Description

The Sine Systems model PA-2 Printer Adapter gives the RFC-1/B Remote Facilities Controller the ability to print to a standard parallel printer. It consists of a small PC board that connects to the the RFC-1 with a jumper connector. A longer case and new rack panel are included to enclose the assembly and provide access to the 25 pin D connector.

The PA-2 printer interface is galvanically isolated to minimize the potential for electrical damage to the rest of the system. It communicates with the RFC-1 over optically isolated data lines and is powered by an isolated supply. The printer connector on the PA-2 is a female 25 pin D connector.

RFC-1/B software version 4.00 or later is required to operate the RS-232 Adapter. Most RFC-1 systems are running version 5.x so this is typically not an issue. A software upgrade kit is available from Sine Systems if needed. Use the command "78" while online with the RFC-1 to read the software version.

Data Transfer

The PA-2 receives serial data from the RFC-1 and translates it into appropriate parallel data signals. In the factory configuration the RFC-1 sends serial data at 2400 baud so the PA-2 is factory configured to receive data at this rate. The baud rate in the RFC-1 is adjustable so it is important that the two devices are set at the same speed. Should there be a problem with dropped characters at the printer, both devices can be slowed to 300 baud.

Printing Devices

A parallel printer should be connected directly to the PA-2 printer connector with the appropriate cable for the printer. True parallel printers are remarkably standard devices and users have 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 available. Typically these printers have only a USB interface which will not work with the PA-2. Aside from the interface, the problem with these devices (and what makes them so cheap) is that 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 treats all printers as continuous paper feed--it does not generate page feeds. It sends a continuous stream of data with carriage returns and line feeds. Most printers will automatically generate page feeds which allows for more efficient paper usage. Occasionally a printer will refuse to dump the final data from the buffer until the page is full. In this case there is usually an option is 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-2 board down next to the rear edge of the RFC-1 board so that J1 on the PA-2 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.*

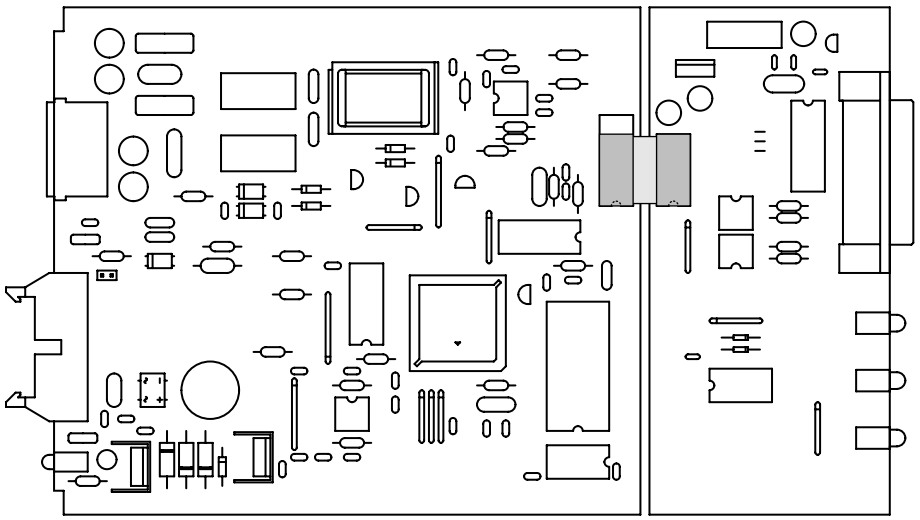


Figure 3; Connecting the PA-2 to the RFC-1/B

Using the new end panel and case supplied with the PA-2, slide the assembly of the original RFC-1/B board and the Printer Adapter board into the case with the connector on the PA-2 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 PA-2 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-2 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-2 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.

Slowing the Data to the Printer

Printing is a relatively slow function compared to the speed at which data can be transmitted. Most printers have a small internal data buffer to avoid loss of data. The RFC-1 does not send data to the PA-2 at high speed and it should not overrun the printer buffer in most cases. However, some printers process data more slowly than others so sometimes it is necessary to slow the data rate from the RFC-1. This can also be useful at noisy sites where RFI is interfering with data transmission.

When making this change, both the RFC-1 and the PA-2 must be adjusted to the same speed.

Adjust the input data rate to the PA-2 by placing a jumper on the pins at position A of the selection jumpers (JPA). The default configuration is no jumper, 2400 baud. When shorted, data is received at 300 baud.

Next adjust the data rate in the RFC-1 using the procedure below. The factory default setting is 2400 baud. Several settings are available but the PA-2 will only recognize 2400 baud and 300 baud.

Setting the RFC-1 for 300 baud data I/O:

Step *1* Enter the Advanced Programming Mode: `80`
2 Enter the Advanced Programming Security Code: `4150`

3 Enter the address (from the Address Table) for Serial Data Baud Rate: `1005`
4 From Section 6 of the RFC-1 manual, the setting for 300 baud is: V1=5
5 Enter V1 for the local print command: `5`
6 Press the # key to enter this value in memory
7 Press the ✳ key to exit the programming mode

If it becomes necessary to reverse this process and reset the RFC-1 to 2400 baud, follow the procedure below.

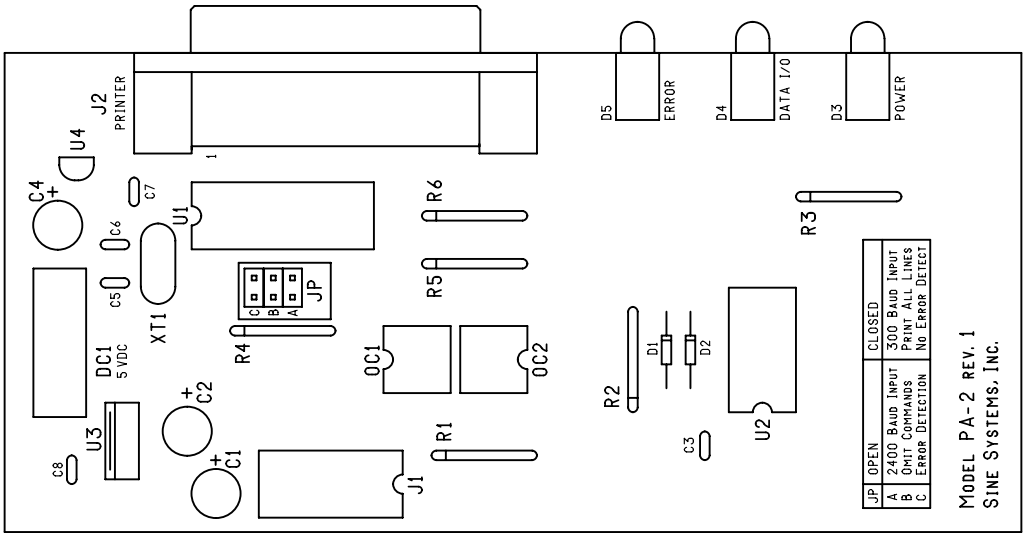
Setting the RFC-1 for 2400 baud data I/O:

Step *1* Enter the Advanced Programming Mode: `80`
2 Enter the Advanced Programming Security Code: `4150`

3 Enter the address (from the Address Table) for Serial Data Baud Rate: `1005`
4 From Section 6 of the RFC-1 manual, the setting for 2400 baud is: V1=2
5 Enter V1 for the local print command: `2`
6 Press the # key to enter this value in memory
7 Press the ✳ key to exit the programming mode

Be sure that the RFC-1 and PA-2 are adjusted to transfer data at the same rate!

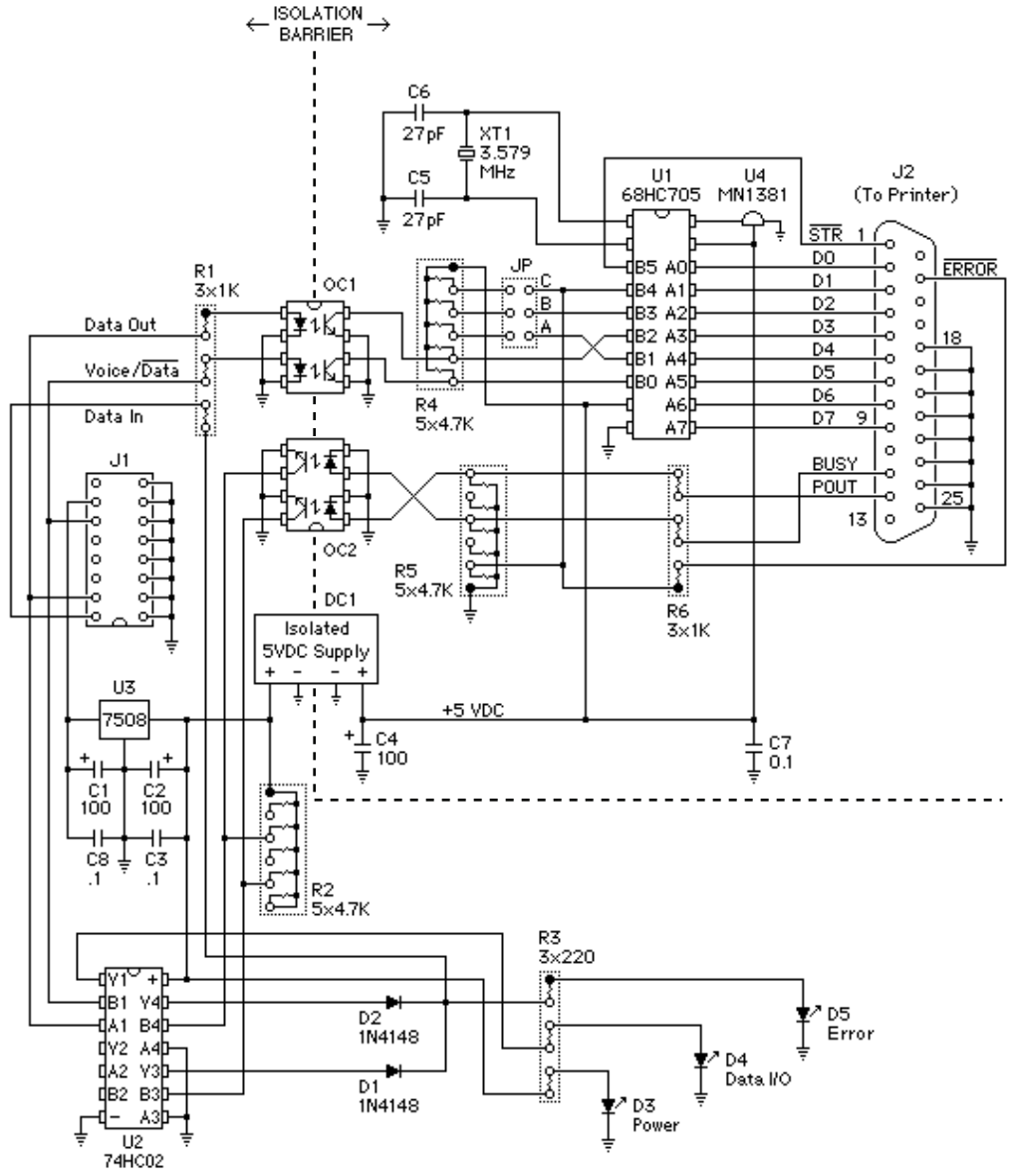
Component Layout



Parts List

Qty	*Part Description and Value*
3	capacitor, aluminum, radial, low profile, 100 uF, 16v
3	capacitor, monolythic ceramic, 0.1 uF, .1" spacing
2	capacitor, monolythic ceramic, 27 pF, .1" spacing
1	connector, D, female, threaded, 25, PCB, 90°
2	connector, DIP, male, 16, IDC
3	connector pins, pin-plug, male, 0.1", 80 (40 x 2), 0.23 gold
1	crystal, 3.579 MHz, 18 pF parallel, HC-49S
2	diode, high speed switching, 100 V/0.5 A, 1N4148
1	enclosure, assembly, platinum, T1 MicroPak, 8.5"
1	enclosure part, rack panel, aluminum, painted for PA-1
2	hardware, jackscrew, 0.312", silver
2	hardware, screw, pan head, thread rolling, 4-40 x 5/8", clear
1	integrated circuit, logic, quad 2-input NOR, 74HC02
1	integrated circuit, low voltage interrupt, MN1381-S, CMOS output
1	integrated circuit, microprocessor, MC68HC705J1ACP
2	integrated circuit, optocoupler, dual, unipolar, single transistor
1	integrated circuit, voltage converter, DC-DC, 5V-5V isolated, 150 mA
1	integrated circuit, voltage regulator, low drop, LM2937ET-5.0, +5V DC/0.5 A
1	LED, 5mm, long, green, 90°
2	LED, 5mm, long, red, 90°
2	resistor, SIP, 3 x 1K, isolated
1	resistor, SIP, 3 x 220, isolated
3	resistor, SIP, 5 x 4.7K, common

Schematic Diagram



Jumper	Open	Closed (shorted)
A	2400 baud input	300 baud input
B	do not print commands	print all lines
C	enable error detection	ignore printer errors

Model PA-2 Revision 1
Sine Systems, Inc. ©2004

Unless otherwise noted, all resistor values are in ohms and all capacitor values are in microfarads.