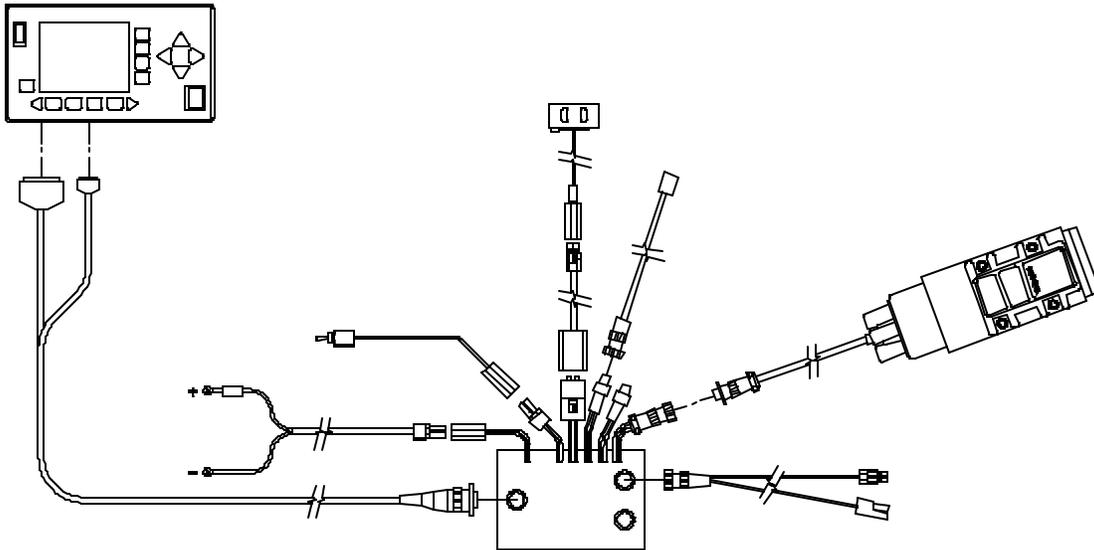
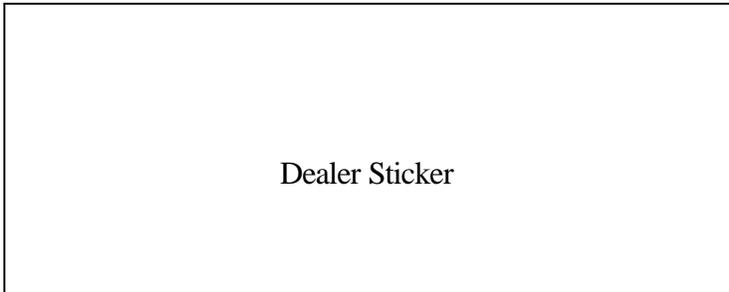


## GENERAL MANUAL FOR MODEL SP.6 DGPS-READY



**SAFETY GUIDELINES**  
**INSTALLATION**  
**OPERATION**  
**TROUBLESHOOTING**  
**PARTS LIST**



This unit may have been built with **SPECIAL FEATURES**. Provide **SERIAL NUMBER** when ordering parts.

**SERIAL NO.** \_\_\_\_\_

**IMPORTANT: READ THE SAFETY GUIDELINES AND ALL INSTRUCTIONS CAREFULLY BEFORE OPERATING**

**HIGHWAY EQUIPMENT COMPANY – NEW LEADER DIVISION**  
**1330 76TH AVE SW, CEDAR RAPIDS, IOWA 52404-7052**  
**PH. (319) 363-8281    www.highwayequipment.com    FAX (319) 632-3081**



# ***NEW LEADER***

***MODEL SP.6 DGPS-Ready***

***SERIAL NUMBER\_\_\_\_\_***

***MANUAL NUMBER: 300410-A***

***EFFECTIVE 8/2003***

***HIGHWAY EQUIPMENT COMPANY  
1330 76<sup>TH</sup> AVE SW  
CEDAR RAPIDS, IOWA 52404-7052***

***PHONE (319) 363-8281***

***FAX (319) 632-3081***

***[www.highwayequipment.com](http://www.highwayequipment.com)***

***BUILDING THE BEST SINCE 1939***

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## NEW LEADER LIMITED WARRANTY

### BASIC WARRANTY

HIGHWAY EQUIPMENT COMPANY ("Highway") has manufactured or is distributing the equipment to which this warranty is attached, and warrants to its original reseller including Dealers, Distributors and Original Equipment Manufacturers (hereafter called Dealer) that the equipment will, under normal conditions of use and service, be free from material defects due to faulty manufacturing for a period of six (6) months from the date of delivery to the original user. For any equipment that does not conform to the aforesaid warranty within six (6) months from the date of delivery to the original user, Highway will, at its option, repair or replace parts, provided that you will pay all labor costs and costs for materials other than parts. If the equipment is defective in materials or workmanship, you must promptly notify your Dealer and return to Highway the warranty registration card (may also fax this information to 800/363-8267 or by utilizing the Internet at [www.highwayequipment.com/warranty.htm](http://www.highwayequipment.com/warranty.htm) and entering in the information) for such equipment before the expiration of the warranty period. If your Dealer determines that the defect is due to Highway's material or workmanship, your Dealer will, within a reasonable time after such notification, repair such defect during normal working hours, at their location, or such other location as the Dealer may designate. This warranty includes only the original equipment manufactured by Highway, and not any parts that may be added to the equipment or replaced by the dealer or user. The installation of any non-Highway manufactured parts in the equipment will void this Basic Warranty in its entirety. In the event of repair or replacement, the warranty period shall not be extended beyond the original warranty period.

### NEW LEADER EXTENDED WARRANTY

In lieu of the basic warranty described above, if the warranty registration card (or warranty card information as provided above) is received at Highway within thirty (30) days after the date of delivery to the original user, Highway will warrant that the equipment will, under normal conditions of use and service, be free from material defects due to faulty manufacturing for a period of twenty-four (24) months from the date of delivery to the original user. For any equipment that does not conform to the aforesaid warranty within twenty-four (24) months from the date of delivery, your Dealer will, at its option, send you a new part, or give you full credit for the part, provided the replacement part is purchased through your Dealer. Labor costs for this extended warranty coverage will be paid by Highway to the dealer at their standard shop rate, based on the amount of time Highway establishes to be the time reasonably necessary to make required repairs. If the equipment is defective in materials or workmanship, you must promptly notify your Dealer before the expiration of the warranty period. If Dealer determines that the defect is due to Highway's material or workmanship, your Dealer will, within a reasonable time after such notification, repair such defect during normal working hours, at their location, or such other location as Dealer may designate. In the event of repair or replacement, the warranty period shall not be extended beyond the original warranty period. **If you fail to return the warranty registration card (or warranty card information as provided above) to Highway within thirty (30) days after the date of delivery, this extended warranty shall not apply, and your sole remedy for any defects in the equipment shall be under the basic warranty described above.**

#### The above warranties do not cover:

- (1) equipment that is damaged by abuse, neglect, accident, or modification;
- (2) fluids, towing, telephone, travel and cleaning cost;
- (3) loss of use of vehicle, inconvenience, commercial loss, or consequential damages;
- (4) any product, component, or part not manufactured by Highway; or
- (5) the equipment itself if non-Highway manufactured parts are installed on the equipment.

#### The above warranties do not apply under the following conditions:

- (1) when equipment has been improperly used or installed, or modified, or fitted with sideboards, or fails because of defects or inefficiency of components not furnished with equipment;
- (2) when equipment is used for purposes for which it was not originally designed or intended;
- (3) when equipment is used under abnormal operating conditions; or
- (4) when the dealer or user fails to follow Highway instructions regarding the equipment, including the instruction to install only Highway-manufactured parts onto the equipment.

**HIGHWAY WILL BEAR NO OTHER EXPENSE, INCLUDING BUT NOT LIMITED TO LABOR AND MATERIAL COSTS (OTHER THAN THOSE SPECIFIED HEREIN) OF ANY KIND, AND YOUR EXCLUSIVE REMEDY, IN LIEU OF ALL INCIDENTAL, SPECIAL, CONSEQUENTIAL OR ANY OTHER DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR NEGLIGENCE, IS LIMITED TO REPAIR OR REPLACEMENT AS HERETOFORE DESCRIBED. THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED OF ANY KIND REGARDING ANY EQUIPMENT, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE OR USE. IN NO CASE SHALL HIGHWAY BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES BASED UPON BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT, OR ANY OTHER LEGAL THEORY.**

Unless modified in a writing, signed by both parties, this Limited Warranty is understood to be the complete and exclusive agreement between the parties, superseding all prior agreements, oral or written, and all other communications between the parties relating to the subject matter of this Limited Warranty. No representative or agent of Highway nor any third party has authority to change or modify this warranty in any respect, nor to assume any other obligation or liability on behalf of Highway. Any action for breach of warranty must be commenced within eighteen (18) months following delivery of the equipment to the original user. This warranty is limited to the United States and Canada.

These warranties are extended only to the original Dealer and are not transferable. In the event of a warranty claim, you should promptly notify your Dealer and provide the following:

1. Model and serial number of the equipment;
2. Date of delivery to the original user;
3. Part number of the defective part;
4. Description of the difficulty encountered.

Highway will work with your Dealer regarding instructions for repair, replacement, or refund, if the warranty claim can be validated.

Effective with equipment delivered to original user on or after August 1, 2003.

**PREFACE****PLEASE! ALWAYS THINK SAFETY FIRST!!**

The purpose of this manual is to familiarize the person (or persons) using this unit with the information necessary to properly install, operate, and maintain this system. These instructions cannot replace the following: the fundamental knowledge that must be possessed by the installer or operator, the knowledge of a qualified person, or the clear thinking necessary to install and operate this equipment. Since the life of any machine depends largely upon the care it is given, we suggest that this manual be read thoroughly and referred to frequently. If for any reason you do not understand the instructions, please call your authorized dealer or our Cedar Rapids, Iowa, Product Support Department at (319) 363-8281.

It has been our experience that by following these installation instructions, and by observing the operation of the spreader, you will have sufficient understanding of the machine enabling you to troubleshoot and correct all normal problems that you may encounter. Again, we urge you to call your authorized dealer or our Cedar Rapids Product Support Department if you find the unit is not operating properly, or if you are having trouble with repairs, installation, or removal of this machine.

We urge you to protect your investment by using genuine HECO parts and our authorized dealers for all work other than routine care and adjustments.

Highway Equipment Company reserves the right to make alterations or modifications to this equipment at any time. The manufacturer shall not be obligated to make such changes to machines already in the field.

This Safety Section should be read thoroughly and referred to frequently.

**ACCIDENTS HURT !!!**

**ACCIDENTS COST !!!**

**ACCIDENTS CAN BE AVOIDED !!!**



**Please Give Part No., Description and Unit Serial No. 300410-A**

## SAFETY



TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THAT OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.

In this manual and on the safety signs placed on the unit, the words “DANGER,” “WARNING,” “CAUTION,” and “IMPORTANT” are used to indicate the following:



**DANGER**

Indicates an imminently hazardous situation that, if not avoided, **WILL** result in death or serious injury. This signal word is to be limited to the most extreme situations and typically for machine components that, for functional purposes, cannot be guarded.



**WARNING**

Indicates a potentially hazardous situation that, if not avoided, **COULD** result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.



**CAUTION**

Indicates a potentially hazardous situation that, if not avoided, **MAY** result in minor or moderate injury. It may also be used to alert against unsafe practices.

**IMPORTANT!**

Is used for informational purposes in areas which may involve damage or deterioration to equipment but generally would not involve the potential for personal injury.

NOTE:

Provides additional information to simplify a procedure or clarify a process.

The need for safety cannot be stressed strongly enough in this manual. At Highway Equipment Company, we urge you to make safety your top priority when operating any equipment. We firmly advise that anyone allowed to operate this machine be thoroughly trained and tested, to prove they understand the fundamentals of safe operation.

The following guidelines are intended to cover general usage and to assist you in avoiding accidents. There will be times when you will run into situations that are not covered in this section. At those times the best standard to use is common sense. If, at any time, you have a question concerning these guidelines, please call your authorized dealer or our factory at (319) 363-8281.



Please Give Part No., Description and Unit Serial No. 300410-A

**SAFETY****AVOID ACCIDENTS**

Most accidents, whether they occur in industry, on the farm, at home, or on the highway, are caused by the failure of some individual to follow simple and fundamental safety rules or precautions. For this reason, most accidents can be prevented by recognizing the real cause and doing something about it before the accident occurs.

Regardless of the care used in the design and construction of any type of equipment, there are many conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation.

A CAREFUL OPERATOR IS THE BEST INSURANCE AGAINST AN ACCIDENT. THE COMPLETE OBSERVANCE OF ONE SIMPLE RULE WOULD PREVENT MANY THOUSAND SERIOUS INJURIES EACH YEAR. THAT RULE IS:

**NEVER ATTEMPT TO CLEAN, OIL OR ADJUST A MACHINE WHILE IT IS IN MOTION.**

NATIONAL SAFETY COUNCIL



**SAFETY DECALS****MAINTENANCE INSTRUCTIONS**

1. Keep safety decals and signs clean and legible at all times.
2. Replace safety decals and signs that are missing or have become illegible.
3. Replaced parts that displayed a safety sign should also display the current sign.
4. Safety decals or signs are available from your dealer's Parts Department or our Cedar Rapids factory.

**INSTALLATION INSTRUCTIONS**

1. **Clean Surface**  
Wash the installation surface with a synthetic, free-rinsing detergent. Avoid washing the surface with a soap containing creams or lotion. Allow to dry.
2. **Position Safety Decal**  
Decide on the exact position before application. Application marks may be made on the top or side edge of the substrate with a lead pencil, marking pen, or small pieces of masking tape. **NOTE:** Do not use chalk line, china marker, or grease pencil. Safety decals will not adhere to these.
3. **Remove the Liner**  
A small bend at the corner or edge will cause the liner to separate from the decal. Pull the liner away in a continuous motion at a 180-degree angle. If the liner is scored, bend at score and remove.
4. **Apply Safety Decal**
  - a. Tack decal in place with thumb pressure in upper corners.
  - b. Using firm initial squeegee pressure, begin at the center of the decal and work outward in all directions with overlapping strokes. **NOTE:** Keep squeegee blade even—nicked edges will leave application bubbles.
  - c. Pull up tack points before squeegeeing over them to avoid wrinkles.
5. **Remove Pre-mask**  
If safety decal has a pre-mask cover remove it at this time by pulling it away from the decal at a 180 degree angle. **NOTE:** It is important that the pre-mask covering is removed before the decal is exposed to sunlight to avoid the pre-mask from permanently adhering to the decal.
6. **Remove Air Pockets**  
Inspect the decal in the flat areas for bubbles. To eliminate the bubbles, puncture the decal at one end of the bubble with a pin (never a razor blade) and press out entrapped air with thumb moving toward the puncture.
7. **Re-Squeegee All Edges.**



**GENERAL DESCRIPTION**

The SP.6 DGPS-Ready controller is designed to control the application rate of dry fertilizer and ag-lime. The controller can program and store up to 30 jobs with personalized names, products, and other settings. Information regarding the rate, ground speed, spinner speed, conveyor speed, product density, and product applied is easily accessed and customer configurable. Rates can be entered manually or received via a serial port (RS-232) connection to a remote device reading a prescription rate file.

The SP.6 also operates with the optional New Leader DGPS-5000 Antenna and Lightbar guidance system. The New Leader DGPS-5000 Antenna and Lightbar are exclusively designed to work with the SP.6 with user-friendly setup and operation commands through the SP.6 display. (The SP.6 on screen setup will not work with other receivers or lightbars.)

This product is intended for commercial use only.



**Please Give Part No., Description and Unit Serial No. 300410-A**

## INSTALLATION INSTRUCTIONS

### GENERAL SYSTEM LAYOUT

The diagram below shows the typical components and cable attachments of the SP.6 control system and its available options.

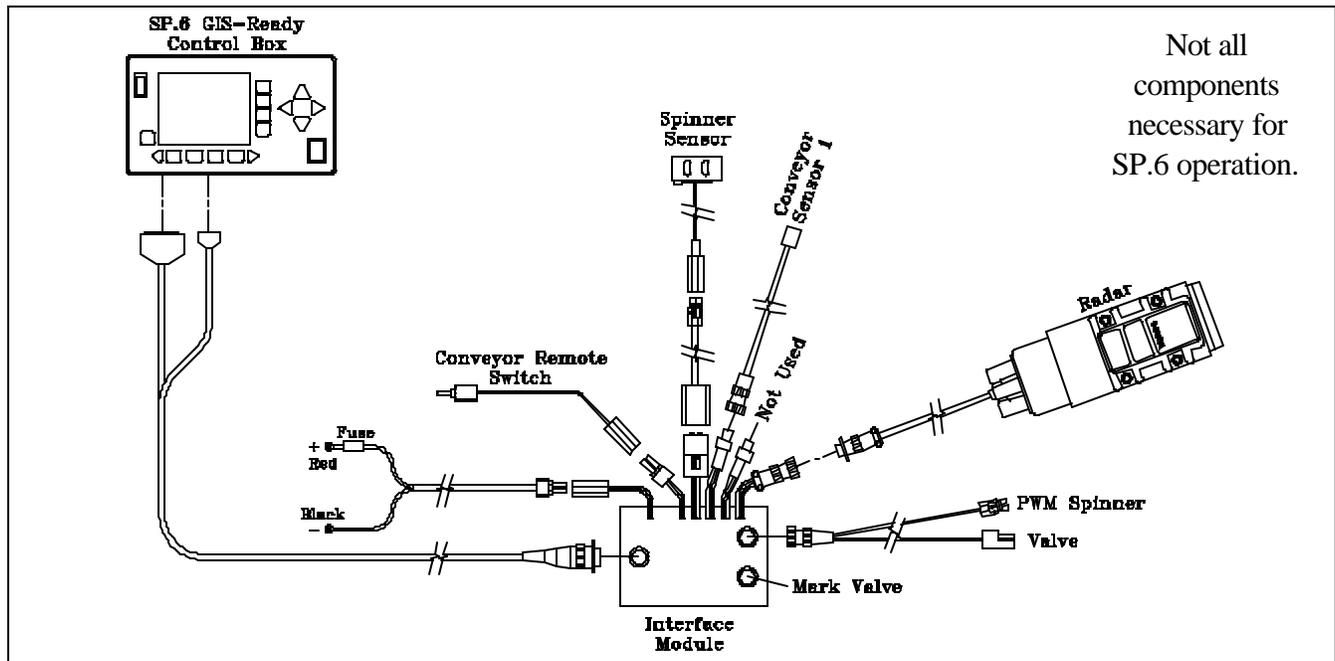


Figure 1

### CONSOLE AND CABLING



#### CAUTION

All holes in the truck cab walls, floor and firewall for control wires, hoses and cables are to be grommets, plugged and sealed to prevent entrance of engine fumes, dust, dirt, water and noise.



#### CAUTION

When drilling holes, make sure that the drill will not puncture the gas tank or harm any other obstruction!

Mount control box to secure support inside vehicle cab, accessible to operator without obstructing or diverting normal driving view. Avoid interference between console and shifting lever or any other vehicle controls. Allow room behind console to permit easy access to cable connections. Console should be mounted out of direct sunlight and installed as far from any two-way radios as possible.

Mount the interface module in a suitable location that is out of the way of the operator. Allow room for cable service loops. After mounting all other system components, connect control cables to the interface. Be careful to route all wire harnesses where they will be protected from pinching, rubbing, sharp edges, and exhaust systems. Use sufficient tie wraps to fasten the harnesses securely.

Make sure all components are connected and console power switch is in off position. Attach power cable to battery. Connect red conductor with fuse holder to battery positive and black conductor to ground.



Please Give Part No., Description and Unit Serial No. 300410-A

## INSTALLATION INSTRUCTIONS CONTINUED

### **IMPORTANT!**

If at anytime an arc welder is used on the vehicle or anything connected to the vehicle, be sure to connect the welders ground directly to one of the two items being welded. Disconnect power cable from the control box! Failure to do so can result in damage to components on both the vehicle and spreader in which case the warranty will be null and void by manufacturer of same.

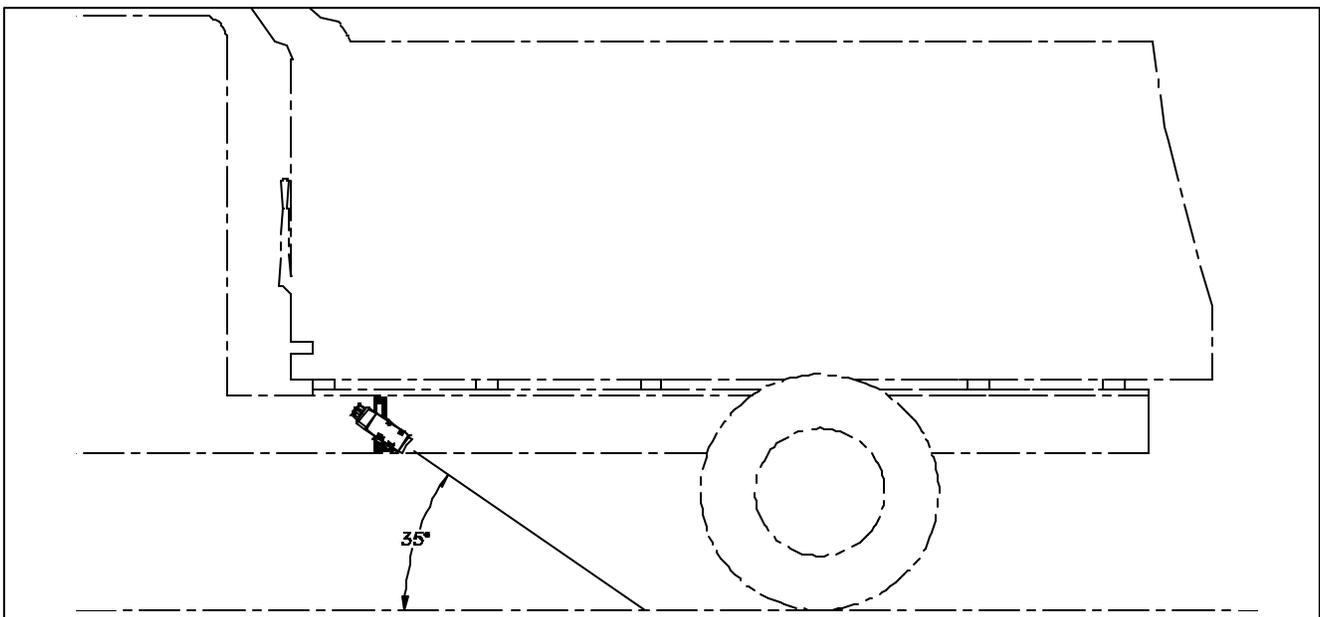
### SPINNER SENSOR

The spinner sensor must be mounted under the right-hand spinner disc in the holes provided. Rotate the disc so that one of the cap screws is directly above the sensor. Position the sensor 1/8-inch or less below the cap screw and tighten the sensor hardware. If the distance between the sensor and the spinner cap screw is more than 1/8 inch, the sensor may not get a good RPM reading.

### RADAR

The mounting of the radar unit will vary with the type of vehicle. The mounting kit supplied uses an "L" shaped bracket and mounting plate. There is also a plate mounting bracket drawing that can be used to fabricate a bolt-on version. Refer to the installation instructions included with the radar for more information.

The radar should be mounted facing rearward and at a 35° angle horizontally. (Figure 2)



**Figure 2 - Radar Mounting Angle**

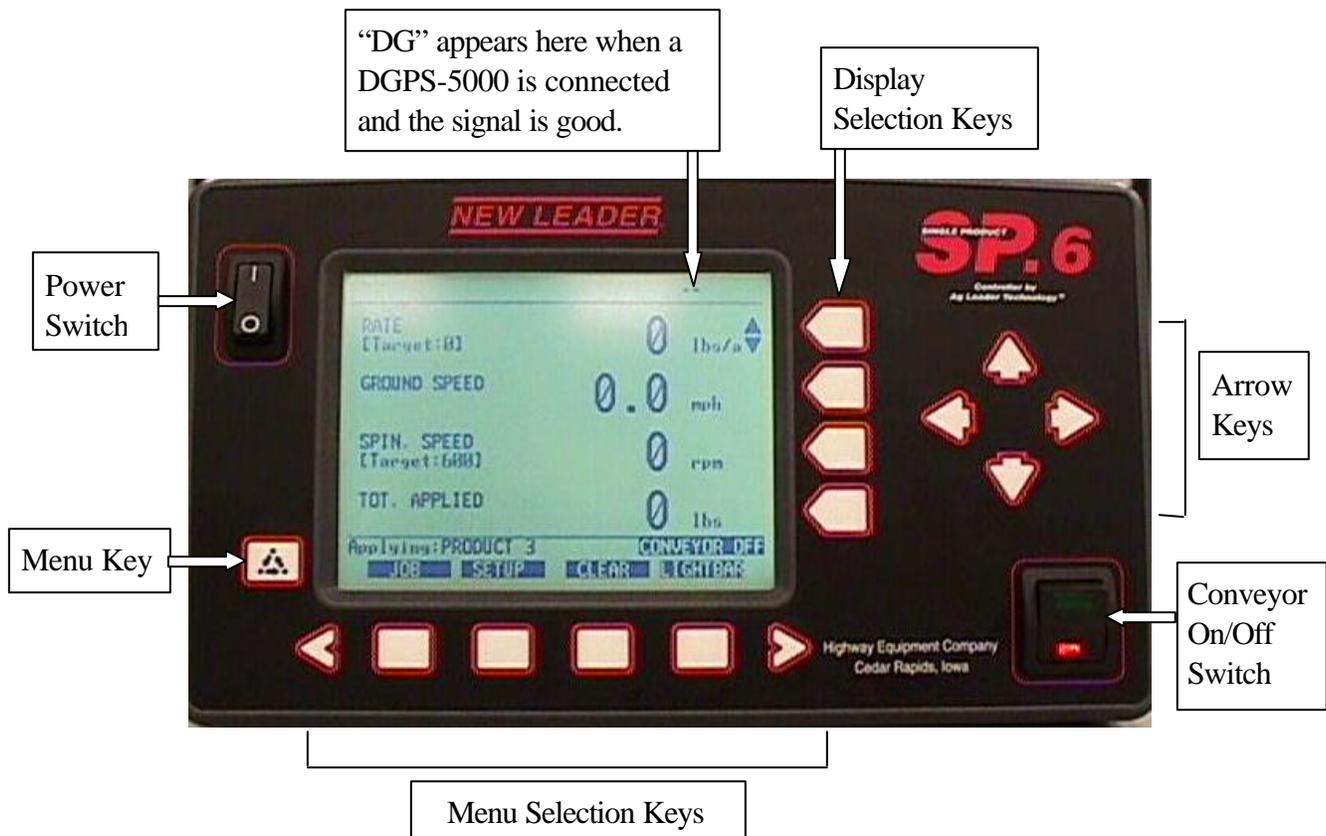


## CONSOLE OVERVIEW

### KEYPAD AND DISPLAY

The first step in operating the SP.6 is to understand the function of the keys and how they relate to the console display. There are two toggle switches and four groups of unlabeled white push keys. The push key groups are defined as Arrow keys, Display Selection keys, Menu key, and Menu Selection keys. Display Selection key and Menu Selection key labels appear on the display adjacent to these keys.

A summary of key functions follows. A Quick Reference sheet is included with the SP.6 and is a handy tool.



**Figure 3**

Power Switch: Selects power ON (|) and OFF (O) for the console.

Conveyor Switch: Turns the main conveyor ON (green) and OFF (red).

Menu Key : Used to exit setup screen or advance menu display.

Menu Selection Keys: Activates the menu or picks the command displayed directly above the key. The left and right arrow keys display other menu choices when arrows are displayed.

Display Selection Keys: Selects the display line to the left of the key and displays a new menu selection at the lower edge of the display.

Arrow Keys: Changes value of a selected display line when up and down arrow symbols are present. Used to navigate setup screens and change values of highlighted areas.



## CONSOLE OVERVIEW

Figure 4 is an example of the main screen of the SP.6 that is displayed on power up. The display shows four typical on-the-go parameters. A menu selection area is along the lower edge of the screen. The menu selection area also displays current information about an active job or machine condition. The Quick Reference sheet included with the SP.6 shows an overview of different screens.

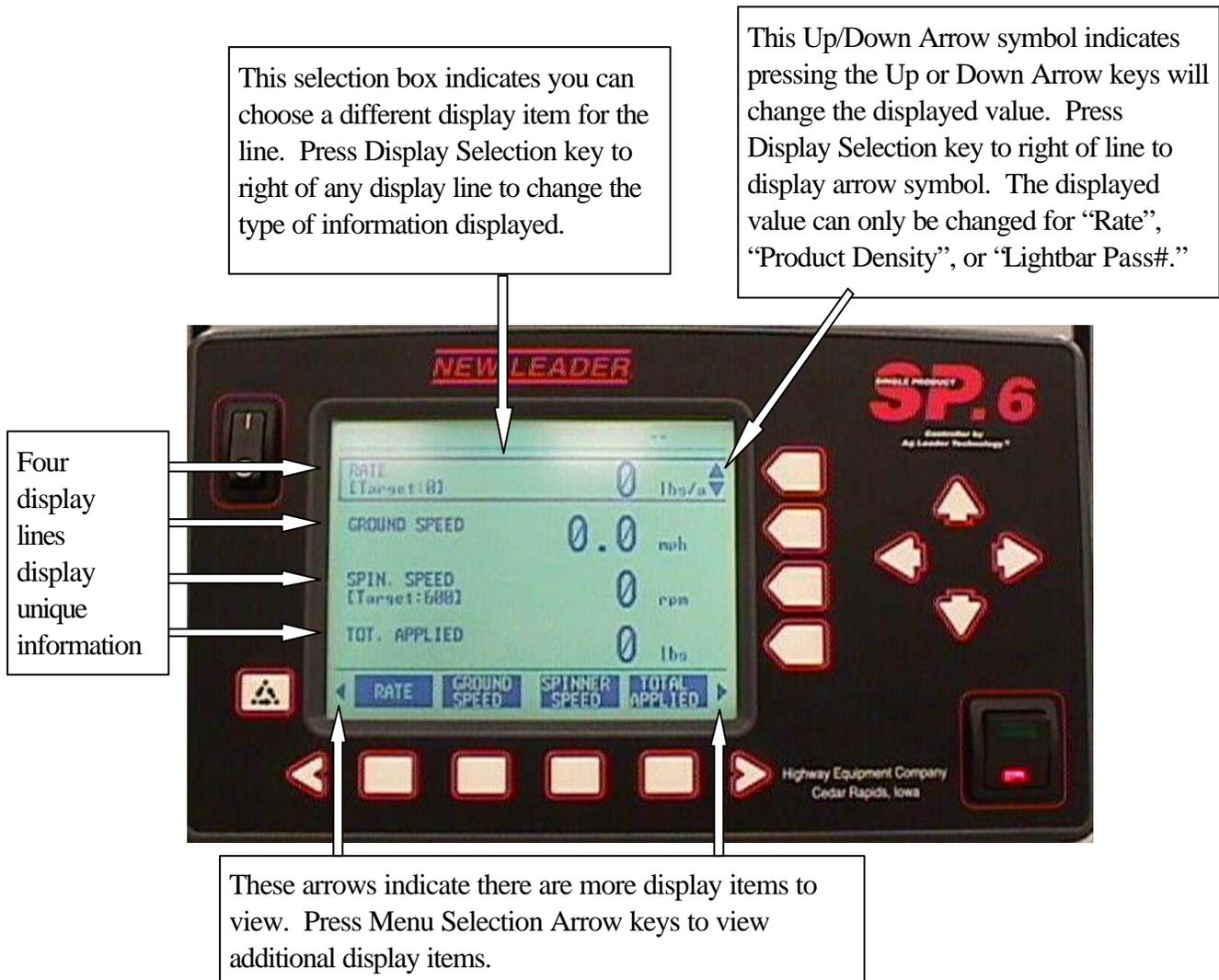


Figure 4



## CONSOLE OVERVIEW CONTINUED

### MAIN SCREEN DISPLAY

To change the display items on the start up screen, press the Display Selection key to the right of the display line you wish to change. A box appears around the display line and four possible display items appear at the bottom of the screen in the menu selection area. Pressing the Menu Selection Arrow keys scroll the menu to display new choices.

To select a new display item, press the Menu Selection Key below the item you want to view. This will replace the previous display line with the one just chosen. You can change all four display lines to the information you want to view and arrange them in any order.

The choices of the display lines include:

**Rate** - Displays application rate. Up/down arrows at the right of the display line indicate the rate can be changed. Select the line and use the Arrow keys to change the rate.

**Ground Speed** – Displays truck speed using a radar or GPS signal. Also displays selected manual speed.

**Spinner Speed** – Displays actual spinner speed. The target rate for the job setting is displayed at left.

NOTE: Controlling spinner speed with the SP.6 console requires optional PWM spinner valve.

**Total Applied** – Displays total amount of material applied. Reset to zero using the Menu Selection key under Clear.

**Area Applied** – Displays total area applied. Reset to zero using the Menu Selection key under Clear.

**Conveyor RPM** – Displays the conveyor revolutions per minute.

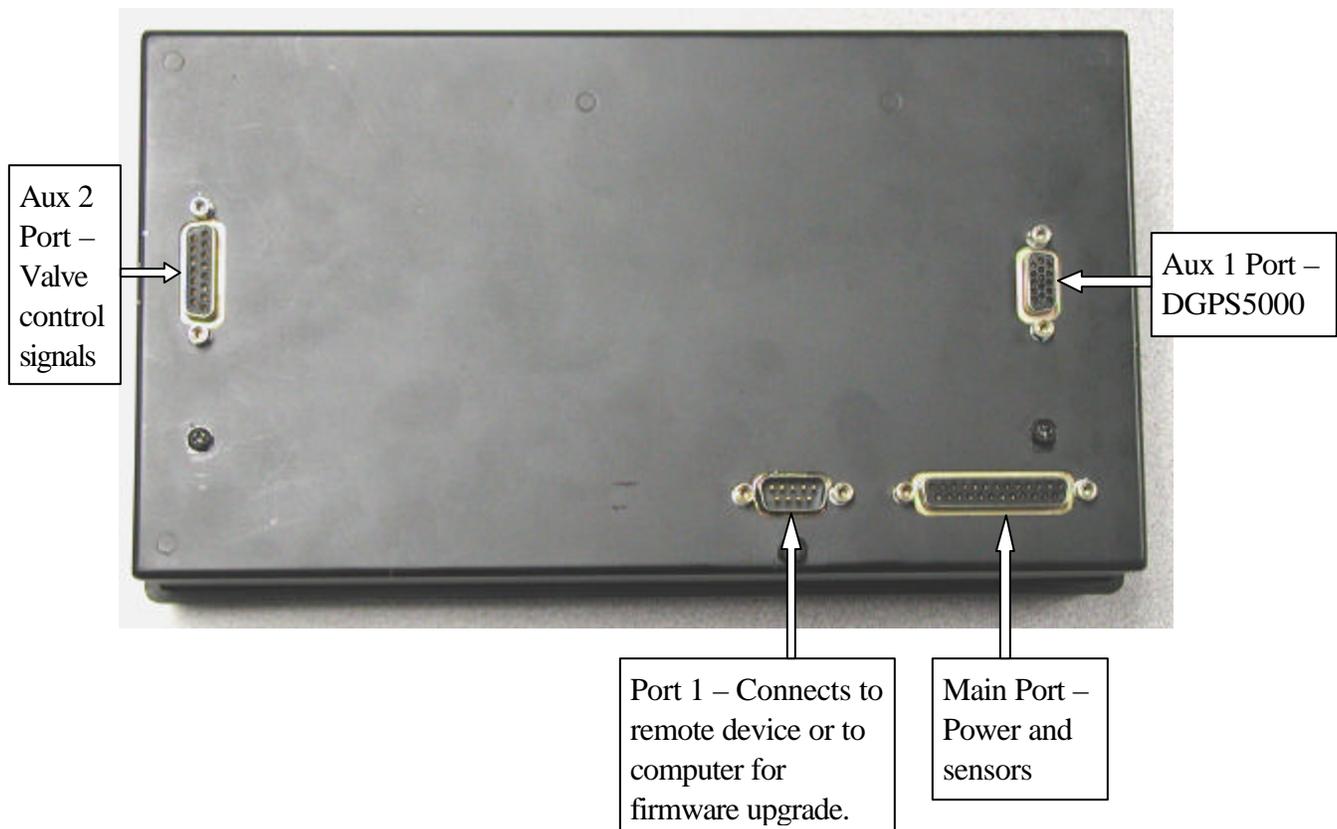
**Lightbar Pass#** - Displays pass number and direction from A-B line when optional DGPS is connected. Line can be selected to change pass number or direction using Menu Selection Arrow keys. See DGPS & Lightbar Manual for further information. [NOTE: Do not display if DGPS system is not connected.]

**Density** - Displays product density. Up/down arrows at the right of the display line indicate the density can be changed. Select the line and use the Arrow keys to change the density.



## CONSOLE OVERVIEW CONTINUED

### CABLE CONNECTIONS:



**Figure 5**

## CALIBRATION AND MACHINE SETTINGS

### CONFIGURATION SETUP

Configure and calibrate the SP.6 to match the spreader being used prior to running any job and spreading material. The console can also be set up to match the preferences of the user. Any optional GPS must also be configured – see your DGPS & Lightbar manual for more information.

To begin the configuration of your SP.6:

- a) Start from the main screen and press Menu Selection Key directly under SETUP. The screen changes to Setup Options display.
- b) Press Menu Selection Key to enter a setup area for Machine settings, Cal radar, Console, Diagnostic or GPS. Press right and left Menu Selection Arrow keys for additional selections.

An optional power supply is available to make machine and console settings or view system diagnostics from your home, office, or shop.

### MACHINE SETTINGS

From main screen, press SETUP key. Press MACHINE SETTINGS key. The screen shown in Figure 6 appears.

| MACHINE SETTINGS           |                  |
|----------------------------|------------------|
| <b>Conveyor valve type</b> | <b>Motorized</b> |
| Spinner valve type         | PWM              |
| Theoretical CFR            | 0.256 cu.ft/rev  |
| Ground speed sensor        | RADAR            |
| Manual speed               | 10.0 mph         |
| Conveyor switch            | INTERNAL         |
| Maximum conveyor rpm       | 50 rpm           |
| Spinner pulses/rev         | 4                |
| Conveyor pulses/rev        | 180              |
| Motorized Valve cal        | 3572             |
| <b>EDIT</b>                | <b>EXIT</b>      |

Figure 6



## CALIBRATION AND MACHINE SETTINGS CONTINUED

To change the settings shown on this screen...

- a) Use Up or Down Arrow Key to highlight a setting.
- b) Press EDIT key. The value will be highlighted.
- c) Press Up or Down Arrow key to change value. [NOTE: Theoretical CFR, Manual speed, Maximum conveyor rpm, Spinner pulses/rev, Conveyor pulses/rev, and Valve cal values can be set one digit at a time. Press Left or Right Arrow key to move a single cursor to the digit to change. Press Up or Down Arrow key to set the digit to the desired value. Move the cursor to the right or left and set all digits to the correct value.]
- d) Press ACCEPT key to accept new value for setting. Press CANCEL key to keep old setting

Press EXIT key to return to Setup Options screen. Press Menu Key to  return to main screen.

### Machine Setting Details

#### **Conveyor Valve Type –**

Set to **MARKIV.2** or **MARKIV.4** to match the appropriate Mark valve of the spreader.

Set to **MOTORIZED** if spreader is equipped with a Raven, Dickey-john, Midtech or other type of motorized valve. NOTE: Different valves will require an optimized setting of the motorized valve calibration number.

#### **Spinner Valve Type –**

Set to **MANUAL** if the spreader's spinner control valve is adjusted with a mechanical lever on the valve body.

Set to **PWM** if spreader is equipped with an optional PWM valve.



**CALIBRATION AND MACHINE SETTINGS CONTINUED****Theoretical CFR**

This CFR is the theoretical volume of product dispensed for each revolution of the conveyor shaft with a gate setting of one inch. The units of measure are cubic feet per revolution per inch of gate opening (metric units are cubic centimeters per revolution per centimeter of gate opening).

Refer to the tables below for the initial setting. This setting becomes the default value for the CFR in each job. [NOTE: Every machine will have a slightly different performance and every product will have a slightly different flow characteristic. Fine-tuning to a Calibrated CFR is done under JOB SETTING. Please refer to the procedure described in that section of the manual.]

| <b>Theoretical Conveyor Rate Values</b> |                      |              |
|---|----------------------|--------------|
| <b>Conveyor Rate</b>                    | <b>Conveyor Type</b> | <b>Model</b> |
| .192 cu. ft/rev                         | Chain & BOC          | L2020G4      |
| .237 cu. ft/rev                         | Belt                 | L2020G4      |
| .256 cu. ft/rev                         | Chain & BOC          | L3020G4      |
| .256 cu. ft/rev                         | Chain & BOC          | L3020XP      |
| .305 cu. ft/rev                         | Chain & BOC          | L7020        |
| .361 cu. ft/rev                         | Chain                | L7000        |

| <b>Theoretical Conveyor Rate Values (metric)</b> |                      |              |
|--|----------------------|--------------|
| <b>Conveyor Rate</b>                             | <b>Conveyor Type</b> | <b>Model</b> |
| 2140 cu. cm/rev                                  | Chain & BOC          | L2020G4      |
| 2641 cu. cm/rev                                  | Belt                 | L2020G4      |
| 2853 cu. cm/rev                                  | Chain & BOC          | L3020G4      |
| 2853 cu. cm/rev                                  | Chain & BOC          | L3020XP      |
| 3399 cu. cm/rev                                  | Chain & BOC          | L7020        |
| 4023 cu. cm/rev                                  | Chain                | L7000        |



**CALIBRATION AND MACHINE SETTINGS CONTINUED****Ground Speed Sensor**

Set to **RADAR** to use a Radar Gun as the source of ground speed.

Set to **GPS** to use the New Leader DGPS-5000 as the source of ground speed.

Set to **MANUAL** to use the manual speed setting as the source of ground speed.

If you choose the GPS setting and the differential signal is lost, ground speed from the DGPS-5000 will go to zero. However, if a radar gun is detected, the SP.6 will automatically switch to the radar before ground speed goes to zero.

The Manual setting can be used when you cannot get ground speed from a radar gun or the DGPS-5000. During application you must hold your travel speed the same as the manual speed setting or the rate applied will be incorrect. New Leader recommends using the manual setting for emergency use only. In Manual mode, the application accuracy depends on the ability of the operator to drive at the programmed manual speed.

The Manual setting is also used to empty leftover product from a stationary vehicle or to fine-tune the CFR.

**Manual Speed**

Set to desired ground speed for manual operation. When the above Ground Speed Sensor setting is "Manual," ground speed is always equal to this setting.

**Conveyor Switch**

Either the console switch or an optional remote switch can be used to turn on/off the conveyor. The default setting is "Internal."

The internal conveyor switch is on the bottom right of the front of the SP.6. Put it in the up position to turn the conveyor on (Green). Put it in the down position to turn the conveyor off (Red).

Set to **INTERNAL** to use switch on bottom-right of SP.6 front panel to turn conveyor on and off.

Set to **REMOTE** to use an optional remote switch to turn the conveyor on and off.



**CALIBRATION AND MACHINE SETTINGS CONTINUED****Maximum conveyor rpm**

Set to the maximum allowed conveyor RPM. If the vehicle speed is too fast for the programmed application rate and the conveyor rpm would need to exceed this setting, the SP.6 will beep and flash “Maximum Conveyor RPM, Slow Down”. [NOTE: The actual conveyor rpm will not exceed this setting. If the warning to slow down is ignored, the rate applied will be incorrect.]

Set to **50** for an L3020G4.

Set to **40** for an L2020G4.

Set to **60** for an L3020XP.

**Spinner pulses/rev**

Set to the number of pulses generated by the spinner speed sensor per revolution of the spinner disk.

Set equal to number of fins on the disk.

If a spinner sensor is not active, set to zero. This disables any spinner speed alarm that would be generated when the spinner speed does not match the job setting. NOTE: If this is set to zero with a PWM valve, the spinner will run at maximum RPM.

**Conveyor pulses/rev**

Set to the number of pulses per revolution generated by the shaft speed sensor.

The shaft speed sensor is used in combination with any motorized conveyor valve. The Mark Valves do not need a shaft speed sensor. To assure smooth operation of the spreader, a rate sensor with a minimum of 180 pulses per revolution should be used.

**Motorized Valve cal**

Factory set to 3572 for Raven valve. Set to 5552 for DICKEY-john valve. This setting controls the reaction time of the motorized conveyor valve to the feedback of the shaft speed sensor. This setting is only valid when the Conveyor valve type is set to Motorized and the conveyor is actually driven by a motorized valve.

This setting should not be changed without consulting your New Leader Dealer

Press EXIT key to return to Setup Options screen. Press Menu Key to return to main screen.



## CALIBRATION AND MACHINE SETTINGS CONTINUED

### DISTANCE CALIBRATION: RADAR

**NOTE:** A job must be active to calibrate radar.

Refer to *Activating Jobs* in “Operating Procedures” section.

From the main screen, press SETUP key. Press CAL RADAR key. The screen in Figure 7 appears.

- Find a good place to travel back and forth in a straight line. Measure and mark off a travel distance. A minimum distance of 200 feet is required.
- Press Display Selection key next to display line for “Actual Distance”. A box should appear around the display line. By pressing Up or Down Arrow keys, set “Actual Distance” to equal the marked off distance.
- Position the vehicle at the beginning of the marked off distance.
- Press START TRAVEL key and drive vehicle to end of marked off distance. Stop at end marker.
- Press STOP TRAVEL key.
- Press PERFORM CAL key.
- Repeat steps c-e to verify the displayed “Measured Distance” equals the “Actual Distance”. If not, repeat the calibration.
- Press EXIT key.
- Press Menu Key  to return to main screen.
- Traveling in a straight line, verify the displayed “Ground Speed” on main screen is correct.

| DISTANCE CALIBRATION: RADAR |  |             |      |
|-----------------------------|--|-------------|------|
| ACTUAL DISTANCE:            | 200 ft  |             |      |
| MEASURED DISTANCE:          | 0 ft   |             |      |
| PULSES / 100 FT:            | 2000   |             |      |
| START TRAVEL                | CLEAR DISTANCE   | PERFORM CAL | EXIT |

Figure 7



## CALIBRATION AND MACHINE SETTINGS CONTINUED

### CONSOLE

#### Console Setup - Display Brightness / English or Metric / Date & Time

From the main screen, press SETUP key. Press CONSOLE key. The screen in Figure 8 appears.

To change the settings shown on this screen...

- a) Use Up or Down Arrow key to select or highlight the setting.
- b) Press EDIT key. The value will be highlighted.
- c) Press Up or Down Arrow keys to change the value. [NOTE: The date and time fields are set one field at a time by using the Left or Right Arrow key to select. Serial number, Voltage cal, and Display brightness values can be set one digit at a time. Press Left or Right Arrow Key to move a single cursor to the digit to change. Press Up or Down Arrow key to set the digit to the desired value. Move the cursor to the right or left and set all digits to the correct value.]
- d) Press ACCEPT key to accept the new value for the setting. If you decide to keep the old setting press CANCEL key.

Press EXIT key to return to Setup Options screen. Press Menu Key to  return to main screen.

| CONSOLE SETUP                 |                   |
|-------------------------------|-------------------|
| <b>Units of Measure</b>       | <b>ENGLISH</b>    |
| <b>Month/Day/Year</b>         | <b>8/19/03</b>    |
| <b>Time</b>                   | <b>9:46:47 AM</b> |
| <b>Serial number</b>          | <b>2002160003</b> |
| <b>Voltage cal</b>            | <b>479</b>        |
| <b>Display brightness</b>     | <b>80%</b>        |
| <b>Display rate smoothing</b> | <b>ON</b>         |
| <b>EDIT</b>                   | <b>EXIT</b>       |

Figure 8

#### Console Setup Details

##### **Units of Measure**

Set to **ENGLISH** to apply based on pounds/acre or tons/acre.

Set to **METRIC** to apply based on kilograms/hectare or tonnes/hectare.



**CALIBRATION AND MACHINE SETTINGS CONTINUED****Month/Day/Year**

The month/day/year should be correct when the monitor is new. If it is not, press EDIT key. Press Up or Down Arrow key to change month. Press Right Arrow key to move to day. Use Up or Down Arrow key to change day. Press Right Arrow key again and change the year. Press ACCEPT key.

**Time**

The time should be correct when the monitor is new. If it is not, press EDIT key. Press Up or Down Arrow key to change hour. Press Right Arrow key to move to minutes. Use Up or Down Arrow key to change minutes. Press Right Arrow key again and change seconds. Press ACCEPT key.

**Serial number**

This will be set correct from the factory. It should match the serial number stamped on the serial number tag of the monitor. Do not change this setting.

**Voltage cal**

This will be set correct from the factory. Do not change this setting.

The SP.6 uses this to determine the battery voltage (displayed under SETUP key, DIAGNOSTIC key). This setting should only be changed if is not between 440-540. In that case set it to 490.

**Display brightness**

This setting controls the brightness of the display backlight. It affects how readable the display appears during different ambient light conditions.

The default setting is 80%. If too bright, decreasing the percentage dims the display. If not bright enough, increase the percentage.

The brightness will not change until ACCEPT key is pressed.

**Display rate smoothing**

The default setting is ON. This setting affects how the actual rate is displayed on the main screen. If the setting is ON, the display rate remains fixed if the actual rate is very close to the target. This permits the user to easily read the displayed rate.

If the setting is OFF, the display rate is always the actual rate. With this setting, the display may appear to be constantly changing a small amount as the controller is fine tuning the system and quickly reporting the information.

This setting only affects the display readability. It does not affect the accuracy of the actual rate being applied.



## PROGRAMMING A JOB

### JOB DESCRIPTION

The SP.6 can store up to 30 separate jobs. A job is a group of unique application and machine settings that are used to apply a particular product. Once a job is created, the SP.6 stores it until you delete it.

An active Job is the job that appears on the main screen. The active job settings are used to control the application of product. Every time a different job is activated for use, the SP.6 automatically is set to properly apply that product using the stored values. Settings for Units/acre, Application rate, Spread width, Feed gate opening, Product density, Product, Spinner speed, Fan frame setting, and Calibrated CFR are used for each job.

### CREATING THE FIRST JOB

The very first time a console is used, there will be no active job available. You must create a new job.

From main screen, press JOB key. The screen in Figure 9 appears.

| ACTIVE JOB |      |            |         |        |
|------------|------|------------|---------|--------|
| ACTIVE JOB |      |            |         |        |
| PRODUCT    | RATE | WIDTH      | SPINNER | GATE   |
| --NONE--   |      |            |         |        |
| ACCEPT     |      | CHANGE JOB |         | CANCEL |

Figure 9



## PROGRAMMING A JOB CONTINUED

Press CHANGE JOB key. The screen in Figure 10 appears.

| ACTIVE JOB                  |          |            |                |
|-----------------------------|----------|------------|----------------|
| PRODUCT                     | RATE     | WIDTH      | SPINNER ACTIVE |
| PRESS <b>CREATE JOB</b> KEY |          |            |                |
| ACTIVE ON/OFF               | EDIT JOB | CREATE JOB | EXIT           |

Figure 10

Press CREATE JOB key. The screen in Figure 11 appears. The settings shown are default settings.

| JOB SETTINGS      |            |           |
|-------------------|------------|-----------|
| Units/acre        | Tons       |           |
| Application rate  | 0.0        | tns/ac    |
| Spread width      | 60         | feet      |
| Feed gate opening | 2.00       | inches    |
| Product density   | 60.0       | lbs/cu.ft |
| Product           | None       |           |
| Spinner speed     | 600        | rpm       |
| Fan frame setting | 3.00       | inches    |
| Calibrated CFR    | .256       | cu.ft/rev |
| EDIT              | DELETE JOB | EXIT      |

Figure 11



## PROGRAMMING A JOB CONTINUED

General instructions to change the settings shown on this screen:

- a) Use Up or Down Arrow key to highlight a setting.
- b) Press EDIT key. The value will be highlighted.
- c) Press Up or Down Arrow key to change the value. [NOTE: Application rate, Spread width, Product density, Spinner speed, and Calibrated CFR values can be set one digit at a time. Press Left or Right Arrow Key to move a single cursor to the digit to change. Press Up or Down Arrow key to set digit to desired value. Move cursor to the right or left and set all digits to the correct value.]
- d) Press ACCEPT key to accept the new value for the setting or press CANCEL key to keep the old value.

Changing the Product value is detailed separately under *Product* heading on the following pages.

### Job Setting Details

#### **Units/acre**

Set to **TONS** when applying lime or other high rate product by the ton (metric units are tonnes).

Set to **POUNDS** when applying fertilizer or like product by pound (metric units are kilograms).

#### **Application Rate**

Set to the desired nominal application rate for the job. This setting automatically becomes the application rate when the job is activated and will appear on the main screen if Rate is selected as a display line.

NOTE: After a job is entered, the Application Rate setting can be edited from the main screen. Changing the Application Rate from the main screen will reset the job application rate value.

#### **Spread Width**

Set to the effective spread width in feet (metric units are meters). New Leader recommends pan testing every new product to determine the actual effective spread width for given spinner speeds and fan settings. Consult your spreader manual for instructions on pan testing.

When an optional New Leader DGPS-5000 and Lightbar are connected, the swath for the Lightbar is automatically set equal to the spread width.

#### **Feed gate opening**

##### **IMPORTANT!**

Actual feedgate opening of spreader must match setting for active job or rate applied will not be correct! Measure depth of product on conveyor.

Set to the correct feedgate opening in inches for the job (metric units are centimeters).



## PROGRAMMING A JOB CONTINUED

### Product density

Set to the density of the product in pounds per cubic feet (metric units are kilograms per cubic meter).

NOTE: After a job is entered, the Product Density setting can be edited from main screen. Changing Product Density from main screen will reset the job product density value.

### Product

Use this setting to identify the product type, such as “LIME” or “DAP”. Up to 12 characters can be used to create a product name for each job. If you do not wish to customize the product field, the SP.6 uses a default of Product 1, Product 2, Product 3, etc.

The same product name can be picked for two or more separate jobs, but you should consider that for any active job, the name of the product appears in the lower left corner of the main screen.

Edit the Product by:

- From Job Settings screen, press EDIT key. The screen in Figure 12 appears.
- Press EDIT NAME key. A cursor appears on the first character of the name.
- Press Up or Down Arrow key to scroll to a different letter or number.  
NOTE: To erase a character, scroll to the blank space character located between “9” and “A”
- Press Right and Left Arrow keys to move the cursor to a different letter.
- After all the letters are set press ACCEPT key to return to the screen in Figure 12.
- Press ACCEPT key again to set the selected product for the job and return to the Figure 11 screen or press the CREATE NEW key to create a new product if desired.

| PRODUCT   |           |            |        |
|-----------|-----------|------------|--------|
| PRODUCT 1 |           |            |        |
|           |           |            |        |
| ACCEPT    | EDIT NAME | CREATE NEW | CANCEL |

Figure 12



## PROGRAMMING A JOB CONTINUED

### Spinner Speed

Set to the target spinner speed required to achieve the desired spread width. New Leader recommends pan testing every new product to determine the settings necessary for a good spread pattern. Consult your spreader manual for instructions on pan testing.

If your spreader is equipped with an optional PWM spinner valve and the machine setting for the spinner valve is configured correctly, the spinner speed is automatically maintained at the job setting within the limits of the hydraulic circuit. This control is “closed loop”. The SP.6 reads the actual spinner speed, compares the speed with the programmed target speed and adjusts the valve accordingly.

The SP.6 will sound an alarm when the spinner speed is 50 or more rpm above or below this setting.

If your spreader is equipped with a manual spinner valve, the Spinner Speed and target can be displayed as one of the four lines of the main menu.

### Fan Frame Setting

Set to record the correct fan frame setting. New Leader recommends pan testing every new product to determine the settings necessary for a good spread pattern. Consult your spreader manuals for instructions on pan testing.

#### **IMPORTANT!**

The actual fan frame setting must match the SP.6 active job to assure consistent results!

### Calibrated CFR

This value defaults to the Theoretical CFR entered in the machine setting (see *Theoretical CFR* in “Calibration & Machine Settings” section of this manual). All products have unique flow characteristics that can vary the rate of actual product conveyed through any given feedgate opening. The Calibrated CFR allows the user to fine tune this value for any job. To insure the greatest accuracy possible, New Leader recommends a static test to determine the calibrated CFR. See Appendix X for the recommended procedure.

After testing, set to the recorded CFR.

### Completing First Job Program

Press EXIT key when you have finished entering values for the initial job on the Job Setting screen (Figure 11), and the active job screen in Figure 13 appears.





**PROGRAMMING A JOB CONTINUED****Activating Jobs**

- a) Press Up or Down Arrow key to highlight the job you want to activate.
- b) Press ACTIVE ON/OFF key to check the job as active.
- c) Press EXIT key. A screen appears summarizing the settings of the active job.
- d) Press ACCEPT key to accept job as active and return to main screen.

NOTE: If the spinner valve is the optional PWM valve, the spinner will turn on when the ACCEPT key is pressed to set a job as active. If the ACCEPT key is pressed and no jobs are checked as active, the spinner will be off.

**Creating New Jobs**

- a) Press CREATE JOB. The Job Settings screen (Figure 11) will appear.
- b) Use the Up or Down Arrow key to highlight a setting.
- c) Press EDIT key. The value will be highlighted.
- d) Press Up or Down Arrow key to change the value. [NOTE: Application rate, Spread width, Product density, Spinner speed, and Calibrated CFR values can be set one digit at a time. Press Left or Right Arrow Key to move a single cursor to the digit to change. Press Up or Down Arrow key to set the digit to desired value. Move cursor to right or left and set all digits to the correct value.]
- e) Press ACCEPT key to accept the new value for the setting or press CANCEL key to keep the old value.
- f) When complete, press EXIT to return to Active Job screen (Figure 13) and activate job if desired.

**Editing Jobs**

- a) Press Up or Down Arrow key to highlight the job you want to activate.
- b) Press EDIT JOB. The Job Settings screen (Figure 11) will appear.
- c) Use Up or Down Arrow key to highlight a setting.
- d) Press EDIT key. The value will be highlighted.
- e) Press Up or Down Arrow key to change the value. [NOTE: Application rate, Spread width, Product density, Spinner speed, and Calibrated CFR values can be set one digit at a time. Press Left or Right Arrow key to move a single cursor to the digit to change. Press Up or Down Arrow key to set digit to desired value. Move cursor to the right or left and set all digits to the correct value.]
- f) Press ACCEPT key to accept the new value for the setting or press CANCEL key to keep old value.
- g) When complete, press EXIT to return to the Active Job screen (Figure 13) and activate job if desired.

**Deleting Jobs**

- a) Press Up or Down Arrow key to highlight the job you want to delete.
- b) Press EDIT JOB key. The Job Settings screen (Figure 11) will appear.
- c) Press DELETE JOB. The SP.6 returns to the Active Job screen (Figure 13) and the job is deleted.



## OPERATING PROCEDURES

### ACTIVATING JOBS



#### **WARNING**

Stay clear of all moving parts. Entanglement of clothes, any part of your body or anything you have in your hands can cause serious injury.

- a) Press JOB key.
- b) Press CHANGE JOB key.
- c) Press Up or Down Arrow key to highlight desired job.
- d) Press ACTIVE ON/OFF key to check the highlighted job.
- e) [If you are unsure of the required feedgate or fan frame setting, Press EDIT JOB to view. Press EXIT to return to the Active Job screen.]
- f) Press EXIT key.
- g) Verify feedgate and fan frame setting according to settings in active job. Adjust spinner valve manually, if applicable, to achieve target spinner speed for the job. The SP.6 automatically adjusts the optional PWM spinner valve to the job setting.
- h) Press ACCEPT key to accept the activated job and return to main screen.  
If hydraulics are turned on and the spinner valve is the optional PWM type, the spinner will start turning.

### CLEARING TOTAL AND AREA APPLIED

At the main screen, press CLEAR button. A warning message appears. Press ACCEPT key to clear the total applied and area applied.

The total applied and area applied must be cleared when switching between tons/ac jobs and pounds/ac jobs. Otherwise the total applied amount will be incorrect.



### OPERATING PROCEDURES CONTINUED

#### CHANGING RATE

A default application rate is setup and stored for each job. When a job is activated, the pre-set rate for that job can be set to appear on one of the four display lines of the main screen. Refer to the “Console Overview” section if you need to change the displayed items.

To override the job rate on-the-go:

- a) Make sure the arrows symbol is displayed next to the Rate display line as shown in Figure 14. If the arrows symbol is not displayed, press adjacent Display Selection Key twice to activate and remove the selection box.
- b) Press Up or Down Keys to change to the desired rate. The rate is incremented by:
  - 0.1 if units are tons/ac or tonnes/ha
  - 10 if units are pounds/ac or kilograms/ha

The new rate is permanently stored as the default in the active job setting and will remain even if the JOB menu is entered or if the SP.6 power is shut off and turned back on.

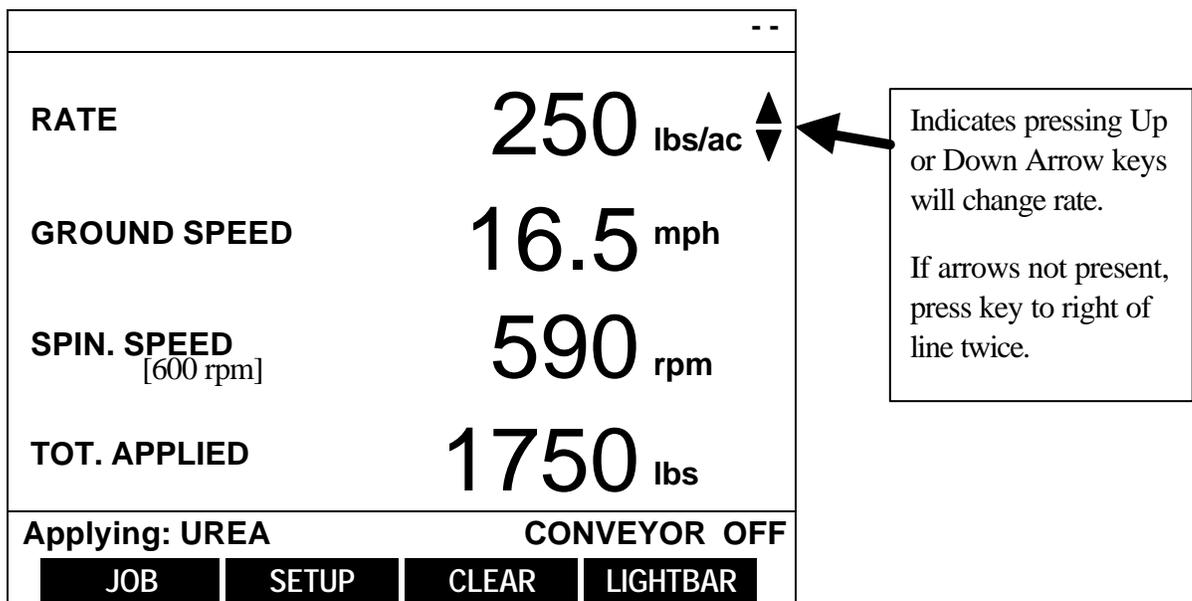


Figure 14



## OPERATING PROCEDURES CONTINUED

### CHANGING DENSITY (in Active Job)

A default product density is setup and stored for each job. When a job is activated, the pre-set density for that job can be set to appear on one of the four display lines of the main screen. Refer to “Console Overview” section if you need to change the displayed items.

To override the product density from the main screen:

- a) Make sure the arrows symbol is displayed next to the Density line. If the arrows symbol is not displayed, press the adjacent Display Selection Key twice to activate and remove the selection box.
- b) Press Up or Down Keys to change to the desired rate. The density is incremented by 1.0 pounds/ac or kilograms/ha

The new density is permanently stored as the default in the active job setting and will remain even if the JOB menu is entered or if the SP.6 power is shut off and turned back on.

### SPINNER SPEED

When the optional PWM spinner valve is installed on your spreader and the appropriate Machine Settings are set to operate the valve, spinner speed adjustment can be made through the SP.6. This control is “closed loop”. The SP.6 reads the actual spinner speed, compares the speed with the programmed target speed and adjusts the valve accordingly. The target rate is set under the JOB menu. Please refer to “Programming a Job” section.

If your spreader is equipped with a manual spinner valve, the Spinner Speed and target can be displayed as one of the four lines of the main menu.

|                                     |                     |              |                 |
|-------------------------------------|---------------------|--------------|-----------------|
| --                                  |                     |              |                 |
| <b>RATE</b>                         | <b>250</b> lbs/ac   |              |                 |
| <b>GROUND SPEED</b>                 | <b>16.5</b> mph     |              |                 |
| <b>SPIN. SPEED</b><br>[TARGET: 600] | <b>590</b> rpm      |              |                 |
| <b>TOT. APPLIED</b>                 | <b>1750</b> lbs     |              |                 |
| <b>Applying: UREA</b>               | <b>CONVEYOR OFF</b> |              |                 |
| <b>JOB</b>                          | <b>SETUP</b>        | <b>CLEAR</b> | <b>LIGHTBAR</b> |

Figure 15



## OPERATING PROCEDURES CONTINUED

### Spinner speed alarms

The SP.6 compares the actual spinner speed to the target spinner speed setting stored in the active job. The following alarms may occur.

“SPINNER SPEED TOO HIGH” – actual spinner speed is 50 rpm or more above the target speed.

“SPINNER SPEED TOO LOW” – actual spinner speed is 50 rpm or more below the target speed.

NOTE: If you do not have a spinner speed sensor or the sensor is faulty, the “Spinner speed too low” alarm will be continuous.

To disable the alarm with a...

- a) Manual spinner valve: Make sure “Spinner valve type” is set to MANUAL and set the “Spinner pulses/rev” to zero (both found under SETUP key and MACHINE SETTINGS key).
- b) PWM spinner valve (optional): Set “Spinner valve type” to MANUAL and “Spinner pulses/rev” to zero (both found under SETUP key and MACHINE SETTINGS key). Manually adjust PWM valve to the correct speed.

|                   |   |
|-------------------|---|
| <b>IMPORTANT!</b> | The spinner will run at maximum RPM if spreader is equipped with a PWM valve and “Spinner pulses/rev” is set to zero. |
|-------------------|---|

### CONVEYOR

The SP.6 conveyor switch, or an optional remote conveyor switch, is used to turn on/off the conveyor. The default switch is the SP.6 toggle switch located on the bottom right corner of the console. The up position turns the conveyor on (Green). The down position turns the conveyor off (Red).

To activate an optional remote conveyor switch:

- a) Press SETUP key.
- b) Press MACHINE SETTINGS key.
- c) Press Up or Down Arrow Keys to highlight Conveyor switch setting.
- d) Press EDIT and toggle setting to “Remote” with Up or Down Arrow Key.
- e) Press ACCEPT.
- f) Press EXIT.
- g) Press Menu Key.



### DGPS-5000 AND LIGHTBAR

The setup and operation instructions for the DGPS-5000 and Lightbar come with that system in the form of a manual insert. Please refer to those instructions.



## OPERATING PROCEDURES CONTINUED

### ALARMS



#### **WARNING**

If the conveyor is not shut off and the alarm is sounding, the conveyor will start unexpectedly if there is motion detected by the radar gun. Turn conveyor off before troubleshooting.

The SP.6 has several alarms that flash and beep to get the operator’s attention. The following messages flash on the line shown in Figure 16.

“SPINNER SPEED TOO HIGH” – Actual spinner speed is 50 rpm or more higher than the target.

“SPINNER SPEED TOO LOW” – Actual spinner speed is 50 rpm or more lower than the target.

“SPEED ZERO – SHUT OFF DRIVE” – Warning to shut off conveyor when vehicle is stopped.

“DRIVE RPM BELOW MINIMUM” – Conveyor RPM drive shaft is below 2 RPM.

“CONVEYOR NOT RESPONDING” – Conveyor is not starting, stopping, or changing speed in response to a controller command.

“MAXIMUM CONVEYOR RPM, SLOW DOWN” - The conveyor speed is at the set maximum and the application rate will not be accurate.

“NO COMM. WITH RATE CONTROLLER” – Communication (port1) with remote variable rate device is lost. The rate on SP.6 defaults to the pre-set rate of the active job until communication is re-established.

“DRIVE OUT OF SYNC” – Mark series hydraulic control is stalled or is not running smooth.

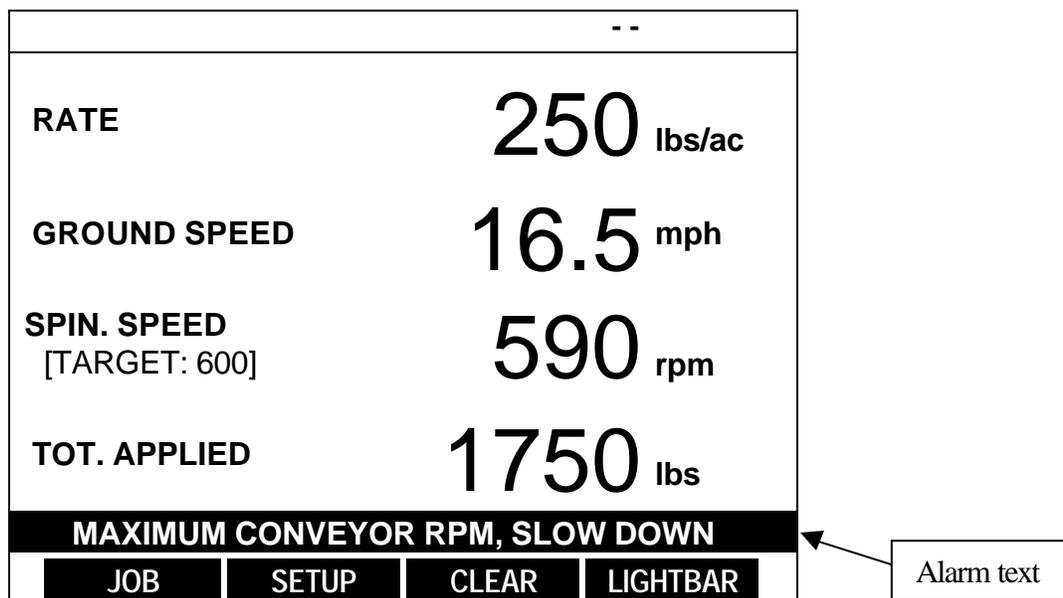


Figure 16



### TROUBLESHOOTING

|  |  |
|--|--|
| Power switch is turned ON, display is blank  | <ol style="list-style-type: none"><li>1. Check fuse.</li><li>2. Check battery connections.</li><li>3. Check cable connections at interface box and console.</li><li>4. Check vehicle battery.</li></ol>  |
| Display is difficult to read   | <ol style="list-style-type: none"><li>1. Adjust backlight brightness.</li><li>2. Temperature below -4°F, allow unit to warm.</li><li>3. Temperature above 140°F, cool console.</li></ol>   |
| Conveyor starts to run when PTO is engaged   | <ol style="list-style-type: none"><li>1. SP.6 power must be on to control Mark series valve.</li><li>2. Faulty motorized valve. Check valve adjustment.</li><li>3. Check cable connections.</li><li>4. Faulty interface box. Contact dealer.</li><li>5. Make sure hydraulic pump flow is not too high.</li><li>6. Faulty radar. Check for ground speed on main screen.</li></ol>   |
| Conveyor does not stop, start, or respond correctly. Alarm flashes on screen - CONVEYOR NOT RESPONDING | <ol style="list-style-type: none"><li>1. Check cable connections.</li><li>2. Faulty interface box. Contact dealer.</li><li>3. Faulty motorized valve. Check valve.</li><li>4. Faulty shaft sensor. Check sensor.</li></ol>   |
| Conveyor does not run when PTO is engaged  | <ol style="list-style-type: none"><li>5. No active job.</li><li>6. Check cable connections.</li><li>7. Check job setting application rate and width.</li><li>8. No ground speed. Check for speed on main screen.</li></ol>   |
| No spinner RPM   | <ol style="list-style-type: none"><li>1. PTO not engaged.</li><li>2. No active job when spreader equipped with PWM spinner valve.</li><li>3. Check spinner sensor cable connections.</li><li>4. Check spinner sensor clearance to bolt head of fins. Clearance must be 1/8" or less.</li><li>5. Check spinner pulses/rev setting equals number of fins on disk.</li><li>6. Faulty sensor. Contact dealer.</li></ol>  |
| Spinner speed will not stay constant at the target speed   | <ol style="list-style-type: none"><li>1. Requires optional PWM spinner valve.</li><li>2. No active job.</li><li>3. Check that "Spinner valve type" setting is not "Manual." Change to "PWM". Turn SP.6 off and back on after changing setting.</li><li>4. Engine RPM variations @ lower RPMs does not provide enough hydraulic flow to the valve – keep engine speed high enough to provide adequate flow.</li><li>5. Check for intermittent operation of speed sensor.</li><li>6. Check cable connections.</li></ol>              |
| Application rate per acre is incorrect   | <ol style="list-style-type: none"><li>1. Check that actual feedgate opening matches active job setting.</li><li>2. Check actual spread width and driving centers match active job setting.</li><li>3. Check that actual density of product matches active job setting.</li><li>4. Check radar calibration and verify ground speed reading on main screen.</li><li>5. If operating in "Manual" verify vehicle ground speed.</li><li>6. Verify rate on main screen is correct.</li><li>7. Adjust "Calibrated CFR" setting.</li></ol> |



### TROUBLESHOOTING CONTINUED

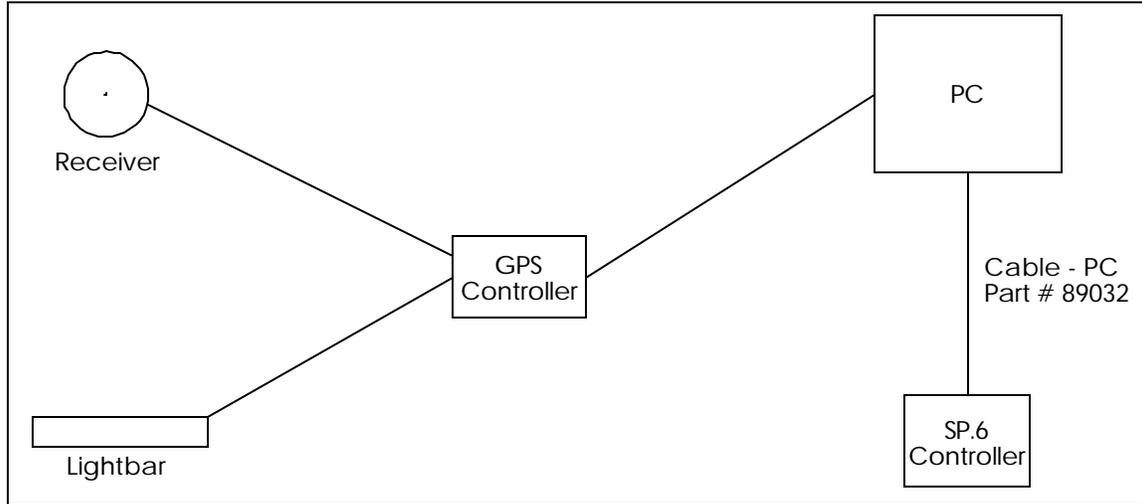
|  |   |
|--|---|
| Alarm flashes on main screen -<br>MAXIMUM CONVEYOR<br>RPM, SLOW DOWN | Conveyor RPM has reached the maximum conveyor rpm setting. The default setting is 50 rpm.<br><ol style="list-style-type: none"><li>1. Slow down – driving too fast.</li><li>2. Check that active job feedgate setting is large enough for rate, spread width and speed.</li><li>3. Ground speed on main screen is too high. Calibrate radar.</li></ol>  |
| Alarm flashes on main screen -<br>SPINNER SPEED TOO LOW              | Spinner speed is 50 or more rpm below the target spinner speed.<br><ol style="list-style-type: none"><li>1. Adjust spinner valve until spinner speed matches target spinner speed for active job.</li><li>2. Check machine settings “Spinner pulses/rev” matches number of fins on disk.</li><li>3. Faulty or no spinner sensor. Set “Spinner pulses/rev” to zero in machine settings if PWM valve not installed.</li><li>4. Inadequate hydraulic flow to spinner motors.</li></ol>   |
| Alarm flashes on main screen -<br>SPINNER SPEED TOO HIGH             | Spinner speed is 50 or more rpm above the target spinner speed.<br><ol style="list-style-type: none"><li>1. Adjust spinner valve until spinner speed matches target spinner speed for active job.</li><li>2. Check machine settings “Spinner pulses/rev” matches number of fins on disk.</li></ol>  |
| Alarm flashes on main screen -<br>DRIVE OUT OF SYNC                  | Mark valve is not synchronized with conveyor speed. Conveyor runs jumpy.<br><ol style="list-style-type: none"><li>1. Check that PTO is not engaged.</li><li>2. Check for adequate hydraulic flow to Mark valve.</li></ol>   |
| Alarm flashes on main screen -<br>SPEED ZERO – SHUT OFF<br>DRIVE     | Conveyor switch is on, but ground speed is zero.<br><div style="border: 1px solid black; padding: 5px; margin: 10px 0;"><p><b>WARNING</b> When this alarm is displayed, any movement detected by the radar can cause the conveyor to start. Always turn conveyor switch off before troubleshooting.</p></div> <ol style="list-style-type: none"><li>1. Shut off conveyor switch.</li><li>2. Check radar and radar connections.</li></ol> |
| Alarm flashes on main screen -<br>DRIVE RPM BELOW<br>MINIMUM         | SP.6 is trying to run the conveyor below 2 rpm.<br><ol style="list-style-type: none"><li>1. Check that active job feedgate setting is small enough for rate, spread width, and speed.</li><li>2. Increase vehicle ground speed.</li></ol>   |
| Alarm flashes on main screen -<br>NO COMM. WITH RATE<br>CONTROLLER   | SP.6 lost communication with remote variable rate device.<br><ol style="list-style-type: none"><li>1. Check cable connection between remote device and port1 on SP.6.</li><li>2. Restart remote device and SP.6.</li></ol>  |
| DGPS-5000 connected but no<br>“DG” displayed.                        | <ol style="list-style-type: none"><li>1. Check cable connection between aux1 port on SP.6 and antenna. Make sure Lightbar and Antenna connection are not backwards.</li><li>2. Vehicle is inside or antenna is mounted in a position that obstructs it from the sky.</li><li>3. Press SETUP key and GPS key. If SP.6 is not communicating with GPS it will display a warning at this point.</li></ol>   |



## APPENDIX W

### CONNECTING TO A REMOTE VARIABLE RATE DEVICE

The SP.6 is programmed to communicate with a remote device that reads a prescription file and sends the rate to the SP.6. The SP.6 receives the rate from the remote device via a connection to “Aux” port1.



**Figure 17 – PC Connection**

No setup is required on the SP.6. As soon as a remote device is plugged into port1, the SP.6’s rate will change if a job is active. However, the remote GIS device must be set to send information via the Raven 660 protocol. The SP.6 is programmed to automatically recognize the Raven Industries protocol according to the following connection settings:

#### SP.6 - Port1

Baud – 9600

8 data bits

No parity

2 stop bits

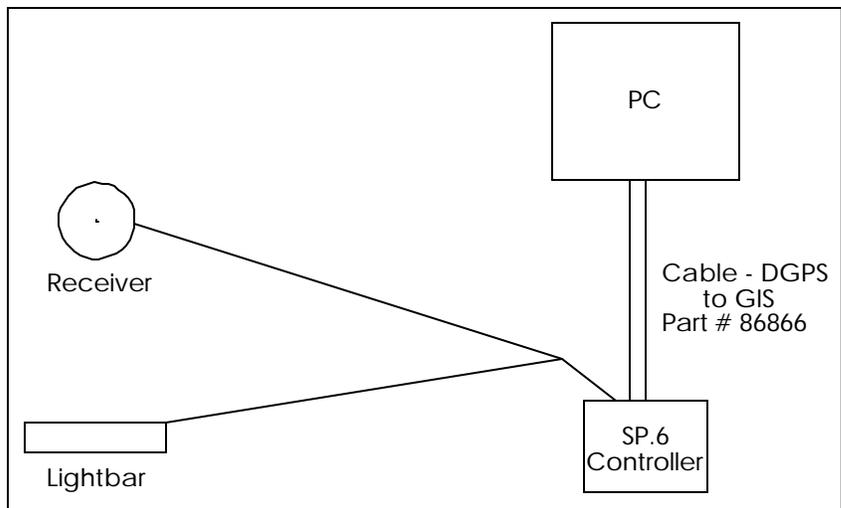
Pin 2 - RXD

Pin 3 - TXD

Pin 4 - DTR

Pin 5 - GND

Pin 6 & 8 – DSR & CTS



**Figure 18 – GIS Connection**

Use the PC Cable (PN 89032) to connect to a PC as shown in Figure 17. Use the DGPS to GIS Cable (PN 86866) to connect to a non-New Leader GPS receiver as shown in Figure 18.



**APPENDIX X****CALIBRATED CFR**

All products have unique flow characteristics that can vary the rate of actual product conveyed through any given feedgate opening. The Calibrated CFR allows the user to fine tune this value for any job. To insure the greatest accuracy possible, New Leader recommends a test to determine the calibrated CFR.

The suggested test procedure is:

- 1) Weigh a loaded truck and note the weight.
- 2) Enter a job for the product you are testing and make the job active.
- 3) Verify that the gate opening matches the job setting.
- 4) Verify that the material density matches the job setting.
- 5) Under Setup Options, Machine Settings, set the ground speed sensor to MANUAL.
- 6) Setup your main screen to show the Total Applied. Press CLEAR if the Total Applied is not zero.
- 7) Turn the conveyor switch on to unload a portion of the product. (If performing a static test turn off the spinners prior to unloading.)
- 8) Find the actual weight of product unloaded by weighing the truck and subtracting from the original weight in step 1.
- 9) Note the value of the Total Applied on the main screen.
- 10) Find the calibrated spreader constant for this job.  $\text{Calibrated CFR} = \text{Theoretical CFR} \times [\text{actual weight}/\text{Total Applied}]$
- 11) Edit the Calibrated CFR for the job. After ACCEPT is pressed, the new CFR is stored as part of the job.
- 12) Repeat the above procedure to verify the Calibrated CFR.
- 13) Remember to set your ground speed sensor back to its original setting.

NOTE: If you are not able to weigh the truck, the material unloaded in step 8 can be collected in a suitable catch pan or bag and weighed separately to determine the actual weight. Be sure to account for the weight of the catch pan or bag.

NOTE: The calibrated CFR will yield an accurate rate, but repeatability is dependent upon the same gate height and same material density. Radar calibration should also be verified to assure an accurate rate.



### APPENDIX Y

NOTE: The following charts are only examples. Complete the equation to find the correct feedgate opening and recommended operating range.

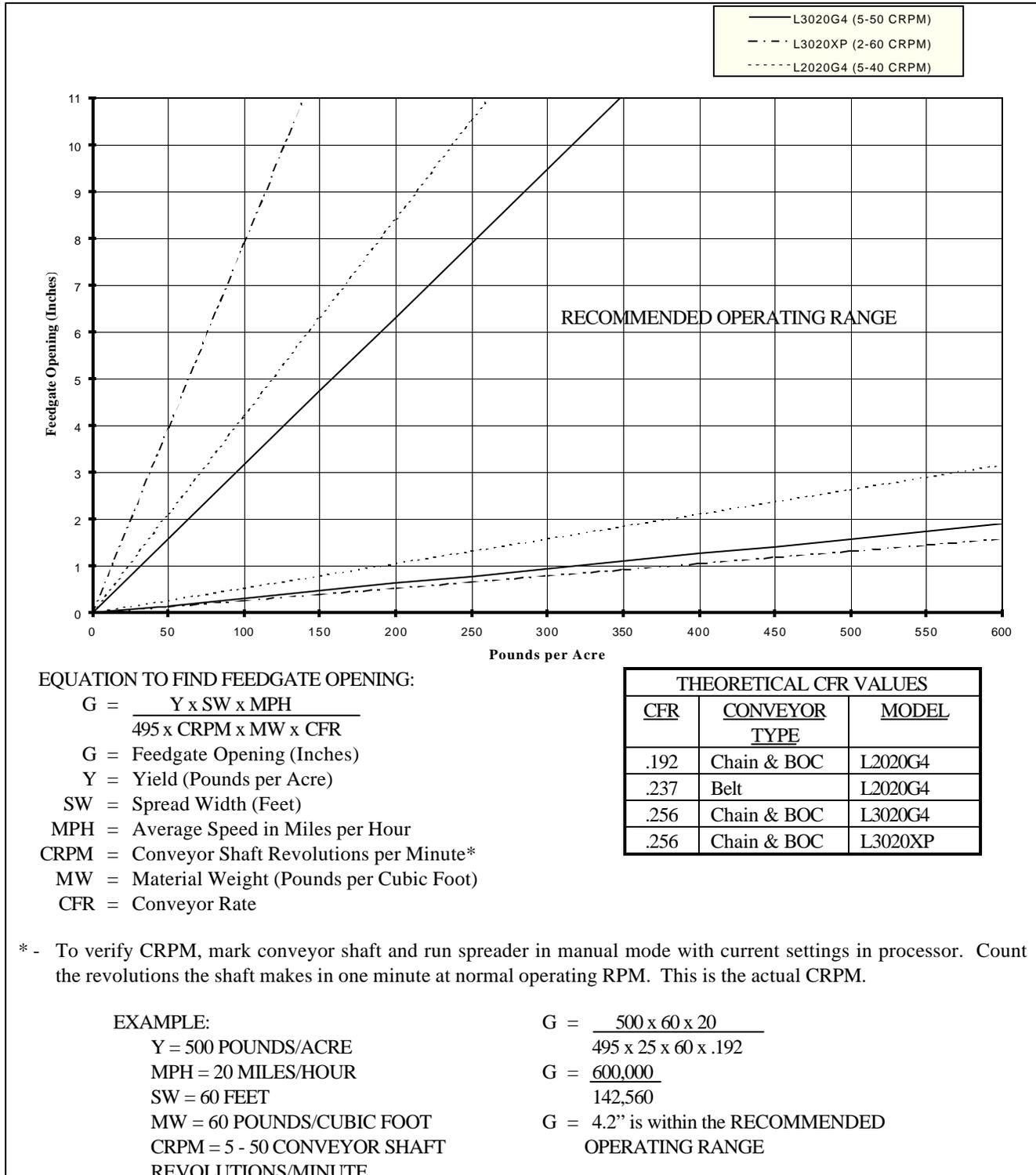


Figure 19 - Fertilizer Application Rates



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## APPENDIX Y

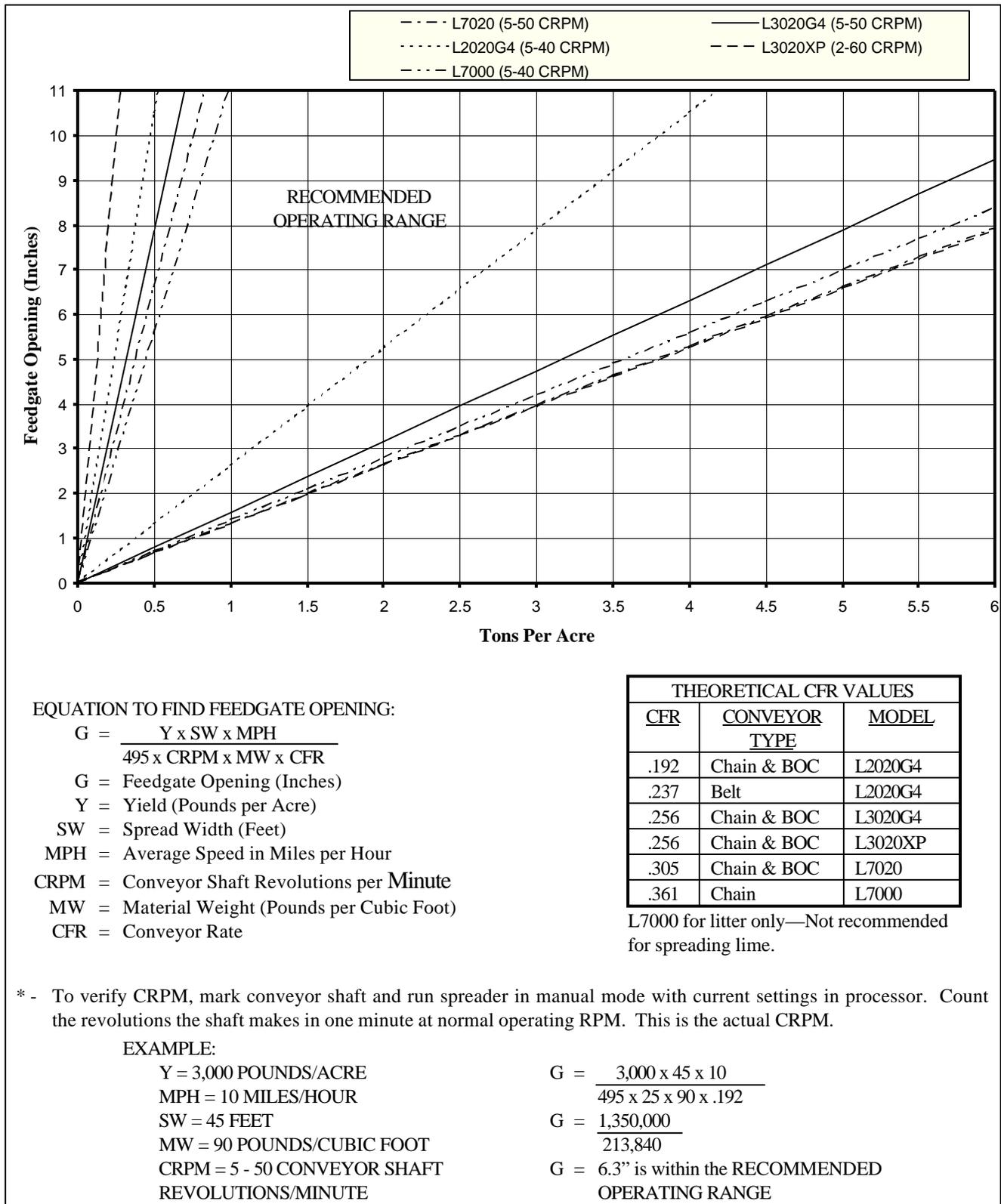


Figure 20 – Lime & Litter Application Rates



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## APPENDIX Z

### ENGLISH/METRIC CONVERSION

#### US TO METRIC

|                                 |   |                                      |
|---------------------------------|---|--------------------------------------|
| 1 Acre                          | = | 0.405 Hectares                       |
| 1 Mile                          | = | 1.61 Kilometers                      |
| 1 Foot                          | = | 0.305 Meters                         |
| 1 Inch                          | = | 2.54 Centimeters                     |
| 1 US Gallon                     | = | 3.785 Liters                         |
| 1 Fluid Ounce                   | = | 29.57 Milliliters                    |
| 1 Pound                         | = | 0.454 Kilogram                       |
| 1 Cubic Foot (ft <sup>3</sup> ) | = | 0.028 Cubic Meters (M <sup>3</sup> ) |
| 1 Pound per Gallon              | = | 119.68 Grams per Liter               |
| 1 US Gallon per Acre            | = | 9.35 Liters per Hectare              |

#### METRIC TO US

|                      |   |                        |
|----------------------|---|------------------------|
| 1 Hectare            | = | 2.471 Acres            |
| 1 Kilometer          | = | 0.62 Miles             |
| 1 Meter              | = | 3.28 Feet              |
| 1 Centimeter         | = | 0.394 Inches           |
| 1 Liter              | = | 0.2642 Gallons         |
| 1 Milliliter         | = | 0.034 Fluid Ounces     |
| 1 Kilogram           | = | 2.205 Pounds           |
| 1 Cubic Meter        | = | 35.31 Cubic Feet       |
| 1 Kilogram per Liter | = | 8.36 Pounds per Gallon |
| 1 Liter per Hectare  | = | 0.107 Gallons per Acre |



**Please Give Part No., Description and Unit Serial No. 300410-A**

## INSTRUCTIONS FOR ORDERING PARTS



Order from the AUTHORIZED DEALER in your area.

- 1. Always give the pertinent model and serial number.**
- 2. Give part name, part number and the quantity required.**
- 3. Give the correct address to where the parts are to be shipped, and the carrier if there is a preference.**

Unless claims for shortages or errors are made immediately upon receipt of goods they will not be considered. Any part returns should be directed through the dealer from which they were purchased.

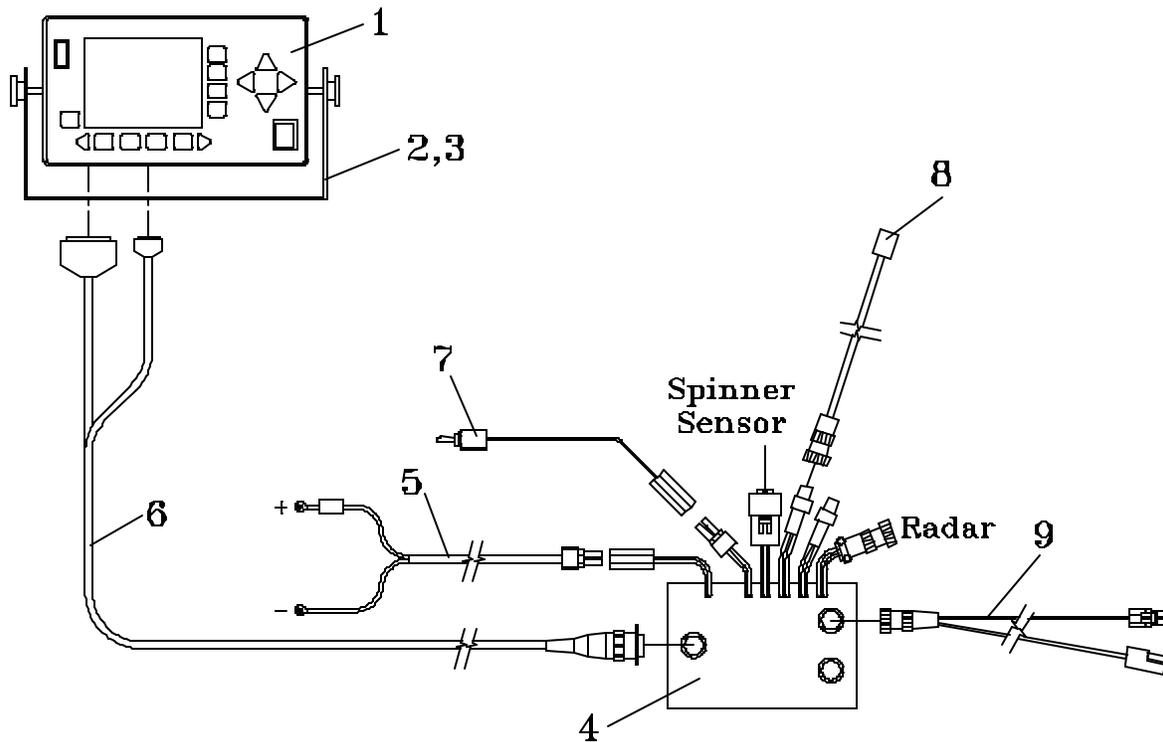
When broken goods are received, a full description of the damage should be made by the carrier agent on the freight bill. If this description is insisted upon, full damage can always be collected from the transportation company.

No responsibility is assumed for delay or damage to merchandise while in transit. Our responsibility ceases upon delivery of shipment to the transportation company from whom a receipt is received showing that shipment was in good condition when delivered to them, therefore, claims (if any) should be filed with the transportation company and not with Highway Equipment Company.

If your claims are not being handled (by the transportation company) to your satisfaction, please call the Parts Manager at Highway Equipment Company (319-363-8281) for assistance.



## CONTROL BOX & CABLES



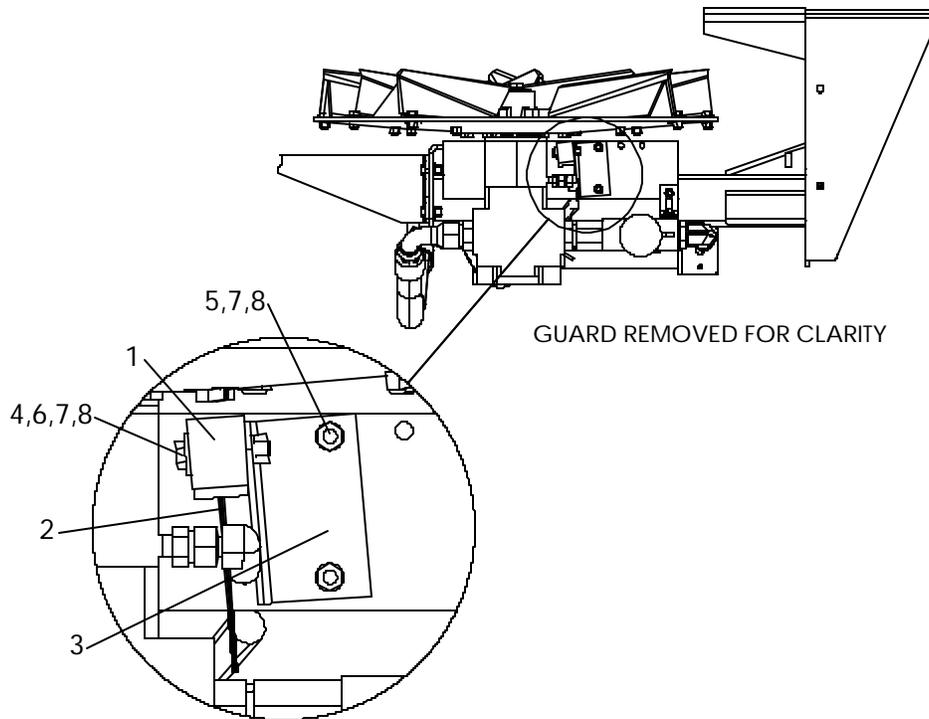
| <u>ITEM</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>               | <u>QTY</u> |
|-------------|-----------------|----------------------------------|------------|
|             | 300407          | SP.6 – Kit, Includes:            | 1          |
| 1           | 300405          | Console – SP.6                   | 1          |
| 2           | 300409          | Bracket – U                      | 1          |
| 3           | 89004           | Hardware – Kit Console           | 1          |
| 4           | 89005           | Module – Interface               | 1          |
| 5           | 89006           | Cable – Power                    | 1          |
| 6           | 89007           | Cable – Console to Driver        | 1          |
| 7           | 89755           | Switch – Single Conveyor Remote  | 1          |
| 8           | 97361           | Cable – Conveyor Sensor          | 1          |
| 9           | 300415          | Cable – Single Raven/PWM Spinner | 1          |
| 10          | * 89029         | Power Supply – 1 Amp             | 1          |
| 11          | * 89032         | Cable – PC                       | 1          |
| 12          | * 86866         | Cable – DGPS to GIS              | 1          |
| 13          | * 89024         | CD – Utilities                   | 1          |

\* – Not Shown



Please Give Part No., Description and Unit Serial No. 300410-A

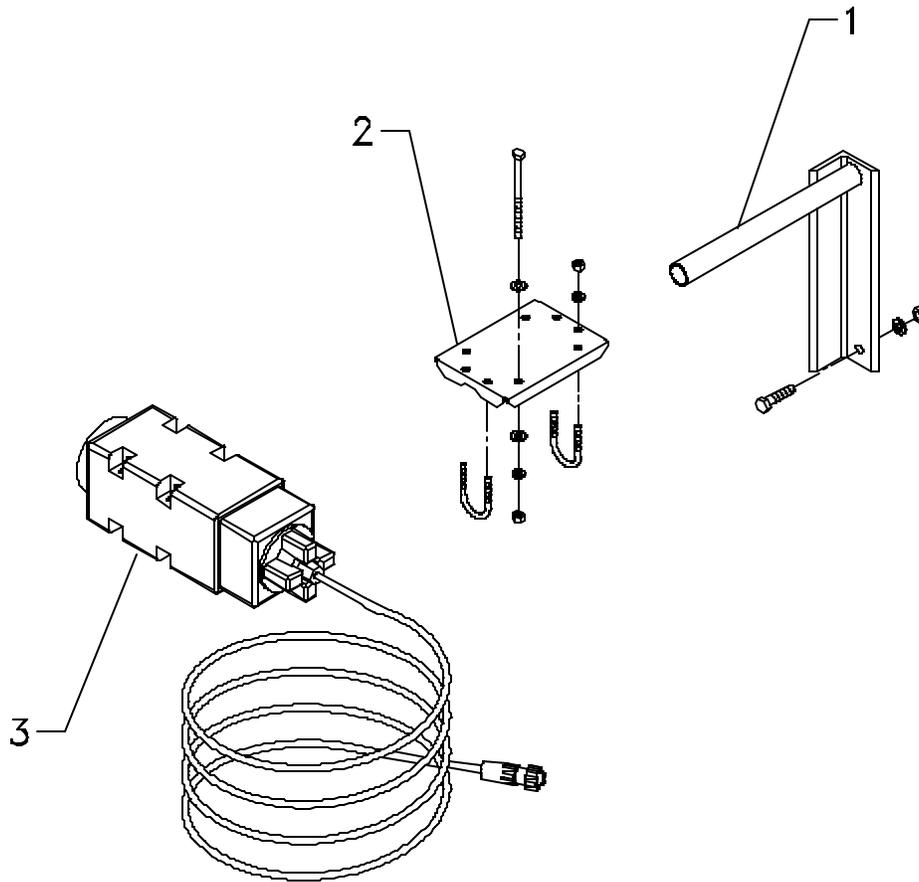
## SPINNER SENSOR



| <u>ITEM</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>         | <u>QTY</u> |
|-------------|-----------------|----------------------------|------------|
|             | 97310           | Sensor – Kit Spinner       |            |
| 1           | 89011           | Sensor – Assembly          | 1          |
| 2           | 89009           | Cable – Sensor Extension   | 1          |
| 3           | 86672           | Bracket                    | 1          |
| 4           | 42448           | Cap Screw – 1/4 x 1-1/2 SS | 2          |
| 5           | 36393           | Cap Screw – 1/4 x 3/4 SS   | 2          |
| 6           | 36423           | Washer – Flat 1/4 SS       | 2          |
| 7           | 36418           | Washer – Lock 1/4 SS       | 4          |
| 8           | 36412           | Nut – Hex 1/4 SS           | 4          |



## RADAR ASSEMBLY



| <u>ITEM</u> | <u>PART NO.</u>           | <u>DESCRIPTION</u>            | <u>QTY</u> |
|-------------|---------------------------|-------------------------------|------------|
| 1           | 79857                     | Radar Velocity Sensor Kit     | 1          |
|             | 79860                     | "L" Pipe Mounting Bracket Kit | 1          |
| 2           |                           | Bracket - Mounting "L" Pipe   | 1          |
|             |                           | Cap Screw - 3/8-16 x 1 1/2    | 2          |
|             |                           | Washer - Lock 3/8             | 2          |
|             |                           | Nut - Hex 3/8-16              | 2          |
|             | 79859                     | Mounting Bracket Kit          | 1          |
|             |                           | Bracket - Mounting            | 1          |
|             |                           | U-Bolt                        | 2          |
|             |                           | Cap Screw - 1/4-20 x 4        | 4          |
| 3           | 79858                     | Washer - Flat 1/4             | 8          |
|             |                           | Washer - Lock 1/4             | 8          |
|             |                           | Nut - Hex 1/4-20              | 8          |
|             |                           | Sensor Kit                    | 1          |
|             |                           | Sensor                        | 1          |
|             | Installation Instructions | 1                             |            |

