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**V232 RS-232 INTERFACE**  
**INSTRUCTIONS**

The V232 is an RS-232 serial interface designed to provide a means by which the user can interface the VIC 20<sup>®</sup> with various devices such as printers, modems and even other systems. The V232 plugs into the user interface connector and provides both positive and negative voltage swings to meet the EIA standard.

**INSTALLING THE V232**

The V232 is configured to interface with Data Communication Equipment (DCE) such as a modem with the VIC 20 as the Data Terminal Equipment (DTE). In this configuration, the board need only be plugged into the user port located on the rear of the VIC 20 (component side up). The RS-232 cable from the printer is connected to the DB 25 type connector on the V232 board.

Note: The board should never be plugged and/or unplugged with the system power on.

In order to use the V232 with other DTE equipment (such as printers), certain changes need to be made by the user to accommodate the desired printer. Many printers are not capable of handling the data rates as they are sent by the VIC because of the mechanical delay of the printer mechanism. For these printers, data will be lost in the transmission unless some form of holdoff is used. Unfortunately, the VIC software is not capable of processing the holdoff, which makes it necessary to utilize a machine language program called a "wedge" that will recognize a printer holdoff. The following program is a Basic program that can be added to the beginning of any program that will use the printer. The program protects a portion of memory and stores a machine language "wedge" that will intercept any data to be printed and make sure the printer is ready for the data. The program can also be used alone so that programs can be listed on the printer if desired. If the program is used by itself, it must be re-run after the "RUN/STOP" and "RESTORE" keys are pushed simultaneously since the system vectors are reset. Pressing the "RUN/STOP" key alone will not necessitate re-running the program.

Note: This program is intended for personal use only and cannot be used in commercial applications without the written permission of Micro Systems Development, Inc.

**RS-232 WEDGE**

```
10 REM RS232 WEDGE COPYRIGHT 1983 MICRO SYSTEMS DEVELOPMENT INC.
50 A=PEEK(56)*256+PEEK(55)
60 FOR B=A TO A+29: READ C:IF C=PEEK(B) THEN NEXT:GOTO 90
70 A=A-30:RESTORE
80 FOR D=A TO A+29:READ E:POKE D,E:NEXT
90 B=INT(A/256):POKE 56,B:POKE 52,B:POKE 644,B
100 C=A-(256*B):POKE 55,C:POKE 51,C:POKE 643,C
120 POKE 793,B:POKE 792,C
130 DATA 72,165,186,201,2,208,19,165,180,208,15,173,18,145,41,46
140 DATA 141,18,145,173,16,145,41,64,240,249,104,76,173,254
```

Printers require special jumpering, and since every printer has its own interfacing scheme, the user must consult the printer operation manual along with the following technical information. Certain specific configurations have also been provided below. In making the jumper cuts, care must be used to avoid cutting other traces on the circuit board. In making jumpers, a small wattage soldering iron should be used to bridge the gap between the two sides of the pads.

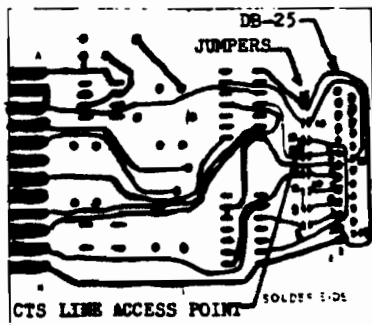


Fig. 1 Solder side view of circuit board depicting jumper number and DB-25 pin-out.

The V232 is designed to provide four RS-232 compatible output lines and four RS-232 compatible input lines. One of each of these I/O lines are utilized for data receiving and transmitting while the others are available for handshake. The RS-232 wedge program provided with this documentation monitors one of the input lines and suppresses output as long as this line is at an RS-232 "high" level. The particular line that is monitored is the CTS line which can be accessed on the solder side of the printed circuit board where jumper pads 12 and 13 are connected by etch. (see Fig. 1). Printers that have a busy line should utilize this pad junction as the point at which the busy line connects to the V232 interface. Certain other printers require that pin 6 and pin 20 of the DB-25 connector be connected together. This can be accomplished by connecting jumpers on pads 6 and 14. When printers are being used with the V232, the jumpers located on the component side should be cut as these jumpers are only applicable for modem operation (except for jumper pad 6, which may be necessary for certain printers). Printers that have memory buffers will generally only require jumpers 6, 8, and 14 for correct operation.

The following information is for connecting specific printers to the V232:

- 1) OKIDATA u82A-a) Remove Jumpers 1, 2, 3, 4, 5, 7.  
b) Add Jumpers 8, 14.  
c) Connect an insulated wire between the DB25 pin 11 and the junction of the etch connecting jumper pads 12 and 13 (see Fig. 1). Do not jumper pads 12 and 13.  
d) Use the RS-232 wedge provided.  
e) Set the front panel switches on the printer as follows: On-SW5, SW6, SW8; all others should be off.  
f) Set the rear dip switches on the printer as follows: On-SW2, SW3, SW6; all others should be off.  
g) The Basic syntax for using the printer is:  
OPEN 2, 2, 0, CHR\$(128+32+6)+ CHR\$(224).
- 2) TI810-a) Remove Jumpers 1, 2, 3, 4, 5  
b) Add Jumpers 8, 14.  
c) Install jumper wire between jumper pads 6 and 7.  
d) Do not use RS-232 wedge.  
e) Set the printer front switches as follows:  
ON-SW1,2; all others off.  
f) The Basic syntax for using the printer is:  
OPEN 2, 2, 0, CHR\$(8).
- 3) Commodore 8300P  
a) Remove Jumpers 1,2,3,4,5,7.  
b) Add Jumpers 8, 14.  
c) Do not use RS-232 wedge.  
d) Set the printer front switches as follows:  
ON-SW4; all others off.  
e) The Basic syntax for using the printer is:  
OPEN 2,2, 0, CHR\$(6).
- 4) Epson MX100  
a) Remove Jumpers 1, 2, 3, 4, 5, 7.  
b) Add jumpers 8, 14.  
c) Connect an insulated wire between the DB25 pin 11 and the junction of the etch connecting jumper pads 12 and 13 (see Fig. 1.) Do not jumper pads 12 and 13.  
d) Do not use RS-232 wedge provided.  
e) Set the switches on the RS-232C/Current Loop Interface card as follows: Switch ON SW1-1, SW1-3, SW1-5, SW1-6, SW1-7, SW1-8, SW2-1, SW2-2, SW2-4, all others should be off.  
f) The Basic syntax for using the printer is:  
OPEN 128,2,0, CHR\$(8).

## OPERATING THE V232

The VIC 20 contains most of the software necessary to utilize the RS-232 interface. The interface behaves much like the cassette except that it is device number 2 instead of device number 1. The following commands in BASIC are used:

- 1) OPEN, CLOSE - allocates and deallocates the upper 512 bytes of user memory for buffer area and configures the channel for the appropriate device to be accessed.
- 2) INPUT #, GET# - used to get data from the receiving buffer (note that INPUT# will cause the system to hang until a non-null character and a carriage return is received).
- 3) PRINT#, CMD - used to place data into the transmitting buffer.

The INPUT#, GET#, PRINT# and CMD work the same for the RS-232 as for the cassette, but the OPEN command has a special syntax:

OPEN <LF>, 2, 0, CHR\$(control register) + CHR\$(command register)

Where: 1) LF is the logical file number from 1 to 255. If LF is less than 128 then no line feed is sent with a carriage return. Logical file numbers greater than 128 will result in a line feed being sent with a carriage return.

- 2) The control register configures the output format as follows:

Bit #	7	6 5	4	3 2 1 0
STOP BITS		WORD LENGTH	NOT USED	BAUD RATE
0=1 stop bit		00=8 bits		0001=50 Baud
1=2 stop bit		01=7 bits		0010=75 Baud
		10=6 bits		0011=110 Baud
		11=5 bits		0100=134.5 Baud
				0101=150 Baud
				0110=300 Baud
				0111=600 Baud
				1000=1200 Baud
				1001=1800 Baud
				1010=2400 Baud

### EXAMPLES:

CHR\$(8) would be 1 stop bit, an 8 bit word length and 1200 baud speed.

CHR\$(128+32+6) would be 2 stop bits, a 7 bit word length and 300 baud speed.

(continued)



2. Printer as a typewriter: 1200 baud, 3-line handshake with a 7 bit word, 2 stop bits and even parity.

```
10 OPEN 2,2,0, CHR$(128+32+8)+ CHR$(96)
20 GET AS: IF AS<>"" THEN PRINT AS;:PRINT#2,AS;
30 GOTO 20
```

### SPECIAL NOTES

1) There is no carriage-return delay built into the output channel, so some RS-232 printers may not correctly print. Slower baud rates may be necessary for certain printouts.

2) In order to make sure all data is transmitted before closing a channel, the following statements may be needed:

```
<line #> IF ST=0 AND (PEEK(37151) AND 64)=1 GOTO <line#>
<line #+1> CLOSE <LF#>
```

3) If ST=0, no error was detected

4) Since the OPEN statement utilizes the last 512 bytes of user RAM, the OPEN statement should be executed before any variables are assigned.

5) The following signals are on the DB-25 when strapped as shipped from the factory:

DB 25 Pin	Signal Name	Description	Input/Output line
1	GND	Protective Ground	-
2	SOUT	Transmitted Data	Output
3	SIN	Received Data	Input
4	RTS	Request to Send	Output
5	CTS	Clear to Send	Input
6	DGR	Data Set Ready	Input
7	GND	Signal Ground	-
8	DCD	Carrier Detect	Input
20	DTR	Data Terminal Ready	Output

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