



PowerCore®

MPC-10 Engine Controller & TEC-10 Panel Operations Manual

To see this manual in Spanish, German, French or Italian, please go to
www.murphybynovationcontrols.com/mpc-10
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In order to consistently bring you the highest quality, full-featured products, we reserve the right to change our specifications and designs at any time.

Warranty - A limited warranty on materials and workmanship is given with this Murphy product.
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ENOVATION CONTROLS has made efforts to ensure the reliability of the MPC-10 / TEC-10 and to recommend safe use practices in system applications. Please note that in any application, operation and controller failures can occur. These failures might result in full control outputs or other outputs that might cause damage to or unsafe conditions in the equipment or process connected to the MPC-10 / TEC-10.

Good engineering practices, electrical codes and insurance regulations require that you use independent external protective devices to prevent potentially dangerous or unsafe conditions. Assume that the MPC-10 / TEC-10 can fail with outputs full ON; outputs full OFF; or that other unexpected conditions can occur.

Please read the following information before installing.

BEFORE BEGINNING INSTALLATION OF THIS MURPHY PRODUCT:

- A visual inspection of this product before installation for any damage during shipping is recommended.
- Disconnect all electrical power to the machine. Failure to disconnect all electrical power connections before welding can result in damage to the panel and/or its components.
- It is your responsibility to have a qualified technician install the unit and make sure installation confirms with local codes.
- Observe all Warnings and Cautions in each section of these instructions.
- The MPC-10 / TEC-10 is designed for use in industrial environments. There might be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.
- Please contact ENOVATION CONTROLS immediately if you have any questions.

IMPORTANT! False or improper use and operation of electronic products could be dangerous. It is required that point-of-operation guarding devices be installed and maintained. All such devices must meet OSHA and ANSI Machine safety standards. The manufacturer shall not accept any responsibility for installation, application or safety of systems.



WARNING



AUTOMATIC START

**Keep hands clear
at all times.**

The MPC-10 can be set as an Auto-Start Controller. Please be cognizant at all times of hands and other objects that are in close proximity to the machine(s) being controlled as they may commence operation suddenly and without warning.

LENS CLEANING PROCEDURES



The lens on the MPC-10 and TEC-10 is composed of Polycarbonate materials. Use only mild soap and water to clean the lens/display window. Evidence of improper cleaning techniques or chemicals includes cracks, smear marks, scratches, or fogged/hazy lenses.



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Introduction

This document is designed to familiarize a user with the MPC-10 / TEC-10 and how to navigate the interface and modify the settings when setting up and operating the controller. The Quick Set Up guide assists with establishing the different functions in the MPC-10 / TEC-10 System Controller. Before attempting to set up the controller, be sure to read and understand this manual in its entirety.

Murphy PowerCore 10 (MPC-10 / TEC-10)

The Murphy PowerCore 10 Controller (MPC-10 / TEC-10) is a general, all-purpose manual/auto start and manual/auto throttling engine controller designed with rental applications in mind. This is a powerful controller that supports J1939 CAN protocols on electronically governed engines as well as analog sensors on mechanical engines for monitoring and fault/safety shutdowns.

The MPC-10 / TEC-10 is flexible in many aspects, with the ability to:

- use in most applications where auto start or auto throttling is required or desired;
- use the same controller on electronically governed J1939 and mechanical engines;
- use the same controller on 12VDC or 24VDC systems;
- assign multiple levels of passcode protection to the menu;
- use as auto start or manual start controller;
- use as manual throttle or auto throttle controller;
- change the input sensor type for analog inputs;
- use analog inputs as digital ground inputs;
- assign functions and actions to digital inputs;
- use digital inputs as battery positive or ground inputs;
- be mounted in all-weather environments;
- be customer mounted in panel of choice (MPC-10 only).

Engine Application States and Delays

The Controller follows a standard operating sequence. This operating sequence is a set of machine states that happen in a fixed order. Machine states can be set to zero if not needed or adjusted to fit the application. The following states will be executed during the auto sequence, provided that the corresponding timer has not been set to 00:00:00 or the controller has not been placed in a manual mode of operation:

- **Stabilize:** This is a timed state to allow the controller to enable the ECU or any senders without warnings or errors. This timer can be disabled if set up for mechanical engine use.
- **Stopped:** This is a timed state where the engine is ready to be started manually or automatically.
- **Standby:** This is a timed state that will shut off the LCD backlight, heater and CAN transceiver to conserve power while the unit waits for a key press or an automatic start condition.
- **Wait To Start:** when an engine is not ready to start and sends a message across the J1939 communications stating it is not ready to start.
- **Auto Start Delay: (available in Auto Mode only)** The auto start condition is ignored and must remain active throughout this delay or the delay is reset to zero.
- **Prestart Delay 1:** After a start condition has been accepted by the controller, this delay begins timing, and the prestart output turns on. When this delay expires, the output is turned off, and the start sequence continues.
- **Check Safe To Start:** This is a non-timed state that will check to ensure the engine can start safely.

- **ECU Stabilize Timer:** This delay begins timing when the controller is powered up, in Spindown or when the Standby delays have expired. During this delay, the ECU-enabled output is turned on. The ECU output turns off when the Standby, ETS or Spindown delays begin timing.
- **Prestart Delay 2 (Precrank):** After a start condition has been accepted by the controller, this delay begins timing, and the prestart output turns on. When this delay expires, the output is turned off, and the start sequence continues. During this delay, the controller checks for faults, J1939 com, etc.
- **Prestart Delay 2 (Crank Through):** After a start condition has been accepted by the controller, this delay begins timing, and the prestart output turns on. When this delay expires, the output remains on, and the start sequence continues. The output turns off when the engine starts. During this delay, the controller checks for faults, J1939 com, etc.
- **Crank:** This is a timed state to try and start the engine.
- **Crank Rest:** This is a timed state to rest the starter between cranks in case the engine did not start during the crank state.
- **False Start Check:** This is a non-timed state that will ensure the engine stays above the crank cut RPM after cranking.
- **Warm-up: (available in Auto mode only)** This is a timed state that will allow the engine to change from idle to desired warm-up RPM after starting. Warm-up will only set as low as the minimum RPM set point.
- **Line Fill 1: (available in Auto mode only)** This is a timed state that will exit if the timer times out or the pressure set point for this state is reached.
- **Line Fill 2: (available in Auto mode only)** This is a timed state that will exit if the timer times out or the pressure set point for this state is reached.
- **Running Loaded:** This is a non-timed state that the controller will stay in until a stop condition occurs.
- **Auto Stop Delay: (available in Auto Mode only)** The auto stop condition is ignored and must remain active throughout this delay or the delay is reset to zero.
- **Cooldown: (available in Auto mode only)** This is a timed state that will allow the engine to run at a desired speed to cool down before allowing to go into a stopped state.
- **Spindown:** The time allotted for the engine to stop all revolutions and be in a stopped state with no frequency.

User Interface

The keypads on the MPC-10 / TEC-10 are comprised of 11 tactile buttons. This section describes the functions of each button.



Figure 1: User Interface

The buttons have the following functions:

- **Start Key** – Allows the operator to start sequence in Manual Mode or initiate an auto start sequence when in Auto Mode (do not use in Auto Mode when set to single contact auto start method).
- **Stop Key** – Allows the operator to initiate the stop sequence in either manual or auto mode of operation. As a safety feature, the stop key will skip the cool-down state when it is pressed twice or held in auto mode. Once shut down, the controller will enter manual mode to eliminate an auto crank condition if the auto start condition is still present.
- **Auto Key** – Allows the operator to change from Auto to Manual or Manual to Auto Mode by pressing the key. When changing from manual to auto mode a confirmation is required by the operator as shown on the display.
- **Alarm Silence Key** – Allows the operator to acknowledge alarms on the controller when warnings and shutdowns are present as well as silences the remote alarm output.
- **Manual Throttle Increase Key** – Allows the operator to manually increase the engine throttle in Manual Mode.
- **Manual Throttle Decrease Key** – Allows the operator to manually decrease the engine throttle in Manual Mode.
- **Menu Key** – Allows the operator to get in and out of the menu.
- **Back Key** – Allows the operator to move back one step while in the menu.
- **Enter Key** – Allows the operator to enter a value in the menu when selected and is used to acknowledge internal and external alarms/shutdowns.
- **Up Key** – Allows the operator to navigate up through the menu and page forward on the main pages.
- **Down Key** – Allows the operator to navigate down through the menu and page reverse on the main pages.

The TEC-10 Panel offering also has a keyswitch and a stop button on the front:

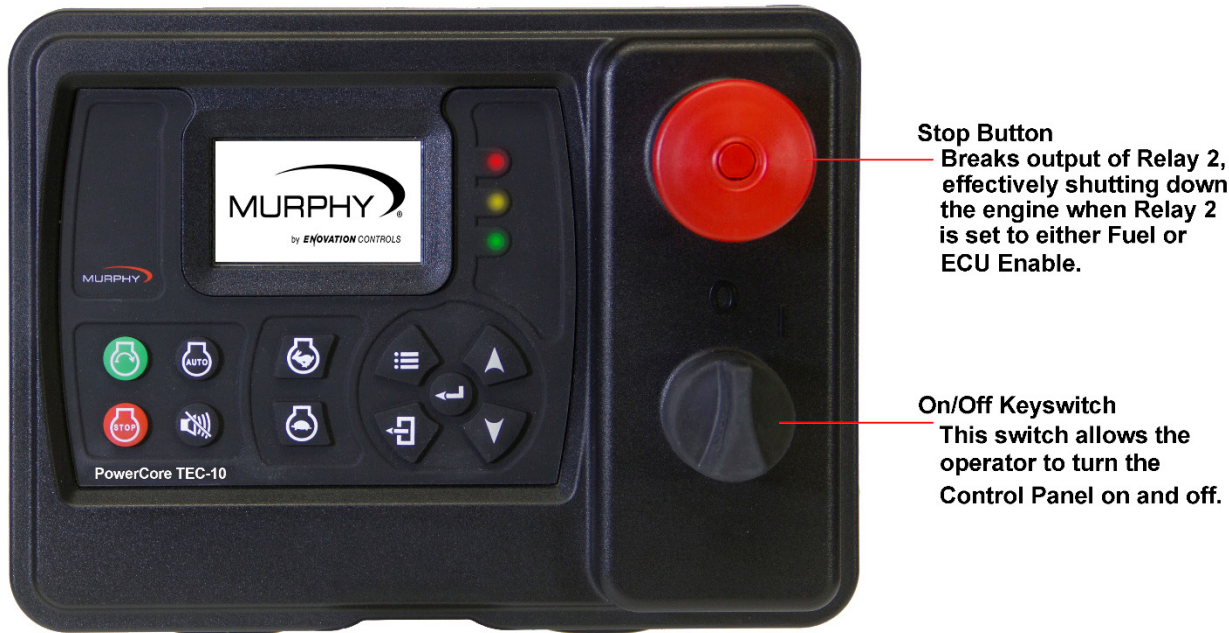


Figure 2: Panel stop button and on/off keyswitch

Accessing the Menu

The MPC-10 / TEC-10 have 3 menu security levels to restrict users from making changes after installation. The security levels are Low, Medium and High. One may consider these security levels as user, technician and OEM. By default the low level security has a small number of menu items a user can access. The medium level security has all the low level menu items plus other menu items a technician may change while in the field. The high security level has the entire menu visible to the operator or OEM.

To access the MPC-10 / TEC-10 menu, press the menu key. Review section Menu Glossary and Passcodes to understand the menu level presets in the controller. The following screen will display to enter the passcode: [Low=1111; Medium=5311; High=3482].

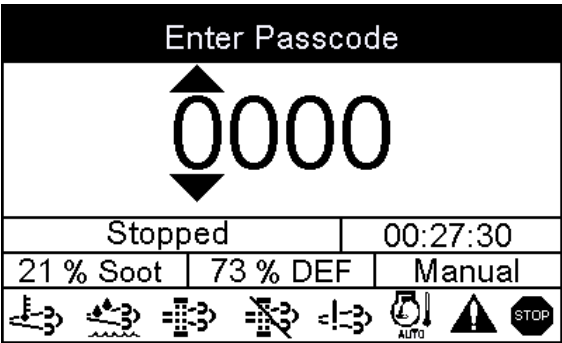


Figure 3: Enter Passcode

The password will be entered left to right. Utilize the up and down arrows, and press the Enter button after each correct number: Entering this password will allow full access to the menu. If you enter the wrong password, it will reset the display to 0000, allowing you to restart the entering process.

NOTE: To learn more about passcode security and changing the security levels, please refer to the Configuration Tool manual for the MPC-10 / TEC-10.

Main Menu

The MPC-10 / TEC-10 controller is incredibly versatile within the menu structure. The operator is able to change most parameters and settings from the face without the need of a PC tool, if desired. **The controller must be in its stopped state in order to change a setting in the menu.** (The Tier 4 menu is the sole exception). Described below are the main sections of the controller's menu. **Cycling power to the controller is recommended after making changes to set points and input/output.**

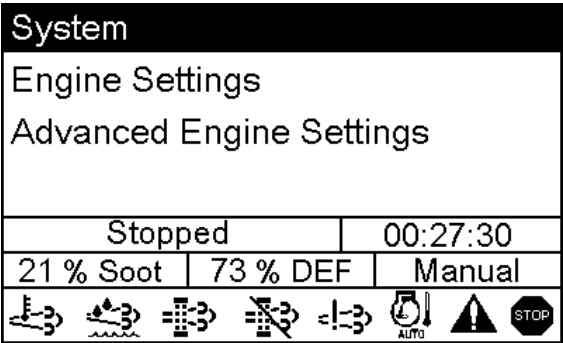


Figure 4: Main Menu, page 1

System

The controller System menu provides the operator with the ability to set the Date/Time, Units, Language, Brightness, Service Reminders and several other system settings. Review System under the Menu Glossary section of this manual for a full list and definition of each setting.

Engine Settings

The Engine Settings menu allows the operator to establish common user-configurable parameters that would be changed from factory default settings when pairing the controller to an engine. This menu allows the operator to choose whether the engine is J1939 or mechanical, the engine's speed source, the minimum and maximum RPM the operator requires/allows the engine to run, warm-up/cool-down settings and other common engine settings. Review Engine Settings under the Menu Glossary section of this manual for a full list and definition of each setting.

Advanced Engine Settings

The Advanced Engine Settings menu allows the operator to set up the less common user-configurable parameters that are not in the Engine Settings menu and which would be changed from factory default settings when pairing the controller to an engine. This menu allows the operator to set items such as the J1939 address claim for the controller, ECU Source Address, ECU hour select, crank attempts, crank disconnect speed and other user-specific engine settings. Review Advanced Engine Settings under the Menu Glossary section of this manual for a full list and definition of each setting.

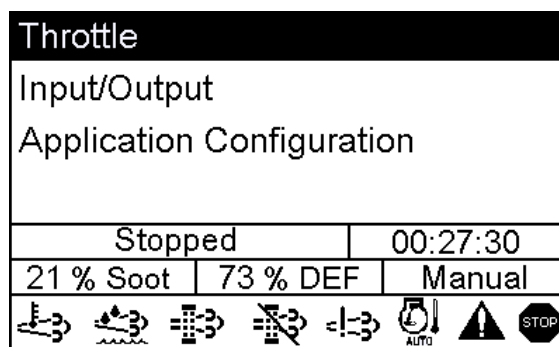


Figure 5: Main Menu page 2

Throttle

The Throttle menu allows the operator to set up the items for throttling the engine such as Manual Throttle Method, Throttle Type, Rate of RPM Increase/Decrease, Throttle Inc/Dec Pulse Time and other parameters pertaining to throttling of the engine. Review Throttle under the Menu Glossary section of this manual for a full list and definition of each setting.

Input / Output

The Input/Output menu allows the user to establish the I/O needed for the application. This includes Digital Inputs, Analog Inputs, Relay Outputs and Digital Outputs. This menu is tied to other aspects of the controller menu such as Auto Start Functions, Auto Throttling Methods, Analog Inputs for Mechanical Engine setup, Warning / Shutdown functions and all outputs needed for starting/controlling the engine and alerting the user.

The Digital Inputs of this menu can be configured from the face of the controller to accept three types of inputs as the Active state of the input.

- High, B(+)
- Low, B(-)
- Open

The Analog Inputs of this menu can be configured from the face of the controller to accept one of four types of senders:

- Resistive
- 4-20mA
- 0-5VDC
- Analog.Digital (B- for additional Digital Inputs)

The Outputs are configurable for the operator to choose which output function to use with the desired output type as shown below.

- Relay [10A, Form C]
- Digital Out [1A, B(+)]
- Digital Out [1A, B(-)]

NOTE: Although the functionality exists to set all analog and digital inputs to the same function, Enovation Controls strongly advises against this.

Application Configuration

The Application Configuration menu is where an operator will set up the controller's Auto Start Functions and Auto Throttling Methods, if the intended use is an auto start and/or auto throttling controller. Depending on which application is chosen in the menu, there are certain auto start functions and auto throttling methods hidden that are not pertinent to the application chosen. This automatic hiding feature allows for a simpler, more intuitive controller menu in the MPC-10 / TEC-10. Review Application Configuration under the Menu Glossary section of this manual for the full list and definition of each setting.

Pump All Purpose

The Pump All Purpose application houses auto start functions and auto throttling methods of the controller for common pumps used in rental applications.

The auto start functions and auto throttle methods are:

Auto Start/Stop Functions

- Single Contact (requires a digital input for start and stop)
- Local Start (Green Start key)
- Two Contact Maintained (Dual Floats) (requires digital inputs for start and stop)
- Pressure Transducer (requires an analog input setting)
- Level Transducer (requires an analog input setting)

Auto Throttle Methods

- Running Loaded RPM
- Pressure Transducer (requires an analog input setting)
- Level Transducer (requires an analog input setting)

Air Compressor

The Air Compressor application houses the auto start functions and auto throttle methods meant to be used on all engine-driven air compressor applications. The MPC-10 / TEC-10 allows for the compressor to start/stop and maintain a desired pressure during operation.

The auto start functions and auto throttle methods to choose from are:

Auto Start/Stop Functions

- Single Contact (requires a digital input for start and stop)
- Local Start (Green Start key)
- Pressure Transducer (requires an analog input setting)

Auto Throttle Methods

- Running Loaded RPM
- Pressure Transducer (requires an analog input setting)

Hose Reel Irrigation

The Hose Reel Irrigation application houses the auto start functions and auto throttle methods meant to be used on hose reel irrigation systems. The MPC-10 / TEC-10 allows for the hose reel pump to auto start with several methods, including the Local Start key which may be the most used in this application. The key feature of this application is the auto throttling method. This feature allows the controller to manage the pump's throttle in order to maintain a pressure in the hose during irrigation.

The auto start functions and auto throttle methods to choose from are:

Auto Start/Stop Functions

- Single Contact (requires a digital input for start and stop)
- Local Start (Green Start key)
- Two Contact Maintained (requires digital inputs for start and stop)

Auto Throttle Methods

- Pressure Transducer (requires an analog input setting)

Frost Protection

The Frost Protection application houses the auto start functions and auto throttle methods meant to be used on frost protection systems. This application allows for a wind machine, sprinkler or other forms of frost protection using single contact or a temperature transducer.

The auto start functions and auto throttle methods to choose from are:

Auto Start/Stop Functions

- Single Contact (requires a digital input for start and stop)
- Temperature Transducer (requires an analog input setting)

Auto Throttle Methods

- Running Loaded RPM

Chipper

The Chipper application houses the auto start functions and engage/disengage methods meant to be used on Chippers. The operator can also choose between Chipper types, On-Off-On or Dumping.

The functions available are:

Auto Start/Stop Functions

- Local Start Key (Green Start key)

Engage RPM

Disengage RPM

Disengage Delay

Chipper Feed System

- On-Off-On
- Dumping

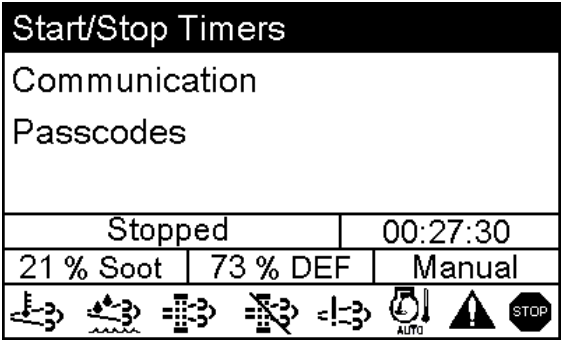


Figure 6: Main Menu page 3

Start / Stop Timers

The Start/Stop Timers menu provides the operator the ability to add a countdown timer, scheduled start/stop times, and an engine exercise timer. All Start/Stop timers only work when the controller is set to auto mode. The countdown timer allows for the operator to set a desired countdown time and walk away from the engine for a controlled shutdown when the timer expires. There are three Start/Stop Timers the operator can choose from within this menu that allows for the specific day and hour the controller will start and stop utilizing the internal clock. Review Start/Stop Timers under Menu Glossary section of this manual for full list and definition of each setting.

NOTE: Start / Stop timers work in conjunction with other Start / Stop types. The Start / Stop times are independent of the other Auto Start methods. If the engine is already running from another Start / Stop type when a Start / Stop timer occurs, the Start / Stop timer is ignored. Once the engine is started by the Start / Stop timer the Auto Stop method is ignored and will be stopped by the set Stop time.

Communication

The Communications menu allows the operator to choose the type of RS485 communications such as PVA Gauge, Modbus or Local Display. The menu also allows for the operator to choose CAN termination and enabling of the CAN Parameter Map. Review Communication under the Menu Glossary section of this manual for a full list and definition of each setting.

Passcodes

The Passcodes menu is only available in the high security menu and allows the operator to see the three level of passcodes set in the controller. The passcodes are read only in this view. Passcodes are able to be changed from default passcode setting via PowerVision for Controllers configuration tool.

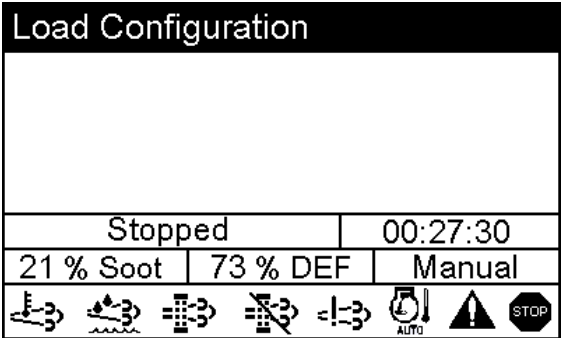


Figure 7: Main Menu page 4

Load Configuration

The Load Configuration menu is only available in the high security menu. This menu item allows the operator to choose a file to load onto the controller when a USB drive is attached to the programming harness of the controller. Review Load Configuration under the Menu Glossary section of this manual for a full list and definition of this item.

Auto Start/Stop Functions Defined

There are six automatic start/stop types in the MPC-10 / TEC-10. Each is detailed below:

Single Contact Start/Stop (commonly known as single float in pumping markets)

The Single Contact Start/Stop occurs when a remote contact is active for auto start and inactive for an auto stop as a digital input.

Two Contact Maintained Start/Stop (commonly known as dual floats in pumping markets)

The Two Contact Maintained Start/Stop occurs when both remote contacts are active for auto start and both contacts are inactive for an auto stop as a digital input (not momentarily).

Pressure, Level and Temperature Transducer Start/Stop

A transducer can be used for Auto Start/Stop when needed for the application. There are set points that allow the operator to enter the appropriate values.

NOTES:

The same transducer can be used for Auto Start/Stop and Auto Throttling if the application supports transducer control.

Local Start Key Start/Stop

The Local Start Key function uses the green and red buttons on the front interface for auto start and stop sequencing.

Quick-Start Setup

The following sections provide a walk-through of the steps necessary for some of the various configurations and settings available on the MPC-10 / TEC-10 Controller. **Cycling power to the controller is recommended after making changes to set points.**

Stepping through the Menu will be depicted as follows:

Menu/System/Contrast directs the operator to go into the Menu first, then look for a parameter titled System and press **[Enter]** to go into the System menu. Then look for a parameter titled Contrast and press **[Enter]** to go into the Contrast menu, etc.

Mechanical Engine Setup

1. Access **Menu/Engine Settings/Engine Type**, and select Mechanical then press **[Enter]**.
2. Press down arrow to **Engine Manufacturer**, select which engine manufacturer the controller is/will be used then press **[Enter]**.
3. Press down arrow to **Speed Source**, and select either Alternator or Magnetic Pickup then press **[Enter]**.
4. Press down arrow to **Speed Calibration**, press **[Enter]**.
5. Utilize the Up and Down arrows to establish the appropriate number of flywheel teeth or engine alternator pulses, and press **[Enter]**.
6. Press the **[Back]** key and down arrow to **Throttle**, and press **[Enter]**.
7. Press **[Enter]** to access **Manual Throttle Method**, select throttle type if throttling the engine from the controller for manually throttling the engine Inc/Dec, Run/Idle, Preset 3, or Preset 4 and press **[Enter]**.
8. Press down arrow to **Engine Throttle Type**, select Pulse Inc/Dec or None and press **[Enter]**.
9. Press down arrow to **Target RPM Step Size**, select appropriate step size then press **[Enter]**.
10. Press down arrow to **Throttle Deadband RPM**, select appropriate deadband then press **[Enter]**.
11. Press down arrow to **Throttle Inc/Dec Pulse**, select appropriate pulse time then press **[Enter]**.
12. Press down arrow to **Throttle Inc/Dec Pulse Delay**, select appropriate pulse delay then press **[Enter]**.
13. Press down arrow to **Throttle Inc Rate**, select appropriate throttle increment rate then press **[Enter]**.
14. Press down arrow to **Throttle Dec Rate**, select appropriate throttle decrement rate then press **[Enter]**.
15. Press the **[Back]** key, and down arrow to **Input/Output**, and press **[Enter]**.
16. Access **Analog Inputs** and assign one Analog input for Oil Pressure and one for Engine Temperature. Press **[Enter]** to save the settings.
17. Press **[Back]** and access Relay and Digital Outputs.
18. Press down arrow to **Relay1-3 or DO1-4**, and assign desired outputs for Crank, Fuel, and Inc/Dec outputs if throttle type selected was Inc/Dec.

NOTE: DO3 and DO4 are factory set to Throttle Decrease and Throttle Increase to be used with the Murphy AT03069 Throttle Actuator.

19. Press the **[Back]** key and up arrow to **Advanced Engine Settings**, and press **[Enter]**.
20. Press down arrow to **Warnings and Shutdowns**, press **[Enter]**.
21. Ensure all warnings and shutdowns are set to the appropriate settings for the engine for engine faults such as oil pressure and coolant temperature.
22. Press the **[Back]** key twice and up arrow to **System**, and press **[Enter]**.
23. Press down arrow to **Set Machine Hours**, select desired machine/internal hours then press **[Enter]**.
24. Press the **[Menu]** key to exit the menu setup screens.

J1939 Electronic Engine Setup (Factory Default)

1. Access **Menu/Engine Settings/Engine Type** to ensure J1939 is selected.
2. Press down arrow to **Engine Manufacturer**, select which engine manufacturer the controller is/will be used then press **[Enter]**.
3. Press down arrow to **Engine Emission**, select the emissions level of the engine then press **[Enter]**.
4. Press down arrow to **Tier 4** (if a Tier 4 selection is made in Engine Emission menu), press **[Enter]**.
 - a. Press down arrow to **DEF Gauge**. Select Yes to show this gauge (if needed) then press **[Enter]**.
 - b. Press down arrow to **Percent Soot Gauge**. Select Yes to show this gauge (if needed) then press **[Enter]**.
 - c. Press down arrow to **Regen Screen**. Select Yes to show this screen (if desired) then press **[Enter]**.
5. Press the **[Back]** key and down arrow to **Speed Source**, ensure J1939 is selected for CANbus engine speed from ECU.
6. Press the **[Back]** key and down arrow to **Advanced Engine Settings**, and press **[Enter]**.
7. Ensure **Address Claim** is set to the CAN address that the TSC1 and Tier 4 regeneration is expected to be sent from to the engine ECU (this is often times designated by the manufacturer/distributor).
8. Press down arrow to **Warnings and Shutdowns**, press **[Enter]**.
9. Ensure all warnings and shutdowns are below or above ECU settings if required to have the ECU shutdown the engine instead of the MPC-10 / TEC-10 (for engine faults such as oil pressure and coolant temperature).

NOTE: If requiring the engine ECU to shutdown the engine on any engine shutdown fault without help from the controller, select ECU Shutdowns in the System Menu and change the setting to ECU Only.

10. Press the **[Back]** key and down arrow to **Throttle**, ensure desired throttle method is selected then press **[Enter]**.
11. Press the **[Back]** key and down arrow to **Input/Output**, and press **[Enter]**.
12. Press down arrow to access **Analog Inputs**, ensure the analog inputs aren't set to oil pressure or coolant temp (disable or change to something different).
13. Press down arrow to **Relay1-3 or DO1-4**, and assign desired outputs for Crank, ECU Enable and Inc/Dec outputs if throttle type selected was Inc/Dec.
14. Press the **[Menu]** key to exit the menu setup screens.

Setting to Auto Start on a Single Contact Input (Single Float)

1. Access **Menu/Application Configuration**. Press the down arrow to **Auto Start/Stop Function** then press **[Enter]**.
2. Utilize the Up and Down arrows to select **Single Contact** then press **[Enter]**.
3. Press **[Back]** once, and select **Input / Output** then press **[Enter]**.
4. Press **[Enter]** to access **Digital Inputs** then assign the **Function** of **Single Contact Start/Stop** to one of the Digital Inputs.
5. Ensure no other Digital Inputs are set to a start/stop type.
6. Press the **[Menu]** key to exit the menu setup screens.

Setting to Auto Start on Local Start Key

1. Access **Menu/Application Configuration**. Press the down arrow to **Auto Start/Stop Function** then press **[Enter]**.
2. Utilize the Up and Down arrows to select **Local Start Key** then press **[Enter]**.
3. Press **[Back]** once and arrow up to select **Input / Output/Digital Inputs**.
4. Ensure no Digital Inputs set to a start/stop type.
5. Press the **[Menu]** key to exit the menu setup screens.

Setting up to Auto Start/Stop for 2 Contact Inputs (Dual Floats)

1. Access **Menu/Application Configuration**. Press the down arrow to **Auto Start/Stop Function** then press **[Enter]**.
2. Utilize the Up and Down arrows to select **Two Contact Maintained** then press **[Enter]**.
3. Press **[Back]** once and arrow up to select **Input / Output** then press **[Enter]**.
4. Press **[Enter]** to access **Digital Inputs**.
5. Assign the **Function** of **Auto Start Maintained** to one of the Digital Inputs then press **[Enter]**.
6. Assign the **Function** of **Auto Stop Maintained** to one of the Digital Inputs then press **[Enter]**.
7. Press the **[Menu]** key to exit the menu setup screens.

Setting to Auto Start on Pressure

1. Access **Menu/Application Configuration**. Press the down arrow to **Auto Start/Stop Function** then press **[Enter]**.
2. Utilize the Up and Down arrows to select **Pressure Transducer** then press **[Enter]**.
3. Utilize the Up and Down arrows to select **Pressure Transducer** in the main application configuration menu.
4. Complete the parameters that apply. (Start/Stop Pressure, Pressure Maintain Type and Line Fill if needed. See Menu Glossary for explanation of settings.)
5. Press **[Back]** twice and access **Input_Output/Analog Inputs**.
6. Select the Analog Input to modify for the pressure transducer.
7. Assign the appropriate pressure input for the selected Analog Input (4-20mA Suction Pressure, 0-5V Suction Pressure, 4-20mA Discharge Pressure, 0-5V Discharge Pressure, Murphy Discharge Pressure or Suction Pressure).
8. Press **[Back]** once and arrow up or down to select **Discharge or Suction Pressure Units** then press **[Enter]**.
9. Select PSI, kPa or BAR as the pressure type then press **[Enter]**.
10. Press arrow up to **Sensor Setup** then press **[Enter]**.
11. Select the pressure input type to set up then press **[Enter]**.
12. Set the offset of the 4mA, if needed, then press **[Enter]**.
13. Now set the range of the transducer on the high side then press **[Enter]**. (e.g., 0-100 PSI transducer would show 4mA at 0psi and 20mA at 100 PSI.)
14. Refer to step #13 above if setting for a 0-5V or Suction Pressure.
15. Press **[Back]** twice to get back to the main menu.
16. Utilize the Up and Down arrows to select **Advanced Engine Settings** then press **[Enter]**.
17. Utilize the Up and Down arrows to select **Warnings and Shutdowns** then press **[Enter]**.
18. Utilize the Up and Down arrows to set the **High and Low Discharge/Suction Pressure** warnings and shutdowns.
19. Press the **[Menu]** key to exit the menu setup screens.

Setting up to Auto Start on Level

1. Access **Menu/Application Configuration**. Press the down arrow to **Auto Start/Stop Function** then press **[Enter]**.
2. Utilize the Up and Down arrows to select **Level Transducer** then press **[Enter]**.
3. Utilize the Up and Down arrows to select **Level Transducer** in the main application configuration menu.
4. Complete the parameters that apply. (Start/Stop Level and Level Maintain Type, See Menu Glossary for explanation of settings.)
5. Press **[Back]** twice and access **Input_Output/Analog Inputs**.
6. Select the Analog Input to modify for the level transducer.
7. Assign 4-20mA System Level as the function for the selected Analog Input.
8. Press **[Back]** once to get back to the Analog Input menu.
9. Press the arrow up or arrow down key. Select **Sensor Setup** then press **[Enter]**.
10. Select System Level to set up then press **[Enter]**.
11. Set the offset of the 4mA if needed to calibrate the low side then press **[Enter]**.
12. Set the range of the transducer on the high side then press **[Enter]**. (i.e., 0-10ft transducer would show 4mA at 0 ft. and 20mA at 10 ft.)
13. Press **[Back]** twice to return to the main menu.
14. Utilize the Up and Down arrows to select **Advanced Engine Settings** then press **[Enter]**.
15. Utilize the Up and Down arrows to select **Warnings and Shutdowns** then press **[Enter]**.
16. Utilize the Up and Down arrows to set the **High and Low Level** warnings and shutdowns.
17. Press the **[Menu]** key to exit the menu setup screens.

Setting to Auto Start on Clock

NOTES:

- 1) Ensure the correct date and time are established in the System menu prior to establishing the Auto Start on Clock settings.
- 2) The Clock start timer is independent of other auto start start/stop functions. When started from the clock the controller will shut down the engine from the clock.

1. Access **Menu/Start_Stop Timers**, and select the first Start/Stop Timer.
2. Select Start Day 1 and then select the appropriate day or Daily.
3. Select Start Time 1 and establish the hour, minute and second to start.
4. Establish the Stop Day and Time as in steps 2-3.
5. Press the **[Menu]** key to exit the menu setup screens.

NOTE: The MPC-10 / TEC-10 has the ability to establish three different Start/Stop dates and times. If desired, repeat steps 1-3 for subsequent Timers.

Setting to Auto Start on Temperature

1. Access **Menu/Application Configuration**. Press the down arrow to **Auto Start/Stop Function** then press **[Enter]**.
2. Utilize the Up and Down arrows to select **Temperature Transducer** then press **[Enter]**.
3. Utilize the Up and Down arrows to select **Temperature Transducer** in the main application configuration menu.
4. Establish a Start and Stop Temperature, and press **[Back]** twice.
5. Utilize the Up and Down arrows to select **Input_Output/Analog Inputs** then press **[Enter]**.
6. Select the Analog Input to modify for the temperature transducer.

7. Assign 4-20mA, 0-5V Ambient Temperature or Model 12 as the function for the selected Analog Input.
8. Press **[Back]** once to return to the Analog Input menu.
9. If 4-20mA or 0-5V Ambient Temperature was selected follow the subsequent procedures below for sensor setup.
10. Press the arrow up or arrow down key. Select **Sensor Setup** then press **[Enter]**.
11. Select Ambient Temp to set up then press **[Enter]**.
12. Set the offset of the 4mA if needed to calibrate the low side then press **[Enter]**.
13. Set the range of the transducer on the high side then press **[Enter]**. (e.g., 32°F -150°F transducer would show 4mA at 32°F and 20mA at 150°F).
14. Press the **[Menu]** key to exit the menu setup screens.

NOTE: If an auto stop condition occurs during the warm-up delay, the controller will enter an auto stop sequence.

Setting up to Stop the Engine from Utilizing the Countdown Timer

The MPC-10 / TEC-10 will only utilize this timer when starting in Auto mode. The control and the running of the engine will continue until the chosen stop condition is met or until the Countdown timer runs out of time. Once set, the operator will be required to disable or change the timer in the menu in order to eliminate the countdown timer being active on every auto startup.

1. Access **Menu/Start_Stop Timers/Countdown Timer**.
2. Set the hours, minutes and seconds desired for the running of the engine, and press **[Enter]**.
3. Press the **[Menu]** key to exit the menu setup screens.

NOTE: When the Countdown Timer is set for a countdown, the controller will always countdown upon an auto start until the timer is set to 0.

Screen Examples

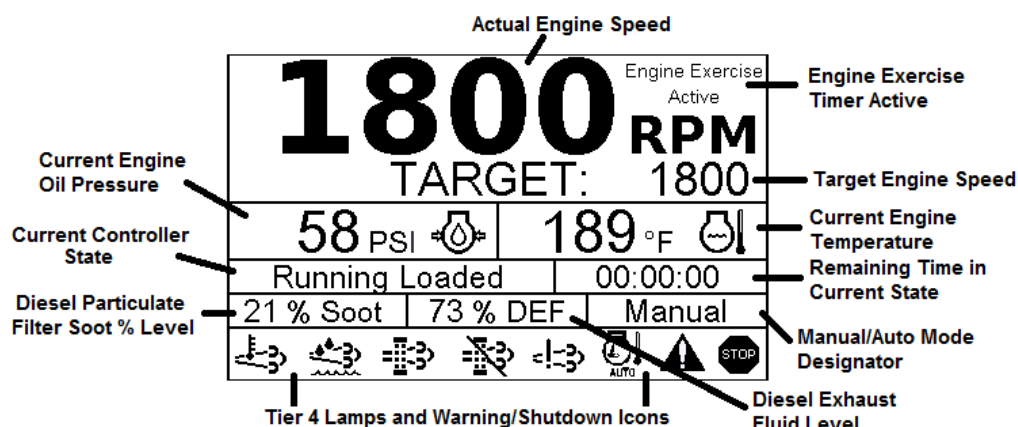


Figure 8: Screen Example

Additional Screens

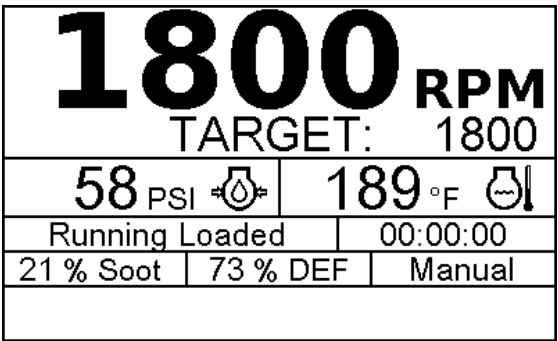


Figure 9: Main Screen

This is the main screen, and it displays actual and target RPM, Mode of Operation, Timer progress, % Soot Level, % DEF Level and current State, along with icons and warnings.

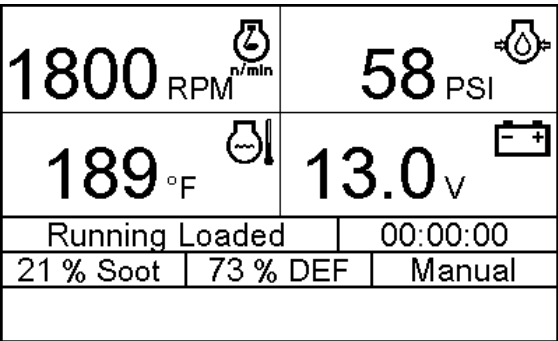


Figure 10: First 4-Up Screen

This is the first 4 up screen, displaying engine RPM, oil pressure, engine temperature and battery voltage. If alternate parameters are desired, these may be changed using the free MPC-10 / TEC-10 software configuration tool.

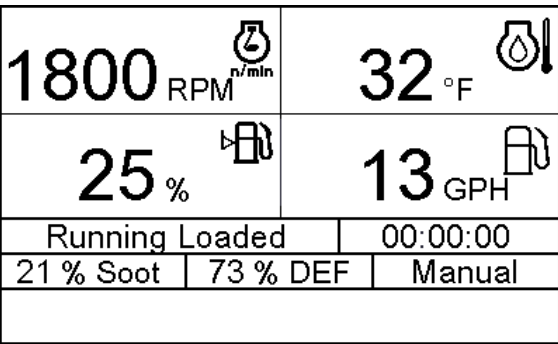


Figure 11: Second 4-Up Screen

This is the second 4 up screen, displaying engine RPM, engine temperature, fuel level and GPH. If alternate parameters are desired, these may be changed using the free MPC-10 / TEC-10 software configuration tool.

Start Inactive Stop Active		Throttle 35 PSI Maintain 35 1625 RPM	
Running Loaded		00:00:00	
21 % Soot	73 % DEF	Manual	

Figure 12: Application Screen

This screen displays the auto start/stop type and will also illustrate the throttling method for the auto start/stop.

 Regeneration Mode Auto Regen 2 Request Counter Press Enter Key to Switch Modes Hold to Request Regeneration		 Hold Enter Key to Request Forced Regeneration Press Enter Key Once to Inhibit Regeneration	
Running Loaded		00:00:00	
21 % Soot	73 % DEF	Manual	

Figures 13: Regeneration Mode Screen & CAT/Perkins Regeneration Screen

This is the Tier 4 Regeneration screen that is selected to be shown in the Tier 4 menu. This screen shows and allows the user to select the regeneration mode without accessing the menu, if desired.

System Information		
Other		104.62 ENG HRS
10 / Sep / 17	Monday	06:03:20 PM
SW: 02 .09 .10029 .00 CFG: 2 .9 .10002		
P/N: 40-70-0494		S/N: 12345678910
Running Loaded		00:00:00
21 % Soot	73 % DEF	Manual

Figure 14: System Information

This screen displays the Engine Manufacturer, Engine Hours, date, day, time, software version number, configuration number, part number (if available) and serial number (if available). This page will assist Technical Services Support should their services be needed.

Digital Output Status		
DO 1	Not In Auto	On
DO 2	Engine Running	On
DO 3	Throttle Decrease	Off
DO 4	Throttle Increase	Off
Running Loaded		00:00:00
21 % Soot	73 % DEF	Manual

Figure 15: Digital Output Status

This screen will allow the operator to see what the digital output functions are set to without accessing the menu and the active setting which informs the user of the output status.

Relay Status		
R 1	Crank	Off
R 2	ECU Enable	On
R 3	Not Used	Off
Running Loaded		00:00:00
21 % Soot	73 % DEF	Manual

Figure 16: Relay Status

This screen will allow the operator to see what the relay status functions are set to without accessing the menu and the active setting which informs the user of the relay status.

Digital Input Status		
DI 1	Disabled	Open
DI 2	Auto Start Maintained	B-
DI 3	Auto Stop Maintained	B-
DI 4	Low Coolant Level	Open
DI 5	Low Lube Oil Level	Open
Running Loaded		00:00:00
21 % Soot	73 % DEF	Manual

Figure 17: Digital Input Status

These two screens will allow the operator to see what the digital input functions are set to without accessing the menu and the active setting which informs the user of the input status.

Analog Input Status		
AI 1 Disabled		
AI 2 Disabled		
AI 3 Disabled		
Running Loaded		00:00:00
21 % Soot	73 % DEF	Manual

Figure 18: Analog Input Status

This screen displays the Analog Input's function selected in the menu for each input.

Service Life Remaining			Service Life Remaining		
Oil Life Remaining 0.0 Hrs			Fuel Filter Life 0.0 Hrs		
Oil Filter Life Remaining 0.0 Hrs			Air Filter Life 0.0 Hrs		
Belt Life Remaining 0.0 Hrs			Overhaul Life 0.0 Hrs		
Battery Life Remaining 0.0 Hrs					
Running Loaded		00:00:00	Running Loaded		00:00:00
21 % Soot	73 % DEF	Manual	21 % Soot	73 % DEF	Manual

Figure 19: Service Life Remaining Screens

These two screens provide a list of service reminders and the hours left until the internal alarm will display the services needed. All the reminders are set to 0.0 Hrs to disable by default and the screens are hidden by default. The screens can be shown by setting the Show Service Reminders Screens to "Show" in the service reminders menu.

ISO Icons

The following ISO icons can be displayed on the controller to designate specific parameters and Tier 4 Emission Alerts, as well as Warnings and Shutdowns.

Icon	Description
	Displays when High Exhaust System Temperature (HEST) is active and exhaust temperature is above normal operating condition.
	Low diesel exhaust fluid. Displays when the DEF is low.
	Displays when engine aftertreatment is in need of regeneration. This is due to the aftertreatment filter reaching the engine manufacturer's set soot level for a regeneration to occur.

	Displays when the Engine ECU has inhibited a regeneration from occurring. This should also be shown when inhibiting regeneration selection is made in the menu.
	Displays when an emissions aftertreatment malfunction has occurred. Contact your local engine manufacturer's service department for direction.
	Deutz – Engine Aftertreatment Override Active Status.
	Deutz – Wash Bit Ash Load High. Status 1 Solid, Status > 1 Flashing.
	CAT/ PERKINS DPF Burner Temp (HEST). Exhaust System High Temperature Lamp Command.
	CAT/PERKINS - Delayed Engine Shutdown. Required for C7.1 ACERT engines having DES enabled.
	FPT (DEF Level – Operator Warning) – Warning DEF Level below 10%
	FPT (DEF Level – Mid Level Inducement) – 65% of torque reduction; 40% engine speed reduction ramped within 40 minutes
	FPT (DEF Level – Severe Inducement) – Engine commanded to low idle within 30 minutes
	JCB/Deutz - Emissions Malfunction Low
	JCB/Deutz - Emissions Malfunction High
	JCB - Catalyst Tank Level below 15%
	JCB - Catalyst Tank Level below 5%
	JCB – DPF Emissions Filter Above 80%. Engine Refresh Required

	JCB – DPF Emissions Filter Above 90%. Engine Overloaded
	JCB – DPF Emissions Filter at 100%. Engine Plugged
	JCB – Inducement Level 2,3 or Final.
	Displays when an active or unacknowledged warning fault exists. The icon will disappear if the fault is acknowledged and is no longer active.
	Displays when an active or unacknowledged shutdown fault exists. The icon will disappear if the fault is acknowledged and no longer active.
	Gear Box Pressure
	Fuel Rate
	Fuel Level
	Pump Flow Rate
	Engine Oil Level
	Discharge Pressure
	Current Oil Pressure
	Current RPM
	Ambient Temperature
	Oil Temperature
	System Level

	Suction Pressure
	Percent Load at Current RPM
	Current Engine Temperature
	Battery Voltage

Icon Troubleshooting

The warnings and shutdowns internally generated by the controller will show an Internal Fault on the top of the screen when a fault is displayed. Check all fluid levels and pressures. Ensure the cooling system and engine are functioning properly.

The warnings and shutdowns the ECU generates will also be accompanied by a cause for the error. Consult with the engine manufacturer regarding fault codes shown on the screen.

If the fault states it is internal and everything checks out normal, consider checking the set points or the bypass timer(s) to ensure the ranges are within normal operating settings for the engine and application.

Menu Glossary

System (Low Security)

Date/Time (Low Security): allows the setting of the controller's date and time.

Units (Medium Security): allows the setting of the units of measurement for information presented on the display.

Pressure Units (Medium Security): allows the selection of PSI, kPa or BAR for pressure designation. **Factory set to PSI.**

Temperature Units (Medium Security): allows the selection of Fahrenheit or Celsius for temperature designation. **Factory set to Fahrenheit.**

Level Units (Medium Security): allows the selection of Feet or Meters for Level designation. **Factory set to Feet.**

Flow Units (Medium Security): allows the selection of gal/min (US), gal/min (UK), lpm (Liters per Minute), lps (Liters per Second), m3/h (Meters Cubed per Hour) and m3/s (Meters Cubed per Second) for flow designation. **Factory set to gal/min (US).**

Fuel Rate Units (Medium Security): allows the selection of gal/hr (US), gal/min (US), gal/hr (UK), gal/min (UK), lph (Liters per Hour), lpm (Liters per Minute), m3/h (Meters Cubed per Hour) for fuel rate designation. **Factory set to gal/hr (US).**

Language (Medium Security): select: English, French, German, Spanish, and Italian. **Factory set to English.**

Brightness (Medium Security): allows the backlight of the screen to be adjusted. **Factory set to 90.**

Parameter Setup (Low Security): allows four-up Page 1 and Page 2 parameters to be changed without using a PC.

Backlight Control (Medium Security): turns off (disables) or on (enables) the screen's backlight. **Factory set to Enable.**

Standby Timer (Medium Security): allows the screen the designated amount of time before the controller goes into Standby mode. Standby is also referred to as sleep mode. **Factory set to 00:30:00.**

Service Reminders (Medium Security): when the service reminder is set to 0, the alarms will be disabled; however, the countdown will continue and will show the numbers as (-) numbers as it counts down past 0 for the following parameters: **All service reminders factory set to 0.0 Hrs. If service reminders are desired they should be set within this menu.**

Show Service Screens (Medium Security): factory set to Hide.

Oil Life (Medium Security): factory set to 0 Hrs

Reset Oil Life (Medium Security): resets Oil Life reminder to factory setting.

Oil Filter Life (Medium Security): factory set to 0 Hrs

Reset Oil Filter Life (Medium Security): resets Oil Filter Life reminder to factory setting.

Belt Life (Medium Security): factory set to 0 Hrs

Reset Belt Life (Medium Security): resets Belt Life reminder to factory setting.

Battery Life (Medium Security): factory set to 0 Hrs

Reset Battery Life (Medium Security): resets Battery Life reminder to factory setting.

Fuel Filter Life (Medium Security): factory set to 0 Hrs

Reset Fuel Filter Life (Medium Security): resets Fuel Filter Life reminder to factory setting.

Air Filter Life (Medium Security): factory set to 0 Hrs

Reset Air Filter Life (Medium Security): resets Air Filter Life reminder to factory setting.

Overhaul Life (Medium Security): factory set to 0 Hrs

Reset Overhaul Life (Medium Security): resets Overhaul Life reminder to factory setting.

Reset All (Medium Security): Resets all service reminders to factory setting.

ECU Fault Codes (Medium Security): allows the operator to request stored fault codes from the ECU and request to clear active as well as stored codes in the ECU.

Stored Fault Codes (Medium Security): allows the operator to query the Engine ECU for review of its stored fault codes.

Clear Active ECU Fault Codes (High Security): Clears any active fault codes broadcast from the ECU as long as the ECU accepts the request.

Clear Stored ECU Fault Codes (High Security): Clears any stored fault codes in the ECU as long as the ECU accepts the request.

Auto / Manual (Low Security):

Manual Only (Medium Security): allows the operator to lock anyone out of placing the controller in Auto mode of operation. **Factory set to Disable**

Power Up Auto/Manual (High Security): allows the controller to power up in either Manual or Auto Mode of operation depending on the selection chosen. The operator can enable Manual only and disable the choice of auto on power up. **Factory set to Manual**

Show Auto Start Confirmation (Low Security): ensures the operator knows the controller is in auto by making the operator accept the Auto mode on power up. This is only shown if Power Up in Auto/Manual is set to Auto. **Factory set to Yes**

Green LED (High Security): select either Auto Operation or Running Loaded for the built-in green LED.

Restore Factory Defaults (Medium Security): allows the operator to reset all settings back to default.

Set Machine Hours (High Security): allows the operator to set the internal hours of the controller if Engine Type is set to Mechanical or ECU Hour Select is set to Internal.

Event History (Medium Security): allows the operator to view up to 32 previous alarms with date and time stamp. Also allows the operator to clear the event history log.

View Event History (Medium Security): allows the viewing of controller stored alarms.

Clear Event History (High Security): allows the clearing of controller stored events (alarms).

Alternator Excite Setup (High Security): allows the operator to set the dedicated alternator excite output to desired control. The alternator excite pulses the output and senses for feedback. If feedback is not received from the alternator in terms of a charge the MPC-10 / TEC-10 will allow for a Warning or shutdown. If there is a diode in the harness between the alternator and the controller, but still need to excite the alternator the operator is able to set the Show Alt Excite Warning to No to allow for the pulsing without feedback. If the alternator is self-exciting or this output is not needed the control can be set to Disable to ensure no voltage is live on the output.

Alt/Excite Control (High Security): allows the operator to enable or disable the dedicated output for Alt Excite. **Factory set to Enable**

Alternator Excite Alert (High Security): allows the operator to select if Alt Fail is a warning or shutdown. **Factory set to Warning.**

Show Alt Excite Warning (High Security): allows the controller to ignore the warning if excitation of the alternator is not sensed to eliminate the Alt Fail Warning. **Factory set to Yes**

Alt Excite Frequency (High Security): allows the operator to set how the Alternator excite output behaves. During setup for the engine the operator can choose Pulse 50ms, Pulse 100ms, or Steady for the frequency the alternator excite output turns on for exciting the field on a non-self-exciting alternator. The Alt Failure Warning will only work with the pulse setting. If setting to Steady (on during all running states) the Show Alt Excite Warning will need to be set to No. **Factory set to Pulse 50ms**

ECU Shutdowns (High Security): allows the controller to not shutdown the engine if a red lamp status (reserved for shutdown) is broadcast across the CANbus. When set to ECU Only the controller will show the fault while completely relying on the engine to shutdown the engine when the fault is broadcast on the

CANbus. When set to Controller and ECU the controller will turn off the ECU enable output when a red lamp status is broadcast on the CANbus. **Factory set to Controller & ECU.**

Engine Settings (Low Security)

Engine Type (High Security): allows the selection between J1939 and Mechanical. If Mechanical is chosen, some parameters associated with J1939 will no longer appear in the menu. **Factory set to J1939.**

Engine Manufacturer (High Security): allows the selection of the specific engine manufacturer (i.e., Caterpillar (M-T4F), Cummins (M-T4F), John Deere (M-T4F), Deutz (M-T4F), Kubota (M-T4i, Gaseous), JCB (T4F), Volvo (T3-T4F), FPT (T4F), Isuzu (M), PSI (EControls ECU), Scania (T3-T4F), FORD (EControls ECU), Perkins (M-T4F), Other, HATZ (M-T4F), GM (MEFI ECU), Yanmar (T4F). **Factory set to Other.**

Engine Emission (High Security): allows the selection of the emissions controls (i.e., Tier 3 or Less, Interim Tier 4 or Tier 4 / EU Stage IIIA, IIIB, IV). **Factory set to Tier 3 or Less.**

Tier 4 (Low Security): (only appears if Interim Tier 4 or Tier 4 / EU Stage IIIA, IIIB, IV is chosen) allows the automatic or inhibition of after treatment regeneration and/or the requesting of a regeneration.

Auto/Inhibit regen (Low Security): allows the operator to inhibit an after treatment regeneration by setting to inhibit. **Factory set to Auto**

Request Regen (Low Security): sends a request to the engine ECU for regeneration. **Factory set to No**

DEF Gauge (High Security): shows the DEF gauge when set to Yes. **Factory set to No**

Percent Soot Gauge (High Security): shows the % Soot gauge when set to Yes. **Factory set to No**

Regen Screen (High Security): shows the regeneration screen in the main screens when set to Yes. **Factory set to No**

NOTE: Inhibiting the Regen may cause the engine to de-rate or shut down if the soot level is too high. Recommend leaving this setting in Auto Regen. The ECU may not allow the Regen request if certain parameters do not meet the engine manufacturers' requested levels.

Speed Source (High Security): allows the selection of the appropriate speed source of the engine (i.e., J1939, Alternator or Magnetic Pickup). **Factory set to J1939**

Speed Calibration (High Security): allows the setting of the correct number of flywheel teeth or engine alternator pulses for mechanical engines when speed source is set to Alternator or Magnetic Pickup. **Factory set to 150**

Warm Up Speed (Medium Security): allows the setting of the speed of the engine during the warm-up phase. This speed setting must be at or above the minimum engine speed setting. **Factory set to 900 RPM**

Warm Up Delay (Low Security): allows the operator to set the desired warm-up time/delay for the engine. This is the length of time the engine will run at a lower speed for its warm-up cycle. **Factory set to 3 minutes**

Minimum Engine Speed (Medium Security): allows the setting of the lowest engine speed for continual operation. The controller will not allow the engine to throttle under the minimum engine speed when maintaining pressure or level. **Factory set to 700 RPM**

Maximum Engine Speed (Medium Security): allows the setting of the highest engine speed for continual operation. The controller will not allow the engine to throttle above the maximum engine speed when maintaining pressure or level. **Factory set to 2200 RPM**

Cooldown Speed (Medium Security): allows the setting of the speed of the engine while it is cooling down. This speed setting must be at or above the minimum engine speed setting. **Factory set to 900 RPM**

Cooldown Delay (Low Security): allows the operator to set the desired cool-down time/delay for the engine. This is the length of time the engine will run at a lower speed for its cool-down cycle. **Factory set to 3 minutes**

Advanced Engine Settings (Low Security)

Address Claim (High Security): allows the operator to set the address claim of the controller when used on the CANbus. This address is relative to the address the ECU requires the TSC1 to be broadcast from along with any Tier 4 messaging. Consult your engine manufacturer or dealer to obtain the correct source address the controller should be set to communicate correctly with the engine ECU. **Factory set to 3 and changed per Engine Manufacturer setting**

ECU Source Address (High Security): source address of the ECU being connected to. Normally set to 0, 1 or 2 per SAE J1939 specifications. This menu item is only shown if J1939 is selected for the Engine Type. **Factory set to 0**

ECU Hour Select (High Security): choose from ECU Hours (engine hours reported by the ECU) or Internal (hours calculated internally by the MPC-10 / TEC-10) provided the RPM>50. This menu item is only shown if J1939 is selected for the Engine Type. **Factory set to ECU Hours**

Crank Attempts (High Security): format of 1.00 to 20.00. The number of times the engine will attempt to start before providing an overcrank shutdown. **Factory set to 3**

Crank Disconnect Speed (Medium Security): the speed at which the crank will disconnect barring other input parameters. **Factory set to 500 RPM**

Run To Destruct (High Security): this feature is used when the controller is not able to shut down the engine, but allows faults to be shown on screen and LEDs per application requirement. **Factory set to Disable**

Timers/Delays (Low Security): establish operational settings for:

Auto Start Delay (Medium Security): the auto start condition must remain active throughout this delay for an auto start to occur. If the auto start condition is removed during this delay, the delay is reset to zero. **Factory set to 3 seconds**

Auto Stop Delay (Medium Security): this auto stop condition must remain active throughout this delay for an auto stop to occur. If the auto stop condition is removed during this delay, the delay is reset to zero. **Factory set to 3 seconds**

ECU Stabilize Timer (High Security): on start-ups, this delay allows the ECU to stabilize and broadcast on the CAN bus prior to actual cranking. **Factory set to 5 seconds**

Crank Time (High Security): this is the length of time the crank output is turned on during cycle cranking. **Factory set to 10 seconds**

Crank Rest (High Security): this is the length of time the crank output is turned off during cycle cranking. **Factory set to 10 seconds**

Prestart Delay 1 (Low Security): after a start condition has been accepted by the controller, this delay begins timing, and the prestart #1 output turns on. When this delay expires, the output is turned off, and the auto sequence continues.

Auto Only (Medium Security): **Factory set to Disabled.**

Prestart Delay (Low Security): **Factory set to 00.00.00**

Prestart Delay 2 (Low Security): after a start condition has been accepted by the controller, this delay begins timing, and the prestart #2 output turns on.

Auto Only (Medium Security): **Factory set to Disabled.**

Prestart Delay (Low Security): **Factory set to 00.00.00**

Prestart Delay 2 Mode (High Security): this setting determines if the prestart #2 output is active through the crank state or only through the prestart #2 state. **Factory set to PreCrank**

Spindown Timer (Medium Security): this delay begins timing when there is no call to run and the engine speed is zero. No auto start functions will occur until this delay expires. **Factory set to 30 seconds** (Unable to set below 5 seconds)

Post Crank Lockout Setup (Medium Security): this is a setup for a delay that begins timing after crank disconnect at startup. During this delay, the selected functions are ignored. When this delay expires, the selected functions are armed. During the duration of this delay, the selected functions can cycle from active to not active and not reset the delay.

Post Crank Lockout Time (Medium Security): **Factory set to 30 seconds**

Post Crank Lockout 1 (Medium Security): **Factory set to Low Oil Pressure**

Post Crank Lockout 2 (Medium Security): **Factory set to High Engine Temperature**

Post Crank Lockout 3 (Medium Security): **Factory set to Disabled**

Post Crank Lockout 4 (High Security): **Factory set to Disabled**

Post Crank Lockout 5 (High Security): **Factory set to Disabled**

Post Warm-up Lockout Setup (Medium Security): this is a setup for a delay that begins timing when the warm-up delay expires. During this delay, the selected functions are ignored. When this delay expires, the selected functions are armed. During the duration of this delay, the selected functions can cycle from active to not active and not reset the delay.

Post Warm-up Lockout Time (Medium Security): **Factory set to 00.00.00**

Post Warm-up Lockout 1 (Medium Security): **Factory set to Disabled**

Post Warm-up Lockout 2 (Medium Security): **Factory set to Disabled**

Post Warm-up Lockout 3 (Medium Security): **Factory set to Disabled**

Post Warm-up Lockout 4 (High Security): **Factory set to Disabled**

Post Warm-up Lockout 5 (High Security): **Factory set to Disabled**

Bubble Lockout Setup (Medium Security): this is a setup for a delay that begins timing when the selected functions are active. If the selected functions are removed during this delay, the delay resets to zero. If the selected functions remain active throughout this delay, the selected action for the parameter will occur.

Bubble Lockout Time (Medium Security): **Factory set to 00.00.00**

Bubble Lockout 1 (Medium Security): **Factory set to Disabled**

Bubble Lockout 2 (Medium Security): **Factory set to Disabled**

Bubble Lockout 3 (Medium Security): **Factory set to Disabled**

Bubble Lockout 4 (Medium Security): **Factory set to Disabled**

Bubble Lockout 5 (Medium Security): **Factory set to Disabled**

Warnings and Shutdowns (Low Security): establish alerts for the listed parameters. When values reach the set points in this menu the controller will show **INTERNAL FAULT** on the top left of the screen. If nuisance faults keep occurring lower or raise the set point within this menu.

Low Oil Pressure Shutdown (High Security): a shutdown will occur when the pressure reaches this set point. **Factory set to 10 PSI.**

Low Oil Pressure Warning (High Security): an alarm will occur when the pressure reaches this set point. **Factory set to 15 PSI.**

High Engine Temp Shutdown (Medium Security): a shutdown will occur when the temperature reaches this set point. **Factory set to 225 F.**

High Engine Temp Warning (Medium Security): an alarm will occur when the temperature reaches this set point. **Factory set to 210 F.**

High Oil Temp Shutdown (Medium Security): a shutdown will occur when the temperature reaches this set point. **Factory set to 225 F.**

High Oil Temp Warning (Medium Security): an alarm will occur when the temperature reaches this set point. **Factory set to 210 F.**

Low Fuel Level Shutdown (Medium Security): a shutdown will occur when the level reaches this set point. **Factory set to 5%.**

Low Fuel Level Warning (Medium Security): an alarm will occur when the level reaches this set point. **Factory set to 10%.**

High Battery Warning (Low Security): an alarm will occur when the VDC reaches this set point. **Factory set to 16.0 VDC.**

Low Battery Warning (Low Security): an alarm will occur when the VDC reaches this set point. This setting is armed after crank disconnect upon startup. **Factory set to 8.0 VDC.**

Weak Battery Warning (Low Security): an alarm will occur when the VDC reaches this set point. **Factory set to 6.0 VDC.**

Underspeed Shutdown (Medium Security): a shutdown will occur when the engine speed reaches this set point. **Factory set to 0 RPM**

Overspeed Shutdown (Medium Security): a shutdown will occur when the engine speed reaches this set point. **Factory set to 2400 RPM.**

High Level Warning (Medium Security): an alarm will occur if the level reaches this set point. Menu setting shown after analog input is set. **Factory set to 0.0 FT**

High Level Shutdown (Medium Security): a shutdown will occur if the level reaches this set point. Menu setting shown after analog input is set. **Factory set to 0.0 FT.**

Low Level Warning (Medium Security): an alarm will occur if the level reaches this set point. Menu setting shown after analog input is set. **Factory set to 0.0 FT.**

Low Level Shutdown (Medium Security): a shutdown will occur if the level reaches this set point. Menu setting shown after analog input is set. **Factory set to 0.0 FT.**

High Flow Warning (Medium Security): an alarm will occur if the flow reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 GPM.**

High Flow Shutdown (Medium Security): a shutdown will occur if the flow reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 GPM.**

Low Flow Warning (Medium Security): an alarm will occur if the flow reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 GPM.**

Low Flow Shutdown (Medium Security): a shutdown will occur if the flow reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 GPM.**

High Discharge Pressure Warning (Medium Security): an alarm will occur when the pressure reaches this set point. **Factory set to 0 PSI.**

High Discharge Pressure Shutdown (Medium Security): a shutdown will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI.**

Low Discharge Pressure Warning (Medium Security): an alarm will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI**

Low Discharge Pressure Shutdown (Medium Security): a shutdown will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI**

High Suction Pressure Warning (Medium Security): an alarm will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI.**

High Suction Pressure Shutdown (Medium Security): a shutdown will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI.**

Low Suction Pressure Warning (Medium Security): an alarm will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI**

Low Suction Pressure Shutdown (Medium Security): a shutdown will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI**

High Gearbox Pressure Warning (Medium Security): an alarm will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI.**

High Gearbox Pressure Shutdown (Medium Security): a shutdown will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI.**

Low Gearbox Pressure Warning (Medium Security): an alarm will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI**

Low Gearbox Pressure Shutdown (Medium Security): a shutdown will occur when the pressure reaches this set point. Menu setting shown after analog input is set. **Factory set to 0 PSI**

Throttle Menu (Medium Security)

Manual Throttle Method (Medium Security):

Throttle Type: allows the operator to choose how they prefer to throttle the engine in manual mode of operation. There are four settings to choose from when throttling in manual. Inc/Dec, Run/Idle, Preset 3, and Preset 4 **Factory set to Inc/Dec**

Inc/Dec: this throttle method allows the operator to manually increase and decrease the engine rpm by the Target RPM Step Size chosen.

Run/Idle: this throttle method allows the operator to manually increase and decrease the engine rpm with 2 presets. When in manual mode this setting will only allow for two throttle set points.

Preset 3: this throttle method allows the operator to manually increase and decrease the engine rpm with 3 presets. When in manual mode this setting will only allow for three throttle set points.

Preset 4: this throttle method allows the operator to manually increase and decrease the engine rpm with 4 presets. When in manual mode this setting will only allow for four throttle set points.

Engine Throttle Type (High Security): allows the selection of J1939 TSC1, Pulse Inc/Dec as the throttle type for the engine. **Factory set to J1939 TSC1.**

J1939 TSC1: this setting will be used when an electronic engine is used for J1939 Throttling. (Verify with Engine Dealer this type of throttling is accepted on the specific engine.)

Pulse Inc/Dec: this setting will be used when throttling a mechanical engine, when using a throttle actuator and also on an electronic engine using digital pulses into the ECU for throttling.

None: when None is selected as throttle type the controller will not show Target RPM on the front screen and does not try to throttle the engine. This is set when another form of throttling is used outside of the MPC-10 / TEC-10 such as a fixed speed engine or a manually controlled hand throttle.

Target RPM Step Size (Medium Security): this is the step size of the target RPM when increasing and decreasing. The actual rate of change is much higher when throttling in auto vs. manually with the push buttons. **Factory set to 25 RPM.**

Throttle Deadband RPM (Medium Security): format of # RPM. Plus/minus value added to the target to provide a range of RPM during which the throttle is not active. No throttling will occur when the engine RPM is within the RPM deadband. **Factory set to 25 RPM.** (Only appears when Pulse Inc/Dec is chosen for the Throttle Type)

Throttle Inc/Dec Pulse (High Security): format of # mS. The amount of time to pulse the throttle. Increase this value for faster engine response, or decrease this value for slower engine response. **Factory set to 50mS.** (Only appears when Pulse Inc/Dec is chosen for the Throttle Type)

Throttle Inc/Dec Pulse Delay (High Security): format of # mS. The amount of delay time before pulsing the throttle. Increase this value for slower engine response, or decrease this value for faster engine response. **Factory set to 250mS.** (Only appears when Pulse Inc/Dec is chosen for the Throttle Type)

Throttle Inc Rate (Medium Security): the rate the engine is signaled to increase in RPM. **Factory set to 100 RPM/s.**

Throttle Dec Rate (Medium Security): the rate the engine is signaled to decrease in RPM. **Factory set to 100 RPM/s.**

Torque Control (High Security): when Volvo is selected as the engine manufacturer this menu item becomes active. This menu allows for enabling or disabling torque control of the engine as well as the limit percentage of control.

Enable/Disable Torque Control: Factory set to Disabled

Torque Limit Control: Torque Control Factory set to 125%

Input / Output Menu

Digital Inputs (1-5) (Medium Security): for each of the digital inputs, the ability to select the following parameters exists:

Digital input 1 (Medium Security): **Factory set to Function: Disabled, Active: B-, Action: Not Used**

Digital Input 2 (Medium Security): **Factory set to Function: Auto Start Maintained, Active: B-, Action: Not Used**

Digital Input 3 (Medium Security): **Factory set to Function: Auto Stop Maintained, Active: B-, Action: Not Used**

Digital Input 4 (Medium Security): **Factory set to Function: Low Coolant Level, Active: B-, Action: Shutdown**

Digital Input 5 (Medium Security): **Factory set to Function: Low Lube Oil Level, Active: B-, Action: Shutdown**

Function (Medium Security):

Disabled

Single Contact Start/Stop

Auto Start Maintained (Auto Start Maintained must have Auto Stop Maintained Set)

Auto Stop Maintained (Auto Stop Maintained must have Auto Start Maintained Set)

Remote Alarm Acknowledge

Low Fuel Level

Fuel Leak

Fuel Filter Restriction

Low Lube Oil Level

Low Coolant Level

Remote Stop

Remote Manual/Auto

Idle Engine

Water in Fuel

No Flow

User 1

User 2

Remote Throttle Inc (allows increasing engine speed remotely)

Remote Throttle Dec (allows decreasing engine speed remotely)

Kubota Parking Brake (needed when Kubota engine and Tier 4 is selected)

Kubota Neutral Switch (needed when Kubota engine and Tier 4 is selected)

Pivot Alignment (allows a warning or shutdown when a pivot becomes misaligned)

Air Damper Closed

Air Filter Restriction

Battery Charger Fail

Oil Filter Restriction

Disable TSC1 (allows the operator to disable the TSC1 message to the engine when active)

Remote Throttle Active (allows the operator to activate the remote throttle of the analog inputs)

Active (Medium Security):

B- (when input closes to ground it enables action of digital function)

B+ (when input closes to battery positive it enables action of digital function)

Open (when input opens it enables action of digital function)

Action (Medium Security):

Not Used: (chosen when using digital input for anything except a fault)

Warning: (chosen for an immediate warning to the operator when function is active)

Shutdown: (chosen for an immediate shutdown of engine when function is active)

Shutdown, Controlled: (chosen to allow the controller to shutdown through the normal sequence of operation including cooldown when function is active. User acknowledgement of the fault is required to restart in Auto after shutdown occurs)

Relay Control: (chosen for control of one of the relay outputs when function is active)

Shutdown, Controlled, Restart: (chosen to allow the controller to shutdown through the normal sequence of operation including cooldown when function is active. User acknowledgement of the fault is **NOT** required to restart in Auto after shutdown occurs if active shutdown is removed from controller)

Analog Inputs (1-3) (Medium Security): for each of the analog inputs, the ability to select the following parameters exists:

Analog input 1 (Medium Security): **Factory set to Function: Disabled**

Analog Input 2 (Medium Security): **Factory set to Function: Disabled**

Analog Input 3 (Medium Security): **Factory set to Function: Disabled**

Function (Medium Security):

Disabled

4-20mA Suction Pressure

0-5V Suction Pressure

4-20mA Discharge Pressure

0-5V Discharge Pressure

4-20mA System Level

4-20mA Flow Rate

4-20mA Ambient Temp

0-5V Ambient Temp
4-20mA Gear Box Pressure
0-5V Gear Box Pressure
Datcon Oil Pressure
Murphy Oil Pressure (ES2P-100)
VDO5 Bar Oil Pressure
VDO7 Bar Oil Pressure
Murphy Engine Temp (ES2T-250/300)
Datcon Engine Temp
VDO Engine Temp
Murphy Fuel Level (ES2F)
VDO Fuel Level
Datcon Fuel Level
Murphy Oil Temp (ES2T-250/300)
Datcon Oil Temp
VDO Oil Temp
Murphy PMK-400 Pressure (Gear Box Pressure, Murphy PMK-400 Sensor)
Analog.Digital1
4-20mA Remote Throttle: (4mA = Min Engine Speed, 20mA = Max Engine Speed, Remote Throttle Digital Input must be active to allow analog to work properly)
0.5-4.5V Remote Throttle: (0.5V = Min Engine Speed, 4.5V = Max Engine Speed, Remote Throttle Digital Input must be active to allow analog to work properly)
Model 12 Air Temp Sensor: (Murphy 0-5V Model 12 preset Ambient Temp Sensor)

Sensor Setup (Medium Security): (This menu only appears when a transducer [4-20mA or 0-5V] is selected for an analog input.)

Ambient Temp (0-5V) or (4-20mA)
Discharge Pressure (0-5V) or (4-20mA)
Suction Pressure (0-5V) or (4-20mA)
Flow Rate (4-20mA)
System Level (4-20mA)

Relay (1-3) and Digital (1-4) Outputs (Medium Security): these same parameters are used for both the Relay and Digital Outputs.

Relay 1 (Medium Security): **Factory set to Crank, Starter Relay**
Relay 2 (Medium Security): **Factory set to ECU Enable**
Relay 3 (Medium Security): **Factory set to Not Used**
DO1 (B+, 1A) (Medium Security): **Factory set to Not in Auto**
DO2 (B+, 1A) (Medium Security): **Factory set to Engine Running**
DO3 (B-, 1A) (Medium Security): **Factory set to Throttle Decrease**
DO4 (B-, 1A) (Medium Security): **Factory set to Throttle Increase**

Not Used: This function does not allow the output to turn on when chosen.

Prestart 1 Delay: Output turns on when in Prestart 1 state. See Timers on page 23.

Prestart 2 Delay: Output turns on when in Prestart 2 state. See Timers on page 23.

Crank: Output turns on when in Crank state. See Timers on page 23.

Fuel: Output turns on when cranking and turns off after cooldown. See Timers on page 23.

ECU Enable Used for enabling the ECU on electronic engines. This output turns on anytime the controller is powered up or in the crank/run state. It's turned off if the controller is in spindown or standby states.

Excite Engine Alternator This output can be used if the dedicated Alt Excite output is not used.

Shutdown This output turns on when a fault shutdown occurs.

Common Alarm This output turns on when either a shut-down or a non-shutdown warning occurs.

Remote Alarm This output turns on when a either a shutdown or a non-shutdown warning occurs.

Not in Auto This output turns on when the controller is in the manual mode.

Engine Running This output turns on after the engine actually starts and off when the engine stops.

Throttle Increase The increase outputs are used for the pulse increment throttling type.

Throttle Decrease The decrease outputs are used for the pulse decrement throttling type.

Digital Input (1-5) A digital input can be assigned to turn on a digital output.

Analog (1-3) Digital An analog input configured to be a digital input can be assigned to turn on a digital output.

Feed Engage This output is used for Chipper control to engage the feed wheel.

Feed Disengage This output is used for Chipper control to disengage the feed wheel.

Pivot Power This output turns on anytime the engine is above crank disconnect RPM to allow voltage to a center pivot.

Failed to Start This output turns on when the cranking cycles have completed and the engine fails to start in an overcrank situation.

Ignition On (off in standby) This output turns on any time the controller is keyed on with the exception of standby. This output is disabled during standby (sleep mode) to help reduce parasitic loads.

Ignition On (on in standby) This output turns on any time the controller is keyed on. Be cautious of using where a parasitic load can drain the battery and not allow the engine to start.

Application Configuration (Low Security)

Application (Medium Security): Factory set to Pump All Purpose

Pump All Purpose: The Pump All Purpose application houses the auto start functions and auto throttle methods meant to be used on most engine-driven pump applications. This application allows for pumps of many variations to be used in a manual/auto start environment utilizing the more common auto start and throttling functions.

Air Compressor: The Air Compressor application houses the auto start functions and auto throttle methods meant to be used on most engine-driven air compressor applications. The MPC-10 / TEC-10 allows for the compressor to start/stop and/or maintain a desired pressure during operation.

Hose Reel Irrigation: The Hose Reel Irrigation application houses the auto start functions and auto throttle methods meant to be used on hose reel irrigation systems. The MPC-10 / TEC-10 allows for the hose reel pump to auto start with several methods, including the Local Key Start which may be the most used in this application. The key feature of this application is the auto throttling method. This feature allows the controller to manage the pump's throttle in order to maintain a pressure in the hose during irrigation.

Frost Protection: The Frost Protection application houses the auto start functions and auto throttle methods meant to be used on frost protection systems. This application allows for wind machine, sprinkler or other forms of frost protection using single contact or a temperature transducer.

Chipper: The MPC-10 / TEC-10 must be in the Manual mode for both Chipper Auto and Chipper Manual (Autofeed Override). The Chipper application has settings required for the operation:

Auto Start / Stop Function (Medium Security): Factory Set to Two Contact Maintained

Single Contact (Pump All Purpose, Air Compressor, Hose Reel Irrigation, Frost Protection, Chipper)

Local Start Key (Pump All Purpose, Air Compressor, Hose Reel Irrigation, Chipper)

Two Contact Maintained (Pump All Purpose)

Pressure Transducer (Pump All Purpose & Air Compressor)

Level Transducer (Pump All Purpose)

Temperature Transducer (Frost Protection)

Auto Throttle Method (Medium Security): Factory Set to Running Loaded

Running Loaded RPM (Pump All Purpose, Air Compressor, Frost Protection) allows the controller to adjust the speed of the engine to maintain a RPM setpoint in Auto mode.

Pressure Transducer (Pump All Purpose, Air Compressor, Hose Reel Irrigation) allows the controller to adjust the speed of the engine to maintain a pressure setpoint in Auto mode.

Level Transducer (Pump All Purpose) allows the controller to adjust the speed of the engine to maintain a level setpoint in Auto mode.

Running Loaded Inc/Dec (Pump All Purpose) allows the controller to ramp the engine speed up and down using the Inc/Dec buttons on the keypad while using the controller for auto start.

Auto Throttle Type (High Security): Factory set to NON PID Auto Throttle.

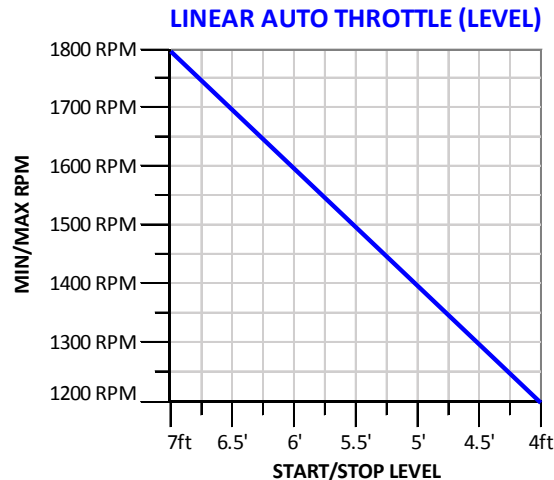
NON PID Auto Throttle: this throttle type does not use the PID adjustments found in the Transducer setups in the Application menu and uses the ramp rates to control the engine speed.

PID Auto Throttle: this throttle type uses the PID adjustments found in the Transducer setups within the Application menu. This setting should only be used by a technician who understands in detail the method of tuning the proportional-integral-derivative control loop commonly used in PLC programming language.

NOTE: When selecting PID Auto Throttle as the auto throttle type the Ramp Inc Rate and Ramp Dec Rate in the Throttle menu should be set to 0 RPM per Second so the PID does not combat the ramp rates set in the controller. This will require the user to manually adjust the throttle rate in manual mode.

Linear Auto Throttle: this throttle type uses the Pressure or Level start and stop setpoints as well as the minimum and maximum RPM setpoints to linearly/proportionally throttle the engine from start to stop depending on pressure or level. The throttle increases or decreases depending on the setting of the transducer type selected. The linear tie to the start/stop should be used when desiring to decrease throttle approaching the stop setting. See figure below as an example.

Example, Linear Auto Throttle: This example shows level with the transducer type set to Empty with auto level start at 7ft and auto level stop at 4ft. This example also shows a maximum RPM of 1800 and a minimum RPM of 1200. As the pump starts it ramps up to 100% (maximum throttle) then slows linearly/proportionally as the level decreases until set stop level is reached with a 0% minimum throttle.



NOTE: In order for linear auto throttle to work correctly the auto start/stop function and auto throttle method need to be set to the same transducer type.

Auto Running Loaded Speed (Medium Security): this selection is present when selecting Running Loaded RPM as the Auto Throttle Method. This setting will set the speed at which the controller will run in auto mode when in the Running Loaded state. **Factory set to 2000 RPM.**

Pressure Transducer (Medium Security): This selection is only present when selecting Pressure Transducer in the Auto Start / Stop Function or Auto Throttle Method.

Start Pressure (Medium Security): This selection is present when selecting Pressure Transducer as the Auto Start / Stop Function. When the pressure reaches this set point, an auto start will occur. **Factory set to 0 psi**

Stop Pressure (Medium Security): This selection is present when selecting Pressure Transducer as the Auto Start / Stop Function. When the pressure reaches this set point, an auto stop will occur. **Factory set to 0 psi**

Maintain Pressure (Medium Security): This selection is present when selecting Pressure Transducer as the Auto Throttling Method. The engine will be throttled between the min. and max. RPM set points to maintain this pressure. **Factory set to 0 psi**

Deadband Pressure (Medium Security): This selection is present when selecting Pressure Transducer as the Auto Throttling Method. This extends above and below the maintain set point, no throttling occurs while the pressure is in the deadband. **Factory set to 0 psi**

Pressure Type (Medium Security): **Factory set to Discharge**

Discharge: When the Auto Start/Stop is selected as Pressure Transducer and the Pressure Type is set to **(Discharge)**, it is necessary to set the pressure to start on a low value (falling ↓) then stop on high value (rising ↑) in order to work correctly. When the Auto Throttle Method is selected to Pressure Transducer and the Pressure Type is set to **(Discharge)**, the controller throttles the engine by increasing the RPM below the deadband and decreasing the RPM above the deadband to maintain the desired level of Pressure.

Suction: When the Auto Start/Stop is selected as Pressure Transducer and the Pressure Type is set to **(Suction)**, it is necessary to set the pressure to start on a high value (rising ↑) then stop

on low value (falling ↓) in order to work correctly. When the Auto Throttle Method is selected to Pressure Transducer and the Pressure Type is set to **(Suction)**, the controller throttles the engine by decreasing the RPM below the deadband and increasing the RPM above the deadband to maintain the desired level of Pressure.

Line Fill 1 Speed – (Medium Security): The engine is throttled to this speed after warm-up to purge the line. **Factory set to 900 RPM**

Line Fill 1 Delay – (Medium Security): This is the time the engine is held at the Line Fill 1 speed. **Factory set to 00.00.00**

Line Fill 1 Pressure – (Medium Security): The engine is held at the Line Fill 1 Speed until either this pressure set point is reached or the Line Fill 1 Delay expires. **Factory set to 0 psi**

Line Fill 2 Speed – (Medium Security): This selection is present when Hose Reel is selected in the Applications menu. The engine is throttled to this speed after Line Fill 1 to fill the line. **Factory set to 900 RPM**

Line Fill 2 Delay – (Medium Security): This selection is present when Hose Reel is selected in the Applications menu. This is the time the engine is held at the Line Fill 2 speed before advancing to pressure throttle control. **Factory set to 00.00.00**

Line Fill 2 Pressure – (Medium Security): This selection is present when Hose Reel is selected in the Applications menu. The engine is held at the Line Fill 2 Speed until either this pressure set point is reached or the Line Fill 2 Delay expires before advancing to pressure throttle control. **Factory set to 0 psi**

Pressure P – (High Security): This selection is present when PID Auto Throttle Type selected and allows adjustment of the Proportional setting of the PID loop when throttling. **Factory set to 0.020**

Pressure I – (High Security): This selection is present when PID Auto Throttle Type selected and allows adjustment of the Integral setting of the PID loop when throttling. **Factory set to 0.020**

Pressure D – (High Security): This selection is present when PID Auto Throttle Type selected and allows adjustment of the Derivative setting of the PID loop when throttling. **Factory set to 0.001**

Level Transducer (Medium Security): This selection is only present when selecting Level Transducer in the Auto Start / Stop Function or Auto Throttle Method.

Start Level – (Medium Security): This selection is present when selecting Level Transducer as the Auto Start / Stop Function. When the level reaches this set point, an auto start will occur. **Factory set to 0.0 ft**

Stop Level – (Medium Security): This selection is present when selecting Level Transducer as the Auto Start / Stop Function. When the level reaches this set point, an auto stop will occur. **Factory set to 0.0 ft**

Maintain Level – (Medium Security): This selection is present when selecting Level Transducer as the Auto Throttling Method. The engine will be throttled between the min. and max. RPM set points to maintain this level. **Factory set to 0.0 ft**

Deadband Level – (Medium Security): This selection is present when selecting Level Transducer as the Auto Throttling Method. This extends above and below the maintain set point, no throttling occurs while the level is in the deadband. **Factory set to 0.0 ft**

Level Type – (Medium Security): **Factory set to Empty**

Fill: When the Auto Start/Stop is selected as Level Transducer and the Level Type is set to **(Fill)**, it is necessary to set the flow to start on a low value (falling ↓) then stop on high value (rising ↑) in order to work correctly. When the Auto Throttle Method is selected to Level Transducer and the Level Type is set to **(Fill)**, the controller throttles the engine by increasing the RPM below the deadband and decreasing the RPM above the deadband to maintain the desired level.

Empty: When the Auto Start/Stop is selected as Level Transducer and the Level Type is set to **(Empty)**, it is necessary to set the level to start on a high value (rising ↑) then stop on low value (falling ↓) in order to work correctly. When the Auto Throttle Method is selected to Level Transducer and the Level Type is set to **(Empty)**, the controller throttles the engine by decreasing the RPM below the deadband and increasing the RPM above the deadband to maintain the desired level.

Level P – (High Security): This selection is present when PID Auto Throttle Type selected and allows adjustment of the Proportional setting of the PID loop when throttling. **Factory set to 0.020**

Level I – (High Security): This selection is present when PID Auto Throttle Type selected and allows adjustment of the Integral setting of the PID loop when throttling. **Factory set to 0.020**

Level D – (High Security): This selection is present when PID Auto Throttle Type selected and allows adjustment of the Derivative setting of the PID loop when throttling. **Factory set to 0.001**

(Flow Transducer): The controller supports this transducer for display and alarms only. No control such as start stop or throttling is available. Auto Flow is available in the MPC-20 controller if required.

Temperature Transducer (Medium Security): only present when selecting Temperature Transducer in the Auto Start / Stop Function.

Start Temperature (Medium Security): When the temperature drops to this set point, an auto start will occur. **Factory set to 32 F**

Stop Temperature (Medium Security): When the temperature rises to this set point, an auto stop will occur. **Factory set to 32 F.**

Engage RPM. In the Chipper Auto mode, the engine speed when the Feed Engage output will be activated. **Factory set to 2200 RPM.**

Disengage RPM. In the Chipper Auto mode, the engine speed when the Feed Disengage output will be activated. **Factory set to 1800 RPM.**

Disengage Delay. The amount of time the Feed Disengage output is active. **Factory set to 50mSec.**

Chipper Feed System. Operation of the outputs. **Factory set to ON-OFF-ON.**

Chipper type: ON-OFF-ON:

CHIPPER AUTO MODE

1. (2) Control outputs, Engage and Disengage are off prior to start up.
2. The engine is started manually using the MPC-10 / TEC-10 and throttled manually up to the Engage RPM set point:

- a. The Engage output turns on.
3. If during normal operation, the engine speed drops to the Disengage RPM set point:
 - a. The Engage output turns off.
 - b. The Disengage output turns on.
 - c. The Disengage delay begins timing. This is the amount of time the disengage (reverse) output is turned on for Chipper applications. **Factory set to 50 mS.**
4. When the Disengage delay expires:
 - a. The Disengage output turns off.
5. When the engine speed rises to the Engage RPM set point:
 - a. The Engage output turns on.

CHIPPER MANUAL MODE (AUTOFEED OVERRIDE)

1. The engine speed must be below the Disengage RPM set point to use the Autofeed Override feature. An RPMs TOO HIGH warning will appear if the Autofeed Override menu is accessed while the engine speed is higher than the Disengage RPM set point.
2. The operator enters the password to access the main menu.
3. Once in the main menu, the operator holds down the Enter button for 5 seconds.
4. The Autofeed Override menu will appear in the Feed Off mode.
5. For Feed Forward, the operator first presses and holds the Up Arrow, then presses and holds the Enter button, holding both for 5 seconds:
6. The Engage output turns on.
7. The display will read Feed Forward.
8. For Feed Reverse, the operator first presses and holds the Down Arrow, then presses and holds the Enter button, holding both for 5 seconds:
9. The Engage output turns off.
10. The Disengage output turns on.
11. The display will read Feed Reverse.
12. For Feed Off, the operator presses and holds the Enter button for 5 seconds.
13. If on, the Engage output turns off.
14. If on, the Disengage output turns off.
15. The display will read Feed Off.
16. To exit the Autofeed Override feature, press and hold the Back button for 5 seconds. This will return the controller to the main menu. Press the menu button to return to the front display.

Chipper type: DUMPING:

CHIPPER AUTO MODE

1. (2) Control outputs, Engage and Disengage are off prior to start up.
2. The engine is started manually using the MPC-10 / TEC-10 and throttled manually up to the Engage RPM set point:
3. The Engage output turns on.
4. If during normal operation, the engine speed drops to the Disengage RPM set point:
 - a. The Engage output remains on.
 - b. The Disengage output turns on.
 - c. The Disengage delay begins timing.
5. When the Disengage delay expires:
 - a. The Engage output turns off.
 - b. The Disengage output turns off.
6. When the engine speed rises to the Engage RPM set point:
 - a. The Engage output turns on.

CHIPPER MANUAL MODE (AUTOFEED OVERRIDE)

1. The engine speed must be below the Disengage RPM set point to use the Autofeed Override feature. An RPMs TOO HIGH warning will appear if the Autofeed Override menu is accessed while the engine speed is higher than the Disengage RPM set point.
2. The operator enters the password to access the main menu.
3. Once in the main menu, the operator holds down the Enter button for 5 seconds.
4. The Autofeed Override menu will appear in the Feed Off mode.
5. For Feed Forward, the operator first presses and holds the Up Arrow, then presses and holds the Enter button, holding both for 5 seconds:
 - a. The Engage output turns on.
 - b. The display will read Feed Forward.
6. For Feed Reverse, the operator first presses and holds the Down Arrow, then presses and holds the Enter button, holding both for 5 seconds:
 - a. The Engage output remains on.
 - b. The Disengage output turns on.
 - c. The display will read Feed Reverse.
7. For Feed Off, the operator presses and holds the Enter button for 5 seconds:
 - a. The Engage output turns off.
 - b. If on, the Disengage output turns off.
 - c. The display will read Feed Off.
8. To exit the Autofeed Override feature, press and hold the Back button for 5 seconds. This will return the controller to the main menu. Press the menu button to return to the front display.

Start / Stop Timers (Low Security)

NOTE: When the engine is started using one of the start timers, the timer which started the engine is the timer which will stop the engine. Other start/stop timers will be ignored if they happen to overlap from the timer that starts the engine.

This section allows the setting of the timers to start and stop the engine. There are three timers, each with a Start Day and a Stop Day, a Start Time and a Stop Time. This is based on the internal real-time clock.

Countdown Timer (Low Security): the countdown timer will be active upon every auto start up until the time is changed or disabled. It is used when it is desirable for a machine to run for a specific amount of

time unmonitored and then shut itself off when that time has expired or when a local key stop occurs. Format of HH:MM:SS. Maximum countdown time is 120 hours. **Factory set to 00:00:00**

NOTE: The countdown timer is only active when starting in Auto mode. This timer will not start counting when starting the engine in manual mode and switching to auto mode after the engine is running.

Start / Stop Timer (1-3) (Low Security): each of the three timers contains the ability to select from the following parameters:

Start Day (Low Security): **Factory set to Off**

Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Daily
Off

Start Time: format of HH:MM:SS (Low Security): **Factory set to 12.00.00 AM.**

Stop Day (Low Security): **Factory set to Off**

Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Daily
Off

Stop Time: format of HH:MM:SS (Low Security): **Factory set to 12.00.00 AM.**

Engine Exerciser (Medium Security): This feature allows the operator to set a voltage point for when the battery voltage drops below for a given period of time the controller will provide an auto start for a defined period of time to energize the battery using the engine alternator.

NOTE: The exerciser is only active when the controller is in Auto mode. If the exerciser starts the engine the exerciser is the only auto stop method to stop the engine. This holds true with all the Start/Stop Timers.

Exercise Mode (Medium Security): Set point for the operator to enable the voltage exerciser of the engine. **Factory set to Disabled**

Low Voltage Set Point (Medium Security): Voltage the operator sets for the battery voltage to drop below before an auto start will initiate to exercise the engine for recharging the battery. **Factory set to 9.5V**

Low Voltage Time (Medium Security): Time the operator sets for the voltage to be below the low voltage set point before an auto start is initiated. **Factory set to 10 minutes**

Exercise Running Loaded Time (Medium Security): Time the operator sets for the engine to run if voltage drops below the low voltage set point. **Factory set to 15 minutes**

Communication (High Security)

Communication Type (High Security):

PVA Gauge: this function will be used if utilizing PVA Gauges on the RS485 Communications Port.

Modbus: this function will be used if using a SCADA or telemetry device for polling the Modbus register list on the RS485 Communications Port. See Modbus Register Map. **Factory Default.**

Local Display: (for future use) this function will be used to connect the display to a remote viewing application. This can be a program running on a PC or another MPC-10 / TEC-10 with a custom configuration set up as a remote viewer.

Slave Address (High Security): This is the RS485 Modbus slave node number. **Factory set to 1.**

Serial Setup (High Security): Allows the operator to change the controller's RS485 serial communication settings.

Baudrate (High Security): **Factory set to 19200**

9600
19200
38400
57600
115200

Stopbits (High Security): **Factory set to 1**

0
1
2

Parity (High Security): **Factory set to None**

None
Odd
Even

PV CAN Backlight Enable (High Security): allows the MPC-10 / TEC-10 to control the backlights of the PVCAN gauges when used with the controller. **Factory set to Off**

CAN Termination (High Security): allows the operator to enable or disable the controller's internal 120 ohm terminating resistor. This should be enabled if the MPC-10 / TEC-10 is located at the end of the CAN bus and the end terminating resistor is not in the harness. **Factory set to Enable.**

CAN Parameter Map (High Security): allows the operator to enable or disable the proprietary CAN parameter map. The CAN Parameter Map can be used in place of the Modbus map when using a CAN device to talk to the controller for starting, stopping and control functions via telematics or another CAN based system. See CAN Parameter Map Section below for definition of the mapping. **Factory set to Disable.**

Passcodes (High Security)

This menu allows the operator using the High Security passcode to see the three 4-digit passcodes for Low, Medium and High security. This is a visual menu only. The security passcodes are only able to be altered via PowerVision for Controllers PC tool.

Load Configuration (High Security) MPC-10 ONLY

NOTE: It is essential that the USB Drive is formatted to a FAT file system before using to load software. If the drive is not formatted to FAT and left in another format the file may not load correctly.

This menu allows the MPC-10 operator using the High Security passcode to select a file from a USB drive plugged into the programming harness for the controller. Once the files are stored on the drive after generated in PowerVision for Controllers the file will show as long as the software was for the MPC-10 hardware and has the file extension .gcibin. Once the file is found it will show in the screen. Follow directions on the screen to load desired file. The screen will turn off then all three LEDs will come on then the Amber LED will begin flashing. Once the file is finished loading the Green LED stays on stead while the Amber and Red LEDs flash. The USB drive can now be removed to initiate a reboot of the controller or simply cycle power off then back on.

NOTE: If the file does not fully load due to the file being corrupt, the controller turned off during installing file, or the USB drive removed during drive the operator will be required to load a file created for the MPC-10 named configurationFull.gcibin to recover the controller from its bootloader mode. Once this is done the operator will be able to load a file from the menu again following power up.

File Name:			File Name:		
File Name			Pump.gcibin		
Press Enter to Select File			Press Enter to Select File		
Running Loaded		00:00:00	Stopped		00:27:30
21 % Soot	73 % DEF	Manual	21 % Soot	73 % DEF	Manual

Figure 20: File Selection

Communication Mapping

This section outlines the RS485 Modbus Register Map and CAN Parameter Map.

Modbus Registers

NOTE: The registers labeled Read/Write will allow the operator to change values through the Modbus as a temporary modification. If power is cycled to the MPC-10 / TEC-10, the values changed via Modbus will revert back to the last value entered locally.

REGISTER #	TYPE	DESCRIPTION	UNITS
40001-40002	Read Only	Current Engine Hours (32 Bit)	Hours
40003	Read Only	Actual Engine Speed	RPM
40004	Read Only	System Voltage (12.5 will read 125)	VDC
40005	Read Only	Actual Engine Oil Pressure	kPa
40006	Read Only	Actual Engine Temperature	Celsius
40007	Read Only	Controller State (Active State: Numeral Indicated) 0 = ECU Stabilize Delay 1 = Engine Stopped 2 = Controller in Standby 3 = Prestart 1 Delay 4 = Check Safe to Start 5 = Prestart 2 Delay 6 = Crank On 7 = Crank Rest 8 = False Start Check 9 = Engine Warmup Delay 10 = Line Fill 1 Delay 11 = Line Fill 2 Delay 12 = Running Loaded 13 = Running Cooldown Delay 14 = Energize to Stop Delay 15 = Engine Spindown Delay 16 = Wait to Start Delay	Numerals
40008	Read Only	Active Shutdown Status (Active Fault: Bit = 1, Inactive: Bit = 0) 0 = Overspeed SD 1 = Underspeed SD 2 = Overcrank SD 3 = Low Oil Pressure SD 4 = High Engine Temp SD 5 = Low Fuel SD 6 = Low Discharge Pressure SD 7 = High Discharge Pressure SD 8 = Speed Signal Lost SD 9 = Low Lube Level SD 10 = Fuel Leak SD 11 = Fuel Filter Restriction SD 12 = Reserved 13 = Reserved	(0 or 1) (0 or 1) (0 or 1) (0 or 1) (0 or 1) (0 or 1) (0 or 1) (0 or 1) (0 or 1) (0 or 1) (0 or 1) (0 or 1) Reserved Reserved

		14 = Reserved	Reserved
		15 = Remote Stop SD	(0 or 1)
40009	Read Only	Active Shutdown Status (Active Fault: Bit = 1, Inactive: Bit = 0)	
		0 = Coolant Level SD	(0 or 1)
		1 = High Level SD	(0 or 1)
		2 = Low Level SD	(0 or 1)
		3 = High Flow SD	(0 or 1)
		4 = Low Flow SD	(0 or 1)
		5 = Reserved	Reserved
		6 = Reserved	Reserved
		7 = Water in Fuel SD	(0 or 1)
		8 = Low Suction SD	(0 or 1)
		9 = High Suction SD	(0 or 1)
		10 = Reserved	Reserved
		11 = High Engine Oil Temp SD	(0 or 1)
		12 = Low Gear Box Pressure SD	(0 or 1)
		13 = High Gear Box Pressure SD	(0 or 1)
		14 = Reserved	Reserved
		15 = Red Lamp Status	(0 or 1)
40010	Read Only	Active Shutdown Status (Active Fault: Bit = 1, Inactive: Bit = 0)	
		0 = Pivot Alignment SD	(0 or 1)
		1 = Reserved	Reserved
		2 = Reserved	Reserved
		3 = Reserved	Reserved
		4 = Reserved	Reserved
		5 = Reserved	Reserved
		6 = Reserved	Reserved
		7 = Reserved	Reserved
		8 = Reserved	Reserved
		9 = Reserved	Reserved
		10 = Reserved	Reserved
		11 = Reserved	Reserved
		12 = Reserved	Reserved
		13 = Reserved	Reserved
		14 = Reserved	Reserved
		15 = Reserved	Reserved
40011	Read Only	Actual System Level	Feet
40012	Read & Write	Modbus Engine Start/Stop Auto Mode Only (Stop = 0, Start = 1)	(0 or 1)
40013	Read & Write	Maximum Engine Speed Setpoint	RPM
40014	Read Only	Actual Ambient Temp	Celsius
40015	Read & Write	Auto/Manual Mode (Manual = 0, Auto = 1)	(0 or 1)
40016	Read & Write	Running Loaded Speed in Auto Setpoint	RPM
40017	Read & Write	Manual Only (Manual Only Enabled = 1, Disabled = 0)	(0 or 1)
40018	Read & Write	Prestart 1 Auto Only (Prestart Auto Only = 1, Prestart Auto & Manual = 0)	(0 or 1)
40019	Read & Write	Prestart 2 Auto Only (Prestart Auto Only = 1, Prestart Auto & Manual = 0)	(0 or 1)
40020	Read Only	J1939.Actual Engine Torque	Percent

40021	Read Only	Reserved	Reserved
40022	Read Only	J1939.Diesel Particulate Filter Outlet Temperature	Celsius
40023	Read Only	J1939.Diesel Particulate Filter Intake Temperature	Celsius
40024	Read Only	J1939.Exhaust Temperature	Celsius
40025	Read Only	J1939.Engine Exhaust Manifold Bank 1 Temperature	Celsius
40026	Read Only	J1939.Boost Pressure	kPa
40027	Read Only	J1939.Engine Fuel Temperature	Celsius
40028	Read Only	J1939.Engine Intercooler Temperature	Celsius
40029	Read Only	J1939.Diesel Particulate Filter Ash Load Percent	Percent
40030	Read Only	J1939.Diesel Exhaust Fluid Tank Temperature	Celsius
40031	Read Only	J1939.Engine Fuel Delivery Pressure	kPa
40032	Read Only	J1939.Barometric Pressure	kPa
40033	Read Only	J1939.Air Filter Diff. Pressure	kPa
40034	Read Only	J1939.Exhaust Gas Temperature	Celsius
40035	Read Only	J1939.Hydraulic Pressure	kPa
40036	Read Only	J1939.Hydraulic Temperature	Celsius
40037	Read Only	J1939.Diesel Particulate Filter Active Regeneration Status: The following is a description of enumeration values.	Numerals
		0 = Not Active	
		1 = Active	
		2 = Regeneration Needed	
		3 = Not Available	
40038	Read & Write	System Level Engine Start (Auto)	Feet
40039	Read & Write	System Level Engine Stop (Auto)	Feet
40040	Read & Write	System Level Maintain Value (Auto)	Feet
40041	Reserved	Reserved	Reserved
40042	Reserved	Reserved	Reserved
40043-40044	Read Only	Actual Discharge Pressure	kPa
40045-40046	Read & Write	Pressure Engine Start (Auto)	kPa
40047-40048	Read & Write	Pressure Engine Stop (Auto)	kPa
40049-40050	Read & Write	Pressure Maintain Value (Auto)	kPa
40051-40200	Read Only	Reserved	Reserved
40201	Read Only	Version.App.1	Numerals
40202	Read Only	Version.App.2	Numerals
40203	Read Only	Version.App.3	Numerals
40204	Read Only	Version.App.4	Numerals
40205	Read Only	Version.Config.1	Numerals
40206	Read Only	Version.Config.2	Numerals
40207	Read Only	Version.Config.3	Numerals
40208	Read Only	Reserved	Reserved
40210	Read Only	J1939.Engine Catalyst Tank Level	Percent
40211	Read Only	J1939.Diesel Particulate Filter 1 Soot Load Percent	Percent
40212	Read Only	J1939.Diesel Particulate Filter Regeneration Inhibit Switch (Inhibit Switch Active = 1)	(0 or 1)
40213	Read Only	The following is a description of bits:	
		0 = J1939.Diesel Particulate Filter Active Regeneration Inhibited Due to Inhibit Switch (Inhibited = 1)	(0 or 1)
		1 = Reserved	Reserved

		2 = Reserved	Reserved
		3 = Reserved	Reserved
		4 = Reserved	Reserved
		5 = Reserved	Reserved
		6 = Reserved	Reserved
		7 = Reserved	Reserved
		8 = Reserved	Reserved
		9 = Reserved	Reserved
		10 = Reserved	Reserved
		11 = Reserved	Reserved
		12 = Reserved	Reserved
		13 = Reserved	Reserved
		14 = Reserved	Reserved
		15 = Reserved	Reserved
40214	Read Only	Controller State Timer	Seconds
40215	Read Only	Target Engine Speed from Controller	RPM
40216	Read Only	All Purpose Auto Start Function: (Active Function: Numeral Indicated)	Numerals
		0 = Single Contact	
		1 = Local Start Button	
		2 = Two Contact Maintained	
		3 = Pressure Transducer	
		4 = Level Transducer	
40217	Read & Write	Pressure Maintain Deadband (Auto)	kPa
40218	Read & Write	System Level Maintain Deadband (Auto)	Feet
40219	Reserved	Reserved	Reserved
40220	Read & Write	Ambient Temperature Engine Start (Auto)	Celsius
40221	Read & Write	Ambient Temperature Engine Stop (Auto)	Celsius
40222	Reserved	Reserved	Reserved
40223	Reserved	Reserved	Reserved
40224	Read & Write	Minimum Engine Speed Setpoint	RPM
40225	Read Only	Service Reminder - Air Filter Life	Hours
40226	Read Only	Service Reminder - Air Filter Life Remaining	Hours
40227	Read Only	Service Reminder - Battery Life	Hours
40228	Read Only	Service Reminder - Battery Life Remaining	Hours
40229	Read Only	Service Reminder - Belt Life	Hours
40230	Read Only	Service Reminder - Belt Life Remaining	Hours
40231	Read Only	Service Reminder - Fuel Filter Life	Hours
40232	Read Only	Service Reminder - Fuel Filter Life Remaining	Hours
40233	Read Only	Service Reminder - Oil Filter Life	Hours
40234	Read Only	Service Reminder - Oil Filter Life Remaining	Hours
40235	Read Only	Service Reminder - Oil Life	Hours
40236	Read Only	Service Reminder - Oil Life Remaining	Hours
40237	Read Only	Service Reminder - Overhaul Life	Hours
40238	Read Only	Service Reminder - Overhaul Life Remaining	Hours
40239	Read Only	Actual Fuel Level	Percent
40240	Read & Write	Modbus EEPROM Values Save (Save = 1)	(0 or 1)
40241	Read Only	Modbus EEPROM Values Saved Confirmation	(0 or 1)

		(Saved = 1)	
40242	Read Only	Active Warning Status (Active Fault: Bit = 1, Inactive: Bit = 0)	
		0 = Low Fuel Warn	(0 or 1)
		1 = Fuel Leak Warn	(0 or 1)
		2 = Fuel Filter Restriction Warn	(0 or 1)
		3 = Low Lube Level Warn	(0 or 1)
		4 = Coolant Level Warn	(0 or 1)
		5 = Water in Fuel Warn	(0 or 1)
		6 = No Flow Warn	(0 or 1)
		7 = High Engine Oil Temp Warn	(0 or 1)
		8 = Low Oil Pressure Warn	(0 or 1)
		9 = High Engine Temp Warn	(0 or 1)
		10 = High Discharge Pressure Warn	(0 or 1)
		11 = Low Discharge Pressure Warn	(0 or 1)
		12 = High Suction Warn	(0 or 1)
		13 = Low Suction Warn	(0 or 1)
		14 = High Level Warn	(0 or 1)
		15 = Low Level Warn	(0 or 1)
40243	Read Only	Active Warning Status (Active Fault: Bit = 1, Inactive: Bit = 0)	
		0 = High Flow Warn	(0 or 1)
		1 = Low Flow Warn	(0 or 1)
		2 = Reserved	(0 or 1)
		3 = Reserved	(0 or 1)
		4 = Low Gear Box Pressure Warn	(0 or 1)
		5 = High Gear Box Pressure Warn	(0 or 1)
		6 = Reserved	(0 or 1)
		7 = Reserved	(0 or 1)
		8 = Reserved	(0 or 1)
		9 = Low Engine Temp Warn	(0 or 1)
		10 = Reserved	(0 or 1)
		11 = Reserved	(0 or 1)
		12 = Run To Destruct Warn	(0 or 1)
		13 = Battery High Warn	(0 or 1)
		14 = Battery Low Warn	(0 or 1)
		15 = Amber Lamp Status	(0 or 1)
40244	Read Only	Active Warning Status (Active Fault: Bit = 1, Inactive: Bit = 0)	
		0 = Pivot Alignment Warn	(0 or 1)
		1 = Reserved	Reserved
		2 = Reserved	Reserved
		3 = Reserved	Reserved
		4 = Reserved	Reserved
		5 = Reserved	Reserved
		6 = Reserved	Reserved
		7 = Reserved	Reserved
		8 = Reserved	Reserved
		9 = Reserved	Reserved
		10 = Reserved	Reserved
		11 = Reserved	Reserved

		12 = Reserved	Reserved
		13 = Reserved	Reserved
		14 = Reserved	Reserved
		15 = Reserved	Reserved
40245-40246	Read Only	J1939.Aftertreatment 1 Diesel Particulate Filter Time to Next Active Regeneration	Seconds
40247	Read & Write	Remote Alarm Acknowledgement	(0 or 1)

CAN Parameter Map

This feature of the MPC-10 allows an operator to control functions of the controller over CAN (J1939) similar to Modbus over the RS485 serial port. The map below will allow for devices to communicate via CAN in place of RS485 to start, stop, and control features listed in the map by enabling the setting in the Communications menu.

All the parameters shown in the map below have a resolution of one and an offset of zero. The PGNs used are shown in HEX and listed as a proprietary parameters in the J1939 standard.

All PGNs received from the MPC-10 will have identification bytes A3, and AD respectively for the first two bytes. Sending to the MPC-10 the PGN will be the same as the one it is received from, however the first two identification bytes will be changed to be A5, AD. The priority will be 18 (hex), and the source address will be 70 (hex). To save the value in the controller through power cycles, send PGN FFBB bit 16 a value of 1. When the controller receives this command a save occurs. In order to save again, FFBB bit 16 needs to be returned to a 0 before it will allow a 1 again.

Parameter Map updates once per second on the CANbus when enabled.

PGN	LENGTH	Start BIT	Stop BIT	TYPE	DESCRIPTION	UNITS
FF90	2 Bytes	16	31	Read Only	Actual Engine Speed	RPM
	2 Bytes	32	47	Read Only	Target Engine Speed	RPM
FF91	2 Bytes	16	31	Read & Write	Minimum Engine Speed Setpoint	RPM
FF92	2 Bytes	16	31	Read & Write	Maximum Engine Speed Setpoint	RPM
FF93	2 Bytes	16	31	Read Only	System Voltage (12.5 will read 125)	VDC
	2 Bytes	32	47	Read Only	Actual Engine Oil Pressure	kPa
	2 Bytes	48	63	Read Only	Actual Engine Temperature	Celsius
FF94	4 Bytes	16	47	Read Only	Current Engine Hours	Hours
	2 Bytes	48	63	Read Only	Actual Fuel Level	Percent
FF95	1 Byte	16	23	Read Only	Controller State (Active State: Numeral Indicated)	Numerals
					0 = Stabilize	
					1 = Stopped	
					2 = Standby	
					3 = Prestart 1 Delay	
					4 = Check Safe To Start	
					5 = Prestart 2 Delay	
					6 = Crank	
					7 = Crank Rest	
					8 = False Start Check	
					9 = Engine Warmup	

					10 = Line Fill 1	
					11 = Line Fill 2	
					12 = Running Loaded	
					13 = Engine Cooldown	
					14 = Energize to Stop	
					15 = Spindown	
					16 = Wait to Start	
	2 Bytes	24	39	Read Only	Controller State Timer	Seconds
FF96	1 Bit	16	16	Read & Write	Communication Engine Start/Stop Auto Mode Only (Stop = 0, Start = 1)	(0 or 1)
FF97	1 Bit	16	16	Read & Write	Auto/Manual Mode (Manual = 0, Auto = 1)	(0 or 1)
FF98	1 Bit	17	17	Read & Write	Manual Only (Manual Only Active = 1, Auto and Manual = 0)	(0 or 1)
FF99	1 Bit	18	18	Read & Write	Prestart 1 Auto Only (Prestart Auto Only = 1, Prestart Auto & Manual = 0)	(0 or 1)
FF9A	1 Bit	19	19	Read & Write	Prestart 2 Auto Only (Prestart Auto Only = 1, Prestart Auto & Manual = 0)	(0 or 1)
FF9B	2 Bytes	16	31	Read & Write	Running Loaded Speed in Auto Setpoint	RPM
FF9C	2 Bytes	16	31	Read Only	Active Discharge Pressure	kPa
FF9D	2 Bytes	16	31	Read & Write	Pressure Engine Start (Auto)	kPa
FF9E	2 Bytes	16	31	Read & Write	Pressure Engine Stop (Auto)	kPa
FF9F	2 Bytes	16	31	Read & Write	Pressure Maintain Value (Auto)	kPa
FFA0	1 Byte	16	23	Read & Write	Pressure Maintain Deadband (Auto)	kPa
FFA1	2 Bytes	16	31	Read Only	Actual System Level	Feet
FFA2	2 Bytes	16	31	Read & Write	System Level Engine Start (Auto)	Feet
FFA3	2 Bytes	16	31	Read & Write	System Level Engine Stop (Auto)	Feet
FFA4	2 Bytes	16	31	Read & Write	System Level Maintain Value (Auto)	Feet
FFA5	1 Byte	16	23	Read & Write	System Level Deadband (Auto)	Feet
FFA6	2 Bytes	16	31	Reserved	Reserved	Reserved
FFA7	2 Bytes	16	31	Reserved	Reserved	Reserved
FFA8	2 Bytes	16	31	Reserved	Reserved	Reserved
FFA9	2 Bytes	16	31	Reserved	Reserved	Reserved
FFAA	1 Byte	16	23	Reserved	Reserved	Reserved
FFAB	2 Bytes	16	31	Read Only	Actual Ambient Temp	Celsius
FFAC	2 Bytes	16	31	Read & Write	Ambient Temperature Engine Start (Auto)	Celsius
FFAD	2 Bytes	16	31	Read & Write	Ambient Temperature Engine Stop (Auto)	Celsius
FFAE	4 Bytes	16-48		Active Warning Status (Active Fault: Bit = 1, Inactive: Bit = 0)		
		16	16	Read Only	Low Fuel Warn	(0 or 1)
		17	17	Read Only	Fuel Leak Warn	(0 or 1)
		18	18	Read Only	Fuel Filter Restriction Warn	(0 or 1)
		19	19	Read Only	Low Lube Level Warn	(0 or 1)
		20	20	Read Only	Low Coolant Level Warn	(0 or 1)
		21	21	Read Only	Water in Fuel Warn	(0 or 1)
		22	22	Read Only	No Flow Warn	(0 or 1)
		23	23	Read Only	High Engine Oil Temp Warn	(0 or 1)
		24	24	Read Only	Low Oil Pressure Warn	(0 or 1)

		25	25	Read Only	High Engine Temp Warn	(0 or 1)
		26	26	Read Only	High Discharge Pressure Warn	(0 or 1)
		27	27	Read Only	Low Discharge Pressure Warn	(0 or 1)
		28	28	Read Only	High Suction Warn	(0 or 1)
		29	29	Read Only	Low Suction Warn	(0 or 1)
		30	30	Read Only	High Level Warn	(0 or 1)
		31	31	Read Only	Low Level Warn	(0 or 1)
		32	32	Read Only	High Flow Warn	(0 or 1)
		33	33	Read Only	Low Flow Warn	(0 or 1)
		34	34	Reserved	Reserved	Reserved
		35	35	Reserved	Reserved	Reserved
		36	36	Read Only	Low Gear Box Pressure Warn	(0 or 1)
		37	37	Read Only	High Gear Box Pressure Warn	(0 or 1)
		38	38	Reserved	Reserved	Reserved
		39	39	Reserved	Reserved	Reserved
		40	40	Reserved	Reserved	Reserved
		41	41	Read Only	Low Engine Temp Warn	(0 or 1)
		42	42	Reserved	Reserved	Reserved
		43	43	Reserved	Reserved	Reserved
		44	44	Read Only	Run To Destruct Warn	(0 or 1)
		45	45	Read Only	Battery High Warn	(0 or 1)
		46	46	Read Only	Battery Low Warn	(0 or 1)
		47	47	Read Only	Amber Lamp Status	(0 or 1)
		48	48	Read Only	Pivot Alignment Warn	(0 or 1)
FFAF	4 Bytes	16-49		Active Shutdown Status (Active Fault: Bit = 1, Inactive: Bit = 0)		
		16	16	Read Only	Overspeed SD	(0 or 1)
		17	17	Read Only	Underspeed SD	(0 or 1)
		18	18	Read Only	Overcrank SD	(0 or 1)
		19	19	Read Only	Low Oil Pressure SD	(0 or 1)
		20	20	Read Only	High Engine Temp SD	(0 or 1)
		21	21	Read Only	Low Fuel SD	(0 or 1)
		22	22	Read Only	Low Discharge Pressure SD	(0 or 1)
		23	23	Read Only	High Discharge Pressure SD	(0 or 1)
		24	24	Read Only	Speed Signal Lost SD	(0 or 1)
		25	25	Read Only	Low Lube Level SD	(0 or 1)
		26	26	Read Only	Fuel Leak SD	(0 or 1)
		27	27	Read Only	Fuel Filter Restriction SD	(0 or 1)
		28	28	Reserved	Reserved	Reserved
		29	29	Reserved	Reserved	Reserved
		30	30	Reserved	Reserved	Reserved
		31	31	Read Only	Remote Stop SD	(0 or 1)
		32	32	Read Only	Coolant Level SD	(0 or 1)
		33	33	Read Only	High Level SD	(0 or 1)
		34	34	Read Only	Low Level SD	(0 or 1)
		35	35	Read Only	High Flow SD	(0 or 1)
		36	36	Read Only	Low Flow SD	(0 or 1)
		37	37	Reserved	Reserved	Reserved
		38	38	Reserved	Reserved	Reserved

		39	39	Read Only	Water in Fuel SD	(0 or 1)
		40	40	Read Only	Low Suction SD	(0 or 1)
		41	41	Read Only	High Suction SD	(0 or 1)
		42	42	Reserved	Reserved	Reserved
		43	43	Read Only	High Engine Oil Temp SD	(0 or 1)
		44	44	Read Only	Low Gear Box Pressure SD	(0 or 1)
		45	45	Read Only	High Gear Box Pressure SD	(0 or 1)
		46	46	Reserved	Reserved	Reserved
		47	47	Read Only	Red Lamp Status	(0 or 1)
		48	48	Reserved	Reserved	Reserved
		49	49	Read Only	Pivot Alignment SD	(0 or 1)
FFB0	2 Bytes	16	31	Read Only	Service Reminder - Air Filter Life	Hours
	2 Bytes	32	47	Read Only	Service Reminder – Air Filter Life Remaining	Hours
FFB1	2 Bytes	16	31	Read Only	Service Reminder – Battery Life	Hours
	2 Bytes	32	47	Read Only	Service Reminder – Battery Life Remaining	Hours
FFB2	2 Bytes	16	31	Read Only	Service Reminder – Belt Life	Hours
	2 Bytes	32	47	Read Only	Service Reminder – Belt Life Remaining	Hours
FFB3	2 Bytes	16	31	Read Only	Service Reminder – Fuel Filter Life	Hours
	2 Bytes	32	47	Read Only	Service Reminder – Fuel Filter Life Remaining	Hours
FFB4	2 Bytes	16	31	Read Only	Service Reminder – Oil Filter Life	Hours
	2 Bytes	32	47	Read Only	Service Reminder – Oil Filter Life Remaining	Hours
FFB5	2 Bytes	16	31	Read Only	Service Reminder – Oil Life	Hours
	2 Bytes	32	47	Read Only	Service Reminder – Oil Life Remaining	Hours
FFB6	2 Bytes	16	31	Read Only	Service Reminder – Overhaul Life	Hours
	2 Bytes	32	47	Read Only	Service Reminder – Overhaul Life Remaining	Hours
FFB7	1 Byte	16	23	Read Only	All Purpose Autostart Function (Current Function = Numeral Indicated)	Numerals
					0 = Single Contact	
					1 = Local Start Button	
					2 = Two Contact Maintained	
					3 = Pressure Transducer	
					4 = Level Transducer	
FFB8	1 Byte	16	23	Read Only	Version.App.1	Numerals
	1 Byte	24	31	Read Only	Version.App.2	Numerals
	2 Bytes	32	47	Read Only	Version.App.3	Numerals
	1 Byte	48	55	Read Only	Version.App.4	Numerals
FFB9	1 Byte	16	23	Read Only	Version.Config.1	Numerals
	1 Byte	24	31	Read Only	Version.Config.2	Numerals
	2 Bytes	32	47	Read Only	Version.Config.3	Numerals
FFBA	4 Bytes	16	47	Read Only	Reserved	Reserved
FFBB	1 Bit	16	16	Read & Write	CAN Map EEPROM Values Save (Save = 1)	(0 or 1)
	1 Bit	17	17	Read Only	CAN Map EEPROM Values Saved Confirmation (Saved = 1)	(0 or 1)
FFBC	1 Bit	16	16	Read & Write	Remote Alarm Acknowledgement	(0 or 1)

Supplementary Information

Passcodes

The MPC-10 & TEC-10 controllers house three levels of passcode protection. This feature allows the OEM, technician or owner to set desired menu parameters to be shown and changed only by selected operators. The three levels are low security, medium security and high security. The default passcodes can easily be changed via the PC Configuration Software (also known as PowerVision for Controllers). Refer to the Glossary section of this manual to know which parameters are set to low, medium and high by default.

Low Security: allows operators to see the lowest security level menus items as set in PowerVision for Controllers. This can be thought to be a user level menu where only particular items such as the warm-up delay times and cool-down delay times are able to be shown and altered. This will keep the user from getting confused in the menu and changing parameters they shouldn't change.

Medium Security: allows operators to see the low and medium security level menus items as set in PowerVision for Controllers. This security can be thought to be a technician level where more access is needed for other critical items in the menu but not necessarily the items like engine manufacturer and Engine Emissions Tier Rating.

High Security: allows operators to see the low, medium and high security level menus items as set in PowerVision for Controllers. This level of security can be thought to be an OEM level where the entire menu is present and is able to be changed. This security level allows the OEM full access to every menu item while setting up the controller for a particular engine and/or application where the OEM may not want the user to have access.

PC Configuration Software

PowerVision for Controllers (PC Configuration Software)

The MPC-10 / TEC-10 controller is released utilizing Enovation Controls' PowerVision Configuration Studio®. PowerVision allows engineering the ability to deliver quicker software updates with the flexibility of a software developer's environment. The addition of PowerVision gives Enovation Controls the ability to provide a free-of-charge basic PC configuration program (PowerVision for Controllers) to all customers for changing default parameters within the controller.

PowerVision for Controllers allows fast changes of default menu settings, customer splash screen, parameters in the 4-up gauges screens, security levels, and text strings within the controller for a ready to load and go setup. PowerVision for Controllers is available via download from our website (forum).

<http://forum.fwmurphy.com/viewforum.php?f=49>

Customers requiring a software developer's environment for changing or adding further functionality into the controller may do so in their own time without waiting or paying non-recurring engineering fees (also referred to as NRE) to make changes. This developer's environment is PowerVision Configuration Studio® and requires purchase of the software license from Enovation Controls. PowerVision Configuration Studio® allows custom software changes to almost all aspects of the controller from languages, screen layouts, text strings, Modbus communications, CAN communications, IO, faults, state machines, activity diagrams (visual scripting), and menu building to name a few.

MPC-10 Specifications

Interface

Display:

Monochrome HR-TFT, 2.7 in. / 68mm, WQVGA (400 x 240 pixels)
(3) LEDs: green (mode), yellow (warning) and red (shutdown)

Operator controls:

(11) Raised silicon keypads, tactile feedback

Power Supply

Operating Voltage: 8-32 VDC, reverse battery polarity and load-dump protected

Cranking Power Holdup: 0 VDC up to 50mS (also good for brownout/blackout instances)

Power Consumption:

18W max without two 1A High-side FETs active,

146W max with two 1A High-side FETs active

Inputs

(5) Digital, configurable (active on High, Low, Open)

(3) Analog, configurable (4-20mA, 0-5V, resistive or digital ground)

(1) Frequency, supporting:

Magnetic Pickup (30 Hz – 10 kHz, 2.0 VAC – 120 VAC) &

Engine Alternator (30 Hz – 10 kHz, 4.5 VRMS – 90 VRMS)

Outputs

(3) Relay, Form C (dry / volt-free), 10A

(2) Low-side FET (-DC), 1A

(2) High-side FET (+DC), 1A

(1) Dedicated Alternator Excitation, +DC, 1A

Communications

(1) CAN: J1939

(1) RS485: Modbus RTU

(1) USB: 2.0B (Supported for quick Programming)

Mating Connectors

12 Position, DT06-12SA PO12 (Gray)

12 Position, DT06-12SB-PO12 (Black)

12 Position, DT06-12SC-PO12 (Green)

Physical / Environmental

Enclosure Material: Polycarbonate / ABS

Dimensions (WxHxD): 9.59 x 7.34 x 5.20 in. (243.48 x 186.5 x 132.23 mm)

Weight: 4 lbs (1.8 kg)

IP Rating: IP69K & IP67 front and back, IP66 panel seal when used with accessory gasket

Operating & Storage Temperature: -40° to +85° C (-40° to +185° F)

Vibration: 7.86 Grms (5-2000 Hz), 3-axis random

Shock: ±50G, 3 axis

Emissions & Immunity: SAE J1113, 2014/30/EU & 2014/35/EU

TEC-10 Specifications

Interface

Display:

Monochrome HR-TFT, 2.7 in. / 68mm, WQVGA (400 x 240 pixels)
(3) LEDs: green (mode), yellow (warning) and red (shutdown)

Operator controls:

(11) Raised silicon keypads, tactile feedback
(1) Keyed Rotary switch, power on/off
(1) Push-switch (red), engine stop

Power Supply

Operating Voltage: 8-32 VDC, reverse battery polarity and load-dump protected
Cranking Power Holdup: 0 VDC up to 50mS (also good for brownout/blackout instances)

Power Consumption:

Power on in stopped state; 117 mA at 12 VDC,
Power on in standby mode; 52 mA at 12 VDC

Inputs

(5) Digital, configurable (active on High, Low, Open)
(3) Analog, configurable (4-20mA, 0-5V, resistive or digital ground)
(1) Frequency, supporting:
Magnetic Pickup (30 Hz – 10 kHz, 2.0 VAC – 120 VAC) &
Engine Alternator (30 Hz – 10 kHz, 4.5 VRMS – 90 VRMS)

Outputs

(2) Relay, switched +DC, 10A
(1) Relay, Form C (dry / volt-free), 10A
(2) Low-side FET (-DC), 1A
(2) High-side FET (+DC), 1A
(1) Dedicated Alternator Excitation, +DC, 1A

Communications

(1) CAN: J1939
(1) RS485: Modbus RTU

Mating Connectors

21 Position, Deutsch HDP26-24-21SE,
31 Position, Deutsch HDP26-24-31SE

Physical / Environmental

Enclosure Material: Polycarbonate / ABS
Dimensions (WxHxD): 9.59 x 7.34 x 5.20 in. (243.48 x 186.5 x 132.23 mm)
Weight: 4 lbs (1.8 kg)
IP Rating: IP67
Operating & Storage Temperature: -40° to +85° C (-40° to +185° F)
Vibration: 7.86 Grms (5-2000 Hz), 3-axis random
Shock: ±50G, 3 axis
Emissions & Immunity: SAE J1113, 2014/30/EU & 2014/35/EU

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