OPTO 22

DATA SHEET

Form 466-030613

Description

Part Number	Description
AC7	RS232 to RS422 Converter

INTRODUCTION

The AC7 is a stand-alone adapter card that converts RS-232 serial communication to RS-422 serial communication, which is directly compatible with the Optomux family of intelligent brain boards.

Features

- RS-422 balanced line drivers
- Operates with up to 5,000 feet of RS-422 twisted-pair cable
- Optical isolation between RS-232 and RS-422 lines
- Visual LED indicators for transmit and receive lines
- Transmission speeds up to 38,400 bits per second
  (Only "REV 1" boards and above, can be used up to 38,400 baud.
  Earlier revision boards will operate up to 19,200 baud only.)

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Installation

PHYSICAL INSTALLATION

The following equipment should be available during installation of the AC7:
- Medium sized, flat-blade screw driver
- Wire stripper
- 25-Watt soldering iron
- 18 guage wire for power connections
- 22 guage twisted-pair RS-422 cable for data link

MOUNTING THE AC7

The AC7 adapter card can be mounted in any position on any flat surface. The adapter card is supplied with 3/4″ standoffs. All the standoffs should be secured using #6 hardware to provide maximum physical strength. Leave sufficient space around the AC7 for serial data link and power wiring.

CONNECTING POWER SUPPLIES

Single Power Supply - No Optical Isolation

The 5-Volt power required by AC7 can be derived from the +12-Volt power input by an onboard regulator, eliminating the need for a separate +5-Volt supply. Using the onboard regulator defeats the optical isolation feature, but provides satisfactory operation in many applications. To use the 5-Volt regulator, install jumpers "E" and "F" and Do Not Connect anything to the 5-Volt input terminals.

In this mode, AC7 requires +12 Volts at 200 milliamps and -12 Volts at 50 milliamps.

OPTICAL ISOLATION ON AC7

A 5V power supply can be used to provide optical isolation on the AC7 by connecting to the 5V terminals.

Two Power Supplies - Provides Optical Isolation

To take advantage of the Optical Isolation feature of the AC7, separate power supplies for +5 Volts and for +12 and -12 Volts are required. In this mode, AC7 requires 200 milliamps at +5 Volts and 50 milliamps at +12 and -12 Volts. Jumpers "E" and "F" MUST be removed if a separate +5 Volt power supply is connected.

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Installation (continued)

CONNECT AC7

Connect the RS232 data connector on the AC7 to the serial port connector on your host computer using a null modem cable. The AC7 can be located up to 50 cable feet from the RS232 serial port.

A null modem cable can be fabricated from the following diagram. The AC7 end uses a standard 25-pin, male "D" connector.
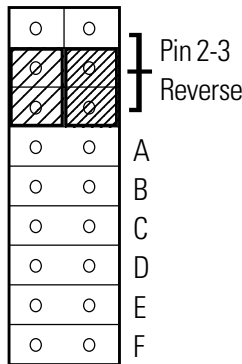
| DB25 on PC end of cable	DB25 on AC7 end of cable
TX, pin 2	RX, pin 3
RX, pin 3	TX, pin 2
Signal Common, pin 7	Signal Common, pin7

REVERSING PINS 2 AND 3 ON AC7

The AC7 provides a set of jumpers that allows you to reverse pins 2 and 3. This is helpful if you are using a cable that is not a null modem. The jumpers are installed at the factory for use with a null modem cable.

Pins 2 and 3 Not Reversed
(Factory Installation)

Pins 2 and 3 Reversed

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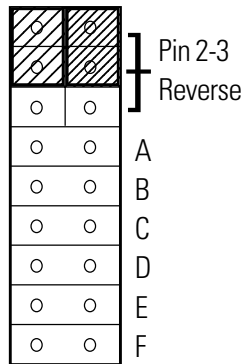
Installation (continued)

ENABLING SIGNALS

Fabricated Cable

Many serial ports monitor pins on the RS232 connector as an indication that the connected data equipment is ready to receive data. If you are fabricating your own cable, the required logic levels can be provided by "looping back" the appropriate pins on the RS232 connector that attaches to your serial port. For example, when connecting the AC7 to a PC DB25 serial port, pins 5, 6, 8 and 20 must be tied together.

Purchased Cable

If you are using a commercially prepared data cable that carries handshaking signals required by your RS232 port through to the AC7, jumpers A through D may be used to enable the appropriate RS232 signals on your computer. The table below describes the function of each of the jumpers. J1 is the RS232 connector on the AC7.

Jumper	Connects
A	pin 20 (DTR) to +12V
B	pin 6 (DSR) to pin 20 (DTR)
C	pin 8 (DCD) to pin 4 (RTS)
D	pin 4 (RTS) to +12V

NOTE: These signals are provided for use by the host computer only -- AC7 uses only pins 2, 3 and 7 of the RS232 connector.

CONNECT AC7

Connect the RS-422 cable to the Optomux network using two twisted pairs plus one additional insulated wire for the signal common. The recommended colors are yellow, red, green, black and blue.

Strip 1/8 to 1/4 inch insulation from both ends of each wire. Use the table below to connect the RS422 communications wires between the adapter card and OPTOMUX.

CAUTION: Make sure the power is OFF while making or removing all connections to the AC7 and OPTOMUX.

Connect the RS422 communication wires as follows:

AC7 Terminal	OPTOMUX Terminal	
To OPTOMUX (+)	From Host (+)	One Twisted Pair
To OPTOMUX (-)	From Host (-)	
From OPTOMUX (+)	To Host (+)	Second Twisted Pair
From OPTOMUX (-)	To Host (-)	
AC7 +5 Return	COM	Insulated wire which is typically from a third twisted pair

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Specifications

Power Requirements (Optical Isolation Mode)	200mA @ +5 VDC 50 mA @ +12 VDC 50 mA @ -12 VDC	Voltage Tolerace = ±0.1 VDC
Power Requirements (Non-Isolated Mode)	200 mA @ +12 VDC 50 mA @ -12 VDC	Voltage Tolerace = ±0.1 VDC
Operating Temperature Range	0° C to 70° C 0 to 95% Humidity (non-condensing)	
Isolation	4,000 VAC (RS-232 to RS-422)	
RS-232 Interface	25-pin, DB-25 female connector	
RS-422/485 Interface	Screw terminals	
Baud Rate	Up to 38,400 baud (Boards earlier than Rev.1 are limited to 19,200 baud)	
RS-232 Distance	Up to 50 feet	
RS-422/485 Distance	Up to 5,000 feet	
Communications	RS-422 full duplex over two twisted pairs and a signal common. Shielded cable recommended. Does not support RS-485 2-wire mode (see AC7A/B)	
Indicators	Transmit, Receive	

Dimensions
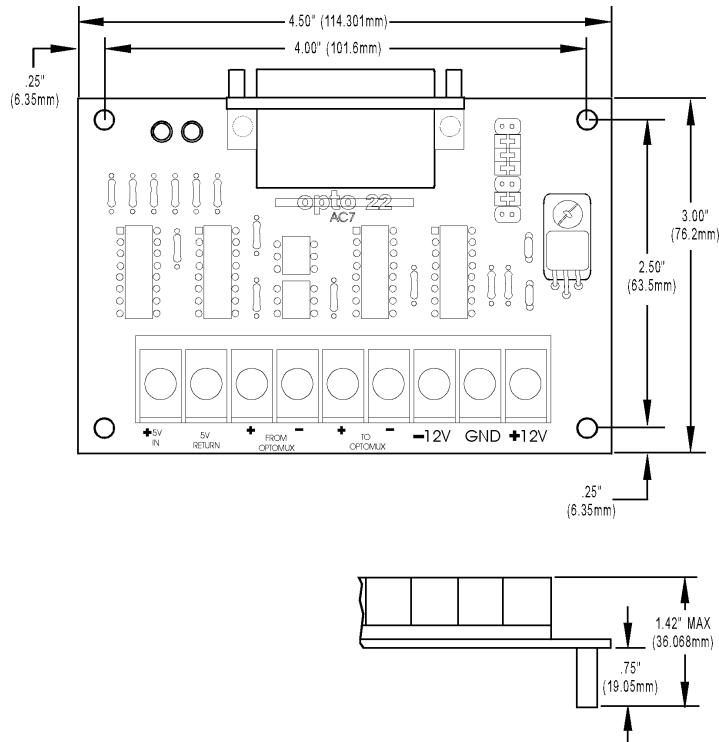
Products

Opto 22 produces a broad array of reliable, flexible hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications.

SNAP Ethernet Systems

Based on the Internet Protocol (IP), SNAP Ethernet systems offer flexibility in their network connectivity and in the software applications they work with. The physical network may be a wired Ethernet network, a cellular wireless network, or a modem. A wide variety of software applications can exchange data with SNAP Ethernet systems, including:

- Opto 22's own ioProject™ suite of control and HMI software
- Manufacturing resource planning (MRP), enterprise management, and other enterprise systems
- Human-machine interfaces (HMIs)
- Databases
- Email systems
- OPC client software
- Custom applications
- Modbus/TCP software and hardware.

SNAP Ethernet system hardware consists of controllers and I/O units. Controllers provide central control and data distribution. I/O units provide local connection to sensors and equipment.

SNAP OEM Systems

Opto 22 SNAP OEM I/O systems are highly configurable, programmable processors intended for OEMs, IT professionals, and others who need to use custom software with Opto 22 SNAP I/O modules.

Linux® applications running on these systems can read and write to analog, simple digital, and serial I/O points on SNAP I/O modules using easily implemented file-based operations. Applications can be developed using several common development tools and environments, including C or C++, Java, and shell scripts.

M2M Systems

Machine-to-machine (M2M) systems connect your business computer systems to the machines, devices, and environments you want to monitor, control, or collect data from. M2M systems often use wireless cellular communications to link remote facilities to central systems over the Internet, or to provide monitoring and control capability via a cellular phone.

Opto 22's Nvio™ systems include everything you need for M2M—interface and communications hardware, data service plan, and Web portal—in one easy-to-use package. Visit nvio.opto22.com for more information.

Opto 22 Software

Opto 22's ioProject and FactoryFloor® software suites provide full-featured and cost-effective control, HMI, and OPC software to power your Opto 22 hardware. These software applications help you develop control automation solutions, build easy-to-use operator interfaces, and expand your manufacturing systems' connectivity.
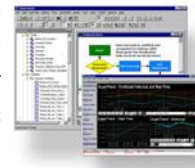
Quality

In delivering hardware and software solutions for worldwide device management and control, Opto 22 retains the highest commitment to quality. We do no statistical testing; each product is made in the U.S.A. and is tested twice before leaving our 160,000 square-foot manufacturing facility in Temecula, California. That's why we can guarantee solid-state relays and optically-isolated I/O modules *for life*.

Product Support

Opto 22's Product Support Group offers comprehensive technical support for Opto 22 products. The staff of support engineers represents years of training and experience, and can assist with a variety of project implementation questions. Product support is available in English and Spanish from Monday through Friday, 7 a.m. to 5 p.m. PST.

Opto 22 Web Sites

- www.opto22.com
- nvio.opto22.com
- www.internetio.com (live Internet I/O demo)

Other Resources

- OptoInfo CDs
- Custom integration and development
- Hands-on customer training classes.

About Opto 22

Opto 22 manufactures and develops hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's input/output and control systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, and electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel.

Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability.

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