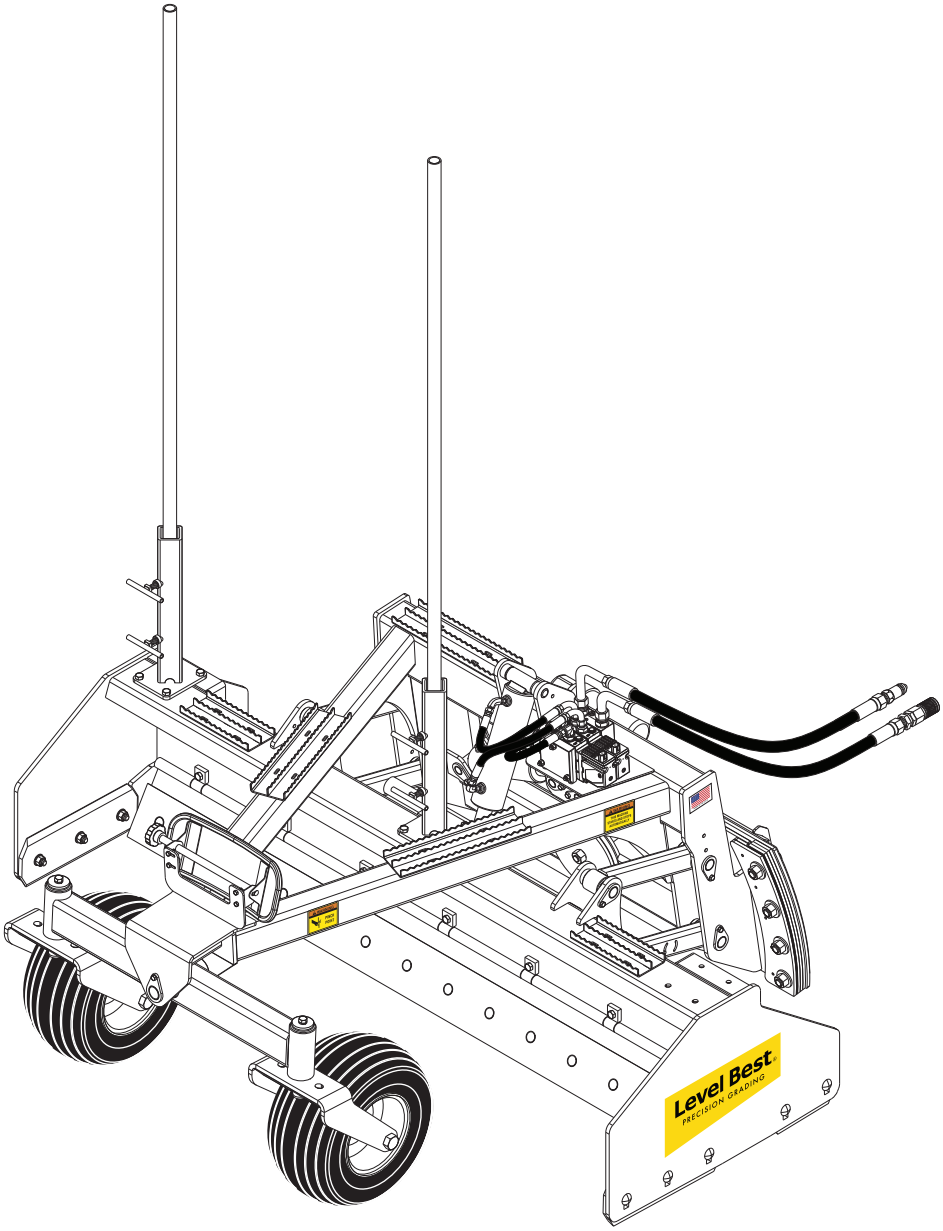
Level Best®
PRECISION GRADING

INSTALLATION & OPERATORS MANUAL

PD - SERIES PARA-LEVEL DUAL



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TRIMBLE GCS900

APRIL 2018

CAT.# PD-OM-T-GCS900 04/01/18

ATI Corporation
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New Holland, PA 17557 U.S.A.

DISCLAIMER

THE INFORMATION IN THIS MANUAL IS PROVIDED TO PROMOTE THE SAFE USE OF, AND ASSIST THE OPERATOR IN ACHIEVING THE BEST PERFORMANCE FROM, PARA-LEVEL GRADING BOX DESCRIBED HEREIN, FOR THEIR INTENDED APPLICATIONS.

NOTES

TABLE OF CONTENTS

WARRANTY

This Level-Best Grading System is designed and manufactured to high standards. ATI Corporation, therefore, guarantees this Level-Best product to be free from defect in workmanship and materials for three (3) years from purchase date. If the machine is to be used for rental purposes the warranty is limited to ninety (90) days.

Components supplied by outside vendors (e.g. cylinders, hydraulic valves and components, electronic modules, and machine control technology systems) are warranted separately by their respective manufacturers. The warranty periods of these components are generally one (1) year from date of purchase.

Neither Level-Best nor hydraulic component manufacturers will cover normal wear or failure due to hydraulic oil contamination from the power source. ALWAYS start with clean oil and filters prior to installation and operation.

Misuse, abuse, misapplication, and unauthorize alterations will void this warranty.

All warranty work must be performed by an authorized Level-Best dealer and authorized by ATI Corporation. All Level-Best parts suspected of failure must be returned to ATI Corporation for warranty analysis prior to any credit being issued.

SAFETY INFORMATION

This manual is furnished to you, the owner/operator, as a guide to get the greatest benefit from your grading box. ATI Corporation wants you to be able to get the most use out of your grading box through safe and efficient operation.

Before attempting to operate the grading box, carefully read all sections of this manual. Be sure that you thoroughly understand all of the safety information and operating procedures.

SAFETY PRECAUTION DEFINITIONS

Dangers, **Warnings**, **Cautions**, and **Notes** are strategically placed throughout this manual to further emphasize the importance of personal safety, qualifications of operating personnel, and proper use of the grading box in its intended application. These precautions supplement and/or complement the safety information decals affixed to the unit and include headings that are defined as follows:

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

Indicates a potentially hazardous situation or practice which, if not avoided, will result in damage to equipment and/or minor injury.

NOTE: Indicates an operating procedure, practice. etc., or portion thereof, which is essential to highlight.

- Always use caution and safe operating practices when operating this equipment.
- Always set the Automatic/Manual Switch on the Control Panel to MANUAL before leaving the operator's seat or whenever the machine is not moving.
- Always allow for clearance under the cutting edge of the machine when tuning the system or when switching to automatic control. Insufficient clearance could cause the machine to lift itself off the ground as its cutting edge attempts to achieve the programmed slope.
- Never adjust the position of the laser receiver when the system is in automatic control.
- Never perform service work on your machine or the Automatic Control System when the system is in automatic control.
- Install all safety panels and guards before operating your equipment.
- Stay clear of all moving parts when the machine is in operation.
- Keep all people clear of the machine when it is running.
- Keep feet and other body parts from under the cutting edges of the machine at all times.
- Read and comply with all safety recommendations of your tractor/skid steer manufacturer, as outlined in its operator and service manuals.

NOTE: References made to left, right, front, and rear are those directions viewed from behind the power unit and grading box.

NOTE: Some equipment depicted in illustrations may not reflect exact production model configurations.

NOTE: All safety, operating, and servicing information reflects current production models at the time of publication of this manual.

NOTE: ATI Corporation reserves the right to discontinue models at any time, change specifications, and improve design without notice and without incurring obligation on goods previously purchased and to discontinue supplying any part listed, when the demand does not warrant production.

LIST OF ILLUSTRATIONS

SYSTEMS FEATURES AND BASIC OPERATION

OVERVIEW

The Level Best grading box is a cost-efficient method for fine grading. Various capacities sized to fit a skid steer or tractor with a choice of automatic control systems are available. This manual is for skid steer systems equipped with a 3D Automatic Control System.

A typical 2D system provides laser-guided depth control along a plane from a single reference point which must be setup for each job site. A 3D system adds locating ability to the control through either a global positioning satellites (GPS) or local positioning system (LPS). The control system not only knows the desired depth on the plane, but the location of the machine on the job site and, in the case of a GPS system, even which job site.

The desired blade depth is processed and automatically controls the grading box's hydraulics to maintain the elevation of the cutting edge based on the site plan.

Components

The control system consists of four components:

- Rotating laser – Provides a reference Plane of Laser Light over the job site. The light plane may be level or set at an angle to match the slope of the ground.
- Laser receivers – Mounted at specific heights on the masts, it determines the difference in depth based on the Plane of Laser Light.
- Control Panel – The Control Panel, mounted in the cab, processes data received from the laser receivers, GPS/LPS, and operator. It also contains a 3D model of the job site. When set to Automatic, it provides signals to the valve assembly to control the grading box so the measured inputs (blade depth) matches the plan.

NOTE: The CB450 Control Panel is recommended due to space availability within most skid steer cabs.

- Valve assembly – Wired to the Control Panel, the valve meters hydraulic oil to the hydraulic cylinders for elevation and tilt control.

Operation of the grading box and automatic control system is typically in automatic mode. Depending upon the type of skid steer, manual overide and fine tuning are through an optional joystick control or buttons on the skid steer auxiliary controls.

NOTE: For operation of the various control panels and how to download and select 3D models for job sites, refer to the documentation for your control panel.

INSTALLATION

Installation involves mounting a few components to the grading box frame and routing hoses and wire harnesses between the skid steer and grading box (see **Figure 1** on **page 2** and **Figure 2** on **page 4**).

Hydraulic Connections

Quick couplers provide connection to the grading box. The male coupler is the pressure side and the female coupler the return.

⚠ CAUTION

Always connect the return oil line and then the pressure line. Accidentally pressurizing the system without the return connected will damage the control valve.

Never connect or disconnect the LGB to the skid steer loader with the engine running. The engine must be turned off.

Electrical Cable Connections

Electrical cable connections will depend upon the auxiliary controls configuration.

- Skid steer controls - Most skid steer manufacturers have integrated controls for auxiliary attachments, such as the grading box (see **Figure 1** on **page 2**). Different manufacturers incorporate these functions in different ways. Therefore, cables between the grading box and the skid steer controls must be ordered specifically for the skid steer model.

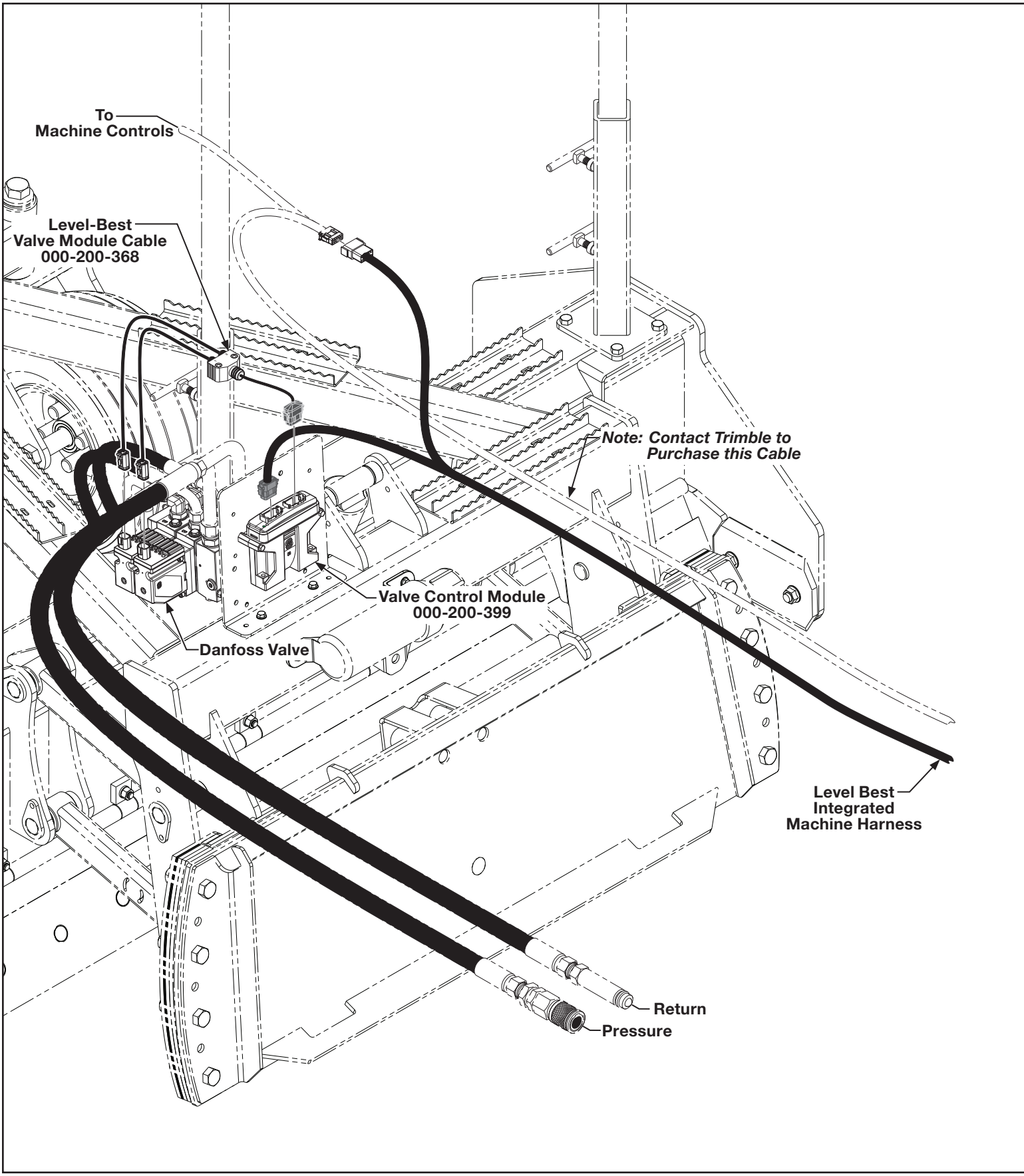
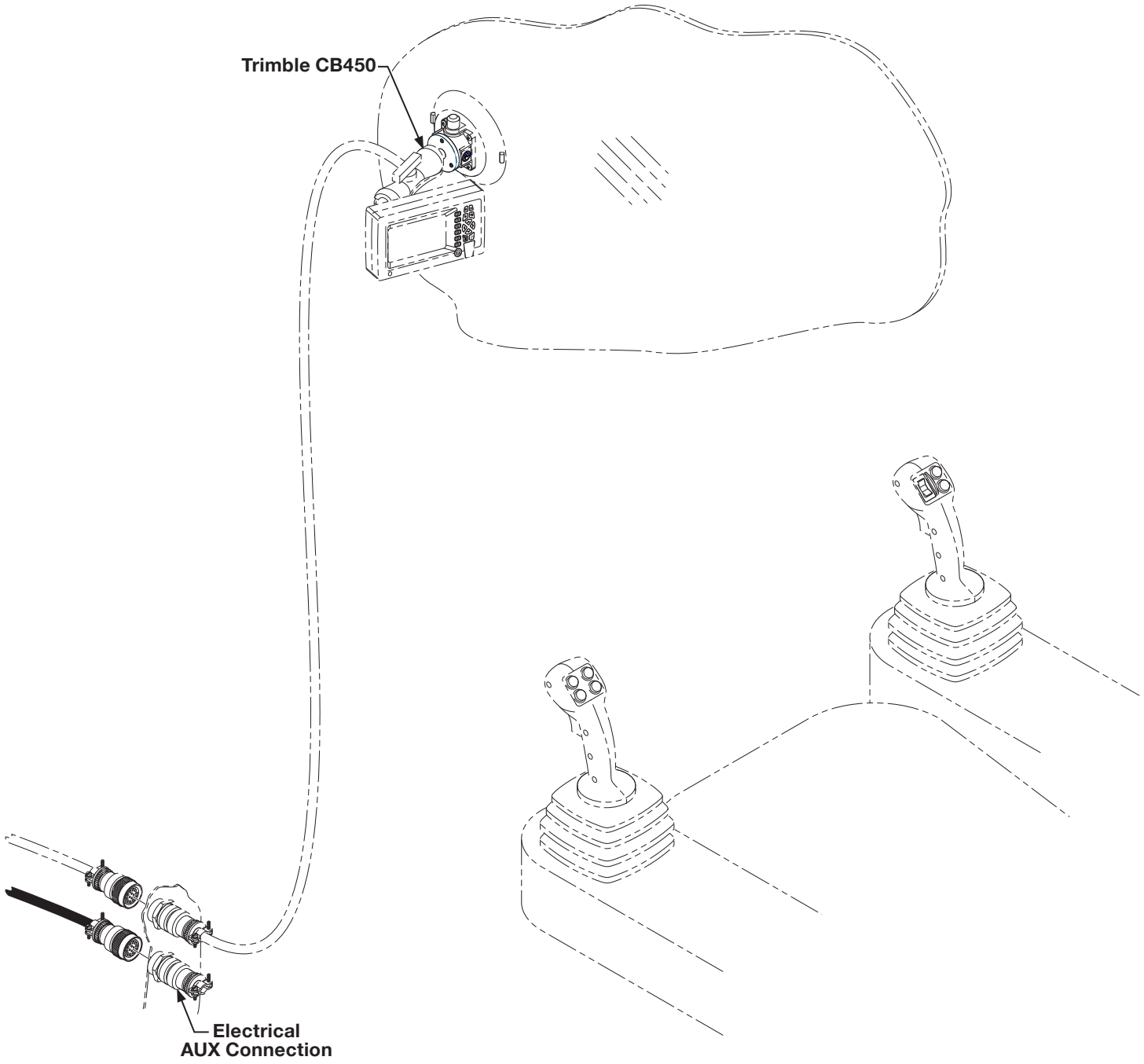


Figure 1. General Arrangement for Integrated Machine Harness


Trimble CB450
Electrical
AUX Connection

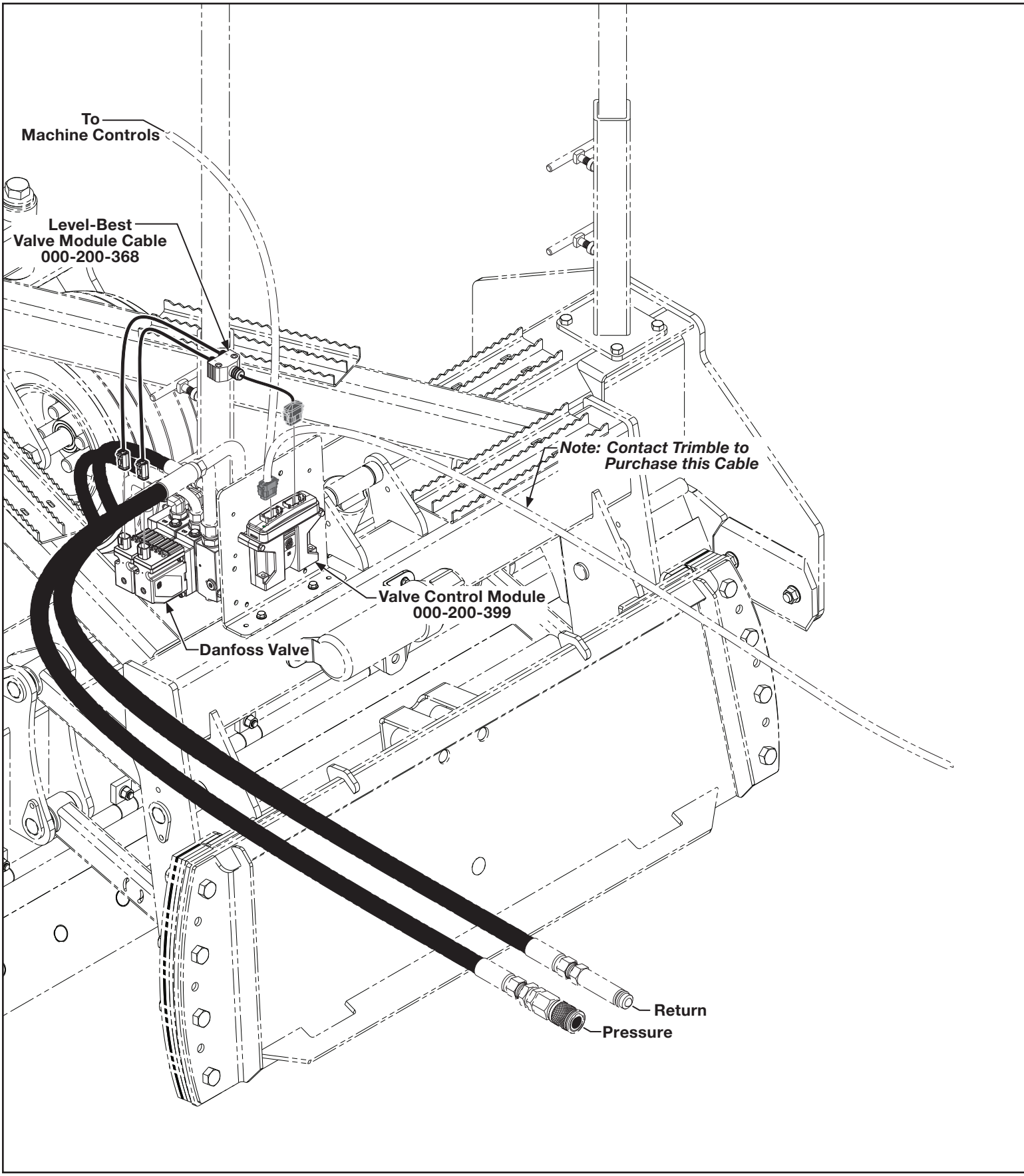
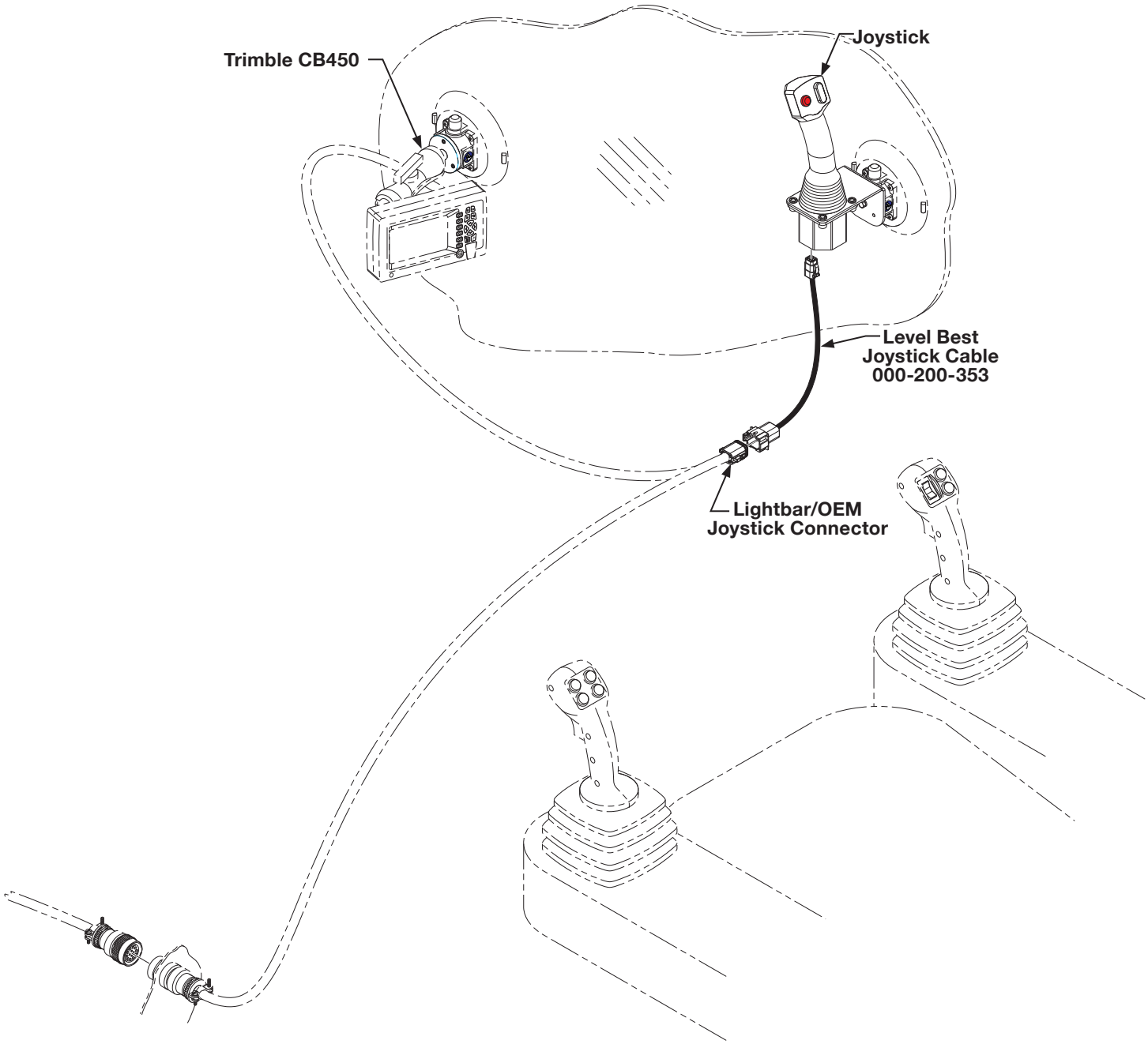


Figure 2. General Arrangement Trimble GCS900


Trimble CB450
Joystick
Level Best
Joystick Cable
000-200-353
Lightbar/OEM
Joystick Connector

Connection of the Module Controller

The Module Controller provides the electronic interface between the Trimble control system in the cab and the hydraulic valve.

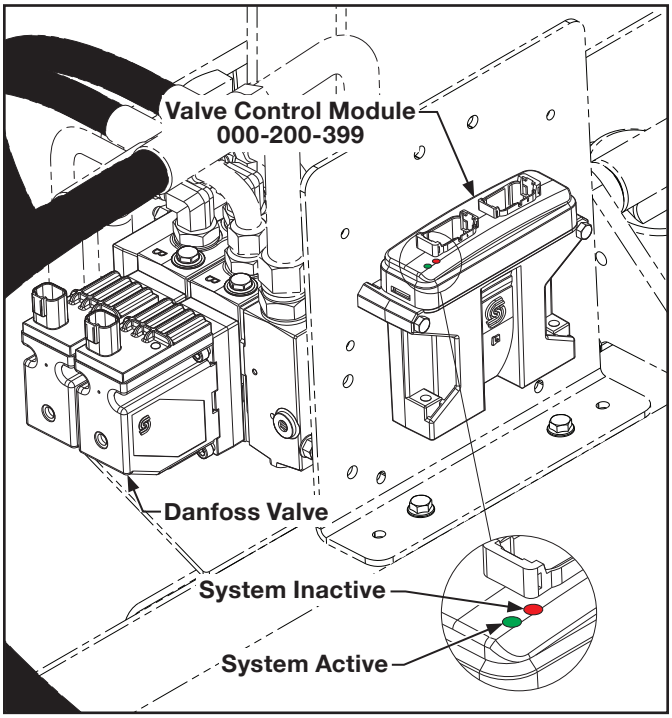


Figure 3. Module Controller

Connecting the two components is the Valve Module Cable (see **Figure 4**). Each connector to the valve is keyed to prevent insertion into the wrong socket. In the same way, the Module Controller end may only be inserted into the correct socket.

NOTE: Never force a plug into a socket. Plugs are keyed to prevent incorrect insertion.

Two LEDs indicate the operating status of the the Module Controller.

The green LED indicates that power is applied and the system is operating normally.

The red LED indicates an error in the communications system. The wire connections should be checked and, if this does not solve the issue, contact your local Trimble service department.

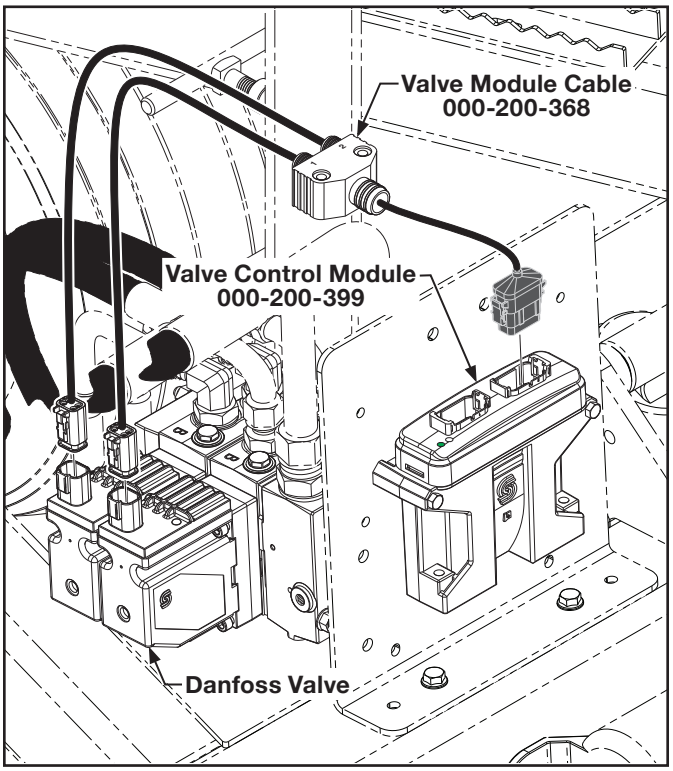


Figure 4. Valve Module Cable

The Module Controller also connects to the machine controls (see **Figure 5**) note that this cable includes a connector to allow the grading box to be removed from the skid steer without fully removing the cable

This cable must be purchased from Trimble.

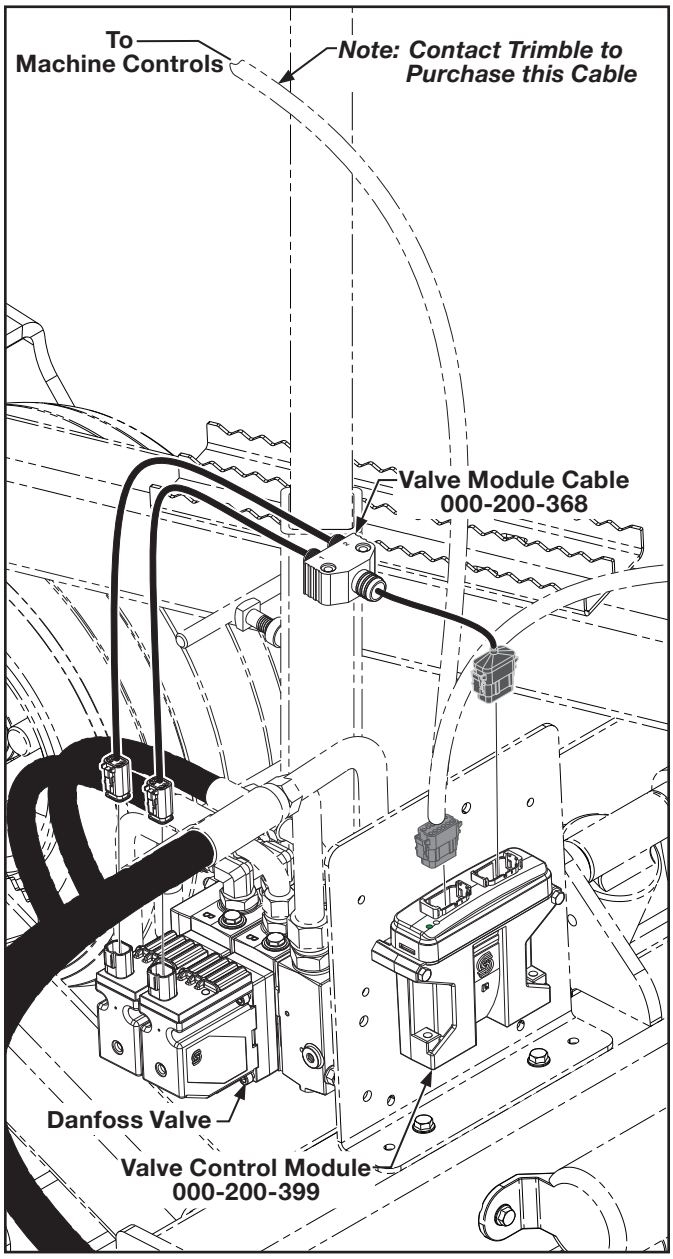


Figure 5. Trimble Cable to Module Controller

If the optional joystick is to be installed (see **Figure 6**), plug the joystick cable into the Lightbar/OEM Joystick Connector on the cable purchased from Trimble. Install the vacuum cup as described in **Vacuum Cup on page 8**.

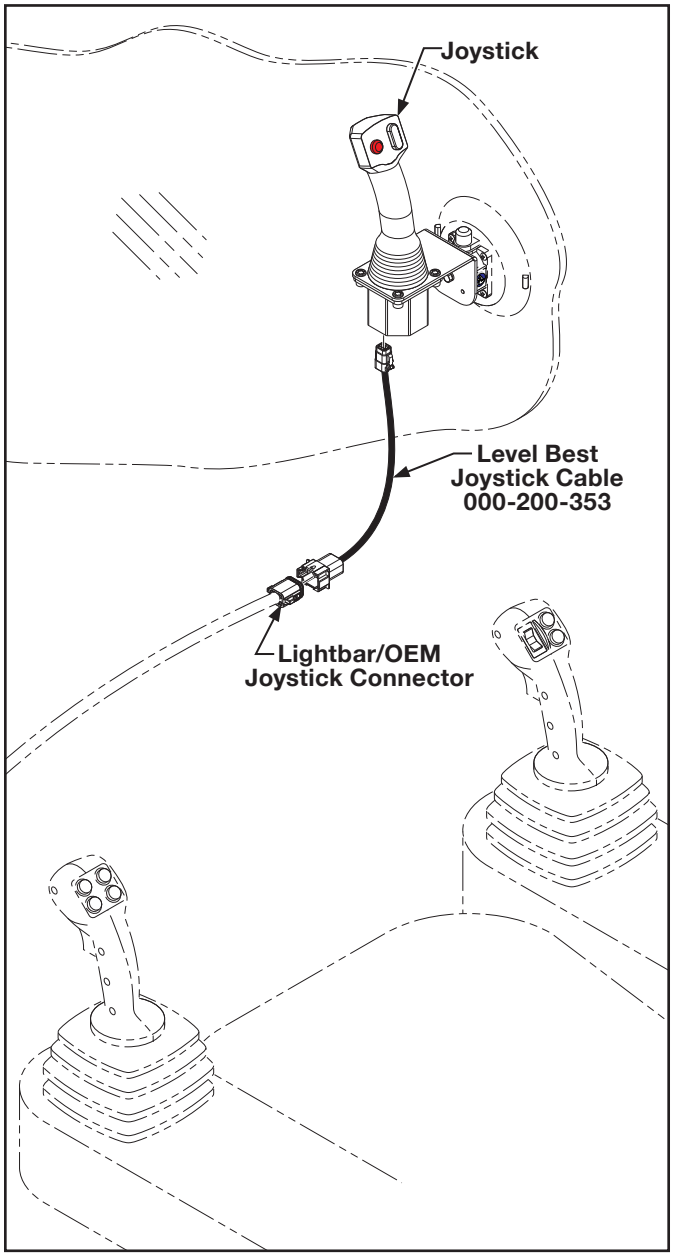


Figure 6. Joystick with Cable

Auxiliary joystick - A standalone joystick (see **Figure 2** on **page 4**) provides selection of automatic and manual control. When in manual control, the grading box can be raised and tilted as desired (see **Figure 7. Optional Joystick Functions on page 8**). A suction cup allows installation of the joystick on a side window.

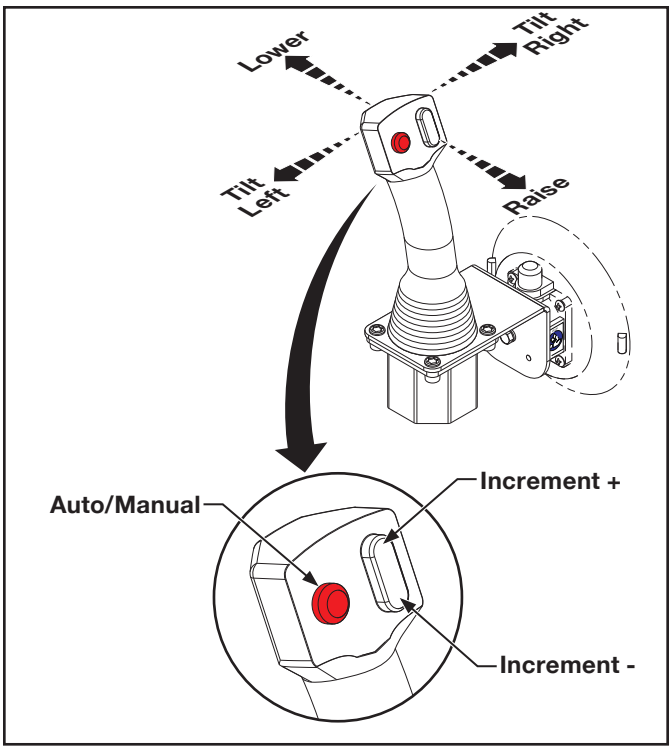


Figure 7. Optional Joystick Functions

Vacuum Cup

Installation

1. Clean the mounting surface and, if needed, the face of the vacuum cup (see **Cleaning**).
2. Position the cup on the mounting surface so the plunger is accessible and visible to the operator.
3. Pump the plunger until the cup attaches completely. When the red line on the plunger is hidden, the cup is ready for use.
4. Check the plunger frequently to make sure the cup remains securely attached. If the red line appears, pump the plunger until the red line is hidden again.

Release

1. Grasp and hold the joystick and cup assembly.
2. Pull one of the release tabs until the cup disengages completely.

⚠ CAUTION

Remove the cup when not in use. If the cup remains attached to a hot surface (e.g,. in direct sunlight) for an extended period, the rubber pad could bond to the mounting surface, resulting in damage to the surface or to the pad when it is removed.

Maintenance Service

Regularly make sure the vacuum cup's air filter is in place. If not, discontinue use until the filter is replaced.

Since aging and water reduce the capacity of the rubber pad, it should be replaced at least once every 2 years or whenever damage is discovered.

If the cup does not function normally, the cup face may be dirty or damaged, or the pump may require service. First clean the cup face as directed.

Cleaning

1. Remove the air filter from the cup face.
2. Use a clean sponge or lint-free cloth to apply soapy water or another mild cleanser to cup face.

⚠ CAUTION

To prevent liquid from contaminating the pump, hold the cup face-down or cover the suction hole in the filter recess while using any liquid.

3. Wipe all residue from the cup face.
4. Allow the cup to dry and reinstall the air filter.

Storage

Store in a clean, dry location out of direct sunlight. Protect the cup face from damage using the pad cover (when supplied) or another appropriate means.

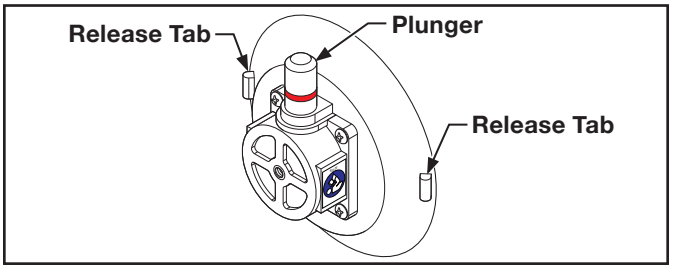
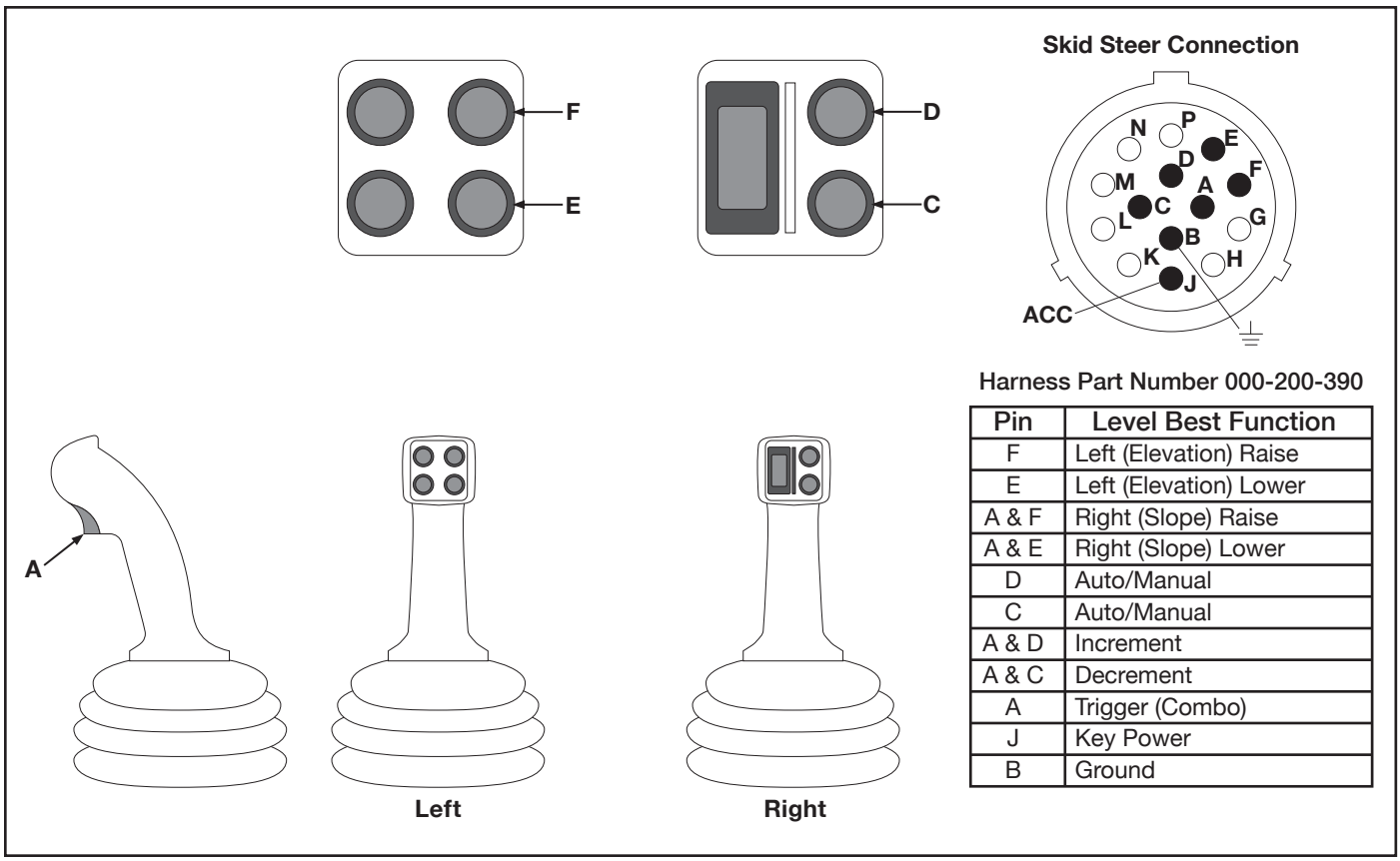


Figure 8. Vacuum Cup

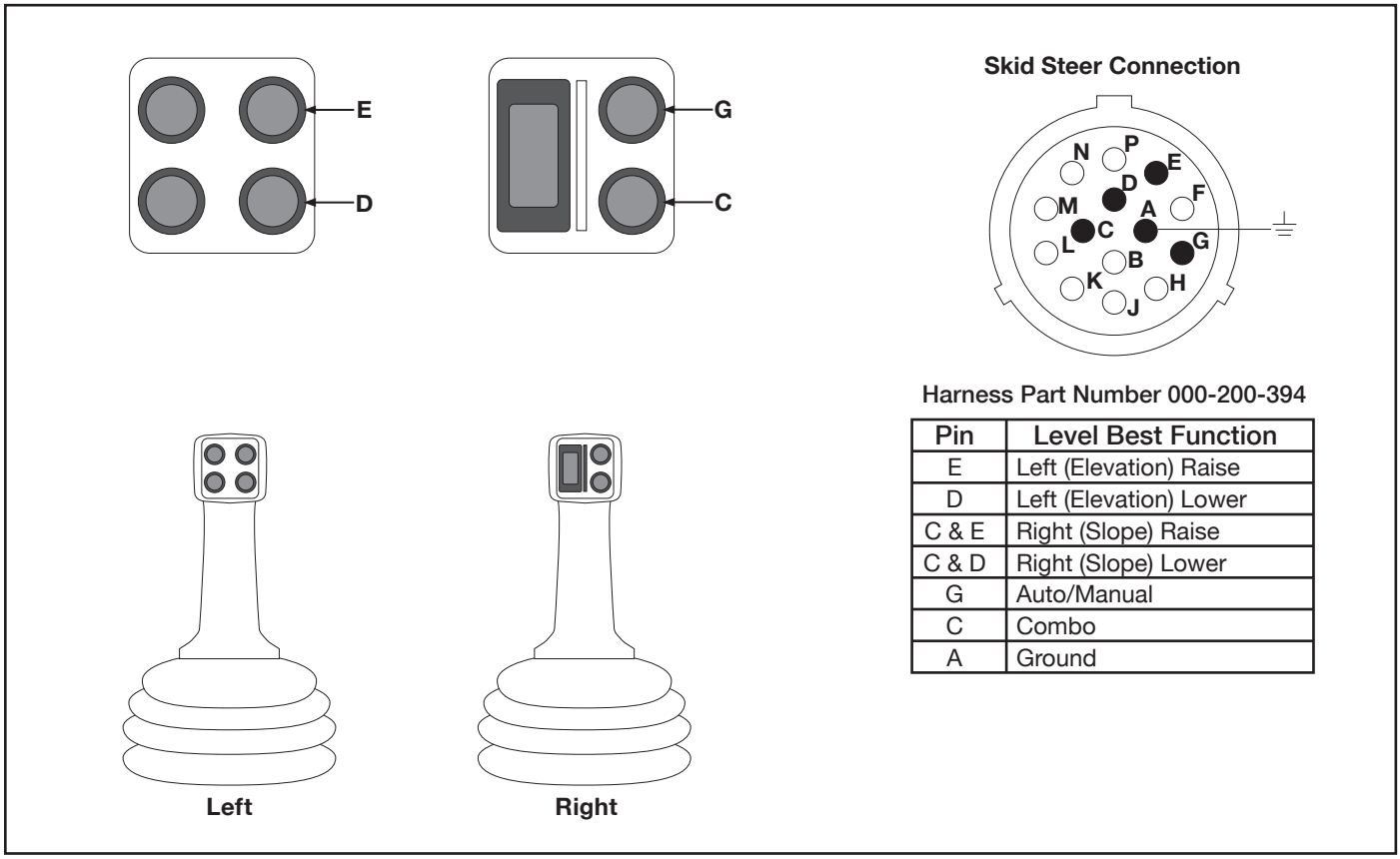
Figure 9 through **Figure 16** show the functions and pinouts of the various integrated control systems based on the skid steer manufacturer. Only the functions and pinouts used are specified.



Harness Part Number 000-200-390

Pin	Level Best Function
F	Left (Elevation) Raise
E	Left (Elevation) Lower
A & F	Right (Slope) Raise
A & E	Right (Slope) Lower
D	Auto/Manual
C	Auto/Manual
A & D	Increment
A & C	Decrement
A	Trigger (Combo)
J	Key Power
B	Ground

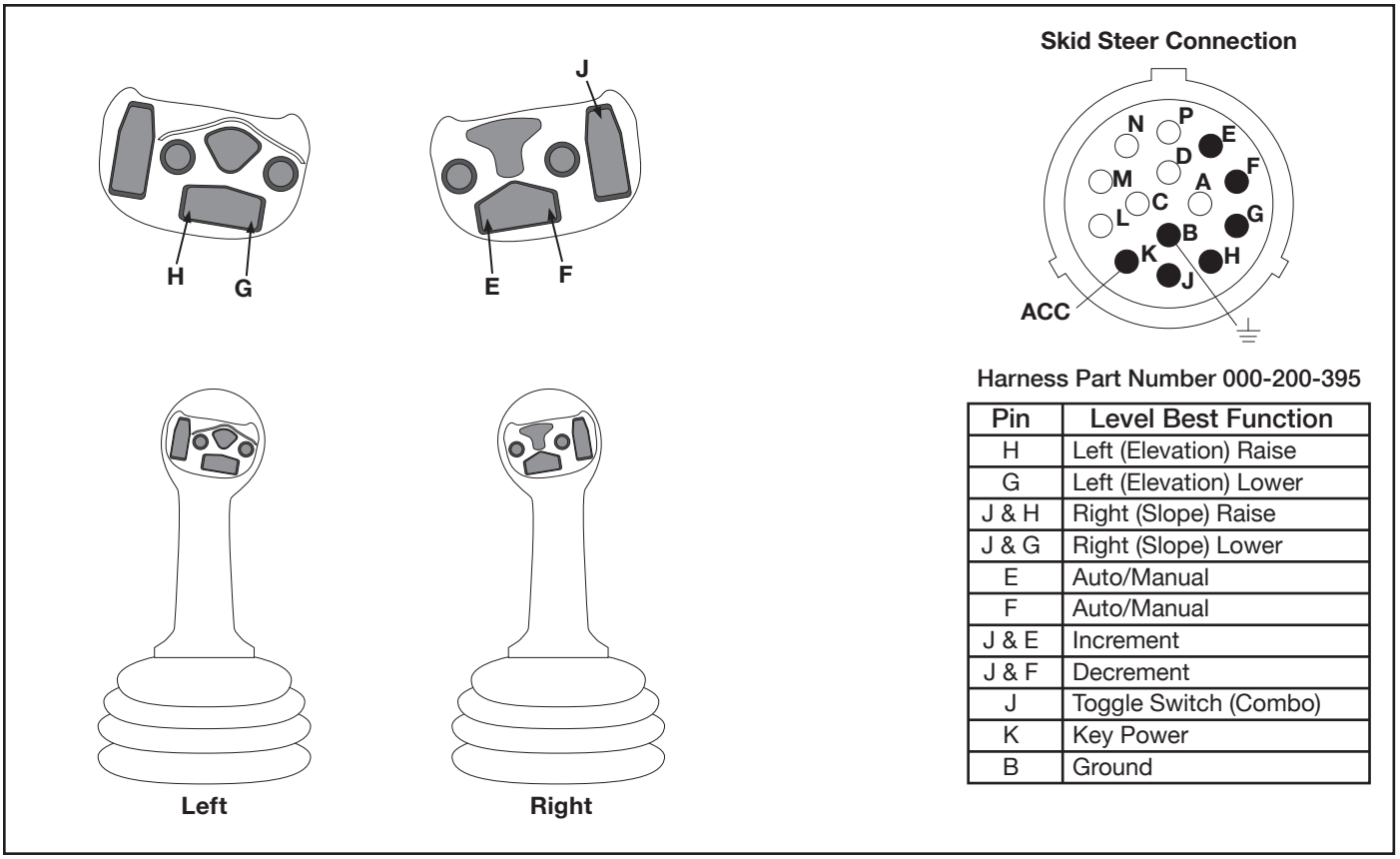
Figure 9. Cat D-Series Joystick Functions



Harness Part Number 000-200-394

Pin	Level Best Function
E	Left (Elevation) Raise
D	Left (Elevation) Lower
C & E	Right (Slope) Raise
C & D	Right (Slope) Lower
G	Auto/Manual
C	Combo
A	Ground

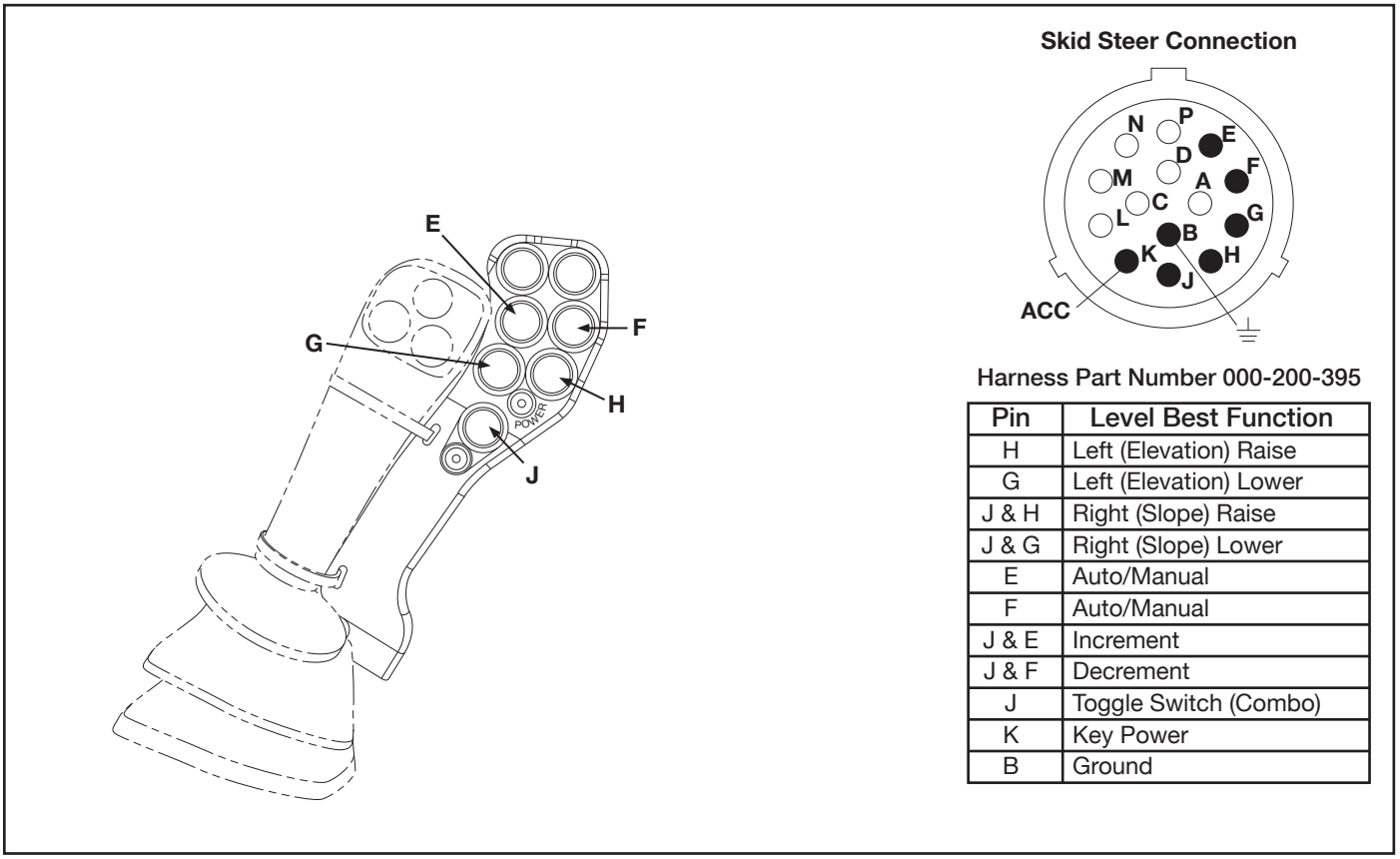
Figure 10. John Deere E-Series Joystick Functions



Harness Part Number 000-200-395

Pin	Level Best Function
H	Left (Elevation) Raise
G	Left (Elevation) Lower
J & H	Right (Slope) Raise
J & G	Right (Slope) Lower
E	Auto/Manual
F	Auto/Manual
J & E	Increment
J & F	Decrement
J	Toggle Switch (Combo)
K	Key Power
B	Ground

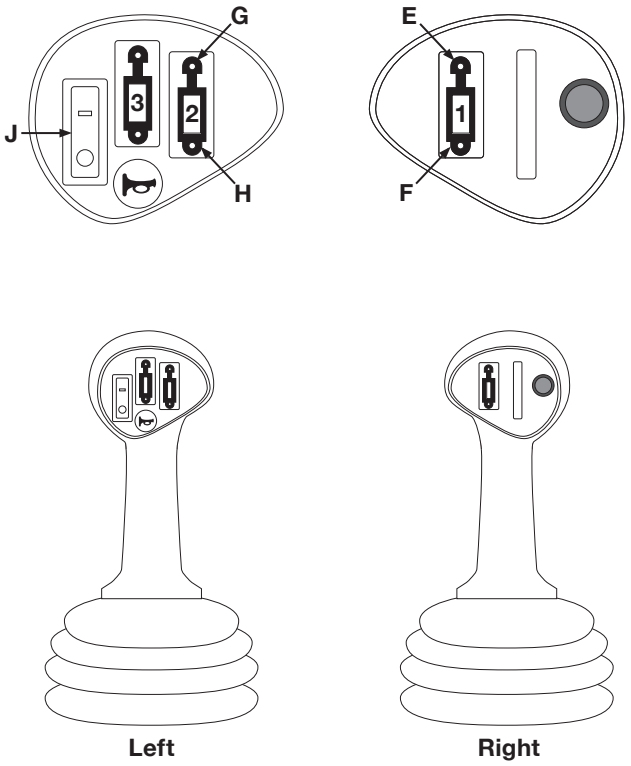
Figure 11. Kubota SSV65 & 75 Joystick Functions

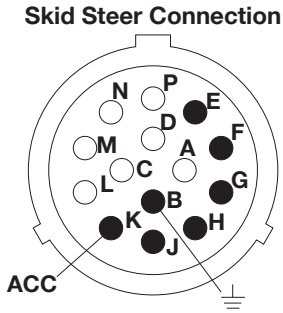


Harness Part Number 000-200-395

Pin	Level Best Function
H	Left (Elevation) Raise
G	Left (Elevation) Lower
J & H	Right (Slope) Raise
J & G	Right (Slope) Lower
E	Auto/Manual
F	Auto/Manual
J & E	Increment
J & F	Decrement
J	Toggle Switch (Combo)
K	Key Power
B	Ground

Figure 12. Kubota SVL 95 S6699 Multifunction Controller Kit



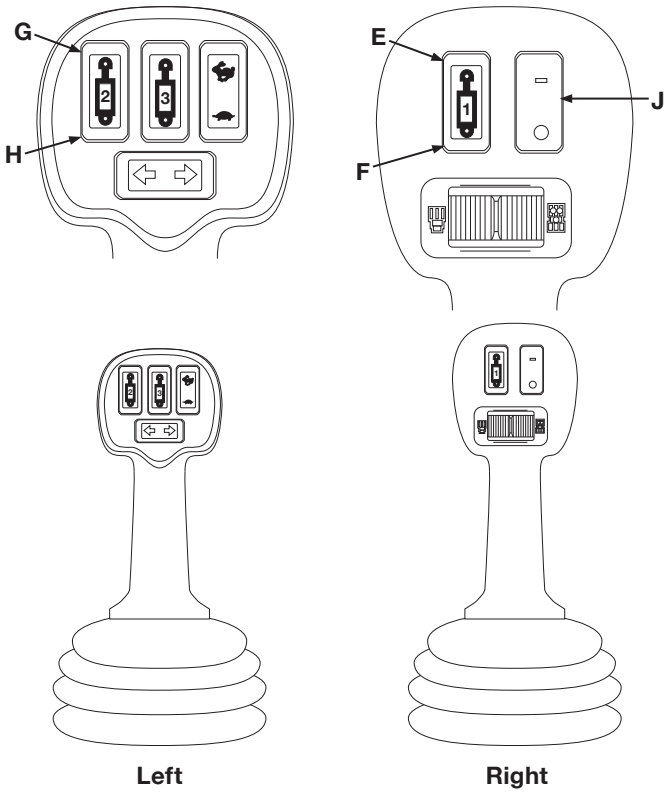


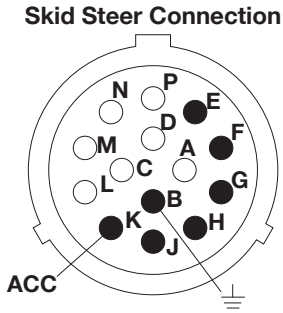
Harness Part Number 000-200-396

Pin	Level Best Function
G	Left (Elevation) Raise
H	Left (Elevation) Lower
J & G	Right (Slope) Raise
J & H	Right (Slope) Lower
E	Auto/Manual
F	Auto/Manual
J & E	Increment
J & F	Decrement
J	Toggle Switch (Combo)
K	Key Power
B	Ground

NOTE: Must be "Level 300" or higher Joystick Confriguration

Figure 13. Case Joystick Functions



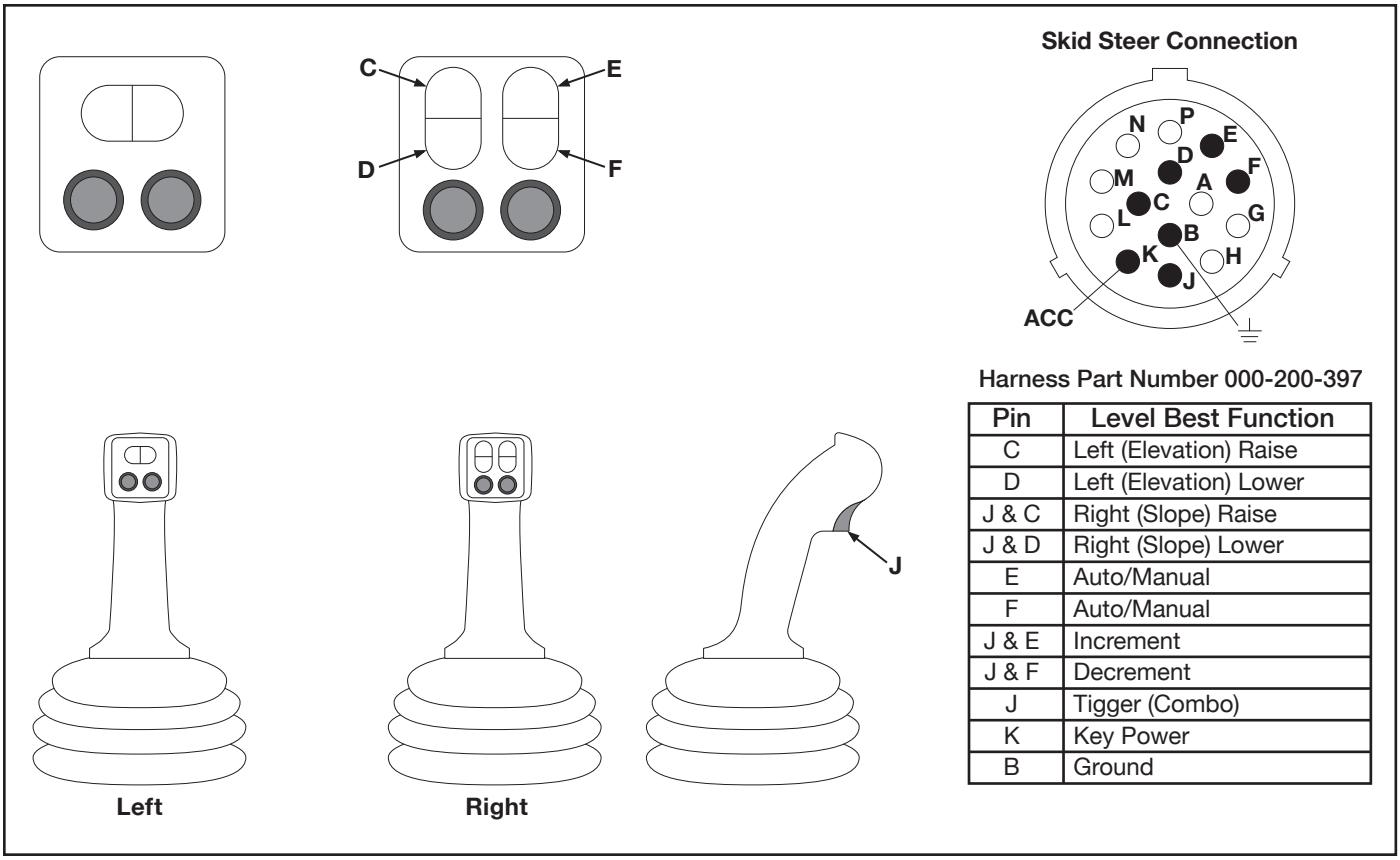


Harness Part Number 000-200-396

Pin	Level Best Function
G	Left (Elevation) Raise
H	Left (Elevation) Lower
J & G	Right (Slope) Raise
J & H	Right (Slope) Lower
E	Auto/Manual
F	Auto/Manual
J & E	Increment
J & F	Decrement
J	Toggle Switch (Combo)
K	Key Power
B	Ground

NOTE: Must be "Level 300" or higher Joystick Confriguration

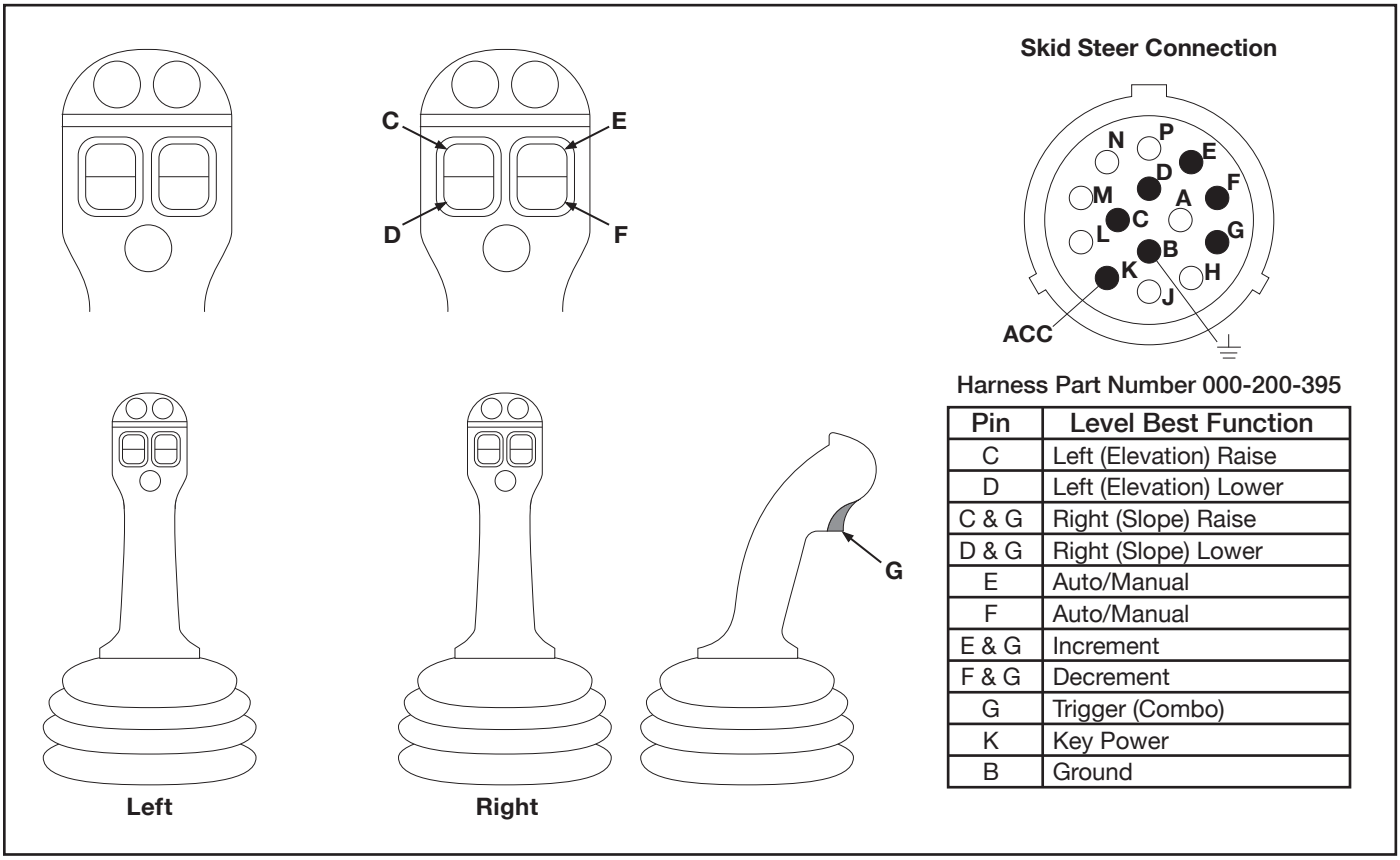
Figure 14. New Holland Joystick Functions



Harness Part Number 000-200-397

Pin	Level Best Function
C	Left (Elevation) Raise
D	Left (Elevation) Lower
J & C	Right (Slope) Raise
J & D	Right (Slope) Lower
E	Auto/Manual
F	Auto/Manual
J & E	Increment
J & F	Decrement
J	Tigger (Combo)
K	Key Power
B	Ground

Figure 15. Takeuchi TL12/TL250 Joystick Functions



Harness Part Number 000-200-395

Pin	Level Best Function
C	Left (Elevation) Raise
D	Left (Elevation) Lower
C & G	Right (Slope) Raise
D & G	Right (Slope) Lower
E	Auto/Manual
F	Auto/Manual
E & G	Increment
F & G	Decrement
G	Trigger (Combo)
K	Key Power
B	Ground

Figure 16. JCB/Volvo Joystick Functions

HYDRAULICS

Danfoss PVG-32 Hydraulic Valve

The hydraulic valve is setup at the factory and should not need any adjustments. If there are any changes required, they should be done by an authorized factory technician.

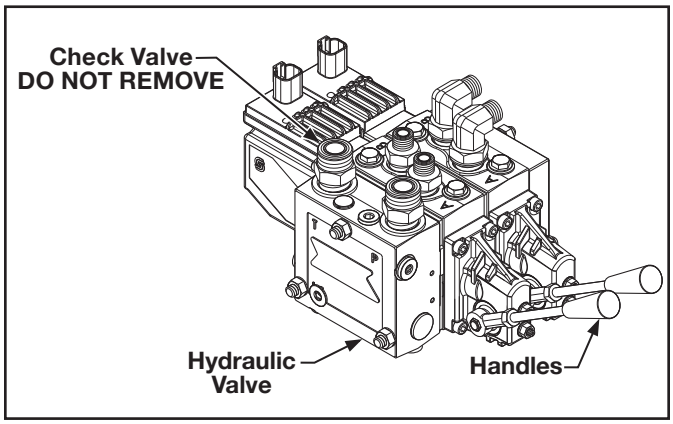


Figure 17. Hydraulic Valve (Danfoss PVG-32)

NOTE: Do not remove the check valve. Removal will void the warranty.

The handles are for manual actuation of the valve.

Hydraulic Hose Connection

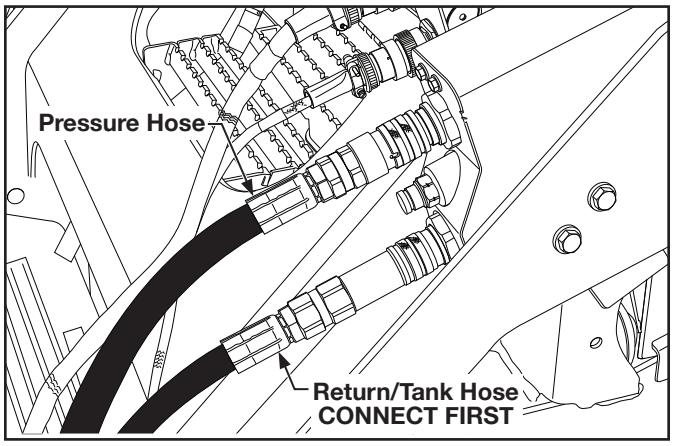


Figure 18. Hydraulic Hose Connections to Skid Steer

⚠ CAUTION

The return line must be connected before the pressure line. Pressurizing the valve without an outlet will damage the valve and void the valve warranty.

NOTE: Check the manufacture of your skid steer for the correct hose connections.

TROUBLESHOOTING

SYMPTOM	POTENTIAL CAUSE	REMEDY
Grading box has trouble staying on grade.	Rotating laser out of range.	Ensure laser receiver is within specified range of rotating laser.
	Laser beam being reflected.	Ensure rotating laser's light is not reflecting off outer surfaces (windows, windshields, mirrors, etc.) causing multiple readings by the laser receivers.
	Multiple laser beams.	Ensure that there are no other lasers operating on the job site or nearby.
	Laser deadband set too narrow.	Ensure the deadband (accuracy) setting is appropriate for rough grading.
	Travel speed is too fast for grade tolerance.	Slow down.
	Hydraulic response too quick.	Decrease the valve speed setting.
Grading box doesn't return all the way to on grade.	Valve offsets need to be raised.	Call dealer.
Grading box keeps driving past on grade, and bouncing.	Valve offsets need to be lowered.	Call dealer.
Grading box doesn't follow receiver or control panel grade display.	Valve cables are connected to wrong sides.	Check to make sure the valve cable branches are hooked up properly. Elevation (left) branch of cable to the Elevation (left) Receptacle on the Valve, and Slope (right) branch of cable to the Slope (right) Receptacle on the Valve.

TROUBLESHOOTING

SYMPTOM	POTENTIAL CAUSE	REMEDY
Grading box does not raise or lower.	Control Panel not turned on.	Push the power switch.
	No hydraulic flow to grading box.	Ensure hydraulic control handle of skid steer is in correct position.
	Cables not connected correctly.	Ensure auxiliary hydraulics are on or in continuous flow mode.
		Check valve cable, valve and valve coils for visible damage.
		Move directional valve spool manually using the overrides, with the handles provided in Manual Canister. (see **Figure 17**.)
		⚠ WARNING **Be sure to stay clear of any moving parts of the grading box.**
		If the grading box moves, refer to Electrical problems. If the grading box does not move, refer to Hydraulic problems.
	Electrical problems.	Check valve cable, valve and valve coils for visible damage.
		Use an ohmmeter to check cable for continuity. Contact ATI Corporation for pinouts.
	Hydraulic problems.	Confirm hydraulic flow through the manifold and returning to the power source through the “T” hose.
		Contact ATI Corporation for help troubleshooting the hydraulic manifold.
Grading box moves in unexpected/erratic direction.	Solenoid cable installed incorrectly.	Verify termination marked “Elevation” is installed in socket of elevation bank on Danfoss valve. Confirm respective termination on slope bank.

SPECIFICATIONS AND MAINTENANCE

SPECIFICATIONS

Dimensions

Model	PD-72	PD-84	PD-96
Box Width	72 in. (183 cm)	84 in. (213 cm)	96 in. (244 cm)
Overall Width	75.25 in. (191 cm)	87.25 in. (222 cm)	99.25 in. (252 cm)
Total Length	71.25 in. (181 cm)		
Box Capacity, Front	11.5 ft^3 (0.33 m^3)	13.4 ft^3 (0.38 m^3)	15.3 ft^3 (0.43 m^3)
Box Capacity, Rear	7.0 ft^3 (0.20 m^3)	8.0 ft^3 (0.23 m^3)	9.0 ft^3 (0.25 m^3)
Weight	1885 lbs. (855 kg)	1935 lbs. (878 kg)	1985 lbs. (900 kg)

MAINTENANCE

The rugged and durable Level Best grading box is built to last, but as with all equipment, a few minutes of routine care, maintenance, and cleaning can extend the life of the system.

Storage and Transport

Most often the grading box and its hydraulic controls remain on the machine. However, the Automatic Control System components should be stored in a safe, protected place when not in use. Protect the cable connections by installing the covers supplied.

Cleaning

The Control Panel is water-resistant. It can be cleaned with mild soap, water, and a damp, soft cloth. Do not submerge the Control Panel or direct high pressure spray at it. Do not use a dry cloth to wipe the laser receiver or Control Panel as scratching may occur.

Cables and Hoses

Check all cables and hoses regularly for signs of wear and damage. Keep cable connections clean and free from dirt and corrosion. If a cable has been damaged, do not attempt to repair. Incorrect or poor connections can cause damage to your Automatic Control System.

When applicable, check the hydraulic hoses. Look for areas where the hoses could rub against each other or another object as they expand and contract under pressure. Check the hydraulic fittings for tightness.

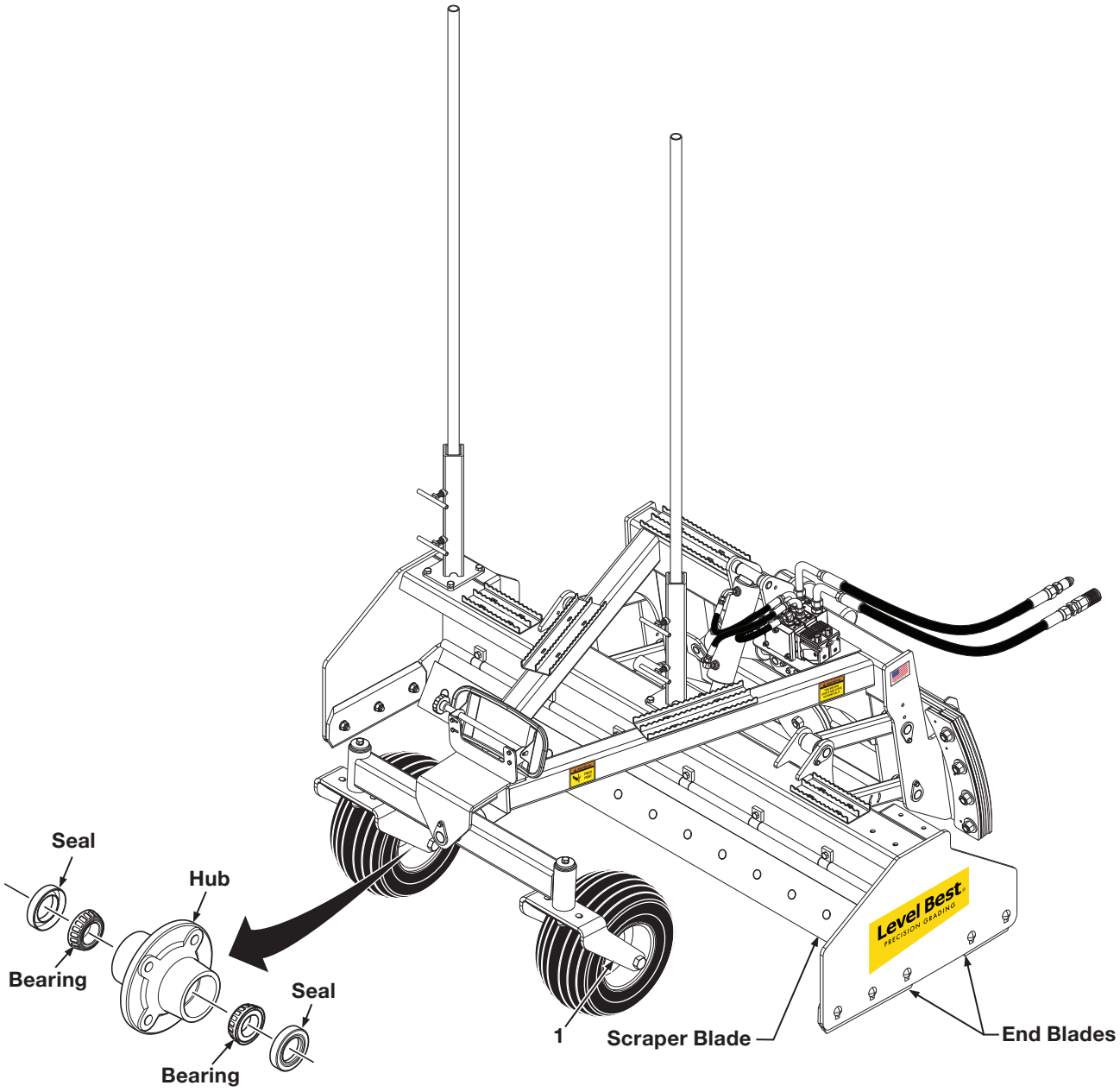
Machine

Check areas that affect the Automatic Control system function and accuracy, such as looseness or play in the cylinders or wear on the box's cutting edge. Looseness in the connection to the skid steer, such as in the adaptor plate, will cause inaccurate depth positioning.

Also check the skid steer routinely for wear to its components, such as loader pins and quick-attach linkage, ensuring it is operating properly.

Loader Hydraulics

Change the oil and filter per loader manufacturer recommendations to ensure proper function of your Level Best grading box.



ITEM	NAME	FREQUENCY	LUBE TYPE
1.	Wheel Hub (2)**	Annually	EP*

* EP - Multi-Purpose Grease.
** Bearings must be pulled apart cleaned and packed once a year. Inspect grease seals and replace if necessary.

NOTES:

1. Check Hydraulic System Components for wear and/or leaks.
2. Check and tighten all bolts and nuts for scraper blade and end blades, weekly.

Figure 19. Lube and Maintenance Chart

INDEX

NOTES

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PRECISION GRADING

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