IC697VAL Analog I/O Products (Built-In Test) Configuration

GE Fanuc Automation

Programmable Control Products

Analog I/O Products (Built-in-Test)

Configuration Guide

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Warnings, Cautions, and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

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Field Control	Motion Mate	Series Five	VuMaster
GEnet	ProLoop	Series One	Workmaster

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Chapter 1 Introduction, Description, and Specifications

This guide was developed to assist the configuration of analog I/O subsystems based on GE Fanuc's analog I/O product line. The configurations shown in this guide are common designs which offer a wide variety of solutions. If you require configurations that are not shown, or if you need assistance in configuring a system, call GE Fanuc.

GE Fanuc manufactures a wide variety of analog I/O products that support fault detection and isolation. The analog I/O product line that supports Built-in-Test is summarized in Table 1-2 and Table 1-3 on page 1-3.

To minimize the cost of configuring analog I/O subsystems, GE Fanuc has developed an analog on-board test system for many analog input and output boards. Boards supporting this BIT functionality are equipped with a programmable precision voltage reference which may be used as a Built-in-Test of the board. When selected, the BIT voltage is fed through the Programmable Gain Amplifier to the ADC bypassing the external analog input on channel number zero. Therefore, the channel zero location in the dual-port RAM will be written with the BIT voltages equivalent digital value. Enabling the BIT can be used to test out the Programmable Gain Amplifier, the Analog-to-Digital Converter, and the dual-port RAM memory. The BIT may be enabled at any time during initial board installation or in real-time for system self-diagnostics.

The Built-in-Test reference is selected from one of three internal precision reference voltages: +4.980 VDC, +0.4928 VDC, +9.91 mVDC, or Analog Ground (0.0 VDC).

The selection is provided by setting the MODE bits 0, 1, 2 in the CSR in Table 1-1 below:

Table 1-1: BIT Reference Voltage CSR Bits

Mode Bit:	2	1	0
Normal Operation	X	X	0
Vref 0 +4.98000V	0	0	1
Vref 1 +0.49280V	1	0	1
Vref 2 +0.09915V	0	1	1
Analog Ground 0.0V	1	1	1

If mode bit zero is a logic zero, the unit will scan all channels in a normal mode of operation. If the mode bit is set to a logic '1' in the CSR, channel zero will correspond to the selected reference voltage VREF0, VREF1, VREF2, or Analog Ground according to the settings of mode bit 1 and mode bit 2. The digital value received should be within ±1 LSB of the selected reference voltage. The remaining channels will digitize their respective external input sources. Thus, channel zero may be periodically checked during run time to verify the ADC's operation. Please note that attention must be given to what gain and unipolar/bipolar mode the unit is set to when selecting the

reference voltage. The BIT voltage precedes the Programmable Gain Amplifier, and will multiply the reference voltage selected. It is not recommended to select a reference voltage which will exceed the ADC's range when multiplied by the gain amplifier.

The IC697VAL301 utilizes an Analog-to-Digital Converter and Multiplexer for BIT operations. The 32 analog outputs are switched by the output monitor demultiplexer onto a single line. This line is connected to a buffer and then to the on-board Analog-to-Digital Converter (ADC). This arrangement permits any one of the analog outputs to be tested by the ADC. It also verifies the operation of the analog input multiplexers by exercising them with known signal levels.

By routing the analog outputs through the test demultiplexers, all of the active components on the board are exercised in a "loopback" arrangement. The controlling processor can perform a loopback test in either the on-line or off-line mode by sending a voltage-level code to a specific output channel, and then verifying the ADC produces the correct code for the output voltage sent.

On-line calibration of scanning analog input (IC697VAL216, IC697VAL232, and IC697VAL264) boards requires a switching network which can replace each field input with a precision calibration signal source.

To calibrate the zero input responses of all channels, both the CALSPAN and CALZERO control signals are asserted. The VMEbus controller reads each channel through the IC697VAL216, IC697VAL232, or IC697VAL264 board, and stores the corresponding ZERO response.

When the responses of all input channels have been characterized, the calibration session is terminated, and the CALSPAN control line is released to restore the field input connections. The stored calibration values then are applied as corrections to subsequent readings of field input levels.

All of GE Fanuc's analog I/O products described in this document are manufactured with high-quality, high-reliability, and low mating force DIN I/O connectors that are engineered to DIN 41612, MIL-C-5530-2, and IEC 130-14 specifications. The reader should refer to GE Fanuc's Document No. GFK-2085 for additional connector/cable applications information.

Table 1-2: Analog Input Applications Matrix

ADC	Resol Bits	Aggregate Sample Rate	Front Panel Inputs	P2 Inputs	On-Board BIT	Auto-Cal	Prog Gain	Int	Output Channels	Auto Scanning
IC697VAL216 IC697VAL232 IC697VAL264	16	100kHz	64	No	No	No	Software	Yes	No	Yes

Table 1-3: Analog Output Applications Matrix

Model No.	Resolution (Bits)	Output Settling Time (µsec)	Front Panel Outputs	Output Voltage Ranges (volts)	Maximum Current Output (mA)	P2 Outputs	On-Board Reference Available to User	Requires Separate ADC for Testing
IC697VAL306 IC697VAL307	12	1.7 msec	16	0 to 5, 10 to 10, ±2.5, ±5, ±10	5, 4 to 20, 8 to 25, 0 to 20	No	Yes	Yes
IC697VAL301	12	3.4 msec	32	±2.5, ±5, ±10, 0 to 5, 10 to 10	10	No	No	No

Chapter 2 Maintenance

This chapter provides information relative to the care and maintenance of GE Fanuc products.

If a product malfunctions, verify the following:

- Software
- System configuration
- Electrical connections
- Jumper or configuration options
- Boards fully inserted into their proper connector location
- Connector pins are clean and free from contamination
- No components of adjacent boards are disturbed when inserting or removing the board from the VMEbus card cage
- Quality of cables and I/O connections

User level repairs are not recommended. Contact your authorized GE Fanuc distributor for a Return Material Authorization (RMA) Number. **This RMA Number must be obtained prior to any return.**