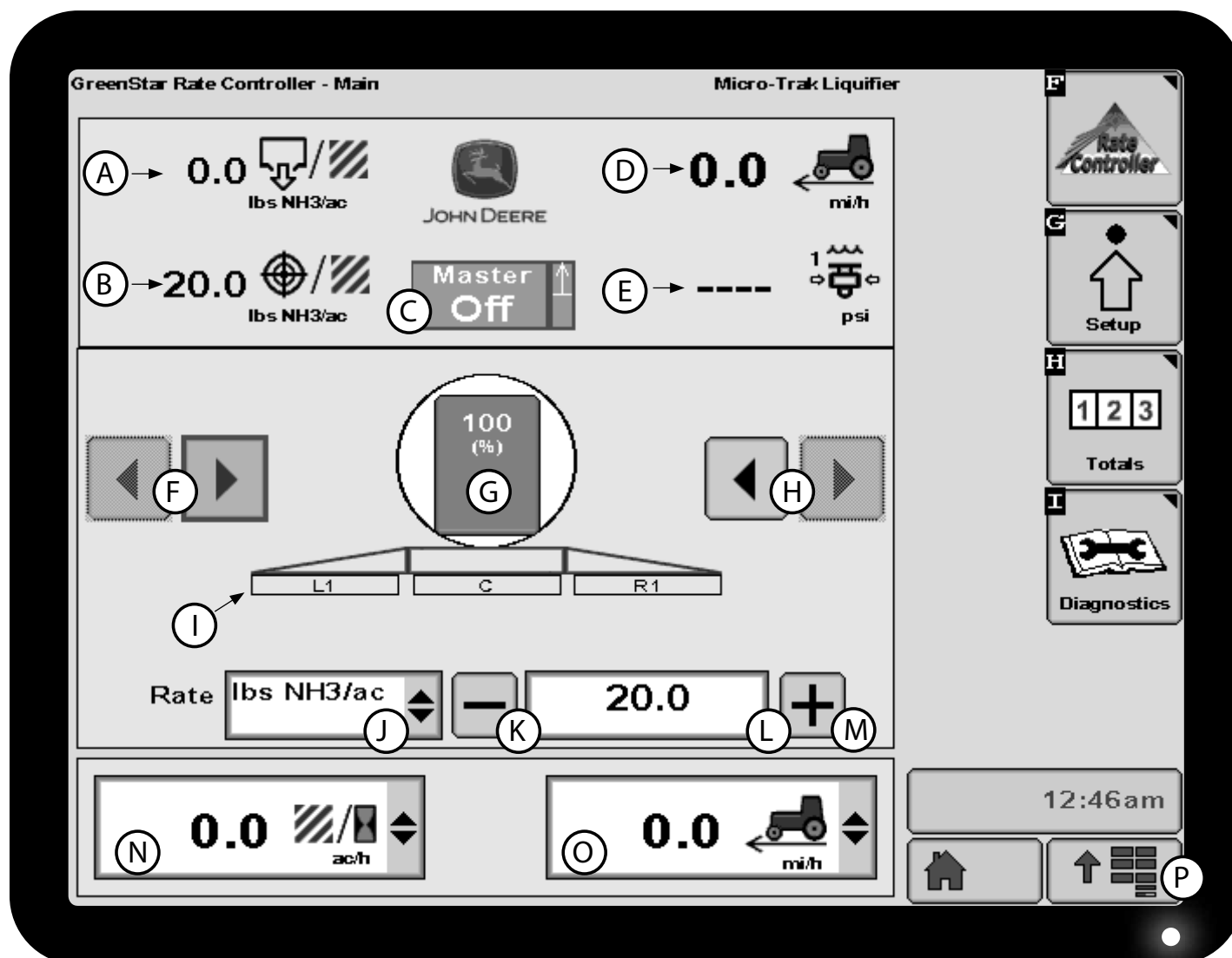
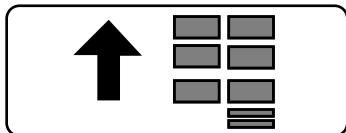


## GreenStar Rate Controller Main Page



- |  |                                     |
|--|-------------------------------------|
| A — Actual Rate of NH3 Application                                     | I — Implement Sections              |
| B — Target Rate of NH3 Application                                     | J — Rate Selection Drop-Down Menu   |
| C — Master Switch Indicator  | K — Rate Decrease                   |
| D — Travel Speed   | L — Defined Rate of NH3 Application |
| E — Pressure (Will show flow/min. if no pressure sensor is configured) | M — Rate Increase                   |
| F — Left Section On/Off Buttons  | N — Information Drop-Down Menu      |
| G — Estimated Volume of Tank Remaining/Tank Refill                     | O — Information Drop-Down Menu      |
| H — Right Section On/Off Buttons                                       | P — Menu Button                     |

1. Select the menu button



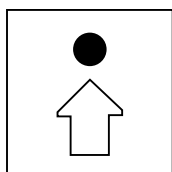
2. Then select the GreenStar™ Rate Controller button.



Each GreenStar™ Rate Controller will be identified by the controller serial number and implement name once the setup procedure has been completed.

NOTE: The GreenStar™ Rate Controller icon will appear upon power up after the harness is installed and the GreenStar™ Rate Controller is connected.

1. Select Setup menu button to enter GreenStar™ Rate Controller setup.



NOTE: Master switch must be off to change most settings or values.

2. Select the Implement tab (A) to enter implement setup.

- A - Implement Tab
- B - Systems Tab
- C - Alarms Tab
- D - Rates Tab
- E - Implement Type Drop Down Menu
- F - Implement Name Drop Down Menu
- G - New Button
- H - Rename Button
- I - Remove Button
- J - Implement Section Widths
- K - Implement Width Input Box
- L - Setup Sections Button
- M- Associated Switchbox Switch Numbers
- N - Disable Rate Controller Check Box

NOTE: Switchbox switch numbers (M) will only be available if a switchbox is connected.

3. Select NH3 Tool from the Implement Type drop-down menu (A).

The screenshot shows a software interface for NH3 application setup. It features two drop-down menus and four buttons. The first drop-down menu, labeled 'Implement', has 'NH3 Tool' selected and is marked with a circled 'A'. The second drop-down menu, labeled 'Implement Name', has 'Micro-Trak Liquifier' selected and is marked with a circled 'B'. Below these menus are four buttons: 'New' (marked with a circled 'C'), 'Rename' (marked with a circled 'D'), 'Remove' (marked with a circled 'E'), and 'Disable This GRC' (marked with a circled 'F'). A legend box on the right side of the interface provides the following definitions:

- A - Implement Type Drop-Down Menu
- B - Implement Name Drop-Down Menu
- C - New Button
- D - Rename Button
- E - Remove Button
- F - Disable Rate Controller Check Box

4. Select Implement Name from Implement Name drop-down menu (B).

**If no name has been added yet:**

- Select new.
- Type new name on keypad.
- Select enter.

**If name needs to be revised:**

- Select implement name to be revised from drop-down.
- Select rename.
- Type new name on keypad.
- Select enter.

**If equipment name is no longer needed:**

- Select implement name to be deleted from drop-down.
- Select remove and accept pop-up notification.

NOTE: If GreenStar™ Rate Controller will not be used but will remain connected, check Disable this GRC check box to eliminate connection to display for Documentation, Swath Control, and controller warnings.

NOTE: A maximum of three implement configurations/ names may be saved per controller.

NOTE: Rename does not affect System tab, Alarm tab, and Rates tab previously configured. Existing calibrations remain valid.

NOTE: Implement name must be defined before the System tab, Alarm tab, and Rates tab are enabled.

## Section Setup - Choose Equal or Variable

### Equal section width:

1. Begin by selecting Setup Section box (D).
2. Enter Initial implement width into the implement Width input box. The width entered is equally distributed among the sections.

If implement sections are different widths or associated switches are different, select setup sections button and follow on screen instructions (see below).

NOTE: It is recommended that the section valve type be determined prior to completing section setup.

NOTE: Switchbox information will be hidden when no switchbox is connected.

Section	Width (ft)
1	10.00
2	10.00
3	10.00

- A - Implement Section Widths
- B - Associated Switchbox Switch Numbers
- C - Implement Width Input Box
- D - Setup Sections Button

### Variable section width:

1. Enter number of sections (A).
2. Select page forward (C).
3. Enter each individual section width (D) and associated switch box number (E).
4. Select page forward (C) to complete setup.

Section	Width
1	10.00
2	10.00
3	10.00

Section	Width
1	10.00
2	10.00
3	10.00

- A - Number of Sections Input Box
- B - Cancel Button
- C - Next Page Button
- D - Width of Section Input Box
- E - Switchbox Switch Association Drop-Down Menu
- F - Previous Page Button

# Setup Height Switch CAN Message (if applicable)

NH3

1. Select Send Status, Receive Status, or Do Not Share.

If using GreenStar™ Rate Controllers in a Multi-Product configuration, a single height switch can be shared among multiple GreenStar™ Rate Controllers.

The height switch must be connected to one GreenStar™ Rate Controller and that GreenStar™ Rate Controller must be configured to SEND the height switch status to the other GreenStar™ Rate Controllers.

Each additional GreenStar™ Rate Controller must be configured to RECEIVE the height switch status.

There is an additional option of DO NOT SHARE that can be used if multiple height switches are desired in the application or operating with a single GreenStar™ Rate Controller.

A

→ Height Switch

☒

Do Not Share

B

▼

Do Not Share	C
Send Status	D
Receive Status	E
Do Not Share	▼

- A - Height Switch Check Box
- B - Height Switch Message Drop-down Menu
- C - Do Not Share
- D - Send Status
- E - Receive Status

## System Setup

Implement

System

Alarms

Rates

Control Valve Type

Fast Close

E

Control Valve Calibration

433

F

Tank Capacity (gal)

1450

G

Tank Capacity Displayed

%

H

Tank Capacity Units

gal

I

Flowmeter Calibration

73

J

Flowmeter Units

gal

K

Calibrate Flowmeter

L

Pressure 1 Sensor

☒

2

N

Calibrate Pressure Sensor

O

- A - Implement Tab
- B - System Tab
- C - Alarms Tab
- D - Rates Tab
- E - Control Valve Type Menu
- F - Control Valve Calibration Input Box
- G - Tank Capacity Input Box
- H - Tank Capacity % Box
- I - Tank Capacity Units Box
- J - Flowmeter Calibration Input Box
- K - Flowmeter Units Drop-Down Menu
- L - Calibrate Flowmeter Button
- M - Pressure Sensor 1 Enable/Disable
- N - Pressure Sensor 2 Enable/Disable
- O - Calibrate Pressure Sensor Button

Valve Settings

CAUTION: Selecting the wrong valve type may result in valves opening unexpectedly. To avoid injury from exposure to chemicals, verify the correct valve is selected. Selecting the wrong valve type may result in unexpected behavior and degraded performance. Review control valve types before moving GreenStar™ Rate Controller between implements.

1. Select Fast Control Valve type from the drop-down menu (A) for Micro-Trak® Liquifier™ Kit.

Control Valve Type

Fast

A

Valve Types

Standard	Used for slower speed servo control valves, typically > 5 seconds from full open to full close. •Typically not used for Micro-Trak® Servo Valves
Fast Close	Uses one control valve to control the application rate and shuts off the product flow when in "HOLD" or all sections are off. Typically used with: <ul style="list-style-type: none"><li>• Micro-Trak® Hydraulic Servo valves when wanting pump to stop when all sections off, or ZERO target rate.</li><li>• positive displacement pumps.</li></ul>
Fast	Uses one control valve to control the application rate and a separate shutoff valve(s) shuts off the product flow when in "HOLD" or all sections are off. <ul style="list-style-type: none"><li>• Typically used with Micro-Trak® Servo Valve, liquid or hydraulic.</li></ul>

2. Enter **0433** for Micro-Trak® Servo Valve in Control Valve Calibration Value input box (A).
3. Enter maximum volume of tank in Tank Capacity input box (B). Tank capacity range is 0 to 17000 gal.

Control Valve Calibration

433

A

Tank Capacity (gal)

1450

B

Tank Capacity Displayed

%

C

Tank Capacity Units

gal

D

4. Select Tank Capacity displayed units from drop-down menu (C).
5. Select Tank Capacity units from drop-down menu (D).

### Fine-tuning Control Valve Calibration Number for Optimal Performance

- Use recommended values to initially set control valve number.
- Evaluate machine behavior during operation, and if necessary, adjust value to attain optimum system performance.

The Control Valve Calibration number is a 4 digit number used to fine-tune control characteristics.

The number is in the form XYZ, and is defined as follows:

• **XX = Valve Speed**

- The higher this value, the quicker the valve responds. If it is set too high, actual flow rate will oscillate continuously around target rate. If it is set too low, target rate will never be reached.

• **Y = Output Deadband**

- Sets the minimum speed that the valve will ramp down toward before stopping. The higher this value, the sooner the valve will become stationary.

• **Z = Control Deadband**

- Sets how close actual flow rate must be to target rate to be considered acceptable. When actual and target rates are within this range, the valve will remain stationary. A higher value allows for a larger difference between actual and target rate.

NOTE: Look for low variance in the gpm (lpm) operating range that the system applies in the field when completing the Configuration Test.

#### Example of tuning the control valve for optimal response:

If the variance is high (at or near 100%) and the valve response seems sluggish after entering the initial starting value for the control valve and running a configuration test, fine tuning the control valve should improve performance.

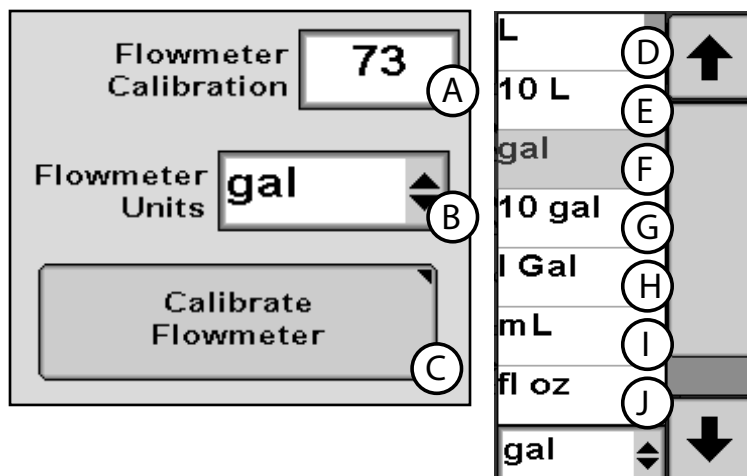
- Raise the valve speed number (first 2 digits) by 10
- Increase the output deadband number (third digit) by 1
- Check for improved performance

Running a nozzle flow check is also a simple way to analyze valve speed and system response.

## Flowmeter Settings

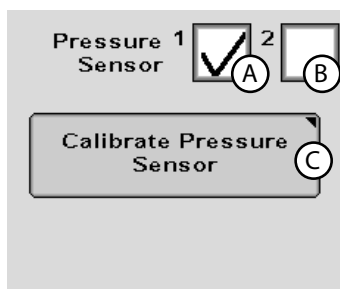
1. Find Pulses per gallon number (A) found on the Flowmeter tag and enter into Flowmeter Calibration Input Box (see screen image on next page). If your Micro-Trak® flowmeter has only a liquid cal. number, divide it by 2 to calculate Pulses per gallon.





- A— Flowmeter Calibration Input Box  
 B— Flowmeter Units Drop-Down Menu  
 C— Calibrate Flowmeter Button  
 D— L (Liter)  
 E— 10 L (10 Liter)  
 F— gal (gallon)  
 G— 10 gal (10 gallon)  
 H— l Gal (Imperial Gallon)  
 I— ml (milliliter)  
 J— fl oz.

2. Select Gallons (F) in Flowmeter Units drop-down menu (B).
  - Calibrate Flowmeter test (C) can be run to find a more accurate flowmeter calibration number (see Calibrate Flowmeter test in the GreenStar™ Rate Controller Manual).
3. Check the pressure sensor box (A) if a sensor is installed. If using more than one pressure sensor, also check the second box (B). Pressure indicator will be displayed on main menu instead of flow rate when pressure sensor box is checked.



- A—Pressure Sensor 1 Enable/Disable Box  
 B—Pressure Sensor 2 Enable/Disable Box  
 C—Calibrate Pressure Sensor Button

4. To calibrate pressure sensor(s), select button (C) and follow on screen instructions. See Test section (GreenStar™ Rate Controller Manual) for details.



## Alarm Setup

1. Select Alarms tab (C) to enter alarm setup.
2. Low tank level, high alarm, low alarm, minimum pressure, and maximum pressure alarms can be toggled on or off via the enable/disable boxes. Define limits by entering values in the boxes.

NOTE: Minimum and Maximum Pressure alarms are disabled if not configured with a pressure sensor.

- A— Implement Tab
- B— System Tab
- C— Alarms Tab
- D— Rates Tab
- E— Low Tank Level Input Box
- F— Low Tank Level Alarm Enable/Disable
- G— High Alarm Input Box
- H— High Alarm Enable/Disable
- I— Low Alarm Input Box
- J— Low Alarm Enable/Disable
- K— Pressure Sensor 1 Min. Pressure Input Box
- L— Pressure Sensor 2 Min. Pressure Input Box
- M— Pressure Sensor 1 Max. Pressure Input Box
- N— Pressure Sensor 2 Max. Pressure Input Box

## Rates Setup

1. Select Rates tab (D) to enter rates setup.
2. Up to three target rates may be defined (A, B, C). Values entered on this page will be available on the home page.
3. Select Rate Smoothing checkbox (E) and enter 5 at Rate Smoothing Input Box (F).

NOTE: When Actual Nitrogen (G) is enabled, the Percent Nitrogen input box will appear. Entering a percent Nitrogen value converts application rates to mass of Nitrogen rather than mass of total product applied.

NOTE: Rate Smoothing (E) shows actual rate as target rate when actual rate is within user defined percentage (F). Rate Smoothing percentage range is 3-15% and defaults to 3%. Micro-Trak® recommends starting at a Rate Smoothing value of 5.

- A— User Rate 1 Input Box
- B— User Rate 2 Input Box
- C— User Rate 3 Input Box
- D— Rates Tab
- E— Rate Smoothing Enable/Disable Box
- F— Rate Smoothing Input Box
- G— Actual Nitrogen Enable/Disable Box
- H— Percent Nitrogen Box

## Control Valve Test Section

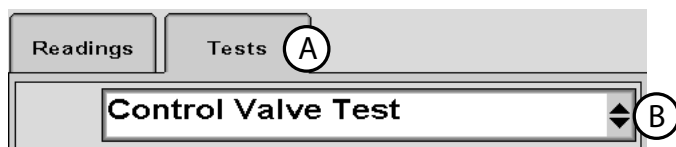
NH3

Testing the system before beginning any fieldwork is extremely important. This will ensure that liquid is applied safely and accurately. Testing the Control Valve will make sure that it is responding correctly to the signals from the GreenStar™ controller.

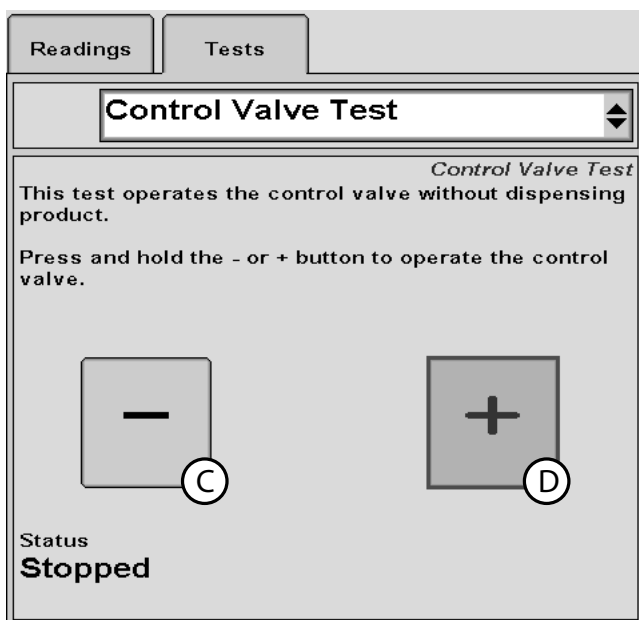
1. Select Diagnostics button on the Main Controller Screen (See page 6).



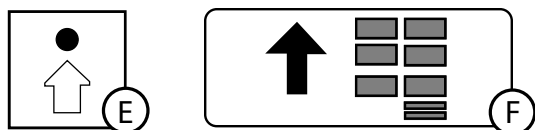
2. Select the Test tab (A) and then select Control Valve Test from the drop-down menu (B).



3. Press and hold the - (C) or + (D) button to operate the control valve without dispensing liquid. Verify visually that the valve is opening and closing properly.



4. Press the Setup button (E) to return to setup menu or press Menu button (F) to return to Main Menu screen.



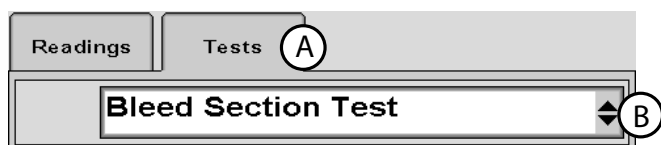
## Section Bleed Test Section

Testing the system before beginning any fieldwork is extremely important. This will ensure that NH3 is applied safely and accurately. Bleeding the Section Valves will make sure they are responding correctly to the signals from the GreenStar™ controller. Caution - this test will release anhydrous ammonia; take all necessary safety precautions to prevent injury.

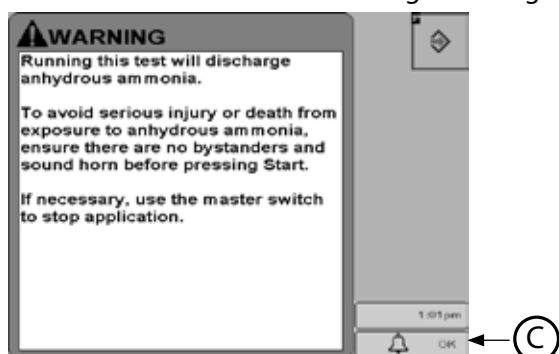
1. Select Diagnostics button on the Main Controller Screen (See page 18).



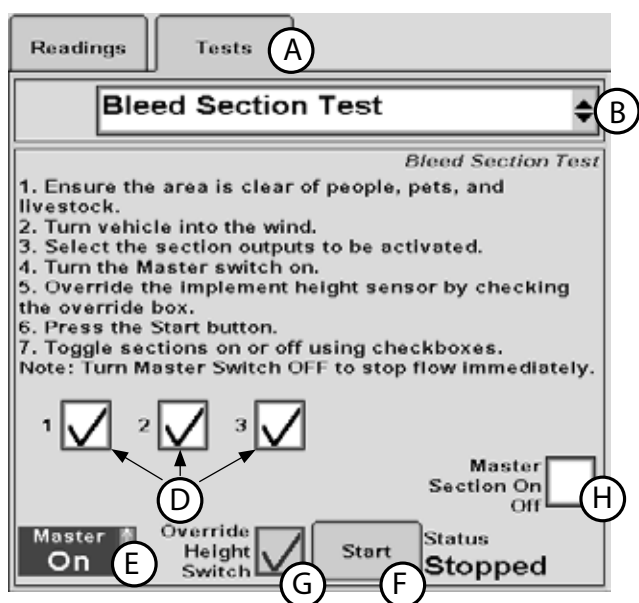
2. Select the Test tab (A) and then select Bleed Section Test from the drop-down menu (B).



3. The controller will show a discharge warning screen (shown below). Press OK (C) to continue.



4. Select any or all numbered section valves (D) to begin test. Turn on Main Master Switch on console. (Master Indicator at lower left of screen (E) will change to Master On). Press Override Height Switch (G) to temporarily disable the implement height sensor. Press Start (F). Toggle sections on and off using checkboxes (D) or Master Section On/Off (H). Verify visually that all valves are opening and closing properly. Return to Setup or Main menu.



- A— Section Test Tab
- B— Test Selection Drop-down Menu
- C— Ok (continue) button (above)
- D— Section On/Off checkboxes
- E— Master Indicator
- F— Test Start button
- G— Override Height Switch checkbox
- H— Master Section On/Off

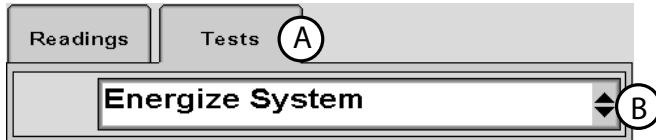
## Energize System Test Section

Testing the system before beginning any fieldwork is extremely important. This will ensure that NH3 is applied safely and accurately. The Energize System Test checks flow at the openers, purges air and vapor from the NH3 delivery system, and fills the cooler and hoses with NH3. Caution - this test will release anhydrous ammonia; take all necessary safety precautions to prevent injury.

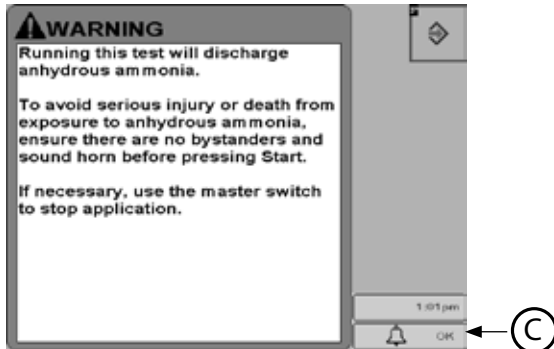
1. Select Diagnostics button on the Main Controller Screen. (See page 18)



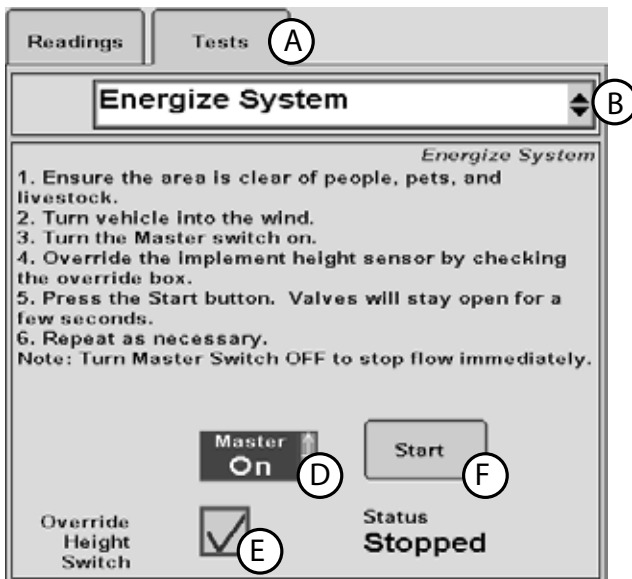
2. Select the Test tab (A) and then select Energize System from the drop-down menu (B).



3. The controller will show a discharge warning screen (shown below). Press OK (C) to continue.



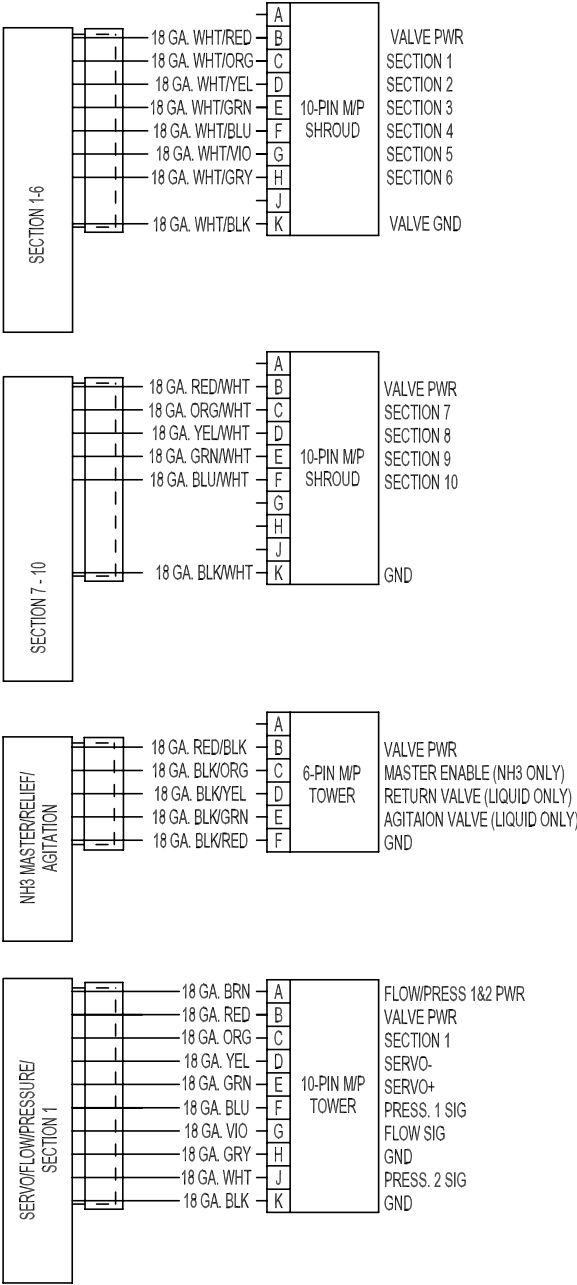
4. Turn vehicle into the wind. Turn on Main Master Switch on console. (Master Indicator at lower center of screen (D) will change to Master On). Press Override Height Switch (E) to temporarily disable the implement height sensor. Press Start (F). Repeat as needed to prepare system for fieldwork. If needed, turn Main Master Switch off to stop flow immediately. Return to Setup or Main menu.



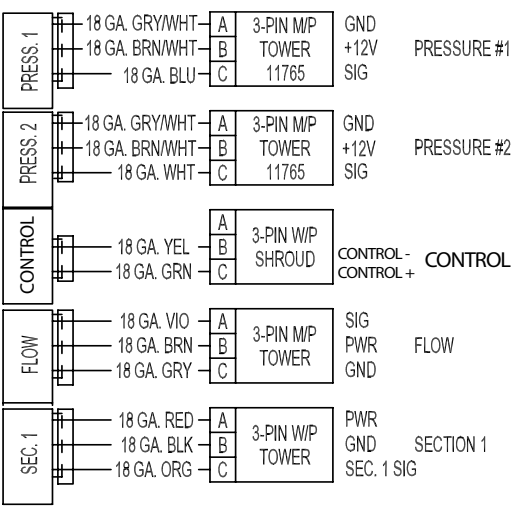
- A— Section Test Tab
- B— Test Selection Drop-down Menu
- C— Ok (continue) button (above)
- D— Master Indicator
- E— Override Height Switch checkbox
- F— Test Start button

Reference - Wiring Diagrams

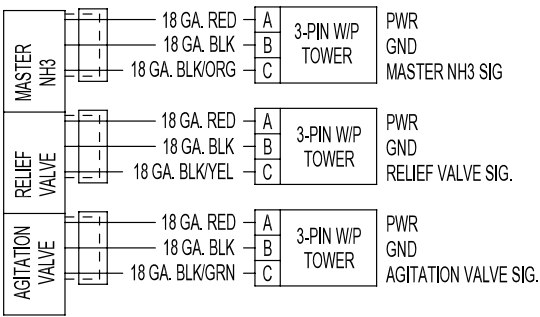
Main Harness - P/N 18456



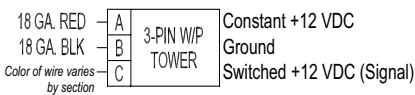
Control/Flow/Section 1 - P/N 18457



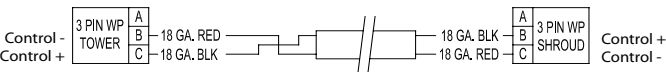
Master NH3/Relief/Agitation - P/N 18458



Section connections - P/Ns 18326 & 18327



Servo Reversal Adapter - P/N 17934



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