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This publication update provides the following new information:

- New table for the 14-bit High Speed Analog Input module.
- Caution message for the 14-bit Analog Input module wiring diagram.
- New section that describes the 14-bit High Speed Analog Input module.
- Part number additions to a Caution message for the Relay Output module.

Add the following new Table 3-5A:

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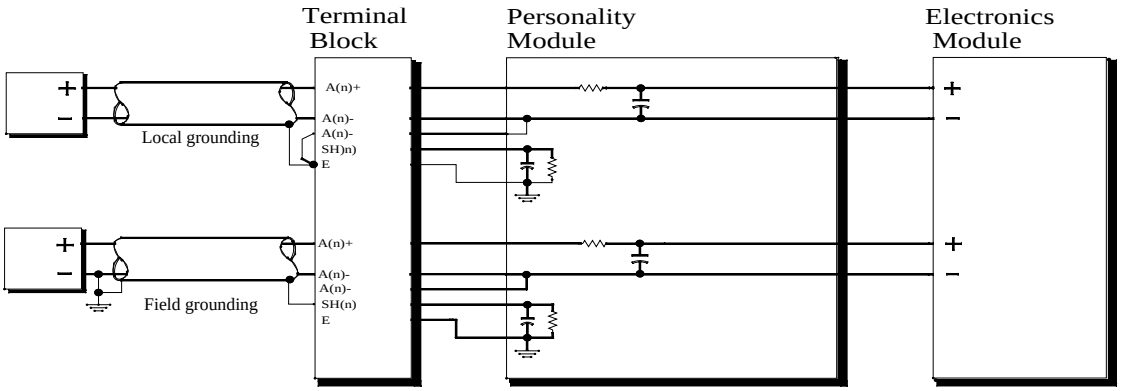
Table 3-5A. Analog Input Subsystem (High Speed)

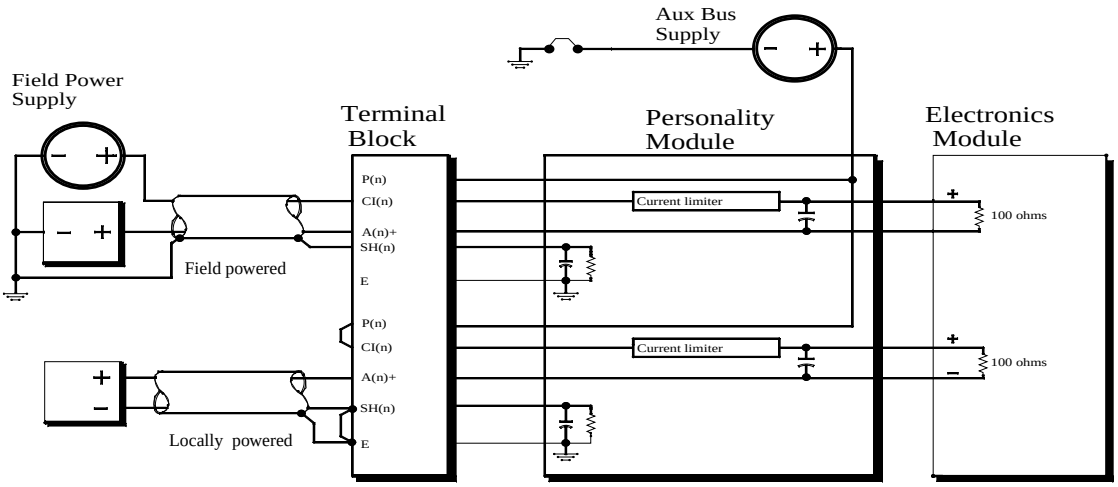
Range	Channels	Electronic Module	Personality Module
4 - 20mA, Field or Locally powered	8	5X00070G01	1C31227G01
± 1 VDC	8	5X00070G02	1C31227G02
± 10VDC	8	5X00070G03	1C31227G02

Add the following Caution message (shown in bold) to Figure 5-2 (Page 5-7)**:**

5-1.6. 14-Bit Analog Input Field Connection Wiring Diagrams



Voltage Input Connections



Current Input Connections

Caution

When using locally powered current inputs, the power distribution panel MUST be equipped with jumper module 5A26471G01 to ensure proper grounding of the Aux Bus supply.

Figure 5-2. Field Connections for the Input Connectors

Add the following new Section 5-A:

Section 5-A. Analog Input Module (High Speed)

5-1. Description

The combined Personality and Electronics Modules form the High Speed Analog Input Module. Eight sets of individually isolated input channels provide 14-bit resolution with 50 or 60 samples per second conversion rates. The input signals are conditioned and routed through the appropriate Personality Module to the Electronics Module. The Personality Module also provides surge protection to protect the input circuits of the Electronics Module. The Electronics Module performs the analog to digital conversions and provides interfacing to the Ovation Serial I/O Bus.

No thermocouple provisions are provided for this module.

5-1.1. Module Groups

Electronics Modules

There are three groups of Electronics modules for the High Speed Analog Input Module:

- **5X00070G01** interfaces to current signals with an input range of 4 to 20 mA.
- **5X00070G02** interfaces to voltage signals with an input range of ± 1V.
- **5X00070G03** interfaces to voltage signals with an input range of ± 10V.

Personality Modules

There are two groups of Personality modules for the High Speed Analog Input Module:

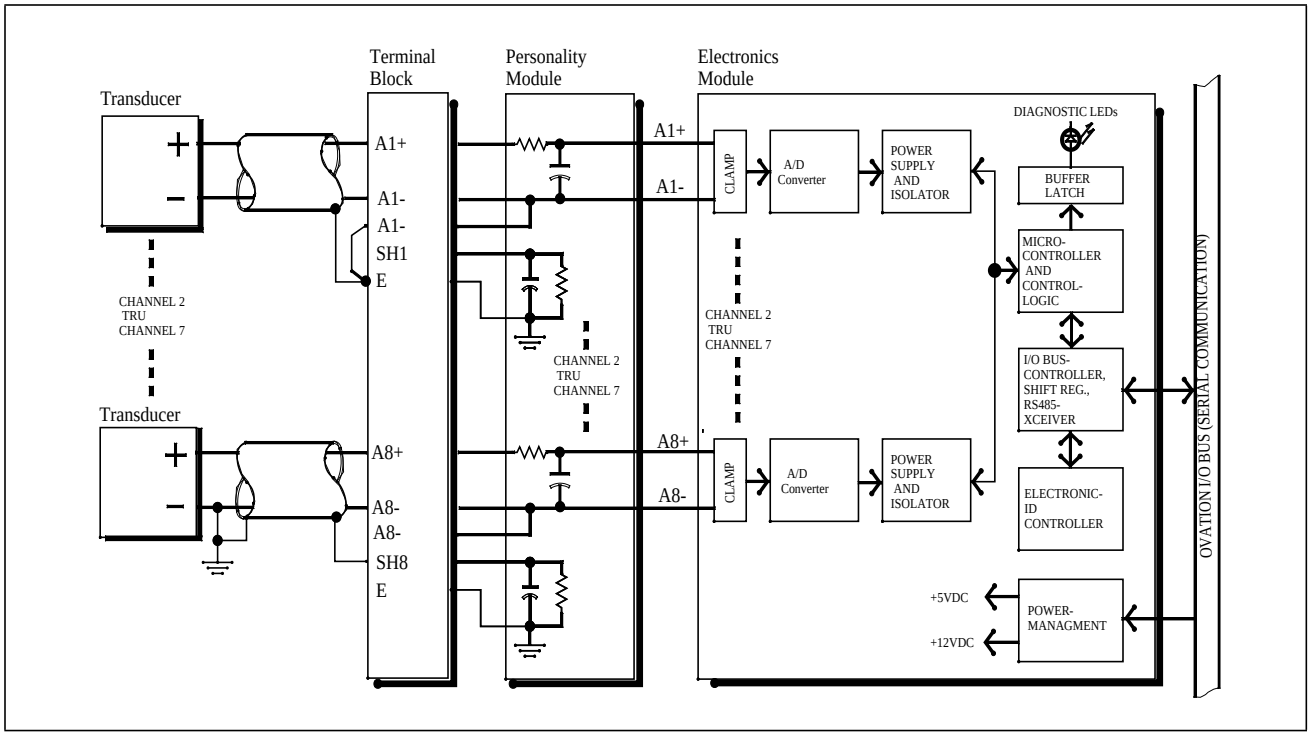
- **1C31227G01** interfaces to current signals with an input range of 4 to 20 mA.
- **1C31227G02** interfaces to voltage signals with an input range of ± 1V or ± 10V.

Note

Refer to Table 3-5A for additional information about the High Speed Analog Input subsystem.

5-1.2. Module Block Diagram

The simplified block diagram for the voltage input configuration of the High Speed Analog Input module is shown below. The channel #1 input is grounded locally at the cabinet, and grounding at the field device is shown for the channel #8 input.



5-1.3. External Power Supplies

Note

Module power specifications (main and auxiliary) refer to the actual power drawn by the module from the 24VDC main power supply and from the auxiliary power supply (if required) and **NOT** from the AC or DC Mains.

If the High Speed Analog Input module uses the 1C31227G01 Personality module, the required voltage source may be obtained from the internal auxiliary power supply (backplane) or it may be obtained from an external power supply.

If an external power supply is used, see Appendix D for the steps to be undertaken before connecting the external power supply to the Analog Input module base unit terminal block. The High Speed Analog Input module auxiliary supply voltage level (24 VDC or 48 V DC) depends on the external transmitter devices being connected to the Analog Input module's inputs.

5-1.4. Specifications

Electronics Module (5X00070)
Personality Module (1C31227)

Table 5-1. High Speed Analog Input Module Specifications

Description	Value
Number of channels	8
Input range	4 - 20 mA [1] ±1V [2] ±10V [3]
Resolution	14 bits (including polarity)
Guaranteed accuracy (@25°C)	±0.10% of full scale value ±1/2LSB @99.7% confidence.
Temperature coefficient	±0.24% of the full scale value over 0 to 60°C.
Input impedance:	3.3 MΩ [4] ; 200 MΩ [5]
Sampling rate (per second)	50 when configured for 50 Hz 60 when configured for 60 Hz
Self-calibration	On demand by the Ovation Controller.

Table 5-1. High Speed Analog Input Module Specifications (Cont'd)

Description	Value
Diagnostics	Internal module operating faults. Out of range detection. Open loop detection for current inputs.
Dielectric isolation: Channel to channel Channel to logic	 1000 V AC/DC 1000 V AC/DC
Normal mode rejection	60 dB @50 Hz ± 1/2% or @60 Hz ± 1/2% (when properly configured) 30 dB (typical) @50 Hz ± 5% or @60 Hz ± 5% (when properly configured)
Common mode rejection	120 dB @ DC or @ the nominal (50/60 Hz) line frequency ± 1/2% and harmonics. 100 dB (typical) for nominal line frequency ± 5% and harmonics.
Module power	Main: 2.4 W typical; 3.125 W maximum Aux: When used (1C31227G01) Aux power supply voltage = 24 V DC 3.84 W typical (8 inputs @ 20mA each)
Operating temperature range	0 to 60°C (32°F to 140°F)
Storage temperature range	-40°C to 85°C (-40°F to 185°F)
Humidity (non-condensing)	0 to 95%

1 Current inputs when using Personality module 1C31224G01 with 5X00070G01 Electronics Module.

2 Voltage inputs when using Personality module 1C31224G02 with 5X00070G02 Electronics Module.

3 Voltage inputs when using Personality module 1C31224G02 with 5X00070G03 Electronics Module.

4 Only for the voltage input module (Personality module 1C31224G02 with 5X00070G02 Electronics Module).

5 Only for the voltage input module (Personality module 1C31224G02 with 5X00070G03 Electronics Module).

5-1.5. High Speed Analog Input Terminal Block Wiring Information

Each Personality module has a simplified wiring diagram label on its side, which appears above the terminal block. This diagram indicates how the wiring from the field is to be connected to the terminal block in the base unit.

The diagrams for the analog input Personality modules are illustrated in Figure 5-3. The following table lists and defines the abbreviations used in those diagrams.

Abbreviation	Definition
A1 - A8 +	Analog Input positive terminal connection (connected to the positive terminal of the field device)
A1 - A8 -	Analog Input negative terminal connection (voltage input group only)
P-1 - P-8	Loop power output terminals (for locally powered loops)
CI1 - CI8	Current input terminals
SH1 - SH8	Shield terminal connection
RSV	Reserved terminal. No connections allowed on these terminals.
	Earth ground terminals
PS+, PS-	Auxiliary power supply terminals

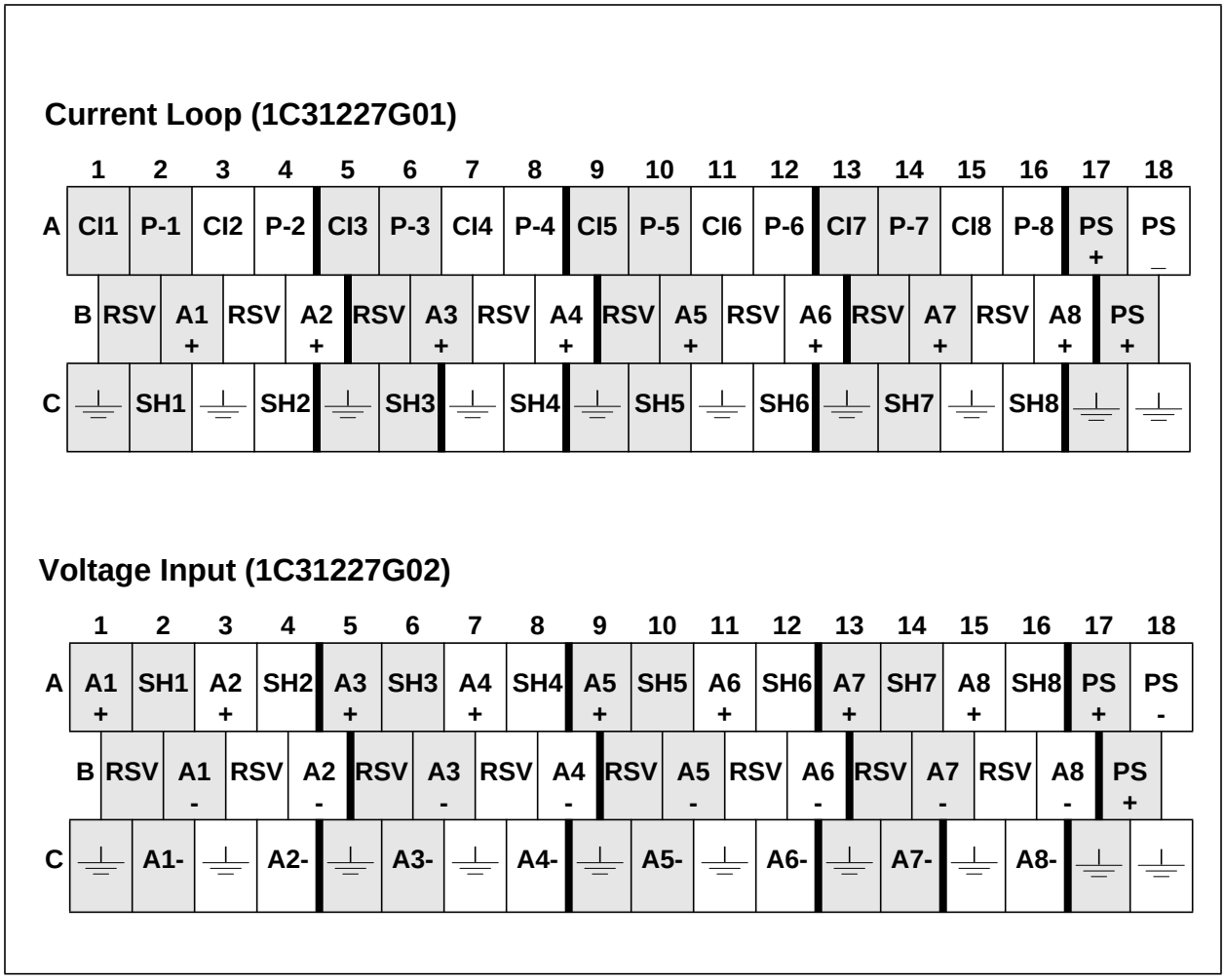


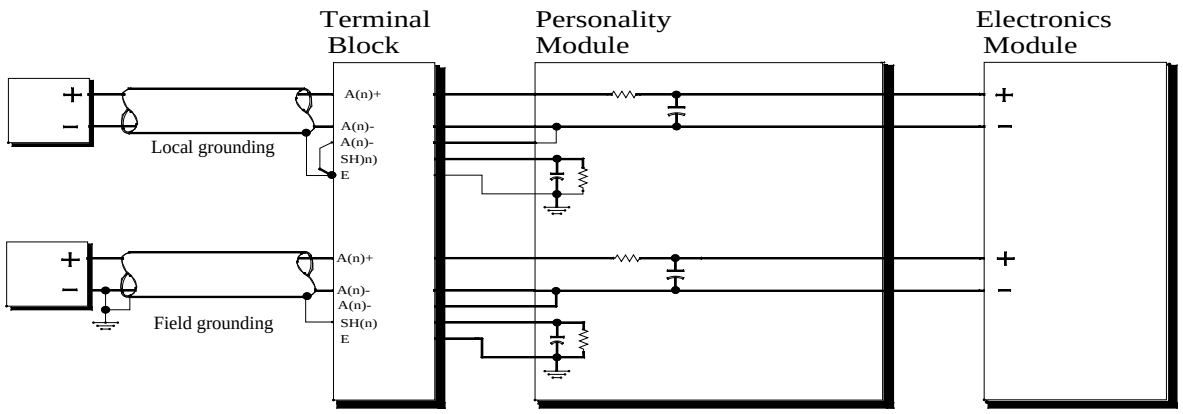
Figure 5-3. Terminal Block Connections for the Analog Input Personality Modules

Use shielded twisted-pair wire for the field wiring. Tie the Analog Input negative terminal and shield together and to earth ground, either locally at the cabinet or at the field device. Voltage inputs use the 1C31227G02 Personality Modules. Grounding the shield and the analog input negative terminal at the cabinet or at the field device is arranged by the proper Terminal Block connections.

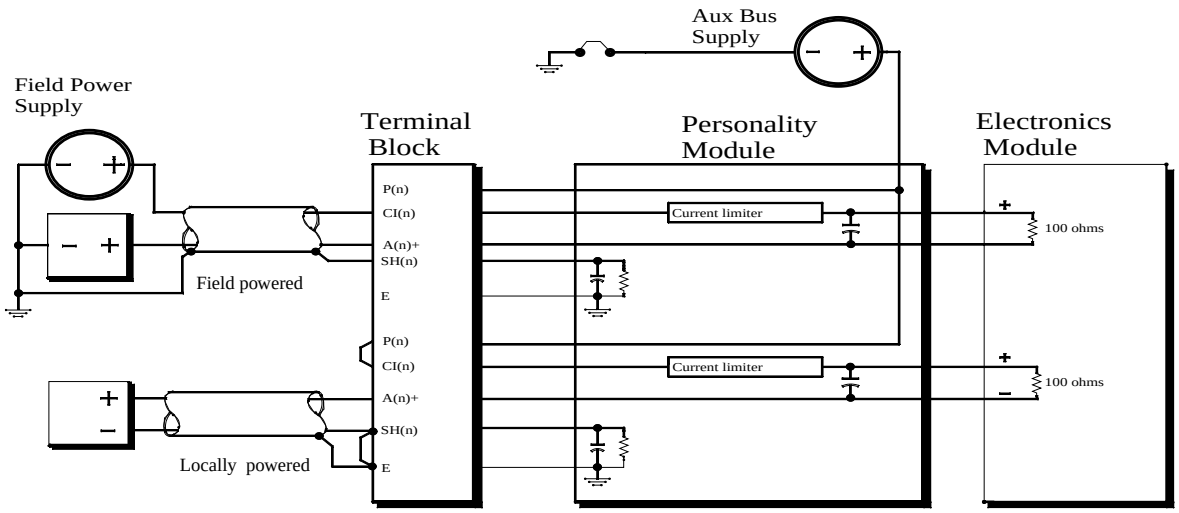
Similarly, current inputs using the 1C31227G01 Personality Modules can accommodate field or locally powered devices by using the correct terminal block connections.

The Personality Modules have a field connection diagram label on top of each module to facilitate field wiring. The following figures show the implementations of the field connections for the various Personality Module and field device combinations:

5-1.6. High Speed Analog Input Field Connection Wiring Diagrams



Voltage Input Connections



Current Input Connections

Caution

When using locally powered current inputs, the power distribution panel **MUST** be equipped with jumper module **5A26471G01** to ensure proper grounding of the Aux Bus supply.

Figure 5-4. Field Connections for the Input Connectors

5-1.7. High Speed Analog Input Address Locations

Configuration and Status Register

Word address 13 (D in Hex) is used to write to the Module Configuration Register and to read the Module Status Register. The status register can be read by using the Point Information window at an Operator Station (see the Bit Pattern Field on the Hardware Tab)

Table 5-2. High Speed Analog Input Configuration/Status Register (Address 13 or D in Hex)

Bit	Data Description - Configuration Register (Write)	Data Description - Status Register (Read)
0	Configure Module	Module Configured (1 = configured; 0 = unconfigured)
1	Force Error	Internal or forced error (1 = forced error; 0 = no forced error)
2	0, (ADD4 bit during diagnostics)	Not Used (0)
3	0, (ADD5 bit during diagnostics)	Not Used (0)
4	0, (ADD6 bit during diagnostics)	Warming
5	0, (ADD7 bit during diagnostics)	Not Used (0)
6	0, (ADD8 bit during diagnostics)	Not Used (0)
7	0, (DIAG_SET, initiates diagnostics)	Module is not calibrated
8	50/60 Hz Selection (0 = 60Hz, 1 = 50Hz)	50 Hz/60 Hz System (0 = 60Hz; 1 = 50Hz)
9	Not defined	Not Used (0)
10	0, (SYS_CAL, initiates system calibration during diagnostics)	SYS_CAL in progress (during diagnostics)
11	SELF_CAL (initiates self calibration)	SYS_CAL completed (during diagnostics)
12	Not defined	SYS_CAL failed (during diagnostics)
13	Not defined	Internal Memory Error (FLASH Checksum, Register, or Static RAM Error)
14	Not defined	Module in diagnostic mode (during diagnostics)
15	Not defined	Point Fault [1]
[1] Refer to the Point Quality Register for descriptions of the Point Faults.		

Bits defined for diagnostics are used only during factory testing.

Bit 0: This bit configures the module (write) or indicates the configuration state of the module (read). A “1” indicates that the module is configured. Note that until the module is configured, reading from addresses 0 through 11 (B in Hex) will produce an attention status.

Bit 1: This bit (write “1”) forces the module into its error state, resulting in the error LED being lit. The read of bit 1 indicates that there is an internal module error, or the Controller has forced the module into the error state. The state of this bit is always reflected by the module's Internal Error LED. Whenever this bit is set, an attention status is returned to the Controller when addresses 0 through 11 (B in Hex) are read.

Bits 2 and **3:** These bits are “not used” and are read as “0” under normal operation.

Bit 4: This bit (read) indicates that the module is in the “Warming” state. This state exists after power up and terminates after 8.16 seconds. The module will be in the error condition during the warm up period.

Bits 5 and **6:** These bits are “not used” and are read as “0” under normal operation.

Bit 7: This bit is the result of a checksum test of the EEPROM. A failure of this test can indicate a bad EEPROM, but typically indicates that the module has not been calibrated. A “0” indicates that there is no error condition. If an error is present, the error will be indicated by the module error LED being lit. The point fault bit will also be set as all the point data is not calibrated. The “1” state of this bit indicates an unrecoverable error condition in the field.

Bit 8: A write to this bit configures the conversion rate of the A/C converters as follows:

Conversion Rate (1/sec)	Bit 8
60 (for 60Hz systems)	0
50 (for 50Hz systems)	1

The status of this bit (read) indicates the conversion rate to which the module is set.

Bits 9 and **10:** These bits are “not used” and are read as “0” under normal operation.

Bit 11: This bit (write) is used to initiate self-calibration. The sampling rate during self-calibration will be 2 per second. The status (read) bit is not used and is read as “0” under normal operation

Bit 12: This bit is “not used” and is read as “0” under normal operation.

Bit 13: This bit (read) indicates that the module has internal memory error (FLASH, checksum, Register, or Static RAM error). If this error is present, the module error LED is lit, the point fault bit will also be set since the condition of the module is undetermined.

Bit 14: This bit is “not used” and is read as “0” under normal operation.

Bit 15: This bit indicates the point fault status of the module. It is the logical “OR” of the eight individual point quality statuses plus bits 1, 7, 12, and 13 of this register. A “0” indicates that all eight points have good quality and no module errors exist.

When bits 1, 4, 7 or 13 of the Status Register are not set, this bit (when set to “1”) indicates that at least one of the points has bad quality.

A subsequent read of the Point Quality Register at Address 12 (C in Hex) will reveal the point(s) that have bad quality (see Table 5-3). The Address 12 (C in Hex) Point Quality Register contains data only when the module fault is due to a bad point quality.

Secondary Configuration and Status Register

Word address 14 (E in Hex) is not used and is read as “0” under normal operation.

Point Quality Register

Word address 12 (C in Hex) serves the purpose of reporting the point quality of the eight channel inputs. The bit definitions for this register are encoded as shown in Table 5-3.

Table 5-3. Point Quality Register (Address 12 or C in Hex)

Point	Bit	Description
1	0	Communication to the Isolated Channel Failed
	1	Overrange Input/Blown Fuse/Open Loop
2	2	Communication to the Isolated Channel Failed
	3	Overrange Input/Blown Fuse/Open Loop
3	4	Communication to the Isolated Channel Failed
	5	Overrange Input/Blown Fuse/Open Loop
4	6	Communication to the Isolated Channel Failed
	7	Overrange Input/Blown Fuse/Open Loop
5	8	Communication to the Isolated Channel Failed
	9	Overrange Input/Blown Fuse/Open Loop
6	10	Communication to the Isolated Channel Failed
	11	Overrange Input/Blown Fuse/Open Loop
7	12	Communication to the Isolated Channel Failed
	13	Overrange Input/Blown Fuse/Open Loop
8	14	Communication to the Isolated Channel Failed
	15	Overrange Input/Blown Fuse/Open Loop

Communication to the Isolated Channel Failed - This bit is set when the communication to the corresponding isolated channel has failed.

Over-range Input/Blown Fuse/Open Loop – This bit is set as follows:

Current Input (Group #1) – When an input current less than 2.5mA (a blown fuse or open loop condition) is detected, or an overrange (greater than 24.6mA) of full scale is present.

Voltage Input (Group #2 and Group #3) – When an overrange input of 121% of the full scale value is read.

5-1.8. Diagnostic LEDs

Table 5-4. High Speed Analog Input Diagnostic LEDs

LED	Description
P (Green)	Power OK LED. Lit when the +5V power is OK
C (Green)	Communications OK LED. Lit when the Controller is communicating with the module.
I (Red)	Internal Error LED. Lit whenever there is any type of error with the module **except** for a loss of power. Possible causes are: - Module initialization is in progress. - I/O Bus timeout has occurred. - Register, static RAM, or FLASH checksum error. - Module reset - Module is uncalibrated. - Forced error has been received from the Controller - Communication between the Field and Logic boards failed
CH1 - CH 8 (Red)	Channel error. Lit whenever there is an error associated with a channel or channels. Possible causes are: - Positive overrange: Input voltage greater than +121% of full scale value (for modules configured as voltage input). - Negative overrange: Input voltage less than -121% of full scale value (for modules configured as voltage input). - Input current less than 2.5mA or blown fuse (for module configured as current input). - An overrange (greater than 24.6mA) of full scale is present (for modules configured as current input) - Self calibration readings out of range.

Add the following part numbers (shown in bold) to the Caution message for the Relay Output module:
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Caution

When using the Relay Output base, the power distribution panel should be equipped with jumper **module 5A26471G01** that connects the returns for the auxiliary power supply and main power supply.

In applications where all radial power terminal block connectors on the power distribution are required for cabling, **cable 5A26472Gxx** should be employed that incorporates the jumper into the cable assembly.

The jumper module or cable mentioned above, ties auxiliary power return to earth ground locally via cabinet grounding. Therefore, to avoid potential ground loops, do not ground auxiliary power to any other point.