Testing and Adjusting
EMCP 3
Media Number -RENR7902-01 **Publication Date -01/01/2006** **Date Updated -27/01/2006**

i02459214

Electronic Control Module (Generator Set) - Configure

SMCS - 4490-025

Function Keys and Navigation Keys

ReferenceFor a full explanation of the use of the Function keys (Enter, Escape) and the Navigation keys (Scroll Left, Scroll Right, Scroll Up, Scroll Down) that are referenced in this section, see Systems Operation, "Electronic Control Module (Generator Set)"

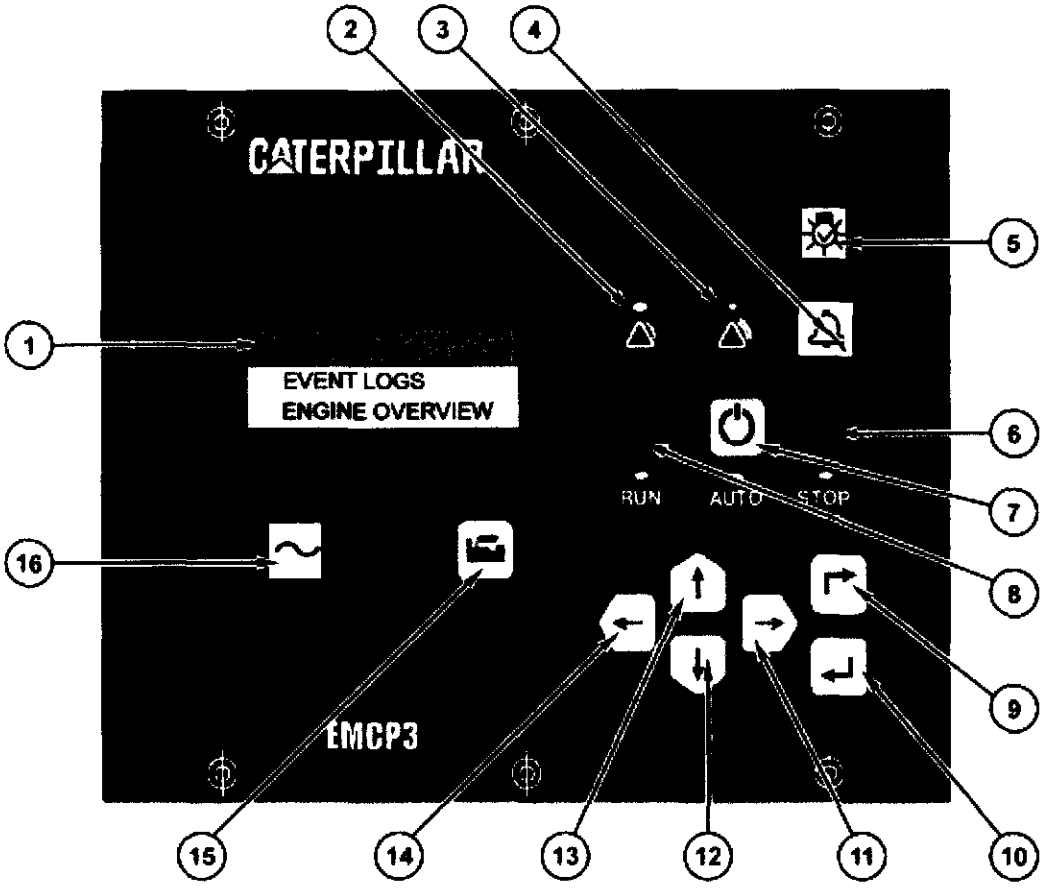


Illustration 1 g012

(1) Display Screen

(2) Yellow Warning Lamp

(3) Red Shutdown Lamp

(4) Alarm Acknowledge/Silence key

(5) Lamp Test key

(6) Stop key

(7) Auto key

(8) Run key

(9) Escape key

(10) Enter key

(11) Scroll Right key

(12) Scroll Down key

(13) Scroll Up key

(14) Scroll Left key

(15) Engine Overview key

(16) AC Overview key

(9) Escape - Navigate up (backward) through the menu structure and also used to cancel out of data entry screens during setpoint programming.

(10) Enter - Select a highlighted menu item

(11) Scroll Right - During numeric data entry, choose the digit to edit. During certain setpoint adjustments, select or deselect a checkbox.

(12) Scroll Down - Move down through the main menu or navigate within a list in order to highlight one of the items. Also used to decrement digits (0-9).

(13) Scroll Up - Move up through the main menu or navigate within a list in order to highlight one of the items. Also used to increment digits (0-9)

(14) Scroll Left - During numeric data entry, choose the digit to edit. During certain setpoint adjustments, select or deselect a checkbox.

Initial Setup

Information from the EMCP 3 is displayed on the Display Screen (1) . Press the **Scroll Up** key or the **Scroll Down** key in order to highlight the MAIN MENU options.

Press the **Enter** key in order to select one of the main menu options.

The keypad is also used in order to change the setpoints. Press the **Enter** key in order to change a setpoint. Press the **Scroll Up** key or the **Scroll Down** key in order to increase or decrease the value. Press the **Scroll Left** key or the **Scroll Right** key in order to change the digit that is to be adjusted.

Note: The EMCP 3 panel will power up to the MAIN MENU screen. If the EMCP 3 panel is already powered up, press the **Escape** key in order to return to the main menu. Each press of the Escape key moves you back one level in the menu structure,

Setpoints

Within each setpoint category there are one or more function blocks. Each of those function blocks may contain one or more setpoints. Each of these setpoint categories and its corresponding function blocks are shown below.

Control

- Automatic Start/Stop
- Automatic Voltage Regulator (AVR) Desired Voltage Request
- Generator Breaker Control
- Generator Desired Engine Speed Request
- Transfer Switch
- Utility Breaker Control

Engine Monitor/Protect

- Battery Voltage Monitor
- Crank Attempt/Successful start Counter
- Engine Coolant Temperature Monitor
- Engine Oil Pressure Monitor
- Engine Speed Monitor
- Enhanced Engine Monitor
- Service Maintenance Interval

Events

- Diagnostics Configuration
- Engine protection Events Configuration
- Generator Protection Events Configuration
- Other System Events Configuration
- Custom Events
- Event Output Function
- Event System

Generator Monitor/Protect

- Enhanced Generator Monitor

- Generator AC Monitor
- Generator AC Power Monitor
- Generator Over Current
- Generator Over/Under Frequency
- Generator Over/Under Voltage
- Generator Reverse Power

Discrete Input Output (I/O)

- Digital Inputs
- Digital Outputs
- Relay Outputs
- Spare Analog Input

Network

- Data Link - SCADA

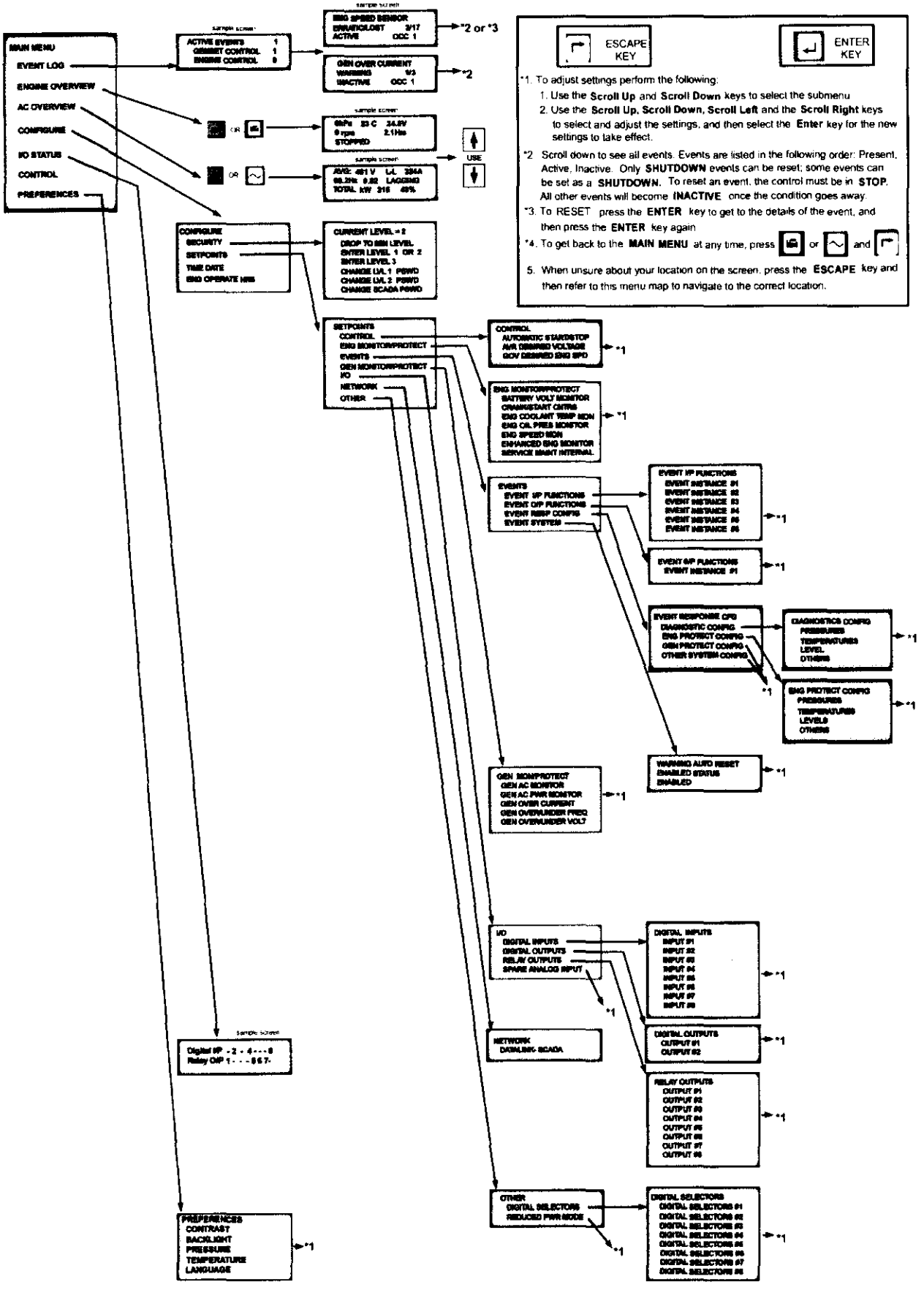
Other

- Digital Selectors
- Reduced Power Mode

Menu Maps

The maps in this section are to be used as a guide when programming the EMCP 3. Maps are provided for all versions of the controller.

EMCP 3.1 Generator Set Control Menu Structure



EMCP 3.2 Generator Set Control Menu Structure

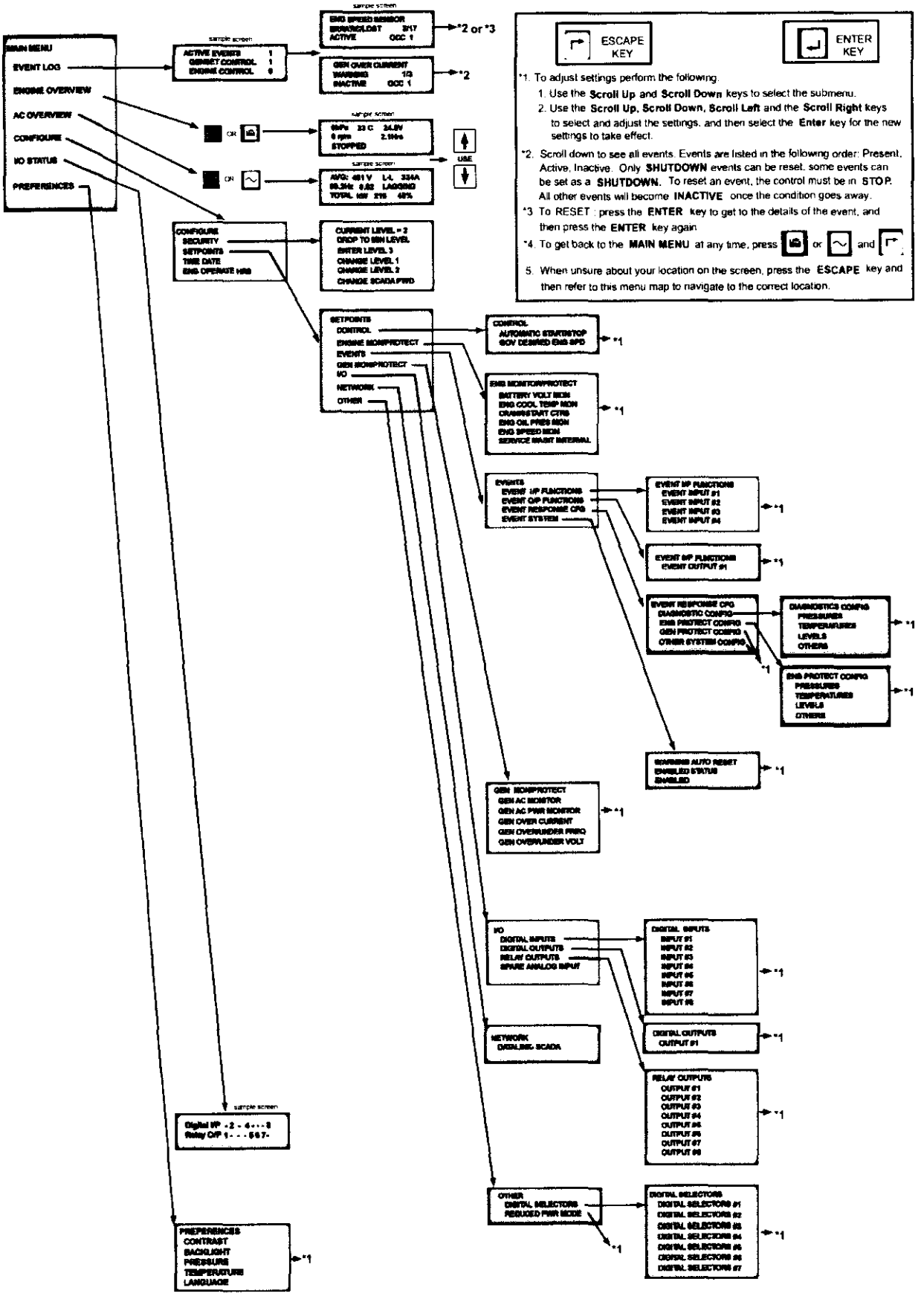


Illustration 4

Programming the Display Preferences

The preferences affect the way data is viewed on the display screen. The configuration may need to be changed in order to meet local requirements.

In order to program the display preferences, perform the following menu options.

1. Press the **Escape** key as many times as necessary in order to go back to the MAIN MENU display.

2. From the MAIN MENU, press the **Scroll Down** key or the **Scroll Up** key in order to highlight the PREFERENCES option. The following parameters can be changed

    - CONTRAST
    - BACKLIGHT
    - PRESSURE
    - TEMPERATURE
    - VOLUME
    - LANGUAGE

    a. Press the **Enter** key in order to select PREFERENCES. CONTRAST will be highlighted.

    b. Press the **Enter** key in order to select the contrast level. The contrast can be adjusted between 1 and 100, with 1 being the least contrast and 100 being the greatest contrast. The display will show a status bar and a number representing the current contrast level.

    c. Use the **Scroll Right** key or the **Scroll Left** key in order to adjust the contrast to the desired level, and then press the **Enter** key in order to save the new contrast setting.

    d. Press the **Scroll Down** key in order to highlight BACKLIGHT and then press the **Enter** key in order to select the backlight function. The backlight can be adjusted between 1 and 100, with 1 being the least backlight and 100 being the greatest backlight. The display will show a status bar and a number representing the current backlight level.

    e. Adjust the backlight to the desired level using the **Scroll Right** key or the **Scroll Left** key, and then press the **Enter** key in order to save the new backlight setting.

    f. Press the **Scroll Down** key in order to highlight PRESSURE, and then press the **Enter** key in order to select the pressure function. The available options for pressure measurement are "kPa", "PSI", and "BAR". The display will list all three options, with the current option

highlighted.

g. Adjust the pressure to the desired measurement unit using the **Scroll Right** key or the **Scroll Left** key , and then press the **Enter** key in order to save the pressure measurement unit.

h. Press the **Scroll Down** key in order to highlight TEMPERATURE and then press the **Enter** key in order to select the temperature function. The available options for temperature measurement are "°C" or "°F". The display will list both options, with the current option highlighted.

i. Adjust the temperature to the desired measurement scale using the **Scroll Right** key or the **Scroll Left** key , and then press the **Enter** key in order to save the temperature measurement unit.

j. Press the **Scroll Down** key in order to highlight VOLUME and then press the **Enter** key in order to select the volume function. The available options for volume measurement are "LITERS", "US GAL", or "IMP GAL". The display will list all three options, with the current option highlighted.

k. Highlight the desired volume measurement unit using the **Scroll Right** key or the **Scroll Left** key , and then press the **Enter** key in order to save the volume measurement unit.

l. Press the **Scroll Down** key in order to highlight LANGUAGE and then press the **Enter** key in order to select the language function. Language does not display a value to the right. The display will show one or two options. TECHNICIAN ENGLISH will always be shown and, if another language is available on the flash file, that language will also be shown as an options.

m. Highlight the desired language that is to be used for display on the EMCP 3 using the **Scroll Right** key or the **Scroll Left** key , and then press the **Enter** key (10) in order to save the desired language selection

n. Press the **Escape** key as required in order to step back up to the MAIN MENU.

Programming The Setpoints

The engine/generator setpoints affect the proper operation and serviceability of the engine, and the accuracy of information shown on the display screen. The EMCP 3 setpoints are programmed at the factory.

The setpoints may require changing when the EMCP 3 is moved from one engine to another engine. The setpoints may also require changing in order to satisfy the site requirements. The setpoints that are stored in the EMCP 3 must match the specified setpoints of the particular generator set.

See the Setpoint tables following these procedures for a complete list of all the setpoint blocks. All of the setpoints listed in the tables should be verified and reprogrammed if required.

The first setpoint block to program is the Automatic Start/Stop Block. The Automatic Start/Stop Block is part of the Control Category. In order program the Automatic Start/Stop Setpoints, perform the

following:

1. Press the **Escape** key as required in order to step back to the MAIN MENU.
2. From the MAIN MENU, press the **Scroll Down** key until CONFIGURE is highlighted and then press the **Enter** key in order to select the menu.
3. Press the **Scroll Down** key until SETPOINTS is highlighted, and then press the **Enter** key in order to select the menu.
4. Press the **Scroll Down** key in order to scroll through the setpoint options until CONTROL is highlighted, and then press the **Enter** key in order to select the menu. The AUTOMATIC START / STOP menu is highlighted.
5. Press the **Enter** Key in order to select the AUTOMATIC START / STOP menu and then use the **Scroll Down** key and the **Scroll Up** key in order to highlight the next setpoint that is to be programmed.
6. Press the **Enter** key in order to select the setpoint and then press the **Enter** key a second time in order to highlight the current configuration of the selected setpoint.
7. Use the **Scroll Down** key and the **Scroll Up** key in order to change the current configuration to the desired setting, and then use the **Enter** key in order to the save the new setting.
8. Repeat steps 5 through 7 in order to program all of the Automatic Start/Stop setpoints.
9. After all of the Automatic Start/Stop Setpoints are programmed as required, then press the **Escape** key in order to back up to the CONTROL menu.
10. The next block of setpoints that is to be programmed is the Automatic Voltage Regulator (AVR) Request block. Press the **Scroll Down** key in order to scroll through the setpoint options until AVR DESIRED VOLTAGE is highlighted, and then press the **Enter** key in order to select the menu.
11. Repeat steps 5 through 7 in order to program all of the AVR Request setpoints.
12. Continue programming the remaining function blocks in the "CONTROL" menu.
13. Press the **Escape** key twice in order to back up to the SETPOINTS menu.
14. Press the **Scroll Down** key in order to scroll through the setpoint options until ENGINE MONITOR/PROTECT is highlighted.
15. Press the **Enter** key in order to select the ENGINE MONITOR/PROTECT menu and then program all of the function blocks in this menu.
16. Continue to program the remaining setpoints until each setpoint in every setpoint category has been checked and programmed as required.

SETPOINT TABLES

All of the available setpoints on the EMCP 3 are listed in the following tables. Refer to these tables while programming the setpoints.

CONTROL

Automatic Start/Stop

The Automatic Start/Stop block receives starting and stopping requests from various sources (local, remote, internal), arbitrates between them and then cranks or shuts down the engine in an orderly fashion.

Table 1

Setpoints - Automatic Start/Stop [1]					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Engine start fault protection activation delay time	0	300	sec	30	Fault protection time delay prevents shut down during start up from low oil pressure etc.
Crank Duration	5	300	sec	10	Amount of time the EMCP 3 energizes (cranks) the starting motor
Crank Cycle Rest Interval	5	300	sec	10	Amount of time the EMCP 3 deenergizes the starting motor between crank cycles
Engine Purge Cycle Time	0	20	sec	0	
Maximum Number of Crank Cycles	1	20	n/a	5	Number of crank/rest cycles that the EMCP 3 uses to declare that a overcrank fault exists
Cooldown Duration	0	30	min.	5	Amount of time the EMCP 3 allows the engine to run after a normal shutdown is initiated
Start Aid Activation Time	0	240	sec.	0	Amount of time the EMCP 3 activates start aid control output. Set to 10 seconds if the EUI with prelube option is installed.
Crank Alert					

Activation Time	0	60	sec.	0	Amount of time the EMCP activates crank alert output.
Crank Terminate RPM	100	1000	rpm	400	Engine speed setting used in order to disengage the starting motor during engine cranking
Engine Fuel Type Configuration	n/a	n/a	n/a	Diesel	Setpoint allows for selection of "Diesel" or "Natural Gas"
Fuel Shutoff Solenoid Type Configuration	n/a	n/a	n/a	Energized to Run	Type of fuel system solenoid used on the generator set. Select "Energized to run" (ETR) or "Energized to Shut Off" (ETS).
Engine Type Configuration	n/a	n/a	n/a	Mechanical	Select mechanical or electronic
Engine Controller J1939 Data Link Support Configuration	n/a	n/a	n/a	No Data Link	Setpoint allows for selection of "No Data Link", "Basic Data Link", or "Enhanced Data" Link.
Engine Cool Down Speed Configuration	n/a	n/a	n/a	Rated	Setpoint allows for selection of engine speed during cooldown. Select rated or idle.
Engine Operating State Input Configuration	n/a	n/a	n/a	CAN Input	Setpoint configures whether the EMCP3 determines its operating state on its own, or whether it receives it over the data link from the engine ECM. Set to "CAN Input" for common engine interface engines and set to "Hard Wired "for non-common engine interface EUI engines and non-EUI engines.

(1) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

AVR Desired Voltage Request

The AVR Desired Voltage Request block generates a data link request over the J1939 data link in order to request a desired output voltage from the CDVR.

Table 2

Setpoints - AVR Desired Voltage Request (2)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**

Maximum Generator Voltage Output Bias Percentage	0	100	%	15	The Maximum Generator Output voltage Bias Percent is the maximum value above and below the Nominal Voltage that the EMCP 3 will send a request for when adjusting the voltage from the control screen
Generator Nominal Output Voltage	100	50000	V	100	The Generator Nominal Output Voltage is the desired output voltage of the generator set. This value is set to match the generator rated voltage.

(2) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Maximum Generator Output Voltage Bias Percent

The following settings will only apply if there is a CDVR installed on the generator.

Note: It is possible to set the "MAXIMUM GEN OUTPUT VOLTAGE BIAS PERCENT" from 0 to 100% but the CDVR will only allow the voltage to change by a maximum of 15%.

1. From the MAIN MENU, press the **Scroll Down** key or the **Scroll Up** key in order to highlight the CONFIGURE menu, and then press the **Enter** key in order to select the menu. "SECURITY" will be highlighted.

2. Press the **Scroll Down** key in order to highlight the SETPOINTS menu, and then press the **Enter** key in order to select the menu. AUTOMATIC START/STOP will be highlighted.

3. Press the **Scroll Down** key in order to highlight the AVR DESIRED VOLTAGE menu, and then press the **Enter** key in order to select the menu. MAXIMUM GEN OUTPUT VOLTAGE BIAS PERCENT will be displayed.

4. Press the **Enter** key in order to select the AVR DESIRED VOLTAGE menu and then press the **Enter** key a second time in order to select the MAXIMUM GEN OUTPUT VOLTAGE BIAS PERCENT function and in order to display the current voltage bias percent.

   Note: The voltage bias percent setpoint will determine the amount of voltage change for each key press on the voltage control screen. A higher value will result in a larger change in voltage per key press. A lower value will result in a smaller change in voltage per key press.

5. Press the **Scroll Down** key or the **Scroll Up** key in order to decrement or increment the highlighted digit to the desired value and then press the **Scroll Right** key or the **Scroll Left** key in order to highlight the next character that is to be entered.

6. Continue this process until the desired current voltage bias percent has been entered and then press the **Enter** key in order to save the new value.

Generator Breaker Control

The Generator Breaker Control block opens and to closes the generator breaker and generates alarms if the generator breaker fails to open or to close.

Note: Standard Caterpillar product does not utilize this group of setpoints.

Table 3

Setpoints - Generator Breaker Control [22]					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Breaker Closing Pulse Active Time	0.1	10	sec.	1.0	
Generator Breaker Closing Pulse Rest Interval	0	60	sec.	15	
Generator Breaker Maximum Closing Time	1	120	sec.	60	
Generator Breaker Maximum Opening Time	1	20	sec.	3	
Generator Breaker Lockout Status	N/A	N/A	N/A	Not Locked Out	Select" Locked Out" or "Not Locked Out"
Generator Breaker Type Configuration	N/A	N/A	N/A	Manual	Select "Manual" or "Automatic"
Automatic Generator Breaker Control Source Configuration	N/A	N/A	N/A	Genset Controlled	Select "Genset Controlled" or "Externally Controlled"

(22) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Generator Desired Engine Speed Request

The Generator Desired Engine Speed Request block generates a data link request over the J1939 data link in order to request a desired generator frequency from a generator.

Table 4

Setpoints - Generator Desired Engine Speed Request [27]					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**

Maximum Engine Speed Range	0	2000	rpm	100	The Maximum Engine Speed Range is the maximum value above and below the Nominal Engine Speed that the EMCP 3 will send a request for when adjusting the speed from the control screen
Generator Nominal Output Frequency	40	500	Hz	50	This value is set to match the generator rated frequency

(27) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Transfer Switch

The Transfer Switch block enables automatic transition from utility power to standby genset power in the case of a Loss of Utility event or an internal request, and then automatically transitions back to utility power after the utility returns or the external request is removed.

Note: Standard Caterpillar product does not utilize this group of setpoints.

Table 5

Setpoints - Transfer Switch (33)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator/Utility Automatic Transfer Enable Status	N/A	N/A	N/A	Disabled	
Loss of Utility Event Notification Delay Time	0	30	sec.	10	
Utility to Generator Transfer Delay Time	1	60	sec.	3	
Generator to Utility Transfer Delay Time	1	60	min.	180	
Generator to Utility Fast Transfer Delay Time	1	60	sec.	10	
Utility to Generator Transfer Failure Warning Event Threshold	1	240	sec.	60	
Utility to Generator Transfer Failure Shutdown Event Threshold	1	240	sec.	90	
Generator to Utility Transfer Failure Warning Event Threshold	1	240	sec.	60	

(33) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Utility Breaker Control

The Utility Breaker Control block opens and closes the utility breaker and generates alarms when the utility breaker fails to open or to close.

Note: Standard Caterpillar product does not utilize this group of setpoints.

Table 6

Setpoints - Utility Breaker Control (34)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Utility Breaker Closing Pulse Active Time	0.1	10.0	sec.	1.0	
Utility Breaker Closing Pulse Rest Interval	0	60	sec.	15	
Utility Breaker Maximum Closing Time	1	120	sec.	60	
Utility Breaker Maximum Opening Time	1	20	sec.	3	
Utility Breaker Lockout Status	N/A	N/A	N/A	Not Locked Out	Select "Locked Out" or "Not Locked Out"
Utility Breaker Type Configuration Automatic	N/A	N/A	N/A	Manual	Select "Manual" or "Automatic"
Utility Breaker Control Source Configuration	N/A	N/A	N/A	Genset controlled	Select "Genset Controlled" or "Externally Controlled"

(34) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

ENGINE MONITOR / PROTECT

Battery Voltage Monitor

The Battery Voltage Monitor block measures the battery supply voltage to the EMCP 3. The EMCP 3 will have the ability to monitor the battery supply voltage based on the "+BATT" and "-BATT".

Table 7

Setpoints - Battery Voltage Monitor (3)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
High Battery Voltage Warning Event Threshold	12	50	VDC	29.4	
High Battery Voltage Warning Event Notification Delay Time	0	240	sec	30	
High Battery Voltage Shutdown Event Threshold	12	50	VDC	32.0	
High Battery Voltage Shutdown Event Notification Delay Time	0	240	sec	2	
Low Battery Voltage Warning Event Threshold	0.0	25.0	VDC	18.0	
Low Battery Voltage Warning Event Notification Delay Time	0	240	sec	10	
Low Battery Charging System Voltage Warning Event Threshold	0	30	VDC	26	
Low Battery Charging System Voltage Warning Event Notification Delay Time	0	240	sec	30	

(3) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Crank Attempt/Successful Start Counter

The Crank Attempt/Successful Start Counter block tracks the number of times the engine has been cranked and the number of times the engine has been successfully started.

Table 8

Setpoints - Crank Attempt / Successful Start Counter (31)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Customer Security Password Level to Reset Crank/Start Counters	0	4	n/a	3	Password level required in order to reset the Crank/Start Counters

(31) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the

particular generator set.

Engine Coolant Temperature Monitor

The Engine Coolant Temperature Monitor block converts a raw sensor value into coolant temperature and, when configured as a sensor, detects sensor diagnostics.

Table 9

Setpoints - Engine Coolant Temperature Monitor (10)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Engine Coolant Temperature Sensor Configuration	N/A	N/A	N/A	Sensor	Select "Sensor" or "Data Link". Set to Sensor for MUI Engines or set to Data Link for EUI engines.
High Engine Coolant Temperature Warning Event Threshold	49 °C (120 °F)	120 °C (248 °F)	deg.	102 °C (216 °F)	
High Engine Coolant Temperature Warning Event Notification Delay Time	0	30	sec.	2	
High Engine Coolant Temperature Shutdown Event Threshold	49 °C (120 °F)	120 °C (248 °F)	deg.	107 °C (225 °F)	
High Engine Coolant Temperature Shutdown Event Notification Delay Time	0	30	sec.	10	
Low Engine Coolant Temperature Warning Event Threshold	0 °C (32°F)	36 °C (99 °F)		21 °C (70 °F)	
Low Engine Coolant Temperature Warning Event Notification Delay Time	0	30	sec.	2	

(10) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Engine Oil Pressure Monitor

The Engine Oil Pressure Monitor block converts a raw sensor value into oil pressure and, when configured as a sensor, detects sensor diagnostics.

Table 10

Setpoints - Engine Oil Pressure Monitor (11)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Engine Oil Pressure Sensor Configuration	N/A	N/A	N/A	Sensor	Select "Sensor" or "Data Link". Set to Sensor for MUI Engines or set to Data Link for EUI engines.
Low Engine Oil Pressure Warning Event Threshold	34 kPa (5 psi)	690 kPa (100 psi)	kPa	239 kPa (35 psi)	
Low Idle Low Engine Oil Pressure Warning Event Threshold	34 kPa (5 psi)	690 kPa (100 psi)	kPa	104 kPa (15 psi)	
Low Engine Oil Pressure Warning Event Notification Delay Time	0	30	sec.	0	
Low Engine Oil Pressure Shutdown Event Threshold	34 kPa (5 psi)	690 kPa (100 psi)	kPa	205 kPa (30 psi)	
Low Idle Low Engine Oil Pressure Shutdown Event Threshold	34 kPa (5 psi)	690 kPa (100 psi)	kPa	70 kPa (10 psi)	
Low Engine Oil Pressure Shutdown Event Notification Delay Time	0	30	sec.	10	
Low Engine Oil Pressure Step Speed	400	1800	RPM	1200	When the engine speed is below this setpoint, the Low Idle setpoint is used. Set to 800 RPM for engines rated at 1000 or 1200 RPM. Set to 1200 RPM for engines rated at 1500

					or 1800 RPM.

(11) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Engine Speed Monitor

The Engine Speed Monitor block determines the engine speed, in rpm, from the Magnetic Pickup (MPU) input pins and detects diagnostics on the MPU. The MPU used for these determinations will be an independent MPU to be used by the EMCP 3 only.

Note: All Engine Speed Monitor setpoints require a "LEVEL 3" password. Engine Speed Monitor setpoints may also be changed with Caterpillar Electronic Technician software without a password.

Table 11

Setpoints - Engine Speed Monitor (12)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Flywheel Teeth	95	350	N/A	183	
Engine Over Speed Shutdown Threshold	400	4330	rpm	2120	Set to 118% of rated speed
Engine Under Speed Warning Event Threshold	400	4330	rpm	1550	Set to 86% of rated speed
Engine Under Speed Warning Event Notification Delay Time	0.0	20.0	sec.	2.0	
Engine Under Speed Shutdown Event Threshold	400	4330	rpm	1480	Set to 82% of rated speed
Engine Under Speed Shutdown Event Notification Delay Time	0.0	20.0	sec.	2.0	

(12) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Enhanced Engine Monitor

The Enhanced Engine Monitor block provides a method to access the engine cylinder temperature parameters from the Primary Data Link for use in configuration logic.

Note: Standard Caterpillar product does not utilize this group of setpoints.

Table 12

Setpoints - Enhanced Engine Monitor (31)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Engine Cylinder Temperature Sensor Installation Status	0	1	n/a	Not Installed	Select "Installed" or "Not installed"
Number of Engine Cylinders	1	20	n/a	1	

(31) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Service Maintenance Interval

The Service Maintenance Interval block annunciates a need for engine service based on engine hours or duration since the last service, whichever occurs first.

Table 13

Setpoints - Service Maintenance Interval (31)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Service Maintenance Interval Hours	0	2000	hours	500 hours	
Service Maintenance Interval Days	0	365	days	180 days	

(31) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

EVENTS

Table 14

Description of Event Response Selections	
Active Only	Only displays event in the event log (no history on the event)
Warning	Event logged, amber warning status LED
Audible Alert	Activates relay output configured as "horn control"
Soft Shutdown	Shutdown event allows cooldown cycle
Hard Shutdown	Shutdown event skips cooldown cycle for fast engine shutdown

Breaker 1 Trip	Activates relay output configured as "breaker 1 trip"
Breaker 2 Trip	Activates relay output configured as "breaker 2 trip"
FTP	Suppress the event until the engine is running and the fault protection timer has expired

Diagnostics Configuration

⚠ WARNING

Warning and/or shutdown events should not be disabled. If warning or shutdown events are disabled, the user may not be aware of conditions that could cause damage to the engine, generator, or electrical loads. If warning or shutdown events are disabled, make sure that there is another control that is set up that can diagnose the event, and if necessary, will shut the engine down.

The "Diagnostics Configuration" block is used in order to configure the desired response for any diagnostic that is generated by the genset control.

The Diagnostics Configuration block is subdivided into four subcategories as follows: Pressures, Temperatures, Levels and Others. Each of the Diagnostics Configuration subcategories is shown in it's own table.

Note: Table 16 lists the available options for each setpoint in the "PRESSURES" category. The options that are available for each setpoint are designated by an "X" in the option column.

Table 15

"PRESSURE" Setpoints - Diagnostics Configuration [15]									
Setpoint Name	**Warning**	**Audible Alert**	**Soft Shutdown**	**Hard Shutdown**	**Loss of Utility**	**Breaker Trip #1**	**Breaker Trip #2**	**FPT**	**A C**
Air Filter Differential Pressure Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
Engine Oil Pressure									

Sensor Diagnostic Response Configuration	X	X	X	X		X	X	
Fire Extinguisher Pressure Sensor Diagnostic Response Configuration	X	X	X	X		X	X	
Fuel Filter Differential Pressure Sensor Diagnostic Response Configuration	X	X	X	X		X	X	
Engine Oil Filter Differential Pressure Sensor Diagnostic Response Configuration	X	X	X	X		X	X	
Starting Air Pressure Sensor Diagnostic Response Configuration	X	X	X	X		X	X	

(15) Each setpoint in the Diagnostics Configuration block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

Note: Table 17 lists the available options for each setpoint in the "TEMPERATURE" category. The options that are available for each setpoint are designated by an "X" in the option column.

Table 16

"TEMPERATURE" Setpoints - Diagnostics Configuration (15)

Setpoint Name	Warning	Audible Alert	Soft Shutdown	Hard Shutdown	Loss of Utility	Breaker Trip #1	Breaker Trip #2	FPT	A (
Ambient Air Temperature Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
Engine Coolant Temperature Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
Engine Oil Temperature Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
Exhaust Temperature Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
Right Exhaust Temperature Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
Left Exhaust Temperature Sensor Diagnostic	X	X	X	X		X	X		

Response Configuration								
Generator Bearing #1 Temperature Sensor Diagnostic Response Configuration	X	X	X	X		X	X	

(15) Each setpoint in the Diagnostics Configuration block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

Note: Table 18 lists the available options for each setpoint in the "LEVEL" category. The options that are available for each setpoint are designated by an "X" in the option column.

Table 17

"LEVEL" Setpoints - Diagnostics Configuration (15)									
Setpoint Name	**Warning**	**Audible Alert**	**Soft Shutdown**	**Hard Shutdown**	**Loss of Utility**	**Breaker Trip #1**	**Breaker Trip #2**	**FPT**	**A C**
Engine Coolant Level Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
Engine Oil Level Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
Fuel Level Sensor Diagnostic Response Configuration	X	X	X	X		X	X		
External									

Tank Fuel Level Sensor Diagnostic Response Configuration	X	X	X	X		X	X	

(15) Each setpoint in the Diagnostics Configuration block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

Note: Table 19 lists the available options for each setpoint in the "OTHER" setpoints category. The options that are available for each setpoint are designated by an "X" in the option column.

Table 18

"OTHER" Setpoints - Diagnostics Configuration (15)									
Setpoint Name	**Warning**	**Audible Alert**	**Soft Shutdown**	**Hard Shutdown**	**Loss of Utility**	**Breaker Trip #1**	**Breaker Trip #2**	**FPT**	**A C**
Accessory Data Link Diagnostic Response Configuration	X	X	X	X		X	X		
Digital Output #1 Diagnostic Response Configuration	X	X	X	X		X	X		
Digital Output #2 Diagnostic Response Configuration	X	X	X	X		X	X		
Engine Speed Sensor Diagnostic Response Configuration		X		X (16)		X	X		
Generator									

Output Sensing System Diagnostic Response Configuration	X	X	X	X		X	X	
Primary Data Link Diagnostic Response Configuration	X	X	X	X		X	X	
SCADA Data Link Diagnostic Response Configuration	X	X	X	X		X	X	X

(15) Each setpoint in the Diagnostics Configuration block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

(16) Setpoint Is not adjustable

Engine Protection Events Configuration

⚠ WARNING

Warning and/or shutdown events should not be disabled. If warning or shutdown events are disabled, the user may not be aware of conditions that could cause damage to the engine, generator, or electrical loads. If warning or shutdown events are disabled, make sure that there is another control that is set up that can diagnose the event, and if necessary, will shut the engine down.

The Engine Protection Events Configuration block is used in order to configure the desired response for any engine protection event generated by the genset control.

The Engine Protection events Configuration block is subdivided into 4 categories as follows: Pressures, Temperatures, Levels and Others. Each of the Diagnostics Configuration subcategories is shown in it's own table.

Note: Table 20 lists the available options for each "PRESSURE" setpoint. The options that are available for each setpoint are designated by an "X" in the option column.

Table 19

"PRESSURE" Setpoints - Engine Protection Events Configuration [17]

Setpoint Name	Warning	Audible Alert	Soft Shutdown	Hard Shutdown	Loss of Utility	Breaker Trip #1	Breaker Trip #2	FPT	A C
High Air Filter Differential Pressure Warning Event Response Configuration	X	X				X	X		
High Air Filter Differential Pressure Shutdown Event Response Configuration		X	X	X		X	X		
Low Air Filter Differential Pressure Warning Event Response Configuration	X	X				X	X	X	
Low Air Filter Differential Pressure Shutdown Event Response Configuration		X	X	X		X	X	X	
High Gas Pressure Warning Event	X	X				X	X		

Response Configuration								
High Gas Pressure Shutdown Event Response Configuration		X	X	X		X	X	
Low Gas Pressure Warning Event Response Configuration	X	X				X	X	
Low Gas Pressure Shutdown Event Response Configuration		X	X	X		X	X	
Low Engine Oil Pressure Warning Event Response Configuration	X	X				X	X	X
Low Engine Oil Pressure Shutdown Event Response Configuration		X	X	X		X	X	X
High Fuel Filter Differential Pressure Warning Event Response	x	x				x	X	

Configuration								
High Fuel Filter Differential Pressure Shutdown Event Response Configuration		X	X	X		X	X	
Low Fuel Filter Differential Pressure Warning Event Response Configuration	X	X				X	X	X
Low Fuel Filter Differential Pressure Shutdown Event Response Configuration		X	X	X		X	X	X
High Engine Oil Filter Differential Pressure Warning Event Response Configuration	X	X				X	X	
High Engine Oil Filter Differential Pressure Shutdown Event Response Configuration		X	X	X		X	X	

Low Engine Oil Filter Differential Pressure Warning Event Response Configuration	X	X				X	X	X
Low Engine Oil Filter Differential Pressure Shutdown Event Response Configuration		X	X	X		X	X	X
High Starting Air Pressure Warning Event Response Configuration	X	X				X	X	
High Starting Air Pressure Shutdown Event Response Configuration		X	X	X		X	X	
Low Starting Air Pressure Warning Event Response Configuration	X	X				X	X	X
Low Starting Air Pressure Shutdown Event Response		X	X	X		X	X	X

Configuration								

(17) Each setpoint in the Engine Protection Events Configuration block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

Table 21 lists the available options for each "TEMPERATURE" setpoint. The options that are available for each setpoint are designated by an "X" in the option column.

Table 20

"TEMPERATURE" Setpoints - Engine Protection Events Configuration (17)									
Setpoint Name	**Warning**	**Audible Alert**	**Soft Shutdown**	**Hard Shutdown**	**Loss of Utility**	**Breaker Trip #1**	**Breaker Trip #2**	**FPT**	**A C**
High Engine Coolant Temperature Warning Event Response Configuration	X	X				X	X	X	
High Engine Coolant Temperature Shutdown Event Response Configuration		X	X	X		X	X	X	
Low Engine Coolant Temperature Warning Event Response Configuration	X	X				X	X	X	
High Engine Oil Temperature Warning Event Response	X	X				X	X	X	

Configuration								
High Engine Oil Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
Low Engine Oil Temperature Warning Event Response Configuration	X	X				X	X	X
Low Engine Oil Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
High Exhaust Temperature Warning Event Response Configuration	X	X				X	X	X
High Exhaust Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
Low Exhaust Temperature Warning Event Response	X	X				X	X	X

Configuration								
Low Exhaust Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
High Right Exhaust Temperature Warning Event Response Configuration	X	X				X	X	X
High Right Exhaust Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
Low Right Exhaust Temperature Warning Event Response Configuration	X	X				X	X	X
Low Right Exhaust Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
High Left Exhaust Temperature Warning	X	X				X	X	X

Event Response Configuration								
High Left Exhaust Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
Low Left Exhaust Temperature Warning Event Response Configuration	X	X				X	X	X
Low Left Exhaust Temperature Shutdown Event Response Configuration		X	X	X		X	X	X

(17) Each setpoint in the Engine Protection Events Configuration block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

Table 22 lists the available options for each "LEVEL" setpoint. The options that are available for each setpoint are designated by an "X" in the option column.

Table 21

"LEVEL" Setpoints - Engine Protection Events Configuration (17)									
Setpoint Name	**Warning**	**Audible Alert**	**Soft Shutdown**	**Hard Shutdown**	**Loss of Utility**	**Breaker Trip #1**	**Breaker Trip #2**	**FPT**	**A C**
High Engine Coolant Level Warning									

Event Response Configuration	X	X				X	X	
High Engine Coolant Level Shutdown Event Response Configuration		X	X	X		X	X	
Low Engine Coolant Level Warning Event Response Configuration	X	X				X	X	
Low Engine Coolant Level Shutdown Event Response Configuration		X	X	X		X	X	
High Engine Oil Level Warning Event Response Configuration	X	X				X	X	
High Engine Oil Level Shutdown Event Response Configuration		X	X	X		X	X	
Low Engine Oil Level Warning								

Event Response Configuration	X	X				X	X	
Low Engine Oil Level Shutdown Event Response Configuration		X	X	X		X	X	
High Fuel Level Warning Event Response Configuration	X	X				X	X	
High Fuel Level Shutdown Event Response Configuration		X	X	X		X	X	
Low Fuel Level Warning Event Response Configuration	X	X				X	X	
Low Fuel Level Shutdown Event Response Configuration		X	X	X		X	X	
External Tank High Fuel Level Warning Event Response	X	X				X	X	

Configuration								
External Tank High Fuel Level Shutdown Event Response Configuration		X	X	X		X	X	
External Tank Low Fuel Level Warning Event Response Configuration	X	X				X	X	
External Tank Low Fuel Level Shutdown Event Response Configuration		X	X	X		X	X	

(17) Each setpoint in the Engine Protection Events Configuration block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

Table 23 lists the available options for each of the "OTHER" setpoints. The options that are available for each setpoint are designated by an "X" in the option column.

Table 22

"OTHER" Setpoints - Engine Protection Events Configuration (17)									
Setpoint Name	**Warning**	**Audible Alert**	**Soft Shutdown**	**Hard Shutdown**	**Loss of Utility**	**Breaker Trip #1**	**Breaker Trip #2**	**FPT**	**A C**
Air Damper Closed Event Response Configuration		X		X					X

Emergency Stop Shutdown Event Response Configuration		X		X (16)		X	X	
Engine Failure to Start Shutdown Event Response Configuration		X		X (16)		X	X	
Unexpected Engine Shutdown Event Response Configuration		X		X (16)		X	X	
Engine Over Speed Shutdown Event Response Configuration		X		X (16)		X	X	
Engine Under Speed Warning Event Response Configuration	X	X				X	X	X
Engine Under Speed Shutdown Event Response Configuration		X	X	X		X	X	X
Fuel Tank Leak Event								

Response Configuration	X	X	X	X		X	X	
Service Maintenance Interval Warning Event Response Configuration	X	X						

(17) Each setpoint in the Engine Protection Events Configuration block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

(16) Setpoint Is not adjustable

Generator Protection Events Configuration

WARNING

Warning and/or shutdown events should not be disabled. If warning or shutdown events are disabled, the user may not be aware of conditions that could cause damage to the engine, generator, or electrical loads. If warning or shutdown events are disabled, make sure that there is another control that is set up that can diagnose the event, and if necessary, will shut the engine down.

The Generator Protection Events Configuration block is used in order to configure the desired response for any engine protection event generated by the genset control.

Note: Table 24 lists the available options for each setpoint number. The options that are available for each setpoint are designated by an "X" in the option column.

Table 23

Setpoints - Generator Protection Events Configuration (18)									
Setpoint Name	**Warning**	**Audible Alert**	**Soft Shutdown**	**Hard Shutdown**	**Loss of Utility**	**Breaker Trip #1**	**Breaker Trip #2**	**FPT**	**A C**
Earth Fault Event Response Configuration	X	X	X	X		X	X		

High Generator Winding #1 Temperature Warning Event Response Configuration	X	X				X	X	X
High Generator Winding #1 Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
High Generator Winding #2 Temperature Warning Event Response Configuration	X	X				X	X	X
High Generator Winding #2 Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
High Generator Winding #3 Temperature Warning Event Response Configuration	X	X				X	X	X
High								

Generator Winding #3 Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
High Generator Bearing #1 Temperature Warning Event Response Configuration	X	X				X	X	X
High Generator Bearing #1 Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
Low Generator Bearing #1 Temperature Warning Event Response Configuration	X	X				X	X	X
Low Generator Bearing #1 Temperature Shutdown Event Response Configuration		X	X	X		X	X	X
Generator Over Current								

(Amp) Warning Event Response Configuration	X	X				X	X	
Generator Over Current (Amp) Shutdown Event Response Configuration		X	X	X		X	X	
Generator Over Frequency Warning Event Response Configuration	X	X				X	X	
Generator Over Frequency Shutdown Event Response Configuration		X	X	X		X	X	
Generator Under Frequency Warning Event Response Configuration	X	X				X	X	X
Generator Under Frequency Shutdown Event Response Configuration		X	X	X		X	X	X

Generator Reverse Power Warning Event Response Configuration	X	X				X	X	
Generator Reverse Power Shutdown Event Response Configuration		X	X	X		X	X	
Generator Over Voltage Warning Event Response Configuration	X	X				X	X	
Generator Over Voltage Shutdown Event Response Configuration		X	X	X		X	X	
Generator Under Voltage Warning Event Response Configuration	X	X				X	X	X
Generator Under Voltage Shutdown Event Response Configuration		X	X	X		X	X	X

(18) Each setpoint in the "Generator Protection Events Configuration" block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

Other System Events Configuration

WARNING

Warning and/or shutdown events should not be disabled. If warning or shutdown events are disabled, the user may not be aware of conditions that could cause damage to the engine, generator, or electrical loads. If warning or shutdown events are disabled, make sure that there is another control that is set up that can diagnose the event, and if necessary, will shut the engine down.

The "Other System Events Configuration" block is used in order to configure the desired response for any engine protection event generated by the genset control.

Note: Table 25 lists the available options for each setpoint number. The options that are available for each setpoint are designated by an "X" in the option column.

Table 24

Setpoints - Other System Events Configuration (19)									
Setpoint Name	**Warning**	**Audible Alert**	**Soft Shutdown**	**Hard Shutdown**	**Loss of Utility**	**Breaker Trip #1**	**Breaker Trip #2**	**FPT**	**A C**
High Ambient Air Temperature Warning Event Response Configuration	X	X				X	X	X	
High Ambient Air Temperature Shutdown Event Response Configuration		X	X	X		X	X	X	
Low Ambient Air									

Temperature Warning Event Response Configuration	X	X				X	X	
Low Ambient Air Temperature Shutdown Event Response Configuration		X	X	X		X	X	
Automatic Transfer Switch in Normal Position Event Response Configuration	X	X						
Automatic Transfer Switch in Emergency Position Event Response Configuration	X	X						
Battery Charger Failure Diagnostic Response Configuration	X	X						
High Battery Voltage Warning Event Response Configuration	X	X				X	X	

High Battery Voltage Shutdown Event Response Configuration		X	X	X		X	X	
Low Battery Voltage Warning Event Response Configuration	X	X				X	X	X
Low Battery Charging System Voltage Warning Event Response Configuration	X	X				X	X	X
Generator Breaker Failure to Open Event Response Configuration	X	X		X		X	X	
Generator Breaker Failure to Close Event Response Configuration	X	X		x		X	X	
Generator Breaker Open Event Response Configuration	X	X						
Generator Breaker								

Closed Event Response Configuration	X	X							X
Utility Breaker Failure to Open Event Response Configuration	X	X		X		X	X		
Utility Breaker Failure to Close Event Response Configuration	X	X		X		X	X		
Utility Breaker Open Event Response Configuration	X	X							X
Utility Breaker Closed Event Response Configuration	X	X							X
Emergency Shutdown Override Mode Active Warning Event Response Configuration	X (16)	X							
Engine in Cooldown Event Response Configuration	X	X							X

Engine Speed-Generator Output Frequency Mismatch Warning Event Response Configuration	X	X				X	X		
Custom Event #1 High Warning Event Response Configuration	X	X				X	X	X	
Custom Event #1 High Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #1 Low Warning Event Response Configuration	X	X				X	X	X	
Custom Event #1 Low Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #1 Event Response	X	X	X	X	X	X	X	X	X

Configuration									
Custom Event #2 High Warning Event Response Configuration	X	X				X	X	x	
Custom Event #2 High Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #2 Low Warning Event Response Configuration	X	X				X	X	X	
Custom Event #2 Low Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #2 Event Response Configuration	X	X	X	X	X	X	X	X	X
Custom Event #3 High Warning Event Response	X	X				X	X	X	

Configuration								
Custom Event #3 High Shutdown Event Response Configuration		X	X	X		X	X	X
Custom Event #3 Low Warning Event Response Configuration	X	X				X	X	X
Custom Event #3 Low Shutdown Event Response Configuration		X	X	X		X	X	X
Custom Event #3 Event Response Configuration	X	X	X	X	X	X	X	X
Custom Event #4 High Warning Event Response Configuration	X	X				X	X	X
Custom Event #4 High Shutdown Event Response		X	X	X		X	X	X

Configuration									
Custom Event #4 Low Warning Event Response Configuration	X	X				X	X	X	
Custom Event #4 Low Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #4 Event Response Configuration	X	X	X	X	X	X	X	X	X
Custom Event #5 High Warning Event Response Configuration	X	X				X	X	X	
Custom Event #5 High Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #5 Low Warning Event Response Configuration	X	X				X	X	X	

Custom Event #5 Low Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #5 Event Response Configuration	X	X	X	X	X	X	X	X	X
Custom Event #6 High Warning Event Response Configuration	X	X				X	X	X	
Custom Event #6 High Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #6 Low Warning Event Response Configuration	X	X				X	X	X	
Custom Event #6 Low Shutdown Event Response Configuration		X	X	X		X	X	X	

Custom Event #6 Event Response Configuration	X	X	X	X	X	X	X	X	X
Custom Event #7 High Warning Event Response Configuration	X	X				X	X	X	
Custom Event #7 High Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #7 Low Warning Event Response Configuration	X	X				X	X	X	
Custom Event #7 Low Shutdown Event Response Configuration		X	X	X		X	X	X	
Custom Event #7 Event Response Configuration	X	X	X	X	X	X	X	X	X

Custom Event #8 High Warning Event Response Configuration	X	X				X	X	X
Custom Event #8 High Shutdown Event Response Configuration		X	X	X		X	X	X
Custom Event #8 Low Warning Event Response Configuration	X	X				X	X	X
Custom Event #8 Low Shutdown Event Response Configuration		X	X	X		X	X	X
Custom Event #8 Event Response Configuration	X	X	X	X	X	X	X	X
High Fire Extinguisher Pressure Warning Event Response Configuration	X	X				X	X	

High Fire Extinguisher Pressure Shutdown Event Response Configuration		X	X	X		X	X	
Low Fire Extinguisher Pressure Warning Event Response Configuration	X	X				X	X	X
Low Fire Extinguisher Pressure Shutdown Event Response Configuration		X	X	X		X	X	X
Generator Control Not in Automatic Warning Event Response Configuration	X	X						
Loss of Utility Event Response Configuration	X	X						
Utility to Generator Transfer Failure Warning Event Response Configuration	X	X				X	X	

Utility to Generator Transfer Failure Shutdown Event Response Configuration		X	X			X	X	
Generator to Utility Transfer Failure Warning Event Response Configuration	X	X				X	X	

(19) Each setpoint in the "Other System Events Configuration" block is used in order to program a system response to the associated Suspect Parameter Number/Failure Mode Identifier (SPN/FMI) for any internal source.

(16) Setpoint Is not adjustable

Event Input Functions

The Event Input Function block allows the user of the genset to define selected inputs to cause user-defined events to become active.

Table 25

Setpoints - Custom Events (13)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Custom Event #NN Active State Configuration	N/A	N/A	N/A	High	Settings for custom events #1- #16
Custom Event #NN Event Notification Delay Time	0	250	sec.	0	Settings for custom events #1- #16
Custom Event #NN Suspect Parameter Number	N/A	N/A	N/A	107	Settings for custom events #1- #16
Custom Event #NN Failure Mode Identifier	0	20	N/A	15	Settings for custom events #1- #16

(13) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Event Output Functions

The Event Output function block provides a method to access the active status of an event for use in configuration logic

Table 26

Setpoints - Event Output Functions (14)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Event Output Function #NN Trigger Condition	N/A	N/A	N/A	Disabled	Settings for event output functions #1- #30
Event Output Function #NN Suspect Parameter Number	N/A	N/A	N/A	100	Settings for event output functions #1- #30

(14) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Event System

Event System block provides a method to log system events to non-volatile memory. The Event System block also manages the status of the events in order to provide overall status outputs to the system.

Table 27

Setpoints - Event System (20)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Event Warning Condition Response Auto Reset Enable Status	N/A	N/A	N/A	Enabled	
Event Audible Alert Response Auto Reset Enable Status	N/A	N/A	N/A	Enabled	
Event Loss of Utility Response Auto Reset Enable Status	N/A	N/A	N/A	Enabled	
Event Breaker #1 Trip Response Auto Reset Enable Status	N/A	N/A	N/A	Enabled	
Event Breaker #2 Trip Response Auto Reset Enable Status	N/A	N/A	N/A	Enabled	

(20) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

GEN MONITOR / PROTECT

Enhanced Generator Monitor

The Enhanced Generator Monitor block provides a method to access the generator monitored parameters from the Accessory Data Link for use in configuration logic. The following generator values will be monitored:

- Front bearing temperature
- Rear bearing temperature
- Winding #1 temperature
- Winding #2 temperature
- Winding #3 temperature

Table 28

Setpoints - Enhanced Generator Monitor (31)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Winding Temperature Sensor Installation Status	N/A	N/A	N/A	Not Installed	Set to "Installed" when a temperature module is installed on the accessory data link
Number of Generator Bearing Temperature Sensors	0	2	N/A	Not Installed	

(31) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Generator AC Monitor

The Generator AC Monitor block measures the AC voltage and current output by the generator. The following generator values will be monitored:

- True RMS line - line voltages
- Average line - line voltage
- True RMS line - neutral voltages (for star/wye configurations)
- Average line-neutral voltage (for star/wye configurations)
- True RMS phase currents
- Average phase current
- Generator output frequency

Table 29

Setpoints - Generator AC Monitor [21]					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Connection Configuration	N/A	N/A	N/A	Star/Wye	Configurations can be: "Star/Wye", "Delta/3 Wire" "Delta/4 Wire" "Single Phase 2 Wire" "Single Phase 3 Wire"
Generator Potential Transformer Primary Winding Rating	1	50000	V	1	For direct sensing, leave at default value. For an application requiring a potential transformer, set to transformer primary winding value.
Generator Potential Transformer Secondary Winding Rating	1	240	V	1	For direct sensing, leave at default value. For an application requiring a potential transformer, set to transformer secondary winding value
Generator Current Transformer Primary Winding Rating	1	7000	A	75	Set to current transformer primary winding value
Generator Current Transformer Secondary Winding Rating	1	5	A	5	Can only be set to 1 or 5
Number of Generator Poles	0	200	N/A	4	
Generator Rated Frequency	50	60	Hz	60	
Generator Rated Voltage	100	50000	V	100	
Generator Rated Power	1	50000	kW	1	
Generator Rated Apparent Power	1	50000	kVA	1	

(21) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Generator AC Power Monitor

The Generator AC Power Monitor Block measures all generator power quantities following generator values will be monitored:

- Per phase kW (for star/wye configurations)
- Total kW
- Total kW hours imported
- Total kW hours exported
- Percent kW output
- Per phase kVAr (for star/wye confutations)
- Total kVAr
- Total kVAr hours imported
- Total kVAr hours imported
- Percent kVAr output
- Per phase kVA (for star/wye confutations)
- Total kVA
- Percent kVA output
- Per phase genset output Power Factor with lead/lag indication (for star/wye confutations)
- Average output Power Factor with lead/lag indication

Note: Per phase quantities (kW, kVAr, KVA, and Power Factor) will be monitored for 3-phase, 4-wire star-connected configurations)

Table 30

Setpoints - Generator AC Power Monitor [31]					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Customer Password Security Level to Reset Generator Energy Meters	0	4	N/A	0.3	

(31) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Generator Over Current

The generator overcurrent block detects an overcurrent condition that persists for a duration that is a function of the overcurrent level or a condition that exceeds a threshold for a programmed duration.

Table 31

Setpoints - Generator Over Current [23]					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Definite Time Over Current (Amp) Warning Event Percentage Threshold	80	130	%	105	Threshold for the Over Current Warning
Generator Inverse Time Over Current (Amp) Shutdown Event Time Multiplier	0.05	10.00	N/A	0.27	Time multiplier setpoint (TM) used in equation shown in Illustration 5
Generator Definite Time Over Current (Amp) Shutdown Event Percentage Threshold	100	300	%	110	If current is above this setpoint value for the specified time (setpoint #4) there will be an overcurrent shutdown.
Generator Definite Time Over Current (Amp) Shutdown Event Notification Delay Time	0.1	20.0	sec.	10	Time delay for setpoint #3

(23) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

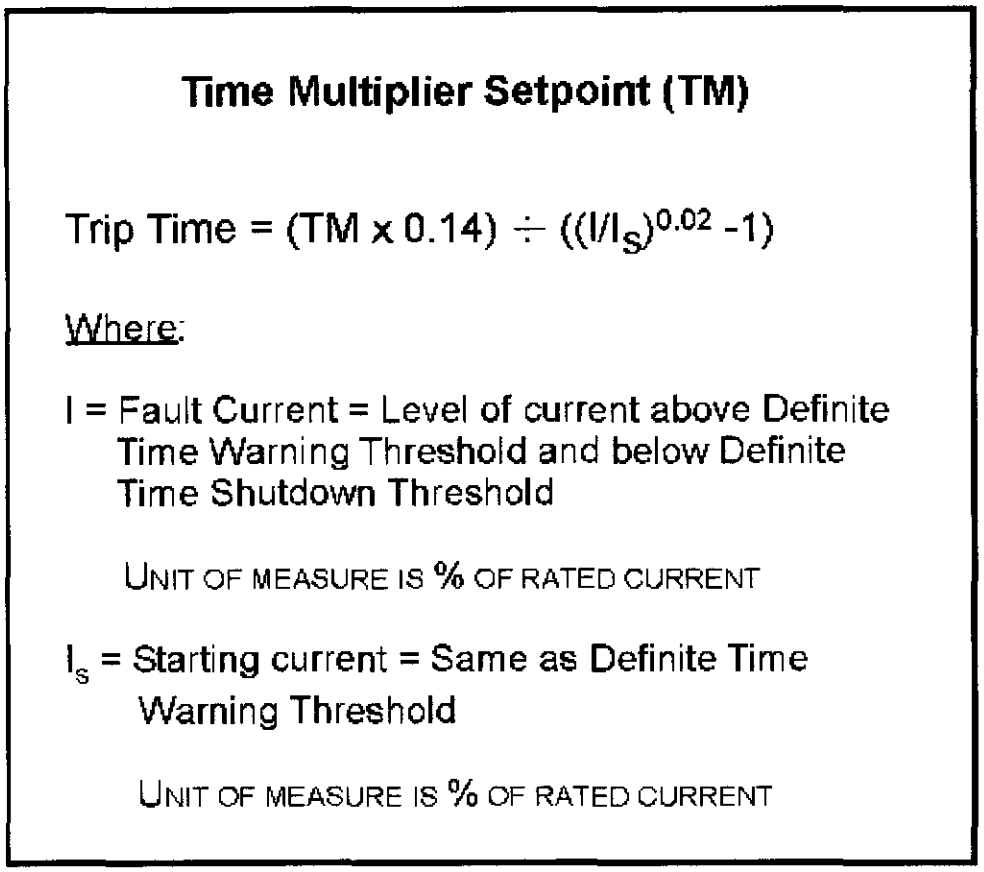


Illustration 5 g01239796

Generator Over / Under Frequency

The Generator Over/Under Frequency block detects bus frequency above or below programmable thresholds for a programmable duration and activates an alarm.

Table 32

Setpoints - Generator Over / Under Frequency [24]					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Over Frequency Warning Event Percentage Threshold	80	120	%	105	
Generator Over Frequency Warning Event Notification Delay Time	0	120	sec.	10	
Generator Over Frequency Shutdown Event Percentage Threshold	80.0	120	%	110	

Generator Over Frequency Shutdown Event Notification Delay Time	0	120	sec.	10	
Generator Under Frequency Warning Event Percentage Threshold	80.0	120.0	%	95.0	
Generator Under Frequency Warning Event Notification Delay Time	0	120	sec.	10	
Generator Under Frequency Shutdown Event Percentage Threshold	80.0	120.0	%	90.0	
Generator Under Frequency Shutdown Event Notification Delay Time	0	120	sec.	15	

(24) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Generator Over / Under voltage

The Generator Over/Under Voltage block detects generator output voltage above or below programmable thresholds for a programmable duration and activates an alarm.

Table 33

Setpoints - Generator Over / Under Voltage (25)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Over Voltage Warning Event Percentage Threshold	100	125	%	105	
Generator Over Voltage Warning Event Notification Delay Time	0	120	sec.	10	
Generator Over Voltage Shutdown Event Percentage Threshold	100	125	%	110	
Generator Over Voltage Shutdown Event Notification Delay Time	0	120	sec.	10	
Generator Under Voltage Warning Event Percentage Threshold	60	100	%	90.0	
Generator Under Voltage Warning Event Notification Delay Time	0	120	sec.	10	
Generator Under Voltage Shutdown Event Threshold	60	100	%	85.0	

Generator Under Voltage Shutdown Event Notification Delay Time	0	120	sec.	15	

(25) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Generator Reverse Power

The Generator Reverse Power block detects a reverse power condition that persists for a duration above a programmed level.

Table 34

Setpoints - Generator Reverse Power (26)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Reverse Power Warning Event Percentage Threshold	1	20	%	5	
Generator Reverse Power Warning Event Notification Delay Time	0	30	sec.	10	
Generator Reverse Power Shutdown Event Percentage Threshold	1	20	%	15	
Generator Reverse Power Shutdown Event Notification Delay Time	0	30	sec.	10	

(26) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

DISCRETE INPUT/OUTPUT (I/O)

Digital Inputs

The Digital Input block is used in order to relay on/off information such as switch closures to the EMCP 3.

Note: There are eight digital inputs on "EMCP 3.2" and "EMCP 3.3". There are six digital inputs on "EMCP 3.1."

Table 35

Setpoints - Digital Inputs (5)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**

E-STOP	Active Low	Active High	N/A	Active High	Activating the E-STOP input will cause the generator set to stop immediately.
REMOTE INITIATE	Active Low	Active High	N/A	Active Low	Setpoint allows for starting and stopping the genset from a remote location. If input is active and the engine mode switch is in "AUTO", the engine will attempt to start and run. Once the input becomes inactive, the engine will enter into cooldown (if programmed) and then STOP.
Digital #3 (6)	Active Low	Active High	N/A	Active Low	The inputs can be set to any of the values listed in Table 37
Digital #4 (6)	Active Low	Active High	N/A	Active Low	
Digital #5 (6)	Active Low	Active High	N/A	Active Low	
Digital #6 (6)	Active Low	Active High	N/A	Active Low	
Digital #7 (6)	Active Low	Active High	N/A	Active Low	
Digital #8 (6)	Active Low	Active High	N/A	Active Low	

(5) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

(6) The "Digital Inputs" parameter can only be set to "Active High" or "Active Low" in order to initiate a High Warning, Low Warning, High Shutdown. Low Shutdown, or Status.

Table 36

Available Digital Inputs	
Pressures Air Filter Differential Pressure Engine Oil Pressure Fire Extinguisher Pressure Fuel Filter Differential Pressure Oil Filter Differential Pressure Starting Air Pressure Gas Pressure	**Other** Air Damper Closed ATS in Normal Position ATS in Emergency Position Battery Charger Failure Battery Charging System Voltage Battery Voltage Fuel Leak Detected Custom Event Earth Fault Earth Leakage Generator Frequency
Temperatures Ambient Air Temperature Engine Coolant Temperature Engine Oil Temperature	

Exhaust Temperature Rear Bearing Temperature Right Exhaust Temperature Left Exhaust Temperature	Generator Voltage Generator Current Generator Power Loss of Utility Utility of Generator Transfer Failure Generator to Utility Transfer Failure
Levels Engine Coolant Level Engine Oil Level Fuel Level External Tank Fuel Level	

Digital Outputs

The Digital Output block is used in order to relay on/off information from the EMCP 3 for purposes such as operating relays, solenoids and indicator lamps.

There are two digital outputs on "EMCP 3.3". There is one digital output on "EMCP 3.2". There are no digital outputs on "EMCP 3.1"

Table 37

Setpoints - Digital Outputs (7)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Digital Output #1 Active State Configuration	Low	High	N/A	Low	
Digital Output #2 Active State Configuration	Low	High	N/A	Low	

(7) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Relay Outputs

The Relay Output block is used in order to relay on/off information from the EMCP 3 for purposes such as operating relays, solenoids and indicator lamps.

There are eight relay outputs on the EMCP 3.2 and EMCP 3.3. Six of the outputs have normally open contacts and two of the outputs have normally open and normally closed contacts.

There are six normally open relay outputs on the EMCP 3.1. There are no normally closed outputs on the EMCP 3.1

Note: The "active" state for relay outputs is not configurable.

Table 38

Setpoints - Relay Outputs [29]					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Relay Output #1 Active State Configuration	N/A	N/A	N/A	High	Relay Output #1 is always configured as the "Starter Motor Relay"
Relay Output #2 Active State Configuration	N/A	N/A	N/A	High	Relay #2 is always configured as the "Fuel Control Relay"
Relay Output #3 Active State Configuration	N/A	N/A	N/A	High	Relay Output #3 is controlled by Digital Selector #1
Relay Output #4 Active State Configuration	N/A	N/A	N/A	High	Relay Output #4 is controlled by Digital Selector #2
Relay Output #5 Active State Configuration	N/A	N/A	N/A	High	Relay Output #5 is controlled by Digital Selector #3
Relay Output #6 Active State Configuration	N/A	N/A	N/A	High	Relay Output #6 is controlled by Digital Selector #4 The output can be set to "Active High" or" Active Low"
Relay Output #7 Active State Configuration	N/A	N/A	N/A	High	Relay Output #7 is controlled by Digital Selector #5
Relay Output #8 Active State Configuration	N/A	N/A	N/A	High	Relay Output #8 is controlled by Digital Selector #6

(29) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Spare Analog Input

The Spare Analog Input block converts a resistive sender value to engineering units, detects sender diagnostics, and detects a high or low condition on the spare sender input.

Note: If you have selected a spare input to be a temperature, setpoints 6, 7, 10, and 11 will not appear since they are associated with pressures and levels. If you have selected a spare input to be a pressure, setpoints 5, 7, 9, and 11 will not appear since they are associated with temperatures and levels. If you have selected a spare input to be a level, setpoints 5, 6, 9, and 10 will not appear since they are associated with temperatures and pressures.

Table 39

Setpoints - Spare Analog Input [29]					

Setpoint Name	Min Value	Max Value	Units	Factory Default	Description
Spare Analog Input Enable Status	N/A	N/A	N/A	Enabled	Set to "Enabled" for MUI engines and set to "Disabled" for EUI engines
Spare Analog Input Type Configuration	N/A	N/A	N/A	Temperature	Select "Temperature", "Pressure", or "Level" .
Spare Analog Input Suspect Parameter Number (SPN)	N/A	N/A	N/A	175	Oil temperature
Spare Analog Input High Percentage Warning Event Threshold	0	100	%	0	
Spare Analog Input High Temperature Warning Event Threshold	-273	1,735	Deg. C	102 °C (216 ° F)	
Spare Analog Input High Pressure Warning Event Threshold	-250	10,000	kPa	-250	
Spare Analog Input High Warning Event Notification Delay Time	0	60	sec.	2	
Spare Analog Input High Percentage Shutdown Event Threshold	0	100	%	0	
Spare Analog Input High Temperature Shutdown Event Threshold	-273	1,735	Deg. C	107 °C (225 ° F)	
Spare Analog Input High Pressure Shutdown Event Threshold	-250	10,000	kPa	-250	
Spare Analog Input High Shutdown Event Notification Delay Time	0	60	sec.	10	
Spare Analog Input Low Percentage Warning	0	100	%	100	

Event Threshold					
Spare Analog Input Low Temperature Warning Event Threshold	-273	1735	Deg. C	1735	
Spare Analog Input Low Warning Event Threshold	-250	10000	kPa	10000	
Spare Analog Input Low Warning Event Notification Delay Time	0	60	sec.	0	
Spare Analog Input Low Percentage Shutdown Event Threshold	0	100	%	100	
Spare Analog Input Low Temperature Shutdown Event Threshold	-273	1735	Deg. C	1735	
Spare Analog Input Low Pressure Shutdown Event Threshold	-250	10000	kPa	10000	
Spare Analog Input Low Shutdown Event Notification Delay Time	0	60	sec.	0	

(29) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

NETWORK

Data Link - SCADA

The SCADA Data Link block is used in order to ()communicate with a System Control and Data Acquisition (SCADA) and is used for support of a service tool connection. SCADA Data Link will use the Modbus protocol with an RS-485 half duplex hardware layer operation at a minimum 2400 bps.

Table 40

Setpoints - Data Link - SCADA (4)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
SCADA Data Link Baud Rate	2400	57600	N/A	19200	

SCADA Data Link Parity	N/A	N/A	N/A	None	Select "None", "Odd", or "Even"
SCADA Data Link Slave Address	1	247	N/A	1	
SCADA Data Link Access Password	0	0xfffff	N/A	0	
SCADA Data Link Connection Timeout Interval	0.1	3600.0	sec.	30	
RS-485 Bias Resistor Enable Status	Disabled	Enabled	N/A	Enabled	

(4) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

OTHER

Digital Selectors

The Digital Selector block determines what "EVENTS" or "STATUS" will cause each of the relays to activate.

Table 41

Setpoints - Digital Selectors (8)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Digital Selector #1 Source Configuration				Input #1	Digital Selector #1 controls Relay Output #3 Configuration Options are: Disabled Use Input #1 Use Input #2 Use Input #3 Use Input #4 Use Input #5 Use Data Link Input
Digital Selector #2 Source Configuration				Input #4	Digital Selector #2 controls Relay Output #4 Configuration Options are: Disabled Use Input #1

					Use Input #2 Use Input #3 Use Input #4 Use Input #5 Use Data Link Input
Digital Selector #3 Source Configuration				Input #6	Digital Selector #3 controls Relay Output #5 Configuration Options are: Disabled Use Input #1 Use Input #2 Use Input #3 Use Input #4 Use Input #5 Use Data Link Input
Digital Selector #4 Source Configuration				Input #6	Digital Selector #4 controls Relay Output #6 Configuration Options are: Disabled Use Input #1 Use Input #2 Use Input #3 Use Input #4 Use Input #5 Use Data Link Input
Digital Selector #5 Source Configuration				Disabled	Digital Selector #5 controls Relay Output #7 Configuration Options are: Disabled Use Input #1 Use Input #2 Use Input #3 Use Input #4 Use Input #5 Use Data Link Input
Digital Selector #6 Source Configuration				Disabled	Digital Selector #6 controls Relay Output #8 Configuration Options are: Disabled Use Input #1 Use Input #2 Use Input #3 Use Input #4

Reduced Power Mode Delay Time	0	120	min.	30	

(9) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.

Remote Callback

Remote Callback is used in gensets with a modem connection in order to allow the genset control to dial a programmed telephone number in response to a fault condition. A receiving PC can then query the nature of the fault.

Note: Standard Caterpillar product does not utilize this group of setpoints.

Table 43

Setpoints - Remote Callback (30)					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Remote Dial Enable Status	N/A	N/A	N/A	Disabled	
Remote Dial Command Configuration	N/A	N/A	N/A	0	

(30) The setpoints that are stored or the setpoints that are being programmed must match the specified setpoints of the particular generator set.