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MURPHY®
by ENOVATION CONTROLS

PowerCore®
MPC-20-R2 Engine Controller
Operations Manual

*Approved by CSA for non-hazardous locations (Group Safety Publication EIC 61010-1, Third Edition)
Products covered in this document comply with European Council electromagnetic compatibility directive 2014/30/EU and electrical safety directive 2014/35/EU.

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Section 40

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.
A copy of the warranty may be viewed or printed by going to www.murphybyenovationcontrols.com/warranty

ENOVATION CONTROLS has made efforts to ensure the reliability of the MPC-20 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-20.

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-20-R2 can fail with outputs full ON, outputs full OFF or that other unexpected conditions can occur.

Please read the following information before operating the MPC-20-R2:

- Observe all Warnings and Cautions in each section of these instructions.
- The MPC-20 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.

The MPC-20 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-20 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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Table of Contents

Introduction

This document is designed to familiarize a user with the MPC-20-R2 and explain how to navigate the interface and modify the settings when installing/operating the controller. The Quick Set Up guide assists with establishing the different functions in the MPC-20-R2 for system setup. Before attempting to set up the controller, be sure to read and understand this manual in its entirety.

Murphy PowerCore 20 Revision 2 (MPC-20-R2)

The Murphy PowerCore 20 Controller (MPC-20) is a general all-purpose manual/auto start and manual/auto throttling engine controller. The controller is purposed primarily for pump and irrigation applications; however, it is versatile and flexible enough to be used on many applications outside pump and irrigation. This is a powerful controller that supports J1939 CAN protocols for electronically governed engines as well as mechanical engines for fault and safety shutdowns.

The MPC-20-R2 is flexible in many aspects. The flexibility consists of 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;
- establish multi-level securities in the menu structure when using the configuration tool;
- use the same controller on 12VDC or 24VDC systems;
- use as auto start and/or manual start controller;
- use as manual throttle and/or auto throttle controller;
- change the input type for the analog inputs;
- use additional analog inputs as digital ground inputs;
- assign functions and actions to digital inputs;
- use digital inputs as battery or ground inputs;
- be mounted in all-weather environment;
- be customer-mounted in panel of choice.

Engine Application States and Delays

While reprogrammable, the MPC-20 follows a standard operating sequence. This operating sequence is a set of machine states that happen in a predetermined order. Machine states and/or delays can be set to zero if not needed or adjusted to fit the application. The following states and delays 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**: a timed state to allow the controller to enable the ECU prior to the controller cranking the engine. This timer can be disabled if set up for mechanical engine use by changing the ECU Stabilize Timer to 0.
- **Stopped**: a timed state where the controller is ready to start the engine manually or automatically. This is also the state that allows changes to be saved in the Menu.
- **Standby**: a timed state that will shut off the LCD backlight, heater and CAN transceiver to conserve battery 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) a user-defined timed state that ensures the auto start signal is present for a desired amount of time prior to cranking the engine. During this period, the auto start condition is ignored and must remain active throughout this delay, or the delay is reset to zero.

- **Prestart Delay 1**: **(Auto Only or Auto/Manual)** 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 auto sequence continues.
- **Check Safe To Start**: a non-timed state that will check to ensure the engine can start safely.
- **Minimum Run Time**: only active using auto start and with all auto start types except local key and clock. Local stop key will also initiate the stop sequence before the timer expires, if pressed.
- ***Prestart Delay 2** (precrank): **(Auto Only or Auto/Manual)** 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 auto sequence continues. During this delay, the controller checks for faults, J1939 com, etc.
- ***Prestart Delay 2** (crank through): **(Auto Only or Auto/Manual)** 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 through crank. The output turns off when the engine starts. During this delay, the controller checks for faults, J1939 com, etc.
- **Crank**: a timed state for when the controller turns on the Crank output to start the engine.
- **Crank Rest**: a timed state to rest the starter between cranks in case the engine did not start during the crank state.
- **False Start Check**: a non-timed state that will ensure the engine stays above the crank cut RPM after cranking.
- **Warm-up**: (available in Auto mode only) a timed state that will allow the engine to run at a desired warm-up RPM after starting.
- **Line Fill 1**: (available in Auto mode only) a timed state that will allow the engine to run at a desired Line Fill RPM and exit if the timer times out or the pressure set point for this state is reached. This is commonly used when filling a discharge line to a desired pressure when a lower RPM is needed prior to throttling to maintain a pressure.
- **Line Fill 2**: (available in Auto mode only) a timed state following Line Fill 1 that will allow the engine to run at a desired Line Fill RPM and exit if the timer times out or the pressure set point for this state is reached. This is commonly used when filling a Hose Reel to a desired pressure when a lower RPM is needed prior to throttling to maintain a pressure.
- **Running Loaded**: a non-timed state that the controller will stay in until a stop condition is initiated in the controller.
- **Auto Stop Delay**: (available in Auto mode only) a user-defined timed state that ensures the auto stop signal is present for a desired amount of time prior to entering the shutdown sequence. During this period 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) 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.
- **Energize to Stop**: a timed state that will control an output in order to stop the engine. This state will only work if the controller is shut down using an auto stop or the local stop key. If the controller loses battery power, this state will not be initiated for energize to stop.
- **Spindown**: time allotted for the engine to stop all revolutions and be in a stopped state with no frequency. The controller will repeat the Spindown state if the controller continues to get RPM when the timer times out.

User Interface

The keypad on the MPC-20-R2 is comprised of 11 tactile buttons. This section describes the functions of each button.

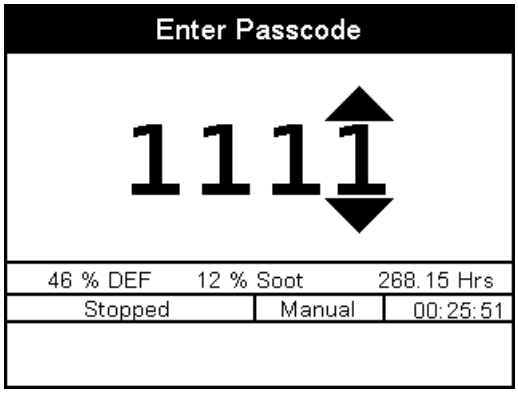
The buttons have the following functions:

- **Start Key** – allows the operator to start sequence in Manual Mode or initiate an auto start sequence when in Auto Mode.
- **Stop Key** – allows the operator to initiate the stop sequence in either mode of operation. A single button press in auto will initiate an auto stop. As a safety feature, when the stop button is pressed twice or held (in auto mode), the controller will skip the cool-down state and (upon shutting down) will place itself in manual mode to eliminate an auto crank condition if the start signal remains present.
- **Auto Key** – allows the operator to change from Auto to Manual or Manual to Auto Mode. The MPC-20-R2 requires an acknowledgement from the user to place in auto mode from manual.
- **Alarm Silence Key** – allows the operator to temporarily silence the internal siren, common alarm output and acknowledge active faults when an alarm or shutdown is present on the controller.
- **Manual Throttle Increase Key** – allows the operator to manually increase the engine speed in Manual Mode.
- **Manual Throttle Decrease Key** – allows the operator to manually decrease the engine speed in Manual Mode.
- **Menu Key** – allows the operator to get into and out of the menu.
- **Back Key** – allows the operator to move back one step in the menu without saving a value.
- **Enter Key** – allows the operator to save a desired value or setting in the menu.
- **Up Key** – allows the operator to navigate up through the menu and page forward in the main page views.
- **Down Key** – allows the operator to navigate down through the menu and page reverse on the main page views.

Accessing the Menu

The MPC-20-R2 has three 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. The low level security only has a small number of items a user can access. The medium level security has all the low level menu items plus others a technician may change while in the field. The high security level has the entire menu visible to the user or OEM.

To access the menu, press the menu key. Review section Passcodes to understand the menu level preset in the MPC-20-R2.The following screen will display to enter the passcode: [Low=1111; Medium=5311; High=3482].

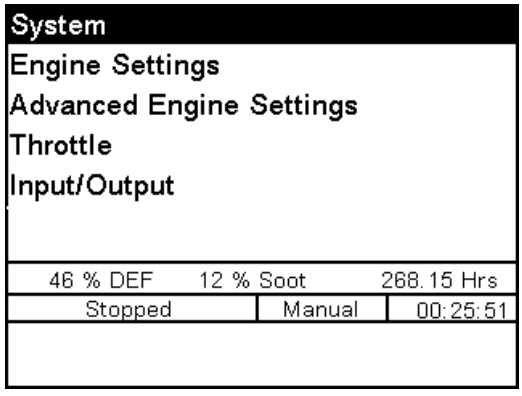


The passcode will be entered left to right. Utilize the up and down arrows, and press the Enter button after each correct number. If you enter the wrong passcode, it will reset the display to 0000, allowing you to restart the entry process.

Main Menu

The MPC-20 controller is incredibly versatile within its menu structure. The operator is able to change many parameters and settings from the face without the need of a PC tool, if desired. The controller has to be in its stopped state in order to save a setting in the menu. (The Tier 4 menu is the 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.**

(Main Menu, page 1)



System

The controller System menu provides the operator with the ability to set the Date/Time, Units, Language, Brightness, Contrast, 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; the RPM step size; 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, clutch engage/disengage speed, run to destruct mode 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.

Throttle

The Throttle menu allows the operator to set up the items for throttling the engine such as throttle type, rate of RPM increase/decrease, throttle Inc/Dec pulse time, throttle RPM deadband 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 to trigger an action.

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

The Analog Inputs of this menu can be configured from the face of the controller to accept one of four types of sensors by software selection only.

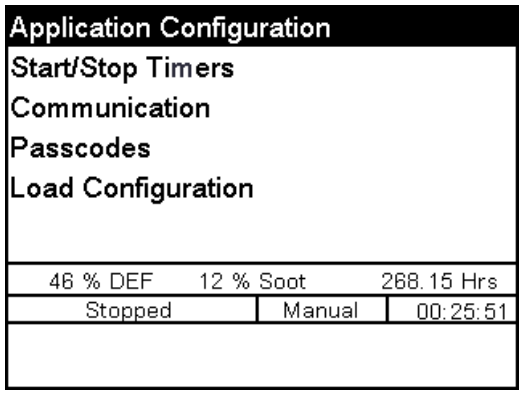
- Resistive
- 4-20mA
- 0-5VDC
- B(-) for additional Digital Inputs

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 [5V, 200mA]
- Digital Out [B+, 2A]
- Digital Out [B-, 1A]
- Analog Out [0-5VDC] Dedicated for analog throttling

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

(Main Menu, page 2)



Application Configuration

The Application Configuration menu is where an operator will set up the controller's Auto Start Functions and Auto Throttle 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-20. 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 most of the auto start functions and auto throttling methods in the controller. This application is the most versatile application thus requiring so many combinations of settings for the operator to choose.

The auto start functions and auto throttle methods to choose from are listed below.

Auto Start/Stop Functions

- Local Key Start
- Single Contact
- Two Contact Maintained
- Two Contact Momentary
- Pressure Transducer
- Level Transducer
- Flow Transducer

Auto Throttle Methods

- Running Loaded

- Pressure Transducer
- Level Transducer
- Flow Transducer
- Local Throttle Input

Center Pivot / Linear Irrigation

The Center Pivot / Linear Irrigation application houses the auto start functions and auto throttle methods meant to be used on center pivot and linear movement irrigation applications.

The auto start functions and auto throttle methods to choose from are listed below.

Auto Start/Stop Functions

- Single Contact
- Local Start Key
- Two Contact Maintained
- Two Contact Momentary

Auto Throttle Methods

- Running Loaded
- Pressure Transducer
- Flow Transducer
- Local Throttle Input

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-20 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 listed below.

Auto Start/Stop Functions

- Single Contact
- Two Contact Maintained
- Two Contact Momentary
- Pressure Transducer

Auto Throttle Methods

- Running Loaded
- Pressure Transducer
- Local Throttle Input

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-20 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.

The auto start functions and auto throttle methods to choose from are listed below.

Auto Start/Stop Functions

- Single Contact
- Local Start Key
- Two Contact Maintained
- Two Contact Momentary

Auto Throttle Methods

- Running Loaded
- Pressure Transducer
- Local Throttle Input

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.

The auto start functions and auto throttle methods to choose from are listed below.

Auto Start/Stop Functions
- Single Contact
- Temperature Transducer

Auto Throttle Methods
- Running Loaded

Start/Stop Timers

The Start/Stop Timers menu provides the operator the ability to add a countdown timer and start/stop times. 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 eight 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.

Start/Stop timers work in conjunction with other Start/Stop types but independently as Start/Stop functions. If the engine is already running from a 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, other Start/Stop types will be ignored until the timer expires and a controlled shutdown occurs.

Communication

The Communications menu allows the operator to choose the type of RS485 communications such as Modbus or Local Display. The menu also allows for the operator to choose the RS485 slave address, RS485 Serial setup and whether or not the controller uses the internal CAN terminating resistor. Review Communication under the Menu Glossary section of this manual for a full list and definition of each setting.

Auto Start/Stop Functions Defined

There are eight automatic start/stop types in the MPC-20-R2 and are shown relative to the application chosen as shown in the previous section. Each is detailed below:

Single Contact Start/Stop

The Single Contact Start/Stop occurs when a remote contact is active for auto start and inactive for auto stop. Think of this as a toggle switch, on or off for remote starting the engine. Requires one digital input for this start/stop type.

Local Start Key Start/Stop

The Local Start Key Start/Stop is used to remove any other auto start/stop types within the controller, if they are not needed. This auto start type still allows the controller to run through the auto states of the controller.

The operator must press the green start key to activate the auto start sequence. The red stop key will initiate the auto stop sequence in the controller.

Two Contact Maintained Start/Stop (commonly known as Floats)

The Two Contact Maintained Start occurs when both contacts are active for an auto start and both contacts are inactive for an auto stop (not momentarily). Depending on whether the application is emptying or filling, the start float will need to be positioned above the stop float or below the stop float. It requires two digital inputs, one for start and one for stop.

Two Contact Momentary Start/Stop

The Two Contact Momentary Start occurs when the start input is active momentarily for an auto start, and the stop contact is momentarily active for an auto stop. The start/stop inputs may have start and stop timer associated. Check this area in the Advanced Engine Settings under Timers. It requires two digital inputs, one for start and one for stop.

(Pressure, Level, Flow or Temperature) Transducer Start/Stop

A transducer is needed for any of these auto start/stop types and setup in the Input/Output menu under Analog Inputs. Set points for the desired auto start/stop type selected will be in populated menu in the application configuration menu allowing the operator to enter the appropriate values needed in the application. Warnings and shutdowns for any of these types are in the Advanced Engine Settings under Warnings and Shutdowns.

Auto Throttling Functions Defined

There are five automatic throttle functions in the MPC-20-R2 and are shown relative to the application chosen as shown in the application configuration section. Each is detailed below:

Running Loaded Throttle

The Running Loaded Throttle function allows the controller, when in auto, to run the engine at a desired speed between the minimum and maximum speed settings of the controller. This speed is set in the application configuration menu when this throttle function is chosen.

(Pressure, Level or Flow) Transducer Throttle

A transducer is needed for any of these auto throttling functions and set up in the I/O menu. Set points for the desired auto throttling function selected will be in populated menu in the application configuration menu allowing the operator to enter the appropriate values needed to maintain a pressure, level, or flow in the application. Warnings and shutdowns for any of these types are in the Advanced Engine Settings under Warnings and Shutdowns.

Local Throttle Input

The Local Throttle Input throttles the engine between the minimum and maximum RPM set points when using the 0-5V analog input function.

Quick-Start Setup Guide

The following sections provide a walk-through of the steps necessary for some of the various configurations and settings available on the MPC-20-R2 Controller. **Cycling power to the controller is recommended after making changes to set points.**

Setting up for a Mechanical Engine

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, Analog, 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 **Relay1-6 or DO1-6**, and assign desired outputs for Crank, Fuel, and Inc/Dec outputs if throttle type selected was Inc/Dec.

> **NOTE:** DO5 and DO6 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.

Setting up for an Electronic J1939 Engine

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 same emission 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-20 (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 **Relay1-6 or DO1-6**, and assign outputs to 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.

Adjusting Screen Contrast

1. Access **Menu/System.** Press down arrow to **Contrast** then press **[Enter]**.
2. Utilize the Up and Down arrows to adjust the Contrast (values of 0 to 255), and press **[Enter]** when the desired number appears.
3. Press the **[Menu]** key to exit the Menu Setup screens.

Setting up to Auto Start/Stop for 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 arrow up to 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 up to Auto Start/Stop for Start Local 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** or **Two Contact Momentary** 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 Momentary/Maintained** to one of the Digital Inputs then press **[Enter]**.
6. Assign the **Function** of **Auto Stop Momentary/Maintained** to one of the Digital Inputs then press **[Enter]**.
7. Press the **[Menu]** key to exit the Menu Setup screens.

Setting up 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 up to Auto Start on Flow

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 **Flow Transducer** then press **[Enter].**
3. Utilize the Up and Down arrows to select **Flow Transducer** in the main application configuration menu.
4. Complete the parameters that apply (Start/Stop Flow and Flow 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 Flow transducer.
7. Assign 4-20mA Flow Rate as the function for the selected Analog Input.
8. Press **[Back]** once to return to the Analog Input menu.
9. Press the arrow up or arrow down key to select **Sensor Setup** then press **[Enter]**.
10. Select Flow Rate 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].** (e.g., 0-20,000 gal/min transducer would show 4mA at 0 gal/min and 20mA at 20,000 Gal/min.)
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 Flow** warnings and shutdowns.
17. Press the **[Menu]** key to exit the Menu Setup screens.

Setting up 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-20 has the ability to establish seven different Start/Stop dates and times. If desired, repeat steps 1-3 for subsequent Timers.

Setting up 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 or 0-5V Ambient Temperature as the function for the selected Analog Input.
8. Press **[Back]** once to return to the Analog Input menu.
9. Press the arrow up or arrow down key. Select **Sensor Setup** then press **[Enter]**.
10. Select Ambient Temp 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].** (e.g., 32°F -150°F transducer would show 4mA at 32°F and 20mA at 150°F).
13. 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.

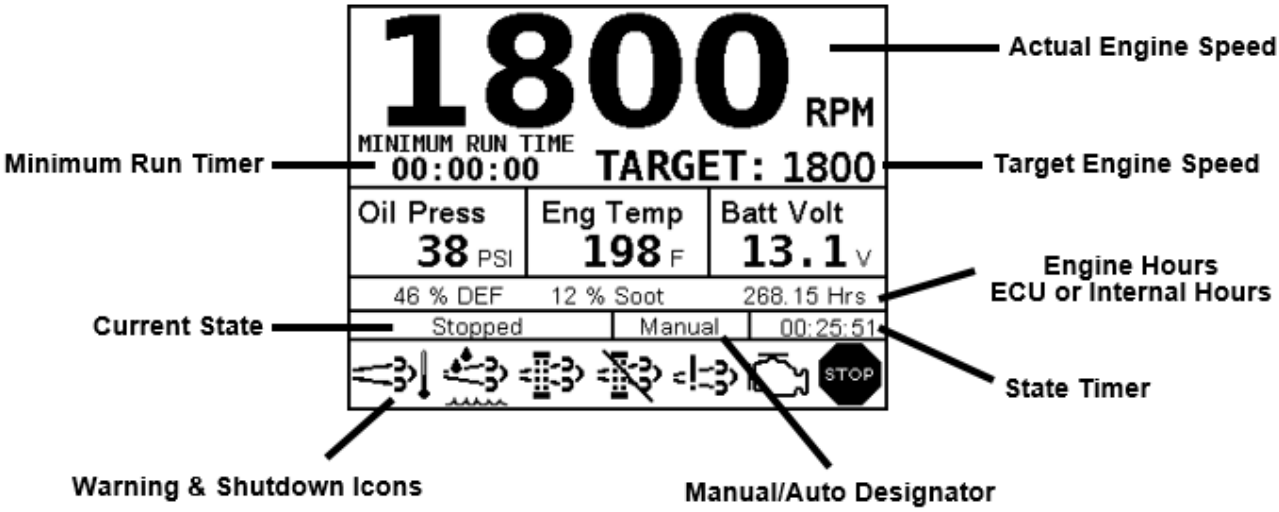
Setting up to Stop the Engine from Utilizing the Countdown Timer

The MPC-20-R2 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 order to eliminate the countdown timer being active on every auto startup.

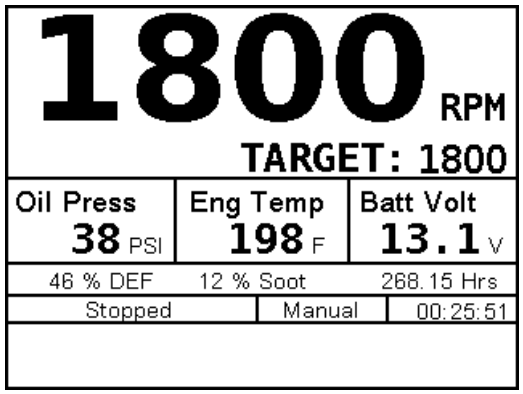
1. Access **Menu/Start_Stop Timers/Countdown Timer**.
3. Set the hours, minutes and seconds desired for the running of the engine, and press **[Enter]**.
4. Press the **[Menu]** key to exit the Menu Setup screens.

> **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.

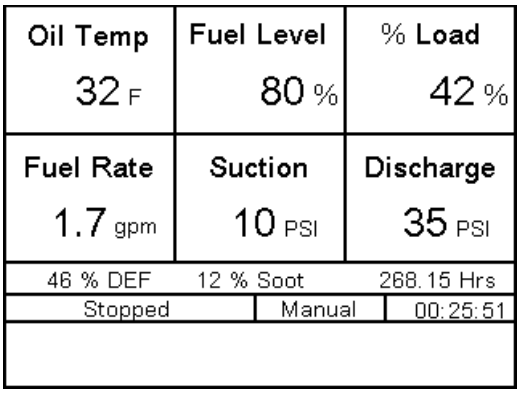
Screen Examples



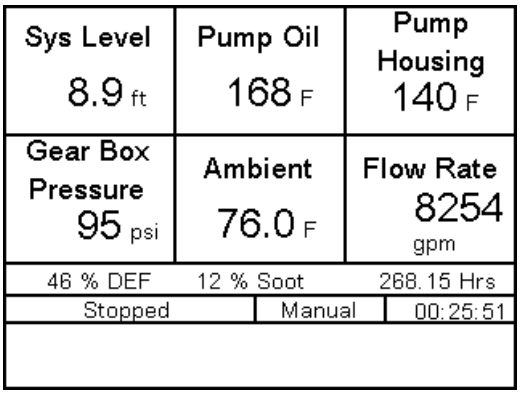
Additional Screens



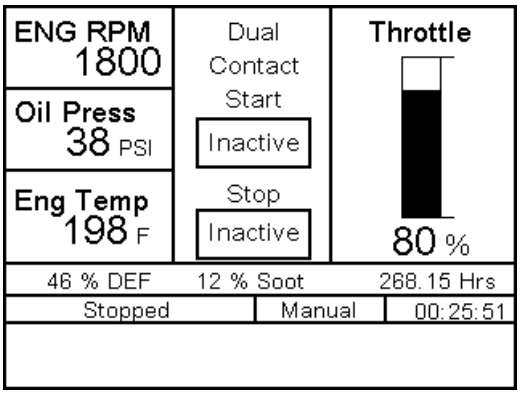
The main screen (shown above) displays actual and target RPM, Oil Pressure, Engine Temperature, Battery Voltage, Engine Hours, Engine State and Mode of Operation.



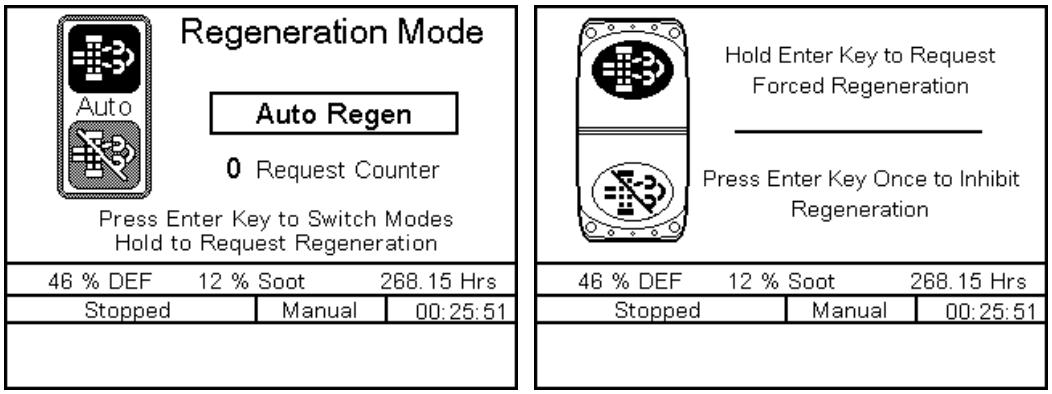
The first six-up screen (shown above) displays Oil Temperature, Fuel Level, % Load, Fuel Rate, Suction and Discharge to the operator. If alternate parameters are desired, these may be changed within the free MPC-20-R2 Software Configuration tool.



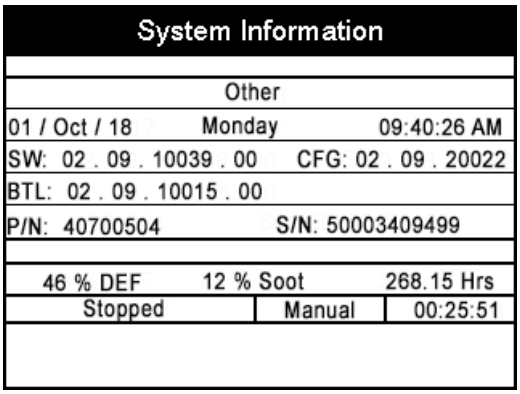
The second six-up screen (shown above) displays to the operator System Level, Pump Oil (temperature), Pump Housing (temperature), Gear Box Pressure, Ambient (temperature) and Flow Rate. If alternate parameters are desired, these may be changed within the free MPC-20-R2 Software Configuration tool.



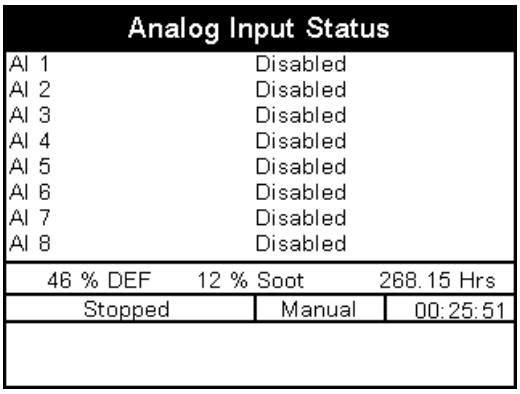
The screen above displays the auto start/stop type and illustrates the throttling method for the auto start/stop. This screen is a default setting which displays dual contact start (floats) and auto throttle to a Running Loaded Speed. The percent shown below the bar is the percent between the minimum and maximum speed set in the controller under Engine Settings.



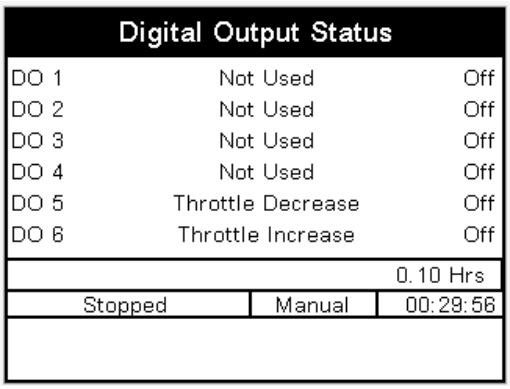
When selected to be shown, the screen above displays the Regeneration Control for Tier 4 engines. The setting to show this page is in the Tier 4 Menu within Engine Settings of the main menu. Use the Enter button to change from Auto to Inhibit. With Auto Regen selected, hold the Enter button for Regeneration request. The screen shown is an example of the request for regeneration. This request is sent once a second for 10 seconds. It is up to the engine whether it accepts the request or denies the request. (Standard Regen Screen shown on left, CAT & Perkins shown on right)



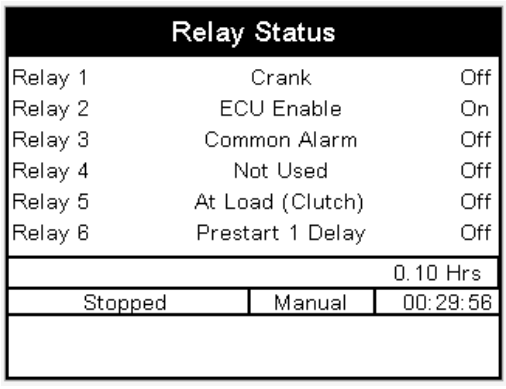
The screen above displays the engine manufacturer, date, day, time, software version number (shown as an example), configuration version number allows for version control (shown as an example), bootloader version number allows version control (shown in example), part number and serial number (shown as an example). This page will assist Technical Services Support should their services be needed.



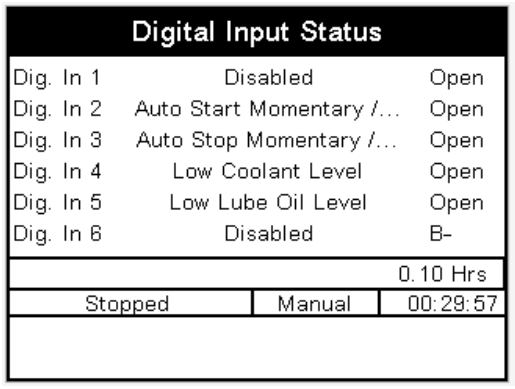
The screen above allows the operator to see what the analog input functions are set to without accessing the menu.



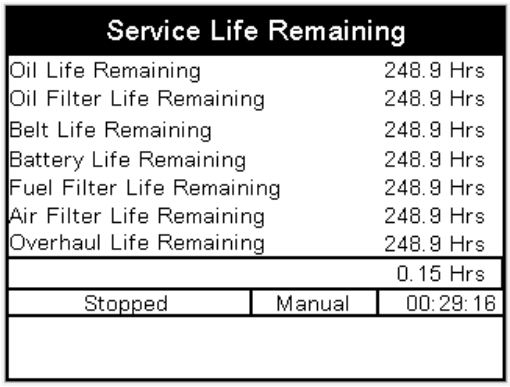
The screen above allows the operator to see what the digital output functions are set to without accessing the menu and the active setting which informs the user of the output status.



The screen above allows 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.



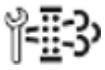
The screen above allows the operator to see what the digital input functions are set to without accessing the menu and the active setting which informs the user of the input status.



When selected to be shown, the screen above provides a list of service reminders and the hours left until the internal alarm will display the services needed. When 0 hours is reached, the hours will continue to count down in negative numbers to indicate how far past the reminder the engine was run. In the MPC-20-R2 controller the service reminder screen is defaulted to be hidden and all reminders are set to 0 Hrs to not cause false alerts. If the operator/owner wishes to use the reminders for service, they can enable the screen and set the hours in the System Settings menu.

Warning and Shut-Down Icons

The following icons/symbols can be displayed at the bottom of the MPC-20-R2 screen to designate warnings or shutdown situations that have occurred:

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. Also used as Malfunction Indicator Lamp. This icon also displays when the ECU sends a message to indicate to the operator a malfunction has occurred with the engine. Contact your local engine manufacturer's service department for direction.

	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.

Icon Troubleshooting

The warnings and shutdowns internally generated by the controller will show an Internal Fault at 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. This cause will be shown as an SPN:FMI:OC. SPN is a common abbreviation for Suspect Parameter Number while FMI is the common abbreviation for Failure Mode Indicator and OC is the common abbreviation for Occurrence Count. Consult with the engine manufacturer regarding fault codes shown on the screen if not shown as internal fault.

If the Internal Fault text is displayed, consider checking the set points or the bypass timer(s) within the MPC-20 to ensure the ranges are within normal operating settings prior to consulting the engine manufacturer.

Menu Glossary

System (Low Security)

Date/Time – (Low Security): allows the setting of the controller's date and time. This is used for clock start/stops and fault recording in event history.

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): allows the section of English, French, German, Spanish or Italian as the language shown on the controller. **Factory set to English.**

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

Contrast – (Low Security): allows the contrast of the screen to be adjusted. **Factory set to 160.**

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

Beeper – (Medium Security): turns off (disables) or on (enables) the alarm beeper for the controller. **Factory set to Enable**

Active Fault Reminder – (Medium Security): turns off (disables) or on (enables) a reminder to the user for active faults once acknowledged. A warning will pop up on the screen every 2 minutes and shutdown will pop up on the screen every 30 seconds when enabled. If disabled, the active fault will not pop up again after being acknowledged without the user interacting. The LEDs will show a warning or shutdown whether set to enable to disable. **Factory set to Enable.**

Standby Timer – (Medium Security): setting this timer (HH:MM:SS) allows the screen the designated amount of time before the controller goes into Standby mode. **Factory set to 00:30:00.**

Service Reminders – (Medium Security):

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):

Stored ECU Fault Codes – (Medium Security): allows the operator to query the Engine ECU for review of its stored fault codes. All engine manufacturers and models may not support this feature. This menu item is only shown if J1939 is selected for the Engine Type.

Clear Active ECU Fault Codes – (High Security): allows the operator to clear all active faults from the engine ECU. This setting should only be used by a qualified engine technician. All engine manufacturers and models may not support this feature. This menu item is only shown if J1939 is selected for the Engine Type.

Clear Stored ECU Fault Codes – (High Security): allows the operator to clear stored faults from the engine ECU. This setting should only be used by a qualified engine technician. All engine manufacturers and models may not support this feature. This menu item is only shown if J1939 is selected for the Engine Type.

Auto / Manual – (High Security): allows the operator to select two options related to Auto and Manual modes.

Manual Only – (High Security): allows the operator to lock out the auto mode of the controller when set to Enable. **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. **Factory set to Manual.**

Show Auto Start Confirmation (High 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): allows the operator to set the green LED to illuminate when either in auto mode or when the controller is in the Running Loaded state. **Factory set to Auto.**

Restore Factory Defaults – (Medium Security): allows the operator to reset all menu settings set as defaults from the last configuration loaded in the controller.

Set Internal Machine Hours – (High Security): allows the operator to set the machine hours. This setting is visible when the Engine Type is set to Mechanical or when the ECU Hour Select is set to Internal.

Event History – (Medium Security):

View Event History – (Medium Security): allows the operator to view history of the last 32 warnings or shutdowns with date and time stamp.

Clear Event History – (High Security): allows the clearing of event history.

J1939 Shutdowns – (High Security): this parameter allows the user to set whether they want the controller to help facilitate a shutdown for the engine if the ECU broadcasts a Red lamp (DM1 Shutdown) 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 of J1939 or 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), Kohler KDI 1903, 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 of the engine (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)**: s**ends a request to the engine ECU for regeneration. **Factory set to No**
>
> **DEF Gauge** (High Security)**: s**hows 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 – Pulse Count (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 J1939, the Speed Calibration menu is hidden. **Factory set to 150.0.**

Speed Calibration – RPM (High Security): allows user to set the known RPM speed of the engine while running to calculate backwards to a pulse count from the alternator or flywheel gear.

Minimum Engine Speed – (Medium Security): allows the setting of the lowest engine speed for the running loaded state. The controller will not allow the engine to throttle under the minimum engine speed during this state. **Factory set to 700 RPM.**

Maximum Engine Speed – (Medium Security): allows the setting of the highest engine speed for the running loaded state. The controller will not allow the engine to throttle above the maximum engine speed during this state. **Factory set to 2200 RPM.**

Warm Up Speed – (Medium Security): allows the setting of the engine speed during the warm-up state. **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 its warm-up speed during the warm-up state. **Factory set to 3 minutes.**

Cooldown Speed – (Medium Security): allows the setting of the engine speed during the cool-down state. **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 its cool-down speed during the cool-down state. **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): allows the operator to set the 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-20 (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 0.00 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): speed at which the crank output will turn off during the start sequence. **Factory set to 500 RPM**.

Clutch Engage Speed – (Medium Security): speed at which the clutch output will turn on to engage the clutch. **Factory set to 1200 RPM.**

Clutch Disengage Speed – (Medium Security): speed at which the clutch output will turn on to disengage the clutch. **Factory set to 1000 RPM.**

Run to Destruct – (High Security): choose from Enable or Disable. This setting will prevent the controller from shutting down the engine for any fault shutdown. This setting will not disable shutdowns from the ECU. This setting is primarily used for marine or fire pump applications where a run to destruct is common. **CAUTION: If enabled, the operator must manually select Disable to allow the controller to shut down and protect the engine from active faults. Factory set to Disable.**

Timers/Delays – (Low Security): establish parameters for the:

> **Auto Start Delay –** (Medium Security): 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): 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.**

Minimum Run Time – (High Security): if an auto start condition started the engine, the auto stop condition is ignored until this delay times out. **Factory set to 00.00.00**

ECU Stabilize Timer – (High Security): on startups, 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): length of time the crank output is turned on during cycle cranking. **Factory set to 10 seconds.**

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

Prestart Delay 1 – (Low Security):

Auto Only – (Medium Security): allows the selection of having Prestart #1 active during auto only. Choose from Enabled or Disabled. **Factory set to Disabled.**

Prestart Delay 1– (Low Security): after an auto 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. **Factory set to 00.00.00**

Prestart Delay 2 – (Low Security):

Auto Only – (Medium Security): allows the selection of having Prestart #2 active during auto only. Choose from Enabled or Disabled. **Factory set to Disabled.**

Prestart Delay 2 – (Low Security): after an auto start condition has been accepted by the controller, this delay begins timing, and the prestart #2 output turns on. When this delay expires, the output is turned off, and the auto sequence continues. **Factory set to 00.00.00**

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

Energize to Stop Time – (High Security): begins timing and an output is turned on after an auto stop condition has been accepted by the controller. The output is turned off when this delay expires. **NOTE:** If the controller is turned off by disconnecting power, this feature will be skipped in the shut-down sequence. **Factory set to 00.00.00**

Spindown Timer – (Medium Security): begins timing after the cool-down delay to remove the ECU Enable/Fuel output to allow the shutdown of the engine. This state allows the engine to get to 0 RPM prior to allowing the engine to crank. This timer will repeat if RPM is present when the timer completes its countdown. **Factory set to 30 seconds.**

Post Crank Lockout Setup – (Medium Security): allows a delay that begins timing when the engine starts. During this delay, the selected functions (Warnings and Shutdowns) 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): allows a delay that begins timing following the warm-up delay. During this delay, the selected functions (Warnings and Shutdowns) 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): 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 parameters for the:

Low Fuel Level Warning – (Low Security): sounds a warning when the fuel level reaches the set lower limit parameter. **Factory set to 10%**

Low Fuel Level Shutdown – (Medium Security): shuts down the engine when the fuel level reaches the set lower limit parameter. **Factory set to 5%**

High Battery Warning – (Low Security): sounds a warning when the charge on the battery reaches the set higher limit parameter. **Factory set to 15.0 V.**

Low Battery Warning – (Low Security): sounds a warning when the charge on the battery reaches the set lower limit parameter. **Factory set to 10.0 V.**

Weak Battery Warning – (Low Security): sounds a warning when the charge on the battery reaches the set parameter for weakness. **Factory set to 6.0 V.**

LOP High Speed – (High Security): speed setting in which the Low Oil Pressure (LOP) will be active at high speed. **Factory set to 2000 RPM.**

LOP Warning/High Speed – (High Security): Low Oil Pressure (LOP) setting in which the controller will provide a warning if dropping below at high speed. **Factory set to 35.00 psi.**

LOP Shutdown/High Speed – (High Security): Low Oil Pressure (LOP) setting in which the controller will provide a shutdown if dropping below at high speed. **Factory set to 30.00 psi.**

Low Oil Pressure Warning – (High Security): sounds a warning when the oil pressure reaches the set lower limit parameter for oil pressure. **Factory set to 15.00 psi.**

Low Oil Pressure Shutdown – (High Security): shuts down the engine when the oil pressure reaches the set lower limit parameter for oil pressure. **Factory set to 10.00 psi.**

High Oil Temp Warning – (Medium Security): sounds a warning when the oil temperature reaches the set higher limit parameter for oil temperature. **Factory set to 210 °F.**

High Oil Temp Shutdown – (Medium Security): shuts down the engine when the oil temperature reaches the set higher limit parameter for oil temperature. **Factory set to 225 °F.**

High Oil Pressure Warning – (Medium Security): sounds a warning when the oil pressure reaches the set higher limit parameter for oil pressure. **Factory set to 200.0 psi.**

High Oil Pressure Shutdown – (Medium Security): shuts down the engine when the oil pressure reaches the set higher limit parameter for oil pressure. **Factory set to 200.00 psi.**

High Engine Temp Warning – (Medium Security): sounds a warning when the temperature of the engine reaches the set higher limit parameter for temperature. **Factory set to 210 F.**

High Engine Temp Shutdown – (Medium Security): shuts down the engine when the temperature of the engine reaches the set higher limit parameter for temperature. **Factory set to 225 F.**

Low Engine Temp Warning – (Medium Security): sounds a warning when the temperature of the engine reaches the set lower limit parameter for temperature. **Factory set to 32 F.**

Underspeed Shutdown – (Medium Security): shuts down the engine when the speed reaches the set lower limit parameter for speed. **Factory set to 0 RPM.**

Overspeed Shutdown – (Medium Security): shuts down the engine when the speed reaches the set higher limit parameter for speed. **Factory set to 2400 RPM.**

High Gearbox Pressure Warning – (Medium Security): sounds a warning when the gearbox pressure reaches the set high limit parameter for gearbox pressure. Selection only shown when an analog input is selected to monitor Gearbox Pressure. **Factory set to 0.00 psi.**

High Gearbox Pressure Shutdown – (Medium Security): shuts down the engine when the gearbox pressure reaches the set high limit parameter for gearbox pressure. Selection only shown when an analog input is selected to monitor Gearbox Pressure. **Factory set to 0.00 psi.**

Low Gear Box Pressure Warning – (Medium Security): sounds a warning when the gearbox pressure reaches the set low limit parameter for gearbox pressure. Selection only shown when an analog input is selected to monitor Gearbox Pressure. **Factory set to 0.00 psi.**

Low Gear Box Pressure Shutdown – (Medium Security): shuts down the engine when the gearbox pressure reaches the set low limit parameter for gearbox pressure. Selection only shown when an analog input is selected to monitor Gearbox Pressure. **Factory set to 0.00 psi.**

High Level Warning – (Medium Security): sounds a warning when the system level reaches the set high limit parameter for system level. Selection only shown when an analog input is selected to monitor System Level. **Factory set to 0.0 ft**.

High Level Shutdown – (Medium Security): shuts down the engine when the system level reaches the set high limit parameter for system level. Selection only shown when an analog input is selected to monitor System Level. **Factory set to 0.0 ft.**

Low Level Warning – (Medium Security): sounds a warning when the system level reaches the set low limit parameter for system level. Selection only shown when an analog input is selected to monitor System Level. **Factory set to 0.0 ft.**

High Flow Warning – (Medium Security): sounds a warning when the flow rate reaches the set high limit parameter for flow rate. Selection only shown when an analog input is selected to monitor Flow Rate. **Factory set to 0 gpm.**

High Flow Shutdown – (Medium Security): shuts down the engine when the flow rate reaches the set high limit parameter for flow rate. Selection only shown when an analog input is selected to monitor Flow Rate. **Factory set to 0 gpm.**

Low Flow Warning – (Medium Security): sounds a warning when the flow rate reaches the set low limit parameter for flow rate. Selection only shown when an analog input is selected to monitor Flow Rate. **Factory set to 0 gpm.**

Low Flow Shutdown – (Medium Security): shuts down the engine when the flow rate reaches the set low limit parameter for flow rate. Selection only shown when an analog input is selected to monitor Flow Rate. **Factory set to 0 gpm.**

High Discharge Pressure Warning – (Medium Security): sounds a warning when the discharge pressure reaches the set high limit parameter for discharge pressure. Selection only shown when an analog input is selected to monitor Discharge Pressure. **Factory set to 0.00 psi.**

High Discharge Pressure Shutdown – (Medium Security): shuts down the engine when the discharge pressure reaches the set high limit parameter for discharge pressure. Selection only shown when an analog input is selected to monitor Discharge Pressure. **Factory set to 0.00 psi.**

Low Discharge Pressure Warning – (Medium Security): sounds a warning when the discharge pressure reaches the set low limit parameter for discharge pressure. Selection only shown when an analog input is selected to monitor Discharge Pressure. **Factory set to 0.00 psi.**

Low Discharge Pressure Shutdown – (Medium Security): shuts down the engine when the discharge pressure reaches the set low limit parameter for discharge pressure. Selection only shown when an analog input is selected to monitor Discharge Pressure. **Factory set to 0.00 psi.**

High Suction Pressure Warning – (Medium Security): sounds a warning when the suction pressure reaches the set high limit parameter for suction pressure. Selection only shown when an analog input is selected to monitor Suction Pressure. **Factory set to 0.00 psi.**

High Suction Pressure Shutdown – (Medium Security): shuts down the engine when the suction pressure reaches the set high limit parameter for suction pressure. Selection only shown when an analog input is selected to monitor Suction Pressure. **Factory set to 0.00 psi.**

Low Suction Pressure Warning – (Medium Security): sounds a warning when the suction pressure reaches the set low limit parameter for suction pressure. Selection only shown when an analog input is selected to monitor Suction Pressure. **Factory set to 0.00 psi.**

Low Suction Pressure Shutdown – (Medium Security): shuts down the engine when the suction pressure reaches the set low limit parameter for suction pressure. Selection only shown when an analog input is selected to monitor Suction Pressure. **Factory set to 0.00 psi.**

High Pump Housing Temp. Warning – (Medium Security): sounds a warning when the pump housing temperature reaches the set high limit parameter for pump housing temperature. Selection only shown when an analog input is selected to monitor Pump Housing Temperature. **Factory wet to 32 F.**

High Pump Housing Temp. Shutdown – (Medium Security): shuts down the engine when the pump housing temperature reaches the set high limit parameter for pump housing temperature. Selection only shown when an analog input is selected to monitor Pump Housing Temperature. **Factory set to 32 F.**

High Pump Oil Temp. Warning – (Medium Security): sounds a warning when the pump oil temperature reaches the set high limit parameter for pump oil temperature. Selection only shown when an analog input is selected to monitor Pump Oil Temperature. **Factory set to 32 F.**

High Pump Oil Temp. Shutdown – (Medium Security): shuts down the engine when the pump oil temperature reaches the set high limit parameter for pump oil temperature. Selection only shown when an analog input is selected to monitor Pump Oil Temperature. **Factory set to 32 F.**

Throttle Menu (Medium Security)

Engine Throttle Type – (High Security): allows the selection of J1939 TSC1, Pulse Inc/Dec, Analog 0-5VDC, or None as the throttle type for the engine. **Factory set to J1939 TSC1.**

J1939 TSC1 (High Security): 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 (High Security): this setting will be used when throttling a mechanical engine, using a throttle actuator and also an electronic engine using digital pulses into the ECU for throttling.

Analog 0-5 VDC (High Security): this setting will be used for throttling an electronic engine utilizing 0-5V output.

None (High Security): this setting will be used when the controller is not used to throttle the engine. This setting will hide target speed on the main screen to only display actual engine speed.

Thomson (High Security): this setting will be used when throttling a mechanical engine, using a Thomson Throttle Linear Actuator via CAN communications.

Separate TSC1 Source Address (High Security): allows the user to set a separate source address for TSC1 throttling from the controller's claim address. This should only be done if the service technician knows this to be true. **Factory set to Disabled.**

TSC1 Source Address (High Security): allows setting TSC1 throttle to be sent from a source address separate than the controller claim address. (Only appears when Separate TSC1 Source Address is set to Enabled).

Target RPM Step Size – (Medium Security): 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): (only appears when Pulse Inc/Dec or Analog, 0-5 VDC is chosen for the Throttle Type) 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.**

Throttle Inc/Dec Analog – (High Security): (only appears when Analog is chosen) 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 50 mS.**

Throttle Inc/Dec Pulse – (High Security): (only appears when Pulse Inc/Dec is chosen) 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 50 mS.**

Throttle Inc/Dec Pulse Delay – (High Security): (only appears when Pulse Inc/Dec is chosen) 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 250 mS.**

Analog Minimum Value – (High Security): (only appears when analog throttle type is chosen) analog throttle output will not go lower than this set point. **Factory set to .50 V.**

Analog Maximum Value – (High Security): (only appears when analog throttle type is chosen) analog throttle output will not go higher than this set point. **Factory set to 4.5 V.**

Throttle Inc Rate – (Medium Security): rate the engine is signaled to increase in RPM. When using Thomson Engine Throttle Type the setting will be shown as a gain value. **Factory set to 100 RPM/s.**

Throttle Dec Rate – (Medium Security): rate the engine is signaled to decrease in RPM. When using Thomson Engine Throttle Type the setting will be shown as a gain value. **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%**

Set Throttle to Zero – (Low Security): This setting allows to zero the Thomson actuator when selected as the Engine Throttle Type.

Throttle Direction – (Low Security): This setting allows the user to set whether the Thomson actuator Extends to Increase the RPM or Extends to Decrease the RPM. **Factory set to Extend to Decrease.**

Input / Output Menu (Medium Security)

Digital Inputs (1-6) – (Medium Security): for each of the digital inputs, the ability to select the following parameters exists:

Digital input 1. **Factory set to Disabled**
Digital Input 2. **Factory set to Auto Start Momentary/Maintained**
Digital Input 3. **Factory set to Auto Stop Momentary/Maintained**
Digital Input 4. **Factory set to Low Coolant Level**
Digital Input 5**. Factory set to Low Lube Oil Level**
Digital Input 6. **Factory set to Disabled**

Function – (Medium Security):

Disabled
Single Contact Start/Stop
Auto Start Momentary / Maintained
Auto Stop Momentary / Maintained
Remote Alarm Acknowledge
Low Fuel Level
Fuel Leak
Fuel Filter Restriction
Low Lube Oil Level
Low Coolant Level
Remote Stop
Idle Engine
Water in Fuel
No Flow
Engine Over Speed
Crank Termination
Air Damper Closed
Air Filter Restriction
Battery Charger Fail
Oil Filter Restriction
Run To Destruct Override
User 1 through User 6
Speed 1 through Speed 5
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)
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)
Remote Throttle Inc (allows increasing engine speed remotely)
Remote Throttle Dec (allows decreasing engine speed remotely)
Remote Manual/Auto (allows to remotely change from Auto to Manual or Manual to Auto)

Active – (Medium Security):

B- (ground input to a function chosen above) **Factory Default**
B+ (battery positive to a function chosen above)
Open (sender/switch is open)

Action – (Medium Security):

Not Used
Warning
Shutdown
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)

DI Speed Set points – (Medium Security): used in place of Throttle Inc/Dec. Provides five throttle set points to which the engine will throttle. These speed inputs will override any other throttling type. When inputs are not active, any other throttling type in use will resume. Digital input 1 will override 2 through 4. Digital 2 will override 3 through 5 and so on.

Analog Inputs (1-8) – (Medium Security): for each of the analog inputs, the ability to select the following parameters exists:

Analog input 1. **Factory set to Disabled**
Analog Input 2**. Factory set to Disabled**
Analog Input 3**. Factory set to Disabled**
Analog Input 4. **Factory set to Disabled**
Analog Input 5**. Factory set to Disabled**
Analog Input 6**. Factory set to Disabled**
Analog Input 7. **Factory set to Disabled**
Analog Input 8. **Factory set to Disabled**

Function – (Medium Security):
Disabled
4-20 mA Oil Pressure
0-5V Oil Pressure
4-20mA Engine Temperature
0-5V Engine Temperature
4-20mA Fuel Level
0-5V Fuel Level
4-20mA Oil Temperature
0-5V Oil Temperature
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 Pump Oil Temperature
0-5V Pump Oil Temperature
4-20mA Pump Housing Temperature
0-5V Pump Housing Temperature
4-20mA Ambient Temperature
0-5V Ambient Temperature
4-20mA Gear Box Pressure
0-5V Gear Box Pressure
0-5V Throttle Input
Datcon Oil Pressure
Murphy Oil Pressure – (ES2P-100)
VDO 5 Bar Oil Pressure
VDO 7 Bar Oil Pressure
Murphy Engine Temperature – (ES2T-250/300)

Datcon Engine Temperature
VDO Engine Temperature
Murphy Fuel Level – (ES2F)
VDO Fuel Level
Datcon Fuel Level
Murphy Oil Temperature – (ES2T-250/300)
Datcon Oil Temperature
VDO Oil Temperature
Murphy Discharge Pressure – (ES2P-100)
Murphy Suction Pressure – (ES2P-100)
Datcon Pump Housing Temperature
Murphy Pump Housing Temperature – (ES2T-250/300)
VDO Pump Housing Temperature
Murphy Pump Oil Temperature – (ES2T-250/300)
Datcon Pump Oil Temperature
VDO Pump Oil Temperature
Murphy GearBox Pressure – (Gear Box Pressure, Murphy PMK-400 Sensor)
Analog.Digital1
Index Coolant Level Probe Shutdown
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)
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)
Model 12 Air Temp Sensor: (Murphy 0-5V Model 12 preset Ambient Temp Sensor)

Sensor Setup – (Medium Security): (only appears when the analog inputs are configured. This sets the range of sensors for 4-20mA or 0-5V senders.)

Oil Pressure (0-5V) or (4-20mA)
Ambient Temp (0-5V) or (4-20mA) by raising the minimum value (4mA or 0V) in the sensor setup, a negative Ambient Temperature can be read by the Controller in Celsius or a temperature below 32 degrees in Fahrenheit.
Coolant Temp (0-5V) or (4-20mA)
Discharge Pressure (0-5V) or (4-20mA)
Fluid Pressure (0-5V) or (4-20mA)
Fuel Level (0-5V) or (4-20mA)
Oil Temp (0-5V) or (4-20mA)
Pump Housing Temp (0-5V) or (4-20mA)
Pump Oil Temp (0-5V) or (4-20mA)
Suction Pressure (0-5V) or (4-20mA) by raising the minimum value (4mA or 0V) in the sensor setup, a negative Suction Pressure can be read by the Controller.
Flow Rate (4-20mA)
System Level (4-20mA) Set mA per Ft

Discharge Pressure Units – (Medium Security): (only appears when discharge pressure is selected as on analog input. This selection allows the operator to change the discharge pressure units and not the global pressure units.) **Factory set to PSI.**

Relay (1-6) and Digital (1-6) Outputs – (Medium Security): the same parameters are used for both the Relay and Digital Outputs.

Relay 1. **Factory set to Crank.**
Relay 2. **Factory set to ECU Enable.** The controller will not transmit on the CAN bus when this output is off.

Relay 3. **Factory set to Common Alarm.**
Relay 4. **Factory set to Not Used.**
Relay 5. **Factory set to At Load (Clutch).**
Relay 6. **Factory set to Prestart 1 Delay.**
DO1 (5V, 200mA). **Factory set to Not Used.**
DO2 (5V, 200mA). **Factory set to Not Used.**
DO3 (B+, 2A). **Factory set to Not Used.**
DO4 (B+, 2A). **Factory set to Not Used.**
DO5 (B-, 1A). **Factory set to Throttle Decrease.**
DO6 (B-, 1A). **Factory set to Throttle Increase.**

Function – (Medium Security):

Not Used
Prestart 1 Delay: See Timers on page 30.
Prestart 2 Delay: See Timers on page 30.
Crank: See Timers on page 30.
Fuel: output turns on when the engine is in the crank/run state.
ECU Enable: used for enabling the ECU on electronic engines. This output is on any time the controller is powered up or in the crank/run state. It's turned off if the controller is in the standby state.
Excite Engine Alternator: used for alternators requiring excite from battery. This output is turned on in the crank/run state.
At Load (Clutch): output is turned on when the warm-up delay has expired and the engine reaches the clutch engage RPM set point. It is turned off during the cool-down delay and the engine reaches the clutch disengage RPM set point.
Gov. Control: output turns on after the warm-up delay expires and turns off when the cool-down delay begins timing.
Shutdown: output turns on when a fault shutdown occurs.
Common Alarm: output turns on when either a shutdown or a warning occurs.
Remote Alarm: output turns on when either a shutdown or a warning occurs.
Air Damper Normally De-energized: output turns off during the energize to stop delay.
Not in Auto: output turns on when the controller is in the manual mode.
Air Damper Normally Energized: output turns on during the energize to stop delay.
Energize to Stop: please see Timers on page 30.
Engine Running: output turns on after the engine actually starts and off when the engine stops.
Throttle Increase: used for the pulse inc/dec throttling type.
Throttle Decrease: used for the pulse inc/dec throttling type.
Digital Input (1-6): can be assigned to turn on a relay or digital output.
Analog (1-8) Digital: an analog input configured to be a digital input can be assigned to provide a fault or alarm if all the digital inputs are used. This input is active on B- only.
External Alarm: turns on when either a shutdown or a warning occurs but will be silenced when the Active Fault Reminder is enabled.
Pivot Power: turns on when the engine is in the crank/run state.
Failed to Start: turns on when the engine does not start after the set crank attempts and the controller has an overcrank fault present.
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 (Medium Security)

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

Pump All Purpose – houses most all auto start functions and auto throttling methods of the controller. This application is the most versatile application thus requiring so many combinations of settings for the operator to choose.

Center Pivot / Linear Irrigation – houses the auto start functions and auto throttle methods meant to be used on center pivot and linear movement irrigation applications.

Air Compressor – houses the auto start functions and auto throttle methods meant to be used on all engine-driven air compressor applications. The MPC-20-R2 allows for the compressor to start/stop and maintain a desired pressure during operation.

Hose Reel Irrigation – houses the auto start functions and auto throttle methods meant to be used on hose reel irrigation systems. The MPC-20-R2 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 – 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.

Auto Start / Stop Function – (Medium Security): **Factory set to Two Contact Maintained.**

Single Contact: (Center Pivot/Linear Irrigation, Air Compressor, Hose Reel Irrigation, Frost Protection)

Local Start Key: (Center Pivot/Linear Irrigation, Hose Reel Irrigation) referring to the green start button as in manual mode. This setting is used when auto start is not desired, but auto throttling is required.

Two Contact Maintained: (Center Pivot/Linear Irrigation, Air Compressor, Hose Reel Irrigation)

Two Contact Momentary: (Center Pivot/Linear Irrigation, Air Compressor, Hose Reel Irrigation)

Pressure Transducer: (Air Compressor, Hose Reel Irrigation) read **Pressure Type** in detail below under Pressure Transducer menu for understanding of setup.

Level Transducer: (Pump All Purpose) read **Level Type** in detail below under Level Transducer menu for understanding of setup.

Flow Transducer: (Pump All Purpose) read **Flow Type** in detail below under Flow Transducer menu for understanding of setup.

Temperature Transducer: (Frost Protection)

Auto Throttle Method – (Medium Security): **Factory set to Running Loaded.**

Running Loaded RPM (Pump All Purpose, Center Pivot/Linear Irrigation, Air Compressor, Hose Reel Irrigation, Frost Protection)

Pressure Transducer (Pump All Purpose, Center Pivot/Linear Irrigation, Air Compressor, Hose Reel Irrigation) read **Pressure Type** in detail below under Pressure Transducer menu for understanding of setup.

Level Transducer (Pump All Purpose) read **Level Type** in detail below under Level Transducer menu for understanding of setup.

Flow Transducer (Pump All Purpose, Center Pivot/Linear Irrigation) read **Flow Type** in detail below under Flow Transducer menu for understanding of setup.

Local Throttle Input for use when an analog input is selected for 0-5V throttle input. (Pump All Purpose, Center Pivot/Linear Irrigation, Air Compressor, Hose Reel Irrigation)

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 – (Medium Security): **Factory set to NON PID Auto Throttle.**

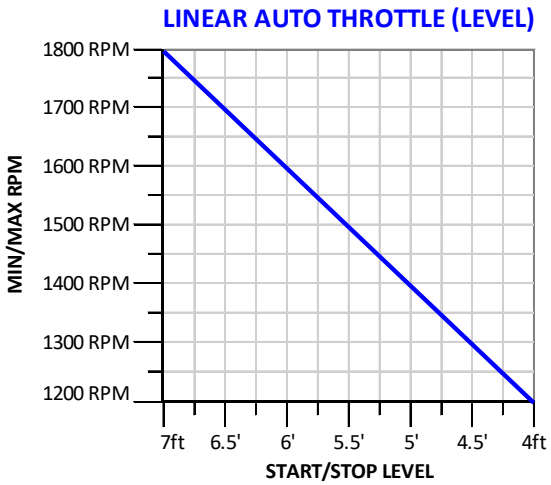
NON PID Auto Throttle: this type does not use the P I D adjustments found in the Transducer setups within the Application menu.

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 type uses the Pressure, Level, or Flow start and stop set points as well as the minimum and maximum RPM set points to linearly throttle the engine from start to stop depending on Pressure, Level, or Flow. The throttle should increase or decrease depending on the setting in the transducer type selected. The linear tie to the start/stop should be used when desiring to decrease throttle as approaching the stop setting. See the 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. The pump starts and ramps to 100% maximum throttle then slows linearly 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): present when selecting Running Loaded as the Auto Throttle Method. This 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): only present when selecting Pressure Transducer in the Auto Start / Stop Function or Auto Throttle Method.

Start Pressure – (Medium Security): 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): 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): 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): 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): **Suction / 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. **Factory set to Discharge.**

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): 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): 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): 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): 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**

Flow Transducer – (Medium Security): only present when selecting Flow Transducer in the Auto Start / Stop Function or Auto Throttle Method.

Start Flow Rate – (Medium Security): present when selecting Flow Transducer as the Auto Start / Stop Function. When the flow reaches this set point, an auto start will occur. **Factory set to 0 gpm.**

Stop Flow Rate – (Medium Security): present when selecting Flow Transducer as the Auto Start / Stop Function. When the flow reaches this set point, an auto stop will occur. **Factory set to 0 gpm.**

Maintain Flow – (Medium Security): engine will be throttled between the min. and max. RPM set points to maintain this flow. **Factory set to 0 gpm.**

Steady / Proportional – (Medium Security): present when PID Auto Throttle Type is selected. Steady throttles the engine to the max. RPM set point when starting and stopping on flow. Proportional throttles the engine proportionally between the min. and max. RPM set points when starting and stopping on flow. 0 gpm must be selected in the maintain flow for the steady/proportional features to work. **Factory set to Steady.**

Deadband Flow – (Medium Security): extends above and below the maintain set point. No throttling occurs while the flow is in the deadband. **Factory set to 0 gpm.**

Flow Type – (Medium Security): **In / Out.**

In: when the Auto Start/Stop is selected as Flow Transducer and the Flow Type is set to **(In)**, 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 Flow Transducer and the Flow Type is set to **(In)**, 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 Flow.

Out: when the Auto Start/Stop is selected as Flow Transducer and the Flow Type is set to **(Out)**, it is necessary to set the flow 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 Flow Transducer and the Flow Type is set to **(Out)**, 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 Flow. **Factory set to Out.**

Flow 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**

Flow 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**

Flow 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): only present when selecting Level Transducer in the Auto Start / Stop Function or Auto Throttle Method.

Start Level – (Medium Security): 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): 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): 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): extends above and below the maintain set point, no throttling occurs while the level is in the deadband. **Factory set to 0.0 ft.**

Steady / Proportional – (Medium Security): present when PID Auto Throttle Type is selected. Steady throttles the engine to the max. RPM set point when starting and stopping on level. Proportional throttles the engine proportionally between the min. and max. RPM set points when starting and stopping on level. 0.0 ft must be selected in the maintain level for the steady/proportional features to work. **Factory set to Steady.**

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

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**

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**.

Start / Stop Timers (Low Security)

There are eight timers to start and stop the engine, each with a Start Day and a Stop Day, a Start Time and a Stop Time.

Countdown Timer – (Low Security): countdown timer will be active upon every **auto startup** 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 an alternate Stop condition has been met. Format of HH:MM:SS

Start / Stop Timer (1-3) – (Low Security): each of the eight timers contains the ability to select from the following parameters. Ensure the stop day and time are set as desired compared to the start day and time.

Start / Stop Timer (4-8) – (Medium Security): each of the eight timers contains the ability to select from the following parameters. Ensure the stop day and time are set as desired compared to the start day and time.

Days of the week are factory set to Off.
Start and Stop Times are factory set to 12.00.00 AM.

Start Day
Sunday
Monday

Tuesday
Wednesday
Thursday
Friday
Saturday
Daily
Off*

Start Time: format of HH:MM:SS

Stop Day:
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Daily
Off*

Stop Time: format of HH:MM:SS

Communication (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.**

Slave Address – (High Security): 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.

Baud Rate – (High Security): **Factory set to 19200**
9600
19200
38400
57600
115200

Stop Bits – (High Security): **Factory set to 1**
0
1
2

Parity – (High Security): **Factory set to None**
None
Odd
Even

PVCAN Backlight Enable – (High Security): allows the MPC-20-R2 to control the backlights of the PVCAN gauges when used with the MPC-20-R2. **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-20-R2 is located at the end of the CAN bus and the end terminating resistor is not used in the harness. **Factory set to Enable.**

CAN Parameter Map – (High Security): allows an operator to enable or disable the 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.**

CAN Baud Rate – (High Security): **Factory set to 250Kbps**

10 Kbps
20 Kbps
50 Kbps
100 Kbps
125 Kbps
250 Kbps
500 Kbps
800 Kbps
1 Mbps

Passcodes (High Security)

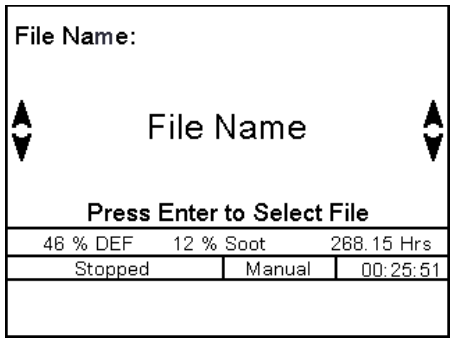
This menu allows the operator using the High Security Passcode to see the three 4-digit passcodes for Low, Medium and High security. This is a visual menu only.

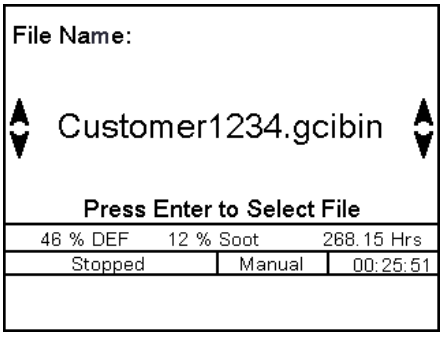
Load Configuration (High Security)

> **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-20 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-20 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-20 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.





Communications

This section covers the RS485 Modbus Registers and Proprietary CAN Parameter Map.

MPC-20-R2 RS485 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-20-R2, the values changed via Modbus will revert back to the last value entered locally at the MPC-20-R2 unless saved using Register 40240. Writing a 1 to register 40240 will allow saving register changes to the controller.

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)	Numerals
		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	
40008	Read Only	Active Shutdown Status (Active Fault: Bit = 1, Inactive: Bit = 0)	
		0 = Overspeed SD	(0 or 1)

		1 = Underspeed SD	(0 or 1)
		2 = Overcrank SD	(0 or 1)
		3 = Low Oil Pressure SD	(0 or 1)
		4 = High Engine Temp SD	(0 or 1)
		5 = Low Fuel SD	(0 or 1)
		6 = Low Discharge Pressure SD	(0 or 1)
		7 = High Discharge Pressure SD	(0 or 1)
		8 = No Speed Signal During Crank SD	(0 or 1)
		9 = Low Lube Level SD	(0 or 1)
		10 = Fuel Leak SD	(0 or 1)
		11 = Fuel Filter Restriction SD	(0 or 1)
		12 = Low Gear Box Pressure SD	(0 or 1)
		13 = High Gear Box Pressure SD	(0 or 1)
		14 = Battery Charger Fail SD	(0 or 1)
		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 = INDEX Coolant Level SD	(0 or 1)
		2 = Speed Signal Lost While Running SD	(0 or 1)
		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 (50.5 ft will read 505)	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. 0 = Not Active 1 = Active 2 = Regeneration Needed 3 = Not Available	Numerals
40038	Read & Write	System Level Engine Start (Auto) (50.5 ft will read 505)	Feet
40039	Read & Write	System Level Engine Stop (Auto) (50.5 ft will read 505)	Feet
40040	Read & Write	System Level Maintain Value (Auto) (50.5 ft will read 505)	Feet
40041	Read & Write	Flow Rate Start	US Gal/Min
40042	Read & Write	Flow Rate Stop	US Gal/Min
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 & Write	All Purpose Auto Start Function: (Active Function: Numeral Indicated)	Numerals
		0 = Single Contact	
		1 = Local Start Button	
		2 = Two Contact Maintained	
		3 = Two Contact Momentary	
		4 = Pressure Transducer	
		5 = Level Transducer	
		6 = Flow Transducer	
40217	Read & Write	Pressure Maintain Deadband (Auto)	kPa
40218	Read & Write	System Level Maintain Deadband (Auto)	Feet
40219	Read & Write	Flow Deadband	US Gal/Min
40220	Read & Write	Ambient Temperature Engine Start (Auto)	Celsius
40221	Read & Write	Ambient Temperature Engine Stop (Auto)	Celsius
40222	Read Only	Actual Flow Rate	US Gal/Min
40223	Read & Write	Flow Rate Maintain Value (Auto)	US Gal/Min
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 (Saved = 1)	(0 or 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 = High Pump Oil Temp Warn	(0 or 1)
		3 = High Pump Housing Temp Warn	(0 or 1)
		4 = Low Gear Box Pressure Warn	(0 or 1)
		5 = High Gear Box Pressure Warn	(0 or 1)
		6 = Air Damper Closed Warn	(0 or 1)
		7 = Air Filter Restriction Warn	(0 or 1)
		8 = Oil Filter Restriction Warn	(0 or 1)
		9 = Low Engine Temp Warn	(0 or 1)
		10 = High Engine Oil Pressure Warn	(0 or 1)
		11 = Battery Charger Fail Warn	(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)
40500	Read Only	J1939.DM1 SPN	Numerals
40501	Read Only	J1939.DM1 FMI	Numerals

CAN Parameter Map

This feature of the MPC-20-R2 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-20-R2 will have identification bytes A3 and AD respectively for the first two bytes. Sending to the MPC-20-R2 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, bit 48 needs to be returned to a 0 before it will allow a 1 again.

Parameter Map updates once per second on the CAN bus 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 Setpont	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 = Wait to Start	
					4 = Prestart 1 Delay	
					5 = Check Safe to Start	
					6 = Prestart 2 Delay	
					7 = Crank	
					8 = Crank Rest	
					9 = False Start Check	
					10 = Engine Warmup	
					11 = Line Fill 1	
					12 = Line Fill 2	
					13 = Running Loaded	
					14 = Running Cooldown	
					15 = Energize to Stop	
					16 = Spindown	
	2 Bytes	24	39	Read Only	Controller State Timer	Seconds
FF96	1 Bit	16	16	Read & Write	CAN Communication Start/Stop - Auto (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	Actual Discharge Pressure	kPa
FF9D	2 Bytes	16	31	Read & Write	Pressure Engine Start Setpoint - Auto	kPa
FF9E	2 Bytes	16	31	Read & Write	Pressure Engine Stop Setpoint - Auto	kPa
FF9F	2 Bytes	16	31	Read & Write	Pressure Maintain Setpoint - Auto	kPa
FFA0	1 Byte	16	23	Read & Write	Pressure Maintain Deadband Setpoint - Auto	kPa
FFA1	2 Bytes	16	31	Read Only	Actual System Level	Feet
FFA2	2 Bytes	16	31	Read & Write	System Level Engine Start Setpoint - Auto	Feet
FFA3	2 Bytes	16	31	Read & Write	System Level Engine Stop Setpoint - Auto	Feet
FFA4	2 Bytes	16	31	Read & Write	System Level Maintain Setpoint - Auto	Feet

FFA5	1 Byte	16	23	Read & Write	System Level Maintain Deadband Setpoint - Auto	Feet
FFA6	2 Bytes	16	31	Read Only	Actual Flow Rate	US Gal/Min
FFA7	2 Bytes	16	31	Read & Write	Flow Rate Engine Start Setpoint - Auto	US Gal/Min
FFA8	2 Bytes	16	31	Read & Write	Flow Rate Engine Stop Setpoint - Auto	US Gal/Min
FFA9	2 Bytes	16	31	Read & Write	Flow Rate Maintain Setpoint - Auto	US Gal/Min
FFAA	1 Byte	16	23	Read & Write	Flow Rate Maintain Deadband Setpoint - Auto	US Gal/Min
FFAB	2 Bytes	16	31	Read Only	Actual Ambient Temperature	Celsius
FFAC	2 Bytes	16	31	Read & Write	Ambient Temperature Engine Start Setpoint - Auto	Celsius
FFAD	2 Bytes	16	31	Read & Write	Ambient Temperature Engine Stop Setpoint - 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	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	Read Only	High Pump Oil Temp Warn	(0 or 1)
		35	35	Read Only	High Pump Housing Temp Warn	(0 or 1)
		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	Read Only	Air Damper Closed Warn	(0 or 1)
		39	39	Read Only	Air Filter Restriction Warn	(0 or 1)
		40	40	Read Only	Oil Filter Restriction Warn	(0 or 1)
		41	41	Read Only	Low Engine Temp Warn	(0 or 1)
		42	42	Read Only	High Engine Oil Pressure Warn	(0 or 1)
		43	43	Read Only	Battery Charger Fail Warn	(0 or 1)
		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	Failed to Start 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	Read Only	Air Damper Closed SD	(0 or 1)
		29	29	Read Only	Air Filter Restriction SD	(0 or 1)
		30	30	Read Only	Oil Filter Restriction SD	(0 or 1)
		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	Read Only	High Pump Oil Temp SD	(0 or 1)
		38	38	Read Only	High Pump Housing Temp SD	(0 or 1)
		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	Read Only	High Engine Oil Pressure SD	(0 or 1)
		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	Read Only	Battery Charger Fail SD	(0 or 1)
		47	47	Read Only	Red Lamp Status	(0 or 1)
		48	48	Read Only	Index Coolant Level Probe SD	(0 or 1)
		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 = Two Contact Momentary	
					4 = Pressure Transducer	
					5 = Level Transducer	
					6 = Flow 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-20-R2 controller houses 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-20 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 6-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 support website.
Login or Register for an Account to Access Downloads

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.

Specifications

Interface:

- Display:
  - Monochrome, Transflective, White Backlight LCD with Heater
  - 3.8 in./ 96.52 mm, QVGA (320 x 240 pixels)
  - Languages: English, Spanish, German, French, Italian
- (3) LEDs: green (mode), yellow (warning) and red (shutdown)
- Operator controls:
  - (11) Raised silicone keypads, tactile feedback

Power Supply:

- Operating Voltage: 8-32 VDC, reverse battery polarity and load dump protected.
- Power Consumption:
  18W max without two 2A High-sides active,
  146W max with two 2A High-sides active

Inputs (13):

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

Outputs (13):

- (6) Relay, Form C (dry / volt-free), 10A; (30 VDC @ 10A max.), 40A maximum aggregate @ 85C
- (2) Low-side FET (–DC), 1A
- (2) High-side FET (+DC), 2A
- (2) 5V, 200mA (available to drive external 5V relay coils)
- (1) Analog 0-5V, (Dedicated for Analog Throttling)

Communications:

- (2) CAN: J1939 (Only one supported in standard releases)
- (1) RS485: Modbus RTU
- (1) USB: 2.0B (Dedicated for programming)
- (1) Ethernet: (Not supported in standard releases)

Mating Connector:

- Delphi SICMA 90 way

Physical/Environmental:

- Enclosure material: Polycarbonate / ABS
- IP rating: IP67, Panel seal is IP66 when used with Accessory Gasket
- Operating & Temperature: -40° to +85° C (-40° to 185° F)
- Vibration: 7.86 Grms (5-2000 Hz), 3-axis random
- Shock: ±50G, 3-axis
- Emissions and Immunity: SAE J1113, 2014/30/EU & 2014/35/EU

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Software Release: [App: 02.09.10039.00 & 02.09.10042.00; Config: 2.9.20024 & 2.9.20025; Built in PowerVision Configuration Studio Version: 2.9.23042 & 2.9.23047; BTL: 02.09.10015.00]

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