G4LC32ISA USER'S GUIDE

Form 641-001003 — October, 2000

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Opto 22 warrants all of its products to be free from defects in material or workmanship for 30 months from the manufacturing date code. This warranty is limited to the original cost of the unit only and does not cover installation, labor, or any other contingent costs. Opto 22 I/O modules and solid-state relays with date codes of 1/96 or later are guaranteed for life. This lifetime warranty excludes reed relay, SNAP serial communication modules, SNAP PID modules, and modules that contain mechanical contacts or switches. Opto 22 does not warrant any product, components, or parts not manufactured by Opto 22; for these items, the warranty from the original manufacturer applies. These products include, but are not limited to, the OptoTerminal-G70, OptoTerminal-G75, and Sony Ericsson GT-48; see the product data sheet for specific warranty information. Refer to Opto 22 form number 1042 for complete warranty information.

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CHAPTER 1

Introduction

Overview — G4LC32ISA

The G4LC32ISA Controller is a high performance real-time controller designed to work within the OPTO 22 family of processors and I/O control units. It may be mounted in both active or passive AT backplanes, and communicates directly with other devices on the bus as a "Bus Master".

Programming is accomplished with OptoControl or Cyrano 200, OPTO 22's revolutionary flowchart based programming languages. Programs are transportable across the entire line of OPTO 22 processors.

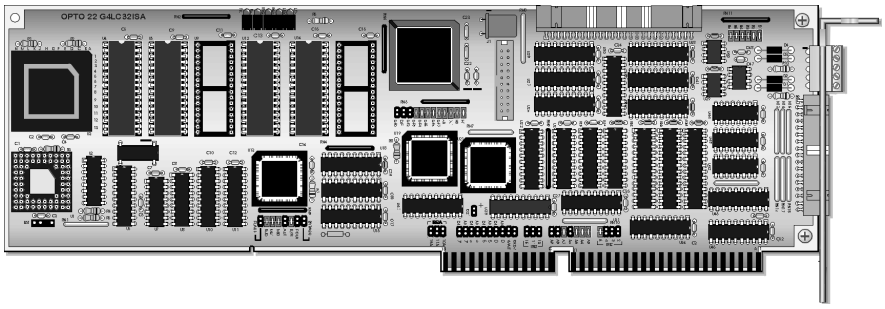


Figure 1-1: G4LC32ISA Card

The G4LC32ISA shrinks the "Two Box" Computer Integrated Manufacturing (CIM) control architecture into a "One Box" package. While still maintaining the performance of a two tier processor architecture, the Industrial PC, in conjunction with the G4LC32ISA, can now operate a complete mistic System of highly intelligent I/O's in real-time, while simultaneously providing such CIM functions as operator interface, maintenance diagnostics, SPC, SQC, CFM, logistical tracking, data entry, historical logging, trends, and host interface. Compatible with OPTO 22's real-time control software, the G4LC32ISA can be programmed to solve the most complex industrial control applications.

Configuration Possibilities

The G4LC32ISA is an extremely flexible product and may be operated as either a slave co-processor or as a bus master. It may also be mounted in either an active or passive ISA backplane. Configured as a slave co-processor, the G4LC32ISA can communicate to other I/O cards on the ISA bus via direct I/O access and the appropriate software driver support. This feature will allow you to manipulate other third party ISA hardware from OptoControl or Cyrano. Both 8 and 16-bit ISA cards are supported. Multiple slave configured G4LC32ISA processors may be installed in a single PC, each having their own mistic I/O and the ability to communicate to other ISA hardware, including other G4LC32ISA's. As a slave, the only resource the G4LC32ISA needs from the ISA bus to run, is power (assuming no other third party hardware accessing). Thus, you may reset the PC, and the G4LC32ISA will continue to operate. Configured as an ISA bus master, the G4LC32ISA can control a passive backplane ISA bus. Again, using the appropriate software driver, third party hardware can be manipulated by the G4LC32ISA under OptoControl or Cyrano.

Available Options

There are also several expansion options available with the G4LC32ISA. A math co-processor may be installed on the G4LC32ISA card, increasing its performance in math intensive applications.

A serial communication expansion daughter board, G4LC32ISASER, may be connected. The G4LC32ISASER has three serial ports (COM1 - COM3) and expands the G4LC32ISA to a total of four serial ports. COM1 is a 2-wire, half-duplex RS-485 port. COM2 and COM3 are jumper configurable as RS-232, 2-wire half-duplex RS-485, or 4-wire full-duplex RS-485. COM2 can be used as a host port in any communication mode. A fused +5 VDC output is provided in the RS-232 mode to simplify wiring to an external device such as a bar code wand. Diagnostic LEDs are provided to debug communication problems and removable terminal block connectors are used. The extra serial ports allow the G4LC32ISA to communicate to more mistic remote I/O or third party external devices.

The G4LC32ISA general purpose processor expansion bus also offers expansion capabilities. OPTO 22 has designed an ARCNET daughter board, G4LC32ISAARC, for this bus. The G4LC32ISAARC daughter board connects the G4LC32ISA to OPTO 22's misticNet (ARCNET). This ARCNET port can be used as the host port.

Thus, the G4LC32ISA may communicate to other OPTO 22 mistic controllers (e.g., G4LC32s, G4LC32SXs, M4RTUs) providing global project information sharing. Each daughter board option uses one ISA slot.

I/O Units (Bricks)

The G4LC32ISA processor not only handles all the logic necessary to run your application programs, but it can also communicate with I/O brick units. I/O units can be connected to the G4LC32ISA in two ways. The base configuration of the G4LC32ISA provides two accessible connectors for both a mistic local bus and a mistic remote bus using RS-485 communication. Using the mistic local bus, you can connect up to 139 local mistic I/O units over a span of 200 feet. The local bus is a 34-conductor parallel interface communicating at over 1.4 MB/s. Using the mistic remote bus, you can connect up to 100 (256 with repeaters), remote mistic I/O units over a span of 3000 feet (further distances with repeaters). The remote bus is a twisted pair serial interface (RS-485) communicating up to 115.2 KBd. The choice of I/O connectivity is speed versus distance and is based on the needs of the industrial control application. You can mix both digital and analog I/O units as needed and each I/O unit can accommodate 16 I/O modules (analog I/O units require an 8 module extender Brick). The base configuration of the G4LC32ISA can control up to 2224 local I/O points and 4096 remote I/O points. CRC 16-error detection is included in every message transaction between the G4LC32ISA and the connected I/O units, insuring a safe, reliable operation. Diagnostic LEDs are also provided on the G4LC32ISA to enhance debug efforts.

How A User Application Works

User applications are developed on a PC workstation using OptoControl or Cyrano. The EPROM in the G4LC32ISA contains a multicharting kernel which uses a time-slicing technique to run up to 31 user-defined charts. Each chart executes its segment of the application program for 500 ms. After 500 ms, that chart is suspended and control is passed to the next chart in a round-robin fashion. The time it takes to complete the round-robin is dependent on the number of charts running. Since each individual chart gets its allocated time slice at least once every 16 ms, all the charts appear to be running simultaneously. A complicated control application can be segmented by function. This enables each function to be represented by its own unique chart. Once completed, the application program can be downloaded to the target G4LC32ISA and the OptoControl or Cyrano debugger can be used to debug the application. The application can run on the G4LC32ISA independent of any other applications (e.g., operator interface) that may be running on the PC. This independence allows you to maintain an appropriate separation between real-time activity and non-real-time activity, while still providing a high speed interface (i.e.,ISA bus) between the two environments.

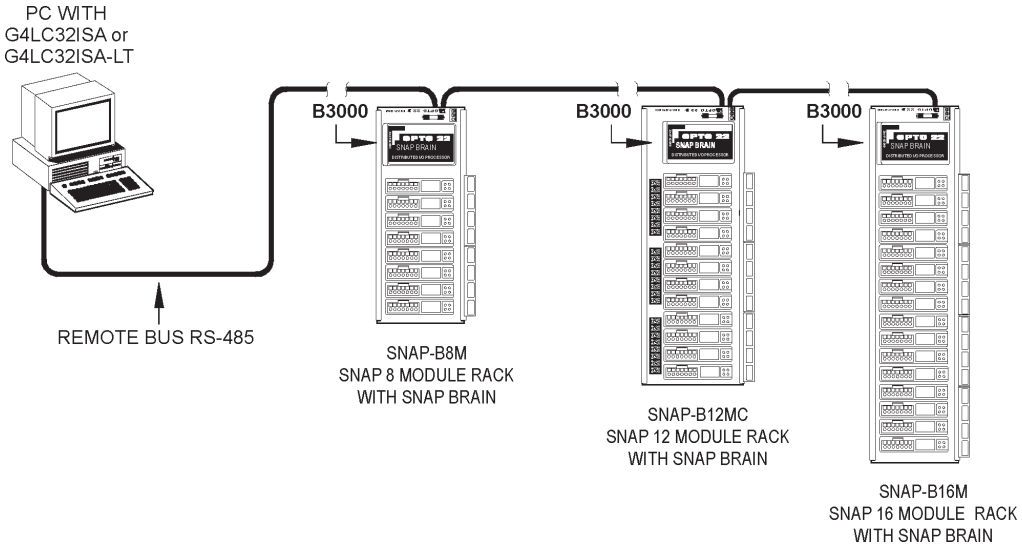


Figure 1-2: G4LC32ISA Stand-Alone Architecture

Basic Architecture

Program control and host communications are handled by a powerful 32-bit 68020 microprocessor. The G4LC32ISA processor's 256 KB of battery backed RAM and 256 KB Flash EPROM allows you to execute control applications with extensive data collection requirements. The processor is mounted on an ISA bus card and can be plugged into a PC.

A block diagram of the G4LC32ISA is shown below•.

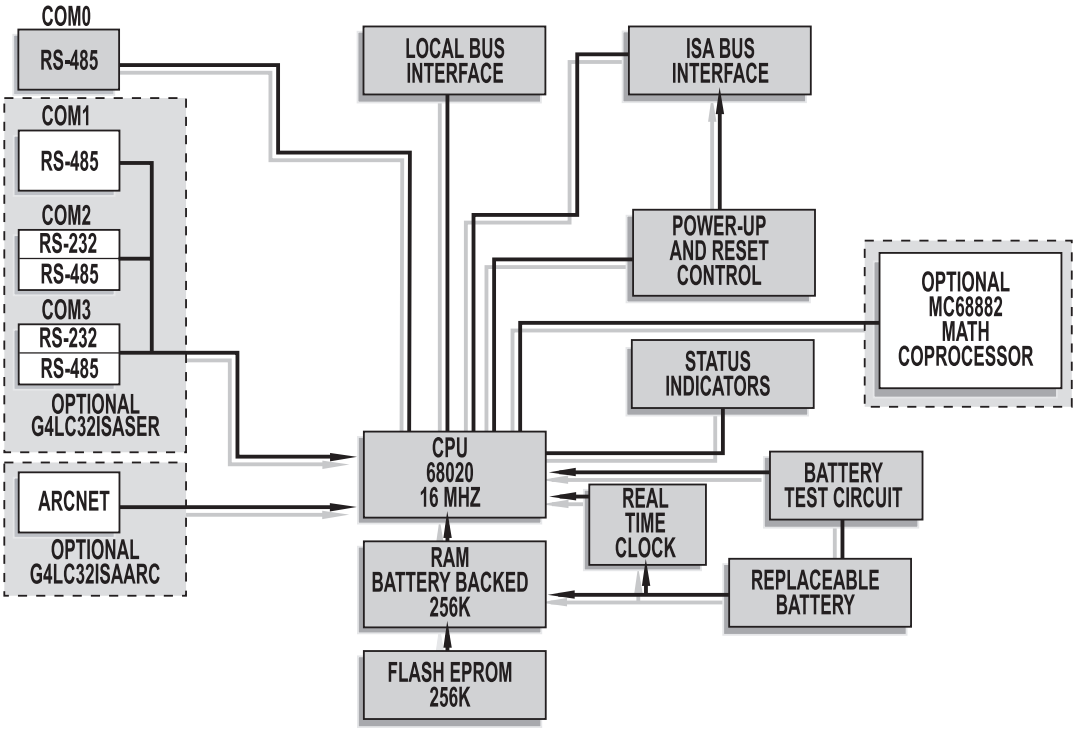


Figure 1-3: Block Diagram of G4LC32ISA

Sophisticated reset circuitry and watchdog timer capability permit a user to develop intelligent, robust error recovery.

Finally, the G4LC32ISA provides expansion options for intelligent coprocessor daughter cards. Armed with a processor, these daughter cards have the capability to interface to various industry hardware and software protocols without degrading overall real-time performance.

CHAPTER 2

Configuration and Installation

Card Diagrams

G4LC32ISA Card Diagram

The following figure shows the jumper groups, LEDs, and physical layout of the G4LC32ISA processor.

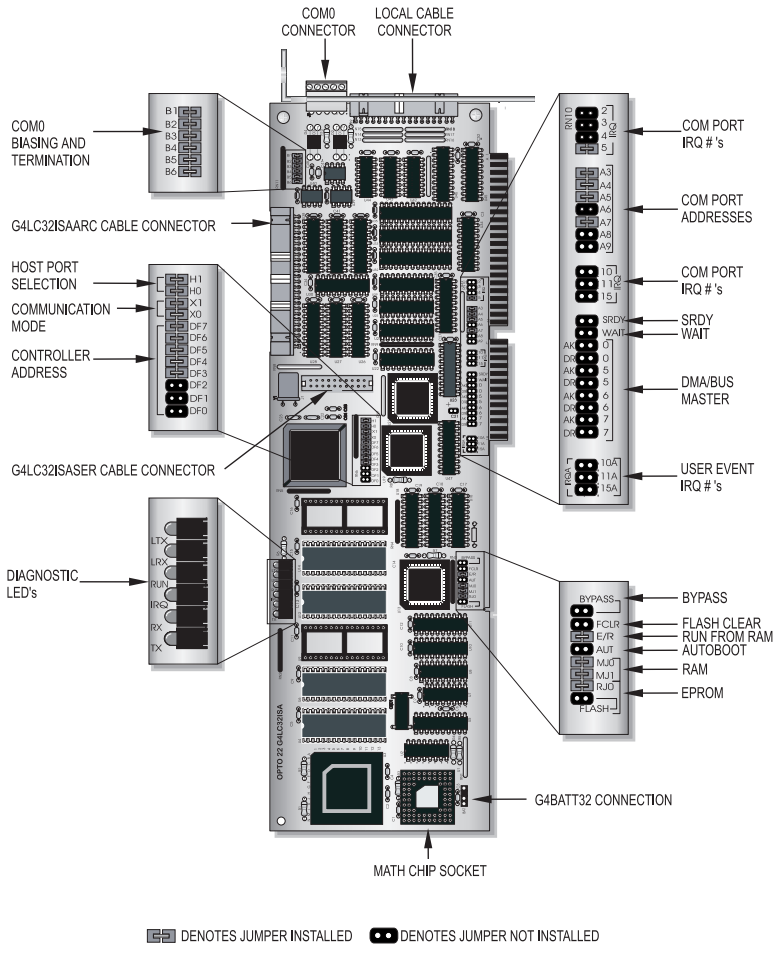


Figure 2-1: G4LC32ISA Physical Layout

G4LC32ISASER Card Diagram

The following figure shows the communication jumper groups, LEDs, RS-232 fuses and physical layout of the G4LC32ISASER daughter card.

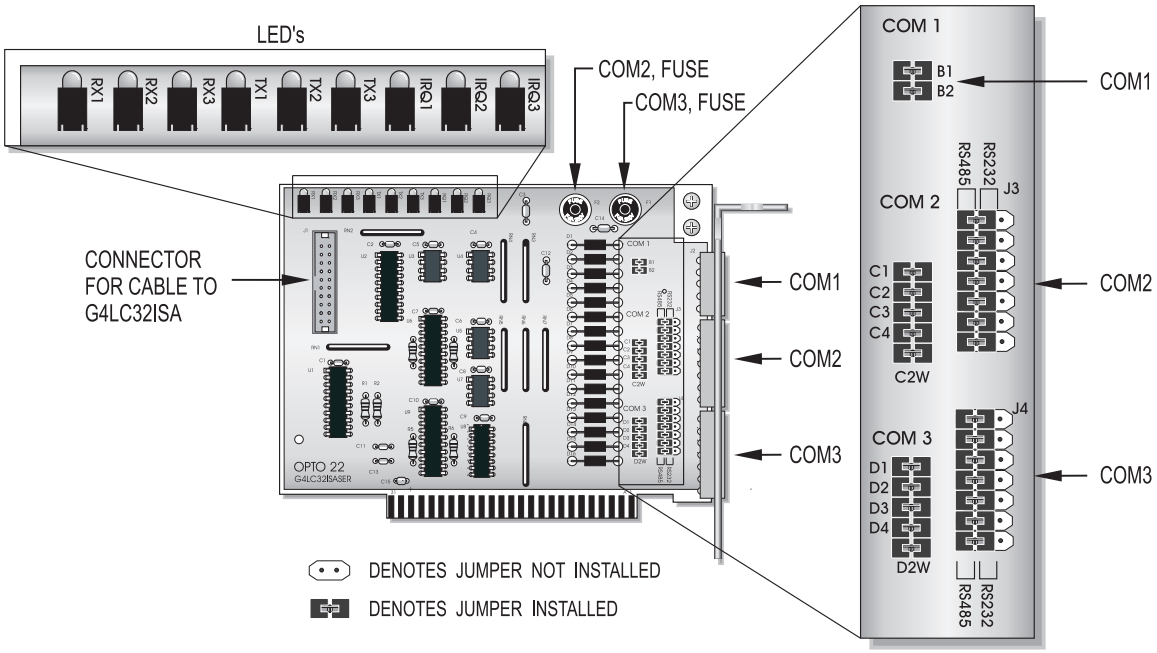


Figure 2-2: G4LC32ISASER Physical Layout

G4LC32ISAarc Card Diagram

The following figure shows physical layout of the G4LC32ISAARC daughter board.

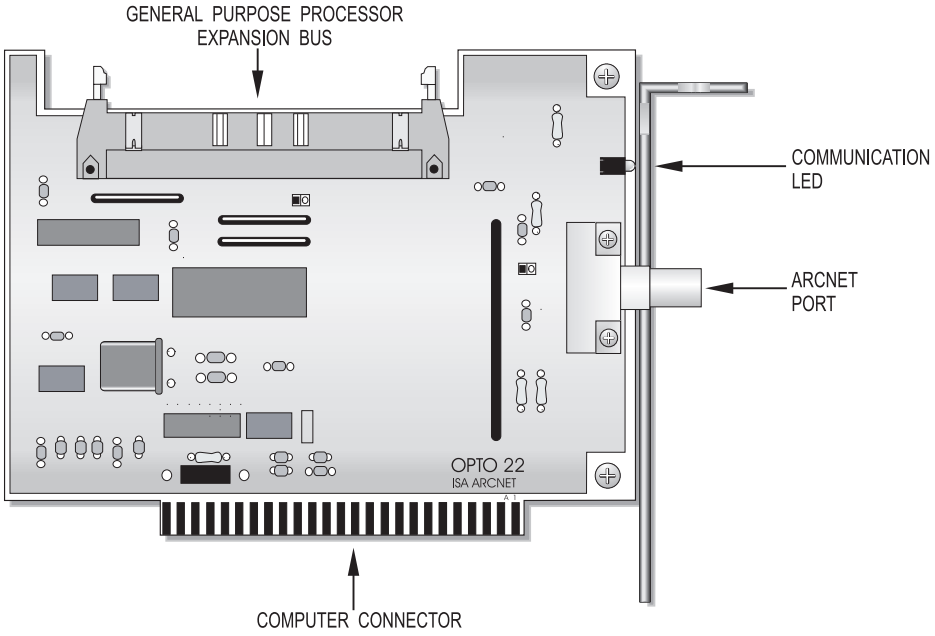


Figure 2-3: G4LC32ISAARC Physical Layout

Configuration Jumpers

E/R

An installed jumper selects RUN from RAM and is the factory default. No jumper selects Run from Flash EPROM.

Autoboot

Use this jumper to determine whether autoboot mode will be enabled (jumper in) or disabled (jumper out, the default).

BYPASS

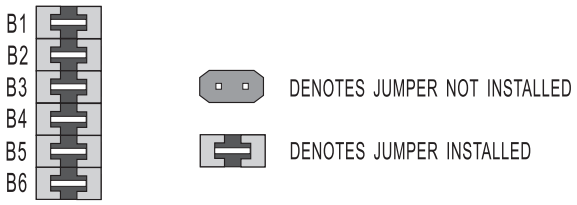
An installed jumper indicates that the processor should bypass the bus arbitration when executing bus master cycles to the ISA bus. This jumper is used only in passive backplane applications where no platform DMA arbitrator is present. If the unit is installed in an active motherboard, this jumper **must not** be installed. The factory default is no jumper installed.

COM0 Jumpers

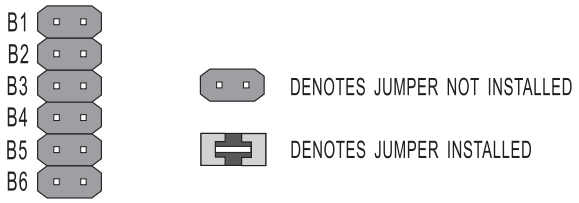
The "B" group jumpers are used for terminating and biasing the RS-485 COM0 port. The physical location of the controller on the RS-485 communication network effects which jumpers are installed. Jumpers installed in B1 through B6 are the default settings.

B1	TX/RX+ pullup bias
B2	TX/RX+ termination
B3	TX/RX+ pulldown bias
B4	IRQ+ pullup dias
B5	IRQ termination
B6	IRQ- pulldown bias

If the controller is at the physical beginning or end of the RS-485 network, install these jumpers:



If the controller is not at the physical beginning or end of the RS-485 network, do **not** install any jumpers.



COM Port Address and IRQ Jumpers

COM port address jumpers A9 to A3 and IRQ jumpers are used to select the base I/O address and interrupt line of the G4LC32ISA's dedicated host port in an active backplane. Refer to the table below for the standard configurations recommended by OPTO 22. The default setting is COM4 at address 340H, IRQ5.

Port	Hex Address	A9	A8	A7	A6	A5	A4	A3	IRQ#
COM1	3F8	:	:	:	:	:	:	:	4
COM2	2F8	:	X	:	:	:	:	:	3
COM3	348	:	:	X	:	X	X	:	2
COM4	340	:	:	X	:	X	X	X	5
COM5	248	:	X	X	:	X	X	:	10
COM6	240	:	X	X	:	X	X	X	11

Communication Mode Jumpers

This group selects between Binary or ASCII communication mode for the dedicated host port. The default setting is binary mode.

X0	Communication Mode
X	Binary Mode
:	ASCII Mode

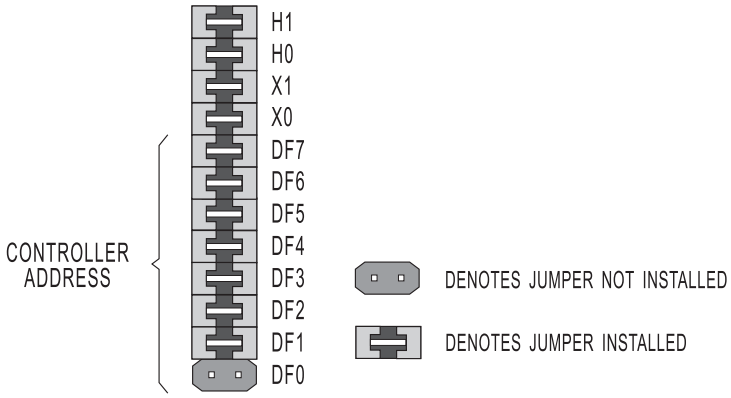
X1 is reserved for future use.

X = Jumper installed

: = Jumper not installed

Controller Address Jumpers

These jumpers are used to select an 8-bit address of 1 to 255 (1-FF hex), allowing up to 255 controllers (with multidrop repeaters if using RS-485) to be networked together. Address 0 is reserved. DF7 is the most significant bit and DF0 is the least. A jumper in is a logical 0, a jumper out is a logical 1, and the default setting is address 1.



Examples of Address Jumper Settings

Address	DF7	DF6	DF5	DF4	DF3	DF2	DF1	DF0	Hex
1	X	X	X	X	X	X	X	:	01
2	X	X	X	X	X	X	:	X	02
3	X	X	X	X	X	X	:	:	03
253	:	:	:	:	:	:	X	X	FD
254	:	:	:	:	:	:	:	X	FE
255	:	:	:	:	:	:	:	:	FF

X = Jumper installed

: = Jumper not installed

FCLR Jumper

An installed jumper instructs the processor to bootup to the protected mistic loader sector of Flash EPROM. FCLR should only be temporarily installed to fix incorrectly configured or corrupted OptoControl or Cyrano kernel sectors of the Flash EPROM. The default setting is no jumper installed.

EXAMPLE: After booting up with the jumper installed, the OptoControl or Cyrano kernel should be re-downloaded using the Flash 200 utility. The jumper should then be removed to continue normal operations.

Flash EPROM Jumpers

These jumpers configure the Flash EPROM size. The factory default size is 256 KB.

Flash	RJ0	ROM Type
X	X	27C1001 (1 Mb UV EPROM) (256 KB)
X	:	27C4001 (4 Mb UV EPROM) (1 MB)
:	X	29F040 (1 Mb Flash EPROM)(256 KB)
:	:	29F040 (4 Mb Flash EPROM)(1 MB)

Host Port Selection Jumpers

These jumpers select the host port. Host port choices are the ISA bus, COM0 (RS-485, 38.4 KBd), ARCNET, and COM2 (RS-232 or RS-485, 38.4 KBd). The ISA bus is the factory default host port.

H1	H0	
X	X	ISA bus dedicated port
X	:	COM0 at 38.4KBd
:	X	ARCNET
:	:	COM2 at 38.4 KBd

X = Jumper installed

: = Jumper not installed

RAM Jumpers

These jumpers configure the RAM size. The factory default size is 256 KB.

MJ1	MJ0	RAM Type
X	X	2 x 1 Mb (256 KB)
X	:	4 x 1 Mb (512 KB)
:	X	2 x 4 Mb (1 MB)
:	:	4 x 4 Mb (2 MB)

X = Jumper installed

: = Jumper not installed

SRDY Jumper

This jumper connects the SRDY line of the ISA bus to the local processor, allowing add-on cards to request shortened bus cycles when accessed by the G4LC32ISA. This feature should not be used without first consulting OPTO 22. The jumper is normally not installed.

Wait Jumper

This jumper, if present, connects the IOCHRDY line of the ISA bus to the local processor, allowing add-on cards to request wait states during G4LC32ISA generated bus cycles. If the jumper is not installed, a standard ISA cycle will be executed. This feature should not be used without first consulting OPTO 22. The jumper is normally not installed.

G4LC32ISASER Jumpers

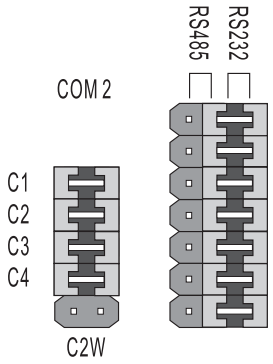
COM1 Jumper Settings

Install jumpers on B1 and B2 to provide termination and biasing for COM1, the RS-485 2-wire, half-duplex serial port.

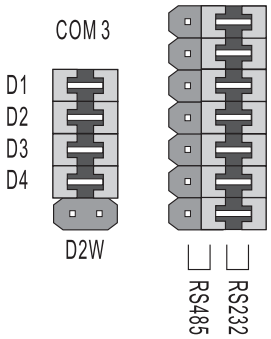
COM2 and COM3 Jumper Settings

COM2 and COM3 offer RS-485 2- or 4-wire communications as well as RS-232. Each port is jumper selectable for the type of mode required. Only one serial mode can be used at a time. Each communication port has two groups of jumpers. They need to be set according to the serial mode used.

RS-232 Jumper Settings:



COM2



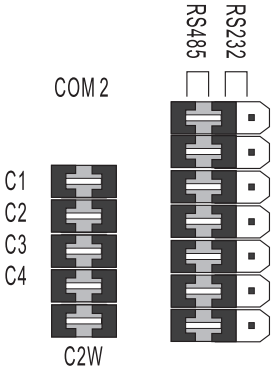
COM3

RS-485 Jumper Settings:

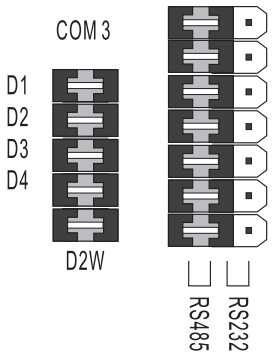
The "C" and "D" jumper groups are used for biasing and terminating the RS-485 ports. The physical location of the controller on the RS-485 communication network effects which jumpers are installed.

If the controller is at the physical beginning or end of the RS-485, install these jumpers:

2-Wire Half-Duplex



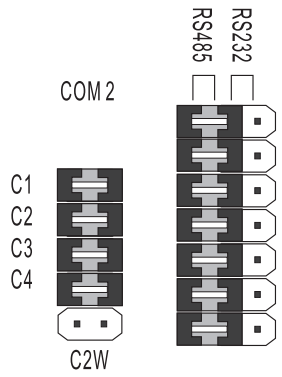
COM2



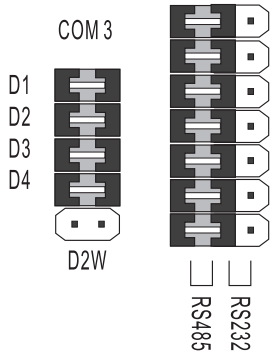
COM3

If the controller is not at the physical beginning or end of the RS-485 network, install these jumpers:

4-Wire Full-Duplex

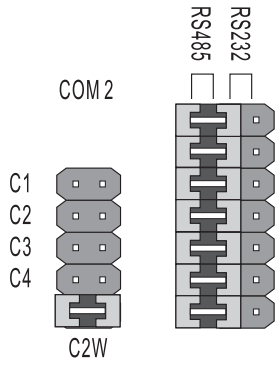


COM2

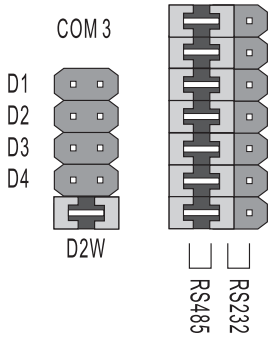


COM3

2-Wire Half-Duplex

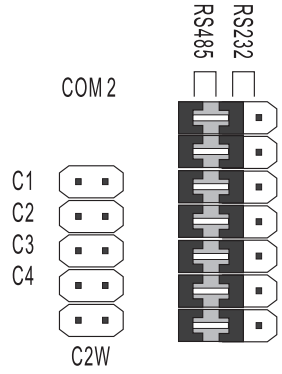


COM2

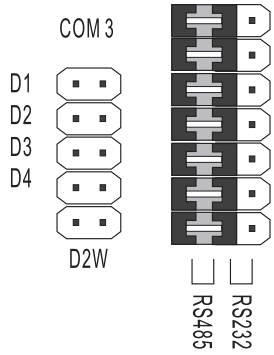


COM3

4-Wire Full-Duplex



COM2



COM3

G4LC32ISAARC Jumpers

JP1 Jumper

This jumper is not installed and is reserved for future use.

JP2 Jumper

This jumper is not installed and is reserved for future use.

G4LC32ISA Installation

This section describes how to install a G4LC32ISA card into your computer. Please refer to the owner's manual for your computer for information on opening and removing the computer's cover.

To install the G4LC32ISA card into the computer:

1. Connect the G4BATT32 battery to the pin group labeled 'BAT'.
2. Find an unoccupied 16-bit ISA expansion slot in the computer. If you will be using any of the optional daughter boards, you may want to choose a slot adjacent to an empty 8- or 16-bit slot.
3. Remove the expansion slot cover if one is installed.
4. Discharge any static electricity you may have by touching the computer's metal chassis.
5. Install the card by orienting the card edge connector facing the expansion slot and the mounting bracket facing the access port.
6. Attach the G4BATT32 battery with the adhesive backing to a convenient location in the computer.

Math Coprocessor Installation

The optional math coprocessor chip used by the G4LC32ISA is a Motorola MC68882.

1. Find pin A1 on the math chip. This pin will be one of the corner pins and is marked from the top of the chip with a "Y".
2. Find the math coprocessor chip socket on the G4LC32ISA board.
3. Align the "Y" marked corner with the beveled outline of the math chip socket.
4. Press the math coprocessor into the socket.

G4LC32ISASER and G4LC32ISAARC Installation

This section describes how to install a G4LC32ISASER or G4LC32ISAARC card into your computer. Please refer to the owner's manual for your computer for information on opening and removing the computer's cover.

To install the daughter cards into the computer:

1. Follow the G4LC32ISA instructions, steps 2 through 4.
2. Attach one end of the cable included with the daughter board card to the daughter board and the other to the G4LC32ISA board.
3. Install the card by orienting the computer connector facing the expansion slot and the mounting bracket facing the access port.

CHAPTER 3

Communications and Cables

Serial Communications

Overview

The G4LC32ISA card has an RS-485 COM0 port available to connect remote I/O units. Additional serial ports are available by using the G4LC32ISASER card. This card provides three serial ports, COM1–COM3, and expands the G4LC32ISA to a total of four serial ports.

COM0	RS-485, 2-wire half-duplex
COM1	RS-485, 2-wire half-duplex
COM2	RS-232, or RS-485, 2-wire half-duplex, or RS-485, 4-wire full-duplex
COM3	RS-232, or RS-485, 2-wire half-duplex, or RS-485, 4-wire full-duplex

The G4LC32ISA and the remote I/O units can be separated by distances up to 3,000 feet, (even longer distances with an AC38 repeater). A single shielded twisted-pair of wire (plus a signal common) provides communications over an RS-485 communications network to up to 100 remote I/O units (256 with repeaters) .

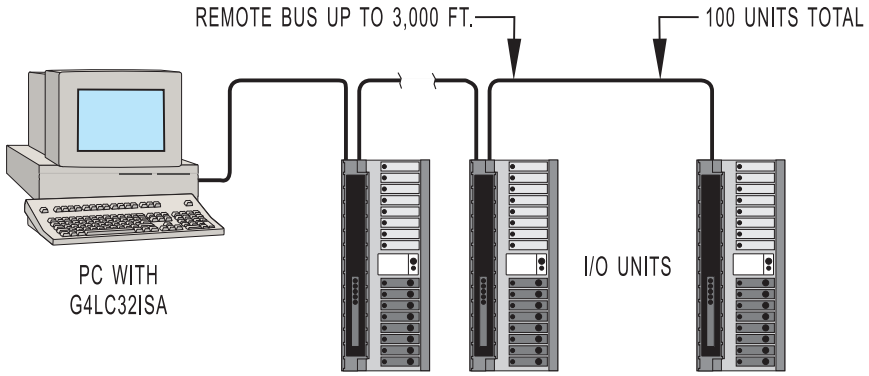


Figure 3-1: G4LC32ISA at the End of the Network

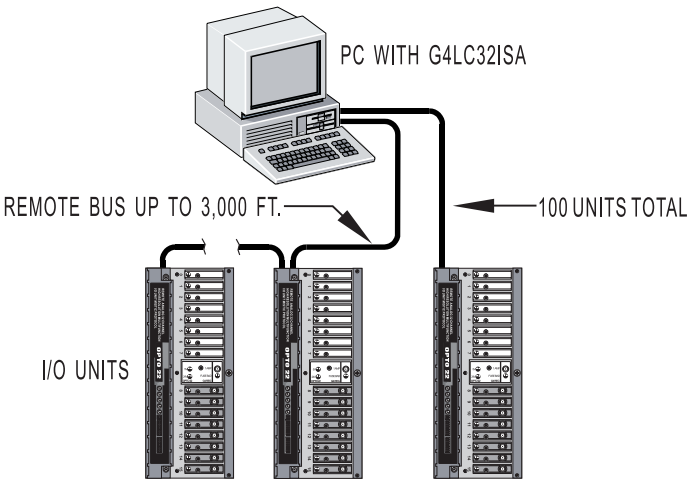


Figure 3-2: G4LC32ISA in the Middle of the Network

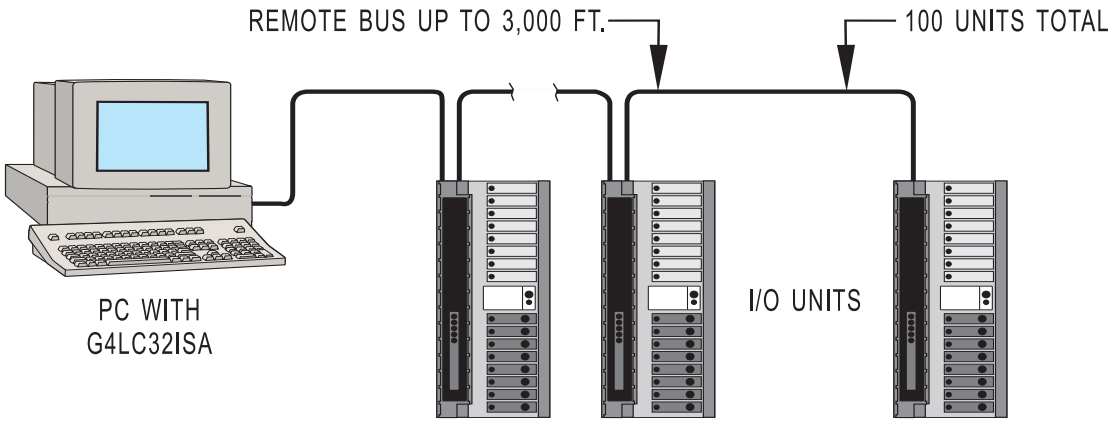


Figure 3-3: G4LC32ISA with More Than 100 Units

Cables and Connectors

RS–422/485 Cables

Shielded, twisted-pair wires are recommended for the communications wiring.

Typical wire types are:

1. Two-pair - Individually shielded pairs (2 pair) PVC chrome jacket:

   Belden P/N 9729
   (#24 guage - 7x32 stranded, 100 hm nom. imp., 12.5 pf./ft.)

2. Two-pair - Individually shielded pairs (2 pairs) and overall shield:

   A. Belden P/N 8162
      (#24 gauge - 7x32 stranded, 100 ohm nom. imp., 12.5 pf./ft.)

   B. Manhattan P/N M3475
      (#24 gauge - 7x32 stranded, 100 ohm nom. imp., 12.5 pf./ft.)

   C. Manhattan P/N M39249
      (#24 gauge - 7x32 stranded, 100 ohm nom. imp., 12.5 pf./ft.)

3. Four-pair - Individually shielded pairs (4 pairs) PVC chrome jacket:

   Belden P/N 9728
   (#24 gauge - 7x32 stranded, 100 ohm nom. imp., 12.5 pf./ft.)

4. Four-pair - Individually shielded pairs (4 pairs) PVC chrome jacket:

   A. Belden P/N 8164
      (#24 gauge - 7x32 stranded, 100 ohm nom. imp., 12.5 pf./ft.)

   B. Manhattan P/N M3477
      (#24 gauge - 7x32 stranded, 100 ohm nom. imp., 12.5 pf./ft.)

   C. Manhattan P/N M39251
      (#24 gauge - 7x32 stranded, 100 ohm nom. imp., 12.5 pf./ft.)

RS–232 Cables

Cables suitable for RS-232 wiring are:

1. Belden #8132 (4-conductor, #28 gauge)
2. Belden #8133 (6-conductor, #28 gauge)
3. Belden #8134 (8-conductor, #28 gauge)
4. Belden #8102 (4-conductor, #24 gauge)
5. Belden #8103 (6-conductor, #24 gauge)
6. Belden #8104 (8-conductor, #24 gauge)

Connectors

Green pluggable 5-position terminal mini-plug:

Used for G4LC32ISA COM0 AND G4LC32ISASER COM1 RS-485 connections

Manufacturer: Phoenix Contact
P/N MC 1,5/5-ST-3,81

Green pluggable 7-position terminal mini-plug:

Used for G4LC32ISASER COM2 and COM3, RS-485 or RS-232 connections

Manufacturer: Phoenix Contact
P/N MC1,5/7-ST-3,81

Wiring

NOTE: Connectors wired for other mistic 200 controllers may not be compatible with the G4LC32ISA. Use the connectors provided and refer to the configuration label for wiring information.

COM0 and COM1

COM0 on the G4LC32ISA and COM1 on the G4LC32ISASER use a pluggable 5-terminal block. The pinouts are:

Pin	RS-485 2-Wire Mode Only
1	TX/RX (+)
2	TX/RX (-)
3	Common Ground
4	Interrupt (+)
5	Interrupt (-)

COM2 and COM3

COM2 and COM3 on the G4LC32ISASER use a pluggable 7-terminal block. The pinouts are:

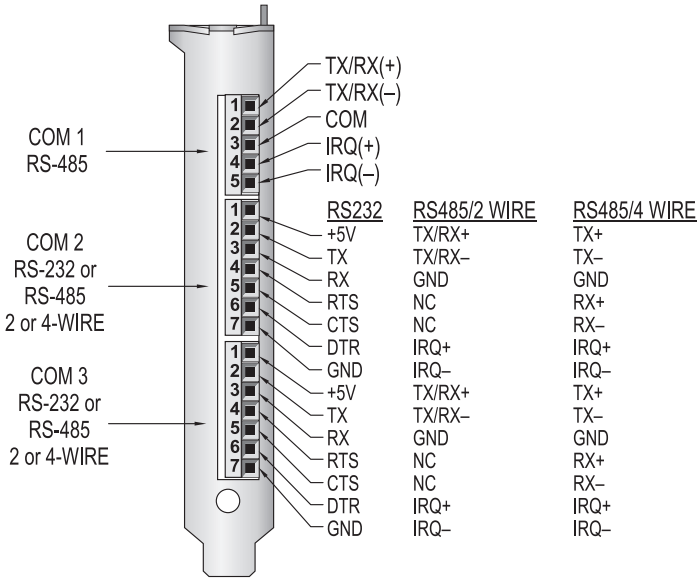


Figure 3-4: G4LC32ISASER Port Pinouts

Fusing for RS–232 +5 VDC

A +5 VDC fused source is available from the COM2 or COM3 ports on Pin 1. Fuse F2 is for COM2 and fuse F1 is for COM3. The replacement part number for this fuse is OPTO 22 part number FUSE01G4 (Wickmann p/n 19373A). The fuse is rate for 1 amp.

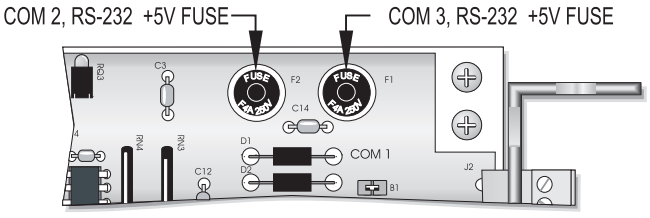


Figure 3-5: Location of COM2 and COM3 Fuses

Local Communications

Overview

The local bus is a high speed parallel interface communicating over 1.4 megabytes per second and can be up to 200 ft. in length. It connects the G4LC32ISA controller to local digital and analog I/O units.

The following table lists some of the local bus specifications.

Local I/O Bus Specifications	
No. of Active Lines	12
No. of Ground Lines	17
No. of Conductors in Cable	34
Cable Type	Flat Ribbon
Bus Drivers	Open Collector
Impedance	100 ohm
Propagation Delay	1.7 ns/ft
Max. Bus Length	200 ft.
Bus Times	Adjusts between 200 and 700 ns and are distance proportional
Reset Line	None
Interrupts	Available
Digital Response Time	1 ms + local bus transmission time
Analog Response Time	3 to 7 ms + local bus transmission time
Bus Speed	1.4 MHz

Connectors and Cables

This table list parts for making custom local bus cables.

Manufacturer		
Ribbon Cable	**3M P/N**	**Alpha P/N**
Regular	3365/34	3580/34 or 3583/34
Ground Planed	3469/34 or 3476/34	3584/34
Jacketed	3603/34	3589/34
Jacketed and Ground Planed	3517/34	3590/34
	3M P/N	**Circuit Assembly**
Connectors	3414-7000	CA-34IDS-B

Wiring

The local bus uses a 34-conductor, flat ribbon cable. There are 12 active lines and 17 ground lines with the address/data bus sharing the same line.

Local Bus Cable Pinouts

Pin	Signal Function
3	A/D master, 1 - address or 0 - data select
9	IRQ interrupt request
11	DTAK active low
15	DS active low
19	D0 data line or A0 address
21	D1 data line or A1 address
23	D2 data line or A2 address
25	D3 data line or A3 address
27	D4 data line or A4 address
29	D5 data line or A5 address
31	D6 data line or A6 address
33	D7 data line or A7 address

ARCNET

The G4LC32ISAARC daughter board is an ARCNET expansion board for the G4LC32ISA and can be used as a host port to the controller. Your PC workstation can also be connected to the ARCNET bus allowing you to develop your application with OptoControl or Cyrano 200 and then download and debug it on any of the G4LC32ISA's connected to the ARCNET bus.

For very large, distributed-control applications, you can use more than one G4LC32ISA controller networked together via the ARCNET port. Passive or active hubs must be used to connect multiple controllers.

ARCNET Port Specifications	
Transfer Rate	2.5 Mb/s
Termination	93 ohms
Address Range	1 to 255, 0 is not allowed
Topology	Star, Bus, and Ring (only Star is supported by mistic cntrollers)
Cable Type	RG62A/U
Connector Type	BNC connector
Normal Signal Levels	20 VPP output, 7.5 VPP input
Minimum Signal Levels	16 VPP output, 6.0 VPP input
Access Time	Deterministic (token passing)

Maximum cable lengths for ARCNET configurations are shown in the following table.

Total network distance (end to end)	20,000 ft.
Active Hub to Active Hub	2,000 ft.
Active Hub to mistic controller (or to Host PC)	2,000 ft.
Active Hub to Passive Hub	100 ft.
Passive Hub to mistic controller (or to Host PC)	100 ft.

Cables and Connectors

The following is suggested cable wire and connectors to make your custom ARCNET cable.

Cable Wire:	RG62A/U Coaxial Cable Manufacturer: Belden
Connectors:	BNC connectors
Terminators:	93 ohms

LEDS

G4LC32ISA LEDS

The group of red LEDs located on the card edge of the G4LC32ISA is used to indicate the status of the controller, the COM0 serial communication lines, and the local bus port.

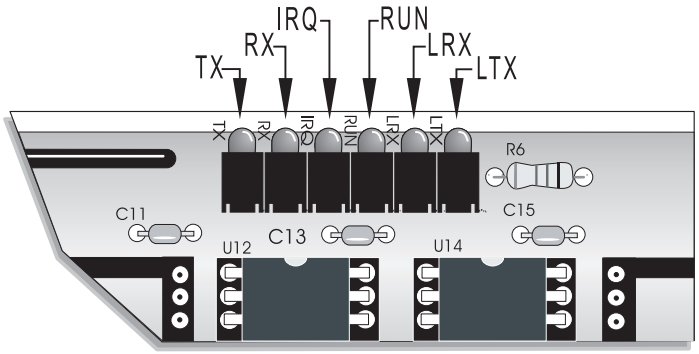


Figure 3-6: Location of LEDs

G4LC32ISASER LEDs

The G4LC32ISASER card has three diagnostic LEDs for each communication port.

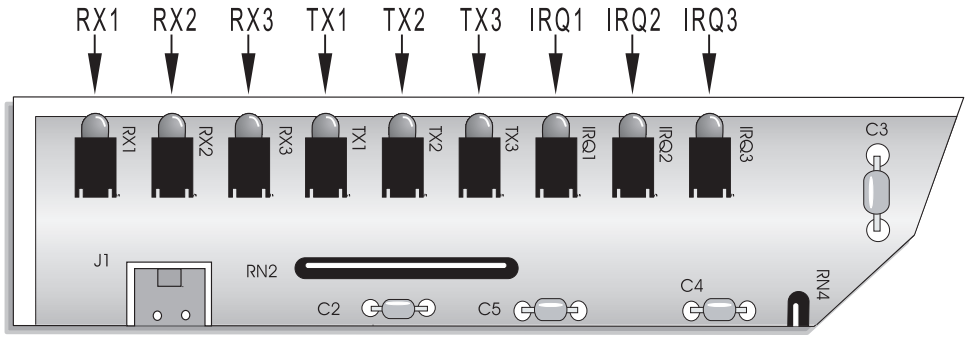


Figure 3-7: G4LC32ISASER Diagnostic LEDs

The following table lists and describes the LEDs' function.

LED	Description
RX1	Receive LED for COM1
RX2	Receive LED for COM2
RX3	Receive LED for COM3
TX1	Transmit LED for COM1
TX2	Transmit LED for COM2
TX3	Transmit LED for COM3
IRQ1	IRQ LED for COM1
IRQ2	IRQ LED for COM2
IRQ3	IRQ LED for COM3

LED Functional Descriptions

TX	Flashes when the controller is transmitting over the serial port.
RX	Flashes when the controller receives information. Failure to flash could indicate a broken wire or a wrong wire connection.
IRQ	Lights when a hardware interrupt is initiated by a brick. Turns off when the interrupt is reset with software.
RUN	Lights when the controller is ON and has sufficient power. A flashing LED could indicate improper Flash EPROM installation, improper firmware download, insufficient power, or hardware problems. If you suspect the controller has hardware problems, contact OPTO 22 Technical Support.
LRX	Flashes when the controller is receiving on the local port. Failure to flash could indicate a broken cable or a poor cable connection.
LTX	Flashes when the controller is transmitting on the local port.

G4LC32ISAARC LEDS

One diagnostic LED is found on the external field interface. It will light when there is communication between the G4LC32ISA and this daughter board.

CHAPTER 4

Software and Firmware

Software

The G4LC32ISA is designed to work in combination with FactoryFloor, OPTO 22's new suite of Windows 32-bit software, which delivers total control to industrial automation customers. FactoryFloor consists of four integrated components:

- OptoControl, a graphical, flowchart-based development environment for control solutions
- OptoDisplay, a graphical, multimedia operator interface package
- OptoServer, a robust data server that connects the controller network with the PC-based FactoryFloor network.
- Plus OptoConnect™, a drag-and-drop database utility that makes building SQL Server and Access databases a snap.

G4LC32ISA configuration and development are performed through OptoControl on a PC workstation. OptoControl is an easy to use, self-documenting control environment that uses a plain English command set and a long tagname database that is shared by all FactoryFloor components. The G4LC32ISA also works with OPTO 22's classic 16-bit software: Cyrano, Mistic MMI and Mistic Data Server (MDS.)

Firmware Updates

Use the FLASH 200 utility supplied with OptoControl or Cyrano to update the G4LC32ISA's firmware. This utility downloads a binary file from a PC to a mistic controller equipped with Flash memory. You can obtain firmware updates by calling OPTO 22's Bulletin Board (909) 695-1367 or from our web site, http://bbs.opto22.com. You can also contact the Technical Support Department at 800-835-6786 and request the file on diskette. The file name of the G4LC32ISA firmware upgrade is MK2ISA.EXE.

RAM and Flash EPROMs

The G4LC32ISA has 256 KB of battery backed RAM and is expandable to 2 MB. It also has 256 KB Flash EPROM and is expandable to 1 MB. The following diagram shows the RAM and Flash EPROM locations on the G4LC32ISA. Refer to the "Configuration Jumpers, RAM jumpers, and Flash EPROM Jumpers" section of Chapter 1 to install the correct size selection jumpers.

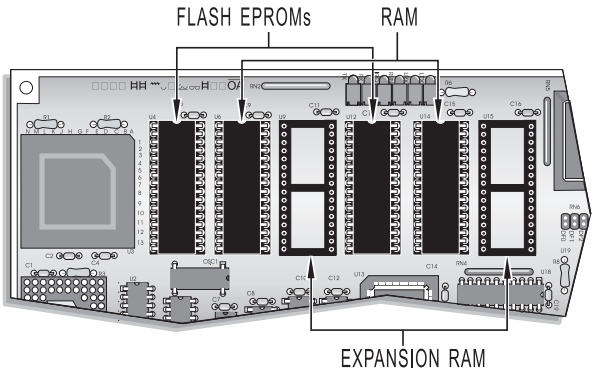


Figure 4-1: Location of RAM and Flash EPROMS

Application programs are downloaded from your PC workstation to battery backed up CMOS RAM in the G4LC32ISA with the OptoControl or Cyrano debugger. The factory default setting is for programs to RUN from RAM unless you have selected to RUN from Flash EPROM. To load your application into Flash EPROM, use the "Burn Strategy Into Flash" command found in the debugger's "Controller" top menu bar.

Running From Flash EPROM and Making Changes

If you want to make changes to an application which has been running from Flash EPROM, make the changes from the debugger and run the program. If you are satisfied with the changes, use the "Burn Strategy Into Flash" command found in the debugger's "Controller" top menu bar. If this command is not executed, the next time the system is powered down and then powered back up, the strategy in Flash EPROM will be copied into RAM and the modified program will be overwritten.

CHAPTER 5

Hardware Specifications

G4LC32ISA Hardware Specifications

Item	Specification
CPU	32-bit Motorola 68020 processor 16-bit External Bus
CPU Clock Frequency	16.67 MHz
EPROM	256 KB Flash
RAM	256 KB CMOS with battery backup
Watchdog Timer	Standard, hardware
Real-time Clock	Clock/Calendar, Epson 72421A, with battery backup
Communications	One half-duplex 2-wire RS-422/485 serial port with baud rates to 115.2 KBd
RAM/Clock Battery	3.6 V lithium, non-rechargeable
Battery Life	Two years under normal operating conditions
Power Requirements	5 VDC ± 0.25 V @ 1.5 A
Weight	1.3 Kg (1.5 Kg with two daughter boards)
Operating Temperature	0°C to 70°C*
Storage Temperature	-25°C to 85°C
Humidity	5% to 95% relative humidity
Software	FactoryFloor (OptoControl, OptoDisplay, and OptoServer) Classic Software (Cyrano, Mistic MMI, and MDS)
Options	G4LC32ISAARC with one ARCNET port G4LC32ISASER with one half-duplex, RS-422/485 and two combined full-duplex RS-422/485 or RS-232 serial ports with baud rates to 115.2 KBd Motorola 68882 Math Coprocessor

G4LC32ISAARC Hardware Specifications

Power Requirements	5 VDC ± 0.25 V @ 0.5 A
Operating Temperature	0°C to 70°C
Storage Temperature	-25°C to 85°C
Humidity	5% to 95% relative humidity
Transfer Rate	2.5 Mb/s
Weight	0.1 Kg

G4LC32ISASER Hardware Specifications

Power Requirements	5 VDC ± 0.25 V @ 0.5 A
Operating Temperature	0°C to 70°C
Storage Temperature	-25°C to 85°C
Humidity	5% to 95% relative humidity
Baud Rate	300–115.2 KBd (all ports)
RS-485	2-wire or 4-wire
RS-232	TX, RX, Gnd, RTS, CTS
Weight	0.1 Kg

APPENDIX A

Product Support

If you have any questions about this product, contact Opto 22 Product Support Monday through Friday, 8 a.m. to 5 p.m. Pacific Time.

Phone:	800-TEK-OPTO (835-6786) 951-695-3080
Fax:	951-695-3017
E-mail:	support@opto22.com
Opto 22 Web site:	www.opto22.com

When calling for technical support, be prepared to provide the following information about your system to the Product Support engineer:

- Software and version being used
- Controller firmware version
- PC configuration
- A complete description of your hardware and operating systems, including:
  — jumper configuration
  — accessories installed (such as expansion daughter cards)
  — type of power supply
  — types of I/O units installed
  — third-party devices installed (e.g., barcode readers)
- Specific error messages seen