OPTO 22

DATA SHEET

Form 043-061030

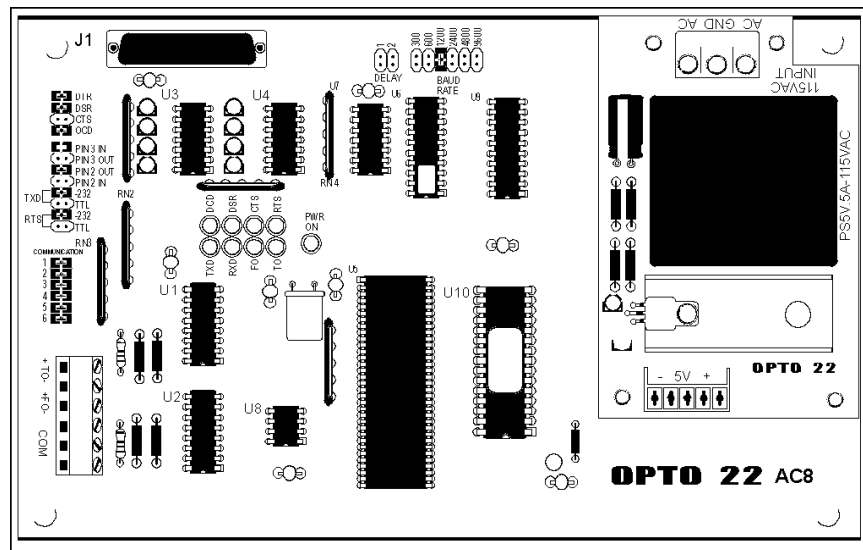| Part Number	Description
AC8	Half Duplex Modem Interface

Description

Introduction

The AC8 adapter card is a communications interface board that provides bi-directional RS-232 to half duplex RS-485/422 conversion, allowing half-duplex modems to be use with the Optomux network.

The AC8 provides transient protection on the RS-422/485 port. The modem adapter card operates as a half or full duplex device with transmission speeds up to 9,600 baud for distances up to 5,000 feet using two twisted pairs.

The AC8 requires a 5 VDC power supply. The AC8A is powered by an on-board 115 VAC power supply.

General information

Optomux uses a RS-422/485 serial communications link. Most modems use the RS-232 serial standard. In addition, modems may be either full- or half-duplex. Half-duplex communication requires flow control which the full-duplex Optomux protocol does not support. The AC8 serves two functions: it provides RS-422/485 conversion to RS-232, and also provides the flow control signals required for half-duplex communication.

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Features

The AC8 includes the following features:
- Baud rates of 300, 1200, 2400, 4800, and 9600 baud.
- LEDs to indicate the state of all modem control and data signals.
- Signal delay from Clear to Send (CTS) to beginning of data transmission adjustable to 1, 25, 100, or 500 milliseconds.

Specifications

AC8 and AC8A Specifications

Power Requirements AC8 AC8A AC8B	5 VDC @ 500 mA 115 VAC ± 10 VAC @ 50 - 60 Hz 220 VAC ± 20 VAC @ 50 - 60 Hz
Power Consumption	0.1 amps @ 115 VAC .06 amps @ 220 VAC
Operating Temperature Range	0 to 70° C 95% relative humidity (non-condensing)
Isolation	None

Interface
  RS-232C
  RS-422/485
	25-pin, D-shell female connector
	4-40 screw terminals

Baud Rate	Up to 9,600 baud

Distance
  RS-232C
  RS-422/485
	Up to 50 feet
	Up to 5,000 feet

Communications	Half or full duplex over two twisted pairs
Indicators	Transmit, receive, RTS, CTS, DCD, DCR, and power

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## Power Supplies for the AC8

There are two versions of the AC8 adapter card. The AC8 requires a 5 VDC power source at about 500 milliamperes, and the AC8A requires a 120 VAC power source.

Environmental Requirements

The operating temperature range of the AC8 is from 0° C to 60° C, while the storage temperature range is from -25° to 85° C. The relative humidity is from 10 to 95 %, non-condensing.

Physical Description

The AC8 is a rectangular, printed circuit board designed to bolt to a panel inside an electrical enclosure. The layout of the AC8 is the same for both versions of the AC8 adapter card.
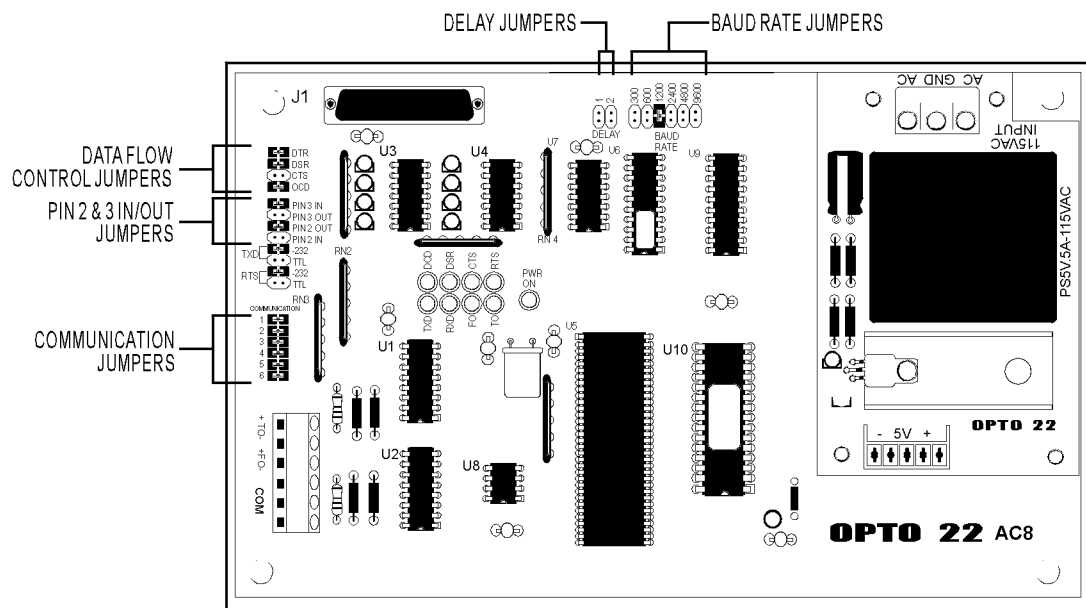
Figure 1 - Dimensions and Layout of the AC8 Adapter Card

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LED Indicators

There are nine LEDs on the AC8, which indicate power, control and data signals
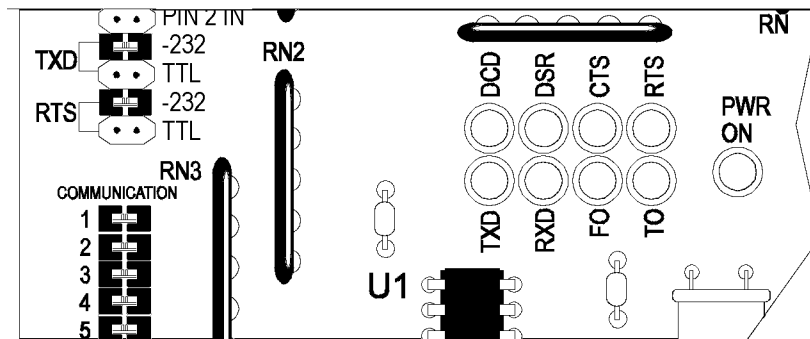
Figure 2 - Layout of the AC8 LED's

The following table lists the LEDs and their descriptions. The LEDs indicate the state of the RS-232 signals with the exception of the PWR ON, FO, and TO LEDs. The PWR ON is on when power is applied to the AC8 adapter card. The FO (From Optomux) and TO (To Optomux) LEDs refer to the RS-422/485 receive and transmit data signals, respectively.

| LED	Description	LED	Description
TXD	Transmit Data	DCD	Data Carrier Detect
RXD	Received Data	DSR	Data Set Ready
FO	From Optomux	CTS	Clear To Send
TO	To Optomux	RTS	Request to Send
PWR ON	Power On		

Configuration Jumpers

There are five groups of configuration jumpers on the AC8 card. The configuration jumpers allow the user to configure the operation of the AC8. The five jumper groups are: delay, baud rate, data flow control, pins 2 & 3 in/out and communication.

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Delay

The delay jumpers (Figure 3, set the delay from the Clear To Send (CTS) line to the beginning of data transmission (TXD). For most modems, no delay is required and neither jumper is installed.

Delay 1	Jumpers 2	Delay Time
0	0	1 milllisecond (default)
X	0	25 milliseconds
0	X	100 milliseconds
X	X	500 milliseconds
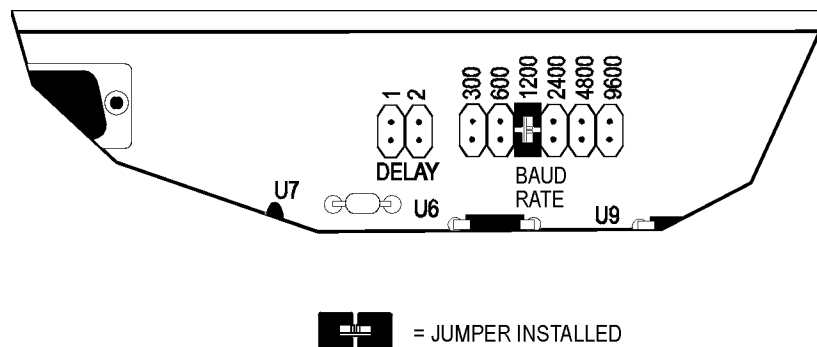
Figure 3 - Jumpers for selectable Delay and Baud Rate

Baud Rate

The baud rate jumper (Figure 3) determines the baud rate of the AC8. Selectable baud rates are: 300, 600, 1200, 2400, 4800, and 9600. The AC8 must be set to the same baud rate as the modem and the Optomux network. The default baud rate is 1200 baud.
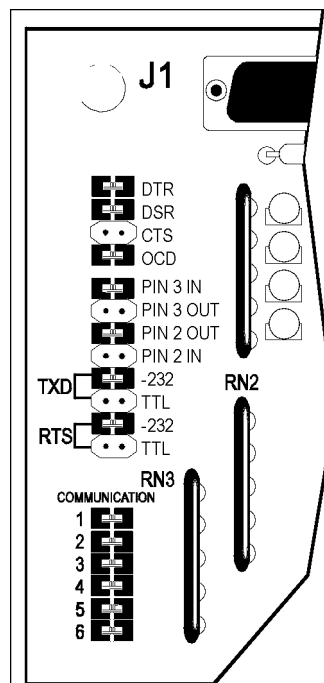
Data Flow Control

This group of jumpers (Figure 4) configures the RS-232 interface (DTR, DSR, CTS, and DCD). The default jumper settings are to install jumpers DTR, DSR, and DCD. This means that the corresponding signals are not available from your modem. If the jumpers are installed, the above signals are always true.

The DTR jumper should be installed if your modem expects this signal. If the jumper is installed, the signal is always true. This signal can be used by a modem to determine if an AC8 is connected and operating.

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Pin 2 & 3 In/Out

The pin 2 & 3 In/Out jumpers (Figure 4) allow the AC8 to be used with either a null modem (pin 2 to 3 and pin 3 to 2) or a straight-through (pin 2 to 2 and pin 3 to 3) cable. The default jumper setting is for the straight-through cable, jumpers on PIN 3 OUT and PIN 2 IN. To configure for a null modem cable, install jumpers on PIN 3 IN and PIN 2 OUT.

Also included in this group of jumpers are the RS-232 or TTL level selection for the TXD and RTS lines. The default jumper settings are RS-232 on both the TXD and RTS lines. If your modem uses TTL signal levels, install both TTL jumpers and remove the RS-232 jumpers.

Figure 4 - Jumpers for the Data flow Control and Pins 2 and 3

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Communication

The communication jumpers (Figure 5) set the pull-up, pull-down and terminating resistors for the RS-422/485 signal (FO and TO). The default setting is to have all six (6) jumpers installed. Default settings should be used.

LED	Description	LED	Description
TXD	Transmit Data	DCD	Data Carrier Detect
RXD	Received Data	DSR	Data Set Ready
FO	From Optomux	CTS	Clear To Send
TO	To Optomux	RTS	Request to Send
PWR ON	Power On		
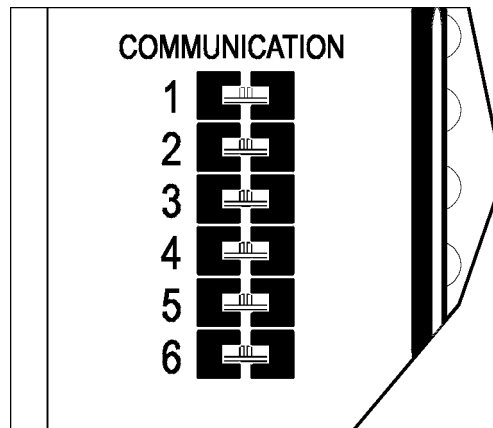
= JUMPER INSTALLED

Figure 5 - Jumpers for the Optomux Communication

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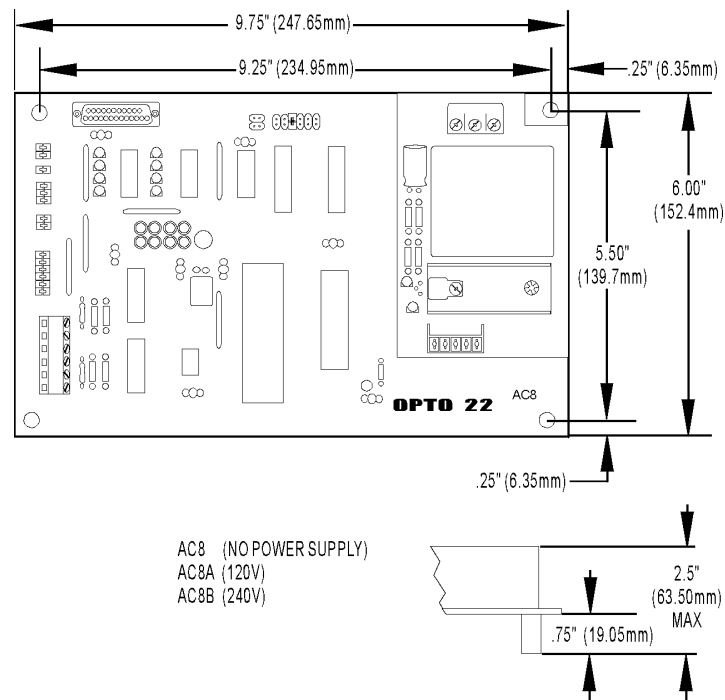Form 043-061030

Installation

Installing the AC8

The following tools and materials are necessary for installing the AC8
- Drill and tap for #6 screws or equivalent
- Medium sized, flat-blade screwdriver
- Wire stripper
- Mounting hardware, #6 or equivalent
- Variety of color-coded wires, #22 AWG or larger
- A standard DB25, RS-232 data cable with a male connector for the AC8 end

Caution: Before connecting or disconnecting anything, turn off the power on the Optomux network and the modem. This is absolutely necessary; as with power applied, it is possible to damage the circuits.

Mounting the AC8 Adapter Card

The AC8/AC8A/AC8B (Figure 6), is designed to operate inside an electrical enclosure. Mount the AC8 to a surface with screws through the four stand-offs in the corners of the AC8 adapter card. The AC8 can be mounted in any physical orientation.

Figure 6 - Dimensions and Layout of the AC8 Adapter Card

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Connecting the AC8 to the Optomux Network

Connecting the AC8 to the Optomux Network is described below. "Optomux Network" refers to one or more B1 (digital) or B2 (analog) brain boards on a RS-422/485 serial communication link.

Follow these steps to connect the AC8 to an Optomux network:

1. Locate the +TO (+ To Optomux), -TO (- To Optomux), +FO (+ From Optomux), -FO (- From Optomux), and COM terminals. (There are two terminals for the COM signal on the AC8, both are internally jumpered together.)
2. Locate the corresponding terminal on the Optomux board. The labels on the Optomux board are: +TH (+ To Host), -TH (- To Host), +FH (+ From Host), -FH (-From Host), and COM.
3. Wire the AC8 to the Optomux network by connecting two twisted pairs of wire to the terminal strip. It is very important that the wires are twisted to negate possible noise signal on the wires.

AC8 Terminals	Optomux Terminals
+TO	+FH (From Host)
-TO	-FH
+FO	+TH (To Host)
-FO	-TH
COM	COM

Connecting a Modem to the AC8

To connect a modem to the AC8, follow the steps below:

1. Connect the DB25 RS-232 cable to your modem.
2. The other end which will connect to the AC8, must be a male DB25 connector. The pinout of the AC8 connector is described below.

Pin Number	Description
1	Protective Ground
2	Transmit Data
3	Receive Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Data Carrier Detect
20	Data Terminal Ready

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Operation

Transmitting From Host To Optomux

When the modem is operational and ready to receive a message from the host computer, it sets a true condition (positive voltage) on the DSR control line.

When the host computer establishes communication, the modem sets a true condition on the DCD control line.

When both DSR and DCD are true, AC8 passes any serial data appearing on the RXD signal line to the OPTOMUX network. If either DSR or DCD is not provided by the modem, you can jumper those signals to be permanently true on the AC8.

Transmitting From Optomux To Host

When an Optomux brain board sends a reply on the Optomux network, the AC8 stores the message in its buffer. It sets a true condition on the control line.

When the modem receives the RTS signal, it reverses the direction of the communication link. It sets a true condition on the CTS control line and a negative condition on the DCD control line.

When the AC8 receives the CTS signal, it delays for 1, 25, 100, or 500 milliseconds, (depending on the delay jumper setting) before transmitting the message stored in its buffer.

When the buffer is empty, it sets a negative condition on RTS and the modem is free to reverse the direction of the communication link once more.

Please note that it may be necessary to increase the time-out time on the host computer's serial port when using the AC8.

If you have any problems interfacing with the AC8 Adapter Card, please call Opto 22 Product Support at 909-695-3080 or 1-800-835-OPTO (outside of California) for assistance.

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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:

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- 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.

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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.

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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.
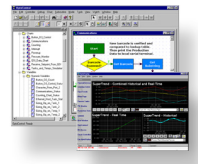
Quality

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.

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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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