SSC3100 Operation
and
Calibration Manual

FORCE America INC.

Welcome

Congratulations on your purchase of a FORCE America®, Inc. SSC3100 Spreader Control. This manual will guide you through the process of using your new spreader control.

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Hardware

The SSC3100 is a self-contained spreader system. It has three rotary adjustment knobs with pushbuttons.

Figure 1: The SSC3100

Powering up the SSC3100

Upon applying 12V DC dashkey power to the SSC3100, the system will perform a panel test by illuminating the LEDs around the dials as well as the ACTIVE and BLAST LEDs. During this test the outputs will remain inactive. The system will also perform a test on the various system inputs. If the system detects any errors on startup the ACTIVE LED and BLAST LED will alternately flash RED to indicate that an error was detected. The error code will be displayed using the Spreader and Spinner dial indicators. If no errors are detected on startup the system will enter normal operation mode in standby.

Normal Operation Mode

When the spreader control is in normal operation mode the output set rates are indicated by the illuminated number next to the corresponding dial from zero to the active rate. The output rates represent the percentage of output between the min and max calibration settings.

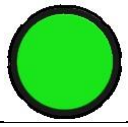
The numbers around the liquid dial will be illuminated when the liquid system is active. When the liquid system is turned off all the numbers around the dial will be off. Pressing the liquid knob will turn on and off the liquid application, if it is enabled. The liquid output operation will also follow the standby state of the spreader control, if enabled.

Applying Material

When your SSC3100 system starts up, it will always be in standby with all outputs inactive. You will need to remove your system from standby before it will apply material.

The spreader can apply granular material only (Dry Granular Application), apply a prewet liquid to the granular material while spreading (Prewetted Granular Application) or apply liquid only (Direct Liquid Application).

Each rotary adjustment knob on the Operator Interface performs a different function when applying material. See the table below.

Input	Input	Function
Green SPREADER Knob 	Twist Left	Decrease the granular set rate.
	Twist Right	Increase the granular set rate.
	Pushbutton	Place the system in standby. Remove the system from standby.
Blue SPINNER Knob 	Twist Left	Decrease the spinner set rate.
	Twist Right	Increase the spinner set rate.
	Pushbutton	Blast the active material(s). Cancel Blast.
Gray LIQUID Knob 	Twist Left	Decrease the liquid set rate, if enabled.
	Twist Right	Increase the liquid set rate, if enabled.
	Pushbutton	Turn on or off the liquid application, if enabled.

To reduce the risk of death or injury, ensure that all personnel are clear from moving machinery before activating outputs.

To spread granular material:

STEP 1: Twist the SPREADER knob to adjust your granular output percentage.

STEP 2: Twist the SPINNER knob to adjust your spinner set rate.

STEP 3: Press the SPREADER knob to remove the spreader control from standby. Granular material will spread depending on the state of the ground speed interrupt calibration setting and if the vehicle is detecting ground speed.

STEP 4: Press the SPREADER knob to place the spreader control back in standby and stop the outputs.

To reduce the risk of death or injury, ensure that all personnel are clear from moving machinery before activating outputs.

To spread granular and prewet material:

STEP 1: Press the gray LIQUID knob to activate the prewet application. This will illuminate the selected prewet application percentage next to the LIQUID dial.

STEP 2: Twist the SPREADER knob to adjust your granular output percentage.

STEP 3: Twist the SPINNER knob to adjust your spinner set rate.

STEP 4: Twist the LIQUID knob to adjust the prewet output percentage.

STEP 5: Press the SPREADER knob to remove the spreader control from standby. Granular and prewet material will spread depending on the state of the ground speed interrupt calibration setting and if the vehicle is detecting ground speed.

STEP 6: Press the SPREADER knob to place the spreader control back in standby and stop the outputs.

This application mode is only applicable when the liquid mode is set to one of the three prewet related modes in calibration.

To spread direct liquid material:

STEP 1: Turn the SPREADER and SPINNER dials to 0.

STEP 2: Press the gray LIQUID knob to activate the liquid application. This will illuminate the selected liquid application percentage next to the LIQUID dial.

STEP 3: Twist the LIQUID knob to adjust the direct output percentage.

STEP 4: Press the SPREADER knob to remove the spreader control from standby. The liquid material will spread depending on the state of the ground speed interrupt calibration setting and if the vehicle is detecting ground speed.

STEP 5: Press the SPREADER knob to place the spreader control back in standby and stop the outputs.

This application mode is only applicable when the liquid mode is set to one of the two direct liquid related modes in calibration.

Blast

Blast is a spreader feature that runs the applicable output at the maximum percentage for a set amount of time. By default, Blast is set to spread for ten seconds.

When Blast is activated, the BLAST LED will illuminate RED.

To reduce the risk of death or injury, ensure that all personnel are clear from moving machinery before activating outputs.

When blast mode is activated, blast rates will only be applied to outputs with application rates currently not set to zero.

NOTE: Blast mode does not affect the spinner output.

To activate Blast:

STEP 1: Press the Blue SPINNER Knob on the Operator Interface. The system will blast for its configured amount of time. The Blast feature works whether or not the system is in standby or the vehicle is moving.

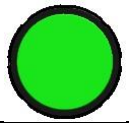
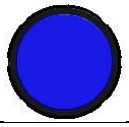
To deactivate Blast before it automatically shuts off:

STEP 1: While the system is Blasting, press the Blue SPINNER Knob on the Operator Interface. The Blast feature will shut off and return to its previous operation (spreading or standby).

Unload

The Unload mode allows you to unload materials from the vehicle. This mode is only necessary if the system is setup to have the ground speed interrupt enabled. The mode is cancelled by placing the system into standby.

Each rotary adjustment knob on the Operator Interface performs a different function when unloading material. See the table below.

Input	Action	Function
Green SPREADER Knob 	Twist Left	Decrease the granular output percentage.
	Twist Right	Increase the granular output percentage.
	Pushbutton	Stop unloading material.
Blue SPINNER Knob 	Twist Left	Decrease the spinner output percentage. (If available)
	Twist Right	Increase the spinner output percentage. (If available)
	Pushbutton	None
Gray LIQUID Knob 	Twist Left	Decrease the liquid output percentage.
	Twist Right	Increase the liquid output percentage
	Pushbutton	Turn on or off the liquid output.

To reduce the risk of death or injury, ensure that all personnel are clear from moving machinery before activating outputs.

When unload mode is active the ACTIVE LED and BLAST LED will illuminate red. The output rates for the granular, spinner or liquid will be reflected by the illuminated numbers around the corresponding dials.

To unload granular material:

STEP 1: Ensure that the system is in standby and the vehicle is not moving.

STEP 2: Turn off the liquid output if it is active by pressing the liquid button.

STEP 3: Press and hold the blue SPINNER knob.

STEP 4: Press the green SPREADER knob, the ACTIVE LED and the BLAST LED will change to red, you can then release the blue SPINNER knob and the green SPREADER knob.

STEP 5: Use the green SPREADER knob to adjust the granular output percentage, it will start out at the maximum rate.

STEP 6: Use the blue SPINNER knob to adjust the spinner output percentage.

STEP 7: Press the green SPREADER knob to finish unloading granular material.

To unload liquid material:

STEP 1: Ensure that the system is in standby and the vehicle is not moving.

STEP 2: Turn the SPREADER and SPINNER dials to 0.

STEP 3: Turn on the liquid output if it is not already on.

STEP 4: Press and hold the blue SPINNER knob.

STEP 5: Press the green SPREADER knob, the ACTIVE LED and the BLAST LED will change to red, you can then release the blue SPINNER knob and the green SPREADER knob.

STEP 6: Use the gray LIQUID knob to adjust the liquid output percentage, it will start out at the maximum rate.

STEP 7: Press the green SPREADER knob to stop unloading liquid material.

Calibration

The Calibration feature is used to setup your FORCE America SS3100 for your system and application requirements. When the calibration feature is active the blast indicator on the front of the unit will be illuminated green.

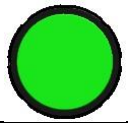
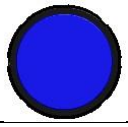
To activate the Calibration Feature:

1. Set the SPREADER and SPINNER set rates to 0.
2. While the system is in Standby, press and hold the liquid button for three seconds.
3. Once the system activates the calibration feature indicated by the blast indicator on the front panel turning green, release the liquid button.

To exit the Calibration Feature:

1. Press and hold the liquid button for three seconds.

When the calibration feature is active, the buttons have the following functions:

Input	Input	Function
Green SPREADER Knob 	Twist Left	Adjust the value for the active calibration setting.
	Twist Right	Adjust the value for the active calibration setting.
	Pushbutton	Place the system in standby. Remove the system from standby.
Blue SPINNER Knob 	Twist Left	Decreases the value for the active calibration setting when setting the min or max duty cycle.
	Twist Right	Increases the value for the active calibration setting when setting the min or max duty cycle.
	Pushbutton	None.
Gray LIQUID Knob 	Twist Left	Select the previous calibration setting for adjustment.
	Twist Right	Select the next calibration setting for adjustment
	Pushbutton	Exits the calibration menu when held for 3 seconds when the system is in standby.

The particular calibration setting being modified along with its current value will be indicated through the various illuminated LEDs on the panel which is explained in the following section, Description of Calibration Values.

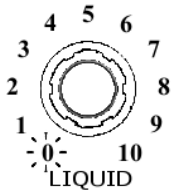
Description of Calibration Values

The numbers located around the liquid dial will be used to indicate which calibration setting is active and the numbers located around the spreader and spinner dials will indicate the selected value for that setting. Rotating the liquid dial will adjust which calibration setting is currently being displayed and changed. Rotating the spreader dial will adjust the setting for the selected calibration item.

The calibration settings will follow the order listed below. The initial value upon entering calibration will be the spreader min output.

> To reduce the risk of death or injury, ensure that all personnel are clear from moving machinery before activating outputs.

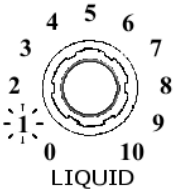
Spreader Min Output



The Spreader Min Output item sets the duty cycle required to turn the auger at its slowest rate. The setting is indicated by having the LIQUID dial illuminated at 0. The value is indicated by illuminating the numbers around the SPREADER and SPINNER dials. The highest number illuminated around the SPREADER dial indicates the tens position for the duty cycle and the highest number illuminated around the SPINNER dial indicates the ones position. The default value is 20% and is represented by having the 0, 1, and 2 numbers illuminated around the SPREADER dial and the 0 number illuminated around the SPINNER dial.

Use the green SPREADER knob to activate/deactivate the output to test the auger speed when adjusting the Min Output value. The ACTIVE LED will illuminate green when the spreader control is out of standby and running the output. Rotating the SPREADER knob will increase/decrease the duty cycle by 10% and using the SPINNER knob will increase/decrease the duty cycle by 1%.

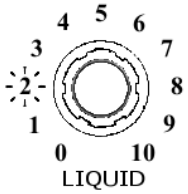
Spreader Max Output



The Spreader Max Output item sets the duty cycle required to turn the auger at its fastest rate. The setting is indicated by having the LIQUID dial illuminated at 1. The value is indicated by illuminating the numbers around the SPREADER and SPINNER dials. The highest number illuminated around the SPREADER dial indicates the tens position for the duty cycle and the highest number illuminated around the SPINNER dial indicates the ones position. The default value is 75% and is represented by having the numbers 0 thru 7 illuminated around the SPREADER dial and the numbers 0 thru 5 illuminated around the SPINNER dial.

Use the green SPREADER knob to activate/deactivate the output to test the auger speed when adjusting the Max Output value. The ACTIVE LED will illuminate green when the spreader control is out of standby and running the output. Rotating the SPREADER knob will increase/decrease the duty cycle by 10% and using the SPINNER knob will increase/decrease the duty cycle by 1%.

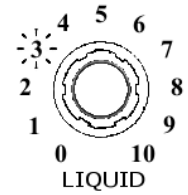
Spinner Min Output



The Spinner Min Output item sets the duty cycle required to turn the spinner at its slowest rate. The setting is indicated by having the LIQUID dial illuminated at 2. The value is indicated illuminating the numbers around the SPREADER and SPINNER dials. The highest number illuminated around the SPREADER dial indicates the tens position for the duty cycle and the highest number illuminated around the SPINNER dial indicates the ones position. The default value is 20% and is represented by having the 0, 1, and 2 numbers illuminated around the SPREADER dial and the 0 number illuminated around the SPINNER dial.

Use the green SPREADER knob to activate/deactivate the output to test the spinner speed when adjusting the Min Output value. The ACTIVE LED will illuminate green when the spreader control is out of standby and running the output. Rotating the SPREADER knob will increase/decrease the duty cycle by 10% and using the SPINNER knob will increase/decrease the duty cycle by 1%.

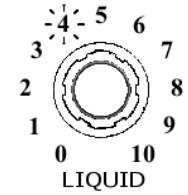
Spinner Max Output



The Spinner Max Output item sets the duty cycle required to turn the spinner at its fastest rate. The setting is indicated by having the LIQUID dial illuminated at 3. The value is indicated by illuminating the numbers around the SPREADER and SPINNER dials. The highest number illuminated around the SPREADER dial indicates the tens position for the duty cycle and the highest number illuminated around the SPINNER dial indicates the ones position. The default value is 75% and is represented by having the numbers 0 thru 7 illuminated around the SPREADER dial and the numbers 0 thru 5 illuminated around the SPINNER dial.

Use the green SPREADER knob to activate/deactivate the output to test the spinner speed when adjusting the Max Output value. The ACTIVE LED will illuminate green when the spreader control is out of standby and running the output. Rotating the SPREADER knob will increase/decrease the duty cycle by 10% and using the SPINNER knob will increase/decrease the duty cycle by 1%.

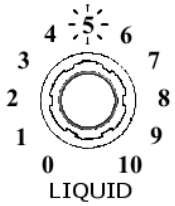
Liquid Min Output



The Liquid Min Output item sets the duty cycle required to turn the liquid pump at its slowest rate. The setting is indicated by having the LIQUID dial illuminated at 4. The value is indicated illuminating the numbers around the SPREADER and SPINNER dials. The highest number illuminated around the SPREADER dial indicates the tens position for the duty cycle and the highest number illuminated around the SPINNER dial indicates the ones position. The default value is 20% and is represented by having the 0, 1, and 2 numbers illuminated around the SPREADER dial and the 0 number illuminated around the SPINNER dial.

Use the green SPREADER knob to activate/deactivate the output to test the liquid pump speed when adjusting the Min Output value. The ACTIVE LED will illuminate green when the spreader control is out of standby and running the output. Rotating the SPREADER knob will increase/decrease the duty cycle by 10% and using the SPINNER knob will increase/decrease the duty cycle by 1%.

Liquid Max Duty Cycle

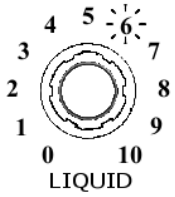


The Liquid Max Output item sets the duty cycle required to turn the liquid pump at its fastest rate. The setting is indicated by having the LIQUID dial illuminated at 5. The value is indicated by illuminating the numbers around the SPREADER and SPINNER dials. The highest number illuminated around the SPREADER dial indicates the tens position for the duty cycle and the highest number illuminated around the SPINNER dial indicates the ones position. The default value is 75% and is represented by having the numbers 0 thru 7 illuminated around the SPREADER dial and the numbers 0 thru 5 illuminated around the SPINNER dial.

Use the green SPREADER knob to activate/deactivate the output to test the liquid pump speed when adjusting the Max Output value. The ACTIVE LED will illuminate green when the spreader control is out of standby and running the output. Rotating the SPREADER knob will increase/decrease the duty cycle by 10% and using the SPINNER knob will increase/decrease the duty cycle by 1%.

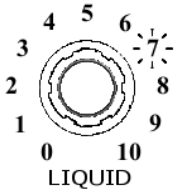
Blast Time

The Blast Time item sets the amount of time in seconds that the blast mode will run once the blue Blast Knob has been pressed and released. The setting is indicated by having the liquid dial illuminated at 6. The value is indicated by the numbers around the spreader dial and the table below. The default value is 10 seconds.



Spreader Dial	Time Setting
0	Momentary
1	1 Second
2	2 Seconds
3	3 Seconds
4	4 Seconds
5	5 Seconds
6	6 Seconds
7	7 Seconds
8	8 Seconds
9	9 Seconds
10	10 Seconds

Speedometer Configuration

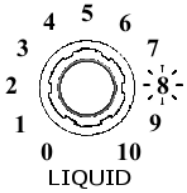


The speedometer configuration item is used to enable the ground speed interrupt. When the ground speed interrupt is enabled, the system will stop spreading material when the vehicle is not moving. If ground speed interrupt is to be enabled the proper speedometer signal type and input pulse range needs to be selected. The system supports an electronic or mechanical signal with a low pulse rate or high pulse rate. If the vehicles pulses per mile is higher than 20,000 (pulses per kilometer is higher than 12,500) select the high pulse rate otherwise select the low pulse rate. The setting is indicated by having the liquid dial illuminated at 7. The value is indicated by the numbers around the spreader dial and the table below. The default value is Disabled.

* When this calibration item is active, spreader dial position 10 will illuminate in addition to the setting value when the system is detecting a speedometer signal.

Spreader Dial	State
0	Disabled
1	Electronic – Low Pulse Rate
2	Electronic – High Pulse Rate
3	Mechanical – Low Pulse Rate
4	Mechanical – High Pulse Rate
*10	Signal Present

Liquid Mode



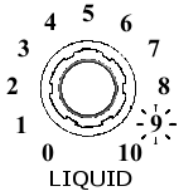
The liquid mode item determines how the liquid output on the controller will operate. The setting is indicated by having the liquid dial illuminated at 8. The value is indicated by the number around the spreader dial and the table below. The default value is Disabled.

Spreader Dial	Description
0	Disabled • The liquid output will not run regardless of the system state
1	Gravity Prewet • The liquid output will function as an on/off output used to operate a ball valve. The output will only be active when the granular output is active.
2	Prewet (No Liquid Blast) • The liquid output will only operate when the granular output is active and the output rate will not change when the blast feature is active.
3	Prewet (Liquid Output Blasts) • The liquid output will only operate when the granular output is active and the output rate will increase to the max setting when blast is active.
4	Direct (No Liquid Blast)

	• The liquid output will run independent of the granular output allowing the liquid to be active when the granular rate is 0. In this mode the liquid output will not change when the blast feature is active.
5	Direct (Liquid Output Blasts) • The liquid output will run independent of the granular output allowing the liquid to be active when the granular rate is 0. In this mode the liquid output will increase to the max setting when blast is active.

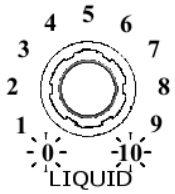
Aux Output Configuration

The Aux Output Configuration will determine the operation of the output associated with the loose wire labeled AUX in the harness. The setting is indicated by having the liquid dial illuminated at 9. The value is indicated by the numbers around the spreader dial and the table below. The default value is None.



Spreader Dial	Description
0	None/Off • The aux output does nothing and will be off.
1	Auger On • The aux output will be on when the auger is running.
2	Liquid On • The aux output will be on when the liquid output is active.

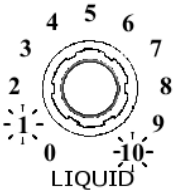
Restore Defaults



The Restore Defaults item allows for the resetting of all calibration settings to factory default settings. The setting is indicated by having the 0 and 10 illuminated around the liquid dial.

To restore the calibration settings, press and release the spreader dial then press and release the spinner dial.

Firmware Version



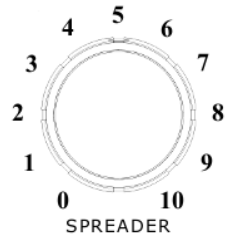
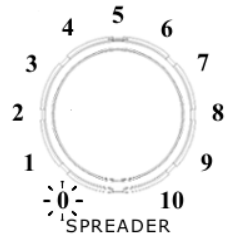
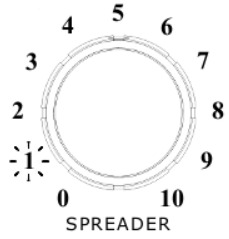
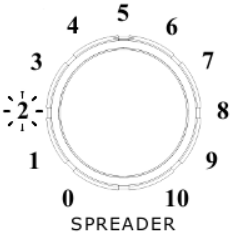
The firmware version item allows for the determination of the systems firmware (software) version. The setting is indicated by having the 1 and 10 illuminated around the liquid dial.

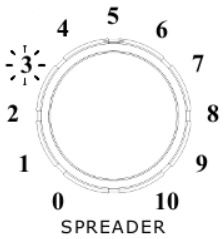
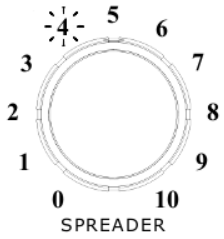
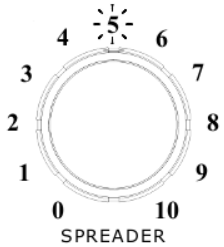
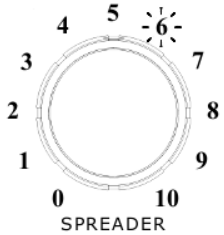
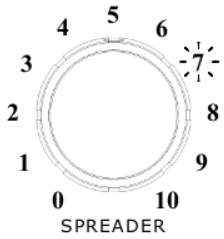
The number indicated by the spreader dial indicates the major number and the number indicated by the spinner dial indicates the minor number. (Version = Major Number**.**Minor Number)

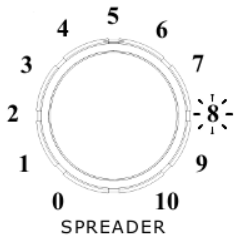
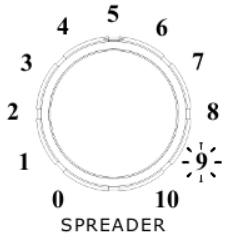
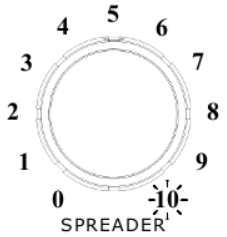
Troubleshooting and Error Conditions

When the system encounters an error condition the ACTIVE LED and BLAST LED will alternately flash RED to indicate that an error was detected. The information related to the error will be indicated using the numbers around the SPREADER dial by illuminating the number of the error. The following table can be used to determine the active error, what conditions caused it to occur and any recommended actions that can be taken to resolve the error.

Pressing the liquid dial will acknowledge the error condition and either advance the indicator to the next error condition or if no more errors are active place the system into normal operation mode. Stuck input errors and the valve power error cannot be acknowledged and will remain active until resolved.

System Status	Condition	Recommended Action
	**Unstable Voltage Detected** The system is detecting an unstable voltage input on the constant power wire during startup.	Verify that the voltage input for the constant power connection is stable and above 8 volts.
	**Stuck Spreader Knob** The green SPREADER knob was pressed during startup.	Verify that the green SPREADER knob is not pressed. This error condition cannot be acknowledged and will remain active until cleared.
	**Stuck Spinner Knob** The blue SPINNER knob was pressed during startup.	Verify that the blue SPINNER knob is not pressed. This error condition cannot be acknowledged and will remain active until cleared.
	**Stuck Liquid Knob** The gray LIQUID knob was pressed during startup.	Verify that the gray LIQUID knob is not pressed. This error condition cannot be acknowledged and will remain active until cleared.

System Status	Condition	Recommended Action
	**Fused Power Missing** The system is not detecting power on the fused circuit which is used to run the valve outputs.	Verify that the fuse is not blown, if it is blown replace with a 10 Amp
	**Stuck Remote Standby** The remote standby input was active during startup.	Verify that the remote standby input is not grounded.
	**Stuck Remote Blast** The remote blast input was active during startup.	Verify that the remote blast input is not grounded.
	**Improper Shutdown** The system detected an improper shutdown caused by losing constant power before the system completed its shutdown process.	Verify that the dashkey wire is properly connected to a dashkey signal. Verify that the constant power wire is properly connected to a voltage source that receives constant power. Verify that the voltage input for the constant power connection is stable and above 8 volts.
	**Corrupt calibration settings** The system detected an issue with the stored calibration data. The calibration data has been reset to the factory defaults.	When calibrating the system make sure to exit the calibration menu before turning off the spreader control.

System Status	Condition	Recommended Action
	**Corrupt Operational Settings** The system failed to load the operation settings. Safe defaults have been loaded.	Verify that the system power and dashkey inputs are wired properly. Please contact your FORCE America representative for help.
	**Diagnostic Error Log Corrupt** The system detected an issue with the stored factory diagnostic error log. The error log will be reset. This error log can only be retrieved by factory personnel.	Verify that the system power and dashkey inputs are wired properly. Please contact your FORCE America representative for help.
	**WDT Reset** The unit experienced a hardware reset caused by the expiration of the watch dog timer.	Please contact your FORCE America representative for help.

FORCE America Contact Information

Should you encounter problems with your SSC3100 system that are not documented in this Operation and Calibration Manual, please contact your local FORCE America Sales Representative for assistance.

For company and product information, please contact FORCE America at:

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