### Installation of ModLon II Gateway Kit 541–1149

#### **GENERAL INFORMATION**

This instruction sheet describes the installation of a ModLon II Gateway kit in FT-10 and TP/XF-78\* networks.

\* The ModLon unit is an FT-10 Device. When connecting to a TP/XF-78 network, there are some special requirements. See the Template 5 section, starting on page 14.

The following parts are included in this kit.

Part Description	Qty
ModLon II Gateway Control	1
Straight-Through Cable	1
LonWorks Support CD	1

In addition to physical connections, this instruction sheet also includes information on binding and register mapping of the following modules to a ModLon II Gateway.

- Controls Communications Module Genset (CCM-G)
- Controls Communications Module ATS (CCM-T)
- Digital I/O Module (DIM)
- PCC 3100 Genset Communications Module (GCM)
- PCC 3200 Genset LonWorks® Card (GLC)
- PCC 2100 Network Communications Module (NCM)
- PowerCommand<sup>®</sup> Automatic Transfer Switch (ATS) Network Communications Module (NCM)

#### REQUIRED SOFTWARE

The following software is required to incorporate this kit into your network.

- LonMaker<sup>™</sup> for Windows<sup>®</sup>
- Device Monitoring Software The communication parameters of the ModLon II Gateway are configurable through LonMaker for Windows. Choose appropriate software that will communicate with user's chosen parameters.

If ModScan<sup>®</sup> software is selected to monitor devices, see the "Optional Software" listed below and the information included under "Using ModScan Software," starting on page 16.

WinZip<sup>®</sup> – Software used to decompress downloaded files.

#### **OPTIONAL SOFTWARE**

 ModScan Software – Used to verify communications between the PCC network devices and the ModLon.

A fully functional demo version of ModScan software can be downloaded from the Internet at http://www.Win-Tech.com. Click on the "Free Trial Demos" button. Under "Win32 ModBus® Applications," click on the ModScan32.zip file and select an appropriate file location to store the software.

#### DESCRIPTION

The ModLon II Gateway provides a direct Echelon LonWorks network interface to any device that can communicate:

- ModBus RTU
   OR
- ModBus ASCII

This module translates LonWorks network protocol into ModLon ASCII or RTU. Figure 1 is a block diagram of the ModLon II Gateway.

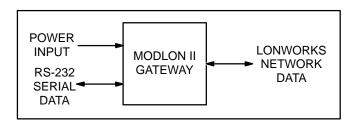


FIGURE 1. MODLON II GATEWAY BLOCK DIAGRAM

Refer to the *PowerCommand Network Installation and Operation Manual* (900–0529) for instructions on network topology, wiring, and software installation.

The ModLon II Gateway (see Figure 2) has a network connector on the front for connection to network data and a DB9 connector on the top for connection to an RS-232 port.

Externally the ModLon II Gateway has a DC power connector input, a Service (SVC) pushbutton, Service (SVC) LED, Reset (RST) pushbutton, MODBUS LED, OK LED, LON LED, Termination Switch, and a Template Selection Dipswitch.

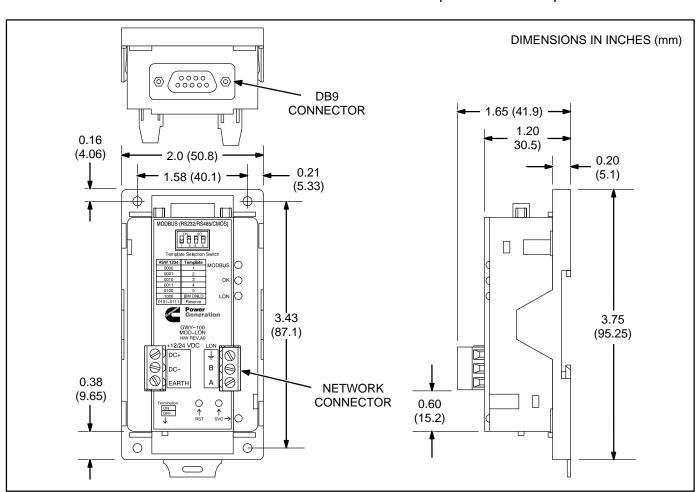


FIGURE 2. MODLON II GATEWAY OUTLINE DRAWING

#### **Termination Switch**

The termination switch is located on the bottom of the ModLon II Gateway (see Figure 3). The termination switch is a doubly terminated bus topology termination circuit.

FT-10 Networks can be configured as either multidrop bus topology (as TP/XF-78 networks are configured) or free topology. Networks configured as a multi-drop bus must be terminated at each end of the bus with a multi-drop bus terminator circuit. Free topology networks must have one free topology type terminator somewhere in the network. The ModLon II has a multi-drop bus terminator. Place the terminator in the "On" position to use this terminator in a multi-drop bus network. If the ModLon II is installed in a free topology network, place the terminator in the "Off" position.

NOTE: Power Command FT-10 devices (CCMs, DIMs, NCMs, GCMs) have free topology terminators. If an FT-10 network is used in a multi-drop bus topology network, use the bus topology terminator (300–5729) to terminate the network. Refer to FT-10 Power-Command Network Installation and Operation Manual (900–0529) for more information on network topology termination.

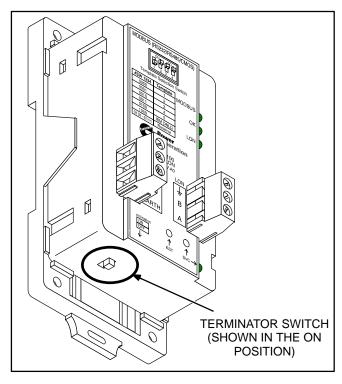


FIGURE 3. MODLON II GATEWAY TERMINATOR SWITCH

#### MODLON II GATEWAY INSTALLATION

If there is a site network installation drawing, refer to it for the ModLon II Gateway location. If a site network installation drawing is not available, refer to the *PowerCommand Network Installation and Operation Manual* (900–0529) for network topology and maximum network length. **All wiring must follow a specific network topology and must fall within distance limits.** Refer to individual instruction sheets for information on installing additional network devices.

Choose a clean, flat, vibration-free mounting surface. Avoid locations that are hot, damp, or dusty. The temperature range must not exceed -4°F (-20°C) to 140°F (60°C).

#### **Power Supply**

The ModLon II Gateway has a DC power connector (see Figure 5) that connects to a power supply from one of the network devices. The ModLon must have a 9–32 VDC power input to function properly.

Locate the ModLon II Gateway near a network device. If the ModLon II Gateway must remain powered during an electrical power failure, use an uninterruptable power supply (UPS). Refer to the *PowerCommand Network Installation and Operation Manual* (900–0529) for UPS information. If more than one device will be connected to the UPS, purchase a multi-outlet adapter or multi-outlet extension cord.

#### **NETWORK TOPOLOGY AND DATA MEDIA**

Refer to the "Network Hardware and Wiring" section of the PowerCommand Network Installation and Operation Manual for information on the network topology and data transmission media.

AWARNING AC voltages and currents present an electrical shock hazard that can cause severe personal injury or death. Only trained, experienced personnel are to perform the following procedures.

#### **Connections**

Network data connections are made at the network connector (LON connector) for LonWorks network data and at a DB9 connector for connection to an RS-232 port. (Connectors and the cable supplied with the ModLon II Gateway are shown in Figure 5.)

#### **Template Selection Dipswitch**

The Template Selection Dipswitch (see Figure 4) sets the state for the ModLon. Dipswitch settings are listed in Table 1.

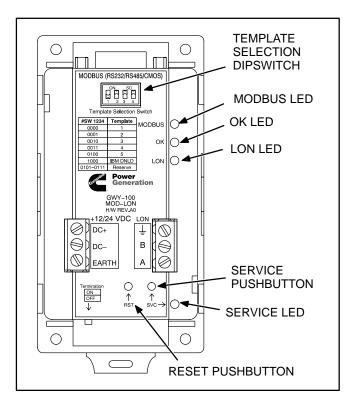


FIGURE 4. MODLON II GATEWAY DIPSWITCH, PUSHBUTTONS, AND LEDS

**TABLE 1. DIPSWITCH SETTINGS** 

#SW 1234	Template	Figure Ref.
0000	1 (FT-10)	9
0001	2 (FT-10)	10
0010	3a (FT-10)	11
0011	3b (FT-10)	12
0100	5 (TP/XF-78)	13
1000	Download	-

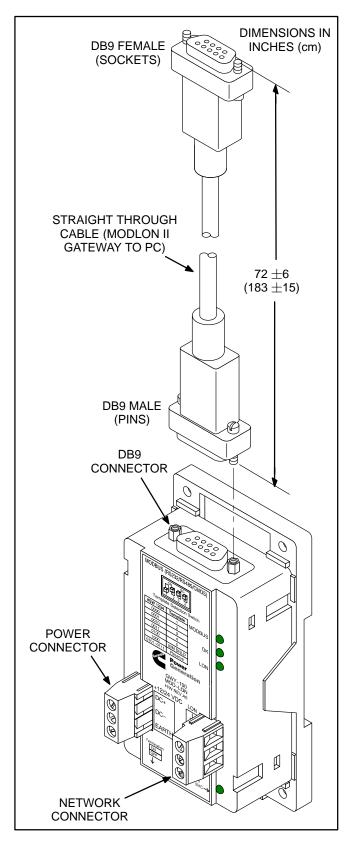


FIGURE 5. MODLON II CONNECTIONS

#### **SWITCH AND LEDS**

The ModLon II Gateway includes two pushbuttons and four status LEDs (see Figure 4).

#### **Service Pushbutton and Service LED**

The Service (SVC) pushbutton is used during installation (when prompted by the LonMaker program). It is important to press the service switch on the ModLon II Gateway that is part of the permanent site. The service switch should only be pressed during installation.

The green Service LED lights when the service push button is pressed. The LED blinks when the ModLon II Gateway is unconfigured and is off if the ModLon II Gateway is configured. The LED remains on if an unrecoverable error is detected.

#### **Reset Pushbutton**

The Reset (RST) pushbutton should not be used during or after installation for any reason.

#### Status LEDs

The ModLon has three status LEDs (MODBUS, OK, and LON) on the front panel. The MODBUS

and LON LEDs indicate communication status on the two ports, whereas the OK LED indicates the ModLon mode.

**TABLE 2. LED FUNCTIONS** 

MODBUS LED				
Status	Description			
Momentary Flashing while communicating with Network/Software	Communication occurring with the MODBUS port			
Off	No Communication on the MODBUS port			
Ol	K LED			
Status	Description			
Off	No Power to ModLon			
Fast Blinking	ModLon is waiting for download			
Steady on	ModLon is On			
LO	N LED			
Status	Description			
Off	No communication on LON			
Momentary Flashing while communicating with Network/Software	Communication occurring with the network and the LON			

#### **NETWORK INSTALLATION**

Read the "Introduction" and "Network Hardware and Wiring" sections of the *PowerCommand Network Installation and Operation Manual* (900–0529) before constructing the network.

#### **ModLon Configuration**

Configuration variable nciNodeCfg allows the user to set the ModLon variables baud rate, parity, data bits, stop bits, mode selection, and device ID through LonMaker for Windows (see Table 3). This variable has to be set according to the specifications of the FT-10 or TP/XF-78 network.

**TABLE 3. VARIABLE SETTINGS** 

Byte	Variable	Setting
8–6	Baud Rate	1200 – 115200
5	Parity	0 – None 1 – Odd 2 – Even
4	Data Bits	7 or 8
3	Stop Bits	1 or 2
2	Mode Selection	0 – ASCII 1 – RTU
1	Device ID	1
0	Not used	Not used

STANDARD BAUD RATES	B <sub>8</sub>	B <sub>7</sub>	B <sub>6</sub>
1200	0	12	0
2400	0	24	0
9600	0	96	0
14400	1	44	0
19200	1	92	0
38400	3	84	0
57600	5	76	0
115200	11	52	0

The two settings shown below are the default settings, FT-10 and TP-78, for the first ModLon unit.

For example, the old ModLon unit setup in FT-10 configurations would be:

Baud Rate: 38,400
Parity: 0
Data Bits: 8
Stop Bit: 1

Mode Selection: 1 (RTU)

Device ID: 1

B <sub>8</sub>	B <sub>7</sub>	B <sub>6</sub>	B <sub>5</sub>	B <sub>4</sub>	В3	B <sub>2</sub>	B <sub>1</sub>	B <sub>0</sub>
3	84	0	0	8	1	1	1	0
0	96	0	2	7	1	0	1	0

Refer to Figure 6 and Figure 7 for examples of the ModLon II unit being configured as the default parameters of the first ModLon in LonMaker.

To set *nciModLonCfg*, right click on the ModLon stencil and select Browse. Change the values of the nciModLonCfg in the Browse window accordingly and click on Set Value. You will get an error message (see Figure 8) that can be ignored; click Close and refresh the Browse screen to confirm the new values. Make sure to note that the ModLon is configured the same as in the "Using ModScan Software" section (starting on page 15).

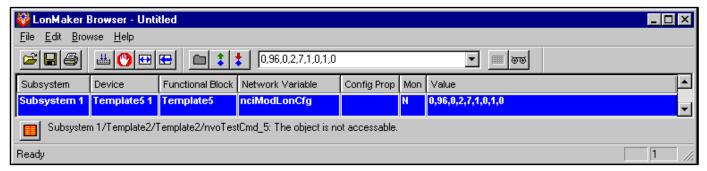


FIGURE 6. nciModLonCfg Settings for FT-10 Network

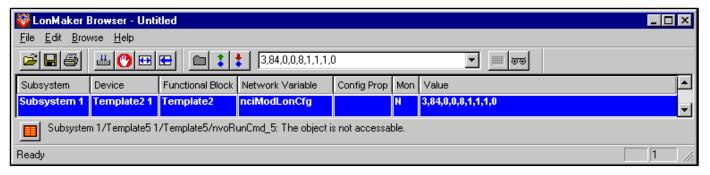


FIGURE 7. nciModLonCfg Settings for TP/XF-78 Network

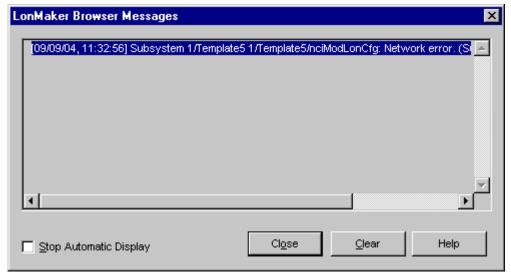


FIGURE 8. ERROR MESSAGE WHEN CHANGING THE MODLON II CONFIGURATION

#### FT-10 Networks

The "Using LonMaker for Windows" section of the FT-10 PowerCommand Network Installation and Operation Manual (900–0529) provides a detailed description of the network installation process, including the following step-by-step installation procedures:

- 1. Setting up Network Installation Tools
- 2. Registering Plug-Ins
- 3. Using LonMaker for Windows Software
- 4. LonMaker for Windows Network Setup
- 5. Adding Devices with LonMaker for Windows
- 6. Installing Bindings with LonMaker for Windows
- 7. Installing Software Upgrades to an Existing Network

The Modlon II includes five possible ModLon options, four that are the same as the old FT-10 ModLon and the fifth option mimics the TP/XF-78 register maps. A device template is available in LonMaker for Windows for each of these templates.

Possible bindings to a ModLon II Gateway are shown in Tables 4 (Template 1), 5 (Template 2), 6 (Template 3A), 7 (Template 3B), and 8 (Template 5).

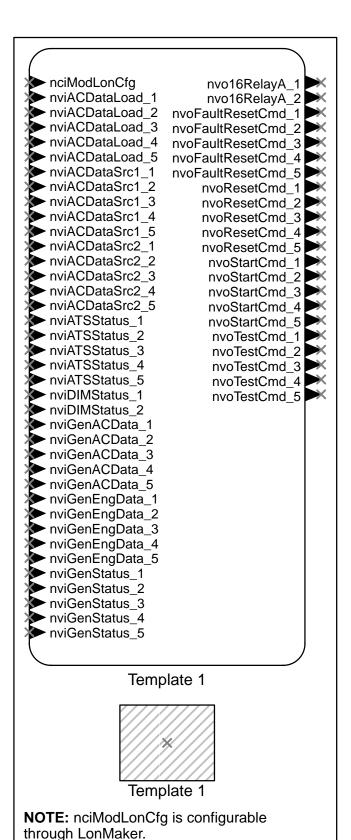


FIGURE 9. MODLON TEMPLATE 1

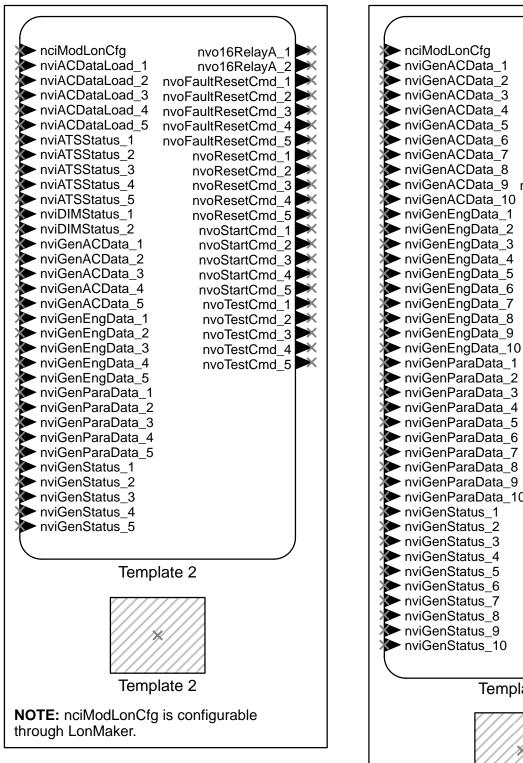


FIGURE 10. MODLON TEMPLATE 2

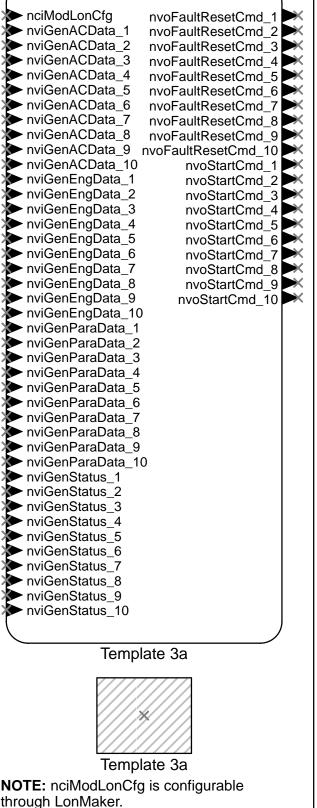


FIGURE 11. MODLON TEMPLATE 3a

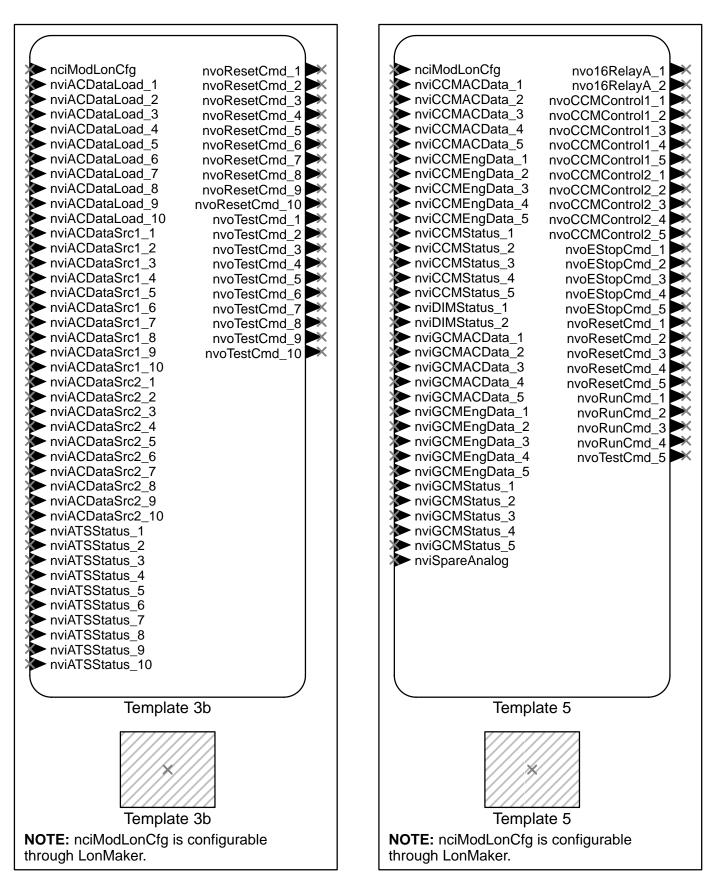


FIGURE 12. MODLON TEMPLATE 3b

FIGURE 13. MODLON TEMPLATE 5

#### TABLE 4. FT-10 NETWORK MODLON BINDINGS - TEMPLATE 1

#### **CCM-G ModBus Interface:**

Possible bindings to a ModLon Interface:

PCC w/CCM-G		ModLon		
nviStartCmd	$\leftarrow$	nvoStartCmd[]	General	Control
nviFaultResetCmd	$\leftarrow$	nvoFaultResetCmd[]		
nvoGenStatus	$\rightarrow$	nviGenStatus[]	General	Monitor
nvoGenACData	$\rightarrow$	nviGenACData[]		
nvoGenEngData	$\rightarrow$	nviGenEngData[]		

#### **CCM-T ModBus Interface (ModLon):**

Possible bindings to the ModLon Interface:

CCM-T		ModLon		
nviTestCmd	$\leftarrow$	nvoTestCmd[]	"Load Shed" "Test" "Transfer Inhibit"	Control
nvoACDataLoad	$\rightarrow$	nviACDataLoad[]	General	Monitor
nvoATSStatus	$\rightarrow$	nviATSStatus[ ]		

#### **DIM ModBus Interface (ModLon):**

Possible bindings to a ModLon Interface:

ModLon		DIM		
nvo16RelayA[]	$\rightarrow$	nvi16RelayA	16 Relays	Control
nviDIMStatus[]	$\leftarrow$	nvolOStatus	Node	Status

#### TABLE 5. FT-10 NETWORK MODLON BINDINGS - TEMPLATE 2

#### **CCM-G ModBus Interface (ModLon):**

Possible bindings to a ModLon Interface:

PCC w/CCM-G		ModLon		
nviStartCmd	$\leftarrow$	nvoStartCmd[]	General	Control
nviFaultResetCmd	$\leftarrow$	nvoFaultResetCmd[]		
nvoGenStatus	$\rightarrow$	nviGenStatus[]	General	Monitor
nvoGenACData	$\rightarrow$	nviGenACData[]		
nvoGenEngData	$\rightarrow$	nviGenEngData[]		
nvoGenParaData	$\rightarrow$	nviGenParaData[]		

#### **CCM-T ModBus Interface (ModLon):**

Possible bindings to the ModLon Interface:

CCM-T		ModLon		
nviTestCmd	$\leftarrow$	nvoTestCmd[]	"Load Shed" "Test" "Transfer Inhibit"	Control
nvoATSStatus	$\rightarrow$	nviATSStatus[]		
nvoACDataLoad	$\rightarrow$	nviACDataLoad[]		

#### **DIM ModBus Interface (ModBus):**

Possible bindings to a ModLon Interface:

ModLon		DIM			
nvo16RelayA[]	$\rightarrow$	nvi16RelayA	16 Rei	lays	Control
nviDIMStatus[]	$\leftarrow$	nvolOStatus	Node		Status

#### TABLE 6. FT-10 NETWORK MODLON BINDINGS - TEMPLATE 3A

#### **CCM-G ModBus Interface (ModLon):**

Possible bindings to a ModLon Interface:

PCC w/CCM-G		ModLon		
nviStartCmd	$\leftarrow$	nvoStartCmd[]	General	Control
nviFaultResetCmd	$\leftarrow$	nvoFaultResetCmd[]		
nvoGenStatus	$\rightarrow$	nviGenStatus[]	General	Monitor
nvoGenACData	$\rightarrow$	nviGenACData[]		
nvoGenEngData	$\rightarrow$	nviGenEngData[]		
nvoGenParaData	$\rightarrow$	nviGenParaData[]		

#### TABLE 7. FT-10 NETWORK MODLON BINDINGS - TEMPLATE 3B

#### **CCM-T ModBus Interface (ModLon):**

Possible bindings to the ModLon Interface:

CCM-T		ModLon		
nviTestCmd	$\leftarrow$	nvoTestCmd[]	"Load Shed" "Test" "Transfer Inhibit"	Control
nvoACDataLoad	$\rightarrow$	nviACDataLoad[]	General	Monitor
nvoATSStatus	$\rightarrow$	nviATSStatus[]		

#### **Template 5**

This template uses the same register map as the TP-78 devices. This will allow for upgrading from TP-78 Networks with FT-10 devices with out having to change the monitoring software. The "Network Installation – LonMaker" section of the *FT-10 PowerCommand Network Installation and Operation Manual* (900–0529) provides a detailed description of the network installation process, including the following step-by-step installation procedures:

- 1. Setting up Network Installation Tools
- 2. Starting LonMaker Software
- 3. Using LonMaker Software

- 4. LonMaker Network Setup
- 5. Connecting Devices with LonMaker
- 6. Installing Devices with LonMaker
- 7. Testing Devices and Verifying Installation

Possible bindings to a ModLon II Gateway are shown in Table 8.

The ModLon is an FT-10 Device. Therefore when it is connected to a TP/XF-78 device or network, it must be separated by a router. However, if you are using just the topology of the TP/XF-78 template for an FT-10 network, there is no need to separate the ModLon with a router.

#### TABLE 8. TP/XF-78 NETWORK MODLON BINDINGS - TEMPLATE 5

#### **GCM ModBus Interface (ModLon):**

Possible bindings to a ModLon Interface:

PCC w/GCM		ModLon		
nviRunCmd	$\leftarrow$	nvoRunCmd[]	General	Control
nviResetCmd	$\leftarrow$	nvoResetCmd[]		
nviEmerStopCmd	$\leftarrow$	nvoEStopCmd[]		
nvoStatus	$\rightarrow$	nviGCMStatus[]	General	Monitor
nvoGenData	$\rightarrow$	nviGCMACData[]		
nvoGenEngData	$\rightarrow$	nviGCMEngData[]		

#### **CCM ModBus Interface (ModLon):**

Possible bindings to the ModLon Interface:

CCM		ModLon		
nviRelayControl4	$\leftarrow$	nvoCCMControl1[]	"Load Shed"	Control
nviRelayControl5		nvoCCMControl2[]	"Test" "Transfer Inhibit"	
nviRelayControl6			Transfer in libit	
nvoACDataLoad (CCM-T) nvoGenACData (CCM-G)	$\rightarrow$	nviCCMACData[]	General	Monitor
nvoNodeStatus	$\rightarrow$	nviCCMStatus[]		
nvoSensorData	$\rightarrow$	nviCCMEngData[]		
nvoSpareAnalog	$\rightarrow$	nviSpareAnalog		

#### **DIM ModBus Interface (ModBus):**

Possible bindings to a ModLon Interface:

ModLon		DIM		
nvo16RelayA[]	$\rightarrow$	nvi16RelayA	16 Relays	Control
nviDIMStatus[]	$\leftarrow$	nvoNodeStatus	Node	Status

#### **USING MODSCAN SOFTWARE**

ModScan is a tool that can help you verify communications between the PowerCommand Network devices you have installed and the ModLon.

#### **Notes**

The following notes apply to using ModScan with FT-10 and TP/XF-78 networks.

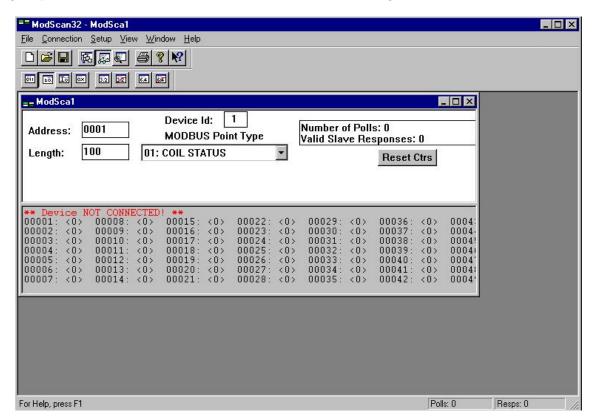
#### Genset Control

- Start/Stop When this register is set to "1," the genset starts, synchronizes, and closes its breaker. As long as this register remains a "1," the genset will continue to run. When this register is set to "0," the genset stops.
- Fault Reset This should be a momentary signal of about 2 seconds duration. Entering a "1" in the fault reset register resets any non-active warning and, If there is not a remote start on the genset, it resets any non-active shutdown except the Emergency Stop.

Emergency Stop (TP/XF-78 networks only) –
When this register is set to "1," the emergency
stop is active at the PowerCommand control.
The emergency stop cannot be rest until this register is set to "0." After the register is reset to "0,"
the emergency stop must be reset at the Power-Command control. It cannot be reset remotely.

#### Miscellaneous

- Fault State As part of Gen Status State, digital value 4 (Fault State 1) = shutdown with an active run command (cannot be remotely reset) and digital value 5 (Fault State 2) = shutdown with no active run command (can be remotely reset).
- Fault Text (TP/XF-78 networks only) These are 8 words (16 ASCII characters, 2 characters per word) that spell out the actual active fault.
- Genset Status Error This a value that is not supported by the genset and therefore, has no meaning or function.

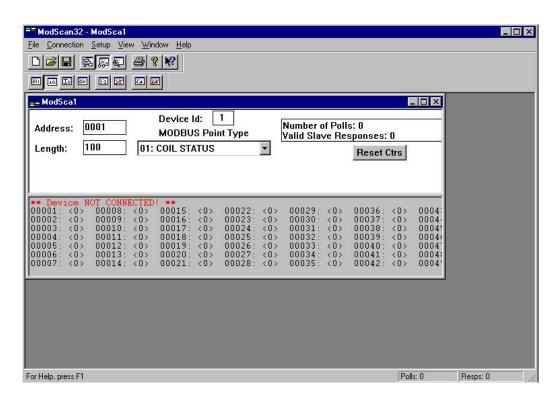


**FIGURE 14. MAIN MODSCAN SCREEN** 

Use ModScan software after this kit has been incorporated into your network. An RS-232 straight-through cable must be installed between the PC serial port and the RS-232 connector on the ModLon II Gateway. Figure 15 shows the initial screen dis-

played upon launching the program.

From the tool bar, select Connection → Connect. The Connection Details dialog box is displayed (see Figure 16). The Device ID is 1.



**FIGURE 15. MAIN MODSCAN SCREEN** 

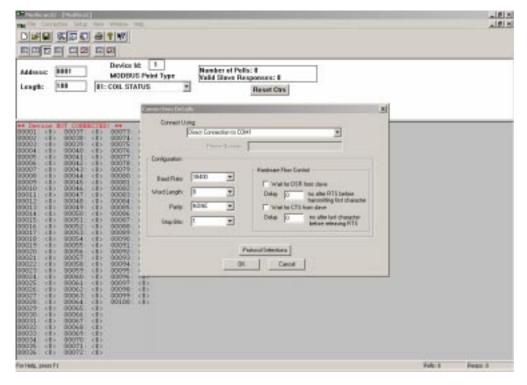


FIGURE 16, FT-10 NETWORK CONNECTION DETAILS DIALOG BOX

- 2. Use the pull down menu under "Connect Using" to select the comm port you wish to use.
  - For FT-10 networks, a typical configuration would be set to Baud Rate: 38400, Word Length: 8, Parity: None, and Stop Bits: 1, as
- shown in Figure 16. Use the pull down menus to change these settings as necessary.
- 3. Click on the "Protocol Selections" button and change the Transmission Mode to "RTU" (see Figure 17). Click "OK."

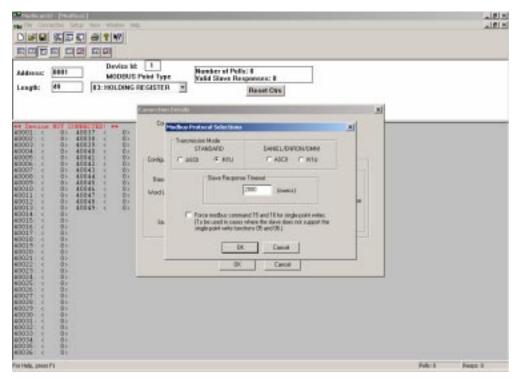


FIGURE 17. MODBUS PROTOCOL SELECTION DIALOG BOX

4. Click "OK" on the two open dialog boxes.

You should notice in the upper right of the dialog box, the "Number of Polls" counter incrementing.

5. On the main ModScan screen (see Figure 18), Change the Address to 1001, the Length to 49 (ModLon Mapping Template 1 or 65 (ModLon Mapping Template 2, ModLon Mapping Template 3), and the Device ID to 1. From the MODBUS Point Type pull down menu, select "03: HOLDING REGISTER."

The "Valid Slave Responses" should now be incrementing as the data on the screen is updated. The following are register addresses for Genset #1.

40036 is Oil Pressure

40038 is Coolant Temp. (L) 40039 is Misc. Temp 1 40040 is Misc. Temp 2 40041 is Fuel Rate

40042 is Engine RPM

40037 is Oil Temp.

40043 is Engine Starts

40044 is Eng Runtime (high)

40045 is Eng Runtime (low)

40046 is Total kwh (high)

Refer to the register mapping information (Tables 9 thru 16) to view different pieces of data.

6. On the main ModScan menu (see Figure 19), change the Length to 49.

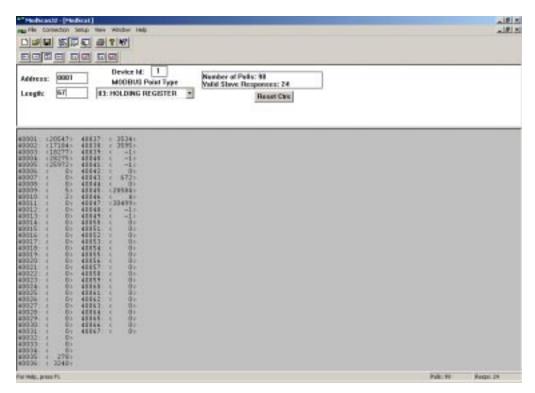


FIGURE 18. MODBUS POINT TYPE = HOLDING REGISTER

AWARNING Accidental starting of the generator set can cause severe personal injury or death. During step 7, a "start" command is sent to the genset. If the genset Run/Off/Auto switch is in the Auto position, the genset WILL start.

- 7. To output a value from the ModLon to a network device, double click on register 40050. The Write Register dialog box is displayed.
  - If you enter a value of "1" and select "Update,"

- Genset #1 starts and runs. If you double click on register 40050 again, enter a value of "0," and selecting "Update;" the Genset stops.
- 8. Review the mapping register information for other coils that you can manipulate.
  - By changing the Length on the main ModScan screen back to 49, the data registers will again update.

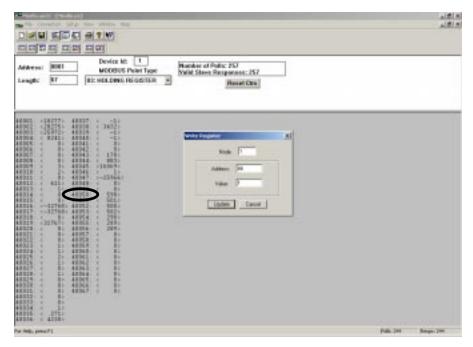


FIGURE 19. WRITE COIL DIALOG BOX

TABLE 9. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 1) SINGLE POWERCOMMAND GENSET (CCM-G) (SHEET 1 OF 2)

Data Point  Name [0,1]	GEN[0]							
11 Name (1		GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
ivallie [U, I]	40001	40101	40201	40301	40401			
Name [2,3]	40002	40102	40202	40302	40402			
Name [4,5]	40003	40103	40203	40303	40403			
Name [6,7]	40004	40104	40204	40304	40404			
Name [8,9]	40005	40105	40205	40305	40405			
Name [10,11]	40006	40106	40206	40306	40406			
Name [12,13]	40007	40107	40207	40307	40407			
Name [14,15]	40008	40108	40208	40308	40408			
Device Type	40009	40109	40209	40309	40409			
Control Switch	40010	40110	40210	40310	40410			
State <sup>1</sup>	40011	40111	40211	40311	40411			
Fault Code*	40012	40112	40212	40312	40412			
Fault Type <sup>2</sup>	40013	40113	40213	40313	40413			
Percent kW	40014	40114	40214	40314	40414	0.5		%
Total kW	40015	40115	40215	40315	40415			
NFPA 110 <sup>3</sup>	40016	40116	40216	40316	40416			
Extended <sup>4</sup>	40017	40117	40217	40317	40417			
Frequency	40018	40118	40218	40318	40418	0.1		Hz
Total pf	40019	40119	40219	40319	40419	0.00005		PF
Total kva	40020	40120	40220	40320	40420	1.0		KVA
Total kW	40021	40121	40221	40321	40421	1.0		KW
Total kvar	40022	40122	40222	40322	40422	1.0		KVAR
Volts ab	40023	40123	40223	40323	40423	1.0		Volts
Volts bc	40024	40124	40224	40324	40424	1.0		Volts
Volts ca	40025	40125	40225	40325	40425	1.0		Volts
Volts a	40026	40126	40226	40326	40426	1.0		Volts
Volts b	40027	40127	40227	40327	40427	1.0		Volts
Volts c	40028	40128	40228	40328	40428	1.0		Volts
Amps a	40029	40129	40229	40329	40429	1.0		Amps
Amps b	40030	40130	40230	40330	40430	1.0		Amps
Amps c	40031	40131	40231	40331	40431	1.0		Amps
Percent Amps a	40032	40132	40232	40332	40432	0.5		%
Percent Amps b	40033	40133	40233	40333	40433	0.5		%
Percent Amps c	40034	40134	40234	40334	40434	0.5		%
	Name [8,9] Name [10,11] Name [12,13] Name [14,15] Device Type Control Switch State <sup>1</sup> Fault Code* Fault Type <sup>2</sup> Percent kW Total kW NFPA 110 <sup>3</sup> Extended <sup>4</sup> Frequency Total pf Total kva Total kW Total kva Volts ab Volts ab Volts bc Volts ca Amps a Amps c Percent Amps b Percent Amps c	Name [8,9]         40005           Name [10,11]         40006           Name [12,13]         40007           Name [14,15]         40008           Device Type         40009           Control Switch         40010           State <sup>1</sup> 40011           Fault Code*         40012           Fault Type <sup>2</sup> 40013           Percent kW         40014           Total kW         40015           NFPA 110 <sup>3</sup> 40016           Extended <sup>4</sup> 40017           Frequency         40018           Total pf         40019           Total kva         40020           Total kva         40020           Total kva         40021           Total kvar         40022           Volts ab         40023           Volts bc         40024           Volts ca         40025           Volts a         40026           Volts b         40027           Volts c         40028           Amps a         40029           Amps b         40030           Amps c         40031           Percent Amps b         40033           Percent A	Name [8,9]         40005         40105           Name [10,11]         40006         40106           Name [12,13]         40007         40107           Name [14,15]         40008         40108           Device Type         40009         40109           Control Switch         40010         40110           State¹         40011         40111           Fault Code*         40012         40112           Fault Type²         40013         40113           Percent kW         40014         40114           Total kW         40015         40115           NFPA 110³         40016         40116           Extended⁴         40017         40117           Frequency         40018         40118           Total pf         40019         40119           Total kva         40020         40120           Total kW         40021         40121           Total kwar         40022         40122           Volts ab         40023         40123           Volts bc         40024         40124           Volts a         40025         40125           Volts b         40027         40127	Name [8,9]         40005         40105         40205           Name [10,11]         40006         40106         40206           Name [12,13]         40007         40107         40207           Name [14,15]         40008         40108         40208           Device Type         40009         40109         40209           Control Switch         40010         40110         40210           State¹         40011         40111         40211           Fault Code*         40012         40112         40212           Fault Type²         40013         40113         40213           Percent kW         40014         40114         40214           Total kW         40015         40115         40215           NFPA 110³         40016         40116         40216           Extended⁴         40017         40117         40217           Frequency         40018         40118         40218           Total pf         40019         40119         40219           Total kva         40020         40120         40220           Total kvar         40022         40121         40221           Total kvar         40022 <td< td=""><td>Name [8,9]         40005         40105         40205         40305           Name [10,11]         40006         40106         40206         40306           Name [12,13]         40007         40107         40207         40307           Name [14,15]         40008         40108         40208         40308           Device Type         40009         40109         40209         40309           Control Switch         40010         40110         40210         40310           State¹         40011         40111         40211         40311           Fault Code*         40012         40112         40212         40312           Fault Type²         40013         40113         40213         40313           Percent kW         40014         40114         40214         40314           Total kW         40015         40115         40215         40315           NFPA 110³         40016         40116         40216         40316           Extended⁴         40017         40117         40217         40317           Frequency         40018         40118         40218         40318           Total kW         40019         40119         4</td><td>Name [8,9]         40005         40105         40205         40305         40406           Name [10,11]         40006         40106         40206         40306         40406           Name [12,13]         40007         40107         40207         40307         40407           Name [14,15]         40008         40108         40208         40308         40408           Device Type         40009         40109         40209         40309         40409           Control Switch         40010         40110         40210         40310         40410           State¹         40011         40111         40211         40311         40411           Fault Code*         40012         40112         40212         40312         40412           Fault Type²         40013         40113         40213         40313         40413           Percent kW         40014         40114         40214         40314         40414           Total kW         40015         40115         40215         40315         40415           NFPA 110³         40016         40116         40216         40316         40416           Extended⁴         40017         40117</td><td>Name [8,9]         40005         40105         40205         40305         40405           Name [10,11]         40006         40106         40206         40306         40406           Name [12,13]         40007         40107         40207         40307         40407           Name [14,15]         40008         40108         40208         40308         40408           Device Type         40009         40109         40209         40309         40409           Control Switch         40010         40110         40210         40310         40410           State¹         40011         40111         40211         40311         40411           Fault Type²         40013         40113         40213         40313         40413           Percent kW         40014         40114         40214         40314         40414         0.5           Total kW         40015         40115         40215         40315         40415         40416           Extended⁴         40017         40117         40217         40317         40417         40417           Frequency         40018         40118         40218         40318         40418         0.1</td><td>  Name [8,9]   40005   40105   40205   40305   40405   Name [10,11]   40006   40106   40206   40306   40406   Name [12,13]   40007   40107   40207   40307   40407   Name [14,15]   40008   40108   40208   40308   40408   Device Type   40009   40109   40209   40309   40409   Control Switch   40010   40110   40210   40310   40410   State</td></td<>	Name [8,9]         40005         40105         40205         40305           Name [10,11]         40006         40106         40206         40306           Name [12,13]         40007         40107         40207         40307           Name [14,15]         40008         40108         40208         40308           Device Type         40009         40109         40209         40309           Control Switch         40010         40110         40210         40310           State¹         40011         40111         40211         40311           Fault Code*         40012         40112         40212         40312           Fault Type²         40013         40113         40213         40313           Percent kW         40014         40114         40214         40314           Total kW         40015         40115         40215         40315           NFPA 110³         40016         40116         40216         40316           Extended⁴         40017         40117         40217         40317           Frequency         40018         40118         40218         40318           Total kW         40019         40119         4	Name [8,9]         40005         40105         40205         40305         40406           Name [10,11]         40006         40106         40206         40306         40406           Name [12,13]         40007         40107         40207         40307         40407           Name [14,15]         40008         40108         40208         40308         40408           Device Type         40009         40109         40209         40309         40409           Control Switch         40010         40110         40210         40310         40410           State¹         40011         40111         40211         40311         40411           Fault Code*         40012         40112         40212         40312         40412           Fault Type²         40013         40113         40213         40313         40413           Percent kW         40014         40114         40214         40314         40414           Total kW         40015         40115         40215         40315         40415           NFPA 110³         40016         40116         40216         40316         40416           Extended⁴         40017         40117	Name [8,9]         40005         40105         40205         40305         40405           Name [10,11]         40006         40106         40206         40306         40406           Name [12,13]         40007         40107         40207         40307         40407           Name [14,15]         40008         40108         40208         40308         40408           Device Type         40009         40109         40209         40309         40409           Control Switch         40010         40110         40210         40310         40410           State¹         40011         40111         40211         40311         40411           Fault Type²         40013         40113         40213         40313         40413           Percent kW         40014         40114         40214         40314         40414         0.5           Total kW         40015         40115         40215         40315         40415         40416           Extended⁴         40017         40117         40217         40317         40417         40417           Frequency         40018         40118         40218         40318         40418         0.1	Name [8,9]   40005   40105   40205   40305   40405   Name [10,11]   40006   40106   40206   40306   40406   Name [12,13]   40007   40107   40207   40307   40407   Name [14,15]   40008   40108   40208   40308   40408   Device Type   40009   40109   40209   40309   40409   Control Switch   40010   40110   40210   40310   40410   State

### TABLE 9. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 1) SINGLE POWERCOMMAND GENSET (CCM-G) (SHEET 2 OF 2)

<b>6</b> : 1	B / B / /		Bus Regis	Scaling					
Structure	Data Point	GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenEngData	Battery Voltage	40035	40135	40235	40335	40435	0.1		Volts DC
	Oil Pressure	40036	40136	40236	40336	40436	0.1		KPA
	Oil Temp (see Note 2)	40037	40137	40237	40337	40437	0.1		Deg Kelvin
	Coolant Temp	40038	40138	40238	40338	40438	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	0.1		Deg Kelvin
	Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	0.01		GPH
	Engine RPM	40042	40142	40242	40342	40442	1.0		RPM
	Engine Starts	40043	40143	40243	40343	40443	1.0		starts
	Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444			
	Eng Runtime (Low)	40045	40145	40245	40345	40445	0.1		Sec
	Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446			
	Total kwh (Low)	40047	40147	40247	40347	40447	1.0		kwh
	Total Fuel (High) (see Notes 1 and 3)	40048	40148	40248	40348	40448			
	Total Fuel (Low)	40049	40149	40249	40349	40449	0.01		Gal
Genset Control	Start/Stop	40050	40150	40250	40350	40450			
	Reset	40051	40151	40251	40351	40451		0.1 0.01 1.0 1.0 0.1 1.0	
* Fault codes are list	ted in the genset Operato	r's/Service I	Manuals.				Data = Mu	ultiplier x ( Offset)	Register +

#### NOTES:

- 1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
- 2. Value not supported in the 3200 controller.
- 3. Value not supported in the 3100 controller.
- 4. Value not supported.
- 5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1

For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

<sup>1</sup> State					
Digital Value	Description				
0	Stopped				
1	Start Pending				
2	Warmup at Idle				
3	Running				
4	Cooldown at Rated				
5	Cooldown at Idle				

<sup>2</sup> Fau	<sup>2</sup> Fault Type						
Digital Value	Description						
0	Normal						
1	Warning						
2	Derate						
3	Shutdown with Cooldown						
4	Shutdown						

<sup>3</sup> NFPA110		
Description		Bit
Normal Power	0	(MSB)
Genset Supplying Load	1	
Genset Running	2	
Not in Auto	3	
High Battery Voltage	4	
Low Battery Voltage	5	
Charger AC Failure	6	
Fail to Start	7	
Low Coolant Temperature	8	
Pre-High Engine Temperature	9	
High Engine Temperature	10	
Pre-Low Oil Pressure	11	
Low Oil Pressure	12	
Overspeed	13	
Low Coolant Level	14	
Low Fuel Level	15	(LSB)

<sup>4</sup> Extended		
Description		Bit
Check Genset	0	(MSB)
Ground Fault	1	
High AC Voltage	2	
Low AC Voltage	3	
Under Frequency	4	
Overload	5	
Overcurrent	6	
Short Circuit	7	
Reverse KW	8	
Reverse KVAR	9	
Fail to Sync	10	
Fail to Close	11	
Load Demand	12	
Genset Circuit Breaker Tripped	13	
Utility Circuit Breaker Tripped	14	
Emergency Stop	15	(LSB)

# TABLE 10. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 1) AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T) (SHEET 1 OF 2)

			Scaling						
Structure	Data Point	NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoATSStatus	Name [0,1]	41001	41101	41201	41301	41401			
	Name [2,3]	41002	41102	41202	41302	41402			
	Name [4,5]	41003	41103	41203	41303	41403			
	Name [6,7]	41004	41104	41204	41304	41404			
	Name [8,9]	41005	41105	41205	41305	41405			
	Name [10,11]	41006	41106	41206	41306	41406			
	Name [12,13]	41007	41107	41207	41307	41407			
	Name [14,15]	41008	41108	41208	41308	41408			
	Device Type	41009	41109	41209	41309	41409			
	Mode <sup>1</sup>	41010	41110	41210	41310	41410			
	State <sup>2</sup>	41011	41111	41211	41311	41411			
	Fault Code	41012	41112	41212	41312	41412			
	Fault Type <sup>3</sup>	41013	41113	41213	41313	41413			
	Percent Amps	41014	41114	41214	41314	41414	0.5		%
	Total kW	41015	41115	41215	41315	41415			
	NFPA 110 <sup>4</sup>	41016	41116	41216	41316	41416			
	Extended <sup>5</sup>	41017	41117	41217	41317	41417			
nvoACDataLoad	Frequency	41018	41118	41218	41318	41418	0.1		Hz
	Total pf	41019	41119	41219	41319	41419	0.00005		PF
	Total kva	41020	41120	41220	41320	41420	1.0		KVA
	Total kW	41021	41121	41221	41321	41421	1.0		KW
	Total kvar	41022	41122	41222	41322	41422	1.0		KVAR
	Volts ab	41023	41123	41223	41323	41423	1.0		Volts
	Volts bc	41024	41124	41224	41324	41424	1.0		Volts
	Volts ca	41025	41125	41225	41325	41425	1.0		Volts
	Volts a	41026	41126	41226	41326	41426	1.0		Volts
	Volts b	41027	41127	41227	41327	41427	1.0		Volts
	Volts c	41028	41128	41228	41328	41428	1.0		Volts
	Amps a	41029	41129	41229	41329	41429	1.0		Amps
	Amps b	41030	41130	41230	41330	41430	1.0		Amps
	Amps c	41031	41131	41231	41331	41431	1.0		Amps
	Percent Amps a	41032	41132	41232	41332	41432	0.5		%
	Percent Amps b	41033	41133	41233	41333	41433	0.5		%
	Percent Amps c	41034	41134	41234	41334	41434	0.5		%
							Data = Mu	Itiplier x (F Offset)	Register

# TABLE 10. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 1) AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T) (SHEET 2 OF 2)

			Scaling						
Structure	Data Point	NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoACDataSrc1	Frequency	41035	41135	41235	41335	41435	0.1		Hz
	Total pf	41036	41136	41236	41336	41436	0.00005		PF
	Total kva	41037	41137	41237	41337	41437	1.0		KVA
	Total kW	41038	41138	41238	41338	41438	1.0		KW
	Total kvar	41039	41139	41239	41339	41439	1.0		KVAR
	Volts ab	41040	41140	41240	41340	41440	1.0		Volts
	Volts bc	41041	41141	41241	41341	41441	1.0		Volts
	Volts ca	41042	41142	41242	41342	41442	1.0		Volts
	Volts a	41043	41143	41243	41343	41443	1.0		Volts
	Volts b	41044	41144	41244	41344	41444	1.0		Volts
	Volts c	41045	41145	41245	41345	41445	1.0		Volts
	Amps a	41046	41146	41246	41346	41446	1.0		Amps
	Amps b	41047	41147	41247	41347	41447	1.0		Amps
	Amps c	41048	41148	41248	41348	41448	1.0		Amps
	Percent Amps a	41049	41149	41249	41349	41449	0.5		%
	Percent Amps b	41050	41150	41250	41350	41450	0.5		%
	Percent Amps c	41051	41151	41251	41351	41451	0.5		%
nvoACDataSrc2	Frequency	41052	41152	41252	41352	41452	0.1		Hz
	Total pf	41053	41153	41253	41353	41453	0.00005		PF
	Total kva	41054	41154	41254	41354	41454	1.0		KVA
	Total kW	41055	41155	41255	41355	41455	1.0		KW
	Total kvar	41056	41156	41256	41356	41456	1.0		KVAR
	Volts ab	41057	41157	41257	41357	41457	1.0		Volts
	Volts bc	41058	41158	41258	41358	41458	1.0		Volts
	Volts ca	41059	41159	41259	41359	41459	1.0		Volts
	Volts a	41060	41160	41260	41360	41460	1.0		Volts
	Volts b	41061	41161	41261	41361	41461	1.0		Volts
	Volts c	41062	41162	41262	41362	41462	1.0		Volts
	Amps a	41063	41163	41263	41363	41463	1.0		Amps
	Amps b	41064	41164	41264	41364	41464	1.0		Amps
	Amps c	41065	41165	41265	41365	41465	1.0		Amps
	Percent Amps a	41066	41166	41266	41366	41466	0.5		%
-	Percent Amps b	41067	41167	41267	41367	41467	0.5		%
	Percent Amps c	41068	41168	41268	41368	41468	0.5		%
Control	Test	41069	41169	41269	41369	41469			
	Reset	41070	41170	41270	41370	41470			
		L	L	L	ı	L	Data = Mu	ıltiplier x (I Offset)	Register +

<sup>1</sup> Mode						
Digital Value Description						
0	Test					
1	Utility/Genset					
2	Utility/Utility					
3	Genset/Genset					

<sup>2</sup> State						
Digital Value Description						
0	Neutral Position					
1	Source 1 Connected					
2	Source 2 Connected					
3	Source 1 and 2 Connected					

<sup>3</sup> Fault Type					
Digital Value Description					
0	No Faults				
1	Warning				

<sup>4</sup> NFPA 110						
Description	Bit					
Source 1 Connected	0	(MSB)				
Source 2 Connected	1					
N/A	2					
Not In Auto	3					
N/A	4					
N/A	5					
Charger AC Failure	6					
N/A	7					
N/A	8					
N/A	9					
N/A	10					
N/A	11					
N/A	12					
N/A	13					
N/A	14					
N/A	15	(LSB)				

<sup>5</sup> Extended						
Description	Bit					
Source 1 Available	0	(MSB)				
Source 2 Available	1					
Source 1 Connected	2					
Source 2 Connected	3					
ATS Common Alarm	4					
Not In Auto	5					
Test / Exercise in Progress	6					
Low Battery Voltage	7					
Load Shed	8					
Transfer Inhibit	9					
Retransfer Inhibit	10					
Fail to Close	11					
Fail to Disconnect	12					
Fail to Synchronize	13					
Bypass to Source 1	14					
Bypass to Source 2	15	(LSB)				

TABLE 11. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 1) DIGITAL INPUT/OUTPUT MODULE (DIM)

		ModPiis	ModBus Register			
Structure	Data Point					
		DIM[0]	DIM[1]			
nvoNodeStatus	Relay 1	41501	41601			
	Relay 2	41502	41602			
	Relay 3	41503	41603			
	Relay 4	41504	41604			
	Relay 5	41505	41605			
	Relay 6	41506	41606			
	Relay 7	41507	41607			
	Relay 8	41508	41608			
	Relay 9	41509	41609			
	Relay 10	41510	41610			
	Relay 11	41511	41611			
	Relay 12	41512	41612			
	Relay 13	41513	41613			
	Relay 14	41514	41614			
	Relay 15	41515	41615			
	Relay 16	41516	41616			
	Input 1	41517	41617			
	Input 2	41518	41618			
	Input 3	41519	41619			
	Input 4	41520	41620			
	Input 5	41521	41621			
	Input 6	41522	41622			
	Input 7	41523	41623			
	Input 8	41524	41624			
Control	nvi16RelayA	41525	41625			
		l .	1			

TABLE 12. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 2) PARALLELING POWERCOMMAND GENSET (CCM-G) (SHEET 1 OF 2)

Campaterna	Data Point	ModBus Registers					Scaling		
Structure		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenStatus	Name [0,1]	40001	40101	40201	40301	40401			
	Name [2,3]	40002	40102	40202	40302	40402			
	Name [4,5]	40003	40103	40203	40303	40403			
	Name [6,7]	40004	40104	40204	40304	40404			
	Name [8,9]	40005	40105	40205	40305	40405			
	Name [10,11]	40006	40106	40206	40306	40406			
	Name [12,13]	40007	40107	40207	40307	40407			
	Name [14,15]	40008	40108	40208	40308	40408			
	Device Type	40009	40109	40209	40309	40409			
	Control Switch	40010	40110	40210	40310	40410			
	State <sup>1</sup>	40011	40111	40211	40311	40411			
	Fault Code*	40012	40112	40212	40312	40412			
	Fault Type <sup>2</sup>	40013	40113	40213	40313	40413			
	Percent kW	40014	40114	40214	40314	40414	0.5		%
	Total kW	40015	40115	40215	40315	40415			
	NFPA 110 <sup>3</sup>	40016	40116	40216	40316	40416			
	Extended <sup>4</sup>	40017	40117	40217	40317	40417			
nvoGenACData	Frequency	40018	40118	40218	40318	40418	0.1		Hz
	Total pf	40019	40119	40219	40319	40419	0.00005		PF
	Total kva	40020	40120	40220	40320	40420	1.0		KVA
	Total kW	40021	40121	40221	40321	40421	1.0		KW
	Total kvar	40022	40122	40222	40322	40422	1.0		KVAR
	Volts ab	40023	40123	40223	40323	40423	1.0		Volts
	Volts bc	40024	40124	40224	40324	40424	1.0		Volts
	Volts ca	40025	40125	40225	40325	40425	1.0		Volts
	Volts a	40026	40126	40226	40326	40426	1.0		Volts
	Volts b	40027	40127	40227	40327	40427	1.0		Volts
	Volts c	40028	40128	40228	40328	40428	1.0		Volts
	Amps a	40029	40129	40229	40329	40429	1.0		Amps
	Amps b	40030	40130	40230	40330	40430	1.0		Amps
	Amps c	40031	40131	40231	40331	40431	1.0		Amps
	Percent Amps a	40032	40132	40232	40332	40432	0.5		%
	Percent Amps b	40033	40133	40233	40333	40433	0.5		%
	Percent Amps c	40034	40134	40234	40334	40434	0.5		%
* Fault codes are liste	d in the genset Operator's	s/Service M	anuals.				Data = Mi	ultiplier x (R Offset)	egister +

TABLE 12. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 2) PARALLELING POWERCOMMAND GENSET (CCM-G) (SHEET 2 OF 2)

Data Point  Battery Voltage Oil Pressure Oil Temp (see Note 2) Coolant Temp	<b>GEN[0]</b> 40035 40036 40037	<b>GEN[1]</b> 40135 40136	<b>GEN[2]</b> 40235	GEN[3]	GEN[4]	Multiplier	Offset	Units
Oil Pressure Oil Temp (see Note 2) Coolant Temp	40036		40235					1
Oil Temp (see Note 2)  Coolant Temp		40136	10200	40335	40435	0.1		Volts DC
Coolant Temp	40037	10100	40236	40336	40436	0.1		KPA
		40137	40237	40337	40437	0.1		Deg Kelvir
Mico Tomp 1 (coo Note 4)	40038	40138	40238	40338	40438	0.1		Deg Kelvir
Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	0.1		Deg Kelvir
Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	0.1		Deg Kelvir
Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	0.01		GPH
Engine RPM	40042	40142	40242	40342	40442	1.0		RPM
Engine Starts	40043	40143	40243	40343	40443	1.0		Starts
Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444			
Eng Runtime (Low)	40045	40145	40245	40345	40445	0.1		Sec
Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446			
Total kwh (Low)	40047	40147	40247	40347	40447	1.0		KWH
Total Fuel (High) (see Notes 1 and 3)	40048	40148	40248	40348	40448			
Total Fuel (Low)	40049	40149	40249	40349	40449	0.01		Gal
Frequency	40050	40150	40250	40350	40450	0.1		Hz
Volts ab	40051	40151	40251	40351	40451	1.0		Volts
Volts bc	40052	40152	40252	40352	40452	1.0		Volts
Volts ca	40053	40153	40253	40353	40453	1.0		Volts
Volts a	40054	40154	40254	40354	40454	1.0		Volts
Volts b	40055	40155	40255	40355	40455	1.0		Volts
Volts c	40056	40156	40256	40356	40456	1.0		Volts
Customer Faults	40057	40157	40257	40357	40457			
Network Faults	40058	40158	40258	40358	40458			
Custom	40059	40159	40259	40359	40459			
ES State <sup>5</sup>	40060	40160	40260	40360	40460			
Load Share State <sup>6</sup>	40061	40161	40261	40361	40461			
Load Govern State kw <sup>7</sup>	40062	40162	40262	40362	40462			
Load Govern State kvar <sup>8</sup>	40063	40163	40263	40363	40463			
Genset CB Position <sup>9</sup>	40064	40164	40264	40364	40464			_
Utility CB Position <sup>10</sup>	40065	40165	40265	40365	40465			
Start/Stop	40066	40166	40266	40366	40466			
Reset	40067	40167	40267	40367	40467			
	Eng Runtime (High) (see Notes 1 and 5)  Eng Runtime (Low)  Total kwh (High) (see Note 1)  Total Fuel (High) (see Notes 1 and 3)  Total Fuel (Low)  Frequency  Volts ab  Volts bc  Volts a  Volts a  Volts b  Customer Faults  Network Faults  Custom  ES State <sup>5</sup> Load Govern State kw <sup>7</sup> Load Govern State kvar <sup>8</sup> Genset CB Position <sup>9</sup> Utility CB Position <sup>10</sup> Start/Stop  Reset	Eng Runtime (High) (see Notes 1 and 5)  Eng Runtime (Low) 40045  Total kwh (High) (see Note 1) 40046  Total Fuel (High) (see Notes 1 and 3) 40048  Total Fuel (Low) 40049  Frequency 40050  Volts ab 40051  Volts bc 40052  Volts ca 40053  Volts a 40054  Volts b 40055  Volts c 40056  Customer Faults 40057  Network Faults 40058  Custom 40059  ES State <sup>5</sup> 40060  Load Share State 40063  Genset CB Position 40065  Start/Stop 40066  Reset 40067	Eng Runtime (High) (see Notes 1 and 5)  Eng Runtime (Low) 40045 40145  Total kwh (High) (see Note 1) 40046 40146  Total kwh (Low) 40047 40147  Total Fuel (High) (see Notes 1 and 3) 40048 40148  Total Fuel (Low) 40049 40149  Frequency 40050 40150  Volts ab 40051 40151  Volts bc 40052 40152  Volts ca 40053 40153  Volts a 40054 40154  Volts b 40055 40155  Volts c 40056 40156  Customer Faults 40057 40157  Network Faults 40058 40158  Custom 40059 40159  ES State <sup>5</sup> 40060 40160  Load Share State 40063 40163  Genset CB Position 40065 40165  Start/Stop 40065 40165	Eng Runtime (High) (see Notes 1 and 5)  Eng Runtime (Low) 40045 40145 40245  Total kwh (High) (see Note 1) 40046 40146 40246  Total kwh (Low) 40047 40147 40247  Total Fuel (High) (see Notes 1 and 3) 40048 40148 40248  Total Fuel (Low) 40049 40149 40249  Frequency 40050 40150 40250  Volts ab 40051 40151 40251  Volts bc 40052 40152 40252  Volts ca 40053 40153 40253  Volts a 40054 40154 40254  Volts b 40055 40155 40255  Volts c 40056 40156 40256  Customer Faults 40057 40157 40257  Network Faults 40058 40158 40258  Custom 40059 40159 40259  ES State <sup>5</sup> 40060 40160 40260  Load Share State <sup>6</sup> 40061 40161 40261  Load Govern State kwa <sup>7</sup> 40062 40162 40262  Load Govern State kvar <sup>8</sup> 40063 40163 40263  Genset CB Position 40065 40166 40266  Reset 40067 40167 40267	Eng Runtime (High) (see Notes 1 and 5)  Eng Runtime (Low)  Eng Runtime (Low)  40045  40145  40245  40345  Total kwh (High) (see Note 1)  Total kwh (Low)  40046  40146  40246  40346  40346  Total Fuel (High) (see Notes 1 and 3)  Total Fuel (Low)  40048  40148  40248  40348  Total Fuel (Low)  40049  40149  40249  40349  Frequency  40050  40150  40250  40350  Volts ab  40051  40151  40251  40351  Volts bc  40052  40152  40252  40352  Volts a 40053  40153  40253  40353  Volts a 40054  40154  40254  40354  Volts b 40055  40155  40255  40355  Volts c 40056  40156  40256  40356  Customer Faults  40057  40157  Network Faults  40058  40158  40259  40359  ES State <sup>5</sup> 40060  40160  40260  40360  Load Share State 6  40061  40062  40163  40263  40363  Genset CB Position 9  40066  40166  40266  40366  Reset  40067  40167  40267  40367	Eng Runtime (High) (see Notes 1 and 5)  Eng Runtime (Low) 40045 40145 40245 40345 40445  Eng Runtime (Low) 40045 40145 40245 40345 40445  Total kwh (High) (see Note 1) 40046 40146 40246 40346 40446  Total Fuel (High) (see Notes 1 and 3) 40048 40148 40248 40348 40348 40448  Total Fuel (Low) 40049 40149 40249 40349 40449  Frequency 40050 40150 40250 40350 40450  Volts ab 40051 40151 40251 40351 40451  Volts bc 40052 40152 40252 40352 40452  Volts ca 40053 40153 40253 40353 40453  Volts a 40054 40154 40254 40354 40454  Volts b 40055 40155 40255 40355 40455  Volts c 40056 40156 40256 40356 40456  Customer Faults 40057 40157 40257 40357 40457  Network Faults 40058 40159 40259 40359 40459  ES State <sup>5</sup> 40060 40160 40260 40360 40460  Load Share State <sup>6</sup> 40061 40161 40261 40361 40461  Load Govern State kwa <sup>7</sup> 40062 40163 40263 40363 40463  Genset CB Position 40066 40166 40266 40366 40466  Reset 40067 40167 40267 40367 40367 40467	Eng Runtime (High) (see Notes 1 and 5)  Eng Runtime (Low) 40045 40145 40245 40345 40445 0.1  Total kwh (High) (see Note 1)  Total kwh (Low) 40047 40147 40247 40347 40447 1.0  Total Fuel (High) (see Notes 1 and 3)  Total Fuel (Low) 40048 40148 40248 40348 40448  Total Fuel (Low) 40049 40149 40249 40349 40449 0.01  Frequency 40050 40150 40250 40350 40450 0.1  Volts ab 40051 40151 40251 40351 40451 1.0  Volts bc 40052 40152 40252 40352 40452 1.0  Volts a 40053 40153 40253 40353 40453 1.0  Volts a 40054 40154 40254 40354 40454 1.0  Volts b 40055 40155 40255 40355 40455 1.0  Volts c 40056 40156 40256 40356 40456 1.0  Customer Faults 40057 40157 40257 40357 40457  Network Faults 40058 40158 40258 40358 40458  Custom 40059 40159 40259 40359 40459  ES State <sup>5</sup> 40060 40160 40260 40360 40460  Load Govern State kw7 40062 40162 40262 40362 40362 40462  Load Govern State kw7 40063 40166 40266 40366 40466  Reset 40067 40167 40267 40367 40467	Eng Runtime (High) (see Notes 1 and 5)  Eng Runtime (Low) 40045 40145 40245 40345 40445 0.1  Total kwh (High) (see Note 1) 40046 40146 40246 40346 40446 40446 (see Note 1) 40047 40147 40247 40347 40447 1.0  Total Full (Low) 40047 40147 40247 40347 40447 1.0  Total Full (High) (see Notes 1 and 3) 40048 40148 40248 40348 40448 40448 40448 40348 40448 40448 40448 4050 40150 4050 40150 40250 40350 40450 0.1  Frequency 40050 40150 40250 40350 40450 0.1  Volts ab 40051 40151 40251 40351 40451 1.0  Volts ac 40052 40152 40252 40352 40452 1.0  Volts a 40054 40154 40254 40354 40454 1.0  Volts a 40055 40155 40255 40355 40455 1.0  Volts a 40056 40156 40256 40356 40456 1.0  Customer Faults 40057 40157 40257 40357 40457  Network Faults 40058 40158 40258 40358 40458  Custom 40059 40159 40259 40359 40459  ES State <sup>6</sup> 40060 40160 40260 40360 40460 40460 40661 40061 40261 40361 40461 40661 40261 40361 40461 40661 40266 40366 40466 40466 40661 40661 40266 40366 40466 40466 40661 40661 40266 40366 40466 40466 40661 40661 40266 40366 40466 40466 40661 40661 40266 40366 40466 40466 40466 40661 40661 40266 40366 40466 40466 40466 40661 40661 40266 40366 40466 40466 40466 40661 40661 40266 40366 40466 40466 40466 404661 40266 40366 40466

#### NOTES:

- 1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
- 2. Value not supported in the 3200 controller.
- 3. Value not supported in the 3100 controller.
- 4. Value not supported.
- 5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1. For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

<sup>1</sup> State						
Digital Value Description						
0	Stopped					
1	Start Pending					
2	Warmup at Idle					
3	Running					
4	Cooldown at Rated					
5	Cooldown at Idle					

<sup>2</sup> Fault Type						
Digital Value Description						
0	Normal					
1	Warning					
2	Derate					
3	Shutdown with Cooldown					
4	Shutdown					

<sup>3</sup> NFPA 110						
Description	ı	Bit				
Normal Power	0	(MSB)				
Genset Supplying Load	1					
Genset Running	2					
Not in Auto	3					
High Battery Voltage	4					
Low Battery Voltage	5					
Charger AC Failure	6					
Fail to Start	7					
Low Coolant Temperature	8					
Pre-High Engine Temperature	9					
High Engine Temperature	10					
Pre-Low Oil Pressure	11					
Low Oil Pressure	12					
Overspeed	13					
Low Coolant Level	14					
Low Fuel Level	15	(LSB)				

<sup>4</sup> Extended				
Description		Bit		
Check Genset	0	(MSB)		
Ground Fault	1			
High AC Voltage	2			
Low AC Voltage	3			
Under Frequency	4			
Overload	5			
Overcurrent	6			
Short Circuit	7			
Reverse KW	8			
Reverse KVAR	9			
Fail to Sync	10			
Fail to Close	11			
Load Demand	12			
Genset Circuit Breaker Tripped	13			
Utility Circuit Breaker Tripped	14			
Emergency Stop	15	(LSB)		

<sup>5</sup> ES State		
Digital Value Description		
0	Standby	
1	Dead Bus Close	
2	Synchronizing	
3	Load Share	
4	Load Govern	

<sup>6</sup> Load Share State		
Digital Value Description		
0	Not in Load Share	
1	Track Load	
2	Ramp Load	
3	Ramp Unload	
4	Load Demand Shutdown	

<sup>7</sup> Load Govern State KW		
Digital Value Description		
0	Not Applicable	
1	Ramp Load	
2	Track Target Load	
3	Ramp Unload	
4	Ramp Unload Done	

<sup>9</sup> Genset CB Position		
Digital Value Description		
0	Open	
1	Closed	
2	Unavailable	
3	Inhibit	

<sup>8</sup> Load Govern State KVAR		
Digital Value Description		
0	Not Applicable	
1	Ramp Load	
2	Track Target Load	
3	Ramp Unload	
4	Ramp Unload Done	

<sup>10</sup> Utility CB Position		
Digital Value Description		
0	Open	
1	Closed	
2	Unavailable	
3	Inhibit	

### TABLE 13. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 2) AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T)

Structure		ModBus Registers				Scaling			
	Data Point	NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoATSStatus	Name [0,1]	41001	41101	41201	41301	41401			
	Name [2,3]	41002	41102	41202	41302	41402			
	Name [4,5]	41003	41103	41203	41303	41403			
	Name [6,7]	41004	41104	41204	41304	41404			
	Name [8,9]	41005	41105	41205	41305	41405			
	Name [10,11]	41006	41106	41206	41306	41406			
	Name [12,13]	41007	41107	41207	41307	41407			
	Name [14,15]	41008	41108	41208	41308	41408			
	Device Type	41009	41109	41209	41309	41409			
	Mode <sup>1</sup>	41010	41110	41210	41310	41410			
	State <sup>2</sup>	41011	41111	41211	41311	41411			
	Fault Code	41012	41112	41212	41312	41412			
	Fault Type <sup>3</sup>	41013	41113	41213	41313	41413			
	Percent Amps	41014	41114	41214	41314	41414	0.5		%
	Total kW	41015	41115	41215	41315	41415			
	NFPA 110 <sup>4</sup>	41016	41116	41216	41316	41416			
	Extended <sup>5</sup>	41017	41117	41217	41317	41417			
nvoACDataLoad	Frequency	41018	41118	41218	41318	41418	0.1		Hz
	Total pf	41019	41119	41219	41319	41419	0.00005		PF
	Total kva	41020	41120	41220	41320	41420	1.0		KVA
	Total kW	41021	41121	41221	41321	41421	1.0		KW
	Total kvar	41022	41122	41222	41322	41422	1.0		KVAR
	Volts ab	41023	41123	41223	41323	41423	1.0		Volts
	Volts bc	41024	41124	41224	41324	41424	1.0		Volts
	Volts ca	41025	41125	41225	41325	41425	1.0		Volts
	Volts a	41026	41126	41226	41326	41426	1.0		Volts
	Volts b	41027	41127	41227	41327	41427	1.0		Volts
	Volts c	41028	41128	41228	41328	41428	1.0		Volts
	Amps a	41029	41129	41229	41329	41429	1.0		Amps
	Amps b	41030	41130	41230	41330	41430	1.0		Amps
	Amps c	41031	41131	41231	41331	41431	1.0		Amps
	Percent Amps a	41032	41132	41232	41332	41432	0.5		%
	Percent Amps b	41033	41133	41233	41333	41433	0.5		%
	Percent Amps c	41034	41134	41234	41334	41434	0.5		%
Control	Test	41035	41135	41235	41335	41435			_
	Reset	41036	41136	41236	41336	41436			
							Data = Mu	ltiplier x (F Offset)	Register

<sup>1</sup> Mode		
Digital Value Description		
0	Test	
1	Utility/Genset	
2	Utility/Utility	
3	Genset/Genset	

<sup>2</sup> State		
Digital Value Description		
0	Neutral Position	
1	Source 1 Connected	
2	Source 2 Connected	
3	Source 1 and 2 Connected	

<sup>3</sup> Fault Type		
Digital Value Description		
0	No Faults	
1 Warning		

<sup>4</sup> NFPA 110				
Description Bi		Bit		
Source 1 Connected	0	(MSB)		
Source 2 Connected	1			
N/A	2			
Not In Auto	3			
N/A	4			
N/A	5			
Charger AC Failure	6			
N/A	7			
N/A	8			
N/A	9			
N/A	10			
N/A	11			
N/A	12			
N/A	13			
N/A	14			
N/A	15	(LSB)		

<sup>5</sup> Extended		
Description	ı	Bit
Source 1 Available	0	(MSB)
Source 2 Available	1	
Source 1 Connected	2	
Source 2 Connected	3	
ATS Common Alarm	4	
Not In Auto	5	
Test / Exercise in Progress	6	
Low Battery Voltage	7	
Load Shed	8	
Transfer Inhibit	9	
Retransfer Inhibit	10	
Fail to Close	11	
Fail to Disconnect	12	
Fail to Synchronize	13	
Bypass to Source 1	14	
Bypass to Source 2	15	(LSB)

TABLE 14. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 2) DIGITAL INPUT/OUTPUT MODULE (DIM)

Oterantone	Data Ballat	ModBus	Register
Structure	Data Point	DIM[0]	DIM[1]
nvoNodeStatus	Relay 1	41501	41601
	Relay 2	41502	41602
	Relay 3	41503	41603
	Relay 4	41504	41604
	Relay 5	41505	41605
	Relay 6	41506	41606
	Relay 7	41507	41607
	Relay 8	41508	41608
	Relay 9	41509	41609
	Relay 10	41510	41610
	Relay 11	41511	41611
	Relay 12	41512	41612
	Relay 13	41513	41613
	Relay 14	41514	41614
	Relay 15	41515	41615
	Relay 16	41516	41616
	Input 1	41517	41617
	Input 2	41518	41618
	Input 3	41519	41619
	Input 4	41520	41620
	Input 5	41521	41621
	Input 6	41522	41622
	Input 7	41523	41623
	Input 8	41524	41624
Control	nvi16RelayA	41525	41625

Name [2.1]   GeN(g)   GeN(g)	7	7::00					ModBus	<b>ModBus Registers</b>						Scaling	
Name [4,5] 40001 40102 40102 40202 40202 40602 40602 40702 40702 40902 A0702	Structure	Data Foint	GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
Name [2,3]         40002         40103         40202         40202         40202         40203         40403         40503         40603         40703         40603         40603         40603         40603         40703         40603         40603         40703         40703         40703         40703         40703         40703         40703         40704         40504         40603         40703         40703         40703         40703         40704         40504	nvoGenStatus	Name [0,1]	40001	40101	40201	40301	40401	40501	40601	40701	40801	40901			
Name [4,5]         40003         40103         40203         40203         40403         40603         40604         40604         40604         40603         40703         40603		Name [2,3]	40002	40102	40202	40302	40402	40502	40602	40702	40802	40902			
Name [6,7]         40004         40104         40204         40305         40405         40604         40704         40904         40104         40205         40405         40604         40704         40904         40906         40706         40807         40807         40807         40806		Name [4,5]	40003	40103	40203	40303	40403	40503	40603	40703	40803	40903			
Name [8,9]         40005         40105         40205         40306         40405         40505         40605         40706         40706         40706         40706         40706         40706         40706         40806		Name [6,7]	40004	40104	40204	40304	40404	40204	40604	40704	40804	40604			
Name [10,11]         40006         40106         40206         40206         40506         40506         40506         40506         40506         40507         40607		Name [8,9]	40005	40105	40205	40305	40405	40505	40605	40705	40805	40905			
Name [12,13]         40007         40107         40207         40307         40407         40507         40707         40807         40808         40908		Name [10,11]	40006	40106	40206	40306	40406	40506	40606	40706	40806	40906			
Name [14,15]         40008         40108         40208         40308         40408         40508         40708         40108         40109		Name [12,13]	40007	40107	40207	40307	40407	40507	40607	40707	40807	40907			
Device Type         40009         40109         40209         40309         40409         40509         40609         40709         40909		Name [14,15]	40008	40108	40208	40308	40408	40508	40608	40708	40808	40908			
Control Switch         40010         40110         40210         40310         40410         40511         40611         40711         40811		Device Type	40009	40109	40209	40309	40409	40509	40609	40709	40809	40909			
State!         40011         40211         40311         40411         40611         <		Control Switch	40010	40110	40210	40310	40410	40510	40610	40710	40810	40910			
Fault Code*         40012         40112         40212         40313         40413         40514         40514		State1	40011	40111	40211	40311	40411	40511	40611	40711	40811	40911			
Fault Type <sup>2</sup> 40013         40113         40213         40313         40413         40513         40613         40613         40713         40813         40813         40813         40813         40813         40813         40813         40813         40813         40813         40813         40814		Fault Code*	40012	40112	40212	40312	40412	40512	40612	40712	40812	40912			
Percent kW         40014         40114         40214         40414         40514         40514         40614         40514         40614         40614         40614         40614         40614         40614         40614         40614         40615         40615         40615         40615         40616         40716         40814         40616         40616         40716         40814         40614		Fault Type <sup>2</sup>	40013	40113	40213	40313	40413	40513	40613	40713	40813	40913			
Total kW         40015         40115         40216         40316         40416         40516         40616         40716         40816         40918		Percent kW	40014	40114	40214	40314	40414	40514	40614	40714	40814	40914	0.5		%
NFPA 1103         40016         40116         40216         40316         40416         40516         40616         40716         40816         40916           Extended**         40017         40117         40217         40317         40417         40617         40617         40717         40817         40917           Frequency         40018         40118         40218         40318         40419         40619         40710         40817         40917           Total kva         40020         40120         40220         40320         40420         40520         40620         40720         40820           Total kva         40021         40120         40220         40320         40421         40621         40713         40814         40619           Total kva         40022         40120         40220         40320         40420         40520         40620         40720         40820           Volts kva         40022         40122         40222         40223         40423         40523         40623         40723         40823           Volts ca         40024         40224         40224         40224         40226         40226         40226         40226		Total kW	40015	40115	40215	40315	40415	40515	40615	40715	40815	40915			
Extended <sup>4</sup> 40017         40117         40217         40417         40517         40517         40517         40517         40517         40517         40517         40517         40517         40517         40517         40517         40517         40518         40518         40518         40518         40518         40519		NFPA 110 <sup>3</sup>	40016	40116	40216	40316	40416	40516	40616	40716	40816	40916			
Frequency         40018         40118         40218         40418         40418         40518         40618         40618         40718         40818		Extended <sup>4</sup>	40017	40117	40217	40317	40417	40517	40617	40717	40817	40917			
40019         40119         40219         40319         40419         40519         40619         40719         40819         40819           40020         40120         40220         40320         40420         40520         40620         40720         40820         40920           40021         40121         40221         40321         40421         40521         40621         40721         40821         40920           40022         40122         40322         40423         40523         40623         40724         40824         40924           40024         40124         40224         40324         40424         40524         40624         40724         40824         40923           40025         40126         40226         40426         40526         40626         40726         40826         40926           40026         40126         40226         40426         40526         40626         40726         40826         40926           40027         40126         40326         40426         40526         40626         40726         40826         40926           40027         40126         40326         40426         40526         40627 <td>nvoGenACData</td> <td>Frequency</td> <td>40018</td> <td>40118</td> <td>40218</td> <td>40318</td> <td>40418</td> <td>40518</td> <td>40618</td> <td>40718</td> <td>40818</td> <td>40918</td> <td>0.1</td> <td></td> <td>Hz</td>	nvoGenACData	Frequency	40018	40118	40218	40318	40418	40518	40618	40718	40818	40918	0.1		Hz
40020         40120         40320         40420         40520         40620         40620         40820         40920         40920         40920         40920         40920         40920         40920         40921         40621         40621         40721         40821         40921         40921         40921         40921         40921         40922         40922         40422         40623         40623         40723         40823         40923         40923         40923         40923         40923         40923         40923         40923         40923         40923         40923         40923         40924 <th< td=""><td></td><td>Total pf</td><td>40019</td><td>40119</td><td>40219</td><td>40319</td><td>40419</td><td>40519</td><td>40619</td><td>40719</td><td>40819</td><td>40919</td><td>5000000</td><td></td><td>ΡF</td></th<>		Total pf	40019	40119	40219	40319	40419	40519	40619	40719	40819	40919	5000000		ΡF
40021         40121         40221         40321         40421         40521         40622         40623         40623         40623         40623         40623         40624         40724         40624         40724         40624         40624         40724         40626         40626         40726         40626         40626         40726         40626 <th< td=""><td></td><td>Total kva</td><td>40020</td><td>40120</td><td>40220</td><td>40320</td><td>40420</td><td>40520</td><td>40620</td><td>40720</td><td>40820</td><td>40920</td><td>1.0</td><td></td><td>KVA</td></th<>		Total kva	40020	40120	40220	40320	40420	40520	40620	40720	40820	40920	1.0		KVA
40022         40322         40322         40422         40523         40623         40623         40623         40723         40823         40923         40623         40623         40723         40823         40923         40923         40623         40724         40824         40923         40923         40923         40924         40624         40724         40824         40924         40924         40625         40625         40726         40824         40924         40924         40924         40924         40625         40625         40726         40826         40926         40926         40926         40726         40726         40926         40926         40926         40926         40726         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40926         40027         40627         40627         40627         40628         40928         40928         40928         40928         40928         40928         40928         40928         40928         40928         40928         40929         40929         40929 <th< td=""><td></td><td>Total kW</td><td>40021</td><td>40121</td><td>40221</td><td>40321</td><td>40421</td><td>40521</td><td>40621</td><td>40721</td><td>40821</td><td>40921</td><td>1.0</td><td></td><td>ΚM</td></th<>		Total kW	40021	40121	40221	40321	40421	40521	40621	40721	40821	40921	1.0		ΚM
40023         40123         40223         40423         40524         40624         40724         40823         40923         40923         40923         40923         40924         40624         40724         40824         40624         40724         40824         40624         40724         40824         40924         40924         40625         40625         40826         40927         40627         40727         40827         40926         40926         40926         40926         40926         40927         40927         40629         40727         40827         40927         40828         40928         40928         40928         40928         40928         40929         40929         40929         40929         40929         40929         40929         40929         40929         40929         40929         40929         40929         40929         40929         40929         40930         40930         40930         40931         40931 <th< td=""><td></td><td>Total kvar</td><td>40022</td><td>40122</td><td>40222</td><td>40322</td><td>40422</td><td>40522</td><td>40622</td><td>40722</td><td>40822</td><td>40922</td><td>1.0</td><td></td><td>KVAR</td></th<>		Total kvar	40022	40122	40222	40322	40422	40522	40622	40722	40822	40922	1.0		KVAR
40024         40124         40244         40524         40624         40624         40824         40824         40625         40625         40625         40726         40826         40925         40926         40925         40925         40625         40725         40826         40926         40926         40926         40926         40926         40926         40926         40926         40926         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40928         40928         40928         40928         40928         40928         40928         40928         40929         40930         40930         40930         40930         40930         40931         40931         40933         40933         40933         40933         40933         40933         40933 <th< td=""><td></td><td>Volts ab</td><td>40023</td><td>40123</td><td>40223</td><td>40323</td><td>40423</td><td>40523</td><td>40623</td><td>40723</td><td>40823</td><td>40923</td><td>1.0</td><td></td><td>Volts</td></th<>		Volts ab	40023	40123	40223	40323	40423	40523	40623	40723	40823	40923	1.0		Volts
40025         40125         40225         40325         40425         40526         40625         40625         40626         40626         40626         40626         40626         40626         40726         40626         40726         40826         40926         40926         40926         40926         40626         40726         40826         40926         40926         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40927         40928         40928         40928         40928         40928         40928         40929         40929         40730         40730         40830         40930         40930         40930         40930         40930         40930         40931         40631         40631         40731         40831         40931         40932         40932         40933 <th< td=""><td></td><td>Volts bc</td><td>40054</td><td>40124</td><td>40224</td><td>40324</td><td>40424</td><td>40524</td><td>40624</td><td>40724</td><td>40824</td><td>40924</td><td>1.0</td><td></td><td>Volts</td></th<>		Volts bc	40054	40124	40224	40324	40424	40524	40624	40724	40824	40924	1.0		Volts
40026         40126         40226         40326         40426         40526         40526         40627         40627         40627         40627         40627         40627         40627         40627         40627         40727         40926         40926           40028         40128         40228         40428         40528         40628         40728         40928         40928           40029         40129         40229         40429         40529         40629         40729         40829         40929           40030         40130         40230         40430         40530         40630         40730         40830         40930           40031         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40332         40432         40632         40632         40732         40831         40931           40032         40132         40332         40432         40632         40632         40732         40832         40932           40033         40133         40433         40633         40633         40633         40633         40633         40633         4063		Volts ca	40025	40125	40225	40325	40425	40525	40625	40725	40825	40925	1.0		Volts
40027         40127         40227         40327         40427         40527         40627         40627         40627         40628         40728         40827         40628         40728         40828         40927           40028         40128         40228         40428         40528         40629         40728         40828         40928           40030         40130         40230         40430         40530         40630         40730         40830         40930           40031         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40232         40432         40532         40632         40731         40831         40931           40032         40132         40432         40432         40632         40632         40732         40832         40932           40033         40133         40233         40433         40633         40633         40833         40833         40833         40833		Volts a	40026	40126	40226	40326	40426	40526	40626	40726	40826	40926	1.0		Volts
40028         40128         40228         40428         40528         40628         40728         40828         40928           40029         40129         40329         40429         40529         40629         40729         40829         40929           40030         40130         40230         40430         40530         40730         40830         40930           40031         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40232         40432         40532         40632         40732         40832         40932           40033         40133         40233         40433         40633         40633         40733         40833         40933		Volts b	40027	40127	40227	40327	40427	40527	40627	40727	40827	40927	1.0		Volts
40029         40129         40229         40429         40529         40629         40729         40829         40929         40929           40030         40130         40230         40430         40530         40630         40730         40830         40930           40031         40131         40231         40431         40531         40632         40732         40831         40931           40032         40132         40233         40433         40433         40633         40633         40733         40833         40933		Volts c	40028	40128	40228	40328	40428	40528	40628	40728	40828	40928	1.0		Volts
40030         40130         40230         40330         40430         40530         40630         40730         40830         40930           40031         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40232         40432         40532         40632         40732         40832         40932           40033         40133         40233         40433         40433         40633         40633         40732         40833         40933		Amps a	40029	40129	40229	40329	40429	40529	40629	40729	40829	40929	1.0		Amps
40031         40131         40231         40331         40431         40531         40631         40731         40831         40931           40032         40132         40232         40432         40432         40632         40732         40732         40832         40932           40033         40133         40233         40433         40533         40633         40733         40833         40933		d sqmA	40030	40130	40230	40330	40430	40530	40630	40730	40830	40930	1.0		Amps
40032         40132         40232         40332         40432         40532         40632         40732         40832         40932           40033         40133         40233         40433         40433         40633         40733         40833         40933		Amps c	40031	40131	40231	40331	40431	40531	40631	40731	40831	40931	1.0		Amps
40033         40133         40233         40433         40533         40633         40733         40833         40933		Percent Amps a	40032	40132	40232	40332	40432	40532	40632	40732	40832	40932	0.5		%
		Percent Amps b	40033	40133	40233	40333	40433	40533	40633	40733	40833	40933	9.0		%
40034   40134   40234   40334   40434   40534   40634   40734   40834   40934		Percent Amps c	40034	40134	40234	40334	40434	40534	40634	40734	40834	40934	0.5		%

TABLE 15. MODLON REGISTER MAPPING INFORMATION - FT-10 NETWORK (TEMPLATE 3) PARALLELING PCC GENSET (CCM-G) (SHEET 2 OF 3)

,						ModBus Registers	egisters						Scaling	
Structure	Data Point	GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
nvoGen EngData	Battery Voltage	40035	40135	40235	40335	40435	40535	40635	40735	40835	40935	0.1		Volts DC
	Oil Pressure	40036	40136	40236	40336	40436	40536	40636	40736	40836	40936	0.1		KPA
	Oil Temp (see Note 2)	40037	40137	40237	40337	40437	40537	40637	40737	40837	40937	0.1		Deg Kelvin
	Coolant Temp	40038	40138	40238	40338	40438	40538	40638	40738	40838	40938	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	40539	40639	40739	40839	40939	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	40540	40640	40740	40840	40940	0.1		Deg Kelvin
	Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	40541	40641	40741	40841	40941	0.01		ВРН
	Engine RPM	40042	40142	40242	40342	40442	40542	40642	40742	40842	40942	1.0		RPM
	Engine Starts	40043	40143	40243	40343	40443	40543	40643	40743	40843	40943	1.0		Starts
	Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444	40544	40644	40744	40844	40944			
	Eng Runtime (Low)	40045	40145	40245	40345	40445	40545	40645	40745	40845	40945	0.1		Sec
	Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446	40546	40646	40746	40846	40946			
	Total kwh (Low)	40047	40147	40247	40347	40447	40547	40647	40747	40847	40947	1.0		KWH
	Total Fuel (High)) (see Notes 1 and 3)	40048	40148	40248	40348	40448	40548	40648	40748	40848	40948			
	Total Fuel (Low)	40049	40149	40249	40349	40449	40549	40649	40749	40849	40949	0.01		Gal

# NOTES:

- 1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
  - 2. Value not supported in the 3200 controller.
    - 3. Value not supported in the 3100 controller.
- 4. Value not supported.
- 5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1

For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

Č						ModBus	ModBus Registers						Scaling	
Structure	Structure Data Point GEN[0] GEN[1] GEN	GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
nvoGenParaData	Frequency	40050	40150	40250	40350	40450	40550	40650	40750	40850	40950	0.1		Hz
	Volts ab	40051	40151	40251	40351	40451	40551	40651	40751	40851	40951	1.0		Volts
	Volts bc	40052	40152	40252	40352	40452	40552	40652	40752	40852	40952	1.0		Volts
	Volts ca	40053	40153	40253	40353	40453	40553	40653	40753	40853	40953	1.0		Volts
	Volts a	40054	40154	40254	40354	40454	40554	40654	40754	40854	40954	1.0		Volts
	Volts b	40055	40155	40255	40355	40455	40555	40655	40755	40855	40955	1.0		Volts
	Volts c	40056	40156	40256	40356	40456	40556	40656	40756	40856	40956	1.0		Volts
	Customer Faults	40057	40157	40257	40357	40457	40557	40657	40757	40857	40957			
	Network Faults	40058	40158	40258	40358	40458	40558	40658	40758	40858	40958			
	Custom	40059	40159	40259	40359	40459	40559	40659	40759	40859	40959			
	ES State <sup>5</sup>	40060	40160	40260	40360	40460	40560	40660	40760	40860	40960			
	Load Share State <sup>6</sup>	40061	40161	40261	40361	40461	40561	40661	40761	40861	40961			
	Load Govern State kw <sup>7</sup>	40062	40162	40262	40362	40462	40562	40662	40762	40862	40962			
	Load Govern State kvar <sup>8</sup>	40063	40163	40263	40363	40463	40563	40663	40763	40863	40963			
	Genset CB Position <sup>9</sup>	40064	40164	40264	40364	40464	40564	40664	40764	40864	40964			
	Utility CB Position <sup>10</sup>	40065	40165	40265	40365	40465	40565	40665	40765	40865	40965			
Genset Control	Start/Stop	40066	40166	40266	40366	40466	40566	40666	40766	40866	40966			
	Ċ	4000	40407	4000	10001	10101	101	10001	10101	1000	1000			

	ı			ı	1		
1State	Description	Stopped	Start Pending	Warmup at Idle	Running	Cooldown at Rated	Cooldown at Idle
	Digital Value	0	_	2	3	4	2

Description

Digital Value

0

(MSB)

0

Bit

<sup>4</sup>Extended tion Not Applicable

Ramp Load

<sup>7</sup>Load Govern State KW

Ramp Unload Done

Track Target Load

Ramp Unload

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0 က 4 2 9 Description

Digital Value

ω 0

0

10

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12 13 4

Genset Circuit Breaker Tripped

Utility Circuit Breaker Tripped

**Emergency Stop** 

Not Applicable

Ramp Load

<sup>8</sup>Load Govern State KVAR

2₽	<sup>2</sup> Fault Type
Digital Value	Description
0	Normal
1	Warning
2	Derate
3	Shutdown with Cooldown
4	Shutdown

4	Shutdown
38	SNEDA 440

3NFPA 110	
Description	Bit
Normal Power	0 (MSB)
Genset Supplying Load	-
Genset Running	2
Not in Auto	3
High Battery Voltage	4
Low Battery Voltage	2
Charger AC Failure	9
Fail to Start	7
Low Coolant Temperature	8
Pre-High Engine Temperature	6
High Engine Temperature	10

	<sup>1</sup> State	,
•	Description	Descript
	Stopped	Check Genset
	Start Pending	Ground Fault
	Warmup at Idle	High AC Voltage
	Running	Low AC Voltage
	Cooldown at Rated	
	Cooldown at Idle	Olidei Flequeilcy
		Overload
2Ε	<sup>2</sup> Fault Type	Overcurrent
4	Description	Short Circuit
	Normal	Reverse KW
	Warning	Reverse KVAR
	Derate	Fail to Sync
	Shutdown with Cooldown	000 \ 04  \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	Shutdown	all to Close
		Load Demand

<sup>5</sup> ES State	Description	Standby	Dead Bus Close	Synchronizing	Load Share	Load Govern
9	Digital Value	0	1	2	3	4

<sup>5</sup> ES State	Description	Standby	Dead Bus Close	Synchronizing	Load Share	Load Govern
	Digital Value	0	1	2	8	4

<sup>9</sup> Genset CB Position	Description	uedO	Closed	Unavailable	Inhibit
ense <sub>6</sub>	Digital Value	0	1	2	3

Ramp Unload Done

(LSB)

15

Track Target Load

2 က 4

Ramp Unload

<sup>10</sup> Utility CB Position	Description	Open	Closed	Unavailable	Inhibit
10 <b>Utilit</b>	Digital Value	0	l	7	8

Description

Digital Value 0

<sup>6</sup>Load Share State

Not in Load Share

Track Load Ramp Load

12 13 4 15

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Pre-Low Oil Pressure

Low Oil Pressure

Load Demand Shutdown

(LSB)

Ramp Unload

0 က 4

Overspeed

Low Coolant Level

Low Fuel Level

TABLE 16. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 3) AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T) (SHEET 1 OF 2)

Name   Langer   Name   Langer   Name   Nam	Stritoting	Osts Boint					ModBus Registers	Registers						Scaling	
Name [6,1]         40001         40101         40201         40101         40201         40101         40201         40101         40201         40101         40201         40102         40202         40502			NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	NCM[5]	NCM[6]	NCM[7]	NCM[8]	[6]WON	Multiplier	Offset	Units
Name [2.3]         40002         40102	S		40001	40101	40201	40301	40401	40501	40601	40701	40801	40901			
Name [4,5]         40003         40103         40203         40403         40403         40503         40603         40603         40703         40803         40603         40603         40704         40603         40704         40603         40604         40603         40604         40603         40603         40603         40603         40604         40603         40604         40603         40604         40603         40604         40603         40604         40604         40603         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40604         40606	•		40002	40102	40202	40302	40402	40502	40602	40702	40802	40902			
Name [677]         40004         40104         40204         40504	•		40003	40103	40203	40303	40403	40503	40603	40703	40803	40903			
Name [8,9]         40006         40106         40106         40106         40106         40106         40107         40206         40107         40207         40306         40107         40206         40107         40206         40107         40206         40107         40206         40107         40207         40306         40107         40107         40207         40307	•		40004	40104	40204	40304	40404	40504	40904	40704	40804	40904			
Name   10,11   40006   40106   40206   40306   40406   40506   40606   40706   40806   40906   40906   40000   40100   40100   40100   40100   40200   40309   40409   40509   40509   40700   40909   40909   40909   40009   40100	•		40005	40105	40205	40305	40405	40505	40605	40705	40805	40905			
Name [12,13]         40007         40107         40207         40308         40408         40507         40707         40708         40907           Name [14,15]         40008         40108         40208         40308         40408         40508         40608	•		40006	40106	40206	40306	40406	40506	40606	40706	40806	40906			
Name [14.15] 40006 40108 40208 40208 40208 40508 40508 40708 40808 40908   40908   40908   40909   40909   40909   40909   40909   40909   40909   40909   40909   40909   40909   40909   40909   40010   40110   40111   40211   40211   40411   40511   40511   40611   40711   40811   40911   40211   40211   40411   40511   40612   40712   40812   40912   40910   4	•		40007	40107	40207	40307	40407	40507	40607	40707	40807	40907			
Pericent Names   40009   40109   40209   40309   40409   40509   40609   40709   40800   40900   40900   40900   40900   40900   40900   40900   40901   40911   409	•		40008	40108	40208	40308	40408	40508	40608	40708	40808	40908			
Sizet	•		40009	40109	40209	40309	40409	40509	40609	40709	40809	40909			
State <sup>2</sup> 40011         40211         40211         40411         40411         40511         40611         40611         40711         40812         40812         40612         40612         40712         40812         40812         40812         40812         40813         40813         40813         40813         40813         40813         40813         40813         40814         40614         40614         40714         40614	•		40010	40110	40210	40310	40410	40510	40610	40710	40810	40910			
Fault Code         40012         40112         40212         40312         40413         40613         40613         40613         40613         40613         40613         40613         40613         40613         40813         40813           Percent Amps         40014         40114         40214         40214         40616         40716         40814         40814           NFPA 1104         40015         40116         40216         40316         40418         40516         40716         40814         40814           NFPA 1104         40016         40116         40216         40316         40418         40516         40716         40816         40916           Extended5         40017         40116         40216         40316         40418         40516         40716         40816         40816           Frequency         40018         40118         40218         40316         40418         40516         40716         40816         40816           Frequency         40018         40118         40218         40418         40518         40618         40718         40818         40918           Total kwa         400220         40120         40320         40420			40011	40111	40211	40311	40411	40511	40611	40711	40811	40911			
Fault Type <sup>3</sup> 40013         40113         40213         40314         40414         40614	•		40012	40112	40212	40312	40412	40512	40612	40712	40812	40912			
Percent Amps         40014         40114         40214         40214         40214         40215         40515         40515         40715         40715         40715         40914         40914           NEPA 1104         40016         40115         40215         40316         40416         40516         40716         40915         40916           NEPA 1104         40016         40116         40216         40317         40417         40617         40717         40816         40916           Extended*         40017         40117         40217         40318         40419         40620         40617         40718         40816           Total KW         40018         40119         40219         40219         40210         40421         40620         40718         40818         40918           Total KW         40020         40119         40221         40320         40420         40620         40718         40818         40918           Total KW         40022         40121         40221         40322         40422         40620         40720         40820         40920           Total KW         40022         40122         40322         40422         40620	•		40013	40113	40213	40313	40413	40513	40613	40713	40813	40913			
NFPA 110 <sup>4</sup> 40015         40115         40215         40316         40415         40415         40616         40716         40816         40916         40916         40916         40916         40916         40916         40916         40916         40916         40916         40916         40916         40916         40917         40817			40014	40114	40214	40314	40414	40514	40614	40714	40814	40914	0.5		%
NFPA 110 <sup>4</sup> 40016         40116         40216         40316         40416         40516         40616         40716         40916         40916         40916         40916         40917         40918         40918         40618         40618         40718         40918         40918         40619         40719         4092         4092         4092         4092         4092 <t< td=""><td>•</td><td></td><td>40015</td><td>40115</td><td>40215</td><td>40315</td><td>40415</td><td>40515</td><td>40615</td><td>40715</td><td>40815</td><td>40915</td><td></td><td></td><td></td></t<>	•		40015	40115	40215	40315	40415	40515	40615	40715	40815	40915			
Extended <sup>6</sup> 40017         40117         40217         40317         40417         40517         40617         40617         40617         40617         40617         40617         40617         40618         40718         40618         40718         40618         40718         40618         40618         40718         40818         40619         40719         40818         40619         40719         40818         40818         40618         40718         40818			40016	40116	40216	40316	40416	40516	40616	40716	40816	40916			
Frequency         40018         40118         40218         40418         40618         40618         40718         40818         40918           Total kva         40019         40119         40219         40319         40419         40619         40719         40819         40919           Total kva         40020         40120         40220         40320         40420         40520         40620         40720         40820           Total kva         40021         40121         40221         40322         40422         4052         40620         40720         40820           Volts ab         40022         40122         40222         40322         40423         40523         40623         40723         40823           Volts ab         40024         40224         40324         40424         40524         40627         40627         40827         40923           Volts ab         40024         40124         40524         40424         40524         40627         40627         40827         40923           Volts ab         40025         40126         40224         40224         40224         40626         40626         40726         40626         40626			40017	40117	40217	40317	40417	40517	40617	40717	40817	40917			
40019         40219         40319         40419         40519         40619         40719         40819         40819         40819         40819         40819         40819         40819         40819         40819         40819         40819         40819         40819         40820         40820         40820         40820         40820         40820         40820         40820         40820         40820         40820         40820         40821         40821         40821         40821         40821         40821         40821         40822         40822         40822         40822         40822         40822         40823         40823         40623         40623         40723         40823         40823         40823         40823         40823         40823         40823         40823         40823         40823         40624         40724         40724         40824         40624         40724         40824         40823         40923           40026         40126         40226         40226         40426         40526         40626         40726         40826         40926           40026         40126         40226         40426         40526         40626         40726         40826 </td <td>Load</td> <td></td> <td>40018</td> <td>40118</td> <td>40218</td> <td>40318</td> <td>40418</td> <td>40518</td> <td>40618</td> <td>40718</td> <td>40818</td> <td>40918</td> <td>0.1</td> <td></td> <td>Hz</td>	Load		40018	40118	40218	40318	40418	40518	40618	40718	40818	40918	0.1		Hz
40020         40120         40220         40320         40420         40620         40620         40720         40820         40920           40021         40121         40221         40321         40422         40522         40623         40722         40822         40923           40022         40122         40223         40324         40423         40523         40623         40723         40823         40923           40023         40123         40224         40324         40423         40623         40723         40823         40924           40024         40124         40224         40425         40624         40724         40824         40924           40026         40126         40226         40426         40526         40626         40726         40826         40926           40026         40126         40326         40426         40526         40626         40726         40826         40926           40028         40128         40326         40426         40526         40626         40726         40826         40926           40028         40128         40326         40429         40526         40626         40726         40826 <td></td> <td></td> <td>40019</td> <td>40119</td> <td>40219</td> <td>40319</td> <td>40419</td> <td>40519</td> <td>40619</td> <td>40719</td> <td>40819</td> <td>40919</td> <td>0.00005</td> <td></td> <td>H.</td>			40019	40119	40219	40319	40419	40519	40619	40719	40819	40919	0.00005		H.
40021         40121         40221         40421         40421         40521         40421         40522         40622         40722         40821         40921           40022         40122         40223         40423         40523         40623         40722         40822         40922           40023         40123         40223         40423         40523         40623         40723         40823         40923           40024         40124         40224         40424         40524         40624         40724         40823         40923           40025         40126         40226         40326         40426         40626         40726         40824         40924           40026         40126         40226         40426         40526         40626         40726         40826         40926           40028         40128         40228         40429         40528         40628         40726         40827         40926           40029         40129         40229         40429         40528         40629         40729         40829         40928           40030         40130         40329         40429         40529         40629         40729 <td></td> <td></td> <td>40020</td> <td>40120</td> <td>40220</td> <td>40320</td> <td>40420</td> <td>40520</td> <td>40620</td> <td>40720</td> <td>40820</td> <td>40920</td> <td>1.0</td> <td></td> <td>KVA</td>			40020	40120	40220	40320	40420	40520	40620	40720	40820	40920	1.0		KVA
40022         40122         40322         40422         40523         40622         40622         40622         40623         40623         40724         40823         40923         40623         40724         40823         40923         40923         40923         40623         40724         40824         40924         40924         40624         40724         40824         40924         40924         40924         40924         40624         40724         40824         40924         40924         40624         40724         40824         40924         40924         40624         40724         40824         40924         40924         40624         40724         40824         40924         40924         40624         40724         40824         40924         40924         40624         40724         40824         40924         40624         40724         40824         40926         40626         40726         40726         40726         40926         40627         40727         40827         40926           40028         40128         40428         40428         40528         40628         40728         40828         40928           40029         40129         40228         40429         40429 </td <td></td> <td></td> <td>40021</td> <td>40121</td> <td>40221</td> <td>40321</td> <td>40421</td> <td>40521</td> <td>40621</td> <td>40721</td> <td>40821</td> <td>40921</td> <td>1.0</td> <td></td> <td>KW</td>			40021	40121	40221	40321	40421	40521	40621	40721	40821	40921	1.0		KW
40023         40123         40233         40423         40524         40624         40724         40824         40624         40724         40824         40624         40724         40824         40624         40724         40824         40624         40724         40824         40624         40724         40824         40924         40924         40625         40726         40826         40927         40927         40927         40927         40928         40928         40928         40928         40928         40928         40929         40929         40929         40929 <th< td=""><td></td><td></td><td>40022</td><td>40122</td><td>40222</td><td>40322</td><td>40422</td><td>40522</td><td>40622</td><td>40722</td><td>40822</td><td>40922</td><td>1.0</td><td></td><td>KVAR</td></th<>			40022	40122	40222	40322	40422	40522	40622	40722	40822	40922	1.0		KVAR
40024         40124         40224         40424         40524         40624         40724         40824         40924         40925           40025         40125         40226         40425         40525         40626         40725         40825         40925           40026         40126         40226         40326         40426         40526         40626         40726         40826         40926           40027         40127         40227         40427         40627         40727         40827         40926           40028         40128         40328         40428         40528         40628         40728         40828         40928           40029         40129         40229         40428         40528         40629         40729         40829         40929           40030         40130         40230         40430         40530         40630         40730         40830         40930           40031         40131         40231         40431         40531         40632         40732         40832         40931           40032         40132         40432         40532         40632         40732         40833         40633         40633 <td>•</td> <td></td> <td>40023</td> <td>40123</td> <td>40223</td> <td>40323</td> <td>40423</td> <td>40523</td> <td>40623</td> <td>40723</td> <td>40823</td> <td>40923</td> <td>1.0</td> <td></td> <td>Volts</td>	•		40023	40123	40223	40323	40423	40523	40623	40723	40823	40923	1.0		Volts
40025         40125         40225         40425         40525         40625         40625         40625         40625         40626         40726         40826         40626         40726         40826         40926         40926         40626         40726         40726         40827         40827         40927           40027         40127         40227         4032         40428         40528         40628         40728         40827         40927           40028         40128         40228         40328         40428         40528         40629         40728         40829         40929           40030         40130         40230         40430         40530         40630         40730         40830         40930           40031         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40332         40432         40632         40732         40832         40932           40033         40133         40433         40633         40633         40732         40833         40933           40034         40134         40534         40634         40634         40634			40024	40124	40224	40324	40424	40524	40624	40724	40824	40924	1.0		Volts
40026         40126         40226         40326         40426         40527         40627         40627         40727         40827         40926           40027         40127         40227         40328         40428         40527         40628         40728         40828         40928           40028         40128         40228         40328         40429         40529         40629         40729         40829         40928           40030         40130         40229         40329         40429         40530         40630         40729         40829         40929           40031         40130         40230         40430         40530         40630         40730         40830         40930           40032         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40332         40433         40533         40633         40733         40833         40933           40034         40034         40434         40534         40634         40634         40634         40634         40634         40634         40634         40634         40634         40634         4063			40025	40125	40225	40325	40425	40525	40625	40725	40825	40925	1.0		Volts
40027         40127         40227         40327         40427         40528         40628         40728         40628         40728         40628         40728         40827         40928           40028         40128         40328         40428         40528         40629         40729         40828         40928           40030         40129         40229         40429         40529         40629         40729         40829         40929           40031         40130         40230         40430         40530         40630         40730         40830         40930           40032         40132         40232         40431         40631         40631         40731         40831         40931           40033         40133         40433         40532         40632         40732         40832         40932           40034         40134         40533         40633         40633         40733         40833         40933           40034         40134         40434         40534         40634         40634         40634         40634         40634         40634         40634         40634         40634         40634         40634         40634         4063			40026	40126	40226	40326	40426	40526	40626	40726	40826	40926	1.0		Volts
40028         40128         40228         40428         40528         40628         40728         40828         40928           40029         40129         40329         40429         40529         40629         40729         40829         40929           40030         40130         40330         40430         40530         40630         40730         40830         40930           40031         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40432         40432         40632         40732         40832         40933           40034         40133         40433         40533         40633         40633         40833         40934           40034         40134         40534         40633         40633         40734         40834         40934           40034         40134         40434         40634         40634         40734         40834         40934			40027	40127	40227	40327	40427	40527	40627	40727	40827	40927	1.0		Volts
40029         40129         40229         40429         40529         40629         40729         40829         40929           40030         40130         40230         40430         40530         40630         40730         40830         40930           40031         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40232         40332         40432         40532         40632         40732         40832         40932           40034         40133         40433         40533         40633         40732         40833         40933           40034         40134         40434         40534         40634         40734         40833         40933			40028	40128	40228	40328	40428	40528	40628	40728	40828	40928	1.0		Volts
40030         40130         40230         40430         40530         40630         40730         40830         40930           40031         40031         40331         40431         40531         40631         40731         40831         40931           40032         40132         40232         40432         40532         40632         40732         40832         40932           40033         40133         40233         40433         40533         40633         40733         40833         40933           40034         40134         40434         40534         40634         40734         40834         40934			40029	40129	40229	40329	40429	40529	40629	40729	40829	40929	1.0		Amps
40031         40131         40231         40431         40531         40631         40731         40831         40931           40032         40132         40232         40432         40532         40633         40733         40832         40933           40034         40134         40134         40534         40634         40733         40833         40934			40030	40130	40230	40330	40430	40530	40630	40730	40830	40930	1.0		Amps
40032         40132         40233         40432         40532         40632         40732         40733         40832         40932           40033         40133         40233         40333         40433         40533         40633         40733         40833         40933           40034         40134         40234         40334         40434         40534         40634         40734         40834         40934			40031	40131	40231	40331	40431	40531	40631	40731	40831	40931	1.0		Amps
40033         40133         40233         40433         40633         40633         40734         40734         40834         40934           40034         40134         40234         40434         40534         40634         40734         40834         40934			40032	40132	40232	40332	40432	40532	40632	40732	40832	40932	9.0		%
40034         40134         40234         40334         40434         40534         40634         40734         40834         40934			40033	40133	40233	40333	40433	40533	40633	40733	40833	40933	0.5		%
Data = Multiplier x (R <sub>1</sub>			40034	40134	40234	40334	40434	40534	40634	40734	40834	40934	0.5		%
													Data = M	ultiplier x Offset)	(Register +

TABLE 16. MODLON REGISTER MAPPING INFORMATION – FT-10 NETWORK (TEMPLATE 3) AUTOMATIC TRANSFER SWITCH CONTROL COMMUNICATIONS MODULE (CCM-T) (SHEET 2 OF 2)

						֓֞֜֜֜֜֜֜֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֜֜֜֓֓֓֓֡֜֜֜֡֓֓֡֓֜֡֡֓֜֡֓֜							:	
Structure	Data Point					Modbus Registers	registers						Scaling	
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	NCM[5]	NCM[6]	NCM[7]	NCM[8]	NCM[9]	Multiplier	Offset	Units
nvoACDataSrc1	Frequency	40035	40135	40235	40335	40435	40535	40635	40735	40835	40935	0.1		Hz
	Total pf	40036	40136	40236	40336	40436	40536	40636	40736	40836	40936	0.00005		PF
	Total kva	40037	40137	40237	40337	40437	40537	40637	40737	40837	40937	1.0		KVA
	Total kW	40038	40138	40238	40338	40438	40538	40638	40738	40838	40938	1.0		KW
	Total kvar	40039	40139	40239	40339	40439	40539	40639	40739	40839	40939	1.0		KVAR
	Volts ab	40040	40140	40240	40340	40440	40540	40640	40740	40840	40940	1.0		Volts
	Volts bc	40041	40141	40241	40341	40441	40541	40641	40741	40841	40941	1.0		Volts
	Volts ca	40042	40142	40242	40342	40442	40542	40642	40742	40842	40942	1.0		Volts
	Volts a	40043	40143	40243	40343	40443	40543	40643	40743	40843	40943	1.0		Volts
	Volts b	40044	40144	40244	40344	40444	40544	40644	40744	40844	40944	1.0		Volts
	Volts c	40045	40145	40245	40345	40445	40545	40645	40745	40845	40945	1.0		Volts
	Ampsa	40046	40146	40246	40346	40446	40546	40646	40746	40846	40946	1.0		Amps
	Amps b	40047	40147	40247	40347	40447	40547	40647	40747	40847	40947	1.0		Amps
	Amps c	40048	40148	40248	40348	40448	40548	40648	40748	40848	40948	1.0		Amps
•	Percent Amps a	40049	40149	40249	40349	40449	40549	40649	40749	40849	40949	0.5		%
•	Percent Amps b	40050	40150	40250	40350	40450	40550	40650	40750	40850	40950	0.5		%
•	Percent Amps c	40051	40151	40251	40351	40451	40551	40651	40751	40851	40951	0.5		%
nvoACDataSrc2	Frequency	40052	40152	40252	40352	40452	40552	40652	40752	40852	40952	0.1		Hz
	Total pf	40053	40153	40253	40353	40453	40553	40653	40753	40853	40953	0.00005		PF
	Total kva	40054	40154	40254	40354	40454	40554	40654	40754	40854	40954	1.0		KVA
	Total kW	40055	40155	40255	40355	40455	40555	40655	40755	40855	40955	1.0		ΚM
	Total kvar	40056	40156	40256	40356	40456	40556	40656	40756	40856	40956	1.0		KVAR
	Volts ab	40057	40157	40257	40357	40457	40557	40657	40757	40857	40957	1.0		Volts
	Volts bc	40058	40158	40258	40358	40458	40558	40658	40758	40858	40958	1.0		Volts
	Volts ca	40059	40159	40259	40359	40459	40559	40659	40759	40859	40959	1.0		Volts
	Volts a	40060	40160	40260	40360	40460	40560	40660	40760	40860	40960	1.0		Volts
	Volts b	40061	40161	40261	40361	40461	40561	40661	40761	40861	40961	1.0		Volts
	Volts c	40062	40162	40262	40362	40462	40562	40662	40762	40862	40962	1.0		Volts
	Amps a	40063	40163	40263	40363	40463	40563	40663	40763	40863	40963	1.0		Amps
	Amps b		40164	40264	40364	40464	40564	40664	40764	40864	40964	1.0		Amps
	Amps c	40065	40165	40265	40365	40465	40565	40665	40765	40865	40965	1.0		Amps
	Percent Amps a	40066	40166	40266	40366	40466	40566	40666	40766	40866	40966	0.5		%
	Percent Amps b	40067	40167	40267	40367	40467	40567	40667	40767	40867	40967	0.5		%
	Percent Amps c	40068	40168	40268	40368	40468	40568	40668	40768	40868	40968	0.5		%
Control	Test	40069	40169	40269	40369	40469	40569	40669	40769	40869	40969			
	Reset	40070	40170	40270	40370	40470	40570	40670	40770	40870	40970			
												Data = Mu	ıltiplr x (Re	Data = Multiplr x (Reg + Offset)

<sup>5</sup> Extended		
Description	B	Bit
Source 1 Available	0	(MSB)
Source 2 Available	~	
Source 1 Connected	2	
Source 2 Connected	ဗ	
ATS Common Alarm	4	
Not In Auto	2	
Test / Exercise in Progress	9	
Low Battery Voltage	7	
Load Shed	8	
Transfer Inhibit	6	
Retransfer Inhibit	10	
Fail to Close	11	
Fail to Disconnect	12	
Fail to Synchronize	13	
Bypass to Source 1	14	
Bypass to Source 2	15	(LSB)

<sup>4</sup> NFPA 110		
Description	ш	Bit
Source 1 Connected	0	(MSB)
Source 2 Connected	-	
N/A	2	
Not In Auto	3	
N/A	4	
N/A	2	
Charger AC Failure	9	
W/A	7	
W/A	8	
W/A	6	
W/A	10	
W/N	11	
W/A	12	
W/A	13	
N/A	14	
N/A	15	(LSB)

	¹Mode
Digital Value	Description
0	Test
1	Utility/Genset
2	Utility/Utility
3	Genset/Genset

	∠State
Digital Value	Description
0	Neutral Position
ı	Source 1 Connected
7	Source 2 Connected
ε	Source 1 and 2 Connected
)	<sup>3</sup> Fault Type
Digital Value	Description

No Faults Warning

0

	<sup>2</sup> State
Digital Value	Description
0	Neutral Position
1	Source 1 Connected
2	Source 2 Connected
3	Source 1 and 2 Connected

TABLE 17. MODLON REGISTER MAPPING INFORMATION – TEMPLATE 5 (TP/XF-78 MAPPING)
POWERCOMMAND GENSET

			Mod	Bus Regis	sters			Scaling	
Structure	Data Point	GCM[0]	GCM[1]	GCM[2]	GCM[3]	GCM[4]	Multiplier	Offset	Units
Status	state <sup>1</sup>	41001	41101	41201	41301	41401			
	Extended <sup>4</sup>	41002	41102	41202	41302	41402			
	fault_type <sup>2</sup>	41003	41103	41203	41303	41403			
	fault_code*	41012	41112	41212	41312	41412			
	Percent_kw	41026	41126	41226	41326	41426	0.5		&
AC Data (Load)	volts_a	41014	41114	41214	41314	41414			VAC
	volts_b	41015	41115	41215	41315	41415			VAC
	volts_c	41016	41116	41216	41316	41416			VAC
	freq	41017	41117	41217	41317	41417	0.1		Hz
	amps_a	41018	41118	41218	41318	41418			А
	amps_b	41019	41119	41219	41319	41419			А
	amps_c	41020	41120	41220	41320	41420			А
	total_pf	41024	41124	41224	41324	41424	0.00005		
	total_kw	41025	41125	41225	41325	41425			kW
Engine Data	oil_press	41029	41129	41229	41329	41429	0.1		KPA
	oil_temp (see Note 2)	41030	41130	41230	41330	41430	0.1		Deg Kelvin
	Coolant temp	41031	41131	41231	41331	41431	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	41033	41133	41233	41333	41433	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	41034	41134	41234	41334	41434	0.1		Deg Kelvin
	battery_volts	41035	41135	41235	41335	41435	0.1		VDC
	Engine runtime (low)	41036	41136	41236	41336	41436	0.1		h
	Engine runtime (high)	41037	41137	41237	41337	41437	1000		h
	engine_starts	41038	41138	41238	41338	41438			
	engine_rpm	41039	41139	41239	41339	41439	0.1		rpm
Genset Control	Start/Stop	41040	41140	41240	41340	41440			
	Reset	41041	41141	41241	41341	41441			
	Emergency Stop	41042	41142	41242	41342	41442			
* Fault codes are	listed in the genset (	Operator's/	Service Ma	anuals.		•	Data = Mu	Itiplier x (Re	gister + Offset)

#### NOTES:

- 1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
- 2. Value not supported in the 3200 controller.
- 3. Value not supported in the 3100 controller.
- 4. Value not supported.
- 5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1. For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

<sup>1</sup> St	ate
Digital Value	Description
0	Power Up
1	Stopped
2	Cranking
3	Running
4	Shutdown with Run
5	Shutdown without Run

	25	Status		
Data Point	Bit	PCC 2100	PCC 3100	PCC 3200
Common Alarm	0 (LSB)	N/A	Х	N/A
Load Dump	1	N/A	Х	N/A
Genset CB Position	2	N/A	Х	N/A
Leading Power Factor	3	Х	Х	Х
Ready To Load	4	N/A	Х	N/A
Control Switch - Run	5	Х	Х	Х
Control Switch – Auto	6	Х	Х	Х
Genset Start Delay	7	N/A	Х	N/A
Genset Stop Delay	8	N/A	Х	N/A
Load Demand	9	N/A	Х	N/A
Paralleling Genset	10	N/A	Х	N/A
Remote Start	11	N/A	N/A	N/A
Right Coolant Sensor	12	N/A	N/A	N/A
Exhaust 1 Installed	13	N/A	Х	N/A
Exhaust 2 Installed	14	N/A	Х	N/A
Genset CB Inhibit	15 (MSB)	N/A	Х	N/A

<sup>3</sup> Fault Type					
Digital Value	Description				
0	Normal				
1	Warning				
2	Shutdown				

TABLE 18. MODLON REGISTER MAPPING INFORMATION – TEMPLATE 5 (TP/XF-78 MAPPING) DIGITAL INPUT/OUTPUT MODULE

<b>2</b>	Data Balar	ModBus Register		
Structure	Data Point	DIM[0]	DIM[1]	
Node Status	relay 1, relay 2	42001	42101	
	relay 3, relay 4	42002	42102	
	relay 5, relay 6	42003	42103	
	relay 7, relay 8	42004	42104	
	relay 9, relay 10	42005	42105	
	relay 11, relay 12	42006	42106	
	relay 13, relay 14	42007	42107	
	relay 15, relay 16	42008	42109	
	input 1, input 2	42009	42109	
	input 3, input 4	42010	42110	
	input 5, input 6	42012	42112	
	input 7, input 8	42013	42113	
Relay Control	All 16 Relays	42011	42111	

TABLE 19. MODLON REGISTER MAPPING INFORMATION – TEMPLATE 5 (TP/XF-78 MAPPING)
CONTROLS COMMUNICATION MODULE

Structure Data Point	Data Daint	ModBus Register				Scaling			
	CCM[0]	CCM[1]	CCM[2]	CCM[3]	CCM[4]	Multiplier	Offset	Units	
Node Status	inputs 116	40001	40101	40201	40301	40401			
	inputs 1732	40002	40102	40202	40302	40402			
	relay 1, relay 2	40003	40103	40203	40303	40403			
	relay 3, relay 4	40004	40104	40204	40304	40404			
AC Data (Load)	volts_a	40005	40105	40205	40305	40405			VAC
	volts_b	40006	40106	40206	40306	40406			VAC
	volts_c	40007	40107	40207	40307	40407			VAC
	freq	40008	40108	40208	40308	40408	0.1		Hz
	amps_a	40009	40109	40209	40309	40409			Α
	amps_b	40010	40110	40210	40310	40410			Α
	amps_c	40011	40111	40211	40311	40411			Α
	percent_amps_a	40012	40112	40212	40312	40412	0.5		%
	percent_amps_b	40013	40113	40213	40313	40413	0.5		%
	percent_amps_c	40014	40114	40214	40314	40414	0.5		%
	total_pf	40015	40115	40215	40315	40415	0.00005		
	total_kw	40016	40116	40216	40316	40416			kW
	percent_kw	40017	40117	40217	40317	40417	0.005		%
	total_kvar	40018	40118	40218	40318	40418			kVAR
	total_mwh	40019	40119	40219	40319	40419			MWh
Engine Data	Coolant temp	40020	40120	40220	40320	40420	0.1		Deg Kelvin
(Genset Only)	Oil temp	40021	40121	40221	40321	40421	0.1		Deg Kelvin
	Misc temp1 (See Note 4)	40022	40122	40222	40322	40422	0.1		Deg Kelvin
	oil_press	40023	40123	40223	40323	40423	0.1		KPA
	battery_volts	40026	40126	40226	40326	40426	0.1		VDC
Spare Analog	spare2	40024	40124	40224	40324	40424	0.1		User-Defined
Relay Control	Control1	40027	40127	40227	40327	40427			
	Control2	40028	40128	40228	40328	40428			
							Data = Mu	Itiplier x (Re	gister + Offset)

#### NOTES:

- For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as
  an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the
  low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
- 2. Value not supported in the 3200 controller.
- 3. Value not supported in the 3100 controller.
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- 5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1. For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.