Storm Guard

Component Technology
A DIVISION OF
Certified Power Inc.

GL-400

Installation and Operation Manual

"Starting a Revolution"

SG07230001
Revision B
Revised 02/23/11

Table of Contents

INTRODUCTION

The **STORMGUARD** GL-400 is the one control that does it all! Whether it's granular, liquid, or both you can rely on the GL-400to assist in all aspects of your business including management, operators, and maintenance technicians. You get accurate control of granular and liquid materials as well as measurement and reporting capabilities. All of this in a competitively priced package. Your operators will appreciate the ease of control making long hours on the road safer and more productive. The "Windows" style menus for ease of calibration and self diagnostics will keep your technicians smiling. Another innovative solution from StormGuard, the leader in Snow & Ice control equipment.

Read this manual completely before operating the spreader control system. The accuracy of the material application rates is only as good as the accuracy of the system calibration and the proper selection of hydraulic components. Once calibrated, experience and weather conditions should be used to get the best performance and material savings.

To order additional manuals, contact your nearest dealer or sales representative, or call 1-888-905-7411.

SG0102000501 CD Rom Manual
SG0102000601 Printed Manual

GLOSSARY OF TERMS

AMOUNT DUMPED: The weight of the material dumped during calibration of the feeder drive "measured dump."

ANNUAL DATA: Values being accumulated in the controller's memory such as pounds, miles, pounds per mile average, percentage of time in auto-mode, gallons, miles w/liquid, miles per hour average speed and maximum speed. **Note:** "Annual" is a period defined by the user, as any length of time.

AUTOMATIC MODE: The controller's ability to adjust application rate of the conveyor or auger speed to vehicle speed.

BLAST: The controller's ability to override the current application rate to a predetermined rate for timed durations.

BLAST TIMER: The interval of time the blast will remain on after the BLAST button has been pushed and then released.

CALIBRATE: To check, adjust or determine by comparison, information that can be used by the controller.

CLEAR: To rid the controller's memory of spreading data.

CONTROL VALUES: Values defined during the calibration process during open/closed loop operation. **Example:** lbs per min, lbs per pulse.

DATA: Information being accumulated in the controller's memory such as pounds, miles, pounds per mile average, percentage of time in auto-mode, gallons, miles w/liquid, miles per hour average speed and maximum speed.

DISPLAY: An alphanumeric dot matrix screen, where operation and calibration information is displayed.

EQUIPMENT: Hardware that the GL-400 will be receiving information from, such as speed sensors, auger sensors, liquid sensors, or hardware the GL-400 will be controlling such as hydraulic valves and prewet control.

FREQUENCY: The control signal to the valve. Most 12 VDC proportional valves operate at a frequency that is hertz. The number of repetitions of the cycle occurring each second is defined as the frequency, which is expressed in HERTZ (Hz).

GATE CONTROL: The controller's ability to match the height of the material spreader gate opening set by the operator to make the rate selected accurate.

GATE SETTING: The numeric reference of the gate's position.

INPUT SELECT: Menu choice for either the skip feature or a remotely mounted blast button feature.

LANE CONTROL: Controls the output of the spinning disk mechanism that distributes the material onto the roadway.

LANE REFERENCE: The hydraulic motor speed that represents one lane.

LCD CONTRAST: The difference in brightness between the light and dark areas of the display, changing the contrast may affect the viewing angle of the display.

MANUAL MODE: The controller's ability to bypass the use of a self-correcting control system that employs feedback, allowing the operator to manually regulate the conveyor or auger speed and spinner speed.

GLOSSARY OF TERMS (cont.)

MATCH ADJUST: The term used while matching the vehicles speed to the controller during the calibration process.

MAXIMUM HEIGHT: The maximum height at which the hopper gate will be set to.

MAXIMUM RATE: The maximum amount of material the operator can select for dispensing in the automatic mode per single lane mile.

MAXIMUM TRIM: Adjusting the GL-400 output to achieve the maximum RPM of the hydraulic motors.

MEASURED DUMP: Requested during feeder calibration; This is how much material is dumped off during calibration.

MENU: A list, displaying calibration options.

MINIMUM TRIM: Adjusting the GL-400 output to achieve the minimum RPM of the hydraulic motors. The value or minimum at which the hydraulic motor will run in the automatic mode.

MODE: A manner, way, or method of operating the controller.

OTHER: User selected rate for blast setup.

PWM: Pulse width modulation. The frequency of a solenoid coil as determined by the valve manufacturer.

RATE CONTROL: The knob used for controlling the output of either a conveyor or auger mechanism.

RECENT DATA: Values derived from (CURRENT STORM) stored information such as pounds, miles, pounds per mile average, percentage of time in auto-mode, gallons, miles w/liquid, miles per hour average speed and maximum speed.

SENSITIVITY: Used in speed adjust when CT-VRM is selected in the equipment setup. To receive a better response from the vehicle speed signal.

SKIP SPREADING: The controller's ability to skip spread areas of the roadway. The application rate is evenly distributed to equal on and off time intervals. Standard part of the GL-400 using the yellow wire (PO-1 port/PIN 12) going to an ON/OFF switch to ground.

SPEED INPUT STYLE: References the type of signal the transmitter on the transmission sends out. **Example:** electronic, low voltage (MD style ALLISON) or rotary mechanical.

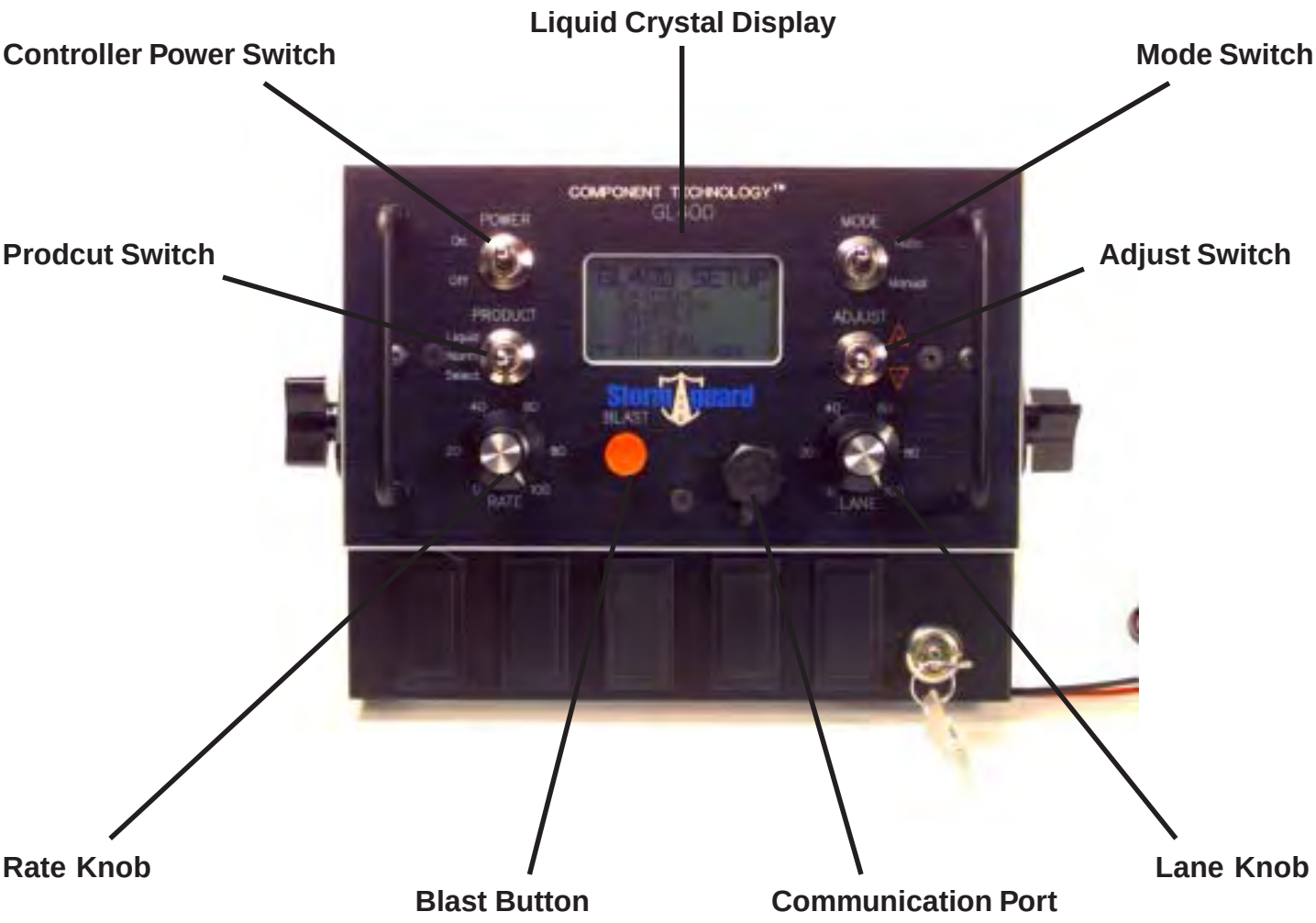
SPOT SPREADING: The operator is choosing to spread material only where he/she feels it is required. **Example:** Trouble spots, standard part of the GL-400 using the orange wire (PO-1 port/PIN 5) going to an ON/OFF switch to ground.

START PERCENT: Quick start option for turning on the auger upon vehicle movement adjustable from 0 to 50% of maximum valve drive.

TWO-SPEED AXLE: The ability of the vehicles rear axle to change ratio to accommodate different pulling or speed conditions. A 2 speed axle will change the MPH readout based on the ratio entered in equipment setup.

WEIGHT RATIO: Comparing the weight of different materials. **Example:** Sand to salt, the weight difference would be the ratio.

CONTROLLER DESCRIPTION



CONTROLLER DESCRIPTION (cont)

CONTROLLER POWER SWITCH
Used to turn on power to the Controller, valve coils and sensors.

LIQUID CRYSTAL DISPLAY
Shows setup and operating information; error messages.

MODE SWITCH
AUTOMATIC – GL-400 compensates for vehicle speed to dispense a preset amount of material.
MANUAL – Operator determines amount of dispensed material, regardless of speed. Also used for unloading when vehicle is stopped.

ADJUST SWITCH
Used to select different material and liquid options, and during the GL-400 setup procedure.

If the GL-400 is configured for gate control, SWITCH changes the height of material spreader gate opening on the display to maintain proper calibration values, if spreader gate is changed manually by the operator.

LANE KNOB
Used to control the distance that material is thrown over the roadway surface. If GL-400 is configured for a closed loop spinner, the distance can be maintained by a sensor.

COMMUNICATION PORT
Connection for portable printer, DATAGUARD software program, or GPS interface. Standard RS-232 Protocal.

BLAST BUTTON
Used to put more material on the road surface. Adjustable duration from 0-30 seconds. May be used in either automatic or manual mode. Used to save values changed in the setup mode.

RATE KNOB
Increases/Decreases the application rate of the GL-400 in either the automatic or manual mode. If the GL-400 is configured for closed loop operation, a sensor is attached to the hydraulic motor monitoring shaft speed.

PRODUCT SWITCH
Used to turn on liquid and to select different material and liquid options. Used to select menu items in GL-400 setup. Used in conjunction with the RATE knob to adjust liquid prewet rate.

CALIBRATION OR AUXILIARY CABLE CONNECTOR
SG07050057 or other cable options.

MAIN CABLE CONNECTOR
SG07050284

INSTALLATION INSTRUCTIONS

(stand alone for GL-400 without a council)

STORMGUARD GL-400 spreader control systems are designed to install in all types of vehicles.
NOTE: Installation instructions are intended for GL-400 controls not included in a StormGuard Council.
When mounting the GL-400 spreader control, make sure the installation:

1. Will not interfere with existing vehicle controls.
2. Will not obstruct operator visibility.
3. Allows the operator easy visibility, access and use.

   Ease of use should be made a high priority. The number of hours spent in a vehicle during and after a storm can be made more tolerable and productive when the operator is involved in determining the placement of the spreader control.

The GL-400 and/or console should be mounted in cab to allow easy viewing of the screen by the operator. **NOTE:** It is not recommended to mount the GL-400 console on the floor of the cab between the seats.

Connecting the GL-400 RFI Strap

Remove one of the three socket head screws from the back cover.

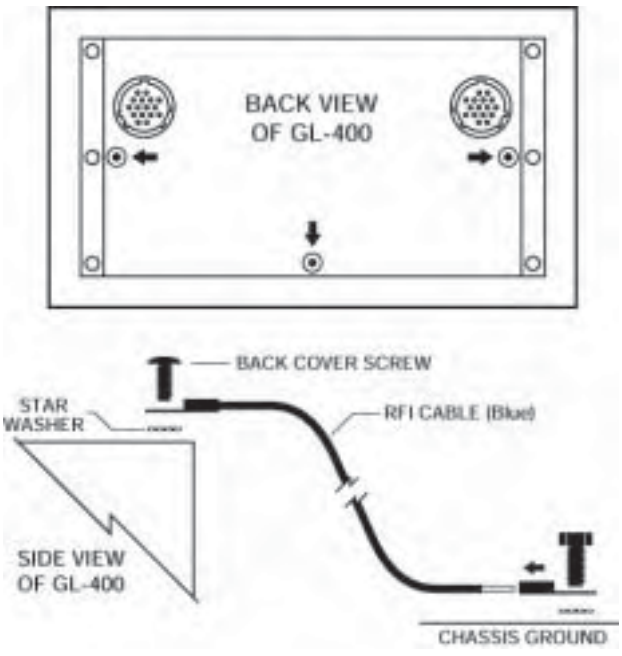
Choose the one that will allow the most convenient routing of the RFI cable.

Remove the paint from under the screw that holds down the sheet metal back cover. This will allow for a proper chassis "ground" connection.

Slip the lug from the RFI wire onto the removed screw.

Slip the star washer onto the screw.

Reinstall the screw into the GL-400 back cover. Find the closest acceptable chassis ground to attach the other end of the RFI cable assembly. **NOTE:** If GL-400 is included in a StormGuard council, the RFI strap is already installed.



INSTALLATION INSTRUCTIONS (cont)

Connecting the Primary Wiring Harness

The SG07050284 main cable assembly is used to supply input power, valve drive and sensor inputs. Use care when installing. When exiting the cab, try to use existing firewall or floor openings. If new holes need to be made, protective bushings should be installed to prevent wire abrasion. Avoid routing the cable next to heat sources, pinch points and sharp edges. Secure cables with cable clamps or wire ties as often as possible. Snow and ice can put undo strain on any cable that may have excessive slack. Use dielectric grease when making all electric plug-ins. Splice-type connections should be soldered and protected with heat shrink – **DO NOT** use "scotch loc" style connectors. Connect the black wires direct to battery ground. Connect the red wires to a good 12V source, either direct to the battery or to the fuse panel. The two red wires can be connected together for installation if a single 8 amp fast blow fuse is used. If you have a 2-speed axle, connect the white wire to the energized side of the 2-speed switch.

Make sure power to the GL-400 is off at this point or leave it unconnected from the controller. Find the yellow and blue colored plug-in valve connections. Attach the yellow 2-pin plug to the spinner valve and attach the blue 2-pin plug to the feeder valve. **Use dielectric grease when making the connection.**

Make your connection to the transmission:

If your vehicle is equipped with a computerized "world style" Allison, seek advise from the chassis manufacturer on where the connection should be made. Do not make any splices between the transmission and Vehicle Interface Module. This can damage the vehicle's computer.

Using the CT-VRM-1 (red band) adapter, connect the clear or white lead to the pulse or signal output, and the black lead to ground.

Plug the 3-pin (red band) to the mating 3-pin (red band) on the main cable assembly. **Use dielectric grease on the connection.**

ATTENTION: MOST CHASSIS MANUFACTURES NOW SUPPLY AN AUXILIARY SPEED OUTPUT SIGNAL. ALL SPEED INPUT CONNECTIONS SHOULD BE CONNECTED TO THE OEM AUXILIARY SPEED OUTPUT SIGNAL.

INSTALLATION (cont.)

VRM-style speedometer – Make your connection in the cab if possible.

Connect to the pulse and ground leads on the back of the speedometer. If this is not possible, refer to the chassis manufacturer's wiring guide.

Make a solder and heat shrink splice type connection using the CT-VRM-1 (red band) adapter.

Connect the clear or white lead to the pulse side and the black lead to the ground side.

Plug the 3-pin (red band) to the mating 3-pin (red band) on the main cable assembly. **Use dielectric grease on the connection.**

Mechanical-style speedometer – Unfasten the sensor from the back of the transmission speedometer cable.

Install in-line sensor. Make sure the drive keys are the same. If not, contact your local STORMGUARD dealer for help.

Reinstall the factory sensor.

Plug the 3-pin (red band) to the mating 3-pin (red band) on the main cable assembly. **Use dielectric grease on the connection.**

Feeder sensor – Attach to the fastest rotating shaft on the spreader, if using a shaft mounted sensor. The sensor needs to be mounted "free floating", if using a shaft mounted sensor.

Use an anti-seizing grease on all set screws and shaft ends prior to installation.

Slide the adapter onto the thru shaft of the gear box and secure it.

Attach the sensor to the adapter. To allow the sensor to "free float," simply wire tie the cable to part of the spreader.

Plug the sensor cable into the auger sensor connection on the main cable marked with the white band.

You may have a hydraulic motor with a built-in speed sensor. If so, let your STORMGUARD dealer know and they can arrange to have the proper adapter cable made for your application.

Remote Spot Spread Switch – Locate orange wire in primary harness, SG07050284.
Connect orange wire to one side of single pole throw ON/OFF Maintain Switch.

Connect other side of switch to proper ground terminal.

Remote Blast/Skip Switch – Locate yellow wire in primary harness, SG07050284.
"Blast" – Connect yellow wire to one side of single pole throw (ON/OFF) Momentary Switch.

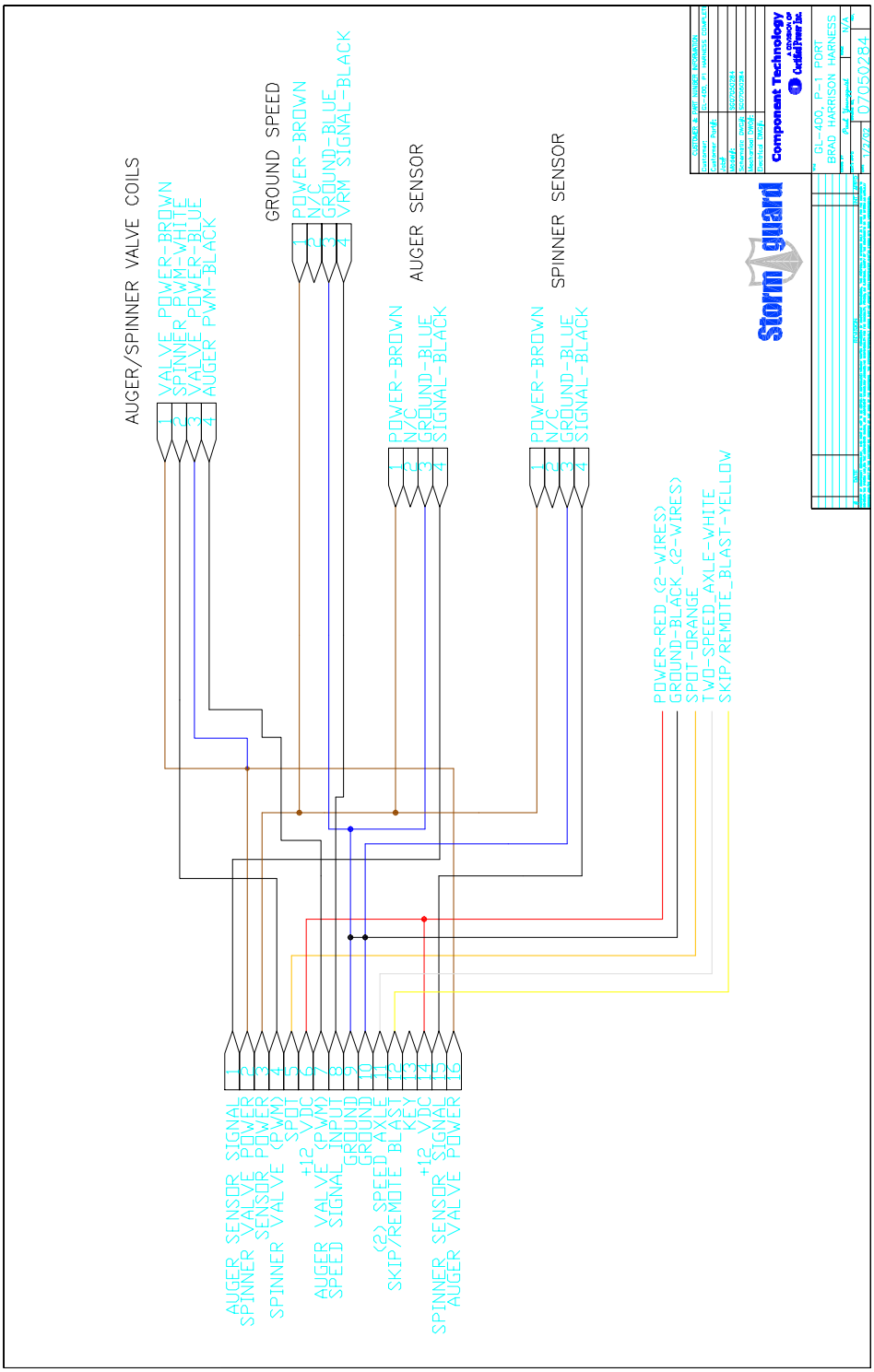
Connect other side of switch to proper ground terminal.

"Skip" – Connect yellow wire to one side of single pole throw (ON/OFF) Maintain Switch.

Connect other side of switch to proper ground terminal.

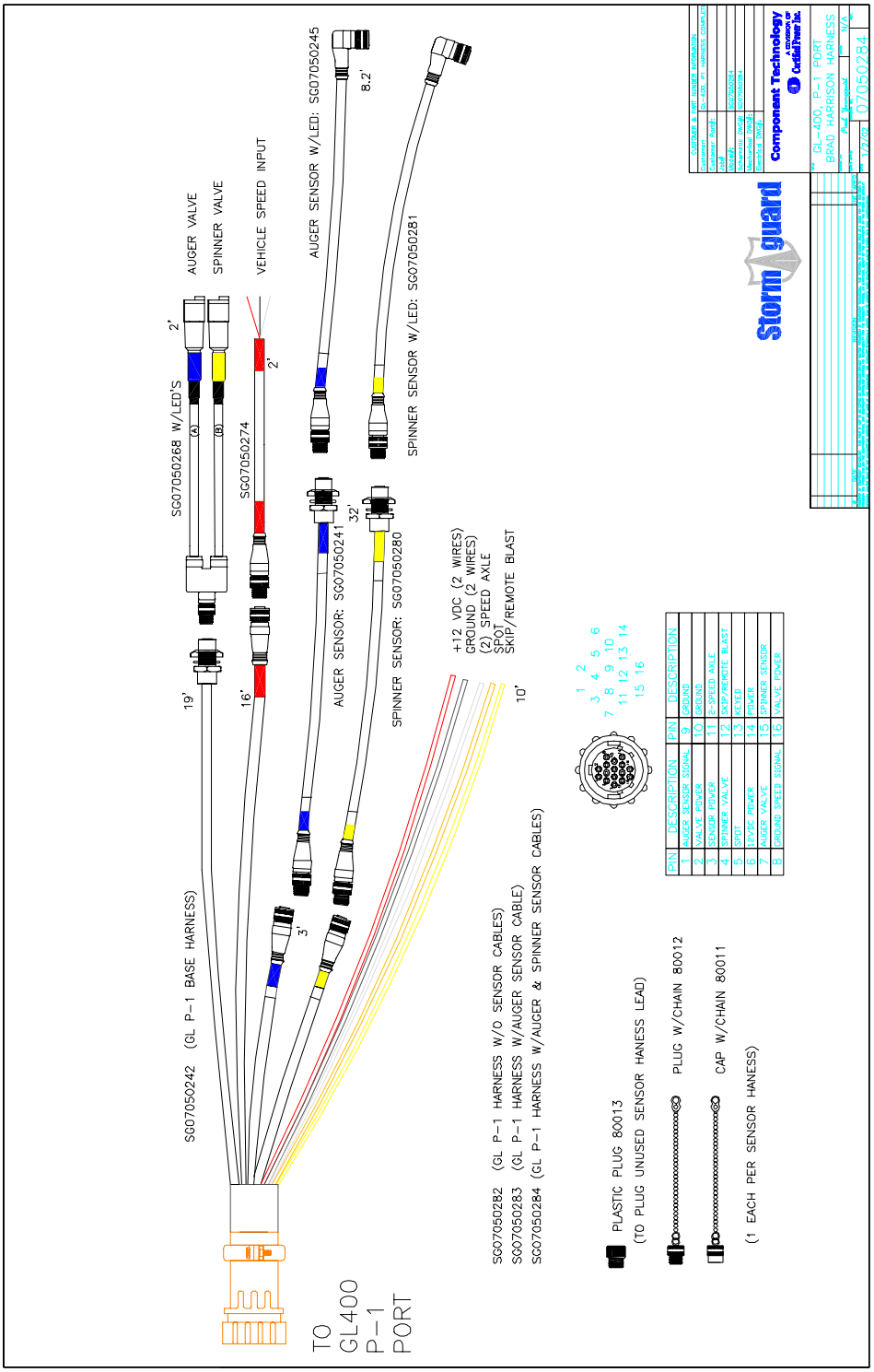
INSTALLATION (cont.)

SG07050284 Main Wiring Schematic



INSTALLATION (cont.)

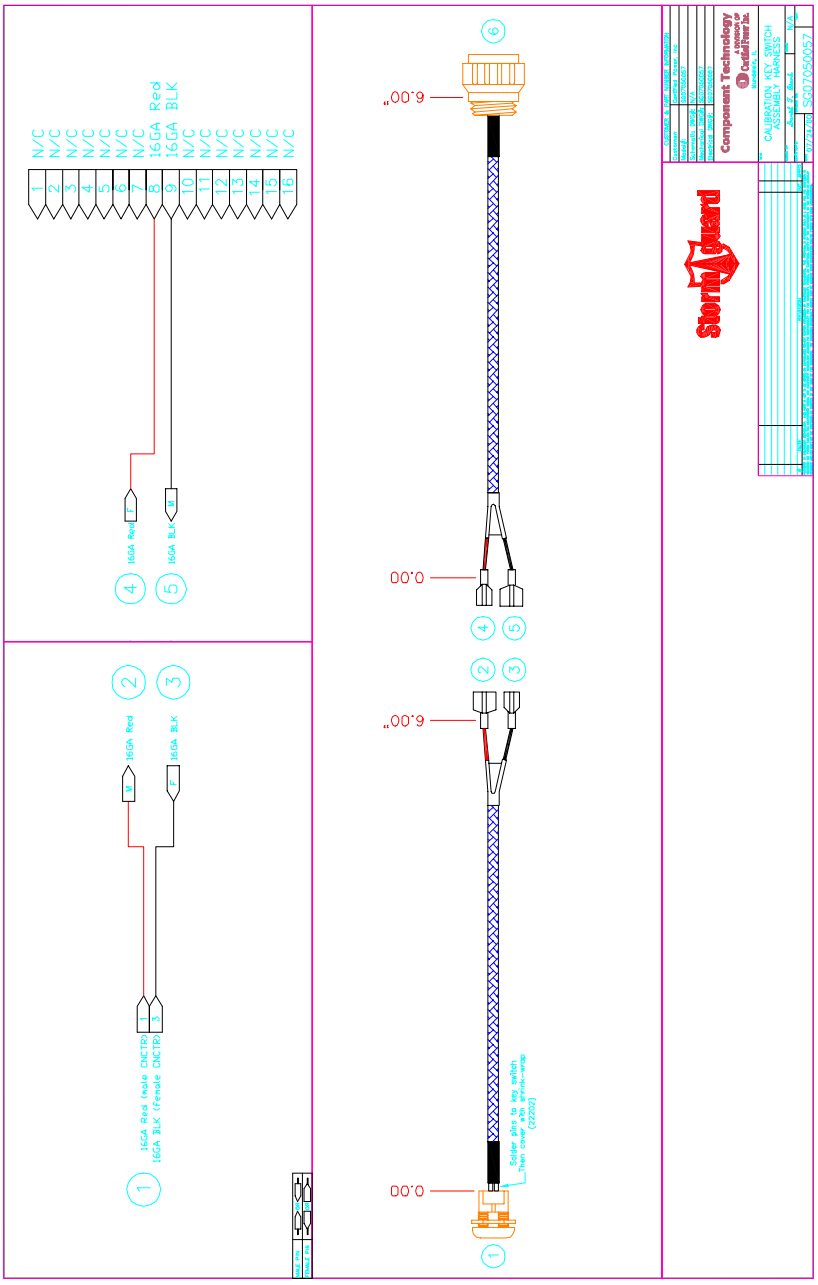
SG07050284 Main Wiring Harness



INSTALLATION (cont.)

SG07050057 Calibration Switch and Cable Assembly

The SG07050057 cable assembly is used in place of the GL-CA-16-J2 when no optional features are being supplied. It is mounted directly to the Standard GL-400 bracket in the lower right hand corner, or is preinstalled on any of our STORMGUARD consoles, and plugs into the P2 connector on the back of the GL-400 controller.

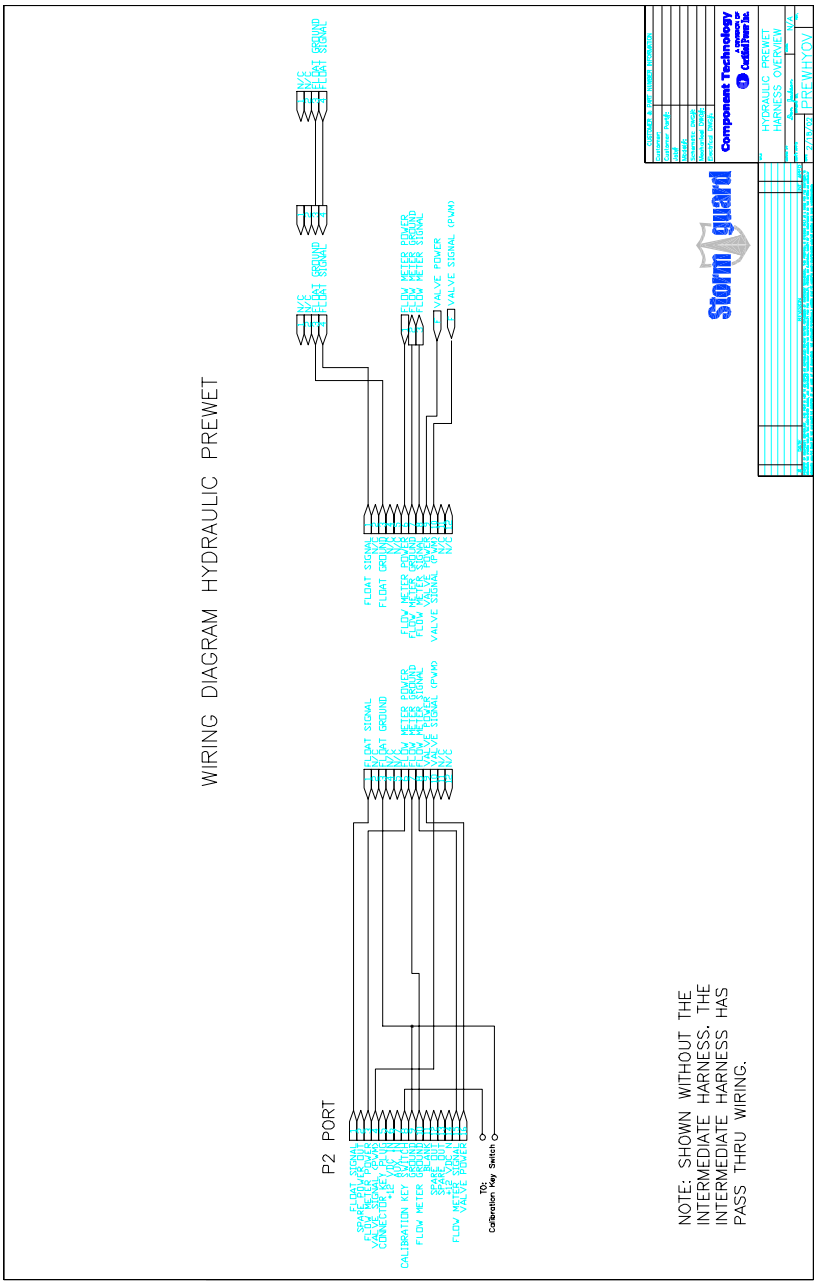


INSTALLATION (cont.)

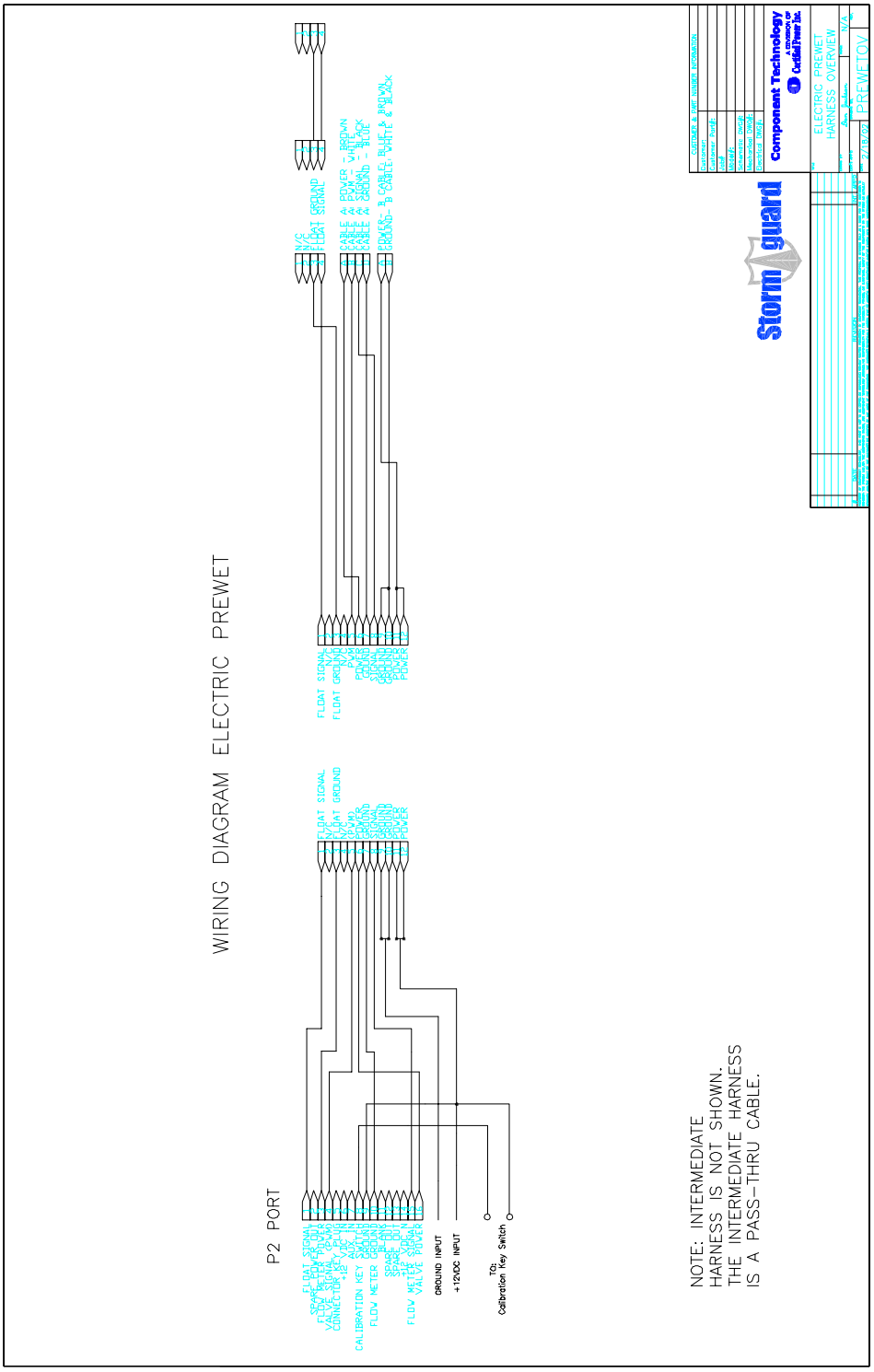
P/N Accessory Wiring Harness

The P/N cable assembly plugs into the P2 connector on the back of the GL-400 controller. It is used for supplying input power, optional features and the calibration inhibit key assembly. Care should be taken when installing. Avoid routing the cable next to heat sources, pinch points and sharp edges. Secure cables with cable clamps or wire ties as often as possible. Snow and ice can put undo strain on any cable that may have excessive slack. **Use dielectric grease when making all electric plug-ins.** Splice-type connections should be soldered and protected with heat shrink – **DO NOT** use "scotch loc" style connectors.

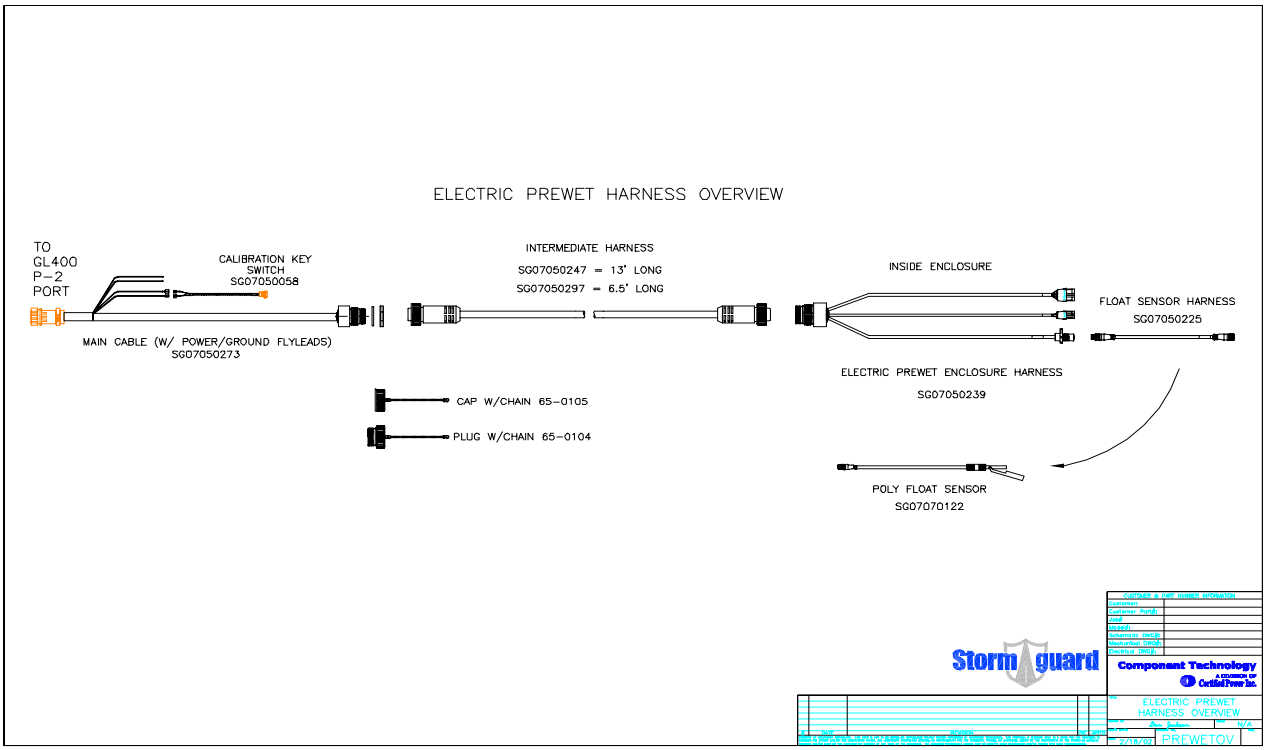
If no accessory is chosen, it will only be the calibration key switch as shown on the previous page.

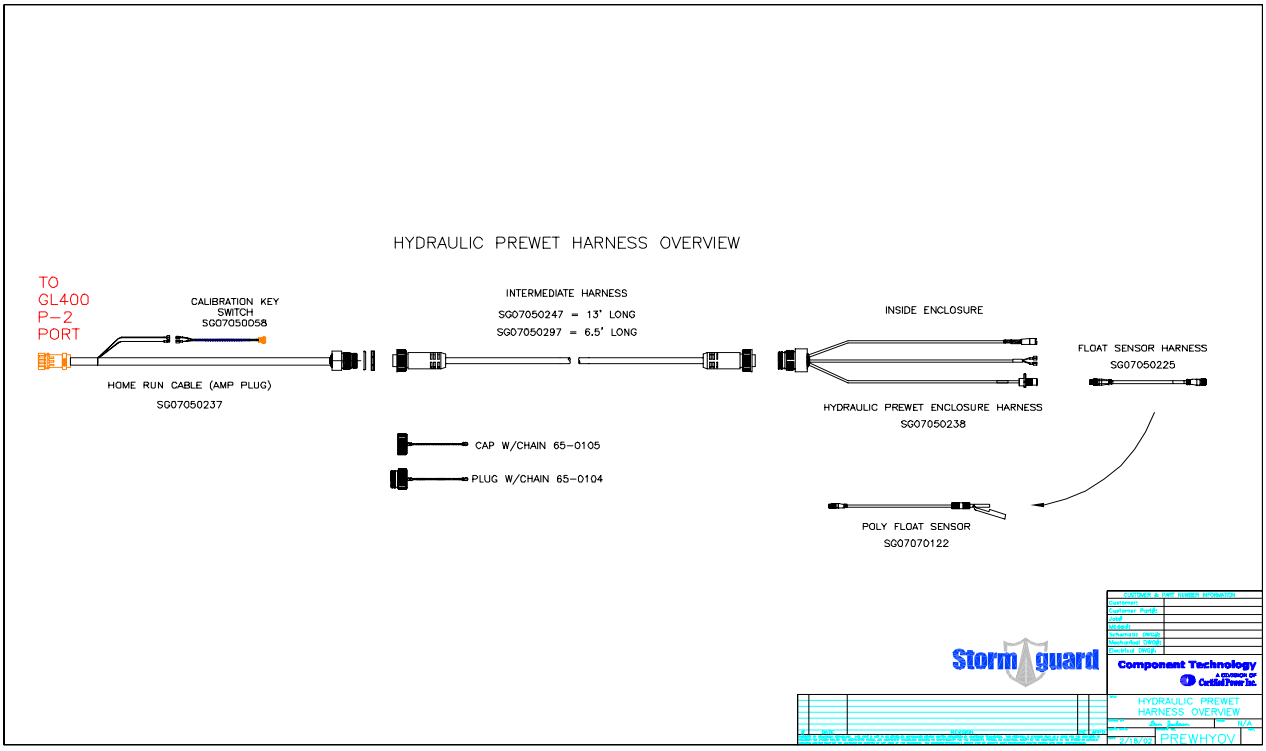


INSTALLATION (cont.)



INSTALLATION (cont.)





POT CALIBRATION

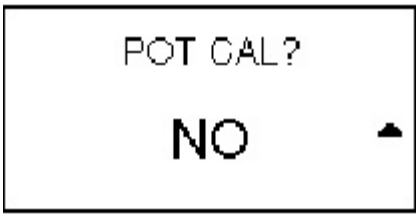
To Access Pot Calibration

THE CALIBRATION KEY IS NOT REQUIRED
FOR THIS PROCEDURE

Simultaneously –

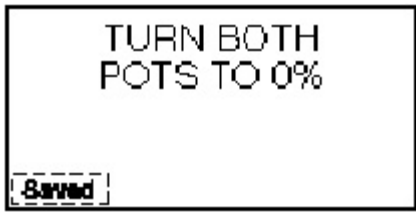
- Hold the Product Type switch down (select)
- Hold Adjust switch up (+)
- Press and hold the Blast button
- Toggle Power switch to On
- Release all switches, leaving power on.
- First display will appear as shown. Do Not change.

Toggle Product Type switch to Select. Display will show:



Toggle Adjust switch up (+). Display will show:

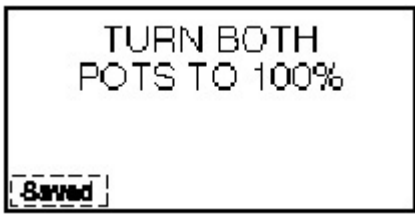
Toggle Product Type switch to Select. Display will show:



Turn the Feed Rate and Lane Width knobs to "0" and press Blast button to save.

POT CALIBRATION (cont)

Toggle Product Type switch to Select. Display will show:



Turn the Feed Rate and Lane Width knobs to "100" and press Blast button to save.

Toggle Product Type switch to Select. Display will show:

Toggle Adjust switch up (+). Display will show:

Toggle Product Type switch to Select.

Pot calibration procedure is complete. Turn off the power switch on the controller and continue with the rest of the setup instructions.

SETUP INSTRUCTIONS

ATTENTION: ALL SETUP SUB-MENU STEPS MUST BE COMPLETED FOR PROPER OPERATION OF THE GL-400.

TO ENSURE PROPER OPERATION USER MUST VERIFY ACCURACY OF ENTERED INFORMATION.

Gaining Entry to the GL-400 Setup Menu

1. Insert the calibration key into the calibration switch (lower right hand corner of mounting bracket). Rotate the key 1/4 turn clockwise.
2. Turn ON the power switch (upper left hand corner of controller).
3. The GL-400 SETUP menu will appear on the controller display.

SETUP INSTRUCTIONS (cont)

Selecting, Adjusting & Saving Sub-menu Items

The **+/- ADJUST** switch controls the line indicator arrow that appears along the right side of the display. Toggling this switch up or down will move the line indicator in the corresponding direction. Note that the indicator shows which way the switch can be toggled to make additional choices – "▼", "▲▼", "▲" .

When you have positioned the line indicator on the desired menu item, toggle the **PRODUCT TYPE** switch to the SELECT position. This will bring up a related sub-menu. The sub-menus present variables that must be set for proper controller operation.

When a specific sub-menu item has been selected, the **+/- ADJUST** switch is used to choose between different options, to increase or decrease a number, or to enter words. After entering the correct information, press the **BLAST** button. This records your selection and the word "**Saved**" will appear in the lower left corner of the display.

Once an item is saved, use the SELECT switch to move back to the previous screen.

GL-400 SETUP MENUS

Setup Procedure

Setup menus can be selected in any order. However, when the GL-400 is setup for the first time, you must start by entering the required information for the EQUIPMENT menu.

Main Menu

Sub-Menus

NOTE: In any menu screen where "Page 1" appears at the bottom, use the +/- adjust switch down to proceed to page 2.

GL-400 SETUP MENUS (cont)

Sub-Menus (cont)

EQUIPMENT SUB-MENU

IMPORTANT!
Settings shown are examples only.
Adjust as needed for actual installation.

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the VALVE FREQUENCY line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Use +/– **ADJUST** switch to increase or decrease number and enter frequency (frq) provided by valve manufacturer.

Press **BLAST** button to save number.

Toggle the **PRODUCT TYPE** switch down to SELECT to proceed to OPEN REFERENCE settings (not available on earlier GL-400 versions)

Recommended method of adjustment is disconnecting the valve coil and use the +/– **ADJUST** switch to increase or decrease number until displayed message "Feeder Valve Open" or "Spinner Valve Open" appears in the operating mode.

This will require the technician to go back and forth in the operating and setup modes until set properly.

Toggle **PRODUCT TYPE** switch down to SELECT to return to EQUIPMENT menu.

Example: Rexroth valve frequency is set at 180.
Rexroth MP 18 Open Reference Valve is set at 2352.
Parker/Gresen model VQM valve frequency is set at 50.
Parker/Gresen model V20 is set at _____.

EQUIPMENT SUB-MENU (cont)

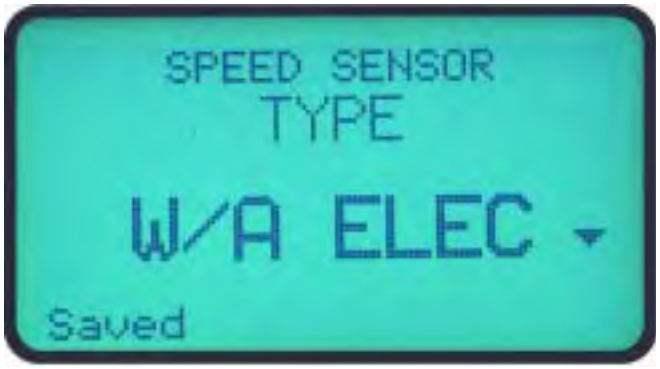
Use the +/– **ADJUST** switch to position the arrow (▼▲) on the SPEED INPUT TYPE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Use +/– **ADJUST** switch to select type of sensor installed – W/A Electric, CTI Mechanical or CTI VRM.

Press **BLAST** button to save selection.

Toggle **PRODUCT TYPE** switch down to SELECT to return to EQUIPMENT menu.

Note: When using auxiliary speed input supplied by chassis manufacture, select W/A Elec.



EQUIPMENT SUB-MENU (cont)

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the TWO-SPEED AXLE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Use +/– **ADJUST** switch to enter rear axle ratio.* (With no sensor, setting has no effect.) If truck does not have a 2-speed axle, the setting will be 1.00.

Press **BLAST** button to save ratio.

Toggle **PRODUCT TYPE** switch down to SELECT to return to EQUIPMENT menu.

* To use this step, vehicle must be equipped with a two-speed rear end, and white wire must be attached to gear ratio switch.

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the FEEDER CONTROL line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Is a sensor installed on the feeder conveyor or auger? Use +/– **ADJUST** switch to select YES or NO.

Press **BLAST** button to save selection.

Toggle **PRODUCT TYPE** switch down to SELECT to return to EQUIPMENT MENU.

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the SPINNER CONTROL line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Is a sensor installed on the spinner? Use +/– **ADJUST** switch to select YES or NO.

Press **BLAST** button to save selection.

Toggle **PRODUCT TYPE** switch down to SELECT to return to EQUIPMENT menu.

EQUIPMENT SUB-MENU (cont)

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the GATE CONTROL line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Use +/– **ADJUST** switch to select YES or NO.

Press **BLAST** button to save selection.

Toggle **PRODUCT TYPE** switch down to SELECT to return to EQUIPMENT menu.

Refer to Glossary for Gate Control definition.

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the LIQUID CONTROL line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Use +/– **ADJUST** switch to chose between ELEC PROP, HYDRAULIC, or ON/OFF.

Press **BLAST** button to save setting.

Toggle **PRODUCT TYPE** switch down to SELECT to return to EQUIPMENT menu.

Return to MAIN SETUP MENU

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the SETUP MENU line. Toggle **PRODUCT TYPE** switch down to SELECT to return to main menu.

Turn the calibration key 1/4 turn counterclockwise. (Back to the locked position.)

CALIBRATION SUB-MENU

ATTENTION: IF YOU ARE COMING FROM ONE OF THE OTHER SETUP SUB-MENUS, SIMPLY CONTINUE WITH THE STEP BY STEP INSTRUCTIONS. IF YOU NEED TO ACCESS SYSTEM SETUP SPECIFICALLY TO DO CALIBRATION, FIRST FOLLOW THE PREPARATION AND ENTRY PROCEDURE DESCRIBED BELOW.

PREPARATION

- ✔ Material (i.e. sand, salt, etc.) will be needed for parts of the calibration procedure.
- ✔ Make sure your installer has connected the auger or conveyor electrical connection correctly. See wiring diagrams in the Installation section for comparison.
- ✔ Set the vehicle's parking brake, place the truck's transmission in neutral and block the vehicle to prevent it from rolling. Vent the vehicle's exhaust using your shop's ventilation system or properly vent the exhaust to the outside.
- ✔ Check placement of spinner deflection shields. Place them in their normal running position for your equipment.
- ✔ With the GL-400 OFF, start engine.
- ✔ Turn the GL-400 ON, select the manual mode and turn RATE and LANE knobs up to allow hydraulics to warm up.

Calibration Steps

IMPORTANT: Be sure to follow the calibration procedure that corresponds to your equipment configuration. Open loop feeders and spinners are ones which do not have a sensor installed on the feeder and spinner motors. Closed loop systems are equipped with sensors.

During the calibration process, it will be necessary to have your primary granular material available, and the ability to weigh the truck.

Load truck with your primary material for the following calibration steps. The load size should be at least 3/4 full.

NOTE: It is recommended to load the truck before doing the minimum and maximum trim settings to provide operating resistance against the hydraulic system.

CALIBRATION SUB-MENU (cont)

Calibrating an Open Loop Feeder

NOTE: For closed loop feeder, go to page 35, Calibrating a Closed Loop Feeder.

NOTE: When setting trims, truck is running with engine at 1200-1500 rpm.

Setting Minimum Trim

Use the +/– **ADJUST** switch to position the arrow (▼) on the FEEDER DRIVE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Use the +/– **ADJUST** switch to position the arrow (▼) on the MINIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up or down until the feeder motor just starts to turn. Once you have found the "sweet spot," allow the motor to run for approximately 30 seconds, then press the **BLAST** button. This saves the MINIMUM TRIM setting. The word **"Saved"** will also appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the FEEDER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating an Open Loop Feeder (cont)

Setting Maximum Trim

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the MAXIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up until the feeder motor reaches the maximum speed. **NOTE:** Once the hydraulic motor has reached its top speed. DO NOT adjust the maximum setting any higher. Use a hand-held tachometer to measure the motor shaft speed. (Our eyes, alone, typically cannot tell a difference in speeds that may vary by 50 rpm or more). Hold this speed for approximately 30 seconds, then press the **BLAST** button. This saves the MAXIMUM TRIM setting. The word **"Saved"** will also appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the FEEDER DRIVE menu.

Setting Start Percent

Toggle the +/– **ADJUST** switch to position the arrow (▼▲) to the START PERCENT line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Set START PERCENT to percentage of valve trim for a faster response when vehicle starts to move. This "Quick Start" option allows for a better response from the stopped position and is adjustable from 0-50% of valve trim. The standard or factory setting is 25%.

Press the **BLAST** button to save this value.

Toggle the **PRODUCT TYPE** switch to SELECT to return to the FEEDER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating an Open Loop Feeder (cont)

Load Your Truck With Material

(If not done previously.)
We recommend 3/4 load minimum.

Remember these things:

- If it is a V-box spreader what was the gate height?
- What material did you use?
- Weigh your **loaded** truck and **record the weight**.

Performing Measured Dump

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the MEASURED DUMP line. Toggle the **PRODUCT TYPE** switch down to.

STEP ONE:

Increase engine speed to around 1200-1500 rpm. You will see the word STOP on the display.

Toggle the +/– **ADJUST** switch up. The display should now show RUN ▼, turn the **RATE** knob to 80-100%. You should hear the engine load up and see seconds counting upward in the lower right corner of the display.

Run your dump for a minimum 300 seconds, going as long as 450 seconds. The longer the measured dump is run the more accurate it is.

When the dump is completed, depress the +/– **ADJUST** switch. The display will now show STOP ▲.

At this time you should write down the seconds that the measured dump was run for.

CALIBRATION SUB-MENU (cont)

Calibrating an Open Loop Feeder (cont)

Performing Measured Dump (cont)

STEP TWO:

Re-weigh the vehicle and record the weight. Toggle the **PRODUCT TYPE** switch down to SELECT. The next screen is the AMOUNT DUMPED menu.

When going back to re-weigh the vehicle, **DO NOT** turn the GL-400 or the truck OFF or calibration settings will be lost. The same operator should be in the truck the second time also.

Use the +/– **ADJUST** switch to enter the measured weight difference.

EXAMPLE: Loaded vehicle weight 30,400 pounds — re-weighed vehicle weight 29,910 pounds = 490 pounds dumped.

Press the **BLAST** button to save the entered amount. The word **"Saved"** will appear on the display, confirming the calibration. **NOTE:** In the lower right corner you will see the pounds per minute.

NOTE: Writing down the time (in seconds) from the bottom right hand corner is done in case the operator accidentally turns the power OFF on the GL-400. Then he will have to do the calculation himself and enter it in the CONTROL VALUES menu under POUNDS PER MINUTES.

EXAMPLE: Measured dump had 450 seconds, it dumped 2750 pounds, divide 2750 by minutes ran (450 divided by 60 equals 7.5 minutes), and enter the results in the GL-400, the result is 366 pounds per minute.

Toggle the **PRODUCT TYPE** switch to SELECT. This will take you back to the FEEDER DRIVE menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATION MENU line. Toggle the **PRODUCT TYPE** switch to SELECT. This will take you back to the CALIBRATION menu.

CALIBRATION SUB-MENU (cont)

Calibrating an Closed Loop Feeder

Setting Minimum Trim

Use the +/– **ADJUST** switch to position the arrow (▼) on the FEEDER DRIVE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

NOTE: When setting trims, truck is running with engine at 1200-1500 rpm.

Use the +/– **ADJUST** switch to position the arrow (▼) on the MINIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up or down until the feeder motor just starts to turn. You will see a number in the lower right corner of the display. This is a measurement of the pulses per minute (PPM). When doing the minimum trim, this number will be approximately 100 to 600. Once you have found the "sweet spot," allow the motor to run for approximately 30 seconds, then press the **BLAST** button. This saves the MINIMUM TRIM setting. The word **"Saved"** will also appear on the display, confirming the calibration. **DO NOT** set minimum trim so the auger is stopped.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the FEEDER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating an Closed Loop Feeder (cont)

Setting Maximum Trim

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the MAXIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up until the feeder motor reaches the maximum speed. The number in the lower right corner of the display is a measurement of the pulses per minute (PPM) received from the feeder motor. When the number stops increasing, you have reached the top speed of the feeder motor. Hold this speed for approximately 30 seconds, then press the **BLAST** button. This saves the MAXIMUM TRIM setting. The word **"Saved"** will also appear on the display, confirming the calibration.

Using the pulse counter, adjust maximum trim until pulses no longer increase.

Adjust Maximum trim down until pulses begin to drop, then adjust back up to value where pulses did not increase. DO NOT adjust above this value.

NOTE: under normal conditions, if engine rpm fluctuates, pulses per minute will flucutate.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the FEEDER DRIVE menu.

Setting Start Percent

Toggle the +/– **ADJUST** switch to position the arrow (▼▲) on the START PERCENT line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Set START PERCENT to percentage of valve trim for a faster response when vehicle starts to move. This "Quick Start" option allows for a better response from the stopped position and is adjustable from 5-50% of valve trim. The standard or factory setting is 25%.

Press the **BLAST** button to save this value.

Toggle the **PRODUCT TYPE** switch to SELECT to return to the FEEDER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating an Closed Loop Feeder (cont)

Load Your Truck With Material
(If not done previously.)
We recommend 3/4 load minimum.

Remember these things:
• If it is a V-box spreader what was the gate height?
• What material did you use?
• Weigh your **loaded** truck and **record the weight**.

Setting Measured Dump

Use the +/– **ADJUST** switch to position the arrow (▼▲) on the MEASURED DUMP line. Toggle the **PRODUCT TYPE** switch down to SELECT.

STEP ONE:
Increase engine speed to 1200-1500 rpm.

You will see the word STOP on the display. Toggle the +/– **ADJUST** switch up. The display should now show RUN, turn the **RATE** knob to 80-100%. You should hear the engine load up and see pulses counting upward in the lower right corner of the display. If they are not, use the +/– **ADJUST** switch down to stop measured dump (refer to Troubleshooting section).
STOP: Measured dump cannot be completed if pulses are not present.

Run your dump for 75,000 to 100,000 pulses. The longer you run the dump the more accurate your average will be. When the dump is completed, depress the +/– **ADJUST** switch. The display will now show STOP, turning the auger OFF.

Calibration Tip: When performing measured dump, turn on spinner so material does not accumulate under feeder.

Be sure to write down the number of pulses recorded in the bottom, right hand corner.

CALIBRATION SUB-MENU (cont)

Calibrating an ClosedLoop Feeder (cont)

STEP TWO:

Re-weigh the vehicle and record the weight. Toggle the **PRODUCT TYPE** switch down to SELECT. The next screen is the AMOUNT DUMPED menu.

When going back to re-weigh the vehicle, **DO NOT** turn the GL-400 or the truck OFF or calibration settings will be lost. The same operator should be in the truck the second time also.

Use the +/– **ADJUST** switch to enter the measured weight difference.

EXAMPLE: Loaded vehicle weight 30,400 pounds — re-weighed vehicle weight 26,200 pounds = 4200 pounds dumped.

Press the **BLAST** button to save the entered amount. The word **"Saved"** will appear on the display, confirming the calibration. **NOTE:** In the lower right corner you will see the pounds per pulse dumped.

NOTE: Writing down the total pulses from the bottom right hand corner of the measured dump run screen (for example 145,000 pulses) is done in case the operator accidentally turns the power OFF on the GL-400. Then he will have to do the calculation himself and enter it in the CONTROL VALUES menu under POUNDS PER PULSE.

EXAMPLE: If 4200 is amount dumped, divided by total pulses, 145,000 = .028.

Toggle the **PRODUCT TYPE** switch to SELECT. This will take you back to the FEEDER DRIVE menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CONTROL VALUES menu line. Toggle the **PRODUCT TYPE** switch down to SELECT.

CALIBRATION SUB-MENU (cont)

Setting Control Values

NOTE: These values are automatically set when a measured dump and maximum trim are performed and does not need to be entered manually.

Use key switch to access the GL-400 Setup. Use +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATION line.

Toggle the **PRODUCT TYPE** switch to SELECT. This will open the CALIBRATION menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the FEEDER DRIVE line. Toggle the **PRODUCT TYPE** switch to down SELECT to open the FEEDER DRIVE.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on CONTROL VALUES.

This display will now show Feeder Drive LBS/PULSE with a number value displayed. Use the +/– **ADJUST** switch to change this value to match the known value (The known value would be determined by performing a measured dump). Press the **BLAST** button to save.

NOTE: Toggle the **PRODUCT TYPE** switch down to SELECT to access the Feeder Drive Pulses/Minute. This value setting is determined by the maximum trim and does not need to be set. (**NOTE:** In closed loop operation there needs to be a value here for the GL-400 to work properly.)

Toggle the **PRODUCT TYPE** switch to SELECT to return to the FEEDER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating an Open Loop Spinner

NOTE: For closed Loop spinner go to page 42, Calibrating a Closed Spinner.

Setting Minimum Trim

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the SPINNER DRIVE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MINIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will select the minimum trim calibration.

Toggle the +/– **ADJUST** switch up or down until the spinner motor just starts to turn. Once you have found the "sweet spot," allow the motor to run for approximately 30 seconds. Press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch to SELECT. This will take you back to the SPINNER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating an Open Loop Spinner (cont)

Setting Maximum Trim

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MAXIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will select the maximum trim calibration.

Toggle the +/– **ADJUST** switch up or down until the spinner motor reaches the maximum lane coverage or lane width that you want. Do this by turning the RATE knob up to get a visual indication of how far the spinner actually throws the product. Allow the motor to run for approximately 30 seconds. Press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the SPINNER DRIVE menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATE MENU line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the CALIBRATION menu.

Note: If using a GL400-6, and you wish to calibrate an Open Loop Spinner with a lane reference, please proceed to the GL-400-6 Addendum on Page 92.

CALIBRATION SUB-MENU (cont)

Calibrating a Close Loop Spinner

Setting Minimum Trim

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the SPINNER DRIVE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MINIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will select the minimum trim calibration.

Toggle the +/– **ADJUST** switch up or down until the spinner motor just starts to turn. You will see a number in the lower right corner of the display. This is a measurement of the pulses per minute (PPM). When doing the minimum trim, this number will be between 100 and 200. Once you have found the "sweet spot," allow the motor to run for approximately 30 seconds, then press the **BLAST** button to save the setting. The word **"Saved"** will also appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the SPINNER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating a Close Loop Spinner (cont)

Setting Maximum Trim

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MAXIMUM TRIM line. Toggle the **PRODUCT TYPE** switch to SELECT. This will select the maximum trim calibration.

Toggle the +/– **ADJUST** switch up or down until the spinner motor reaches the maximum lane coverage or lane width that you want. At this time it will also show pulses per minute in the lower right hand corner. Allow the motor to run for approximately 30 seconds. Press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the SPINNER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating a Close Loop Spinner (cont)

Setting Lane Reference

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the LANE REFERENCE line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will select the LANE REFERENCE menu.

Rotate the LANE knob to a position where the spinner is covering a width equal to one lane, as defined by the user. Pulses per minute will be shown in the lower right hand corner of the screen. Turn the **RATE** knob up so material is falling on the spinner disk. Once you have this position set, press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration and the lane reference value will be displayed on the screen.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the SPINNER DRIVE menu.

CALIBRATION SUB-MENU (cont)

Calibrating a Close Loop Spinner (cont)

Setting Number of Lanes

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the NUMBER OF LANES line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will select the NUMBER OF LANES menu.

Toggle the +/– **ADJUST** switch up or down until the maximum number of lanes that you will be spreading is displayed. Press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the SPINNER DRIVE menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATE MENU line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the CALIBRATION menu.

NOTE: The lane reference value multiplied by the number of lanes CANNOT exceed the pulses per minute on your maximum trim setting. If they do, you need to repeat the maximum trim setting calibration steps to get a higher pulses per minute value. **EXAMPLE: Lane reference 4000 pulses per minute multiplied by 3 lanes equals 12000 pulses per minute. Maximum trim must be equal to or greater than 12000 pulses per minute.**

NOTE: After completion of feeder and spinner calibrations, truck should be unloaded.

CALIBRATION SUB-MENU (cont)

Calibrating the Speed Sensor

IMPORTANT: Be sure that you know what type of speed sensor is installed on the vehicle, and then proceed with the corresponding calibration instructions. Also verify that the proper speed sensor was selected in the Equipment section of GL-400 Setup Procedure.

PREPARATION

- ✓ Securely place the rear end of the vehicle on jack stands. Vent the vehicle's exhaust using your shops ventilation system or properly vent the exhaust to the outside.
- ✓ If jacking up the vehicle is not possible, you will need an assistant.
- ✓ Material is not needed for this part of the calibration procedure.

W/A Elec, VRM, and CTI Mech Speed Sensors

Setting Speed Sense

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the SPEED SENSE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MATCH/ADJUST line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Place your foot on the brake. Place the gear selector in drive. Release the vehicle's parking brakes, slowly take your foot off of the brake and bring the speed of the vehicle up to 35 to 40 mph.

CALIBRATION SUB-MENU (cont)

W/A Elec, VRM, and CTI Mech Speed Sensors (cont)

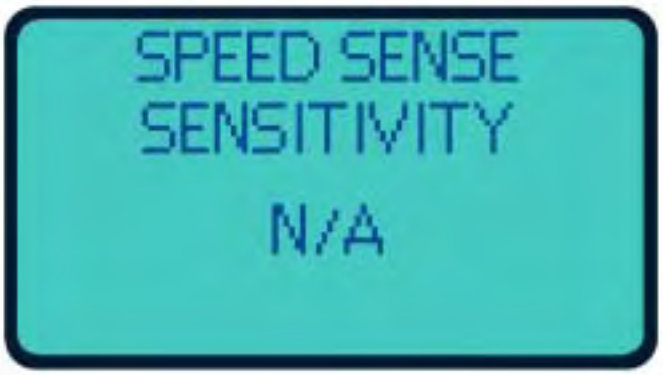
Setting Speed Sense (cont)

Toggle the +/– **ADJUST** switch up or down until the GL-400 display matches the speed shown on the dashboard. Increase the truck speed then decrease the speed. Make sure the GL-400 display tracks along with the changing speed. Matching the GL-400's display to the highest speed that you can safely operate will provide the greatest system accuracy. The number that appears in the lower right hand corner of the display is the reference number for the number of pulses/mile. Once you have matched the speed, press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the SPEED SENSE menu.

NOTE: With a W/A Elec or a CTI Mech speed sensor, you do not need to set a value for SENSITIVITY. If you select this menu item as shown below, you will see the message N/A (Not Applicable).

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATE MENU line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the CALIBRATION menu.



CALIBRATION SUB-MENU (cont)

CTI VRM Speed Sensor

Setting Speed Sense

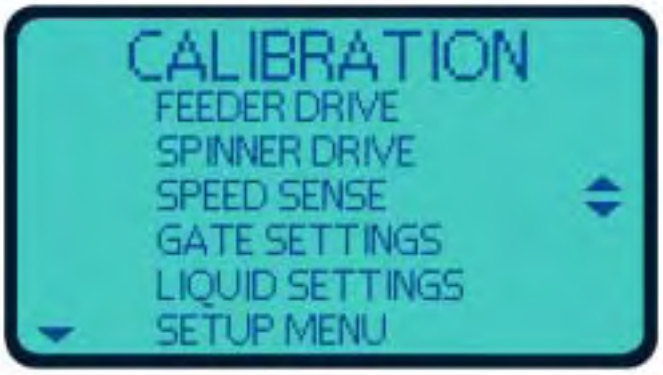
Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the SPEED SENSE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MATCH/ADJUST line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Place your foot on the brake. Place the gear selector in drive. Release the vehicle's parking brakes, slowly take your foot off of the brake and bring the speed of the vehicle up to 35 to 40 mph.

Toggle the +/– **ADJUST** switch up or down until the GL-400 display matches the speed shown on the dashboard. Increase the truck speed then decrease the speed. Make sure the GL-400 display tracks along with the changing speed of the truck. Matching the GL-400's display to the highest speed that you can safely operate will provide the greatest system accuracy. The number that appears in the lower right hand corner of the display is the reference number for the number of inches/pulse. Once you have matched the speed, press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the SPEED SENSE menu.



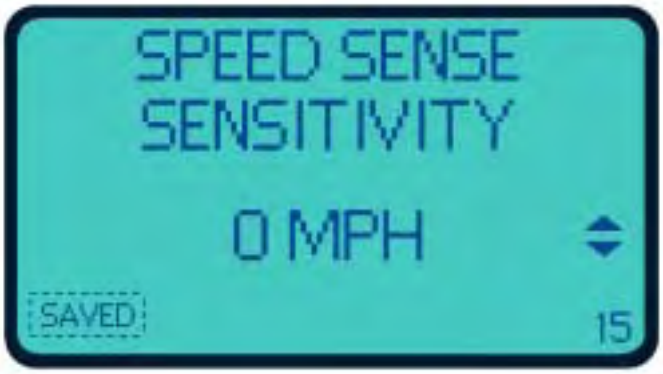
CALIBRATION SUB-MENU (cont)

CTI VRM Speed Sensor (cont)

Setting Sensitivity

The sensitivity is an adjustable filter. It has a range of zero to a maximum of 31. A zero reference number will allow all voltage generated by the VRM to pass into the ground speed circuit. The higher the reference number is, the more filtration that will be added to the circuit.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the SENSITIVITY line. Toggle the **PRODUCT TYPE** switch down to SELECT.



There is a fine line when using the sensitivity. If you set the reference number too low, the GL-400 may not be accurate over the full range of spreading mph. If the reference number is too high, the spreader may be slow to start spreading when starting from a stop and also may not be as accurate over the full range of spreading mph. To have a proper calibration, make sure the sensitivity is as high as possible. When you have finished adjusting the sensitivity, press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

If the GL-400 does not register vehicle speed immediately upon vehicle movement, then the sensitivity should be adjusted. Adjust the sensitivity until the GL-400 registers at least 1 mph.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the SPEED SENSE menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATE MENU line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the CALIBRATION menu.

CALIBRATION SUB-MENU (cont)

PREPARATION

✓ Make sure your installer has connected the auger or conveyor electrical connections correctly. See wiring diagrams in Installation section for comparison.

✓ For gate control to function, it must have been selected in the Equipment section of the GL-400 Setup Procedure. Verify that the Equipment settings are correct before proceeding.

✓ Set the vehicle's parking brake, place the truck's transmission in neutral and block the vehicle to prevent it from rolling. Vent the vehicle's exhaust using your shops ventilation system or properly vent the exhaust to the outside.

Calibrating The Low and High Gate Dump

This calibration will be done in the run mode. It will be a timed dump in the manual mode. **NOTE:** The minimum and maximum trims for the feeder drive **MUST BE** set before this procedure can be done.

It is also very important to determine what your smallest and largest gate openings you feel you will be using in your spreading applications.

Load truck with the primary material you plan to use for your spreading. The truck does not have to be completely full, 1/2 to 3/4 full is adequate. Weigh your **loaded** truck and **record the weight**.

Determine what your lowest gate setting will be, and add 25 to 30% to it. This will be your opening for your LOW GATE DUMP.

Open gate to the height you have figured for the LOW GATE DUMP. Start the truck and turn the GL-400 power switch ON (make sure the RATE and LANE knobs are turned to "0"). Turn the **MODE** switch (top right corner) to MANUAL. You need to have a stop watch or clock for the rest of this calibration. With your stop watch ready, raise the truck RPM to around 1500 to make sure you have good pump flow. Turn the RATE knob to 80-100% to start the spreader, and begin timing.

CALIBRATION SUB-MENU (cont)

Calibrating The Low and High Gate Dump (cont)

NOTE: The longer you run this dump the more accurate it will be. Recommended length of dump would be 5–7 minutes as long as the material you have loaded will last for that period. While doing this dump, it is very important to make sure the spreader stays full. Spreaders will often dig holes in the material which, if unattended, will produce highly inaccurate results.

Once your timed dump is complete, close the gate and record the length of the dump.

Take the truck back to be reweighed. If a driver was in the truck on the first weigh, he should also be in it for the second weigh. With the two weights you now have, you are ready to figure your lbs/minute.

Subtract the second weight from the loaded weight to get the amount of material you dumped. Next, divide the amount of material dumped by the number of minutes you recorded to come up with your pounds per minute. This figure will be entered under the LOW GATE DUMP in the GATE SETTINGS menu.

EXAMPLE: You ran your test for 4 minutes and dumped a total of 1300 lbs. 1300 divided by 4 equals 325 lbs/minute.

With your LOW GATE DUMP complete, you are ready to do the HIGH GATE DUMP. Determine what the highest gate setting is that you will use when spreading and reduce it by 25 to 30%. This will be the opening for your HIGH GATE DUMP.

Repeat the previous steps to achieve your HIGH GATE DUMP lbs/minute. You will once again enter this value in the GATE SETTING MENU under HIGH GATE DUMP.

CALIBRATION SUB-MENU (cont)

Calibrating The Gate Setting

Setting Maximum Height

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the GATE SETTINGS line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MAXIMUM HEIGHT line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will select the maximum height calibration.

Toggle the +/– **ADJUST** switch up or down until the display shows your maximum operational gate height. This is the maximum height you will open your gate during normal operation. The range runs from 0.00" to 18.0" in .5" increments. Once set, press the **BLAST** button to save the setting. The word **"Saved"** will also appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the GATE SETTING menu.

CALIBRATION SUB-MENU (cont)

Calibrating The Gate Setting (cont)

Setting Calibrate Height

NOTE: Setting the calibrate height by following the steps below will allow the operator to manually change gate setting on the spreader and maintain accurate application rates as long as the actual gate height and the gate height setting on the GL-400 control match.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATE HEIGHT line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up or down until the number in the display matches the gate height you calibrated at. **NOTE:** This is what your gate height was set at during the measured dump under the feeder drive menu. It will only allow you to enter the maximum gate height or less. Once the value is set, press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the GATE SETTING menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATE MENU line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the CALIBRATION menu.

CALIBRATION SUB-MENU (cont)

Calibrating The Gate Setting (cont)

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) to the LOW GATE DUMP line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to the low gate setting that was used for the low gate dump. Press the **BLAST** button to save the setting. The word **"Saved"** will appear in the lower left corner of the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you to the next menu. Toggle the +/– **ADJUST** switch to enter the lbs/minute value from your timed material dump. Press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the GATE SETTINGS menu.

CALIBRATION SUB-MENU (cont)

Calibrating The Gate Setting (cont)

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the HIGH GATE DUMP line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to the high gate setting that was used for the high gate dump. Press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you to the next menu. Toggle the +/– **ADJUST** switch to enter the lbs/minute value from your timed material dump with your high gate opening. Press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the GATE SETTINGS menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATE MENU line. Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the CALIBRATION menu.

CALIBRATION SUB-MENU (cont)

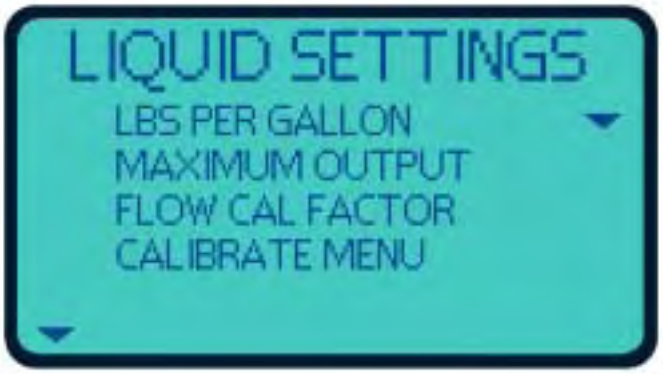
Calibrating The Liquid Settings for Electric Proportional (shown as ELEC PROP)

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the LIQUID SETTINGS line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the LBS PER GALLON line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up or down to set the LBS PER GALLON to 10.4. Once this value is set, press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.

Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the LIQUID SETTINGS menu.

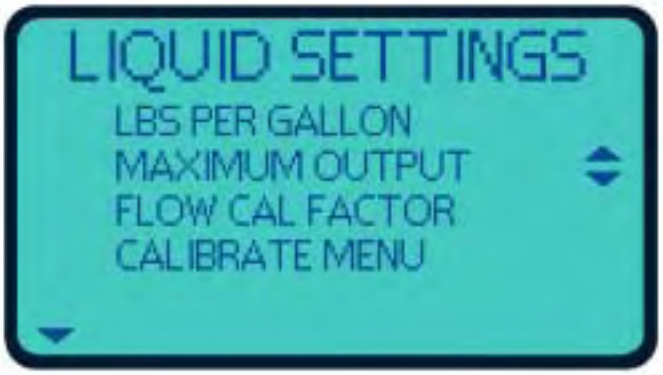


CALIBRATION SUB-MENU (cont)

Calibrating The Liquid Settings (cont)

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MAXIMUM OUTPUT line. Toggle the **PRODUCT TYPE** switch down to SELECT.

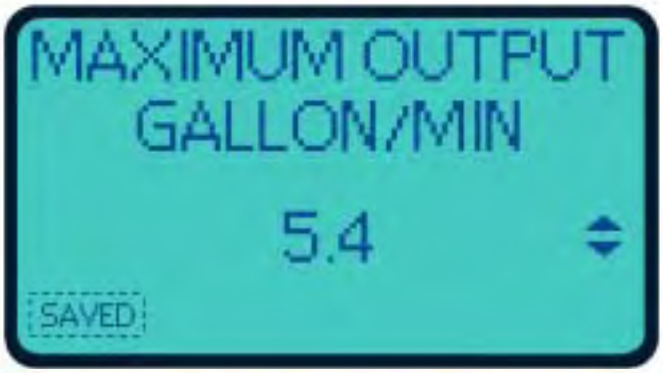
Toggle the +/– **ADJUST** switch up or down to set the MAXIMUM OUTPUT to 5.4. Once this value is set, press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.



Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the LIQUID SETTINGS menu.

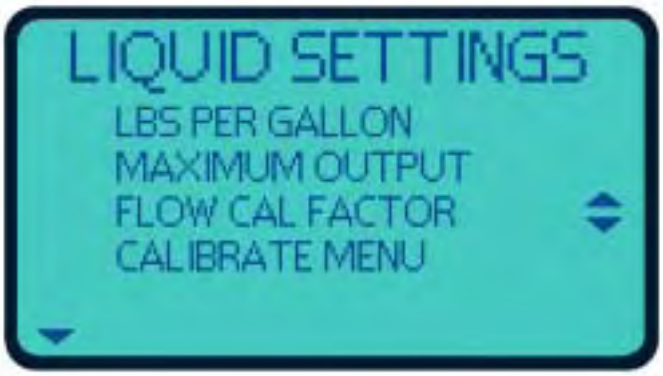
Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the FLOW CAL FACTOR line. Toggle the **PRODUCT TYPE** switch down to SELECT.

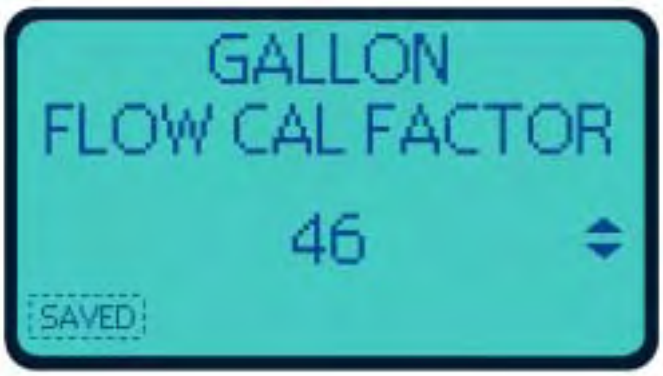
Toggle the +/– **ADJUST** switch up or down to set the FLOW CAL FACTOR to 46. Once this value is set, press the **BLAST** button to save the setting. The word **"Saved"** will appear on the display, confirming the calibration.



Toggle the **PRODUCT TYPE** switch down to SELECT. This will take you back to the LIQUID SETTINGS menu.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the CALIBRATE MENU line. Toggle the **PRODUCT TYPE** switch down to SELECT to return to the CALIBRATION menu.





CALIBRATION SUB-MENU (cont)

Calibrating The Hydraulic Pre-wet System (shown as HYDRAULIC)

Enter the GL-400 SETUP menu.

Toggle the +/– **ADJUST** switch to the EQUIPMENT menu line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to LIQUID CONTROL line. Toggle the **PRODUCT TYPE** switch down to SELECT.

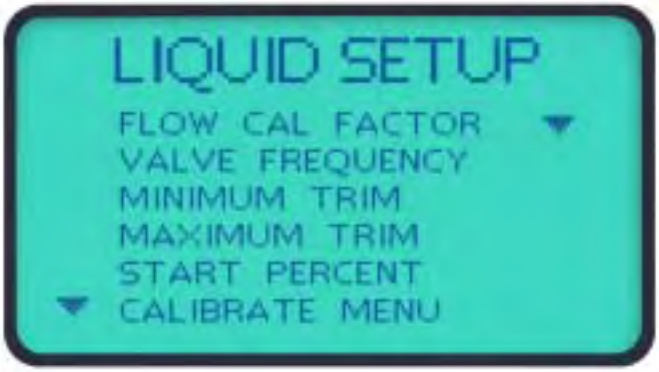
Toggle the +/– **ADJUST** switch up or down to select HYDRAULIC and press the **BLAST** button to save the setting.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the EQUIPMENT menu.

Toggle the +/– **ADJUST** switch to the SETUP menu line. Toggle the **PRODUCT TYPE** switch down to SELECT to return to the SETUP menu.

Toggle the +/– **ADJUST** switch to the CALIBRATION menu line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to LIQUID SETTINGS line. Toggle the **PRODUCT TYPE** switch down to SELECT.



CALIBRATION SUB-MENU (cont)

Calibrating The Hydraulic Pre-wet System (cont)

Flow Cal Factor

Flow cal factor is different on all flow meters. On the side of the SEAMETRICS flow meter there is an identification sticker. On the sticker is a K-FACTOR which is how many pulses per gallon the flow meter registers: this number is needed to determine the FLOW CAL FACTOR. The following formula is used to determine the FLOW CAL FACTOR.

(1/pulses per gallon)*100,000
EXAMPLE: K-FACTOR on flow meter is 1350.
(1/1350) * 100,000
1 divided by 1350 = .00074074
.00074 multiplied by 100,000 = 74.074
Set FLOW CAL FACTOR at 74

Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up or down to select CAL FACTOR number and press the **BLAST** button to save the setting.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the SETUP menu.

CALIBRATION SUB-MENU (cont)

Calibrating The Hydraulic Pre-wet System (cont)

Valve Frequency

Determine valve being used to run pre-wet system and set frequency. This is a number that is in Hertz, if you do not know what frequency the valve you are using is running at, contact COMPONENT TECHNOLOGY.

Toggle the +/– **ADJUST** switch to position the arrow (▼▲) on the VALVE FREQUENCY line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Use +/– **ADJUST** switch to increase or decrease number and enter frequency (frq) provided by valve manufacturer.

Press **BLAST** button to save number.

Toggle the **PRODUCT TYPE** switch down to SELECT to proceed to OPEN REFERENCE settings (not available on earlier GL-400 versions)

Recommended method of adjustment is disconnecting the valve coil and use the +/– **ADJUST** switch to increase or decrease number until displayed message "Feeder Valve Open" or "Spinner Valve Open" appears in the operating mode.

This will require the technician to go back and forth in the operating and setup modes until set properly.

Toggle **PRODUCT TYPE** switch down to SELECT to return to SETUP menu.

Example: Rexroth valve is set at 180.
Rexroth MP 18 is set at 2352.
Hydraforce Valve being run by return oil would be set at 2400.

CALIBRATION SUB-MENU (cont)

Calibrating The Hydraulic Pre-wet System (cont)

Minimum Trim

Start engine of vehicle.

Set RPM of vehicle to approximately 1200-1500.

Toggle the +/– **ADJUST** switch to position the arrow (▼▲) on the MINIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Turn RATE knob up to 100%.

With RATE knob ON, toggle the +/– **ADJUST** switch up or down to set minimum trim so the liquid spray pattern is as narrow as a fan pattern as possible. At this time you should see pulses per minute in the bottom right hand corner of the screen. Approximately 600-900 pulses per minute is a good minimum setting. Once set, press **BLAST** button to save.

Toggle **PRODUCT TYPE** switch down to SELECT to return to SETUP menu.

Maximum Trim

With engine still running from setting the minimum trim, perform the same procedure to set the MAXIMUM TRIM.

Toggle the +/– **ADJUST** switch to position the arrow (▼▲) on the MAXIMUM TRIM line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up or down to set maximum trim until all four nozzles come on and have about a 12" wide pattern on all nozzles. Your reference number on your dispay should be about 500. At this time you should see the pulses per minute in the lower right hand corner of the screen. Once set, press **BLAST** button to save.

Toggle **PRODUCT TYPE** switch down to SELECT to return to SETUP menu.

NOTE: This step must be performed to record pulses per minute for open loop override in the event of a sensor failure.

CALIBRATION SUB-MENU (cont)

Calibrating The Hydraulic Pre-wet System (cont)

Start Percent

The START PERCENT is how fast and to what setting your pre-wet system will start when the vehicle starts moving.

Toggle the +/– **ADJUST** switch to position the arrow (▼▲) on the START PERCENT line. Toggle the **PRODUCT TYPE** switch down to SELECT.

The start percent should be factory set at 25. We recommend this setting as a good starting point. If the system does not start as quickly as you think it should, it is adjustable from 0-50. Toggle the +/– **ADJUST** switch up or down to set. Once set, press **BLAST** button to save.

Toggle **PRODUCT TYPE** switch down to SELECT to return to SETUP menu.

With all these steps performed, the HYDRAULIC PRE-WET system has been calibrated.

MATERIALS SUB-MENU

The Materials Menu is used to enter essential information about each of the materials that will be used with the GL-400 controller – sand, salt, etc.

User may select up to four different material types.

NOTE: "NONE" cannot be used as a material name.

MATERIALS SUB-MENU (cont)

Setting Material Name

Material "1" should be set as the primary material (material used when calibrating the truck).
When entering a new material, toggle the +/– **ADJUST** switch to position the arrow (▼▲) on the first unused material number. Toggle the **PRODUCT TYPE** switch down to SELECT to bring up the first material entry window.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MATERIAL NAME line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up or down to set first character of material name.

Press the **BLAST** button to save entry.

Toggle the **PRODUCT TYPE** switch down to SELECT to move to the next position. Repeat adjust and save procedure for each character.

NOTE: The material name is limited to 4 characters in length.

MATERIALS SUB-MENU (cont)

Setting Material Weight Ratio

IMPORTANT: To accurately determine weight ratios, you should weigh an identical volume of each material you will be using. Divide the weight of each material sample by the sample weight of the material that was used for calibrating the system. Be aware that materials from different sources may vary in weight and that moisture content can significantly change product weight.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the WEIGHT RATIO line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch up or down to enter the weight ratio of the material compared to the material that was used for calibrating the system.

EXAMPLE: The material used to calibrate the system is automatically assigned a weight ratio of 1.00. If the system was calibrated with salt, and you are now entering material information for salt, you would enter a value of 1.00. If, however, the system was calibrated with sand, the value you would enter for salt should be around .6, since the weight of salt is approximately 60 percent that of sand.

Press the **BLAST** button to save entry.

Toggle the **PRODUCT TYPE** switch down to SELECT to move to next menu item.

MATERIALS SUB-MENU (cont)

Setting Material Maximum Rate

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the MAXIMUM RATE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to enter maximum number of lbs. that may be applied per lane mile.

This maximum rate setting is accomplished in the operating mode if the **RATE** knob is turned to 100%.

Press the **BLAST** button to save entry.

EXAMPLE: If 500lbs. max setting is desired per lane, set the rate at 500. For multiple lanes, two for example, the rate would be set for 1000.

Toggle the **PRODUCT TYPE** switch to SELECT to move to next menu item.

Ssetting Material Blast Timer

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the BLAST TIMER line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to enter the number of seconds that the blast timer should run.

Press the **BLAST** button to save entry.

Toggle the **PRODUCT TYPE** switch down to SELECT to move to next menu item.

MATERIALS SUB-MENU (cont)

Setting Material Blast Follows

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the BLAST FOLLOWS line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to choose between MAX TRIM, MAX RATE, or OTHER..

Press the **BLAST** button to save entry.

Toggle the **PRODUCT TYPE** switch down to SELECT to move to next menu item.

MAX TRIM: Will run feeder as fast as hydraulics will allow.

MAX RATE: Will run feeder to the max rate setting.

OTHER: Will allow you to set a rate.

MATERIALS SUB-MENU (cont)

Ssetting Material Liquid % of Dry

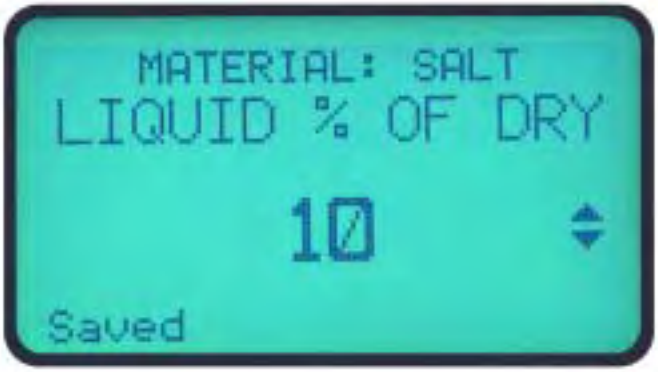
NOTE: This is only available if ELEC PROP was chosen in the equipment setup for liquid method.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the LIQUID % OF DRY line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to enter the liquid application rate as a percentage of the granular material spreading rate.

Press the **BLAST** button to save entry.

Toggle the **PRODUCT TYPE** switch down to SELECT to move to next menu item.



OPTIONS SUB-MENU

Setting LCD Contrast

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the LCD CONTRAST line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to increase or decrease display contrast to desired visibilty. **NOTE:** Factory setting is 15. 0 = least contrast, 31 = greatest contrast.

Press the **BLAST** button to save number.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the OPTIONS menu.

OPTIONS SUB-MENU (cont)

Setting Auto/Manual Mode

Do you want the ability to manually override the controller?

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the AUTO/MANUAL MODE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to select YES or NO.

Press the **BLAST** button to save selection.

Toggle the **PRODUCT TYPE** switch to SELECT to return to the OPTIONS menu.

OPTIONS SUB-MENU (cont)

Setting Spinner Shut-off

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the SPINNER SHUT-OFF line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to select spinner response when vehicle stops – RUNS or STOPS.

Press the **BLAST** button to save selection.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the OPTIONS menu.

OPTIONS SUB-MENU (cont)

Entering Truck ID Code

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the TRUCK ID CODE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to enter vehicle I.D. number (up to 10 numbers or letters).

Toggle the +/– **ADJUST** switch to set first character.

Press the **BLAST** button to save.

Toggle the **PRODUCT TYPE** switch down to SELECT to move to next position. Repeat for each position.

OPTIONS SUB-MENU (cont)

Ssetting Input Select

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the INPUT SELECT line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to select BLAST or SKIP. (See description below.)

Press the **BLAST** button to save selection.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the OPTIONS menu or to the step below.

If SKIP was selected, this window will appear. Toggle the +/– **ADJUST** switch to set the number of seconds that the Skip will be on – 0 to 30 seconds. **NOTE:** If the SKIP/BLAST feature is used, the yellow wire in the main harness must be hooked up to an ON/OFF switch and then to ground.

Press the **BLAST** button to save number.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the OPTIONS menu.

NOTE: If not using either option, the setting should be SKIP and 0 seconds.

SECONDS ON — SECONDS OFF — SECONDS ON — SECONDS OFF — SECONDS ON

OPTIONS SUB-MENU (cont)

Setting Date

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the SET DATE line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to set day, month and year.

Press the **BLAST** button to save each entry.

Toggle the **PRODUCT TYPE** switch down to SELECT to move to next position. Repeat for each position.

NOTE: The time and date appear in the lower right corner of the display, if chosen under display select.

SETTING TIME

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the SET TIME line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to set hour and minutes of the day.

Press the **BLAST** button to save each entry.

Toggle the **PRODUCT TYPE** switch down to SELECT to move to next position. Repeat for each position.

NOTE: The hour setting is what changes the AM, PM.

Ssetting Display Select

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the DISPLAY SELECT line. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to have the display show DATE/TIME or WEIGHT/DISTANCE during operation.

Press the **BLAST** button to save selection.

Toggle the **PRODUCT TYPE** switch down to SELECT to return to the OPTIONS menu.

DATA SUB-MENU

The DATA MENU is used to remove stored application information for any of the materials that have been spread with the GL-400. The menu allows you to select RECENT or ANNUAL data for each material independently.

This menu is only used when you wish to clear the controller's memory of old data and ready the system for recording application information for a new year or storm.

Toggle the +/– **ADJUST** switch to position the arrows (▼▲) on the material record line you wish to clear. Toggle the **PRODUCT TYPE** switch down to SELECT.

Toggle the +/– **ADJUST** switch to choose RECENT or ANNUAL DATA. Toggle the **PRODUCT TYPE** switch down to SELECT to display the stored information.

Toggle the +/– **ADJUST** switch down to "–" to clear the data. The word CLEAR will appear in the lower left corner of the display. If you accidently clear the wrong data, toggle the +/– **ADJUST** switch up to "+". This restores the original information.

When you have cleared the correct data, press the **BLAST** button to save the clear command. At this time you will also see the date and time change to the current date and time.

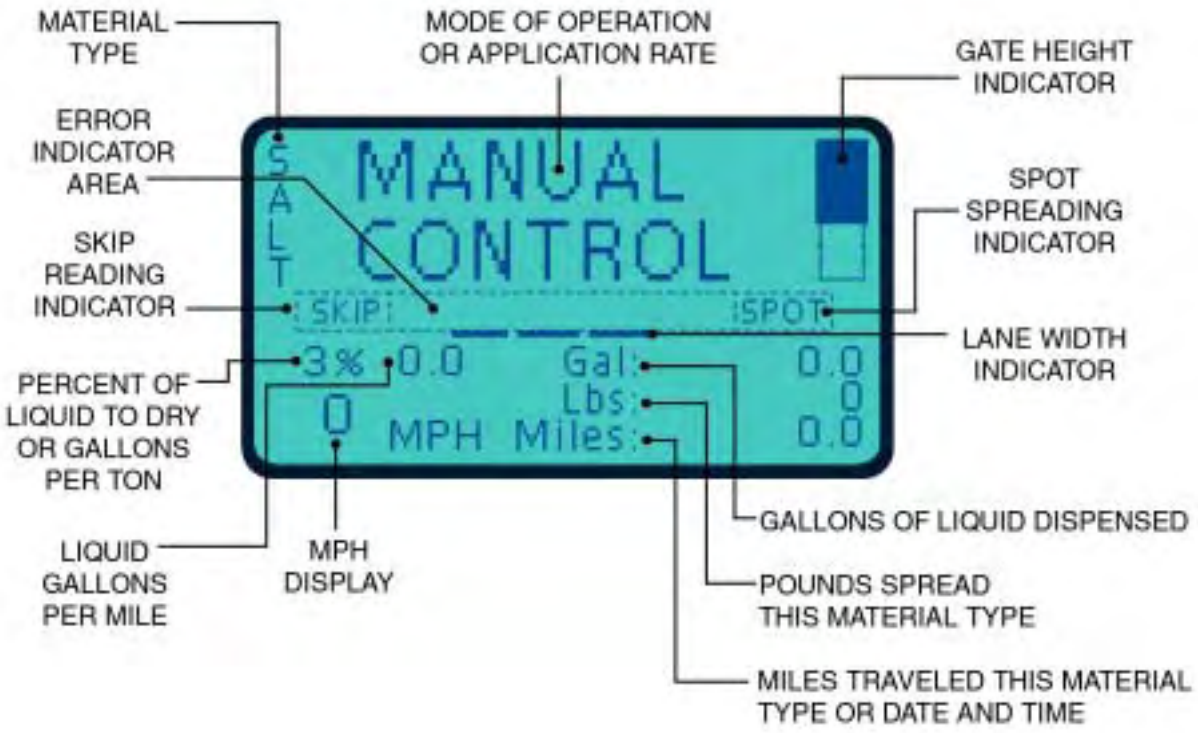
Toggle the **PRODUCT TYPE** switch down to SELECT to move to next menu item.

NOTE: Recent and Annual totals should be cleared after setup and calibration on all four material types.

OPERATING INSTRUCTIONS

IMPORTANT: Before proceeding with any piece of equipment, make sure you follow your agency's safety policy. Also make sure you have checked the equipment for proper spreader operation by following these steps:

1. Make sure the spreader is empty of material.
2. Place the controller MODE switch in the MANUAL position.
3. Make sure that the RATE and the LANE knobs are set to zero.
4. Turn the GL-400 Power switch ON.
5. Rotate the RATE and LANE knobs clockwise a small amount at a time making sure that the auger and the spinner are working and turning the correct direction.
6. Check the display for any error messages.
7. If no messages are found, your system is ready for use. If error messages are found, review the ERROR CODES and TROUBLE SHOOTING sections of this manual before continuing.



OPERATING INSTRUCTIONS (cont)

CONTROLLER POWER SWITCH
Turn the power switch to ON to power-up the controller, valve coils and sensors. If the power is turned on with the controller in the manual mode and the RATE and LANE knobs on, they will become live. We do not recommend that the ON/OFF switch be used for SPOT SPREADING.

GRAPHIC DISPLAY
This is the information center. It communicates application rates, gate height, mph, error messages, blast, manual control, liquid, material type, date and time, miles, total pounds, gallons and other useful operator information. The LCD illustration shows where information is presented on the display. In the automatic mode, the words MANUAL CONTROL are replaced with your application rate. When the **BLAST** button is pressed, the word "**Blast**" will appear in this same area. **NOTE:** What shows up on the display will change when different features are chosen in the EQUIPMENT settings.

MODE SWITCH
This switch is used for telling the controller how you intend to use it. AUTOMATIC or MANUAL mode.

MANUAL
In the MANUAL mode, the operator has complete control over how much material is dispensed onto the road surface regardless of vehicle speed. The MANUAL mode is also used to unload the spreader. Primary use of MANUAL mode should be for unloading. During spreading, manual should only be used in the event of a speed sensor failure. Manual mode does not turn the spreader ON/OFF when the vehicle starts and stops.

AUTO
In the AUTO mode, the controller will regulate the amount of material you have selected in relationship to vehicle speed, provided you have enough hydraulic flow. If you do not have sufficient hydraulic flow, the display will show you how much material you are dispensing.

OPERATING INSTRUCTIONS (cont)

To operate in the AUTOMATIC mode, the switch in the upper right-hand corner of the controller must be toggled to the up position. An application rate, provided by management or based on current conditions, must also be selected.

Example: You wish to spread 500 pounds of material per lane. Rotate the FEED RATE knob (lower left-hand corner) clockwise until 500 is shown on the display. Once the rate is entered you can either turn the controller OFF, OR if you have a SPOT SPREADING switch (the preferred way), turn it ON. The word "SPOT" will appear in the lower middle left of the display. The SPOT SPREADING switch turns off the feeder and the spinner. (Note: With some installations, the spinner may be calibrated to run continuously).

When you reach the point where you need to begin spreading, turn the controller back ON OR if you have the **SPOT SPREADING** switch, simply turn it OFF. The controller becomes fully functional, and begins spreading material. Keep in mind that the vehicle must be moving for spreading to occur in the AUTO mode.

PRODUCT TYPE SWITCH

This is used for turning ON liquid, and used for selecting different materials. To activate the liquid system, toggle the **PRODUCT TYPE** switch up to the LIQUID position. The switch is also used in conjunction with the RATE knob to set your desired gallons per ton of liquid material if using pre-wet.

TO CHANGE MATERIAL

This can only be done when the vehicle is not moving. Hold the **PRODUCT TYPE** switch to the SELECT position and at the same time, toggle up the **ADJUST** switch to the "+" position. Continue to hold down the **PRODUCT TYPE** switch in the SELECT position. The display will then show your granular material on the top of the display and your liquid method, if selected, on the bottom of the display. Next, use the **ADJUST** "+" switch to choose the desired granular material, and the **ADJUST** "–" switch to select the desired liquid application. Once the new material is shown on the display, press the **BLAST** button to save the new selection and release the **PRODUCT TYPE** switch.

SETTING HYD. PRE-WET RATE

When in the AUTOMATIC mode and HYDRAULIC PRE-WET has been selected, the rate is done as gallons per ton and will show up on the middle left of the display with a "T" and the rate selected. To set or change the rate, toggle the **PRODUCT TYPE** switch down to SELECT and hold it, turn the FEED RATE knob until the desired rate is displayed next to the "T" on the display, and release the PRODUCT TYPE switch. In the MANUAL mode the liquid rate is set the same way, only it will show up as a percentage of the valve drive.

OPERATING INSTRUCTIONS (cont)

+/– ADJUST SWITCH

This switch is used for selecting a different material. If the GL-400 has been configured for gate control, this switch is also used to tell the controller how to adjust for a new gate height setting. **EXAMPLE: If your gate is currently set at 2" and you increase it to 4", you will need to flip the ADJUST switch up to the "+" position until 4" is on the display. (The gate setting moves in 1/2" steps). If you decrease the gate height, you would correspondingly flip the ADJUST switch down to the "–" position as many times as needed to match the new height. When the switch is toggled either way, the graphic gate symbol on the display will move and the new gate setting, in inches, will appear on the display for approximately two seconds.**

RATE KNOB

Rotating this knob from 0 to 100, increases the application rate or output of the selected material in either the AUTOMATIC or MANUAL mode. If the controller has been configured for closed loop operation, a sensor has been attached to the hydraulic motor monitoring the speed of the shaft. This, in turn, maintains the displayed application rate in relation to ground speed. **EXAMPLE: To increase the application rate from 500 lb/mi to 1000 lb/mi, locate the RATE knob. It is positioned on the lower left corner of the controller. The knob has detents that can help you *feel* for an application rate once you become familiar with its operation. It also has reference numbers around the circumference of the knob. Rotate the knob clockwise until you see 1000 appear on the display. That rate will automatically be maintained regardless of changes in vehicle speed. If you travel too fast, you may see the numbers start decreasing. This indicates that you do not have enough hydraulic capacity to maintain the desired application rate at that speed. Your options are to either decrease vehicle speed or the specified application rate or increase gate height.**

ANTI-ICING

If using your GL-400 for ANTI-ICING, meaning spraying liquid direct to the road surface, then the **FEED RATE** knob controls how many gallons per lane mile you will be applying. This number will be shown on the display.

LANE KNOB

The **LANE** knob controls the distance over which material will be spread by the spinner. When the operator changes from 1 to 2 lanes of spread width, he must also double his application rate. With a closed loop spinner, one or more dashes will be shown in the center of the display. The number of dashes represent the number of lanes that are being covered. Also with a closed loop spinner, the GL-400 will automatically maintain the set application rate as the knob is turned up or down. In closed loop operation, the operator does not have to manually change the application rate when changing from 1 to 2 lanes. (See figure 1).

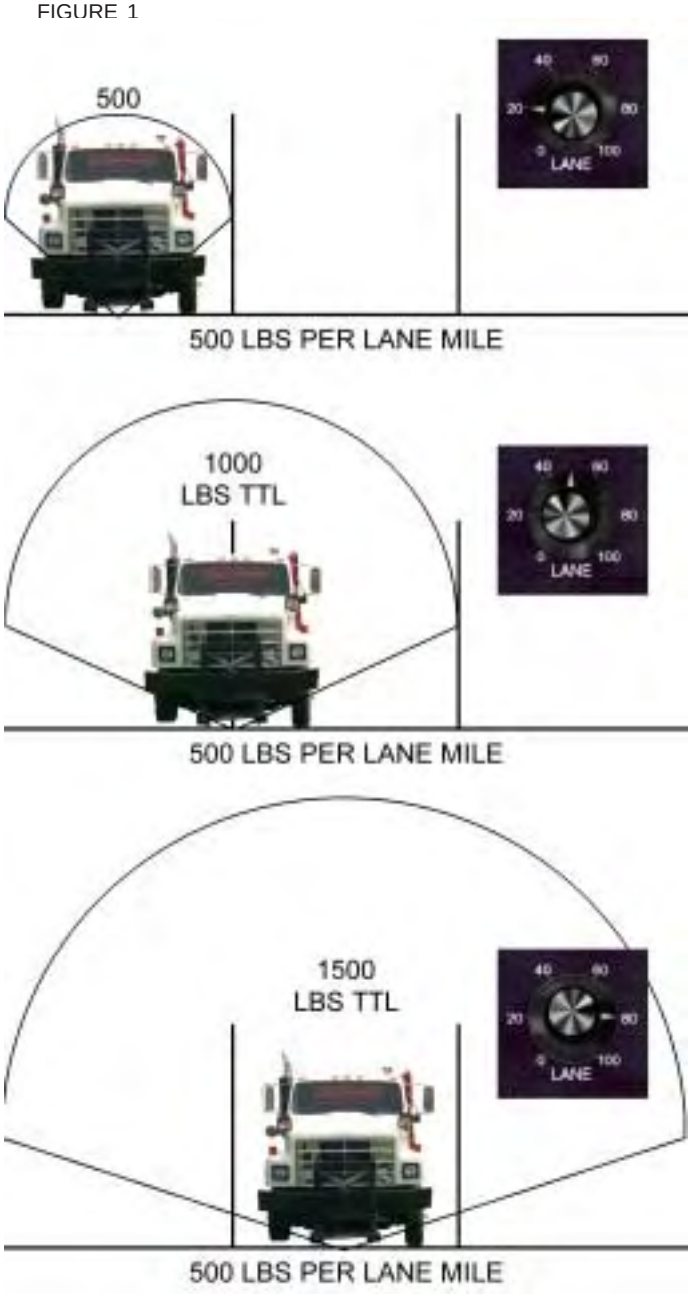
BLAST BUTTON

This is used to put more material onto the road surface. The blast has a timer feature from 0–30 seconds. The timer starts when the button is released. The blast feature can be used in either MANUAL or AUTOMATIC modes. **NOTE:** Using the blast feature only increases the feeder rate, NOT the spinner distance.

OPERATING INSTRUCTIONS (cont)

EXAMPLE: You are spreading at a rate of 500 lb/mi with the GL-400 in the AUTOMATIC mode. You approach a bridge which is a typical situation in which the Blast would be used. Assume the BLAST TIMER has been set at 5 seconds during the calibration procedure. Press and release the BLAST button. The material will be discharged at a higher preset amount for 5 seconds. After 5 seconds, your spreading rate will return to 500 lb/mi. What if it will take more than 5 seconds to cover the bridge? If conditions warrant, you could simply wait longer before releasing the button. If you need more BLAST coverage, press and release the button a second time. Pressing the BLAST button anytime during the BLAST cycle will stop the BLAST.

FIGURE 1



DATA PORT

The **DATA PORT** is used for connecting devices such as a portable printer, GPS or other data retrieval devices, and can also be used for trouble shooting diagnostics. The supervisor can retrieve the amount of material spread from the last storm or from storms up to that point.

OPERATING INSTRUCTIONS (cont)

SPOT SPREADING

SPOT SPREADING is a standard feature of the GL-400 and is activated by hooking up the orange wire in the harness to an ON/OFF switch and then to ground. SPOT SPREADING allows the operator instant ON and OFF of AUTOMATIC mode spreading to do trouble areas. With the switch turned ON, the word SPOT appears on the display and means that the material spreader is not moving. When you get to your trouble area, turn the switch OFF and the word SPOT goes away. Your spreader is now working and spreading at the application rate set on your display.

SKIP SPREADING

SKIP SPREADING is a standard feature of the GL-400 and must be selected in the OPTIONS MENU during the calibration procedure. With SKIP SPREADING selected, the yellow wire in the harness must go to an ON/OFF switch and then to ground. In the AUTOMATIC mode with the SKIP switch turned ON, the word SKIP appears on the display and is activated. Your spreader will now turn ON and OFF automatically according to how many seconds you set the feature up for in the OPTIONS MENU. The ON and OFF time will be equal, 10 seconds ON and 10 seconds OFF, until the SKIP switch is turned OFF.

CLOSED TO OPEN LOOP

If you are using a feedback sensor on the feeder motor, you are spreading in CLOSED LOOP operation. In an event of a sensor failure, your GL-400 will display FEEDER SENSOR FAULT on the display. At this time you should check the items listed in the TROUBLE SHOOTING section of the manual to find the possible problem. With all items checked and the problem turns out to be a defective sensor, the operator should then push the **BLAST** button to clear the FAULT on the display. Doing this converts the control from CLOSED LOOP to OPEN LOOP. The display will show FEEDER OVERRIDE under the application rate letting the operator know he is in OPEN LOOP mode. The control still functions in the AUTOMATIC mode with no need to go to MANUAL mode. Everytime the control is turned OFF then back ON and used in the AUTOMATIC mode, it will give the fault until the sensor is fixed. At that time the operator hits the BLAST button to override the fault again to continue spreading.

OPERATING INSTRUCTIONS (cont)

Operation of The Pre-wet System

Turn the GL-400 ON and make sure the mode switch is turned to AUTO.

The liquid material being sprayed is now set from the faceplate and can be done by the operator without going to the SETUP menu. The liquid rate is also now set in GALLONS PER TON for pre-wet.

To set the rate in GALLONS PER TON that you would like to use will be done by pushing and holding the **PRODUCT TYPE** switch down to SELECT and turning the RATE knob. When you do this, on the display above the MPH reading you will see a number that is changing. Set this number to the GALLONS PER TON you want to achieve.

To turn the liquid spray on once you have set your GALLONS PER TON, simply toggle the **PRODUCT TYPE** switch up to LIQUID.

Also, next to your GALLONS PER TON number that you have just set, there will be the letter "M" or "T". This letter is telling you how you are applying the material in either GALLONS PER TON or in GALLONS PER LANE MILE, which is used for ANTI-ICING.

M = Gallons per lane mile
T = Gallons per ton

To change between these methods of application, hold the **PRODUCT TYPE** switch down to SELECT and the +/– **ADJUST** switch up. (During this whole procedure the **PRODUCT TYPE** switch **must be** held down on SELECT.) When this is done, a menu will come up that has 2 features on it. The top of the menu is to change your granular material and the bottom menu is to change your liquid material.

To change your liquid spray method toggle the +/– **ADJUST** switch down until the bottom menu reads GALLONS PER TON for pre-wet, and press the BLAST button to save your selection.

You are now able to release the **PRODUCT TYPE** switch and you will return to the RUN mode. At this point next to your GALLONS setting on the faceplate, there will be a "T" next to it.

With these settings done you are now ready to use your PRE-WET system with your GL-400 control. **NOTE:** The changing of your liquid application rate can only be done when this vehicle is not moving.

Please contact COMPONENT TECHNOLOGY with any questions you may have.

ERROR CODES

FAULT
When the GL-400 detects a problem, the word FAULT will fill the display, or replace the application rate. Look below this message for the specific error condition.

FEED RATE LIMITED
This will be displayed when the GL-400 is not capable of maintaining the desired application rate.

POSSIBLE CAUSES:
- There is not enough hydraulic capacity.
- The vehicle speed is too fast.
- The gate is set too low when using a v-box type spreader.

CORRECTIVE ACTION:
- Slow the vehicle down.
- If gate control is being used, increase the gate height. This will slow down the feeder drive.
- Decrease the desired application rate.

FEEDER SENSOR FAULT
The GL-400 is reporting that it is not receiving pulses from the feeder sensor.

POSSIBLE CAUSES:
MECHANICAL
- Broken or frozen sensor shaft.
- Incorrect air space on integral sensor or missing or displaced magnet on disk.
- Inoperative hydraulic motor or blown hose.
- Frozen conveyor chain.
- Defective gear box.
- Frozen spool in valve bore – check cartridge for contamination.

ELECTRICAL
- Disconnected feeder sensor cable.
- Corroded pins on connectors.
- Cut cable or damaged wires.
- Defective coil.

CORRECTIVE ACTION:
- If it is a defective sensor or broken wire, use the **BLAST** button to clear the fault. This will also put the GL-400 in the OPEN LOOP mode until the problem is fixed, allowing the operator to be able to continue to run in the AUTOMATIC mode. You do not need to switch to the MANUAL mode in the event of a sensor failure. Isolate problem(s) and repair or replace defective equipment.

FEEDER OVERRIDE
This message reminds you that you have hit the **BLAST** button to clear the FEEDER SENSOR FAULT error code. It will be displayed until the problem has been corrected. Message will be gone when the GL-400 is turned OFF and back ON. FEEDER OVERRIDE means you are now in the OPEN LOOP mode and the control is no longer looking at the sensor.

ERROR CODES (cont)

FEEDER VALVE OPEN

This message is displayed when the GL-400 senses an open or high resistance circuit on the feeder valve drive. If the circuit resistance is higher the outputs will still be active, even though the GL is displaying an error.

POSSIBLE CAUSES:

- The feeder cable is cut or the connector has come apart.
- The coil on the hydraulic feeder valve has failed.
- Some other wire in the feeder valve drive is damaged or has come loose.
- The open reference value should be adjusted in the setup / equipment menu.

CORRECTIVE ACTION:

- Visually inspect cables and connections.
- Run continuity tests on cables.
- Check/replace coil if necessary.
- Increase the value in increments of 50 until the error goes away. It will be necessary to switch back and forth between setup and operating mode.

SPINNER VALVE OPEN

This message is displayed when the GL-400 senses an open circuit on the spinner valve drive. If the circuit resistance is higher the outputs will still be active, even though the GL is displaying an error.

POSSIBLE CAUSES:

- The spinner cable is cut or the connector has come apart.
- The coil on the hydraulic spinner valve has failed.
- Some other wire in the spinner valve drive is damaged or has come loose.
- The open reference valve should be adjusted in the setup / equipment menu.

CORRECTIVE ACTION:

- Visually inspect cables and connections.
- Run continuity tests on cables.
- Check/replace coil if necessary
- Increase the value in increments of 50 until the error goes away. It will be necessary to switch back and forth between setup and operating mode.

FEEDER VALVE SHORT

POSSIBLE CAUSE:

- Power wire for feeder valve drive has been shorted to ground.
- Feeder valve coil be shorted.

CORRECTIVE ACTION:

- Check wires for breaks or shorts.
- Do continuity test on cables to find shorted wire.
- Replace main wire harness.
- This may lightly damage the GL-400 and require factory repair.
- If this is a recurring problem, a separate fuse can be installed on the feeder valve circuit.

SPINNER VALVE SHORT

POSSIBLE CAUSE:

- Power wire for spinner valve drive has been shorted to ground.
- Spinner valve coil may be shorted.

CORRECTIVE ACTION:

- Check wires for breaks or shorts.
- Do continuity test on cables to find shorted wire.
- Replace main wire harness.
- This may lightly damage the GL-400 and require factory repair.
- If this is a recurring problem, a separate fuse can be installed on the spinner valve circuit.

TROUBLE SHOOTING

POWER IS ON, BUT DISPLAY DOES NOT LIGHT UP

- Check the ground connection.
- Check the power connection.

THERE IS NO BACK LIGHTING OR VALVE DRIVE

- Are the power leads reversed or disconnected?
- Is the 16-pin connector properly connected to the GL-400?

TURNING KEY SWITCH DOES NOT GIVE ENTRY TO THE SETUP MODE

- Is the key switch assembly plugged into the P-2 connector on the GL-400?
- Have the blue in-line cable connectors come apart?

IN AUTOMATIC MODE, THE DISPLAY SHOWS FAULT (FEEDER DRIVE) FEEDER SENSOR FAULT

- The GL-400 is not receiving pulses from the feeder sensor.
- Is the auger/conveyor sensor properly connected?
- Enter System Setup and select CALIBRATION; FEEDER DRIVE; MAXIMUM TRIM. Check lower right corner of display to see if a PPM value is shown. If not, the GL-400 is not receiving information from the sensor. Recheck connection and pin-outs. With the sensor disconnected from the main harness and the GL-400 still in the FEEDER DRIVE MAXIMUM TRIM, locate pin 3 and 4. With a piece of wire with both ends stripped, hold one end of the wire on pin 3 and tap the other end of the wire to pin 1. When doing this you should see pulses in the bottom right hand corner of the display showing that the cable is good. If pulses occur with this test, try replacing the sensor.
- Are the hydraulic quick-couplers connected?
- Check the coil for the auger/conveyor. A normal coil will have between 3–15 ohms of resistance. To make sure, compare it to a good one.
- Has the shaft on the sensor failed? (Sometimes they break). Is the sensor shaft turning? If you have a hydraulic motor with an integral speed sensor, check that the air gap to the magnet is correctly set or that the magnet is not missing.
- Has the hydraulic motor quit turning? Is there a blown hose? Has the conveyor chain frozen? Is the gear box defective?
- Has the spool frozen in the valve bore? Check the cartridge for contamination.
- If your feeder motor is a White Hydraulics, Inc. with a silver colored sensor mounted near the front mounting plate, you may have a CTI sensor cable with built-in LEDs. If this is the case, there will be two LEDs on the cable end that plugs into the sensor. The green LED will remain on as long as power is present. The amber LED will flicker or flash when the motor is turning. If the LEDs appear as described, the sensor should be good. If the LEDs are not lit or flickering, review the following service ideas:
  - Is the feeder sensor plugged in?
  - Have the pins corroded away?
  - Has the main cable been cut?

TROUBLE SHOOTING (cont)

THE SPREADER WILL NOT WORK IN MANUAL MODE

- Is the GL-400 turned on? The display will show MANUAL CONTROL.
- Check hydraulic quick coupler connections.
- Are the electrical connections to the spinner and auger/conveyor properly made? Yellow goes to the spinner, blue goes to the auger/conveyor.
- Check valve coils. Normal resistance is from 3–15 ohms. To make sure, compare it to a good coil.
- If coils have manual overrides, with the truck running push the override to see if auger and spinner will run.

BLAST BUTTON DOES NOT WORK

- Did you set any time in the BLAST feature under the MATERIALS menu?
- Is your SPOT SPREAD switch on? If so, the display will show the word SPOT in the lower right hand corner.
- If the SPOT SPREAD switch is on, turn it OFF. The spot spread feature overrides everything in the AUTOMATIC mode. Using the spot feature is telling the spreader "*I want no material*."

SPINNER RUNS CONTINUOUSLY

- If the spinner does not stop when the vehicle stops, enter the GL-400 Setup and select the OPTIONS sub-menu. Select SPINNER SHUT-OFF from the menu and change setting to "When Vehicle Stops SPINNER STOPS". Be sure to save new setting. (See Setup instructions for complete information).

SPREADER TURNS ON AND OFF BY ITSELF

- Has the SKIP SPREADING switch been activated? The word SKIP appears in the lower left hand corner of the display. Turn OFF the switch.
- If you do not have a SKIP SPREADING switch, the yellow wire has grounded out somewhere. Check wiring and correct problem.
- The pots must be calibrated. Read and perform the Pot Calibration described on page 20.

"FAULT" APPEARS ON THE DISPLAY

Whenever the GL-400 controller detects an error condition it displays a fault message. Explanations of fault messages are continued on the following page. For a more detailed explanation and corrective measures ERROR CODES.

"FEED RATE LIMITED" FAULT

GL-400 cannot maintain the desired application rate due to insufficient hydraulic capacity, vehicle speed too fast or gate setting too low. This fault code does not make the spreader stop working. It only warns you it cannot keep up with the rate you are asking for.

"FEEDER OVERRIDE" FAULT

This message that the blast button has been pressed to clear the code. The GL-400 is now operating in open loop. Open loop is not as accurate as closed loop. However, it will allow the spreader to continue to operate until the problem can be fixed. When the GL-400 is turned back on after the problem has been corrected, the message will be gone.

TROUBLE SHOOTING (cont)

"FEEDER VALVE OPEN" FAULT
The GL-400 has sensed an open circuit. This message will appear if the feeder electrical connector has come apart, the coil on the hydraulic feeder valve has failed or some other wire in the feeder valve drive circuit has come loose.

"SPINNER VALVE OPEN" FAULT
The GL-400 has sensed an open circuit. This message will appear if the spinner electrical connector has come apart, the coil on the hydraulic spinner valve has failed or some other wire in the spinner valve drive circuit has come loose.

"FEEDER VALVE SHORT" FAULT
The feeder valve drive power wire has been shorted to ground. GL-400 may require repair. If this is an ongoing problem, a separate fuse can be installed in the feeder valve circuit.

"SPINNER VALVE SHORT" FAULT
The spinner valve drive power wire has been shorted to ground. GL-400 may require repair. If this is an ongoing problem, a separate fuse can be installed in the spinner valve circuit.

NO GROUND SPEED OR CANNOT PICK UP A SIGNAL
- Check the chassis manufacturers wiring diagram for proper connection.
- Is the SPOT SPREADING feature activated? If so, it will show the word SPOT in the middle right side of the display. Turn off the spot feature.
- Do you have the GL-400 configured for the correct type of speedometer circuit. See GL-400 Setup instructions.

NO SPREADER ACTIVITY IN MANUAL MODE
- Have you lost the hydraulics?
- Have hydraulic quick-couplers come apart?

THE DISPLAY IS TOO DARK OR TOO LIGHT
Change the contrast setting in the GL-400 SETUP OPTIONS sub-menu. See SETUP section for step-by-step instructions.

THE GL-400 CUTS OUT OR ACTS STRANGE
The minimum input power required for the GL-400 is 10 volts DC. If the vehicle's system voltage drops below that level, the controller can act erratically. Low voltage may be caused by the use of auxiliary lighting, plow lights, spreader lights, heater blowers or a faulty voltage regulator.

LIQUID RATE LIMITED
The GL-400 cannot maintain the desired liquid application rate due to insufficient liquid pump capacity, vehicle speed is too fast.

FIELD PRINTER INSTRUCTIONS

IMPORTANT: To prevent possible damage to the GL-400's electronics, the controller should always be turned off before connecting or disconnecting any accessory device.

Printer Installation and Operation

1. Turn the GL-400 OFF.
2. Remove the dust cap from the printer port on the front of the GL-400 controller.
3. Plug the field printer cable into the printer port.
4. Turn the GL-400 ON.
5. A menu will appear on the GL-400 display.
   - PRINT MENU
     - MATERIAL 1 TOTALS
     - MATERIAL 2 TOTALS
     - MATERIAL 3 TOTALS
     - MATERIAL 4 TOTALS
     - SETUP VALUES
     - ALL THE ABOVE

NOTE: Insert your material names in the above example.

6. Toggle the **ADJUST** switch to "+" or "–" to select the menu item you want information about.
7. To start printing, toggle the **PRODUCT TYPE** switch down to the SELECT position.
8. When the printing is complete, turn the GL-400 OFF.
9. Remove the printer cable.
10. Reinstall the printer port dust cap.

DATAGUARD INSTRUCTIONS

Dataguard Installation and Operation

Load the **DATAGUARD** software on your computer.

1. The software program comes with 2 disks. During the loading process, your computer will tell you if it is necessary to load the second disk.
2. Put the disk labeled 1 in your computers floppy drive and:
   - Press START button,
   - Select RUN,
   - Select a:/setup, and
   - Follow the on-screen instructions until the software load is finished.

With the software loaded, you are now ready to use your **DATAGUARD** program.

1. Connect the supplied cable to your computers serial port and the other end to the communications port on your GL-400.
2. Turn the GL-400 ON and start the **DATAGUARD** program on your computer.
3. Go to TRANSFER and then to SETTINGS to make sure the program is set to match the COM port being used on your computer.
4. Go to TRANSFER FROM GL to download calibration and spreading data to your computer.
5. Go to TRANSFER TO GL to send calibration data into a control that is not yet calibrated or if you made a change that you want to take affect in the GL-400.

NOTE: When saving data, it is recommended you save the data in a separate folder and save each truck by the truck number.

The downloaded information has the ability to be exported to a Window's Excel spread sheet. When you export the information it goes to a generic page and you will be required to make modifications to that sheet to see all the information.

When all your downloads are complete and the information saved, you are able to disconnect the cable from the GL-400 and it is ready for spreading again.

GL400-5.6 New Features and Changes

Ground Speed Simulator (Test Speed)

This feature allows the user to set a simulated ground speed value in MPH to check visual performance of the Feeder, Spinner and Liquid channels in the Auto mode without moving the vehicle.

Operation

Under the Equipment menu select into the Test Speed screen. Enter a value from 1-99, (which represents MPH) and hit Blast to save. The user would now return to the operating mode in Auto, set an application rate and observe the spreader operation. During this test, the Spot and Blast features work. The control will show the MPH that you set under Test Speed, and it will collect data as if you were actually spreading. The truck does need to be running for this feature to work.

Things to know

To modify the Test Speed value, it is necessary to return to Setup under the Equipment menu as described above. The outputs are disabled while in Setup. During the Test Speed operation if there is a single ground speed pulse detected by the GL400 the Test Speed feature will be automatically disabled and set to 0. Using the Test Speed to simulate operation will accumulate Storm and Annual Totals in the Data menu for the selected material. Turning the power switch on and off on the GL400 will also default the Test Speed to 0, or disable it.

Auxiliary Audible Alarm output of Visual Faults

Gives the ability to have a visual or audible alarm for any error or fault displayed on the GL400 control

1. Operation:
   a. Any fault condition will generate a pulsed TTL 1 second on, 2 seconds off duty cycle output on P2 connector pin 13. This coupled to a relay module (available through Component Technology) will operate a indicator lamp and/or audible alarm
2. Things to know:
   a. The alarm output on P2, pin 13 is always active. There is no user selectable parameter in the Setup mode to turn it on or off.
   b. The output on P2 pin 13 should only be coupled with TTL compatible hardware. The GL400 will be permanently damaged if the output on P2, pin 13 exceeds 20ma. (.020 amps). This applies to sync or source current (positive = source, negative = sync).

GL400-5.6 New Features and Changes (cont)

Spot In Manual Mode

1. Gives the convenience of a Spot Spread Switch in the Manual operating mode.

Feeder Sensor Fault in Manual Mode

This feature will alert the Operator that a Feeder Sensor has failed if operating in the manual mode.

1. Operation:
   a. If the GL400 is receiving a speed input signal in the manual mode while operating closed loop feeder, it will continue to accurately track material output as it does in the Auto mode, but will fault if it stops receiving pulses from the Feeder Sensor.
2. Things to know:
   a. If the GL400 is not receiving a speed signal input, (vehicle not moving) in the Manual mode while operating closed loop feeder: The GL400 will still fault if it fails to receive pulse from the Feeder Sensor, even though it was not accumulating material totals.
   b. Feeder sensor faults can be overridden into open loop by pressing the orange Blast button anytime the screen is reporting the error.

Product Unload

Gives the ability to the operator to easily unload product from the vehicle when Manual Mode has been locked out.

1. Operation:
   a. First the operator would position the vehicle in the area they would like to unload the product.
   b. The operator would then actuate the Mode switch to the Manual position.
   c. Next, the operator would actuate and hold the Product switch to the select position for a 5 second duration. The GL400 then switches into Manual control where the operator has full control.
   d. When the unloading process has completed, the operator may simply drive away. The GL400 will switch to Auto mode as soon as it detects Ground Speed above 5 MPH.
2. Things to know:
   a. The GL400 will not switch into the unload mode if it detects any Ground Speed signal.
   b. The operator can move or reposition the vehicle during the unload procedure as long as they do not exceed 5 MPH.
   c. While unloading with a closed loop feeder the GL400 will still display a feeder sensor fault if it does not receive any sensor pulses. (It can be overridden by pressing Blast)
   d. The operator may now use the Spot Spread switch (if installed) to suspend the unload procedure.
   e. Cycling the power on the GL400 will cancel the unload process.

GL400-5.6 New Features and Changes (cont)

Power On Clear of Storm Totals

Allows the operator to reset the accumulated Storm Totals for the selected material without having to access the Setup Menu.

1. Setup:
   a. Under the Options menu, the user must enter a value of Yes or No (default is No) into the Power on Clear menu.
2. Operation:
   a. With the GL400 power turned off, the operator must actuate and hold both the Product switch to the select position and the Adjust switch to the (-) position (both down).
   b. While continuing to hold the switches, the operator must turn the Power switch on.
   c. The operator may then release the two switches to observe that the material totals have been cleared on the lower right hand corner of the display.
3. Things to know:
   a. Only the current selected material can be cleared. If the operator wishes to clear totals for other materials, they will have to select each material they wish to clear and repeat the steps above.
   b. When doing the power on clear, it only clears the Storm Totals and not the Annual Totals.

Other Changes

1. There is a 5 second buffer on the liquid tank float switch before an alarm is displayed and the Liquid Output (Pre-Wet or Anti-Ice) is shut down.
2. The spinner start percent has been changed from 25% of maximum trim to 8%. This is a fixed value.
3. Switching the Product/Liquid switch off then on again will now clear ‘liquid sensor faults’.

GL400-6 Supplement

Open Loop Lane Control Using a GL400-6

Important: Operating machinery can be hazardous for you and everyone around you. Use sound judgment when performing any operation on the vehicle, especially while performing calibrations. Make sure you are in an open area where you can safely operate all components of the vehicle.

Purpose: This section when followed correctly will setup the GL400 version 6 with open loop lane control.

What is open loop lane control? When adjusting the spinner the operator's selection will be limited to a predetermined maximum number of lanes 1-4, which the GL400 will automatically multiply by the current 'FEED' Rate Lbs/Lane Mile as the operator changes Lane widths. This results in maintaining a close Lbs./ Lane Mile average while varying lane widths. Open loop lane control establishes a % of motor speed for 1 lane then multiplies this value by the number of lanes active, to establish a new motor speed for both the material feeder and the spinner. This is different than closed loop, which relies solely on a sensor for motor speed feedback and adjustment.

How does it work? The operable span (0 -100) of the 'LANE' knob, which is located on the operator panel is divided by the maximum number of lanes you wish to spread material onto. The center of the display screen will display lane Indicators dependant upon the position of the 'LANE' knob. E.g. If a maximum of 2 lanes has been selected the span of the 'LANE' knob will be divided by (2). Where 0 –50 will be 1 lane and 51-100 will be 2 lanes. Lane indicators in the center of the screen will provide feedback to the operator.

It is important that the following be done before performing open loop lane control calibration:

- The vehicles feeder must be calibrated, if not please proceed to Open or Closed Loop Calibration in the GL400 manual.
- The vehicle must be full of material and in an area where it is OK to dispense material onto the pavement surface.
- The vehicle must be fully operational. Inspect and repair if necessary all vehicle components including but not limited to: hoses, fittings, valves, and wiring before continuing with calibration.

GL400-6 Supplement (cont)

Open Loop Lane Control Using a GL400-6 (cont)

Enter into the GL Setup menu and follow the steps below.

A. Under the EQUIPMENT menu SPINNER CONTROL, select and save <NO>.
B. **Spinner Drive Minimum Trim:** Under the CALIBRATION menu SPINNER DRIVE, select MINIMUM TRIM.
   a. Minimum Trim: This number represents the <percentage of valve drive> with <1000> equal to 100.0%. Minimum Trim should be set so that the Spinner is rotating, but as slow as possible. While adjusting the trims, the Feeder will run at Minimum Trim dropping material onto the Spinner.
C. **Spinner Drive Maximum Trim:** Under the CALIBRATION menu SPINNER DRIVE, select MAXIMUM TRIM.
   a. Maximum Trim: This number represents the <percentage of valve drive> with <1000> equal to 100.0%. With the truck engine running between 1000 – 1200 RPM adjust Maximum Trim so that the Spinner is rotating as fast as necessary for your maximum spread width (**Number of Lanes**) to cover. While adjusting the trims, the Feeder will run at Minimum Trim dropping material onto the Spinner.
D. **Number of Lanes:** Under the CALIBRATION menu SPINNER DRIVE, select NUMBER OF LANES.
   a. **Number of Lanes:** Enter the maximum <number of Lanes> to be covered **<1–4>. There must be <u>at minimum</u> a **Lane Reference** (open loop) value entered into **Lane Reference** for this feature to operate. If a **Lane Reference** value is known from previous calibration, proceed to step (F.) below.

   **** Spinner Maximum Trim** along with spinner height and deflection plate arrangement may limit the **Number of Lanes** effectively covered.

E. **Lane Calibrate:** Under the CALIBRATION menu SPINNER DRIVE, select LANE CALIBRATE.
   a. **Lane Calibrate:** Using the 'LANE' knob adjust the spinner rotation until the spinner is covering **1 lane width. Note the OPEN LOOP <Percentage of valve drive >, which can be <1 – 100>. Press the 'BLAST' switch to save the lane calibrate setting. See the Note below.

   ** While adjusting **Lane Calibrate**, it may be necessary to drive the vehicle while making this adjustment to take into account material scatter on the road surface.

GL400-6 Supplement (cont)

Open Loop Lane Control Using a GL400-6 (cont)

Note: The **Lane Reference** (open loop) value multiplied by the number of lanes cannot exceed 100. E.g. if running (2) Lanes, your **Lane Reference** (open loop) value cannot exceed 50, for 3 lanes it cannot exceed 33. If the value exceeds 100, try re-adjusting your **Spinner Drive Maximum Trim** for a higher output then perform the **Lane Calibrate** procedure over.

F. **Lane Reference:** Under the CALIBRATION menu SPINNER DRIVE, select LANE REFERENCE.
   a. **Lane Reference** (open loop):The <Percentage of valve drive> value <0 – 100> for coverage over 1 lane should be entered here if it is known from previous GL400 **Lane Calibrate** operations. The <Percentage of valve drive> value is set automatically when the **Lane Calibrate** process has been completed.

G. The open loop lane calibrate procedure is now complete!
H. Operation of Lane Control
   a. In the Operating mode, the driver will now see _ _ _ _ dashes under the quantity being spread. The number of _'s corresponds to the number of lanes being covered. The LANE knob is used to adjust the number of lanes covered. Whatever you have selected for a maximum number of lanes during calibration under **Number of Lanes** is also the maximum number of _ _'s that can be displayed. Simultaneously, the conveyor is speeding up or slowing down to control granular output at a consistent rate across all lanes.
   b. To deactivate this feature of the GL 400-6, you must go back into the Spinner Drive menu and select **Lane Reference**. Adjust Open Loop to 0. If a closed loop spinner is used, you must (0) both closed and open Loop values.

GL400-6 Supplement (cont)

Anti-Ice Control Using a GL400-6

Important: Operating machinery can be hazardous for you and everyone around you. Use sound judgment when performing any operation on the vehicle, especially while performing calibrations. Make sure you are in an open area where you can safely operate all components of the vehicle.

It is important that the following be done before performing Anti-Ice Calibration:

- Inspect all vehicle components including: hoses, fittings, valves, and tanks before calibration.
- Check that all wire connections are sound. • Record the calibration “K-Factor” per US Gallon from the **Flow Meter** (if running Closed Loop). The K-Factor must be entered into the GL during calibration process. Note: K-Factor is usually listed on the Flow Meter.
- If running **Open Loop** record the **Maximum GPM** available by pump rating or total additive nozzle GPM. Use whichever number is smaller.
- Make sure the Anti-Ice tanks have been filled with material.
- Make sure all electric ball valves operate. If the ball valves are controlled through the GL400 this may have to be done while adjusting the **Trim** settings below.
- Check that all manual flow control valves are adjusted to the proper position.

Enter into the GL Setup menu and follow the steps below.

A. Under the EQUIPMENT menu ANTI-ICE CONTROL, select and save the applicable setting as defined below:
   a. **None:** Select if the GL400 Anti-Ice System will not be used.
   b. **Open Loop:** Select when there will be NO Flow Meter used. Therefore, this setting will not utilize a Flow Meter feedback signal to calculate and control the output or, to accumulate **Storm Totals** and **Annual Totals**. The GL will calculate and control the required output and accumulate Storm Totals and Annual Totals utilizing an internal algorithm based on vehicle speed and current selected rate.
   c. **Flowmeter:** Selecting this setting requires the use of a Flow Meter or compatible 12-volt open collector current sync. device capable of generating a feedback signal proportionate to the material output. The feedback signal will be used by the GL400 to calculate and control the speed of the hydraulically driven Liquid Pump. Additionally, the GL will accumulate **Storm Totals** and **Annual Totals** directly from the feedback signal being received.

B. Under the CALIBRATION menu enter the applicable settings into ANTI-ICE CONTROL:
   a. **Maximum Gal/Min** or **Maximum L/Min** OPEN LOOP ONLY! (GL400-6) Used for open loop systems only. Set <maximum output> to a value between <0 - 180> Gal/Min or <0 to 681> LPM if Metric. The <maximum output> value is dependent upon your system characteristics: pump capacity and total number of spray nozzles.

GL400-6 Supplement (cont)

Anti-Ice Control Using a GL400-6 (cont)

b. **Flowmeter PPG** CLOSED LOOP ONLY! (GL400-6) The K factor value <**P**ulses **P**er U.S. **G**allon> should be entered directly into the GL. When Metric is used the value is still <pulses per U.S. Gallon>. If converting from liters to U.S. Gallons use the following formula:
1 liter = 0.2641721 Gallon [US, liquid]
   i. **Note:** Raven Flow Meter K-Factors are normally labeled pulses per 10 U.S. Gallons. E.G. If labeled as (680) it must be saved into the GL as (68). Check with your equipment supplier if you are not clear about the Flow Meters K-Factor.

c. **Valve Frequency:** (GL400-6) Enter the <PWM frequency> recommended by the hydraulic valve manufacturer. Range is 30 to 285> Hertz. Consult your dealer for the correct <PWM frequency> if it's unknown. (Example: Rexroth = <180> hertz.)

d. **Minimum Trim:** This value represents the <percentage of valve drive> with <1000> equal to 100.0%. With the engine running at 1000 to 1200 RPM adjust the Minimum Trim so the Liquid Pump is running, but at a low rate. There must be adequate flow to open check valve(s) if installed or liquid sensor faults will occur at low flows and /or pump speed. Please see Note below.

e. **Maximum Trim:** The number value represents the <percent of valve drive> or output on the valve drive with <1000> equal to 100.0%. With the engine running at 1000 to 1200 RPM adjust the Maximum Trim exactly when the Liquid Pump reaches maximum flow. Setting a Maximum Trim to far above the maximum flow of the pump will create a dead band making the GL in-accurate while running **Open Loop** and will result in difficult material output regulation while running with a **Flowmeter**. Please see **Note** below.

(**Note:** While adjusting trims on a system utilizing a **Flowmeter** the GL displays the Pulses/Min from the flow meter in the lower right corner of the display. This can be used like a tachometer to find the minimum or maximum system flow. For **Open Loop** systems having someone in back watching flow and listening for the pump's min and maximum speed while another person adjusts the trim seems to work well to insure it's close as possible.)

f. **Start Percent:** Set value at <percent of **Maximum Trim**> to quick start the pump when vehicle first begins to move. Default setting is <25>%. The range is <5 to 50>%

g. Once the above steps have been completed exit Calibration Mode. You should now be able to run your Anti-Ice System!

GL400-6 Supplement (cont)

Anti-Ice Control Using a GL400-6 (cont)

C. Operation of the Anti-Ice System

a. Choosing a **Liquid Application:** Switch the GL into Manual Mode. Hold the Product Select Switch down and then toggle the Product Adjust Switch down to choose a suitable Liquid Application as shown below.

Note: The GL will not allow a change in Liquid Application while the vehicle is in motion.

- **Pre-wet Only:** Use this setting if running a Pre-Wet System only. Application based on gallons or Liters per Ton of Dry (Granular) material.
- **Anti-Ice Only:** Use this setting if running an Anti-Ice System. Application is based on Gallons or Liters per Lane Mile.
- **Anti-Ice + Dry:** Use this setting if running an Anti-Ice System and Granular System together.
- **Anti-Ice + Pre-wet:** Use this setting if it is necessary to run all 3 types of application together, Anti-Ice, Pre-Wet, and Granular.

b. Setting/Changing an **Application Rate:** After selecting a Application Method it is necessary to set an Application Rate. To set an Application Rate hold the Product Select Switch down and adjust the Lane Width Knob until a suitable rate is found. For Manual Mode the rate is set a 0 – 100% of **Maximum Trim**. For Automatic Mode the Rate is set as **Gallons per Lane Mile**. (**Open** or **Closed Loop** Anti-Ice System). See Note below. (Note: If running a multiple boom system it will be necessary to adjust the application rate each time you enable or disable a boom to maintain a uniform output.)

D. Explanation of Anti-Ice Logs: Access all Logs under the DATA MENU

a. **Total gallons spread (Gal or L):** Total amount of Liquid material spread since data was last cleared.
b. **Total miles driven (Mile or Km):** Total distance driven since data last was cleared.
c. **Average gallons/mile (G/ Mi or L/KM):** Average gallons or liters spread per mile since data was last cleared.
d. **Percent of Miles or Kilometers in Auto (Auto):** Percent of distance traveled while the GL400 operated in Automatic Mode. “Value” shown is since data was last cleared.
e. **Average Miles/ Hour or Kilometers/ Hour (Ave):** Average vehicle speed with Anti-Ice operating since data was last cleared.
f. **Maximum Miles/ Hour or Kilometers/ Hour (Max):** Maximum vehicle speed with Anti-Ice operating since data was last cleared.
g. **Last time cleared:** Record of the last time Anti-Ice data was cleared.

GL400 SETUP VALUES

(Start-Up Screen)

Customer:		GL400 Software Version	E-
Work Order:			S-
Truck Number:		GL Serial #	
Current Date:		Spreader MFR/Model/Type	
Hydraulic Valve Manufacturer (Main Stack)			
and/or Spreader Valve Manufacturer		Pre-Wet System Mfr.	

Equipment Menu

VALVE FREQUENCY (HZ)			
OPEN REFERENCE VALUE			
SPEED INPUT TYPE		Transmission MFR.	
TWO-SPEED AXLE			
FEEDER CONTROL		Sensor MFR./type	
SPINNER CONTROL		Sensor MFR./type	
GATE CONTROL			
PREWET CONTROL		Sensor MFR./type	
ANTI-ICE CONTROL		Sensor MFR./type	

Calibration Menu

Feeder Drive

MINIMUM TRIM		pulses/min	
MAXIMUM TRIM		pulses/min	
START PERCENT			

Control Values

LBS./PULSE	
PULSE/MIN.	

Spinner Drive

MINIMUM TRIM		pulses/min	
MAXIMUM TRIM		pulses/min	
# OF LANES			

Lane reference

	CLOSED LOOP	
(GL-6 ONLY)	OPEN LOOP	

Speed Sense

MATCH/ADJUST		E.G. 2500
SENSITIVITY		

Gate Settings

MAXIMUM HEIGHT	
CALIBRATE HEIGHT	

Low Gate Dump		High Gate Dump	
GATE HEIGHT		GATE HEIGHT	
LBS./MIN		LBS./MIN	

Liquid or Pre-Wet Control

(GL-5X ONLY)	FLOW CAL FACTOR		
(GL-6 ONLY)	MAXIMUM GPM (open loop)		
(GL-6 ONLY)	FLOWMETER PPG (closed loop)		
	VALVE FREQUENCY (HZ)		
	OPEN REFRENCE VALUE		
	MINIMUM TRIM	pulses/min	
	MAXIMUM TRIM	pulses/min	
	START PERCENT		
(ELEC. PROP.)	LBS. PER GALLON		
(ELEC. PROP.)	MAXIMUM OUTPUT		
(ELEC. PROP.)	FLOW CAL FACTOR		

(GL-6 ONLY) Anti-Ice Control

MAXIMUM GPM (open loop)			
FLOWMETER PPG (closed loop)			
VALVE FREQUENCY (HZ)			
MINIMUM TRIM		pulses/min	
MAXIMUM TRIM		pulses/min	
START PERCENT			

Options Menu

LCD CONTRAST	
MANUAL MODE Y/N	

	RUNS	STOPS
WHEN VEHICLE STOPS, SPINNER		

TRUCK I.D.	

	BLAST	SKIP
INPUT SELECT		
SKIP TIMER		

	WGHT/DIST.	DATE/TIME
DISPLAY SELECT		

	ENGLISH	METRIC
UNITS OF MEASURE		

	YES	NO
(GL-5.6 ONLY) POWER ON CLEAR		

Materials Menu

Material 1

NAME	
WEIGHT. RATIO	
MAX. RATE	
BLAST TIMER	
BLAST FOLLOWS	
if (OTHER) then RATE	
LIQ. % OF DRY	

Material 2

NAME	
WEIGHT. RATIO	
MAX. RATE	
BLAST TIMER	
BLAST FOLLOWS	
if (OTHER) then RATE	
LIQ. % OF DRY	

Material 3

NAME	
WEIGHT. RATIO	
MAX. RATE	
BLAST TIMER	
BLAST FOLLOWS	
if (OTHER) then RATE	
LIQ. % OF DRY	

Material 4

NAME	
WEIGHT. RATIO	
MAX. RATE	
BLAST TIMER	
BLAST FOLLOWS	
if (OTHER) then RATE	
LIQ. % OF DRY	