


OS-TSC13

TSC Commercial Basic Panel User Manual

OPERATOR'S MANUAL

Marine Generators | Marine Diesel Engines | Land-Based Generators

NORTHERN LIGHTS




— CALIFORNIA —
Proposition 65 Warning:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

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OS-TSC13 User Manual

Read this operator's manual thoroughly before starting to operate your equipment.
This manual contains information you will need to run and service your new unit.

Table of Contents

1 Specifications

Testing Specifications

Specification	Rating
Electrical Transients	SAE1113-11
Thermal Shock and Cycling	SAE1455
Vibration Profiles	SAE1455
Electric Static Discharge	SAE1113-13

Physical Specifications

Specification	Rating
Operating Temperature	-40 to +158°F (-40 to +70°C)
LCD Viewing Temperature	-4 to +158°F (-20 to +70°C)
Weight	0,83lb (0.38kg)
Dimensions	4.17" x 6.50" x 1.38" (10.59cm x 16.51cm x 3.51cm)

Electrical Specifications

Specification	Rating
Operating Voltage	5.5 ~ 36VDC
Standby Current	60mA @ 12V 38mA @ 24V
Switched Inputs	+Battery, Ground, Open
Switched Outputs	+Battery @ 1A Max
Communications	SAE J1939 (Tier II, III, IV)

1.1 Introduction

The TOUGH series controllers are designed to provide complete control, protection, AC metering, and engine instrumentation for both standard and electronic engines. Your S-TSCI Panel has been configured by Northern Lights to work with your genset. However, if you require custom configurations, the programming can be modified using either the front panel buttons or PC configuration software. See Appendix for information. TOUGH series controllers are ideally suited for severe duty applications where reliability is critical.

Features and Functions:

- SAE J1939 CAN Bus Protocol
- RPM via J1939
- Maintenance counter
- Exerciser Clock
- 150 Event Log
- Conformally coated for protection against moisture
- Gasket for water ingress protection IP65
- Passcode protected
- Automatic shutdowns and warnings
- Manual and Remote start

1.1 Introduction (Continued)

Available Displays:

- Engine Temperature
- Oil Pressure
- Fuel Level
- Engine Speed
- Battery Voltage
- Real Time Clock
- Engine Hours
- Time to Maintenance
- Text
- Warnings and Failures

1.2 This Manual

This manual is divided into three sections:

1. Hardware Installation
2. Operation / Configuration
3. Advanced Configuration

1.3 Receiving, Handling & Storage

Receiving:

Every effort is made to ensure that your S-TSC gen-set controller arrives at its destination undamaged and ready for installation. The packaging is designed to protect the S-TSC internal components as well as the enclosure. Care should be taken to protect the equipment from impact at all times. Do not remove the protective packaging until the equipment is at the installation site and ready to be installed.

When the S-TSC reaches its destination, the customer should inspect the shipping box and controller for any signs of damage that may have occurred during transportation. Any damage should be reported to a Northern Lights representative after a thorough inspection has been completed.

A shipping label affixed to the shipping box includes a variety of product and shipping information, such as items and Customer numbers. Make certain that this information matches your order information.

Handling:

As previously mentioned, each S-TSC gen-set controller is packaged in its own individual box. Do not discard the packing material until the controller is ready for installation. Protect the equipment from impact at all times and do not carelessly stack. Once the controller is at the installation site and ready to be installed, the packaging material may be removed.

Storage:

Although well packaged, this equipment is not suitable for outdoor storage. S-TSC is to be stored indoors for any period of time, it should be stored with its protective packaging in place. Protect the controller at all times from excessive moisture, dirty conditions, corrosive conditions, and other contaminants. It is strongly recommended that the package-protected equipment be stored in a climate-controlled environment of -20 to 65°C (-4 to 149°F), with a relative humidity of 80% or less. Do not stack other equipment on top of the stored controllers.

2 Installation

Generator systems contain high voltage circuitry and precautions to protect against it should be taken. Failing to power down and lock out equipment can cause damage, injury or death.

WARNING ***Wiring of this controller should be performed by qualified electricians only.***

The following general electrical safety precaution should be followed:

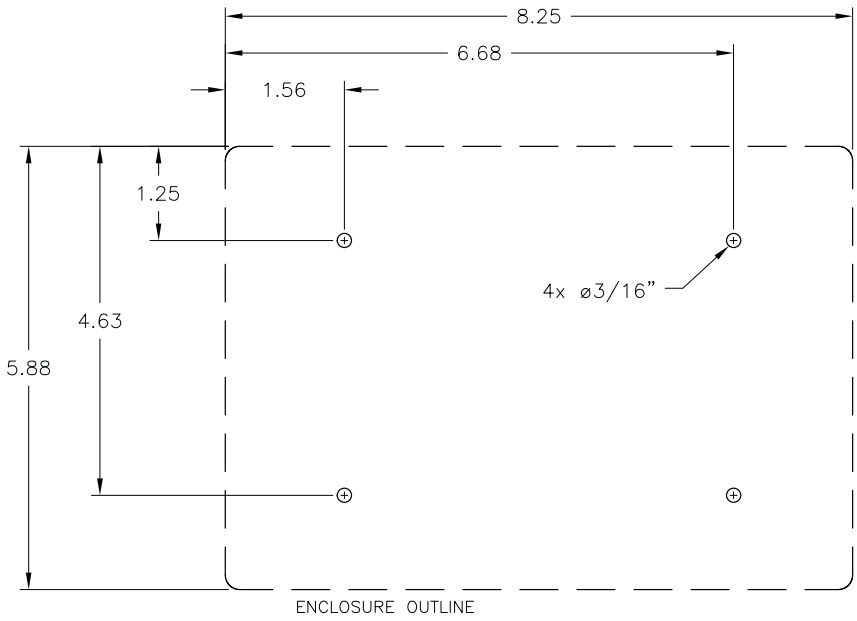
- Do a thorough inspection of the area before performing any maintenance.
- Keep fluids away from electrical equipment.
- Unplug connectors by pulling on the plug and not the cord.
- Use fuses where appropriate.
- Ensure all equipment is properly grounded.
- Provide support to wires to prevent stress on terminals.

To ensure proper and safe operation, caution must be taken at the installation site to make sure it is free from excessive moisture, fluctuating temperature, dust and corrosive materials.
Choose a mounting surface with the least amount of vibration, within reach of the cables connecting the unit to the generator set. There are two ways to mount the local (or remote) control panel.

Surface Mounting

The rear wall of the S-TSC enclosure has four, 3/16" diameter holes for mounting to a flat surface.

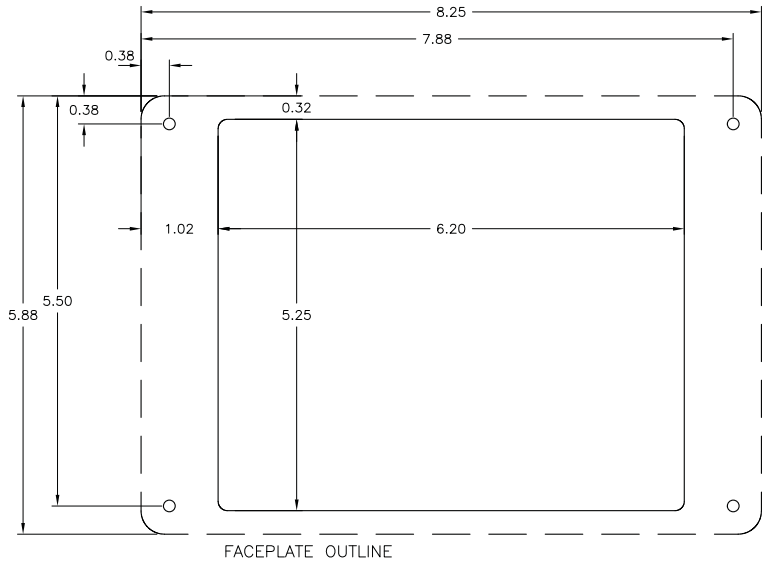
1. Choose a suitable location based on the criteria above, with adequate space for the S-TSC enclosure.
2. Using the dimensions below, drill pilot or through holes for the enclosure, depending on your mounting method.
3. Remove the four screws holding the S-TSC faceplate to the enclosure.
4. If desired, the connectors to the back of the S-TSC controller can be (carefully!) removed for enclosure installation. They will only plug in to the correct receptacles.
5. Secure the enclosure to the mounting surface.
6. Plug in the panel connectors if necessary, and secure the faceplate to the enclosure with the original screws.



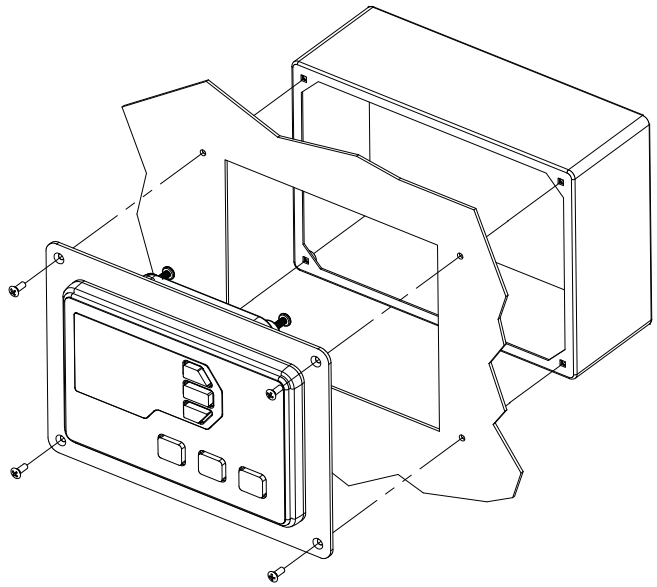
Flush Mounting

If low profile mounting is desired, the S-TSC faceplate and enclosure can be mounted on opposite sides of an existing panel.

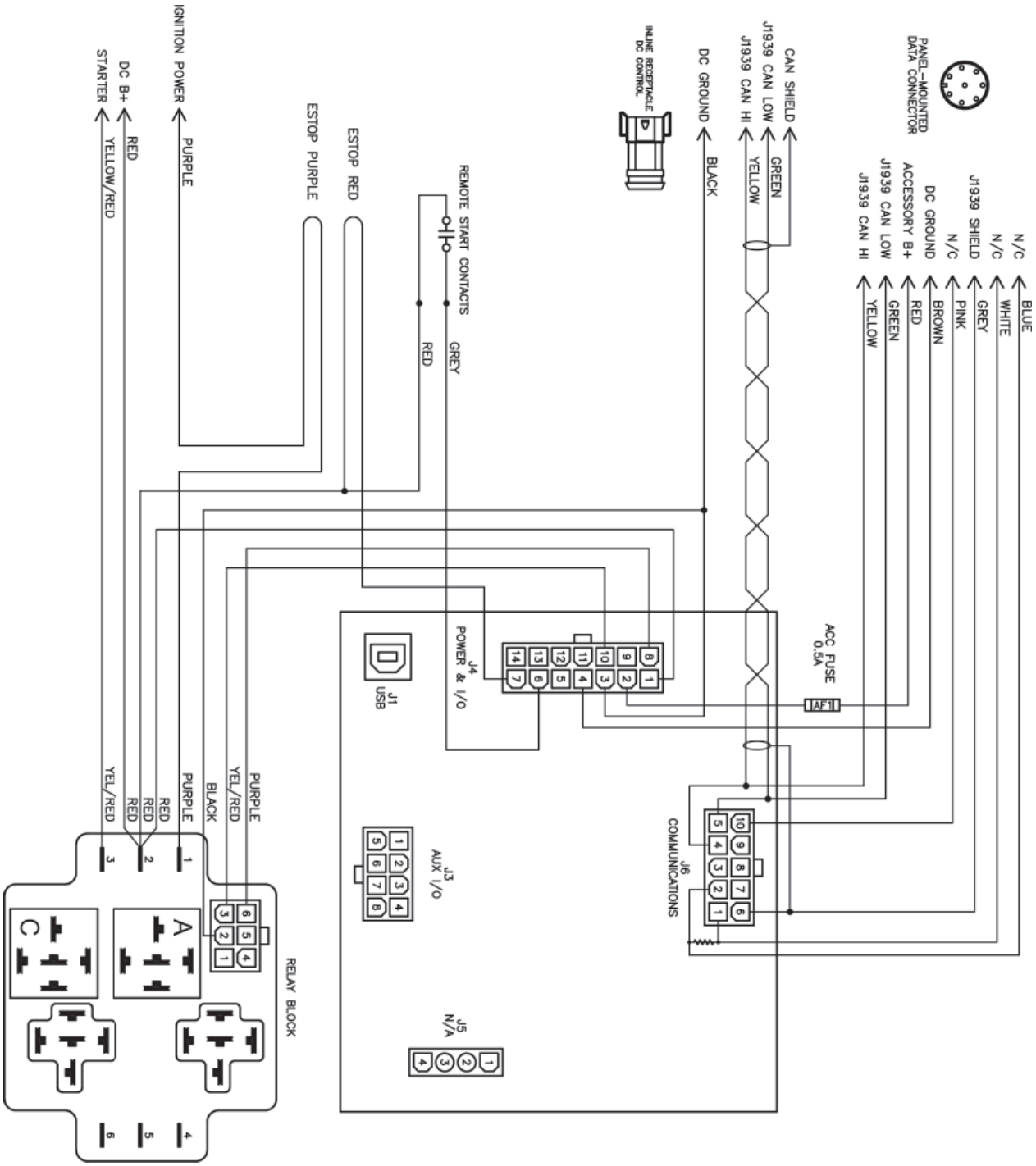
1. Choose a suitable location based on the criteria above, with adequate area for the S-TSC faceplate and adequate depth behind the panel for the enclosure body.
2. Drill four mounting holes and create a rectangular cutout in your panel to the dimensions shown below.
3. Remove the four screws holding the S-TSC faceplate to the enclosure.
4. If desired, the connectors to the back of the S-TSC controller can be (carefully!) removed for enclosure installation. They will only plug in to the correct receptacles.
5. Place the controller and faceplate on the front surface of your panel. Insert one of the faceplate screws in a mounting hole to maintain location if necessary.
6. Bring the enclosure close to the rear side of the panel, and plug the connectors into the back of the S-TSC.
7. Secure the enclosure to the rear of your panel by inserting the faceplate screws through the faceplate, through the holes in your panel, and threading into the enclosure.



FACEPLATE OUTLINE



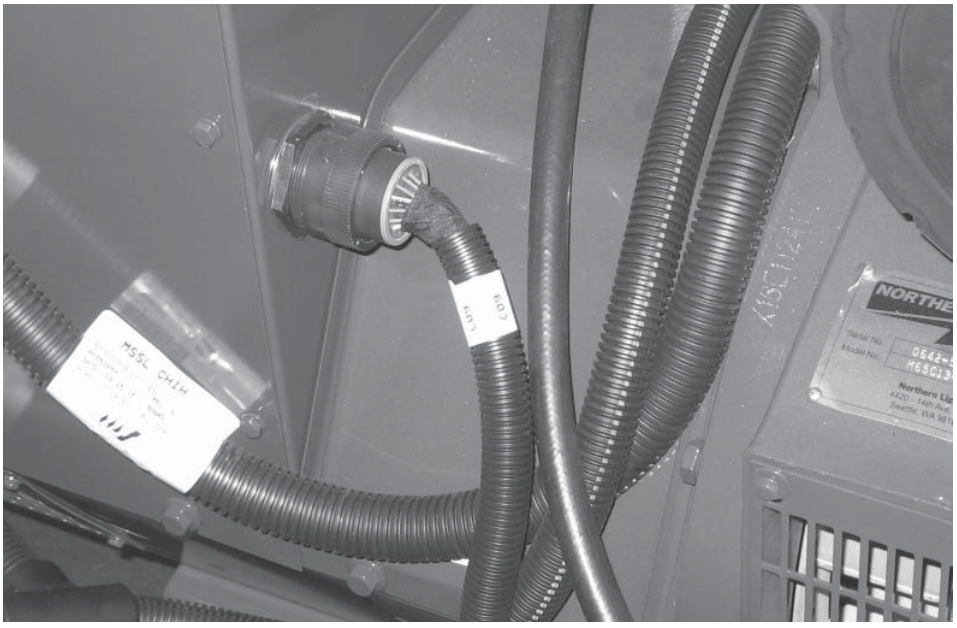
2.1 Panel Wiring Diagram



Wiring required for S-TSC controllers is installed by Northern Lights, and your controller has been configured for and tested with your generator set at the factory. Minimal installation, if any, is required.

Control Connections

1. Disconnect the large circular connector (marked C09) from the front of the generator junction box by unscrewing the collar while pulling.
2. Connect this plug to the circular connector on the TSC13 interface harness.
3. Connect the rectangular plug on the interface harness to the TSC13 panel pigtail.
4. Extension harnesses are available to install the panel further from the generator.



C09 connector plugged into J-Box

Data Connections

The circular connector on the bottom of the S-TSC enclosure provides power and data to an S-TSC remote panel. Connect the extension cable to this connector, and the other end to the remote panel.

Remote Start Contact Connection

The S-TSC panel includes a small harness pigtail including two wires with butt splice connectors installed. These can be connected to set of dry contacts to allow other equipment to start and stop the generator. With the controller in AUTO, close the contacts to run the generator, and open them to stop the generator.

The other wire loops are for an emergency stop switch connection. See the “Emergency Stop Wiring” section for details.

2.3 Emergency Stop Wiring

The remote start harness pigtail includes provisions for installing an E-Stop switch, consisting of two loops of wire (one red, one purple). To install an E-stop switch, cut these loops and install a normally closed, double-pole E-stop pushbutton as shown in the diagram below. The wires can be extended with 14 AWG wire to place the switch further from the unit, and multiple switches can be installed in series if desired. Test all E-stop switches after installation to ensure proper system functioning.

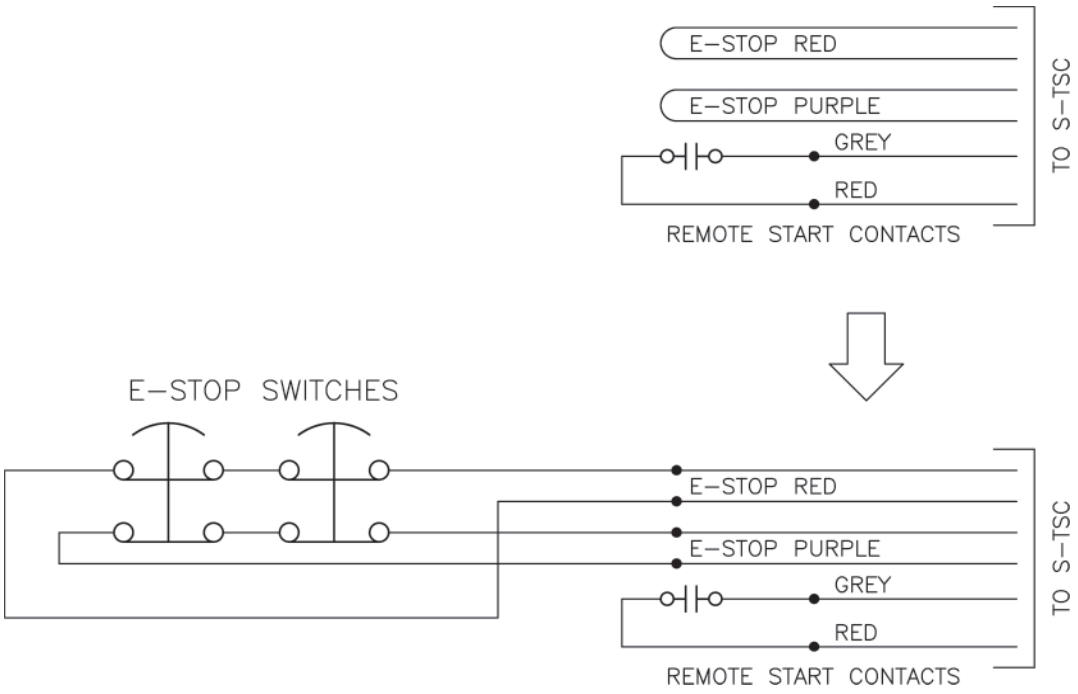


Figure TSC13 Estop

3 Using the Controller

Running the Generator

With the generator set fully installed, connected to the starting battery and ready to run, the S-TSC will power on and the LCD display will show the status of the generator.

Manual Run: Press the Run button. The controller will enter preheat mode for ten seconds, and then engage the starter. The starter will crank for a maximum of ten seconds. If the generator fails to start in that time, the controller will repeat the crank cycle for a total of three times. If the generator still fails to start after the third attempt, the S-TSC will display a failure message and return to stopped mode.

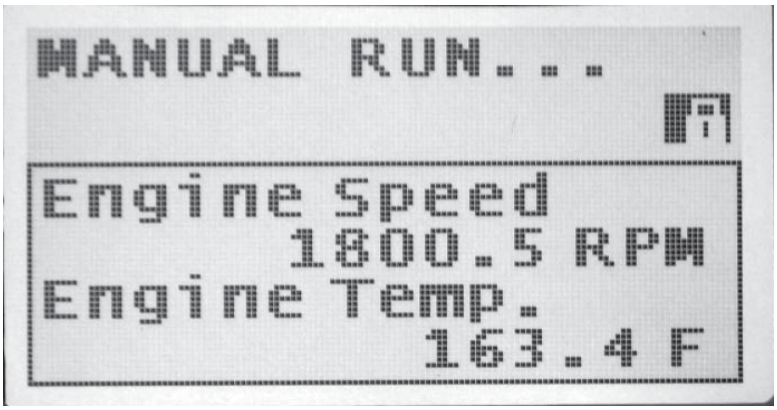
Press the Stop button to stop the generator.

Auto or Remote Start: From Off mode, press the Auto button to place the S-TSC into autostart mode. The generator set can then be run by

- Pressing the Run button on the local or remote panel
- Closing the remote start contacts

Likewise, the generator can be stopped by pressing the Stop button on the local or remote panel, or opening the remote start contacts.

Pressing the Stop button at the local panel will also revert the S-TSC from Auto to Off mode.



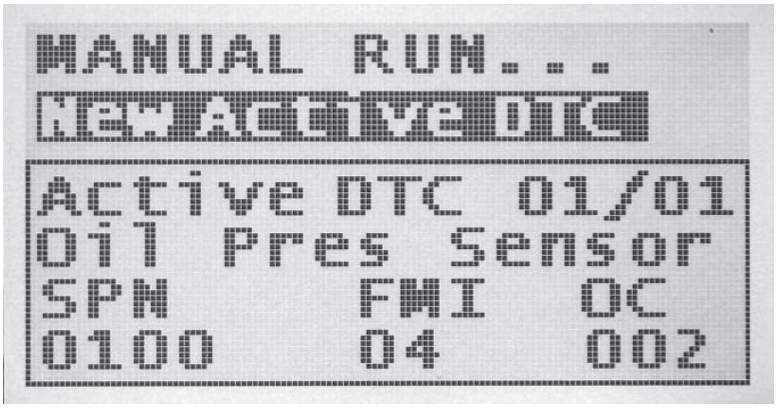
WARNING Warning! Placing the S-TSC in Off mode is not an adequate method of disabling the generator for service. The starting battery cables MUST be disconnected before attempting to adjust or service the generator set.

When the generator is running, the S-TSC display will scroll through engine information. Refer to the tables below for further information about display and control functions.

Warnings and Failures

The S-TSC is programmed with a number of warnings and shutdowns (failures). These include high engine temperature, low oil pressure, overspeed, underspeed, and other parameters specific to your generator. When a warning threshold is reached, a warning message will show on the display and be added to the event log. The generator will continue to run, and if the problem is remedied, the warning will turn off. If a failure threshold is exceeded, the generator will shut down. The failure will be displayed on the screen and recorded in the event log.

The S-TSC panel will also display Diagnostic Trouble Codes (DTCs) transmitted by the ECU. The more common codes include an abbreviated text description. These codes can be used to help troubleshoot any problems that may arise in the operation of the genset.



Using the Menu System

Task	Description
Entering Menu	When in the OFF mode, press the enter button to bring up the menu.
Navigating Menu	Once in the menu, use the up and down arrows to navigate. Pressing enter will move you into that menu.
Change a Setting	Scroll to the desired value and press enter to select. A check mark should now be beside that item. Press enter again to save the setting and return to the previous screen.
Scroll Parameters	When in Auto or Running mode, pressing the up and down arrows will scroll through the parameters pages.
Lock Screen	When in Auto or Running mode, you can lock the screen onto a certain parameter page by pressing enter. You can unlock the screen by pressing enter again.
Events History	Once in the menu, select Events History to view the most recent controller event. Use the up and down arrows to navigate to other events. The controller can store up to 150 events. If more than 150 events occur, the oldest event is deleted to make room for the next event.

Front Panel Items

Item	Name	Description
	Off Button	Used for turning off the engine or exiting out of Auto mode. This is not intended to function as an Emergency Stop as there are conditions in which it will not shutdown the engine. See the OFF Button Function section for more information
	Auto Button	Used for placing the controller into Auto mode. Once in Auto the controller waits for a start command to be received.
	Run Button	Used to start the engine manually. Must use the Off button to shutdown the engine if started from front panel.
	Up Button	Used for moving around in the menu, changing a settings value, or changing the currently displayed parameter page.
	Enter Button	Used for entering the menu system, accepting settings, or locking the LCD screen when viewing parameters.
	Down Button	Used for moving around in the menu, changing a settings value, or changing the currently displayed parameter page.
	Generator LED	Green = Engine running with no issues Amber = Engine running with warnings Red = Engine shutdown on failure

The following table describes the different operating modes of the controller:

Modes

Mode / State	Description
OFF	When in the OFF mode, the engine cannot be remotely started.
Auto	When in the Auto mode, the engine waits to receive a start command.
Running	When engine is Running, the controller monitors engine parameters and waits to receive a stop command.
Failure	When a failure occurs, the controller shuts down the engine and displays reason for failure. The unit must be reset using the front panel OFF button with the exception of Modbus.
Menu	When in the menu you can change settings and view the events history.

The following table describes the different methods in which a controller can start. The controller *must* be in the AUTO mode in order to start for all methods with the exception of Manual Run.

Starting Methods

Methods	Description
Manual Run	Pressing the Run button will start the engine. You must press the OFF button to shutdown the engine.
Start / Stop Switched Input	When this input is active the engine will start. When the input becomes inactive the engine will shutdown.

Appendix A: Settings

The following section relates to settings that can be changed to alter the way the controller performs its functions. Read and review these sections carefully to ensure your settings are set correctly for your engine. The default password, when required, is 0000.

A.1 Operator Setup

The following settings are used to change the way the user interacts with the controller. They are not password protected and can be changed by anyone from the front panel.

Name	Range	Description
Lamp Test	Function	Performs a lamp test on the LED's when selected.
Display -> LCD Reverse	Function	Reverses the white and black pixels when selected.
Display -> LCD Contrast	5 ~ 95%	Changes the contrast of the LCD.
Display -> Page Scroll	1 ~ 10 seconds	Amount of time between each auto scroll of the parameter pages.
Display -> Message Pop-Up	1 ~ 10 seconds	Amount of time each message is displayed on the screen before displaying next message in buffer.
Display -> LCD Backlight Timeout	10 ~ 600 seconds	Amount of time the LCD Backlight stays on after button activity stops.
Date / Time -> Date Change	1 ~ 31 days 1 ~ 12 months 2000 ~ 2099 years	Sets the date.
Date / Time -> Time Change	0 ~ 23 hours 0 ~ 59 minutes 0 ~ 59 seconds	Sets the time.
Date / Time -> Daylight Savings	Enable ~ Disable	Turns Daylight Savings Time on or off.
Units -> Temperature Unit	°F or °C	Selects the units in which temperature is displayed.
Units -> Pressure Unit	PSI or kPa	Selects the units in which oil pressure is displayed.
Run from OFF	Enable ~ Disable	When enabled, allows user to start engine using the run button while in the OFF mode. When disabled the controller must be placed in AUTO mode before the run button can start the engine.

A.2 OFF Button Function

The OFF button on the front panel of the controller can be configured to function in 3 different ways while the engine is running. To change the setting, go to Main Menu > Timers > Passcode > Engine Logic > OFF Button Func. The table below describes each of these functions:

Function	Description
Cooldown	This function causes the controller to go into cooldown. Pressing the OFF button again will cause the engine to shutdown.
Shutdown	This function bypasses Cooldown and causes the engine to shutdown.
Force Cooldown	This function causes the controller to go into cooldown. Pressing the OFF button will have no affect as the controller is forcing the engine to perform a full cooldown.

WARNING: If the controller receives a command to start while in Cooldown, it will leave the Cooldown mode and go back to Running mode.

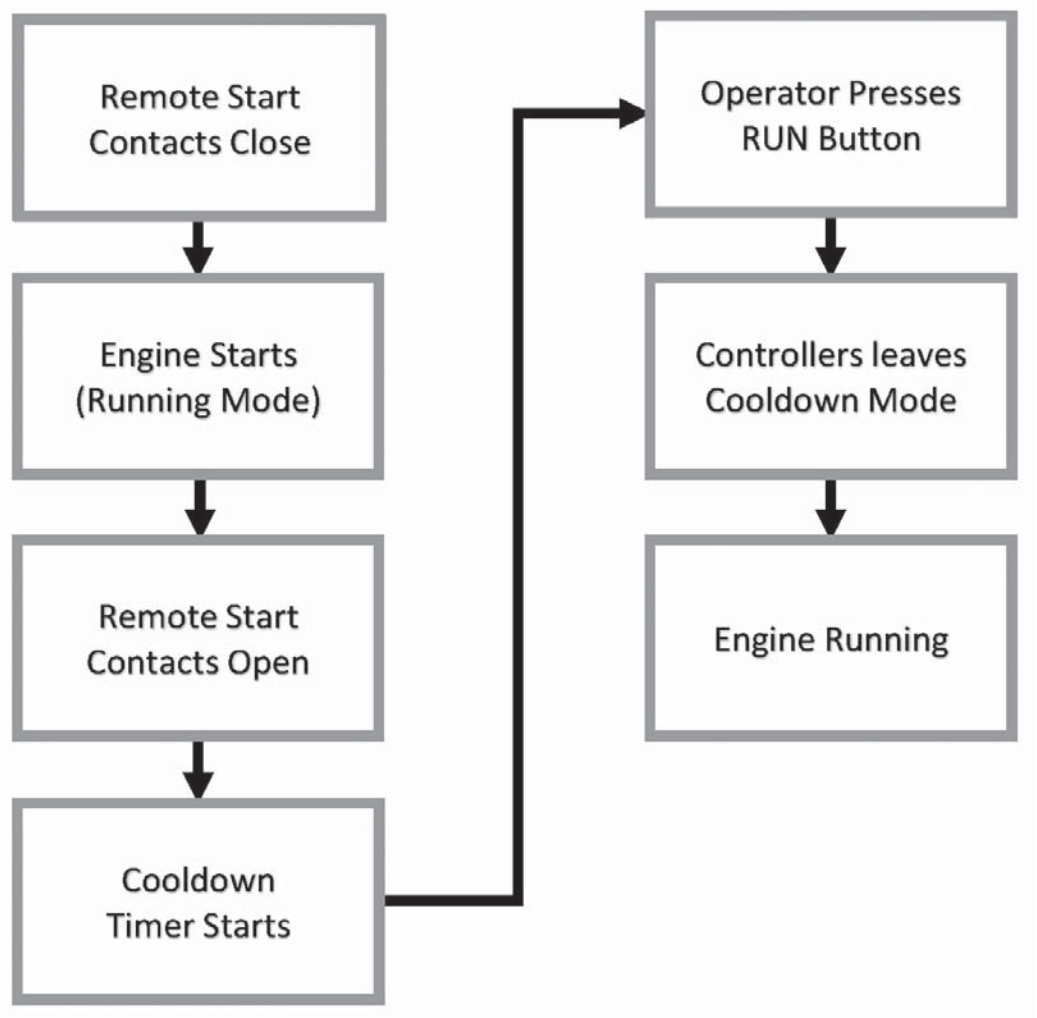
A.3 Using Cooldown Mode

When the controller is configured to have a cooldown period for the engine, there is some special functionality that must be considered. Note that Northern Lights does not recommend running a generatror set unloaded for any significant length of time. The cooldown period should be programmed for no longer than two minutes. To program a cooldown period, go to Main Menu > Timers > Passcode > Engine Logic > Cooldown Time.

The cooldown period is special in that during this time, it will accept a Start Command. This means that if the engine is cooling down and a start command is received, the controller will be placed back into a running mode and will not shutdown.

Example: The following is an example of how the cooldown functionality works.

1. Remote Start contacts close
2. Engine starts and is in the running mode
3. Remote Start contacts open
4. Engine starts cooldown period
5. User presses RUN button on the front panel
6. Engine moves back into running mode and does not shutdown
7. Engine can now only be shutdown by the OFF button or Emergency Stop input



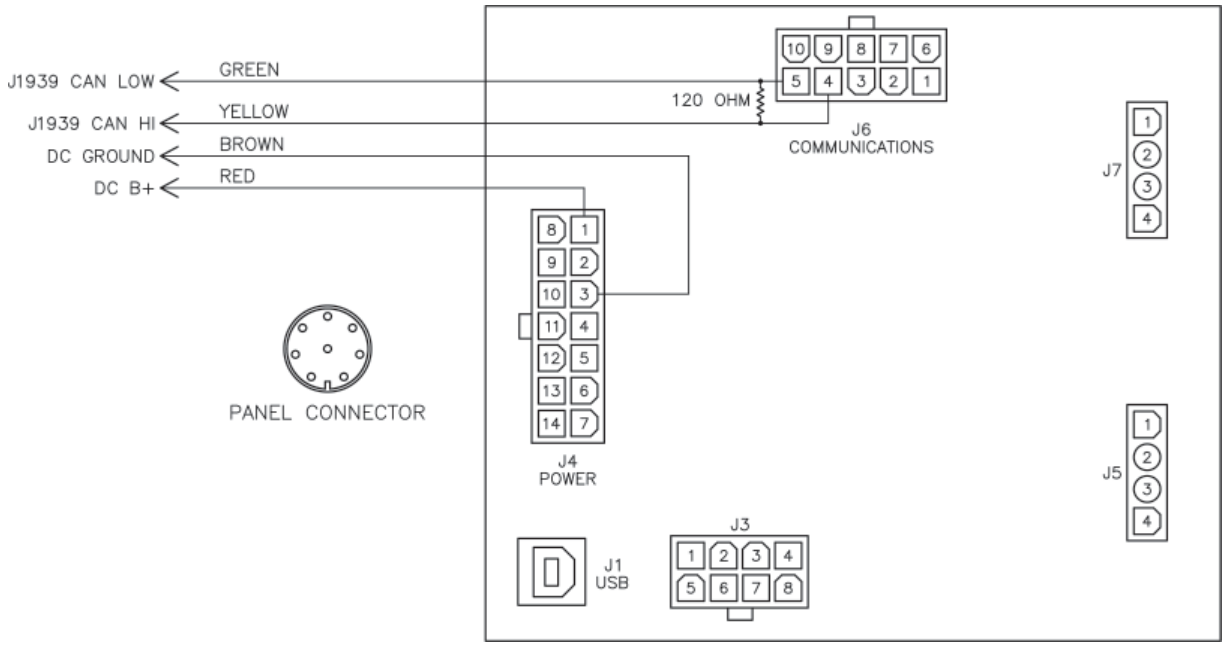
A.4 Maintenance Counter

The controller has the ability to count down the time between scheduled maintenance by a technician. Once maintenance is required, the controller will alert the operator via the LCD screen. The following settings are used to configure the maintenance timer.

Name	Range	Description
Reset Counter	Enable ~ Disable	Once the maintenance count interval expires, use this setting to reset the time and turn off the switched output (if enabled).
Enable Counter	Enable ~ Disable	Determines the number of hours between required maintenance. A switched output can be configured to turn on once the count interval expires.
Counter Interval	10 ~ 9990 hours	Enables or disables the maintenance function.

To activate and set the counter, go to Main Menu > Timers > Passcode > Maintenance, enable the timer and set the interval as desired. This menu location is also used to reset the maintenance counter.
To find out the amount of time until the next maintenance, go to Main Menu > Device Info > Maintenance
Maintenance counter is disabled if '----' is displayed. A negative number indicates the amount of time since maintenance timer expired.

B Appendix B: Additional Resources



TSC Remote Panel Wiring

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