ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Opto-22 EX2* at our website: ***Click HERE***

EX2 USER'S GUIDE

Form 412-001009 — October, 2000

OPTO 22

43044 Business Park Drive, Temecula, CA 92590-3614
Phone: 800-321-OPTO (6786) or 951-695-3000
Fax: 800-832-OPTO (6786) or 951-695-2712
www.opto22.com

Product Support Services:
800-TEK-OPTO (835-6786) or 951-695-3080
Fax: 951-695-3017
E-mail: support@opto22.com
Web: support.opto22.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

EX2 User's Guide
Form 412-001009 — October, 2000

All rights reserved.
Printed in the United States of America.

The information in this manual has been checked carefully and is believed to be accurate; however, Opto 22 assumes no responsibility for possible inaccuracies or omissions. Specifications are subject to change without notice.

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.

Opto 22 FactoryFloor, Cyrano, Optomux, and Pamux are registered trademarks of Opto 22. Generation 4, ioControl, ioDisplay, ioManager, ioProject, ioUtilities, mistic, Nvio, Nvio.net Web Portal, OptoConnect, OptoControl, OptoDisplay, OptoENETSniff, OptoOPCServer, OptoScript, OptoServer, OptoTerminal, OptoUtilities, SNAP Ethernet I/O, SNAP I/O, SNAP OEM I/O, SNAP Simple I/O, SNAP Ultimate I/O, and SNAP Wireless LAN I/O are trademarks of Opto 22.

ActiveX, JScript, Microsoft, MS-DOS, VBScript, Visual Basic, Visual C++, and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries. Linux is a registered trademark of Linus Torvalds. Unicenter is a registered trademark of Computer Associates International, Inc. ARCNET is a registered trademark of Datapoint Corporation. Modbus is a registered trademark of Schneider Electric. Wiegand is a registered trademark of Sensor Engineering Corporation. Nokia, Nokia M2M Platform, Nokia M2M Gateway Software, and Nokia 31 GSM Connectivity Terminal are trademarks or registered trademarks of Nokia Corporation. Sony is a trademark of Sony Corporation. Ericsson is a trademark of Telefonaktiebolaget LM Ericsson.

All other brand or product names are trademarks or registered trademarks of their respective companies or organizations.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Description

The EX2 daughter card is an expansion card for the LC4. The EX2 provides two, independent, full-duplex serial communications ports and a 24-line bidirectional parallel port. The parallel port provides a direct interface to 4-, 8-, 16-, and 24-point I/O module mounting racks. One communication port can be RS-232 with full handshaking or a multidrop compatible RS-422/485 port. The second port is RS-422/485 compatible only.

Dimensions

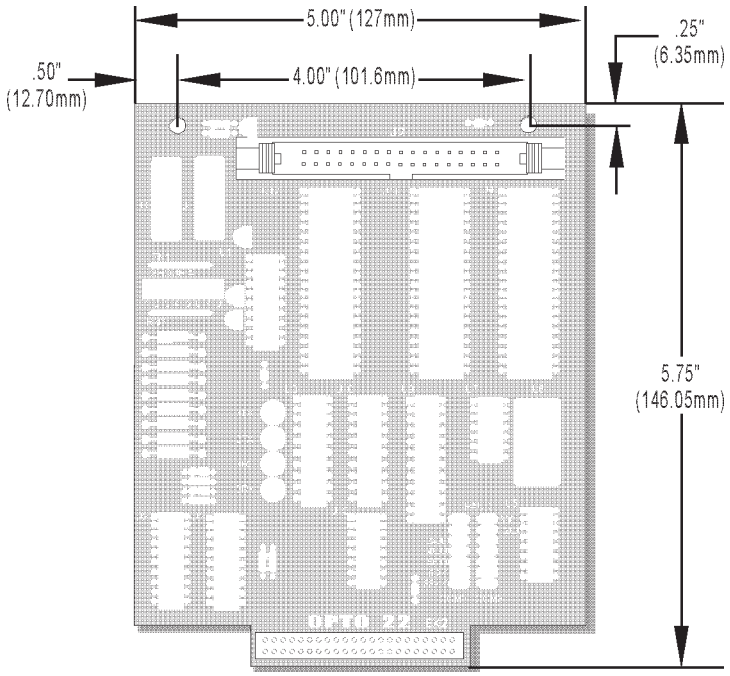


Figure 1: EX2 Card Dimensions

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

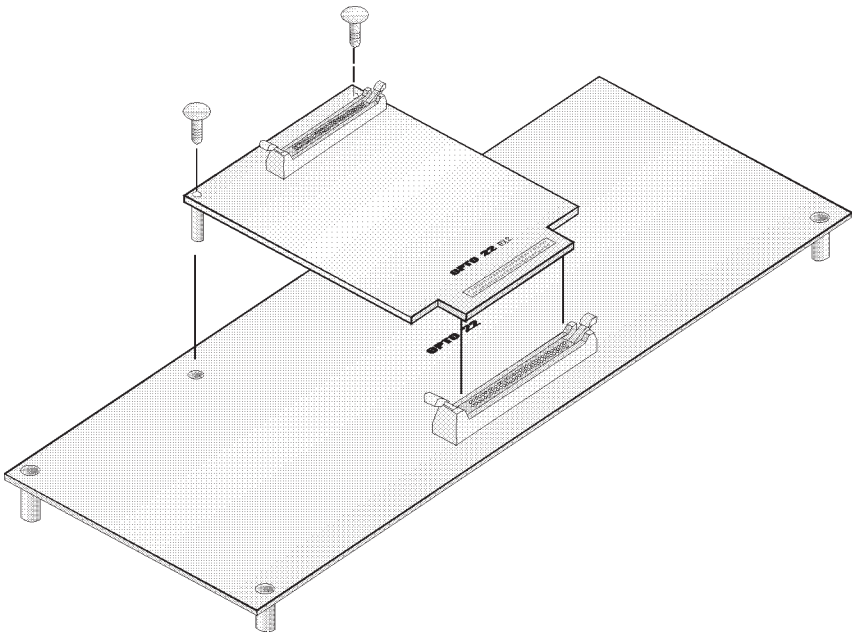


Figure 2: EX2 Mounting

Serial Ports

The communications ports use a Z80 Dual Asynchronous Receiver Transmitter (DART) device which is directly accessible from LC4 BASIC and FORTH. The DART registers reside at I/O locations 70 to 73 hex. Baud rates for each serial port are selectable via jumpers labeled "BAUD". The serial ports are labeled as COM 2 for the combination RS-232/RS422/485 port and COM 3 for the RS/485 port. The RS-422/485 lines of both ports are accessible from the female 9-pin D-shell connector labeled J3. The RS-232 lines are accessible from the male 9-pin D-shell connector labeled J4.

LED indicators are provided for the transmit and receive lines of both serial ports. The RS-232 lines are wired-OR with the RS-422/485 lines on the COM 2 port so that two different devices can be permanently connected together. However it is important to note that only one device can access the port at any one time or characters will be erroneous.

A jumper block labeled "Group A" provides termination and bias resistor connections for both RS-422/485 ports.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

RS-232 Connection Pin Descriptions

Pin	Description
1	No Correction
2	Transmit (TX)
3	Receive (RX)
4	Request-to-Send (RTS)
5	Clear-to-Send (CTS)
6	No Connection
7	Ground (GND)
8	No Connection
9	Data Terminal Ready (DTR)

RS-422/485 Connection Pin Descriptions

Pin	Description
1	COM 2 Transmit + (2TX+)
2	COM 2 Transmit - (2TX-)
3	Ground (GND)
4	COM 3 Transmit + (3TX+)
5	COM 3 Transmit - (3TX-)
6	COM 2 Receive + (2RX+)
7	COM 2 Receive - (2RX-)
8	COM 3 Receive + (3RX+)
9	COM 3 Receive - (3RX-)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

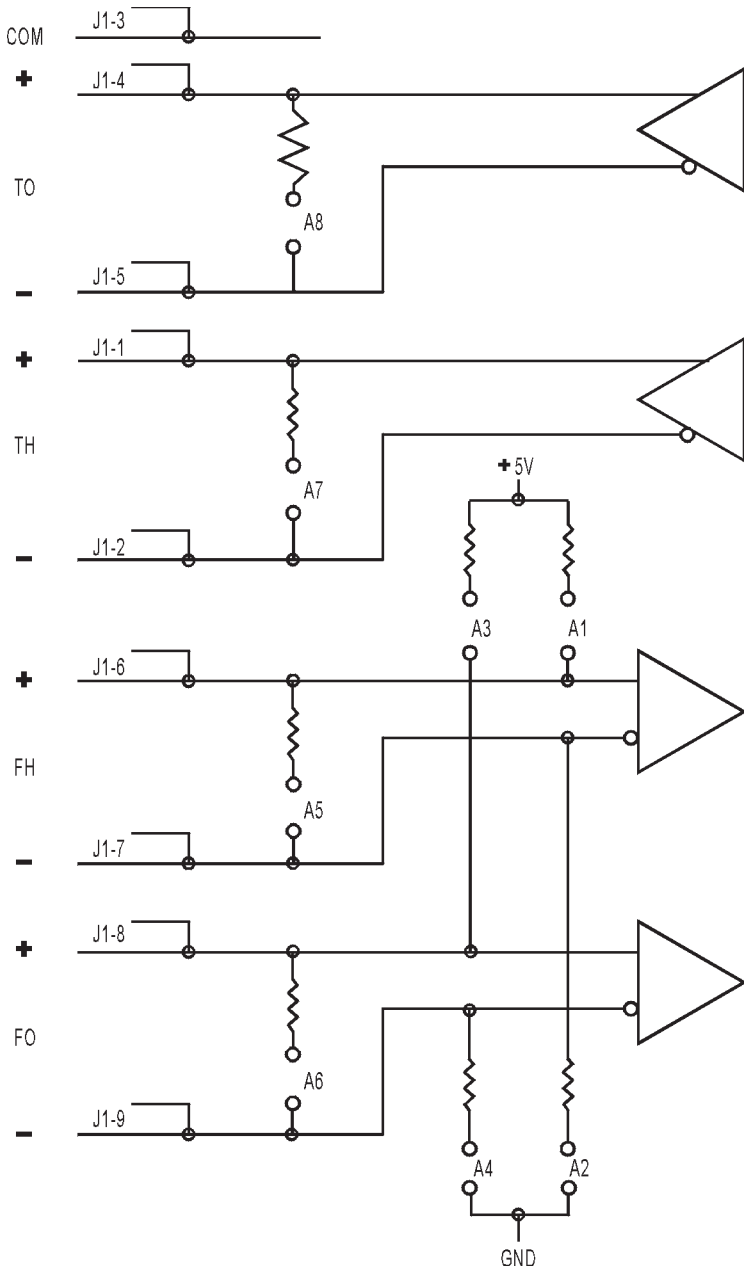


Figure 3: Group A Communications Jumpers

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Parallel Port

The parallel interface consists of two 6821 Peripheral Interface Adapter (PIA) chips which provide a total of 24 lines of unbuffered bidirectional I/O lines. The registers of the PIA for the lower 16 lines resides at I/O locations 80 to 83 hex. The registers of the PIA for the upper 8 I/O lines (port A of 6821) resides at I/O locations 88 to 8B hex. The second PIA's port B is not connected. The parallel lines are accessed via connector J2 on the EX2 daughter card. Ports CA and CB on both PIA's are unused.

Pin	Description
J2-1	PIA2-A7
J2-3	PIA2-A6
J2-5	PIA2-A5
J2-7	PIA2-A4
J2-9	PIA2-A3
J2-11	PIA2-A2
J2-13	PIA2-A1
J2-15	PIA2-A0
J2-17	PIA1-B7
J2-19	PIA1-B6
J2-21	PIA1-B5
J2-23	PIA1-B4
J2-25	PIA1-B3
J2-27	PIA1-B2
J2-29	PIA1-B1
J2-31	PIA1-B0
J2-33	PIA1-A7
J2-35	PIA1-A6
J2-37	PIA1-A5
J2-39	PIA1-A4
J2-41	PIA1-A3
J2-43	PIA1-A2
J2-45	PIA1-A1
J2-47	PIA1-A0

NOTES: PIA1 is at I/O address 80–83 hex.
PIA2 is at I/O address 88–8B hex.
All even numbered pins on J2 are connected to ground.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Programming

There are 8 I/O locations used by both PIA devices. These locations are shown in the following table:

Address	Register	I/O Lines
80 hex	Data Reg. A	J2-47 to J2-33
81 hex	Control Reg. A	
82 hex	Data Reg. B	J2-31 to J2-17
83 hex	Control Reg. B	
88 hex	Data Reg. A	J2-15 to J2-1
89 hex	Control Reg. A	
8A hex	Unused	
8B hex	Unused	

Programming the PIA devices requires that the devices first be initialized. Each I/O line is configurable as an input line is configurable as an input line or an output line and therefore a configuration byte must be written to each port. The following steps show the sequence of operations for initializing a port.

1. Write a 0 to the corresponding control register.
2. Write the configuration byte to the data register. (Setting a bit to 1 sets the corresponding I/O line to an output. Setting a bit to 0 sets that I/O line to an input).
3. Write a hex 34 to the control register.

Example:

The following BASIC example initializes the I/O lines at J2–47, J2–45 as outputs and lines J2–43 through J2–33 as inputs. Remember, the PIA devices are I/O mapped and require the use of the OUT and INP () statements in BASIC, (or the P! and P@ words in FORTH).

```
100 OUT &h81,0                  'set control reg. A

110 OUT &h80,3                  'first two bits = 1, rest = 0

120 OUT &h81,&h34               'reset control reg. A
```

After initialization, data can be read or written by accessing that port's data register. The following example reads the status of the input lines J2–47 through J2–33.

```
200 STATUS% = INP(&h80) AND &h03 'read and mask off first two bits
```

The following example shows how to activate I/O lines J2–47 and J2–45 and leave all others off.

```
300 OUT &h80,&hFC               'Turn on first two bits
```


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Serial Ports

The two serial ports on the EX2 daughter card can be accessed using the BASIC statements, OPEN, ON COM..., PRINT #, and INPUT #.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP