

Radio Shack

TRS-80

**SCREEN
PRINTER**

Catalog Number 26-1151

Operator's Manual

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The TRS-80 Screen Printer consists of a rotary printer, built-in power supply and a 36" (91 cm) interconnect cable. It also contains a power-ON/OFF switch, power-ON indicator, a fuse and a PRINT command switch. The upper half of the case may be raised for access to the rotary printer for paper replacement. The front has a removable panel for access to the print head. This Screen Printer will connect to any TRS-80 Computer and print-out whatever information is displayed on the Video Display screen.

SPECIFICATIONS:

Power Input	120VAC, 60Hz
Power Consumption at 120VAC	60 Watts (Printing) 10 Watts (Standby)
Printing Rate	2,200 characters/second
Drive-unit Lifetime	500,000 screen printouts
Print-head Lifetime	5,000 screen printouts

CONNECTIONS

NOTE: The word "UP" is printed on the cable connectors to provide correct orientation.

All TRS-80 devices should be OFF while you connect the Screen Printer. Install the interconnect cable between the Screen Printer and the TRS-80 Computer expansion connector that is located under the removable cover. If, however, you have a TRS-80 Expansion Interface unit, you must connect the interconnect cable from the Screen Printer to the Expansion Interface (refer to the Expansion Interface Operator's Manual).

Connect the AC power cord to any standard 120 VAC outlet.

OPERATION

Apply power to the Screen Printer, Computer and Video Display (and, if it is in the system, the Expansion Interface). To get a hard copy of a program, load it into the Computer via a tape cassette, keyboard or Mini-Disk. Display the desired information on the Video Display screen and press the PRINT switch on the Screen Printer. The Printer will then print-out all of the information as it appears on the Video Display screen. For operation when using Level II, refer to USING IN A SYSTEM ENVIRONMENT, below.

NOTE: To avoid malfunctions in computer programs, the power-ON/OFF switch should remain "ON" whenever the Printer is connected to the Computer or to the Expansion Interface.

USING IN A SYSTEM ENVIRONMENT

The Printer employs a unique direct memory access interface technique which is essentially transparent to the TRS-80. Printing may be initiated by one of two methods: by depressing the PRINT switch on the front panel of the Screen Printer or by a special software command in Level II

BASIC. OUT 254, A is the command in Level II. The current value is not important, and in fact, any legal variable name could be used. Initiating a print cycle by either of the above methods begins a series of direct memory accesses of the TRS-80 video memory by the Screen Printer. The Printer gains control of the TRS-80 bus by forcing the Z-80 processor to execute wait cycles and by pulling low the TEST line on the TRS-80 bus. The Printer addresses each location in the video memory and reads the actual data stored.

A certain amount of caution should be exercised by the user when attempting a screen print, due to the nature of the interface technique. A screen print should be avoided when the processor is involved in any operation that is timing dependent. (i.e., Cassette saves and loads, disk operations, etc.). The wait cycles forced by the Printer on each direct memory access will upset any critical timing loops that the processor is executing.

The Printer interface employs a decoding scheme which will not allow the Printer to access the TRS-80 video memory unless the processor is executing in the ROM address space. This was done to increase system reliability by avoiding timing problems associated with the dynamic RAMs used in the TRS-80. This presents no problem to users who run only BASIC programs. If the user wishes to print while executing a machine level program residing in R/W memory, a special technique is required. The programmer can repeatedly call one of the utility subroutines residing in the BASIC ROMs. This allows the Printer to gain control of the bus and access the video memory for the print data. Below is a short Z-80 assembly language program that can be used to get around the problem:

ASSEMBLY LANGUAGE SCREEN PRINT ROUTINE (LEVEL I)

```

10          PUSH AF          ; Save Registers
20          PUSH BC
30          LD B, 00H
40          LD C, 00H
50          OUT (FEH), A    ; Initiate Screen Print
60 PAUSE    CALL 0B40H      ; Call key Scan Routine
70          DEC BC
80          LD A, B
90          OR C             ; Test for Zero
100         JP NZ, PAUSE    ; Loop till Zero
110         POP BC          ; Restore Registers
120         POP AF
130         RET             ; Return from Subroutine

```

For Level II ROMs, change the call address at PAUSE (line 60) to 002BH and, in line 30, load B with 08H instead of 00H.

SCREEN PRINT ROUTINE FOR DISK BASIC

In DISK BASIC, the following routine should always be used for initiating a screen print. If you don't use such a routine, your print-out may contain randomly placed @ symbols, etc.

```
1000      CMD"T" : OUT254, 255
1010      LINE INPUT SP$ : CMD"R"
1020      RETURN
```

CMD"T" turns off the clock
OUT254, 255 causes the print
LINE INPUT is used because it does not print a
"?" on the screen so, after the print
is completed, the user presses
ENTER. The clock is restored and
execution continues.

HEAD ADJUSTMENT PROCEDURE

All printers are given an operational test before leaving the factory. Only minor adjustments should be required and it is not necessary to remove the print head from its housing to make any preliminary centering adjustments. Before you start this procedure, see Figure 1. It shows the end view of the print head with the adjusting screws.

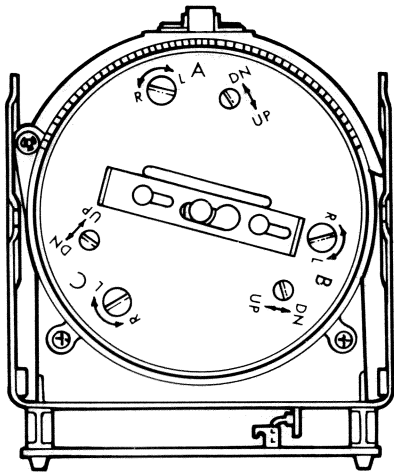


FIGURE 1. PRINT HEAD (END VIEW)

CHECKOUT PROGRAM (LEVEL I OR LEVEL II ONLY)

```
5      CLS
10     FOR I = 1 TO 10
20     PRINT "ABCABCABC"
30     NEXT I
```

Run the program above then press PRINT on the Screen Printer. Now check the print-out. Look at the vertical align-

ment of the characters in each line. Observing the first three characters in the line, determine if one of the three is out of alignment with the other two. Should the first character be either higher or lower than the second or third, locate the adjustment screw at stylus "A" that is marked "DN ↔ UP". Turn this screw counterclockwise 1/4 turn to remove tension on the head. Now, by bringing the blade of the screwdriver to bear on the side of the screw head, you can move the stylus assembly in the desired direction. Now tighten the screw to hold the stylus assembly in place.

Apply power and recheck the character alignment. If further adjustment is required, repeat the procedure. Should the second character be out of alignment with the first and third, go through similar adjustment procedures at stylus B. Likewise, to bring the third character into alignment with the first and second, make an adjustment at stylus C. Refer to Figure 2 for typical situations and alignment procedures.

When required vertical adjustments have been made, pay attention to the spacing between columns A and B, B and C and C and A. The spaces between columns should be nearly equal. If not, equalize the spacing by making adjustments with "R ↔ L" screws associated with each stylus. See Figure 3 for adjustments to make in typical situations.

Stylus A	Stylus B	Stylus C	Stylus A	
A	B	C	A	Normal alignment
A	—	C	A	Irregular alignment (Move stylus "A" down)
A	—	C	A	Irregular alignment (Move stylus "B" up)
A	B	—	A	Irregular alignment (Move stylus "C" down)

FIGURE 2. VERTICAL CHARACTER ALIGNMENT

Stylus A	Stylus B	Stylus C	Stylus A	
A	B	C	A	Normal spacing
AB		C	A	Unequal spacing (Move stylus "B" to the right)
A	BC		A	Unequal spacing (Move stylus "C" to the right)
A	B	C	A	Unequal spacing (Move stylus "A" to the left)

FIGURE 3. HORIZONTAL CHARACTER ALIGNMENT

PAPER LOADING (See Figure 4)

A red stripe on the paper indicates that the end of the roll is approaching and that the roll should be replaced. You can buy new rolls of paper through your local Radio Shack store.

To replace the roll of paper, perform the following steps:

1. Raise the upper half of the case.
2. Release the snap-down paper-guide cover (A) by pulling outward on the cover latch.
3. Remove the spindle from the slots (B). Discard the empty spool and replace it with a new roll of paper.
4. Insert the spindle in slots (B). Position the roll so that the paper rolls off of the spool at the bottom and toward the rear.
5. Route the paper, **coated side down**, over the top spindle (C).
6. Fold the paper to form a pointed edge (D).
7. Insert the pointed edge through the writing platen and pull the paper through until the entire folded section has passed the cutting edge on the platen (E).
8. Align the edge of the paper with the paper guide (F).
9. Close the snap-down paper-guide (G).
10. Hold the end of the paper and press it firmly against the cutting edge. With an upward motion, tear off the excess paper.
11. Close the top half of the case.

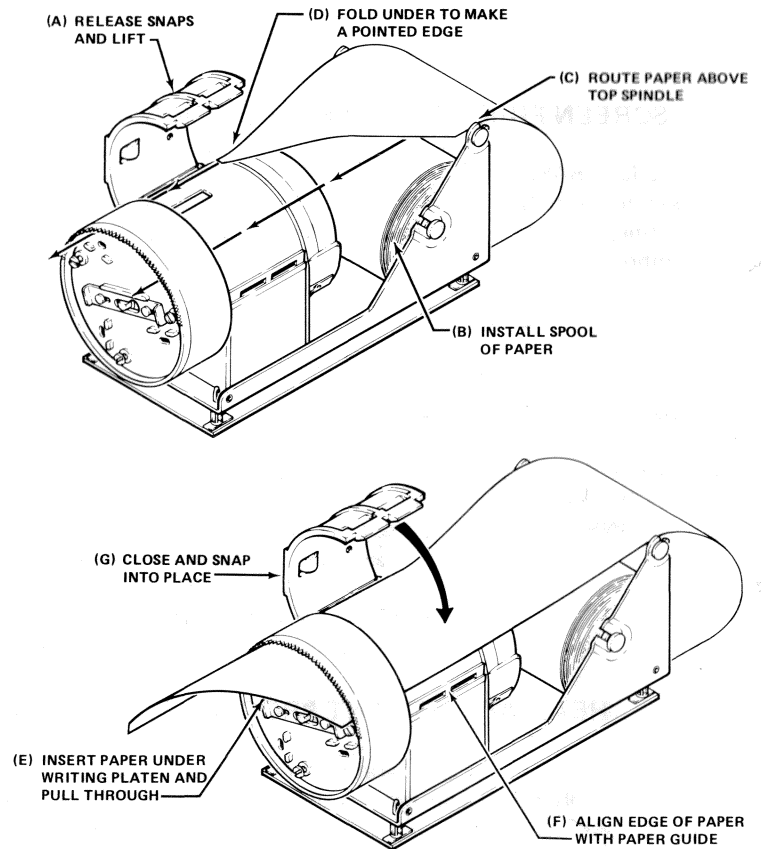


FIGURE 4. PAPER LOADING

CLEANING PROCEDURE

After printing 10 or more rolls of paper, a small amount of dust will accumulate under the print head assembly. At this time, the front plate of the housing should be removed and the dust cleaned out with a small brush or with alcohol saturated pads.

LIMITED WARRANTY

Radio Shack warrants for a period of 90 days from the date of delivery to customer that the computer hardware described herein shall be free from defects in material and workmanship under normal use and service. This warranty shall be void if the computer case or cabinet is opened or if the unit is altered or modified. During this period, if a defect should occur, the product must be returned to a Radio Shack store or dealer for repair. Customer's sole and exclusive remedy in the event of defect is expressly limited to the correction of the defect by adjustment, repair or replacement at Radio Shack's election and sole expense, except there shall be no obligation to replace or repair items which by their nature are expendable. No representation or other affirmation of fact, including but not limited to statements regarding capacity, suitability for use, or performance of the equipment, shall be or be deemed to be a warranty or representation by Radio Shack, for any purpose, nor give rise to any liability or obligation of Radio Shack whatsoever.

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