

Identifier: <b>DGR-106</b>	Revision: <b>2.0</b>	Effective Date: <b>4/9/19</b>
-------------------------------	-------------------------	----------------------------------

Document Catalog Number: ET-DGR-106

Author: Robert Leib



## DGR-106 Dozer Grader



Manufactured By:

**Eterra**

Bellingham, Washington

USA

### Operator's & Parts Manual

For more Information and Customer Support – Visit our  
Website [www.etterra-usa.com](http://www.etterra-usa.com)

All rights reserved.

No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from [Skid Steer Solutions, Inc.].

All copyright, confidential information, patents, design rights and all other intellectual property rights of whatsoever nature contained herein are and shall remain the sole and exclusive property of Skid Steer Solutions, Inc. The information furnished herein is believed to be accurate and reliable.

However, no responsibility is assumed by Eterra for its use, or for any infringements of patents or other rights of third parties resulting from its use.

The Eterra name and logo are registered trademarks.

All other trademarks are the property of their respective owners.

---

# Table of Contents

## Table of Contents

1.1. Purpose.....	5
1.2. Scope.....	Error! Bookmark not defined.
1.3. Safety Marking .....	6
1.4. General Safety .....	6
1.5. Operational Safety .....	7
1.6. Maintenance & Transport Safety .....	Error! Bookmark not defined.
2. Operation.....	8
2.1. Introduction.....	9
2.2. Theory of Operation .....	9
2.3. Main Components - DGR-106-SS .....	10
2.4. Main Components - Cutter Bar.....	Error! Bookmark not defined.
2.5. Pre-Operation Checklist .....	11
2.6. Mini SSL & CTL Loader Connection .....	14
2.7. Hydraulic Connections .....	15
2.8. Hose Routing.....	16
2.9. Electrical Installation.....	Error! Bookmark not defined.
2.10. DGR-106 Operation - Initial .....	19
2.11. Initial Cutting .....	20
3. Maintenance & Trouble Shooting.....	32
3.1. Scheduled Maintenance Table .....	32
3.2. DGR-106 Grease Points .....	32
3.3. Trouble Shooting.....	32
4. Warranty.....	36

---

## About This Manual

This document is divided into the following chapters:

- Chapter 1, "Introduction" – Use this to familiarize your self with the features and safety requirements when using this product.
- Chapter 2, "Operation" - Learn how to operate this DGR-106 efficiently and safely.
- Chapter 3, "Maintenance and Troubleshooting Guidelines", explains how to work the DGR-106 in the safest manner possible.
- Chapter 4, "Warranty" – See what you are covered for and how long. We offer one of the most extensive and hassle free warranties in the business. We know that you depend on this product to make a living and it shows with how easy it is to get replacement parts and technical advice.

---

## Who Should Use It

This manual is being provided to you to give you the greatest benefit in the operation of this attachment. This guide is intended for users of different degrees of knowledge and experience with equipment. Before attempting to operate this Dozer Grader, please read and fully understand all of the aspects of this attachment operation.

- Users: This manual provides all of the safety information you will need to operate this DGR-106 without incident.
- Technicians: All service information and parts diagrams are furnished so that you can inspect and repair your DGR-106 yourself or with the help of a qualified service technician.

---

## 1.1. Purpose

This Eterra DGR-106 is designed to be used with skid steer and compact track loaders only of the appropriate 6000 to 12000 lb. weight class. **Any use outside of this parameter and damages caused to the attachment, machine or operator are the sole responsibility of the operator. Eterra assumes no liability for this type non-approved of use.** This attachment is intended to be used by operators of all experience levels. To accomplish this feat, a very simple design has been used which is unlike anything else found in the industry.

By offering a Genius Joystick Controller, we have created one of the safest attachments available that can be operated around buildings and vehicles in the toughest conditions without fear or damage to the equipment.

Having extreme duty parts means fewer parts to wear and to repair. This adds to the reliability and serviceability of the DGR-106 and provides the operator with a very simple attachment to own and maintain. The safety and construction features of the DGR-106's are second to none.

You must read and understand the theory of operation so that you can operate the DGR-106 safely and so you can maintain the safety of the operators and bystanders.

This product was designed to be sold online and out of the box ready to operate with the minimal amount of assembly.

### **This Document:**

The sole purpose of this manual is to help you train yourself to be a responsible operator and troubleshooter of the operation of the Eterra DGR-106 so that you can identify safety issues before anything serious can happen. Failure to follow the directives noted in this document may lead to serious injury or death.

---

## 1.2. Features and Accessories

### **Standard items include:**

Six Way Adjustable 86" Moldboard	2 x 10" extensions = 10" total width
Hydraulic Six Way Operation	Flotation Tires
Oscillating Bolster	Laser Ready Connection
Hydraulic Wheel Control	Joystick Control System

### **Options and Accessories:**

Bolt-on wing kit	Receiver Masts
Laser Control System	Slope Controller
GPS 3D System	

---

### 1.3. Safety Marking

Safety Alert Symbols are used throughout this manual and on decals on your DGR-106. When you see symbols become alert to safety information and adhere to it to prevent injury or death.

**SIGNAL WORDS** - There are signal words that are used in conjunction with the safety alert symbol; these signal words have been selected using the following guidelines:

**DANGER** – An immediate and specific hazard WILL result in severe personal injury or death if the proper precautions are not taken.

**WARNING** – A specific hazard or unsafe practice which could result in severe personal injury or death if proper precautions are not taken.

**CAUTION** – Unsafe practices which could result in personal injury if proper practices are not taken, or as a reminder of good safety practices.

You, as the owner of an Eterra DGR-106, are responsible for its safe operation and maintenance. You need to make sure anyone working with, maintaining or working around the DGR-106 is familiar with the operation and maintenance of the unit. Be alert, know all safety information in this manual and adhere to safety practices at all times. **DO NOT EVER PLACE ANY BODY PART NEAR THE OPERATIONAL PARTS OF THE GRADER WHEN YOUR MACHINE IS RUNNING. NEVER STAND UNDER THE BLADE.**

Remember a safe operator is the key to avoiding most accidents. Most accidents can be avoided by – THINKING SAFETY AND WORKING SAFELY.

---

### 1.4. General Safety

- Read, study and understand your Operator's Manual.
- Understand all safety symbols before operating or maintaining the DGR-106.
- After maintaining or adjusting, make sure all tools and foreign objects are removed.
- Stop Skid Steer, set park brake and remove the key from ignition. Make sure all moving parts have been stopped before dismounting your Skid Steer for any reason.
- Make sure all guards and shields are properly installed and secure.
- NEVER leave the DGR-106 lifted off the ground and stored for any reason. Leakage in your loader will cause the boom to relax and cause the blade to contact items in the vicinity.

---

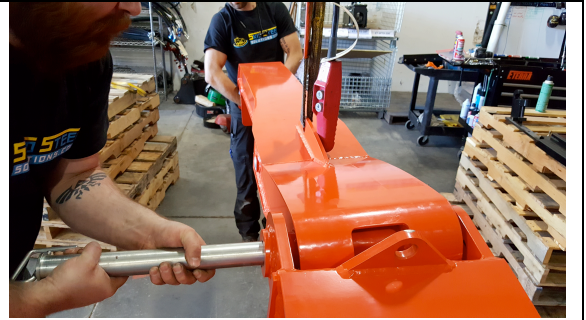
## 1.5. Operational and Transport Safety

- Read and understand the Operator's Manual and all safety signs before operating, servicing, adjusting or unplugging. Review all safety instructions annually.
- Do not allow riders on the Skid Steer during field operation or transport.
- Install and secure all guards and shields before starting and operating.
- Never wear ill-fitting, baggy or frayed clothing when working around or on any of the drive system components.
- Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
- Never operate the machine inside a closed building.
- Stop Skid Steer engine, place hydraulic controls in neutral, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
- NEVER EVER Climb under of your machine with the boom raised. Serious injury or death can occur.
- Insure that all Skid Steer controls are in neutral before starting.
- Clear the area of all bystanders, especially children, before starting.
- Be careful when working around or maintaining a high-pressure hydraulic system. Wear proper eye and hand protection when searching for a high-pressure leak. Use a piece of wood or cardboard as a backstop when searching for a pin-hole leak in a hose or line.
- Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are not damaged.
- Take care when working on steep ground, particularly when turning, and especially with mounted DGR-106s.
- Stay away from overhead obstructions and power lines during set-up and operation. Electrocution can occur without direct contact.
- Seek immediate medical attention if a high-pressure concentrated stream of hydraulic fluid pierces the skin, as a toxic reaction and infection could develop.
- Lower boom to the ground before servicing, adjusting or repairing the machine.
- When moving on or near roadways, make sure the SMV (Slow Moving Vehicle) emblem and all the lights and reflectors that are required by the local highway and transport authorities are in place, are clean and can be seen clearly by all overtaking and oncoming traffic.
- Never transport with the boom arms extended upward. Boom arms should be in the stowed position in towards the Skid Steer when transporting.
- Attach the DGR-106 to the Skid Steer using the skid mounting plate. Always use warning flashers (hazard) on the Skid Steer when transporting unless prohibited by law.

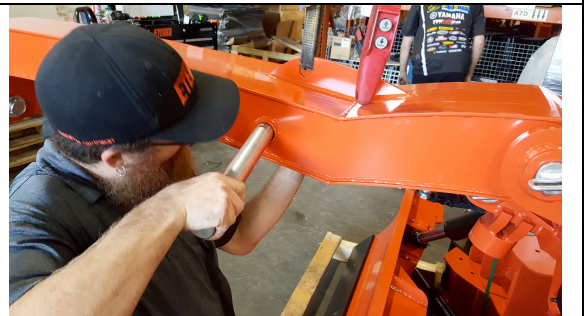
## 1.6. Initial Set-up

Your Dozer Grader is shipped with the front frame removed to make the shipment as compact as possible and to help alleviate shipping damage. When you first receive your grader, please inspect it for damage and missing parts. Note this on the BOL before you let the driver leave. If all of the parts are include, it is time to assemble.

Using a lifting aid, connect the top frame to the main pivot point on the grader using the supplied pin. Install and tighten the retaining pin.



Install cylinder to main boom pin to hold the lift cylinder in place and install the locking device. Connect the cylinder hoses to the main control hoses.



Orient the wheel boom with the collars facing down. If the wheels do not sit far enough up for proper operation, flip the boom over so the collars face up.



Tighten the retaining nut with a pin tool or collar socket.



Install the wheel assemblies and insert the washers and supplied snap rings.



Grease all pivot points

Connect to machine and verify operation.

---

## 1.7. Introduction

The Skid Steer DGR-106 is designed to be a highly effective grading solution. If maintained properly, it will provide the owner with many years of service with no damage to property or people. If not maintained properly, the DGR-106 can easily wear much faster than the original design intent. You must visually inspect and test the DGR-106 before and after each use to ensure nothing has come loose or is badly worn. The most common areas to inspect are the hose connections and the pivot points for excessive wear and broken fittings. Inspect the electrical connections carefully and repair as needed before your grader stops working. Damage or wear which is caused by under-greasing and is not covered by any warranty. The Owner's Manual is designed to help you be a safe and knowledgeable operator of this DGR-106.

---

## 1.8. Theory of Operation

The DGR-106 is a hydraulically operated front mounted dozer grading system. What sets this attachment apart from other grader attachments is it's ability to dozer an area into a rough grade, then come back and do a final finish grade. Add a laser set and you can finish grade down to the minutest specifications. There are no other attachments that we know of that are as brilliantly designed as this one. The base unit comes with a standard 86" moldboard and two bolt-on extensions that give the operator a full 106" width. The valve is an open center design where you will turn on your auxiliary flow and leave it. All of the blade functions are then performed with the Joystick Controllers in the manual mode. There are two automatic modes available. By switching to the laser automatic mode will enable the laser receivers. There is an additional power switch that will enable a GPS controller.

**Dozer Mode** allows you to roll up the front wheels and frame so it is out of your way and will allow full access to the front of the blade with no obstructions so you can dozer. Other graders simply do not have a strong enough blade to allow you to dozer but the DGR-106 does. You can easily cut a road and then come back and final grade, all with the same attachment.

**Laser Masts (Optional).** These are adjustable poles that allow you to hang your favorite receivers onto the DGR and get the job done automatically and precisely.

**Wing Kit (Optional).** These are bolt on wings that allow the spoils to be pulled back into the grader path.

**Laser Receiver Kit (Optional).** Modular receiver kit with twin receivers, control box/screen and slope control.

**GPS Control Kit (Optional).** Optional plug and play GPS Controller.

**Laser Transmitter (Optional).** Optional laser transmitter available.

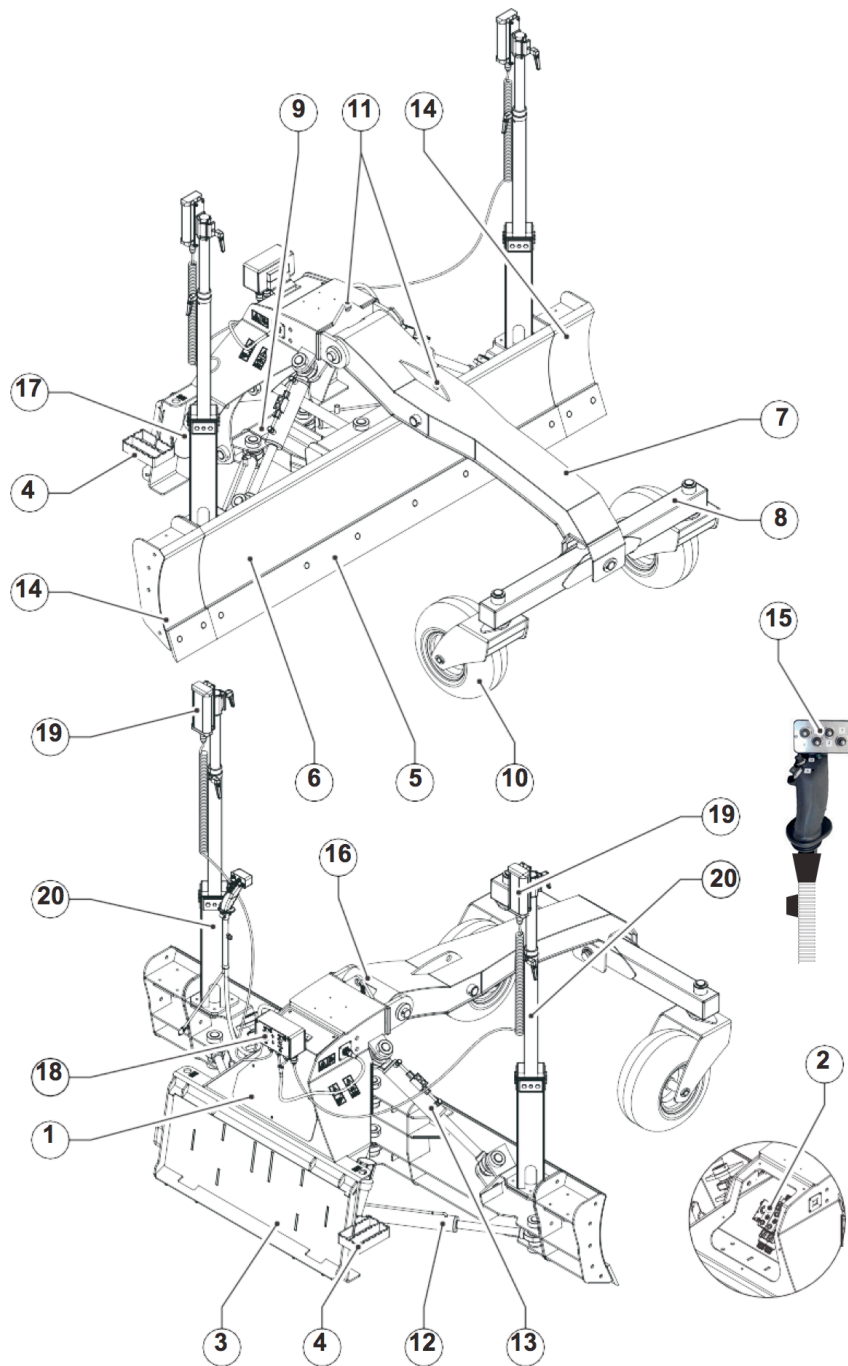
## 1.9. Main Components - DGR-106

- 1) Valve Cover
- 2) Main Hydraulic Control Valve
- 3) Universal Skid Steer Attachment Plate
- 4) Side step
- 5) Blade
- 6) Moldboard
- 7) Main Frame
- 8) Oscillating Bolster
- 9) Blade Support Articulated Frame
- 10) Swivel Wheels with flotation tires
- 11) Lifting Points
- 12) Blade Rotation Hydraulic Cylinder
- 13) Blade Tilt Hydraulic Cylinder
- 14) Blade Extension
- 15) Control Handle Joystick – N/A
- 16) Hydraulic Lift Cylinder
- 17) Document holder

**Laser control system (optional) consisting of:**

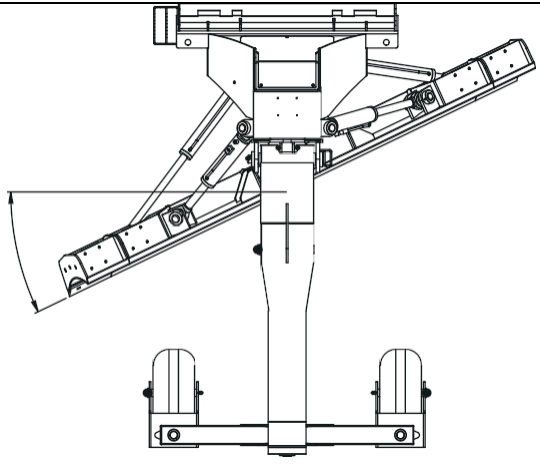
- 18) Control Box (Optional)
- 19) Receiver (left/right) (Optional)
- 20) Receiver pole (left/right) (Optional)

Slope control and basic level available as extended options – not shown. Comes standard with Laser Ready Connector.

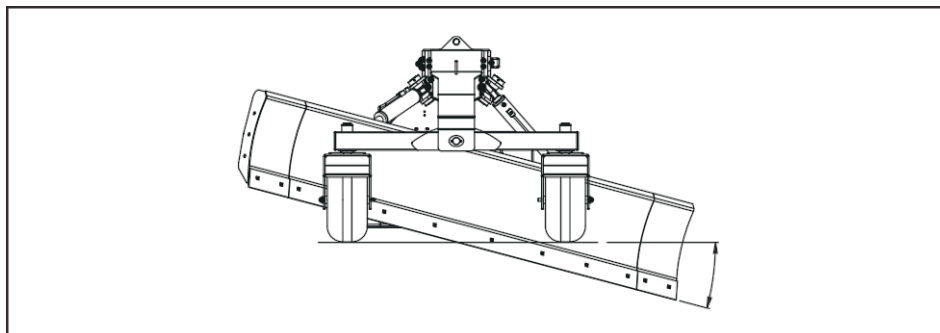
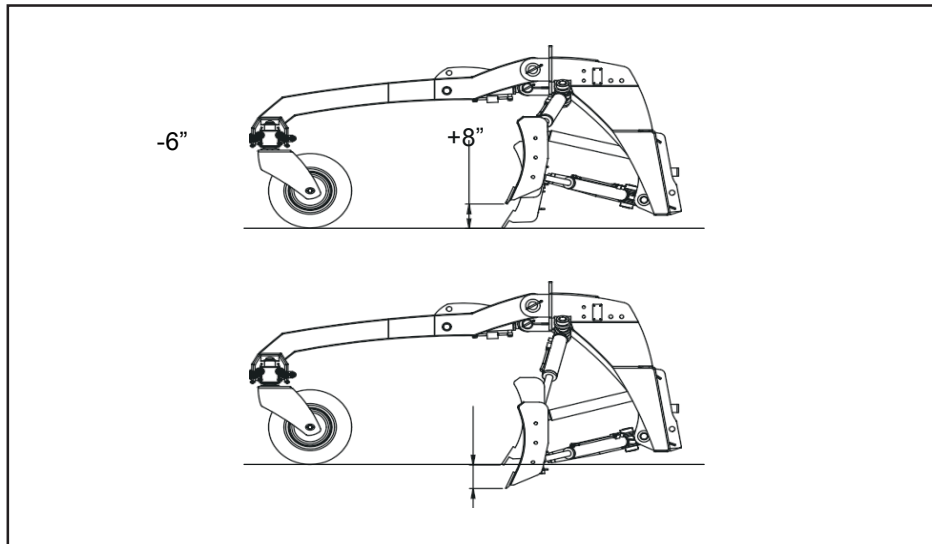


## 1.10. Operational Angles

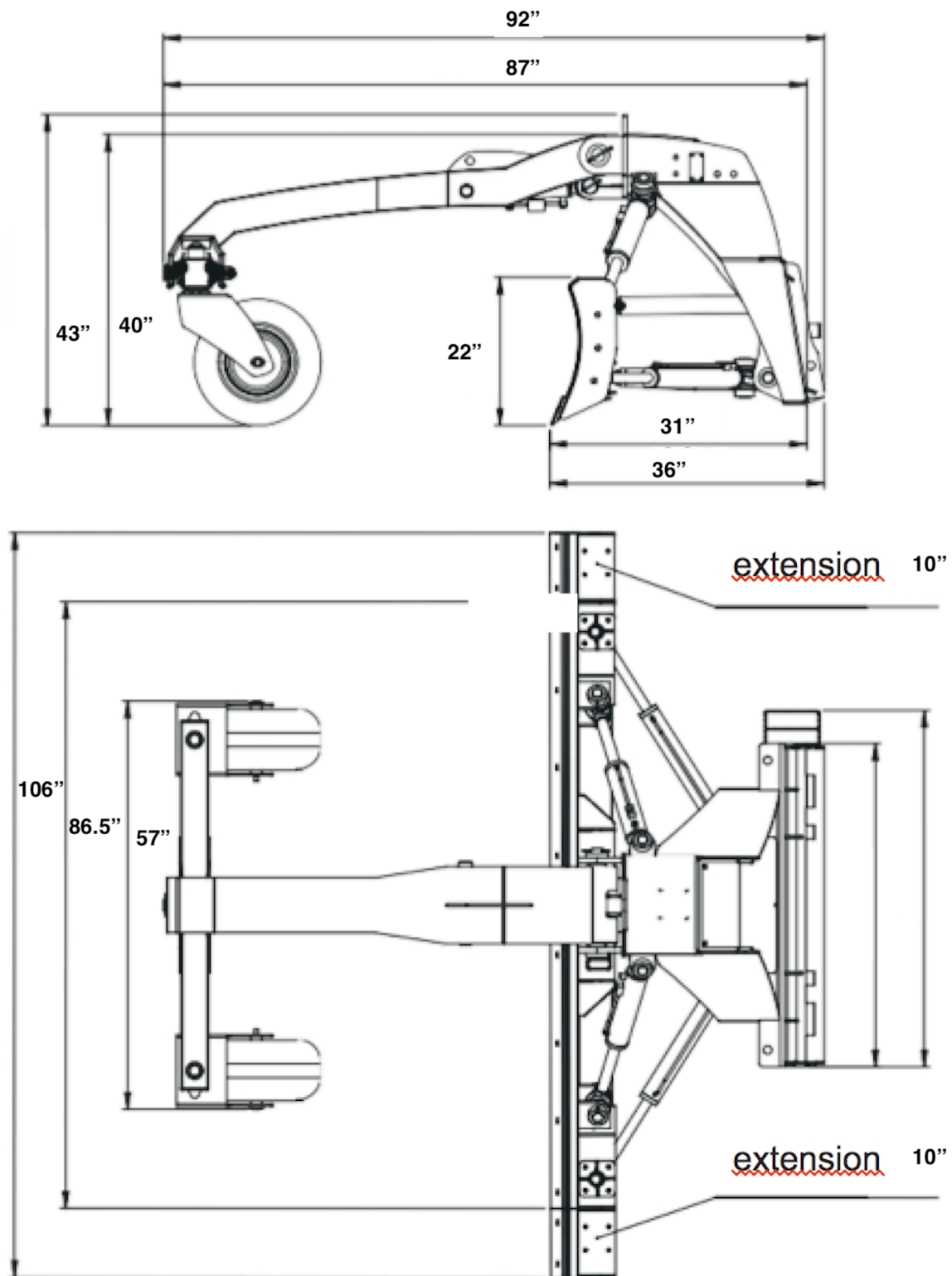
The blade angle is 26 degrees in each direction while the tip angle is 15 degrees.



**Grader Blade Height adjustment = +8" and - 6"**



## 1.1. Dozer Grader Dimensions

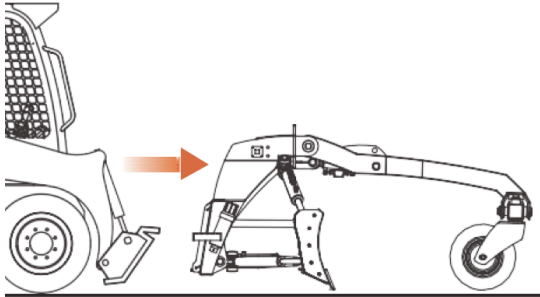
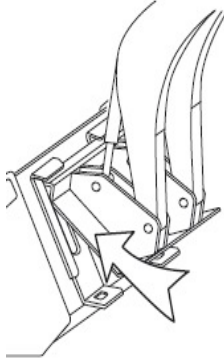
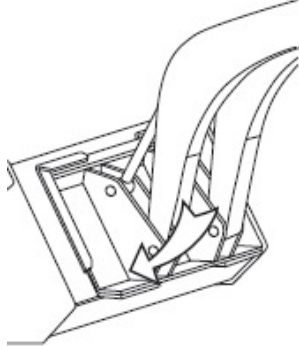


---

## Pre-Operation Checklist

- Eterra DGR-106s are designed to ensure years of trouble free use. A poorly maintained DGR-106 is an invitation to expense and trouble. We recommend that before operation that this checklist be followed to ensure trouble free operation.
  - Give the DGR-106 a “once-over” for any loose bolts, worn parts, cracked welds, hydraulic leaks, frayed hoses etc. and make necessary repairs. Double check the DGR-106 coupler as well as mounts to ensure nothing has come loose as you risk the DGR-106 falling off if not properly inspected.
  - Be sure that there are no tools lying on or in the DGR-106.
  - Check lubrication points for adequate grease and damage.
  - Make sure all hoses are clear of cuts, abrasions, worn spots and pinch points before operating. Check that hoses do not get caught in the pinch areas of your loader. Hose pinch is not covered under any warranty.
  - Check the tire pressure of your machine and the front caster wheels if applicable and make sure they are inflated to their recommended pressures so that the grader does not cause the machine to lean to one side while grading. Connect to the loader and check the mechanical skid steer connection point for wear that could cause DGR-106 to fall off. Repair any damage as needed.
  - If equipped, check laser operation and that the controls will turn on and off.
  - Lift the blade off the ground, engage the hydraulics and check all functions.
- These checks should be done prior to arriving at the job site.

## 1.2. SSL & CTL Loader Connection

<p>1: Slowly position your skid steer loader towards the rear of the DGR-106.</p>	
	<p>2: Slowly insert the top edge of your quick attach into the top rail of the DGR-106 from underneath.</p>
<p>3: As the top of the quick attach aligns into the DGR-106, slowly roll your quick attach back towards the machine until the entire quick attach locks into the mount. Using either your power attach or manual levers, lock the DGR-106 in place and connect your hydraulic hoses and electrical connection.</p>	

---

### 1.3. Hydraulic Connections

Depending on your order, your DGR-106 may or may not have come with hydraulic quick couplers. The hose ends are furnished with fittings that will screw either directly into the back of the hydraulic couplers or a 90 degree fitting depending on your specific machine requirements. You should check the best hose routing for your machine prior to use and adjust accordingly. If you were shipped 90 degree fittings and they are not required, you can remove them and the hoses will screw in directly to the couplers allowing the hose routing to come straight out of your connections on your machines. In some cases this is useful, but always extend your quick attach prior to use and check for hose length and areas that the hoses could snag or be cut by the quick attach. Operational direction can be changed by swapping the connectors on the coupler end of the DGR-106. Couplers can be alternated on hose ends easily by the operator.



Once the couplers are installed, you may connect them to your machine by pushing the male coupler into the female coupler on the machine and the female coupler of the DGR-106 into the male coupler on the machine.

If you experience a lot of pressure when connecting, you may have to relieve some of it by loosening the fitting behind the coupler to bleed off some of the pressure. Next time you disconnect, you will want to even the pressure in the DGR-106 by not dead-heading any of the cylinders all of the way. Thermal locking can be caused by outdoor storage in hot conditions where the oil expands in the hoses and pressurizes the couplers. Only extreme pressures will cause a thermal lock, which will have to be relieved prior to installation of the DGR-106.

---

## 1.4. Hose Routing

- It is important that you check and recheck your hose routing each time you connect the DGR-106 to your machine. Each machine is different so you need to make sure that you have routed the hoses away from any potential pinch points. Check that there are no pinch points around the main skid steer pivot. Average hose lengths are shipped at no-charge with each DGR-106. Try to route the hoses towards the top of your boom and make sure there is no excessive slack. It is the customers' responsibility to modify these hose lengths locally as required for your specific machine. Hose lengths can be varied by using or not using a 45 or 90 degree fitting. There is no warranty either expressed or implied with regards to hose damage due to improper routing or length.

---

## 1.5. Hydraulic Operation

- The DGR-106 is furnished with a single valve open center hydraulic control system, which allows the operator to make minute adjustments to any function on the fly. Once hydraulic pressure is applied to the attachment, it should be locked on so it continuously flows oil through the control block. The use of this style of control block is required in order to allow the automatic function controls of the attachment.
- Once oil is flowing, you will use your electrical controls to operate each function. These functions are as follows: Left Side – Up/Down, Right Side – Up/Down, Blade Angle – Left/ Right, Wheels – Up/Down, Laser – On/Off, GPS – On/Off
- Wheel up/down motion is controlled to allow minute adjustments which makes the action slow. To speed up this function, reverse the hydraulic flow and the restrictors will be bypassed and allow the up/down motion to occur much faster.

---

## 1.6. DGR-106 Theory of Operation

### **Components:**

- DGR-106 grader featuring SSG Super Joystick Controller (Either permanent or partially installed). Used as a stand-alone grader or dozer the DGR-106 is an optimal attachment allowing the operator the full flexibility of being able to spread and final grade all with one attachment.
- Rotating Laser (Either Operator or Eterra Supplied) – This provides a level light plane over the job site and allows the grader to have a constant level reference plane from which to guide the blade. A job site rotating laser must have a 360 degree rotation and be bright enough to be seen over the entire working area or the grader will not work properly. The blade can be either guided manually by watching the arrow indicators on the masts and the control box or by using the auto mode whereby the controls take over and no operator intervention is needed.
- Laser Receivers – Mounted at the same height on both sides from the base of the blade, allows a determination between the laser reference and the blade reference. A visual indicator will show the operator if either of the blade sides is higher or lower than the required grade. In manual mode, the operator will adjust the blade height in accordance with the receiver indicators to create a level grade and in auto mode the controls will take over and maintain the grade automatically.
- Control Panel – Connected between the receivers and the hydraulic valve assembly, it processes the data from the receivers and provides a visual indication of the actual position of the grader. It also gives the operator to change slope angles minutely with the turn of a dial as well as allow manual/auto operation.
- Valve Assembly – Connected directly inside the grader between the electrical controls and the hydraulic cylinders, this valve allows the free flowing of hydraulic fluid and with an electrical control, the flow will be diverted to either extend or retract one of the cylinders.
- Junction Box – A junction box may or may not be supplied depending on your controller model. This box manages some of the connections to simplify the cabling required to operate your controls.
- Solenoid cable – This cable communicates through the auxiliary grader port directly to the hydraulic valve and over-rides the manual controls to allow automatic control of the solenoid valves directly.
- In addition, wires and cables are included to allow the operator to easily connect any function required easily and efficiently.

## **Control Panel:**

The Control Panel is essentially a computer with built-in logic for the inputs (Receivers) and outputs (Hydraulics) connected to it. The Control Panel provides many adjustments to allow compatibility with different machinery and application requirements. The Control Panel uses an LCD screen to provide information to the operator. One side of the screen displays elevation, or blade depth, at the center of the grader and other side is for elevation at the right side of the blade. Selections are made via two multiple-function (joysticks) that move up or down and left or right. By pressing and holding the joystick for 6 seconds, the auto laser or GPS functions can be initialized.

Grade LED indicators are used to indicate elevation of the grade. The laser receiver located on the right side of the Dozer Grader controls the tilt, or slope, of the right cutting edge by measuring elevation of the grade at a different location than the center laser receiver. The left mounted receiver handles the same functions on the left of the blade.

NOTE: Additionally a slope indicator can be installed either with the control box or as an additional stand alone unit to control simple leveling and slope functions. The slope capability is obtained by using multiple inclinometers in relations to the receivers. The stand-alone unit uses inclinometers relative to an operator pre-set level.

For operation and set-up, please see the appropriate manual section or the manufacturers supplied documentation. The standard set-up is universal for all graders. Only connection types vary. For custom connections, please contact your Eterra representative for connection parts and schematics.

---

## 1.7. DGR-106 Operation - Initial

- After you have connected your hoses to your machine, you should start the machine and turn on your auxiliary hydraulics in the forward direction.
- Check the boom up and down motion and ensure that the attachment pins have locked in place all the way into the attachment. Push the nose down a little and see if it tries to disconnect. If the connecting pins do not lock all of the way in place, it is possible to notch out the attachment plate slightly to allow a better fit.
- Lift the DGR-106 off the ground and check all of the controls for operation. Bring the grader blade all of the way up and then lower the attachment to the ground.
- Your boom must be lowered all of the way down onto the boom stops so you have a constant fixed reference.
- Adjusting the skid steer plate. In some instances you may have been shipped a model with an adjustment plate. This is because your machine may have been identified as a machine with a lower than standard quick attach. Cut a block (6") tall and place under the skid steer mount base to hold it off the ground. Move your machine in place with the boom all of the way down. Adjust the rear plate to align on the same plane as the skid steer quick attach. Once this adjustment is made, you do not need to do it again unless you change brands of machines.
- Once you have established your level point, and are familiar with establishing this point, it is safe to try initial grading.
- If you have laser receivers, you can install them on the masts and run the coil cables to the interface box. Ensure that all connections are tight so the receivers are not knocked during use.
- Plug in the main control cable and check your functions with the grader lifted off the ground. Check for manual vs auto operation. If installed properly, the center of the left joystick should be depressed for 6 seconds to allow the receivers to switch on. Depress again for less than 1 second and they will switch off.
- If GPS is installed, the center of the right joystick should be depressed for the unit to switch on.

### **Mast Leveling:**

If you wish to use the laser grader feature, now is the time to level the masts by measuring the distance between the bottom blade edge and the center of each receiver. Ensure that each is the exact distance as the other. Set your Laser up on a tripod (Level) high enough to be seen above the machine and slide each receiver mast up until it can be seen by both receivers. Measure the distance again from the blade to the centerline of the receivers and lock in place. Minute adjustments can now be made using the control functions on the control box. Slope adjustments may also be made at this time.

## 1.8. Initial Grading

It is always best to try a sample grade when first using this attachment. The controls are shown below with how they operate the grader.

Joy Stick 1			Joy Stick 2		
Y1 - CH1 - Pin E Orange/Blk Left Angle Up (Left Upper Solenoid)			Y1 - CH6 - Pin G Right Angle Up (Right Upper Solenoid) Green		
X1 - CH3 - Pin C Blade Angle Left (Center Lower Solenoid) Pink/Blk	Z-CH5 - Pin A Switches Laser On/Off Control Box On/Off Pink	X2 - CH4 - Pin D Blade Angle Right (Center Upper Solenoid) Pink/Wht	X1 - CH8 - Pin M Sideshift Left Wheels Up Green/Blk	Z-CH10 - Pin P GPS ON/OFF or Self Learn	X2 - CH9 - Pin N Sideshift Right Wheels Down Blue
Left Angle Down (Left Lower Solenoid) Y2 - CH2 - Pin F Orange			Right Angle Down (Right Lower Solenoid) Y2 - CH7 - Pin H Green/Wht		
Ball of Enclosure			Ball of Enclosure		

Note: If your controls operate opposite to this, you will need to reverse the connections at the control box. Do not attempt to re-pin any of the connections.

**Warning: Do not ever re-pin any connections or the blade may behave uncontrollably and will not work properly with laser controls.**

Starting on a level surface, lower both sides of the blade at once until it makes contact with the ground. Make sure your wheels are down when doing this so you can see the angle you need to have your quick attach at to maintain ground contact. Start by making small movements forward and see how much ground the blade will move. It is always best to remove too little than too much. In the grader mode, you want to be making small incremental grade changes and not try to do everything at once. If you rush, the end result will be more time wasted in making adjustments back up to grade.

It is always best to angle the blade to one side and maintain that side no matter which direction you are grading. This helps to keep the ground surface level and consistent. This is called wind-rowing because the after effect is a small row of material. As you get better, you will be able to reduce the height of the wind-row by making shallower cuts with each pass.

Crowning (Sloping): Crowning is accomplished by having one side of the blade higher than the other. It allows the operator to set a side slope which aids in drainage. It is best to set the angle less than required on the first pass because as your wheels enter the cut path, the machine will lean as well causing a more angled slope than you may have planned.

1.9. Laser Components

Control System



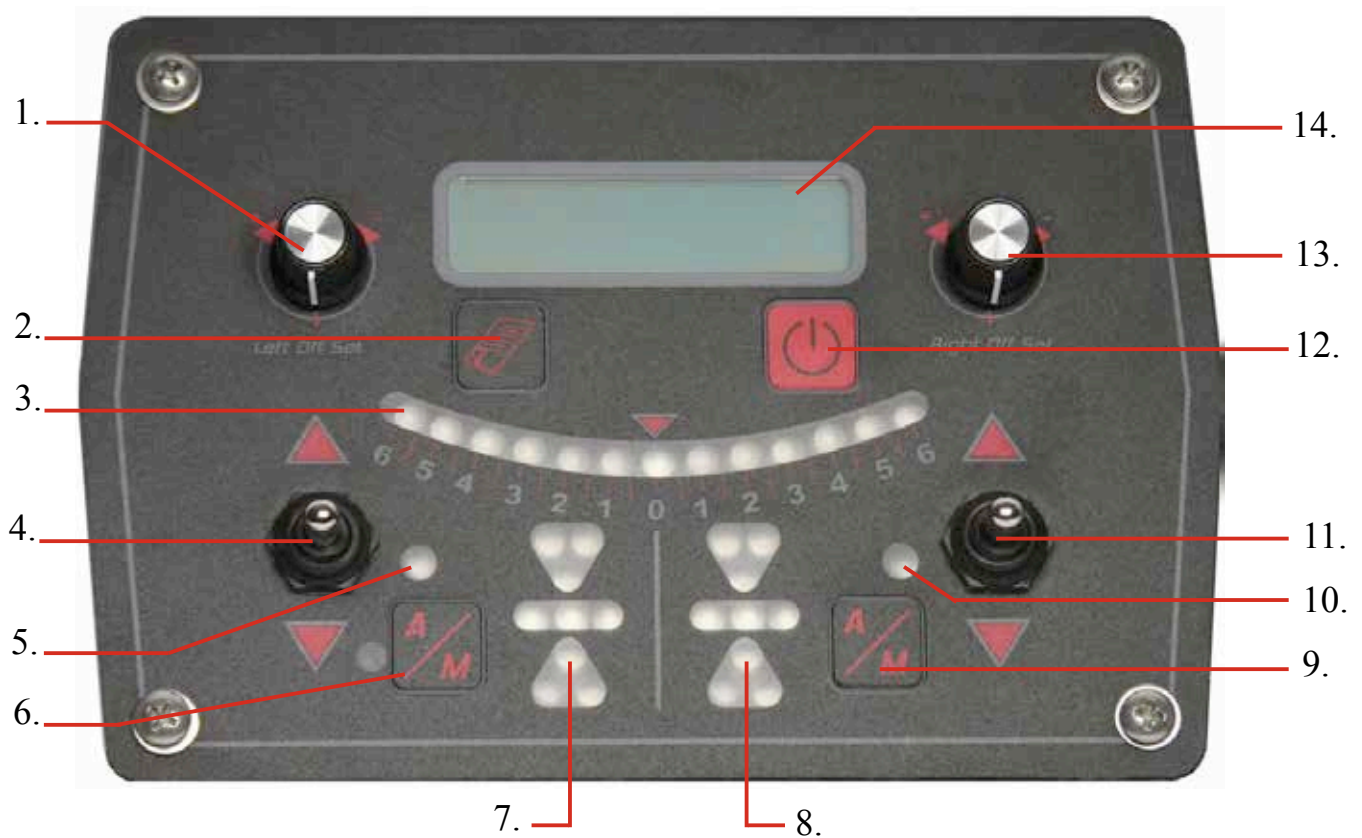
Optional Telescoping Mechanical Mast



Cable Set



## EG Series Control Box Controls (fig 1)



**1) Left On-grade Offset -**

**13) Right On-grade Offset -** These knobs control the offset of the on-grade of each receiver. They allow the operator to move the on-grade position of each receiver up or down by 54mm (2.13 inches)

**2) Menu Button -** These keys are used to step through the menus to setup all of the controls in the System. The menu flow is unidirectional and can only cycle through in one direction, if you go past a menu step it can't go back. Pressing either of the A/M keys is a short cut back to the main screen, a quick way to start over.

**3. Slope Indicator Display -** The slope indicator displays gives the operator real time slope indication from -6% to +6% in 0.5% steps.

**4) Left Valve Raise/Lower Switch -**

**11) Right Valve Raise/Lower Switch -** These toggle switches are used for manual control and allow the operator to raise and lower each hydraulic circuit on the machine. These switches also act as a control in the menu and are used to change parameters in the menu display.

**5) Auto/Manual Indicator -**

**10) Auto/Manual Indicator -** These indicators display when the system is in the automatic mode, if the light is on, the systems control is active.

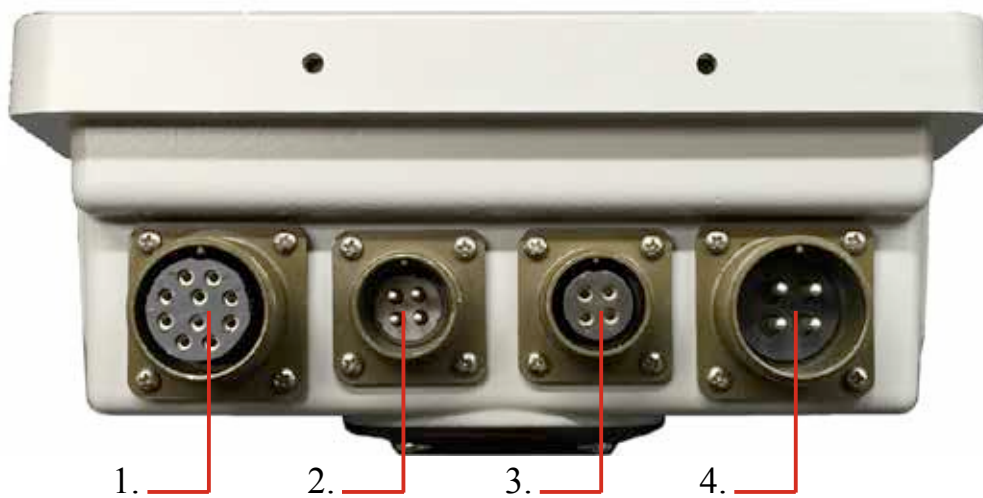
**6) Left Auto/Manual button -**

**9) Right Auto/Manual button -** These buttons switch the EG Series system between automatic and manual control modes. The right switch controls both the left and right sides together and the left switch controls just the left. This configuration allows a way to control both sides together as well as individually.

**7) Left LED Grade Display -**

**8) Right LED Grade Display -** These LED's display whether you are above grade, below grade or on grade. The red arrows tell the user which direction the blade must move to achieve grade, while the single up or down red LED will flash when the receiver is within 10mm (0.39") of the desired grade. The green LED's in the middle will flash when you are within your desired 'on grade'.

**12. Power On/Off switch -** Press the power button briefly to turn it on, and the button must be pushed and held for approximately two seconds to turn the system off. This button is also used as a soft key providing the function indicated in the display directly above it.



1. Valve Cable Connector - This is where the valve cable is connected to the control box.

2. Remote Switch Connector - The remote auto/raise/lower toggle switch assembly plugs into the control box via this connector.

3. Communication Connector - Receiver and Sensors plug into the Node Box, their signals are transferred to the control box via this 4 pin connector.

4. Power Cable Connector - Battery power is routed to the system via this cable connection.

# EG Series Control Box

## Display Screens and Menus

EG-3 Control  
ver 7 16 Sep

**Splash Screen** -The EG Series has many menu screens for setting the system parameters. The first to show up after power up is the Splash screen displaying System Type and Version. The Version and Version Date may change as features and program modifications are implemented.

### Main Operating Screens

#### Single Laser

20mm↑ -0mm-  
Manual

**The Main Control Screens:** This is the first screen displayed after the 10 second start up routine is complete. The control screens will look different depending on the systems model, as well as how the system setup is configured. The three main configurations of the four EG Series models are shown here.

**Single Laser Control** - The upper left reading is the real time position of the laser beam on the receiver in metric or imperial depending on the units configuration. The upper right is the receiver on-grade offset entered in via the right offset adjust knob.

#### Single Laser with Slope

4mm↓ 0.5%→  
Manual Manual

**Single Laser with Slope Control** - The upper left shows the receiver on-grade offset, which can be entered by the left offset adjust knob. The upper right displays the desired slope, this value is entered by the right offset knob.

#### Dual Laser

#### Dual Laser with Slope Indicate

10mm↓ 10mm↑  
Manual Manual

#### Dual Laser Control -

**Dual Laser Control with Slope Indicate** - The upper left and right display are the receiver on-grade offset values, they are adjusted via the adjustment Knobs. The Left Knob adjusts the left offset and Right Knob adjusts the right offset. We can also temporarily link the Left and Right offset together. This is accomplished by pressing the Power button once, an X will be displayed between the two offset values. While the X is present the Right Offset Knob will adjust both the Left and Right offset values together. The X will disappear 5 seconds after the value has been entered.

10mm ↑ X 10mm↑  
Manual Manual

#### Slope Indicate / Control

◀0.5% 0.5%→  
Return Next

#### Slope Indicate / Control -

If the system has the slope option and the slope option is enabled, pressing the menu button once will display the slope indicate / control screen. Here the real-time slope in the upper left side of the display and the direction is shown by a thick directional arrow. The desired slope is in the upper right hand side of the display and the direction is shown by a thin directional arrow. The desired slope is entered via the right offset knob while this screen is active. The system will remain in this slope screen until either the return or next key is pressed. The return key returns you to the main control screen and the next key will continue to the menu screens.

Pass IEFFFI 0000  
-> Return

**System Lockout Screen** - When entering the menu screens, if there is a lockout code this screen will appear. You must enter the system password to be able to go any further into the menu screens. If this option is not needed it may be disabled in the installation menu. Password is Factory set to 1000

FAST -I- - - - Slow  
Filtering Next

**Filtering** - Changing the filtering rate can help to cure any jumpy behavior of the receiver. The best setting is the fastest setting with the least amount of interruptions.

Valve deadband  
7mm grade Next

**Valve Dead band** - Is the amount of allowable on-grade tolerance. The range is 1mm to 30mm at 1mm steps. When the receiver is receiving the laser light in the on-grade position, the valves will not activate until the dead band range is passed. If the on-grade dead band is set to 10mm, the valves will not be activated until the receiver readings are beyond 5mm in either direction.

Horn Off  
Next

**Horn** - Sets the function of the internal beeper. **Off:** disables the internal beeper. **Alert:** sets the beeper to grade alarm mode, when in automatic, if there is no on-grade indication for 6 seconds the alarm will sound. **Indicate:** sets the beeper to indicate mode, the grade lights sounds the beeper like a detector. If the too high you get a double beep, low a single beep and on grade a solid beep.

Height Adj ON  
Next

**Height Adjustment** - By setting the Height adjustment option to "ON", the off-set knob is enabled and the user has the ability to have an adjustable 'on grade' which is displayed on the LCD. If the Height adjustment is off or **Height set to "0"**, the off-set knob is disabled and the 'Real Time' blade position is displayed on the LCD.

Use millimeters  
Change Next

**Unit selection** - Sets for 3 different units: **Millimeters**, **Inches** (decimal inches) or **Feet** (10th of a foot).

LATEC Instr. Inc  
5192354585 Next

**Latec Info Screen** - The final screen in the menu displays Latec Info, Name and phone number. Outside of North America, dial +01.519.235.4585.

**Note:**

To access the Installation Menu , press the Menu

and Power button in UNISON while the LATEC info screen is displayed.

## Valve Settings

**Valve1 Types (Left Side)** - EG Series can control proportional time ('bang-bang') valves, proportional valves with integrated electronics (Danfoss), Selective Control Valve (SCV) and proportional current (variable flow) valves. There are three Proportional current settings: 50 Hz., 100 Hz., and 200 Hz.; Consult the valve manufacturer to find the proper type and dither frequency for your valve.

Valve1 type  
Prop time      Next

In **Proportional Time** mode, the EG Series valve output is an on/off voltage, high current output; the output voltage will, during the valve on time, be equal to the DC input supply.

Valve1 type    100Hz  
Prop Curr      Next

In **Proportional Current** mode, the EG Series valve output is a pulse-width-modulated, high current output; the output voltage will, during the valve on time, be equal to the DC input supply.

Valve1 type  
Danfoss              Next

The **Danfoss** setting, as well as producing the low power analogue control signal for the valve, also drives both of the high current valve outputs. One of those high current outputs can supply power to the Danfoss valve, and the other can operate the hydraulic system loading valve as recommended by the manufacturer.

Valve Direction:  
Normal              Next

**Valve Control Direction** can be changed to alleviate the need to change wiring or hydraulic plumbing. To enter Valve Direction menu, press the **Menu and Power Button in Unison**, then pressing the Menu button will switch between Normal and Inverted

Minimum PW    80ms  
Test              Next

### Proportional Time Valve Settings:

**CAUTION: THE FOLLOWING ITEMS WILL OPERATE THE HYDRAULIC VALVE. BE CAREFUL WITH THEIR USE! MAKE SURE YOUR AREA IS CLEAR.**

**If your valve has been set to either proportional current or Danfoss go to Minimum DC setting on next page. Proportional time continue with below.**

Up PlsWdth      35ms  
Chg Dir           Stop

Down PW        25ms  
Chg Dir           Stop

**Minimum Pulse Width** - The EG Series needs information about the hydraulic system on your machine, as all hydraulic systems are not the same. Here we are telling the system the signal needed to move the cylinder at its slowest speed. Pressing the Menu (Test) button will enter you in to this routine. Your hydraulics will begin to move, use the right toggle switch to increase or decrease the signal to the valve until you get a blade movement of approximately 0.5 inches per second. Press the menu button to change the direction, then adjust the cylinder speed for the opposite direction. When the cylinder speed is OK then press the power button (Stop) and these values will be stored. There may be a need to enter different values for Up and Down to balance the over all minimum speed. This is due to gravity helping in the downward direction and the volume differences in the cylinder, from the cap end to rod end.

**Note: that either the “Stop” button, or the Power button will turn off the valve drive, and return you to the Minimum PW window. Also, the valve will shut off automatically after 20 seconds without any buttons being pushed.**

Valve cycle time  
250ms Next

**Valve Cycle Time** - This screen will only be displayed as part of the Proportional Time valve setup. This menu function sets how often the valve pulses are sent to the hydraulic valve called, hits per second. The range is 1 - 15 hits per second and unit is in milliseconds, to calculate the hits per second divide 1 by the milliseconds. eg.  $1 / 0.250 = 4$  hits per-second. The lower the number the more hits per-second, for most hydraulic system starting at 100ms or 10 hits per second is a good place to start. The faster you can hit the valve the smoother it will seem to respond, the valve response will differ for valve to valve, playing with this setting will show you your valves limitations.

Minimum DC 35%  
Test Next

### **Proportional Current and Danfoss Valve Settings:**

**Proportional Time users proceed to the Valve Gain screen.**

Down PlsDC 20%  
Chg Dir Stop

**Minimum DC Pulse Width** - This screen changes slightly when the Proportional Current and Danfoss valves are selected. It's functions and procedures are exactly the same as the Proportional Time routine except the units is in percent.

Up PulseDC 35%  
Chg Dir Stop

**Note that either the “Stop” button, or the Power button will turn off the valve drive, and return you to the Minimum PW window. Also, the valve will shut off automatically after 20 seconds without any buttons being pushed.**

Valve 1 gain  
50%Next

### **All Valves Types:**

**Valve Gain** - The span of error between the onset of valve operation and the point at which the valve is fully on is determined by the valve gain setting. In this case, the units displayed (percentage) are arbitrary, but higher numbers suggest more vigorous valve action. With the gain set to 100%, the slightest error will fully open the appropriate valve. This setting should be left at 50% until after the Minimum Pulse width has been set and the hydraulics tested to see in which direction you would like to adjust this setting. The higher the number the more aggressive the hydraulic system. Conversely the lower the number the less aggressive the hydraulic system will be.

Derivative gain  
Medium Next

**Derivative Gain** - To stabilize some machine control applications, it is necessary for the control box to know not only whether the machine is at the desired slope or not, but how fast the slope is changing and in what direction. This is known variously as velocity or derivative (dv/dt) feedback. The control box can vary the amount of velocity feedback added; choose among: "High" "Medium" "Low" or "Off" This setting is to be left at medium for 99% of all installations.

Auto Return Off  
Change Next

**Auto Return** - Is the time duration that it takes for the valve to return the blade to the on-grade range after being manually driven away from the laser light using the toggle switch. The options available are in increments of 0.5 seconds with a range from 0 (off) to 7.5 seconds. After the set time is expired, the unit will move toward the last laser hit that it received. To disable this feature set the time to 0.

Tilt Sensing On  
Change Next

**Tilt Sensing On/Off** - This is where you turn slope sensing on. If your system has the optional slope sensor feature. If Tilt Sensing is set to Off the next menu will be Factory Settings.

Sensor 3→Forward  
◀1.2% Next

**Sensor Forward** - To add flexibility to the sensor mounting we have added a forward axis selection to orient the sensor after mounting. The label on top of the sensor shows a number for each quadrant, enter the number that is facing the forward direction of travel, this will orient the sensor axis. In the bottom left corner the real-time slope is displayed, this will help in mechanically adjusting the sensor to zero (level) after making sure the control surface is level before calibrating.

FAST - - I - - - Slow  
Filtering Next

**Filtering** - Changing the filtering rate mathematically changes the sensor's viscosity. The slower the filtering setting the thicker the sensor fluid will appear. Depending on the machine and the type of work, there will be a need to speed up or slow down the sensor.

Factory settings  
Restore Next

**Factory Settings:** All of the EG Series variables can be restored to their default values with this window displayed. The defaults are restored by pushing the Restore button. The values saved will be:

Filtering	-- ---
On-grade dead band	10mm
Horn	Off
Height Adjustment	-On-
Units of Measurement	mm
Valve type	P.T.
Minimum PW	100ms
Valve Cycle time	250ms
Valve Gain	50%
Derivative Gain	medium

Laser Receiver  
Latec Next

**Laser Receiver** - The EG Series has the ability to communicate with other manufacturers receivers, due to the communication changes necessary we had to limit the number of receivers to one and our slope sensor can not be implemented. Selections are limited to Apache Bulls Eye and Topcon LS-B series receivers, each requires an adapter cable to connect to our system.

Pass Change 1000  
-> Next

**System Lockout Screen** - This is the screen where you can enter a new password into the box. The factory default password in every system is "1000". If user would like this option to be disabled set password to "0000" and all menu options will be available to the user.

English  
Change Next

**Language** - Pick your language...English or French only (sorry)

Use 2 Lsr Recvr  
Change Next

**Number of Receivers** - The system needs to know the number of receivers being connected, one is the default and two is the maximum. If the system is set to two receiver and the second receiver is not connected, the system will be looking for the receiver. Then an error will be displayed telling you the system cant find it.

TiltSns-> Valve2  
Change Next

**Valve2 Select** - This selects the controlling device for Valve 2 (right valve), it can be changed between the Right Receiver and the Slope Sensor. The main control screen will change depending which device has been selected for Valve 2.

Valve2 type  
Prop.time Next

**Valve 2 Settings** - Valve 2 setting procedures are in the same order as Valve 1, follow the procedure as described for Valve 1.

Valve Direction:  
Normal Next

Minimum PW 40ms  
Test Next

Valve 2 gain  
32% Next

Derivative gain  
Medium Next

EG- 3 Control  
Ver8 16 Jun 2015

Laser Recv'r Bad  
Manual Manual

Slope Sensor Bad  
Manual Manual

**Software Ver.** - This screen is also displayed when the box is first powered on. These version numbers and dates will change as new features are added.

**Error Screens:** EG Series control system has built in diagnostics to keep you system running at its peak performance. If a problem develops with the receiver or slope sensor connection, cable, or the device itself, it will be displayed in the main screen.

## EG Series Options:



### EG Series Remote Toggle Switch Assy

**(Optional):** You can switch your EG2 from auto to manual mode, or raise and lower the valves right from the lever in your cab. The switch on the bottom toggles the EG Series between Automatic and Manual mode, and the switch on the top raises and lowers the valves. The switch assembly attaches to any lever using the universal U-bolt assembly.

### EG Series Manual Mast:

The manual mast is made from 2" steel pipe and the slide can be adjusted up and down as required. The receiver fits on the top of the mast, tighten the receiver into place via the two knobs on the base of the receiver.

Once the mast is mounted onto your machine, loosen the adjustment knob by turning it counter clockwise. Then move the knob up or down, until the receiver picks up a laser hit. Once the receiver has an on-grade laser hit, tighten the mast into place by turning the knob clockwise until it is tight.

### Control Box mount:

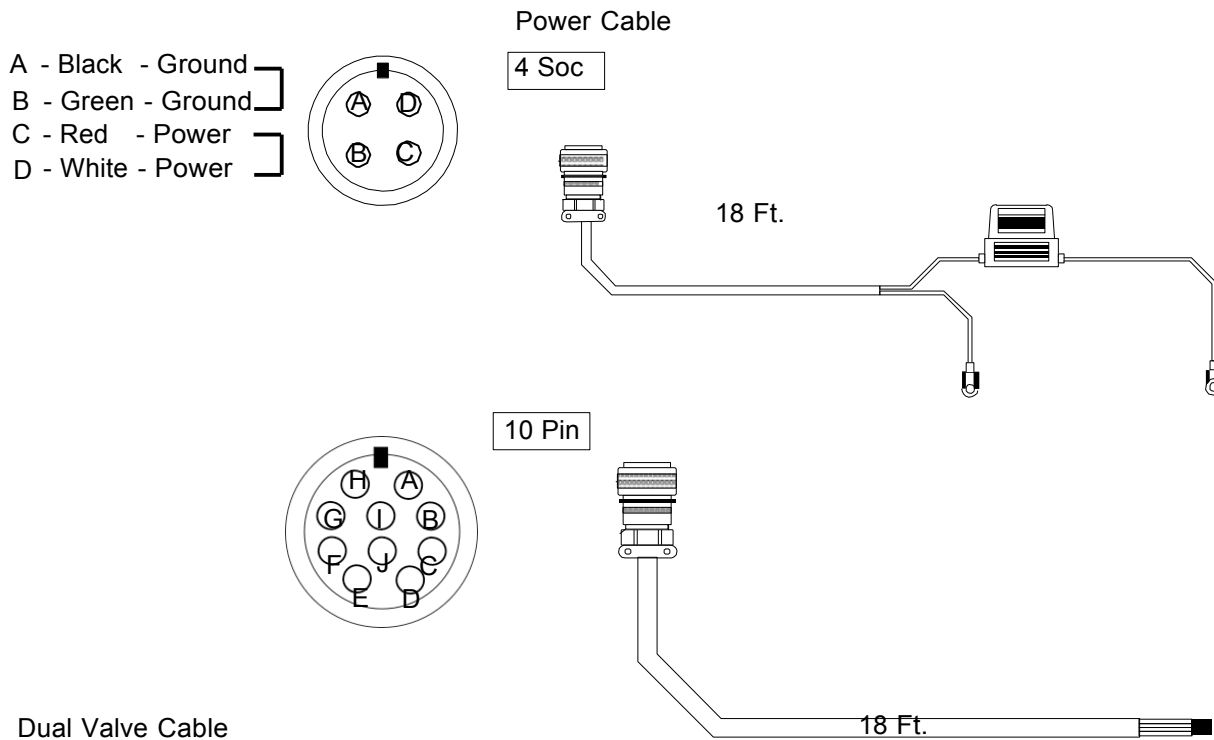
EG Series comes standard with a Ram Mount mounting system that is designed to clamp to a steel rod or to be bolted to a flat surface. This system will allow for great flexibility in control box positioning

## EG Series Installation:

**Control Box:** To install the control box find an area in the cab which will allow for the control box to be easily viewed and controlled, but also does not interfere with the operators controls and line of sight. To mount the control box use the supplied mount as a template and drill 4 holes in the appropriate place. Then screw the mount into position and attach the control box to the mount. The control box can now be adjusted for your optimum viewing pleasure.

**Receiver:** The receiver can be mounted with any 1 3/4" pipe or using the optional EG2 Manual Mast as a stand-alone or with the optional Shock Mount bracket. It should be mounted so that the receiver can receive a laser hit from 360°. This means the receiver should clear any cab, stack or any other obstacle on the machine.

## Cable Assembly Information:



A	Red/Black – Right Valve Lower/PWM Out	F	Yellow/Black – Left Valve Raise/PWM Out
B	Brown – Right Valve Raise/PWM Out	G	Orange/Black – Left Danfoss/SCV Out
C	Yellow – Right Danfoss/SCV Out	H	Blue/Black – Left Danfoss/SCV Out
D	Orange – Right Danfoss/SCV Reference In	I	Black - Ground
E	Blue	J	Red - Ground

---

## 2. Maintenance & Trouble Shooting

---

### 2.1. Scheduled Maintenance

---

**Daily** – Grease the pivot points of each cylinder. Grease main pins. It is important that these points stay lubricated to maintain grading integrity.

**Daily** – Check blades for damage or excessive wear and replace as. Failure to replace when needed will alter your grading results.

---

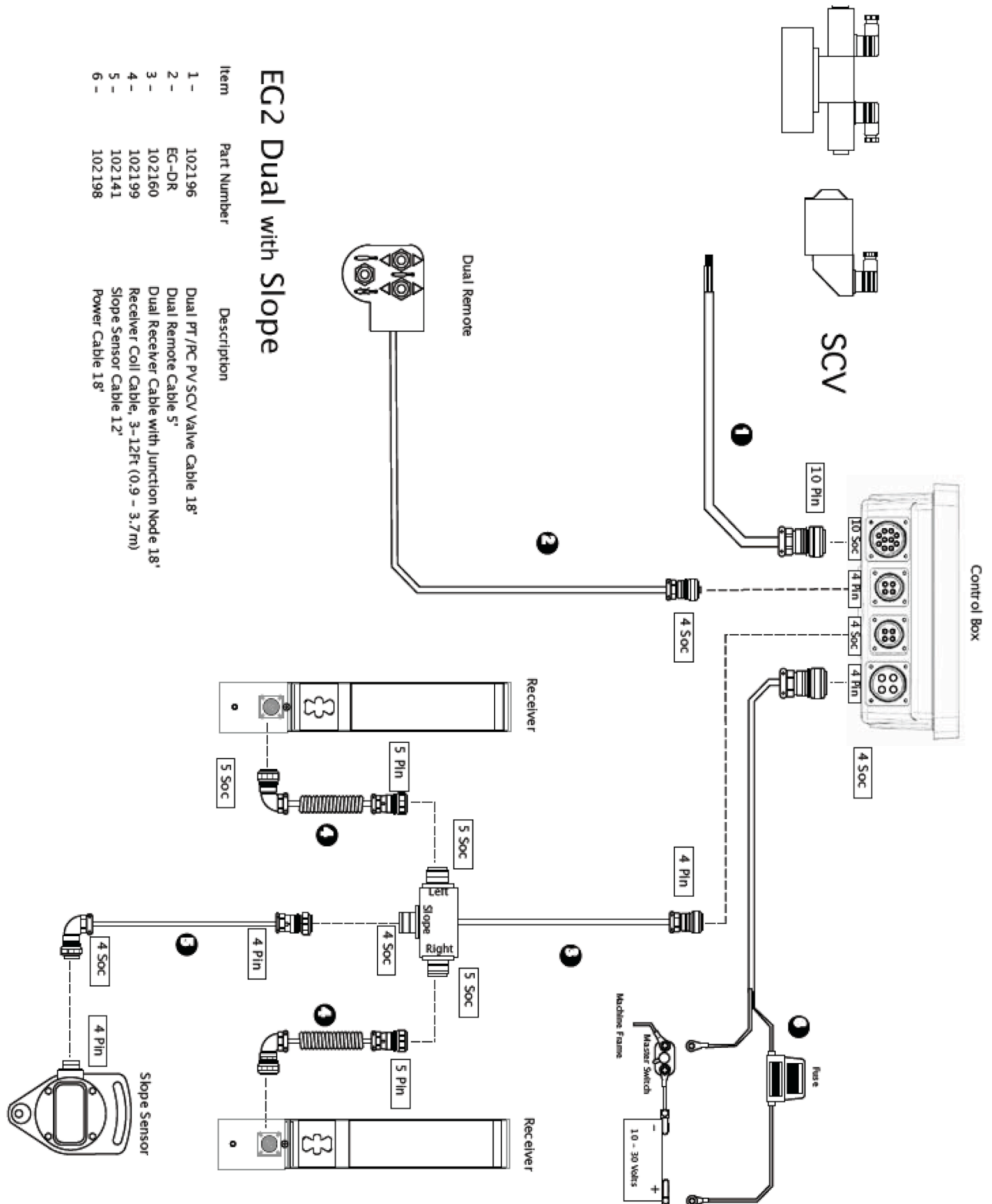
### 2.2. DGR-106 Grease Points

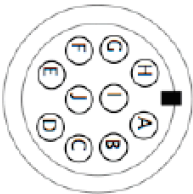
There is one main grease point on each pivot point and one on each pivot point except for the wheels casters which have permanently lubricated nylon bushings. Lack of grease means death on an attachment like this. Please take care of it and ensure a long and accurate life of all of the pivot surfaces.

---

### 2.3. Trouble Shooting

Controls	If one control stops working, it is most likely a wiring issue. Completely check all harnesses for damage and replace as needed.
Controls	Check control box LED's to see if any are stuck on. This will indicate a stuck or damaged joystick control. Replace as needed.
Laser	If lasers stop working check pin K for constant power and Pin A for switched power. If there is no power, check joysticks for damage.
GPS Failure	Check Pin P for power. If no power, check right joystick for proper operation.
Uneven Grading	Check pivot points for damage or leaking cylinders. Replace seals and or cylinders as needed.
Uneven Grading	Check tire pressure of loader and grader wheels.

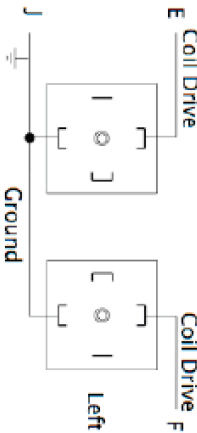
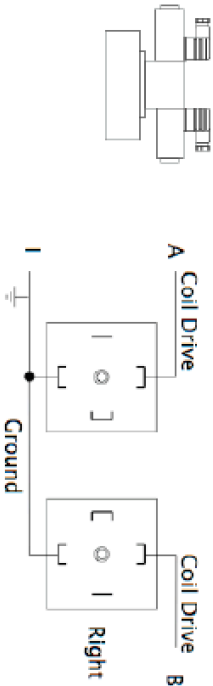




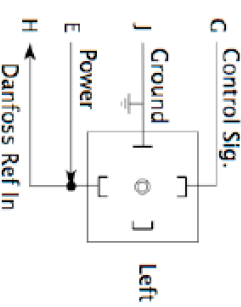
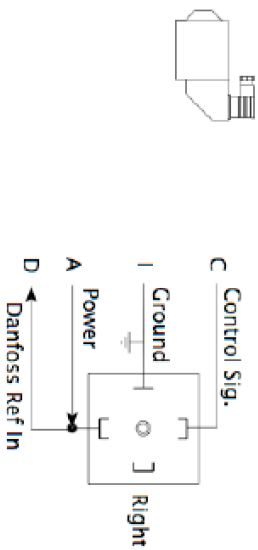
- A - Red/Blk - Right valve 1 PT / PWM Out
- B - Brown - Right Valve 2 PT / PWM Out
- C - Yellow - Right Danfoss / SCV Out
- D - Orange - Right Danfoss / SCV Reference In

- E - Blue - Left Valve 1 PT / PWM Out
- F - Yel/Blk - Left Valve 2 PT / PWM Out
- G - Org/Blk - Left Danfoss / SCV Out
- H - Blue/Blk - Left Danfoss / SCV Reference In
- I - Black - Ground
- J - Red - Ground

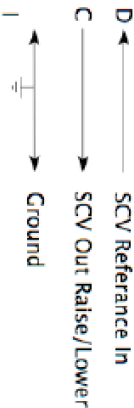
Proportional Time & 200, 100, 50 Hz Proportional Current:



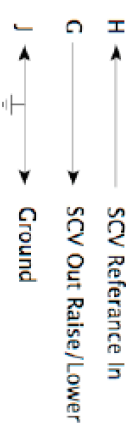
Proportional Voltage PVE: (Danfoss)



Selective Control Valve:  
**SCV**



Tractor





---

## **3. Warranty**

### **Eterra Limited Product Warranty**

If you find physical defects in the materials or the workmanship used in making the product described in this document, Skid Steer Solutions, Inc. will repair, or at its option, replace, the product at no charge to you, provided you return it (freight prepaid, with proof of your purchase from the original reseller) during the 1 Year period after the date of your original purchase of the product.

### **Eterra RMA Replacement Product Warranty**

If you find physical defects in the materials or the workmanship used in the refurbishment of an RMA product replacement, we will repair, or at our option replace, the product at no charge to you for a period of 90-days from the date the RMA was created, or until the end of your original warranty period (whichever is greater).

### **Eterra Refurbished Product Warranty**

If you find physical defects in the materials or the workmanship used in a product sold as a refurbished unit, we will repair, or at our option replace, the product at no charge to you for a period of 90-days from the date of purchase.

ETERRA WARRANTS THAT THE EQUIPMENT DELIVERED BY SELLER WILL BE OF THE KIND AND QUALITY DESCRIBED IN THE ORDER OR CONTRACT AND WILL BE FREE FROM DEFECTS IN WORKMANSHIP OR MATERIAL. SHOULD ANY FAILURE TO CONFORM WITH THIS WARRANTY OCCUR, AND THE BUYER HAVING GIVEN WRITTEN NOTICE TO SELLER WITHIN 180 DAYS FROM THE DATE OF SHIPPING, SELLER SHALL CORRECT SUCH NONCONFORMITY AT ITS OPTION BY EITHER REPAIRING THE DEFECTIVE PART OR PARTS OR MAKING AVAILABLE F.O.B. AT SELLERS LOCATION A REPAIR OR REPLACEMENT PART.

THIS WARRANTY IS IN LIEU OF ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. CORRECTION AND NONCONFORMITIES IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE, SHALL CONSTITUTE FULFILLMENT OF ALL LIABILITIES OF SELLER TO BUYER, WHETHER BASED ON CONTRACT, NEGLIGENCE OR OTHERWISE RESPECT TO OR ARISING OUT OF SUCH GOODS.

NEITHER PARTY SHALL BE LIABLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES. THE REMEDY SET FORTH IN THIS INSTRUMENT ARE EXCLUSIVE, AND THE LIABILITY OF SELLER WITH RESPECT TO ANY CONTRACT OR SALE OF ANYTHING DONE IN CONNECTION WITH THE SAME, WHETHER IN CONTRACT, IN TORT, UNDER WARRANTY, OR OTHERWISE, SHALL NOT EXCEED THE PRICE OF THE GOODS OR PART UPON WHICH SUCH LIABILITY IS ALLEGEDLY BASED

All exclusions and limitations of this warranty are made only to the extent permitted by applicable law and shall be of no effect to the extent in conflict with the express requirements of applicable law.