

- Maximum mow speed must be between 1.0 and 5.0 mph (1.6 and 8.0 kph), and is adjustable in 0.5 mph (0.8 kph) increments.

Maximum Transport Speed

To set the maximum transport speed, press either of the orange buttons **(AM or AN)** on the LDU until the set **MAX SPEED** screen is on the LCD display. Press the black button **(AL)** to enter set mode. Use the orange buttons to raise **(AN)** or lower **(AM)** the maximum transport speed to the desired speed. press the black button to set speed.

- Maximum transport speed must be between 1.0 and 9 mph (1.6 and 14.5 kph), and is adjustable in 0.5 mph (0.8 kph) increments.

Number of Reel Blades

To set the number of blades on each reel, press either of the orange buttons **(AM or AN)** on the LDU until the reel blades screen is on the LCD display. Press the black button **(AL)** to enter set mode. Use the orange buttons to raise **(AN)** or lower **(AM)** the number of reel blades. press the black button to set speed. Entering the wrong number of blades will affect the fixed FOC setting.The only reels currently available are 7, 9, 11, or 15 blade reels.

2WD/3WD Mode

pressing black button **(AL)** toggles mower between 2WD and 3WD modes. Do not set mower to 3WD if the 3WD system is not installed.

Fixed FOC Setting

To set the fixed FOC, press either of the orange buttons **(AM or AN)** on the LDU until the **FOC x.xxx CHANGE?** screen is on the LCD display. Press the black button **(AL)** to enter set mode. Use the orange buttons to raise **(AN)** or lower **(AM)** the FOC value to the desired setting. press the black button to set speed. The minimum and maximum fixed FOC setting varies, depending on the number of blades. **See *Frequency of Cut*** on page 34**.**

15 Blade Reel..... 0.05 - 0.25 in. (0.12 - 0.63 cm)
11 Blade Reel..... 0.05 - 0.25 in. (0.12 - 0.63 cm)
9 Blade Reel..... 0.06 - 0.30 in. (0.15 - 0.77 cm)
7 Blade Reel..... 0.07 - 0.39 in. (0.19 - 0.99 cm)

Factory Reset

To reset controller to factory default values, press either of the orange buttons **(AM or AN)** on the LDU until the Factory Reset screen is on the LCD display. Press the black button **(AL)** to reset values back to factory default settings. All values saved in mower attachment modes will also revert to their original factory default settings.

Mower Attachment Mode 1 (11 Blade Reel)
Reel Direction..... CW
Reel Speed..... 2200 rpm
Mow Speed ..... 4 mph
Transport Speed..... 9 mph
FOC..... 0.160 in.
Reel Blades..... 11
Display Units ..... English
Backlap Timer..... 10 Minutes

Mower Attachment Mode

To set the mower attachment mode, press either of the orange buttons **(AM or AN)** until the **MODE CHANGE?** screen is on the lcd display. Press the back button **(AL)** to enter set mode. Press the right orange button until the desired mode is on the screen, then press the black button to select it. **See *Mower Attachment Modes*** on page 26 for default values.

NOTICE

If a mower attachment mode change is required, change mower attachment mode first before setting other values. Values stored in new mode will override previous settings for reel speed, FOC, maximum mow and travel speeds, reel direction, and display units.

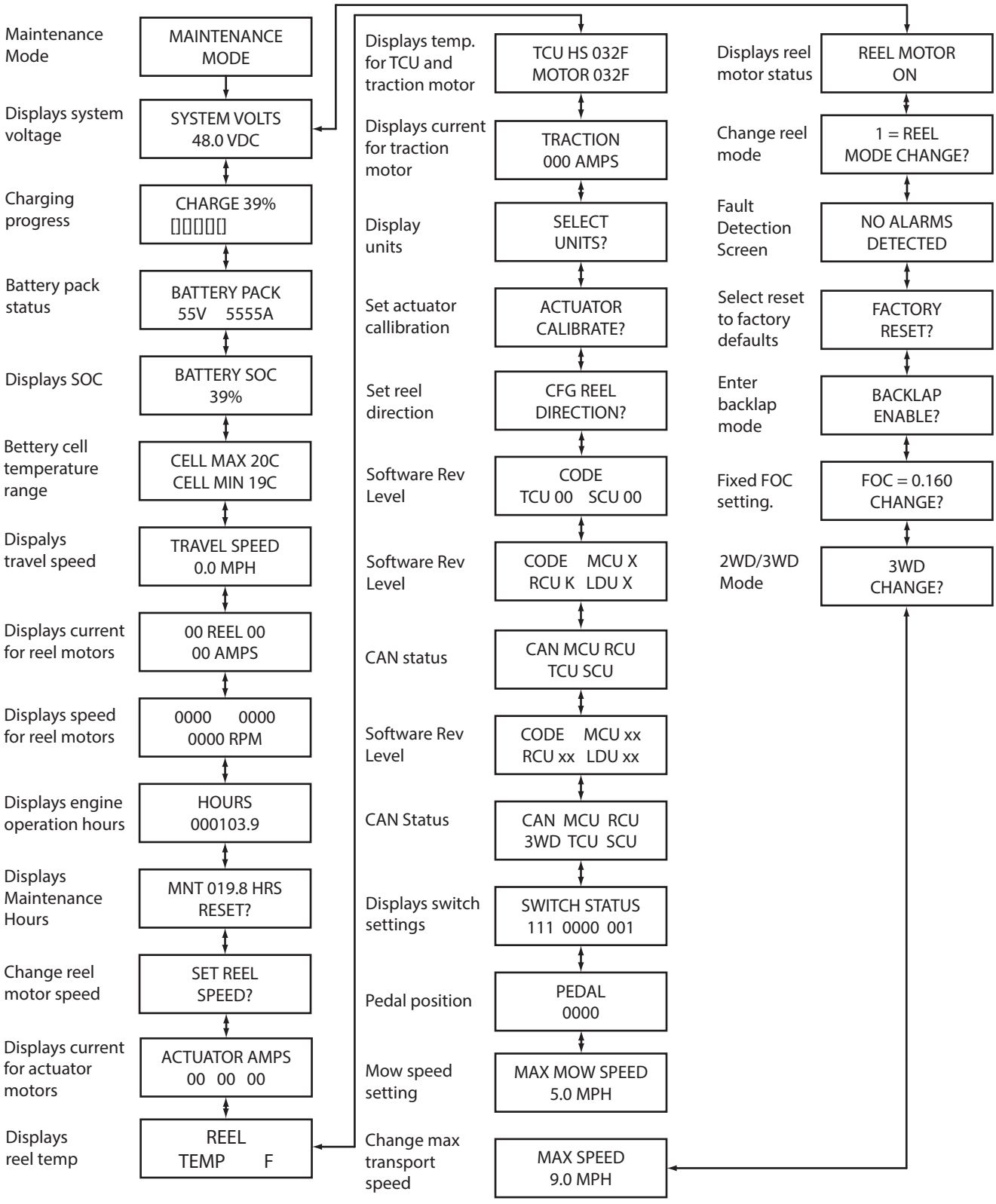

Maintenance Mode
MAINTENANCE MODE
Displays system voltage
SYSTEM VOLTS 48.0 VDC
Charging progress
CHARGE 39%
[][][][][]
Battery pack status
BATTERY PACK 55V 5555A
Displays SOC
BATTERY SOC 39%
Bettery cell temperature range
CELL MAX 20C CELL MIN 19C
Dispalys travel speed
TRAVEL SPEED 0.0 MPH
Displays current for reel motors
00 REEL 00 00 AMPS
Displays speed for reel motors
0000 0000 0000 RPM
Displays engine operation hours
HOURS 000103.9
Displays Maintenance Hours
MNT 019.8 HRS RESET?
Change reel motor speed
SET REEL SPEED?
Displays current for actuator motors
ACTUATOR AMPS 00 00 00
Displays reel temp
REEL TEMP F
Displays temp. for TCU and traction motor
TCU HS 032F MOTOR 032F
Displays current for traction motor
TRACTION 000 AMPS
Display units
SELECT UNITS?
Set actuator callibration
ACTUATOR CALIBRATE?
Set reel direction
CFG REEL DIRECTION?
Software Rev Level
CODE TCU 00 SCU 00
Software Rev Level
CODE MCU X RCU K LDU X
CAN status
CAN MCU RCU TCU SCU
Software Rev Level
CODE MCU xx RCU xx LDU xx
CAN Status
CAN MCU RCU 3WD TCU SCU
Displays switch settings
SWITCH STATUS 111 0000 001
Pedal position
PEDAL 0000
Mow speed setting
MAX MOW SPEED 5.0 MPH
Change max transport speed
MAX SPEED 9.0 MPH
Displays reel motor status
REEL MOTOR ON
Change reel mode
1 = REEL MODE CHANGE?
Fault Detection Screen
NO ALARMS DETECTED
Select reset to factory defaults
FACTORY RESET?
Enter backlap mode
BACKLAP ENABLE?
Fixed FOC setting.
FOC = 0.160 CHANGE?
2WD/3WD Mode
3WD CHANGE?

Fig. 5

FREQUENCY OF CUT

The FOC (Frequency of Cut) is the distance, in inches (cm), the machine travels forward between reel blades contacting the bedknife. The FOC can be adjusted either by changing the Fixed FOC setting or by changing the maximum mow speed and the fixed reel speed on the LCD display.

Adjust FOC with Fixed FOC setting

Changing the FOC setting to a value other than 0 will enable the fixed FOC mode and overrides the reel speed setting. As mower travel speed increases or decreases, reel speed will automatically adjust as required to maintain set FOC.

NOTICE

When using a fixed FOC setting, the reels will not turn if the mower is not moving.

Maximum mow speed may be lower than what is set in the LDU when using a very low FOC.

Adjust FOC with Reel Speed Setting

1. Using the FOC charts, determine the maximum mow speed and fixed reel speed required for the desired FOC.
2. Switch to Maintenance Mode. **See *Maintenance Mode*** on page 29**.**
3. Set fixed FOC setting to 0.
4. Set desired Maximum Mow Speed.
5. Set desired Fixed Reel Speed.

NOTE: Mow speed is measured in mph (kph), FOC is measured in inches (millimeters).

15 Blade Reel FOC Table

Mow Speed	Reel RPM								
	1800	1850	1900	1950	2000	2050	2100	2150	2200
MPH (KPH)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)
1.0	0.039	0.038	0.037	0.036	0.035	0.034	0.034	0.033	0.032
(1.61)	(0.993)	(0.967)	(0.941)	(0.917)	(0.894)	(0.872)	(0.852)	(0.832)	(0.813)
1.25	0.049	0.048	0.046	0.045	0.044	0.043	0.042	0.041	0.040
(2.01)	(1.242)	(1.208)	(1.176)	(1.146)	(1.118)	(1.090)	(1.064)	(1.040)	(1.016)
1.50	0.059	0.057	0.056	0.054	0.053	0.052	0.050	0.049	0.048
(2.41)	(1.490)	(1.450)	(1.412)	(1.376)	(1.341)	(1.308)	(1.277)	(1.248)	(1.219)
1.75	0.068	0.067	0.065	0.063	0.062	0.060	0.059	0.057	0.056
(2.82)	(1.738)	(1.692)	(1.647)	(1.605)	(1.565)	(1.526)	(1.490)	(1.455)	(1.422)
2.00	0.078	0.076	0.074	0.072	0.070	0.069	0.067	0.065	0.064
(3.22)	(1.987)	(1.933)	(1.882)	(1.834)	(1.788)	(1.745)	(1.703)	(1.663)	(1.626)
2.25	0.088	0.086	0.083	0.081	0.079	0.077	0.075	0.074	0.072
(3.62)	(2.235)	(2.175)	(2.118)	(2.063)	(2.012)	(1.963)	(1.916)	(1.871)	(1.829)
2.50	0.098	0.095	0.093	0.090	0.088	0.086	0.084	0.082	0.080
(4.02)	(2.484)	(2.416)	(2.353)	(2.293)	(2.235)	(2.181)	(2.129)	(2.079)	(2.032)
2.75	0.108	0.105	0.102	0.099	0.097	0.094	0.092	0.090	0.088
(4.43)	(2.732)	(2.658)	(2.588)	(2.522)	(2.459)	(2.399)	(2.342)	(2.287)	(2.235)
3.00	0.117	0.114	0.111	0.108	0.106	0.103	0.101	0.098	0.096
(4.83)	(2.980)	(2.900)	(2.823)	(2.751)	(2.682)	(2.617)	(2.555)	(2.495)	(2.438)
3.25	0.127	0.124	0.120	0.117	0.114	0.112	0.109	0.106	0.104
(5.23)	(3.229)	(3.141)	(3.059)	(2.980)	(2.906)	(2.835)	(2.767)	(2.703)	(2.642)
3.50	0.137	0.133	0.130	0.126	0.123	0.120	0.117	0.115	0.112
(5.63)	(3.477)	(3.383)	(3.294)	(3.210)	(3.129)	(3.053)	(2.980)	(2.911)	(2.845)
3.75	0.147	0.143	0.139	0.135	0.132	0.129	0.126	0.123	0.120
(6.04)	(3.725)	(3.625)	(3.529)	(3.439)	(3.353)	(3.271)	(3.193)	(3.119)	(3.048)
4.00	0.156	0.152	0.148	0.144	0.141	0.137	0.134	0.131	0.128
(6.44)	(3.974)	(3.866)	(3.765)	(3.668)	(3.576)	(3.489)	(3.406)	(3.327)	(3.251)
4.25	0.166	0.162	0.157	0.153	0.150	0.146	0.142	0.139	0.136
(6.84)	(4.222)	(4.108)	(4.000)	(3.897)	(3.800)	(3.707)	(3.619)	(3.535)	(3.454)

Mow Speed	Reel RPM								
	1800	1850	1900	1950	2000	2050	2100	2150	2200
MPH (KPH)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)
4.50	0.176	0.171	0.167	0.162	0.158	0.155	0.151	0.147	0.144
(7.24)	(4.470)	(4.350)	(4.235)	(4.127)	(4.023)	(3.925)	(3.832)	(3.743)	(3.658)

11 Blade Reel FOC Table

Mow Speed	Reel RPM								
	1800	1850	1900	1950	2000	2050	2100	2150	2200
MPH (KPH)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)
1.0 (1.61)	0.053 (1.355)	0.052 (1.318)	0.051 (1.283)	0.049 (1.250)	0.048 (1.219)	0.047 (1.189)	0.046 (1.161)	0.045 (1.134)	0.044 (1.108)
1.25 (2.01)	0.067 (1.693)	0.065 (1.648)	0.063 (1.604)	0.062 (1.563)	0.060 (1.524)	0.059 (1.487)	0.057 (1.451)	0.056 (1.418)	0.055 (1.385)
1.50 (2.41)	0.080 (2.032)	0.078 (1.977)	0.076 (1.925)	0.074 (1.876)	0.072 (1.829)	0.070 (1.784)	0.069 (1.742)	0.067 (1.701)	0.065 (1.663)
1.75 (2.82)	0.093 (2.371)	0.091 (2.307)	0.088 (2.246)	0.086 (2.188)	0.084 (2.134)	0.082 (2.082)	0.080 (2.032)	0.078 (1.985)	0.076 (1.940)
2.00 (3.22)	0.107 (2.709)	0.104 (2.636)	0.101 (2.567)	0.098 (2.501)	0.096 (2.438)	0.094 (2.379)	0.091 (2.322)	0.089 (2.268)	0.087 (2.217)
2.25 (3.62)	0.120 (3.048)	0.117 (2.966)	0.114 (2.888)	0.111 (2.814)	0.108 (2.743)	0.105 (2.676)	0.103 (2.613)	0.100 (2.552)	0.098 (2.494)
2.50 (4.02)	0.133 (3.387)	0.130 (3.295)	0.126 (3.208)	0.123 (3.126)	0.120 (3.048)	0.117 (2.974)	0.114 (2.903)	0.112 (2.835)	0.109 (2.771)
2.75 (4.43)	0.147 (3.725)	0.143 (3.625)	0.139 (3.529)	0.135 (3.439)	0.132 (3.353)	0.129 (3.271)	0.126 (3.193)	0.123 (3.119)	0.120 (3.048)
3.00 (4.83)	0.160 (4.064)	0.156 (3.954)	0.152 (3.850)	0.148 (3.751)	0.144 (3.658)	0.140 (3.568)	0.137 (3.483)	0.134 (3.402)	0.131 (3.325)
3.25 (5.23)	0.173 (4.403)	0.169 (4.284)	0.164 (4.171)	0.160 (4.064)	0.156 (3.962)	0.152 (3.866)	0.149 (3.774)	0.145 (3.686)	0.142 (3.602)
3.50 (5.63)	0.187 (4.741)	0.182 (4.613)	0.177 (4.492)	0.172 (4.377)	0.168 (4.267)	0.164 (4.163)	0.160 (4.064)	0.156 (3.969)	0.153 (3.879)
3.75 (6.04)	0.200 (5.080)	0.195 (4.943)	0.189 (4.813)	0.185 (4.689)	0.180 (4.572)	0.176 (4.460)	0.171 (4.354)	0.167 (4.253)	0.164 (4.156)
4.00 (6.44)	0.213 (5.419)	0.208 (5.272)	0.202 (5.133)	0.197 (5.002)	0.192 (4.877)	0.187 (4.758)	0.183 (4.645)	0.179 (4.537)	0.175 (4.433)

Mow Speed	Reel RPM								
	1800	1850	1900	1950	2000	2050	2100	2150	2200
MPH (KPH)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)
4.25 (6.84)	0.227 (5.757)	0.221 (5.602)	0.215 (5.454)	0.209 (5.314)	0.204 (5.182)	0.199 (5.055)	0.194 (4.935)	0.190 (4.820)	0.185 (4.711)
4.50 (7.24)	0.240 (6.096)	0.234 (5.931)	0.227 (5.775)	0.222 (5.627)	0.216 (5.486)	0.211 (5.353)	0.206 (5.225)	0.201 (5.104)	0.196 (4.988)

9 Blade Reel FOC Table

Mow Speed	Reel RPM								
	1800	1850	1900	1950	2000	2050	2100	2150	2200
MPH (KPH)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)
1.0 (1.61)	0.065 (1.656)	0.063 (1.611)	0.062 (1.569)	0.060 (1.528)	0.059 (1.490)	0.057 (1.454)	0.056 (1.419)	0.055 (1.386)	0.053 (1.355)
1.25 (2.01)	0.081 (2.070)	0.079 (2.014)	0.077 (1.961)	0.075 (1.910)	0.073 (1.863)	0.072 (1.817)	0.070 (1.774)	0.068 (1.733)	0.067 (1.693)
1.50 (2.41)	0.098 (2.484)	0.095 (2.416)	0.093 (2.353)	0.090 (2.293)	0.088 (2.235)	0.086 (2.181)	0.084 (2.129)	0.082 (2.079)	0.080 (2.032)
1.75 (2.82)	0.114 (2.897)	0.111 (2.819)	0.108 (2.745)	0.105 (2.675)	0.103 (2.608)	0.100 (2.544)	0.098 (2.484)	0.096 (2.426)	0.093 (2.371)
2.00 (3.22)	0.130 (3.311)	0.127 (3.222)	0.124 (3.137)	0.120 (3.057)	0.117 (2.980)	0.114 (2.908)	0.112 (2.838)	0.109 (2.772)	0.107 (2.709)
2.25 (3.62)	0.147 (3.725)	0.143 (3.625)	0.139 (3.529)	0.135 (3.439)	0.132 (3.353)	0.129 (3.271)	0.126 (3.193)	0.123 (3.119)	0.120 (3.048)
2.50 (4.02)	0.163 (4.139)	0.159 (4.027)	0.154 (3.921)	0.150 (3.821)	0.147 (3.725)	0.143 (3.634)	0.140 (3.548)	0.136 (3.465)	0.133 (3.387)
2.75 (4.43)	0.179 (4.553)	0.174 (4.430)	0.170 (4.314)	0.165 (4.203)	0.161 (4.098)	0.157 (3.998)	0.154 (3.903)	0.150 (3.812)	0.147 (3.725)
3.00 (4.83)	0.196 (4.967)	0.190 (4.833)	0.185 (4.706)	0.181 (4.585)	0.176 (4.470)	0.172 (4.361)	0.168 (4.258)	0.164 (4.159)	0.160 (4.064)
3.25 (5.23)	0.212 (5.381)	0.206 (5.236)	0.201 (5.098)	0.196 (4.967)	0.191 (4.843)	0.186 (4.725)	0.182 (4.612)	0.177 (4.505)	0.173 (4.403)
3.50 (5.63)	0.228 (5.795)	0.222 (5.638)	0.216 (5.490)	0.211 (5.349)	0.205 (5.215)	0.200 (5.088)	0.196 (4.967)	0.191 (4.852)	0.187 (4.741)
3.75 (6.04)	0.244 (6.209)	0.238 (6.041)	0.232 (5.882)	0.226 (5.731)	0.220 (5.588)	0.215 (5.452)	0.210 (5.322)	0.205 (5.198)	0.200 (5.080)
4.00 (6.44)	0.261 (6.623)	0.254 (6.444)	0.247 (6.274)	0.241 (6.113)	0.235 (5.961)	0.229 (5.815)	0.223 (5.677)	0.218 (5.545)	0.213 (5.419)
4.25	0.277	0.270	0.262	0.256	0.249	0.243	0.237	0.232	0.227

Mow Speed	Reel RPM								
	1800	1850	1900	1950	2000	2050	2100	2150	2200
MPH (KPH)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)
(6.84)	(7.037)	(6.847)	(6.666)	(6.495)	(6.333)	(6.179)	(6.031)	(5.891)	(5.757)
4.50	0.293	0.285	0.278	0.271	0.264	0.258	0.251	0.246	0.240
(7.24)	(7.451)	(7.249)	(7.059)	(6.878)	(6.706)	(6.542)	(6.386)	(6.238)	(6.096)

7 Blade Reel FOC Table

Mow Speed	Reel RPM								
	1800	1850	1900	1950	2000	2050	2100	2150	2200
MPH (KPH)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)
1.0 (1.61)	0.084 (2.129)	0.082 (2.071)	0.079 (2.017)	0.077 (1.965)	0.075 (1.916)	0.074 (1.869)	0.072 (1.825)	0.070 (1.782)	0.069 (1.742)
1.25 (2.01)	0.105 (2.661)	0.102 (2.589)	0.099 (2.521)	0.097 (2.456)	0.094 (2.395)	0.092 (2.336)	0.090 (2.281)	0.088 (2.228)	0.086 (2.177)
1.50 (2.41)	0.126 (3.193)	0.122 (3.107)	0.119 (3.025)	0.116 (2.948)	0.113 (2.874)	0.110 (2.804)	0.108 (2.737)	0.105 (2.673)	0.103 (2.613)
1.75 (2.82)	0.147 (3.725)	0.143 (3.625)	0.139 (3.529)	0.135 (3.439)	0.132 (3.353)	0.129 (3.271)	0.126 (3.193)	0.123 (3.119)	0.120 (3.048)
2.00 (3.22)	0.168 (4.258)	0.163 (4.142)	0.159 (4.033)	0.155 (3.930)	0.151 (3.832)	0.147 (3.738)	0.144 (3.649)	0.140 (3.564)	0.137 (3.483)
2.25 (3.62)	0.189 (4.790)	0.183 (4.660)	0.179 (4.538)	0.174 (4.421)	0.170 (4.311)	0.166 (4.206)	0.162 (4.105)	0.158 (4.010)	0.154 (3.919)
2.50 (4.02)	0.210 (5.322)	0.204 (5.178)	0.198 (5.042)	0.193 (4.913)	0.189 (4.790)	0.184 (4.673)	0.180 (4.562)	0.175 (4.456)	0.171 (4.354)
2.75 (4.43)	0.230 (5.854)	0.224 (5.696)	0.218 (5.546)	0.213 (5.404)	0.207 (5.269)	0.202 (5.140)	0.198 (5.018)	0.193 (4.901)	0.189 (4.790)
3.00 (4.83)	0.251 (6.386)	0.245 (6.214)	0.238 (6.050)	0.232 (5.895)	0.226 (5.748)	0.221 (5.607)	0.216 (5.474)	0.210 (5.347)	0.206 (5.225)
3.25 (5.23)	0.272 (6.918)	0.265 (6.731)	0.258 (6.554)	0.251 (6.386)	0.245 (6.227)	0.239 (6.075)	0.233 (5.930)	0.228 (5.792)	0.223 (5.661)
3.50 (5.63)	0.293 (7.451)	0.285 (7.249)	0.278 (7.059)	0.271 (6.878)	0.264 (6.706)	0.258 (6.542)	0.251 (6.386)	0.246 (6.238)	0.240 (6.096)
3.75 (6.04)	0.314 (7.983)	0.306 (7.767)	0.298 (7.563)	0.290 (7.369)	0.283 (7.185)	0.276 (7.009)	0.269 (6.842)	0.263 (6.683)	0.257 (6.531)
4.00 (6.44)	0.335 (8.515)	0.326 (8.285)	0.318 (8.067)	0.309 (7.860)	0.302 (7.664)	0.294 (7.477)	0.287 (7.299)	0.281 (7.129)	0.274 (6.967)

Mow Speed	Reel RPM								
	1800	1850	1900	1950	2000	2050	2100	2150	2200
MPH (KPH)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)	Inch (cm)
4.25 (6.84)	0.356 (9.047)	0.347 (8.803)	0.337 (8.571)	0.329 (8.351)	0.321 (8.143)	0.313 (7.944)	0.305 (7.755)	0.298 (7.574)	0.291 (7.402)
4.50 (7.24)	0.377 (9.579)	0.367 (9.321)	0.357 (9.075)	0.348 (8.843)	0.339 (8.621)	0.331 (8.411)	0.323 (8.211)	0.316 (8.020)	0.309 (7.838)

ELECTRONIC TRACTION CONTROL SYSTEM

The Eclipse is equipped with an electronic traction control system which utilizes a controller and software to regulate speed and optimize the driveability of the unit. A speed sensor in the drive motor reports the exact vehicle speed to the controller which electronically controls the drive motor to maintain a smooth and constant speed whether the unit is going uphill or downhill.

When the direction/speed pedal is returned to Neutral, the controller uses regenerative braking by essentially turning the drive motor into a generator and putting energy back into the battery pack or automatically adjusting the engine throttle on hybrid powered mowers to control proper generator output.

To prevent an over-voltage condition, any excess power created by the regenerative action is sent through the resistor banks located on the right side of the machine. System voltage over 60 VDC could cause damage to the controllers.

PARKING BRAKE

The Eclipse mower is equipped with a parking brake. When the parking brake is applied, the parking brake light on the LDU will be lit. The parking brake is applied whenever the parking brake switch is ON.

To disengage parking brake: The parking brake will disengage when the parking brake switch is in the OFF position.

To engage parking brake: To engage the parking brake, move the parking brake switch on the console to the ON position.

LIFT SYSTEM

The Eclipse 360 lift system operates in one of two modes, service mode and mow mode, depending on the position of the mow switch **(B)**.

Service Mode - Service mode is active with mow switch **(B)** in OFF (down) position and parking brake engaged. Service mode is used to raise or lower the individual reels for servicing, without activating reel motors. Push forward on joystick **(J)** to lower reels, or pull back on joystick to raise reels. Only reels with corresponding reel switches **(C, D, or E)** in the ON position will lower.

If reels are lowered or in the crosscut position, mow switch is off, and mower starts moving, reels will automatically raise to the transport position.

NOTICE

A ratcheting sound will come from the lift actuators if joystick (J) is pulled back with reels fully raised. The sound is produced by a clutch in the actuator, and is designed to prevent damage to the actuator.

Mow Mode - Mow mode is active with mow switch **(B)** in ON (up) position. Reels will automatically lower to crosscut position when mow switch is turned ON. Push forward and release joystick **(J)** to fully lower reels and activate reel motors. Pull back on joystick and release to raise reels to crosscut position and deactivate reel motors. Pull back and release a second time to fully raise reels to transport position.

Only reels with corresponding reel switches **(C, D, or E)** in the ON position will lower and activate reel motors. This allows operation of one, two, or all three reels, depending on area to be cut or operation being performed (clean up pass, etc.).

NOTE: When operating, depending on mower speed, there will be up to a two second delay before center reel raises or lowers. See Center Reel Delay on page 49.

If reel(s) fail to raise in mow mode, or an error code appears in the LDU, stop mower, push down on mow switch **(B)**, and try to raise the reel in service mode. Return mower to the service area to have the lift system inspected.

Notes:

OPERATIONS

DAILY INSPECTION

⚠ CAUTION

The daily inspection should be performed only when the system power is off. Turn mow switch OFF, lower reels to the ground, turn system power switch to OFF position, and remove the key.

1. Perform a visual inspection of the entire unit, look for signs of wear, loose hardware, and missing or damaged components. Check for fuel or oil leaks to ensure connections are tight and hoses and tubes are in good condition.
2. Make sure all mowers are adjusted to the same cutting height.
3. Check tires for proper inflation.
4. Test the Interlock System.

NOTICE: For more detailed maintenance information, adjustments and maintenance/lube charts, see the Parts & Maintenance manual.

INTERLOCK SYSTEM

1. The Interlock System prevents the mower from starting unless the operator is in the seat, mow switch is OFF, and the traction pedal is in Neutral. The system also disables the mow, traction, and steering functions without the operator in the seat.

⚠ WARNING

Never operate equipment with the Interlock System disconnected or malfunctioning. Do not disconnect or bypass any switch.

2. Perform each of the following tests to insure the Interlock System is functioning properly. Stop the test and have the system inspected and repaired if any of the tests **fail** as listed below:
   - lthe system **does not** start in test 1;
   - lthe system **does** start in test 4;
   - lthe traction function **is not disabled** in test 3;
   - lthe mow, traction, and steering functions **are not disabled** during test 2 and 5.
3. Refer to the chart below for each test and follow the check (4) marks across the chart. Shut engine off between each test.
   a. ***Test 1:*** Represents normal starting procedure. The operator is seated, mow switch is OFF, and the traction pedal is in Neutral. The mower should start.
   b. Test 2: The mower must start with mow, traction, and steering functions disabled if operator is not in the seat.
   c. ***Test 3:*** The mower must start with traction function disabled if the traction pedal is not in Neutral. Traction function will be disabled until traction pedal is returned to Neutral.
   d. ***Test 4:*** The mower must not start if the mow switch is ON.
   e. ***Test 5:*** Start the mower in the normal manner then lift your weight off the seat. Mow, traction, and steering functions should be disabled until operator sits back in seat.

Interlock System Check

Test	Operator Seated		Traction Pedal in Neutral		Mow Switch OFF		System Starts	
	Yes	No	Yes	No	Yes	No	Yes	No
1	✔		✔		✔		✔	
2		✔	✔		✔		★	
3	✔			✔	✔		★★	
4	✔		✔			✔		✔
5	✔	★	✔		✔		★	

H The mow, traction, and steering functions are disabled without operator in seat.

HH System starts with traction function disabled until traction pedal is returned to Neutral.

OPERATING PROCEDURES

⚠ WARNING

A Roll Over Protection Structure (ROPS) for this mower is standard equipment. Seat belts must always be worn. Always keep seat belt snugly adjusted.

If the mower is overturning, hold onto the steering wheel. Do not attempt to jump out or leave the seat.

⚠ CAUTION

To prevent injury, always wear safety glasses, leather work shoes or boots, a hard hat, and ear protection.

- Under no circumstances should the engine be started without the operator seated on the mower.
- Do not operate mower or attachments with loose, damaged, or missing components. Whenever possible mow when grass is dry.
- First mow in a test area to become thoroughly familiar with the operation of the mower and controls.

NOTICE

To prevent damage to the reel and bedknife, never operate reels when they are not cutting grass. Heat will develop between the bedknife and reel and damage the cutting edge.

- Study the area to determine the best and safest operating procedure. Consider the height of the grass, type of terrain, location of any drop offs or sandtraps, and condition of the surface. Each condition will require certain adjustments or precautions.
- Never direct discharge of material toward bystanders, nor allow anyone near the mower while in operation. The owner/operator is responsible for injuries inflicted to bystanders and/or damage to their property.

⚠ CAUTION

Before mowing, pick up all debris such as rocks, toys, sticks, and wire which can be thrown by the mower. Enter a new area cautiously. Always operate at speeds that allow you to have complete control of the mower.

- Use discretion when mowing near gravel areas (roadway, parking areas, cart paths, etc.). Stones discharged from the implement may cause serious injuries to bystanders and/or damage the equipment.
- Always turn mow switch OFF to stop blades when not mowing.
- Turn mow switch OFF and raise the reels when crossing paths or roadways. Look out for traffic.
- Stop and inspect the equipment for damage immediately after striking an obstruction or if the mower begins to vibrate abnormally. Have the equipment repaired before resuming operation.

⚠ WARNING

Before you clean, adjust, or repair this equipment, always disengage all drives, lower implements to the ground, turn system power switch to OFF position, and remove key to prevent injuries.

- Slow down and use extra care on hillsides. See *Hillside Operation* on page 51. Use caution when operating near drop offs.
- Look behind and down before backing up to be sure the path is clear. Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.
- Never use your hands to clean reels. Use a brush to remove grass clippings from blades. Blades are extremely sharp and can cause serious injuries.

STARTING

1. Sit in operator's seat, make sure mow switch is OFF, and traction pedal is in Neutral. See *INSTRUMENT PANEL* on page 20, See *OPERATOR CONTROLS* on page 22.
2. Turn system power switch to RUN. Steering controller will initialize, LDU will display Jacobsen start up screen, and all lights on LDU will be on for two seconds.

⚠ WARNING

When steering controller initializes, the rear steering motor will turn slightly. To prevent injury, do not turn power switch to RUN with hood open or performing work on steering system.

   - After LDU initializes, green power light will be flashing two times per second and parking brake light will be on. Engine oil pressure light will be on for diesel and gasoline power modules.
3. Turn system power switch to START position.

- Battery Power Module: Release key, green power light will be solid on and traction and mow systems will be active.

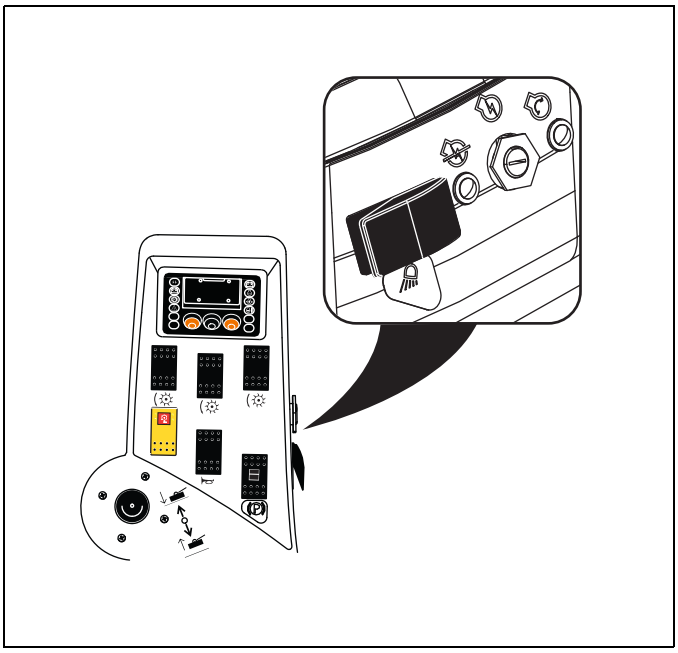


Fig. 1

STOPPING / PARKING

To stop:

Remove your foot from traction pedal, regen braking will start, bringing the mower to a complete stop. When mower stops, move the parking brake switch to the ON position. The parking brake will engage and the parking brake light on the LDU will turn on.

To park the mower under normal conditions:

1. Disengage the mow switch, raise the implements, and move away from the area of operation.
2. Select a flat and level area to park.

- Release traction pedal to bring the mower to a complete stop.
- Move the parking brake switch to the ON position The parking brake light should come on.
- Disengage all drives, lower reels to the ground.

3. Turn system power switch to OFF position, and always remove key.

If an emergency arises and the mower must be parked in the area of operation, follow the guidelines outlined by the grounds superintendent. If the mower is parked on an incline, chock or block the wheels.

TO DRIVE / TRANSPORT

Read and follow all safety notes contained in this manual when driving or transporting mower. ***See Operating Procedures*** on page 46 for general operating instructions. When operating in reverse, look behind you to ensure you have a clear path.

Important: If this mower is driven on public roads, it must comply with federal, state, and local ordinances. Contact local authorities for regulations and equipment requirements.

1. Disengage mow switch. Reels will automatically raise to the transport position once mower starts moving.
2. Depress traction pedal slowly.
3. Move the parking brake switch to the OFF position. The parking brake should disengage and mower will start moving.

⚠ CAUTION

To prevent tipping or loss of control, travel at reduced speed when making turns.

CENTER REEL DELAY

The raising and lowering of the center reel is slightly delayed from the front reels. When mowing, this allows the center reel to contact the ground at the same location as the front reels, resulting in an accurate cut.

The length of delay is automatically adjusted for any change in vehicle speed, which is determined by the speed sensor in the drive motor. If the unit is not in motion or if there is no speed sensor signal, the center reel delay will default to a time of approximately 2 seconds. There is no delay when lift system is in service mode (Mow switch is OFF).

OVERLOAD PROTECTION

The reel drive motors and lift actuators are controlled by the RCU. The RCU has built–in overload protection and will disable the motor or actuator if it is drawing too much electrical current.

If there is an overload on a reel drive motor, the circuit breaker will trip, the motor will be disabled, the reel will raise to the up position and the fault light on the LDU will flash two times per second.

If there is an overload on a lift actuator, the actuator will be disabled and the fault light on the LDU will flash two times per second.

To reset an overload fault condition, the mower must be shut down and re-started. If the problem persists, inspect the device and the electrical system to determine the cause of the overload or contact an authorized Jacobsen dealer.

MOWING

⚠ WARNING

To prevent serious injuries, keep hands, feet, and clothing away from reel when the blades are moving.

NEVER use your hands to clean reels. Use a brush to remove grass clippings from blades. Blades can be sharp and could cause injuries.

To clear obstructions from reel, turn mow switch OFF, stop the mower, turn system power switch to OFF, and remove key, then remove obstruction.

NOTICE

To prevent damage to the reel and bedknife, never operate reels when they are not cutting grass.

Operators should practice mowing in a clear area to become familiar with raising and lowering the reels. Practicing, by turning reel motors off **(See *Operator Mode*** on page 28**)**, will help the operator become proficient at starting and stopping each pass within a foot or two of the edge of the green. Then only one final pass around the green will be required to finish the operation.

NOTICE

Always remove the flag and inspect the green before mowing. Remove debris or other objects that may damage the reels and/or bedknives.

Several factors may determine the direction of the mowing pattern. Sand traps or other hazards near the green and trees or other objects can restrict where turns are made. The terrain of the green may also be a factor, but if conditions allow, always try to mow the green in a different direction than the last time it was mowed.

1. Stop the unit just before reaching the green and raise the reels. Set the mow switch to ON.
2. Proceed toward the green at mowing speed. **See *Frequency of Cut*** on page 34 for matching mowing speed to desired Frequency of Cut.
3. Lower the reels as the front grass catchers cross the edge of the green. At the end of the pass, raise the reels as the just before grass catchers cross the edge of the green.
4. Always make mowing passes across the green in a straight line. Do NOT start to make the turn for the next pass until the center wheel is off the green, this will eliminate the possibility of the tires tearing the turf during the turn.
5. Each successive pass should overlap the previous one by a few inches.
6. After all of the straight passes have been made, make one final pass around the outer edge of the green. This final pass should always be in the opposite direction from the last time the green was mowed.
7. Empty the grass catchers before proceeding to the next green. To remove or install the grass catchers, turn mow switch OFF, lower the reels to the ground, and shut off the unit. Tilt the grass catcher body so the front edge clears the mower frame, and slide the catcher onto or off the catcher frame.
8. Stop and raise the mowers to the transport position when crossing paths or roadways. Look out for traffic.

NOTICE

To avoid damage to the green, NEVER stop the forward motion of the mower while on the green with the reels turning. Stopping the mower on a wet green may cause wheel indentations.

NOTICE

When verticutting with the Eclipse 360 Jacobsen recommends setting the reel speed at 1800 rpm. If the reel motor temperature or current exceeds limits, reduce ground speed of mower, reduce reel speed, or adjust verticutter depth.

HILLSIDE OPERATION

⚠ WARNING

To minimize the possibility of overturning, the safest method for operating on hills and terraces is to travel up and down the face of the slope (vertically), not across the face (horizontally). Avoid unnecessary turns, travel at reduced speeds, and stay alert for hidden hazards and drop offs.

⚠ CAUTION

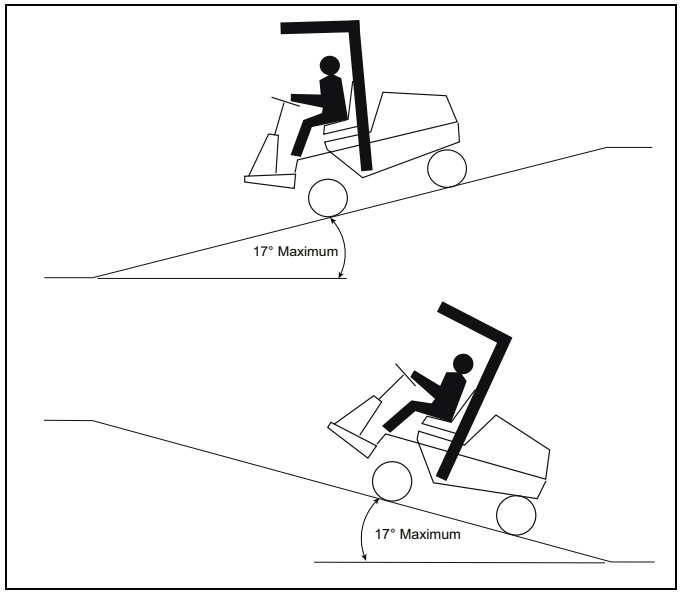
Do not operate this mower on side slopes greater than 17° or 31% grade.

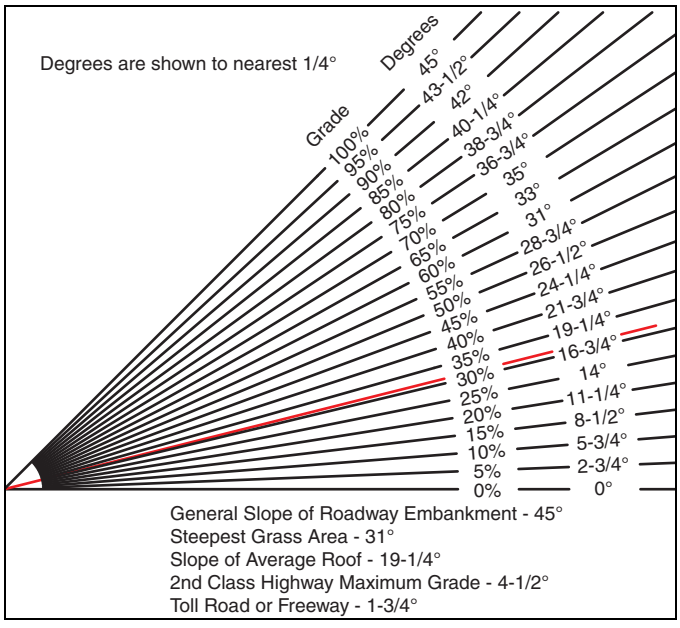
The mower has been designed for good traction and stability under normal mowing conditions; however, use caution when operating on slopes, especially over rough terrain or when the grass is wet. Wet grass reduces traction and steering control.

- If the mower tends to slide or the tires begin to “mark” the turf, angle mower into a less steep grade until traction is regained or tire marking stops.
- If mower continues to slide or mark the turf, the grade is too steep for safe operation. Do not make another attempt to climb, and back down slowly.

Correct tire pressure is essential for maximum traction.

- Front - 16 psi (1.11 BAR)
- Rear - 20 psi (1.38 BAR)





How to calculate a slope

Tools Required:

Level (A), either ..... 1 yard, or 1 meter long.
Tape measure (B).....1.

1. With the level **(A)** positioned horizontally, measure the distance **(C)** with tape measure **(B)**.
2. Use the chart to calculate either the slope angle or the % grade of the slope **(D)**.

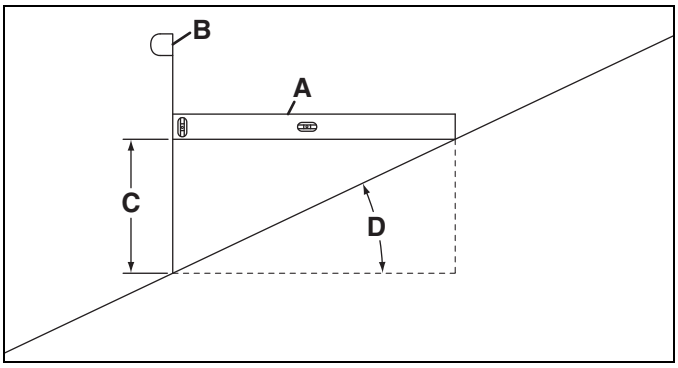


Fig. 2

Height (C)		Result (D)	
Inches with 1 Yard Level (A)	**Millimeters with 1 Meter Level (A)**	**Slope in Degrees**	**Slope Grade %**
3		4.8	8.3
	100	5.7	10.0
	150	8.5	15
6		9.5	16.7
	200	11.3	20.0
7.5		11.8	20.8
	225	12.7	22.5
9	250	14	25.0
	275	15.4	27.5
10		15.5	27.8
	300	16.7	30.0
11		17.0	30.6
	325	18.0	32.5
12		18.4	33.3
	350	19.3	35.0
13		19.9	36.1
	375	20.6	37.5
14		21.3	38.9
	400	21.8	40.0
15		22.6	41.7
	425	23.0	42.5
16		24	44.4
	475	25.4	47.5
18	500	26.6	50.0
20		29.1	55.6

Height (C)		Result (D)	
Inches with 1 Yard Level (A)	Millimeters with 1 Meter Level (A)	Slope in Degrees	Slope Grade %
	600	31.0	60.0
25		34.8	69.4
	800	38.7	80.0
30		39.8	83.3
	900	42.0	90
36	1000	45.0	100

LOADING MOWER ON TRAILER

Use care when loading and unloading mower onto trailer. Fasten mower to trailer, using tie downs on left and right side and rear of mower, to prevent mower from rolling or shifting during transport.

If the mower experiences problems and must be shut down and removed from the area, it should be towed back to the maintenance area, or loaded onto a trailer for transport. **See *Towing Mower*** on page 54 for towing instructions.

Fully raise reels before driving up trailer ramp. Lift arms must be in lift locks and bumpers properly adjusted to prevent damage to reels, mower, or other objects.

If the mower is to be trailered on the highway, before strapping to trailer, inflate tires to 22 psi (1.5 BAR). After unloading mower, reduce tire pressure to normal operating pressure. **See *Tires*** on page 69**.**

Always secure armrest cover in closed position with a strap when transporting.

NOTICE

Failure to properly secure armrest cover in the closed position when transporting may result in armrest cover damage.

Make certain key switch is in OFF position and key removed.

If mower is unable to drive onto trailer on its own power, follow this procedure:

1. Follow procedure for disengaging parking brake. **See *Towing Mower*** on page 54**.**
2. Make sure reels are raised. If they cannot be raised, remove them from the mower.
3. Make certain key switch is in OFF position and key removed.
4. Use a winch or other device to load mower onto trailer. Mower must be moved in a straight line to prevent damage to steering system.
5. Use tie down at rear of mower for attaching winch. If front tie downs must be used, winch must be connected to both the left and right tie downs.
6. With mower strapped down to trailer, remove brake release harness. Brake must be disengaged again before unloading mower.
7. Carefully unload mower from trailer using a winch or other device to slowly get mower down trailer ramp. Mower brakes have been disabled and are not able to stop mower.

⚠ WARNING

To prevent injury, keep bystanders away when loading or unloading a disabled mower on trailer. Mower brakes have been disabled and may not be used to stop mower.

Do not attempt to roll mower down trailer ramp without use of winch or similar device to restrain mower.

8. After unloading mower, remove brake release harness.

NOTICE: Do Not operate mower with parking brake disabled or removed.

TOWING MOWER

If the mower experiences problems and a trailer is not available, the unit can be towed slowly for short distances.

1. The parking brake must be disengaged.

⚠ WARNING

If mower is on an incline, chock or block the wheels before manually disengaging parking brake. Mower will roll with parking brake disengaged.

Towing vehicle must be capable of stopping mower without assistance from mower brakes.

- Disconnect battery pack electrical connector.
- Disconnect brake electrical connector **(ZX)**.
- Connect brake release harness to battery pack and brake. The parking brake should disengage.
- If the battery pack does not have enough power to disengage the brake, remove three screws **(ZY)** and remove the parking brake **(ZZ)** from the drive motor.

2. Open hood, remove four thumbscrews **(ZU)**, and lift steering cover **(ZV)** off mower.
3. Remove steering chain master link **(ZW)**. Remove chain from steering motor.
4. Attach tow bar accessory, Part No. 62811, to rear steering yoke (Refer to tow bar instruction sheet). Do not use tow strap to tow mower. Connect other end of tow bar to towing vehicle equipped with 1-7/8 in. ball hitch and vehicle tow bar 10-15 in. (25.4 - 38.1cm) from ground.
5. Before towing make sure reels are raised. If they cannot be raised, remove them from the mower.
6. Make certain key switch is in off position and key is removed.

⚠ WARNING

To prevent injury or damage to mower, do not tow mower with system power switch in RUN position.

NOTICE

Do not exceed 2 MPH (3.2 KPH) while towing. Long distance towing is not recommended.

- Use caution when towing. Avoid steep inclines. Steep inclines may cause tow bar to contact and damage hood and hood hinges. To prevent damage to steering yoke, avoid turns that will cause rear wheel to turn more than 55° in either direction.

- After towing mower, remove tow bar accessory, attach steering chain, remove brake release harness, connect brake electrical connector **(ZX)**, and connect battery pack connector.

⚠ WARNING

Do Not operate mower with parking brake manually disengaged.

Remove brake release harness and connect steering chain before returning mower to normal operation.

NOTICE

If brake electrical connector is disconnected, and mower is started, then brake light will turn off, and mower will not move under traction power.

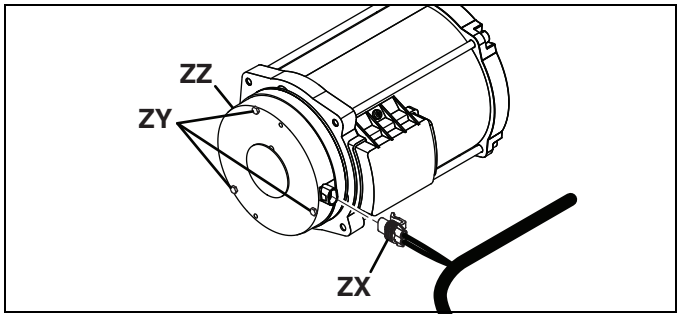


Fig. 3

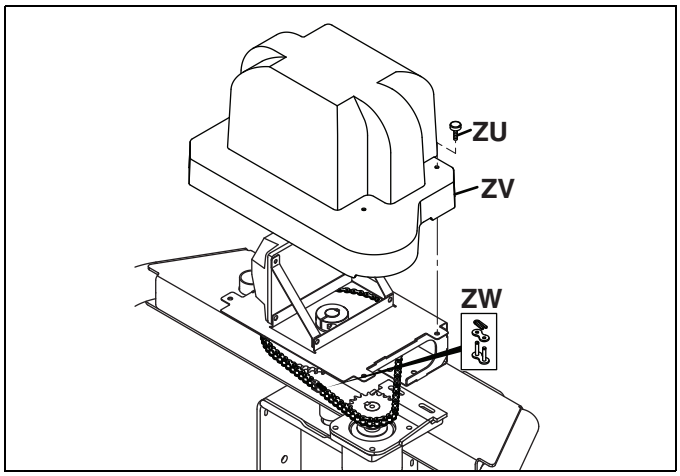


Fig. 4

DAILY MAINTENANCE

IMPORTANT: For more detailed maintenance information, adjustments and maintenance/lubrication charts, see the Parts & Maintenance manual.

1. Park the mower on a flat, level surface. Fully lower the reels to the ground, stop the engine and remove key from ignition switch.
2. Grease and lubricate all points if required. Lubricate with grease that meets or exceeds NLGI Grade 2 LB specifications. Apply grease with a manual grease gun and fill slowly until grease begins to seep out. Do not use compressed air.

NOTICE

To prevent damage to reel motor, do not over-grease reel bearings. Damage of this nature is not covered by the factory warranty.

3. To prevent fires, clean the reels and mower after each use.

- Whenever possible, use compressed air to clean mower.
- Use only fresh water for cleaning your equipment.

NOTICE

Use of salt water or effluent water has been known to encourage rust and corrosion of metal parts resulting in premature deterioration or failure. Damage of this nature is not covered by the factory warranty.

NOTICE

Do not use high pressure spray.

- Do not pressure wash mower.
- Do not spray water directly at instrument panel, electrical connectors, generator, controllers, motors, or any other electrical components.
- Do not spray water into the cooling air intake or the engine air intake.

NOTICE

Do not wash a hot or running engine. Use compressed air to clean the mower, engine and radiator fins to reduce the potential for corrosion and moisture contamination.

- Clean all plastic or rubber components with a mild soap solution and warm water, or use commercially available vinyl/rubber cleaners.

4. Remove any dirt or other debris from both steering proximity switches.

Battery Powered Mowers:

- Disconnect power connector and connect battery pack to charger.

MAINTENANCE AND LUBRICATION CHARTS

GENERAL

⚠ WARNING

Before you clean, adjust, or repair this equipment, disengage all drives, lower implements to the ground, engage parking brake, stop engine and remove key from ignition switch to prevent injuries

- Always clean the grease fitting before and after lubricating.
- Lubricate with grease that meets or exceeds NLGI Grade 2 LB specifications. Apply grease with a manual grease gun and fill slowly until grease begins to seep out. Do not use compressed air guns.
- Periodically apply a small amount of lithium based grease to the seat runners.
- For smooth operation of all levers, pivot points and other friction points that are not shown on the lubrication chart apply several drops of SAE 30 oil every 40 hours or as required.
- Grease fittings **(F1)** every 50 hours, fittings **(F2)** every 100 hours, and fittings **(F3)** every 200 hours.

MAINTENANCE CHARTS

Recommended Service and Lubrication Intervals

	Every 8-10 Hours	Every 25 Hours	Every 40-50 Hours	Every 100 Hours	Every 200 Hours	Every 300 Hours	Every 400 Hours	Every 500 Hours	Every 1000 Hours	See Page	Lubricant Type
Battery Electrolyte (Battery)				I					A		
Battery Fluid (Battery)	I/A										
Belts	I-A*			I-A							
Brake Resistors	I/C										
Front Axle Fluid									I/A	63	III
Front Axle, Hub & Bearings						I***				64	
Electrical System			I/C							71	
Grease Fittings - F1			L							58	I
Grease Fittings - F2				L						58	I
Grease Fittings - F3					L					58	I
Parking Brake								IC****		65	
Rear Wheel Bearings								L			I
Reel Motor Coupler						IC*****					
Steering Chain				I/L							V
Tires			I-A							69	

A - Add or Adjust C - Clean I - Inspect L- Lubricate R - Replace AR - As Required

* Indicates initial service for new machines.

** Not required unless engine problems occur.

*** Every 300 hours or Yearly, whichever occurs first.

**** Every 500 hours or Yearly, whichever occurs first.

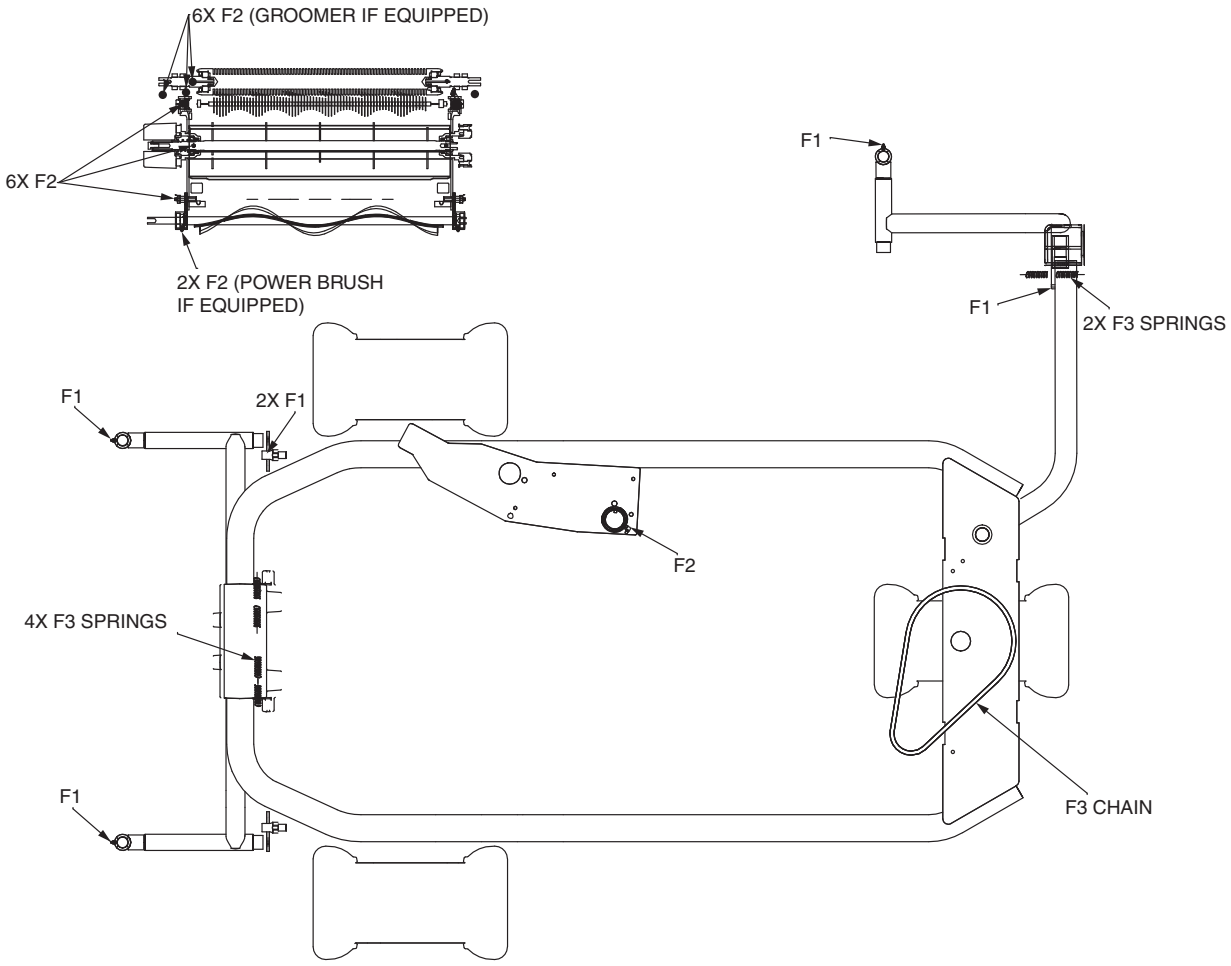
***** Every 300 hours or Yearly, whichever occurs first. Replace if coupler is loose or damaged.

MAINTENANCE & LUBE CHARTS

Note: Loose fitting reel motor couplers will damage the motor shaft and this will not be covered under warranty after 1 year or 300 hours whichever occurs first.

- Manual grease gun with NLGI Grade 2 (Service Class LB).
- Mobilfluid 424 or SAE 30 wt.

LUBRICATION CHART



BATTERIES

BATTERY SAFETY

Charging should be performed when ambient temperatures are between 40°F and 110°F (4°C and 42°C). The battery pack may be charged or topped off after every use.

The battery management system (BMS) and charger cooperate to make sure that charging occurs at the proper rate for the battery temperature. When the battery charger is connected to the vehicle, it will determine the charge rate based on the battery temperature. The charger will operate at the rates shown in the table below:

Charge Rate	Temperature
NO charging	below 14°F (-10°C) or above 140°F (60°C)
Pre-charge (charge at reduced rate, 21 amps)	between 14°F (-10°C) and 41°F (5°C) between 104°F (40°C) and 140°F (60°C)
Full charging	between 37.4°F (3°C) and 107.6°F (42° C)

- The BMS will adjust the charge rate based on the temperature of the batteries.
- Use only the OEM approved Lithium-Ion battery charger for your vehicle. See charge operating instructions for use.
- Turn the key to the OFF position and remove it from the vehicle.
- Inspect the charger cord for cracks, frayed wires or loose connections. If damaged, replace it.
- Inspect the vehicle charger receptacle and charger for dirt, debris or damage. Clean if necessary and replace immediately if damage is found.
- Connect the charger to a wall receptacle. Do not use a multi-plug adapter or power strip. Do not connect anything else to the same receptacle.
- When the battery pack is finished charging, disconnect the charger cord from the vehicle. If disconnecting before the charge cycle is complete, it is recommended that the charger be disconnected from the wall receptacle first, then unplug the charger from the vehicle receptacle.

BATTERY PROLONGED STORAGE

NOTICE: Improper storage may damage, destroy or cause permanent loss of battery capacity. Do not exceed storage time or temperature limits. Batteries must be charged to the correct level before storage. Storing fully depleted batteries will make them permanently unusable.

Storage Preparation

The optimum storage temperature range is between 65° and 82° (18° and 28°C)

- Charge the battery module based on climate during storage period.
- In cold climates, fully charge the battery module. Make sure that the charging operation is complete and there are no faults displayed on the charger. The green light on the charger should be on, indicating the charge cycle is complete.
- In hot climates, store the vehicle with a 30% to 50% charge of battery pack capacity.
- Turn the key to the OFF position and remove it from the key switch.
- Check the run-tow switch under the seat, make sure it is set in the RUN position.
- Turn off all accessories.

The storage time for properly charged Lithium-Ion batteries supplied with this vehicle varies based on the ambient temperature.

Temperature	Length of Storage Time
-22°F to -4°F (-30°C to -20°C)	One month at 100% battery charge, all accessories turned off.
-4°F to 113°F (-20°C to 45°C)	Six months at 100% battery charge, all accessories turned off.
113°F to 140°F (45°C to 60°C)	One month at 30% - 50% charge, all accessories turned off.

Setting State of Charge (SOC)

The SOC meter or the hand held programmer may be used to determine the state of charge of the battery module. If the SOC is below 30%, charge the battery module until the state of charge reaches 50%. The charge cycle may be interrupted by disconnecting the charger from the AC power source first, then from the charging receptacle on the vehicle. If the SOC is above 50%, operate the vehicle until the SOC is below 50%.

During Storage

Check the state of charge every 30 days. If the SOC is below 30%, charge the battery module until the state of charge reaches 50%.

Extreme Low Temperature Storage

If the ambient temperature is below -4°F (-20°C) DO NOT:

- turn the vehicle key to the ON position
- drive the vehicle
- tow the vehicle
- charge the vehicle
- operate accessories
- turn the lights on (if equipped)

Returning Vehicle to Service

At the end of the storage period, charge the battery module to 100% before operating the vehicle.

Before charging the vehicle be sure that the ambient temperature is between 14°F (-10°C) and 113°F (45°C) and the vehicle has had time to adjust to the temperature.

Battery Disposal

Lithium-Ion batteries are recyclable:

•Contact the distributor or manufacturer for information on returning or recycling used or damaged battery packs.

•Contact local or state environmental department for disposal information.

•Refer to the MAINTENANCE section for additional information.

BATTERY CHARGING AND MAINTENANCE

The charger should be operated in accordance with the charger manufacturer's instructions. Never charge batteries in a hazardous environment.

⚠ DANGER

Risk of electric shock. Connect the charger power cord to an outlet that is correctly installed and connected to an electrical ground according to all codes and regulations. A grounded outlet is necessary to decrease the risk of electric shock-do not use ground adapters or replace the plug. Do not touch parts of output connector or battery terminals that do have insulation.

Disconnect the AC plug before you make or break the connections to a battery that is charging. Do not open or disassemble the charger. Do not operate the charger if the AC cord is damaged. Make sure qualified personnel does all repair work to the charger.

Refer to the charger manufacturer's User's Guide for operating instructions, maintenance instructions and troubleshooting instructions.

The battery charger will test the temperature of the battery pack, if the temperature is too hot or too cold the charger will shutdown. If the battery pack temperature is within the safe-to-charge range, the charger will operate.

⚠ WARNING

Do not attempt to start the vehicle or charge the battery pack if the vehicle has been stored at or below freezing temperatures.

NOTICE: Do not spray the battery module with water.

Do not charge the batteries if the is below -4° F(-20°C) or above 113°F (45°C).

Before connecting the battery charger:

- Park the vehicle, turn the key switch to OFF and remove the key.
- Inspect the charging receptacle for dirt or debris. Remove dirt or debris if found.
- Inspect the charger cords and plugs for cracks or damage. replace any damaged cords before use.
- Plug the charger into a receptacle on a dedicated circuit. Do not connect any other devices to the receptacle.
- Connect the charger to the vehicle.

Battery Charging

The battery charger is designed to completely charge the battery set. If the batteries are severely deep cycled the charger will indicate a fault. The automatic charger determines the correct length of charge for the battery set and turns off when the batteries are charged. Always refer to the instruction supplied with the charger.

AC Voltage

The battery charger output voltage is directly related to the input voltage. If the vehicle receives an incomplete charge in an normally adequate time period, low AC voltage can be the cause. Consult an electrician if necessary.

Notes:

MAINTENANCE

GENERAL

⚠ WARNING

Before you clean, adjust, or repair this equipment, disengage all drives, lower implements to the ground, turn system power off, remove key from ignition switch, and disconnect battery pack(s) to prevent injuries.

Make sure the mower is parked on a solid and level surface. Never work on a mower that is supported only by the jack. Always use jack stands.

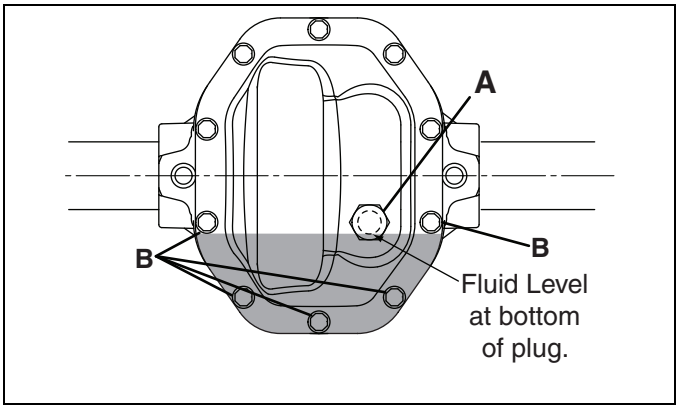
- Adjustment and maintenance should always be performed by a qualified technician. If proper adjustments cannot be made, contact an Authorized Jacobsen Dealer.
- Inspect the equipment on a regular basis, establish a maintenance schedule and keep detailed records.
  - Keep the equipment clean.
  - Keep all moving parts properly adjusted and lubricated.
  - Replace worn or damaged parts before operating the machine.
  - Keep all fluids at their proper levels.
  - Keep shields in place and all hardware securely fastened.
  - Keep tires properly inflated.
- Do not wear jewelry or loose fitting clothing when making adjustments or repairs.
- Use the illustrations in the Parts Catalog as reference for the disassembly and reassembly of components.
- Recycle or dispose of all hazardous materials (batteries, fuel, lubricants, anti-freeze, etc.) according to local, state, or federal regulations.

FRONT AXLE

Remove hex plug and check fluid level. Fluid should be up to the bottom of the plug. Add Mobilfluid 424 or SAE 30 wt. as required to bring fluid to correct level. Insert plug and clean up any spilled fluid.

To drain fluid:

1. Place a suitable container under front axle.
2. Remove bottom five screws **(B)**, and loosen remaining screws from differential cover.
3. Being careful not to damage sealing surface, or deform cover, break seal to drain fluid into pan.
4. Remove differential cover and apply bead of RTV sealant to axle housing, inside of cover holes.
5. Assemble cover bolts. Torque bolts to 16 - 24 ft. lbs. (21 - 32 Nm).
6. Remove plug **(A)**, and fill with 18 ounces (532 ml) of Mobilfluid 424 or SAE 30 wt. oil to bring fluid to correct level. Inert plug and clean up any spilled fluid.



AXLE HUB INSPECTION

The following procedure must be performed once a year or every 300 hours, whichever comes first.

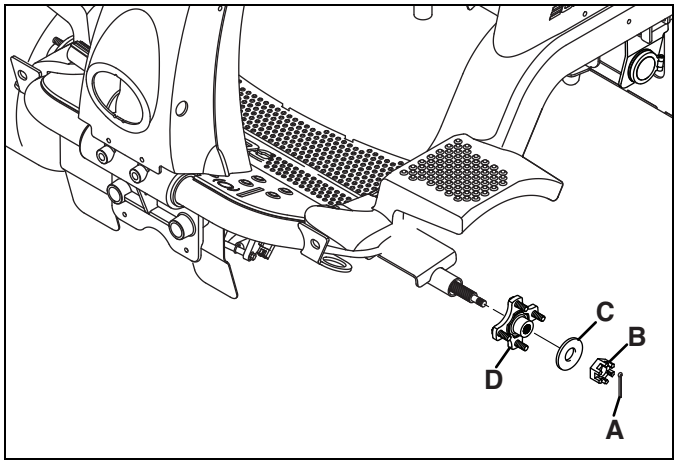
1. Remove and discard cotter pin **(A)** from the axle.
2. With tire on ground, break castle nut **(B)** free. Do not fully remove the castle nut.
3. Raise the mower and support front axle on jack stands. Remove lug nuts and wheel.

⚠ WARNING

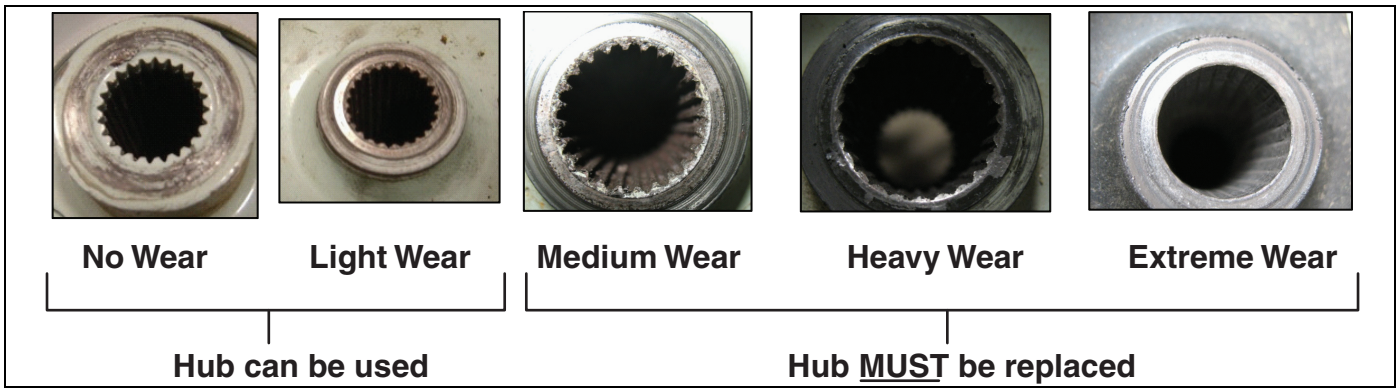
Make sure the mower is parked on a solid and level surface. Never work on a mower that is supported only by the jack. Always use jack stands.

If only the front or rear of the mower is raised, place chocks in front of and behind the wheels that are not raised.

4. Remove castle nut **(B)**, washer **(C)** and hub **(D)**.
5. Inspect the both ends of hub splines for wear or damage. Refer to **Figure 9B** for examples of hub wear.
   - If no wear to light wear is present, hub can be used.
   - If medium to extreme wear is present, hub must be replaced. **Do not operate mower until hub is replaced.**
   - inspect condition of bearings and replace if excessive wear is found.
6. Apply anti-seize to axle shafts.
7. Slide hubs **(D)** onto axle shafts.
8. Assemble washers **(C)** and castle nuts **(B)** to axle shafts.
9. Torque castle nut **(Item 2)** to 125-140 ft. lb. (170-190 Nm). Tighten nut as required to align cotter pin hole with slot in nut.



10. Install new cotter pin **(A)**.
11. Whilst mower is raised off the ground, Check for any movement of the hub/shaft or rough rotation that may indicate a deteriorating bearing that should be replaced.
12. Assemble tire and lug nuts. Lower mower to the ground.
13. Repeat procedure on opposite side of the mower.



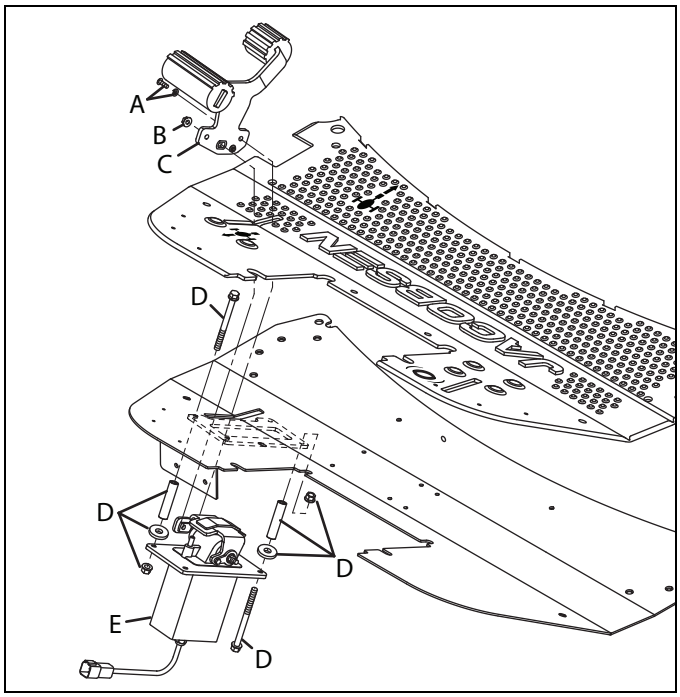
PARKING BRAKE INSPECTION

Refer to the parts catalog as an aid for the removal and assembly of components.

NOTE: The motor brake may be removed with the front axle motor in the vehicle.

Use a dust mask and gloves to protect lungs and hands from brake dust.

1. Disconnect the main power connector.
2. Remove the traction pedal sensor.
   - Remove the right fender and the screws securing the floor mat to the floor.
   - Remove hardware **(A)** securing traction pedal to the sensor bracket.
   - Remove hardware **(B)** securing traction pedal to the sensor shaft.
   - Remove the traction pedal **(C)**.
   - Raise the mower and support front axle on jack stands.

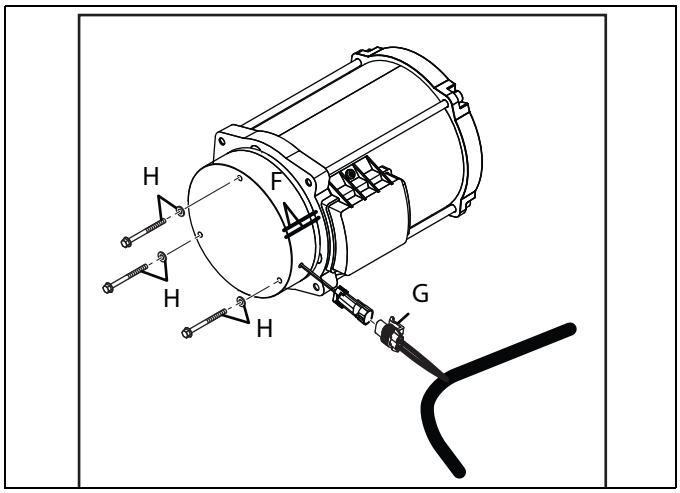


⚠ WARNING

Make sure the mower is parked on a solid and level surface. Never work on a mower that is supported only by the jack. Always use jack stands.

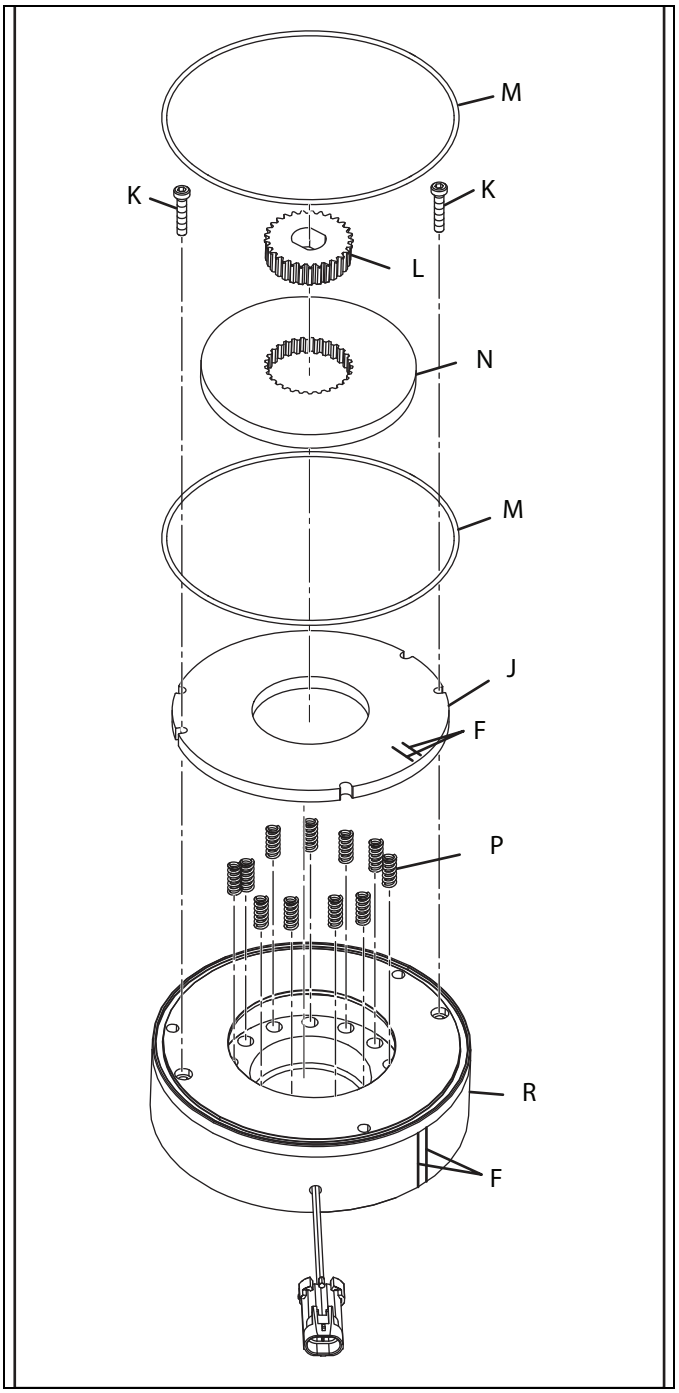
If only the front or rear of the mower is raised, place chocks in front of and behind the wheels that are not raised.

   - Disconnect the traction pedal sensor electrical connector.
   - Remove hardware **(D)**. Remove the traction pedal sensor **(E)**.
3. Make alignment marks **(F)** on parking brake and motor.
4. Disconnect the parking brake electrical connector **(G)**.
5. Remove three screws and lock washers **(H)** securing parking brake to the motor. Remove the parking brake.Put the parking brake, brake disk side up, on a workbench.
6. Extend the alignment marks onto the cover plate **(J)**. Remove two screws **(K)**, cover plate and brake disk/hub **(L)**. Inspect both o-rings **(M)** for damage.
7. Extend the alignment marks onto the pressure plate **(N)**. Remove the pressure plate, and eleven clutch springs **(P)** from the brake housing **(R)**.



8. Clean and inspect all components.
   a. Thoroughly clean all debris and corrosion from all components. Replace components as required.
   b. Check for approximately 25 ohms at the brake coil. If the coil resistance is out of range, the entire parking brake assembly must be replaced.
   c. If the brake assembly must be replaced, proceed with **Step 14.** If brake will be reused, proceed with **Step 9.**

9. Install the eleven clutch springs **(P)** into the brake housing **(R)**.
10. Assemble the pressure plate **(N)** into the brake housing **(R)**. Align marks **(F)**.
11. Place brake disk and hub **(L)** on the pressure plate **(N)**. Brake disk should be centered on the pressure plate.
12. Assemble one o-ring **(M)** into groove in brake housing **(R)**.
13. Assemble cover plate **(J)** onto brake housing **(R)** using two screws **(K)**. Alternate tightening the screws a little at a time to compress the brake springs. Torque the screws to 35 in. lbs. (3.9 Nm).
14. Clean the parking brake mounting area of the front axle motor and clean the motor shaft.
15. Apply a thin film of high temperature anti-seize to the motor shaft.
16. Assemble one o-ring **(M)** into groove in cover plate **(J)**.
17. Slide the parking brake onto the motor shaft.
18. Connect brake release harness to brake connector and battery pack connectors. Adjust parking brake on motor until mounting hardware **(H)** can be assembled.
19. Torque the three screws **(H)** evenly and in small increments to 53-71 in. lb. (6-8 Nm).
20. Remove brake release harness.
21. Apply dielectric grease and connect the brake electrical connector.
22. Assemble the traction pedal sensor in reverse order of removal.
23. Connect main power connector. Test the operation of the brake.



LIFT ACTUATOR CALIBRATION

The actuators need to be calibrated at initial setup, whenever an actuator or the RCU was replaced, or when switching from reels to vertical mowers.

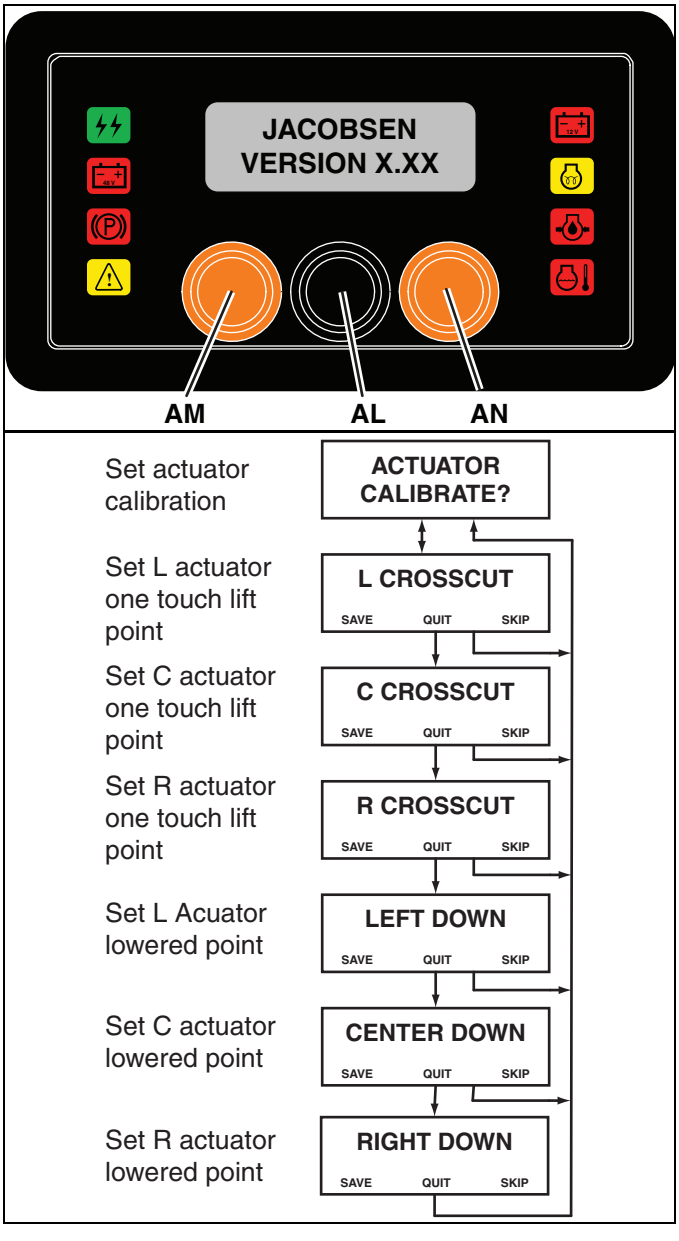
NOTICE

Any changes made to settings in the Maintenance Mode will not be active until the mower is powered down and restarted.

Before calibrating, reels or vertical mowers must be properly set-up with rollers, and installed on the Eclipse mower.

To calibrate the actuators:

1. Park the mower on a flat and level surface.
2. Enter Maintenance Mode. **See *Maintenance Mode* on page 29..**
3. Press either of the orange buttons **(AM or AN)** on the LDU until the **ACTUATOR CALIBRATE?** screen is on the LCD display. Press the black button **(AL)** to enter set mode.

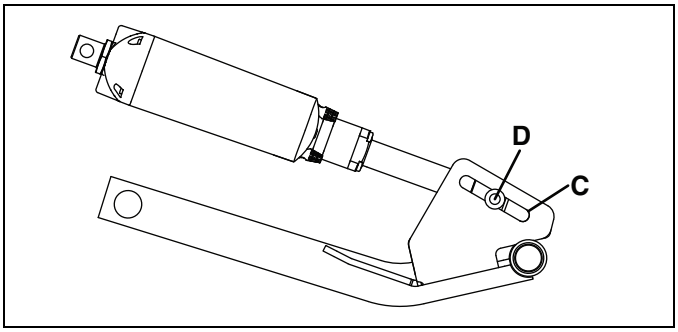


4. With mow switch off, all three mower switches on, and parking brake engaged, raise or lower all three reels until the left reel is at the desired crosscut position. Crosscut position may be measured by the distance actuator is extended, or by measuring the distance from the ground to the reel.

NOTICE

To ensure all three reels lower and start cutting at the same point, the crosscut position should be the same distance from the ground for each reel.

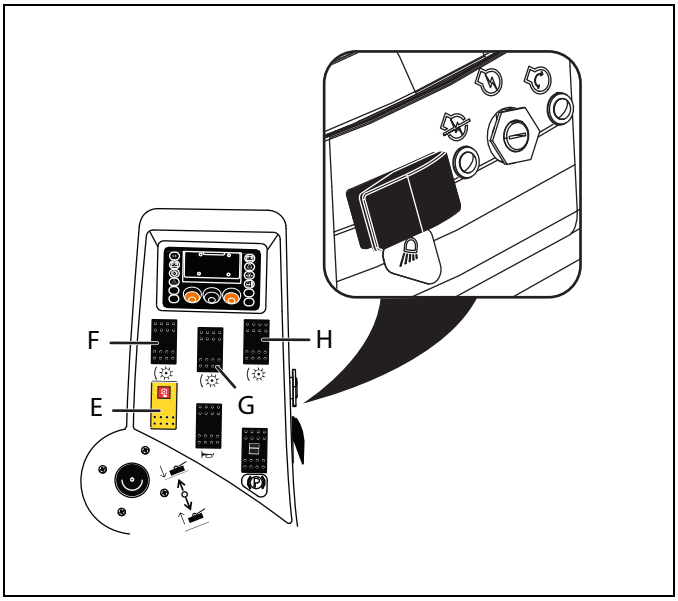
   a. Press the left orange button **(AN)** on the LDU to save the crosscut position for the left reel.
   b. Raise or lower the center reel as required to match the crosscut position of the left reel. Press the left orange button **(AN)** on the LDU to save the crosscut position for the center reel. Repeat for the right reel.
   c. Lower all three reels until the left reel actuator pin **(D)** is centered in the lift arm slot **(C)**. Save the lowered position for the left reel.
   d. Raise or lower the center reel as required until the center reel actuator pin **(D)** is centered in the lift yoke bracket slot **(C)**. Press the left orange button **(AN)** on the LDU to save the lowered position for the center reel. Repeat for the right reel.

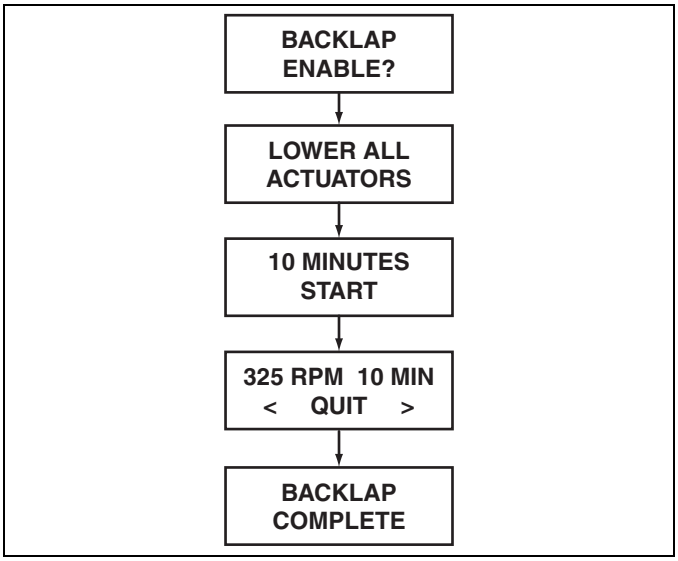


BACKLAPPING AND GRINDING

To backlap:

1. Park the mower on a flat and level surface.
2. Enter Maintenance Mode. **See *Maintenance Mode*** on page 29..
3. Press either of the orange buttons **(AM or AN)** on the LDU until the **BACKLAP ENABLE?** screen is on the LCD display. Press the black button **(AL)** to enter backlap mode.
4. If reels are not lowered, the **LOWER ALL ACTUATORS** will display on the LDU. Lower reels to the ground. Pressing any of the three buttons **(AL, AM, or AN)** with **LOWER ALL ACTUATORS** on the display will cancel backlap mode.
5. Use orange buttons **(AM and AN)** to adjust timer. Press black button **(AL)** to start backlapping. Selected motors will start rotating and horn will periodically chirp.
6. Turn mow switch **(E)** and desired reel switches **(F, G, and H)** to ON position.
7. Adjust reel speed between 150 and 400 rpm using the orange buttons **(AM or AN)**.
8. Apply lapping compound with a long handle brush along the entire length of the reel.
9. 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.
10. Exit backlap mode by allowing the timer to end, or pressing the black button **(AL)** to select **QUIT**.
11. Turn key switch to off position.
12. Carefully and thoroughly remove all lapping compound from reel and bedknife *before running the reel in forward direction*.





TIRES

1. Keep tires properly inflated to prolong tire life. Check inflation pressure while the tires are cool. Inspect tread wear.
2. Check the pressure with an accurate, low pressure tire gauge.
3. Keep tires inflated to:

Front ..... 16 psi (1.1 BAR)
Rear ..... 20 psi (1.3 BAR)

NOTICE

Under inflated tires may leave tire marks in turf. For soft turf, tire inflation pressure may need to be increased to 22 psi (1.5 BAR).

⚠ CAUTION

Unless you have the proper training, tools and experience, DO NOT attempt to mount a tire on a rim. Improper mounting can produce an explosion which may result in serious injury.

WHEEL MOUNTING PROCEDURE

⚠ WARNING

Make sure the mower is parked on a solid and level surface. Never work on a mower that is supported only by the jack. Always use jack stands.

If only the front or rear of the mower is raised, place chocks in front of and behind the wheels that are not raised.

1. Remove dirt, grease and oil from stud thread. Do not lubricate threads.
2. Position wheel on hub and inspect to insure full contact between mounting surface of wheel and hub or brake drum.
3. Finger tighten all hardware then torque hardware in criss-cross order; always tighten nuts in the top position.
4. Check and retorque daily until torque is maintained, 85-95 ft.lbs. (115-128 Nm)

CARE AND CLEANING

Clean the mower and implements after each use. Keep the equipment clean. Whenever possible, use compressed air to clean mower.

NOTICE

Do not wash any portion of the equipment while it is hot. Do not use high pressure spray or steam. Use cold water and automotive cleaners.

- Use compressed air to clean engine and radiator fins (30 psi (2.1 BAR) maximum).

- Use only fresh water for cleaning your equipment.

NOTICE

Use of salt water or affluent water has been known to encourage rust and corrosion of metal parts resulting in premature deterioration or failure. Damage of this nature is not covered by the factory warranty.

- Do not spray water directly at the instrument panel, ignition switch, controller, or any other electrical components, or at bearing housings and seals.
- Clean all plastic or rubber components with a mild soap solution and warm water, or use commercially available vinyl/rubber cleaners.
- Repair damaged metal surfaces and use Jacobsen touch-up paint. Wax the equipment for maximum paint protection.

⚠ CAUTION

Clean grass and debris from cutting units, drives, muffler, and engine to prevent fires.

⚠ WARNING

NEVER use your hands to clean cutting units. Use a brush to remove grass clippings from blades. Blades are extremely sharp and can cause serious injuries.

STORAGE

General

1. Clean the mower thoroughly and lubricate. Repair and paint damaged or exposed metal.
2. Inspect the mower, tighten all hardware, replace worn or damaged components.
3. Clean the tires thoroughly and store the mower so the load is off the tires. If mower is not on jack stands, check tires at regular intervals and re-inflate as necessary.
4. Keep the machine and all its accessories clean, dry and protected from the elements during storage.

Cutting Units

1. Wash the cutting units thoroughly, then repair and paint any damaged or exposed metal.
2. Lubricate all fittings and friction points.
3. Backlap the reels then back the reel away from the bedknife. Apply a light coat of rust preventative oil to the sharpened edges of the reel and bedknife.

ELECTRICAL SYSTEM

GENERAL INFORMATION

⚠ CAUTION

Always turn the system power switch off, remove key, and disconnect battery connector(s), before inspecting or working on the electrical system.

General precautions that can be taken to reduce electrical problems are listed below.

- Make certain all terminals and connections are clean and properly secured.
- Check the interlock system, fuses, and circuit breakers regularly.
- If the interlock does not function properly and the problem cannot be corrected, contact an authorized Jacobsen Dealer.
- Keep the wire harness and all individual wires away from moving parts to prevent damage.
- Make sure the seat switch harness is connected to the main wire harness.
- Check the battery and battery charging circuit.
- Do not wash or pressure spray around electrical connections and components.

The electrical system is monitored and controlled by the multiple controllers. The controllers are equipped with LED's which can be used when troubleshooting the electrical system.

CONTROLLERS

Controller	Location/Function
Traction Controller (TCU)	Located to the right of the operator seat, under the right cowling. Traction controller is used to control the operation of the traction drive motor. The traction controller has one green light for diagnostics.
Steering Controller (SCU)	Located at the rear of the unit below the hood. Steering controller is used to control the power steering system. The steering controller has one green light for diagnostics.
Main Controller Unit (MCU)	Located to the left of the operator seat, under the left cowling. MCU is used to control communications between the different controllers. The MCU has diagnostic lights to help troubleshoot controller functions. **See MCU Controller Lights** on page 75.
Reel Controller Unit (RCU)	Located on the right side of the steering column, under the steering column cover. RCU is used to control the operation of the reel motors and the lift/lower actuators. The RCU has diagnostic lights to help troubleshoot controller functions. **See RCU Controller Lights** on page 74.
LCD Display Unit (LDU)	Located on the instrument panel. Used to display and set functions. ***See* LCD Display Unit (LDU)** on page 25.
Braking Resistor Controller (BRC)	Located on side of TCU. BRC controller is used to energize the four over-voltage resistors on the side of the machine.
Power Distribution Unit (PDU)	Located to the left of the operator seat, under the MCU. PDU is used to switch 48V and 12V motor/controller outputs on or off. Three circuit breakers are located on the rear of the PDU.

Controller	Location/Function
3WD Controller (3WD)	Located at the rear of the unit below the hood. 3WD controller is used to control the rear wheel motor. The 3WD controller has one green light for diagnostics.

PDU AND CONTROLLER LOCATIONS

Power Distribution Unit (PDU) Circuit Breakers

Used to protect electrical system. Three manual reset circuit breakers located on the PDU are accessible by opening the hood and looking towards the left ROPS post. Push down on rubber boot to reset circuit breaker.

Main Controller Unit (MCU) Diagnostic Lights

Twenty four lights are used to indicate active MCU functions. Lift MCU access panel to access MCU.

Reel Controller Unit (RCU) Diagnostic Lights

Eighteen lights are used to indicate active RCU functions. Remove access plug from right side of steering column to view RCU diagnostic lights.

Braking Resistor Controller (BRC)

Remove right side operator platform cover to access BRC.

Traction Controller Diagnostic Light

Single green light on traction controller indicates power and faults. A steady light indicates the controller is active. A flashing light indicates a traction system fault/error has occurred. Remove right side operator platform cover to access traction controller.

Steering Controller Diagnostic Light

Single green light on steering controller indicates power and faults. A steady light indicates the controller is active. A flashing light indicates a steering system fault/error has occurred. Open the hood and remove controller cover to access the steering controller.

3WD Controller Diagnostic Light

Single green light on 3WD controller indicates power and faults. A steady light indicates the controller is active. A flashing light indicates a 3WD system fault/error has occurred. Open the hood and remove controller cover to access the 3WD controller.

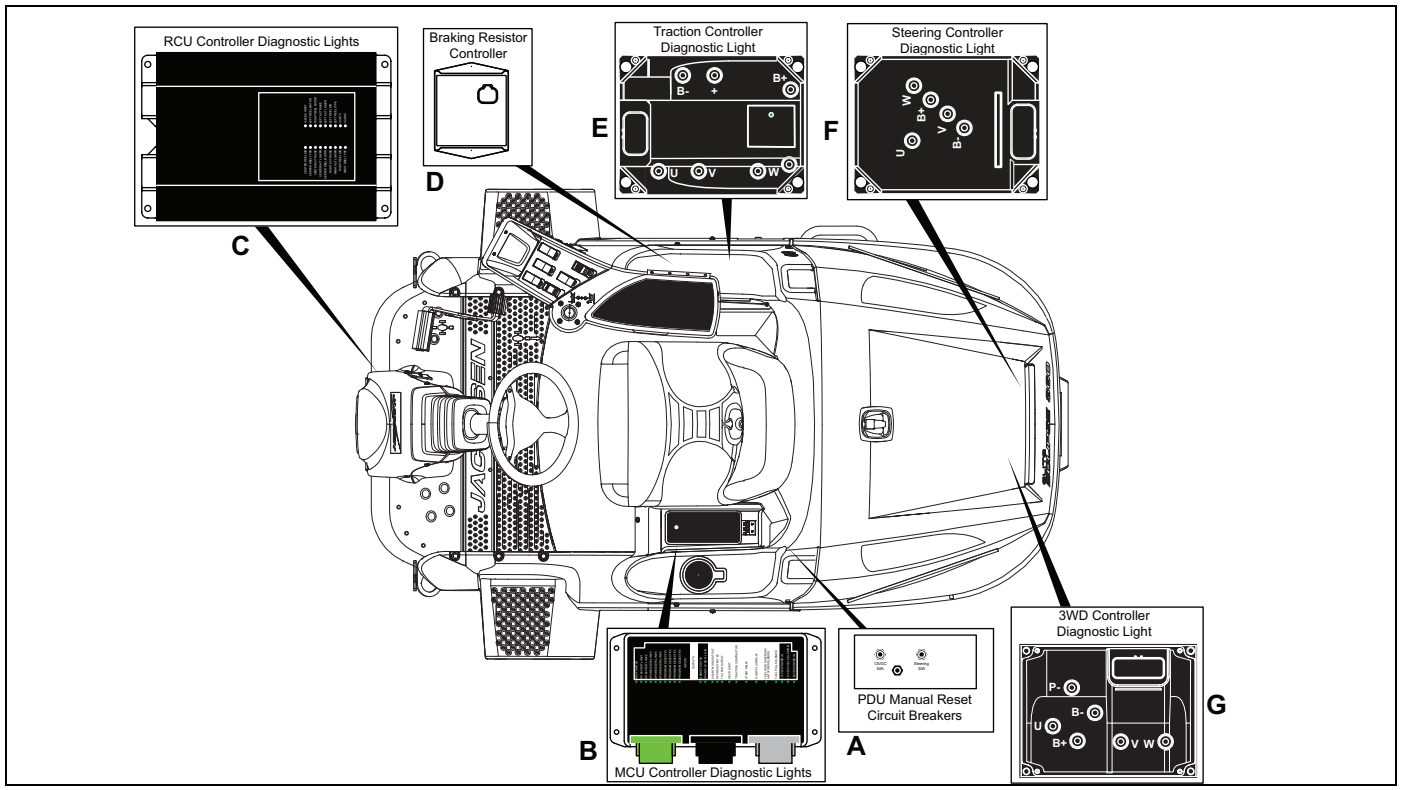

RCU Controller Diagnostic Lights
Braking Resistor Controller
Traction Controller Diagnostic Light
Steering Controller Diagnostic Light
C
D
E
F
B-
+
B+
U
V
W
B+
W
V
B-
U
JACKSON
3WD Controller Diagnostic Light
P-
B-
U
B+
V W
G
PDU Manual Reset Circuit Breakers
A
B
MCU Controller Diagnostic Lights

Figure 0A

RCU CONTROLLER LIGHTS

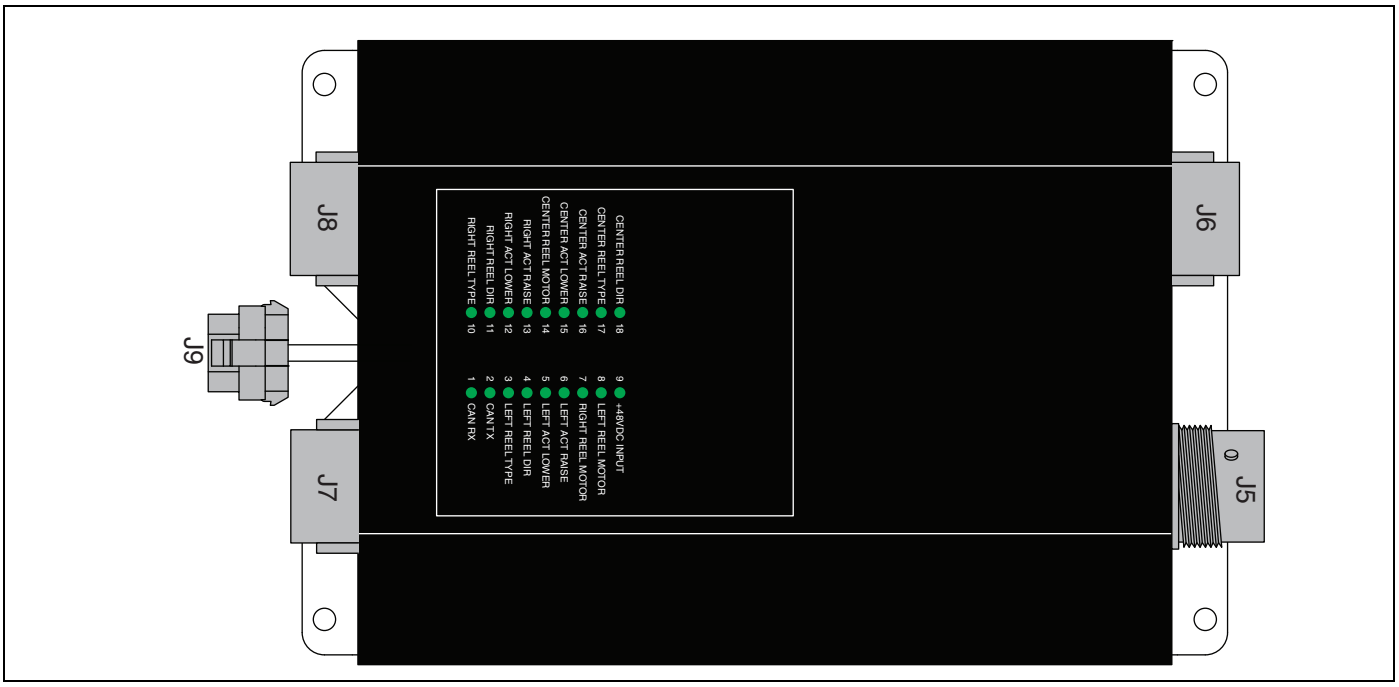
The RCU controller is a solid state device that monitors and controls reel and lift electrical functions. The RCU communicates with the MCU via the CAN network.

Each input and output signal is displayed through lamps located on front face of the controller. An active circuit will turn an input lamp on, an inactive circuit will turn a lamp off. Outputs are active when their lights are on.

Controller Functions by Lamp Number

Lamp On - Circuit is active
Lamp Off - Circuit is inactive

INPUTS		OUTPUTS	
Lamp	**Circuit**	**Lamp**	**Circuit**
1	CAN Low	**3**	Left Reel Clockwise/Counter-Clockwise
2	CAN High	**4**	Left Reel Forward/Reverse
9	48 Volt DC	**5**	Left Reel Raise
		6	Left Reel Lower
		7	Right Reel Motor
		8	Left Reel Motor
		10	Right Reel Clockwise/Counter-Clockwise
		11	Right Reel Forward/Reverse
		12	Right Reel Lower
		13	Right Reel Raise
		14	Center Reel Motor
		15	Center Reel Lower
		16	Center Reel Raise
		17	Center Reel Clockwise/Counter-Clockwise
		18	Center Reel Forward/Reverse



MCU CONTROLLER LIGHTS

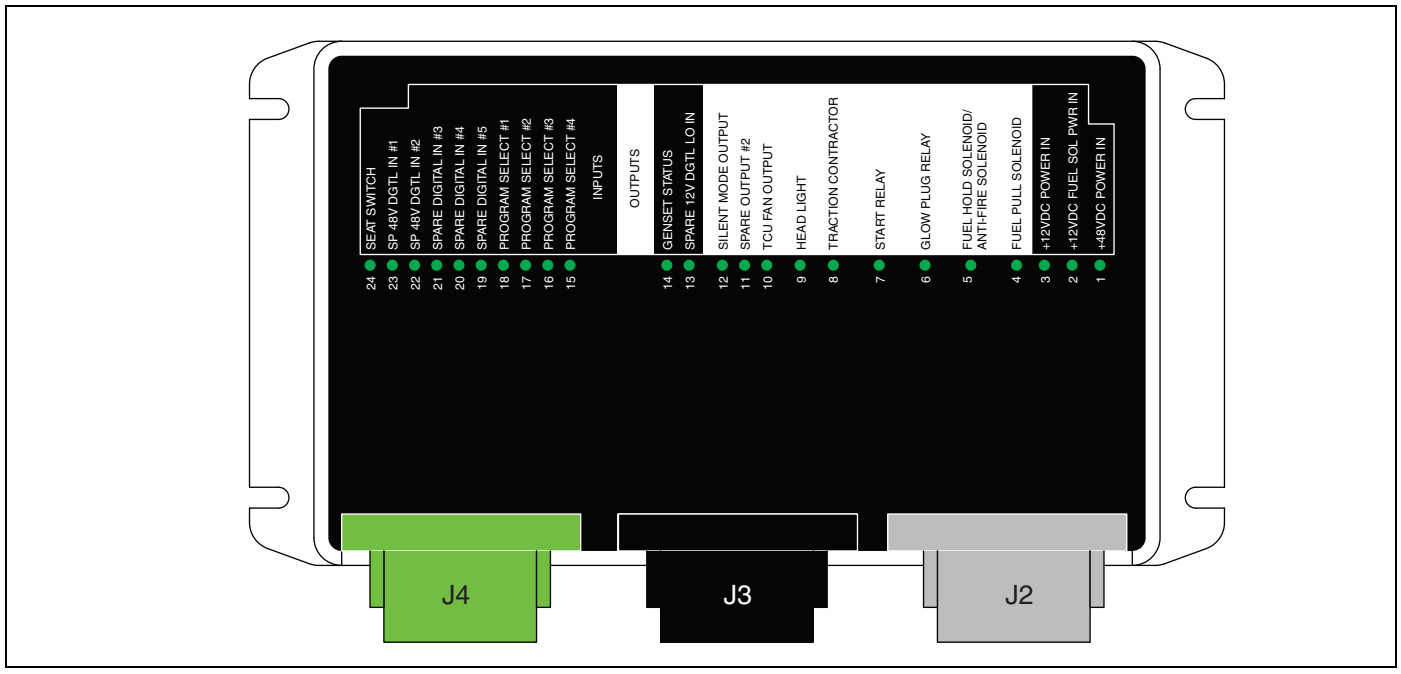
The MCU controller is a solid state device that monitors and controls mower functions. The MCU communicates with the other controllers via the CAN network.

Each input and output signal is displayed through lamps located on top face of the controller. A closed input switch indicates an active circuit and will turn an input lamp on, an open switch an inactive circuit and will turn a lamp off. Outputs are active when their lights are on.

Controller Functions by Lamp Number

Lamp On - Circuit is active
Lamp Off - Circuit is inactive

INPUTS		OUTPUTS	
Lamp	**Circuit**	**Lamp**	**Circuit**
1	+48 Volt DC Power In	**4**	Fuel Pull Solenoid
2	+12 Volt DC Fuel Solenoid Power In	**5**	Fuel Hold Solenoid/Anti-Fire Solenoid
3	+12 Volt DC Power In	**6**	Glow Plug Relay
13	Spare 12 Volt Digital Low In	**7**	Start Relay
14	Genset Status	**8**	Traction Contactor Output
15	Program Select #4	**9**	Head Light
16	Program Select #3	**10**	TCU Fan Output
17	Program Select #2 (Diesel)	**11**	Spare Output #2
18	Program Select #1 (Gasoline)	**12**	Silent Mode Output
19	Spare 48 Volt Digital In #5		
20	Spare 48 Volt Digital In #4		
21	Spare 48 Volt Digital In #3		
22	Spare 48 Volt Digital In #2		
23	Spare 48 Volt Digital In #1		
24	Seat Switch		



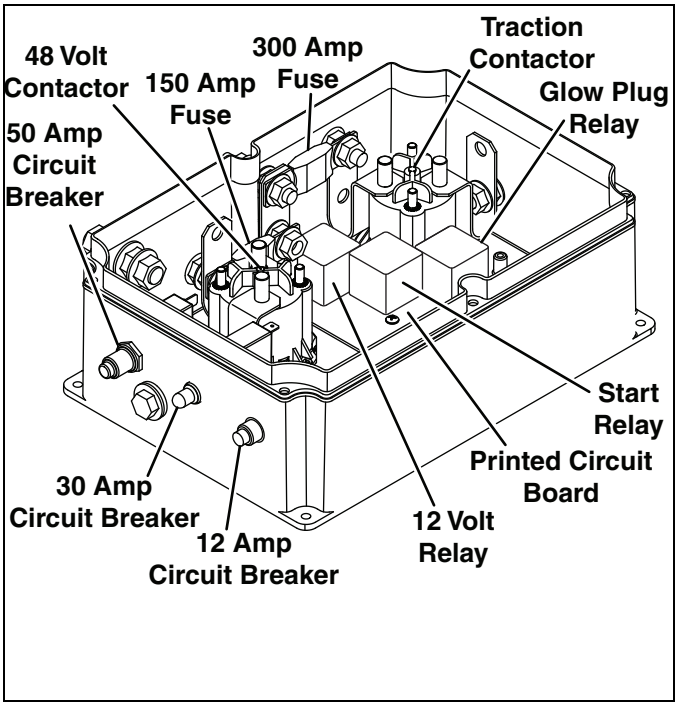
PDU

The PDU is located to the left of the operator seat, under the MCU, and is used to switch 48V and 12V motor/controller outputs on or off. Three circuit breakers are located on the rear of the PDU.

Before working on, or opening the PDU, shut mower off, remove key, disconnect 48 volt battery connector, and disconnect 12 volt battery connector (Hybrid mowers). Use caution to prevent shorting between PDU input, output, and ground cable studs.

Inside the PDU are the following components:

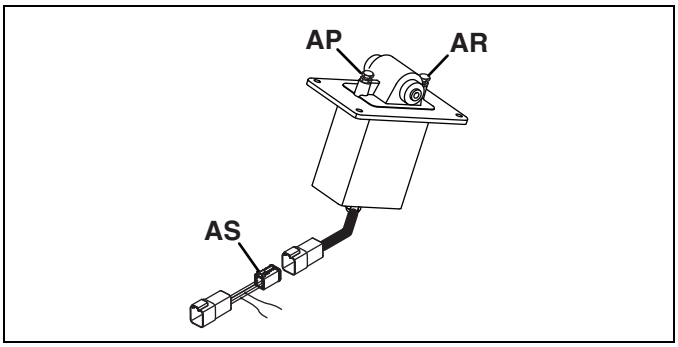
- **Traction Contactor -** Used to control 48 volt power output to TCU and OLM.
- **48 Volt Contactor -** Used to control 48 volt power output to MCU, RCU, SCU, and other components.
- **12 Volt Relay -** Used to control 12 volt power output to MCU, 12 volt lights, and engine components.
- **150 Amp Fuse -** Used to provide circuit protection for 48 volt contactor.
- **300 Amp Fuse -** Used to provide circuit protection for traction contactor.
- **12 Amp Circuit Breaker** - Used to provide circuit protect for 48 volt contactor output except for RCU and SCU.
- **30 Amp Circuit Breaker** - Used to provide circuit protection for SCU.
- **50 Amp Circuit Breaker -** Used to provide circuit protection for 12 volt contactor.
- **Printed Circuit Board -** Used for controlling PDU inputs and outputs.
-
-



TRACTION PEDAL TEST

Check traction pedal adjustment if mower is not maintaining correct speeds.

1. Obtain optional pedal test connector **(AS)** (Part Number 4225240). Connect test connector to main harness and traction pedal.
2. Turn mow switch to RUN position. Do not start mower.
3. Measure voltage using White and Black wires on test connector **(AS)**. If test connector is not used, measure directly at Orange and Black wires in pedal connector, pins 2 and 3.
4. Press pedal for full forward movement. The voltage should read 4.5V.
5. Press the pedal for full rear movement. The voltage should read 0.5V.
6. Move the pedal to the neutral location. The voltage should read 2.5V.
7. Remove test connector **(AS)**.



. ADJUSTMENTS

GENERAL

⚠ WARNING

Before you clean, adjust, or repair this equipment, disengage all drives, lower implements to the ground, turn system power off, remove key from ignition switch, and disconnect battery pack(s) to prevent injuries

Make sure the mower is parked on a solid and level surface. Never work on a mower that is supported only by the jack. Always use jack stands.

- Adjustments and maintenance should always be performed by a qualified technician. If proper adjustment cannot be made, contact an authorized Jacobsen Dealer.
- Replace, do not adjust, worn or damaged components.
- Long hair, jewelry or loose fitting clothing may get tangled in moving parts.

⚠ CAUTION

Be careful to prevent entrapment of the hands and fingers between moving and fixed components of the machine.

- Do not change speed limit settings or overspeed the drive motors.

BEDKNIFE-TO-REEL

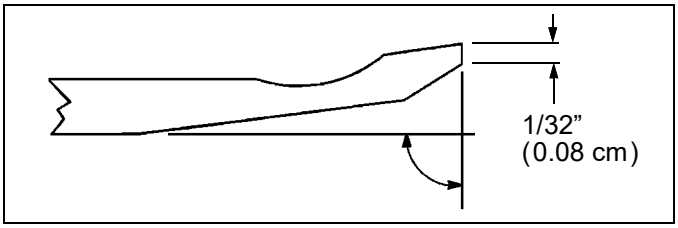
(Pre-adjustment Check)

- Check the reel bearings for end play or radial play. There should be no end play or radial play. See *Torque Specification* on page 86.

⚠ CAUTION

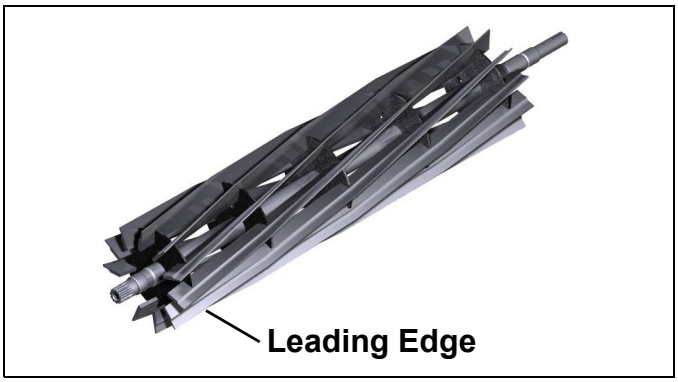
To prevent personal injury and damage to the cutting edges, wear gloves and handle the reel and bedknife with extreme care.

- Inspect the reel blades and bedknife to insure good sharp edges without bends or nicks.
- The leading edge of the reel blades must be sharp, free of burrs and show no signs of rounding off.
- The bedknife and bedknife backing must be securely tightened. The bedknife must be straight and sharp.



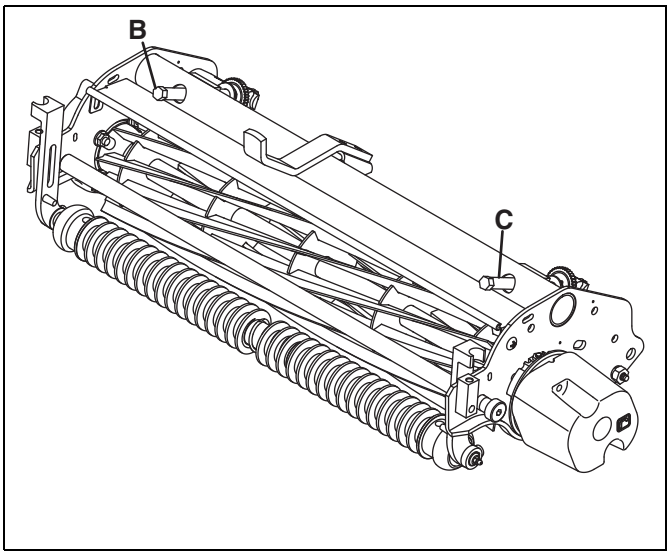
- A flat surface of at least 1/32 in. (0.08 cm) minimum must be maintained on the front face of the bedknife. Use a standard flat file to dress the bedknife.

- If wear or damage is beyond the point where the reel or bedknife can be corrected by the lapping process, they must be reground.
- Proper reel-to-bedknife adjustment is critical. A gap of 0.001 to 0.003” (0.0025 to 0.0076 cm) must be maintained across the entire length of the reel and bedknife.
- 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.
- Grass conditions will also affect the adjustment.
  - Dry, sparse conditions will require a wider gap to prevent heat buildup and damage to the reel and bedknife.
  - High quality grass with a good moisture content requires a closer gap (near zero).



BEDKNIFE ADJUSTMENT

- See *Bedknife-To-Reel* on page 77 before making the adjustment.
- Start adjustment at the leading end of the reel, followed by the trailing end. *The leading end of the reel blades is that end which passes over the bedknife first during normal reel rotation.*
- Use adjusters **(B** and **C)**, to adjust gap. Rotate adjusters (Clockwise) to close gap. Each click of the adjuster moves the bedknife 0.001” (0.0025 cm) closer to the reel.
  - Slide a feeler gauge or shim stock 0.001” - 0.003” (0.0025 - 0.0075 cm) between the reel blade and the bedknife. Do not turn the reel.
  - Adjust the trailing end of the reel to the same gap in a similar manner then recheck the adjustment at the leading end.
  - When the reel is properly adjusted to the bedknife, the reel will spin freely and you should be able to cut a piece of newspaper, along the full length of the reel, when the paper is held at 90° to the bedknife.



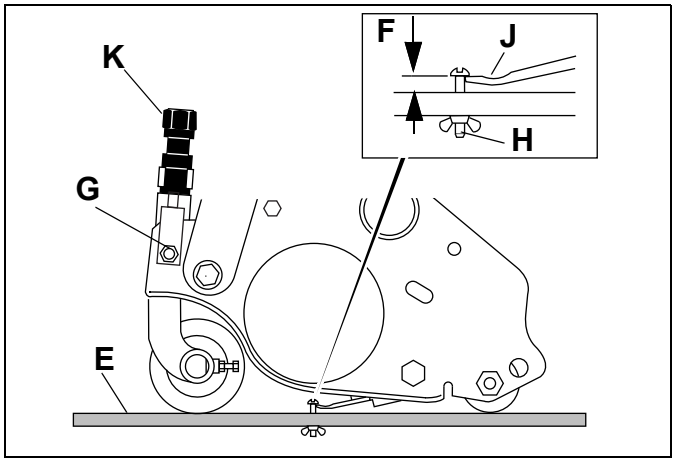
NOTICE

Avoid excessive tightening or serious damage may result to bedknife and reel blades. Reels must turn freely.

CUTTING HEIGHT

Note: Always make the reel to bedknife adjustment before adjusting height of cut. See Bedknife-To-Reel on page 77 and See Bedknife Adjustment on page 78.

1. Set desired cutting height on the gauge **(E)**.
   - Measure distance between the underside of screw head and gauge block surface **(F)**.
   - Adjust screw **(H)** to obtain desired height then tighten the wing nut.
2. Loosen the nuts on the front roller brackets **(G)** just enough to allow the adjuster knob **(K)** to raise or lower the front roller.
3. Place gauge **(E)** across bottom of front and rear rollers near one end of roller.
4. Slide the head of gauge screw **(H)** over the bedknife **(L)** and adjust the knob **(K)** to close the gap between the screw head and bedknife. Then tighten locknut **(G)**.
5. Repeat Steps 4 and 5 on opposite end. Complete adjustment to one end before adjusting opposite end.
6. Tighten nuts **(G)** and recheck each end.

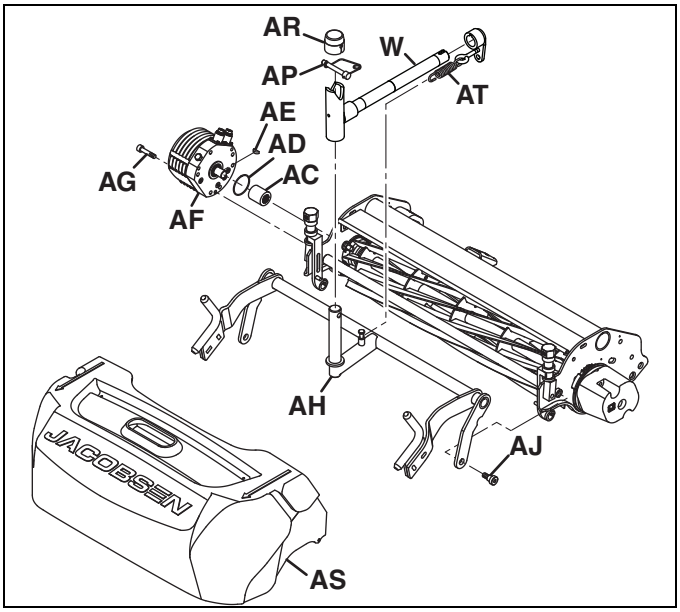


REEL ASSEMBLY

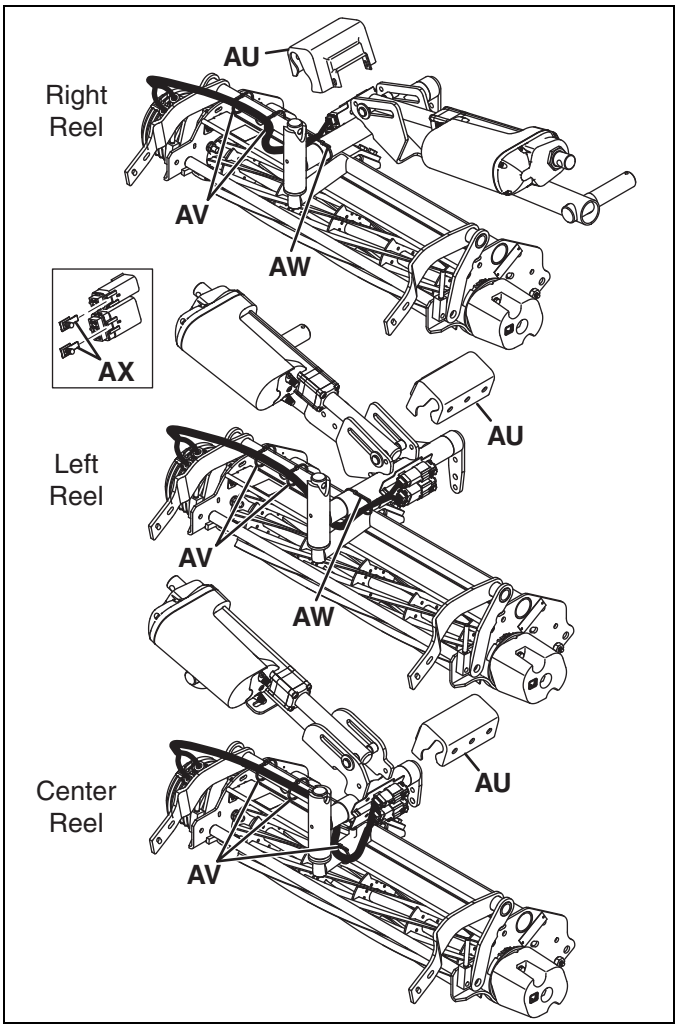
1. Slide coupler onto reel motor shaft. Check that reel motor shaft engages the coupler without excess play.

NOTE: Loose fitting reel motor couplers will damage the motor shaft. Damage to the motor shaft due to loose or worn couplers will not be covered under warranty after 1 year or 300 hours whichever occurs first.

2. Slide splined end of coupler **(AC)** onto reel shaft.
3. Assemble o-ring **(AD)** onto motor adapter on reel.
4. Insert key **(AE)** into motor shaft.
5. Slide motor **(AF)** into coupler **(AC)** and secure to reel using three 1/4-20 x 1-3/4" socket head screws **(AG)**. Torque hardware to 75 in. lbs. (8.5 Nm).
6. Assemble lift yoke **(AH)** to reel, using shoulder bolts **(AJ)** included with reel.
7. Start mower, and lower lift arms. Shut mower off.
8. Move reel into position, lift up on lift arms, and slide lift yoke shaft into lift pivot. Secure with lock pin **(AP)**, and assemble cap **(AR)**.
9. Route right front reel motor harnesses along lift yoke to lift arm. Open connector cover **(AU)** and assemble motor harness to mower harness. Check to be certain harness does not contact moving parts, and secure harness to lift arm using one cable tie **(AW)** and lift yoke using two cable ties **(AV)**.



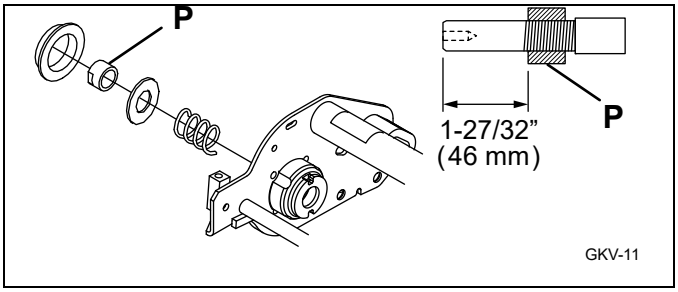
10. Route left front reel motor harness along lift yoke and under lift arm. Open connector cover **(AU)** and assemble motor harness to mower harness. Check to be certain harness does not contact moving parts, and secure harness to lift arm using one cable tie **(AW)** and lift yoke using two cable ties **(AV)**.
11. Route center reel motor harness along lift yoke and under lift arm. Open connector cover **(AU)** and assemble motor harness to mower harness. Check to be certain harness does not contact moving parts, and secure harness to lift yoke using three cable ties **(AV)**.
12. Assemble harness clips **(AX)** onto back of connector assemblies and press clips into holes in lift arm brackets.
13. Place grass catchers **(AS)** in place on all three reels.
14. **Center Reel Only:** Connect centering spring **(AT)** to pin on lift yoke.



REEL BEARING

Any radial play or excessive end play indicates bad bearings, a weak tension spring or a backed off nut.

1. Check bearing housing mounting hardware. Tighten or replace components as required. Carefully clean threads with degreaser.
2. Apply a medium strength grade of Loctite to nut **(P)**, then thread nut onto the reel shaft until the nut is 1-27/32” (4.6 cm) from the end of the reel shaft.
3. Fill reel bearing housings with NLGI - Grade O grease after adjusting spring.



REEL STABILIZER RODS

The reel stabilizer rods help keep the reels level when raising or lowering reels or making turns.

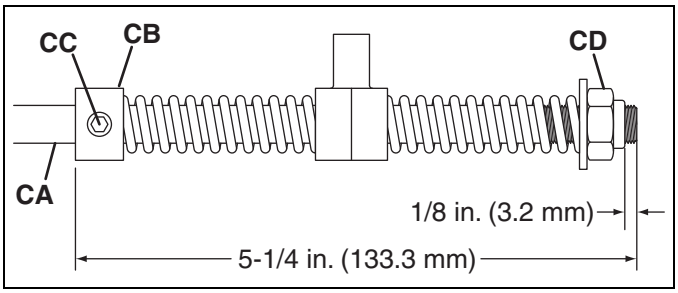
Pre-Adjustment

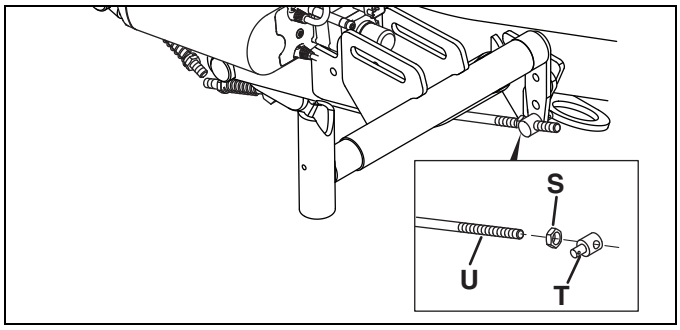
On the end of the reel stabilizer rod with the springs and lock collar, the adjustment is set at the factory, and should not need to be changed. To set adjustment after replacement of components, use the following procedure.

1. Lower reels to the ground, and disconnect pin **(T)**. from lift arm.
2. Measure distance from end of rod **(CA)** to face of collar **(CB)**. if required, loosen set screw **(CC)** and adjust position of collar to achieve a dimension of 5-1/4 in. (13.33 cm). Tighten set screw.
3. Measure distance from end of rod **(CA)** to face of nut **(CD)**. Adjust position of nut as required to achieve a dimension of 1/8 in. (0.32 cm).

Adjustment

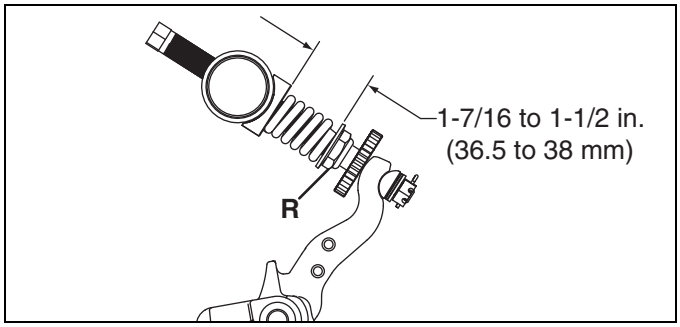
1. Lower reels to one-touch position. Shut mower off.
2. Loosen hex nut **(S)**.
3. Turn stabilizer rod **(U)** in or out of connecting pin **(T)** as required until reel is leveled. Tighten hex nut **(S)**.
4. Repeat for remaining reels.





BEDKNIFE ADJUSTER SPRING

- For proper operation, bedknife adjuster spring should be compressed to a dimension of 1-7/16 - 1-1/2 in. (3.65-3.8 cm).
- To adjust spring compression, loosen or tighten nut **(R)** to obtain a distance of 1-7/16 - 1-1/2 in. (3.65-3.8 cm).
- After adjusting spring, check reel to bedknife adjustment.

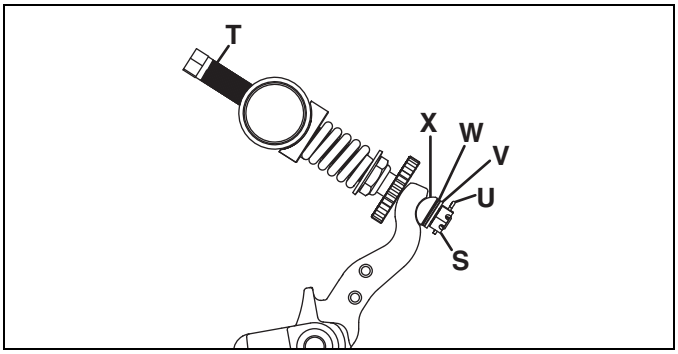


BEDKNIFE ADJUSTER TENSION

NOTICE

Over tightening slotted nut (S) will make bedknife adjuster rod (T) difficult to adjust.

1. Remove cotter pin **(U)** and fully loosen, then tighten slotted nut **(S)** to remove clearance (no end play) between components. Continue to tighten nut until next slot in nut aligns with hole in bedknife adjuster rod **(T)**. Install new cotter pin.
2. Check torque required to rotate adjuster rod **(T)**. Maximum torque should be 24 in. lb. (2 ft. lb.) (2.7 Nm).
3. After adjusting nut, check reel to bedknife adjustment.



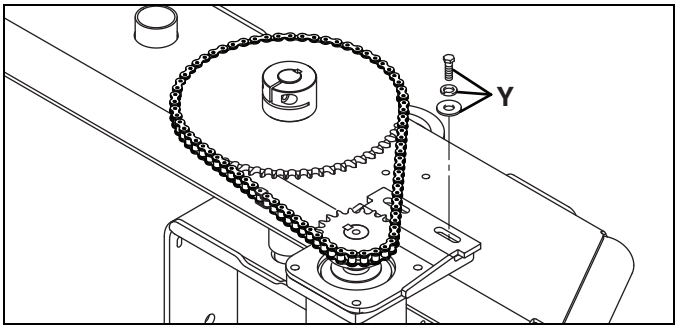
GRINDING BEDKNIFE

Bedknife can be lowered out of the reel for grinding without completely removing the bedknife assembly.

1. Remove cotter pin **(U)**, slotted nut **(S)**, belleville washer **(V)**, shim washer **(W-If required)**, and half trunnion **(X).**
2. Press down on adjuster end of rod **(T)** to rotate other end of the adjuster out of the bedknife finger.
3. Rotate bedknife backing to access the reel and bedknife for grinding.
4. After grinding, assemble bedknife using reverse order of removal. Check adjustment of bedknife adjuster tension **(See *Bedknife Adjuster Tension*** on page 82**)**, and reel to bedknife adjustment **(See *Bedknife Adjustment*** on page 78**)**.

STEERING CHAIN TENSION

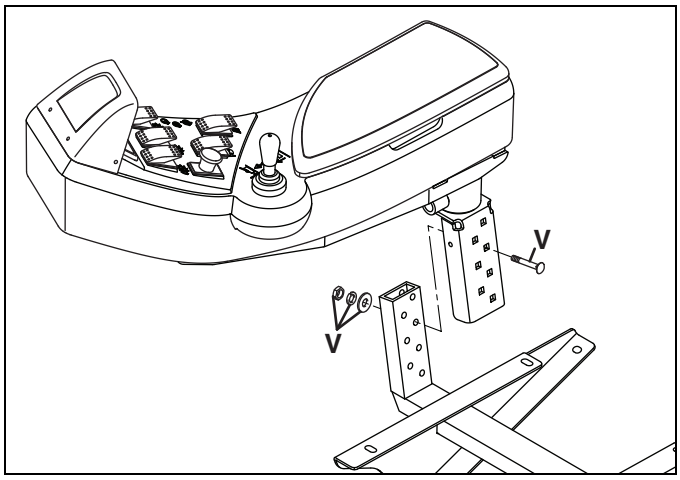
1. Loosen hardware **(Y)**.
2. Adjust steering motor position to obtain 1/16 to 1/4 in. (0.15 to 0.6 cm) deflection, with 2 to 10 lb. (9 to 45 N) push at mid span of chain.



ARMREST HEIGHT ADJUSTMENT

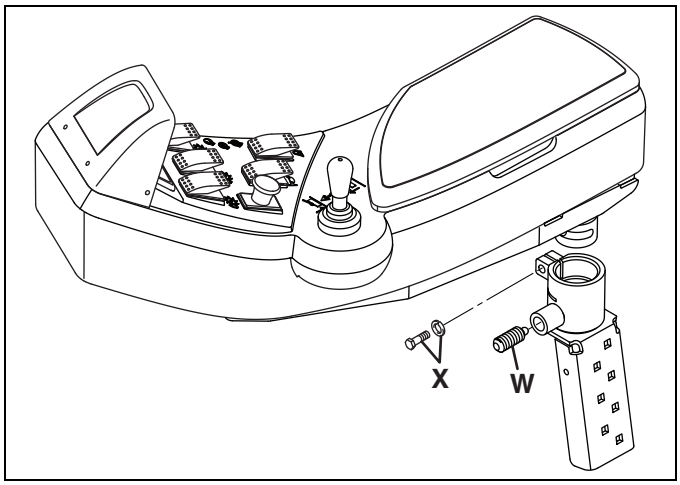
The armrest has three available height settings for operator convenience. To adjust armrest height:

1. Shut mower off and remove key.
2. Remove three bolts **(V)** from bracket on right side of seat.
3. Raise or lower armrest as needed until another set of holes in armrest bracket line up with seat bracket. Assemble hardware **(V)**.
4. After adjusting height, check three armrest wire harness connectors for a tight connection to main harness.



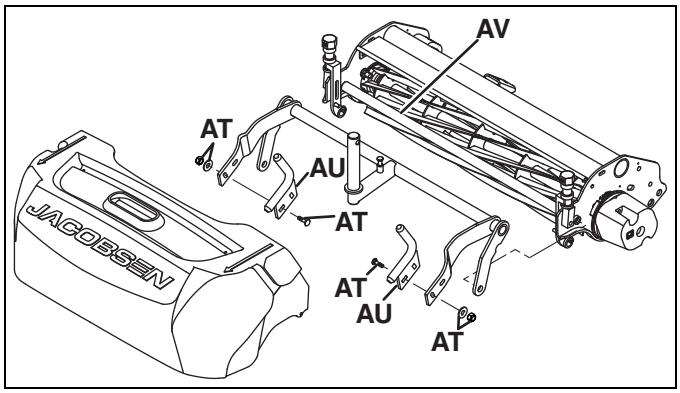
ARMREST PIVOT

1. Tighten or loosen pivot plunger **(W)** as required so plunger button stops the armrest at both ends of armrest pivot slots, and plunger body does not contact armrest pivot. Do not use plunger to increase pivot tension.
2. Adjust hardware **(X)** as required to obtain 2 to 6 lbs (9 to 26.7 N) of force required, at visor end of armrest, to pivot armrest. Do not overtighten pivot hardware or leave too loose.



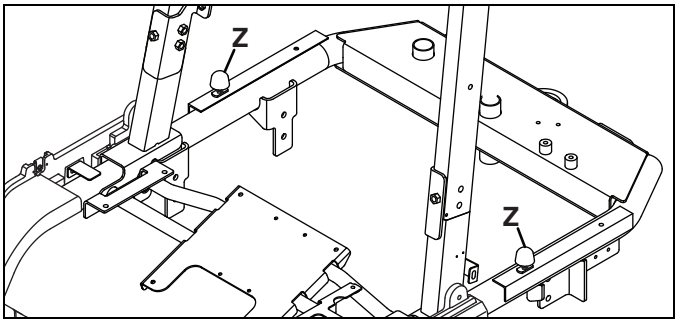
GRASS CATCHER YOKE ADJUSTMENT

1. Loosen hardware **(AT)**.
2. Adjust yoke **(AU)** as required so lip of grass catcher is resting on reel crossbar **(AV)**.
3. Tighten hardware **(AT)**.



HOOD STOPS

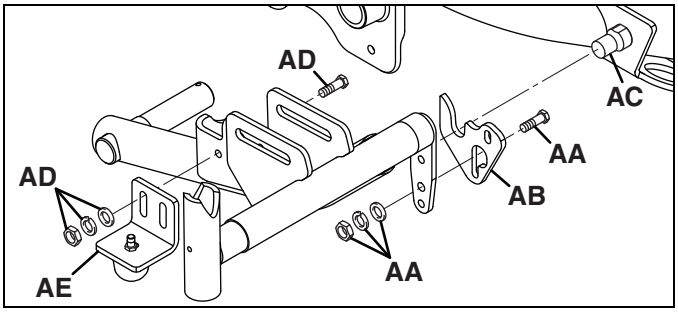
1. Adjust position of hood stop bumpers **(Z)** as required so hood contacts bumpers with approximately 1/8 in. (0.3 cm) clearance between hood and cowlings.
2. Adjust left and right side bumpers as required so hood is level.
3. Test operation of hood latch. Hood latch must be able to latch hood.
4.



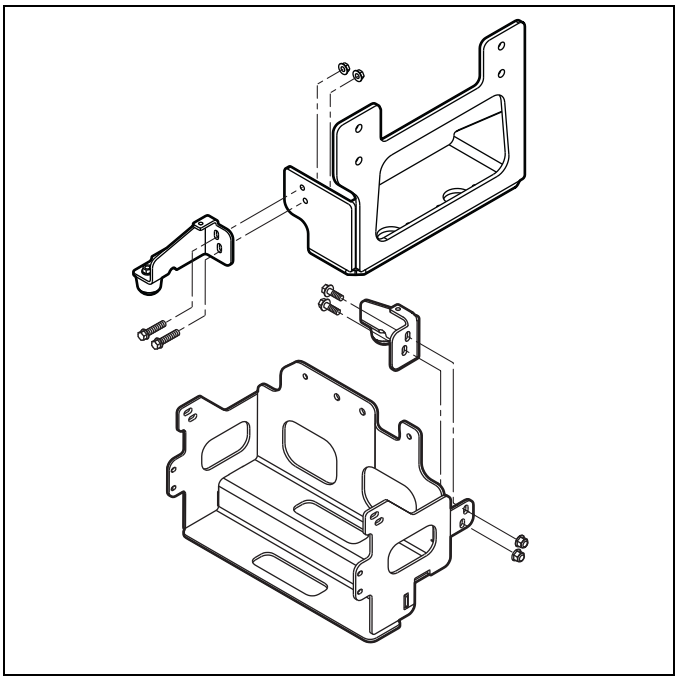
LIFT STOPS

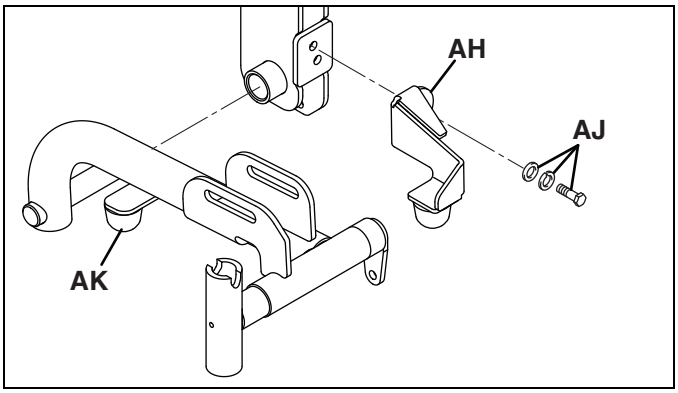
If the lift actuators make a ratcheting sound when being raised, lift stop adjustment may be required. Lift stops must be adjusted with lift system in Mow Mode. **See *Lift System*** on page 43.

1. Loosen left and right reel stop hardware **(AA)**.
2. Start mower, turn mow switch on, and fully raise reels. Shut off mower.
3. Adjust left reel stop bracket **(AB)** so reel stop pin **(AC)** is resting in bracket slot. Tighten hardware **(AA)**. If additional adjustment is needed, adjust position of stop pin **(AC)**.
4. Repeat for right reel stop bracket.
5. Loosen hardware **(AD)**. Adjust left reel bumper and bracket **(AE)** to contact left reel in fully raised position.



6. Repeat bumper adjustment for right reel bumper.
7. Loosen hardware **(AF)**. Adjust left side bumper **(AG)** to contact center reel in fully raised position. Hardware **(AF)** is located on battery tray on battery power modules and buffer battery tray on hybrid power modules.
8. Loosen hardware **(AJ)**. Adjust right side center reel bumper **(AH)** to contact center reel. Adjust center bumper **(AK)** if required.

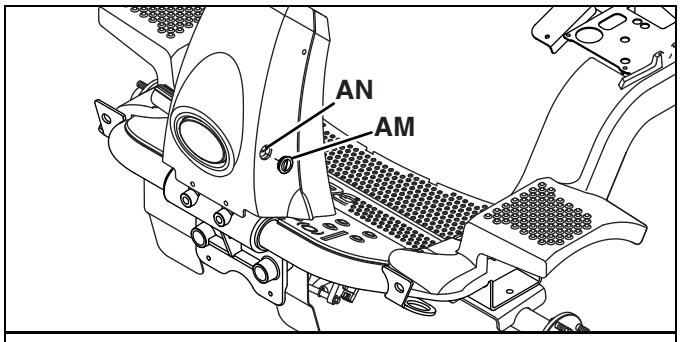




HEADLIGHT ADJUSTMENT

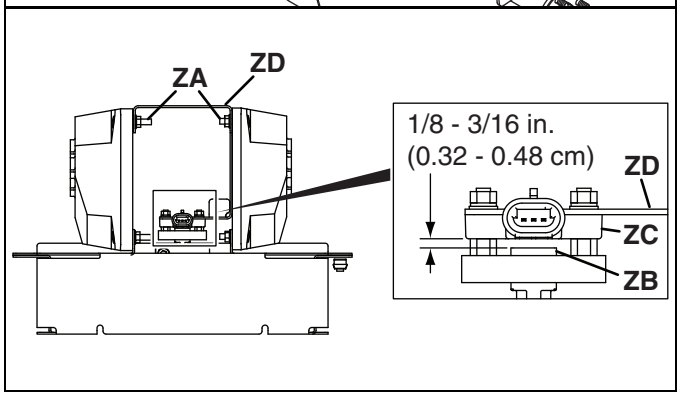
Headlight has four adjustment positions to change distance head light beam lights up. To Adjust headlight:

1. Remove access plug **(AM)** from left side of steering column.
2. Raise or lower adjustment tab **(AN)** until headlight latches in desired detent position.
3. Insert access plug.



STEERING SENSOR ADJUSTMENT

1. Open hood and remove controller cover.
2. Loosen controller brace hardware **(ZA)**.
3. Adjust position of controller brace **(ZD)** as required to allow an air gap of 1/8 to 3/16 in. (0.32 to 0.48 cm) between magnetic portion of sensor **(ZB)** and sensor body **(ZC)**. Torque hardware **(ZA)** to 53 in. lb. (6 Nm).



TORQUE SPECIFICATION

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.

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

AMERICAN NATIONAL STANDARD FASTENERS

SIZE	UNITS	GRADE 5		GRADE 8		SIZE	UNITS	GRADE 5		GRADE 8	
		Lubri-cated	Dry	Lubri-cated	Dry			Lubri cated	Dry	Lubri cated	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 FASTENERS										
SIZE	UNITS	4.6		8.8		10.9		12.9		Non Critical Fasteners into Aluminum
		Lubri-cated	Dry	Lubri-cated	Dry	Lubri-cated	Dry	Lubri-cated	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)

SPECIFIC TORQUE

Rear Axle Shaft .....150 ft. lbs. (203 Nm)
Tire Lug Nuts.....85-95 ft. lbs (115-128 Nm)
T890 Battery Posts.....95-120 in. lbs. (10.7-13.5 Nm)
12 Volt Battery Posts.....80 in. lbs. (9 Nm)

Notes:

LDU ERROR CODES

GENERAL INFORMATION

When the Eclipse mower encounters an error or fault in one of the controllers, an error code will display on the LDU, and certain machine functions may shut down.

Record any error codes that appear on the LDU, and notify maintenance at the end of the day.

Refer to the following list for LDU error codes and machine functions.

SYSTEM ERROR CODES

LDU Error Message	Error Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
OIL PRESSURE ALARM	Engine oil pressure low. Return mower to maintenance shed. Transport speed will be limited to 3 mph (4.8 kph).	4		4		4			4	4	
TEMPERATURE HIGH ALARM	Diesel engine coolant above 230°vF. (110° C). Return mower to maintenance shed. Transport speed will be limited to 3 mph (4.8 kph).	4		4		4			4	4	
12 VOLT SYSTEM LOW	12 VDC system below 12.5 VDC. Return mower to maintenance shed.	4		4			4		4		4
48 VOLT SYSTEM LOW	System voltage drops below 43 VDC for 10 seconds or more. Return mower to maintenance shed. Transport speed will be limited to 4 mph (6.4 kph).	4		4			4		4	4	
48 VOLT SYSTEM HIGH	System voltage above 60 VDC. Return mower to maintenance shed. Transport speed will be limited to 3 mph (4.8 kph).	4		4		4			4	4	
LOW FUEL WARNING	Fuel level in tank is low. Less than 2 qts (1.9 l) fuel remaining in tank. Return to fueling area. Do not allow tank to completely empty.	4		4			4		4		4

REEL CONTROL UNIT ERROR CODES

RCU error codes are displayed on the LDU as a message.

LDU Error Message	Error Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
LEFT REEL TEMPERATURE	Left Reel Motor Temperature above 266° F (130° C).	4		4			4		4		4
CENTER REEL TEMPERATURE	Center Reel Motor Temperature above 266° F (130° C).	4		4			4		4		4
RIGHT REEL TEMPERATURE	Right Reel Motor Temperature above above 266° F (130° C).	4		4			4		4		4
LEFT REEL FAULT	Left Reel Motor Short Circuit. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
CENTER REEL FAULT	Center Reel Motor Short Circuit. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
RIGHT REEL FAULT	Right Reel Motor Short Circuit. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
LEFT REEL OVERCURRENT	Left Reel Motor current over 35 Amps for 30 seconds. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed. Excessive grass height being mowed.	4		4			4		4	4	
CENTER REEL OVERCURRENT	Center Reel Motor current over 35 Amps for 30 seconds. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed. Excessive grass height being mowed.	4		4			4		4	4	
	l If fault returns after shutting down and restarting mower, mowing can continue with other reels if reel enable switch for indicated reel is turned OFF.										

LDU Error Message	Error Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
RIGHT REEL OVERCURRENT	Right Reel Motor current over 35 Amps for 30 seconds. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed. Excessive grass height being mowed.	4		4			4		4	4	
LEFT REEL VOLTS LOW	Left Reel Motor fuse blown. Return mower to maintenance shed. Check 150 amp fuse in PDU.	4		4			4		4	4	
CENTER REEL VOLTS LOW	Center Reel Motor fuse blown. Return mower to maintenance shed. Check 150 amp fuse in PDU.	4		4			4		4	4	
RIGHT REEL VOLTS LOW	Right Reel Motor fuse blown. Return mower to maintenance shed. Check 150 amp fuse in PDU.	4		4			4		4	4	
CHECK LEFT REEL	Left Reel Motor RPM is not within the range of the set point. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed. Excessive grass height being mowed.	4		4			4		4	4	
CHECK CENTER REEL	Center Reel Motor RPM is not within the range of the set point. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed. Excessive grass height being mowed.	4		4			4		4	4	
CHECK RIGHT REEL	Right Reel Motor RPM is not within the range of the set point. Shut mower off, and remove key. Check reel for blockage. Restart mower. If fault returns, return mower to maintenance shed. Excessive grass height being mowed.	4		4			4		4	4	
L ACTUATOR OVERCURRENT	Left Actuator Overcurrent. Shut mower off, and remove key. Check grass catcher for excessive weight. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
	l If fault returns after shutting down and restarting mower, mowing can continue with other reels if reel enable switch for indicated reel is turned OFF.										

LDU ERROR CODES

LDU Error Message	Error Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
C ACTUATOR OVERCURRENT	Center Actuator Overcurrent. Shut mower off, and remove key. Check grass catcher for excessive weight. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
R ACTUATOR OVERCURRENT	Right Actuator Overcurrent. Shut mower off, and remove key. Check grass catcher for excessive weight. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
L ACTUATOR FAULT	Left Actuator or wiring Short Circuit. Shut off mower and remove key. Check both actuator connectors for a tight connection. Check visible portion of wire harness for damage. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
C ACTUATOR FAULT	Center Actuator or wiring Short Circuit. Shut off mower and remove key. Check both actuator connectors for a tight connection. Check visible portion of wire harness for damage. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
R ACTUATOR FAULT	Right Actuator or wiring Short Circuit. Shut off mower and remove key. Check both actuator connectors for a tight connection. Check visible portion of wire harness for damage. Restart mower. If fault returns, return mower to maintenance shed.	4		4			4		4	4	
CHECK LEFT ACTUATOR	Left actuator did not reach position within 6 seconds. Shut mower off, and remove key. Check grass catcher for excessive weight. Restart mower. If fault returns, return mower to maintenance shed.	4			4		4		4		4
CHECK CENTER ACTUATOR	Center actuator did not reach position within 6 seconds. Shut mower off, and remove key. Check grass catcher for excessive weight. Restart mower. If fault returns, return mower to maintenance shed.	4			4		4		4		4
	l If fault returns after shutting down and restarting mower, mowing can continue with other reels if reel enable switch for indicated reel is turned OFF.										

LDU Error Message	Error Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
CHECK RIGHT ACTUATOR	Right actuator did not reach position within 6 seconds. Shut mower off, and remove key. Check grass catcher for excessive weight. Restart mower. If fault returns, return mower to maintenance shed.	4			4		4		4		4

TRACTION & STEERING CONTROLLER ERROR CODES

Traction and steering controller error/fault codes display on the LDU as a four digit error code.

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 2310	Software detected short circuit in controller, cabling to motor or in motor. Measured current is 50% above the 2 min., rating current. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 2310		4		4			4	4			4
3WD TRACTION FAULT 2310		4		4			4	4			4
STEERING FAULT 2311	Over Current Glitch: The system detected that the current is over voltage in any of the U, V, or W phases.										
3WD TRACTION FAULT 2311											
TRACTION FAULT 2315	DC Over Current Error: The DC current is too high. Two Consecutive measurements must be above in order to set the event.										
3WD TRACTION FAULT 2315											
TRACTION FAULT 2316	Phase UV Not Connected A startup check of the motor connections measured current i phase U to be under the defined limit.										
3WD TRACTION FAULT 2316											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 2317	Phase UW Not Connected: A startup check of the motor connections measured current i phase U to be under the defined limit.										
3WD TRACTION FAULT 2317											
TRACTION FAULT 2318	Phase VW Not Connected: A startup check of the motor connections measured current i phase V to be under the defined limit.										
3WD TRACTION FAULT 2318											
TRACTION FAULT 2319	Drive Not Disable: A startup check of the motor connections detected that the drive is not disabled.										
3WD TRACTION FAULT 2319											
TRACTION FAULT 2320	Rotor Rotation Too High: A startup check of the motor connections detected that the rotor rotation is too high.										
3WD TRACTION FAULT 2320											
TRACTION FAULT 2340	Hardware detected short circuit in controller, cabling to motor or in motor. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 2340		4		4			4	4			4
3WD TRACTION FAULT 2340		4		4			4	4			4
TRACTION FAULT 2341	Short Circuit Glitch: The system has detected a short circuit in the hardware. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.										
STEERING FAULT 2341											
3WD TRACTION FAULT 2341											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 2360	PWM Unexpected Off: The power stage was unexpectedly turned off.										
STEERING FAULT 2360											
3WD TRACTION FAULT 2360											
TRACTION FAULT 2361	PWM Unexpected Off Glitch: The power stage was unexpectedly turned off but restarted successfully.										
STEERING FAULT 2361											
3WD TRACTION FAULT 2361											
TRACTION FAULT 2370	Supervision PWM Disable: The supervision CPU has disabled PWM.										
3WD TRACTION FAULT 2370											
TRACTION FAULT 2410	DC Short Circuit: The system has detected a short circuit in the hardware. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.										
3WD TRACTION FAULT 2410											
TRACTION FAULT 2412	DC Unexpected Off: The power stage was unexpectedly turned off.										
3WD TRACTION FAULT 2412											
TRACTION FAULT 3120	The DC Bus charging is not finished within 10 seconds. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 3120		4		4			4	4			4
3WD TRACTION FAULT 3120		4		4			4	4			4

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 3211	DC Voltage is above the High Trip level. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 3211		4		4			4	4			4
3WD TRACTION FAULT 3211		4		4			4	4			4
TRACTION FAULT 3212	DC Voltage is above the hardware defined trip level. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 3212		4		4			4	4			4
3WD TRACTION FAULT 3212		4		4			4	4			4
TRACTION FAULT 3221	DC Bus voltage is below the Low Trip Level. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 3221		4		4			4	4			4
3WD TRACTION FAULT 3221		4		4			4	4			4
TRACTION FAULT 3301	15V Out of Range: The internal 15V supply is out of range. The valid range is 13.0V to 16.0V.										
STEERING FAULT 3301											
3WD TRACTION FAULT 3301											
TRACTION FAULT 3302	5V Out of Range / 3V3 Low: Either the internal 5V supply is out of range or the internal 3.3V supply is too low. The valid range is 4.5V to 5.5V.for the 5V supply. The 3.3V supply low limit is 2.9V.										
STEERING FAULT 3302											
3WD TRACTION FAULT 3302											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 3304	5V C Out of Range: The internal 5V C is out of range. The valid range is 4.5V to 5.5V.										
3WD TRACTION FAULT 3304											
STEERING FAULT 3311	Analog Supply 1 Out of Range: The analog supply 1 is out of range. The valid range is 4.0V to 6.0V.										
STEERING FAULT 3313	Analog Supply 2 Out of Range: The analog supply 2 is out of range. The valid range is 4.0V to 6.0V.										
TRACTION FAULT 3330	Ext Gnd Tripped: The system detected a HW EXT GND TRIP signal. A reset of the node is required to clear the error. Events related to speed feedback and motor temp measurement may follow this event.										
STEERING FAULT 3330											
3WD TRACTION FAULT 3330											
TRACTION FAULT 4210	Motor temperature is above 356° F (180° C). Shut mower off and wait ten minutes. Restart mower. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 4210		4		4			4	4			4
3WD TRACTION FAULT 4210		4		4			4	4			4
TRACTION FAULT 4220	Not Connected / Short Circuit: The motor temperature sensor is either disconnected or has short circuited.										
STEERING FAULT 4220											
3WD TRACTION FAULT 4220											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 4310	Heatsink temperature is above 185° F (85° C). Shut mower off and wait ten minutes. Restart mower. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 4310		4		4			4	4			4
3WD TRACTION FAULT 4310		4		4			4	4			4
TRACTION FAULT 4320	Not Connected / Short Circuit: The internal power stage is either not connected or has short circuited. This fault is triggered when the sensor measures above 130°C or below -50°C.										
STEERING FAULT 4320											
3WD TRACTION FAULT 4320											
TRACTION FAULT 4510	High: The internal DC power stage temperature is above the predefined level.										
3WD TRACTION FAULT 4510											
TRACTION FAULT 4520	Not Connected / Short Circuit: The internal DC motor power stage temperature sensor is either not connected or has short circuited.										
3WD TRACTION FAULT 4520											
TRACTION FAULT 5210	The offset in the current measurement is too high. The offset is adjusted during power-up of the drive. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 5210		4		4			4	4			4
3WD TRACTION FAULT 5210		4		4			4	4			4
TRACTION FAULT 5220	DC Sensor Offset: The system detected that the offset is too high. Offset is calibrated when drive is disabled.										
3WD TRACTION FAULT 5220											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 5411	Short Circuit Ch1: A hardware short circuit is detected. Disabling of the output is required to clear the fault.										
STEERING FAULT 5411											
3WD TRACTION FAULT 5411											
TRACTION FAULT 5412	Short Circuit Ch2: A hardware short circuit is detected. Disabling of the output is required to clear the fault.										
STEERING FAULT 5412											
3WD TRACTION FAULT 5412											
TRACTION FAULT 5413	Short Circuit Ch3: A hardware short circuit is detected. Disabling of the output is required to clear the fault.										
STEERING FAULT 5413											
3WD TRACTION FAULT 5413											
TRACTION FAULT 5414	Short Circuit Ch4: A hardware short circuit is detected. Disabling of the output is required to clear the fault.										
STEERING FAULT 5414											
3WD TRACTION FAULT 5414											
TRACTION FAULT 5415	Short Circuit Ch5: A hardware short circuit is detected. Disabling of the output is required to clear the fault.										
3WD TRACTION FAULT 5415											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 5416	Short Circuit Ch6: A hardware short circuit is detected. Disabling of the output is required to clear the fault.										
3WD TRACTION FAULT 5416											
TRACTION FAULT 5431	High Current Ch1: The system has detected a peak over-current or overload.										
3WD TRACTION FAULT 5431											
TRACTION FAULT 5432	High Current Ch2: The system has detected a peak over-current or overload.										
3WD TRACTION FAULT 5432											
TRACTION FAULT 5433	High Current Ch3: The system has detected peak over-current or overload.										
3WD TRACTION FAULT 5433											
TRACTION FAULT 5434	High Current Ch4: The system has detected peak over-current or overload is detected.										
3WD TRACTION FAULT 5434											
TRACTION FAULT 5435	High Current Ch5: The system has detected peak over-current or overload is detected.										
3WD TRACTION FAULT 5435											
TRACTION FAULT 5436	High Current Ch6: The system has detected peak over-current or overload is detected.										
3WD TRACTION FAULT 5436											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 5451	Not Connected Ch1: The measured current is below the not connected level.										
STEERING FAULT 5451											
3WD TRACTION FAULT 5451											
STEERING FAULT 5452	Not Connected Ch2: The measured current is below the not connected level.										
3WD TRACTION FAULT 5452											
TRACTION FAULT 5453	Not Connected Ch3: The measured current is below the “not connected” level.										
STEERING FAULT 5453											
3WD TRACTION FAULT 5453											
TRACTION FAULT 5454	Not Connected Ch4: The measured current is below the “not connected” level.										
STEERING FAULT 5454											
3WD TRACTION FAULT 5454											
TRACTION FAULT 5455	Not Connected Ch5: The measured current is below the “not connected” level.										
3WD TRACTION FAULT 5455											
TRACTION FAULT 5456	Not Connected Ch6: The measured current is below the “not connected” level.										
3WD TRACTION FAULT 5456											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 5461	Curr Meas When Off Ch1: More than 200 mA of current is detected when the output should be off.										
STEERING FAULT 5461											
3WD TRACTION FAULT 5461											
TRACTION FAULT 5462	Curr Meas When Off Ch2: More than 200 mA of current is detected when the output should be off.										
STEERING FAULT 5462											
3WD TRACTION FAULT 5462											
TRACTION FAULT 5463	Curr Meas When Off Ch3: More than 200 mA of current is detected when the output should be off.										
STEERING FAULT 5463											
3WD TRACTION FAULT 5463											
TRACTION FAULT 5464	Curr Meas When Off Ch4: More than 200 mA of current is detected when the output should be off.										
STEERING FAULT 5464											
3WD TRACTION FAULT 5464											
TRACTION FAULT 5465	Curr Meas When Off Ch5: More than 200 mA of current is detected when the output should be off.										
3WD TRACTION FAULT 5465											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 5466	Curr Meas When Off Ch6: More than 200 mA of current is detected when the output should be off.										
3WD TRACTION FAULT 5466											
TRACTION FAULT 5481	Load Active When ODO Off Ch1: The system detected that the voltage drop is active across the load when OD is off. This indicates that the open drain has a short circuit to B-.										
3WD TRACTION FAULT 5481											
TRACTION FAULT 5482	Load Active When Off ODO Ch2: The system detected that the voltage drop is active across the load when OD is off. This indicates that the open drain has a short circuit to B-.										
TRACTION FAULT 5483	Load Active When Off ODO Ch3: The system detected that the voltage drop is active across the load when OD is off. This indicates that the open drain has a short circuit to B-.										
3WD TRACTION FAULT 5483											
TRACTION FAULT 5500	High Side Short Circuit: A hardware short circuit is detected. Disabling of the output is required to clear the fault.										
STEERING FAULT 5500											
3WD TRACTION FAULT 5500											
TRACTION FAULT 5501	High Side Input Low: The system detected that the high side input is low. This indicates that the high side input is not connected or has a short circuit to B-.										
3WD TRACTION FAULT 5501											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 5502	High Side Output Low: The system detected that the high side output is low. This indicates that the high side input has a short circuit to B-.										
STEERING FAULT 5502											
3WD TRACTION FAULT 5502											
STEERING FAULT 5503	High Side Output High When Off: The system detected the the high side output is high. This indicates that the high side has a short circuit to B+.										
3WD TRACTION FAULT 5503											
TRACTION FAULT 5504	High Side Overload: The system has detected high continuous current on high side out.										
3WD TRACTION FAULT 5504											
STEERING FAULT 5504	High Side Out Not Connected: Detected that nothing has been connected to the high side output.										
TRACTION FAULT 5505	High Side High Peak Current: The system has detected high peak current on high side out.										
3WD TRACTION FAULT 5505											
STEERING FAULT 5505	High Side Switch Short Circuit Supervision: A short circuit of the high side controlled by the supervision CPU has been detected. This indicates a hardware failure.										
STEERING FAULT 5506	High Side Switch Short Circuit Main: A short circuit of the high side controlled by the main CPU has been detected. This indicates a hardware failure.										

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT 5507	High Side Plausibility Error: An internal high side failure was detected. This indicates that the high side output is not producing the expected voltage.										
STEERING FAULT 5508	High Side Overload: The system has detected high continuous current on the high side output.										
STEERING FAULT 5509	High Side High Peak Current: The system has detected high peak current on the high side output.										
TRACTION FAULT 5520	Checksum Error: The system has detected a checksum error in an EEPROM segment with checksum.										
STEERING FAULT 5520											
3WD TRACTION FAULT 5520											
TRACTION FAULT 5521	Checksum Error on Sensor Angle Offset: The system has detected a checksum error on a sensor angle offset related EEPROM segment.										
STEERING FAULT 5521											
3WD TRACTION FAULT 5521											
TRACTION FAULT 5522	Checksum Error on Item Info: The system has detected a checksum error on an item info related EEPROM segment.										
3WD TRACTION FAULT 5522											
TRACTION FAULT 5523	Checksum Error on Item Max Current: The system has detected a checksum error on item max current EEPROM segment.										
3WD TRACTION FAULT 5523											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 5524	Checksum Error on Can't Talk: The system has detected a checksum error on a can't talk EEPROM segment.										
STEERING FAULT 5524											
3WD TRACTION FAULT 5524											
TRACTION FAULT 5530	EEPROM Size Error: The system has detected an EEPROM memory size mismatch.										
3WD TRACTION FAULT 5530											
TRACTION FAULT 5541	Load Active When HS Off Ch1: The system detected that the voltage drop is active across the load when OD is off. This indicates that the open drain has a short circuit to B-.										
3WD TRACTION FAULT 5541											
TRACTION FAULT 5542	Load Active When HS Off Ch2: The system detected that the voltage drop is active across the load when OD is off. This indicates that the open drain has a short circuit to B-.										
3WD TRACTION FAULT 5542											
TRACTION FAULT 5543	Load Active When HS Off Ch3: The system detected that the voltage drop is active across the load when OD is off. This indicates that the open drain has a short circuit to B-.										
3WD TRACTION FAULT 5543											
STEERING FAULT 6001	Startup Sequence Error: There was an error in the startup sequence of the application.										
STEERING FAULT 6002	Startup Calibration Timeout: A startup calibration of position has timed out.										
STEERING FAULT 6100	Vehicle Speed Start Timeout: The reception of the first vehicle speed frame has timed out.										

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT 6101	Vehicle Speed Counter Error: The vehicle speed counter value has not been updated.										
STEERING FAULT 6102	Zero Speed Error: The received vehicle speed is greater than zero when it should have been zero.										
STEERING FAULT 6103	Vehicle Slow Down Too Slow: The vehicle is not decreasing speed fast enough when the system has been set to monitor vehicle speed.										
STEERING FAULT 6104	Vehicle Speed Value Error: The received vehicle speed value was equal to the indicator value. This indicates that there was an error in the speed measurement in the traction controller.										
STEERING FAULT 6200	Speed Set Act Error: The difference between the main CPU steer (speed) and motor (act) speed has exceeded the error limit.										
STEERING FAULT 6201	Speed Steer Cross Error: The difference between the main CPU and supervision CPU steer speed has exceeded the error limit.										
STEERING FAULT 6202	Motor Speed Cross Error: The difference between the main CPU and supervision CPU motor speed has exceeded the error limit.										
TRACTION FAULT 6210	Direction Error. Traction fault: Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed. Steering fault: Shut mower off. Check steering proximity switches for debris or obstruction. Restart mower. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 6210		4		4			4	4			4

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 6211	Throttle Sensor Error. Shut mower off, then restart, making certain traction pedal is in neutral. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 6211		4		4			4	4			4
TRACTION FAULT 6212	BRC Timeout / BRC On Failure / BRC Off Failure: BRC failure. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
TRACTION FAULT 6213	Start Up Procedure Failed. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
TRACTION FAULT 6214	Brake sensor error. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 6300	Dynamic Reference Ratio Error: This indicates that a dynamic reference ratio below the allowable level has been detected.										
STEERING FAULT 7210	Signal 1 Gain Out of Range: The adapted gain is too low or too high.										
3WD TRACTION FAULT 7210											
STEERING FAULT 7211	Signal 2 Gain Out of Range: The adapted gain is too low or too high.										
3WD TRACTION FAULT 7211											
STEERING FAULT 7212	Signal 1 Offset Out of Range: The adapted offset is too high or too low/										
3WD TRACTION FAULT 7212											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT 7213	Signal 2 Offset Out of Range: The adapted offset is too high or too low.										
3WD TRACTION FAULT 7213											
STEERING FAULT 7214	Signal 1 Saturated High: The signal 1 raw AD value saturate is high. This indicates a short circuit.										
3WD TRACTION FAULT 7214											
STEERING FAULT 7215	Signal 1 Saturated Low: The signal 1 saturated is low. This indicates a short circuit.										
3WD TRACTION FAULT 7215											
STEERING FAULT 7216	Signal 2 Saturated High: The signal 2raw AD value saturate is high. This indicates a short circuit.										
3WD TRACTION FAULT 7216											
STEERING FAULT 7217	Signal 2 Saturated Low: The signal 2saturated is low. This indicates a short circuit.										
3WD TRACTION FAULT 7217											
STEERING FAULT 7218	SIN COS Sensor Not Connected: Check that the unit circle is consistent. This will detect one broken signal even if the sensor is not rotating.										
3WD TRACTION FAULT 7218											
TRACTION FAULT 7220	Sensor Supply SHC: The sensor supply current is too high. The limit is 0.068 A.										
STEERING FAULT 7220											
3WD TRACTION FAULT 7220											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 7221	Sensor Supply Not Connected: The sensor supply current is too low. The limit is 0.000 A										
STEERING FAULT 7221											
3WD TRACTION FAULT 7221											
TRACTION FAULT 7230	Sensor Supply Reference Range: The sensor supply reference voltage is out of range. The valid range is 10.0V to 16.0V.										
STEERING FAULT 7230											
3WD TRACTION FAULT 7230											
TRACTION FAULT 7231	Sensor Supply Range: The sensor supply voltage is out of range. The valid range is 10.0V to 16.0V.										
STEERING FAULT 7231											
3WD TRACTION FAULT 7231											
TRACTION FAULT 7240	Dec Too High: The change of sensor speed is too high.										
TRACTION FAULT 7250	Wrong Direction / Plausibility Error: The sensor and stator frequency have different signs. Either the sensor signals need to be inverted or the motor phase cables are connected incorrectly. The sensor speed is too high, i.e. not plausible/possible.										
STEERING FAULT 7250											
3WD TRACTION FAULT 7250											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT 7251	No Rotation: The motor does not accelerate to the target speed within the specified time. Possible causes could be inertia is too high, friction is too high, DC voltage too low, an error condition, or current reduction. If the motor rotates but not fast enough, attempt increasing acceleration current or timeout.										
3WD TRACTION FAULT 7251											
STEERING FAULT 7252	Low DC BUS Voltage: The motor has gone into field weakening before the desired AC voltage was reached. The most likely cause is a weak battery or power supply.										
3WD TRACTION FAULT 7252											
TRACTION FAULT 7260	Sensor Supply 2 SHC / Dec Too High Glitch: The sensor supply 2 current is too high. The limit is 0.068 A. Intermittent change of sensor speed is too high.										
3WD TRACTION FAULT 7260											
TRACTION FAULT 7261	Sensor Supply 2 Not Connected: The sensor supply is too low. The limit is 0.003A.										
3WD TRACTION FAULT 7261											
TRACTION FAULT 7270	Sensor Supply 2 Reference Range / Sensor Supply 1 Output Voltage Out of Range: The sensor supply 2 reference voltage is out of of range. The valid range is 4.60V to 8.30V. Alternately, the internal sensor supply 1 output voltage The valid range is 10.80V to 13.20V.										
3WD TRACTION FAULT 7270											
TRACTION FAULT 7271	Sensor Supply 2 Range / Sensor Supply 2 Output Voltage Out of Range: The sensor supply 2 voltage is out of range. The valid range is 4.60V to 8.30V. Alternately, the internal sensor supply 2 output voltage is out of range. The valid range is 4.50V to 5.50V.										
3WD TRACTION FAULT 7271											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 7351	Bad or Shorted Inputs: Bad state machine transition. This can idicate shorted inputs.										
TRACTION FAULT 7360	Loss of Ch A: Only Ch B is toggling and Ch A is not.										
TRACTION FAULT 7370	Loss of Ch B: Only Ch A is toggling and Ch B is not.										
TRACTION FAULT 7380	Cross Monitoring Error: The error between sensor speeds in each CPU has been larger than the allowed error for a specified time.										
TRACTION FAULT 7381	Cross Monitoring Communication Error. There is a fault on the communication link or the transmitting CPU from either timeout, faulty CRC, or counter. This can also be triggered if the value from either side is invalid.										
STEERING FAULT 7450	Loss of Ch A: Loss of channel A signal or too noisy.										
STEERING FAULT 7451	Loss of Ch B: Loss of Ch B or too noisy.										
STEERING FAULT 7452	Angle Error: The difference reported by channel A and B is greater than 25°.										
TRACTION FAULT 8060	Speed Limit / High Speed: The system has detected that the motor speed is above a ramped speed limit or the predefined level.										
STEERING FAULT 8060											
3WD TRACTION FAULT 8060											
TRACTION FAULT 8070	Slip In Wrong Direction: The detected slip speed is wrong compared to the expected slip speed.										

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 8071	Tool High Zero Speed Slip: The slip speed is too high compared to the expected slip speed at zero sensor speed. The typical cause of this error is that the sensor is mechanically separated from the motor.										
TRACTION FAULT 8090	AC Current Control Error: The system has detected that the expected AC current and the measured AC current is too high. This indicates a faulty current measurement sensor or poorly tuned current controller.										
STEERING FAULT 8090											
3WD TRACTION FAULT 8090											
TRACTION FAULT 80A0	AC Current Meas Plausibility Error: The reference AC voltage is higher than what the measured AC current indicates. This indicates that one or more motor phase cables are not connected properly or that there is a faulty current measurement sensor.										
STEERING FAULT 80A0											
3WD TRACTION FAULT 80A0											
TRACTION FAULT 80B0	Frequency Above 599 Hz: The electric frequency is evaluated to be above 599Hz.										
STEERING FAULT 80B0											
3WD TRACTION FAULT 80B0											
TRACTION FAULT 8100	Controller has not received an expected CANopen message within the time out time. Shut mower off, then restart. If fault returns, mower must be towed back to maintenance shed.	4		4			4	4			4
STEERING FAULT 8100		4		4			4	4			4
3WD TRACTION FAULT 8100		4		4			4	4			4

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 8101	PDO1 Timeout: Rx PDO1 has not been received within the timeout time on Rx PDO1.										
STEERING FAULT 8101											
3WD TRACTION FAULT 8101											
TRACTION FAULT 8102	PDO2 Timeout: Rx PDO2 has not been received within the timeout time on Rx PDO2.										
STEERING FAULT 8102											
3WD TRACTION FAULT 8102											
TRACTION FAULT 8103	PDO3 Timeout: Rx PDO3 has not been received within the timeout time on Rx PDO3.										
STEERING FAULT 8103											
3WD TRACTION FAULT 8103											
TRACTION FAULT 8104	PDO4 Timeout: Rx PDO4 has not been received within the timeout time on Rx PDO4.										
STEERING FAULT 8104											
3WD TRACTION FAULT 8104											
TRACTION FAULT 8105	PDO5 Timeout: Rx PDO1 has not been received within the timeout time on Rx PDO5.										
3WD TRACTION FAULT 8105											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT 8105	Sync Timeout: A sync was not received within the timeout time.										
TRACTION FAULT 8106	PDO6 Timeout: Rx PDO6 has not been received within the timeout time on Rx PDO6.										
3WD TRACTION FAULT 8106											
TRACTION FAULT 8107	PDO7 Timeout: Rx PDO7 has not been received within the timeout time on Rx PDO7.										
3WD TRACTION FAULT 8107											
TRACTION FAULT 8108	PDO8 Timeout: Rx PDO8 has not been received within the timeout time on Rx PDO8.										
3WD TRACTION FAULT 8108											
TRACTION FAULT 8109	PDO9 Timeout: Rx PDO9 has not been received within the timeout time on Rx PDO9.										
3WD TRACTION FAULT 8109											
TRACTION FAULT 810A	PDO10 Timeout: Rx PDO10 has not been received within the timeout time on Rx PDO10.										
3WD TRACTION FAULT 810A											
TRACTION FAULT 810B	PDO11 Timeout: Rx PDO11 has not been received within the timeout time on Rx PDO11.										
3WD TRACTION FAULT 810B											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 810C	PDO12 Timeout: Rx PDO12 has not been received within the timeout time on Rx PDO12.										
3WD TRACTION FAULT 810C											
TRACTION FAULT 810D	PDO13 Timeout: Rx PDO13 has not been received within the timeout time on Rx PDO13.										
3WD TRACTION FAULT 810D											
TRACTION FAULT 810E	PDO14 Timeout: Rx PDO14 has not been received within the timeout time on Rx PDO14.										
3WD TRACTION FAULT 810E											
TRACTION FAULT 810F	PDO15 Timeout: Rx PDO15 has not been received within the timeout time on Rx PDO15.										
3WD TRACTION FAULT 810F											
TRACTION FAULT 8110	PDO16 Timeout: Rx PDO16 has not been received within the timeout time on Rx PDO16.										
3WD TRACTION FAULT 8110											
STEERING FAULT 8110	SDO1 Timeout: No SDO message has been received within the timeout time on SDO1.										
TRACTION FAULT 8111	PDO17 Timeout: Rx PDO17 has not been received within the timeout time on Rx PDO17.										
3WD TRACTION FAULT 8111											
STEERING FAULT 8111	SDO2 Timeout: No SDO message has been received within the timeout time on SDO2.										

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 8112	PDO18 Timeout: Rx PDO18 has not been received within the timeout time on Rx PDO18.										
3WD TRACTION FAULT 8112											
TRACTION FAULT 8113	PDO19 Timeout: Rx PDO19 has not been received within the timeout time on Rx PDO19.										
3WD TRACTION FAULT 8113											
TRACTION FAULT 8114	PDO20 Timeout: Rx PDO20 has not been received within the timeout time on Rx PDO20.										
3WD TRACTION FAULT 8114											
TRACTION FAULT 8115	PDO21 Timeout: Rx PDO21 has not been received within the timeout time on Rx PDO21.										
3WD TRACTION FAULT 8115											
TRACTION FAULT 8116	PDO22 Timeout: Rx PDO22 has not been received within the timeout time on Rx PDO22.										
3WD TRACTION FAULT 8116											
TRACTION FAULT 8117	PDO23 Timeout: Rx PDO23 has not been received within the timeout time on Rx PDO23.										
3WD TRACTION FAULT 8117											
TRACTION FAULT 8118	PDO24 Timeout: Rx PDO24 has not been received within the timeout time on Rx PDO24.										
3WD TRACTION FAULT 8118											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT 8118	SDO1 Session Busy: An SDO request is not finished and a new SDO request was received.										
TRACTION FAULT 8119	PDO25 Timeout: Rx PDO25 has not been received within the timeout time on Rx PDO25.										
3WD TRACTION FAULT 8119											
STEERING FAULT 8119	SDO1 Session Busy: An SDO request is not finished and a new SDO request was received.										
TRACTION FAULT 811A	PDO26 Timeout: Rx PDO26 has not been received within the timeout time on Rx PDO26.										
3WD TRACTION FAULT 811A											
TRACTION FAULT 811B	PDO27 Timeout: Rx PDO27 has not been received within the timeout time on Rx PDO27.										
3WD TRACTION FAULT 811B											
TRACTION FAULT 811C	PDO28 Timeout: Rx PDO28 has not been received within the timeout time on Rx PDO28.										
3WD TRACTION FAULT 811C											
TRACTION FAULT 811D	PDO29 Timeout: Rx PDO29 has not been received within the timeout time on Rx PDO29.										
3WD TRACTION FAULT 811D											
TRACTION FAULT 811E	PDO30 Timeout: Rx PDO30 has not been received within the timeout time on Rx PDO30.										
3WD TRACTION FAULT 811E											

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 811F	PDO31 Timeout: Rx PDO31 has not been received within the timeout time on Rx PDO31.										
3WD TRACTION FAULT 811F											
TRACTION FAULT 8140	Sync Timeout: Sync was not received within the timeout time.										
3WD TRACTION FAULT 8140											
STEERING FAULT 8140	NMT Safe State Error: 20 ms has passed since the main CPU has detected the NMT safe state event.										
TRACTION FAULT 8141	SDO1 Timeout: No SDO message has been received within the timeout time on SDO1.										
3WD TRACTION FAULT 8141											
TRACTION FAULT 8142	SDO2 Timeout: No SDO message has been received within the timeout time on SDO2										
3WD TRACTION FAULT 8142											
TRACTION FAULT 8143	SDO1 Session Busy: An SDO1 request is not finished and a new SDO1 request is receivedt.										
3WD TRACTION FAULT 8143											
TRACTION FAULT 8144	SDO2 Session Busy: An SDO2 request is not finished and a new SDO2 request is received.										
3WD TRACTION FAULT 8144											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 814C	SDO3 Timeout: No SDO message has been received within the timeout time on SDO3.										
3WD TRACTION FAULT 814C											
TRACTION FAULT 814D	SDO4 Timeout: No SDO message has been received within the timeout time on SDO4										
3WD TRACTION FAULT 814D											
TRACTION FAULT 814E	SDO3 Session Busy: An SDO3 request is not finished and a new SDO3 request is received.										
3WD TRACTION FAULT 814E											
TRACTION FAULT 814F	SDO4 Session Busy: An SDO4 request is not finished and a new SDO4 request is received.										
3WD TRACTION FAULT 814F											
TRACTION FAULT 8180	RX Map Length Error: An RxPDO has received a short packet.										
3WD TRACTION FAULT 8180											
TRACTION FAULT 81F5	CAN Config Error: CAN configuration conflict detected.										
3WD TRACTION FAULT 81F5											
STEERING FAULT 8300	CRC Error: The system received a message with a CRC error.										
STEERING FAULT 8301	Sequence error: The system received a message with an invalid sequence number.										

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT 8302	Rx Timeout: A message received has timed out.										
STEERING FAULT 8303	Bad Function Argument: The system has detected an invalid argument in the internal communication module.										
STEERING FAULT 8304	Invalid State Change: There was an invalid state change in the internal communication software module.										
STEERING FAULT 8305	TX Overflow: The transmit buffer has overflowed.										
STEERING FAULT 8306	Unknown Rx Frame: An unknown message has been received.										
STEERING FAULT 8307	CMD Busy: A software failure in internal communication has occurred.										
STEERING FAULT 8308	Supervisor Event Not Valid: A supervisor event ID to replicate is not valid.										
STEERING FAULT 8309											
TRACTION FAULT 8400	Independent Watchdog Timeout: The MCU internal independent watchdog was not reset in time causing the MCU to reset.										
STEERING FAULT 8400											
3WD TRACTION FAULT 8400											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 8401	Windowed Watchdog Timeout: The MCU internal windowed watchdog was not reset in time causing the MCU to reset.										
STEERING FAULT 8401											
3WD TRACTION FAULT 8401											
TRACTION FAULT 8403	Power Out Reset: The MCU was unintentionally reset due to low 3.3V power supply.										
STEERING FAULT 8403											
3WD TRACTION FAULT 8403											
TRACTION FAULT 8404	Brown Out Reset: The MCU was unintentionally reset due to low 3.3V power supply.										
STEERING FAULT 8404											
3WD TRACTION FAULT 8404											
TRACTION FAULT 8410	Execution Time High 4kHz: The average execution time is higher than 200U us.										
STEERING FAULT 8410											
3WD TRACTION FAULT 8410											
TRACTION FAULT 8411	Execution Time High 50Hz: The average execution time is higher than 7000U us.										
STEERING FAULT 8411											
3WD TRACTION FAULT 8411											

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 8412	Execution Time High Independent Supervision: The average execution time is higher than 500U us.										
STEERING FAULT 8412											
3WD TRACTION FAULT 8412											
TRACTION FAULT 8413	Execution Time High CAN: The average execution time is higher than 1000U us.										
STEERING FAULT 8413											
3WD TRACTION FAULT 8413											
TRACTION FAULT 8414	Execution Time High Slow App: The average execution time is higher than 2000U us.										
STEERING FAULT 8414											
3WD TRACTION FAULT 8414											
TRACTION FAULT 8415	Execution Time High Fast App: The average execution time is higher than 400U us.										
STEERING FAULT 8415											
3WD TRACTION FAULT 8415											
TRACTION FAULT 8416	Execution Time Mod High Slow App: The average execution time is higher than 300U us.										
STEERING FAULT 8416											
3WD TRACTION FAULT 8416											

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 8417	Execution Time Mod High Fast App: The average execution time is higher than 300U us.										
STEERING FAULT 8417											
3WD TRACTION FAULT 8417											
TRACTION FAULT 8420	CPU Test / Watchdog / 64 MHz HSI / Checkpoint 1 / Full Ram March / Switch Of PLL / LSI Start / HSE Start / HSI HSE / Ext Source / Clock Frequency / Checkpoint 2 / Incompatible Software Hardware Configuration: One or more of a number of startup tests failed including any of the above.										
STEERING FAULT 8420											
3WD TRACTION FAULT 8420											
TRACTION FAULT 8450	Internal Error: An internal error has occurred. This most likely indicates a static configuration error that is not caught at compile time including the following: -Impossible configuration in flash memory -Illegal error bit configured for an event -Same event id on two different events										
STEERING FAULT 8450											
3WD TRACTION FAULT 8450											
TRACTION FAULT 8451	Clock Failure: CPU clock failure. Either external or internal PLL failed to generate a stable clock. The CPU will be clocked by the internal 8MHz oscillator.										
STEERING FAULT 8451											
3WD TRACTION FAULT 8451											

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
TRACTION FAULT 8452	Boot Internal Error: An internal error occurred in boot. It may occur if an incompatible application is running with the boot code.										
3WD TRACTION FAULT 8452											
STEERING FAULT F000	Speed Set Act Error: The difference between the supervision CPU (steer (set) and motor (act) speed has exceeded the error limit.										
STEERING FAULT F001	Steer Speed Cross Error: The difference between the main CPU and supervision steer speed has exceeded the error limit.										
STEERING FAULT F002	Motor Speed Cross Error: The difference between the main CPU and supervision motor speed has exceeded the error limit.										
STEERING FAULT F003	Position set act Error: The difference between the supervision CPU (steer (set) and motor (act) speed has exceeded the error limit.										
STEERING FAULT F004	PWM Unexpected Off: The power stage was unexpectedly turned off. The most likely occurred as a result of a hardware detected short circuit or a hardware detected over-voltage.										
STEERING FAULT F005	No Position: The supervision CPU did not receive the position (for position synchronize) from the main CPU.										
STEERING FAULT F006	Other Side Fail: This indicates that the two CPUs are not in the same device state. Most likely one CPU has unexpectedly entered the end state.										

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F010	CRC Error: The system has received a message with a CRC error.										
STEERING FAULT F011	Sequence Error: CRC Error: The system has received a message with a sequence number error.										
STEERING FAULT F012	Rx Timeout: CRC Error: The system did not receive a message within the time limit.										
STEERING FAULT F013	Bad Function Argument: An internal communication API function was called with wrong arguments.										
STEERING FAULT F014	Inv State Change: The two CPU device state machines are not in synchronization.										
STEERING FAULT F015	Tx Overflow: An attempt to send an internal message failed due to no room in FIFO.										
STEERING FAULT F016	Unknown Rx Frame: An internal communication message was received with unknown information.										
STEERING FAULT F017	CMD Busy: An attempt was made to issue a new command before a previous command has finished.										
STEERING FAULT F018	Pro Ver Mismatch: The internal communication revisions in the two CPUs are not compatible.										
STEERING FAULT F020	Vehicle Speed Start Timeout: The reception of the first vehicle speed frame has timed out.										

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F021	Vehicle Speed Counter Error: The received speed counter counter value has not been updated.										
STEERING FAULT F022	Speed Fit Error: The speed value in the received message for vehicle speed does not fit as considered.										
STEERING FAULT F023	Speed Unknown Bit Error: The configured number of bits for speed in the received message for vehicle speed is unknown.										
STEERING FAULT F024	Counter Fit Error: The counter value in the received message for vehicle speed does not fit as configured.										
STEERING FAULT F025	Overlap Error: The counter and speed values in the received message overlap each other.										
STEERING FAULT F026	Counter Unknown Bit Ranking: The speed value in the received message for vehicle does not fit as configured.										
STEERING FAULT F027	Message Timeout Error: The reception of the vehicle speed message timed out.										
STEERING FAULT F028	Zero Speed Error: The received vehicle speed value is not considered to be zero when it should have been.										
STEERING FAULT F029	Vehicle Slow down Too Slow: The monitored vehicle speed is not decreasing fast enough when the system is set to monitor vehicle speed.										

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F02A	Vehicle Speed Value Error: The received vehicle speed was equal to the error indicator value. This indicates that there was an error in the speed measurement in the traction controller.										
STEERING FAULT F030	PDO1 Timeout: No Rx PDO1 was received within the timeout time.										
STEERING FAULT F031	PDO2 Timeout: No Rx PDO2 was received within the timeout time.										
STEERING FAULT F032	PDO3 Timeout: No Rx PDO3 was received within the timeout time.										
STEERING FAULT F033	PDO4 Timeout: No Rx PDO4 was received within the timeout time.										
STEERING FAULT F034	Sync Timeout: No sync was received within the timeout time.										
STEERING FAULT F035	Map Error: Any PDO map has an invalid configuration.										
STEERING FAULT F036	SDO1 Timeout: No SDO1 message was received within the timeout time.										
STEERING FAULT F037	SDO2 Timeout: No SDO2 message was received within the timeout time.										
STEERING FAULT F038	SDO1 Session Busy: An SDO1 request was not finished and a new SDO1 request was received.										
STEERING FAULT F039	SDO Session Busy: An SDO2 request was not finished and a new SDO2 request was received.										

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F03A	Msg Timeout Consumer0: No heartbeat message was received within the timeout time from the node.										
STEERING FAULT F03B	Msg Timeout Consumer1: No heartbeat message was received within the timeout time from the node.										
STEERING FAULT F03C	Msg Timeout Consumer2: No heartbeat message was received within the timeout time from the node.										
STEERING FAULT F03D	Msg Timeout Consumer3: No heartbeat message was received within the timeout time from the node.										
STEERING FAULT F040	NMT Safe State Error: 20 ms has passed since the main CPU has detected the NMT safe state event but this CPU has not detected the NMT safe state event.										
STEERING FAULT F051	Checksum Error: There is a checksum error on any EEPROM segment with checksum.										
STEERING FAULT F053	Independent Watchdog Timeout: The MCU internal independent watchdog was not reset in time causing the MCU to reset.										
STEERING FAULT F054	Windowed Watchdog Timeout: The MCU internal windowed watchdog was not reset in time causing the MCU to reset.										
STEERING FAULT F055	Execution Time High 4kHz: The average execution time was higher than 200U us.										
STEERING FAULT F056	Execution Time High 50Hz: The average execution time was higher than 6000U us.										

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F058	Execution Time High CAN: The average execution time was higher than 1000U us.										
STEERING FAULT F059	Internal Error: Most likely a static configuration error was not caught at compile time including the following - Impossible configuration in flash memory - Illegal error bit configured for an event. - Same event id on two different events. This can also be set by various state machines when an unknown state is encountered.										
STEERING FAULT F05A	Clock Failure: Either the external crystal or internal PLL failed to generate a stable clock. The CPU will be clocked by the internal 8MHz RC oscillator.										
STEERING FAULT F061	15V Out of Range: The internal 15V supply is out of range. The valid range is 10.56V to 19.0V.										
STEERING FAULT F062	3V3 Low: The internal 3.3V supply is too low. The limit is 2.9V.										
STEERING FAULT F080	CPU Test: The startup test of the CPU failed.										
STEERING FAULT F081	Watchdog: The startup test of the watchdog failed.										
STEERING FAULT F082	64MHz HSI: The startup test of the 64MHz HSI failed.										

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F083	Checkpoint1: The startup test of the checkpoint1 failed.										
STEERING FAULT F084	Full RAM March: The startup test of the full RAM march failed.										
STEERING FAULT F085	Switch Off PLL: The startup test failed due to switch off PLL.										
STEERING FAULT F086	LSI Start: Failed to start LSI.										
STEERING FAULT F087	HSE Start: Failed to start HSE.										
STEERING FAULT F088	HSI HSE: The startup test of the HSI HSE switch failed.										
STEERING FAULT F089	EXT Source: The startup test of the EXT source failed.										
STEERING FAULT F08A	Clock Frequency: The startup test of the clock frequency failed.										
STEERING FAULT F08B	Checkpoint2: The startup test of the checkpoint2 control flow failed.										
STEERING FAULT F090	Signal1 Amplitude Out of Range: The adapted amplitude is too high or too low.										
STEERING FAULT F091	Signal2 Amplitude Out of Range: The adapted amplitude is too high or too low.										
STEERING FAULT F092	Signal1 Offset Out of Range: The adapted offset is too high or too low.										

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sounding		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F093	Signal2 Offset Out of Range: The adapted offset is too high or too low.										
STEERING FAULT F094	SIN COS Sensor Not Connected: Check that the unit circle vector is constant. The system will detect a broken signal even if the motor is not rotating.										
STEERING FAULT F095	Speed Error: The speed calculated from the sensor signals is not valid.										
STEERING FAULT F0A1	High Side Output Low: The high side output has been detected to be low. This indicates a short circuit to B-.										
STEERING FAULT F0A2	High Side Output High: The high side output has been detected to be high. This indicates a short circuit to B+.										
STEERING FAULT F0A3	High Side Output Not Connected: The system detected that nothing is connected to the high side output.										
STEERING FAULT F0A4	High Side Switch SHC Supervision: A short circuit of the high side switch controlled by the supervision CPU was detected. This indicates a hardware failure.										
STEERING FAULT F0A5	High Side Switch SHC Main: A short circuit of the high side switch controlled by the main CPU was detected. This indicates a hardware failure.										
STEERING FAULT F0A6	High Side Plausibility Error: An internal high side failure was detected. This indicates that the high side output is not producing the expected voltage.										
STEERING FAULT F0B0	Signal1 Amplitude Out of Range: The adapted amplitude is too high or too low.										

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F0B1	Signal2 Amplitude Out of Range: The adapted amplitude is too high or too low.										
STEERING FAULT F0B2	Signal1 Offset Out of Range: The adapted offset is too high or too low.										
STEERING FAULT F0B3	Signal2 Offset Out of Range: The adapted offset is too high or too low.										
STEERING FAULT F0B4	SIN COS Sensor Not Connected: Check that the unit circle vector is constant. The system will detect a broken signal even if the motor is not rotating.										
STEERING FAULT F0B5	Speed Error: The speed calculated from the sensor signals is not valid.										
STEERING FAULT F0C0	Negative Positive Limit: The calculation of the positive start of the slow down position resulted in a negative value which is not allowed.										
STEERING FAULT F0C1	Positive Negative Limit: The calculation of the negative start of the slow down position resulted in a positive value which is not allowed.										
STEERING FAULT F0C2	Dynamic Reference Ration Error: The monitoring of the dynamic reference ration has detected an error. This indicates that a dynamic reference ratio value below the dynamic reference ratio minimum limit has been detected when not allowed.										
STEERING FAULT F0D0	Stepper Signal1 High: The filtered stepper signal1 is above 4000mV.										
STEERING FAULT F0D1	Stepper Signal1 Low: The filtered stepper signal1 is below 1000mV.										

LDU ERROR CODES

LDU Error Code	Description	Caution LED		Alarm Sound-ing		Engine Stop		Traction Stop		Mow Stop	
		On	Off	Yes	No	Yes	No	Yes	No	Yes	No
STEERING FAULT F0D2	Stepper Signal2 High: The filtered stepper signal1 is above 4000mV.										
STEERING FAULT F0D3	Stepper Signal2 Low: The filtered stepper signal1 is below 1000mV.										
STEERING FAULT F0E0	Ch A Signal Loss: The sensor signal is suddenly lost.										
STEERING FAULT F0E1	Ch A Low Update Rate: The sensor update rate is considered to be too low.										
STEERING FAULT F0E2	Ch A FIFO Overrun: The first in first out buffer was full.										
STEERING FAULT F0E4	Ch B Signal Loss: The sensor signal is suddenly lost.										
STEERING FAULT F0E5	Ch B Low Update Rate: The sensor update rate is considered to be too low.										
STEERING FAULT F0E6	Ch B FIFO Overrun: The first in first out buffer was full.										
STEERING FAULT F0E7	Wrong AB Difference: The angle difference between channel A and B was larger than 90°.										

TROUBLESHOOTING

TROUBLE SHOOTING

Problem	Possible Cause/Items to Check	Additional Items to Check
Key switch ON - No power to LDU	48VDC Battery or 48VDC Buffer Battery not connected or discharged.	Check battery connections and voltage.
	No 12V power to LDU. Overcurrent protection device in PDU may be tripped. Check for open connection or shorted wire to GND for LDU 48V power.	Cycle power once corrected.
Key switch ON - No power to MCU or RCU	Main Contactor not on due to circuit breaker tripped.	Check to see if circuit breaker 4 is tripped.
	Fault Code on LDU	Review any fault codes and take appropriate action.
	Overcurrent protection device in LDU tripped. Check for open connection or shorted wire to battery for main contactor coil power.	
No Traction Movement	Ensure Machine was started. Check LDU Green Lightning Bolt for steady on.	If flashing initiate start sequence.
	Fault Code on LDU	Review any fault codes and take appropriate action.
	Traction Contactor is off. Check MCU LED # 8 should be on when contactor is on. If off see next item.	Overcurrent protection device in MCU tripped. Check for open connection or shorted wire to battery for traction contactor power.
	Check if Seat Switch is functioning. Check MCU LED #24 should be on when on seat and off when off seat.	Check switch and harness connection.
	No CAN communication.	Check connections.
	Parking Brake not releasing	Manually release parking brake, then remove release screws. Cycle power.
	Overcurrent protection device in PDU tripped. Check for open connection or shorted wire to GND for throttle pedal power, TCU logic power, and park brake power.	Cycle power once corrected.
	Overcurrent protection device in MCU tripped. Check for open connection or shorted wire to battery for traction contactor coil power.	

No steering (Electric steering system)	Check if Seat Switch is functioning. Check MCU LED #24 should be on when on seat and off when off seat.	Check switch and harness connection.
	SCU does not have power.	Check to see if circuit breaker 5 is tripped.
	Fault Code on LDU	Review any fault codes and take appropriate action.
	Overcurrent protection device in PDU tripped. Check for open connection or shorted wire to GND for SCU logic power.	Cycle power once corrected.
	Proximity switches dirty.	Clean all dirt or debris from proximity switch. Check for obstructions that may interfere with switch operations.
Manual Actuator Mode not working	Park brake off. Check LDU Park Brake LED should be on.	Cycle power.
	No CAN communication.	Check connections.
	Fault Code on LDU	Review any fault codes and take appropriate action.
	Mow switch is in ON position.	Ensure Mow switch is in OFF position.
One or more reel motors won't run	Mow switch is in OFF position.	Ensure Mow switch is in ON position.
	Reel enable switches are in OFF position.	Ensure to enable reels.
	Machine not moving. (applicable if FOC is not zero)	Reel motors should come on when machine starts moving forward.
	Fault Code on LDU	Review any fault codes and take appropriate action.
	No power to reels. When actuators are down check RCU LED's #8 for Left, #14 for Center, #7 for right should be on.	Check PDU circuit breakers for tripped: CB3 for left, CB2 for center, CB1 for right.
Reel motor temperature or current high when mowing.	Excessive amount of grass being cut.	Reduce mower speed, increase FOC, or change height of cut.
Actuators raise and motors shut off while mowing	Low Battery Power. LDU-Red 48V Battery LED will be on.	Recharge Batteries.
	Reel or Actuator Fault. LDU-Yellow Caution LED will be on.	Review fault codes to determine which reel or actuator is faulted.
Steering wheel has no resistance	Overcurrent protection device in PDU tripped. Check for open connection or shorted wire to GND for Lord brake, Lord protection diode.	Cycle power once corrected.
Headlights don't turn on	Overcurrent protection device in PDU tripped. Check for open connection or shorted wire to GND for headlight(s).	Cycle power once corrected.

QUALITY OF CUT

QUALITY OF CUT TROUBLESHOOTING

It is recommended that a “test cut” be performed to evaluate the mower’s performance before beginning repairs.

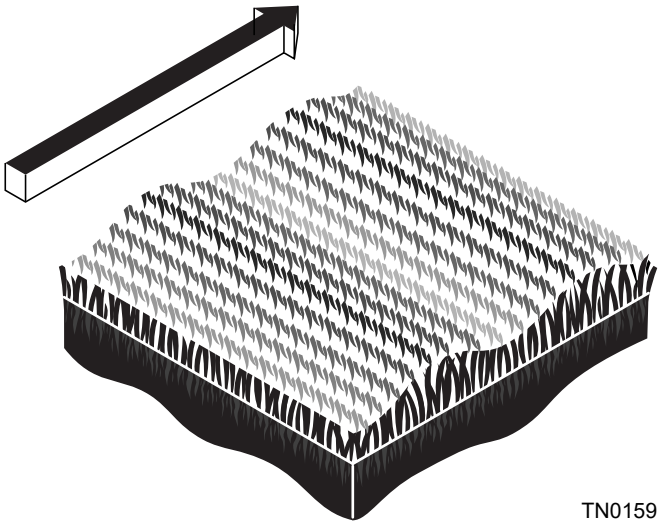
An area should be available where “test cuts” can be made. This area should provide known and consistent turf conditions to allow accurate evaluation of the mower’s performance.

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.”

- Mowing (Ground) Speed. **See *Operator Mode*** on page 28..
- Reel Bearing Condition and Pre-Load (End Play) Adjustment.
- Reel and Bedknife Sharpness
- Bedknife Alignment to Reel.
- Reel-to-Bedknife Contact.
- Height-of-Cut (HOC).
- Roller and Roller Bearing Condition
- Reel Speed.

WASHBOARDING



NOTE: Arrow indicates direction of travel.

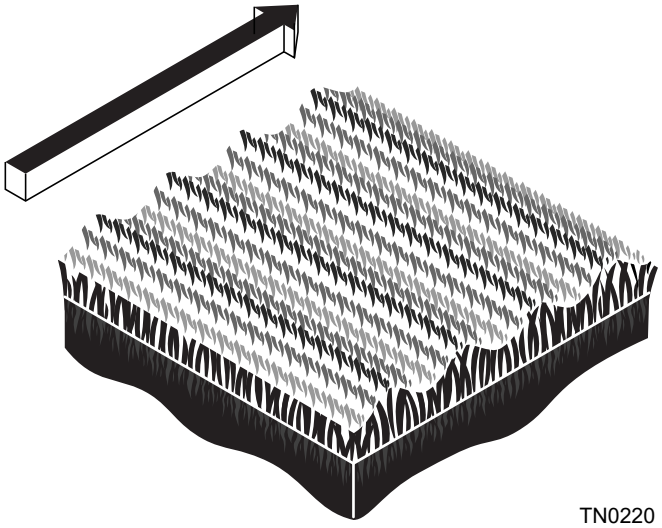
Washboarding is a cyclical pattern of varying cutting heights, resulting in a wave-like cut appearance. In most cases, the wave tip-to-tip distance is approximately 6—8 in. (15—20 cm). Color variation (light-to-dark) may also be noticed.

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 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 roller.
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.
Reel drive motor performance is reduced.	Check LDU for excessive reel motor current and/or temperature. Check/remove cutting reel movement obstruction.

MARCELLING

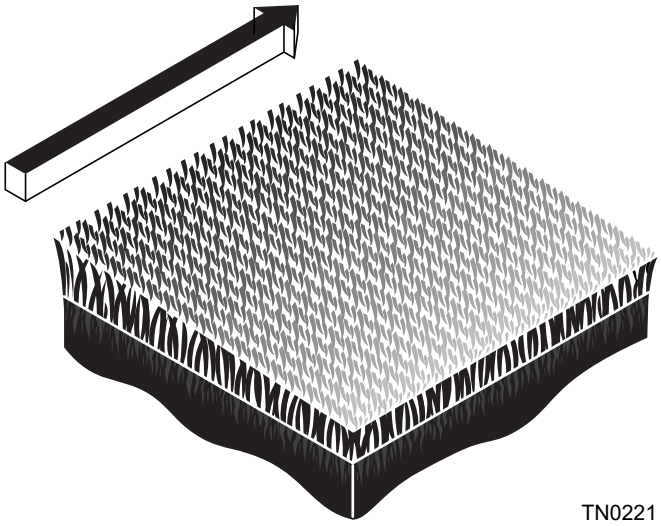


Marcelling, like washboarding, is a cyclical pattern of varying cutting heights, resulting in a wave-like cut appearance. In most cases, the wave tip-to-tip distance is 2 in. (5 cm) or less.

NOTE: Arrow indicates direction of travel.

Probable Cause	Remedy
Mowing (ground) speed is too fast.	Reduce mowing (ground) speed.
HOC (height-of-cut) setting is too low for turf conditions.	Check/adjust HOC to turf conditions.
Cutting reel diameter is worn.	Check cutting reel diameter and replace if worn.
Reel drive motor performance is reduced.	Check LDU for excessive reel motor current and/or temperature. Check/remove cutting reel movement obstruction.

STEP CUTTING

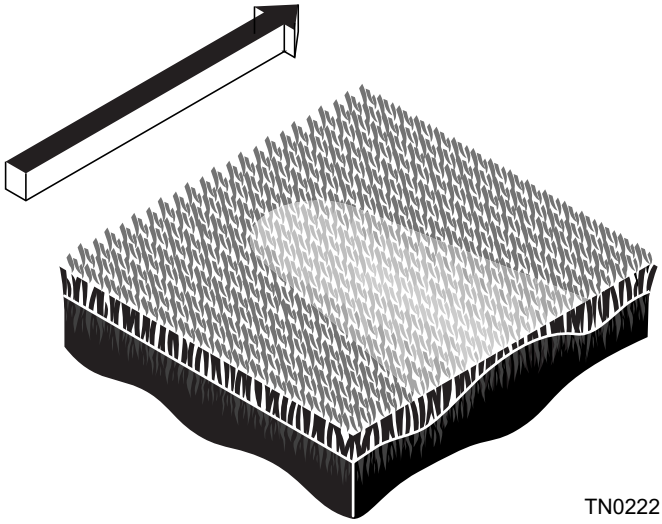


Step cutting occurs when grass is cut taller on one side of a reel than the other or one cutting unit to another. This is usually caused by mechanical wear or an incorrect roller or HOC (height-of-cut) adjustment.

NOTE: Arrow indicates direction of travel.

Probable Cause	Remedy
HOC (height-of-cut) settings are different from one side of a reel to the other or from one cutting unit to another.	Check HOC adjustment of cutting units.
Worn front roller bearings.	Check/replace front roller bearings.
Reel-to-bedknife contact is different from one side of the cutting unit to the other or from one cutting unit to another.	Check reel-to-bedknife contact.
Cutting reel movement is restricted.	Check/remove cutting reel movement obstruction.
Variations in turf density.	Change mowing direction.
Machine weight distribution is uneven.	Check/adjust tire inflation pressure.

SCALPING

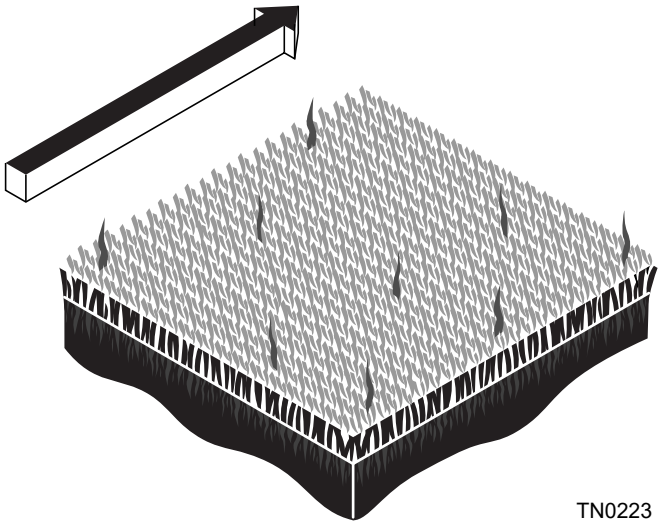


NOTE: Arrow indicates direction of travel.

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 (HOC) setting and/or uneven turf.

Probable Cause	Remedy
HOC (height-of-cut) settings are lower than normal.	Check/adjust the HOC settings.
Improper reel-to-bedknife adjustment.	Adjust reel-to-bedknife setting for desired HOC.
Turf too uneven for the mower to follow.	Change mowing direction.
Cutting too much grass at one time.	Mow more often.
Mowing (ground) speed is too fast.	Reduce mowing (ground) speed.

STRAGGLERS

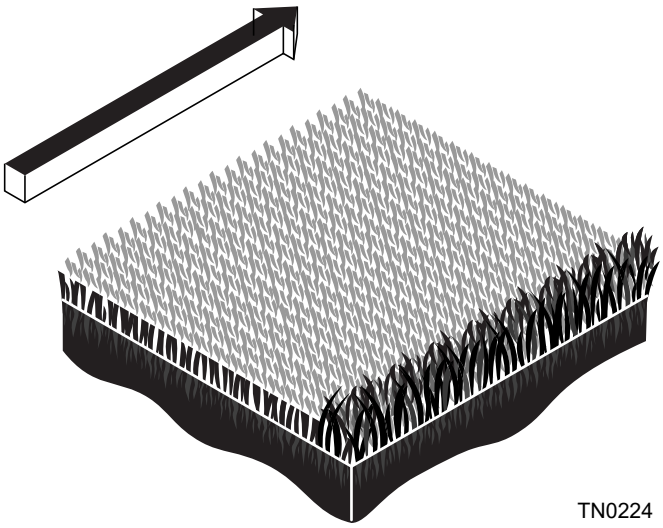


Stragglers are scattered blades of uncut or poorly cut grass.

NOTE: Arrow indicates direction of travel.

Probable Cause	Remedy
Bedknife improperly adjusted.	Adjust reel-to-bedknife setting.
Dull reel or bedknife cutting edges.	Sharpen or replace reel blade and bedknife as necessary.
Mowing (ground) speed is too fast.	Reduce mowing (ground) speed.
Grass is too tall.	Mow more often.
Mowing in the same direction.	Change mowing direction regularly.
Nicks in reel or bedknife.	Grind, sharpen or replace reel blades and bedknife as necessary.

STREAKS

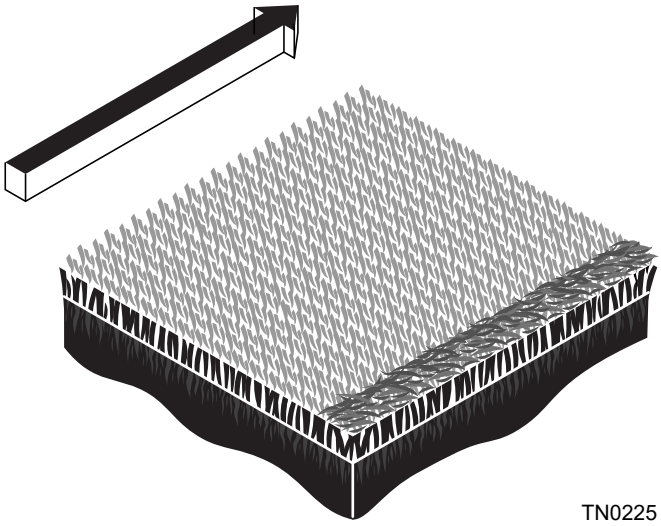


A streak is a line of uncut grass. This is usually caused by a nicked or bent bedknife.

NOTE: Arrow indicates direction of travel.

Probable Cause	Remedy
Damaged bedknife.	Replace bedknife.
Damaged or unevenly worn reel.	Inspect reel. Replace as needed.
Loose or missing bedknife fasteners.	Check bedknife screws. Tighten loose screws; replace missing screws.
Turning too aggressively. Cutting units don’t overlap around turns or on side hills.	Turn less aggressively to allow cutting units to overlap. Change mowing direction or pattern on side hills.
Tire mats down grass before it is cut.	Check/adjust tire inflation pressure.
Wet grass is matted down before it is cut.	Mow when grass is dry.

WINDROWING

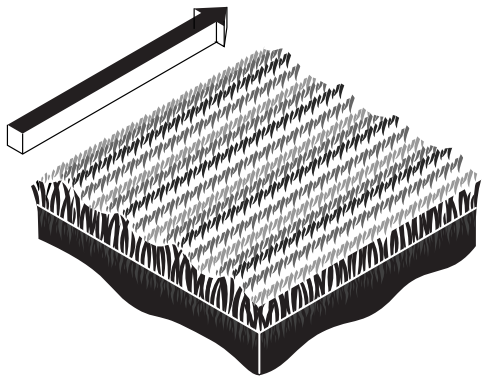


Windrowing is the deposit of clippings concentrated at one end of cutting unit(s) or between two cutting units, forming a line in the direction of travel.

NOTE: Arrow indicates direction of travel.

Probable Cause	Remedy
Grass is too tall.	Mow more often.
Mowing while grass is wet.	Mow when grass is dry.
Grass built up on roller(s).	Clean roller(s) and scraper(s).
Grass collecting on bedknife.	Adjust reel-to-bedknife setting.

RIFLING OR TRAMLINING

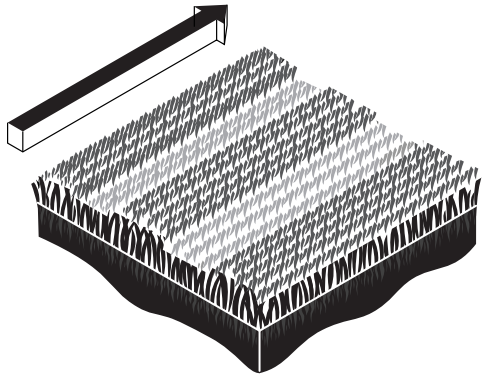


NOTE: Arrow indicates direction of travel.

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

Probable Cause	Remedy
Reel and/or bedknife unevenly worn.	Inspect bedknife and reel. Sharpen or replace reel and bedknife as necessary.
Missing, loose, or overtorqued bedknife screws.	Install, replace or tighten bedknife screws to proper torque setting.
Mowing (ground) speed is too fast.	Reduce mowing (ground) speed.

MISMATCHED CUTTING UNITS



NOTE: Arrow indicates direction of travel.

Mismatched cutting units is a pattern of varying cutting heights, resulting in a stepped cut appearance, usually due to mismatched HOC (height-of-cut) adjustment from one cutting unit to another.

Probable Cause	Remedy
HOC inconsistent from one cutting unit to another.	Check/adjust HOC on cutting units.
Difference in mower ride height side to side.	Check/adjust tire inflation pressure.

Notes:

APPENDIX A

BATTERY CHARGER USERS GUIDE

DELTA-Q IC SERIES

User Manual: Important Safety and Operating Instructions

Save these instructions. This manual contains important safety and operating instructions for the Delta-Q IC Series Industrial Battery Charger. Read this information in its entirety before using your Delta-Q Charger. For technical support, please contact the manufacturer or distributor of your vehicle or machine, as their version of this charger may require unique operating instructions. For additional product documentation please see www.delta-q.com/resources

⚠ WARNING

Only use the charger with a charging profile that is appropriate to the specific battery type. Other usage may cause personal injury and damage. Lead acid batteries may generate explosive hydrogen gas during normal charging. Keep sparks, flames, and smoking materials away from batteries. Do not operate charger in a closed-in area or an area with restricted ventilation. Never charge a frozen or non-rechargeable battery. Observe all battery manufacturers' precautions (e.g. maximum charge rates and if cell caps should be removed while charging).

⚠ DANGER

Risk of electric shock. Connect charger power cord to an AC outlet that has been properly installed and grounded in accordance with all local codes and ordinances. A grounded AC outlet is required to reduce the risk of electric shock—do not use ground adapters or modify the plug. Do not touch uninsulated portions of the output connector or uninsulated battery terminals. Disconnect the AC supply before making or breaking the connections to the battery. Do not open or disassemble the charger. Do not operate this charger if the AC supply cord or DC output cord is damaged or if the charger has received a sharp blow, been dropped, or is damaged in any way. Refer all repair work to the manufacturer, or qualified personnel. This charger is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge on electrical systems and battery charging, unless they have been given supervision or instruction concerning use of the charger by a person responsible for their safety. Children should be supervised to ensure they do not play with the charger.

Safe Operating Instructions

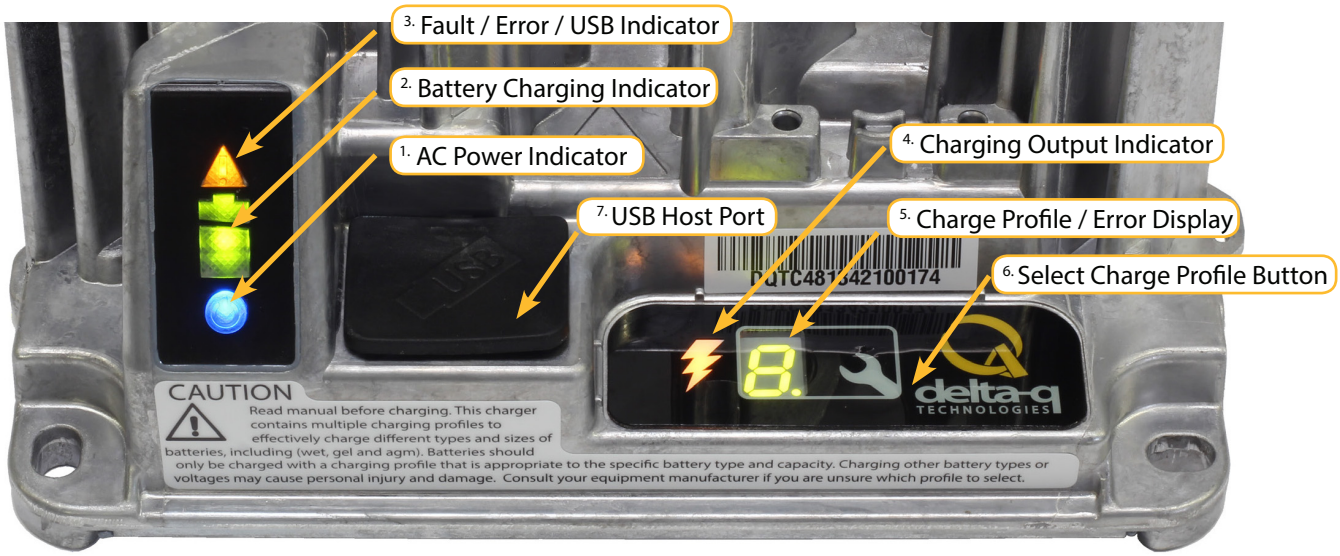
- The charger contains up to 25 selectable charging profiles stored in its internal memory to charge batteries. These profiles are specific to each manufacturer and model of battery. Your equipment supplier or charger distributor is responsible for ensuring the active charge profile matches the battery pack charging requirements. Contact them with any questions about which profile to select for each battery pack.
- The charger may become hot during charging. Use hand protection to safely handle the charger during charging.
- To maintain safe operations, the unit automatically reduces its output power if the temperature rises above set thresholds, or if the AC input voltage is too low. The charger will also reduce output power if it detects that the battery pack is damaged.
- If power is interrupted, and then returns, the charger will start and continue to operate without hazard to the user, or damage to the batteries.
- Unplug the charger from both AC and DC sources when cleaning, moving or conducting any maintenance or repair on the charger. No user serviceable parts inside. Do not remove the cover due to the risk of electrical shock.

- Do not expose charger to oil, dirt, mud or direct heavy water spray when cleaning the vehicle or machine.
- If the detachable AC input power cord set or DC output cord is damaged, do not use the charger until they are replaced with cord sets appropriate to your region and application.
- When mated with a Delta-Q sealed AC cord, the charger meets IP66 specifications, making it dust-tight and protected against powerful water jets. If a cord set with an unsealed connector is used, the plug and connectormust be periodically inspected to ensure the contacts are clean and dry.

- If this charger is provided with an AC cord set and the power plug does not match the power outlet, contact the equipment manufacturer, distributor or Delta-Q Technologies for the correctAC cord set terminating with a 3-prong plug suitable for your regions' groundedpower outlet.
- Only use compatible IEC320 C13 cables, as shown above
- In North America (and other 120V AC regions), the AC cord must be a 3conductor UL Listed/CSA approved detachable cord set at least 1.8m in length (≥ 6 feet), minimum 16AWG andrated SJT; terminated with 250V, 13A orgreater connector.

- In Japan, the AC cord must be a 3 conductor PSE approved detachable AC cord set terminated with 100V, 15A or greater connector.
- In 220-240VAC regions the AC cord must be a 3-conductor safety-approved cord set, with 1.5mm² conductors (min.), rated appropriately for industrial use. The cord must be terminated on one end with a grounding type input plug appropriate for use in the country of destination and both plug and connectorshould be rated 250V, 10A or greater.
- Extension cords must be 3-wire cord no longer than 30m (100') at 10 AWG or 7.5m (25') at 16 AWG, per UL guidelines.

Getting to Know Your Delta-Q IC Series Battery Charger



1. When you first plug your charger into AC power, the AC Power Indicator will light solid blue to indicate AC power ispresent.

Solid Blue = AC power available

2. The Battery Charging Indicator has 4 states as indicated here.

Flashing green = Low state of charge

Solid green = High state of charge.

Flashing green = High state of charge

Solid green = Charge completed

3. The Fault / Error / USB Indicator will indicate faults, errors, and USB activity as indicated below. See the Error Display forthe code and find the error description in the Charger Error and Fault Codes Table.

Solid red = Charger fault. See display panel for detail.

Flashing amber = External error condition - caution. See display panel for details.

Flashing green = USB port active.

4. The Charging Output Indicator means that the charger output is active, and there is a potential risk of electric shock.

5. The Charge Profile / Error Display shows one of four possible codes to indicate different conditions:

- ‘F’ codes; a condition has caused charging to stop. Re-insert AC power to reset the charger to clear the error.
- ‘E’ code; an error condition has caused charging to stop. Re-insert AC power to reset the charger to clear theerror.
- ‘P’ code; the charger profile selection is active.
- ‘USB’ code; the USB interface is active, and the USB flash drive should not be removed.

When the ‘E,’ ‘F’ and ‘P’ codes appear, the letter is followed by three numbers and a period to indicate different conditions (e.g. E-0-0-4). See the “Charger Fault Codes” or “Charger Error Codes” sections for details on these conditionsand its solution.

6. The Select Charge Profile Button is used to select a charge profile from the profiles that are stored on the charger. Upto 25 charge profiles can be stored. See the “Selecting A Charge Profile” section for instructions.

7. The USB Host Port allows data to be transferred to and from the charger using a standard USB flash drive, including thedownloading of charge tracking data and updating of the charger’s software and / or charge profiles.

Charging Profiles

The IC Series charger contains up to 25 selectable charging profiles stored in its internal memory to charge batteries. These profiles are specific to each manufacturer and model of battery. Your equipment supplier or charger distributoris responsible for ensuring the active charge profile matches the battery pack charging requirements. Contact them with any questions about the default profile, the other profiles on the charger, and which profile to select for each battery pack.

Selecting A Charge Profile

1. Disconnect AC input from the charger, or from the wall outlet. Wait 30 seconds for the input relay to open.

2. While reconnecting AC input, press and hold the Select Charge Profile Button. Hold the button (approximately 10 seconds) through the light check function until Error Indicator is on (in amber) and Battery Charging Indicator(in green) starts flashing.

3. Press and release the Select Charge Profile Button to advance through the charge profiles. The selected chargingprofile will be displayed up to three times (e.g. “P-0-1-1” for Profile 11).*

* Process will time out and profile will remain unchanged if there is 15 seconds of inactivity, a profile number is allowed to display three times, or if AC power is cycled.

4. Once the desired charging profile is displayed, press and hold the Select Charge Profile button for 10 seconds to confirm selection and exit from Profile Selection Mode. When the charge profile is confirmed, the Error Indicator and Battery Charging Indicator lights will turn off, while the blue AC Power Indicator stays lit. At this point, the button can be released.

5. Press the Select Charge Profile Button to check that the desired profile has been selected.

In some circumstances, the charging profile output will be altered, to maintain safe operations. The unit automatically reduces its output power if the temperature rises above set thresholds, or if the AC input voltage is too low. The charger will also reduce output power if it detects that the battery pack is damaged. If power is interrupted, and then returns, the charger will start and continue to operate without hazard to the user, or damage to the batteries.

Identifying Charger Serial Number

The charger's serial number is printed on the front of the charger. This is the number to provide when requesting technical support.

Charger Error & Fault Codes Table

Code	Description	Solution
E-0-0-1 E-0-2-1	Battery high voltage	Possible causes: wrong battery voltage for charger, other charger also attached, resistive battery. Possible solutions: check the battery voltage and cable connections. Check battery size and condition. This error will automatically clear once the voltage is in range.
E-0-0-2 E-0-2-2	Battery low voltage	Possible causes: battery disconnected, battery overdischarged. Possible solutions: check the battery voltage and cable connections. Check battery size and condition. This error will automatically clear once the voltage is in range.
E-0-0-3	Charge timeout caused by battery pack not reaching required voltage within safe time limit. (charge profile dependent)	Possible causes: charger output reduced due to high temperatures, poor battery health, very deeply discharged battery and /or poorly connected battery. Possible solutions: operate at lower ambient temperature. Replace battery pack. Check DCconnections. This error will clear once the charger is reset by cycling DC or AC.
E-0-0-4	Battery could not meet minimum voltage (charge profile dependent)	Possible causes: check for shorted or damaged cells. Possible solutions: replace battery pack. Check DC connections. This error will automatically clear once the charger is reset by cycling DC or AC.
E-0-0-7	Battery amp hour limit exceeded	Possible causes: poor battery health, very deeply discharged battery, poorly connected battery, and / or high parasitic loads on battery while charging. Possible solutions: replace battery pack. Check DC connections. Disconnect parasitic loads. This error will automatically clear once the charger is reset by cycling DC or AC.
E-0-0-8	Battery temperature is out of range	Possible battery temperature sensor error. Check temperature sensor and connections. Reset charger. This error will clear once the condition has been corrected.
E-0-1-2	Reverse polarity error	Battery is connected to the charger incorrectly. Check the battery connections. This error will clear once the condition has been corrected.
E-0-1-6 E-0-1-8 E-0-2-6	USB operation failed (software)	Software upgrade failure or script operation failure. Ensure the USB flash drive is properly formatted and reinsert the USB flash drive.
E-0-1-7	USB operation failed (hardware)	Remove and reinsert the USB drive. If condition persists, cycle AC and retry byreinserting the USB drive.
E-0-2-3	High AC voltage error (>270VAC)	Connect charger to an AC source that provides stable AC between 85 - 270 VAC / 45-65 Hz. This error will clear once the condition has been corrected.
E-0-2-4	Charger failed to initialize	The charger has failed to turn on properly. Disconnect AC input and battery for 30 seconds before retrying.
E-0-2-5	Low AC voltage oscillation error	AC source is unstable. Could be caused by undersized generator and /or severely undersized input cables. Connect charger to an AC source that provides stable AC between 85 - 270 VAC / 45-65 Hz. This error will clear once the condition has been corrected.

Code	Description	Solution
F-0-0-1, F-0-0-2 F-0-0-3, F-0-0- 4 F-0-0-6		Internal charger fault. Remove AC and battery for minimum 30 seconds and retry charger. If it fails again, please contact the manufacturer of your vehicle or machine.

This is a Class A product complying with United States Federal Communications Commission, Code of Federal Regulations;47CFR part 15. In a domestic environment, this product may cause radio interference, in which case the user may be
required to take adequate measures.

Cert No. FS609275 Cert No. EMS609276 Cert No. OHS609277

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