FREEDOM SERIES

ACS OPERATORS MANUAL

P/N SG07230013

REVISION C
REV DATE 6-10-08 PWR

Certified Power Inc.

BLOCK DIAGRAM OF THE ACS SYSTEM

CURRENT HARDWARE IMPLEMENTATION

VEHICLE CAN BUS
INTERFACE

AVL SERIAL PORT RS-232

FLASH/FIRMWARE UPDATE
SERIAL PORT RS-232

TERMINATION

10/100 NETWORK WEB SERVER
CONFIGURATION TOOL

LCD
DISPLAY

CAN BUS

(5) .5-4.5 ANALOG
JOYSTICK AXIS INPUT

14 DIGITAL PNP INPUTS

JOYSTICK
CAN
INTERFACE

(5) .5-4.5 ANALOG
JOYSTICK AXIS INPUT

10 DIGITAL PNP INPUTS

(2ND.)
JOYSTICK CAN
INTERFACE

GROUND SPEED (MPH) INPUT
ROAD-WATCH 1 RS-232 INPUT
ROAD-WATCH 3 J1708 INPUT

OPERATOR
PANEL

CAN BUS

(14) 6 AMP PWM OUTPUTS (SOURCING
BATTERY) 0-300hZ.

(14) NPN INPUTS (PULL-TO-GROUND)
(4) PNP INPUTS (PULL-TO-BATTERY)
4-20 mA. PRESSURE SENSOR INPUT

TERMINATION

MASTER
OUTPUT
MODULE

SLAVE
OUTPUT
MODULE

(14) 6 AMP PWM OUTPUTS
(SOURCING BATTERY) 10-300HZ.

BASIC SYSTEM OVERVIEW

TYPICAL STAND-ALONE SPREADER
SYSTEM COMPONENTS

-ACS OPERATOR PANEL

-OPERATOR SWIVEL MOUNT

-DISPLAY SWIVEL MOUNT

-ACS LCD DISPLAY

CAN NETWORK

IGNITION HARNESS

POWER RELAY MODULE

OUTPUT MODULE

OUTPUT MODULE
INSTALLED INTO
HYDRAULIC VALVE
ENCLOSURE

TYPICAL 2-STICK CONTROL CONSOLE
SYSTEM COMPONENTS

-ACS CONTROL ARM

JOYSTICKS &
OPERATOR PANEL
AND AUXILLARY
SWITCHES ARE
INCORPORATED.

-DISPLAY SWIVEL MOUNT

-ACS LCD DISPLAY

CAN NETWORK

IGNITION HARNESS

POWER RELAY MODULE

OUTPUT MODULE

OUTPUT MODULE
INSTALLED INTO
HYDRAULIC VALVE
ENCLOSURE

OPERATOR PANEL INTERFACE

TACTILE SWITCH "BLAST" FOR TEMPORARY OVERRIDE TO HIGH MATERIAL RATE OUTPUT.

ENCODER USED FOR PRE-WET AND ANTI-ICE RATE ADJUSTMENT.

TACTILE SWITCH "PAUSE" FOR STOPPING SPREADER OUTPUT.

TACTILE SWITCH "LIQUID" USED TO ENABLE OR DISABLE EACH LIQUID OUTPUT.

ENCODER "RATE" FOR ADJUSTMENT OF THE SFEEDER

ENCODER "LANE" FOR ADJUSTMENT OF THE SPINNER

BLAST   **PAUSE**

LIQUID

StormGuard

RATE   **LANE**

MODE   **PRODUCT**   **SELECT**

TACTILE SWITCH "MODE" USED FOR CHANGING BETWEEN AUTO-MANUAL-UNLOAD.

TACTILE SWITCH "PRODUCT" USED WHEN CHANGING GRANULAR MATERIAL. Note: There must be no Ground speed signal to change materials.

TACTILE SWITCH "SELECT" USED TO CHANGE THE LIQUID ENCODER AND TACTILE SWITCH FUNCTIONS FROM ONE LIQUID FUNCTION TO ANOTHER. Note: Only used when Pre-Wet and Anti-Ice have been configured together.

DISPLAY PANEL INTERFACE

AMBIENT LIGHT SENSOR (BACKLIGHT CONTROL)

340 X 260 MONOCHROME LCD

-ACS LCD DISPLAY

INCREASE GATE HEIGHT VALUE.

ARROWS USED FOR MENU NAVIGATION.

DECREASE GATE HEIGHT VALUE.

F1 — VIEW ALL CURRENT MESSAGES/ERRORS.

F2 — VIEW REAL-TIME STORM TOTALS.

F3 — MENU KEY TO ACCESS MAIN MENU. (LOG-IN/OUT) (CLEAR STORM TOTALS) (VIEW LOGS)

ESC — "ESC" ESCAPE KEY USED TO BACK OUT OF SCREENS

SYSTEM POWER UP

Switching on the Ignition switch in a typical installation will power the system on. The LCD will display list of data that is being transferred on the CAN bus to the display from the Master module located in the valve enclosure.
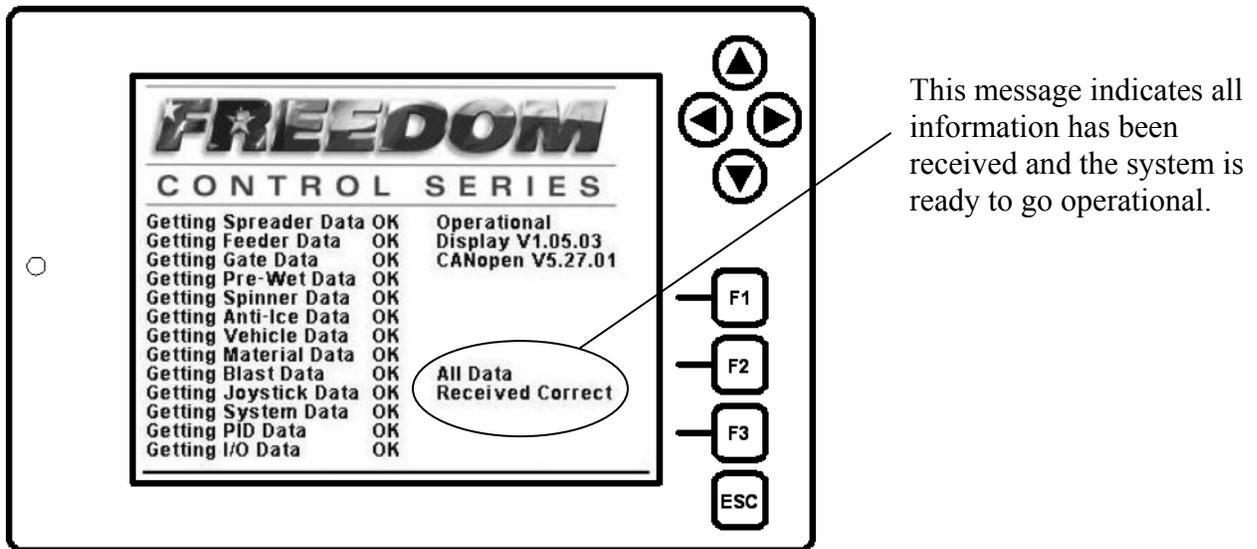
This message indicates all information has been received and the system is ready to go operational.

METRIC MODE

The ACS control can be configured to display metric labels for all measuring units

- When the control is in Metric mode all English labels are converted to metric labels.
- The ACS system cannot be switched between English and Metric display; unit values DO NOT CONVERT between English and metric equivalents. The system will always need to be calibrated under the unit-of-measure it will be operated in.
- Unit label abbreviations are as follows: This applies to ALL setup and operating values. All English units referenced in this manual should be substituted for their metric counterpart as detailed below.

MODE: English		MODE: METRIC
Lb. - Pound US	/	Kg. - Kilogram
Miles	/	Km – Kilometer
T - Ton US	/	MT – Metric Ton
In. - Inch	/	cm - centimeter
Lbs/LnM. - Pounds per Lane Mile	/	Kg/LnKm – Kilogram per Lane Kilometer
Gal/T - Gallons US per ton US	/	L/Kg. - Liters per Kilogram
GPM - Gallons US per minute	/	L/Min. – Liters per minute
MPH - Miles per hour	/	Km/H - Kilometers per hour
Lbs/minute - Pounds per minute	/	Kg/Min. – Kilograms per minute

LOG-ON/OUT

There are (3) 'User' ID's for Log-On: "Administrator" "Technician" and "Operator". We will cover the "Operator" log-on which pertains to the nature of this document.

LOG ON Operator

The screen detailed below is displayed after system boot; if "Log-On" (log-in) is required.

The user must arrow DOWN ▼ then right ▶ into the "User ID" field. Entries must be minimum of (1) and maximum of (10) alpha or numeric characters to Log-On. press F3 (to Accept) the entry. If the operation is successful the main operating screen will appear

LOG-OUT "Operator"

The user must arrow DOWN ▼ then press F3 key to log-out

- The ESC key can be used to "escape" back to operating mode at anytime BEFORE pressing the F3 key to log-out. Once logged out the escape key CANNOT be used to get back into operating mode.

The "Operator" ALWAYS has the ability to log-out, however the following rules apply for logging back on:

- If the system has been configured by the Administrator to require login, the Operator (User) must always enter his/her user ID into the field.
- If the system has been configured to NOT require an ID then the Operator (User) can enter his/her user ID or not. However it is necessary to arrow down to the "User ID" box and press F3 "Accept"

EXAMPLE OPERATING SCREENS
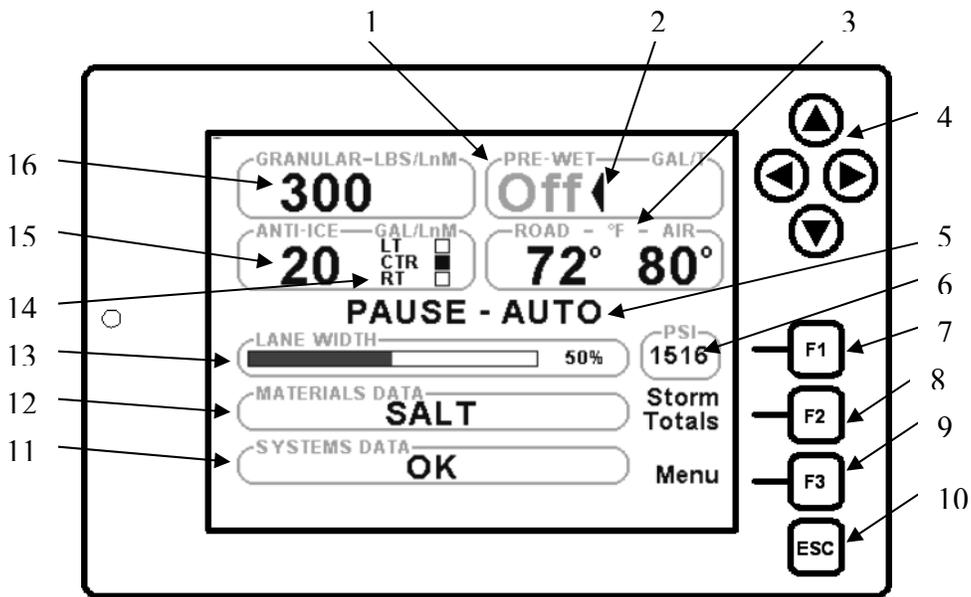
GRANULAR + BOTH LIQUIDS; operating screen showing one active channel. The current active granular material "Salt" is displayed. Spinner is at 50% output. Pre-wet and Anti-Ice are off.

1. *Pre-wet rate* in "OFF" mode. Rate can be changed if Operator panel "Liquid" knob is turned.
2. *Select arrow*. The Operator panel "Select" switch and Liquid knob are dedicated to the Pre-wet while the arrow is in the Pre-wet box. The Operator panel "Select" switch can be used to move the arrow to the Anti-Ice box if Anti-Ice operation is required or a rate change must be made.
3. *Road/Air temperature* read-out. To be used with Road-Air temperature sensors.
4. *Arrow keys*. Used to move through menus but also used for Gate height adjust if using variable height gate.
5. *Pause indicator* Spreader functions are suspended. *Modes*: Auto/Manual/Unload.
6. *Main Hydraulic Pressure* read-out. 0-3000 PSI.
7. *F1 key* can be pressed to display current errors and messages if any are available to view.
8. *F2 key* can be pressed to view real-time storm totals.
9. *F3 key* can be pressed to gain entry to the *log-out* menu
10. *Esc. key* can always be used to "escape" or back-up out of any of the other function key menus.
11. *Systems Data window*. Used to display critical errors or message.
12. *Materials Data window*. Used to display the current selected Granular material.
13. *Spinner Lane percent*. Displays current Spinner motor percent of operation.
14. *Active lanes* (ANTI-ICE). Displays Anti-Ice lanes or Booms that will activate when Anti-ice is enabled.
15. *Anti-Ice rate* in "OFF" mode. Rate can be changed if Operator panel "Liquid" knob is turned while the select arrow is within the Anti-Ice box.
16. *Granular Rate* in Lbs/LnM (LBS/ Lane Mile.) Granular rate can be changed at anytime by turning the "RATE" knob.
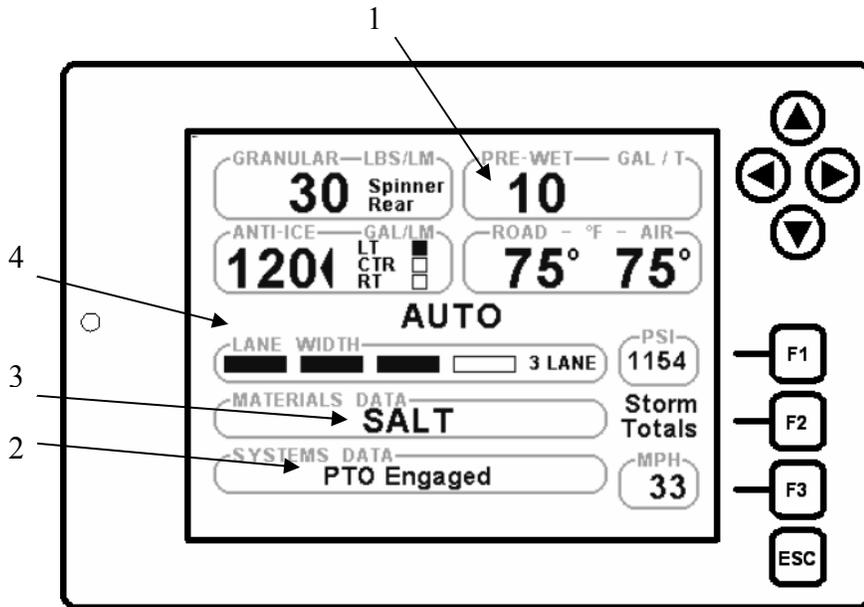
GRANULAR + BOTH LIQUIDS IN AUTO; operating screen showing 4 channels active. Road-watch and Pressure transducer displaying data.

1. Pre-wet active showing a rate of 10Gal/Ton. Text is bold black instead of Gray to show it is active.
2. PTO engagement is shown in Systems Data box.
3. Salt is displayed as the active granular material.
4. Lane mode is active. 3 lanes times 30 LBS/(L)ane-(M)ile indicate a current feeder output totaling 90 LBS per mile.

OPERATING MODES AUTO-MANUAL-UNLOAD

- (3) Possible modes of Spreader operation

MODE KEY

OPERATOR PANEL MODE KEY

AUTO → PRECISE CONTROL OF MATERIAL BASED ON VEHICLE SPEED.

MANUAL → 0-100% CONTROL OF MATERIAL OUTPUT

UNLOAD → USED TO UNLOAD TRUCK. MUST NOT EXCEED 5 MPH ELSE UNLOAD IS CANCELED.
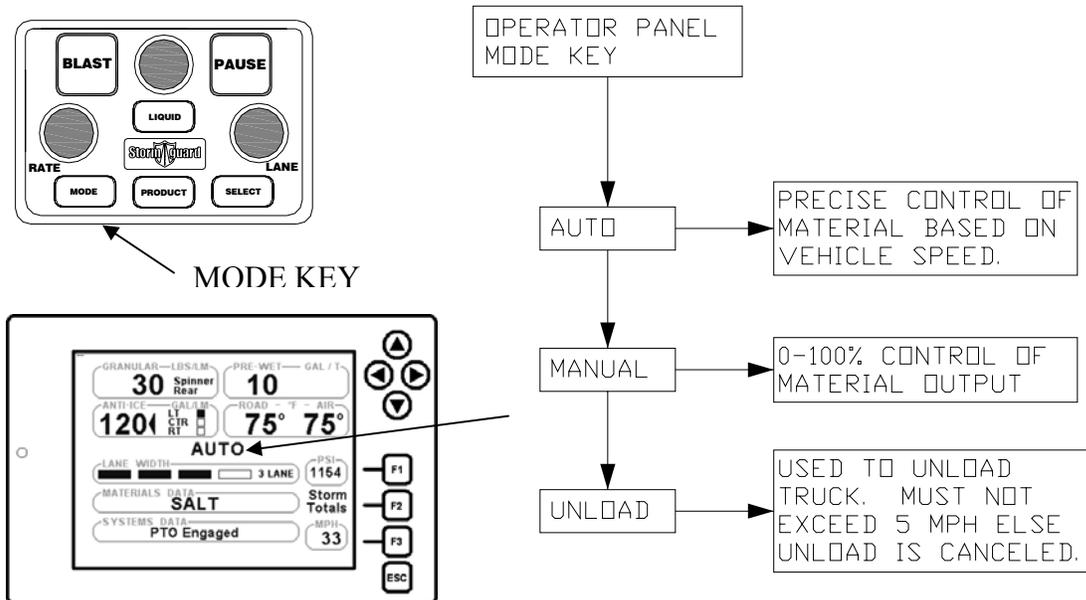
SELECTING A MATERIAL

- SELECT MATERIAL: Press the Operator panel Product key to select your loaded materials. The materials are loaded and calibrated by the Systems supervisor.

```
VEHICLE MUST BE
STOPPED (NO
'MPH' DISPLAY)
```

```
EACH
KEY
PRESS
SELECTS
THE
NEXT
MATERIAL
IN THE
LIST.
```

```
PRESS "PRODUCT"
KEY ON OPERATOR
PANEL
```

PRODUCT KEY

SALT	MATERIAL 1
SAND	MATERIAL 2
50/50	MATERIAL 3
CINDERS	MATERIAL 6
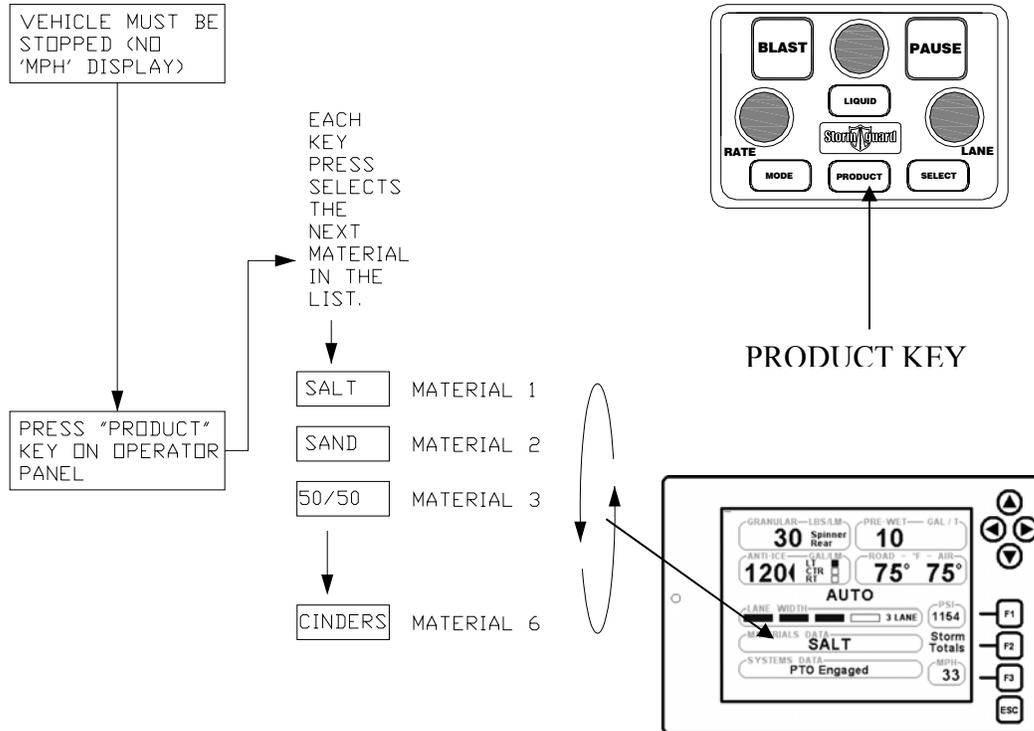
SETTING GRANULAR RATE (Auto Mode)

- TARGET RATE: Turn knob clockwise or counter clock-wise to set desired rate LBS/LnM (POUNDS per LANE MILE) (shown on display). Note: Pound Increment steps are set by the systems supervisor during the setup process.

GRANULAR
RATE LBS/LnM

```
OPERATOR
PANEL
ENCODERS
(KNOBS)
```

DECREASE RATE   INCREASE RATE
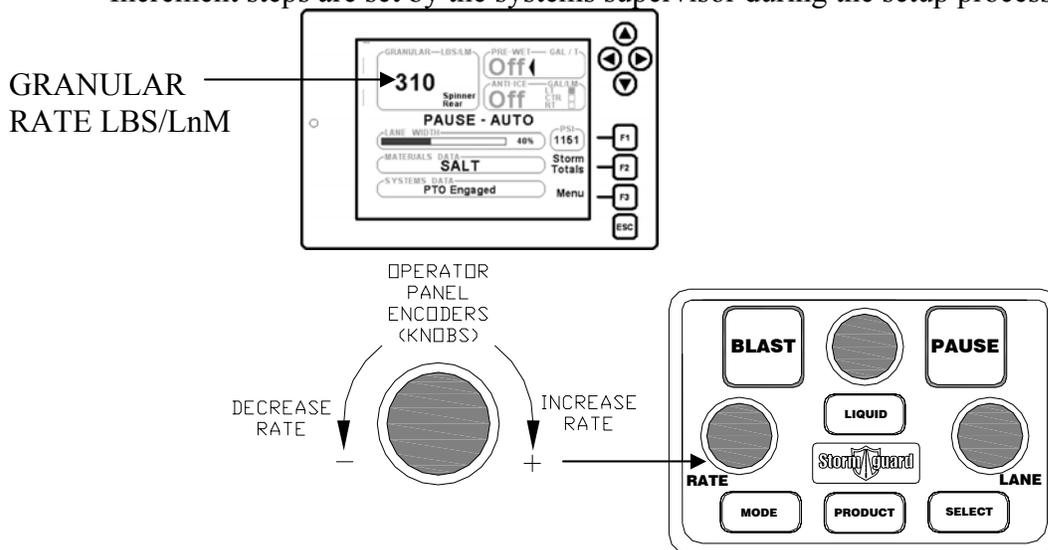
SPINNER MODES OF OPERATION.

1. Using Percent % mode spinner.
- PERCENT CONTROL SPINNER: You have 0-100% control over the speed of the spinner.
    - o Feeder operates independent of Spinner: Granular FEED IS NOT ADJUSTED for changes in the spinner LANE WIDTH.
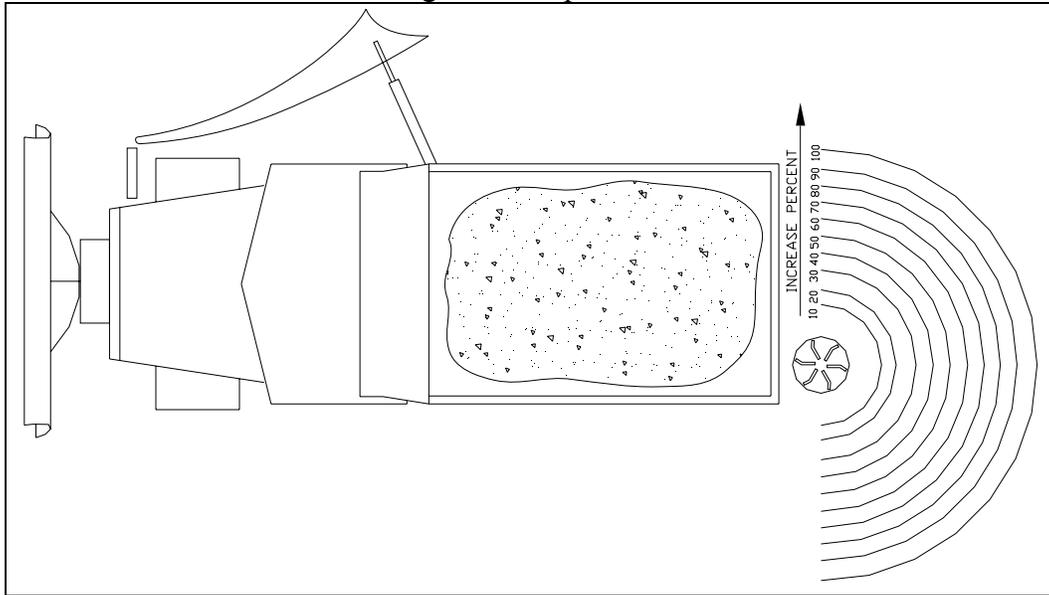
Percent mode spinner shown. Operator has control of spinner speed 0-100% of trim.
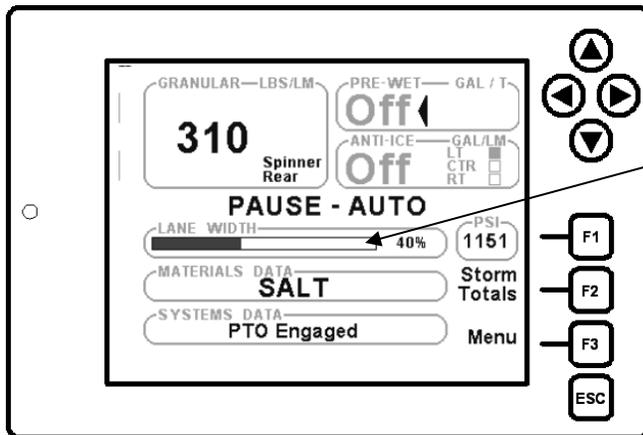
Lane width BAR SCALE 0-100%
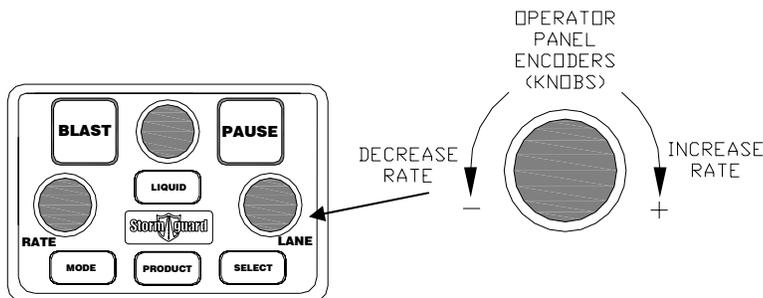
Adjust the knob until the Spinner is throwing the material to the desired width. View the Spinner Speed percent % of Trim on the LCD screen.

2. Using Lane mode Spinner.
- LANE CONTROL SPINNER: Lanes have been pre-calibrated for you. You simply choose 1-2-3 or 4 lanes. (Max number of lanes is set by your systems supervisor during setup)
  - The Feeder is controlled by the spinner in 'LANE' mode: Granular feed Lbs./LnM (Pounds per Lane-Mile) is automatically adjusted for your selected lane width to maintain uniform coverage for your set Granular rate.
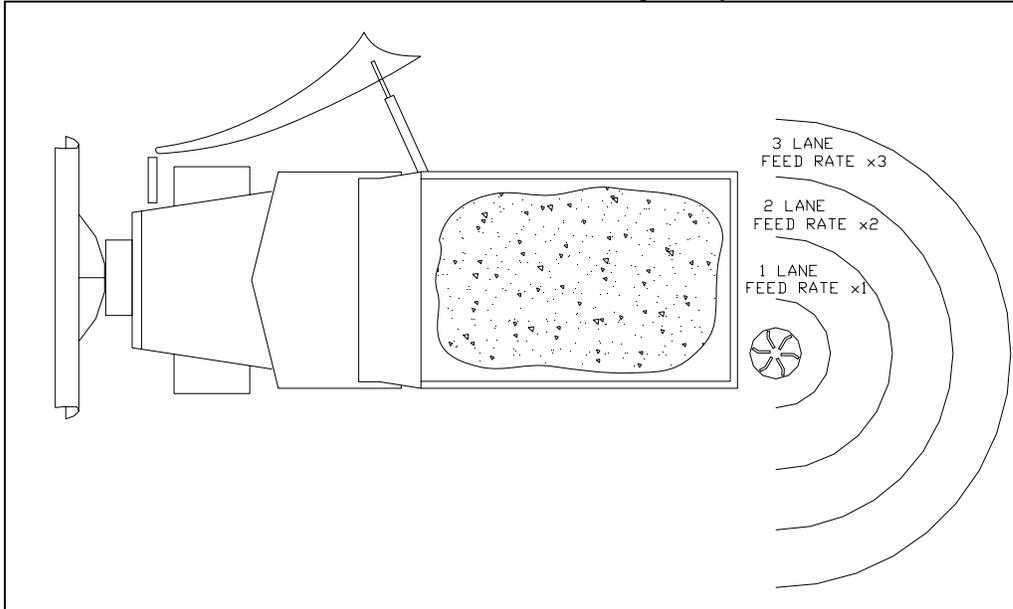
Lane control spinner shown. Operator selects how many lanes. Spinner motor speed is pre-calibrated for 1,2, 3, or 4 lanes.
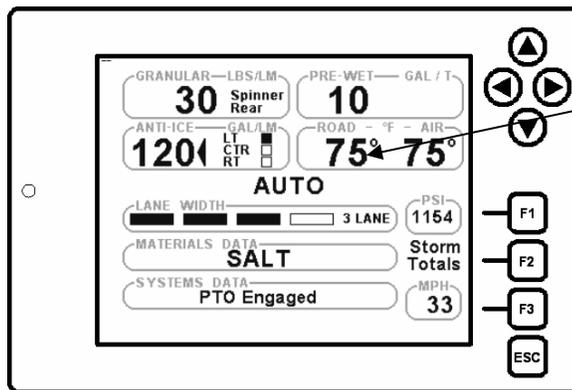
1 BAR = 1 LANE
2 BARS = 2 LANES
3 BARS = 3 LANES
4 BARS = 4 LANES
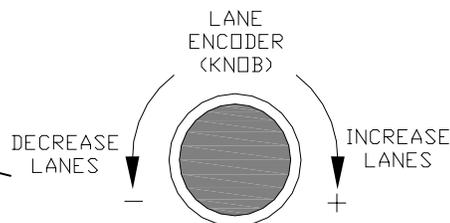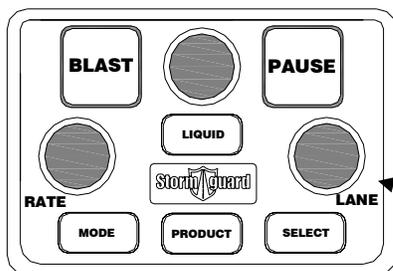
3. Using Zero-Velocity Spinner
- You must have a Zero Velocity Spinner installed and calibrated to use Zero-Velocity mode.

Basic theory of operation **:**
- Material being distributed to the road surface is accelerated at a speed equal to the current vehicle speed in Miles Per hour or [Kilometer per hour *metric mode*] but, in opposite direction to which the vehicle is traveling, therefore canceling material velocity in relation to the road surface.
  - o As material contacts the road surface it will not tumble and scatter therefore it's possible to place material in an exact location such as on the crown of the road reducing the amount of wasted material that tumbles to areas of little usefulness.

Operating Zero velocity in AUTOMATIC MODE
- The ZV Spinner speed is automatically controlled based on Vehicle MPH.
  - o Operators shouldn't have to adjust spinner speed unless environmental factors, shoot angle or other unusual conditions require adjustment.
  - o The Operator has the ability to increase or decrease spinner speed in relation to the speed of the vehicle.
  - o When the vehicle stops the spinner stops (unless configured is setup to run.)
  - o When the control is put into "PAUSE" the Spinner stops.

Operating screen and Operator panel controls

Spinner in "Zero Velocity" mode.

Material Velocity in ACTUAL MPH

The Cursor moves as the spinner knob is rotated.

NOTE: During typical operation the vehicle speed should match Spinner Zero-velocity speed while the cursor is in the cal box.

The box in the center denotes the calibrated position.
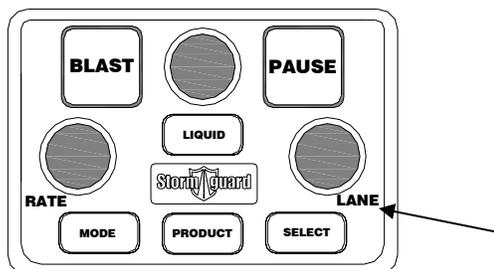
Turning LANE knob clock-wise increases velocity and moves the cursor out of the cal box to the right. Note: Material velocity is 28 MPH. compared to the vehicle speed of 26 MPH.

Operating panel

Turning the LANE knob counter-clockwise moves the bar to the left away from the cal box decreasing velocity.

ZERO VELOCITY SPINNER IN MANUAL CONTROL CONTINUED ON NEXT PG.

Zero Velocity in Manual mode
- When in Manual control or UNLOAD mode of operation, 0-100% control of Spinner speed is available for total control of material velocity leaving the spreader. Current material Velocity in MPH (KmH) is always displayed.
- The Spinner bar graph replaces the Spinner cursor viewed in 'AUTO'giving visual feedback about current Spinner drive % of output.

Control in Manual or Unload as shown below.

Spinner bar shows output at approximately 5%

Material Velocity displayed
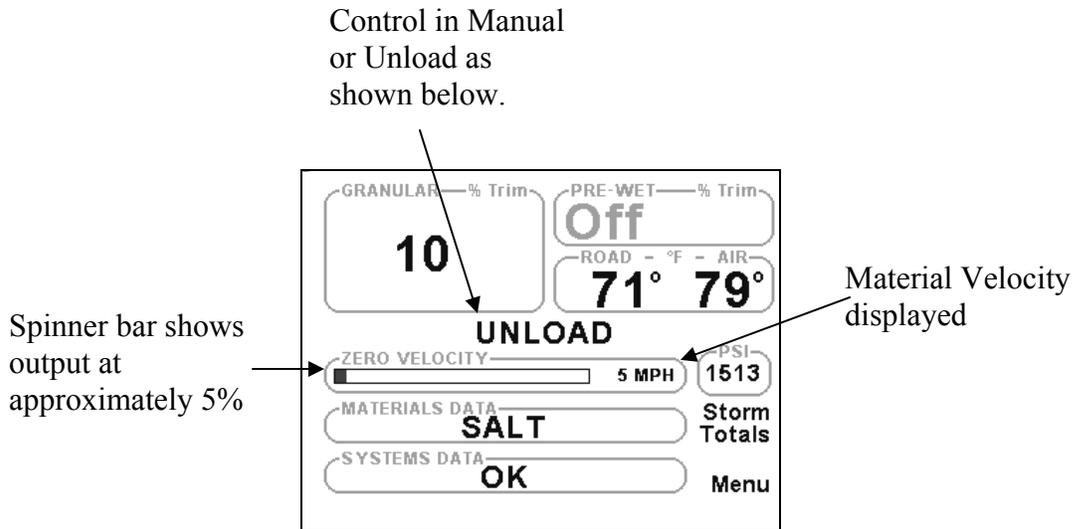
TAKING THE CONTROL OUT OF PAUSE

!!CAUTION!! The outputs are active when the control is out of PAUSE. Be sure all personnel are clear of the mechanism and vehicle.
- REMOVE PAUSE: Press the Pause switch on the operator panel to go into operating mode. Be cautious of the spinner speed. The spinner could run without moving the vehicle if the Spinner is configured to *Spinner Shut-off = NO* under the *Spinner cal settings*. Ask your system supervisor if you are unsure.
- CAUTIOUSLY DRIVE THE VEHICLE: The Feeder and Spinner will run when the movement of the vehicle is detected by the control.
- STOP THE VEHICLE AND CHECK THAT THE MATERIAL STOPS: When the vehicle comes to a stop the Feeder and Spinner should stop.
- USE PAUSE WHEN NOT SPREADING: Pause can be used to suspend all material outputs onto the road anytime during normal operation

USING PROPORTIONAL PRE-WET (TYPICAL)
1. Setting a Pre-wet Rate
- TARGET RATE (VARIABLE RATE): Set an output rate in Gal/Ton (Gallons per Ton of salt.) or in Metric L/Kg. (Liters per Kilogram of Salt) by turning the liquid encoder knob. Set an appropriate rate for conditions.
  o Rates can be changed at any time the controller is powered on.

CONTINUED ON NEXT PAGE….

- TARGET RATE (SINGLE RATE): A single rate can be pre-programmed. As the encoder is turned left the rate is changed to (0) or if turned right it will use the pre-programmed rate. e.g. (8) = 8 Gal/Ton. If rate is at (0) the Pre-wet will be off though the Liquid system is still enabled. The Liquid switch should be used to enable and disable the system. *See below on how to turn the liquid system On and Off.*
- TARGET RATE (FIXED) A fixed rate can also be programmed that disables the Operator panel Liquid knob in AUTO mode only. Operation is simplified to using the Operator panel Liquid switch to enable or disable the Pre-wet. Again the feed rate Gal/ton is fixed. *See below on how to turn the liquid system On and Off.*

'Turn' encoder knob to adjust Rate. DISPLAYED "Off" will change to RATE as adjustment is made then change back to "Off" after the knob is no longer rotated.
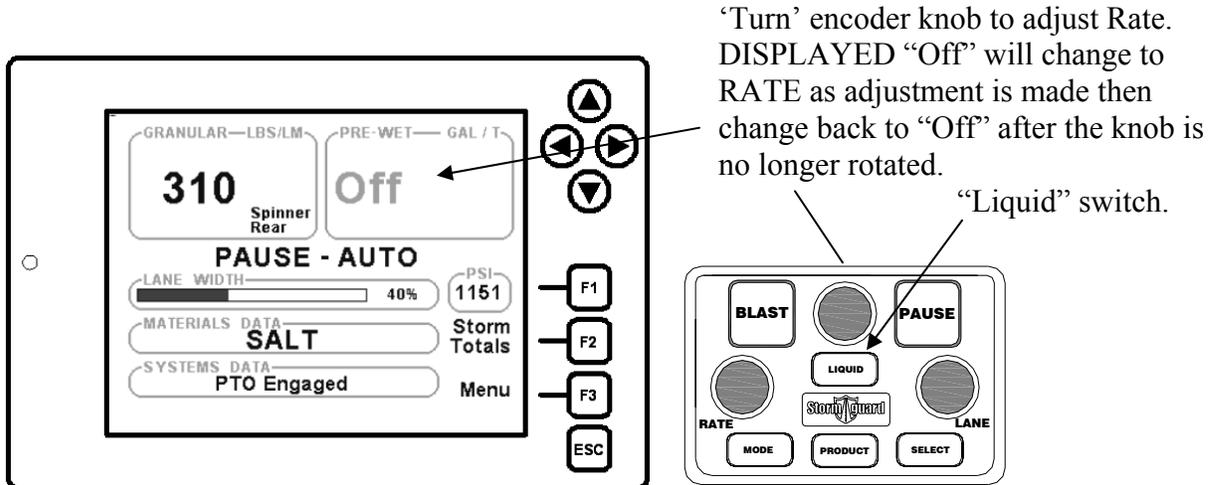
"Liquid" switch.

Liquid Rates can be changed at any time. Turning the encoder changes the display from 'off' to the dialed rate while the encoder is turned.

2. Turning Pre-wet ON or OFF with liquid switch

- LIQUID SWITCH: The Operator panel Liquid switch can be used to enable (ON) the system if Pre-wet is enabled. Press the Liquid switch until the Rate display shows the Pre-wet system is enabled as defined below.
    - Bold characters on-screen define the ENABLED state of the Pre-wet system.
    - Grayed characters on-screen define the DISABLED state of the Pre-wet system. (It is disabled at system power-up)
    - The Liquid switch can be used to disable (Off) the Pre-wet system at any time.
- CAUTIOUSLY DRIVE THE VEHICLE: The Feeder, Spinner and Pre-wet will run when the movement of the vehicle is detected by the ACS controller.
- STOP THE VEHICLE AND CHECK THAT THE MATERIAL STOPS: When the vehicle comes to a stop the Feeder Spinner and Pre-wet should stop.
- USE PAUSE WHEN NOT SPREADING: Pause can be used to stop all material outputs onto the road anytime during normal operation.
    - Note about multi-lane Spinner: Pre-wet rate always follows Granular Rate. As the granular rate increase, the Pre-wet rate increases. Therefore multi-lane spinner affects Granular as well as Pre-wet rate when changing the number of active spinner lanes.
- USE OF SELECT SWITCH: If system configured for Anti-Ice and Pre-Wet (Both displayed), the operator panel Select switch must be used to switch the Liquid controls between the (2) liquid functions. The arrow defines the current selected liquid channel.

- Both Pre-Wet and Anti-Ice can be run simultaneously. The Select arrow always denotes the liquid channel assigned to the operator panel controls. This includes the Liquid switch that controls the enable disable function of the liquid systems.
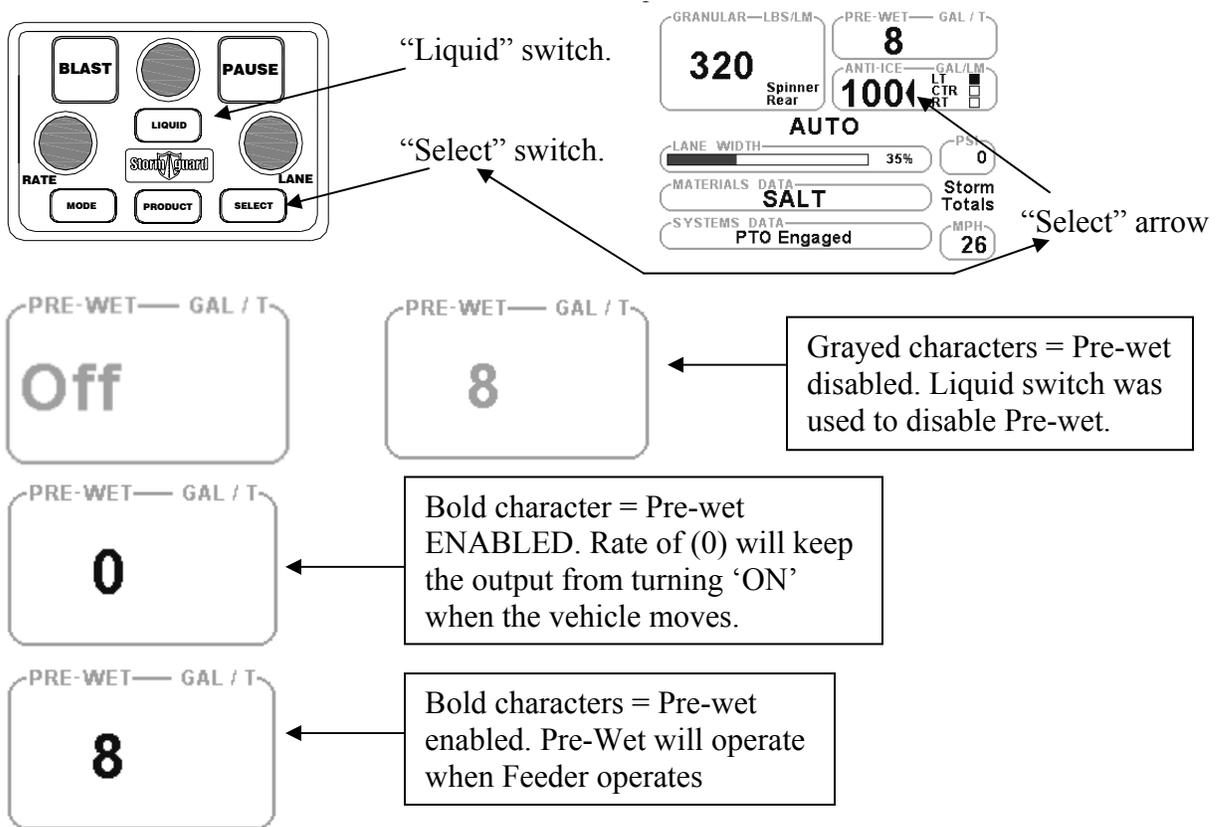
"Liquid" switch.

"Select" switch.

"Select" arrow

Grayed characters = Pre-wet disabled. Liquid switch was used to disable Pre-wet.

Bold character = Pre-wet ENABLED. Rate of (0) will keep the output from turning 'ON' when the vehicle moves.

Bold characters = Pre-wet enabled. Pre-Wet will operate when Feeder operates

3. Pre-Wet Errors and Messages

- Below is a list of some of the common errors associated with Pre-Wet operation.
  Pre-Wet Sensor Error:
  > Definition: The ACS system is reading NO feedback pulses coming from the Flow-Meter.

  PW Rate Low –Slow Down!
  > Definition: The ACS cannot hold the Target application rate for the current vehicle speed.

  Pre-Wet Tank Empty:
  > Definition: The tank is empty.

  Pre-Wet Tank Low:
  > Definition: The Pre-Wet tank is low.

USING ON/OFF PRE-WET

1. Setting a Pre-Wet rate
- TARGET RATE %: Pre-Wet rate is limited to (0) and (100). 100 = 100 % of Valve Trim. This is pre-set during liquid calibration by the administrator.
  - o (0) disables +Pre-Wet. (100) enables Pre-Wet. (If the liquid switch is pressed to turn it 'ON'.)
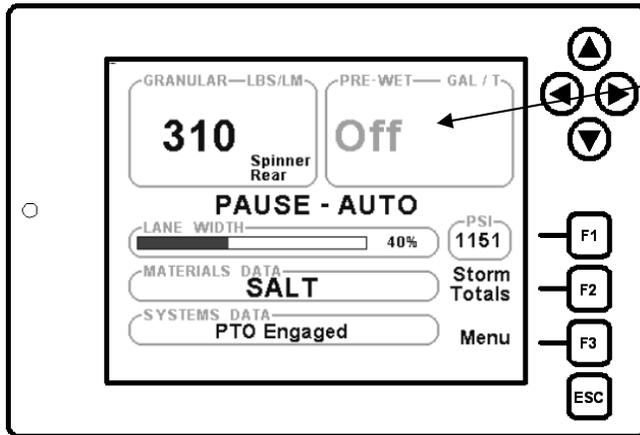
'Turn' encoder knob to adjust Rate. DISPLAYED "Off" will change to RATE as adjustment is made then change back to "Off" when the knob is no longer rotated.
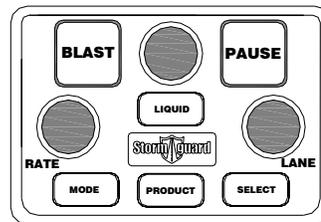
2. Turning Pre-wet ON or OFF with liquid switch
- LIQUID SWITCH: The Operator panel Liquid switch can be used to enable (On) and disable (Off) the Pre-wet system at any time.
- Remember the following:
  - o A Rate must be set or the Pre-Wet will not operate.
  - o If the displayed Rate is Grayed out or the display shows "Off"= The Pre-wet system is disabled..
  - o ON/OFF Pre-wet IS NOT ground speed controlled. It is necessary to use the Pause switch or Liquid switch to control the output.
  - …..continued on next page
  - o If the system configured for Anti-Ice and Pre-Wet (both displayed), the operator panel Select switch must be used to switch the Liquid controls between the (2) liquid functions.
  - o The Pre-Wet will not operate if the screen displays "Pre-Wet Tank Empty" under Systems Data box.
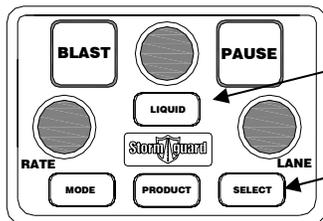
"Liquid" switch.

"Select" switch.
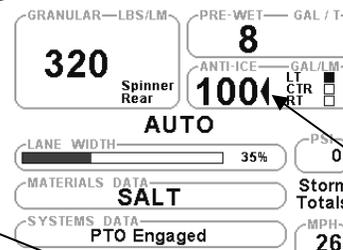
"Select" arrow

ON/OFF PRE-WET CONTINUED ON THE NEXT PAGE….

- Defining various screens for ON/OFF PRE-WET.

PRE-WET——% Trim

Off

Note: % Trim <u>NOT</u> Gal/T

Grayed characters =
Pre-wet DISABLED

PRE-WET——% Trim

0

Grayed characters = Pre-wet
DISABLED. Having a Rate of (0) will
keep the PUMP from activating even
when liquid switch is 'ON'

PRE-WET——% Trim

0

Bold character = Pre-wet
ENABLED. Rate of (0) will keep
the PUMP from running.

PRE-WET——% Trim

100

Bold character = Pre-wet ENABLED by liquid
switch. The Pre-wet WILL FUNCTION when
control IS NOT in PAUSE because rate of
(100) has been set by encoder.

3. Pre-Wet Errors and Messages
- Below is a list of some of the common errors associated with Pre-Wet operation.
    Pre-Wet Sensor Error:
        Definition: The ACS system is reading NO feedback pulses coming from
        the Flow-Meter.
    PW Rate Low –Slow Down!
        Definition: The ACS cannot hold the Target application rate for the
        current vehicle speed.
    Pre-Wet Tank Empty:
        Definition: The tank is empty.
    Pre-Wet Tank Low:
        Definition: The Pre-Wet tank is low.

ANTI-ICE CONTROL

1. Setting an Anti-Ice Rate
- Output is Gal/LnM (Gallons per Lane Mile.) or in Metric Kg/LnKm (Kilograms per Lane Kilomter).
- Rates can be changed at any time the controller is powered on.
- If rate is at (0) the Anti-Ice will be off though the Liquid system <u>is still enabled.</u> The Liquid switch should be used to enable and disable the system. *See the FOLLOWING PAGE on how to turn the liquid system On and Off.*

'Turn' encoder knob to adjust Rate. DISPLAYED "Off" will change to RATE as adjustment is made then change back to "Off" when the knob is left alone.
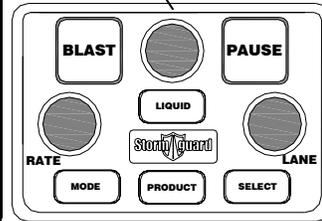
2. Using the Anti-Ice system

- 2. LIQUID SWITCH: The Operator panel Liquid switch can be used to enable (ON) the system. Press the Liquid switch until the Rate display shows the Anti-Ice system is enabled as defined below.
    - o Bold characters on-screen define the ENABLED state of the Anti-Ice system.
    - o Grayed characters on-screen define the DISABLED state of the Anti-ice system. (It is disabled at system power-up.)
    - o The Liquid switch can be used to disable (Off) the Anti-Ice system at any time.
- TARGET RATE: Selected target spread Rate is shown in the Anti-ice section of the screen.
- SELECT LANES: If running multi-lane Anti-Ice, select which lanes you wish to apply material to: (L)eft/(C)enter/(R)ight by actuating your lane switch. The Lane indicators on the display will reflect each lane that is enabled. If running single Lane Anti-Ice you may or may not have a Lane switch. If the (C)enter Lane indicator is highlighted all of the time the lane has been configured to be active permanently.
- REMOVE PAUSE: Pause can be used to stop all material outputs onto the road anytime during normal operation. Pause is always enabled by default at system power-on. This is not a configurable option.
- NOTE THE FOLLOWING:
    - o Blast input has NO effect on Anti-ice.
    - o If system configured for Anti-Ice and Pre-Wet (Both displayed), the operator panel Select switch must be used to switch the Liquid controls between the (2) liquid functions.
    - o It is not necessary to change rates when switching booms (Lanes) ON or Off. The control automatically adjusts rates for # of lanes 1,2 or 3
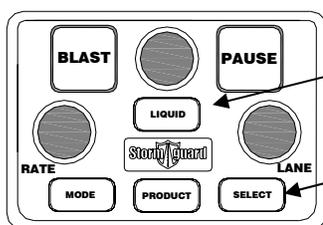
"Liquid" switch.

"Select" switch.
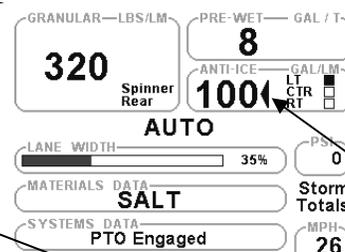
"Select" arrow

Below is a diagram defining the ACS Ant-ice system.

ANTI-ICE CONTROL (3 LANES) AUTO MODE.

OPERATOR PANEL
LIQUID SWITCH

SYSTEM
FAULTS

PAUSE
SWITCH

MUST HAVE ATLEAST (1)
SWITCH 'ON' TO HAVE
ANTI-ICE SYSTEM
ACTIVATE.

ON/OFF
CONTROL

MPH
SIGNAL

LANE 1 SWITCH

LANE 2 SWITCH

LANE 3 SWITCH

(L)ANE
(C)OMPENSATED
(R)ATE CONTROL

BALL VALVE WILL
AUTOMATICALLY OPEN AND
CLOSE WITH:
-GROUND SPEED (MPH)
-PAUSE
-LIQUID SWITCH
-TANK SWITCH (IF INSTALLED)
-FLOW METER FAULTS
  (CLOSED LOOP)

MECHANICAL LANE SWITCHES
(IF INSTALLED)

MASTER
OUTPUT
MODULE
(MOUNTED IN
VALVE
ENCLOSURE)

PUMP CONTROL?
BALL VALVE
OPEN/CLOSE?

LANE 1 BALL VALVE

LANE 2 BALL VALVE

LANE 3 BALL VALVE

HYD. VALVE
CONTROL
(LIQUID PUMP)

ANTI-ICE   GAL/LM

Off

LT   ■
CTR □
RT   □

Grayed characters = Anti-Ice disabled. Liquid switch was used to disable Anti-ice.

ANTI-ICE   GAL/LM

0

LT   ■
CTR □
RT   □

Bold character = Anti-ice ENABLED. Rate of (0) will keep the output from turning 'ON' when the vehicle moves.

ANTI-ICE   GAL/LM

100

LT   ■
CTR □
RT   □

Bold characters = Anti-Ice enabled. Anti-Ice will operate when vehicle moves.

3. Anti-Ice Errors and Messages

- Below is a list of some of the common errors associated with Anti-Ice operation.
  Anti-Ice Sensor Error:
  > Definition: The ACS system is reading NO feedback pulses coming from the Flow-Meter.

  AI Rate Low –Slow Down!
  > Definition: The ACS cannot hold the Target application rate for the current vehicle speed.

  Anti-Ice Tank Empty:
  > Definition: The tank is empty.

  Anti-Ice Tank Low:
  > Definition: The tank is low.

USING PRE-WET FOR DIRECT APPLICATION (Anti-Ice type operation)

Overview: Some municipalities have vehicles equipped with the ability to divert the flow of their Pre-Wet systems to a boom (usually a single lane) to allow direct application of liquid chlorides to the road surface. The ACS system is equipped to easily accomplish this task.

1. Setup & Operation:

- The Pre-Wet is configured and calibrated as normal.
- The Anti-Ice is also configured and calibrated but here is the difference:
  - The Pre-Wet pump output has a manual diverter valve that diverts the flow of fluid to a boom for direct application to the road surface.
  - The Anti-Ice configuration menu has an option for "Pre-Wet" which is where the magic happens. This option keeps the operator from being able to turn both systems on together. This should make sense to you because there really aren't (2) systems. It's a single pump used for dual tasks.
  - The Storm totals only accumulate data for Pre-Wet when Pre-Wet is enabled and only accumulate data for Anti-ice when Anti-Ice is enabled. IT IS NOT POSSIBLE TO ENABLE BOTH AT ONCE.
- Both Pre-Wet and Anti-ice operate identically as described under "Proportional Pre-wet section and Anti-Ice sections".

Example: Typical operating screen set-up for granular with Pre-Wet and Anti-Ice.
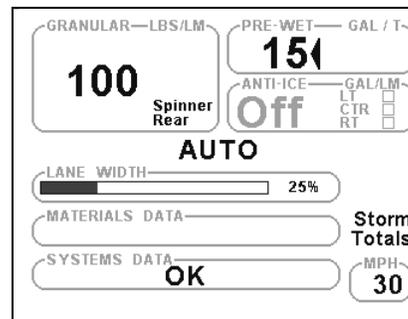
- Diagram: Explanation of how pump and settings apply to ACS control running dual operations as Pre-Wet system or Direct Application (A.I.)
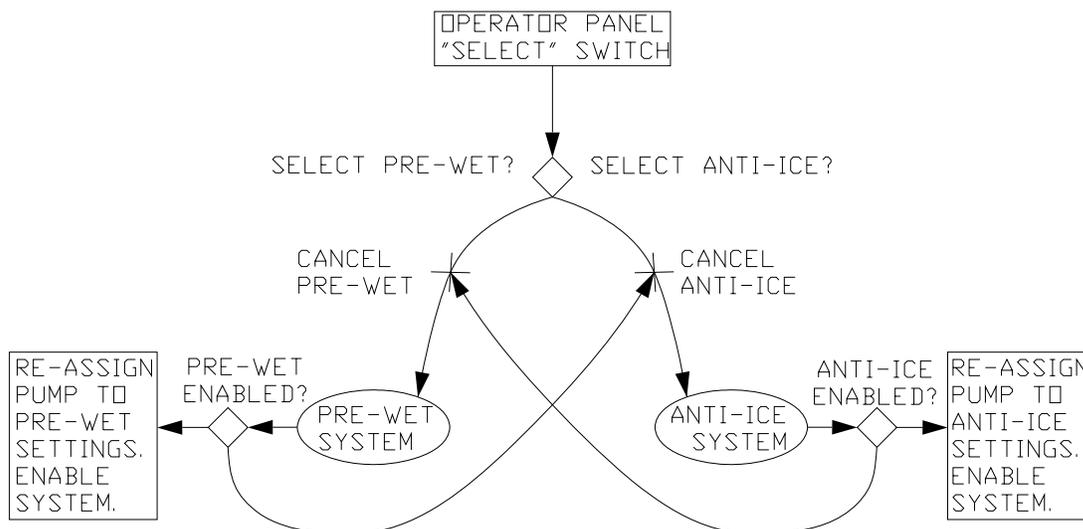
UNLOAD MODE

1. When to use Unload

- Unload mode has identical functionality as Manual Mode except it does not write material data into logs. Use "unload mode" instead of manual mode to *UNLOAD* the vehicle at the yard. This will keep the Storm and Annual Totals from being mistakenly written into, generating false Granular and Liquid spread data.
  - o The controller limits the vehicle speed while unloading to less than 5 mph or the controller will be kicked back into Auto mode/pause.

MANUAL MODE:

1. When to use manual

- Manual mode may or may not be available for standard operation. This is configurable during system setup. Check with your supervisor if you are unable to operate in Manual mode. Use "Unload mode" to *unload* the vehicle.

Repeatedly press mode switch until "MANUAL" appears.

"Mode" switch.

Rates are changed to "0".
All outputs switch OFF.

The system is put into "Pause"
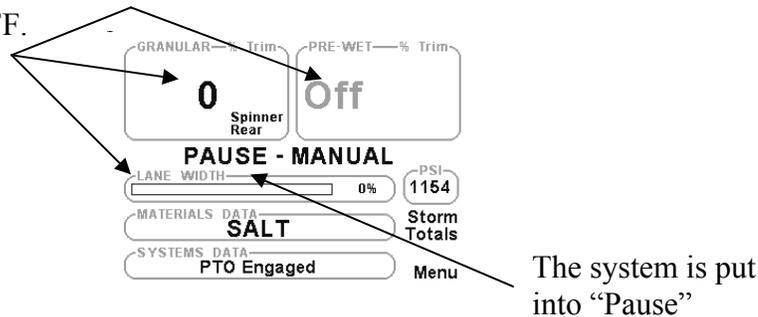
2. Setting Rates and general manual operation

- SETTING RATE: Once in manual mode simply dial a rate % (0-100) for any of the Active Granular/Spinner/ or Liquid channels.
- REMOVE PAUSE: Once out of Pause the outputs will activate.
- THINGS TO REMEMBER:
  - o If the vehicle is moving the material logs (Storm/Annual totals) are being written into. If unloading material at the yard it is better to use UNLOAD mode. This keeps you from inadvertently writing to the material logs.
  - …..continued on next page

If running CLOSED LOOP (FEEDBACK SENSOR PRESENT) the system will still FAULT into open loop if sensor signal is lost.
  o Spinner LANE CONTROL is disabled in manual control.
- ANTI-ICE IN MANUAL/UNLOAD: The AI liquid pump will run regardless of Lane switches. This is different than Auto mode where the output will not activate until at least one lane switch is active. This ability is necessary for re-circulate requirements when mixing materials and to retain the ability to pump material back into a holding tank.

VARIABLE GATE (Using different gate openings on your route)

Note: The gate must be calibrated by your equipment supervisor. If the gate height is displayed then it has been configured in the setup menu. If there is no "Gate" display then Variable gate is disabled and changing the mechanical gate on the rear of the truck will drastically affect the calibration of the system.

1. How to change gate height
- CHANGE PHYSICAL GATE: Physically change the opening on the tailgate. Open the gate for higher vehicle speed and/or Pounds/Mile requirements. Close the gate for smaller material requirements.
- SET NEW MEASURED VALUE INTO DISPLAY: Once back in the safety of your vehicle carefully adjust the measurement on the display using the UP/DOWN arrows to set the new opening height.
  o Note: If your ACS system is calibrated with variable gate and you frequently get the error "Feed Rate low for MPH", it is possible you may need to make a gate adjustment. However this is not a solution for driving too fast.

▲ Increase gate opening measurement by 1/2 IN. increments

▼ Decrease gate opening measurement by 1/10th. IN. increments

Gate opening measurement (enter in your gate opening measurement.)
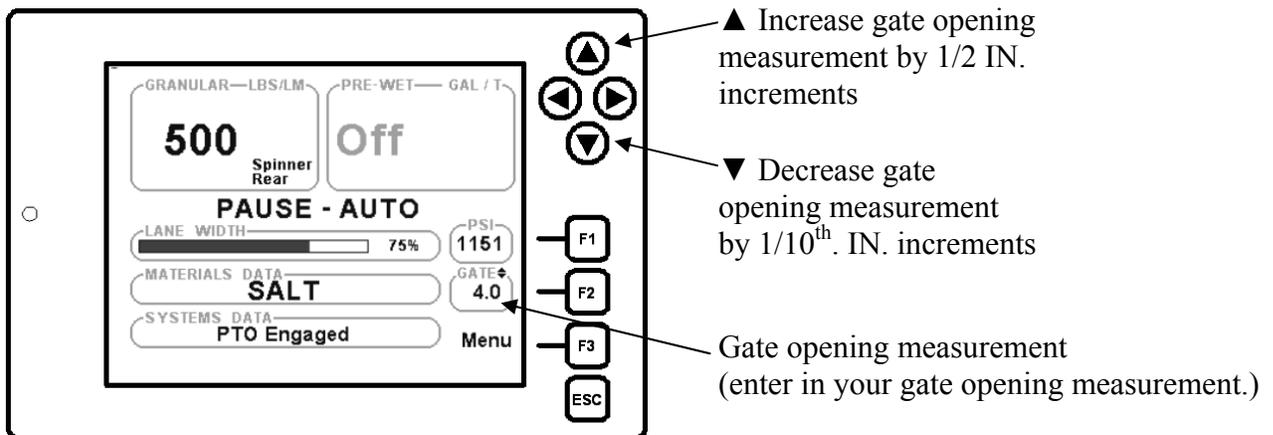
MATERIAL LOGS

2. How to check material logs

- REAL TIME MATERIAL LOGS: Logs can be viewed at anytime during normal operation by pressing the F2 function key on the display.
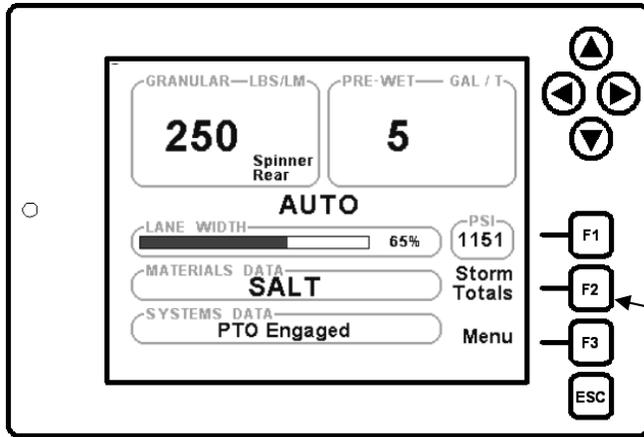
Function key "F2" brings up storm totals at anytime during normal operation.
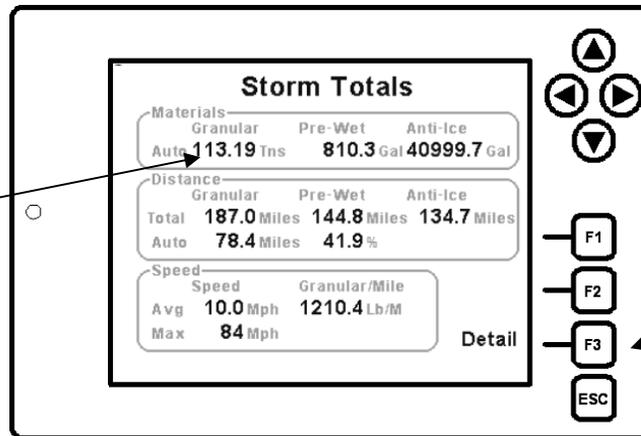
Note: Material totals units change from POUNDS to TONS after 999,999

Function key "F3" brings up an itemized screen for all configured granular materials

3. How to clear Storm Totals

The ACS system can be set up to allow clearing of Storm Totals through operators' "Main Menu" screen.

- STOP VEHICLE: The vehicle cannot be moving to access menu.
- LOGIN: you must first log-in. Enter you user I.D.
- MENU KEY TO LOG-OUT: Once successfully logged on the main screen appears. Use the F3 key to gain access to Main menu.
- CLEAR STORM TOTALS: Use arrow keys to navigate to "Clear Storm Totals". Change the variable to "Yes".
- F3 ACCEPT: Press F3 to Accept and clear storm totals.
- NOTE:
  - If the system is not configured to allow an operator to clear Storm Totals the menu item will be grayed out and you will not be able to navigate to it.

Function key "F3" brings up "Main menu"
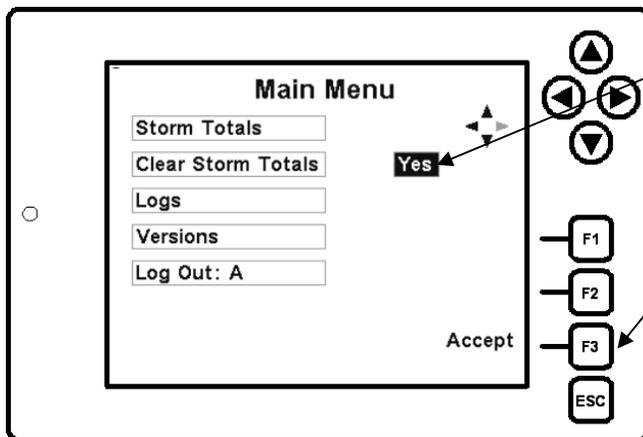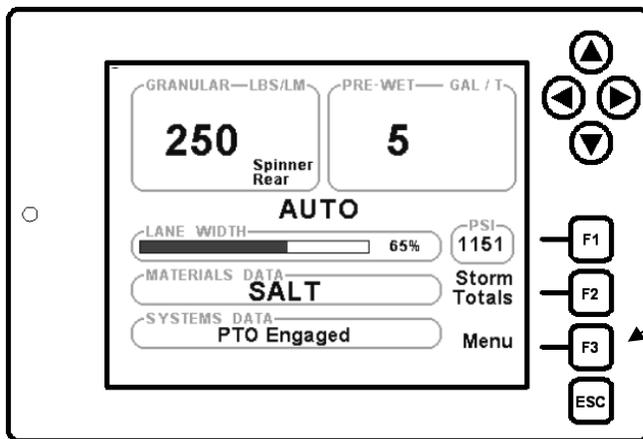
1. Navigate to -variable.
2. Change to "Yes".
3. Press F3 to accept.
4. Storm Totals will clear!

BLAST MODE

Blast is used for Feeder and Pre-Wet only. Blast is generally used to output an increased amount of material over current spread rate for use in intersections and bridge decks or other places where ice is detrimental. Ask your supervisor where and when to use Blast. Blast has no interaction with Anti-ice operation. All Blast settings are set up individually with each granular material by your equipment supervisor.

1. Blast types:

- ON/OFF: Press Blast to invoke function. Blast runs indefinitely until Blast button is pressed again.
- MOMENTARY: Blast functions while Blast switch is held.
- TIMED: Blast will function for pre-set time 1-99 seconds after the button is released.

2. Ground Speed Required:

- Custom Blast settings for each material include an option for Ground Speed Required? "Yes/No". An example for this option to be used for Blasting cul-de-sac areas after you make a 3-point turn.

3. Output goes to:

- MAX TRIM: Max motor speed. Or max Feeder speed capable.
- MAX RATE: Maximum feeder rate in Pounds per Lane/Mile or LBS/Mile set up by your equipment supervisor for each granular material. If running Lane mode spinner number of lanes is factored into the Blast output to keep a true Pounds per Lane/mile output.
- OTHER RATE: Any configured rate between 1-9,999 Lbs/Lane Mile.
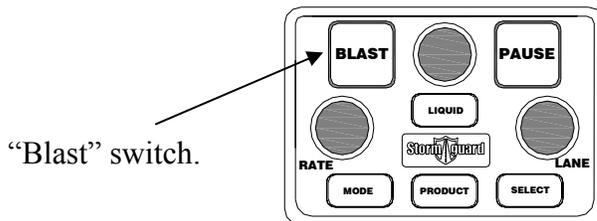
"Blast" switch.

Operator Panel showing location of "Blast switch"
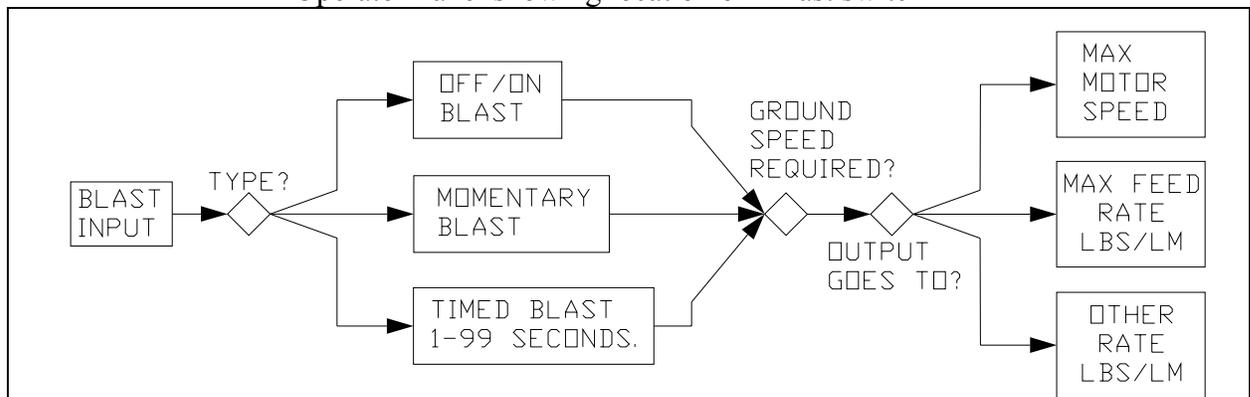
Flow Chart detailing "Blast" capability