

## Generator Set Applications FT-10 Network Control Communications Module (CCM-G) Kit 541–0810

### GENERAL INFORMATION

This kit contains one Control Communications Module (CCM-G) with housing. This instruction sheet describes mounting the housing to a wall and connecting the generator set (genset) monitoring and control leads between the CCM-G and a genset equipped with a Detector™ or DK type of control in a PowerCommand® FT-10 network. The CCM-G can also be used with a non-CPG (Cummins Power Generation) genset. Thoroughly review these instructions before starting the installation.

This kit must be installed by trained and experienced generator set and transfer switch service personnel only or equipment failure and damage can result.

**⚠ CAUTION** *Electrostatic discharge will damage circuit boards. To prevent damage, do not handle circuit boards unless you are adequately grounded with a wrist strap. Use a protective shipping bag for storing or transporting circuit boards.*

The CCM-G can be used to monitor and control a genset. It provides a PowerCommand FT-10 Network interface for remote monitoring and control. The relay outputs on the CCM-G provide a limited amount of control of the monitored equipment from the network. For example, these outputs can be used to remotely start a genset.

Refer to Table 2 for the maximum distance between the CCM-G and the current transformers (CTs). Use the part number on the CTs or contact an authorized parts distributor with the genset model and spec number to determine if a CT kit is required. If a CT kit is needed, install it before performing the CCM-G installation. Refer to the instructions provided with the CT kit.

When each of the steps in this installation are complete, the CCM-G is ready for connection to a network. Refer to the *PowerCommand Network Installation and Operation Manual (900–0529)* for instructions on network wiring, network software installation, and connection of the CCM-G to the network.

### CCM-G Inputs

The CCM-G has 16 channels of analog input and 32 digital inputs. Most of the analog channels are configured for monitoring signals found on a genset (AC volts, current, oil temp, oil pressure, coolant temp, exhaust temp, etc., see Figures 7 and 8). The spare analog inputs are for signal monitoring (4-20 mA, 0-1 mA, 0-5V). The sensor inputs are used for monitoring temperature or pressure. The three temperature inputs accept RTD values between 80 and 2200 ohms. The pressure input can be used generically with any sensor that provides 0-9 VDC.

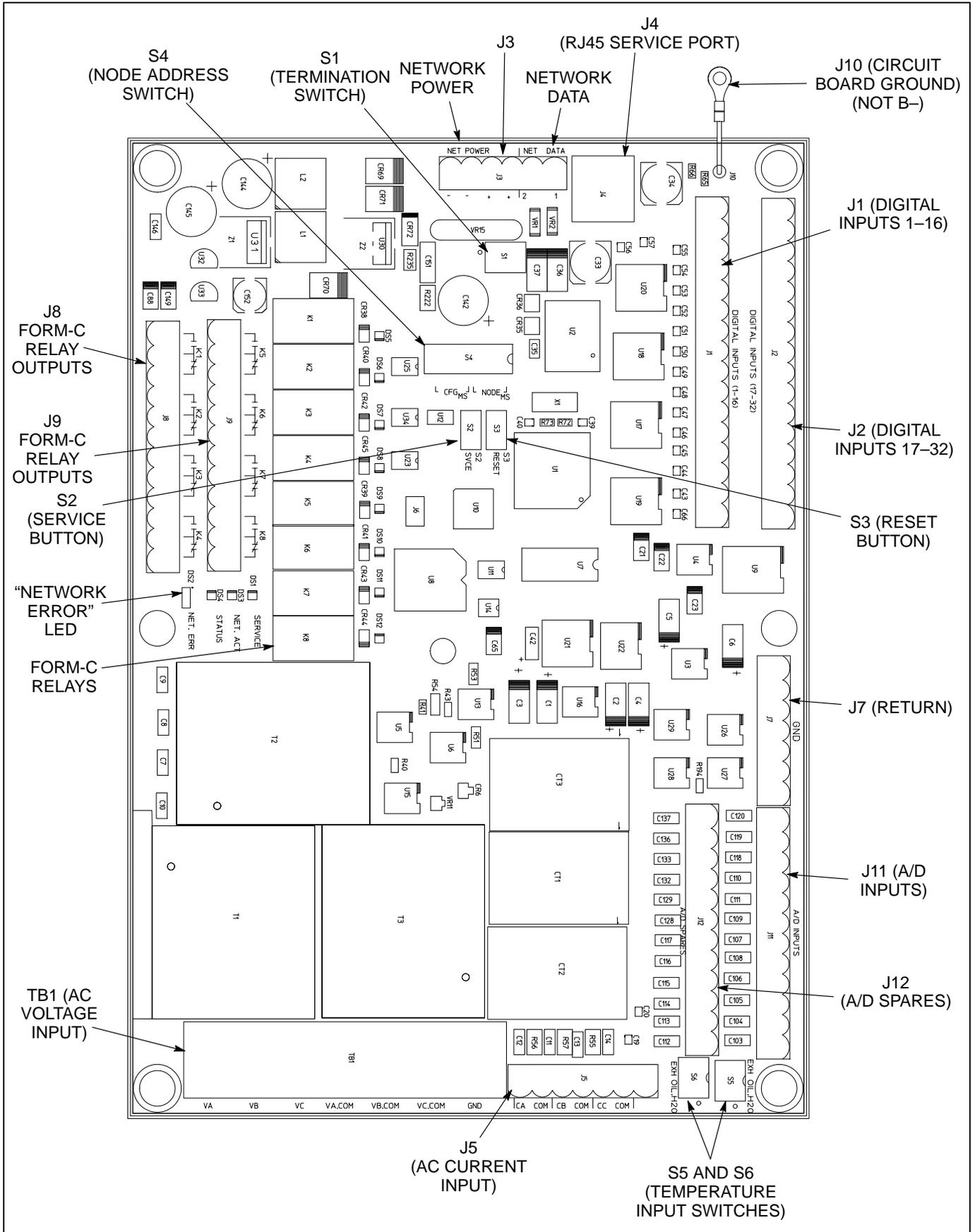
The 32 discrete inputs permit monitoring of numerous status/fault conditions. These inputs must be referenced back to either analog ground (J7) through dry contacts or through a pulldown resistor when active “OPEN” input is +5 to +36 VDC (see notes 6 and 17 in Figure 8).

The values of the analog and discrete inputs are read from the network.

### CCM-G Outputs

The CCM-G has eight 250 volt, 3 amp Form-C relay outputs (see Figure 1). The relays are controlled from the network and are used to transmit start/stop/reset control signals and five customer-defined events.

**External devices that are wired to these relays should be fused appropriately to prevent damage to the CCM-G.**



**FIGURE 1. GENERATOR SET CONTROL COMMUNICATIONS MODULE**

**CCM-G Power Supply**

For genset applications, the 12- or 24-volt genset starting battery(ies) are used to power the CCM-G. See the wire size chart in Figure 5. The genset must have a battery charger capable of maintaining the starting battery(ies) with the CCM-G load.

Refer to the *PowerCommand Network Installation and Operation Manual* (900-0529) for a detailed description of *Network Power* and *Network Power Wire Sizing* requirements.

**Standard Displays**

Solid state indicators are provided to aid in diagnosis of module operating status. These include a service LED for the Neuron<sup>®</sup> chip, a running LED on the main processor, and LEDs to show when the relays are activated.

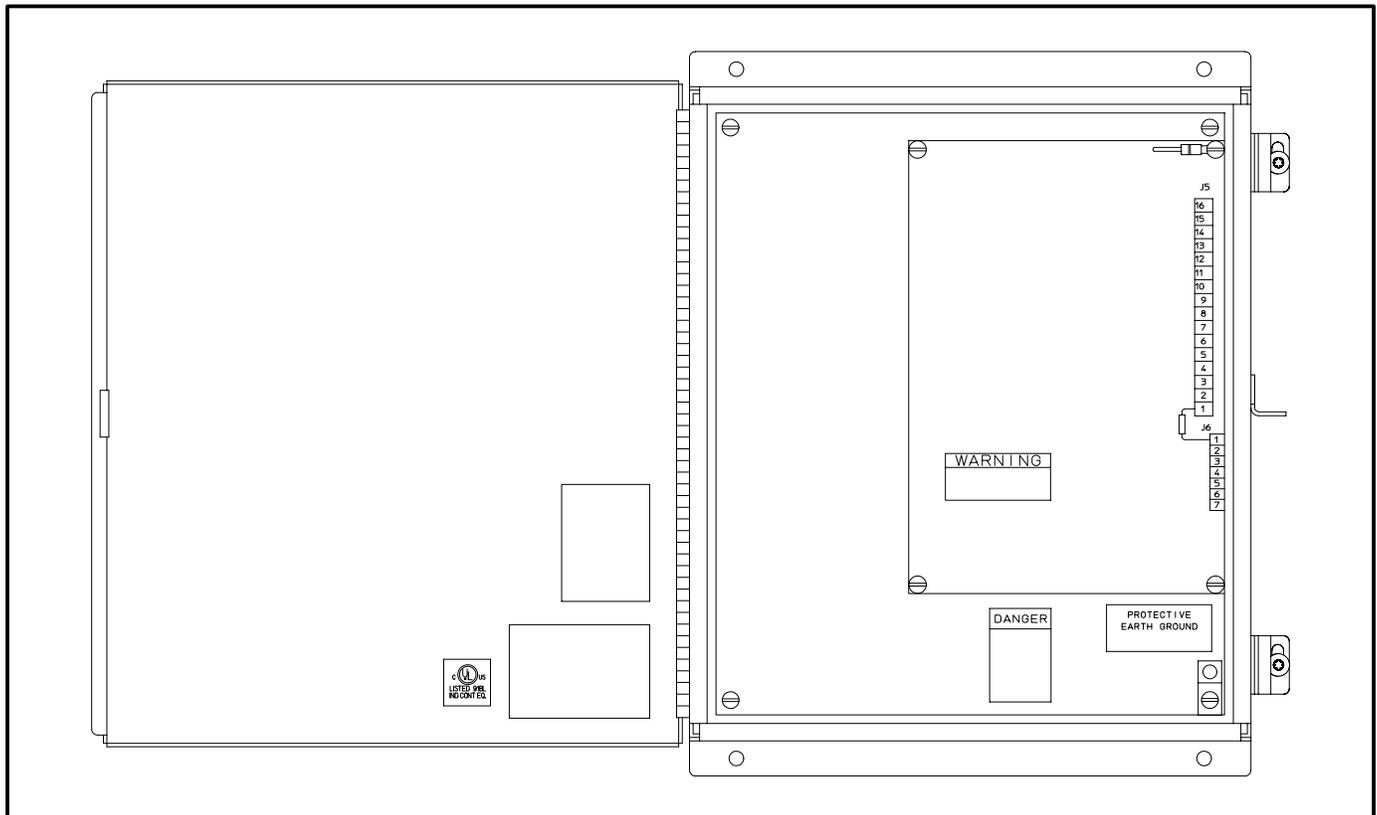
**PHYSICAL INSTALLATION**

**Location**

Mount the CCM-G control box as close as possible to the genset so the wire size can be kept to a minimum.

The CCM-G is preassembled inside an enclosure that is designed for wall mounting (see Figure 2). Choose a clean, vibration-free mounting surface near the genset. Avoid locations that are hot, damp or dusty. The temperature range must not exceed -40°F (-40°C) to 158°F (70°C).

Refer to the *PowerCommand Network Installation and Operation Manual* (900-0529) for network topology and maximum network length.



**FIGURE 2. CONTROLS COMMUNICATIONS MODULE (CCM-G) CONTROL BOX**

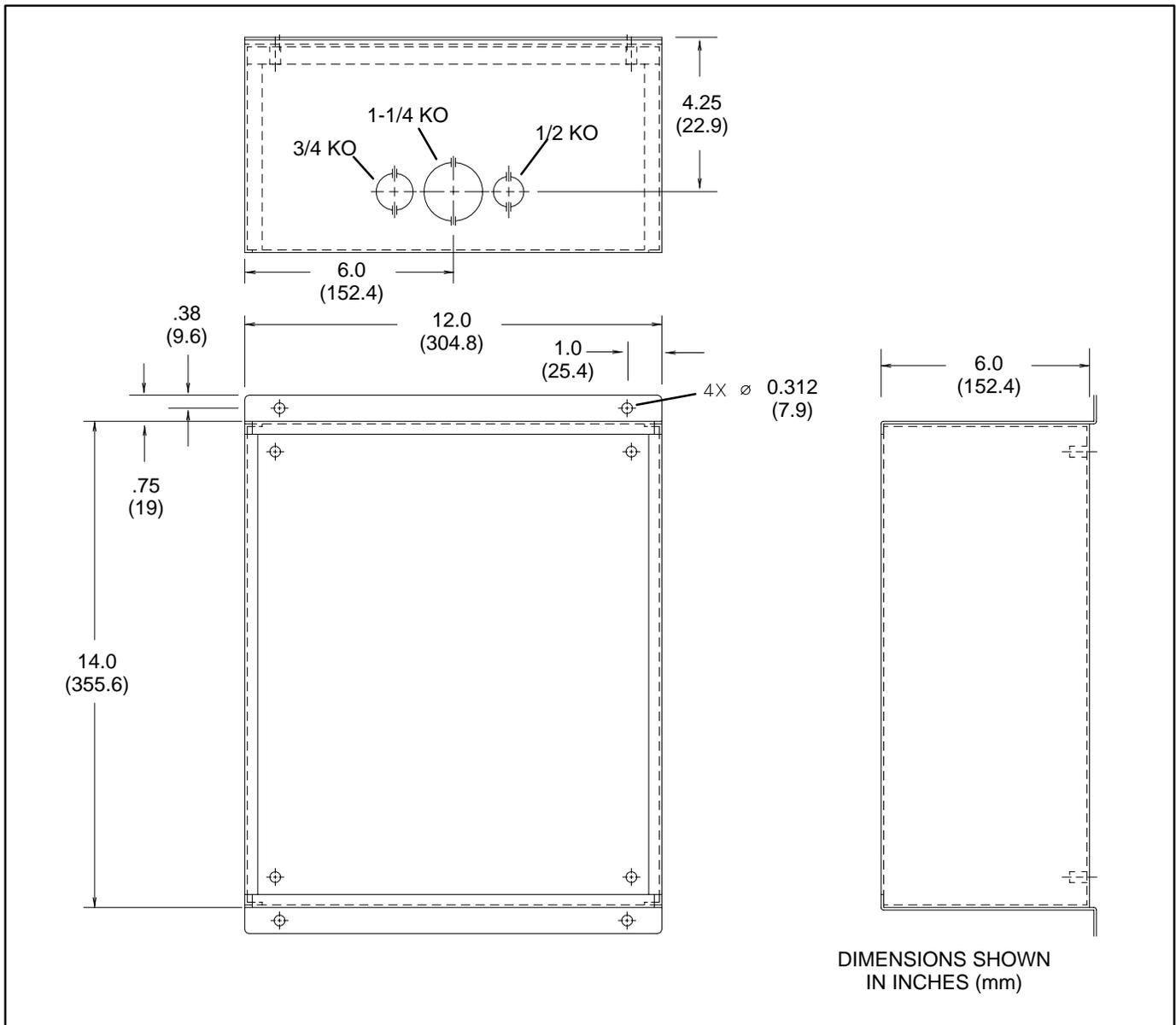
## Control Box Mounting

Figure 3 shows the CCM-G mounting box outline dimensions. The outside dimensions do not include clearance for wire connections. When the mounting location and wire routing are determined (see Wiring Connections section), make holes in the control box for AC, DC, and data wire routing. Be careful not to damage the CCM-G module. If the CCM-G is removed during mounting, make sure the ground lead

is reconnected to the mounting stud when reinstalling the CCM-G.

**⚠ CAUTION** *Installation debris can cause equipment failure and damage. Use extreme care to keep drill chips and filings out of the CCM-G control box. Use tools carefully to prevent damage to components.*

Make sure that no wires, plumbing, gas or exhaust lines run behind the wall before drilling the mounting holes.



**FIGURE 3. CCM-G BOX MOUNTING**

## WIRE AND CONDUIT

Measure the distance, one way, between the CCM-G mounting location and the genset control. Refer to the wire size chart in Figure 5 to determine the appropriate wire gauge for CT wires, power supply wires and monitor and control wires (see Table 2 for additional CT wire information). Use stranded wire with a minimum insulation rating of 600V and a temperature rating of 105°C.

Run a conduit for the AC wire connections and a separate conduit for the DC wire connections between the CCM-G and the genset control. Install at least 2 feet (610 mm) of flexible conduit on both lines at the genset control box connection to allow for genset vibration during operation. Round off or cover the ends of the conduit to prevent sharp edges from cutting the insulation. Use waterproof conduit if it will be exposed to moisture.

The number of leads pulled through each conduit will be determined by the type of genset control and the desired monitor and control features selected. Refer to the table in Figure 5 for a list of the possible AC and DC connections. Number both ends of each lead for identification before pulling the wire through the conduit.

Grounding must comply with all codes. Mount the enclosed grounding lug inside the mounting box (refer to the instructions provided with the lug). Make sure the paint is removed from the ground lug mounting location to provide a good ground.

## WIRING CONNECTIONS

This section describes connecting the CCM-G to a genset with a Detector or DK type of control. Figures 5 and 6 show the interconnect wiring diagram specifically for the CCM-G to Detector or DK control. (Figures 5 and 6 apply to both 7-light and 12-light Detector controls. Connections for Low Fuel, Low Engine Temp, Fault 1 and Fault 2 are not available from the 7-light control.)

Figures 7 and 8 provide basic CCM-G interconnect wiring diagram information, review the notes on Figures 7 and 8 and use these drawings for reference.

**⚠WARNING** *Accidental starting of the generator set while working on it can cause severe injury or death. Disconnect the battery cables to prevent accidental starting. Be sure to move the generator set operation selector switch to Stop, disconnect the battery charger, disconnect the starting battery (negative [-] lead first).*

**⚠WARNING** *Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark or flame while servicing batteries.*

**⚠CAUTION** *Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits of the generator set.*

1. Before making any wiring connections, make sure the genset cannot be started by moving the RUN/STOP/REMOTE switch to STOP. Disconnect the power to the battery charger and disconnect the starting battery (negative [-] battery cable[s] first).
2. Refer to Figures 5 and 6 for point-to-point wiring information and component and terminal locations. Follow standard wiring practices. Properly secure wire terminals. Secure wires in the terminal blocks to 2 inch-lbs. (0.23 N•m). Observe wire gauge requirements for CT wires, power supply wires and monitor and control wires.
3. The table in Figure 5 identifies the DC and AC connections. The DC leads must be run inside a separate conduit from the AC leads.

It may be easiest to start at the top of the table with the DC connections and make all the connections inside the CCM-G control box. Then move to the genset control to complete the wiring. Make sure that each lead is marked and pay close attention to the associated notes in the wiring table. Some connections are for jumpers inside the CCM-G only.

4. When making connections inside the genset control, provide enough wire so that the leads can be secured to the existing harness. Leads that connect to components on the control panel door should be routed near the hinges and be secured to the existing leads.
5. Connect the data wire to the CCM-G and provide an adequate length of twisted pair wire for future connection to a junction box. Tighten the tamperproof control box mounting screws securely to prevent tampering.
6. The module is now ready for network wiring. Network wiring must be done by a trained network installer. Refer to the *PowerCommand Network Installation and Operation Manual* (900-0529) for instructions on network wiring

the CCM-G and for installation and connection of this module to the network.

7. Set the Temperature Input switches (see Figure 1) to either “EXH” (80–390 ohm exhaust temperature RTD) or “OIL.H2O” (500–2200 ohm oil/water temperature RTD). For more information, see the Controls Communications Module section of the *PowerCommand Network Installation and Operation Manual (900–0529)*.

8. If the CCM-G is terminated, the termination switch S1 must be set (see Figure 1). This is accomplished by moving it to the ON or TERM position.

**NOTE:** For free topology, only one device on each segment must be terminated. Multidrop bus topology requires termination at each end of the bus using multidrop bus terminators (Echelon P/N 44101), or the device terminator switch.

9. When the network installation is complete, reconnect battery (negative [–] battery cable[s] last), reconnect battery charger and return the genset control switch to the Remote position.

## SELF-INSTALLATION

### Requirements

This procedure can be used to logically install the CCM-G when the following requirements are met.

Self-installation is limited to one PowerCommand Genset or CCM-G, one PowerCommand Automatic Transfer Switch (ATS) or CCM-T, and no more than four annunciators or five DIMs. The CCM-G can be autobound by an ATS and up to two annunciators and two DIMs, but by no more than a total of three annunciators and DIMs.

With networks containing a transfer switch, the genset CCM-G must be logically installed before the transfer switch is logically installed and before the annunciators, DIMs, and other network devices are logically installed.

**NOTE:** The CCM-G must be installed first.

If these requirements cannot be met, the system must be installed with LonMaker™. Refer to “Lon-Maker Installation” on Page 8.

### Node Address

Each node on a self-installed network must have a unique address. Switches 1 through 4 of switch S4 are used to set the *Node Address* (see Figure 4). The default node address is 0001, which is a “STATUS” LED pulse rate of 1.

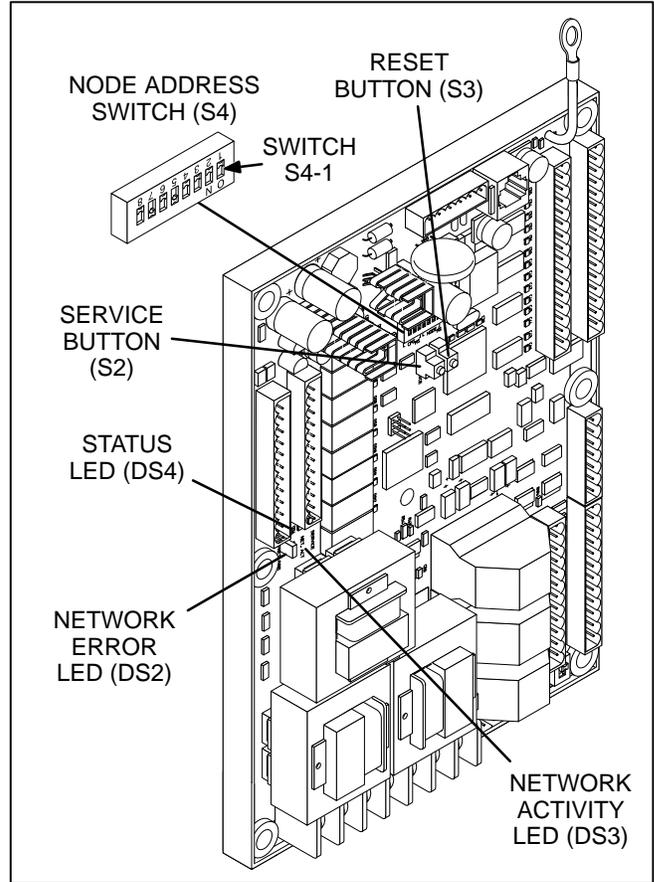


FIGURE 4. NODE ADDRESS SWITCH

The switches are oriented so that switch S4-1 is the most significant bit (MSB) of the *Node Address*. Thus, S4-1 has a value of “8” when it is ON. S4-2 has a value of 4, S4-3 has a value of 2, and S4-4 has a value of 1. For example, to set the *Node Address* to 9, set switch S4 to 1001 (8+0+0+1=9). See Table 1.

TABLE 1. SETTING THE NODE ADDRESS (S4)

S4-1 (8)	S4-2 (4)	S4-3 (2)	S4-4 (1)	Address (binary)	Address (decimal)
OFF	OFF	OFF	OFF	0000	0 <sup>1</sup>
OFF	OFF	OFF	ON	0001	1
OFF	OFF	ON	OFF	0010	2
				↓	↓
ON	ON	ON	ON	1111	15

NOTE 1. “0” (zero) is not a valid *Node Address*.

Be sure to assign each node in the network a unique address.

After the device has been installed, the *Node Address* can be verified by counting the number of pulses of the “STATUS” LED (DS4) (see Figure 5). Make sure each device has a unique node address.

After the genset has been installed, a DIM, annunciator, or ATS may bind to the genset. Because the genset does not execute the binding function, the genset must be installed first.

## Logical Installation

After the CCM-G is *physically* connected to the network, it is ready to be *logically* installed.

1. Make sure the CCM-G node and other network devices are powered and connected to the twisted-pair data bus.
2. Make sure S4-1, S4-2, S4-3, and S4-4 on the CCM-G are configured for the desired node address. Each device on the network must have a unique address.
3. Make sure the network is terminated.
4. Press and hold the *Service* button (S2) (see Figure 4) for approximately two seconds until the *Status* LED (DS4) begins flashing.
5. Release the *Service* button.

## Binding Sequence

Logically connecting to another device is referred to as *binding*. *Binding* may be done when all the nodes are installed, connected, and powered.

*Binding* the node must occur in the proper sequence. Logically install the genset first, followed by the transfer switch, and then the annunciator(s) and other network accessories.

**NOTE:** The genset (CCM-G) and ATS module must be Cummins Power Generation (CPG) devices which are able to self-install in the network. Each device on the network must have a unique address.

## Verify Binding

To verify the genset has installed itself properly and is bound to the ATS, disconnect the twisted-pair data cable at J30. The “Network Error” LED (DS2) (see Figure 4) should turn on (red) within 10 seconds. This indicates communications have failed and that the device was properly bound.

Reconnect the twisted pair cable and confirm that DS2 turns off within 10 seconds.

If no error is produced, use InPower™ to verify the *Test Interval* (located in the LONWORKS device folder from the Adjustments directory) is set for 10.0 seconds. Also check the wiring and Address of each node. Repeat the Self-Installation steps to re-initiate *binding*.

## Remove Bindings

If unresolved system errors occur, the bindings can be removed and then re-installed to reset the system. The bindings can also be removed if the network is being changed or the device is being moved to another network.

To remove all bindings from the device, change the *Node Address* (S4) to 0 (zero) and logically re-install the device.

The node will remove all bindings at this time, including the genset and annunciator bindings. The “STATUS” LED will not flash when the *Node Address* is 0, nor will it attempt to bind to a genset.

## Re-Binding

*Re-Binding* the node must occur in the proper sequence. Logically install the genset first, followed by the transfer switch; and then the annunciator(s), DIMs, and other network accessories.

To re-bind an annunciator to the genset node, press and hold the annunciator’s *Silence/Lamp Test* button or service pin for two seconds. To re-bind a DIM or ATS to the genset, press and hold the service pin for two seconds.

## LONMAKER INSTALLATION

The CCM-G can be manually installed with LonMaker. The Device Stencil is required.

LonMaker installation is required to use PowerCommand Software (PCW II). Self-installation does not require LonMaker.

To install using LonMaker:

1. Run LonMaker. Refer to the *PowerCommand Network Installation and Operation Manual (900-0529)*.

2. Open the Device Stencil.
3. Create a new site (or update an existing site).
4. Define, install, and bind devices.
5. Verify system operation.

The CCM-G is defined and installed like any other device in LonMaker where:

Device Type: "CCM GenSet"

**TABLE 2. CURRENT TRANSFORMER WIRE SIZE Vs. DISTANCE CHART**

CURRENT CTs MAXIMUM DISTANCE BETWEEN CT AND CCM (A CT KIT IS REQUIRED IF THE DISTANCE IS BLANK)						REPLACEMENT CTs (KIT NUMBERS GIVEN FOR REFERENCE ONLY, CONTACT YOUR AUTHORIZED PARTS DISTRIBUTOR FOR CURRENT LISTING)					
CT LIST	APPLICATION	RATIO	AWG #12 FEET (M)	AWG #14 FEET (M)	AWG #16 FEET (M)	CT KIT #	RATIO	AWG #12 FEET (M)	AWG #14 FEET (M)	AWG #16 FEET (M)	NOTES
302-1984-02	Genset(DK)	25/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	6-Turns
302-1984-02	Genset(DK)	50/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	3-Turns
302-1984-03	Genset(DK)	100/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	2-Turns
302-1984-03	Genset(DK)	50/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	4-Turns
302-1984-04	Genset(DK)	150/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	1-Turn
302-1984-04	Genset(DK)	75/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	2-Turns
302-1984-05	Genset(DK)	100/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	2-Turns
302-1984-05	Genset(DK)	200/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	1-Turn
302-1868-01	Genset(DG)	25/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	6-Turns
302-1868-01	Genset(DG)	50/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	3-Turns
302-1868-02	Genset(DG)	100/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	2-Turns
302-1868-02	Genset(DG)	50/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	4-Turns
302-1868-03	Genset(DG)	150/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	1-Turn
302-1868-03	Genset(DG)	75/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	2-Turns
302-1868-04	Genset(DG)	100/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	2-Turns
302-1868-04	Genset(DG)	200/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	1-Turn
302-1868-05	Genset(DG)	150/5				300-4864-03	300/5-150/5	41 (12.6)	26 (7.8)	16 (4.9)	1-Turn
302-1868-05	Genset(DG)	300/5				300-4864-03	300/5-150/5	291 (88.6)	181 (55.1)	114 (34.6)	1-Turn
302-1868-06	Genset(DG)	200/5				300-4864-04	400/5-200/5	41 (12.6)	26 (7.8)	16 (4.9)	1-Turn
302-1868-06	Genset(DG)	400/5				300-4864-04	400/5-200/5	166 (50.6)	103 (31.4)	65 (19.8)	1-Turn
302-1868-07	Genset(DG)	250/5				300-4864-05	500/5-250/5	41 (12.6)	26 (7.8)	16 (4.9)	1-Turn
302-1868-07	Genset(DG)	500/5				300-4864-05	500/5-250/5	291 (88.6)	181 (55.1)	114 (34.6)	1-Turn
302-1868-08	Genset(DG)	375/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-08	Genset(DG)	750/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-09	Genset(DG)	400/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-09	Genset(DG)	800/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-10	Genset(DG)	1000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-10	Genset(DG)	500/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-11	Genset(DG)	1200/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-11	Genset(DG)	600/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-12	Genset(DG)	1500/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1868-12	Genset(DG)	750/5	30 (9.1)	20 (6.1)	14 (4.1)						

- NOTES:**
1. This table is for copper wire at 50°C (122°F). Derate the distance by 0.4% per °C over 50°C.
  2. The number of turns in the notes column refers to the number of times a lead passes through the CT. In some cases more than one turn is used to compensate for the difference in the replacement CT ratio. (Example: If 2-turns are required, the lead must pass through the CT once and then loop around the CT and pass through a second time.)
  3. Minimum wire gauge for NEC compliance is AWG 14

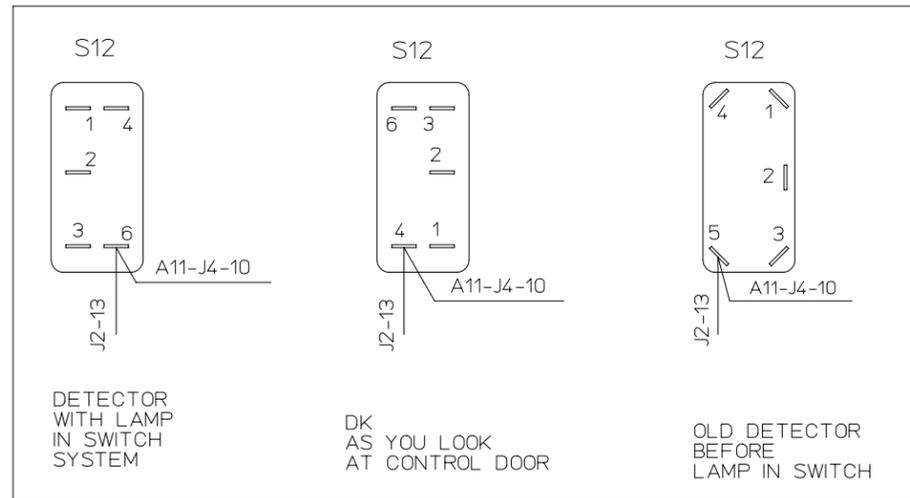
**TABLE 2. CURRENT TRANSFORMER WIRE SIZE Vs. DISTANCE CHART (CONTINUED)**

CURRENT CTs MAXIMUM DISTANCE BETWEEN CT AND CCM (A CT KIT IS REQUIRED IF THE DISTANCE IS BLANK)						REPLACEMENT CTs (KIT NUMBERS GIVEN FOR REFERENCE ONLY, CONTACT YOUR AUTHORIZED PARTS DISTRIBUTOR FOR CURRENT LISTING)					
CT LIST	APPLICATION	RATIO	AWG #12 FEET (M)	AWG #14 FEET (M)	AWG #16 FEET (M)	CT KIT #	RATIO	AWG #12 FEET (M)	AWG #14 FEET (M)	AWG #16 FEET (M)	NOTES
302-1794-01	Genset(DF)	150/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	1-Turn
302-1794-01	Genset(DF)	75/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	2-Turns
302-1794-02	Genset(DF)	100/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	2-Turns
302-1794-02	Genset(DF)	200/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	1-Turn
302-1794-03	Genset(DF)	150/5				300-4864-06	300/5-150/5	41 (12.6)	26 (7.8)	16 (4.9)	1-Turn
302-1794-03	Genset(DF)	300/5				300-4864-06	300/5-150/5	228 (69.6)	142 (43.2)	89 (27.2)	1-Turn
302-1794-04	Genset(DF)	200/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-04	Genset(DF)	400/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-05	Genset(DF)	250/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-05	Genset(DF)	500/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-06	Genset(DF)	300/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-06	Genset(DF)	600/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-07	Genset(DF)	375/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-07	Genset(DF)	750/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-08	Genset(DF)	400/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-08	Genset(DF)	800/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-09	Genset(DF)	1000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-09	Genset(DF)	500/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-10	Genset(DF)	600/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-10	Genset(DF)	1200/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-11	Genset(DF)	750/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-11	Genset(DF)	1500/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-12	Genset(DF)	1000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-12	Genset(DF)	2000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-13	Genset(DF)	1500/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-13	Genset(DF)	3000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-14	Genset(DF)	2000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-14	Genset(DF)	4000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-15	Genset(DF)	3000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-1794-15	Genset(DF)	6000/5	30 (9.1)	20 (6.1)	14 (4.1)						
302-2034-02	Genset(DNA)	100/5				300-4864-02	200/5	72 (22.1)	45 (13.7)	28 (8.6)	2-Turns
302-2034-03	Genset(DNA)	30/1				300-4864-01	150/5	51 (12.6)	26 (7.8)	16 (4.9)	1-Turn
302-1417	Genset(ES)	150/5				300-4864-01	150/5	41 (12.6)	26 (7.8)	16 (4.9)	1-Turn

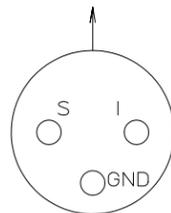
302-1845-XX is the same as 302-1868-XX (Example: 302-1845-02, refer to 302-1868-02 row for distances)  
 302-2055-XX is the same as 302-1794-XX (Example: 302-2055-02, refer to 302-1794-02 row for distances)  
 302-2056-XX is the same as 302-1868-XX (Example: 302-2056-02, refer to 302-1868-02 row for distances)

- NOTES:**
1. This table is for copper wire at 50°C (122°F). Derate the distance by 0.4% per °C over 50°C.
  2. The number of turns in the notes column refers to the number of times a lead passes through the CT. In some cases more than one turn is used to compensate for the difference in the replacement CT ratio. (Example: If 2-turns are required, the lead must pass through the CT once and then loop around the CT and pass through a second time.)
  3. Minimum wire gauge for NEC compliance is AWG 14

J2-13 CONNECTION



TOP OF GAUGE



ON DK, REMOVE GAUGE BOARD BEFORE CONNECTING WIRE TO "S" TERMINAL

WIRE SIZE	DISTANCE IN FEET ONE WAY			
	A 12/24V	B 12 VOLT	B 24 VOLT	C
24	500	----	----	----
22	700	----	----	----
18	1500	20	175	----
16	3000	35	250	14
14	----	55	400	20
12	----	90	650	30

FOR CT'S USE COLUMN C  
FOR B+, GND USE COLUMN B  
FOR ALL ELSE USE COLUMN A



NOTES:

IF SET IS EQUIPPED WITH TIME DELAY START/STOP MODULE, THE START SIGNAL FROM CCM-J8-1 SHOULD BE CONNECTED TO A15-TB1-5. IF NOT EQUIPPED THE START SIGNAL WILL BE CONNECTED TO A11-TB1-6.

S12 IDENTIFICATION:  
DK CONTROL... S12, AS YOU LOOK AT THE CONTROL DOOR OPEN, IS LOCATED ON YOUR LEFT. YOU NEED TO CONNECT THE RESET POWER LEAD TO TERMINAL NUMBER 4. TERMINAL 4 WILL BE LOCATED TO THE OUTSIDE EDGE OF THE CONTROL ON THE LEFT.  
CHECK TO SEE THAT IT IS CONNECTED TO A11-J4-10. REMOVE THE FASTON, CONNECT THE PIGGY BACK AND REPLACE THE FASTON.

DETECTOR IDENTIFICATION... IF YOUR CONTROL HAS A RESET SWITCH WITH INDICATOR LAMP IN IT, S12 WILL BE TO YOUR RIGHT WITH THE DOOR OPEN. YOU NEED TO CONNECT THE RESET POWER LEAD TO TERMINAL NUMBER 6.  
TERMINAL 6 WILL BE ON THE RIGHT HAND SIDE OF THE SWITCH AT THE BOTTOM. CHECK TO SEE THAT IT IS CONNECTED TO A11-J4-10. REMOVE THE FASTON, CONNECT THE PIGGY BACK AND REPLACE THE FASTON.

IF YOUR CONTROL DOES NOT HAVE AN INDICATOR LAMP IN THE RESET SWITCH, S12 WILL BE LOCATED TO YOUR RIGHT WITH THE DOOR OPEN. YOU NEED TO CONNECT THE RESET POWER LEAD TO TERMINAL NUMBER 5.

TERMINAL 5 WILL BE ON THE LEFT HAND SIDE OF THE SWITCH AT THE BOTTOM. CHECK TO SEE THAT IT IS CONNECTED A11-J4-10. REMOVE THE FASTON, CONNECT THE PIGGY BACK AND REPLACE THE FASTON.

THE GAUGE SIGNAL CIRCUIT SHOULD BE CONNECTED TO THE "S" TERMINAL OF THE GAUGE.  
DK CONTROL... THE "S" TERMINAL IS LOCATED TO THE RIGHT SIDE OF THE GAUGE WITH THE DOOR OPEN.

REMOVE THE GAUGE BOARD ON THE WATER TEMP GAUGE AND CONNECT THE SIGNAL WIRE THEN REPLACE THE GAUGE BOARD. CHECK TO SEE THAT THE EXISTING WIRE IS MARKED M12-S OR M11-S.

DETECTOR CONTROL... THE "S" TERMINAL IS LOCATED TO THE LEFT SIDE OF THE GAUGE WITH THE DOOR OPEN. CHECK TO SEE THAT THE EXISTING WIRE IS MARKED M12-S OR M11-S. CONNECT THE SIGNAL WIRE AND TIGHTEN THE NUT.

USE COLUMN "C" FOR DETERMINING WIRE SIZES BASED ON DISTANCE FOR CT'S. USE COLUMN "B" FOR DETERMINING WIRE SIZES BASED ON DISTANCE FOR B+ AND GND CIRCUITS. COLUMN "A" CAN BE USED FOR ALL OTHER CIRCUITS.

NOTE THAT THE DISTANCE IS MEASURED IN FEET FROM THE SET TO THE CCM BOARD ONE WAY ONLY.

STRANDED WIRE IS PREFERRED FOR VIBRATION RESISTANCE.

REMOVE WIRE FROM TB21-28, 29, 30 AND REMOVE THE SPADE LUG. RELUG WITH SPLICE AND CONNECT WIRE TO CCM BOARD TERMINAL J5-1, J5-3, J5-5. CONNECT ADDITIONAL WIRE FROM TB21-28, 29, 30 AND CONNECT TO CCM BOARD TERMINAL J5-2, J5-4, J5-6.

CT CIRCUITS MUST BE FULLY CONNECTED BEFORE STARTING SET. ELECTRICAL HAZARD OR DAMAGE TO EQUIPMENT COULD RESULT.

WHEN CCM IS USED WITH A 7 LIGHT CONTROL THESE CONNECTIONS WILL NOT BE AVAILABLE.

FOR DELTA WIRED SETS, TIE ALL RETURNS TOGETHER. NO CONNECTION IS MADE TO TB21-26. LEAVE FLOATING.

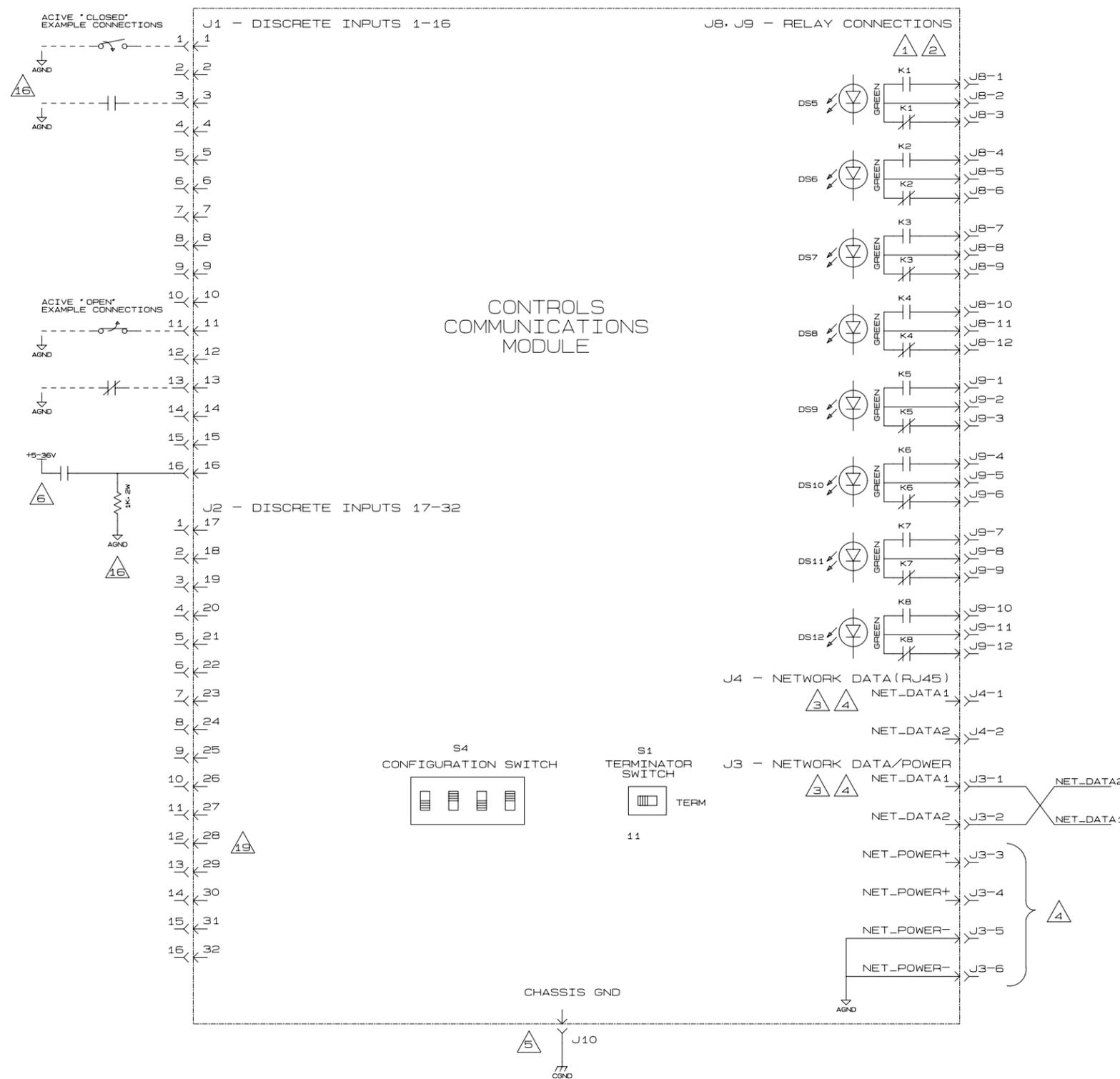
IF SENDER READINGS ARE REQUIRED WHEN GENSET IS NOT RUNNING, THE FOLLOWING CONNECTIONS MAY BE NECESSARY: (DETECTOR ONLY) REMOVE THE WIRE M12-1 (TEMP GAUGE) AND SAFELY TIE THE LEAD BACK INTO THE HARNESS, INSTALL A JUMPER FROM A11-TB1-7 (B+ FUSED) TO M12-1.

WHEN THE INPUT IS ACTIVE "OPEN" (5-36VDC), YOU MUST CONNECT A 1K.2W PULL-DOWN RESISTOR BETWEEN J2-13 AND J7-3 (AGND). FOR DK AND DETECTOR SETS, A11-J4-10 IS ACTIVE "OPEN" 12V - 24V.

NOTES	FROM	TO	OPTIONAL CONNECTIONS	COLOR
DC CONNECTIONS				
	J8-1	START	A11-TB1-6	A15-TB1-5
	J8-2	CCM B+	J9-3	
	J8-4	RESET	A11-TB2-5	
	J8-5	GND	J9-6	
	J8-7	SHUTDOWN	A11-TB2-16	
	J8-8	GND	J1-6	
	J11-12	OP GAUGE	M11-S	
	J11-3	WT GAUGE	M12-S	
	J11-11	GND	J3-2	
	J11-2	GND	J6-2	
	J1-2	FAULT2	A11-TB2-2	
	J1-1	FAULT1	A11-TB2-4	
	J2-16	LO COOL LVL		
	J2-15	CHRG AC FAIL		
	J2-14	SW RUN		
	J2-13	SW OFF	S12-??	
	J2-12	RUN	A11-TB1-3	
	J2-11	PLOP	A11-TB2-11	
	J2-10	PHET	A11-TB2-10	
	J2-9	LOP	A11-TB2-9	
	J2-8	HET	A11-TB2-8	
	J2-7	OS	A11-TB2-7	
	J2-6	OC	A11-TB2-6	
	J2-5	LO BATTERY		
	J2-4	HI BATTERY		
	J2-3	LET	A11-TB2-13	
	J2-2	LOW FUEL	A11-TB2-15	
	J2-1	COM ALARM	A11-TB1-4	
	J2-1	1K.2W RSTR	J6-1	
	J12-5	SENSED GND	A11-TB1-5	
	J12-6	SENSED B+	A11-TB1-7	
	J3-4	CCM B+	A11-TB1-7	
	J3-5	CCM GND	A11-TB1-5	
AC CONNECTIONS				
	TB1-1	VA GEN8	TB21-22	
	TB1-2	VB GEN7	TB21-23	
	TB1-3	VC GEN6	TB21-25	
	TB1-4	NEUTRAL	TB21-26	
	TB1-5	NEUTRAL	TB1-4	
	TB1-6	NEUTRAL	TB1-5	
	J10	GND LUG IN BOX	CONTROL GND STUD	
	GND LUG IN BOX			
	J5-1	CT21(+)	CT21	
	J5-2	CT21(-)	TB21-28	
	J5-3	CT22(+)	CT22	
	J5-4	CT22(-)	TB21-29	
	J5-5	CT23(+)	CT23	
	J5-6	CT23(-)	TB21-30	

FIGURE 5. CCM-G TO DETECTOR/DK GENSET CONTROL INTERCONNECT WIRING DIAGRAM (1 OF 2)



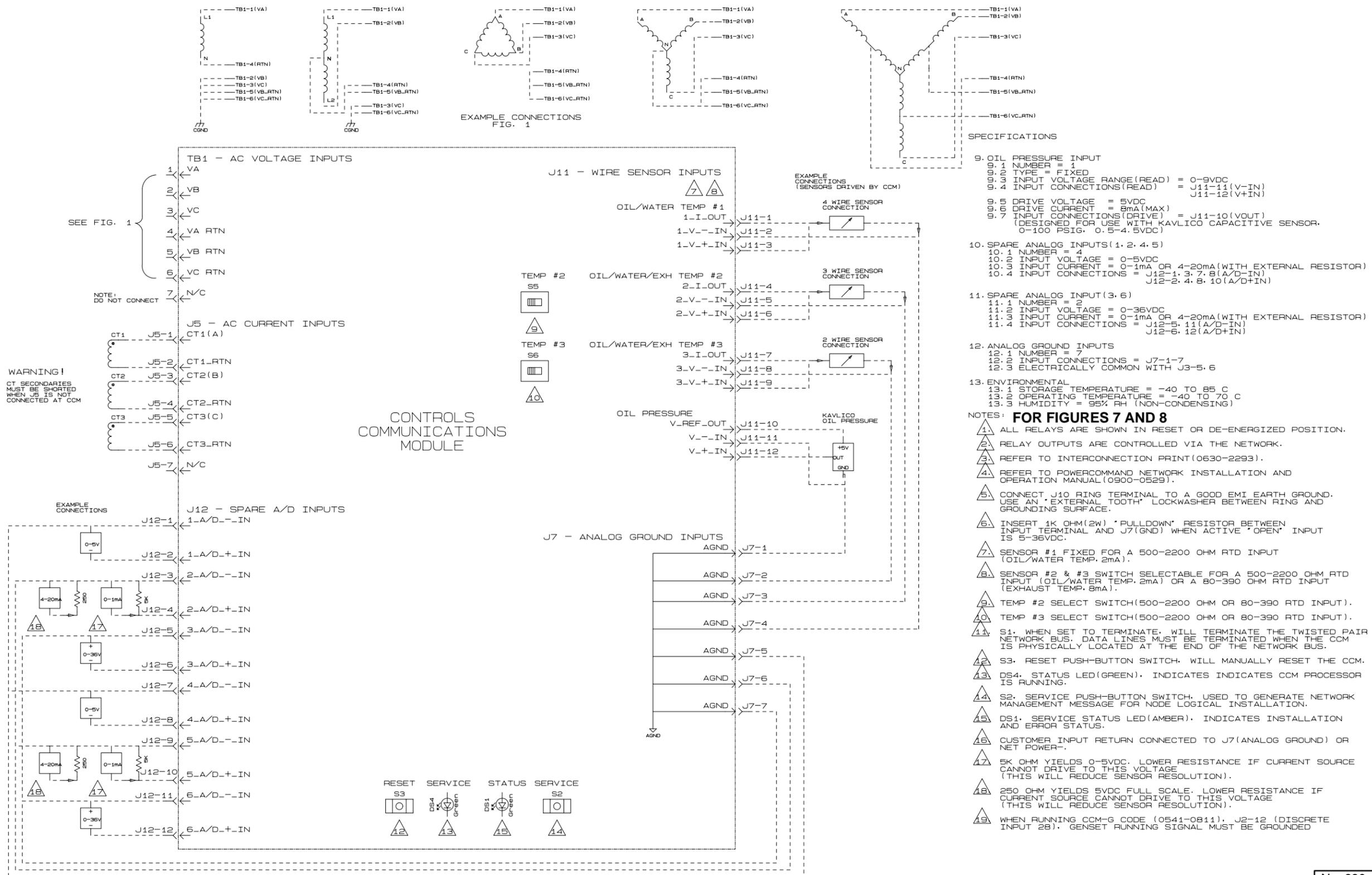


**NOTES: SEE FIGURE 8**

**SPECIFICATIONS**

1. NET POWER
  - 1.1 INPUT VOLTAGE = 5-36VDC (OPERATING RANGE)
  - 1.2 INPUT CURRENT = 150mA @ 36VDC  
200mA @ 24VDC  
400mA @ 12VDC  
1.25A @ 5VDC
  - 1.3 INPUT CURRENT (MAX) = 2.4A @ 3.5VDC
  - 1.4 INPUT CONNECTIONS = J3-3, 4 (NET POWER+)  
J3-5, 6 (NET POWER-)
2. NET DATA
  - 2.1 TYPE = ECHELON LONTALK  
FT10
  - 2.2 INPUT CONNECTIONS = J3-1 (NET DATA1)  
J3-2 (NET DATA2)  
J4-1 (RJ45-NET DATA1)  
J4-2 (RJ45-NET DATA2)  
(J4 (RJ45), SERVICE/INSTALLATION USE ONLY)
3. DISCRETE INPUTS
  - 3.1 TYPE = DISCRETE
  - 3.2 NUMBER = 32
  - 3.3 OUTPUT CURRENT = 0.5mA SOURCE (INPUTS 1-24, CLOSED)  
0.05mA SOURCE (INPUTS 25-32, CLOSED)
  - 3.4 VOLTAGE THRESHOLDS (TO ACTIVATE) = 4V (FOR ACTIVE 'CLOSED')  
4V (FOR ACTIVE 'OPEN')
  - 3.5 INPUT CONNECTIONS = J1 (INPUT 1-16)  
J2 (INPUT 17-32)  
J7 (ANALOG GROUND)
4. RELAY OUTPUTS
  - 4.1 TYPE = NON-LATCHING
  - 4.2 NUMBER = 8 (K1, K2, K3, K4, K5, K6, K7, K8)
  - 4.3 CONTACTS = 1 FORM C  
3A @ 30VDC  
3A @ 250VAC
  - 4.4 OUTPUT CONNECTIONS = J8, 9-3, 6, 9, 12 (N/C CONTACTS)  
J8, 9-2, 5, 8, 11 (COMMON)  
J8, 9-1, 4, 7, 10 (N/O CONTACTS)
5. 3 PHASE VOLTAGE INPUTS
  - 5.1 INPUT VOLTAGE = 0-600VAC (LINE-TO-LINE) OR 0-347VAC (LINE-TO-NEUTRAL)
  - 5.2 INPUT CONNECTIONS = TB1-1, 2, 3 (VA, VB, VC)  
TB1-4, 5, 6 (VA RTN, VB RTN, VC RTN)  
TB1-7 (DO NOT CONNECT)
  - 5.3 MAXIMUM VOLTAGE BETWEEN ANY LINE (TB1-1 TO 6)  
AND CHASSIS GND (J10) = 0-600VAC
6. 3 PHASE CURRENT INPUTS
  - 6.1 INPUT CURRENT = 0-5A AC
  - 6.2 INPUT CONNECTIONS = J5-1, 3, 5 (CT1, CT2, CT3)  
J5-2, 4, 6 (CT1 RTN, CT2 RTN, CT3 RTN)  
J5-7 (DO NOT CONNECT)
  - 6.3 BURDEN = 1.1 VA
7. RTD TEMPERATURE INPUTS
  - 7.1 NUMBER = 3
  - 7.2 TYPE = 1 FIXED, 2 SWITCH SELECTABLE
  - 7.3 INPUT VOLTAGE RANGE (READ) = 0-9VDC
  - 7.4 DRIVE CURRENT = 2mA OR 8mA
  - 7.5 INPUT CONNECTIONS (READ) = J11-2, 5, 8 (V-IN)  
J11-3, 6, 9 (V+IN)
  - 7.6 INPUT CONNECTIONS (DRIVE) = J11-1, 4, 7 (IOUT)

**FIGURE 7. CCM-G INTERCONNECT WIRING DIAGRAM (1 OF 2)**



No. 630-2390 Sh 2 of 2  
Rev. B Sys: HP  
Modified 9/2002

FIGURE 8. CCM-G INTERCONNECT WIRING DIAGRAM (2 of 2)