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SAFETY NOTICES

Safety notices are one of the primary ways to call attention to potential hazards.



This Safety Alert Symbol identifies important safety messages in this manual. When you see this symbol, carefully read the message that follows. Be alert to the possibility of personal injury or death.

⚠ WARNING

Use of the word **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Use of the word **CAUTION** with the Safety Alert Symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Use of the word **CAUTION** without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in equipment damage.

OPERATOR'S MANUAL





SYSTEM OVERVIEW

The Land Manager control system makes precision chemical and fertilizer applications easy. The system operates in English or Metric modules and in a variety of commonly-used languages without reprogramming. Password protection is standard on each unit to limit access to configuration programming setup. Each is equipped with speed/area and distance monitoring modes and controls proportional, hydraulic, servo, and electric drives.

Land Manager units are available for flow or pressure-based systems, whether you are running liquid, granular, or anhydrous ammonia systems.

Land Manager features:

- Single channel
- Variable rate application control
- Application library stores up to 10 configurations
- Creates and logs up to 10 individual reports
- Standard RS-232 interface link
- Records tank fill (with optional flow meter)
- Automatic pump shutoff
- Auto gain tunes responsiveness to application

Land Manager II features:

- Dual channel
- Spray and spread with one console
- Variable rate application control
- Application library stores up to 10 configurations
- Creates and logs up to 10 individual reports
- Standard RS-232 interface link
- Records tank fill (with optional flow meter)
- Automatic pump shutoff
- Auto gain tunes responsiveness to application

COMPONENTS

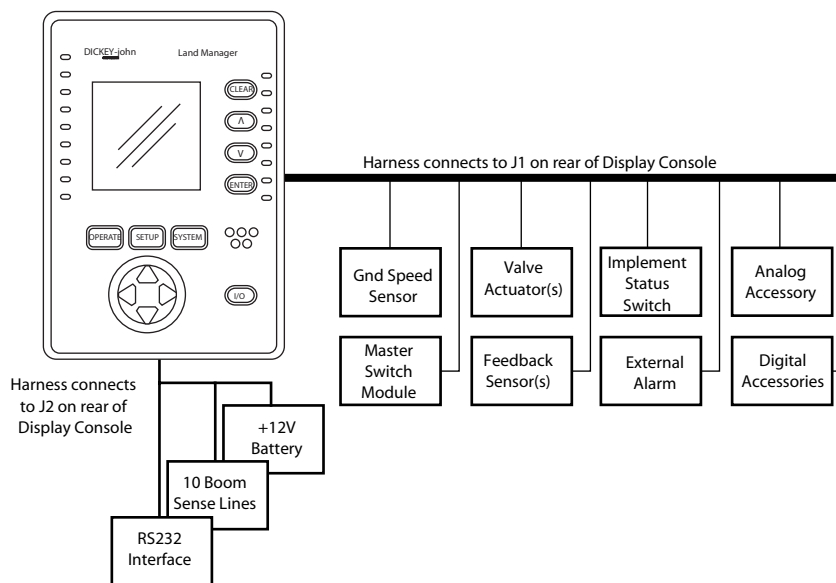
A complete DICKEY-john Land Manager system consists of six basic components:

- Display console
- Master Switch module
- Ground speed sensor
- Feedback device to monitor application rate (at least one)
- Actuator device to regulate the application rate (at least one)
- Harness system

Figure 1 provides an illustration of a typical overall system configuration.



Figure 1
Typical System Configuration



DISPLAY CONSOLE

The display console consists of five major functional areas:

- Display
- On/Off power switch
- Three mode keys
- Four arrow keys
- Four function keys

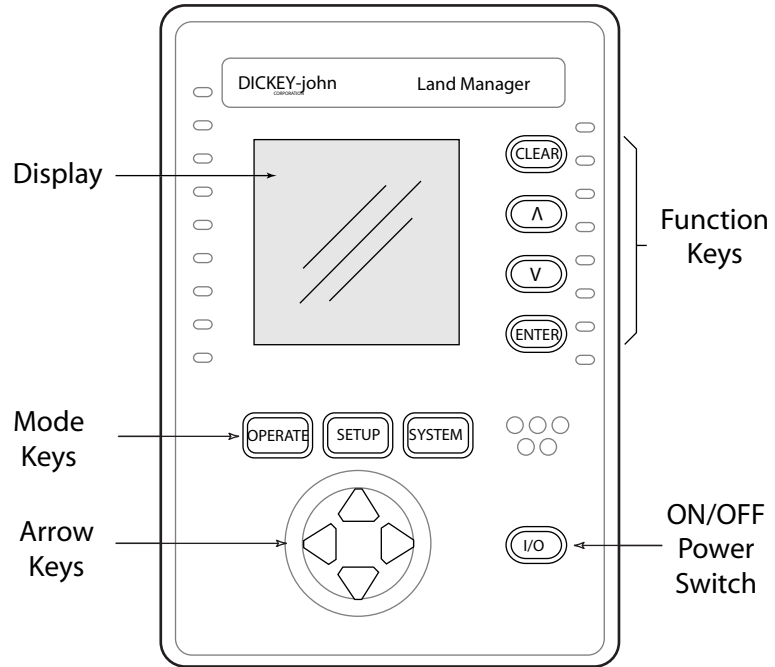
The display console can be mounted on the dash or in an instrumentation panel. After disconnecting from a pull-type implement, the display console continues to function as a speed/area monitor. However, the tractor must have a ground speed sensor installed and connected to the console.

During normal operation, the display will show instant system status, application setup, and system configuration data to the operator. In the SPEED/AREA MONITOR mode (no sensors connected except ground speed), only ground speed, area, date, and time are monitored. Some configured accessories may still function.

Area accumulates whenever the Master Switch module switch is set to AUTO, but stops and holds the accumulated value in OFF. The acreage value continues again when the switch is returned to AUTO. The total acres continue to accumulate until cleared by the CLEAR key. An audible alarm (self-contained or external) alerts the operator to specific conditions.



Figure 2
Display Console



Several optional peripheral devices such as a Personal Computer (PC), printer, etc. can interface through the RS-232 communication port (cable connector). The RS-232 port allows uploading or downloading of data and the downloading of new software as it becomes available. A printer connected to the port provides a printing configuration summary and acreage reports.

The Display Console controls and senses system devices including:

- Up to 10 boom sections for both one or two channel systems
- A valve actuator (two for dual channel) to control application
- A feedback sensor to monitor application rate (two sensors for a dual channel system) (i.e., digital sensors such as flowmeters, application rate sensor or analog sensors such as pressure transducers)
- Two optional digital accessory/diagnostics sensors (e.g., hopper level, flowmeters, etc.)
- One analog accessory/diagnostics sensors (e.g., tank level sensor, pressure transducers, etc.)



MASTER SWITCH MODULE

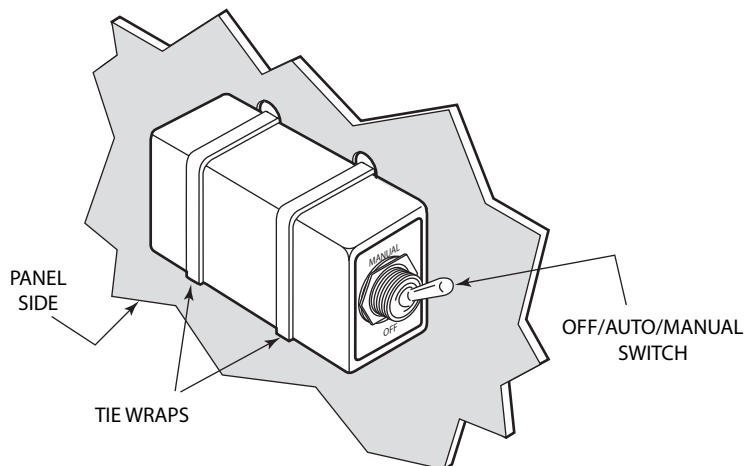
The Master Switch Module allows the start and stop of product application through a single switch. The three switch positions include:

- Auto
- Off
- Manual (momentary position)

The typical operating position for field application is AUTO. In this position, ground speed controls the dispersal rate. When ground speed is reduced to zero, all application ceases. The OFF position of the switch inhibits all product flow. Generally, the MANUAL (momentary) position is for applications at very slow speeds (i.e., startup from rest). The ground speed startup value for the MANUAL position is programmable under the ground speed configuration.

Figure 3

Master Switch Module Mounted On Side Of Panel



GROUND SPEED SENSOR

The ground speed sensor responds to vehicle speed. Product application begins with vehicle movement and varies with ground speed. When motion ceases, the application of the product also ceases. Current ground speed is displayed continuously on the unit's display console.

FEEDBACK SENSORS

A feedback sensor signal indicates product application rate. Several types of feedback sensors such as pressure transducers, application rate sensors, and flow meters are used.

ACTUATORS

An actuator regulates the valve opening to control product flow. A dual channel system uses an actuator for each channel.



SYSTEM HARNESSES

Two harness assemblies connect to the rear side of the Land Manager console (refer to [Figure 4](#)). The first harness is used for the dual channel system and has added provisions for a second actuator and an analog (PQ) and/or digital (FQ) sensor feedback.

The harness assembly connects:

- Master Switch Module
- Actuator
- Digital feedback sensor (i.e., flow meter)
- External alarm device (if used)
- Radar sensor or other electronic speedometer device
- Analog feedback sensor (i.e., pressure sensor)
- Analog accessory
- Digital accessories (2)

The second harness assembly has three cables that connect to:

- Battery for power
- Up to ten booms
- RS-232 device such as a PC computer, printer, or other peripheral device.

CCS100/CMS100 AND CCS100/CMS200 ADAPTER HARNESSES

Special adapter harnesses are available to connect Land Manager to an existing CCS100/CMS100 or to a CCS100/CMS200 system. Each system requires its own adapter harness to replace the two standard Land Manager harnesses (refer to [Figure 5](#)). An actuator power harness must also be added to the system for the actuator to receive power directly from a battery or other power source on the vehicle. This configuration only allows single channel operation.

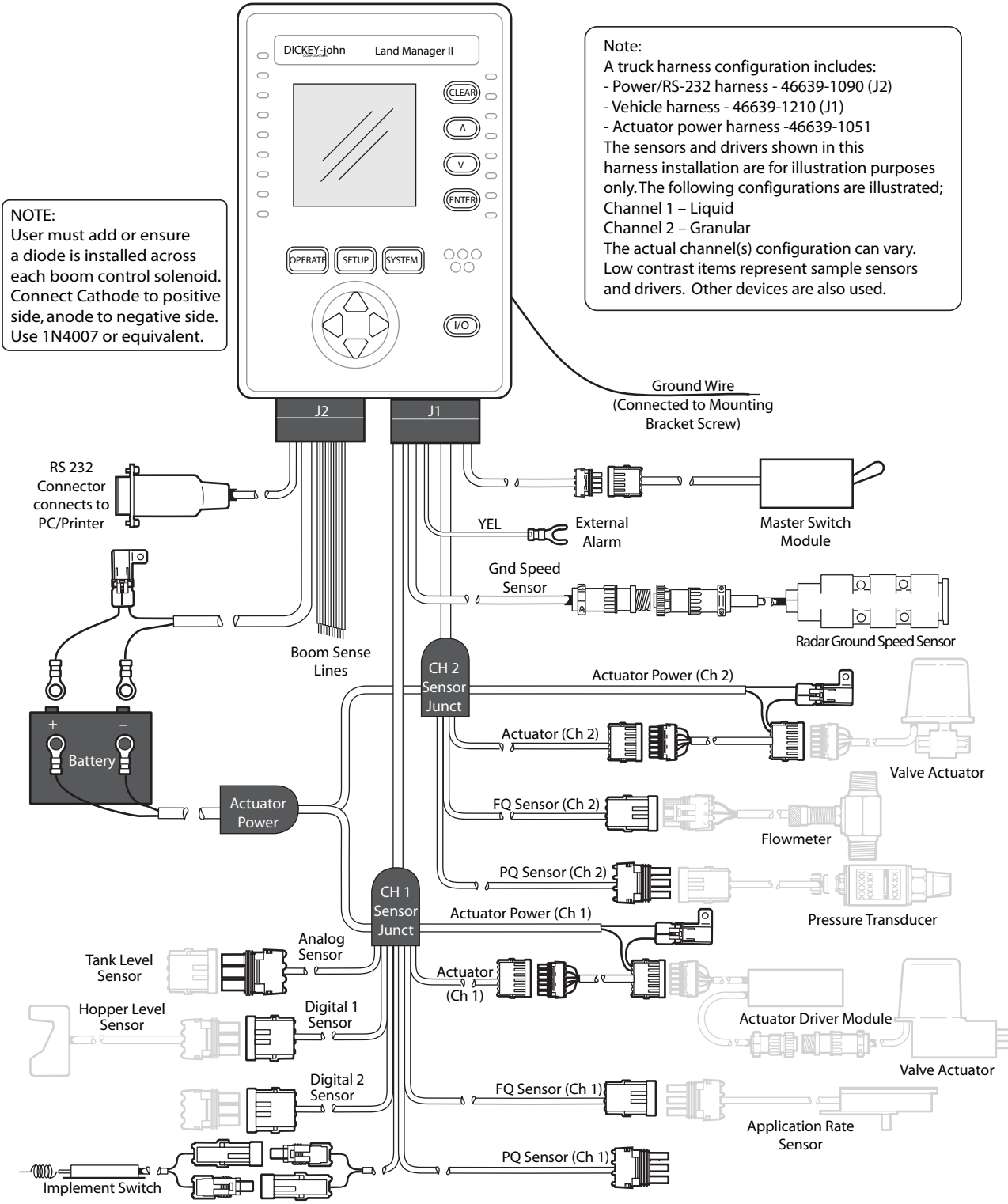
IMPORTANT: Remove the old Master Switch module from the obsolete system and replace with the new Master Switch module accompanying the Land Manager console. The old module is incompatible with Land Manager.

OPERATOR'S MANUAL



Figure 4

Display Console Showing Typical Truck Harness Configuration



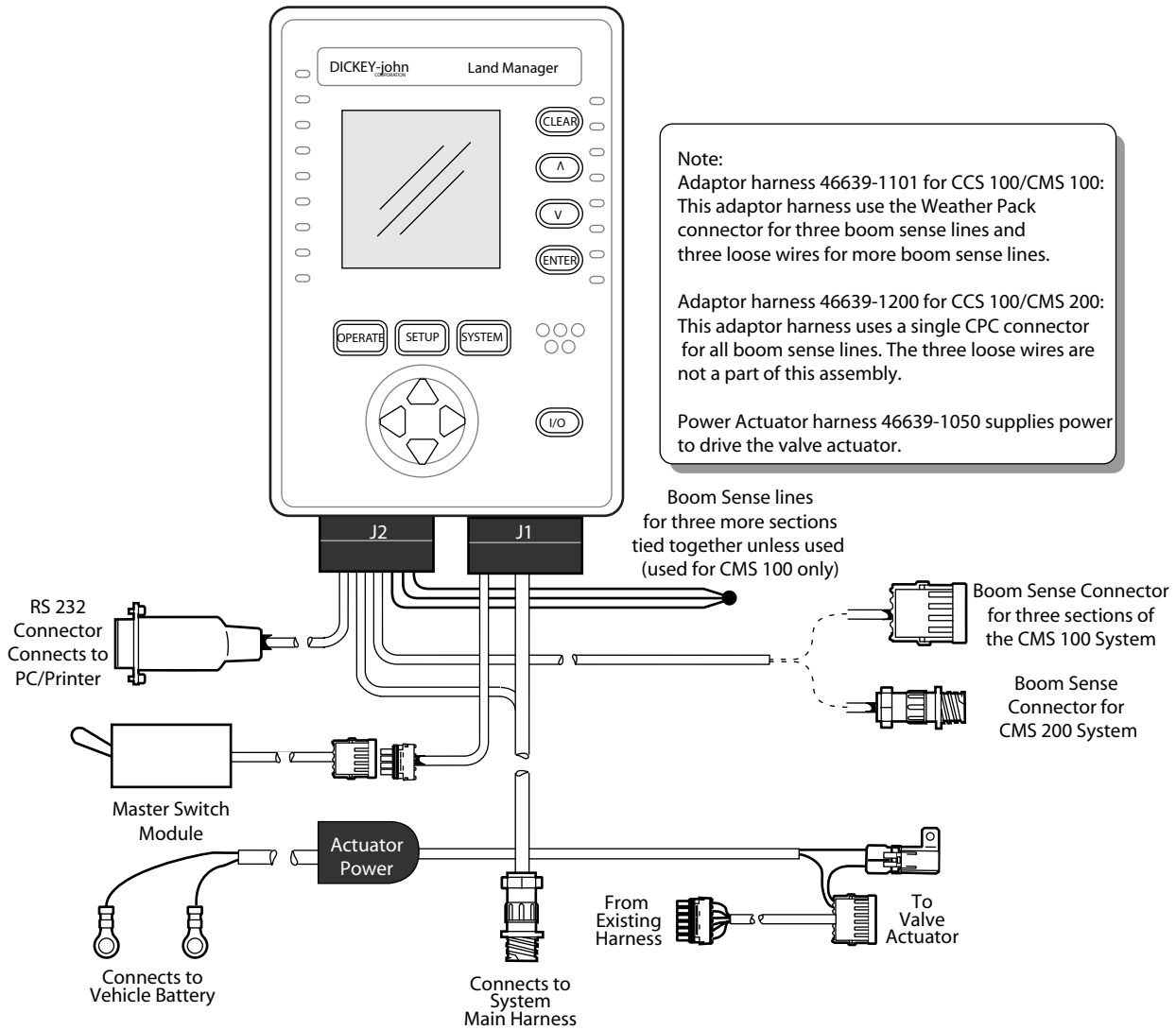
NOTE:
User must add or ensure a diode is installed across each boom control solenoid. Connect Cathode to positive side, anode to negative side. Use 1N4007 or equivalent.

Note:
A truck harness configuration includes:
- Power/RS-232 harness - 46639-1090 (J2)
- Vehicle harness - 46639-1210 (J1)
- Actuator power harness -46639-1051
The sensors and drivers shown in this harness installation are for illustration purposes only. The following configurations are illustrated;
Channel 1 – Liquid
Channel 2 – Granular
The actual channel(s) configuration can vary. Low contrast items represent sample sensors and drivers. Other devices are also used.



Figure 5

Display Console Showing CCS100/CMS100 And CCS100/CMS200 Retrofit Harnesses



Note:
 Adaptor harness 46639-1101 for CCS 100/CMS 100:
 This adaptor harness use the Weather Pack connector for three boom sense lines and three loose wires for more boom sense lines.

Adaptor harness 46639-1200 for CCS 100/CMS 200:
 This adaptor harness uses a single CPC connector for all boom sense lines. The three loose wires are not a part of this assembly.

Power Actuator harness 46639-1050 supplies power to drive the valve actuator.





DISPLAY CONSOLE

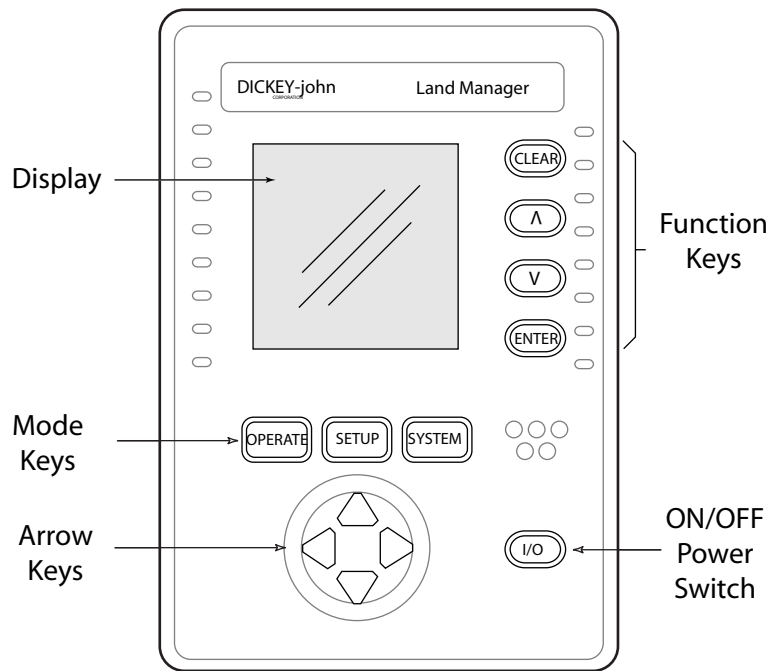
DISPLAY SCREEN

The display screen provides messages in an easy-to-read format. Each presentation on the display initiated from the keys is called a SCREEN.

ON/OFF POWER SWITCH

The On/Off power switch toggles the system ON or OFF and remains in the selected state until pressed again. The unit automatically reverts to OFF when power is removed.

Figure 6
Display Console Showing Major Divisions



MODE KEYS

After powering the unit ON and all self tests are successfully completed, the system will automatically enter OPERATE mode, ready for monitoring and controlling product application in the field. To enter either SETUP or SYSTEM modes, press the desired key.



Operate key



Setup key



System key



Up and Down Arrow keys



Left and Right Arrow keys



Increment key



Decrement key

OPERATE KEY

When in OPERATE mode, product application will begin after placing the Master Switch module into the AUTO position and ground speed is indicated. Pressing the **Operate** key several times will access the **Accessory**, **Accumulator**, **Product Level** (if enabled), and **Alarm History** screens. To re-enter OPERATE mode from either SETUP or SYSTEM modes, press the **Operate** key.

SETUP KEY

After the powerup routine is completed, pressing the **Setup** key enters SETUP mode when the Master Switch module switch is in the OFF position. SETUP mode allows for the establishment of correct application rates and setup conditions.

SYSTEM KEY

After the powerup routine is completed and the Master Switch module switch is in the OFF position, pressing the **System** key enters SYSTEM mode. SYSTEM mode differs from SETUP mode in that it allows for the defining and calibration of system devices.

ARROW KEYS

Arrow key functions are mode sensitive.

OPERATE MODE

When no channel is selected, the **Up** and **Down Arrow** keys increase and decrease screen contrast. The **Left** and **Right Arrow** keys increase and decrease backlight intensity. After a channel is selected, the **Up** and **Down Arrow** keys increase and decrease application rate. The **Left** and **Right Arrow** keys turn the selected channel ON and OFF. A channel is selected or deselected by using the **Increment** and **Decrement** function keys.

SETUP AND SYSTEM MODES

The **Left** and **Right Arrow** keys move a selection left or right for digit changing. The **Up** and **Down Arrow** keys increase and decrease the value of the selected digit. When pressing the first key, normal highlighting will result and a box will appear around the field. At this time, the **Up** and **Down Arrow** keys toggle the value to a different character selection.

Whenever highlighting an alphanumeric field (one requiring editing), a popup matrix screen appears (refer to [Figure 7](#)). In this case, the **Up** and **Down Arrow** keys will select the matrix row and the **Left** and **Right Arrow** keys will select the matrix column. After locating the character, the **Increment** and **Decrement** function keys will accept the character and move one space to the right or left, ready for the next selection. In this fashion, words or labels can be entered or changed.



Clear key



Increment key



Decrement key



Enter key

FUNCTION KEYS

Four function keys (**Clear**, **Increment**, **Decrement**, and **Enter**) are located on the right side of the LCD. These keys perform one set of functions in OPERATE mode and a different set in SETUP and SYSTEM modes.

OPERATE MODE

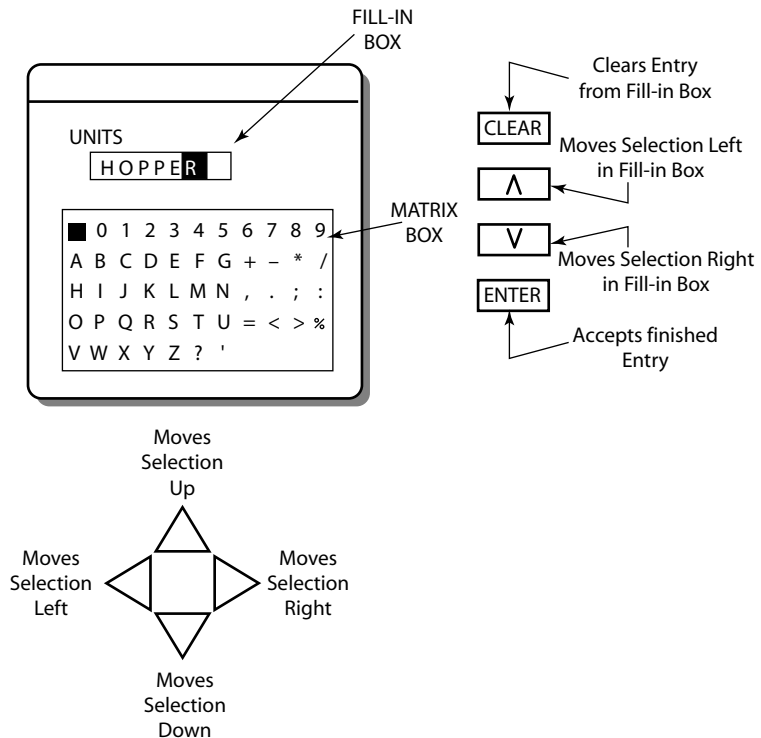
The **Increment** and **Decrement** keys select or deselect a channel (dual channel). The **Enter** key clears alarm conditions. The **Clear** key resets the application rate.

SETUP AND SYSTEM MODES

When changing alphanumeric values in the pop-up matrix, the **Clear** key clears the selection. The **Increment** and **Decrement** keys move the selection in the fill-in box to the right or left to accept the character. After completing a label, pressing the **Enter** key records the new value in memory. When the pop-up matrix is not present, the **Increment** and **Decrement** keys move the selection bar up or down one line at a time to select the new data.

Figure 7

Alphanumeric Matrix For Selecting Characters





STARTUP PROCEDURE AND DISPLAY INFORMATION

The following steps are performed in the order given while observing the display. These steps are basic and necessary whenever applying power to the system.



Up and Down Arrow keys

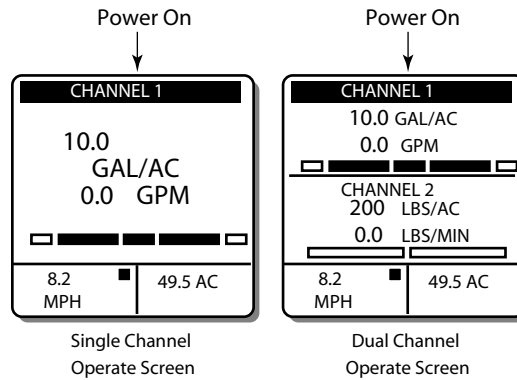


Left and Right Arrow keys

1. Make sure the Master Switch module switch is in the OFF position. If the switch is in the AUTO position, the display console will interrupt operation before the primary **Operate** screen will appear. An error message will display stating MASTER SWITCH ERROR. Turn the switch to OFF and the startup routine will continue.
2. Press the On/Off switch on the display console. When turning the unit ON, a logo appears briefly and an audible chirp will announce that all tests have been successful. If a self-test or other operational test fails, read the error message from the display and refer to TROUBLESHOOTING.
3. Observe the **Operate** screen (refer to [Figure 8](#)).
4. To adjust screen contrast, press the **Up Arrow** key to darken the screen and the **Down Arrow** key to lighten the screen.
5. To adjust backlight intensity, press the **Left Arrow** key to darken the backlight or the **Right Arrow** key to brighten the backlight.

Figure 8

Startup Routine For Single/Dual Channel Units





SYSTEM MODE CONFIGURATION

Constants are entered into memory in both SETUP and SYSTEM modes. These constants (e.g., channel type, number of boom sections, product flow rate, etc.) define system parameters. SETUP mode will accept those that frequently change such as application rate (refer to SETUP MODE FUNDAMENTALS). SYSTEM mode constants identify the system configuration and do not normally change once entered (e.g., drive type, drive frequency, boom assignment, etc.).

SYSTEM SCREEN

After the power-up routine has completed, the **Primary Operate** screen (in OPERATE mode) will display.



1. Make sure the Master Switch module switches in the OFF position.
2. Press the **System** key. The **System** screen will display (refer to [Figure 9](#)). At least one channel must be configured before product application can begin. On a dual channel system, an unused channel can remain unconfigured.

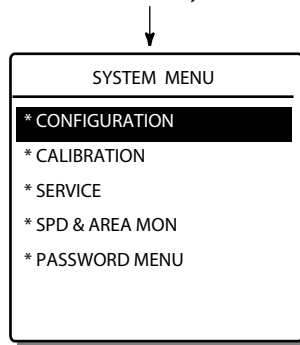
The following selections are available on the **System** screen.

- CONFIGURATION - Defines channel type, accessories, and ground speed sensor.
- CALIBRATION - Allows sensor calibrations and the entering of constants.
- SERVICE - Allows checking/monitoring of operational capabilities.
- SPD & AREA MON - Allows for reconfiguring in the Stand Alone Mode for times when the main system is disconnected.
- PASSWORD screen - Allows use of a password to protect important screens in both the SETUP and SYSTEM modes.

Figure 9

System Screen Selections

Press SYSTEM key





CONFIGURATION SCREEN

The **Configuration** screen allows for setup of channel type:

- Liquid
- Granular
- Anhydrous ammonia
- RPM



Increment key



Decrement key

1. From the **System** screen, select CONFIGURATION and press the **Enter** key. The **Configuration** screen extends to two screens (refer to [Figure 10](#)) showing seven items (sub-screens). Each screen contains predefined values requiring editing for system accuracy. Use the **Increment** or **Decrement** keys to scroll the selection bar to the correct line for editing. Selections include:
 - CHANNEL - Defines channel type and sensor characteristics.
 - BOOM - Describes the boom section details on each boom.
 - GROUND SPEED - Identifies ground speed sensor and parameters.
 - ACCESSORY - Configures extra sensors connected to the system (e.g., fan sensor, hopper level, tank level, etc.).
 - SUMMARY - Lists all system information in one location for viewing or printing of the overall configuration.
 - SERIAL PORT - Describes four selectable port configurations for such devices as a printer, computer, or other remote device that can connect to the RS-232 port.
 - IMPLEMENT LIFT - Sets the state of the lift switch (normally open/closed) so the unit detects the status of the implement.
 - SYSTEM UNITS - Switches between English and metric measuring units.
2. Select the desired option and press the **Enter** key.

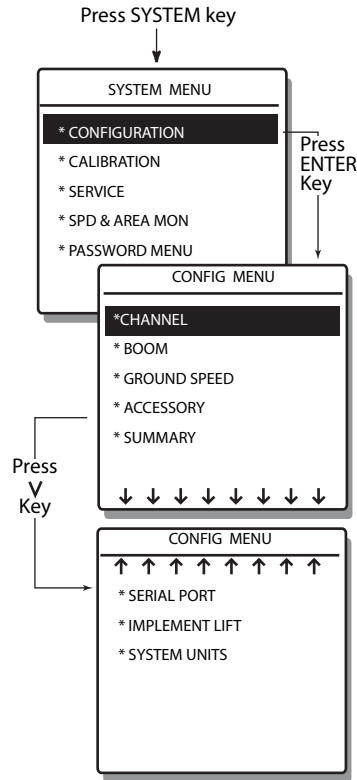
The CHANNEL and BOOM configurations of each product should be performed together. Settings between the two configurations must match for each channel configured or an error message will appear indicating that the system cannot operate under the conditions (i.e. a liquid channel must have a liquid boom). If this occurs, read the message carefully to determine the mismatch, press the **Enter** key, and make the correction.

Configurations for Anhydrous Ammonia, Granular, and Liquid Systems are located under their respective sections.



Figure 10

Configuration Screen Selections



NOTE: The Decrement key scrolls the selection bar downward. Arrows at the screen bottom indicate more selections. Continuing downward scrolling from the last item accesses a spillover screen. After selecting the last item, the next downward advancement causes a rollover to the top item. The Increment key reverses the above process.



ACCESSORY CONFIGURATION

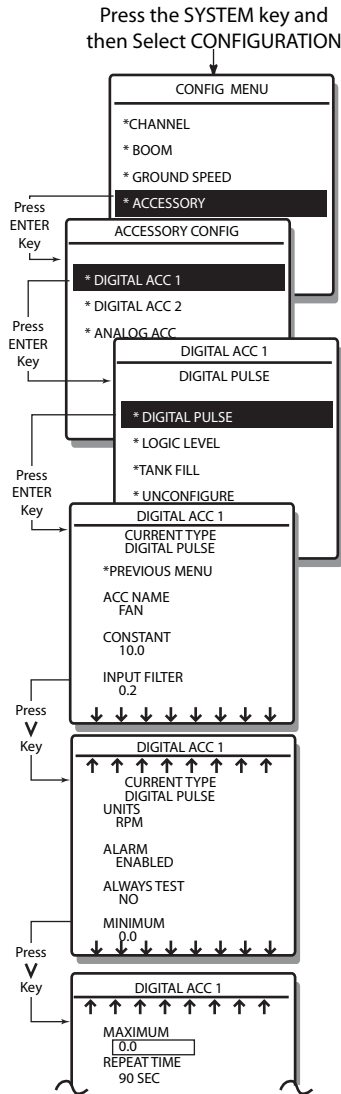
This **Accessory** screen is accessed from the **Configuration** screen (refer to [Figure 11](#)) and need not be of concern unless optional accessory sensors (digital or analog) are connected. There are input connectors for one analog sensor and two digital sensors. Examples of optional sensors are fan speed sensor, pressure sensor, vapor detector, hopper level sensor, etc. Sensors configured through this screen are monitored on the **Accessory** screen in OPERATE mode.

1. From the **Configuration** screen, select ACCESSORY. Press the **Enter** key. Three choices will appear - two digital and one analog.
2. Determine first if the sensor to be configured is analog (varying voltage) or digital (pulse generating or logic level). Select the appropriate option and press the **Enter** key. A hopper level sensor is an example of a digital logic level device that detects a full or empty condition. A digital pulse device might be a fan sensor generating pulses. A typical analog device such as a pressure sensor develops varying voltages to represent values.
3. If the sensor is digital, select either DIGITAL ACC 1 or DIGITAL ACC 2 on the **Accessory** screen. If analog, select ANALOG ACC (refer to). Press the **Enter** key. Configuration for the DIGITAL ACC 1 and DIGITAL ACC 2 selections are identical. The one chosen must have the sensor for configuration connected to it.



4. If using a digital sensor, select either DIGITAL PULSE (refer to [Figure 11](#)) or LOGIC LEVEL (refer to [Figure 12](#)) from the **Digital ACC** screen. The UNCONFIGURE selection disables the function of the sensor without losing the settings. Later, the function can be easily restored.

Figure 11
Configuring Digital Pulse Sensor



5. Edit the following details. The definitions below are for all three types of sensors configured above. Select the definition as applicable and edit.
 - ACC NAME (All Sensor Types) - Edit the accessory name for the sensor. The name typically represents the type of sensor (i.e. fan).
 - CONSTANT (Digital Pulse and Analog) - The correct value is calculated by converting the sensor's output characteristics (i.e. pulses per rev) into a multiplier resulting in a meaningful readout



- (i.e. RPM). Sensors are of two types – Analog and Digital Pulse. See the note on this page for methods of calculating each constant.
- OFFSET (Analog Only) – To obtain the correct value for this setting, set in a 0 and temporarily place a 1 in for the CONSTANT (above). Next go to the ACCESSORY screen in the Operate mode and read the OFFSET value. Return to this screen and change the OFFSET 0 value to the one just read. Then go back and change the CONSTANT to the correct value.
 - INPUT FILTER (Digital Pulse and Analog) – This number is between 0 and 1. The value affects the response time of the accessory sensor. The default is 0.3 and should be adequate for most applications. If necessary, increase the value slightly to make the response time faster or decrease slightly to slow the response time.
 - UNITS (Digital Pulse and Analog) – Indicates the measuring label for display (i.e. RPM, PSI, etc.) in the OPERATE ACCESSORY screen. Edit the desired label.
 - ALARM ENABLE/DISABLE (All Sensor Types) – Turns alarm function on or off.
 - ALWAYS TEST (All Sensor Types) – If YES, the sensor continually checks for an out of range condition. If NO, then testing only occurs when the Master Switch is in AUTO.
 - MINIMUM (Digital Pulse and Analog) – Minimum value before an alarm condition occurs.
 - MAXIMUM (Digital Pulse and Analog) – Maximum value before an alarm condition occurs.
 - LOW LABEL (Logic Type) – Active operating condition (i.e. EMPTY).
 - HIGH LABEL (Logic Type) – Active operating condition (i.e. FULL).
 - ALARM IF HIGH (Logic Type) – If set to HIGH, the alarm sounds for a high condition. If set to LOW, the alarm sounds for a low condition.
 - REPEAT TIME – Time interval before the alarm condition repeats. Values can be set from 0 seconds to 60 minutes.

DETERMINING A CONSTANT FOR AN ACCESSORY SENSOR

Analog and digital pulse sensors require a constant to be calculated so that meaningful readouts will result (e.g., LBS, Degrees, RPM, etc.).

Analog sensor - The CONSTANT is calculated as follows:

$$\text{Constant} = \text{Max Value} / (5 - \text{OFFSET})$$

Example: First determine the offset value as outlined in the text. For this example, use 1. Next, if a pressure sensor is being configured with a rating of 0-60 PSI, select 60 as the max value. Calculate the constant.

$$\text{Constant} = 60 / (5 - 1) = 15$$

Digital Pulse Sensor - Start with the number of pulses produced per unit such as pulses per revolution or per gallon. Calculate the constant as follows:

$$\text{Constant} = 60 / \# \text{ of pulses}$$



Example: If a fan speed sensor produces two pulses for each rotation of the fan, the calculation results as follows:

$$\text{Constant} = 60/2 = 30$$

Enter 30 as the constant. The resultant readout indicates RPM.

Figure 12

Configuring Logic Level Sensor

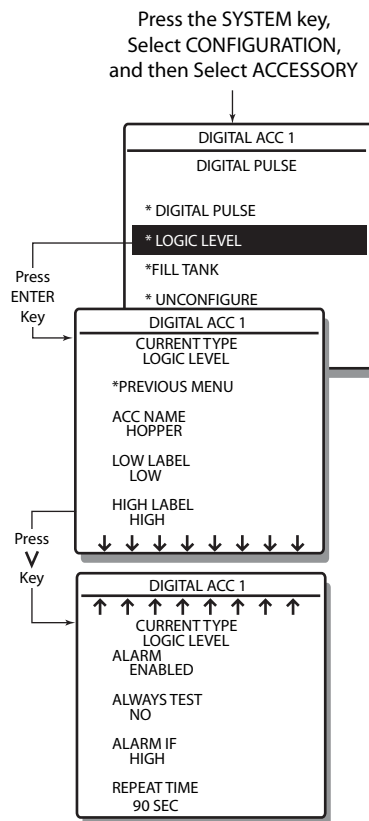
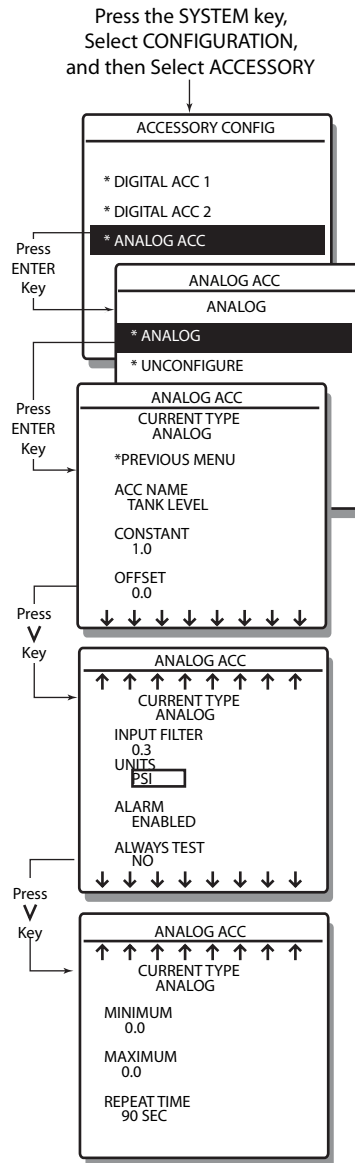




Figure 13
Configuring Analog Sensor



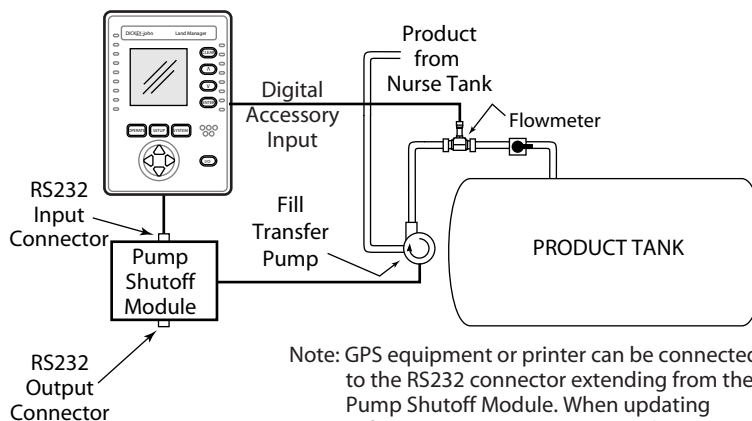
6. After selecting DIGITAL ACC 1 or DIGITAL ACC 2 from the **Accessory** screen, scroll down the screen and select TANK FILL. This option monitors and/or controls the volume of liquid being loaded for liquid applications (refer to [Figure 14](#)). A flow meter installed in the intake line to the product tank will measure the volume loading. An optional pump shutoff module will stop the transfer pump when the set capacity is reached. The operator establishes the volume for loading (i.e. 1000 gallons) and Land Manager measures up to that level (refer to SETUP MODE). When 90% of the set volume is loaded, a warning alarm will sound (a series of beeps). At 100%, a continuous alarm sounds and the pump automatically shuts off if a pump shutoff module is installed.



If no pump shutoff module is used, the transfer pump must be shut off manually. Under this condition, an overfill can occur.

Figure 14

Flow Meter And Shutoff Module Location



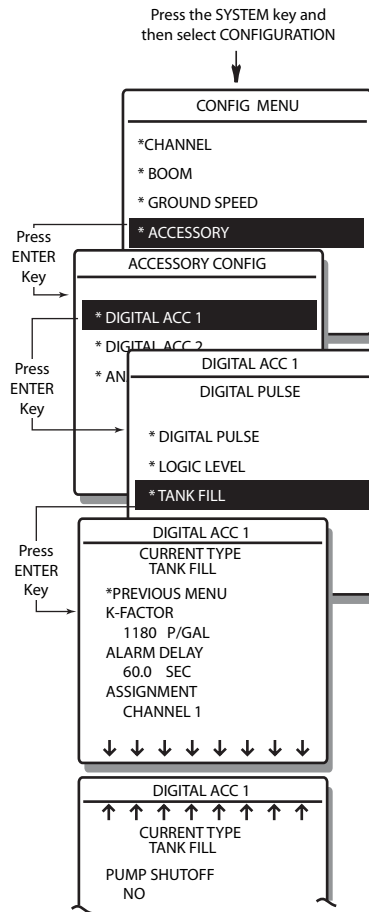
Note: GPS equipment or printer can be connected to the RS232 connector extending from the Pump Shutoff Module. When updating software or connecting to a PC, the Pump Shutoff Module must be disconnected to allow a direct connection.

7. Edit the four items on the TANK FILL screen.
 - K-FACTOR – Value on the side of the flowmeter or a calibration value determined by the operator.
 - ALARM DELAY – Delay before the flow meter must detect product flow or a flow alarm sounds. The default is 60 seconds which is normally adequate to purge air from the line.
 - CHANNEL # – Select Channel 1, 2, or NONE.
 - PUMP SHUTOFF – If a pump shutoff module is used, answer YES.
8. Access the **Setup** screen to complete the setup and to operate the filling process.



Figure 15

Setting Up A Digital Accessory Input For Tank Fill



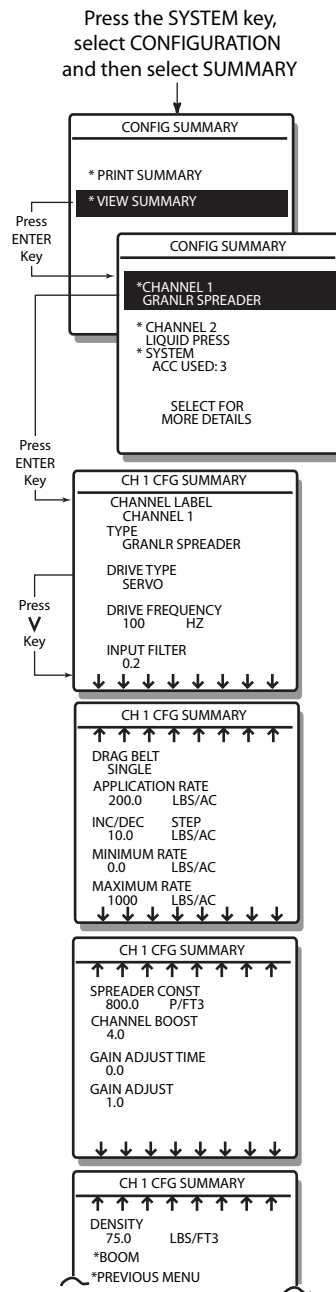
SUMMARY CONFIGURATION

The **Config Summary** screen allows the operator to observe the overall system configuration and setup at a glance. Values on these screens cannot be changed. If changing is required, normal procedures must be followed to access the screens.

1. From the **Configuration** screen, select SUMMARY.
 - PRINT SUMMARY - Prints a copy of the entire summary as viewed in the next screen, assuming the RS-232 port is configured correctly before printing.
 - VIEW SUMMARY - A screen appears showing CHANNEL 1, CHANNEL 2 (dual channel system), and SYSTEM. Additional details are available by selecting each channel separately for viewing. System details are viewed by scrolling to SYSTEM and pressing the **Enter** key.



Figure 16
Summary Screen Example





Increment key



Decrement key



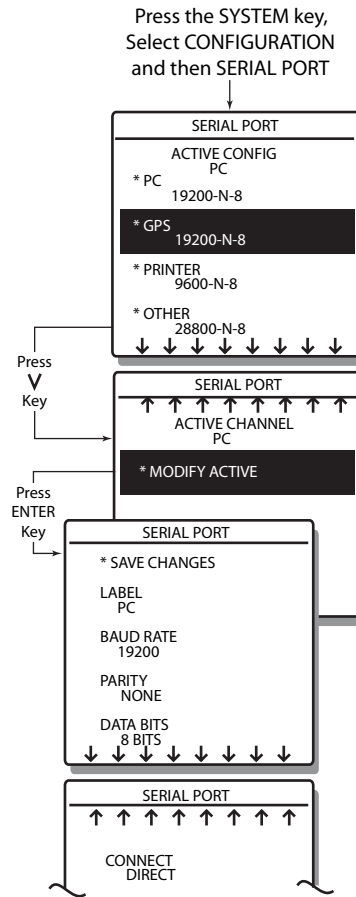
SERIAL PORT CONFIGURATION

The Serial Port can drive a printer, computer, modem or other external device through the RS-232 port.

1. From the **Configuration** screen, select SERIAL PORT and press the **Enter** key (refer to [Figure 17](#)). A screen will appear with four pre-configured devices. Notice the labels (i.e. PC, GPS, PRINTER, and OTHER) on the screen. These are arbitrary labels to identify the intended use for each device but they can be changed or re-arranged to read anything as outlined in the next step. The second line of each device indicates configuration (i.e. 19200-N-8).
The 19200 is the Baud rate, N means no parity, and the 8 indicates an eight-bit character (refer to Step 3 for additional information).
2. To modify any of the four devices, first select the desired position and press the **Enter** key. This will activate the selected device for the serial port. The selection label will appear at the top of the screen.
3. Scroll down to MODIFY ACTIVE on the extended screen and press the **Enter** key. A screen will open for editing.
 - LABEL - Identifies the device (i.e. PC). If another label (word) is preferred, change it by using the **Increment/Decrement** keys, then press the **Enter** key.
 - BAUD RATE - Selectable rates include 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, and 57600.
 - PARITY - Selectable between NONE, ODD, and EVEN.
 - DATA BITS - Selectable between 7 or 8 bit words. The STOP BITS are automatically selected.
 - CONNECT - Switches between DIRECT and MODEM. DIRECT connects the serial port directly to an external device (e.g., printer or computer). Use the MODEM selection to transmit data via the telephone line.
4. When finished, select SAVE CHANGES and press the **Enter** key.
5. Press the **System** key to exit.



Figure 17
Serial Port Screen





ENTER

SYSTEM

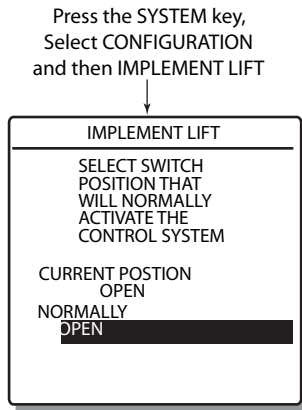
IMPLEMENT LIFT CONFIGURATION

The status of the implement switch controls the accumulation of area.

1. From the **Configuration** screen, select IMPLEMENT LIFT and press the **Enter** key (refer to [Figure 18](#)). A screen will appear to SELECT SWITCH POSITION THAT WILL NORMALLY ACTIVATE THE CONTROL SYSTEM. Select the condition for normally OPEN or CLOSED switch contacts when the implement is engaged.
2. When finished, press the **Enter** key and then the **System** key to exit.

Figure 18

Configuring Implement Lift Switch



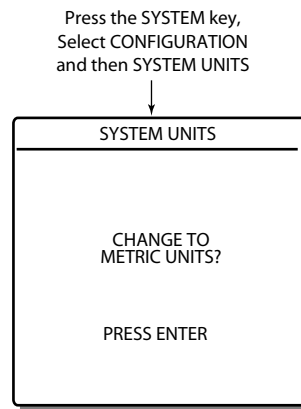
SYSTEM UNITS CONFIGURATION

1. From the **Configuration** screen, select SYSTEM UNITS (refer to [Figure 19](#)). A screen will appear asking to CHANGE TO METRIC (ENGLISH) UNITS.
2. To change the present measuring system to the opposite units, press the **Enter** key. All present values will convert to the opposite units system.

NOTE: To exit the screen without changing system units, press one of the mode keys.

Figure 19

Selecting System Units



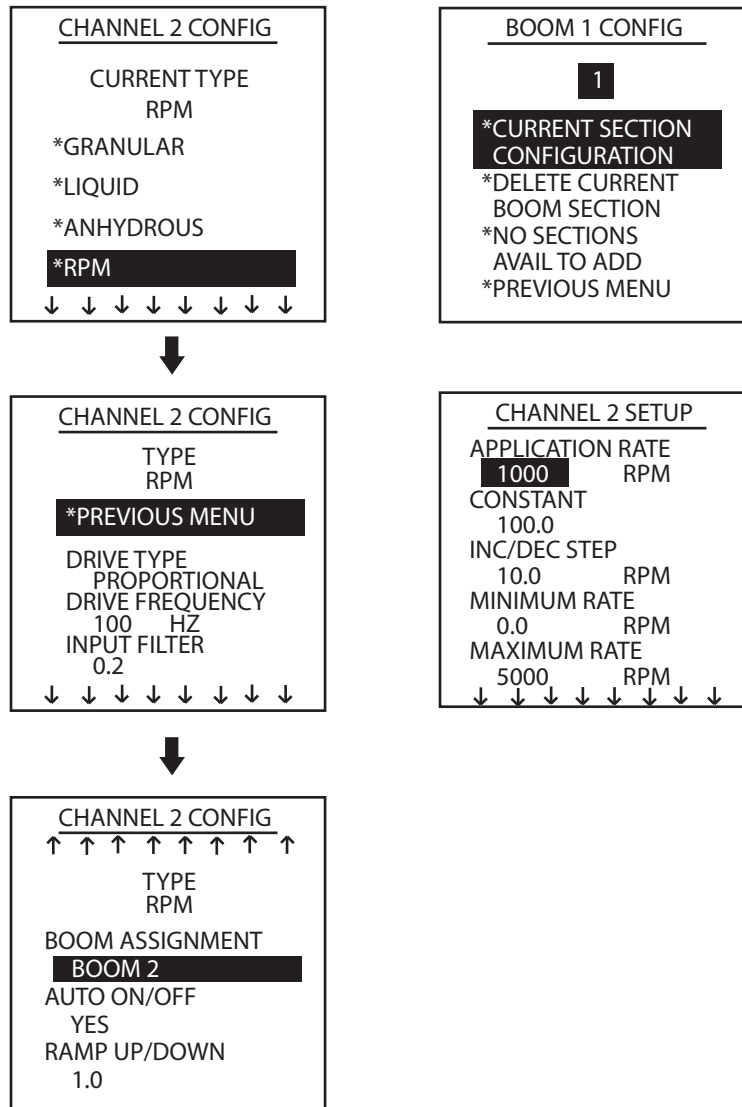


RPM CHANNEL TYPE (VERSION 1.4)

A new channel type has been added to complement the granular, liquid, and anhydrous channel types. The fourth selection on the **Channel Type** screen is RPM as illustrated in Figure 20. This is a time-based control channel that is completely independent of ground speed. The target rate and actual rate will be in units of RPM. Boom section width is irrelevant and should be ignored. This channel type can operate with Servo, Nonlinear Proportional, and Proportional control valves. The channel type has a special configuration feature that enables the channel to run without the Master Switch in the operating positions. This channel type can only be configured on one channel.

Figure 20

RPM Channel Types





AUTO ON/OFF

Auto On/Off refers to if the channel is automatically turned off when the Master Switch is turned off, or when the implement lift input becomes inactive.

When this is set to YES, as shown in [Figure 20](#):

- Master Switch must be in AUTO or MANUAL
- Implement lift input must be active
- Configured boom section must be active
- Channel must be turned ON for the channel to become active and control.

When this is set to NO, the requirements for the Master Switch and implement lift are removed. The Master Switch can be OFF and as long as the boom section is configured and active, and the channel is ON, the channel will run and control to the set RPM.

RAMP UP/DOWN

Ramp Up/Down specifies the minimum time in seconds for the control valve to open from the full-closed position to the full-open position. The Ramp Up value will be the value that is entered in this field down to a minimum of 0.1 seconds. The Ramp Down value will inherently be 3 times the value entered in this field. This value is user changeable due to the high inertia of some devices and allows greater flexibility across a range of applications. The larger the number, the longer the Auto Gain calibration will take to complete. This must be set large enough for high inertia devices to spin down to nearly a stop during the calibration process.

RPM BOOM

The RPM boom type has a different set of rules and configuration. Only ON boom section can be configured for an RPM type as illustrated in [Figure 20](#). During configuration, the only option that is available is the 12V ON option. The boom input should be connected to a switched voltage that indicates the status of the power source (e.g., hydraulic, electric) for the control channel.

RPM CHANNEL SETUP

The setup menu is different with the RPM channel type configured. The RPM setup parameter CONSTANT is the value that represents the number of sensed points (pulses) per revolution of the controlled shaft.

OPERATING TERMS AND CONDITIONS

The RPM channel type will always display in units of RPM on the main **Operate** screen as illustrated in [Figure 21](#). Also, there will never be a secondary value for an RPM channel type (i.e., Liquid Flow has provisions for a pressure reading). The calculation for application is different from normal area-based control calculations. If k_q is the pulses/revolution constant, and f_q is the sensor frequency, then the equivalent of the application rate becomes:

$$\text{RPM} = f_q / k_q \times 60$$



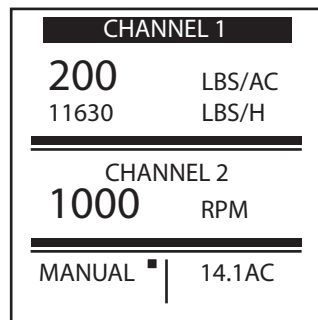
The product and area accumulators for RPM channels are irrelevant and will always remain 0.0 even though the boom section does appear to have a width set.

Any time that an RPM channel is configured, there are certain rules that apply to automatically turn the channel OFF. In SETUP or SYSTEM modes, the RPM channel will automatically be turned OFF. Any time the system is turned OFF, at the next powerup, any RPM channels will have their channels turned OFF.

IMPORTANT: Ensure that any RPM channels have completely shut down prior to leaving the System Menus by pressing the Operate or Setup keys. When SYSTEM is exited, all of the channels are reinitialized and this will cause an immediate shutdown of all control valves, regardless of any ramp down that might be in progress.

Figure 21

RPM Channel Type Display





ANHYDROUS AMMONIA

⚠ WARNING

NOTE: REFER TO MATERIAL SAFETY DATA SHEETS (MSDS) AND OTHER PERTINENT SAFETY REQUIREMENTS ASSOCIATED WITH THE HANDLING AND APPLICATION OF ANHYDROUS AMMONIA WITH A LOCAL ANHYDROUS AMMONIA SUPPLIER. It is recommended that users also consult other helpful sources concerning proper procedures for handling anhydrous ammonia and related equipment use, e.g., The National Ag Safety Database (www.cdc.gov/nasd) and The Fertilizer Institute, 1014 18th Street, NW, Washington DC 20036.46

For your own protection, it is important to carefully read, understand, and follow all safety precautions outlined in this manual when handling anhydrous ammonia. Anhydrous ammonia can be very dangerous if improperly handled. All safety procedures must be carefully observed. Serious injury is preventable when safety precautions are observed.

It is recommended that protective gloves, boots, slicker and/or pants and jacket, and chemical-splash goggles that are impervious to anhydrous ammonia are worn at all times.

These safety precautions are not meant as a substitute for proper training regarding the handling and application of anhydrous ammonia. Do not use or handle anhydrous ammonia without appropriate training.

The Land Manager is warranted and guaranteed with only DICKEY-john recommended peripheral devices (e.g., Radar ground speed sensor, valve actuators, flow meter, etc.). Other manufacturer's devices are not recommended because of unpredictable results and in some cases can have dangerous consequences.

Anhydrous ammonia can cause severe injury if improperly handled. Any person engaged in handling ammonia can reduce risk of serious accidents by observing the following:

1. DO NOT TAMPER WITH SAFETY RELIEF, EXCESS FLOW VALVES, OR OTHER SAFETY DEVICES.
2. DO NOT MODIFY ANY OF THE CONTROL SYSTEM PARTS.
3. A fail safe valve (hydraulic or electric) is required to provide shutdown capability in the event of an electrical failure.
4. Know the product, its characteristics, and behavior. Refer to manufacturer guidelines regarding cleaning, inspecting, maintenance, and replacement of the nurse tank and component parts such as valves and hoses.
5. Use only equipment suitable for anhydrous ammonia service, and make sure it is properly installed - never try to just get by.
6. Make regular inspections of equipment to ensure everything is fully maintained. Always perform corrective measures immediately to maintain a high level of safety.
7. Use and maintain standard protective equipment necessary to safely handle anhydrous ammonia.
8. Obtain proper training in handling and applying anhydrous ammonia.
9. Store and handle anhydrous ammonia in accordance with state and local regulations. Where no state or local regulations exist, use only



- equipment that is constructed in accordance with The Fertilizer Institute Standards.
10. Ensure all ammonia is out of the system before disconnecting or disassembling any parts. Be alert for frosting which is a certain indication of trapped liquid ammonia vaporizing. Depressurize all hoses when not in use. Lack of frost does not always indicate a lack of ammonia.
 11. Always repair ammonia leaks immediately.
 12. Inspect hoses thoroughly before each season or when the hose has been subjected to abnormal abuse. Ensure hoses are not kinked. Check for breaks or softening in the cover, blistering, swelling, loose couplings or damage to the hose reinforcement. Correct any defects or retire the hose from service. Replace hoses as recommended by the manufacturer.
 13. Always pick up a hose by the valve body or coupling, never by the valve handwheel.
 14. Always stay clear of valve or hose openings, particularly safety relief valves; even when the system has been depressurized.
 15. Use only proper capacity safety relief and excess flow valves - do not tamper with them or other safety devices.
 16. Never use wrenches in closing handwheel operated valves.
 17. Always stand on the upwind side of ammonia transfer operations.
 18. Be certain to wear tight fitting safety goggles or a full-face shield and protective gloves made of rubber or other material impervious to anhydrous ammonia when transferring ammonia.
 19. Be certain no person or animal is in line with the discharge before opening any ammonia valve into the air.
 20. Close all valves and disconnect all hoses when transfer operations are suspended or unattended.
 21. Install an automatic liquid relief (Hydrostatic) valve in any location where a possibility of liquid anhydrous ammonia could be trapped. This valve must open at a safe pressure and discharge into a safe location.
 22. Be sure there is a proper shutoff valve on both sides of any point where a disconnect is made.
 23. Do not assume that all ammonia is out of the system even when relief valves have been opened and there is zero pressure. Ammonia can remain in the system for several days and sometimes even weeks depending upon weather conditions.
 24. Clean, service, and replace safety breakaway valves in accordance with the manufacturer's instructions.
 25. Be aware that ammonia can collect in low parts.
 26. Do not attempt to modify or lengthen any sensor or flow meter cables. Extension cables are available from your dealer.
 27. Running the nurse tank empty or bleeding system through the flow meter may cause damage to the flow meter.

 DANGER

Anhydrous ammonia can cause severe injury if improperly handled. Any person engaged in handling ammonia can reduce the risk of serious accidents by observing the following rules.



PHYSIOLOGICAL RESPONSES TO AMMONIA VAPOR

Concentration of ammonia in the air is measured by parts per million (ppm) and 10,000 ppm = 1%.

⚠ WARNING

Exposure levels tolerated by average persons can produce severe respiratory damage to others. First aid for all ammonia victims consists of fresh air and plenty of water for affected areas. The average person's response when exposed to different concentration levels of ammonia vapor are:

- 5 ppm - Least perceptible odor.
 - 20-50 ppm - Readily detectable odor.
 - 50-100 ppm - No discomfort or impairment of health for prolonged exposure.
 - 150-200 ppm - General discomfort and eye tearing; no lasting effect on short exposure.
 - 400-700 ppm - Severe irritation of eyes, ears, nose, throat; no lasting effect on short exposure.
 - 1,700 ppm - Coughing, bronchial spasms.
 - 2,000-3,000 ppm - Dangerous, less than 1/2 hour exposure can be fatal.
 - 5,000-10,000 ppm - Serious edema, strangulation, asphyxia, rapidly fatal.
 - 10,000 ppm - Immediately fatal.
-

It is recommended that:

- **A clean, five-gallon water supply is attached to the nurse tank as required by federal and state regulation.**
- **At least five gallons of easily-accessible clean water is in the vehicle used to tow an anhydrous ammonia nurse tank as recommended by the University of Minnesota Extension Series.**
- **A 16-ounce water bottle is on the person for immediate access to flush any areas of the body exposed to anhydrous ammonia.**

⚠ CAUTION

It is recommended that protective gloves, boots, slicker and/or pants and jacket, and chemical-splash goggles that are impervious to anhydrous ammonia are worn at all times.

⚠ DANGER

ANYONE BURNED OR OVERCOME BY AMMONIA SHOULD SEEK IMMEDIATE EMERGENCY MEDICAL ASSISTANCE.



CHARACTERISTICS OF ANHYDROUS AMMONIA

Under normal atmospheric conditions, anhydrous ammonia is a gas. It is lighter than air, colorless*, and has a characteristic sharp odor. The chemical formula for ammonia is NH_3 , which means that in every molecule of ammonia, there are three hydrogen atoms for each nitrogen atom. Since a nitrogen atom is 14 times heavier than a hydrogen atom, ammonia contains 82% nitrogen by weight.

The pressure required to liquify ammonia gas varies with temperature (boiling point). The density of liquid ammonia also varies a function of temperature. Some of this information is illustrated in the following table.

Figure 22

NURSE TANK TEMPERATURE °F	NURSE TANK PRESSURE (PSI)	POUNDS PER CUBIC FOOT NH_3	POUNDS PER CUBIC FOOT NITROGEN
-28	0	42.5	35.0
-8	10	41.7	34.3
6	20	41.1	33.8
16	30	40.6	33.4
26	40	40.2	33.1
34	50	39.8	32.8
42	60	39.4	32.4
50	75	39.0	32.1
58	90	38.6	31.8
68	110	38.1	31.4
77	130	37.7	31.0
86	155	37.2	30.6
96	185	36.6	30.2
105	215	36.1	29.7
115	250	35.6	29.3

*The white cloud seen when liquid ammonia is released into the atmosphere is actually water condensed from the air.



HANDLING TRAPPED ANHYDROUS AMMONIA

The Super Flow Assembly is a manufactured product of Continental NH₃ Products, therefore, the user should consult with the individual manufacturer's guidelines regarding inspection, maintenance, and useful life of any component parts.

NOTE: Contact Continental NH₃ Products for Super Flow Assembly usage guidelines: 130 Yorktown Dallas, TX 75222 PH#1-800-537-5642 www.continentalnh3.com

DICKEY-john does not warrant products that are not manufactured by DICKEY-john and does not make any definitive representation regarding the useful lives of those parts. It is recommended to conduct daily inspections of hoses for kinks and defects, as well as full inspection and maintenance of those hoses and valves.

⚠ WARNING

Zero pressure in your applicator system does not mean that all anhydrous ammonia is out of the system. Liquid anhydrous ammonia may still be present. Frost on any part or component of the system is a positive indication of liquid anhydrous ammonia at low pressure. However, the lack of frost does not indicate a lack of anhydrous ammonia, particularly in heavy-duty hoses.

IMPORTANT: It is recommended that upstream and downstream check valves are installed. Refer to the appropriate piping/plumbing component manufacturer and anhydrous ammonia literature for further details.

Figure 23
Component Control System

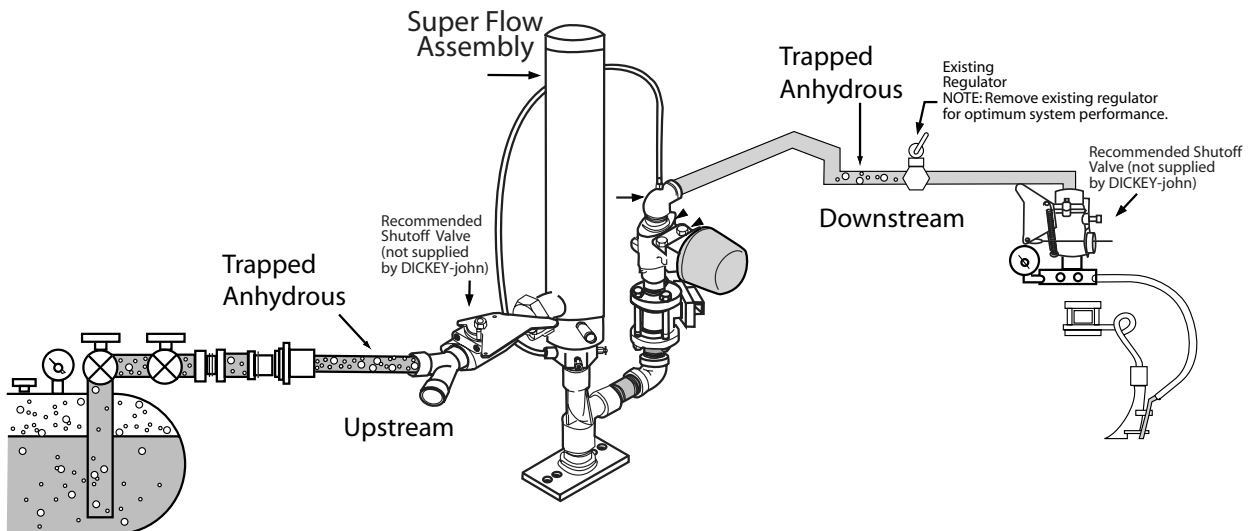
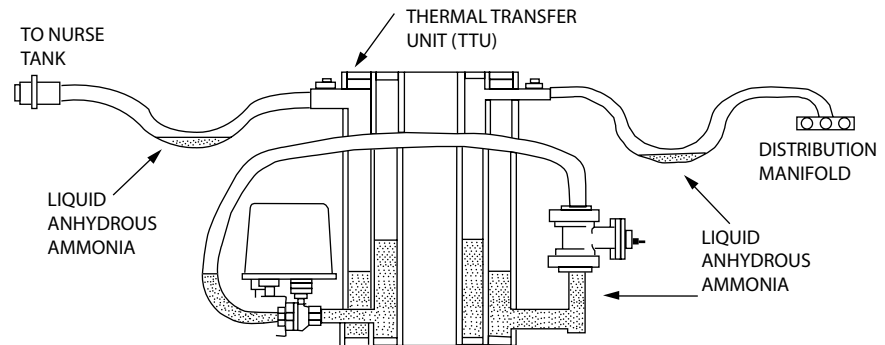




Figure 24

Thermal Transfer Unit



IMPORTANT: Before installation, and if it becomes necessary to replace any component of the control system, the applicator must be drained of all anhydrous ammonia.

To drain the application (for installation, storage, or maintenance):

1. Disconnect the nurse tank from the applicator.
2. Lower the applicator. While pulling it through the field, open the regulator valves or place the control system in AUTO. If manifold shutoff valves are present, open them.
3. Continue driving until the applicator system shows zero pressure. Applicator knives do not "smoke" when raised out of the ground.
4. Open all bleed-off valves of the system to allow vapors to dispense. If liquid anhydrous ammonia is present (after a short period of time) frost may form on metallic components and a temperature change can be detected on hoses.
5. Clear the hoses by raising the low spots.

CAUTION

If liquid anhydrous ammonia is present, a discharge will be visible through the applicator knives. Make certain you are on the upwind side of the applicator.

Liquid anhydrous ammonia will evaporate from a depressurized (all valves open) system. This evaporation may take 1 day, 2 days, or several weeks depending on temperature and weather conditions. After a period of time, check the temperature from top to bottom of the Super Flow. If a temperature difference is detected, liquid anhydrous ammonia is still present and additional time is required for evaporation. If no temperature difference is detectable, the system can be stored.



▲ CAUTION

It is recommended that protective gloves, boots, slicker and/or pants and jacket, and chemical-splash goggles that are impervious to anhydrous ammonia are worn at all times.

To remove or replace components (after completing previous steps):

6. Look for frost on the Super Flow and hoses. If none is seen, check the temperature of the hoses in question, particularly at low spots and the Super Flow. If a change in temperature is detected along a hose or from top to bottom, this indicates that liquid anhydrous ammonia is present.
7. Clear the hoses by raising the low spots. If liquid anhydrous ammonia is present, a discharge will be seen through the applicator knives. Make certain you are on the upwind side of the applicator.
8. **For replacement of flow meter, control valve, or Super Flow**, it is recommended that the Super Flow be completely filled with water. With protective clothing and goggles in place, carefully remove one of the pressure relief valves on the Super Flow. Install a 1/4 inch pipe nipple (4-6 inches in length) in the pressure relief valve port. Slide a garden hose over the 1/4 inch pipe nipple and clamp it in place.

IMPORTANT: When water mixes with anhydrous ammonia, boiling will occur and may cause vapor and water to shoot out the knives and the nurse tank hose end. Make sure the nurse tank hose is pointed in a safe direction. If water runs out of the nurse tank hose before both chambers of the Super Flow are filled, it may be necessary to close the shutoff valve on the hose.

▲ CAUTION

Make certain you are a safe distance on the upwind side and that no person or animal is immediately downwind.

9. Slowly turn on the water. Allow the applicator system and the Super Flow to completely fill with water. Turn off the water and remove the garden hose. Disassemble the components as required.
10. Reinstall the pressure relief valve.



NOTE: *DICKEY-john manufactured servo valves should be used for anhydrous ammonia. Proportional valves cannot be used.*

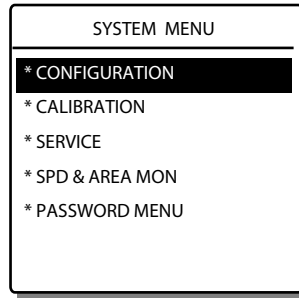
CHANNEL CONFIGURATION

1. Ensure the Master Switch module switch is in the OFF position.
2. Press the **System** key. The **System** screen will appear (Figure 25).

Figure 25

System Screen

Press SYSTEM key

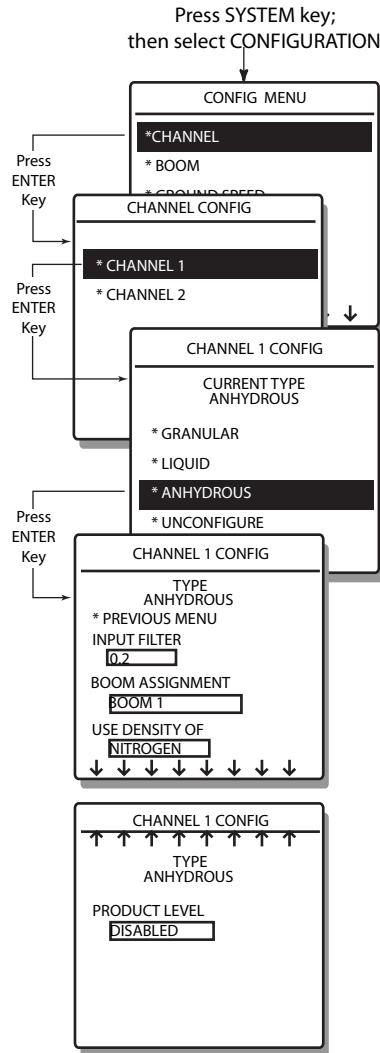


3. From the **Configuration** screen, select CHANNEL and press the **Enter** key. For a dual channel unit, a screen will appear for selecting CHANNEL 1 or CHANNEL 2. This screen should be skipped for a single channel unit.
4. Select a channel number for configuration and press the **Enter** key. A screen will appear for product selection (refer to Figure 26).
5. Select ANHYDROUS to define the channel and press the **Enter** key. Three product types will display, in addition to an UNCONFIGURE selection. This selection will allow the present channel to be unconfigured but will retain the details for later use unless modified by a different configuration.
6. Edit the items on the screen. Press the **Enter** key after each.
 - INPUT FILTER - The value affects the response time of the drive. Values normally range from 0.1 to 0.5. A typical value is 0.2.
 - BOOM ASSIGNMENT - Links the channel to the boom configured in a later paragraph (BOOM CONFIGURATION). Enter the correct boom number (i.e. 1 or 2).
 - USE DENSITY OF - Toggles between NITROGEN and NH₃ and determines the actual pounds of nitrogen or NH₃ per acre displayed during application.
 - PRODUCT LEVEL - When ENABLED, the current amount of product remaining aboard displays on the OPERATE mode screen. The product level will decrease as material is dispersed and an alarm sounds when the level drops below the preset value.
7. When finished, select PREVIOUS MENU and press the **Enter** key.
8. Select BOOM and continue with configuration.



Figure 26

Configuring Anhydrous Ammonia Channel



BOOM CONFIGURATION

1. Select BOOM from the **Configuration** screen and press the **Enter** key. For a dual channel unit, a screen will appear with two choices.
2. Select the desired BOOM # and press the **Enter** key (refer to [Figure 27](#)). The product type previously programmed is highlighted.
3. Select ANHYDROUS and press the **Enter** key. The product type at the top of the screen will change (if different) to match the selection. If no sections were assigned earlier, a screen will appear asking to INSERT SECTION. If so, refer to Step 5; then return to Step 4.
4. Select a boom section at the top of the screen and then select the CURRENT SECTION CONFIGURATION.



5. Press the **Enter** key. Details for the selected boom section will appear. Other sections are located on separate screens with similar formats. Screen entry includes:
 - 12V ON - YES means +12 volts activates the section solenoid. NO indicates grounding activates the section solenoid.
 - NUMBER OF KNIVES - The knife count in the boom section.
 - KNIFE SPACING - Distance in inches (centimeters) between knives.
6. To add a boom section, use the **Increment** or **Decrement** keys to scroll (if necessary) to INSERT SECTION and press the **Enter** key. Any number (up to ten) can be used only once within the two booms. The section numbers already assigned will display across the top of the screen. By using the **Increment/Decrement** keys, these numbers can be edited or re-arranged in any manner necessary to reflect actual boom layout.
 - **To add or insert a section** – Move the selection box to the location for the new section number. If the selection box is placed on top of an existing number, that number will shift to the right one position when the new number is inserted. If the number is placed on the right end, move the box one space past the right most digit.
 - **To select a new number** – Use the **Increment/Decrement** keys to select a new number and press the **Enter** key. If section numbers have already been assigned, the next (or lowest unused) available number will appear for entering. This prevents assigning the same number twice.
7. To delete a boom section, use the **Increment/Decrement** keys to select the section number using the selection box, select DELETE CURRENT BOOM SECTION, and press the **Enter** key.
8. When finished, select PREVIOUS MENU and press the **Enter** key.
9. Select GROUND SPEED and configure.



Increment key



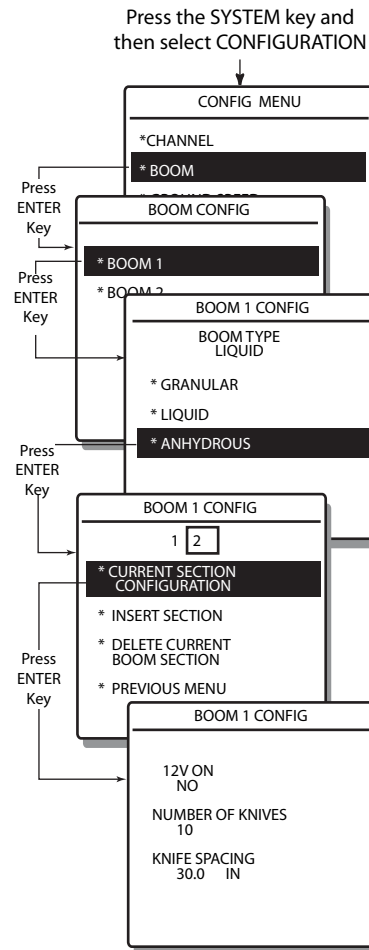
Decrement key





Figure 27

Configuring Anhydrous Ammonia Boom



GROUND SPEED CONFIGURATION

1. Select GROUND SPEED from the **Configuration** screen. The GND SPD CONFIG screen will appear for editing (refer to).
 - MANUAL SPEED - Internally generates ground speed rate whenever the Master Switch module switch is held into the MANUAL position. Value can be set to any speed within the delivery capabilities of the system. This speed is also used when GROUND SPEED OVERRIDE is selected from the **Manual Overrides** screen.
 - MIN OVERRIDE – A minimum ground speed that automatically takes over system control between its set point and the SHUT OFF SPEED set point during slowdown conditions.
 - SHUT OFF SPEED – The minimum ground speed allowed before the system ceases total operation.
 - SHUT OFF DELAY – Determines the length of time before the system disables the operate function after ground speed ceases if the Master Switch Module switch remains in the AUTO position. After the delay time elapses, the Master Switch module switch must



be turned OFF and back to AUTO again before the system will restart. The value is programmable from 1 to 90 seconds for liquid or granular systems. Anhydrous ammonia systems are programmable from 1 to 10 seconds.

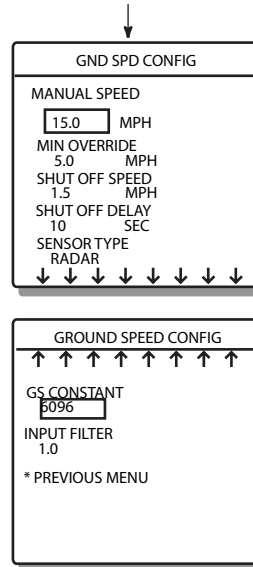
- SENSOR TYPE - Choose either RADAR or NON RADAR.
- CONSTANT - Represents the pulse count produced by the sensor over a given distance (refer to GROUND SPEED CALIBRATION to calculate the constant).
- INPUT FILTER - Affects the response time of the ground speed sensor. The number must be set between 0 and 1. A radar ground speed sensor is usually set to 1. For all others, set the value between .2 and .4.

NOTE: Only the last three items (SENSOR TYPE, CONSTANT, and INPUT FILTER also appear for the Speed Area Monitor mode.

Figure 28

Configuring Ground Speed Sensor

Press the SYSTEM key.
Select CONFIGURATION, and
then Select GROUND SPEED



ENHANCED MANUAL GROUND SPEED

Once the manual ground speed is set (**System, Configuration, Ground Speed** screens) the control can run from the entered manual ground speed. There are two ways to set manual ground speed:

1. Setting through the **System, Service, System Overrides, and Ground Speed** screens. If manual ground speed is setup using these screens, it must also be disabled the same way.
2. Hold the Master Switch into the MANUAL position and press the right green cursor key. The readout on the **Operate** screen will change to MANUAL. The control will operate off of the set manual ground speed. To disengage the manual ground speed feature from this shortcut mode, turn the Master Switch to the OFF position.

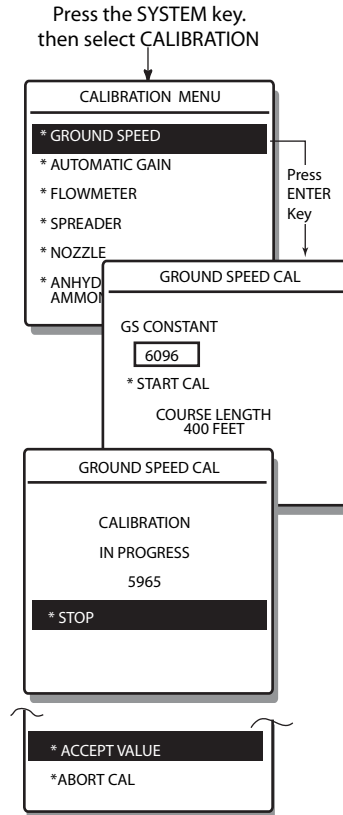


GROUND SPEED CALIBRATION

The ground speed calibration constant is determined by counting the number of pulses produced by the ground speed sensor over a given distance. This procedure is the same for all product types, refer to [Figure 29](#).

Figure 29

Developing Ground Speed Constant



1. Accurately measure a 400 foot course (preferably on level ground in a typical field condition). The course length must be 100 meters for the metric mode. Mark the start and finish points so the course is clearly visible from the driver's position.
2. Select **GROUND SPEED** from the **Calibration** screen and press the **Enter** key. The screen will display a blank for the **GS CONSTANT** (ground speed). If the correct value is known, enter the number and the calibration is complete. However, to determine the correct value, proceed to Step 3.
3. Scroll down to the **START CAL** line on the display while driving toward the starting marker of the course. A normal speed (minimum of 2 mph) should be maintained. Do not stop.
4. When even with the starting marker, press the **Enter** key on the display console to start the counting. The display readout will reset to 0 (zero), and then begins counting upward as the tractor drives.
5. Continue to drive the measured course at a constant speed.



6. When even with the finish marker, press the **Enter** key again to STOP the counting. The accumulated number displays on the screen in the blank for the GS CONSTANT. This is the new constant.
7. Read and record this number as a first run.
8. Repeat the test two more times to ensure accuracy.

IMPORTANT: If a ground speed error is noticed, two reasons are possible: 1. The ground speed calibration did not run on an accurate 400 foot (100 m) course, or 2. the speed sensor mounting position has changed since the ground speed calibration was performed.

AUTOMATIC GAIN CALIBRATION

Auto Gain Calibration for an Anhydrous Ammonia channel is similar to Liquid or Granular but has a few additional operator input and safety screens. The process requires two or three minutes depending on the equipment and a test strip of land long enough to maintain a ground speed greater than 1 mph (i.e. 3 minutes x 2 mph = 528 feet). The application rate will vary and therefore inadequately applies ammonia to the test strip. This area must be re-applied if the test strip is part of the field for the application.

PERFORMING AUTO GAIN CALIBRATIONS

1. Enter SYSTEM mode and then the **Calibration** screen. Select AUTOMATIC GAIN and press the **Enter** key (refer to [Figure 30](#)).
2. Select a channel number if required. Edit the MAX APP RATE and MAX GND SPEED values from AUTO GAIN CAL screen. Set these limits for maximum typical rates of use for this system. These rates are used only during this Auto Gain calibration.

ENTER

CAUTION

Do not set these limits beyond system capacity or incorrect gain settings will result.

3. Select CONTINUE and press the **Enter** key. A screen will appear warning that CALIBRATION WILL ACTIVATE THE SELECTED CHANNEL during the test. This means the actuator valve will open and close in varying degrees for several intervals throughout the test.
4. Select CONTINUE and press the **Enter** key again. The final screen will appear before the test begins. A warning will display stating to KEEP KNIVES IN GROUND AND SPEED ABOVE 1 MPH DURING CAL. These two conditions must be followed. If the ground speed is less than 1 MPH, SPEED TOO LOW will display.
5. With the knives in the ground and the ground speed above 1 MPH, START will appear on the screen. Press the **Enter** key. A screen will appear stating CALIBRATION IN PROGRESS. A progression bar will indicate activity. The message STEP numbers will display below the progression bar and will advance upward toward 15 during calibration.



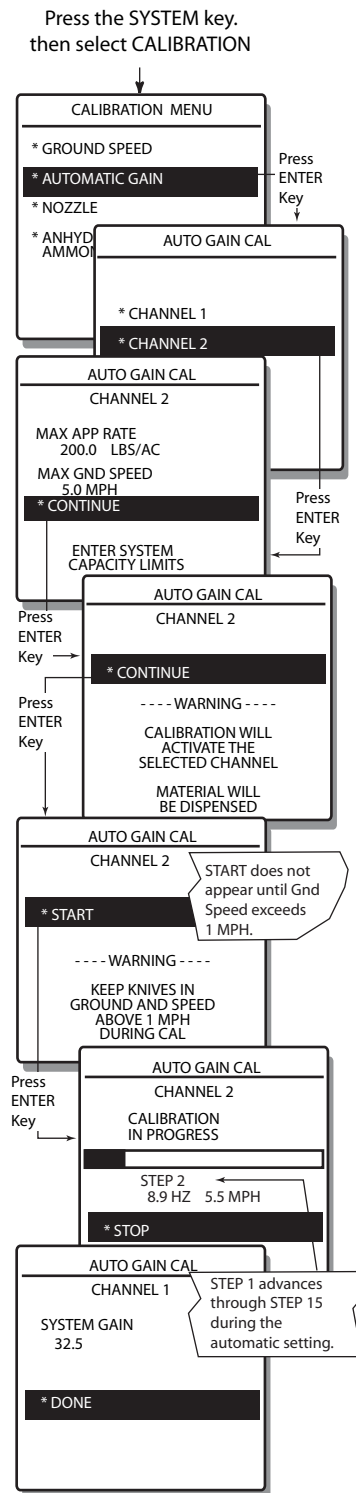
Continue to monitor ground speed. If the ground speed drops below 1 MPH, a screen will appear stating CALIBRATION ABORTED, SPEED DROPPED BELOW 1 MPH DURING CAL.

6. Press the **Enter** key to dump the unfinished calibration and to return to the **Calibration** screen. Begin the test again. When calibration is successful, a screen will automatically appear showing a SYSTEM GAIN number (i.e. 32.5).
7. To save the value displayed, press the **Enter** key. The system gain can be fine tuned through the **Channel Setup** screen in SETUP mode. Nonlinear components in the control channel might cause oscillation or sluggishness at certain application rates. To fine tune, decrease the SYSTEM GAIN value slightly if the channel oscillates or increase if sluggish. The AUTO GAIN measures and calculates other control channel characteristics which are viewable in the CONFIGURATION SUMMARY of the SYSTEM mode.



Figure 30

Automatic Gain Calibration Screens For Anhydrous Ammonia





FLOW METER CALIBRATION

The number of pulses generated by the flow meter per volume of product indicates the flow rate. Calibration determines the actual amount of product applied as compared to the recorded amount and adjusts the calibration constant accordingly. This number becomes the new K-Factor instead of the one stamped on the flowmeter body.

1. Select a field of at least ten acres (preferably more).
2. Weigh a loaded nurse tank and record the total weight.
3. Before starting the field test, enter SETUP mode and prepare the system for normal operation. Since this test actually applies product, application accuracy is important.
4. Enter OPERATE mode and clear all the accumulator values for the channel being calibrated.
5. Press the **Operate** key to access the **Accumulator** screen. Select the desired channel and clear the values.
6. Enter SYSTEM mode. Select ANHYDROUS AMMONIA from the **Calibration** screen. Select the correct channel number. A screen will display PERFORMED DURING NORMAL OPERATION – DO NOT RESET ACCUMULATORS DURING THE TEST.
7. Move to the field and prepare to apply ammonia. When ready, select START and press the **Enter** key (refer to [Figure 31](#)). The screen will instruct the user to RETURN TO NORMAL OPERATION.
8. Select CONTINUE to resume normal operation. The OPERATE mode screen will appear; normal field operation can begin.
9. Place the Master Switch module switch into the AUTO position and begin applying product in a normal fashion.
10. When the test plot is finished, return to SYSTEM mode. To stop the test, re-enter SYSTEM mode as before. The screen will appear stating CALIBRATION IN PROGRESS.
11. Select STOP and press the **Enter** key. When the test ends, an amount of anhydrous ammonia in pounds will appear on the screen. Do not change anything at this time.
12. Reweigh the nurse tank. Subtract this weight from the full load weight. The result is the actual amount applied on the test plot.
13. Record weights.

Nurse tank weight before application _____

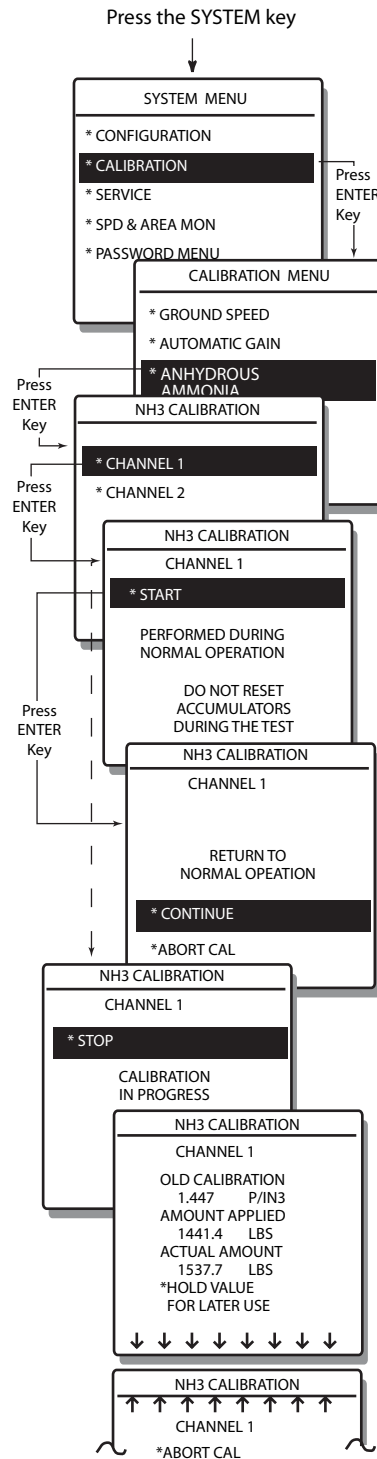
Nurse tank weight after application _____

Total Anhydrous Ammonia used _____



NOTE: For spreaders, a boom equals the spreader width. For a dual belt or drag chain system, two boom sections of equal size are configured. With one disabled, the unused half indicates on the graphic display in the OPERATE mode and the system automatically adjusts to maintain proper calculations for area covered.

Figure 31
Flow Meter Calibration (Anhydrous Ammonia)



14. Enter the amount of product applied into the waiting screen and press the **Enter** key. The **NEW CALIBRATION** number will appear.



15. If the number appears to be correct, select DONE and press the **Enter** key. The calibration is complete. If the number is incorrect, it can be re-entered.

Two other choices are also available after the field application is complete. If you are not satisfied with the results or decide not to finish the test, select ABORT CALIBRATION and start again. Or, when finished and waiting for the total weight to be determined, you can select HOLD VALUE FOR LATER USE and recall the screen again when you are ready to complete the calibration.

FINE TUNE APPLICATION RATE

If, over a period of time, a small (less than 10%) application rate error is consistently over or under, fine tuning the K-Factor number might be indicated.

Small consistent errors can be compensated for by adjusting the value of the K-Factor the same percentage as the error and in the same direction of the error. For example, if the application rate is set at 100 pounds per acre, but 105 pounds is being applied, the rate is 5% too high. This means the K-Factor must be reduced by 5% or lowered to 95% of the original value. If the K-Factor is now at 2.250, the new value is calculated as follows:

$$\text{Existing K-Factor} \times \text{Percentage of total} = \text{New K-Factor}$$
$$\text{Therefore a 5\% decrease is } 2.250 \times .95 = 2.1375$$

If the product application was 5% under applied, the K-Factor requires raising from 100% to 105%. In this case, the number is calculated as follows:

$$5\% \text{ increase is } 2.250 \times 1.05 = 2.3625$$

ENSURE TANK PRESSURE IS CORRECT

Check that the tank pressure is entered correctly.

CHECK FLOWMETER MOUNTING AND K-FACTOR

Ensure the flow meter is installed correctly. There is an in and out orientation to the flow meter and this must be correct. Also check that the correct flow meter constant (K-Factor) is entered.

ANHYDROUS AMMONIA SYSTEM SETTINGS

- APPLICATION RATE - Target rate for applying Anhydrous Ammonia.
- K-FACTOR - Number of flowmeter pulses per volume material.
- TANK PRESSURE - Represents the value read from the pressure gauge on the nurse tank. If the gauge fails, a temporary means of determining pressure from the tank temperature can be used (refer to TEMPERATURE/PRESSURE CONVERSION). The pressure should be checked and adjusted as necessary on each tank. Also, tank pressure should be checked if sitting overnight or for an extended period of time since the application started.
- INC/DEC STEP - The desired application rate increment/decrement to that increases or decreases the application rate by a specified amount during application (on-the-go) through the field.

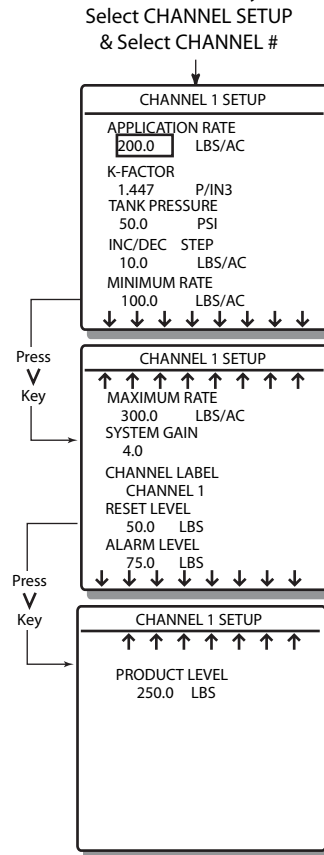


- MINIMUM RATE - Minimum acceptable product application rate the system allows.
- MAXIMUM RATE - Maximum acceptable product application rate the system allows.
- SYSTEM GAIN – Affects the response of the control valve created by changes in ground speed. The larger the number the faster the response time. In field application, if the valve seems to be moving too rapidly and tends to be oscillating, this number should be lowered. The number can be as low as 1 or smaller but cannot be 0.0. If the valve seems to be moving too slowly, this value should be increased. The starting value is automatically set during Automatic Gain Calibration.
- CHANNEL LABEL – An arbitrary label of up to ten characters to identify the channel on the **Operate** screen.
- RESET LEVEL – Typically represents the amount of a full product load after each reset.
- ALARM LEVEL – Minimum level of product remaining aboard before the alarm sounds. A typical value is 10% of the full load.
- PRODUCT LEVEL – Monitors the amount of product remaining aboard (if enabled in SYSTEM mode). The operate mode screen displays the amount remaining. If loading only a partial load, change this number to the correct value instead of resetting.



Figure 32

Typical Channel Setup For Anhydrous Systems



TEMPERATURE/PRESSURE CONVERSION

If the pressure gauge fails, pressure can be determined by using the tank temperature. The following table allows converting nurse tank temperature to tank pressure for temporary operation only. To use the table, find the nearest temperature and read the corresponding pressure. Enter that value at the **Setup** screen (refer to [Figure 32](#)).

Temperature (F)	Pressure (PSI)	Temperature (F)	Pressure (PSI)
-28	0	50	75
-8	10	58	90
6	20	68	110
16	30	77	130
26	40	86	155
34	50	96	185
42	60	105	215





GRANULAR SYSTEMS

CHANNEL CONFIGURATION



Increment key

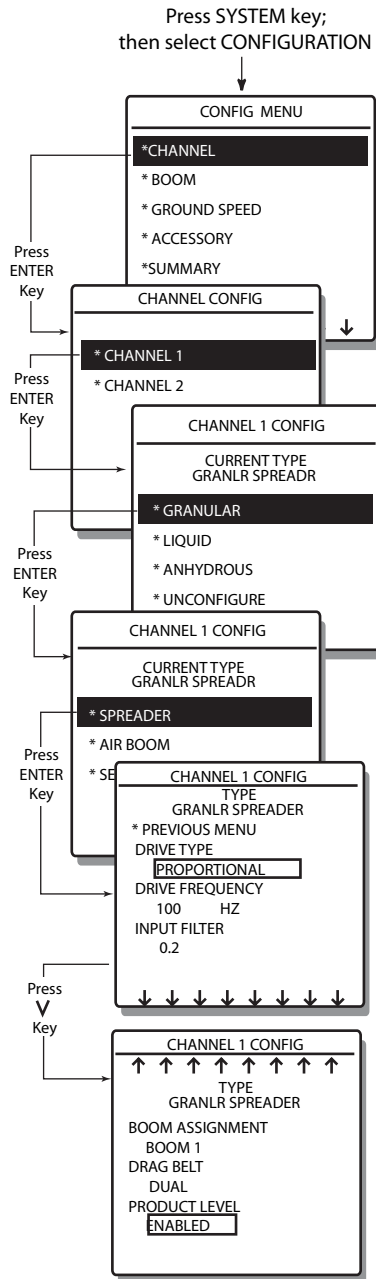


Decrement key

1. From the **Configuration** screen, select CHANNEL and press the **Enter** key. For a dual channel unit, a screen will appear for selecting CHANNEL 1 or CHANNEL 2. This screen is skipped for a single channel unit.
2. Select a channel number for configuring and press the **Enter** key. A screen will appear for product selection (refer to [Figure 33](#)).
3. Select GRANULAR and press the **Enter** key. Three product types will display in addition to an UNCONFIGURE selection. This selection will allow the present channel to be unconfigured but retains the details for later use unless modified to a different configuration.
4. Select the correct equipment type: SPREADER, AIR BOOM, or SEEDING and press the **Enter** key.
5. Edit each of the following items:
 - DRIVE TYPE - Several selections are available depending on a spreader or air boom system. Use the **Increment** and **Decrement** keys to toggle to the desired drive type (refer to DRIVE TYPE DESCRIPTIONS).
 - DRIVE FREQUENCY - The frequency ranges between 40 to 250 Hz. A typical value is 40 Hz for SERVO or 100 Hz for PROPORTIONAL.
 - INPUT FILTER - Affects the response time of the drive. Values normally range from 0.1 to 0.5. A typical value is 0.2.
 - BOOM ASSIGNMENT - Links the channel to the boom (refer to BOOM CONFIGURATION). Enter the correct boom number (i.e. 1 or 2).
 - DRAG BELT - If equipped with a dual belt or drag chain delivery system, select DUAL. If not, select SINGLE.
 - PRODUCT LEVEL - When ENABLED, the current amount of product remaining aboard is monitored on the Operate Mode screen. The product level will decrease as material is dispersed and an alarm will sound when the level drops below a preset value. These values are established in SETUP mode.
6. When finished, select PREVIOUS MENU and press the **Enter** key.
7. Select BOOM and continue with configuration.



Figure 33
Configuring A Granular Channel



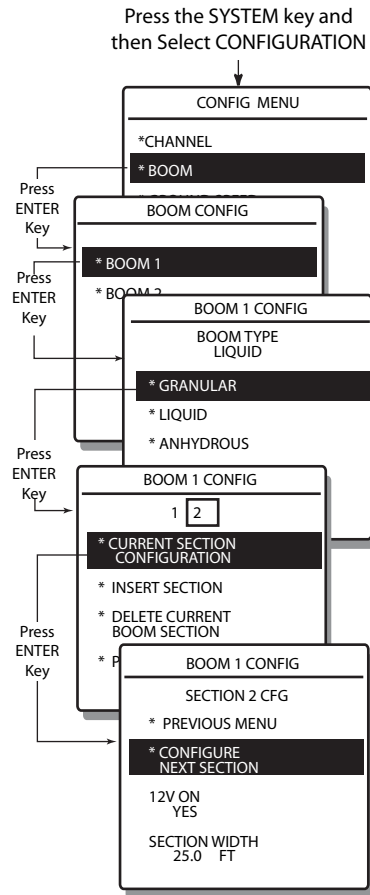


BOOM CONFIGURATION

1. Select BOOM on the **Configuration** screen and press the **Enter** key. If configuring a dual channel unit, a screen with two choices will appear.
2. Select the desired BOOM # and press the **Enter** key. The **Boom # Configuration** screen will appear. The product type previously programmed will be highlighted (refer to [Figure 34](#)).
3. Select GRANULAR and press the **Enter** key. The product type at the top of the screen will change (if different) to match the selection when the next screen appears. If no sections were assigned earlier, a screen will appear asking to INSERT SECTION. If so, proceed to Step 4. Skip to Step 5 if the screen does not appear.
4. To add a boom section, use the **Increment** or **Decrement** keys to scroll (if necessary) to INSERT SECTION and press the **Enter** key. The use of any number (up to ten) is only allowed once within the two booms. The numbers already assigned for the present boom will display across the top of the screen. By using the **Increment/Decrement** keys, these numbers can be edited and rearranged as necessary to reflect actual boom layout.
 - **To add or insert a section** – Move the selection box to the location to add the new section number. If the selection box is placed on top of an existing number, that number will shift to the right one position when the new number is inserted. To place the number on the right end, move the box one space past the right most digit.
 - **Select a new number** – Use the **Increment/Decrement** keys to select a new number and press the **Enter** key. If section numbers have already been assigned, the next (or lowest unused) available number will appear for entering. This prevents assigning the same number twice.
5. Select a boom section at the top of the screen and then select CURRENT SECTION CONFIGURATION. Press the **Enter** key. Details for the selected boom section will appear. Other sections are located on separate screens with similar formats. Entries are defined below:
 - 12V ON - YES means +12 volts activates the section solenoid. NO indicates grounding activates the section solenoid.
 - SECTION WIDTH - Establishes application width of this boom section.
6. To delete a boom section, use the **Increment/Decrement** keys to select to the section number using the selection box. Then select DELETE CURRENT BOOM SECTION and press the **Enter** key.
7. When finished, select PREVIOUS MENU and press the **Enter** key.
8. Continue to GROUND SPEED and configure.



Figure 34
Configuring A Granular Boom



GROUND SPEED CONFIGURATION

1. Select GROUND SPEED from the **Configuration** screen. The **Gnd Spd Config** screen will appear for editing (refer to [NOTE](#)):
 - MANUAL SPEED - Internally generated ground speed rate whenever the Master Switch module switch is held into the MANUAL position. This value can be set to any speed within the delivery capabilities of the system. This speed is also used when GROUND SPEED OVERRIDE is selected from the **Manual Overrides** screen.
 - MIN OVERRIDE – A minimum ground speed that automatically takes over system control between its set point and the SHUT OFF SPEED set point during slow down conditions.
 - SHUT OFF SPEED – The minimum ground speed allowed before the system ceases total operation.
 - SHUT OFF DELAY – Determines the length of time before the system disables the operate function after ground speed ceases if the Master Switch module switch remains in the AUTO position. After the delay time elapses, the Master Switch module switch must be turned OFF and back to AUTO again before the system will restart. The value is programmable from 1 to 90 seconds for liquid

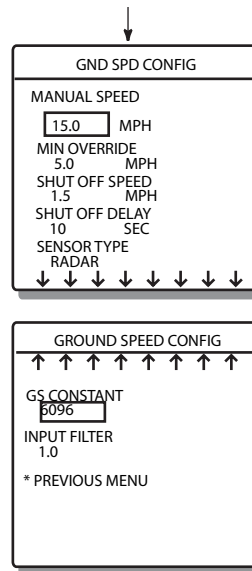


- or granular systems. Anhydrous ammonia systems are programmable from 1 to 10 seconds.
- SENSOR TYPE - Choose either RADAR or NON RADAR.
 - CONSTANT - Represents the pulse count produced by the sensor over a given distance (refer to GROUND SPEED CALIBRATION to calculate the constant).
 - INPUT FILTER - Affects the response time of the ground speed sensor. The number must be set between 0 and 1. A radar ground speed sensor is usually set to 1. For all others, set the value between .2 and .4.

NOTE: Only the last three items (SENSOR TYPE, CONSTANT, and INPUT FILTER also appear for the Speed Area Monitor mode.

Figure 35
Configuring Ground Speed Sensor

Press the SYSTEM key.
Select CONFIGURATION, and
then Select GROUND SPEED



ENHANCED MANUAL GROUND SPEED

Once the manual ground speed is set (**System, Configuration, Ground Speed** screens) the control can be set to control from the entered manual ground speed.

There are two ways to set manual ground speed:

1. Setting through the **System, Service, System Overrides**, and **Ground Speed** screens. If manual ground speed is setup using these screens, it must also be disabled the same way.
2. Hold the Master Switch into the MANUAL position and press the right green cursor key. The readout on the **Operate** screen will change to MANUAL. The control will operate off of the set manual ground speed. To disengage the manual ground speed feature from this shortcut mode, turn the Master Switch to the OFF position.

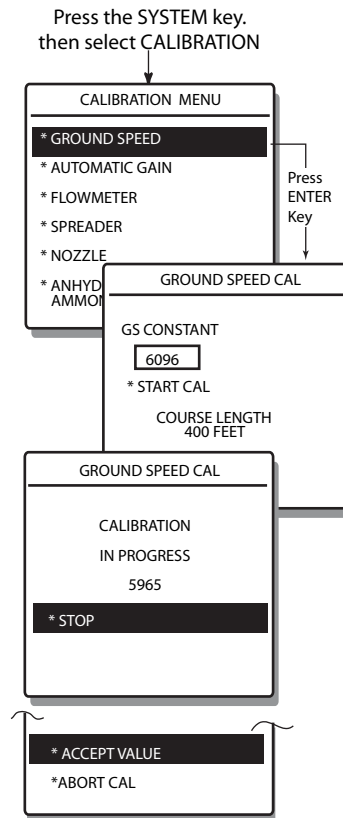


GROUND SPEED CALIBRATION

The ground speed calibration constant is determined by counting the number of pulses produced by the ground speed sensor over a given distance. This procedure is the same for all product types.

Figure 36

Developing Ground Speed Constant



ENTER

1. Accurately measure a 400 foot course (preferably on level ground in a typical field condition). The course length must be 100 meters for the metric mode.
2. Mark the start and finish points so the course is clearly visible from the driver's position.
3. Select GROUND SPEED from the **Calibration** screen and press the **Enter** key. The screen will display a blank for the GS CONSTANT (ground speed).
4. If the correct value is known, enter the number and the calibration is complete. However, to determine the correct value, proceed to Step 5.
5. Scroll down to the START CAL line on the display while driving toward the starting marker of the course. A normal speed (minimum of 2 mph) should be maintained. **Do not stop.**
6. When even with the starting marker, press the **Enter** key on the display console to start the counting. The display readout will reset to 0 (zero), and then begin counting upward as the tractor drives. Continue to drive the measured course at a constant speed.



7. When even with the finish marker, press the **Enter** key again to STOP the counting. The accumulated number will display on the screen in the blank for the GS CONSTANT. This is the new constant.
8. Read and record this number as a first run.
9. Repeat the test two more times to ensure accuracy.

IMPORTANT: If a ground speed error is noticed, two reasons are possible: (1) The ground speed calibration was not run on an accurate 400 foot (100m) course, or (2) the speed sensor mounting position has changed since the ground speed calibration was performed.

SPREADER CALIBRATION

A spreader constant calibration determines how many pulses the application rate sensor produces per volume of material the spreader discharges for a particular gate height setting (pulses per cubic foot). To determine this, several hundred pounds of material are discharged from the rear of the applicator and carefully weighed while the pulses from the sensor are counted automatically by Land Manager.

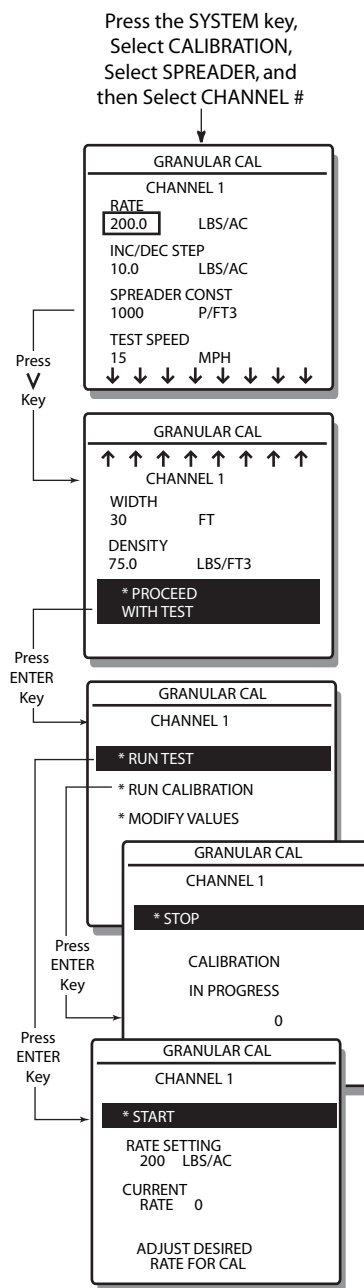
Then by dividing the pounds of material dispensed into the sensor count, the pulses/pounds are determined. Land Manager does the necessary calculation automatically. The resulting number becomes the constant for that particular gate height setting. Each gate height setting requires a separate spreader constant.

1. Load material and carefully weigh the vehicle. Record total weight for later reference.
2. For this test, back the vehicle up to a material pile for unloading. Set the gate height to the first setting and shut off the spinner motor(s).
3. Press the **System** key and choose CALIBRATION.
4. Select SPREADER and enter the correct channel number to access the **Granular Cal** screen (refer to [Figure 37](#)). This screen will list several variables requiring verification. Values need to be set to match your system capabilities.

– RATE	200.0 LBS/AC
– INC/DEC STEP	10.0 LBS/AC
– SPREADER CONSTANT	1000P/FT3
– TEST SPEED	15.0 MPH
– WIDTH	30.0 FT
– DENSITY	75 LBS/FT3
5. The spreader constant can be any reasonable value at this point. The real value is determined by this test.
6. Weigh a sample of material and determine the weight of a cubic foot.
7. Enter that number as DENSITY.



Figure 37
Spreader Calibration (Granular)



8. Select **PROCEED WITH TEST** and press the **Enter** key.
9. Start the vehicle engine and increase the engine RPM to the governed or operating speed.
10. Start the conveyor.
11. Select **RUN CALIBRATION** and press the **Enter** key to start the test. Placing the vehicle in motion for this test is unnecessary. Land Manager will generate an artificial ground speed signal for stationary testing. When the **RUN CALIBRATION** procedure begins, a screen will



appear stating CALIBRATION IN PROGRESS. A number representing the application rate sensor pulses will begin counting upward.

12. After dispensing a few hundred pounds of material (a longer test ensures higher accuracy), press the **Enter** key to stop the test. Be certain the material does not drop below the top of the gate opening during the test. The last screen will appear to ENTER THE AMOUNT (of material) DISPENSED IN POUNDS.
13. Weigh the spreader vehicle again to determine the material dispensed.
14. Subtract the present weight from the full load to determine how many pounds were dispensed.
15. Enter the weight of material used for the test into the screen.
16. Press the **Enter** key to accept the results. After pressing the **Enter** key, the new spreader constant is automatically calculated and displayed.
17. Record the number and gate height on the Summary Sheet at the rear of this manual.
18. When finished and with DONE highlighted, press the **Enter** key.
19. Repeat this procedure for additional gate heights.

FINE TUNING THE APPLICATION RATE

If, over a period of time, a small application rate error is consistently over or under, fine tuning the K-Factor number can be indicated. Typically, small errors result from overall spreader variations.

For example, a Spreader Discharge Factor (SDF), which is normally obtained from the spreader manufacturer, might be off for your gate opening resulting in an incorrect calculated spreader constant.

Small consistent errors can be compensated for by adjusting the value of the spreader constant the same percentage as the error. For example, for an application rate set at 100 pounds per acre and over a period of time note the amount spread is actually 105 pounds per acre (5% too high). This means the spreader constant must be reduced by 5% or lowered to 95% of the original value. If the Spreader Constant is now 1000, the new value is calculated as follows;

$$\text{Present Spreader Constant} \times \text{Percent of original target} = \text{New Spreader Constant}$$

$$\text{Therefore: A 5\% decrease is } 1000 \times .95 = 950$$

If the product application is 5% under applied, the spreader constant requires raising from 100% to 105%. In this case, the number is calculated as follows:

$$\text{A 5\% increase is } 1000 \times 1.05 = 1050$$



AUTOMATIC GAIN CALIBRATION

Automatic Gain calibration establishes channel response and channel boost values for the control loop. The results established determine good working values that can be fine tuned based upon field operation.

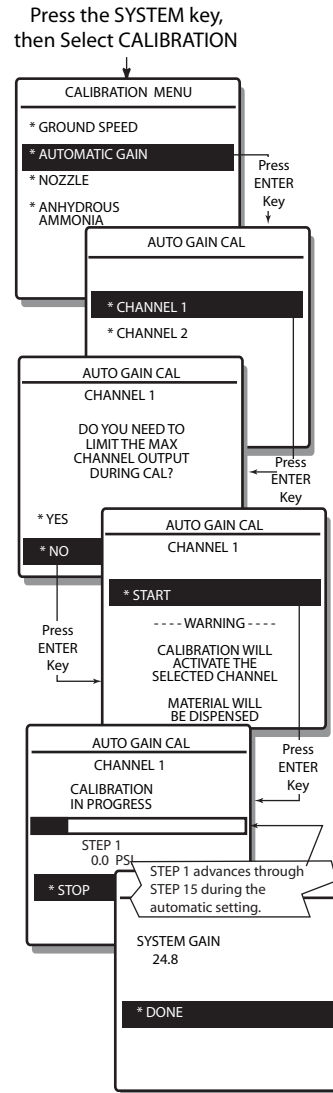
The Auto Gain procedure allows limiting the maximum channel drive output during Auto Gain calibration. All control channel components must be in good working order before calibrating. If components are changed in the control channel after calibration, the procedure should be repeated. An Auto Gain procedure requires two to five minutes to complete.

1. Select AUTOMATIC GAIN from the **Calibration** screen and press the **Enter** key (refer to [Figure 38](#)). If a dual channel system is configured, an intermediate screen will prompt for a channel number. A single channel system will skip this screen.
2. Determine if the maximum channel output needs to be limited during calibration. Select either YES or NO and press the **Enter** key. It may be necessary to limit the upper value of the channel output to prevent over speeding of motors and drive trains. If limiting is desired, select YES.
3. A warning screen will display stating CALIBRATION WILL ACTIVATE THE SELECTED CHANNEL during the test indicating that the actuator valve will open and close in varying degrees for several intervals during the test.



Figure 38

Auto Gain Calibration Screens For Output Limiting (NO)



Increment key



Decrement key



ENTER

4. If limiting is selected, adjust the values on the screen using the **Increment** and **Decrement** keys. Use the **Increment/Decrement** keys to adjust the values. It may be necessary to press the **Increment** key several times to bring the value into range. Notice the two numbers on the screen adjust in conjunction with one another in incremental steps. Choose values within the operating range of the valve near the maximum drive desired. The system type dictates the designations displayed as follows:

Granular	Liquid Flow	Liquid Pressure
LBS	GPM	GPM
HZ	HZ	PSI

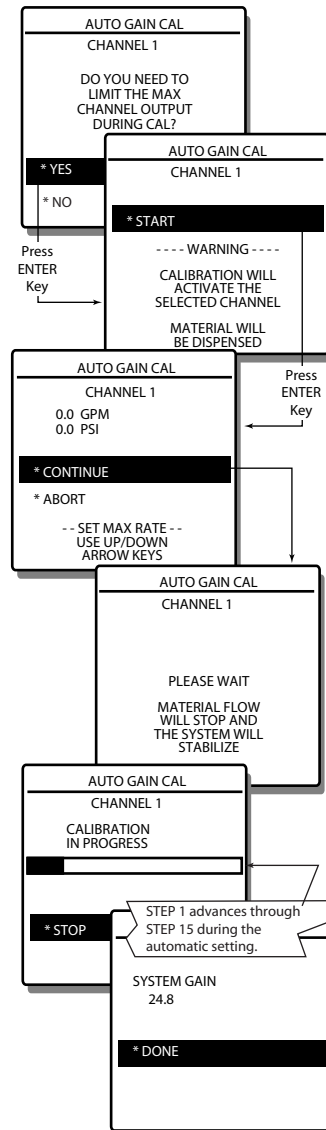
5. After adjusting the limit value, choose CONTINUE and press the **Enter** key. A screen will appear stating CALIBRATION IN PROGRESS. A progression bar will indicate activity. The message STEP numbers will



- display below the progression bar and will advance upward toward 15 during calibration.
6. When finished, the screen will display a SYSTEM GAIN number derived through the calibration procedure (i.e., 24.8).
 7. With DONE highlighted, press the **Enter** key to save the calibrated value. The system gain can be fine tuned through the **Channel Setup** screen in SETUP Mode. On occasion, nonlinear components in the control channel causes oscillation or sluggishness at certain application rates. To fine tune, decrease the SYSTEM GAIN value slightly if the channel oscillates. Increase the SYSTEM GAIN value if the channel is sluggish. The Auto Gain calibration measures and calculates other control channel characteristics that can be viewed in the CONFIGURATION SUMMARY of the SYSTEM mode.

Figure 39

Auto Gain Calibration Screens For Output Limiting (YES)





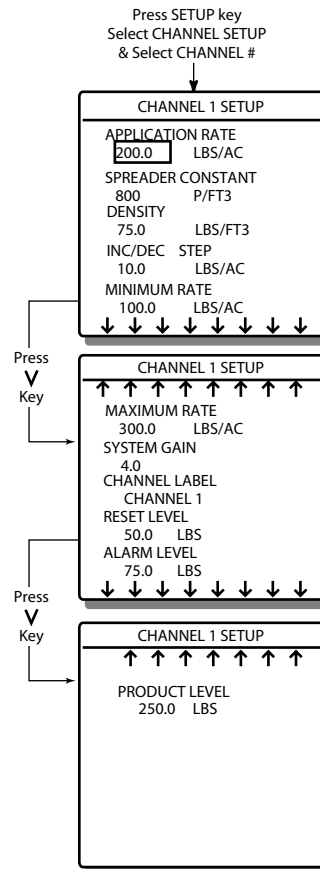
SETTINGS

APPLICATION RATE - Target rate for applying the product.

- SPREADER CONSTANT - Number of application rate sensor pulses per volume of material dispensed.
- DENSITY - Relative density of the material being applied. It represents the weight of 1 cubic foot of product.
- INC/DEC STEP - The desired increment/decrement value to change the application rate by a specified amount during application (on-the-go) through the field.
- MINIMUM RATE - Minimum acceptable product application rate the system allows.
- MAXIMUM RATE - Maximum acceptable product application rate the system allows.
- SYSTEM GAIN – Affects the response of the control valve created by changes in ground speed. The larger the number the faster the response time. In field application, if the valve seems to be moving too rapidly and tends to be oscillating, this number should be lowered. The number can be as low as 1 or smaller but cannot be 0.0. If the valve seems to be moving too slowly, this value should be increased. The starting value is automatically set during Automatic Gain Calibration.
- CHANNEL LABEL – An arbitrary label of up to ten characters or less to identify the channel which appears on the **Operate** screen.
- RESET LEVEL – Typically represents the amount of a full product load after each reset.
- ALARM LEVEL – Minimum level of product remaining aboard before the alarm sounds. A typical value is 10% of the full load.
- PRODUCT LEVEL – Monitors the amount of product remaining aboard (if enabled in SYSTEM mode). The Operate Mode screen displays the amount remaining. If loading only a partial load, change this number to the correct value instead of resetting.



Figure 40
Typical Channel Setup For Granular Systems



NOTE: The last three items only appear on the menu if the Product Level has been enabled in System Mode.



LIQUID SYSTEMS



Increment key



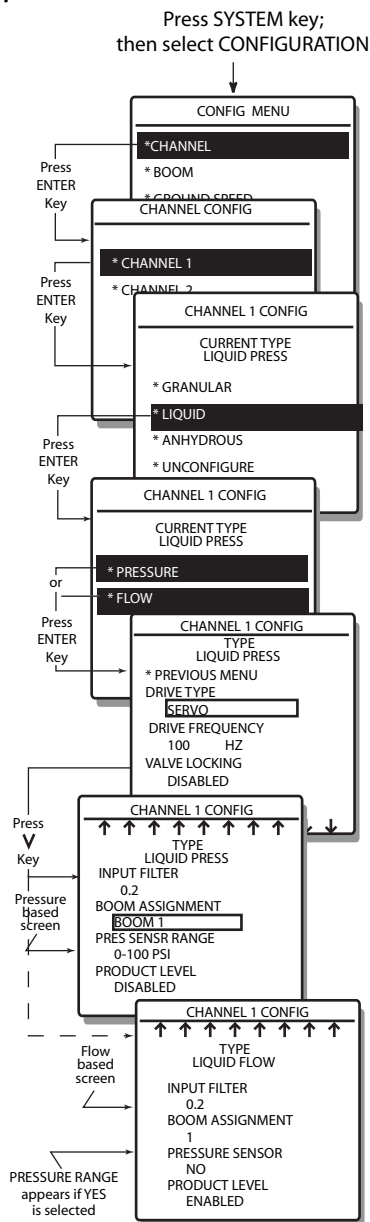
Decrement key

CHANNEL CONFIGURATION

1. From the **Configuration** screen, select CHANNEL and press the **Enter** key. For a dual channel unit, a screen will appear for selecting CHANNEL 1 or CHANNEL 2. This screen is skipped for a single channel unit.
2. Select a channel number for configuring and press the **Enter** key. A screen will appear for product selection (refer to [Figure 41](#)).
3. Select LIQUID to define the channel and press the **Enter** key. Three product types will display, including an UNCONFIGURE selection. This selection allows the present channel to be unconfigured but retains the details for later use unless modified by a different configuration.
4. Select FLOW or PRESSURE and press the **Enter** key.
5. Edit the items. Press the **Enter** key after each change.
 - DRIVE TYPE - Several selections are available depending on a flow-based or pressure-based system. Use the **Increment** and **Decrement** keys to toggle to the desired drive type.
 - DRIVE FREQUENCY - The frequency ranges between 40 to 250 Hz. A typical value is 40 Hz for SERVO or 100 Hz for PROPORTIONAL.
 - VALVE LOCKING - When enabled, locks the valve into the last operating position whenever the booms are turned off. This maintains system pressure while turning so a quick spray pattern can resume after turning is complete. Valve locking is also used for tank agitation.
 - INPUT FILTER - The value affects the response time of the drive. Values normally range from 0.1 to 0.5. A typical value is 0.2.
 - BOOM ASSIGNMENT - Links the channel to BOOM CONFIGURATION. Enter the correct boom number (i.e. 1 or 2).
 - PRES SENSR RANGE - Select the value matching the pressure sensor. Available value pressure sensors are 0-60, 0-100, 0-225, 0-300, or 0-650.
 - PRESSURE SENSOR - Select either YES or NO. If NO is entered, the configuration is complete. YES, indicates a pressure sensor connects to a flow-based channel. This results in another screen appearing to identify the pressure sensor used. Select the correct pressure range.
 - PRODUCT LEVEL - When ENABLED, the current amount of product remaining aboard displays on the Operate Mode screen. The product level will decrease as material is dispersed and an alarm will sound when the level drops below a preset value. These values are established in SETUP mode.
6. Select PREVIOUS MENU and press the **Enter** key.
7. Select BOOM and continue with configuration.



Figure 41
Configuring A Liquid Channel





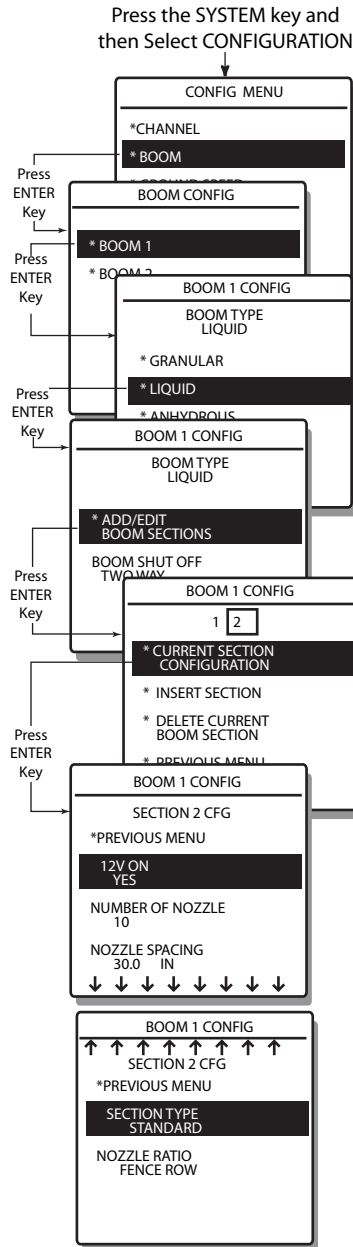
ENTER

BOOM CONFIGURATION

1. Select BOOM on the **Configuration** screen and press the **Enter** key. For a dual channel unit, a screen will appear with two choices. This screen is skipped for a single channel unit.
2. Select the desired BOOM # and press the **Enter** key. The **Boom # Config** screen will appear. The product type that was previously programmed will be highlighted (refer to [Figure 42](#)).
3. Select LIQUID and press the **Enter** key. The product type at the top of the screen will change (if different) to match the selection when the next screen appears. If no sections were assigned earlier, a screen will appear displaying INSERT SECTION. If this occurs, refer to Step 6 and then return to Step 4.
4. When selecting LIQUID, a screen will appear to allow the selection of a BOOM SHUTOFF valve type. Select either a TWO WAY or THREE WAY valve. A liquid sprayer system can have either a two way or three way valve (refer to [Figure 43](#)). A two way valve turns on/off liquid flow to the boom. A three way valve differs in that the liquid flow rate is not shut off but diverted back through a bypass line to the product tank. This arrangement maintains constant flow meter flow at all times. To ensure the flow remains constant, a calibrated orifice is inserted in the return line to equal the volume of liquid through all sprayer nozzles. After selecting the correct valve type, select the ADD/EDIT BOOM SECTION option to advance to the next screen.
5. Select a boom section at the top of the screen and then select the CURRENT SECTION CONFIGURATION. Press the **Enter** key. Details for the selected boom section will appear. Other sections are located on separate screens with similar formats.
 - 12V ON - YES means +12 volts activates the section solenoid. NO indicates grounding activates the section solenoid.
 - NUMBER OF NOZZLE - Equals the nozzle count in the boom section.
 - NOZZLE SPACING - Distance between nozzles. For sections with only one nozzle, the spacing is the effective spray width of the nozzle.
 - SECTION TYPE - STANDARD indicates normal application rate and FENCE ROW indicates an increased output rate for fence row applications.
 - NOZZLE RATIO - If FENCE ROW was selected in the above entry, this line appears. The desired ratio (i.e. 1.5, 2.0, etc.) is entered.



Figure 42
Configuring Liquid Boom



- To add a boom section, use the **Increment** or **Decrement** keys to scroll (if necessary) to **INSERT SECTION** and press the **Enter** key. Up to ten sections distributed through two booms can be assigned. However, the use of any number is only allowed once within the two booms. The section numbers already assigned for the present boom configuration display across the top of the screen. By using the

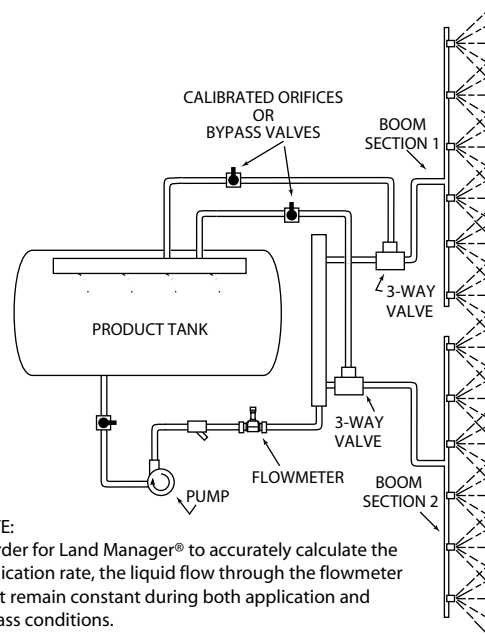


Increment/Decrement keys, these numbers can be edited or rearranged in any manner necessary to reflect actual boom layout.

- **To add or insert a section** – Move the selection box to the location the new section number is to be added. If the selection box is placed on top of an existing number, that number will shift to the right one position when the new number is inserted. If you want to place the number on the right end, move the box one space past the right most digit.
 - **Select a new number** – Use the **Increment/Decrement** keys to select a new number and press the **Enter** key. If section numbers have already been assigned, the next (or lowest unused) available number will appear for entering. This prevents assigning the same number twice.
7. To delete a boom section, use the **Increment/Decrement** keys to select the section number using the selection box, select **DELETE CURRENT BOOM SECTION** and press the **Enter** key. The boom section will be erased.
 8. When finished, select **PREVIOUS MENU** and press the **Enter** key.
 9. Select **GROUND SPEED** and configure.

Figure 43

Three-Way Shutoff Valve Operation



GROUND SPEED CONFIGURATION

1. Select **GROUND SPEED** from the **Configuration** screen. The **Gnd Spd Config** screen will appear for editing (refer to [Figure 44](#)).
 - **MANUAL SPEED** - This is an internally generated ground speed rate whenever the Master Switch module switch is held into the **MANUAL** position. This value can be set to any speed within the delivery capabilities of the system. This speed is also used when



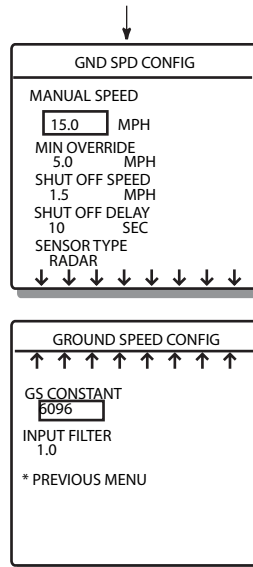
- GROUND SPEED OVERRIDE is selected from the **Manual Overrides** screen.
- MIN OVERRIDE – A minimum ground speed that automatically takes over system control between its set point and the SHUT OFF SPEED set point during slow down conditions.
 - SHUT OFF SPEED – The minimum ground speed allowed before the system ceases total operation.
 - SHUT OFF DELAY – Determines the length of time before the system disables the operate function after ground speed ceases if the Master Switch module switch remains in the AUTO position. After the delay time elapses, the Master Switch module switch must be turned OFF and back to AUTO again before the system will restart. The value is programmable from 1 to 90 seconds for liquid or granular systems. Anhydrous ammonia systems are programmable from 1 to 10 seconds.
 - SENSOR TYPE - Choose either RADAR or NON RADAR.
 - CONSTANT - This value represents the pulse count produced by the sensor over a given distance (refer to GROUND SPEED CALIBRATION to calculate the constant).
 - INPUT FILTER - This number affects the response time of the ground speed sensor. The number must be set between 0 and 1. A radar ground speed sensor is usually set to 1. For all others, set the value between .2 and .4.

NOTE: Only the last three items (SENSOR TYPE, CONSTANT, and INPUT FILTER also appear for the Speed Area Monitor mode.

Figure 44

Configuring Ground Speed Sensor

Press the SYSTEM key.
Select CONFIGURATION, and
then Select GROUND SPEED





ENHANCED MANUAL GROUND SPEED

Once the manual ground speed is set (**System, Configuration, Ground Speed** screens) the control can be set to control from the entered manual ground speed.

There are two ways to set manual ground speed:

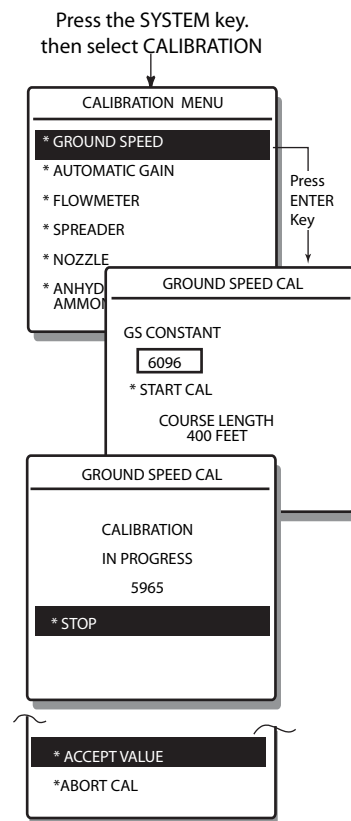
1. Setting through the **System, Service, System Overrides, and Ground Speed** screens. If manual ground speed is setup using these screens, it must also be disabled the same way.
2. Hold the Master Switch into the MANUAL position and press the right green cursor key. The readout on the **Operate** screen will change to MANUAL. The control will operate off of the set manual ground speed. To disengage the manual ground speed feature from this shortcut mode, turn the Master Switch to the OFF position.

GROUND SPEED CALIBRATION

The ground speed calibration constant is determined by counting the number of pulses produced by the ground speed sensor over a given distance. This procedure is the same for all product types.

Figure 45

Developing Ground Speed Constant





1. Accurately measure a 400 foot course (preferably on level ground in a typical field condition). The course length must be 100 meters for the metric mode. Mark the start and finish points so the course is clearly visible from the driver's position.
2. Select GROUND SPEED from the **Calibration** screen and press the **Enter** key. The screen will display a blank for the GS CONSTANT (ground speed). If the correct value is known, enter the number and the calibration is complete. However, to determine the correct value, proceed to Step 3.
3. Scroll down to the START CAL line on the display while driving toward the starting marker of the course. A normal speed (minimum of 2 mph) should be maintained. Do not stop.
4. When even with the starting marker, press the **Enter** key on the display console to start the counting. The display readout will reset to 0 (zero), and then begins counting upward as the tractor drives. Continue to drive the measured course at a constant speed.
5. When even with the finish marker, press the **Enter** key again to STOP the counting. The accumulated number will be displayed on the screen in the blank for the GS CONSTANT. This is the new constant.
6. Read and record this number as a first run.
7. Repeat the test two more times to ensure accuracy.

IMPORTANT: If a ground speed error is noticed, two reasons are possible (1) The ground speed calibration was not run on an accurate 400 foot (100 m) course, or (2) the speed sensor mounting position has changed since the ground speed calibration was performed.

AUTOMATIC GAIN CALIBRATION

Automatic Gain calibration establishes channel response and channel boost values for the control loop. The results established determine good working values which can be fine tuned based upon field operation.

The Auto Gain procedure allows limiting the maximum channel drive output during Auto Gain calibration. All control channel components must be in good working order before calibrating. If components are changed in the control channel after calibration, the procedure should be repeated. An Auto Gain procedure requires two to five minutes to complete.

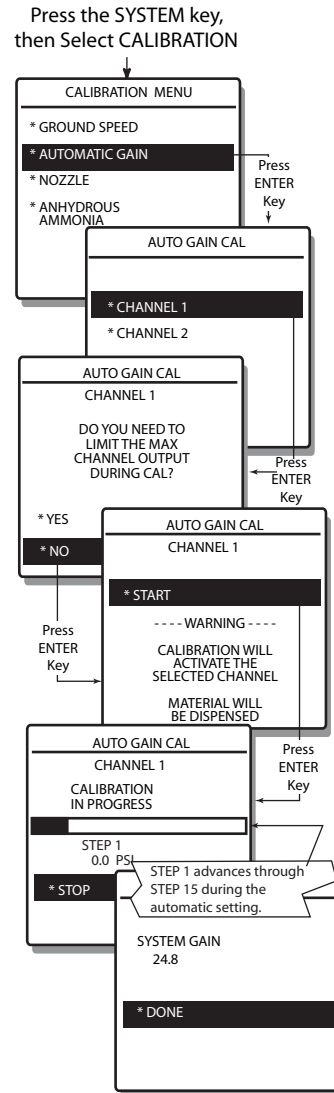
1. Select AUTOMATIC GAIN from the **Calibration** screen and press the **Enter** key (refer to [Figure 46](#)). If a dual channel system is configured, an intermediate screen will prompt for a channel number. A single channel system will skip this screen.
2. Determine if the maximum channel output needs to be limited during calibration. Select either YES or NO and press the **Enter** key. It may be necessary to limit the upper value of the channel output to prevent over speeding of motors and drive trains. If limiting is desired, select YES.
3. A warning screen will display stating CALIBRATION WILL ACTIVATE THE SELECTED CHANNEL during the test. This means the actuator valve will open and close in varying degrees for several intervals during the test.

ENTER



Figure 46

Auto Gain Calibration Screens For Output Limiting (NO)



Increment key



Decrement key



- If limiting is selected, adjust the values on the screen using the **Increment** and **Decrement** keys. Use the **Increment/Decrement** keys to adjust the values. It may be necessary to press the **Increment** key several times to bring the value into range. Notice the two numbers on the screen adjust in conjunction with one another in incremental steps. Choose values within the operating range of the valve near the maximum drive desired. The system type dictates the designations displayed as follows:

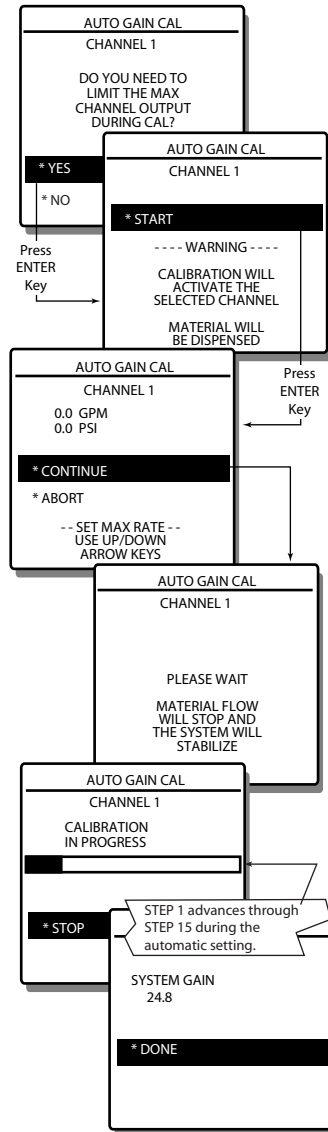
Granular	Liquid Flow	Liquid Pressure
LBS	GPM	GPM
HZ	HZ	PSI

- After adjusting the limit value, choose CONTINUE and press the **Enter** key. A screen will appear stating CALIBRATION IN PROGRESS. A progression bar will indicate activity. The message STEP numbers will



- display below the progression bar and will advance upward toward 15 during calibration. When finished, the screen will display a SYSTEM GAIN number derived through the calibration procedure (i.e., 24.8).
- With DONE highlighted, press the **Enter** key to save the calibrated value. The system gain can be fine tuned through the **Channel Setup** screen in SETUP Mode. On occasion, nonlinear components in the control channel causes oscillation or sluggishness at certain application rates. To fine tune, decrease the SYSTEM GAIN value slightly if the channel oscillates. Increase the SYSTEM GAIN value if the channel is sluggish. The Auto Gain calibration measures and calculates other control channel characteristics which can be viewed in the CONFIGURATION SUMMARY of the SYSTEM mode.

Figure 47
Auto Gain Calibration Screens For Output Limiting (YES)





FLOW METER CALIBRATION

Flow meter calibration determines how many pulses are produced by the sensor per gallon of liquid through the flow meter. To determine this, a few gallons of water are dispensed through the system and weighed (or measured) while automatically counting flow meter pulses using Land Manager. Then by dividing the gallons of liquid into the pulse count, the pulses/gallon are determined. This number becomes the actual K-Factor instead of the one stamped on the flowmeter body.

One of two methods can be used to measure the gallons of liquid flowing through the sprayer system. However, whichever method is chosen, the more liquid passing through the system during calibration increases the degree of K-Factor accuracy.

Method 1 – Use a container such as a bucket or barrel to catch all liquid from the nozzles. Later the amount of liquid is measured or weighed.

Method 2 – This method is recommended because a larger volume of liquid passes through the entire sprayer system making errors in weighing a smaller factor. Fill the tank and weigh the load. Activate the calibration routine. After spraying a few hundred gallons but before the load is empty, stop the calibration. Weigh the load again.

NOTE: Placing the vehicle in motion for this test is optional. Land Manager generates an artificial ground speed signal for stationary testing.

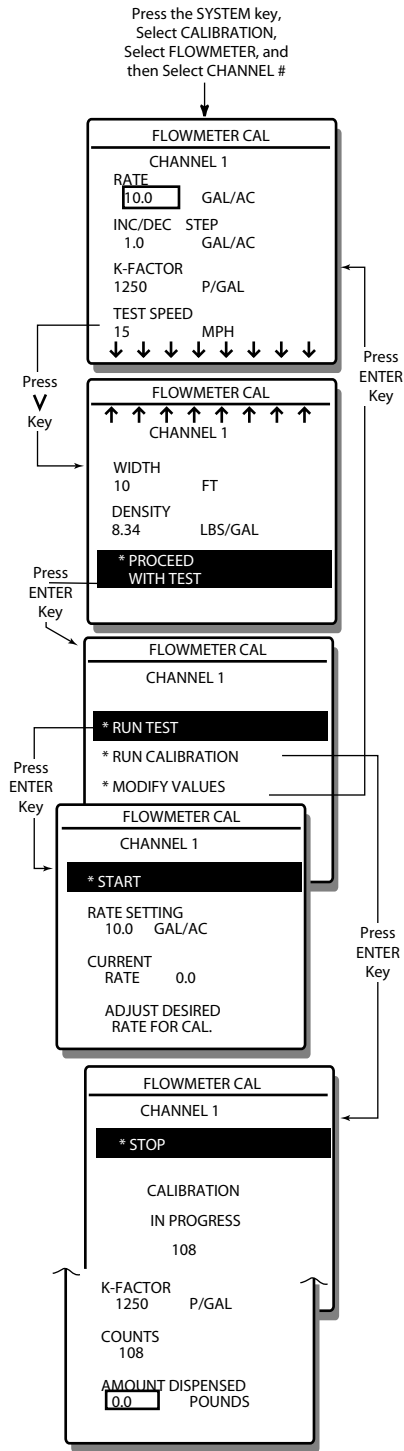
1. From the **Calibration** screen, select FLOW METER and press the **Enter** key. If the system has more than one flow channel, a screen will appear requesting a channel number.
2. Enter the correct number and press the **Enter** key. The screen will advance to the **Flow meter Calibration** screen (refer to [Figure 48](#)).
3. The **Flow meter Calibration** screen displays a list of parameters for verification. Change any of the values necessary before proceeding. Use the K-factor number located on the body of the flowmeter for a starting value. Steps 3 and 4 must be completed before the vehicle is initially weighed.
4. Before running the calibration procedure, a test should be run to check the flow of the system. It may be desirable to increase the flow to save test time or to decrease the flow to make handling the volume of liquid more manageable. To start the test, turn on the boom sections and the pump. The flow must remain within the specifications of the flowmeter. Select PROCEED WITH TEST and press the **Enter** key.
5. Select RUN TEST and press the **Enter** key. With START highlighted, press the **Enter** key to begin the test. Use the **Increment/Decrement** keys to increase/decrease the flow rate. These keys step the RATE SETTING up or down to a desired rate. If the rate is increased too much (out of range) an APER will occur and the alarm will sound. When the adjustment is complete, the RATE SETTING and the CURRENT RATE should be very close in agreement.
6. Select STOP to end the test. The rate on the screen should show the same as the value just made during the test. This is the rate used during the following calibration procedure.
7. Weigh the vehicle and begin testing.
8. Select RUN CALIBRATION and press the **Enter** key to start the procedure. The flow meter constant will begin counting.



9. At the end of the test with STOP highlighted press the **Enter** key to end spraying.
10. Weigh the liquid caught or reweigh the load to determine how much was dispensed. Be sure to subtract the weight of the container.
11. Enter the weight (in pounds) into Land Manager and press the **Enter** key. A new K-FACTOR will automatically calculate and display.
12. To ensure the accuracy of the reading, repeat this procedure two more times and then average the results of all three tests. If the test results differ slightly, averaging the numbers is acceptable.
13. Record the averaged number on the Summary Sheet at the end of this manual.
14. Correct the K-FACTOR number on the screen as necessary. If one test differs significantly, an error was likely made. After the flow meter is in service a couple of weeks, recheck the K-Factor number. A new flow meter can drift slightly. After the recalibration a second time, the accuracy usually remains very stable.



Figure 48
Flow Meter Calibration





NOZZLE CALIBRATION

This calibration determines the number of gallons per minute passing through the sprayer nozzles. In general, the larger the volume of liquid through the system the more accurate the results. While liquid is flowing, time is accurately checked, ideally with a stopwatch. Then by dividing the liquid volume dispensed by the time, the constant representing gallons per minute results.

Use a container such as a cup, bucket or barrel to catch the liquid from a nozzle while timing the test. At the end of the test, the amount of liquid is measured or weighed. The test then must be repeated for each nozzle. After checking all nozzles, the values are added together and averaged. This result is the NOZZLE CONSTANT. The reason for checking each nozzle is because nozzle wear causes a different test result from each nozzle. Also, each type (size) of nozzle used must be checked.

ENTER

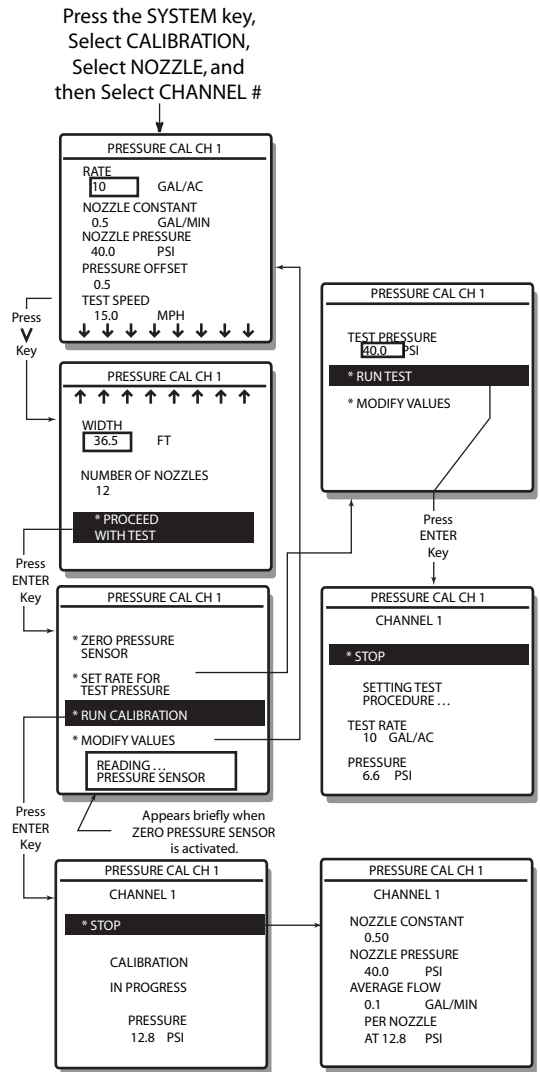
1. From the **Calibration** screen, select NOZZLE and press the **Enter** key (refer to [Figure 49](#)). If the system has more than one pressure channel, a screen will appear requesting a channel number.
2. Enter the channel number and the screen will automatically advance to the PRESSURE CAL CH #.
3. Verify the list variables on the screen for accuracy. Values need to be set to match system capabilities.
 - RATE 10.0 GAL/AC
 - NOZZLE CONSTANT 0.5 GAL/MIN
 - NOZZLE PRESSURE 40 PSI
 - PRESSURE OFFSET 0.50
 - TEST SPEED 15.0 MPH
 - WIDTH 36.5 FT
 - NUMBER OF NOZZLES 12
4. Scroll down to PROCEED WITH TEST and press the **Enter** key.
5. Before running the test, zero the pressure transducer by selecting ZERO PRESSURE SENSOR and pressing the **Enter** key. An insert will appear on the screen stating READING... PRESSURE SENSOR. Be certain system pressure is at zero first.
6. Next, start the pump and select SET RATE FOR TEST PRESSURE. Press the **Enter** key. A screen will appear requesting TEST PRESSURE # PSI. Enter the desired test pressure for the nozzles (i.e., 40 PSI) and select RUN TEST.
7. Press the **Enter** key. The system will begin spraying and a screen will appear stating SETTING TEST PRESSURE.
8. When the test is satisfied and the pressure equals the entered value, press the **Enter** key to STOP the procedure.
9. If using the catch test, select RUN CALIBRATION to start the procedure. After the spray begins, place a container under the nozzle to catch the liquid. At the same time, start a stopwatch and time for exactly one minute.
10. Remove the container and weigh. Repeat Step 6 until a sample from all nozzles is made. Make sure the volume of each sample is approximately equal. Each sample must be weighed individually. If the nozzle's volume is significantly different, that nozzle is probably worn and should be replaced.



11. At the end of the test, press the **Enter** key to STOP the procedure. A screen will appear requesting ENTER THE AVERAGE FLOW RATE PER NOZZLE IN GAL/MIN AT 40 (or your pressure) PSI. Let the screen wait while you calculate the value.
12. To determine the value to enter, weigh the liquid. Divide the total weight by the number of samples (nozzles). Then convert the weight to gallons by dividing by 8.33 (pounds per gallon). If measuring by volume, gallons are already known. The answer can be a fraction. Since each sample was timed for one minute, the results are already in gallons per minute.
13. Enter the calculated value onto the screen. With DONE highlighted, press the **Enter** key.
14. To ensure the accuracy of the reading, repeat this procedure two additional times and average the results. Use the averaged number. If the test results differ slightly, averaging is acceptable. If one test is off significantly, an error was likely made.



Figure 49
Nozzle Calibration



FINE TUNING NOZZLE CONSTANT AND K-FACTOR

If over a period of time, a small application rate error is consistently over or under, fine tuning the NOZZLE CONSTANT (pressure-based) or K-FACTOR (flow-based) may be required. Small errors typically result from overall sprayer variations. For example, normal nozzle wear will result in a small change over time.

Small consistent errors may be compensated for by adjusting the value of the correct constant (nozzle or K-factor) the same percentage as the error.



For example, if the application rate is set at 10 gallons per acre and over a period of time the application is actually 10.5 gallons per acre or 5% too high ($10.5 \div 10 = 105\%$ of target). This indicates the constant value (nozzle or K-factor) should be adjusted by 5% to reduce the application rate. However, the constant for the nozzle (pressure-based) and K-factor (flow-based) require opposite adjustments. For a pressure-based system, increase the value by 5%; for a flow-based system, reduce the value by 5%.

Present Constant x Percent of adjusted target = New Constant.

Pressure-Based System (to reduce application rate) - If the Nozzle Constant is now 0.50, the new value must be increased (not decreased) by 5% or raised to 105% of the original constant value.

Therefore: A 5% increase is $0.50 \times 1.05 = 0.525$

Flow-based system (to reduce application rate) - If the K-factor is now 1500 P/GAL, the new value is decreased (not increased) by 5% or reduced to 95% of the original constant value.

Therefore: A 5% decrease is $1500 \times .95 = 1425$

If the product application is 5% under applied, the constant value requires adjusting in the opposite direction as outlined above.

NOTE: Pressure-based and flow-based constants affect the application rate differently. To fine tune the product application rate, change the constant (nozzle or K-factor) as follows: Pressure-based system-increasing the constant value will reduce the effective application rate; reducing will increase the rate. Flow-based system-increasing the constant value will increase the effective application rate; reducing will decrease the rate.

LIQUID FLOW SYSTEM SETTINGS

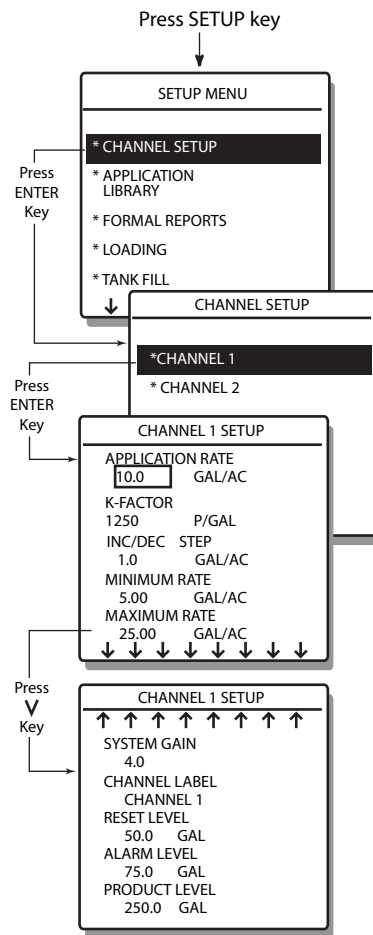
- APPLICATION RATE - Target rate for applying the product.
- K-FACTOR - Number of flowmeter pulses per volume material.
- INC/DEC STEP - The desired application rate increment/decrement to increase or decrease the application rate by a specified amount during application (on-the-go) through the field.
- MINIMUM RATE - Minimum acceptable product application rate the system allows.
- MAXIMUM RATE - Maximum acceptable product application rate the system allows.
- SYSTEM GAIN – Affects the control valve response created by changes in ground speed. The larger the number the faster the response time. In field application, if the valve seems to be moving too rapidly and tends to be oscillating, this number should be lowered. The number can be as low as 1 or smaller but cannot be 0.0. If the valve seems to be moving too slowly, this value should be increased. The starting value is automatically set during Automatic Gain Calibration.
- CHANNEL LABEL – An arbitrary label of up to ten characters to identify the channel type on the OPERATE screen.
- RESET LEVEL – Typically represents the amount of a full product load after each reset.
- ALARM LEVEL – Minimum level of product remaining before the alarm sounds. A typical value is 10% of the full load.



- **PRODUCT LEVEL** – Monitors the amount of product remaining (if enabled in SYSTEM mode). The Operate Mode screen displays the amount remaining. If loading only a partial load, change this number to the correct value instead of resetting. This value tracks the level of material during product dispersal and displays on the **Product Level - Operate** screen (refer to MONITORING THE PRODUCT LEVEL). If only a partial load, change this number to the correct value instead of resetting.

NOTE: Items displayed on the Channel Setup screen are determined by channel programming in the System mode. Also, the last three items only appear on menu if the Product Level has been enabled in System mode.

Figure 50
Typical Channel Setup For Liquid Flow Systems





LIQUID PRESSURE SYSTEM SETTINGS

- APPLICATION RATE - Target rate for applying the product.
- NOZZLE CONSTANT - Gallons per minute (GPM) through a nozzle at a given nozzle pressure. Usually determined during calibration.
- NOZZLE PRESSURE - Specifically determined through calibration. A reference number is found either on the nozzle or in nozzle literature.
- DENSITY - Relative liquid density as represented by the weight of one gallon of product.
- INC/DEC STEP - The desired increment/decrement value for changing the application rate during application (on-the-go) through the field.
- MINIMUM RATE - Minimum application rate the system allows.
- MAXIMUM RATE - Maximum application rate the system allows.
- MINIMUM PRESSURE - Minimum level before an alarm occurs.
- MAXIMUM PRESSURE - Maximum level before an alarm occurs.
- PRESSURE OFFSET - A correction value normally set automatically during the ZERO PRESSURE SENSOR procedure. The reading must be made with no pressure (zero) on the system.
- ZERO PRESSURE SENSOR - A routine to automatically set the pressure OFFSET value. The pressure must be zero before setting.
- SYSTEM GAIN – Affects the response of the control valve created by changes in ground speed. Same as for Liquid Flow.
- CHANNEL LABEL – An arbitrary label of up to ten characters to identify the channel which appears on the **Operate** screen.
- RESET LEVEL – Typically represents the amount of a full product load after each reset.
- ALARM LEVEL – Minimum level of product remaining before the alarm sounds. A typical value is 10% of the full load (refer to [Figure 51](#)).
- PRODUCT LEVEL – Monitors the amount of product remaining (if enabled in SYSTEM mode). The Operate Mode screen displays the amount remaining. If only a partial load, change this number to the correct value instead of resetting (refer to [Figure 51](#)).

The SPEED RANGE centered at the bottom of each screen is automatically calculated from several factors entered by the operator.

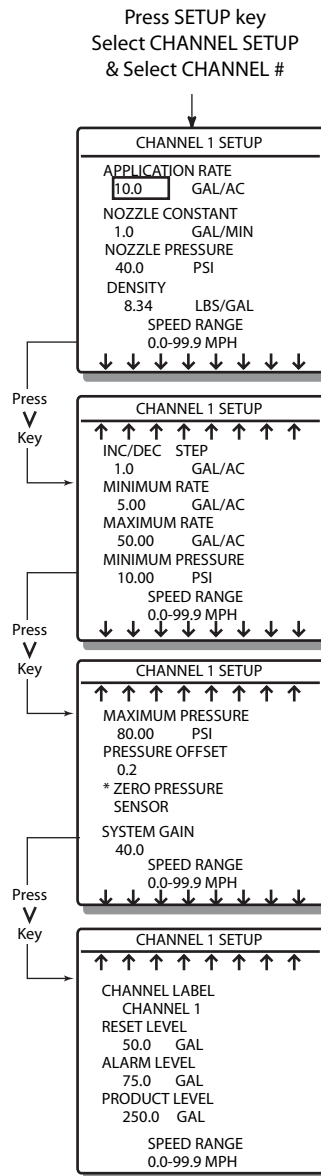
- Nozzle constant
- Nozzle pressure
- Min/Max alarm settings

The SPEED RANGE indicated is the speed required to accurately apply material.



Figure 51

Typical Channel Setup For Liquid Pressure Systems



NOTE: The last three items only appear on the menu if the Product Level has been Enabled in System mode.



SYSTEM MODE CALIBRATIONS

Sensors connected to a Land Manager require calibrating to ensure accuracy. After completing each procedure, record the new constants on the Summary Sheet in the rear of this manual for future reference.

Channel Automatic Gain Calibration must be performed before calibrating any sensors. This is important to ensure the control system is not sluggish or oscillating. If this is happening, sensor calibrations will be inaccurate. Also be sure the ground speed sensor is calibrated before proceeding.

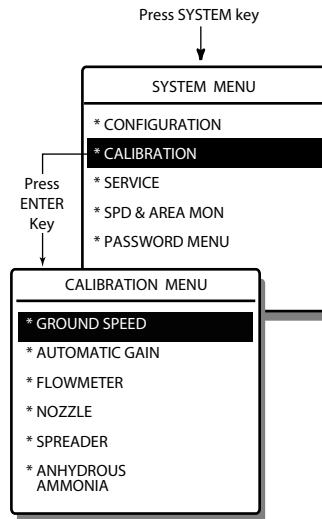
CALIBRATION SCREEN DESCRIPTION

After completing the system configuration, sensor constants within the **Calibration** screen must be correct to ensure application accuracy. Until accurate constants are developed, approximate or otherwise known values can be entered to allow operation to begin with reasonable application rates. However, a full calibration procedure should be performed to ensure accuracy.

1. To access the **Calibration** screen, press the **System** key. The Master Switch module switch must be in the OFF position. The **System** screen will appear.



Figure 52
Calibration Screen



2. Select **CALIBRATION** from the **System** screen and press the **Enter** button. Observe the selections available.
 - **GROUND SPEED** - Represents the sensor pulse count for a given distance which may be entered either manually or automatically generated during calibration.
 - **AUTOMATIC GAIN** - Automatically establishes channel response and channel boost values for the control loop during an Auto Gain procedure.

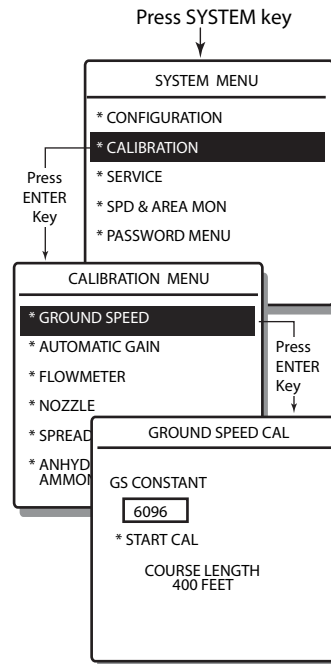


ENTER

- FLOWMETER - Represents the sensor pulse count for each gallon of liquid through the flow meter. The value can be entered either manually or automatically generated during calibration.
 - NOZZLE - Represents the average gallons of liquid per minute passing through each sprayer nozzle at a given pressure for a system. The value can be entered either manually or automatically generated during calibration.
 - SPREADER - Represents a pulse count from the application rate sensor per cubic foot of material the spreader discharges for a particular gate height setting. The value can be entered either manually or automatically generated during calibration.
 - ANHYDROUS AMMONIA - Represents the sensor pulse count per volume of product through the flow meter. The value can be entered either manually or automatically generated during calibration.
3. Select GROUND SPEED and press the **Enter** key (refer to [Figure 53](#)). A screen will appear showing a space for the GS CONSTANT (ground speed). Until a calibration procedure can be performed, a temporary constant can be entered. The ground speed constant applies equally to both channels and all product types, therefore, requiring entering only once.
 4. Enter a known value for the ground speed (GS CONSTANT) and press the **Enter** key. If the correct value is known, enter the number and the ground speed calibration is complete.
 5. To determine exact value, perform a complete calibration procedure.

Figure 53

Ground Speed Calibration Screen





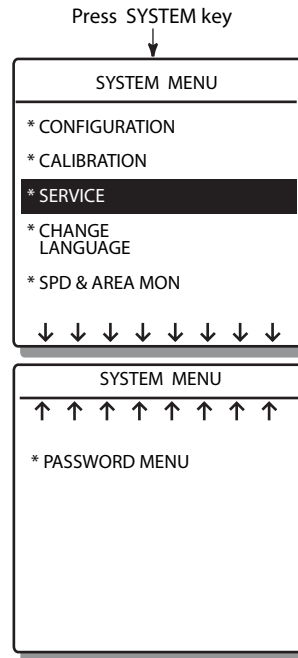
SYSTEM MODE UTILITIES

This section describes the **Service, Change Language, Spd & Area Mon** and **Password** screens (refer to [Figure 54](#)). These four items configure a variety of functions for individual capabilities.

- SERVICE screen – A troubleshooting tool to allow checking and monitoring of operating capabilities, clearing of certain values, and downloading of new software.
- LANGUAGE CHANGE – Appears only on units capable of multi-languages. When the selection is present, the displayed language can easily convert all screens to a different language.
- SPD & AREA MON – Allows a quick configuration transfer to the stand alone mode for times when the main system is disconnected. The unit will continue to display ground speed and area accumulation.
- PASSWORD screen – Allows entering a code which must be used as a password to access important screens in both SETUP and SYSTEM modes, thus preventing unauthorized changes.

NOTE: Only one screen is used when Change Language selection does not appear on the menu.

Figure 54
System Screen Showing All Selections



SERVICE SCREEN MONITORING/CHANGING

The **Service** screen is accessed from the **System** screen (refer to [Figure 55](#) and [Figure 57](#)). The **Service** screen allows checking for correct system operation, clearing certain values, and downloading new software. This should only be used if problems occur or to browse system conditions.

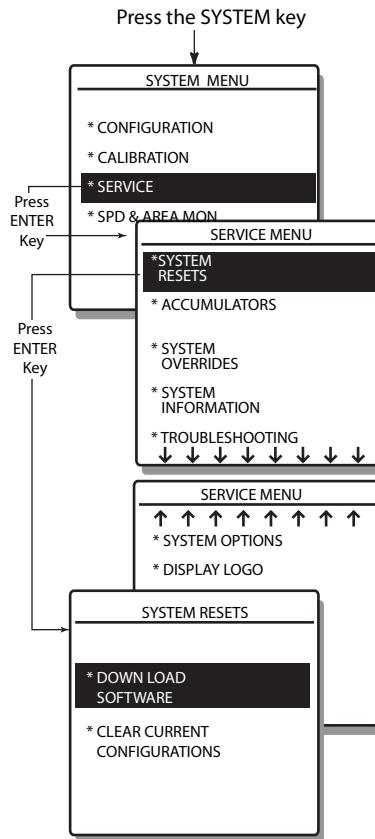


SYSTEM RESETS SCREEN

1. From the **System** screen, select SERVICE and press the **Enter** key.
2. Select SYSTEM RESETS and press the **Enter** key (refer to [Figure 55](#)).
The **System Resets** screen will appear with two choices:
 - DOWNLOAD NEW SOFTWARE – Only authorized personnel should enter this selection. Making improper software changes can impair or disable system operation.
 - CLEAR CURRENT CONFIGURATIONS – press the **Enter** key to reset the system. A secondary screen will appear asking CLEAR ALL STORED VALUES, RETURN TO FACTORY DEFAULTS? CURRENT VALUES WILL BE LOST.

Figure 55

Accessing System Resets Screen



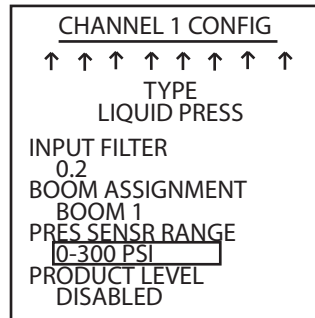
300 PSI PRESSURE SENSOR

There has been an additional pressure sensor added to the system configuration for liquid pressure sensing. When configuring a liquid pressure channel or second sense, there are now 5 different pressure ranges to choose from: 0-60, 0-100, 0-225, 0-300, and 0-650 as shown in [\(Figure 55\)](#).



Figure 56

Pressure Sensors

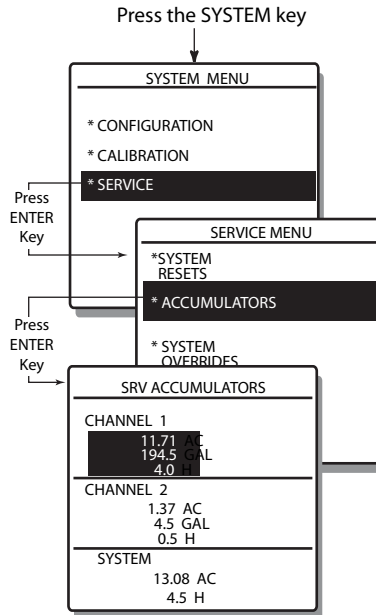


ACCUMULATORS SCREEN

1. Select ACCUMULATORS from the **Service** screen and press the **Enter** key. A screen will appear showing a similar accumulator screen as viewed in the OPERATE mode. However, these are a different set of system accumulators used for long-term record keeping or service information (refer to Figure 57).
2. To clear the values on this screen, select the totals and press the **Clear** key.

Figure 57

Accessing The Accumulators Screen





MANUAL CHANNEL CONFIGURATION ACCUMULATOR RESET

If the channel type is changed manually and the basic channel types are the same (i.e., Liquid-Flow to Liquid-Pressure) then none of the accumulators will reset. If the basic channel type is changed (i.e., Liquid-Flow to Granular-Spreader) on one of the channels, the channel accumulator for the channel will be reset. The other channel, if configured, and the system accumulator will retain their accumulator values. When manually changing the channel type, the system accumulator will never automatically reset. Selecting the system accumulator and pressing the **Clear** key will reset the system accumulator.

APPLICATION LIBRARY CHANNEL CONFIGURATION ACCUMULATOR REPORT

If using the application library function and the basic channel type does not change (i.e., Liquid-Flow to Liquid-Pressure) from library to library:

- Channel accumulators will retain their values and the system area will reset.

If the basic channel type changes on one channel from library to library (i.e., Liquid-Flow to Granular-Spreader):

- That channel and the system area will be reset. The other channel, if configured, will retain the accumulator values.

If both basic channel types are changed from library to library:

- Channel accumulators and the system accumulator will be reset.

If both basic channel types are the same from library to library:

- Channel accumulators will retain their accumulator values and the system accumulator will be reset.



Up and Down Arrow keys



Left and Right Arrow keys

SYSTEM OVERRIDE SCREENS

The **Manual Override** screen will appear displaying two selections. Each selection controls the valve or ground speed without the benefit of the system sensors (refer to [Figure 58](#)).

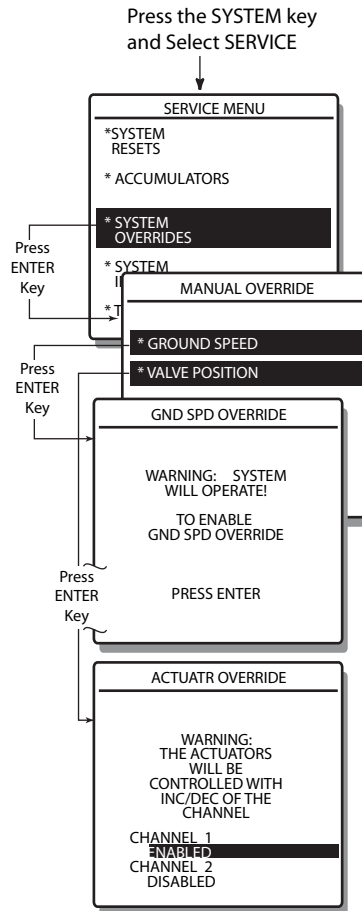
- GROUND SPEED – Forces the system to use the manual speed instead of the ground speed sensor. The speed used is the manual speed set on the **Ground Speed Configuration** screen (refer to GROUND SPEED CONFIGURATION). The system will perform as if the Master Switch is locked in the MANUAL position. Area accumulators do not function in this mode.
- VALVE POSITION (Not available for NH₃) – Use the **Left** and **Right Arrow** keys to enable/disable this feature. When operating in the MANUAL OVERRIDE mode, place the Master Switch in AUTO and increment/decrement valve position open/close with the **Up** and **Down Arrow** keys. Turning the Master Switch to OFF also closes the valve and displays MANUAL on the Target Rate line of the **Operate** screen. Values will display on the Target Rate and Present Dispersal Rate lines



of the **Operate** screen with the Master Switch in the ON position (refer to [Figure 58](#)). These values will display in small size to indicate that the Land Manager is operating in the MANUAL mode. The displayed value is the calculated application rate based on current ground speed and feedback sensor readings. Material accumulation is not functional in this mode.

Figure 58

Accessing System Overrides Screen



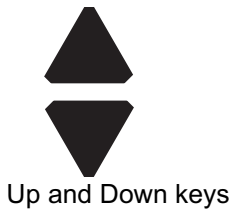
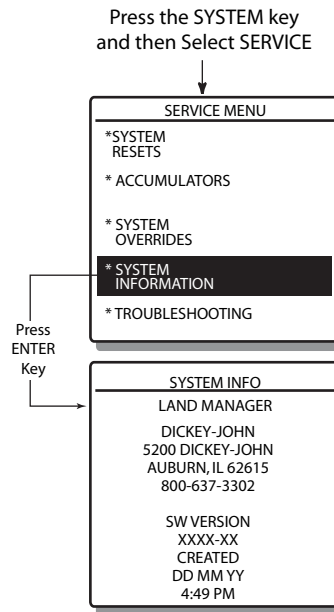


SYSTEM INFORMATION SCREEN

1. Select SYSTEM INFORMATION from the **Service** screen and press the **Enter** key. A screen will appear identifying the system, manufacturer, and the software version (refer to [Figure 59](#)).

Figure 59

Accessing System Information Screen



I/O key

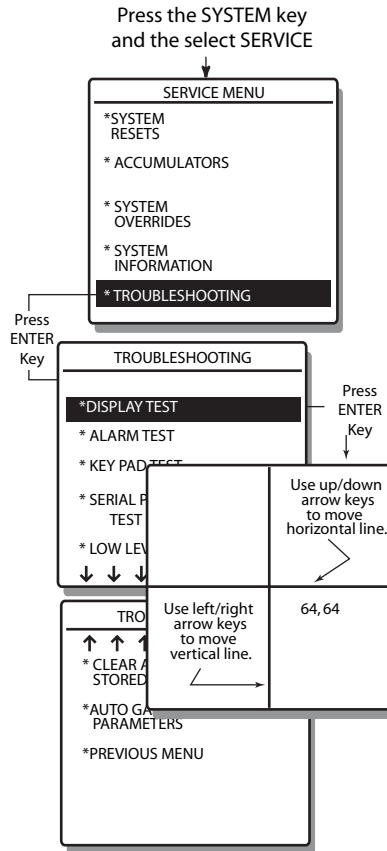
TROUBLESHOOTING SCREEN

1. Select TROUBLESHOOTING from the **Service** screen. This screen allows basic tests to ensure the Land Manager is functioning normally (refer to [Figure 60](#)). These tests can run at any time.
 - DISPLAY TEST – A screen will appear displaying two cross lines. Each line should be complete with no gaps. The full screen is tested by using the **Up** and **Down** and **Left** and **Right Arrow** keys to move the lines both vertically and horizontally. The two numbers appearing in one of the quadrants separated by a comma are the x and y coordinates for the intersecting lines. 0, 0 begins in the upper left corner and increases to 128, 128 in the lower right corner. If gaps are located, coordinates can be recorded for reference. Gaps can adversely affect the display quality.
 - ALARM TEST – The selection energizes the alarm to test its condition. This causes the alarm to sound continuously until the **Clear** key is pressed.
 - KEY PAD TEST – Each key depression is read on the screen to identify the particular active key. This quickly locates a key failure. The test ends by pressing any key twice. Pressing the **I/O** key will turn the console off.



Figure 60

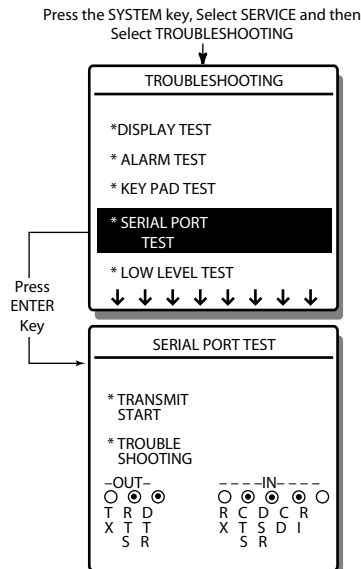
Accessing Troubleshooting Screen



- SERIAL PORT TEST – After selecting and entering, the status of each RS-232 input/output signal is read (refer to Figure 61).

Figure 61

Accessing The Serial Port Test Screen



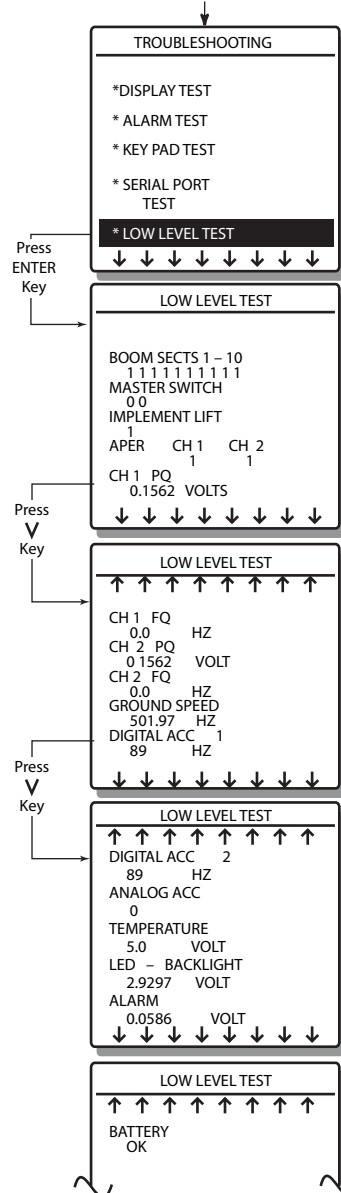


- LOW LEVEL TEST – Once selected and entered, the status of all input and output lines is checked. Logic lines are reported as logic levels, analog as voltages, and digital pulses as frequencies (refer to [Figure 62](#)).

Figure 62

Accessing Low Level Test Screen

Press the SYSTEM key, Select SERVICE and then Select TROUBLESHOOTING



- CLEAR ALL STORED VALUES – When initiated, clears all stored values established and resets to factory defaults (refer to [Figure 63](#)). Generally used to start over again.
- AUTO GAIN PARAMETERS – This screen can only be entered with a special password. Values are established by the Auto Gain

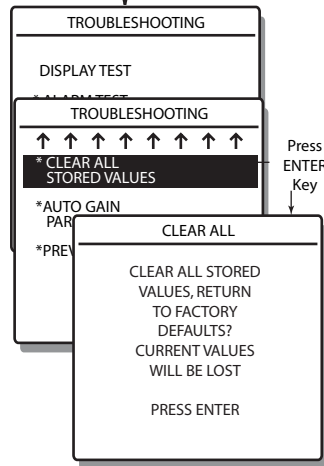


calibration and cannot be readily changed. If necessary, contact DICKEY-john for technical assistance with the problem. Values can be viewed/printed under SUMMARY on the **Configuration** screen.

Figure 63

Clearing All Stored Values

Press the SYSTEM key, select SERVICE, and then select TROUBLESHOOTING



SYSTEM OPTIONS SCREEN

This selection from the **Service** screen represents the side-by-side option available only on a two channel system using two booms. Configuration of the side-by-side option indicates the two booms are across the system in a serial arrangement with designations of left and right sides. When selecting a full width setting, the two booms are configured again as parallel and overlapping in product application (refer to [Figure 65](#)). The two booms can deliver the same or different products.

1. Access the **System** screen and select SERVICE. Press the **Enter** key (refer to [Figure 64](#)).
2. Scroll down to SYSTEM OPTIONS and press the **Enter** key. SYSTEM OPTIONS will only appear if two booms are configured on a Land Manager II system.
3. Edit the **System Options** screen. The two screen items, CHANNEL 1 and CHANNEL 2, will display the current boom assignment (refer to [Figure 64](#)). Each boom assigned to either RIGHT SIDE, LEFT SIDE, or FULL WIDTH (default setting).
4. The last screen item will display the system/vehicle width. If one boom is assigned LEFT and the other one RIGHT, then the side-by-side orientation will display the sum width of the two booms. If booms are assigned the same side (i.e. both LEFT SIDE) or both set to FULL WIDTH, the booms will operate in parallel and the maximum width displays the larger of the two booms.



Figure 64
Accessing The System Options Screen

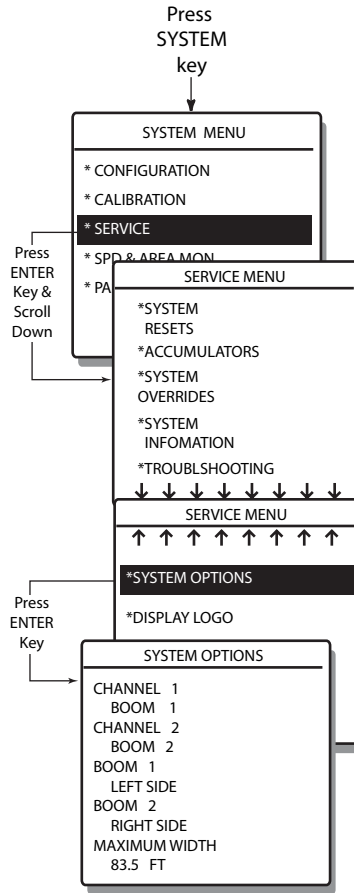
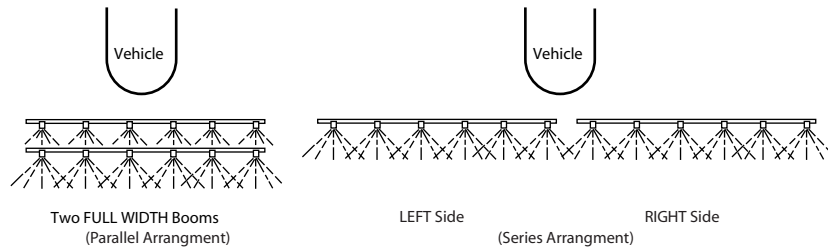


Figure 65
Full Width Vs. Side-by-side Boom Configuration



DISPLAY LOGO SCREEN

Choosing this selection displays the DICKEY-john logo and performs no other function.



CHANGE LANGUAGE SELECTIONS

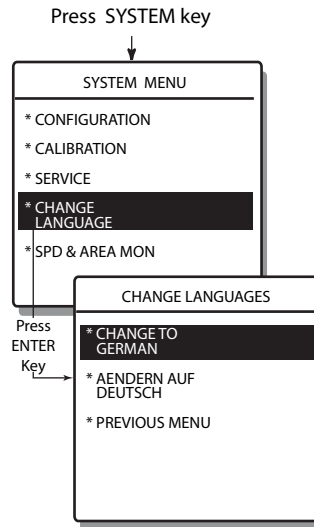
Application Libraries and Serial Port Configuration are capable of displaying in a different language on some models. If your unit does not show this selection, it is not equipped for multi-language use (refer to [Figure 66](#)).

NOTE: The following only applies to Land Manager and Land Manager II models that support multi-language operation.

1. Select CHANGE LANGUAGE from the **System** screen and press the **Enter** key. A screen will appear to allow for selecting the desired language.
2. Select the desired language and press the **Enter** key to enable. All screens will immediately convert to the new language. ENGLISH UNITS DO NOT AUTOMATICALLY CHANGE.

Figure 66

Changing The Language Displayed



SPEED AND AREA MONITOR ENABLING/DISABLING

The SPEED/AREA MONITOR mode requires only the ground speed sensor to drive the Land Manager Console. This mode displays only two functions on the primary **Operate** screen - GROUND SPEED and AREA. Accessory sensors will continue to display on the **Accessory** screen if the system is not disconnected. These functions are available to both truck and tractor configurations at any time by selecting the SPD & AREA MON. For a tractor configuration, Land Manager is useful in the field with other implements.

Land Manager continues operation as before except with fewer choices. The only adjustment necessary is to set the implement width for accurate area measurements. All display adjustments remain functional and operate as before. The Master Switch retains its function to start/stop area accumulation.

1. Select SPD & AREA MON from the **System** screen. A screen will appear to allow enabling the SPD & AREA MONITOR mode (refer to [Figure 67](#)).
2. Press the **Enter** key to view the next screen and then press the **System** key to enter the mode. The **System** screen will display many

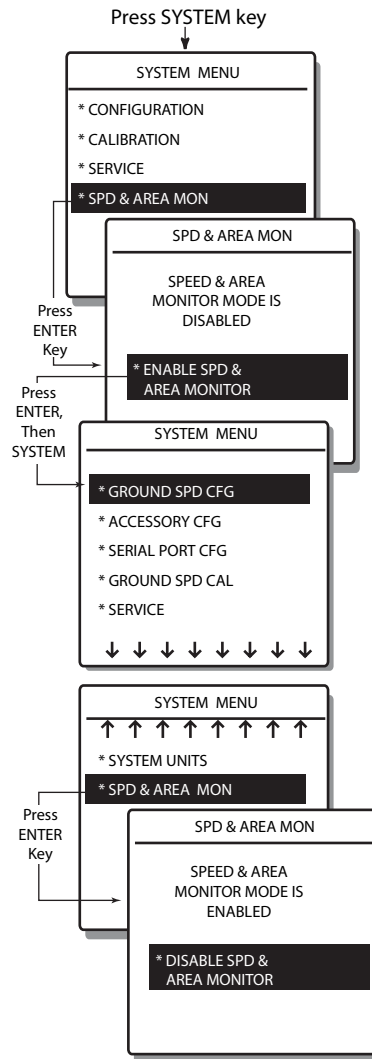




SYSTEM

- of the same functions as before but does not normally require editing unless system conditions change.
3. Press the **System** key again to exit. When returning to the standard operation, the **Spd & Area Mon** screen will require revisiting to disable this mode (refer to [Figure 67](#)). After entering the SPEED/AREA MONITOR mode, be sure to go to the SETUP mode before attempting to operate in the OPERATE mode. The implement width must be adjusted.

Figure 67
Accessing The Speed/Area Monitor Mode





Left and Right Arrow keys



Up and Down Arrow keys



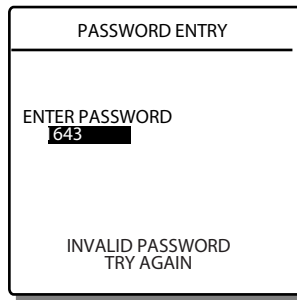
PASSWORD SCREEN MODIFYING

Assigning a password to Land Manager SETUP and SYSTEM mode screens creates a security level for protecting parameters. The OPERATE mode screens do not use the password and thus normal operation continues. Protected screens or screen items are only accessed by entering the correct numeric sequence (code) of up to six digits in length. Before granting access, a prompt will request ENTER PASSWORD (refer to [Figure 68](#)). Use the **Left/Right** and **Up/Down Arrow** keys to enter the password (number) and press the **Enter** key. If the password is invalid, a TRY AGAIN message will appear at the bottom of the screen. After three unsuccessful attempts, the display will return to the previous screen. The password can be changed at any time but the present password is necessary to gain access to the **Password** screen.

IMPORTANT: Be sure to record the password in a safe place for future reference.

Figure 68

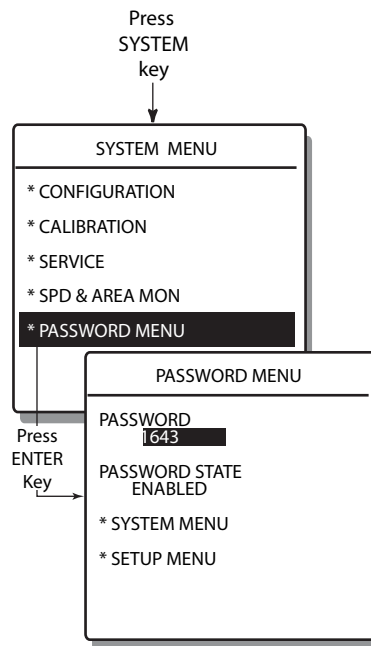
Password Prompt For Each Protected Parameter



1. Access the **System** screen and select PASSWORD. Press the **Enter** key (refer to [Figure 69](#)). The **Password** screen will appear displaying four lines.
 - PASSWORD – Access code to edit protected parameters.
 - PASSWORD STATE – Enables/disables password feature.
 - SYSTEM MENU – Allows selecting items to protect.
 - SETUP MENU – Allows selecting items to protect.
2. To create/change a password, select PASSWORD from the **Password** screen and use the **Arrow** keys to select any number up to six digits in length (refer to [Figure 69](#)). The factory will ship the unit with a password of 0. Record and store the new number for safe keeping. If the number is lost or forgotten, the only means of entering protected screens is to contact the DICKEY-john Service Department for assistance.
3. Select the PASSWORD STATE line, select ENABLED with the **Arrow** keys, and press the **Enter** key. If choosing DISABLED, no password protection is in effect. ENABLED prevents access to certain parameters selected on the **System** and **Setup** screens described next. All screen items indicating NO ACCESS or PARTIALI displays a password prompt (refer to) before the parameter can be opened to monitor or edit.



Figure 69
System Mode Showing Password Screen

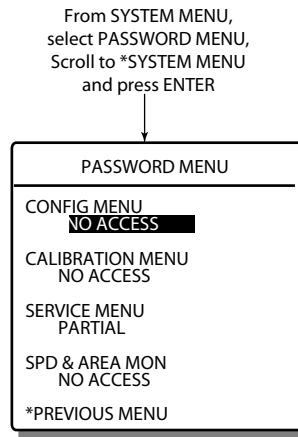


4. On the **Password** screen, select SYSTEM MENU and press the **Enter** key. This screen will display which SYSTEM mode items can be protected (refer to). Most items (CONFIGURATION, CALIBRATION, and SPD & AREA MON) can be set to either ACCESS or NO ACCESS. ACCESS indicates no password protection is in effect. The SERVICE screen contains three choice; ACCESS, NO ACCESS, and PARTIAL. A setting of PARTIAL restricts access to certain SERVICE sub-screens as follows:
 - SYSTEM RESETS – Requires password.
 - ACCUMULATORS – Requires password.
 - TROUBLESHOOTING only requires a password to CLEAR ALL STORED VALUES.



Figure 70

Password Screen For System Mode

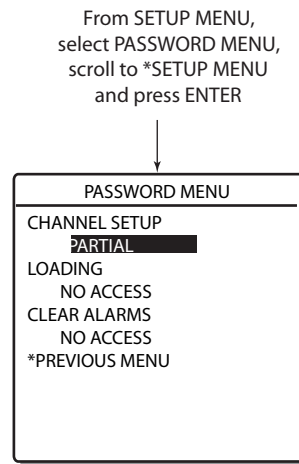


NOTE: Password protection parameters are not saved as part of an application library. Once parameters are set, protection applies equally to all configurations loaded from the library and are only changed on the **Password** screen.

- On the **Password** screen, select SETUP MENU and press the **Enter** key. The screen appearing will display which SETUP mode items can be protected (refer to Figure 71). A setting of ACCESS, NO ACCESS, or PARTIAL can be assigned to CHANNEL SETUP, APP LIBRARY, and FORMAL REPORTS. A setting of PARTIAL restricts as follows:
 - CHANNEL SETUP – All screen items require a password except for the APPLICATION RATE, PRODUCT LEVEL, RESET LEVEL, ALARM LEVEL, ZERO PRESSURE, TANK PRESSURE SENSOR, and DENSITY.
 - APPL LIBRARY – The SAVE and DELETE items require a password; LOAD does not.
 - FORMAL REPORTS – ADD requires a password, VIEW/EDIT allows viewing but requires a password to edit. PRINT, START, and STOP are not protected.

Figure 71

Password Screen For Setup Mode







SETUP MODE

Both SETUP and SYSTEM modes require constants to be entered into memory. SYSTEM mode constants identify system configuration (e.g., number of boom sections, volume of product flow, ground speed calibration pulse count, actuator values, etc.). The SETUP mode constants are those that change more frequently (such as application rate).

SETUP MODE (SETUP KEY)

After the power-up routine is completed, the Primary Operate screen of the OPERATE mode will appear on the display.



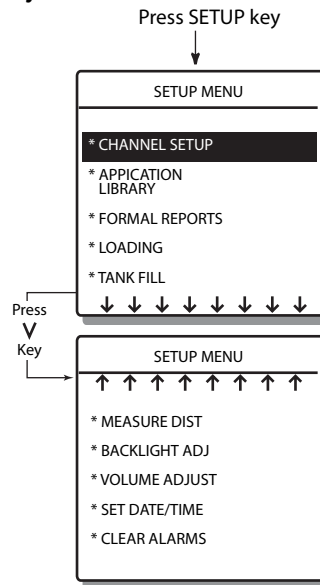
SETUP

1. Press the **Setup** key. Maneuvering through the SETUP mode screens follow the same basic procedures as for the SYSTEM mode.
2. Ten items (sub-screens) will appear on two screens to allow correct parameter settings (refer to [Figure 72](#)). Each screen is predefined but requires editing for proper system operation.
 - CHANNEL SETUP – Establishes application parameters.
 - APPLICATION LIBRARY – Stores a collection of settings (applications) that can be quickly changed. Up to ten applications can be stored.
 - FORMAL REPORTS – Allows accumulation of detailed job information.
 - LOADING – Opens valve for loading or agitation.
 - TANK FILL – Allows monitoring/control liquid volume being loaded.
 - MEASURE DISTANCE – Measuring of precise distance in feet (meters) between two points (such as the length of a field).
 - BACKLIGHTING ADJUSTMENT – Adjusts the brightness of the keypad and display level for night and day time use.
 - VOLUME ADJUSTMENT – Adjustment of the audio level.
 - SET DATE/TIME – Sets the correct date and time for use during operation and for all reports including alarm messages.
 - CLEAR ALARMS – Erases all accumulated alarm history.



Figure 72

Setup Screen - Primary Screen



ENTER



Increment key



Decrement key



Up and Down Arrow keys



Left and Right Arrow keys

SETUP SCREEN DESCRIPTION

Use the **Increment** or **Decrement** keys to scroll the selection bar to the desired line for entering a screen and the **Up/Down** and **Left/Right Arrow** keys to select/edit entries. Before beginning product application, at least one active channel must be setup with correct values. The following steps outline the setup for all three product types (liquid, granular, or anhydrous ammonia). Select the setup that apply to your application.

CHANNEL SETUP SCREEN SETTINGS

1. From the **Setup** screen, select CHANNEL SETUP and press the **Enter** key. An intermediate screen will appear and ask which channel is desired for setup. If only one is configured or for a single channel unit, this screen will not display.
2. Select either CHANNEL 1 or CHANNEL 2 and press the **Enter** key. Depending upon channel type, the screen may extend to several screens.
3. Edit the items on the **Channel # Setup** screen. Check each item on the screen for channel type being established.

APPLICATION LIBRARY SCREEN

An application is a collection (or group) of configurations/setup values contained by the system for the application of a particular product. This includes:

- Channel Setups
- Channel Calibration Constants
- System Configurations
- Boom Configurations



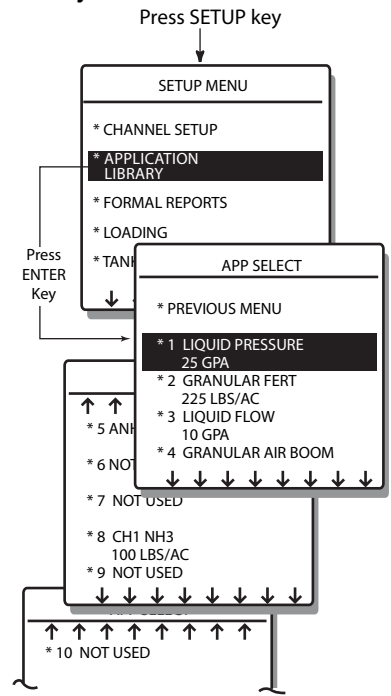
- Accessory Configurations
- System Mode (Current Units - Metric/English, Language)

Most entries in the unit except for the Formal Reports, Alarm Log, Accumulators, and Serial Port configuration are included as part of an application.

The application library stores up to ten complete applications. These applications are identified by a library number along with an identifying label. The system is always operating in the current application. The **Library Application** screens allow the current application to be saved (copied) into a location in the library. Applications previously saved in the library can be loaded (copied) into the current application. Only one application, the current application, is active at any given time.

Figure 73

Entering Application Library



USES FOR THE APPLICATION LIBRARY

- **A system requiring different calibration data for different rates.** Several applications can be stored in the library, each with the different application rates and calibration data. This allows for a quick change in system setup and ensures optimum performance for a specific rate.
- **Multiple configurations of a vehicle or multiple vehicles.** Each unique vehicle configuration (e.g., granular bed, liquid, etc.) can be saved as an application in the library. This allows transferring the Land Manager console from one vehicle to another without re-entering configuration information – just select and load the appropriate application from the library. Multiple boom configurations on a vehicle can also be stored as separate applications.



- **Combinations of above two items (up to ten applications can be stored in the library) allow for mixed uses on multiple vehicles.**
- **The first five library applications contain factory default settings representing basic channel configurations.** Any of the basic settings can be modified or deleted for specific applications. The preprogrammed applications are (1) LIQUID PRESSURE, (2) LIQUID FLOW, (3) GRANULAR SPREADER, (4) GRANULAR AIR BOOM, and (5) ANHYDROUS AMMONIA.

LOADING AN APPLICATION FROM THE LIBRARY INTO THE SYSTEM

1. From the **Setup** screen, select APPLICATION LIBRARY and press the **Enter** key (refer to [Figure 73](#)). The **App Select** screen will display showing the first four of up to ten applications stored in the library.
2. From the **App Select** screen, select the desired Application Library number and press the **Enter** key (refer to [Figure 74](#)). To select application library numbers 5 through 10, scroll down.
3. After pressing the **Enter** key, the **Application** screen will display with the selected application library number and current label near the top of the screen.
4. From the **Application** screen, select LOAD and press the **Enter** key. The selected application becomes the current application and the system will advance directly to the **Operate** screen.

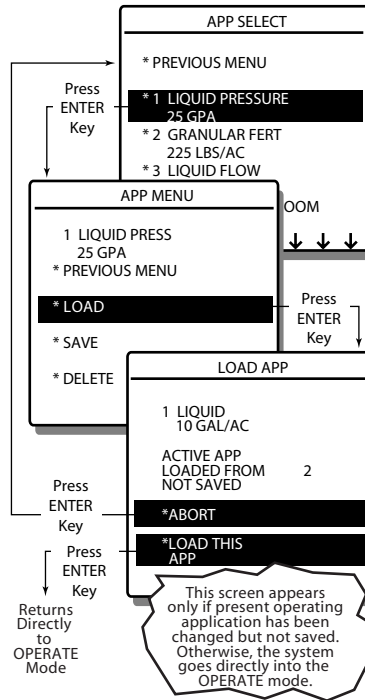
To save the Current Application – Select ABORT to return to the **App Select** screen and follow the instructions below for saving the Current Application.

To continue and discard all changes to the Current Application – Select LOAD THIS APP and press the **Enter** key. The application will load and the system will advance to the **Operate** screen.



Figure 74

Loading Applications From The Library



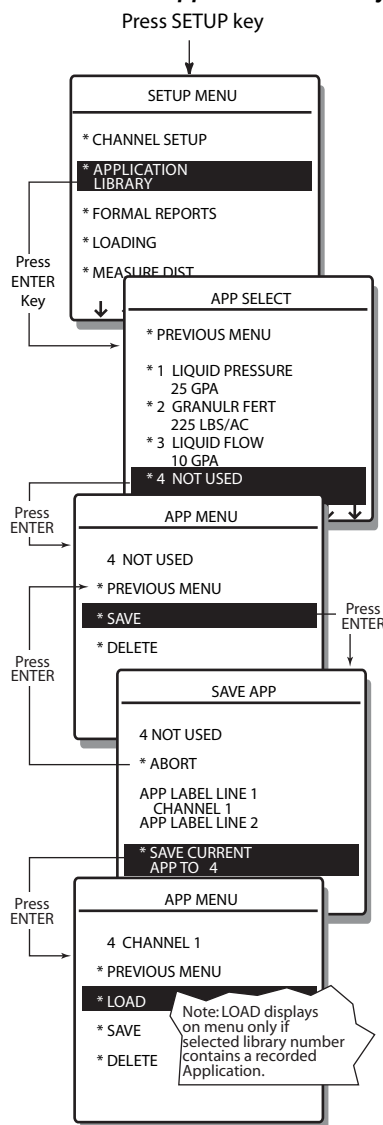
SAVING THE CURRENT APPLICATION TO THE LIBRARY

1. Select the **Setup** screen, then the APPLICATION LIBRARY and press the **Enter** key. (refer to Figure 75). The **App Select** screen will appear and display the first four of up to ten applications stored in the library.
2. From the **App Select** screen, select the desired application library number and press the **Enter** key. The **App Menu** will display with the selected application library number and current label near the top of the screen.
3. From the **App Menu**, select **SAVE** and press the **Enter** key. The **Save App** screen will display with the application library number and current label near the top.
4. From the **Save App** screen, change the label to a descriptive title. The label lines 1 and 2 default to the current channel labels if the application was empty (NOT USED). If this application had been previously saved, then the default becomes the current label.
5. From the **Save App** screen, select **SAVE CURRENT APP to #**. The **App** screen will once again display and will show the new label.



Figure 75

Saving System Parameters To Applications Library



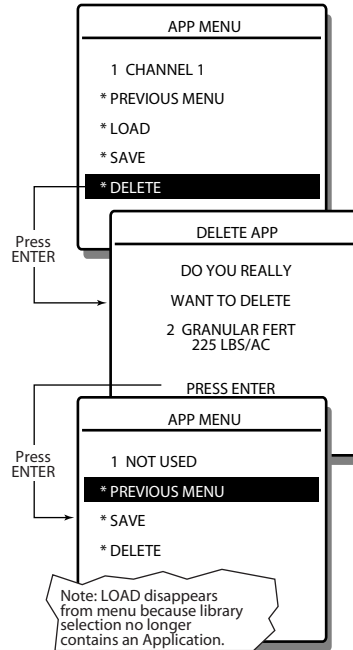
DELETING AN APPLICATION FROM THE LIBRARY

1. From the **Setup** screen, select APPLICATION LIBRARY and press the **Enter** key (refer to Figure 75). The **App Select** screen will display showing the first four of up to ten applications stored in the library.
2. From the **App Select** screen, choose the desired application library number and press the **Enter** key. The **App Menu** will display with the selected application library number and current label near the screen top (refer to Figure 76).
3. From the **App Menu**, select DELETE and press the **Enter** key. A confirmation screen will display, DO YOU REALLY WANT TO DELETE.



4. Press the **Enter** key to complete the deleting process. The **App** screen will again display with the selected application library number and the label NOT USED.

Figure 76
Deleting Application From Library



RESTORING ORIGINAL SYSTEM CONFIGURATION

Restoring system parameters to factory defaults is divided into two options (refer to [Figure 77](#) and [Figure 78](#)).

Option 1 – In **SYSTEM** mode, under the **Service** screen, selecting **SYSTEM RESETS-CLEARs ALL STORED VALUES EXCEPT APPLICATION LIBRARY AND FORMAL REPORTS**. This method unconfigures the channel(s) for the current application but retains information in the application library and formal reports.

Option 2 – In **SYSTEM** mode, under the **Troubleshooting** screen, **CLEAR ALL STORED VALUES AND TO RETURN TO FACTORY DEFAULTS**. **ALL CURRENT VALUES WILL BE LOST**. This method returns the current application, application library, and formal reports to the original factory default settings.



Figure 77

Reloading Factory Defaults For Current Configuration

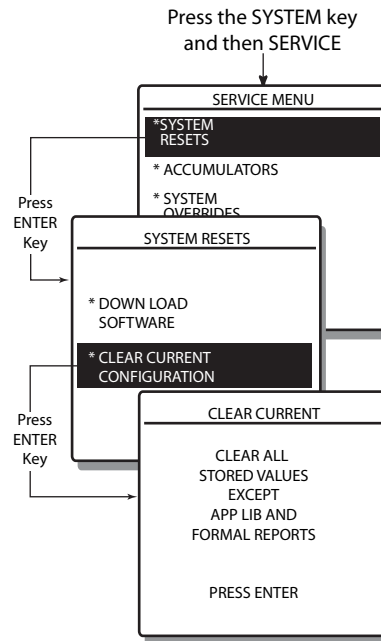
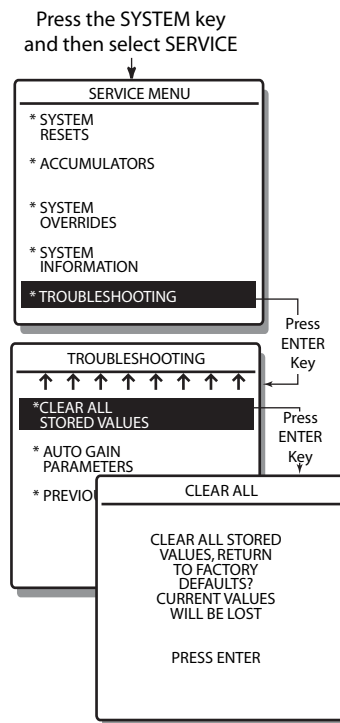


Figure 78

Reloading All Factory Default Settings





FORMAL REPORTS SCREEN

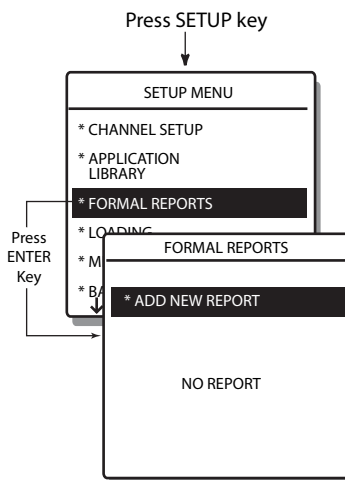
Formal reports records application data for individual jobs. After establishing a report file, data accumulates by starting and stopping the report from the **Formal Report** screen whenever dispensing product. Field area, application data and labels are automatically recorded. Several job titles can display on the screen but only one is activated at a given time (refer to [Figure 81](#)).

Each report can be started and stopped as many times as necessary to accumulate data for a given job. At the end of designated time intervals (i.e., end of day), the reports can be printed on a printer, downloaded as a text file to a computer, or hand copied from the screen to a log.

1. To set up an initial report, select FORMAL REPORTS from the **Setup** screen. A screen will be displayed showing report titles that have been previously configured. If this is the case, skip to Step 4. If no reports are configured, the screen displays NO REPORT. Proceed to Step 2 (refer to [Figure 79](#)).

Figure 79

Basic Formal Reports Screens

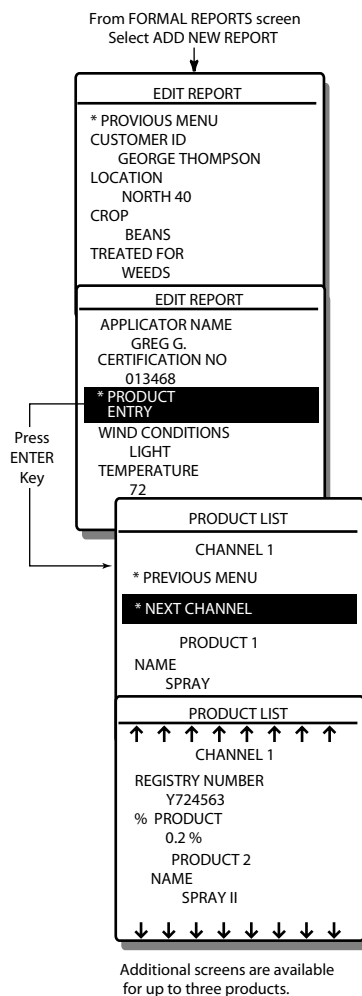


2. To add a report, select ADD NEW REPORT and press the **Enter** key. A new screen will display with empty blanks to be filled in to establish basic details for the report (refer to [Figure 80](#));
 - CUSTOMER ID: (Name of customer)
 - LOCATION: (Land description)
 - CROP: (Corn, cotton, beans, etc.)
 - TREATED FOR: (Reason for application)
 - APPLICATOR NAME: (Your name)
 - CERTIFICATION NO: (Your authorized number)
 - WIND CONDITIONS: (Direction/speed)
 - TEMPERATURE: (Ambient air temperature)



Figure 80

Formal Reports Showing Product List



ENTER

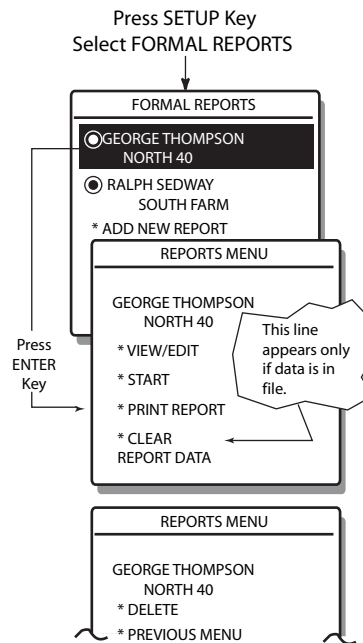
3. Select **PRODUCT ENTRY** and press the **Enter** key to access the **Product List** screen (refer to [Figure 80](#)). Fill in the **NAME**, **REGISTRY NUMBER**, and **%PRODUCT** for the chemical being applied. Three products can be recorded for each channel.
4. Enter the **% CHEMICAL** used in the formulation and the report generates the correct amount applied for the specific report.
5. After the new report (or one existing) displays on the screen, select the desired report and start data recording. When application begins, select **START** and press the **Enter** key (refer to [Figure 81](#)). A dot will appear in the circle in front of the selected report.
6. Stop the data accumulation by selecting **STOP** and pressing the **Enter** key.
7. Reports are later viewed and/or printed (refer to [Figure 81](#) and Step 6).



8. To use the other functions on the **Formal Report** screen, select the desired function and press the **Enter** key (refer to [Figure 81](#)).
 - VIEW/EDIT - Views of all accumulated data for a selected report that can be used anytime.
 - PRINT REPORT - If a printer is connected, a report printout can be printed.
 - CLEAR REPORT DATA - Available only if data for a selected report is accumulated. If this selection is activated, only the accumulated data can be deleted. All basic information remains and data accumulation can begin again.
 - DELETE - Removes a complete report (accumulated and configuration data) from the system. Use this when the report is no longer needed.
9. Select VIEW/EDIT REPORT; and press the **Enter** key (refer to [Figure 81](#)). Full details of a report is shown. The eight items entered above will appear plus accumulated data.

Figure 81

Formal Reports Showing Reports Screen



LOADING SCREEN

The Loading/Unloading feature agitates or loads a liquid tank or moves the conveyor in a granular channel for unloading. For a granular system, ground speed cannot exceed 5 MPH or a warning screen will appear and the unloading process will stop. Anhydrous ammonia cannot use the Loading/Unloading feature.

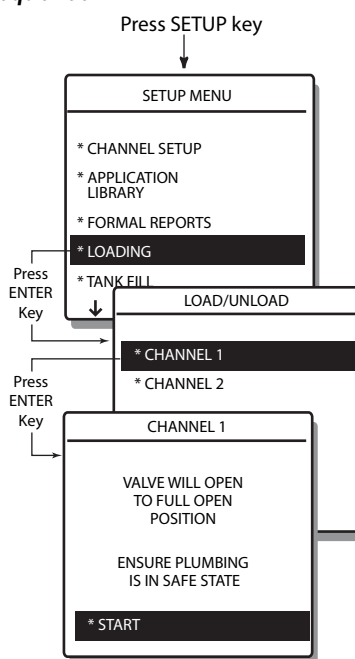
1. From the **Setup** screen, select **LOADING** and press the **Enter** key (refer to [Figure 82](#)). A screen will appear asking for a channel number (dual channel system). Enter the correct channel number. A second screen will appear displaying **CHANNEL # LOAD/UNLOAD** with a



WARNING - VALVE WILL OPEN TO FULL POSITION - ENSURE PLUMBING IS IN A SAFE STATE. The boom must be off and the Master Switch in the OFF position before agitation begins. The next step turns the system on for loading or unloading of product. All equipment should be ready for product flow.

2. Perform this step only if all equipment is ready and in a safe condition. When performing this step, a screen will appear stating WARNING - VALVE IS OPEN. However, this occurs only if the booms are turned off and the Master Switch module switch is OFF. Otherwise, an appropriate screen will appear warning of the conditions and the process cannot continue until the problem is corrected.

Figure 82
Loading Screen Sequence



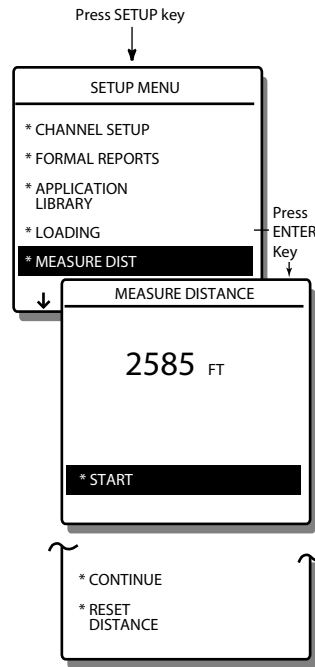
MEASURING DISTANCE SCREEN

1. From the **Setup** screen, select MEASURE DISTANCE and press the **Enter** key (refer to [Figure 83](#)). The **Measure Distance** screen will appear. Across the screen is a measurement showing 0 FT. When activated, this screen will accumulate the distance traveled in feet (meters) between two points (starting and stopping) such as the length of a field or how far traveled, etc. Counting begins by scrolling to **START** and pressing the **Enter** key and will continue until the **Enter** key is pressed again. The count will cease but may be resumed later by selecting **CONTINUE**. The accumulated value will continue to display until activating the **RESET DISTANCE** or by entering another mode.



Figure 83

Measure Distance Sequence



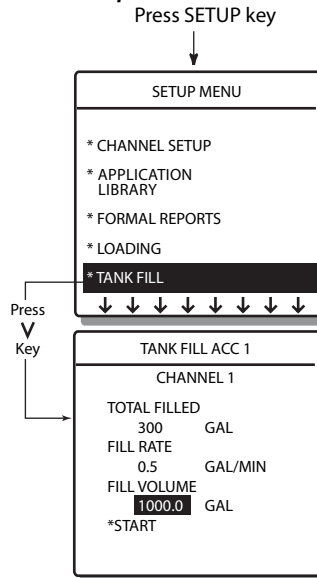
TANK FILL SCREEN

1. Press the **Setup** key and select TANK FILL (refer to [Figure 84](#)).
2. Press the **Enter** key. The screen will show the assigned channel, volume of liquid pumped since the pumping started, and the rate of liquid flow. The FILL VOLUME is the amount of liquid to be loaded into the product tank. At this volume level, Land Manager displays TANK FILL COMPLETE and issues a command to stop the pump.
3. Adjust the FILL VOLUME to the desired amount.
4. Select START.
 - If using a pump shutoff module, press the **Enter** key to begin pumping. The START line on the screen will change to STOP. Press the **Enter** key to shut the pump off at any time. When the FILL VOLUME is reached, Land Manager will automatically shut off the pump.
 - If no pump shutoff module is used, press the **Enter** key to begin monitoring how much fluid has been transferred. The START line will change to STOP. Press the **Enter** key to stop monitoring the fill process. When the fill volume is reached, Land Manager will continue to monitor any flow activity until STOP is pressed. Whether using a pump shutoff module or not, a continuous alarm will sound if flow is detected after the FILL VOLUME is reached.



Figure 84

Setting Fill Volume In Setup Mode



ENTER



Up and Down Arrow keys



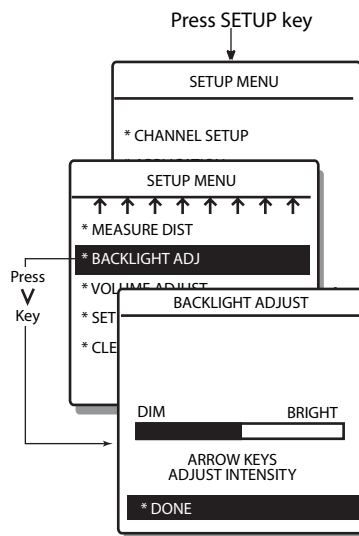
Left and Right Arrow keys

BACKLIGHT ADJUSTMENTS SCREEN

1. From the **Setup** screen, select BACKLIGHTING ADJ and press the **Enter** key (refer to Figure 85). A bar graph will appear across the screen to indicate the relative backlight level of the key switches and LCD for night time or day time use.
2. To change the backlight level, use the **Up/Down** and **Left/Right Arrow** keys. The **Up** and **Right Arrow** keys increase the backlight level. The **Down** and **Left Arrow** keys decrease the level. The bar graph will indicate the relative brightness change.

Figure 85

Adjusting Backlight Level



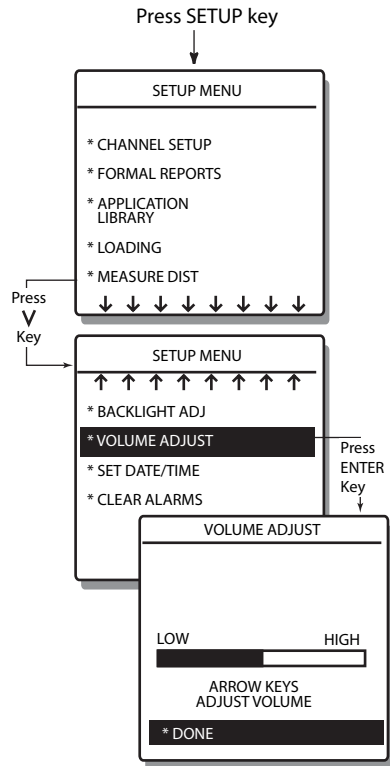


VOLUME ADJUSTMENT SCREEN

1. From the **Setup** screen, select VOLUME ADJUST and press the **Enter** key (refer to [Figure 86](#)). A bar graph will appear to indicate the relative loudness level of the alarm.
2. To change the volume level, use the **Up/Down** and **Left/Right Arrow** keys. The **Up** and **Right Arrow** keys increase the volume. The **Down** and **Left Arrow** keys decrease the volume. The bar graph will indicate volume change and also audio level emitted by the alarm.
3. With DONE highlighted, press the **Enter** key to complete.

Figure 86

Adjusting Alarm Volume Level



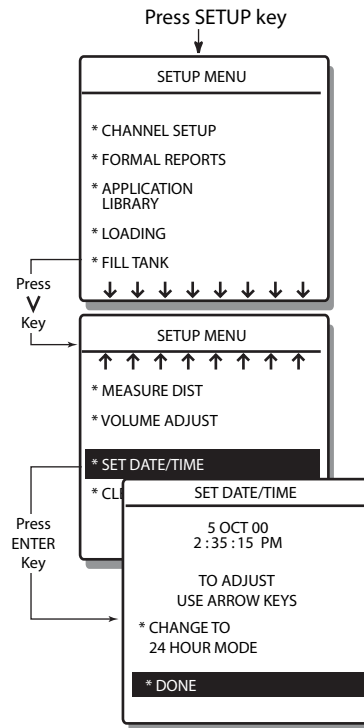


SET DATE/TIME SCREEN

1. From the **Setup** screen, select SET DATE/TIME and press the **Enter** key. The **Set Date/Time** screen will appear displaying the current settings for the date and time (refer to [Figure 87](#)).
2. Set the correct date. The **Left** or **Right Arrow** keys move the selection across. The **Up** or **Down Arrow** keys change the value of the selected digit.
3. To select 12 or 24 hour time, select the line located on the lower screen and press the **Enter** key.
4. Change the time by using the **Arrow** keys. There is no need to press the **Enter** key after each change, only move to the next digit. After the last digit is changed, advance one more space to ensure the last entry is valid. Selecting AM or PM is performed in the same manner.
5. When finished, select **DONE** and press the **Enter** key.

Figure 87

Set Date/Time



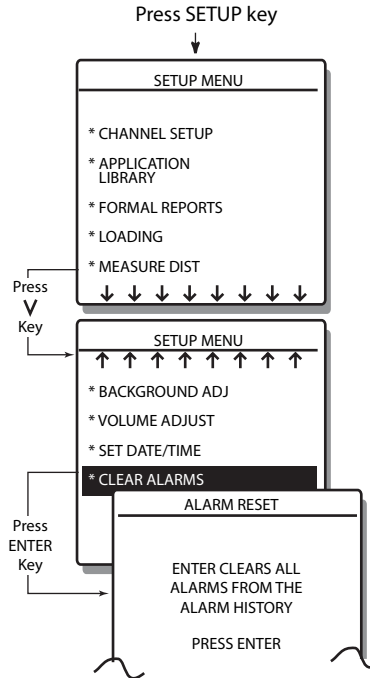


CLEAR ALARMS SCREEN

1. From the **Setup** screen, select CLEAR ALARMS and press the **Enter** key (refer to [Figure 88](#)). A screen will appear stating ENTER CLEARS ALL ALARMS FROM THE ALARM HISTORY.
2. Press the **Enter** key to clear all accumulated alarms.

Figure 88

Clearing Alarm History



SPEED/AREA MONITOR MODE (SETUP MODE)

The SPEED/AREA MONITOR mode must be enabled on the **System Mode** screen to become active. Once active, SETUP mode is entered as before by pressing the **Setup** key (Master Switch module switch must be OFF). The **Setup** screen adds one function and retains five others (refer to [Figure 89](#)). To set the implement width setting, perform the following procedure:

1. From the **Setup** screen, select IMPLEMENT WIDTH. A screen will appear displaying the present width (refer to [Figure 90](#)).
2. Set width value to equal the width of the implement (refer to [Figure 90](#)). A maximum width of 200 feet (60 meters) can be entered. Use the **Right Arrow** key to move the cursor to select other digits for changing. When finished, press the **Enter** key.
3. When complete, press the **Setup** key again to return to the **Setup** screen or the **Operate** key to resume Speed/Area operation.



Figure 89

Speed/Area Setup Mode

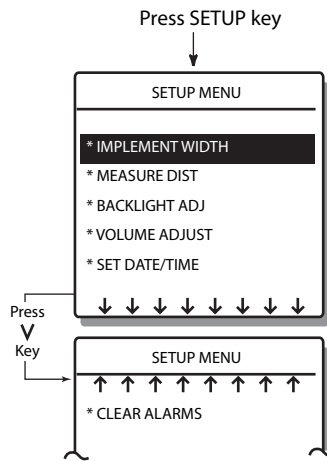
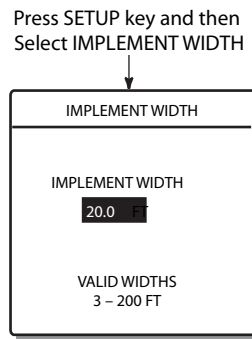


Figure 90

Speed/Area Implement Width Mode





OPERATE MODE

After completing all configuration and calibration in SYSTEM mode and making all entries in SETUP mode, the system is ready for product application. The OPERATE mode monitors the product application rate, area covered, and ground speed. Also monitoring of several other functions occur - accessory sensors, accumulated totals for application/acreage, product level for both channel(s) and system, and alarm history.

SCREENS (OPERATE KEY)

The primary **Operate** screen is the main screen referenced during field operation. Four additional supporting screens are accessible by pressing the **Operate** key a second, third, and fourth time.



- **Primary Operate** screen - Monitor and adjust application rates and also monitor ground speed and system area accumulation.
- **Accessories** screen - Pressing the **Operate** key a second time accesses this screen. Displays configured sensors and status conditions for any optional sensors connected to the digital and/or analog accessory inputs. If no accessory sensors are configured, this screen will not display.
- **Accumulator** screen - Pressing the **Operate** key a third time will access this screen. Displays channel totals for product dispensed and area covered. Total area covered by the vehicle also displays. When the Master Switch is OFF, the accumulated value for any selected channel can be cleared by pressing the **Clear** key.
- **Product Level** screen - Pressing the **Operate** key a fourth time will access this screen if the PRODUCT LEVEL feature has been enabled in SYSTEM mode. This screen monitors the amount of product remaining aboard during application.
- **Alarm History** screen - Pressing the **Operate** key another time will access the recorded errors that have occurred over time.

PRIMARY OPERATE SCREEN

This screen will appear first each time OPERATE mode is entered.

1. Turn power ON and wait for the power up routine to finish. If the Master Switch module switch was inadvertently left in AUTO, a series of audio beeps will sound and an alarm message will display:

MASTER IN AUTO

TURN OFF

Turning the switch OFF allows the console to continue without further interruption. This switch must always be turned OFF when the system is not being used. The **Primary Operate** screen will appear at the end of the routine ready for field operation.

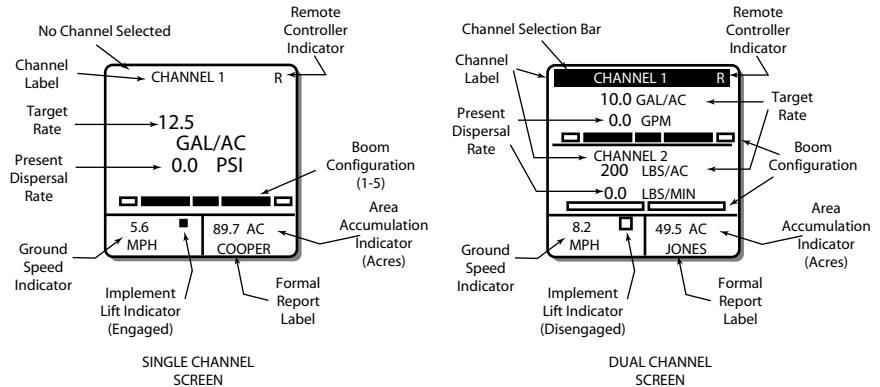
2. If the system is already on and in another mode, press the **Operate** key. From the SYSTEM or SETUP modes, the unit will immediately enter OPERATE mode and displays the **Primary Operate** screen.



3. **Figure 91** shows the **Primary Operate** screen for both single channel and dual channel systems. The major difference between the two screens is the extra channel displays on the dual channel system.

Figure 91

Single And Dual Channel Primary Operate Screens



Up and Down Arrow keys



Left and Right Arrow keys



Increment key



Decrement key

- Channel Label – This is an arbitrary label to identify the channel. The illustration uses CHANNEL 1 and CHANNEL 2, but a more meaningful label might be LIQUID or GRANULAR. These are easily changed anytime from the SETUP mode.
- Remote Controller Indicator - An “R” at the right end of the Channel Selection Bar indicates a remote controller (i.e. GPS) in control.
- Target Rate – The application rate the operator intends to apply per acre (hectare). If a “+” or “-” sign appears after the value, the target value has been increased/decreased (inc/dec) with the **Up** or **Down Arrow** keys.
- Present Dispersal Rate – This is the instantaneous product dispersal rate.
- Boom Configuration – A bar graph shows the boom configuration. Each division represents a boom section. The darkened division represents those sections presently active.

Selection Bar – To turn a channel on or off, the channel must first be selected. Pressing the **Increment** key will select the top channel (CHANNEL 1). Pressing the **Decrement** key will select the lower channel (CHANNEL 2). Deselecting a channel is accomplished by pressing either key a second time. To turn a channel on, select the channel and then press the **Right Arrow** key. The **Left Arrow** key will turn a channel off.

- Ground Speed Indicator – Appears in the lower left portion of the screen. The reading shows the instantaneous vehicle ground speed.
- Implement Lift Indicator – A small square box in the upper right corner of ground speed window appears dark when the implement is engaged.



- Area Accumulation – Appears in the lower right portion of the screen. This indicates the area covered since the last system reset.
- Formal Reports – The active formal report name displays directly below the area accumulation. If no report is active, this portion of the screen is blank.

ACCESSORIES SCREEN (IF CONFIGURED)

The **Accessory** screen reports the activity of optional sensors connected to the digital or analog accessory inputs (refer to [Figure 92](#)).

1. With the **Primary Operate** screen displayed, press the **Operate** key (the second time) to access the **Accessories** screen.

Figure 92

Accessory Screen - Operate Mode

ACCESSORIES	
HOPPER LEVEL	FULL
FAN	758 RPM
PRESSURE	40 PSI



Increment key



Decrement key



ACCUMULATORS SCREEN

1. With the **Accessories** screen displayed, press the **Operate** key until the **Accumulators** screen appears. Values shown in each screen division are total area covered and volume of products applied since the last reset time. With the channel selected using the **Increment** or **Decrement** keys, select CHANNEL 1, CHANNEL 2, or SYSTEM. Reset the value to zero by pressing the **Clear** key. The Master Switch must be in the OFF position.

Figure 93

Accumulators Screen - Operate Mode

ACCUMULATORS	
CHANNEL 1	
8.2	AC
83.4	GAL
CHANNEL 2	
4.0	AC
800	LBS
SYSTEM	
12.2 AC	
25 OCT 00	APP
12:12:PM	3



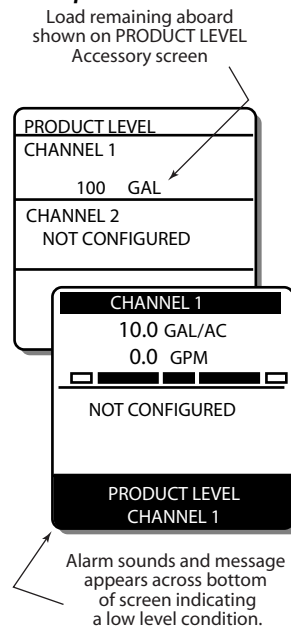
PRODUCT LEVEL SCREEN (IF ENABLED)

Enabling the product level feature adds one additional screen to OPERATE mode. Accessing this screen is the same as all other OPERATE screens by successively pressing the **Operate** key. The PRODUCT LEVEL feature is enabled on the **Configuration** screen of SYSTEM mode and operating parameters are entered in SETUP mode.

1. To view the product level remaining aboard, press the **Operate** key several times to display the **Product Level** screen. The channel is identified and the product remaining aboard is shown (refer to [Figure 94](#)). During product dispersal, the value on the display will decrease as material is dispersed.
2. After loading the product, select the channel and press the CLEAR key to reset the value to represent a typical full load (RESET LEVEL entered in the Setup Mode).
3. During field operation, monitor the **Primary Operate** screen in a normal fashion. When the load is depleted to the alarm level, the alarm will sound and a PRODUCT LEVEL alarm message will appear across the bottom of the display to alert of the load status (refer to [Figure 96](#)). The alarm can be acknowledged by pressing the **Enter** key. The alarm will repeat again if the Master Switch is cycled OFF and then ON.

Figure 94

Monitoring Product Level - Operate Mode



ALARM HISTORY SCREEN

1. Press the **Operate** key once more (or as many times as required) to advance to the **Alarm History** screen. This screen displays the recorded history of alarms occurring over a period of time (since last reset). Each time an alarm occurs, the new record is inserted at the top of the list. The older alarms are pushed downward. The numbers at the left do not move; number 1 always remains on top. When the screen



becomes full, the **Decrement** key will scroll the data upward on the screen to allow viewing of the older alarms. Each key depression will result in a short beep and one line movement upward of the screen. When the scrolling pushes the last line of data up and can no longer move higher, the next key depression will emit a long beep (indicating the end). Up to 30 messages are stored. After that, the oldest message is automatically dumped from the bottom of the list making room for the next error message at the top. The small circle to the left of the number indicates the activity of the alarm. If the circle is filled in, the alarm is still active (refer to [Figure 95](#)). An unfilled circle indicates the alarm condition has been cleared



2. Return to the **Primary Operate** screen in one of two ways:
 - Press the **Enter** key at any time, or
 - Press the **Operate** key at any time.

Figure 95

Alarm History Screen - Operate Mode

ALARM HISTORY	
●1	ALARM: 230 VALVE FULL OPEN CHANNEL 1 10:45: AM 8 OCT
○2	ALARM: 110 CHANNEL 2 NOT RESPONDING 3:45: PM 6 OCT
○3	ALARM: 500 MASTER IN AUTO TURN OFF 9:18: AM 6 OCT



Increment key



Decrement key



Up and Down Arrow keys



INCREASE/DECREASE TARGET APPLICATION RATE

Application rates are raised or lowered by preprogrammed amounts without having to stop the vehicle.

1. Select a channel using the **Increment** or **Decrement** keys. The channel label at the top of the screen must be highlighted.
2. To increase the application rate, press the **Up Arrow** key. A "+" sign will appear after the target rate to indicate the original programmed value is increased (if channel is selected). Repeated key depressions increase the value by the same incremental value. Press the **Down Arrow** key to decrement the value lower. When the target rate decreases below the original value, a "-" sign appears. By returning the application rate to the original value, the plus or minus signs will disappear.
3. To return quickly to the original value, press the **Clear** key. A + or – behind the application rate indicates the value has been changed.



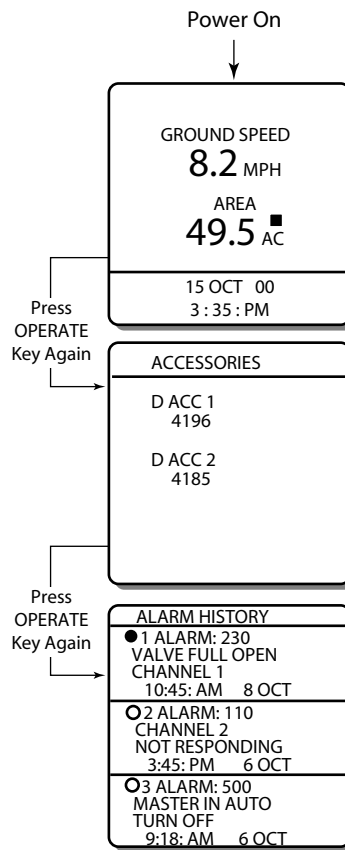
SPEED/AREA MONITOR MODE (OPERATE KEY)

The SPEED/AREA MONITOR mode is selected from SYSTEM mode. When operating in SPEED/AREA mode, the primary screen displays ground speed, area, and the correct date and time as illustrated in [Figure 96](#).

The Master Switch module retains its function to start and stop area accumulation in the same manner as before. The **Accessories** screen and the **Alarm History** screen are accessed by pressing the **Operate** key a second and a third time. Accessories will display if any remain connected.

Figure 96

Speed/Area Mode - Operate Mode





USING APPLICATION LIBRARY

If the current application has been saved or loaded, its application library number appears under APP on the bottom right hand corner of the **Accumulators** screen. Until an application has been saved or loaded, this space will remain blank (refer to [Figure 97](#)).

Figure 97

Accumulators Screen Showing Application Library Number

ACCUMULATORS	
CHANNEL 1	
18.2	AC
145.4	GAL
CHANNEL 2	
4.0	AC
800	LBS
SYSTEM	
12.2 AC	
5 OCT 00	APP
12:12:PM	2

Indicates Application Library number in use. If Application is not saved, number is blank.

PRODUCT FLOW STATUS INDICATOR

When the Master Switch is switched from AUTO to OFF during product application in a flow-based system, the displayed Target Rate text size reduces to indicate the OFF state. If the control valve in any drive type does not close properly and maintains a flow of greater than 2%, the Target Rate continues to display the reduced text size, but the value drops to reflect the actual flow. This feature is used for monitoring the control valve in the return or sparge line of the sprayer.

When product application is switched OFF on the Master Switch in a pressure-based control system, after 2 seconds, the set Target Rate continues to display but the pressure readout changes to 0.0, even if product pressure remains on the sensor.



Figure 98

Target Rate Changes On/Off State

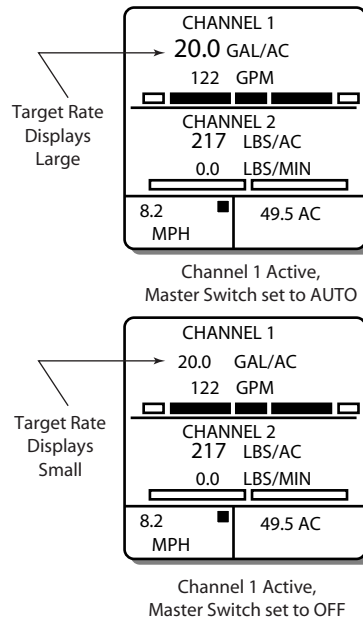
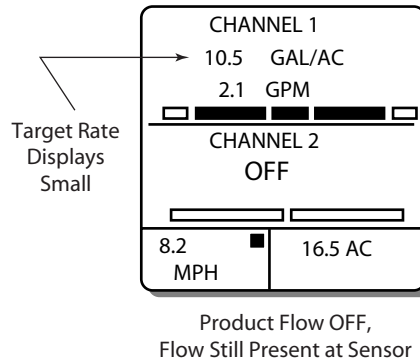


Figure 99

Target Rate Indicating Excessive Flow Rate



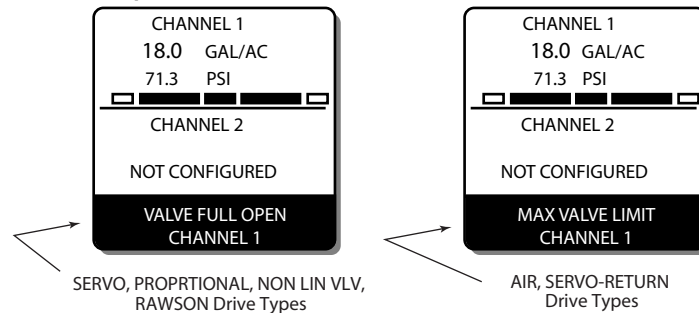


VALVE FULL OPEN ALARM CONDITION

When configured for AIR or SERVO-RETURN valve drive types, Land Manager will display MAX VALVE LIMIT CHANNEL (number) if the valve reaches its maximum position. A VALVE FULL OPEN CHANNEL (number) warning message displays for the same condition when configured for SERVO, PROPORTIONAL, NON LIN VLV, or RAWSON.

Figure 100

Valve Full Open Indicators



MANUAL MODE OPERATION

When SYSTEM OVERRIDES on the **Service** screen of SYSTEM mode is selected, two manual operational conditions are available: GROUND SPEED and VALVE POSITION.

When using the manual GROUND SPEED, the system will substitute an internally generated ground speed signal instead of using the signal from a ground speed sensor. That speed will be displayed as a fixed rate on the screen and does not vary with actual ground speed. In other words, the system will perform as if the Master Switch is locked in the MANUAL position. This selection is normally chosen if the ground speed sensor fails or for stationary operation. The area accumulators do not function in this mode.

When using the VALVE POSITION option (not available for anhydrous ammonia), the control valve can be opened and closed manually using the **Up** and **Down Arrow** keys when the Master Switch in the ON position.

Turning the Master Switch to OFF also closes the valve. When the Master Switch is OFF, MANUAL displays on the Target Rate line (refer to [Figure 101](#)). Material accumulation is not functional in this mode. When the Master Switch is ON, the target line on the screen displays in small text size to indicate that Land Manager is operating in the MANUAL mode.

The displayed value is calculated from the application rate based on current ground speed and feedback sensor readings.

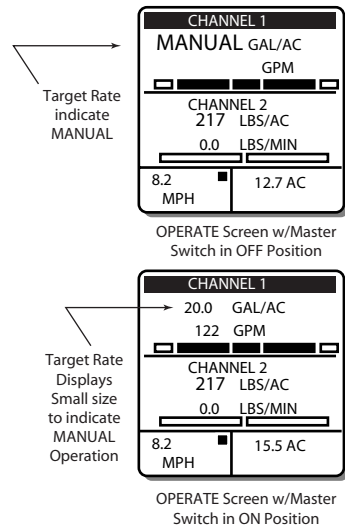


Up and Down Arrow keys



Figure 101

Manual Mode Screens





TROUBLESHOOTING

SELF-TEST ERROR MESSAGES

All self-tests must successfully pass at startup before the system will become operational. A self-test failure will appear on the display with an error message. Other types of errors show error messages as listed below.

Two types of self-test errors can occur during start-up. The more serious type will cause the alarm to sound continually and cannot be cleared. The proper action for this type of error is to shut the system down and obtain technical assistance.

A second type of error causing an alarm can be cleared. Operation may be able to continue but with unpredictable results. Try powering down and starting again. If the problem persists, obtain technical assistance.

OPERATIONAL ERRORS (CORRECTABLE)

Correctable errors are caused by incorrect settings or a component on the applicator system has failed. The following lists the error messages encountered with the cause of each.

TYPE 1 ERROR - 100 THRU 199 SERIES - SYSTEM CRITICAL

Shutdown all systems.

- Alarm 110 - CONTROL NOT RESPONDING CHANNEL (NO.)
- Alarm 170 - MASTER SWITCH ERROR
- Alarm 181 - LOW VOLTAGE ALARM
- Alarm 182 - HIGH VOLTAGE ALARM
- Alarm 185 - TANK FILL FLOW ERROR
- Alarm 186 - PUMP MODULE FAILURE

TYPE 2 ERROR - 200 THRU 299 SERIES - ERROR HAS OCCURRED.

Corrective action should be taken by operator.

- Alarm 200 - BOOM SECTION NOT ENABLED
- Alarm 230 - VALVE IS FULL OPEN CHANNEL (NO.)
- Alarm 240 - MAX SHAFT SPEED CHANNEL (NO.)
- Alarm 250 - CHECK HYDRAULIC DRIVE CHANNEL (NO.)
- Alarm 260 - MAX VALVE LIMIT CHANNEL (NO.)
- Alarm 280 - RS-232 SERIAL BUS ERROR



TYPE 3 ERROR - 300 THRU 399 SERIES - REMINDER

- Alarm 310 - PRESSURE OUT OF RANGE CHANNEL (NO.)
- Alarm 340 - REMOTE CONTROL LOST
- Alarm 360 - ACCESSORY: (Label for accessory) OUT OF RANGE ALARM
- Alarm 365 - ACCESSORY: (Label for accessory)
- Alarm 370 - PRODUCT LEVEL CHANNEL (NO.)

TYPE 4 ERROR - 400 - ALTERNATE FUNCTION ACTIVE

- Alarm 410 - MINIMUM GROUND SPEED OVERRIDE IS ACTIVE

TYPE 5 ERROR - 500 THRU 599 SERIES - SYSTEM DISABLED.

- Alarm 500 - MASTER IN AUTO TURN OFF
- Alarm 510 - SYSTEM TIMEOUT CYCLE MASTER SWITCH

TYPE 6 ERROR - 600 THRU 699 SERIES - SYSTEM FAILURE.

Restart system to see if error failure clears. If it cannot be cleared after several attempts, record all the information on the screen and then call DICKEY-john Service for assistance.

- Alarm 635 - MEMORY READ ERROR
- Alarm 640 - MEMORY WRITE VERIFY ERROR
- Alarm 650 - UNEXPECTED INTERRUPT NUMBER
- Alarm 660 - WATCHDOG TIMEOUT BY TASK (No.)
- Alarm 670 - STACK OVER FLOW
- Alarm 680 - ALARM LOG CORRUPT
- Alarm 690 - VIDEO MEMORY ERROR



COMMON OPERATOR PROBLEMS

ISSUE	PROBABLE CAUSE	CORRECTIVE ACTION
Console will not turn on.	<ol style="list-style-type: none"> 1. Base fuse or no battery voltage. 2. Battery terminal corrosion 	<ol style="list-style-type: none"> 1. Check fuses first and then the battery voltage to the display console. 2. Clean battery connections.
Alarm sounds but display is dark	<ol style="list-style-type: none"> 1. Contrast of display is too dark. 	<ol style="list-style-type: none"> 1. Adjust the contrast of the display.
Alarm sounds continuously but does not sound normal.	<ol style="list-style-type: none"> 1. Vehicle battery is low. 	<ol style="list-style-type: none"> 1. Check battery voltage to the display console.
Application continues even after power is turned off.	<ol style="list-style-type: none"> 1. Display console has lost communication with system control devices. 2. Broken wire or bad actuator valve. 	<ol style="list-style-type: none"> 1. Manually shut everything down and power back on. 2. Manually shut everything down and check all connections. Try operating another channel to see if problem persists. Check for faulty cabling or bad sensor/ actuator.
Alarm sounds (beep)	<ol style="list-style-type: none"> 1. Normal alarm condition for application error (valve wide open). 2. Master switch module is in the AUTO or MANUAL position and control valve is wide open. 3. Master switch module was left in the AUTO position after the vehicle came to a stop and the shutdown time has elapsed. 	<ol style="list-style-type: none"> 1. Reduce ground speed. If condition persists, check valve for missing or faulty components. 2. Check feedback sensor or reduce speed. 3. Turn off the switch on the module.
Alarm sounds and the display indicates an application error while driving.	<ol style="list-style-type: none"> 1. Console doesn't see the correct application rate for the driving speed. 	<ol style="list-style-type: none"> 1. Lower driving speed. Check the application rate entered in Setup mode.
System does not run in Auto.	<ol style="list-style-type: none"> 1. Vehicle must be moving for the system to run in Auto. 	<ol style="list-style-type: none"> 1. Check to see if Land Manager is operating in Manual. 2. Check for adequate hydraulic oil flow. 3. Check for a blown fuse to the actuator power input.
Alarm beeps and display indicates an application error.	<ol style="list-style-type: none"> 1. Control valve may be wide open. 2. Blockage is caused by something other than the system or control valve. 3. Manual or electric valves are closed. 4. Tank empty or faulty pump. 	<ol style="list-style-type: none"> 1. Check control valve. 2. Check for blockage. 3. Check manual or electric valves. 4. Check tank and/or pump.
Ground speed is incorrect.	<ol style="list-style-type: none"> 1. Low ground speed or zero ground speed. 	<ol style="list-style-type: none"> 1. Check for an incorrect constant or a faulty ground speed sensor.





APPENDIX A

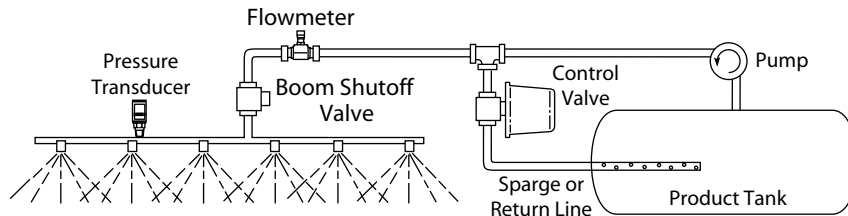
DRIVE TYPE DESCRIPTIONS

The following describe each drive type available for liquid and granular systems. During CHANNEL CONFIGURATION, select the VALVE DRIVE TYPE that matches your system. Types appearing on the channel configuration screen are system dependent.

- SERVO – Selected for most systems using a standard servo valve.
- PROPORTIONAL – Selected for a PWM Proportional Hydraulic valve.
- NON LIN VLV – Nonlinear Valve drive type is selected for a PWM Proportional Hydraulic valve exhibiting nonlinear flow characteristics. A valve with nonlinear flow characteristics can cause excessive oscillation in the system at specific flow rates. Performing an AUTO GAIN with this drive type allows Land Manager to compensate for nonlinear flow properties of the valve. Be sure to follow the installation instructions included with the PWM valve.
- SERVO-RETURN – This type is selected for a servo type flow valve installed in the return or sparge line of a sprayer system (refer to [Figure 102](#)).

Figure 102

Return Line Installation For Sprayer System



During installation of a servo return valve, the valve assembly must be in the OPEN position when the actuator is placed on the valve body as shown in [Figure 103](#). If using a 2-inch or 3-inch butterfly valve, remove the four bolts at the bottom of the actuator and rotate until the coupling post are in the position shown in [Figure 104](#).

Place the round molded coupling on the coupling posts of the valve assembly. Reinstall the actuator by aligning the coupling posts of the actuator 90 degrees from the valve assembly coupling posts (refer to Installation Instructions). Performing an AUTO GAIN with this drive type compensates for the different flow characteristics of the servo valve operating in the return line.

- AIR – This type is chosen for an air style "pinch" valve installed in the return or sparge line of the sprayer system (refer to [Figure 43](#)). Performing an AUTO GAIN allows Land Manager to compensate for the flow characteristics of the air-type valve in the return line.
- RAWSON – This drive type is selected for a Rawson valve installed on the system. To use this valve, the Rawson Valve Adapter must be



installed according to the Installation Instruction provided with the adapter. Performing an AUTO GAIN allows Land Manager to compensate for the flow characteristics of the Rawson Valve.

Figure 103

Ball Valve In Open Position

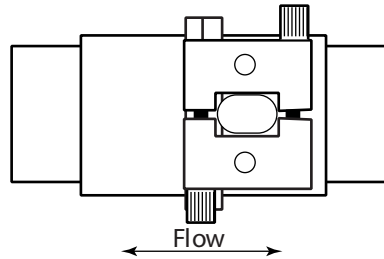
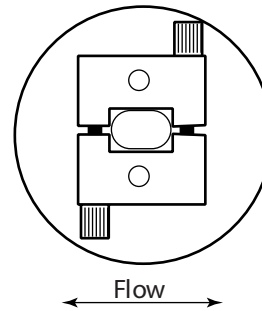


Figure 104

Butterfly Valve In Open Position





APPENDIX B

INTERFACING TO AN EXTERNAL CONTROLLER

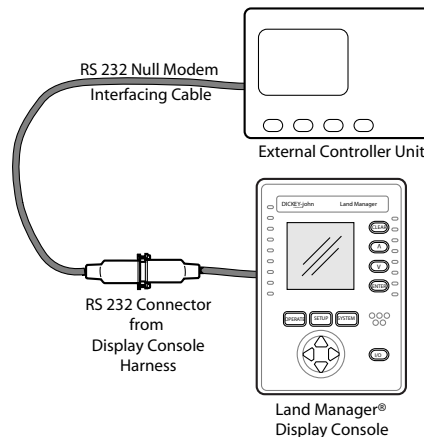
By using special computing type equipment, Land Manager can automatically receive instructions from a remote controlling system to produce special application results. A controlling device for special application equipment can interface and communicate with Land Manager through proper RS-232 port configuration between the two units. When connected in this fashion, Land Manager responds to the commands from the controlling device and returns status and application information to complete system communications.

INTERFACING REQUIREMENTS

- An RS-232 cable connects between the remote controller and the Land Manager console for communication purposes. Land Manager is cable ready via the Display Console harness (refer to [Figure 105](#)).
- Land Manager is a DTE device. If the controller is also a DTE device, a null modem cable or null modem adaptor must be used to complete proper communications between the units. If Land Manager is connected to a DCE device, the null modem adaptor is not required.

Figure 105

Interfacing To An External Controlling Unit



PREPARING FOR OPERATION

- Land Manager must be configured and all sensors calibrated for normal operation before allowing the controlling unit to take charge.
- The controlling unit must be set up according to its operating manual.
- The Serial port baud rate of Land Manager must match the baud rate of the controlling unit. Typically, the baud rate is set to 9600 but can be higher.



TRANSFERRING CONTROL

To make operation available to the remote controller apply power to the Land Manager. After power is applied, the controller issues commands to regulate the application rate.

OPERATING DIFFERENCES

- After communications are established between the two units, an "R" will appear in the upper right corner of the display (in the system information box) on the display console. If for any reason communications fail, the alarm will sound and the "R" will disappear. An alarm message will also appear on the display.
- Use of the Master Switch module continues to function in the standard fashion. In the AUTO position, the system will operate normally for product application and in the OFF position, application will cease.
- The INC/DEC and Channel ON/OFF functions are disabled while the controller is in charge. These functions are transferred to the controlling unit.

CHANGING LAND MANAGER CONFIGURATION

- If SYSTEM mode is entered to make changes to the configuration, the remote controller should be turned off to avoid any possible conflicts or interaction between units.
- In order to operate Land Manager in a normal fashion (without the controller unit), simply turn off the remote controller power and proceed as usual. The Land Manager will issue an alarm with a message stating communication between the two units is lost. To clear the error, press the **Enter** key and proceed.

GPS APPLICATION DATA LOGGING MODE

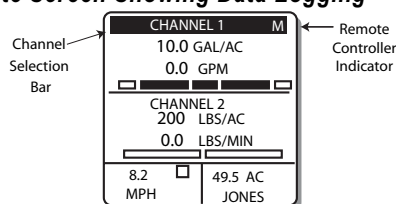
The data logging mode is an additional function performed by the GPS controller interfacing device. The interfacing to the GPS device remains the same as above. This mode monitors the application data (on the go) from Land Manager to the GPS controller for recording and mapping.

OPERATING ADDITIONS

- The GPS Controller device enters a monitoring mode and establishes communications with Land Manager. After completing the link, an "M" will appear in the upper right corner of the display console screen during OPERATE mode (refer to [Figure 106](#)).
- All operating functions of Land Manager remain normal while the GPS unit records actual application rates and changes during operation.

Figure 106

Operate Screen Showing Data Logging





APPENDIX C

Land Manager System Summary Sheet

System Statistics Entry	
Owner Name	_____
Date of Setup	_____
Software Revision	_____
Display Console Serial Number	_____

Gnd Spd Parameters	Values
Speed Sensor	_____
Constant	_____
Manual Speed	_____
Minimum Override	_____
Shut Off Speed	_____
Shut Off Delay	_____
Input Filter	_____

Configuration Summary		
Parameter	Ch1	Ch2
Channel Label	_____	_____
Channel Type	_____	_____
Drive Type	_____	_____
Drive Frequency	_____	_____
Valve Locking (Liq)	_____	_____
Input Filter	_____	_____
Drag Belt	_____	_____
Pres Sensr Range	_____	_____
Pressure Offset	_____	_____
K-Factor	_____	_____
Density	_____	_____
Tank Press	_____	_____
Application Rate	_____	_____
Spreader Constant	_____	_____
Nozzle Constant	_____	_____
Nozzle Pressure	_____	_____

Configuration Summary		
Parameter	Ch1	Ch2
Use Density of (NH ₃)	_____	_____
Inc/Dec	_____	_____
Minimum Rate	_____	_____
Maximum Rate	_____	_____
System Gain	_____	_____
Channel Response	_____	_____
Channel Boost	_____	_____
Pulse Gain	_____	_____
Delay Cycles	_____	_____
Start Cycles	_____	_____
Time Constant	_____	_____
Min Valve Drive	_____	_____
Max Valve Drive	_____	_____
Product Level	_____	_____
Reset Level	_____	_____
Alarm Level	_____	_____

* Parameters above are not used for any given channel configuration. Some will remain blank.

Boom Configuration		
Parameter	Ch1	Ch2
Type	_____	_____
Boom Shutoff	_____	_____
Max Width	_____	_____

Boom Configuration							
Section Number	Boom Number	Standard/Fence Row	Nozzle Ratio	12V On/Off	Number of Nozzles	Nozzles Spacing	Width
1	_____	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____	_____	_____
5	_____	_____	_____	_____	_____	_____	_____
6	_____	_____	_____	_____	_____	_____	_____
7	_____	_____	_____	_____	_____	_____	_____
8	_____	_____	_____	_____	_____	_____	_____
9	_____	_____	_____	_____	_____	_____	_____
10	_____	_____	_____	_____	_____	_____	_____



Land Manager System Summary Sheet

System Statistics Entry	
Owner Name	_____
Date of Setup	_____
Software Revision	_____
Display Console Serial Number	_____

Gnd Spd Parameters	Values
Speed Sensor	_____
Constant	_____
Manual Speed	_____
Minimum Override	_____
Shut Off Speed	_____
Shut Off Delay	_____
Input Filter	_____

Configuration Summary		
Parameter	Ch1	Ch2
Channel Label	_____	_____
Channel Type	_____	_____
Drive Type	_____	_____
Drive Frequency	_____	_____
Valve Locking (Liq)	_____	_____
Input Filter	_____	_____
Drag Belt	_____	_____
Pres Sensr Range	_____	_____
Pressure Offset	_____	_____
K-Factor	_____	_____
Density	_____	_____
Tank Press	_____	_____
Application Rate	_____	_____
Spreader Constant	_____	_____
Nozzle Constant	_____	_____
Nozzle Pressure	_____	_____

Configuration Summary		
Parameter	Ch1	Ch2
Use Density of (NH ₃)	_____	_____
Inc/Dec	_____	_____
Minimum Rate	_____	_____
Maximum Rate	_____	_____
System Gain	_____	_____
Channel Response	_____	_____
Channel Boost	_____	_____
Pulse Gain	_____	_____
Delay Cycles	_____	_____
Start Cycles	_____	_____
Time Constant	_____	_____
Min Valve Drive	_____	_____
Max Valve Drive	_____	_____
Product Level	_____	_____
Reset Level	_____	_____
Alarm Level	_____	_____

* Parameters above are not used for any given channel configuration. Some will remain blank.

Boom Configuration		
Parameter	Ch1	Ch2
Type	_____	_____
Boom Shutoff	_____	_____
Max Width	_____	_____

Boom Configuration							
Section Number	Boom Number	Standard/ Fence Row	Nozzle Ratio	12V On/Off	Number of Nozzles	Nozzles Spacing	Width
1	_____	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____	_____	_____
5	_____	_____	_____	_____	_____	_____	_____
6	_____	_____	_____	_____	_____	_____	_____
7	_____	_____	_____	_____	_____	_____	_____
8	_____	_____	_____	_____	_____	_____	_____
9	_____	_____	_____	_____	_____	_____	_____
10	_____	_____	_____	_____	_____	_____	_____



APPENDIX D

SYSTEM CAPACITY CONSIDERATIONS

Below recommendations provide information to help increase the maximum flow rate of the applicator system. There are two different types of heat exchangers sold by DICKEY-John:

1. Continental Super Flow (Table 1 refers to NH³ flow rates that can be achieved using a Super Flow System.
2. Thermal Transfer Unit (TTU) (Table 2 refers to NH³ flow rates that can be achieved using a thermal transfer unit.

CONTINENTAL SUPER FLOW

The Continental Super Flow Assembly system allows for faster runs at lower tank pressures. The system can attain flow rates up to 9,600 lbs/hr. It contains standard 1 1/4 inch plumbing and is compatible with the N-Serve nitrogen stabilizer. It features interchangeable orificed hose barbs for constant 2% or less vapor bleed off.

To ensure the highest possible flow rates, your applicator plumbing must be sized properly. The following is a guideline for transfer of NH₃ from the nurse tank to the applicator.

Table 1 (Super Flow System)

Lbs/Hour	Plumbing Size
0 - 3,600	1 inch feed line and breakaway
3,600 - 6,800	1 1/4 inch feed line and breakaway
6,800 and up	1 1/2 inch feel line and breakaway

THERMAL TRANSFER UNIT

The control console, control valve, and flow meter are capable of handling liquid anhydrous ammonia flow rates in excess of 7200 lbs/hr.

Table 2, derived from field test data, provides a general guide in determining overall system capacity when using the Thermal Transfer Unit exchanger.

Table 2 (Thermal Transfer Unit)

Lbs of NH ₃	System Requirements
up to 6800	<ol style="list-style-type: none"> 1. Two nurse tanks, 1 inch plumbing or larger. 2. Applicator plumbing, 1 1/4 inch or larger. 3. Two thermal transfer units.
up to 5400	<ol style="list-style-type: none"> 1. Two nurse tanks, 1 inch plumbing or larger. 2. Applicator plumbing, 1 1/4 inch or larger. 3. One thermal transfer unit.
up to 4200	<ol style="list-style-type: none"> 1. One nurse tank, 1 inch plumbing or larger. 2. Applicator plumbing, 1 1/4 inch or larger. 3. One thermal transfer unit.



- Data given for nurse tank pressure of 120 psi. Flow rate values at 60 psi should be reduced by approximately one third.
- One inch plumbing may be suitable for lower flow rate requirements.
- Plumbing size and tank pressure determine maximum flow rates. Increased or decreased hose size and/or increased or decreased tank pressure will effect maximum flow rates.

NH₃ SYSTEM FLOW RATES

All maximum flow rates listed are at 110 psi tank pressure. To account for application in cold conditions where tank pressures will be significantly lower, use the following conversion when sizing an NH₃ system. Approximately 1/3 of the total system capacity is lost at one half of the tank pressure.

Example: 42.5 ft x 6 mph x 200 lbs. NH₃ x 0.1212 = 6181 lbs/hr

6181 lbs/hr x 1.335 = 8251 lbs/hr

Based on the calculation above, you would need a system with at least 8251 lbs/hr capacity to put on the required amount at 55 psi tank pressure or in this instance, a Continental Super Flow system rated at 9600 lbs/hr maximum flow rate.

OPERATING PRINCIPLES

The flow based control system will accurately control the application of NH₃ as long as liquid NH₃ is flowing through the flow meter. As illustrated in (Figure 3), vapor bubbles are formed in the liquid as it leaves the nurse tank. This vaporization occurs as a result of the pressure loss required to push liquid NH₃ out of the nurse tank. Furthermore, any pressure losses between the tank and the flow metering point can only generate more vapor.

The Heat Exchanger Unit, inserted just before the flow meter, transfers heat from the warmer incoming liquid-vapor mix to the cooler outgoing liquid-vapor mix. This heat transfer allows incoming vapor to cool and condense into liquid, thus providing a pure liquid flow to be metered.

In practice, doubling flow rate will increase the volume of vapor generated by factors of 4 to 8 times. This means 4 to 8 times more thermal capacity is needed from the thermal transfer unit.

In terms of cost and size, this is not an overly desirable solution. It is far more cost effective to minimize the generation of vapor before the material reaches the thermal transfer unit and flowmeter. The following recommendations address this issue.

RECOMMENDATIONS

1. Use 1 1/4 inch or larger hoses, pipe fittings, and valves between the nurse tank and the thermal transfer unit.
2. Do not coil up excess supply hoses; use only the lengths required.
3. Use 1 1/4 inch or larger breakaway couplers.
4. Do not use elbows if a straight coupler can be used.
5. Keep any filter screens in the system cleaned.



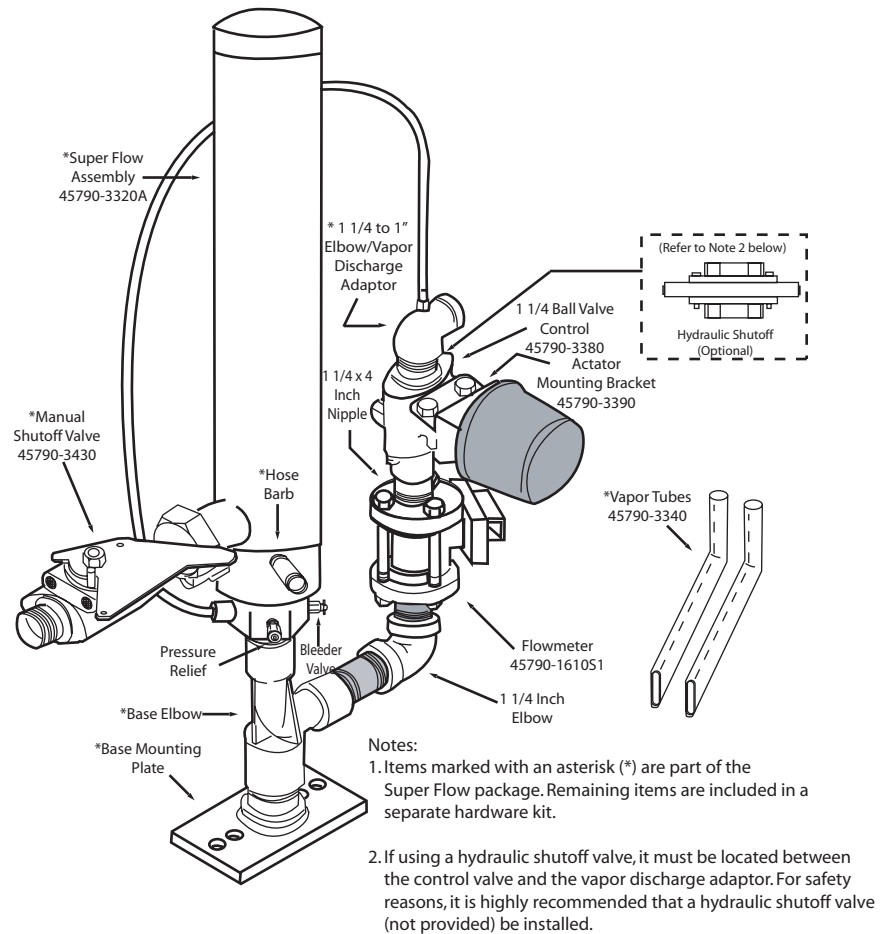
NOTE: Manifolds typically require 10 psi or greater to provide uniform distribution.

6. Provide adequately sized downstream plumbing to prevent excessive manifold pressure.
7. Fill the center hole of the heat exchanger unit with fiberglass insulation.
8. If an old flow regulator is left in the system, be certain that it is full open.
9. Do not expect all nurse tanks to work equally.
10. Keep knife injector tubes from plugging.
11. Replace collapsed, soft, or kinked hoses.
12. When two nurse tanks are used, tee the feed hoses together just before the heat exchanger unit.
13. Nurse tanks with temperatures above air temperature will provide greater flow rates than those with temperatures below air temperature.

⚠ WARNING

Use a 1 1/4 inch breakaway coupler for each feed hose.

Figure 107
Super Flow Assembly





Dealers have the responsibility of calling to the attention of their customers the following warranty prior to acceptance of an order from their customer for any DICKEY-john product.

DICKEY-john® WARRANTY

DICKEY-john warrants to the original purchaser for use that, if any part of the product proves to be defective in material or workmanship within one year from date of original installation, and is returned to DICKEY-john within 30 days after such defect is discovered, DICKEY-john will (at our option) either replace or repair said part. This warranty does not apply to damage resulting from misuse, neglect, accident, or improper installation or maintenance; any expenses or liability for repairs made by outside parties without DICKEY-john's written consent; damage to any associated equipment; or lost profits or special damages. Said part will not be considered defective if it substantially fulfills the performance expectations. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. DICKEY-john neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part and will not be liable for consequential damages. Purchaser accepts these terms and warranty limitations unless the product is returned within fifteen days for full refund of purchase price.

**For DICKEY-john Service Department, call
1-800-637-3302 in either the U.S.A. or Canada**



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