

USING THE TELESYS COMMODORE 64[®] TO IEEE INTERFACE

Assembly Note: Prior to using the Telesys IEEE Interface for the first time, the two support feet should be installed using the supplied screws.

Installation: The IEEE Interface should be plugged into the Commodore 64's expansion port, label side up, with the power on the 64 TURNED OFF. A "CBM/PET to IEEE" cable should be plugged into the IEEE port of the IEEE Interface.

The IEEE Interface board provides the C64 with normal CBM/PET -type control over the IEEE-488 bus (devices such as the 4040, 8050, 2031, 2022, 4022, and 8023). When plugged into the Commodore 64, the card gives "transparent" access to the IEEE bus. It allows the user to use normal BASIC commands to utilize the bus. Commands that access the bus are:

- 1.) OPEN - Sets up a channel to the IEEE device.
- 2.) CLOSE - Terminates an "Open" IEEE channel.
- 3.) PRINT# - Sends data to the IEEE channel.
- 4.) GET#, INPUT# - Gets data from the IEEE channel.
- 5.) CMD - Turns over I/O control to an IEEE device.
- 6.) SAVE - Stores a program to the IEEE device.
- 7.) LOAD - Retrieves a program from an IEEE device.

For syntax and exact usage for the above BASIC commands, refer to your BASIC reference manual.

Using the Telesys IEEE Interface: To enable the IEEE Interface once the C64 is turned on, type: SYS57278. When return is hit, the CIE enabled message should appear, informing the user that the IEEE software is now active. If this does not occur, check all previous steps and insure that all have been done properly.

Once the IEEE Interface is enabled, it will remain enabled until one of the following occurs: A power off, a "RESTORE" is issued (RUN/STOP and RESTORE keys), a 6502 BRK command, or an exit command.

The exit (disable) for the IEEE Interface is: SYS64789.

Expansion: For the user's advantage, we have provided an extension of the expansion connector on the IEEE Interface board, so the interface can be used with another cartridge without the use of a mother board, etc.

Specs: There are approximately 1024 bytes of software that are downloaded from the Telesys IEEE Interface to the 64's RAM at locations 39936-40959 (\$9c00-\$9fff hex). Also, the I/O slots at 56832 (\$de00) and 57088 (\$df00) are used.

The pin-out on the IEEE connector is as follows:

1 - Data 0	5 - EOI	9 - IPC	A - Data 4	E - Gnd	K - Gnd
2 - Data 1	6 - DAV	10 - SRQ(NI)	B - Data 5	F - Gnd	L - Gnd
3 - Data 2	7 - NRFD	11 - ATN	C - Data 6	H - Gnd	M - Gnd
4 - Data 3	8 - NDAC	12 - Gnd	D - Data 7	J - Gnd	N - Gnd

Note: All signals are TTL compatible active low and low level output current capability is 48 ma. It is recommended that no more than five computers be connected to a device.

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PROGRAMMER'S NOTE #1 FOR THE
TELESYS IEEE INTERFACE

When the IEEE Interface is enabled, it downloads itself into RAM at addresses 39936-40959 (\$9C00-\$9FFF). Some programs written for the C64 use some of this area for certain things, so we have created a relocate program to move the IEEE Interface once it has been downloaded. Two programs are provided, one to relocate to one area, and one to relocate to another area.

Type the program(s) into the computer exactly as shown below. Before executing the program, save it to a media device for future retrieval.

To use one of the programs -- first, if you are using a serial disk, load the relocate program. Now enable the IEEE Interface (SYS57278). If you are using an IEEE disk, load the program now. Execute the program (RUN). After approximately 25 seconds, the computer will respond with the "CIE ENABLED" message. The program has been moved to the other area and the space it occupied is now available to the computer.

Note: These programs should be executed only when the machine has just been turned on or a reset has occurred. The program will remain in the new area until a reset or power-down occurs.

The following program relocates the IEEE Interface code to addresses 52224-53247 (\$CC00-\$CFFF). When the code has been relocated, the new address to enable the IEEE Interface is "SYS52281" and the disable remains the same as before (SYS64789).

```
10 DATA 11,43,47,87,145,210,280,321,396,401,410,0
20 READB:FORI=39936TO40893:A=PEEK(I)
30 IFA<1560RA>159THEN60
40 IFI=B+4E4THENREADB:GOTO60
50 A=A+48
60 POKEI+12288,A:NEXT
70 SYS52281
80 POKE55,0:POKE56,160:POKE643,0:POKE644,160:NEW
```

The following program relocates the IEEE Interface code to addresses 31744-32767 (\$7C00-\$7FFF). When the code has been relocated, the new address to enable the IEEE Interface is "SYS31801" and the disable remains the same as before (SYS64789).

```
10 DATA 11,43,47,87,145,210,280,321,396,401,410,0
20 READB:FORI=39936TO40893:A=PEEK(I)
30 IFA\560RA>159THEN60
40 IFI=B+4E4THENREADB:GOTO60
50 A=A-32
60 POKEI-8192,A:NEXT
70 SYS31801
80 POKE55,0:POKE56,124:POKE643,0:POKE644,124:NEW
```

**PROGRAMMER'S NOTE #2 FOR THE
TELESYS IEEE INTERFACE**

(Using Serial and IEEE Devices Simultaneously)

The Telesys IEEE Interface is designed to interface a Commodore 64 to IEEE-488 devices. Since many users want to use a serial device and an IEEE device at the same time, we have created this program to allow the user to select which device numbers he/she wants to use for the IEEE bus.

Type the program shown below into your unit exactly as shown below. Before executing the program, save it to a disk or tape for future retrieval.

Once the program is loaded into the machine, just type RUN and press the RETURN key. After a few seconds, the computer will respond with the "CIE ENABLED" message and the question: "FIRST DEVICE?". Answer the question by entering the device number of the active IEEE device you want to use (usually "4" for a printer such as the 4022 and "8" for a disk drive such as the 4040, 8050, or 2031). The computer will then ask: "SECOND DEVICE?". If you have two active IEEE devices you wish to use, answer this question like the first question. If you have only one IEEE device, respond to this with "255".

This program allows the user to modify the IEEE Interface code to selectively access one of two IEEE devices. All other device numbers in the 4-31 range will be treated as serial devices. Once this IEEE Interface code has been modified, it will stay modified until the computer is reset or a power-down occurs.

IMPORTANT: The IEEE Interface code produced here can be relocated by the relocate programs in the "Programmer's Note #1 for the IEEE Interface. However, one change is required; the "40893" in line 20 of either program must be changed to "40922" and the IEEE Interface Select must be executed before the IEEE Interface Relocate.

```
10 DATA40894,165,186,205,206,159,240,7,205,207,159,240,2,24,96,56,
96,255,255
20 DATA 165,153,56,176,235,165,154,56,176,230,-1
30 DATA 39952,32,190,159,234,-1
40 DATA 40871,32,213,159,234,-1
50 DATA 40880,32,208,159,234,-1
60 DATA 40834,32,208,159,234,-1
70 DATA 40854,32,213,159,234,-1
80 DATA 40825,32,208,159,234,-1,-1
100 SYS64789:REM DISABLE CIE
110 READA:IFA=-1THENSYS39993:GOTO200
120 READB:IFB=-1THEN110
130 POKEA,B:A=A+1:GOTO120
200 INPUT"FIRST DEVICE";A:POKE40910,A
210 INPUT"OTHER DEVICE (255 FOR NONE)";A:POKE40911,A
```

Note: Due to the increasing demand for the information provided in "Programmer's Note #2", the note was released early. This information was used only in two test situations and is believed to be correct. However, should you encounter a problem with the program itself, please bring it to the attention of the Engineering staff at Telesys. Immediate action will be taken to resolve any problems and we will continue to test this code ourselves. Telesys is currently upgrading all of our documentation and instruction sheets. If you are having difficulty with any of our products, please write and be sure to include a telephone number where you can be reached during the day.