

TRS-80 Line Printer II Interface Cable

Catalog Number 26-1416

Radio Shack
**TRS-80
MICRO
COMPUTER
SYSTEM**

HARDWARE



CUSTOM MANUFACTURED BY RADIO SHACK



A DIVISION OF TANDY CORPORATION

Introduction

This Interface Cable will allow you to connect a Radio Shack Line Printer II to your LEVEL II TRS-80 without an Expansion Interface. The Interface Cable actually contains a portion of the same circuitry that's in the Expansion Interface – just enough to provide for Printer connection.

The Interface Cable supplies 8-bit ASCII data in parallel format (that is, all eight bits are output at once). In addition, the Interface signals the Printer when it has a character to be printed, and provides the TRS-80 with Printer status signals (BUSY, OUT OF PAPER, etc.).

You can also use the Interface Cable with certain other printers; with a LEVEL I TRS-80; and with an external device of your choice and design; see **Special Applications** below.

Note: The Interface Cable actually consists of two cables. If you add an Expansion Interface to your system, you can use the longer of these two cables to connect your Printer directly to the Printer card-edge on the Expansion Interface. A locator key, or guide pin, has been inserted between pins 36 and 38 inside the card-edge connector to help you make this connection.

Device Specifications

Input Mode Memory-mapped to hex address 37E8

Inputs

From Computer 8-bit data bus
 16-bit address bus
 1 Read Enable, active low
 1 Write Enable, active low

From Printer BUSY, active low
 OUT OF PAPER, active low
 SELECT, active high
 FAULT, active high
 Regulated 5 VDC $\pm 5\%$,
 80 mA maximum
 GND, power return

Outputs

To Computer 4-bit status code multiplexed to data bus:
 BUSY applied during Read Enable to bit
 7 (MSB)
 OUT OF PAPER applied during Read
 Enable to bit 6
 SELECT during Read Enable to Bit 5
 FAULT applied during Read Enable to
 bit 4

To Printer 8-bit parallel ASCII (latched)
 Strobe, active low, $1.5 \mu\text{S} \pm 10\%$

Connection

1. Both the TRS-80 and the Printer should be turned OFF.
2. Remove the Expansion Port door from the rear of the TRS-80, to expose the 40-pin "card-edge".
3. The Expansion Interface cable actually consists of two cables:
 - A) A shorter one which contains the interface circuitry
 - B) A longer one which simply extends the cable for your convenience.

Mate the card-edge connector on the short cable to the TRS-80 card-edge, making sure the cable exits from the **bottom** of the connector. See Figure 1.

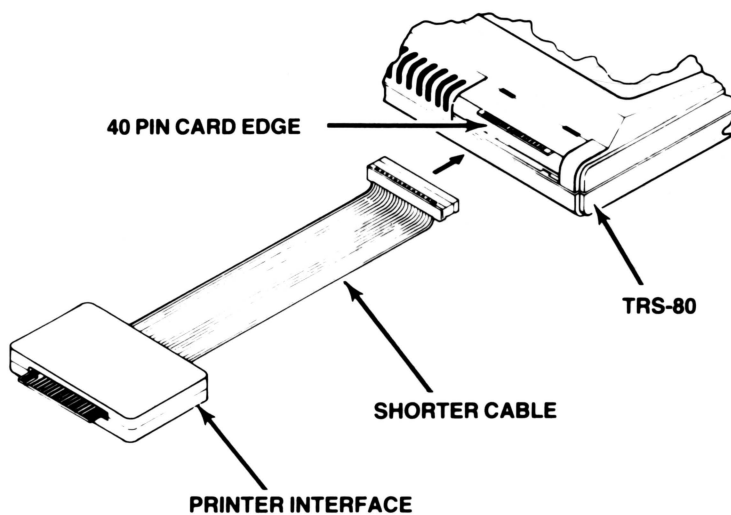


Figure 1. Connect the shorter cable to the TRS-80 Card-Edge.

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4. Notice the card-edge that exits from the black Interface case. Connect the card-edge plug on the longer cable to this card-edge, again making sure the cable exits from the bottom of the connector. See Figure 2.

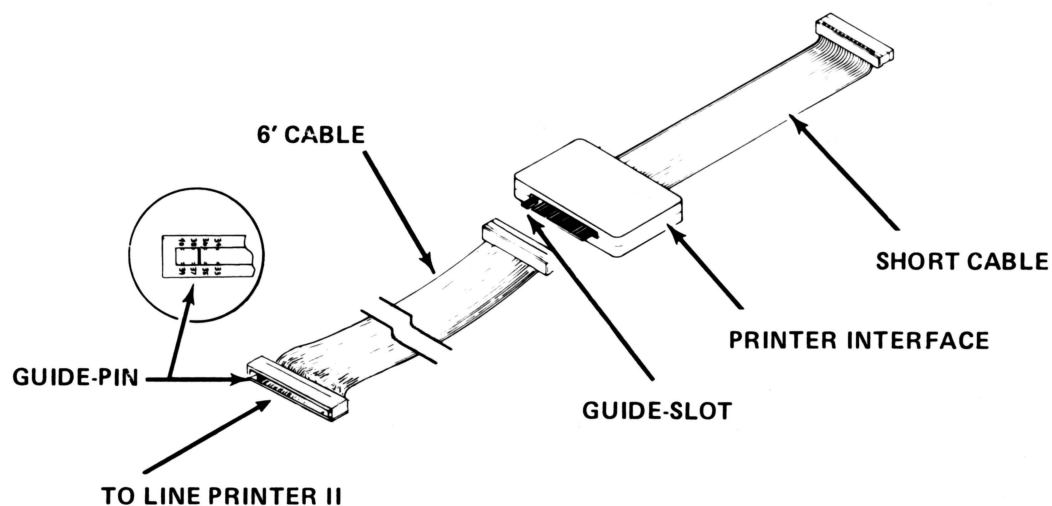


Figure 2. Connect the longer cable to the black Interface case.

Note: There is a guide-pin inside the connector (between pins 36 and 38) to help you make the connection properly. If you have problems, try again more carefully – the guide-pin is easily damaged – and be sure to line up the guide-pin with the guide-slot in the card edge.

5. Connect the other end of the longer cable to your Printer. Again, make sure that the cable exits from the **bottom** of the connector (As in Figure 1).

Notes on Using the Interface Cable

Once the Printer is connected via the Interface Cable, you can follow the operating instructions provided with your Printer and in the LEVEL II Reference Manual. In addition, you should **always** follow the special precautions listed below.

Power-on sequence

Always turn on the Printer first, then the TRS-80. If the TRS-80 does not function normally (keyboard “dead”, improper display, etc.), refer to **If You Have Problems**, later on.

Turning off the Printer

Because it is now connected directly to the TRS-80, turning the Printer on or off may cause the Computer to “lock up” – the keyboard may appear dead, the Computer may lose any BASIC program in memory, etc. Therefore **do not turn off the Printer** until you are through using the Computer.

For a similar reason, do not disconnect the Interface Cable while the Computer is on.

If you want to use the Computer but not the Printer, disconnect the Interface Cable before you turn on the Computer.

Special Applications

I. Connection to a LEVEL I TRS-80

By connecting this Interface Cable to a LEVEL I TRS-80 exactly as described above, you can use any of the line printers suggested in this manual. However, since LEVEL I BASIC does not include an LPRINT statement, you will not be able to output to the Printer from LEVEL I BASIC.

Instead, you will have to write and load a machine-language program which includes a line-printer output routine similar to the following:

```
      ; THIS SUBROUTINE IS A TYPICAL
      ; LINE PRINTER DRIVER
      ; LOAD ASCII CHAR. INTO REG. C, THEN CALL PRTDVR
PRTDVR LD      A, (37E8H)      ; GET PRINTER STATUS
      AND      0F0H          ; MASK UNUSED BITS
      CP       30H           ; CHECK STATUS
      JR       Z, PRTDVR     ; BUSY? THEN CHECK AGAIN
      LD       A, C          ; ELSE GET CHAR
      LD       (37E8H), A    ; OUTPUT CHAR TO LP PORT
      RET                      ; RETURN TO MAIN PROG.
```

Note: To write such a program requires experience in machine-language programming and familiarity with the Z-80 instruction set. After you have written the machine-language program, you'll need to put it on tape with Radio Shack's TBUG (26-2001) or Editor-Assembler (26-2002).

II. Use with Other Printers

There are other printers you can use with the TRS-80 via this Interface Cable. In general, the Printer must:

1. Be equipped with a female 40-pin card edge to mate with the Printer connector on the Interface Cable.
2. Supply regulated 5 VDC ($\pm 5\%$) to the Interface Cable, 80 mA maximum.
3. Accept 7 or 8-bit ASCII data in parallel format. You can even use a serial-type Printer if you supply the external logic to convert the Interface Cable's parallel output to serial format (typically RS-232C).
4. Supply the Computer with the following status signal:

BUSY (low = not busy – okay to send; high = busy – do not send)

Note: The other Printer status signals are optional, as follows:

OUT OF PAPER – If the Printer does not provide this signal, simply ground this input to System Common (see Schematic Diagram for pin location). Not necessary for use with Line Printer II.

SELECT AND FAULT – If the Printer does not supply these signals, external resistors in the Interface will automatically pull these inputs high, to allow normal output to the Printer.

Special Notice

The specifications listed above will help you determine whether you can use the Interface Cable with a non-Radio Shack line printer of your choice. However, Radio Shack *does not and will not* promise the success of any such application. The Line Printer II Interface Cable is primarily designed for use with Radio Shack Line Printers.

III. Use as an Input/Output Port

The Interface Cable can be used to activate relays, input data from external devices, etc., with the following limitations:

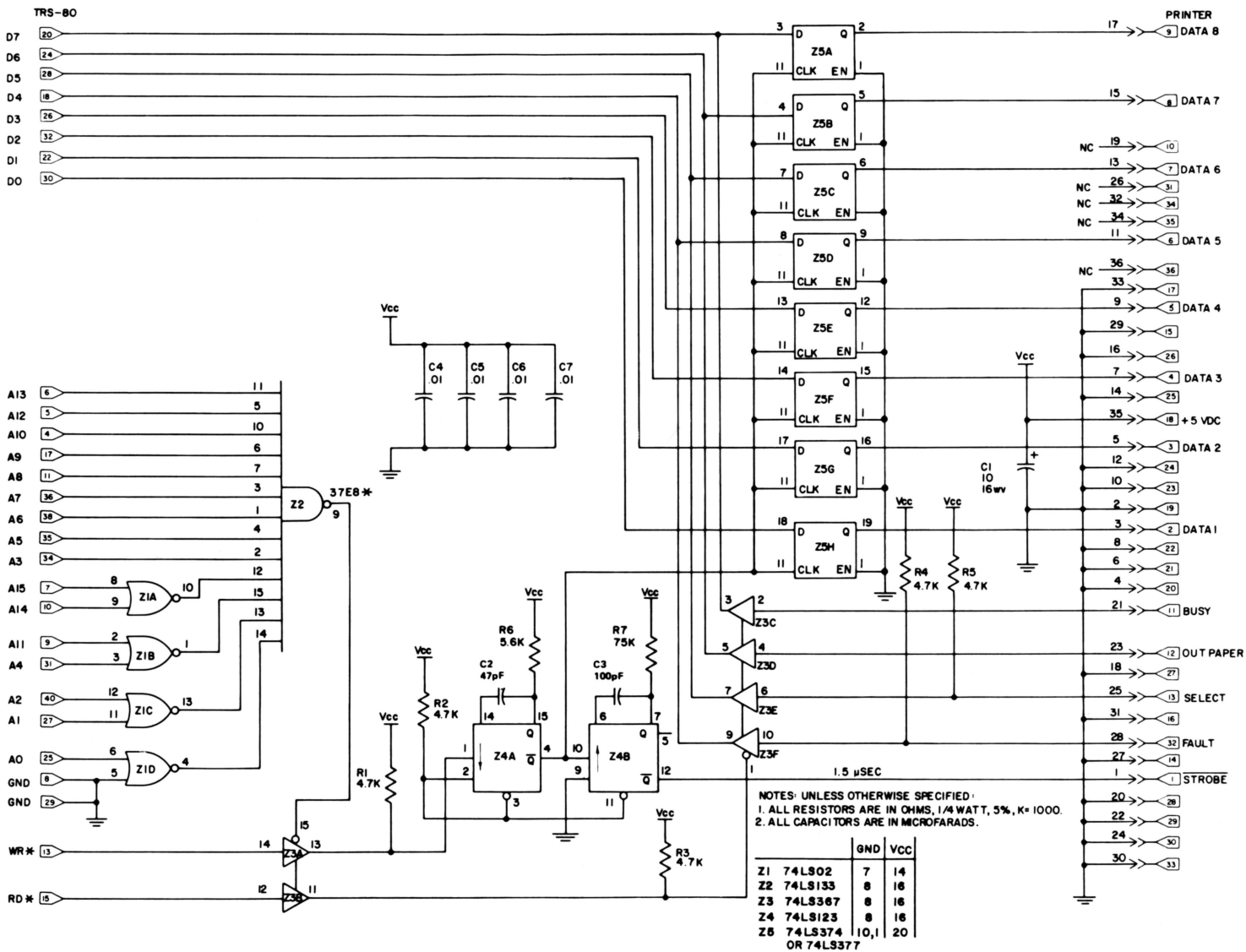
1. **Do not attempt such a custom application unless you have the necessary background in digital electronics.** In particular, if the external device uses or switches any electrical current other than +5 VDC, an error in your wiring or design could easily damage the Computer.
2. The external device must supply the correct, regulated power to the Interface (see **Device Specifications**)
3. The external device must buffer any relays you connect – the output latches cannot activate most relays.
4. The Interface can only input 4 bits at once, since bits 0-3 are not usable as inputs.
5. You must provide the necessary software (either BASIC or machine-language) to control the input/output function.

If You Have Problems . . .

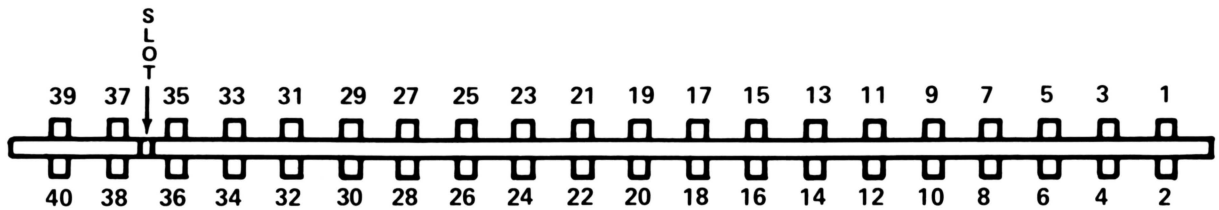
We hope you don't . . . but just in case . . . see if you can solve them by using the table below. If you can't, then try to determine which component in your system is at fault, and bring it in to your local Radio Shack for repair. We'll have it back ASAP!

Problem	Probable Cause/Solution
TRS-80 won't operate or operates abnormally.	Power off. Check all TRS-80 and Printer Switches, then repeat the Power-Up Sequence described previously. TRS-80 connector upside-down – turn off the entire system and connect the Interface Cable according to Connections, above. Power-up again.
TRS-80 okay, but will not line print.	Printer off or not ready. Check Printer power switch, On-Line Switch, and other causes for not-ready condition.

Schematic Diagram



Pin-Outs of Printer Interface Card-Edge



Cable Card Edge Connector Pin #	Printer Card Edge Connector Pin #	Function of Pin	Cable Card Edge Connector Pin #	Printer Card Edge Connector Pin #	Function of Pin
1	1	Strobe	21	11	Busy
2	19	Gnd	22	29	Gnd
3	2	DATA 1	23	12	Out of Paper
4	20	Gnd	24	30	Gnd
5	3	DATA 2	25	13	Select
6	21	Gnd	26	31	NC
7	4	DATA 3	27	14	Gnd
8	22	Gnd	28	32	Fault
9	5	DATA 4	29	15	Gnd
10	23	Gnd	30	33	Gnd
11	6	DATA 5	31	16	Gnd
12	24	Gnd	32	34	NC
13	7	DATA 6	33	17	Gnd
14	25	Gnd	34	35	NC
15	8	DATA 7	35	18	+5.0 Volts
16	26	Gnd	36	36	NC
17	9	DATA 8	37	Not Used	NC
18	27	Gnd	38	Not Used	NC
19	10	NC	39	Not Used	NC
20	28	Gnd	40	Not Used	NC

LIMITED WARRANTY

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