

## Description

The Sine Systems model PA-1 Printer Adapter is designed for use with the RFC-1/B Remote Facilities Controller to allow local printing. It consists of a small PC board which connects to the rear edge of the RFC-1 board with a jumper connector. A longer case and new rack panel are included to enclose the assembly and mount the 25 pin D connector.



To isolate the RFC-1 from the PA-1 data connection, a special optocoupler is used which optically isolates the data stream direction. A DC-to-DC converter is used to isolate +5 volts in the RFC-1 to the +5 volts needed at the PA-1 side. The connector on the PA-1 adapter is a female 25 pin D connector. The RFC-1 data format is factory set to 2400, 8, N, 1 (2400 baud, 8 data bits, no parity bits, one stop bit). The baud rate can be set to any standard value from 75 baud to 9600 baud via software programming in the RFC-1/B however the PA-1 only supports rates of 2400 baud or 300 baud. The factory setting on the PA-1 is 2400 baud and can be changed to 300 baud by shorting jumper A on the PA-1 board.

RFC-1/B software version 4.00 or later is required to operate the RS-232 Adapter. A software upgrade kit is available from Sine Systems as model SU-5. The upgrade kit will include a new microprocessor, instructions for installing the new microprocessor, a new speech chip, and a new Programming Instruction book.

## Printing Devices

A parallel printer can be connected directly to the PA-1 connector with the appropriate cable (25 pin male D to Centronics). Serial printers can be used but the data must first be converted from parallel data to serial data. Some printer manufacturers offer this as an option on some models. Call your dealer or the printer manufacturer to find out if such an accessory is available for your printer. Third party devices are also available that perform this task. Your local computer superstore should have one. They usually cost between \$50 and \$100. A simple gender changer adapter is not the same as a parallel to serial converter and will not work.

Parallel printers are remarkably standard devices. Users have had very little trouble with the vast majority of parallel printers. In fact, most problems can be traced to mistakes in wiring or equipment setup. A relatively new class of extremely inexpensive printers sometimes called Windows printers are now available. Typically these printers have only a USB interface which will not work with the PA-1 but some of them also have a parallel port. The problem with these devices (and what makes them so cheap) is that they are just a print engine that is unable to print without a personal computer to provide the intelligence for the engine. This type of printer will not work with the RFC-1/B.

The RFC-1/B thinks that all printers are continuous feed dot matrix parallel printers so it does not know that it should send page feeds to a printer. It sends a continuous stream of data with carriage returns and line feeds, and lets the printer break the pages up as efficiently as possible. Usually this is not a problem. A few printers, however, refuse to dump the final data from the buffer because a page feed has not been received and the page is not complete. In these cases, there is usually an option in the printer setup that will make it print the final data from buffer.

## Printer Adapter Installation

*Use proper precautions for handling static sensitive devices while performing the installation!*

Disconnect all cables from the RFC-1/B and remove it from the rack. Remove the two screws from the rear panel of the RFC-1/B. Remove the bezel and metal end panel. Slide the RFC-1 PC board out of the case.

The original rack panel and 6 inch long base/cover will not be reused. It is probably a good idea to save these, however, in case it is ever necessary to return the RFC-1/B to its original configuration.

Set the RFC-1/B board on a flat surface with the component side up. Set the PA-1 board down next to the rear edge of the RFC-1 board so that J1 on the PA-1 board is next to J4 on the RFC-1/B board. Install the jumper connector between the two boards to form one PC board assembly, now 8.5 inches long.

It does not matter which direction the jumper is installed as long as the jumper is aligned against the notched edges of the expansion sockets. See figure 3.

On recent revisions of the RFC-1 the expansion socket has 20 positions while earlier RFC-1/B expansion sockets have only 16 positions. When the jumper is installed properly on newer revisions, the socket on the RFC-1/B will have 4 unused pin positions at the edge nearest the telephone line connector. This is normal--they are used by other expansion devices. *These 4 socket positions must be left empty.*

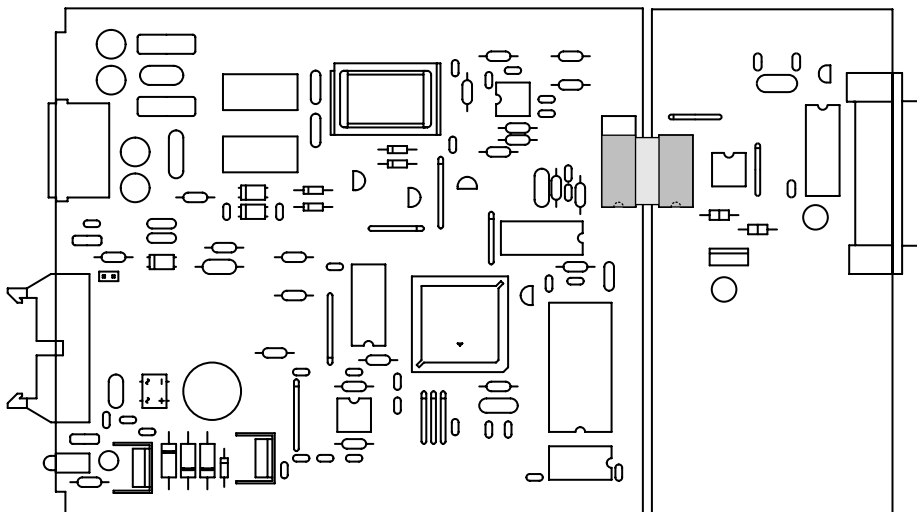


Figure 3; Connecting the PA-1 to the RFC-1/B

Using the new end panel and case supplied with the PA-1, slide the assembly of the original RFC-1/B board and the Printer Adapter board into the case with the connector on the PA-1 extending out through the front panel. Place the remaining bezel over the case and drop in the RFC-1 rear panel. Secure the end panel with two Phillips head screws.

Finally, install the two jack screws on the 25 pin D connector. The jack screws are optional but they do hold the D connector firmly against the back panel and help make the entire assembly a little more stable. Thread locking compound can keep the jack screws from loosening unintentionally when the connected device is disconnected.

## Parallel Printer Installation

The following is a list of steps to install a typical parallel printer to an RFC-1/B with the MA-1 already installed. You will need a printer cable--usually a 25 pin male D to Centronics cable.

- Step 1 Plug the end of 25 pin D cable to the PA-1 Printer Adapter on the RFC-1/B.
- 2 Attach the Centronics type end directly to the parallel input of the printer.
  - 3 Apply power to the printer then to the RFC-1/B. The printer should print the firmware version of the Printer Adapter when power is applied.
  - 4 Set the RFC-1/B baud rate to 2400--this is the factory setting. This is done by programming a value of 2 at address 1005 using the Advanced Programming Mode of the RFC-1/B.
  - 5 Program the RFC-1/B to send readings to the printer at scheduled intervals by programming an action sequence and setting up the proper date and time triggers for that action sequence. This programming is accomplished through the Advanced Programming Mode of the RFC-1/B. An example is shown below.

More information on advanced programming in the RFC-1/B can be found in the manual that came with the RFC-1/B.

## Printing Readings to a Local Printer

In this example we will program Action Sequence 2 to print a set of readings to the printer connected to the PA-1 and we will program Date/Time Trigger 1 to activate the action sequence hourly at 10 minutes past the hour to automatically log the transmitter readings.

- Step 1 Enter the Advanced Programming Mode: 80
- 2 Enter the Advanced Programming Security Code: 4150
  - 3 Enter the starting address (from the Address Table) for Action Sequence 2: 0740
  - 4 From Section 6 of the RFC-1 manual, the command for local printing is: V1=8, V2=8
  - 5 Enter V1 for the local print command: 8
  - 6 Press the # key to enter this value and increment to the next address in memory
  - 7 Enter V2 for the local print command: 8
  - 8 Press the # key to write this value and increment to the next address in memory

The action sequence is programmed. The example continues on the next page.

## Printing Readings to a Local Printer (*continued*)

Jump to a new address to program the date/time trigger.

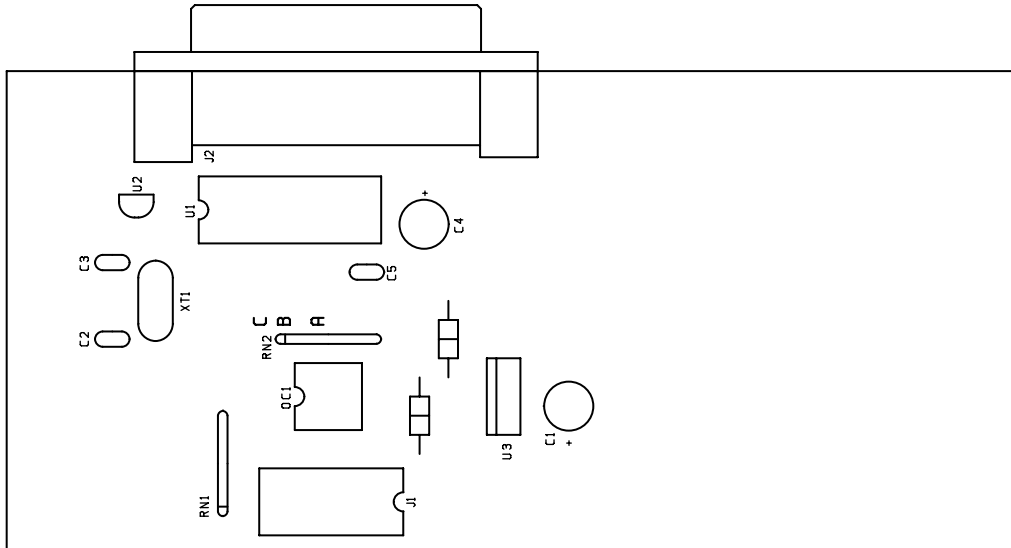
- 9 Enter the Advanced Programming Mode command to jump to a new address: 80
- 10 Enter the starting address (from the Address Table) for Date/Time Trigger 1: 0632
  
- 11 Enter the number of the action sequence that should be triggered: 2 (local print, programmed above)
- 12 Press the # key to enter this value and increment to the next address in memory
  
- 13 Enter up to two digits for the month in which this trigger should function: 15 (every month)
- 14 Press the # key to write this value and increment to the next address in memory
  
- 15 Enter the first digit for the date in which this trigger should function: 15 (every day)
- 16 Press the # key to write this value and increment to the next address in memory
  
- 17 Enter the second digit for the date in which this trigger should function: 15 (every day)
- 18 Press the # key to write this value and increment to the next address in memory
  
- 19 Enter the first digit for the hour at which this trigger should function: 15 (every hour)
- 20 Press the # key to write this value and increment to the next address in memory
- 21 Enter the second digit for the hour at which this trigger should function: 15 (every hour)
- 22 Press the # key to write this value and increment to the next address in memory
  
- 23 Enter the first digit for the minute at which this trigger should function: 1
- 24 Press the # key to write this value and increment to the next address in memory
- 25 Enter the second digit for the minute at which this trigger should function: 0
- 26 Press the # key to write this value and increment to the next address in memory
  
- 27 Press the \* key to exit the programming mode

The text in RFC-1/B manual describes the use of the value 15 for a “global match”--an entry that will match any condition in a time trigger.

Readings will be printed from channel 00 to the autoscan stop channel. The autoscan stop channel is programmed at addresses 1010-1011. The default setting is channel 07.

The clock must be set before the time trigger can function. Setting the clock/calendar is easy. Issue the commands 70 and 71 in the operating mode, *not in programming mode*, and the RFC-1 will prompt for the time and date.

## Component Layout



## Parts List

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J1	16 pin DIP connector
J2	25 pin D connector
RN1	resistor network, SIP, isolated, 3 x 1K
RN2	resistor network, SIP, isolated, 3 x 3.3K
OC1	optocoupler, dual, unipolar, single transistor
C1, 4	capacitor, aluminum electrolytic, radial, 100 mF, 16V
C2, 3	capacitor, monolythic ceramic, 50V, 27pF
C5	capacitor, monolythic ceramic, 50V, 0.1mF
CV1	DC-DC converter (5 volt to 5 volt), isolated
XT1	crystal, 3.579 MHz
U1	IC, MC68HC705J1ACP
U2	IC, MN1381-S
jumper	16 conductor flat cable with two 16 pin male DIP connectors
jack screws	3/16 inch hex male/female