

PRODUCT MANUAL

ENGINE CONTROL PANEL

RX SERIES



Part Number: RX-A1730

Revision: V1.0

Engine Type: J1939 Electronic Engines

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MODULE CONNECTOR

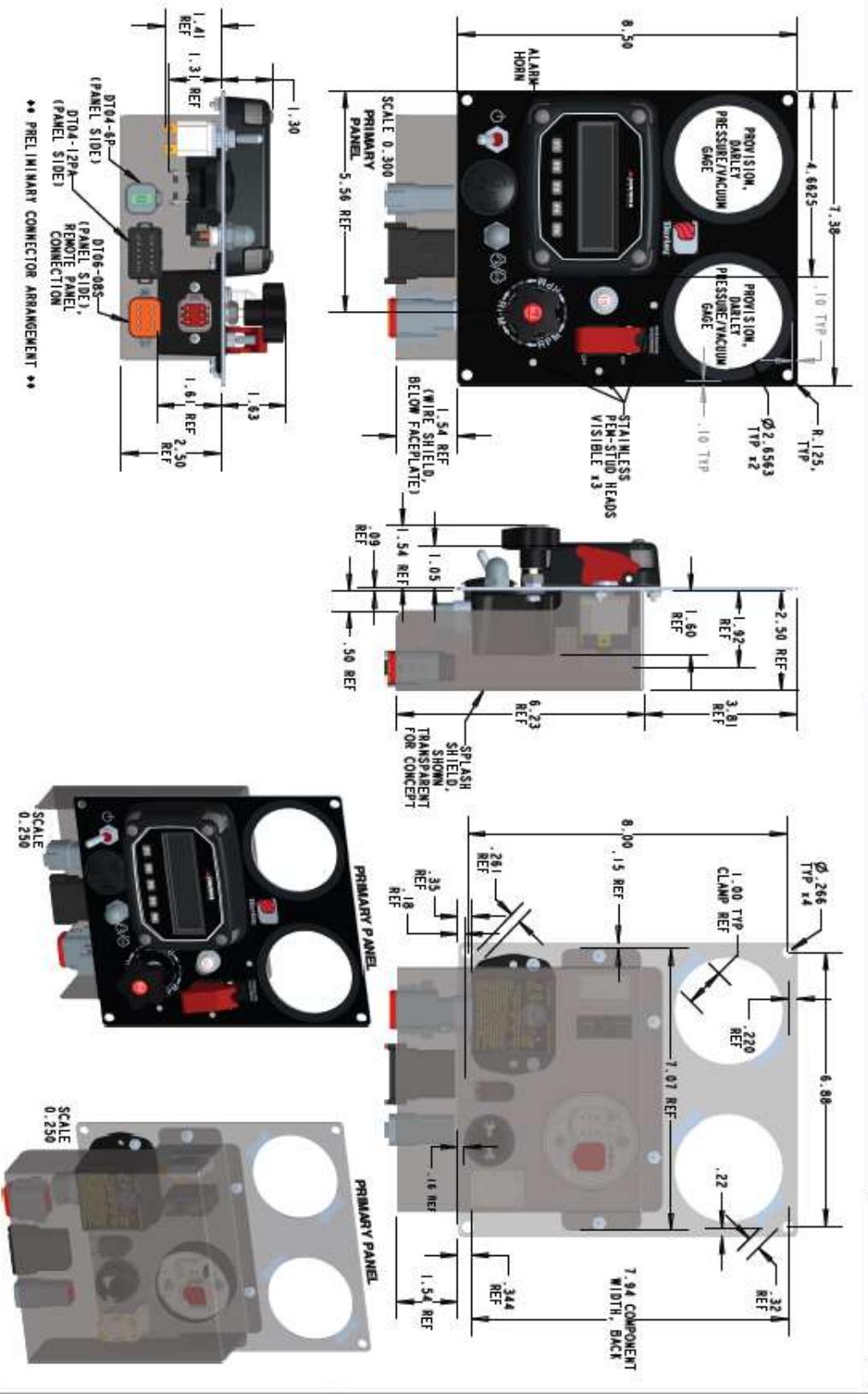
WARRANTY.....36

INSTALLATION

MOUNTING LOCATION

To ensure a long life from your module, please review the following installation guidelines.

- **HEAT:** Be sure to take into account excessive heat areas when mounting your control panel. Stay away from turbo chargers, exhaust manifolds, diesel particulate filters or any other location that would put the control panel in the vicinity of excessive heat
- **ENCLOSURE MOUNT:** If your installation is better suited for a full control panel rather than a module, contact Controls, Inc. for available options or assistance in designing an enclosure for your application.
- **CONVIENCE OF USE:** Study the final assembly of the piece of equipment and how it will be used. Take into account the operator when locating the module. Ease of access to the unit, buttons and display are all critical in allowing the operator to successfully and safely operate the module. Extension harnesses are available from Controls, Inc. if the engine harness being used does not allow for proper location selection.
- **WEATHER AND WASHDOWN:** The control panel is designed to be weather tight and can be used in open outdoor conditions. The enclosure has a Gore vent, located on the rear of the enclosure, which will allow for breathing between the interior of the control enclosure and the outside environment. Be sure to not apply undue water pressure during wash down and do not directly spray the Gore vent area.
- **HARNESS ROUTING:** The use of common sense with respect to harness routing and drip loops can go a long way in the prevention of unintended water intrusion. Also take into account the stresses put on the harnessing and the proximity to heat sources as well. For spark ignited engines, be sure to keep the panel wiring at least 12 inches from the ignition wires.



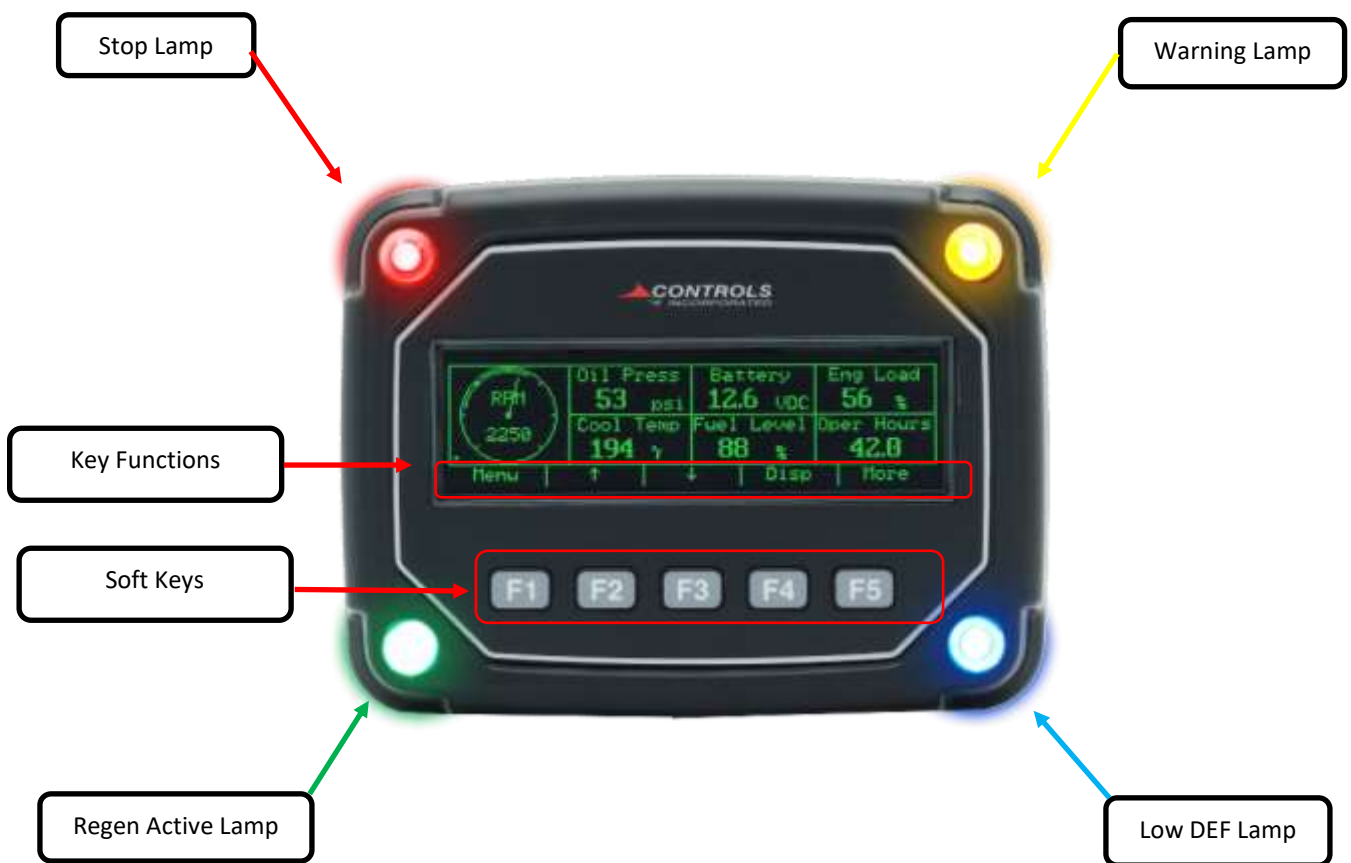
NOTE:
 1. CONCEPT LAYOUT GENERATED BASED ON 18-FEB-2025 TOP GAUGES VARIATION FROM EXISTING DEMO PANEL.

| TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED | | CONTROL SYSTEMS | |
|---|------------------------------|--------------------|----------------------------|
| DECIMAL PLACE | 0.0 = ±0.000 | MM CONTROL SYSTEMS | 390-239-435 |
| TOLERANCES | 0.00 = ±0.030 | NEXT ASS'Y: | DABLEY / NUBOTA 24HP |
| ANGLES: | XX = ±0.5° | DESCRIPTION: | PANEL CONCEPT, PRIMARY |
| DRAWING UNITS UNLESS SPECIFIED: | INCHES | MATERIAL: | REFERENCE BILL OF MATERIAL |
| DATE: | DATE: 18-MAR-2025 | STATUS: | CONCEPT |
| BY: | DATE: 24-MAR-2025 | MODEL: | RX |
| DESCRIPTION: | CONFIGURATION: A1730R-SHIELD | DRAWING NUMBER: | |
| REV: | DATE: | SHEET: | 1 OF 1 |
| | | | RX-A1730R-SHIELD |

OPERATION

POWER UP

Turn on the power to the module. The display will illuminate and show the module part number version in the upper left status line and the graphical logo will be centered in the screen. The LED indicators will turn on for one second to verify operation.



SPEED CONTROL - ELECTRONIC ENGINES

The display can control the engine's speed using J1939 Torque Speed Control (TSC1). When the engine is started, the control panel will request the minimum programmed speed. Pressing the Function Up button will cause the panel to increase the requested speed. The display will place an up or down arrow to the right of the RPM displayed to indicate that a change in speed is being requested. See Speed Control Options for more details.



SPEED CONTROL OPTIONS

ELECTRONIC ENGINE SPEED CONTROL

The display can control the engine's speed using J1939 Torque Speed Control (TSC1). When the engine is started, the control panel will request the minimum programmed speed. Pressing the Function Up button will cause the panel to increase the requested speed. The display will place an up or down arrow to the right of the RPM displayed to indicate that a change in speed is being requested.

Please note that if the low idle speed on the engine's ECU is higher than the minimum speed programmed in the controller, the actual engine RPM will be the low ECU setting until the controller's speed request command (TSC1) exceeds the ECU low idle speed. This holds true for the high idle speed set in the ECU as well.

The control panels TSC address and the engine's ECU address must match. Most major engine manufacturer's TSC addresses are loaded into the control panel when that engine manufacturer is selected in the Quick Setup. However, there may be instances where ECU programming may vary. The control does have the ability to change the TSC address manually in the CAN Configuration menu. If speed control continues to be elusive, verify that the engine's ECU does have J1939 throttling enabled.

REQUESTED SPEED VERSUS ACTUAL SPEED

The requested speed by the control panel cannot exceed the maximum programmed speed of the engine ECU. Once the speed is being controlled by the module, the acceleration will be based on the ramp rate in the controller. If precise speed control is desired, be sure to have the ECU governing mode set to Isochronous or Zero Droop; otherwise the actual engine speed will be somewhat below the requested TSC. To verify the speed being requested by the control module, access the **Engine Parameters** menu. From here, you can see the Requested TSC and compare it to the Actual RPM.

| Engine Parameters | | | | | | | | |
|--------------------|--|--------------|--|----|--|------|--|-------|
| Total Hours | | Hours | | | | | | |
| Requested TSC | | 800 RPM | | | | | | |
| Other TSC Reqst | | ---- RPM | | | | | | |
| ↓Actual RPM | | ---- RPM | | | | | | |
| Exit | | Back | | Up | | Down | | Enter |

TSC VERNIER THROTTLE

TSC Vernier is the most popular throttle selection when operating in the manual start mode. The operator can control the engine speed anywhere between the programmed speed range. This throttle type allows you to set the minimum engine speed, maximum engine speed, ramp rate, curve type and bump speed increments without the use of a computer. At engine start, the display will request the minimum engine speed. When the operator presses the Function Up button, the engine speed will ramp up at the programmed rate until the Function Up button is released. The display will indicate an up arrow to the right of the RPM. If the maximum speed is reached, the up arrow on the display will be replaced by an X indicating the maximum speed has been reached. This same operation applies to slowing the engine speed down using the down arrow button. A single press of the Function Up or Function Down button will cause the RPM of the engine to change in that direction by the bump increment, typically set to 20 RPM.

In the example below, the engine would start at 800 RPM and could be operated up to 2400 RPM. Pressing a throttle button momentarily would change the RPM by increments of 20 RPM. Holding a throttle button down would change it by 100 RPM/Second.

| Throttle Configuration | | | | | | | | |
|--------------------------|--|------|------------------------|----|--|------|--|-------|
| Throttle Type | | | Use Vernier | | | | | |
| Cooperative TSC | | | Primary | | | | | |
| Coop. TSC regain | | | Off | | | | | |
| ↓Coop. TSC timeout | | | 50 mSec | | | | | |
| Exit | | Back | | Up | | Down | | Enter |

TSC BUMP SPEED

The operator can control the engine speed anywhere between the programmed speed range. However, changes in speed are limited to single presses of the Function Up and Function Down. Each press will change the requested RPM by the programmed Bump speed.

TSC MULTISTATE THROTTLE

Another widely used throttle type in manual mode allows the operator to increment the engine speed between predetermined speed settings by pressing the Function Up and Function Down buttons. The number of discrete speeds set is up to four ascending speeds. After the operator starts the engine, the controller will run the engine at Speed 1 setting, the lowest speed. Pressing the Function Up button momentarily will ramp the engine speed up to the Speed 2 setting. Another press would accelerate to speed three and so on. Pressing the Function Down button will increment the speed to the next lower speed. You cannot operate the engine between the speed settings. Leave all unused speeds below the previous speed and the module will ignore them. In the example below, the engine will start at 800 RPM. Pressing the Function Up button will ramp the engine to 1600 RPM. Press it again and it will accelerate to 2000 RPM. Pressing the Function Up again will have no effect on the engine speed since Multistate Speed 4 is set below the Speed 3 setting.

| Throttle Configuration | | | | |
|------------------------|----------|----|------|-------|
| ↑ Multistate Spd 1 | 2000 RPM | | | |
| Multistate Spd 2 | 1600 RPM | | | |
| Multistate Spd 3 | 800 RPM | | | |
| ↓ Multistate Spd 4 | 800 RPM | | | |
| Exit | Back | Up | Down | Enter |

TSC HIGH-LOW MOMENTARY THROTTLE

This throttle option can be used if only two speeds are desired, a low idle and a high operating speed. The engine starts at the programmed minimum speed and only accelerates when the Function Up button is pressed and held. Once the Function Up button is released, the speed automatically drops back to the low idle speed. With this option, it is fairly typical to assign a digital input to the Throttle Up function to allow a remote switch to be installed elsewhere on the equipment.

MODBUS THROTTLE

Engine speed can be requested through the modules RS485 MODBUS interface. Contact Controls, Inc. for a complete register map. The example for speed control is below. Use of 40004 or 40051 is acceptable.

| Register | Description | Decimal Places | Units | Range per Bit | Scaling per Bit |
|----------|--------------|----------------|-------|---------------|-----------------|
| 40004 | Engine Speed | 0 | RPM | 0 - 8031 | 1 RPM |
| 40051 | Engine Speed | 0 | RPM | 0 - 8031 | 1 RPM |

| Examples |
|--|
| Set Slave #1 Speed to 1234 RPM (using register 40004) Command: 01 06 00 03 04 D2 FB 57 Response: 01 06 00 03 04 D2 FB 57 |
| Set Slave #1 Speed to 1234 RPM (using register 40051) Command: 01 06 00 32 04 D2 AA 98 Response: 01 06 00 32 04 D2 AA 98 |

SPEED / TORQUE LIMIT

If another throttle device (not the display) is being used for speed control, the module can provide a PGN for Speed and/or Torque Limit. The limits will be based on the programmed Speed Limit and Torque Derate Limit found under the Throttle Configuration menu.

COOPERATIVE THROTTLE

Controls, Inc. modules can be installed together on the same engine to provide additional display and speed control from multiple locations. The main module must be configured as the Primary, while the remaining modules should be set to remote.

TWIST THROTTLE KNOB

The TT-100 throttle knob is available to work with Controls, Inc. modules as well. Contact CI for more details.



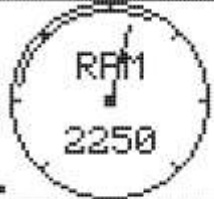
DISPLAY CONFIGURATION

GRAPHICAL DISPLAY

The RX Series uses a 3.2" diagonally measured, OLED (Organic Light Emitting Diode) display with a resolution of 256x64 pixels. The OLED technology provides a vibrant display that is highly readable in direct sunlight while also offering a wide temperature range of -40C to +80C for both operating and storage.

DISPLAY LAYOUT

The display is defined into 10 sections. Sections 1 through 8 are defined as the rectangles that contain various engine and system parameters. They are numbered from the upper left as Area 1, with Area 2 directly below and continuing as shown below.

| | | | |
|---|-----------|------------|------------|
|  | Oil Press | Battery | Eng Load |
| | 53 psi | 12.6 VDC | 56 % |
| | Cool Temp | Fuel Level | Oper Hours |
| | 194 °F | 88 % | 42.0 |
| Menu | ↑ | ↓ | Disp |
| | | | More |

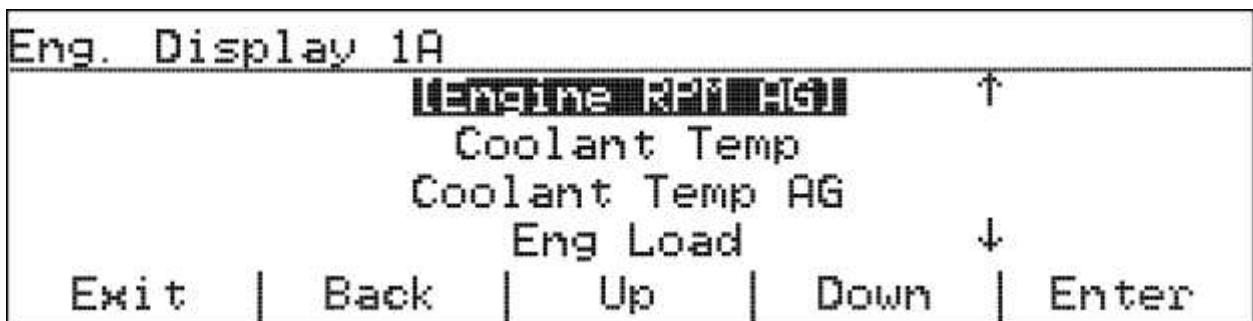
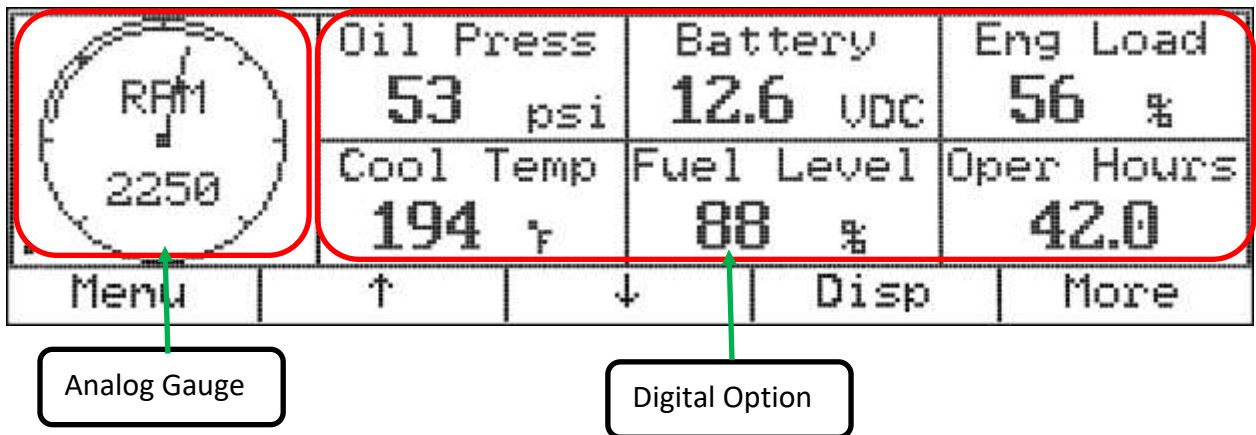
| | | | |
|---------------|---------------|---------------|---------------|
| Area 1 | Area 3 | Area 5 | Area 7 |
| Area 2 | Area 4 | Area 6 | Area 8 |

DISPLAY CUSTOMIZATION

There are three objects that can be used to create your display. Digital and Analog structures are available to tailor the screen to display what is important to your piece of equipment. Configuration is available in Areas 1 through 8.

Digital – This will provide information on the parameter, the value in digital format and the value’s unit-of-measure. Each digital parameter will occupy one area of the display.

Analog – This will provide a round gauge display of the parameter, the value in digital format, an indicating needle against the dial, the value’s unit-of measure, and an indication of the acceptable range. Each analog display will occupy two areas on the display and must be set at any of the odd numbered areas. Each analog gauge option will occupy the area set plus 1 area. For example, if you set the Engine RPM [AG] to Area 1, Area 2 will be over written with the lower half of the gauge automatically.



PROTECTION OPTIONS

ECU SAFETY SHUTDOWNS AND WARNINGS

Once the engine is started, the engine's ECU has primary control over the operation of the engine under safe conditions. If the ECU detects that any of its critical parameters are out of tolerance, the ECU can take a variety of actions, including derating of the engine horsepower or complete engine shut down. The display will illuminate the red or yellow LED *as instructed by the ECU* and display any trouble code *as presented from the ECU*. Some engine manufacturers have unique codes that the control panel will show in lieu of the J1939 DM1 messaging. Otherwise, codes will be displayed as J1939 SPN (Suspect Parameter Number) and FMI (Failure Mode Identifier).

MODULE SAFETY SHUTDOWNS AND WARNINGS

The control panel also has the ability to monitor the engine vitals *if configured*. The ability to set pre alarms and alarms in the panel is supported to back up the ECUs safeties in the event the ECU shutdowns were not enabled or a more conservative setting is desired. If the parameter falls outside of the normal operating range, the control panel will stop the engine by removing power to the fuel solenoid or ignition circuit. The display will indicate the reason for the shutdown and a red alarm lamp will be illuminated in the upper left corner of the module.

LOW POWER (SLEEP) MODE

A low power mode is available to allow the module to minimize power consumption during times when the panel is on, but the engine is not running. To minimize current draw, the module goes into a sleep mode after a programmable time period (two-minute default) after being powered on without the engine starting or after a protection shutdown occurs.

There are two sleep modes.

Normal State – The module is powered, but the engine is not started. This can be selected to occur in Off/Manual, Auto or both operating modes. The display goes blank and the red lamp blinks once every ten seconds. The engine's ECU circuit is de-energized as to not allow a continuous power drain. No faults are present.

Alarm State – The module is powered; the engine is not running and an alarm or fault is present. The display goes blank and the red lamp stays on and blinks off once every ten seconds. Note, the display will maintain the fault condition that shut the engine down as well as the time of day it shut down in area 10 of the display.

In either case, the module will wake up and resume normal operation if any button is pressed or the power is cycled off and then back on. *However, if the operator turned the power off and then back on, the display would not indicate the safety shutdown message, but the alarm would be recorded in the Alarm Log menu section for reference.*



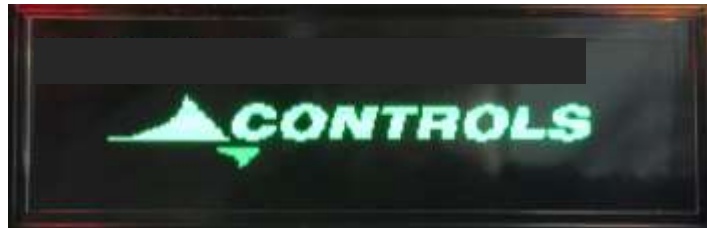
OTHER MODULE FUNCTIONALITY

STANDARD FEATURES

The control panel has many options that can be configured, enabled or selected that will enhance the operation of the equipment. A list of items is below with descriptions on the selection and use of each.

CUSTOM SPLASH SCREEN

The control panel can be programmed to customize the initial display screen when powered up. OEMs can provide a graphic file of their artwork to CI for loading into the firmware application.

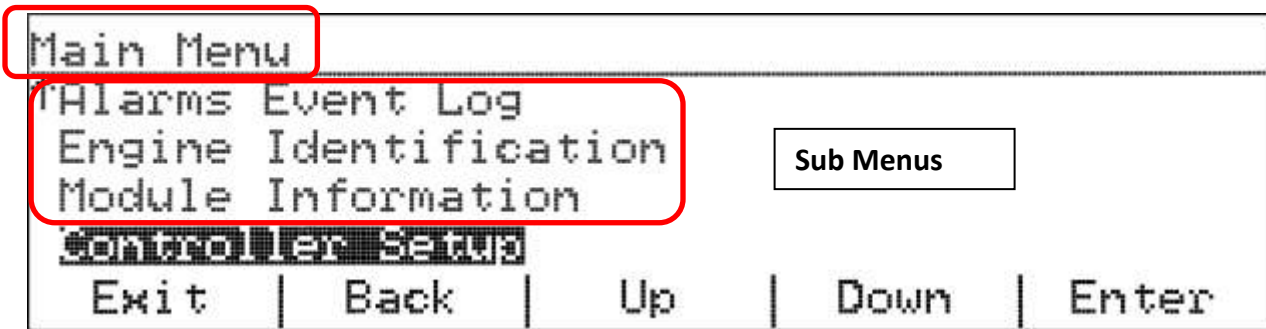


MAIN MENU ACCESS

To access the module menu system, apply power to the module and press the Menu Function button.



If the engine is running, the throttle buttons will remain active for speed control. The menu system is broken into two main sections; the Operator **Main Menu** and the Controller **Setup Menu**. The operator menu contains information about the engine and module. The topics will vary based on the engine type and control panel model. Pressing the Up and Down button will move the highlighted selection up or down in the list. Indicator Arrows show if there are additional subjects above or below the current screen view. Pressing the Enter button will select the highlighted sub menu.



MAIN MENU TOPICS

The Main Menu contains many areas that are useful for the routine operation and troubleshooting of an industrial engine. Each feature cannot be covered in this manual; however, a list of main topics is below.

ACTIVE ENGINE FAULT CODES

If the engine's ECU is generating trouble codes, they can be viewed from this menu. Typically, a yellow warning lamp will be illuminated as well.

```
Active Engine Fault Codes
End of List

Exit | Back | Up | Down | Enter
```

STORED ENGINE FAULT CODES

The engine's ECU will store its fault codes. The module can be used to view and clear them.

```
Stored Engine Fault Codes
End of List

Exit | Back | Up | Down | Enter
```

ENGINE PARAMETERS

Engine's ECUs collect a large amount of information about the operating conditions of the engine. To view more of these details and gain a better understanding of your engine's operating conditions, view this menu.

| Engine Parameters | | | | |
|-------------------|--|----------|--|-------------------|
| Total Hours | | 2 Hrs | | |
| Requested TSC | | 800 RPM | | |
| Other TSC Reqst | | ---- RPM | | |
| ↓Actual RPM | | ---- RPM | | |
| Exit | | Back | | Up Down Enter |

EMISSIONS PARAMETERS

For engines equipped with emission components, a menu is available to view these details.

| Emissions Parameters | | | | |
|----------------------|--|------------------|--|-------------------|
| Regen Options | | Auto | | |
| Regen Inhibit | | Not Inhibited | | |
| Soot Level | | 0 | | |
| ↓DPF Ash Ld | | Waiting for Data | | |
| Exit | | Back | | Up Down Enter |

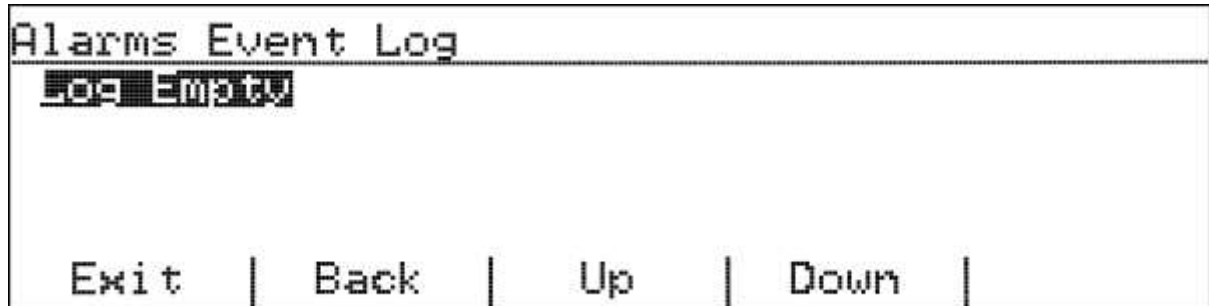
OPERATION EVENT LOG

The module will record the last 32 operational events and show the most recent first. The event log can be cleared in the Module Configuration menu of the Controller Setup area.

| Operation Event Log | | | | |
|---------------------|--|------|--|-----------|
| Log Empty | | | | |
| Exit | | Back | | Up Down |

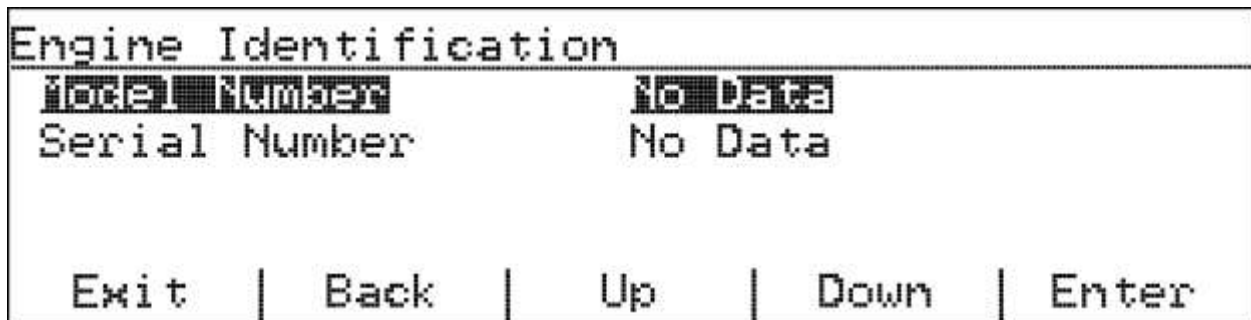
ALARMS EVENT LOG

The module will record the last 32 Alarm events and show the most recent first. What is different about this log when compared to the Stored Code list is that the Alarm Log will record both the ECU codes and module monitored events, such as low fuel level or other non-ECU monitored events. This paints a more complete picture of what is occurring at the engine while troubleshooting. This log can also be cleared under the Module Configuration menu.



ENGINE IDENTIFICATION

Use this menu to view the engine's Model and Serial number.



MODULE INFORMATION

Use this menu to view the detailed information about your RX Series module.

MODULE PROGRAMMING

PROGRAMMING OPTIONS

There are two methods for programming your control panel. One is by using the module's built in menu system and the other is done using a PC based application called CI Station.

PC BASED PROGRAMMING

The CI Station is available in a kit form that includes the PC application, USB programming adapter, power supply and interconnect harnessing. The CI Station allows the user to save configurations and reuse them over and over for production line programming or to configure replacement panels to match the original OEM programming. Contact Controls, Inc. for more details.

The screenshot displays the CI Station software interface. At the top, there is a navigation bar with icons for 'Open Profile', 'Save Profile', 'Save Profile', 'Print Profile', 'Connect', 'Dis-Connect', 'COM Port', 'Connection Status', 'Model', 'Firmware Version', 'Table Token Version', 'Configuration Filename', 'Program Controller', 'Help', 'Set Clock', and 'Flash Update'. The 'Connection Status' is shown as 'Not Connected'. Below this, a sidebar menu lists various configuration options: Start Page, System Settings, Clock Setup, Eng. Parameter Configuration, Scheduler Configuration, Input Configuration, Output Configuration, Throttle Configuration, Engine Safety Configuration, Module Configuration, Display Configuration, CAN Configuration, Auto Start Configuration, Batt. Recharge Configuration, Maintenance Configuration, Emissions Configuration, MODBUS Configuration, Clutch Configuration, Remote Inputs, and Remote Outputs. The main area shows a 'ReSync with Controller' button and a configuration table:

| | | |
|--------------------|----------------|-----|
| Configuration Name | MX0001 | |
| Engine Mfr. | John Deere 2 | |
| Engine Type | Electronic FT4 | |
| TSC Abs Min Spd | 650 | RPM |
| TSC Abs Max Spd | 4000 | RPM |
| Press&Temp Units | English | |
| Rem 4-20mA Sense | 237 Ohm | |

Below the table, there is a promotional image for the 'CI STATION Payload Management System' featuring a control panel and various components. The status bar at the bottom indicates 'Status: Programming Controller'.

MODULE BASED PROGRAMMING

The control panel will come with a factory configuration unless otherwise specified. Consult with your sales channel for modifications to the factory configurations.

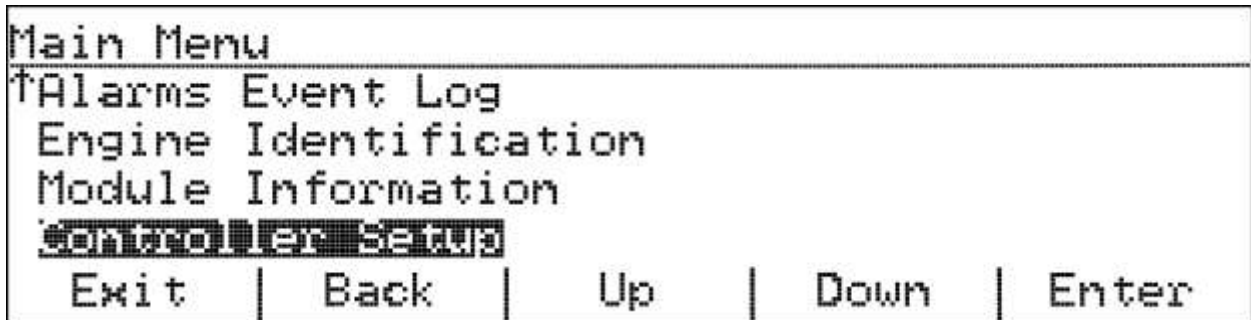
A Quick Setup menu is located under the Controller Setup area that will provide the basic selections you may want to review and/or change to meet your needs. These parameters will vary based on the model selected. You will be able to select the engine manufacturer, minimum engine speed and maximum engine speed.

For further in-depth programming, you can access up to twenty other menu topics that will vary based on your model. The ability to change the controller behavior through these menu systems is equivalent to the capabilities of the PC based CI Station, but can be more difficult due to the number of options available. However, because of this flexibility, complete field configuration is possible without the use of a laptop.

| Quick Setup | | | | | | | | |
|--------------------|--|-------------------|--|----|--|------|--|-------|
| <u>Engine Mfr.</u> | | <u>Mechanical</u> | | | | | | |
| Engine Mfr. | | John Deere | | | | | | |
| Flywheel Teeth | | 30 | | | | | | |
| Preheat | | 0:00 | | | | | | |
| Exit | | Back | | Up | | Down | | Enter |

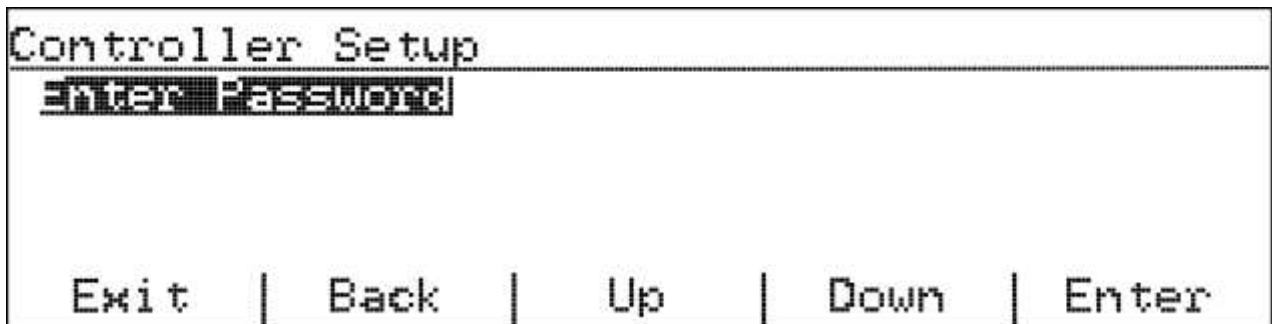
CONTROLLER SETUP

When navigating through the Main Menu you will arrive at the **Controller Setup** selection. To configure the module to new settings, you can enter into this area by pressing the Enter Button

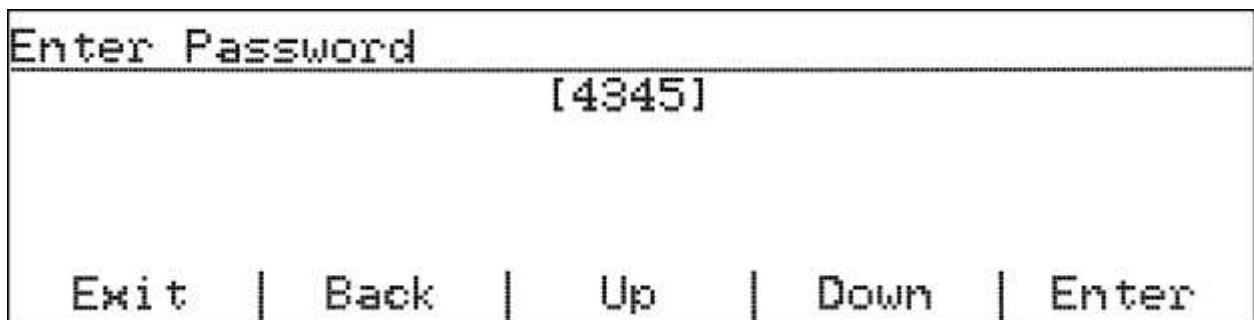


PASSWORD ENTRY

The next screen will ask for a password. If no password, or an incorrect password is used, navigation into the menu is still possible and permitted, however, the ability to make changes will be restricted. To enter the password, press the Enter button and brackets will appear. Use the Up and Down arrow buttons to set each digit individually, pressing the Enter button to index to the next digit from left to right.



Once the last digit is entered, the Setup Menu will be displayed and the selected sub topic will be the Quick Setup menu. Programming can continue.

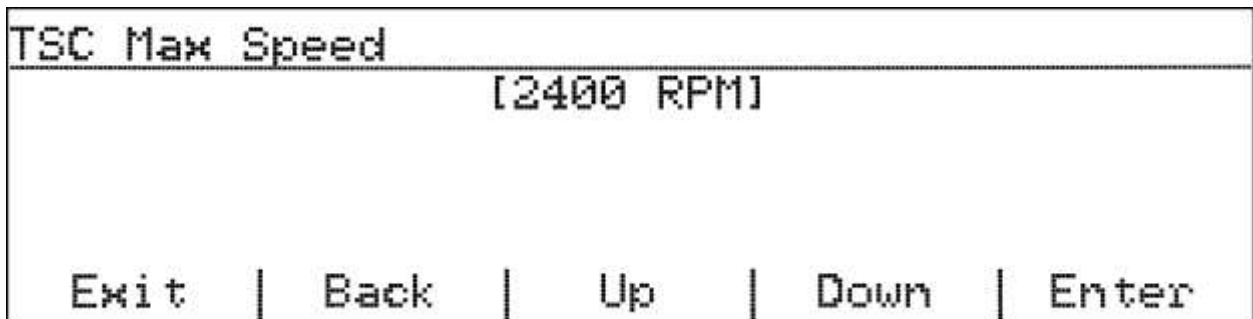


SETUP MENU

Navigating the Controller Setup menu structure is done in the same manner as the Main Menu system. Up and Down arrows will scroll to the next topic; Enter button will access the topic, etc.

To make changes to the settings, you will need to locate the item you are looking to modify under the appropriate topic and then press the Enter button.

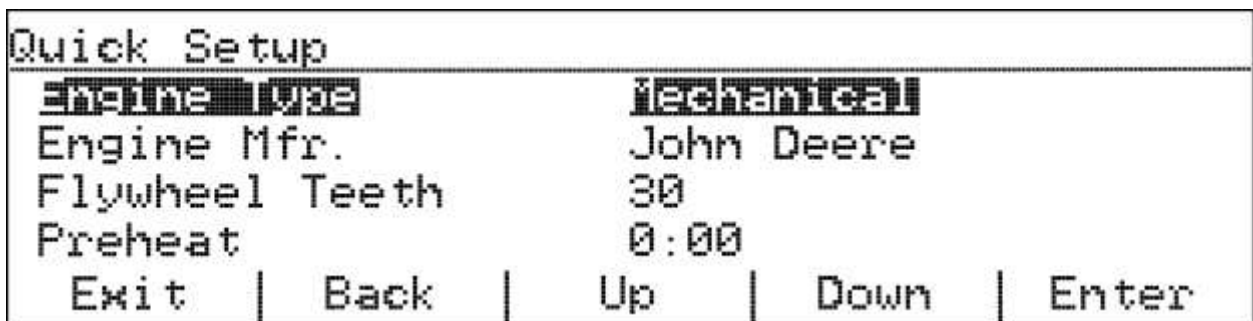
The editing brackets will appear allowing you to make changes to the value or change the selection.



Once you have made your selection or changed the value, simply press Enter again to accept it and the editing brackets will be removed.

QUICK SETUP

This menu is designed to allow you to configure the module in a simple manner, asking you to select the most common options used with today's industrial engines. Based on your selections here, other items will be affected. The menu selections will change based on how you select certain options. If you need to make changes after Quick Setup is complete, navigate to the area of interest and set your parameters up as needed.



ENGINE PARAMETER CONFIGURATION

Individual engine parameters can be changed here. For example, if you had an engine that provided all of the information about the operating parameters except oil pressure, you could configure your oil pressure to be gathered via an analog input channel instead.

| Parameter | | | | | | | | |
|------------------|--|------|--|----|--|------|--|-------|
| <u>Sw</u> | | | | | | | | |
| Coolant Temp | | | | | | | | |
| Oil Pressure | | | | | | | | |
| ↓Oil Temperature | | | | | | | | |
| Exit | | Back | | Up | | Down | | Enter |

| Eng. Parameter Configuration | | | | | | | | |
|------------------------------|--|------|---------------|----|--|------|--|-------|
| <u>OilP Sw</u> | | | <u>Analog</u> | | | | | |
| OilP Sender | | | S-W | | | | | |
| OilP Channel | | | None | | | | | |
| ↓OilP Min | | | 0 psi | | | | | |
| Exit | | Back | | Up | | Down | | Enter |

PUMP PARAMETER CONFIGURATION

Individual pump parameters can be changed here. Two transducers can be configured for Inlet and Discharge pressures. Note: These two inputs are also associate with analog oil pressure and coolant temp. They must be assigned to one or the other, not both.

| Pump Parameter Configuration | | | | | | | | |
|------------------------------|--|------|---------------|----|--|------|--|-------|
| <u>Inlet Source</u> | | | <u>Analog</u> | | | | | |
| Vacuum Units | | | "Hg | | | | | |
| Inlet Channel | | | None | | | | | |
| ↓Inlet Vacuum Max | | | 30.0 "Hg | | | | | |
| Exit | | Back | | Up | | Down | | Enter |

INPUT CONFIGURATION

The module has two on board digital inputs that can be configured in a large variety of ways. All digital inputs are pulled high and must be closed to ground.

| Input Configuration | | | | |
|---------------------|---------------|----------|-------------|-------|
| Digit 1 | Normal | W | Open | |
| Digit 1 Action | | | Throttle Up | |
| Digit 1 Message | | | None | |
| ↓Digit 1 Check | | | Run | |
| Exit | Back | Up | Down | Enter |

OUTPUT CONFIGURATION

The module has two on board outputs that can be configured for engine operation and other requirements. All outputs are rated at 5 amps each and switch battery positive. The two outputs are field configurable.

THROTTLE CONFIGURATION

The speed control behavior of the engine can be changed under the Throttle Configuration menu. Selection of throttle type, minimum operating and maximum operating speeds and other details as well can be set here. See Speed Control Options for more details.

| Throttle Configuration | | | | |
|------------------------|-------------|----------|-----------|----------------|
| Throttle | Type | W | St | Vernier |
| Cooperative TSC | | | Primary | |
| Coop. TSC regain | | | Off | |
| ↓Coop. TSC timeout | | | 50 mSec | |
| Exit | Back | Up | Down | Enter |

ENGINE SAFETY CONFIGURATION

The module can provide warnings, shutdowns, deceleration, and other behaviors based for the critical engine parameters of oil pressure, coolant temperature, engine speed, fuel level and battery voltage. Simply select the parameter in questions and set the thresholds and actions desired. In the example below, a warning will be annunciated when the fuel level drops below 20%. If the level drops below 1% for 5 seconds, the engine will be shut down.

| Engine Safety Configuration | | | | | |
|-----------------------------|--|------|------------|------|-------|
| Fuel Lvl Check | | | Off | | |
| Lo Fuel PreAlm @ | | | 20 % | | |
| Low Fuel Alarm @ | | | 1 % | | |
| ↓FuelLvl Alm Act | | | Shutdown | | |
| Exit | | Back | | Up | |
| | | | | Down | |
| | | | | | Enter |



PUMP SAFETY CONFIGURATION

The module can provide warnings, shutdowns, deceleration, and other behaviors for the critical pump parameters of suction pressure and discharge pressure. Simply set the thresholds and actions desired. In the example below, a warning will be annunciated if the discharge pressure rises above 200 psi and the engine will be decelerated to minimum speed if it exceeds 250 psi.

| Pump Safety Configuration | | | | | |
|---------------------------|--|------|------------|------|-------|
| Inlet Press Off | | | Off | | |
| Hi InVac PAlm @ | | | 30.0 "Hg | | |
| Hi InVac Alm @ | | | 30.0 "Hg | | |
| ↓Hi InP PreAlm @ | | | 30.0 psi | | |
| Exit | | Back | | Up | |
| | | | | Down | |
| | | | | | Enter |


MODULE CONFIGURATION

This menu allows you to configure the behavior of the module itself and to clear event logs, number of start counters. Low Power Mode can also be selected here. You can assign the number of password levels as well as set an OEM password.

| Module Configuration | | | | | | | | |
|---|--|---|--|----|--|------|--|-------|
|  | |  | | | | | | |
| Preheat | | 0:00 | | | | | | |
| Low Power Mode | | Off | | | | | | |
| ↓Power Save Delay | | 2:00 | | | | | | |
| Exit | | Back | | Up | | Down | | Enter |

DISPLAY CONFIGURATION

Use this area to set up the display with the parameters you desire to see on the full-time display. For details on configuration, see DISPLAY OPTIONS in this manual. In the example below, Area 3 would display engine Oil Pressure in digital format. The AG suffix stands for Analog Gauge presentation.

| Eng. Display 1A | | | | | | | | |
|-----------------|--|--|--|----|--|------|--|-------|
| | |  | | ↑ | | | | |
| | | Coolant Temp | | | | | | |
| | | Coolant Temp AG | | | | | | |
| | | Eng Load | | ↓ | | | | |
| Exit | | Back | | Up | | Down | | Enter |

CAN CONFIGURATION

This menu is used to define how and what messages are transmitted on the J1939 CAN Bus. Destination and broadcast addresses are defined here. Most CAN addresses will be programmed based on the engine manufacturer selection automatically. However, you can overwrite the defaults if desired. If you are connecting to a CAN based, telematics radio, you may want to enable the transmission of parameters not being broadcast by the ECU and how and when the module will transmit. Contact CI application engineers for assistance.

| CAN Configuration | | | | | |
|---------------------|--|------|-------------------|------|-------|
| <u>Engine Mfr.</u> | | | <u>John Deere</u> | | |
| TSC1 Address | | | 3 | | |
| Source Address | | | 44 | | |
| ↓ Regen Switch Addr | | | 44 | | |
| Exit | | Back | | Up | |
| | | | | Down | |
| | | | | | Enter |

MAINTENANCE CONFIGURATION

If you would like to set up service intervals for your equipment, use this menu to establish up to three unique service schedules. You can set the time between, name of service, and when to bring warning of impending service requirements.

| Maintenance Configuration | | | | | |
|---------------------------|--|------|----------|------|-------|
| <u>Sched A Reset?</u> | | | <u>Y</u> | | |
| Sched A Interval | | | 200 Hrs | | |
| Sched A Warning | | | 10 Hrs | | |
| ↓ Sched A Trip @ | | | 0 Hrs | | |
| Exit | | Back | | Up | |
| | | | | Down | |
| | | | | | Enter |

EMISSION CONFIGURATION

If your engine is equipped with emission components, you may use this menu to setup additional warnings, enable and disable regen options and other CAN based messaging. Consult with a CI application engineer if there are questions on its use.

| Emissions Configuration | | | | |
|--------------------------|-----------|----|------|-------|
| Idle Shutdown D/W | On | | | |
| Allow Srvc Regen | No | | | |
| Regen Interlock | Off | | | |
| ↓DPF Inh Lamp Src | ECU | | | |
| Exit | Back | Up | Down | Enter |

MODBUS CONFIGURATION

When connecting to a MODBUS device such as PLCs, telematics or other controls, this menu will define the communication protocol for successful integration. The modules are designed to operate as a MODBUS RTU.

| MODBUS Configuration | | | | |
|----------------------|------------|----|------|-------|
| MODBUS Mode | RTU | | | |
| Baud Rate | 19200 | | | |
| Parity | None | | | |
| ↓Stop Bits | 1 | | | |
| Exit | Back | Up | Down | Enter |

PANEL CONNECTORS

The control panel has two Deutsch engine harness connectors and one remote connector located on the bottom of the display. There is also a connector for the TT-100 Throttle Knob

Engine Connectors:

DT04-6P

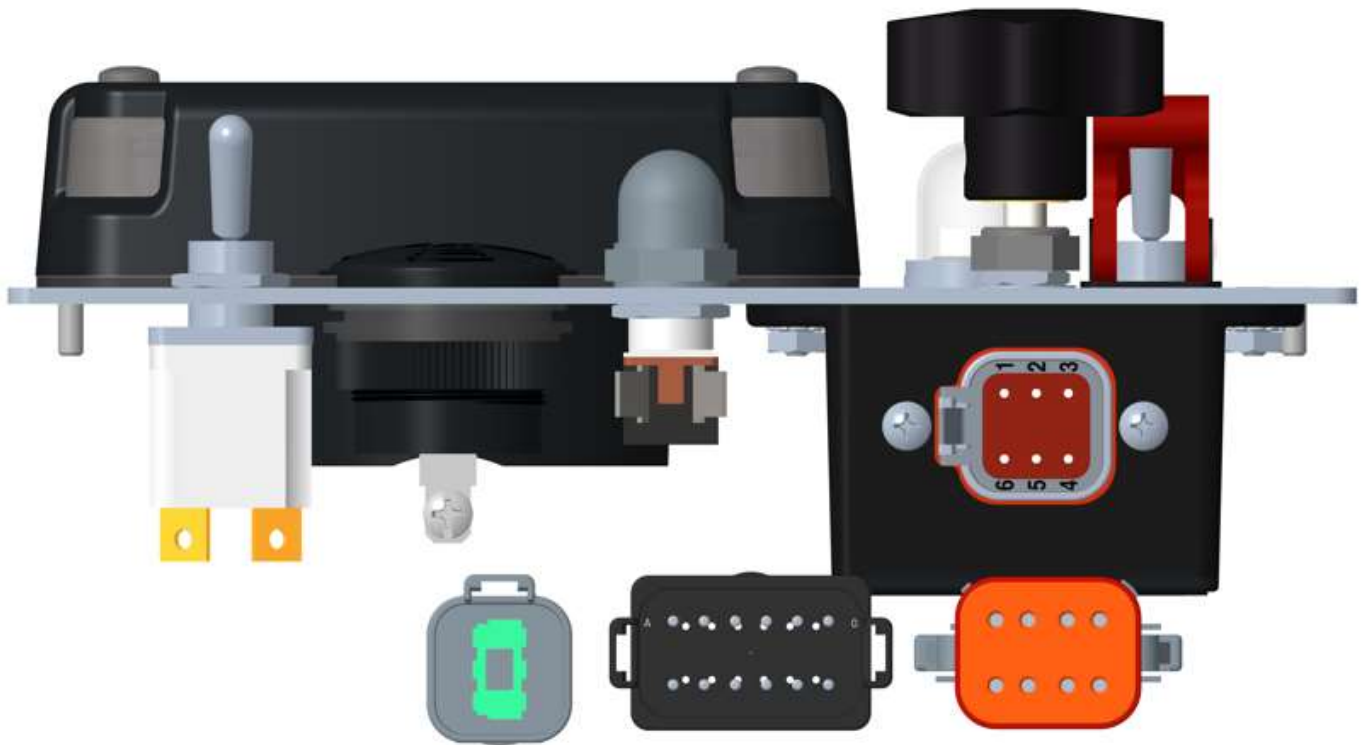
DT04-12PA

Remote Connector

DT06-8S

Throttle Connector

DT06-6P



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| 6- Pin Engine Harness Connector | |
|--|-------------------------|
| Pin | Function |
| 1 | Open |
| 2 | Crank Signal |
| 3 | Battery Positive |
| 4 | Fuel Signal / ECU Power |
| 5 | Open |
| 6 | Open |

| 8- Pin Remote Harness Connector | |
|--|---------------------------|
| Pin | Function |
| 1 | Battery Positive |
| 2 | Switched Battery Positive |
| 3 | J1939 Canbus High |
| 4 | J1939 Canbus Low |
| 5 | Battery Positive |
| 6 | Open |
| 7 | Open |
| 8 | Battery Negative |

| 12- Pin Engine Harness Connector | |
|---|--------------------|
| Pin | Function |
| 1 | Battery Negative |
| 2 | Open |
| 3 | Open |
| 4 | Low Pressure Input |
| 5 | J1939 Canbus High |
| 6 | J1939 Canbus Low |
| 7 | Open |
| 8 | Open |
| 9 | Open |
| 10 | Open |
| 11 | Open |
| 12 | Open |

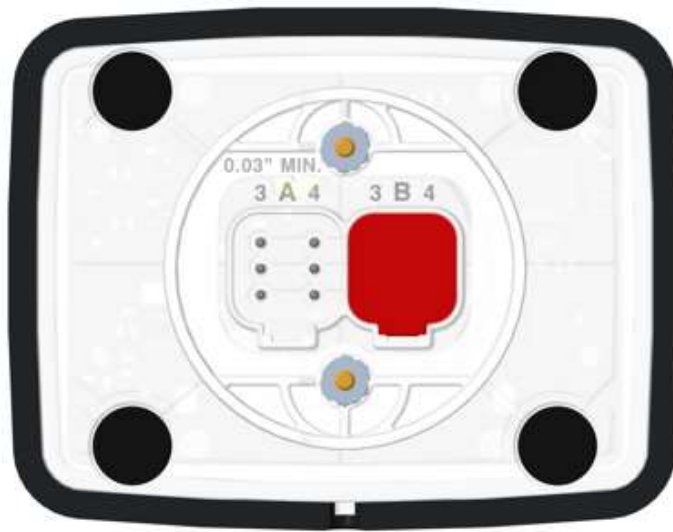
| 6- Pin Throttle Knob Connector | |
|---------------------------------------|-------------------|
| Pin | Function |
| 1 | Switched Battery |
| 2 | J1939 Canbus High |
| 3 | J1939 Canbus Low |
| 4 | Digital Input 1 |
| 5 | Digital Input 2 |
| 6 | Battery Negative |

MODULE CONNECTORS

The module has one Deutsch, keyed connector, located on the back of the display. The connector provide access through the weather tight display enclosure which houses the electronics.

Mating Connector Deutsch DT06-12SA

Sockets 0462-209-16141



| Pin | Plug A Function | Pin | Plug B Function |
|-----|------------------------|-----|-------------------------|
| 1 | Battery Positive | 1 | DO 1 Fuel/Run |
| 2 | Can High | 2 | DI 7 Low Pressure Input |
| 3 | Can Low | 3 | DI 4 Shutdown Override |
| 4 | DI 1 | 4 | DO 3 Alarm Horn |
| 5 | AI 1 Fuel Level Sender | 5 | DI 6 |
| 6 | Battery Negative | 6 | DO 2 Crank Signal |

DO= Digital Output (Switched Vbatt, 5 Amp max each, 10 Amp Total Load)

DI= Digital Input (Normally Open* or Normally Closed) (Close to Ground)

AI = Analog Input (Resistive Sender*, 4-20ma or 0-5VDC)

* = Default

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CONTROLS, INC. is herein called "Seller". The person, firm or corporation to whom or which the sale is made is herein called "Buyer". Seller warrants to the Buyer that all products furnished under this order will conform to Seller's specification, drawings as described in its current catalog or quotation and will be free from defects in materials and workmanship. Seller must approve other special requirements asked for by the Buyer in its purchase order in writing. Parts replaced or repaired in the warranty period shall carry the unexpired portion of the original warranty. The foregoing is subject to the provisions that in no case will the total warranty period extend beyond twenty-four (24) months or two thousand (2000) hours of use, whichever occurs first, from date seller ships equipment from point of sale.

The Liability of Seller hereunder is limited to replacing or repairing at Seller's factory any part or parts which have been returned to the Seller and which are proved by buyer as defective or not conforming to Seller's specifications, drawings or other written descriptions, accepted by Seller, provided that such part or parts are returned by the buyer within thirty (30) days after such defect is discovered. All items returned to Seller for repair or replacement must be sent freight prepaid to its factory. Buyer must obtain Seller's Return Merchandise Authorization Number prior to returning items. The above conditions must be met if warranty is valid. Seller will not be liable for any damage done by unauthorized repair work, or unauthorized misapplication in non-suitable environments.

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