This Datasheet is for the

IC693ALG392

Analog Current/Voltage Output - 8 Channel

http://www.qualitrol.com/shop/p-14576-ic693alg392.aspx

Provides the wiring diagrams and installation guidelines for this GE Series 90-30 module.

For further information, please contact Qualitrol Technical Support at

1-800-784-9385

support@qualitrol.com

Analog Current/Voltage Output - 8 Channel
IC693ALG392

The *8-Channel Analog Current/Voltage Output* module provides up to eight single-ended output channels with current loop outputs or voltage outputs. Each analog output channel is capable of providing two current output ranges or two voltage output ranges. Each channel can be individually configured for the output range required for your application. The module has no jumpers or switches for configuration.

All ranges can be configured using either Logicmaster 90-30/20/Micro or CIMPLICITY Control Programming Software configurator function, or the Series 90-30 Hand-Held Programmer. The default range is 0 to +10 volts. Configurable current and voltage output ranges are:

- 0 to +10 volts (unipolar)

- –10 to +10 volts (bipolar)

- 0 to 20 milliamps

- 4 to 20 milliamps

Each channel is capable of converting 15 to 16 bits (depending on the range selected) of binary (digital) data to an analog output for use as required by your application. All eight channels are updated every 12 milliseconds. User data in the %AQ registers is in a 16-bit 2's complement format. In current modes, an *open-wire fault* is reported to the CPU for each channel. The module can go to a known last state when system power is interrupted. As long as user power is applied to the module, each output will maintain its last value, or reset to zero, as determined by how you have configured the module.

Important Product Information

Please note the following important product information. This version of the 8-Channel Analog Current/Voltage Output module requires the following product versions for compatibility:

CPU: Firmware Versions 3.3 to 4.6:
   If your CPU has firmware version 3.3 to 4.6, you **must** select 16 %I bits at configuration. If this selection is not made, a *loss of module* fault will occur.

CPU: Firmware Version 5.0 or later:
   If your CPU has firmware version 5.0, or later, then the %I configuration will accept 8 or 16 %I bits.

Logicmaster 90-30/20/Micro Software:
   Version 5.00, or later, is required to configure the module using the Logicmaster 90-30/20/Micro software configuration function.

Control Software:
   Version 2.00, or later, is required to configure the module using the Control software configuration function.

IC693ALG392 Current/Voltage Ranges and Output Modes

Current Operation

In the 4 to 20 mA range user data is scaled so that 4 mA corresponds to a count of 0 and 20 mA corresponds to a count of 32000. In the 0 to 20 mA range, user data is scaled so that 0 mA corresponds to a count of 0 and 20 mA corresponds to 32000. Note that in the 0 to 20 mA mode, you can enter a value up to 32767 which provides a maximum output of approximately 20.5 mA. Scaling of the current output for both the 4 to 20 mA range and the 0 to 20 mA range is shown below. In current mode the module also provides an open loop fault detect which is reported to the PLC in the %I table.
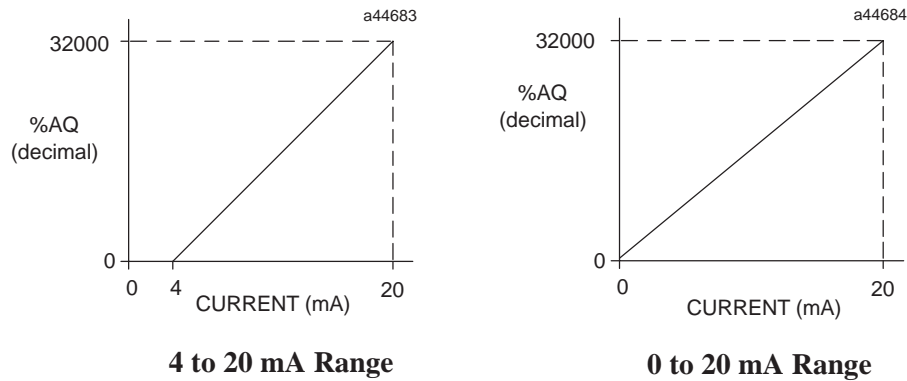
4 to 20 mA Range   **0 to 20 mA Range**

Figure 11-13. Scaling for Current Output

Voltage Operation

For *Voltage Operation* in the default unipolar mode (0 to +10 volts), user data is scaled so that 0 volts corresponds to a count of 0 and +10 volts corresponds to a count of 32000. In this mode, you can enter up to 32767 for an overrange of approximately 10.24 volts output. In the –10 to +10 volt range user data is scaled so that –10 volts corresponds to a count of –32000 and +10 volts corresponds to a count of +32000. In this range, you can enter –32767 to +32767 for an overrange of approximately –10.24 volts to +10.24 volts.

Scaling of the voltage output for both the 0 to +10 volt range and the –10 to +10 volt range is as shown in the following figure.
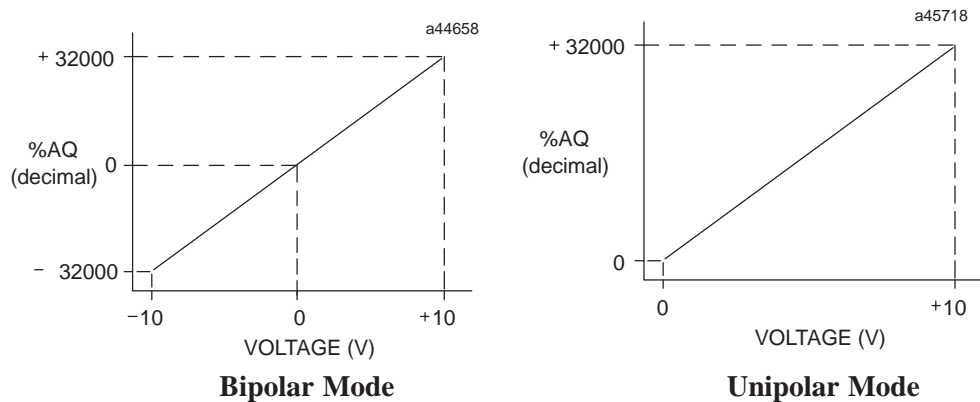
Bipolar Mode   **Unipolar Mode**

Figure 11-14. Scaling for Voltage Output

CPU Interface to the 8-Channel Analog Current/Voltage Output Module

The Series 90-30 PLC uses the data within the %AQ data table to record analog values for use by the programmable controller. This scheme for the 8-Channel Analog Current/Voltage Output module is shown below. More information on the CPU interface to analog modules can be found at the beginning of this chapter.
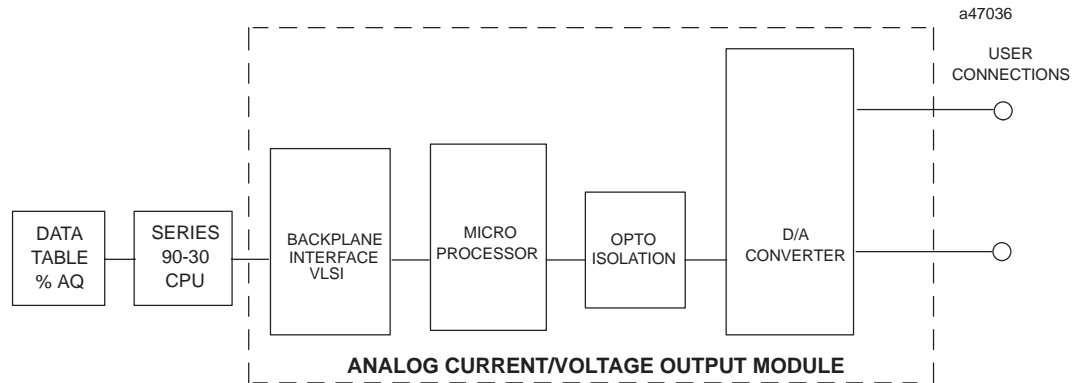
Figure 11-15. Basic Block Diagram for IC693ALG392

The following table summarizes the above information, including the module output range, user input data range, and the resolution of the selected range

Module Output Range	User Input Data Range	Resolution
4 to 20 mA	0 to 32000	15 bits
0 to 20.5 mA	0 to 32767	15 bits
0 to +10 volts	0 to 32767	15 bits
−10 to +10 volts	−32767 to +32767	16 bits

IC693ALG392 Field Wiring Connections

Connections to this module from user devices are made to screw terminals on a removable 20-terminal connector block mounted on the front of the module. The actual terminals used are described in the following table and are shown in the following wiring diagrams.

Terminal Assignments

Pin assignments for the 20 terminal I/O connector on the 8-Channel Analog Current/Voltage Output module are as shown in the following table.

Table 11-4. Terminal Pin Assignments for IC693ALG392

Pin Number	Signal Name	Signal Definition
1	24VIN	User Supplied +24 Volt Input
2	V CH 1	Channel 1 Voltage Output
3	I CH 1	Channel 1 Current Output
4	V CH 2	Channel 2 Voltage Output
5	I CH 2	Channel 2 Current output
6	V CH 3	Channel 3 Voltage Output
7	I CH 3	Channel 3 Current output
8	V CH 4	Channel 4 Voltage Output
9	I CH 4	Channel 4 Current output
10	V CH 5	Channel 5 Voltage Output
11	I CH 5	Channel 5 Current output
12	V CH 6	Channel 6 Voltage Output
13	I CH 6	Channel 6 Current output
14	V CH 7	Channel 7 Voltage Output
15	I CH 7	Channel 7 Current output
16	V CH 8	Channel 8 Voltage Output
17	I CH 8	Channel 8 Current output
18	V COM	Voltage Common
19	I COM	Current Common/User +24 Volt Return
20	GND	Frame ground connection for cable shields

IC693ALG392 Analog Output Module Field Wiring Diagram

The following figure provides information for connecting field wiring to the user terminal board on the 8-Channel Analog Current/Voltage Output Module.
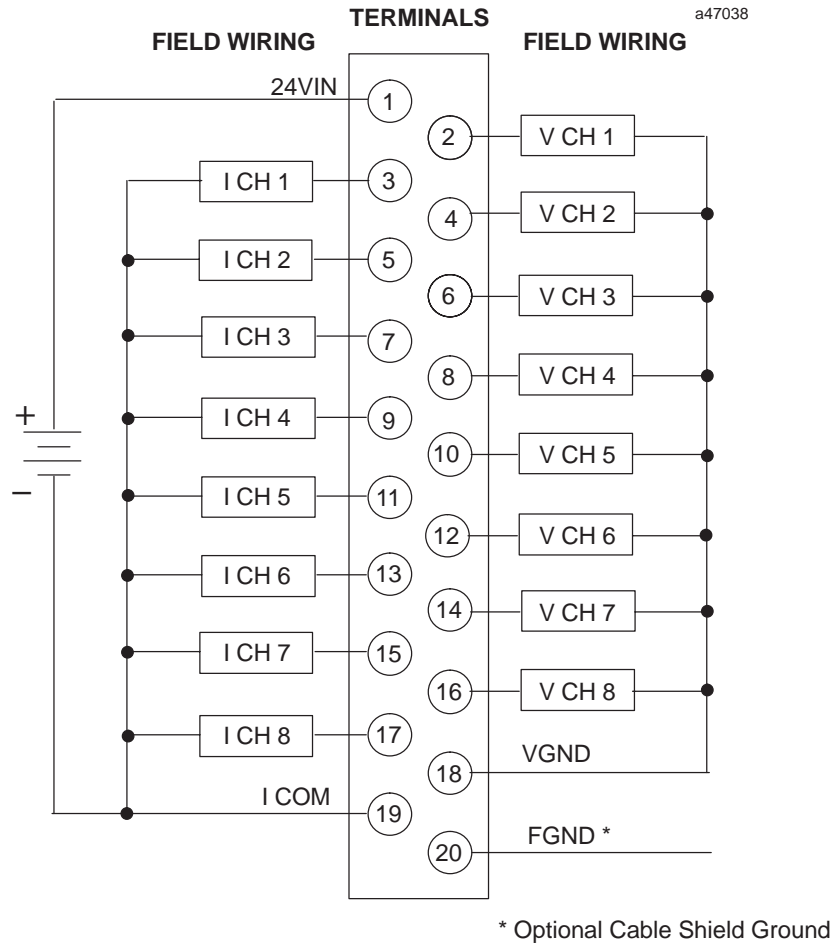

Figure 11-16. Field Wiring for 8-Channel Analog Current/Voltage Output Module, IC693ALG392

Note

Each channel can be configured independent of other channels to operate as a voltage output *or* a current output – *not both simultaneously.*

Please refer to Chapter 2 for wiring and shield ground connection details.

IC693ALG392 Status Reporting

The Analog Current/Voltage Output module provides status information to the PLC. This status information is updated once each PLC sweep and consists of three items:

■ *health of the module* (all ranges)

■ ov*erload or open wire detect* (current mode only)

■ *status of the user-supplied power* to the module (all ranges)

IC693ALG392 Power Requirements and LEDs

This module requires a maximum of 110 mA from the 5V bus on the PLC backplane for the logic side The module's analog power *must be supplied* by a user supplied single +24 VDC power source *and* requires a maximum current of 315 mA.

There are two green LED indicators on the module which provide module and user supply status. The top LED, **OK,** provides module status information and the bottom LED, **USOK,** indicates whether the user supply is present and is above a minimum designated level. Note that both LEDs are powered from the +5V backplane power bus.

The LEDs have six possible status combinations, which are described below.

LED Status Indications for IC693MDL392			
Combination	**LED**	**Status**	**Description**
1	OK	ON	Module OK and configured
	USOK	ON	User power is present
2	OK	FLASH	Module OK but not configured
	USOK	OFF	No user power
3	OK	FLASH	Module OK but not configured
	USOK	ON	User power is present
4	OK	ON	Module OK and configured
	USOK	OFF	No user power
5	OK	OFF	Module is defective or no +5V backplane power present
	USOK	OFF	User power may or may not be present
6	OK	OFF	Module not OK
	USOK	ON	User power is present

Location in System

This module can be installed in any I/O slot of a 5 or 10-slot baseplate in a Series 90-30 PLC system.

References Used

The number of 8-Channel Analog Current/Voltage Output modules which may be installed in a system depends on the amount of %AQ and %I references available. Each module uses 8 %AQ references (depending on the number of channels enabled) and 8 or 16 %I references (depending on *open wire detect* configuration).

There are 32 %AQ references available in a Model 311, Model 313, and Model 323 system, 64 %AQ references available in a Model 331 system, 256 %AQ references available in a Model 340 and Model 341 system, and 512 %AQ references available in a Model 351 and Model 352 system

The maximum number of 8-Channel Analog Current/Voltage Output modules that can be installed in a system are:

- 4 in a system using CPU Models 311, 313, or 323
- 8 in a system using CPU Model 331
- 32 in a system using CPU Models 340 and 341
- 64 in a system using CPU Models 350 – 364

Other Configuration Considerations

When planning the module configuration for your application you must also consider the load capacity of the installed power supply and the total load requirements of all modules that are installed in the baseplate.

Refer to Chapter 1 in this manual for details on power supply, baseplate, and module load requirements. The following table lists the specifications for this module. *Note that test conditions, unless otherwise noted, are:* V_{USER} = *24 VDC at an ambient temperature of 25°C (77°F).*

Table 11-5. Specifications for IC693ALG392

Number of Output Channels	1 to 8 selectable, single-ended
Output Current Range	4 to 20 mA and 0 to 20 mA
Output Voltage Range	0 to 10 V and –10 to +10 V
Calibration	Factory calibrated to .625µA for 0 - 20 mA; 0.5µA for 4 - 20 mA; and .3125 mV for voltage (per count)
User Supply Voltage (nominal)	+24 VDC, from user supplied voltage source
External Supply Voltage Range	20 to 30 VDC
Power Supply Rejection Ratio (PSRR) [1]	
Current	5 µA/V (typical), 10 µA/V (maximum)
Voltage	25 mV/V (typical), 50 mV/V (maximum)
External Power Supply Voltage Ripple	10% (maximum)
Internal Supply Voltage	+5 VDC from PLC backplane
Update Rate	8 msec (approximate, all eight channels) *Determined by I/O scan time, and is application dependent.*
Resolution:	
4 to 20 mA	0.5 µA (1 LSB = 0.5 µA)
0 to 20 mA	.625 µA (1 LSB = .625 µA)
0 to 10 V	.3125 mV (1 LSB = .3125 mV)
–10 to +10 V	.3125 mV (1 LSB = .3125 mV)
Absolute Accuracy: [3]	
Current Mode	± 0.1% of full scale @ 25°C (77°F), typical ± 0.25% of full scale @ 25°C (77°F), maximum ± 0.5% of full scale over operating temperature range (maximum)
Voltage Mode	± 0.25% of full scale @ 25°C (77°F), typical ± 0.5% of full scale @ 25°C (77°F), maximum ± 1.0% of full scale over operating temperature range (maximum)
Maximum Compliance Voltage	V_{USER} –3V (minimum) to V_{USER} (maximum)
User Load (current mode)	0 to 850Ω (minimum at V_{USER} = 20V, maximum 1350Ω at V_{USER} = 30V) [2]
Output Load Capacitance (current mode)	2000 pF (maximum)
Output Load Inductance (current mode)	1 H
Output Loading (voltage mode)	5 mA (2K ohms minimum resistance)
Output load Capacitance	(1 µF maximum capacitance)
Isolation	1500 volts between field and logic side
Internal Power Consumption	110 mA from +5V PLC backplane supply 315 mA from +24V user supply

Refer to Appendix C for product standards and general specifications.

[1] PSSR is measured by varying V_{USER} from 24V to 30V.

[2] Load less than 800 Ω is temperature dependent.

[3] In the presence of severe RF interference (IEC 801-3, 10V/m), accuracy may be degraded to ±1% FS for current outputs and ±3% FS for voltage outputs.

Derating Curves for the 8 Channel Analog Output Module

Figure 11-17. Module Derating Curves for IC693ALG392

Chart annotations for top graph:
- AMBIENT TEMPERATURE (°C)
- 1200 ohm loads
- 1000 ohm loads
- 500 ohm loads
- 250 ohm loads
- shorted loads
- V_{USER} = 30V (CURRENT MODE)
- ACTIVE CHANNELS

Chart annotations for middle graph:
- AMBIENT TEMPERATURE (°C)
- 800 ohm loads
- 500 ohm loads
- 250 ohm loads
- Shorted loads
- V_{USER} = 26.5V (CURRENT MODE)
- ACTIVE CHANNELS

Chart annotations for bottom graph:
- AMBIENT TEMPERATURE (°C)
- 8 Channels V
- 6 Channels V
- 4 Channels V
- 2 Channels V
- V_{USER} = 30V (MIXED VOLTAGE AND CURRENT)
- ACTIVE CHANNELS CURRENT AND VOLTAGE MIX

Maximum Operating Temperature

Select the line for the number of voltage channels used, then add the number of current channels. This is the total number of channels used.

To determine the maximum operating temperature, select the total active channels used (from the bottom of chart), then draw a vertical line to the line for the number of voltage channels.

VOLTAGE CHANNELS HAVE 2K ohm LOADS
CURRENT CHANNELS HAVE SHORTED LOADS

NOTE

For maximum performance and module life, it is recommended that the module be operated at maximum load resistance to offload heat from the module.

Configuring the IC693ALG392 Analog Output Module

The 8-Channel Analog Current/Voltage Output module can be configured using the Logicmaster 90-30/20/Micro or CIMPLICITY Control Programming Software configurator function, or with the Hand-Held Programmer.

The parameters that can be configured are described in the following table. Configuration procedures using Logicmaster 90-30/20/Micro Programming Software and the Hand-Held Programmer are described in the following pages.

Table 11-6. Configuration Parameters for IC693ALG392

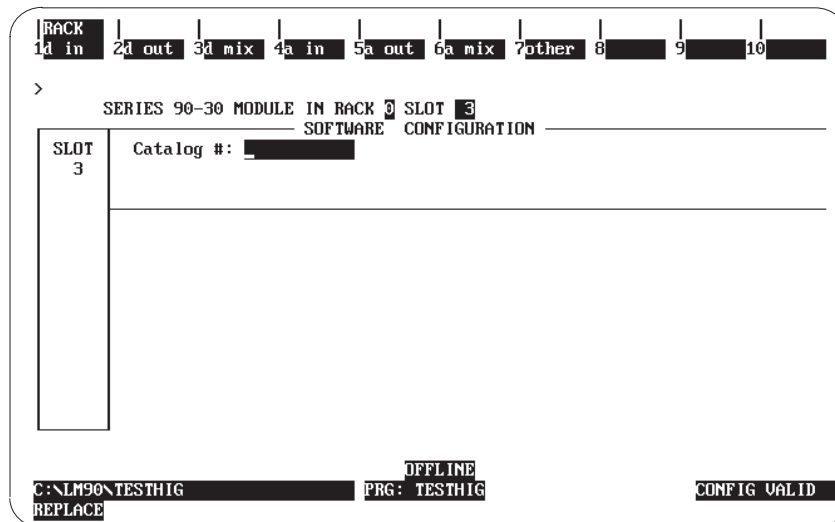| Parameter Name	Description	Values	Default Values	Units
Active Channels	Number of channels converted	1 through 8	1	n/a
%AQ Address	Starting address for %AQ reference type	standard range	%AQ0001, or next highest available address	n/a
%I Address	Starting address for %I reference type	standard range	%I00001, or next highest available address	n/a
%I Size	Number of %I status locations	8 or 16	8	bits
STOP MODE	Output state when module toggled from RUN to STOP mode	HOLD or DEFLOW	HOLD	n/a
Range (Displayed under Stop Mode)	Type of Output Range	0, +10V –10, +10V 4, 20 mA 0, 20 mA	0, 10V	n/a

For more information on configuration, see

▫ *Configuration Using Logicmaster 90-30/20/Micro Programming Software* beginning on page 3-72

▫ *Configuration Using the Hand-Held Programmer* beginning on page 3-76

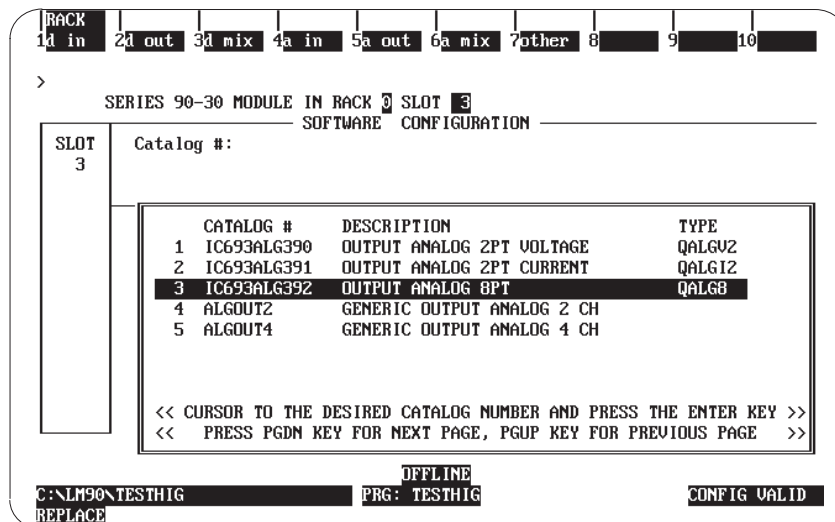## Configuring IC693ALG392 Using Logicmaster Software

This section describes how to configure the 8-Channel Analog Current/Voltage Output module using the configurator function in Logicmaster 90-30/20/Micro Programming Software. *Configuration can also be done using CIMPLICITY Control Programming Software. For details refer to the CIMPLICITY Control online help.*

To configure an 8-Channel Analog Current/Voltage Output Module on the I/O Configuration Rack screen:

1. Move the cursor to the desired rack and slot location. The slot may be either unconfigured or previously configured.

2. Press the **lm30 io** key (**F1**). You will then see a screen similar to the following:

```
RACK
1d in   2d out  3d mix  4a in   5a out  6a mix  7other  8       9       10

>
           SERIES 90-30 MODULE IN RACK 0 SLOT 3
                          SOFTWARE   CONFIGURATION
  SLOT     Catalog #: _
   3




                                    OFFLINE
C:\LM90\TESTHIG                    PRG: TESTHIG                  CONFIG VALID
REPLACE
```

3. Press the **a out** key (**F5**). Your screen will now look like the one displayed below:

```
RACK
1d in   2d out  3d mix  4a in   5a out  6a mix  7other  8       9       10

>
           SERIES 90-30 MODULE IN RACK 0 SLOT 3
                          SOFTWARE   CONFIGURATION
  SLOT     Catalog #:
   3

              CATALOG #      DESCRIPTION                    TYPE
           1  IC693ALG390    OUTPUT ANALOG 2PT VOLTAGE      QALGV2
           2  IC693ALG391    OUTPUT ANALOG 2PT CURRENT      QALGI2
           3  IC693ALG392    OUTPUT ANALOG 8PT              QALG8
           4  ALGOUT2        GENERIC OUTPUT ANALOG 2 CH
           5  ALGOUT4        GENERIC OUTPUT ANALOG 4 CH



           << CURSOR TO THE DESIRED CATALOG NUMBER AND PRESS THE ENTER KEY >>
           <<    PRESS PGDN KEY FOR NEXT PAGE, PGUP KEY FOR PREVIOUS PAGE    >>
                                    OFFLINE
C:\LM90\TESTHIG                    PRG: TESTHIG                  CONFIG VALID
REPLACE
```

4. Move the cursor to the IC693ALG392 selection as shown above. Then press **Enter**.

The next screen that appears will look like the one displayed below:

```
┌────────────────────────────────────────────────────────┐
│ │RACK│  │     │     │     │     │     │     │     │     │
│ │1d in│ 2d out 3d mix 4a in  5a out 6a mix 7other 8     9     10    │
│                                                        │
│ >                                                      │
│        SERIES 90-30 MODULE IN RACK 0 SLOT 3            │
│                   SOFTWARE  CONFIGURATION ─────────────│
│    SLOT  │ Catalog #: IC693ALG392       OUTPUT ANALOG 8PT│
│     3    │                                              │
│          │                                              │
│  ALG392  │                                              │
│          │ Active Chan:    1     %AQ Ref Adr:   %AQ001 %I Ref Adr :   %I0001│
│  QALG8   │ Stop Mode  : HOLD                   %I Size   :    8    │
│          │                                              │
│          │ Channel 1  : 0,+10V                          │
│          │                                              │
│          │                                              │
│          │                                              │
│          │                                              │
│          │                                              │
│          │                                              │
│          │                                              │
│                              OFFLINE                    │
│ C:\LM90\TESTHIG              PRG: TESTHIG       CONFIG VALID│
│ REPLACE                                                │
└────────────────────────────────────────────────────────┘
```
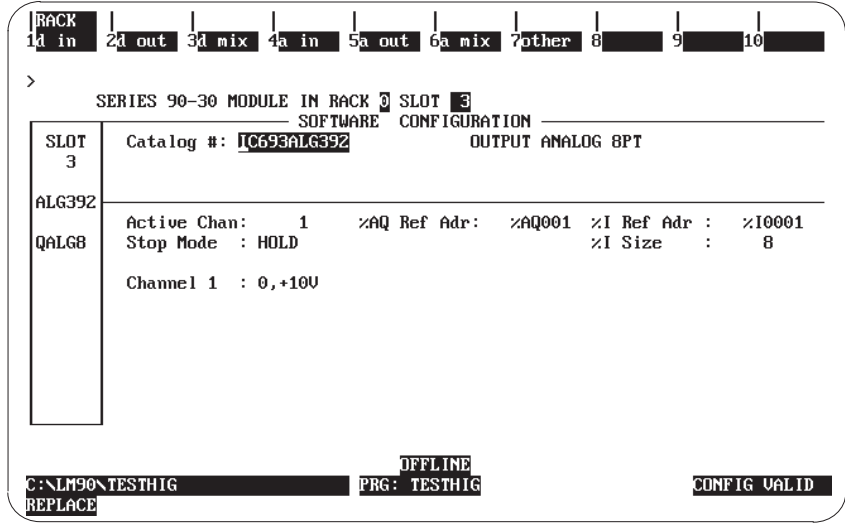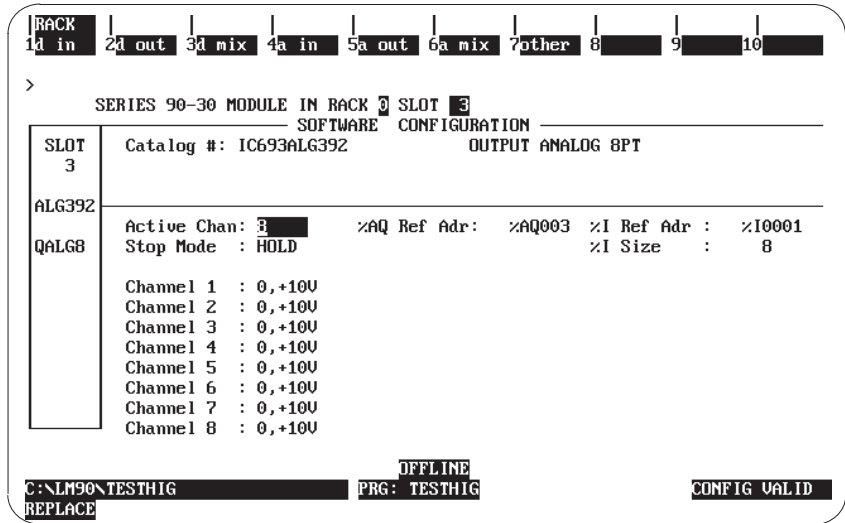
5. Enter the remaining configuration parameters on this screen. You can move your cursor from field to field by pressing the **Arrow** cursor control keys. When you are in the field you want to modify, you can either type in your choice or press the **Tab** key to scroll through the available selections (or **Shift-Tab** to reverse the direction of the selection list).

   The default number of Active Channels (**Active Chan:**) is 1. You will not be able to configure additional channels until you change this field (by typing in the correct number (1 through 8) or by pressing the **Tab** key to increment the number). The screen displayed below shows the default selections after changing the **Active Chan:** field.

```
┌────────────────────────────────────────────────────────┐
│ │RACK│  │     │     │     │     │     │     │     │     │
│ │1d in│ 2d out 3d mix 4a in  5a out 6a mix 7other 8     9     10    │
│                                                        │
│ >                                                      │
│        SERIES 90-30 MODULE IN RACK 0 SLOT 3            │
│                   SOFTWARE  CONFIGURATION ─────────────│
│    SLOT  │ Catalog #: IC693ALG392       OUTPUT ANALOG 8PT│
│     3    │                                              │
│          │                                              │
│  ALG392  │                                              │
│          │ Active Chan: 8      %AQ Ref Adr:   %AQ003 %I Ref Adr :   %I0001│
│  QALG8   │ Stop Mode  : HOLD                   %I Size   :    8    │
│          │                                              │
│          │ Channel 1  : 0,+10V                          │
│          │ Channel 2  : 0,+10V                          │
│          │ Channel 3  : 0,+10V                          │
│          │ Channel 4  : 0,+10V                          │
│          │ Channel 5  : 0,+10V                          │
│          │ Channel 6  : 0,+10V                          │
│          │ Channel 7  : 0,+10V                          │
│          │ Channel 8  : 0,+10V                          │
│                              OFFLINE                    │
│ C:\LM90\TESTHIG              PRG: TESTHIG       CONFIG VALID│
│ REPLACE                                                │
└────────────────────────────────────────────────────────┘
```

Note

The entry in the **Stop Mode** field (**HOLD** or **DEFLOW)** determines how the outputs will behave when the module is toggled from **RUN** to **STOP** mode. When this value is set to **HOLD** (the default), the outputs will retain their last state. When you change this value to **DEFLOW**, the output will go to zero.

Other Configuration Considerations for IC693ALG392

Channels are scanned in sequential, contiguous order with channel 1 being the first to be scanned. Note that the impact of the Current/Voltage Output module on the CPU scan time is directly proportional to the number of analog channels that you have enabled.

The only allowable entries for the **%AQ Ref Adr** are %AQ addresses. The only allowable entries for the **%I Ref Adr** are %I addresses.

The entry in **%I Size** will only accept 8 or 16. This field denotes the number of bits returned to the user.

The **%AQ Ref Adr** field is the reference address for the %AQ data and points to the start of the locations in the %AQ memory where the output data to the module begins. Each channel provides 16 bits of analog output data as an integer value from 0 to 32,760 or –32,767 to 32,752. depending on the range type selected. For detailed information on the data format, see the *CPU Interface to Analog Modules* section in this manual.

The **%I Ref Adr** is the reference address for the %I data and points to the start of the locations in the %I memory (the Input Table) where status information from the module is reported. You can select the number of %I status locations reported to the PLC by editing the value in the **%I Size** field. Values allowable in the **%I Size** field are 8 or 16, which refer to the number of %I locations reported to the PLC.

The **%I Ref Adr** field will only accept %I for %I Size values 8 or greater; the data brought back is in the format that follows:

The first eight %I locations (available for %I SIZE values 8, 16)

%I Locations	Description
%I	*Module OK*; a 0 (zero) indicates NOT OK, 1 indicates module OK
%I+1	*User Supply OK* - Indicates when user supply is in specified limits; reads a 0 when user supply is below the specified limit, 1 when User supply is OK
%I+2 – %I+7	Reserved for future modules. Not used in this module.

Second eight locations – (available for %I SIZE value of 16)

%I Locations	Description
%I+8	Channel #1 BROKEN WIRE ; 0 = OK, 1 = Wire broken (I modes only)
%I+9	Channel #2 BROKEN WIRE ; 0 = OK, 1 = Wire broken (I modes only)
%I+10	Channel #3 BROKEN WIRE ; 0 = OK, 1 = Wire broken (I modes only)
%I+11	Channel #4 BROKEN WIRE ; 0 = OK, 1 = Wire broken (I modes only)
%I+12	Channel #5 BROKEN WIRE ; 0 = OK, 1 = Wire broken (I modes only)
%I+13	Channel #6 BROKEN WIRE ; 0 = OK, 1 = Wire broken (I modes only)
%I+14	Channel #7 BROKEN WIRE ; 0 = OK, 1 = Wire broken (I modes only)
%I+15	Channel #8 BROKEN WIRE ; 0 = OK, 1 = Wire broken (I modes only)

One of four output ranges can be selected. Two are voltage ranges. The default range is 0 to 10V, where output voltage values ranging from 0 to 10 volts correspond to 0 to 32000 integer values from the Series 90-30 CPU. The –10 to +10V range, when selected, corresponds from –32000 to 32000 from the CPU over an output voltage range of –10 to +10V. The two current ranges are 4 to 20 mA, and 0 to 20 mA. In each of the current ranges values between 0 and 32000 are sent to the module. Depending on which range is selected, will determine if the module is in Current or Voltage mode.

The following table shows values sent from the CPU to the module.

Range	Module Mode	*Allowed Values
0 to 10 V	Voltage	0 to 32767
–10 to 10 V	Voltage	– 32768 to 32767
4 to 20 mA	Current	0 to 32000*
0 to 20 mA	Current	0 to 32767

*Allowed values refers to the values that are valid. If a user sends a
value > 32000, the module will truncate that value to 32000 before
 sending it to the D/A Converter.

Note

Only enabled (active) channels are displayed on the screen

6.   Press **Shift-F1** *(Rack))* or the **Esc**ape key to return to the rack display.

Configuring IC693ALG392 with Hand-Held Programmer

You can also configure the 8-Channel Analog Current/Voltage Output module using the Series 90-30 Hand-Held Programmer. In addition to the information in this section, refer to GFK-0402, the *Hand-Held Programmer User's Manual* for more information on configuration of Intelligent I/O modules.

Although you can change the number of actively scanned channels with the Logicmaster 90-30/20/Micro configurator function, the Hand-Held Programmer does not support editing the number of actively scanned channels. If the 8-Channel Analog Current/Voltage Output module is initialized by a Hand-Held Programmer, the number of actively scanned channels is 8.

If a module had been previously configured with Logicmaster 90-30/20/Micro software and the number of actively scanned channels has been changed from 8, that number will be displayed on the bottom line of the Hand-Held Programmer display following the **AQ** entry. You can edit data with the Hand-Held Programmer only for the active channels, but you can not change the number of actively scanned channels.

Module Present

If a module is physically present in a system, it can be added to the system's configuration by reading the module into the configuration file. For example, assume that an 8-Channel Analog Current/Voltage Output module is installed in slot 3 of a Model 311 PLC system. It can be added to the configuration with the following sequence. Use the ↑ and ↓ arrow cursor keys or the # key to display the selected slot.

Initial Display

```
┌─────────────────────────┐
│ ┌─────────────────────┐ │
│ │ R0:03 EMPTY    >S    │ │
│ │                      │ │
│ └─────────────────────┘ │
└─────────────────────────┘
```

To add the IC693ALG392 module to the configuration, press the **READ/VERIFY**, **ENT** key sequence. The following screen will be displayed:

```
┌─────────────────────────┐
│ ┌─────────────────────┐ │
│ │ R0:03 AO 1.00 >S     │ │
│ │  I16:I_              │ │
│ └─────────────────────┘ │
└─────────────────────────┘
```

Selecting %I Reference

At this point the starting %I reference address for the status data returned from the module must be entered. Notice that the length of the status field (**16**) is displayed as the first two digits following the first **I** on the second line of the display.

Note

This field cannot be changed with the Hand-Held programmer. However, it can be changed using the Logicmaster 90-30/20/Micro software configurator function. The Hand-Held Programmer will always reflect the currently active length of the status field.

Pressing the **ENT** key will allow the PLC to select the starting address of the status data. You can select a specific starting address by pressing the key sequence for the desired address and pressing the **ENT** key.   For example to specify the starting address as I17, press the key sequence **1**, **7, ENT**. The following screen will be displayed:

```
R0:03 AO 1.00 >S
 I16:I0017-I0032
```

You can press the **CLR** key at any time to abort the configuration you have just selected and return the slot to EMPTY.

After selecting the starting %I address and pressing the **ENT** key, the following screen appears.

```
R0:03 AO 1.00 >S
 AQ8:AQ_
```

Selecting %AQ Reference

This screen allows you to select the starting address for the %AQ reference by specifying the starting reference in the %AQ field. You can select the next available address (the default) or enter a specific address.   Pressing the **ENT** key will allow the PLC to select the starting addresses.

To enter a specific address (for example %AQ35), press the starting reference number keys and the **ENT** key. For example, to specify a starting address of %AQ35, press the key sequence **3, 5**, **ENT**.

```
R0:03 AO 1.00 >S
 AQ8:AQ035-AQ043
```

Note that the length of the status field (**8**) is displayed as the first two digits following the first **AQ** on the second line of the display.

Note

This field cannot be changed with the Hand-Held programmer. However, it can be changed using the Logicmaster 90-30/20/Micro software configurator function. The Hand-Held Programmer will always reflect the currently active length of the status field.

You can press the **CLR** key at any time to abort the configuration you have just selected and return the slot to EMPTY.

Removing Module From Configuration

If required, this module can be removed from the current rack configuration. Assume that the module is currently configured in rack 0, slot 3. It can be deleted with the following sequence:

Initial Display

```
R0:03 AO 1.00 >S
 AQ8:AQ_
```

To delete the module, press the **DEL**, **ENT** key sequence. The display will then be:

```
R0:03 EMPTY     >S
```

If the **CLR** key had been pressed after the **DEL** key (instead of the **ENT** key), the delete operation would have been aborted.

Selecting Module Default Mode

The default STOP mode of the module, either HOLD or DEFLOW, can be displayed and modified, if required, by using the following procedure.

Initial Display

```
R0:03 AO 1.00 >S
 I16:I0017-I0032
```

To display the module's default STOP mode, press → →. The display will show the current mode of the module. The default mode is **HOLD**.

```
R0:03 AO 1.00 >S
HLS/DEF:HOLD
```

You can toggle between the HOLD and DEFLOW modes by pressing the ± key. The range selected is the one currently displayed.

```
R0:03 AO 1.00 >S
HLS/DEF:DEF LOW
```

When the desired mode for the module is displayed on the screen it can be accepted by pressing the **ENT** key. To return to the previous screen, press the ← key.

Selecting Output Channel Ranges

The range for each of the 8 channels can be displayed and selected or changed as described below. There are two current and two voltage ranges that can be selected.

 Initial Display

```
R0:03 AO 1.00 >S
 I16:I0017–I0032
```

To display the channel ranges press → → →. The display will show Channel 1 (or the currently selected channel) and the first available range.

```
R0:03 AO 1.00 >S
CHAN 1: 0 – 10 V
```

You can toggle through the range for each channel by pressing the ± key. Each range will be displayed as shown. Each of the ranges are shown below. The range that will be selected is the one currently displayed.

```
R0:03 AO 1.00 >S
CHAN 1: –10 – 10
```

```
R0:03 AO 1.00 >S
CHAN 1:4 – 20 MA
```

```
R0:03 AO 1.00 >S
CHAN 1:0 – 20 MA
```

When the desired range for the module is displayed on the screen it can be accepted by pressing the **ENT** key. To return to the previous screen, press the ← key. To view the next channel's range display, press the → key.

```
R0:03 AO 1.00 >S
CHAN 2: 0 – 10 V
```

Edit this channel's range the same as you did for the first channel. The range of all active channels can be changed in the same manner. Return to the initial display screen by pressing the **ENT** key or by pressing the ← key until the initial screen is displayed.

Saved Configurations

Configurations that contain an 8-Channel Analog Current/Voltage Output module can be saved to an EEPROM or MEM card and read from that device into the CPU at a later time. MEM cards and EEPROMs containing these configurations can be read into any Release 4 or later Series 90-30 CPU (cannot be read into a Series 90-20 CPU). Refer to Chapter 2 of the *Hand-Held Programmer User's Manual* for detailed information on the Save and Restore operations.

IC693ALG392 Analog Current/Voltage Output Block Diagram

The following figure is a block diagram of the 8-Channel Analog Current/Voltage Output Module.
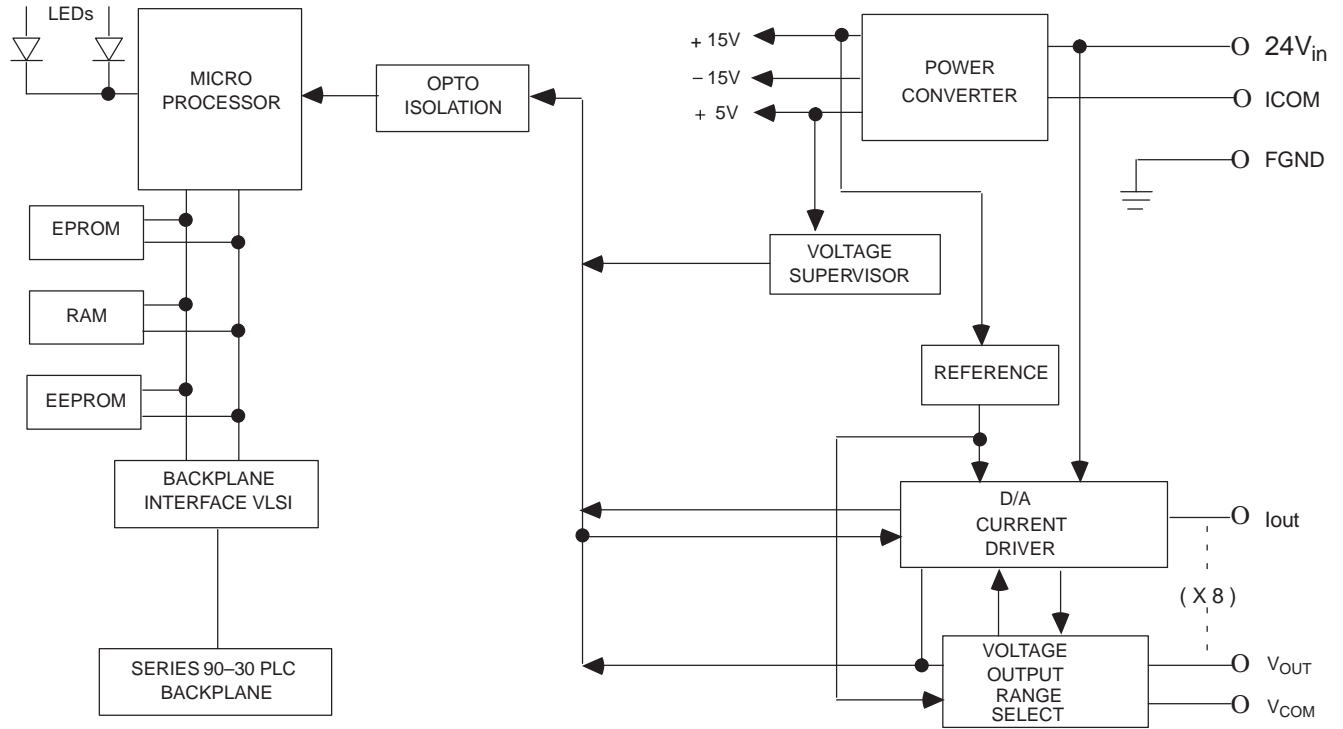
a47037

Figure 11-18. 8-Channel Analog Current/Voltage Output Module Block Diagram - IC693ALG392