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*2100 series computers*



***HP 2762A***  
***terminal printer***  
***diagnostic***

*HP Product No. 24311A*

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# ***Printing History***

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# ***HP 2762A Terminal Printer Diagnostic***

The HP 2762A Terminal Printer Diagnostic tests the printer and keyboard functions of the HP 2762A terminal printer. It is one of the 2100 series computer system diagnostics executed in conjunction with the HP 2100 Series Diagnostic Configurator. Operator communication is provided through the Terminal Printer under test, through the computer Memory Data Register (MDR), and optionally through the auxiliary peripheral printer or teleprinter.

## **GENERAL ENVIRONMENT**

The general hardware and software environments and system configuration procedures are described in the *HP 2100 Series Diagnostic Configurator* manual (02100-90157).

### **Hardware Requirement**

Special system hardware required to run the test are:

- 2762A Terminal Printer
- 12531D Interface Kit

### **Software Requirement**

The required software consists of the Binary Loader and the following binary object tapes:

- HP 2762A Terminal Printer Diagnostic (Product No. 24311)
- HP 2100 Series Diagnostic Configurator (Product No. 24296)



# *Operating Procedures*

Operating procedures are divided into three parts: Preparation for Diagnostic Run, Running the Diagnostic, and Diagnostic Messages and Halts.

## **PREPARATION FOR DIAGNOSTIC RUN**

Before the tests can be initiated, the user performs the following actions:

- Load the Diagnostic Configurator
- Configure to available system hardware
- Dump the configuration for later use (optional)
- Load the diagnostic
- Place 2762A Terminal Printer in test ready status



### **Loading**

Using the Binary Loader, load the HP 2100 Series Diagnostic Configurator. The Diagnostic Configurator and this diagnostic fit into 4K of memory. Perform the configuration procedure (see "Configuring," below) before loading diagnostic. Then load the HP 2762A Terminal Printer Diagnostic, using the Binary Loader. Insure that proper diagnostic is loaded by checking memory location  $126_8$  for Diagnostic Serial Number =  $104005_8$ .

### **Configuring**

The 2100 Series Diagnostic Configurator receives the input definitions of computer and I/O parameters required by 2100 series diagnostics. The six groups of parameters are:

- Computer Type and Options
- Fast Input Device
- Fast Output Device



- Slow Output Device
- Slow Input Device
- Computer Memory Size and Type

Procedures for inputting these system hardware parameters are found in the *HP 2100 Series Diagnostic Configurator* manual under "CONFIGURING." The user must be familiar with this manual so that he understands the parameter requirements.

**COMPUTER TYPE AND OPTIONS.** At the back of the Diagnostic Configurator manual is a **PRODUCT APPLICABILITY** sheet, which describes which computers are compatible with this diagnostic. The Configurator requires that the user determine his computer type and the standard and optional hardware features installed. These parameters must be entered via the Diagnostic Configurator.

**FAST INPUT DEVICE.** This parameter is *not required* by the 2762A Terminal Printer Diagnostic. A *zero* is the parameter input value.

**FAST OUTPUT DEVICE.** Configuration of a fast output device is *optional*. The user may configure a line printer, a teletype, a CRT display terminal or a 2762A Terminal Printer.

**SLOW INPUT DEVICE.** This parameter is *not required* by the 2762A Terminal Printer Diagnostic. A *zero* is the parameter input value.

**SLOW OUTPUT DEVICE.** This parameter is *required* by the 2762A Terminal Printer Diagnostic. Operator communication messages are output from the diagnostic to this device. This device should be an auxiliary output device that is not a 2762A Terminal Printer being tested. This relieves the user of having to isolate diagnostic operator communication messages from diagnostic test output. If no such auxiliary device is available, then configure the 2762A Terminal Printer under Test for Slow Output Device.

**COMPUTER MEMORY SIZE AND TYPE.** These parameters are *required* by the 2762A Terminal Printer Diagnostic. They vary from one 2100 Series computer installation to the other. The user must determine the parameters for his installation and configure accordingly.

## Dumping

Using procedures described in Diagnostic Configurator manual, dump memory onto paper tape so that the above configuration procedures need not be repeated. The dumped paper tape is loaded via the Binary Loader.

## Making 2762A Terminal Printer Ready

Perform the following actions to make terminal ready for test.

- a. Set POWER switch ON.
- b. Set LINE SPACE switch to 1.
- c. Set ALL CAPS switch to OFF.
- d. Set the AUTO LF switch to OFF.
- e. Set HALF/FULL DUPLEX switch to FULL.
- f. If INTERRUPT switch is lit, press it to extinguish light.
- g. Press ON-LINE button insuring that the ON-LINE and READY lights come on.

## RUNNING THE DIAGNOSTIC

The switch register specifies the 2762A Terminal Printer used and the set of execution options selected. These parameters are set up in stages before execution of the diagnostic is initiated. If the user wants a subset of the tests or to suppress the diagnostic header message, he specifies this by setting switch 9. A HALT then follows program start up. He then sets bits in the A-register such that bit  $i$  set, causes test  $i$  to be executed (e.g., bit 3 set specifies test 3 is to be run). Bit 0 of A-register must be set if the diagnostic header message is to be printed. Following the A-register setting, the operator presses RUN. The diagnostic then executes the selected tests in the manner specified in the switch register.

Note that during the running of tests 11 and 14, CONTROL *lower case s* is used to terminate operator input. In the case where the keyboard is not functioning well enough, switch register bit 2 may be set and cleared to terminate input as a backup.

## Starting Up

### a. *Input Terminal Printer Select Code and Options*

ACTION	EXPLANATORY INFORMATION
Set P-register to $100_8$ .	Program Address to start.
Set switch register bits according to functions specified in Table 1.	Specify select code and features of 2762A to be tested.
Press RUN.	

*Result:* HALT with  $MDR = 107076_8$ .

### b. *Establish Execution Options*

ACTION	EXPLANATORY INFORMATION
Set switch register to diagnostics options required according to format in Table 2.	Table 2 shows options. Note that if switch register 9 is not set at the time of program start up, all tests are executed. Section c may then be skipped.
Press RUN.	

*Result:* Diagnostic execution is started unless switch register bit 9 was set. In that event, HALT with  $MDR = 107077_8$  occurs.

### c. *Procedure From $107077_8$ HALT*

ACTION	EXPLANATORY INFORMATION
Select tests to be run by setting corresponding bits in A-register; A-register bit $i$ set, indicates test $i$ to be run. Set bit 0 if the diagnostic header message is to be printed.	For example, if user sets bits 0, 1, 2, 5 and 7 in A-register, tests 1, 2, 5 and 7 will be run, and header message will be printed. If A-register is left clear, all tests are run, and header message is printed.
Press RUN.	Reselection of tests may be performed at anytime during diagnostic execution. User simply sets bit 9 of switch register. At end of current test, HALT $107077_8$ will occur and this procedure (c.) is followed.

*Result:* Diagnostic execution proceeds with selected tests.

**Table 1. 2762A Select Code and Options**

Switch-register Bits	Function
0	} Select Code of 2762A to be tested
1	
2	
3	
4	
5	
6	If set, 150 BAUD; if clear, 300 BAUD
7	Reserved
8	Reserved
9	If set, 118 print positions; if clear, 75 print positions
10	If set, Vertical Tab and Form Feed option
11	If set, Horizontal Tabbing option
12	Reserved
13	Reserved
14	Reserved
15	Reserved

**Table 2. Diagnostic Switch Register Options**

Bit	Function If Set
0	Read switch register bits 1 through 15 and store in internal switch register
1	Reserved
2	Abort input to tests 11 and 14 by setting, then clearing; this switch is used as a backup for terminating input in the case where keyboard is not functioning; equivalent to CONTROL S.
3	Reserved
4	Reserved
5	Reserved
6	Reserved
7	Reserved
8	Device configured as fast output device receives operator messages; not set means device configured as slow device receives operator message
9	Abort current diagnostic execution and perform HALT with MDR = 107077 <sub>8</sub> ; user specifies new group of tests in A-register, then presses RUN
10	Suppress non-error messages
11	Suppress error messages
12	Repeat all selected tests after diagnostic run is complete without HALT
13	Repeat last test executed (loop)
14	Suppress error HALTS
15	HALT at end of each numbered test; MDR = 102076 <sub>8</sub> ; A-register = test number.

## Diagnostic Execution

Tests are divided into two groups: Basic I/O tests, 1-7, and Peripheral tests, 8-15. Appropriate error messages are printed for software detected hardware test failures.

### a. Execution of Basic I/O

ACTION	EXPLANATORY INFORMATION
Initiate diagnostic execution via Starting Up procedures, above.	

*Result:* The message  
PRESS PRESET (EXTERNAL AND INTERNAL)  
is printed  
HALT with MDR = 102000<sub>g</sub> occurs.

ACTION	EXPLANATORY INFORMATION
Press PRESET (External and Internal, if applicable). Press RUN.	Restart execution

*Result:* Basic I/O test is completed. The message  
BASIC I/O COMP  
is printed. Execution of Peripheral tests begin immediately.

### b. Execution of Peripheral Tests

These tests should not be run until Terminal Printer passes all Basic I/O tests. Some of these tests require visual verification and some require manual intervention by user.

*Result:* Tests 8 and 9 execute automatically, if selected. If test 10 is selected, Printer Test output is made. Figure 1, included at back of manual, shows complete Printer Test printout. The line length is 75 or 118 characters, depending on which option is used.

ACTION	EXPLANATORY INFORMATION
Operator visually verifies that printout appears as shown in Figure 1.	Note that first two lines under heading "TYPE ALIGNMENT" in Figure 1 holds H's overprinted with I's. Operator should check these closely for type alignment.

*Result:* If test 11 is selected, three groups of characters are output a line at a time. The first group is labelled UNSHIFTED, the second SHIFTED, the third CONTROL.

### ACTION

Operator keys in the characters as they are prompted a line at a time. For the shifted group, the SHIFT key is input with every key. For the Control group, the CONTROL is input with every key.

### EXPLANATORY INFORMATION

This test verifies that pressing a key inputs the proper code to the diagnostic program.

*Result:* If character received by diagnostic is not equal to the one output by the diagnostic, the octal code of the keyed in character is printed out. If the character was received correct, a space is emitted. Verify codes using Table 3.

Following completion of the prompted key in test, the diagnostic accepts any keys.

### ACTION

Key in any characters terminating input with CONTROL *lower case s* (or switch register bit 2).

### EXPLANATORY INFORMATION

This part of the test may be continued for as long and as many characters as desired.

*Result:* The printed character or octal equivalent is echoed back to Terminal Printer for each key-in performed. Compare to Table 3, if necessary.

If test 12 was selected, it is next entered. If the message  
VT & FF OPTION NOT CONFIGURED  
TEST 12 ABORTED

is printed, then the Vertical Tab and Form Feed option was not specified with switch register bit 10 during "Starting Up" procedure. The diagnostic proceeds to the next selected test.

If test 12 was properly selected, the message

VT & FF TEST  
PUNCH VT & FF DISC  
INSTALL VTFF DISC AS DESCRIBED IN MOD  
TYPE CONTROL *s* TO SIGNAL READY

is printed.

## ACTION

Install VTFF disc that has the following characteristics:

- VT holes at lines 16, 33 and 49
- FF hole at line 66

When disc is installed, key in CONTROL *lower case s* to signal to diagnostic that it can proceed with test.

## EXPLANATORY INFORMATION

Refer to *Operating and Service Manual for the 2762A Terminal Printer (02762-90001)* for procedures covering preparation of VTFF disc.

*Result:* A form feed to top of form is executed. The message  
-REFERENCE  
is printed. A vertical tab is then performed and the message  
-16'th LINE, 6.7 CM FROM REFERENCE  
is printed. Another vertical tab is then performed and the message  
-33'rd LINE, 13.9 CM FROM REFERENCE  
is printed. Another vertical is performed and the message  
-49'th LINE, 20.6 CM FROM REFERENCE  
is printed. Finally, the message  
-TOP OF FORM, 27.8 CM FROM REFERENCE  
is printed.

## ACTION

Verify that distances indicated from reference line are correct.

## EXPLANATORY INFORMATION

6.7 cm = 2 and 2/3 inches  
13.9 cm = 5 and 1/2 inches  
20.6 cm = 8 and 1/8 inches  
27.8 cm = 11 inches

*Result:* If test 13 was selected, it is next entered. If the message  
HT OPTION NOT CONFIGURED  
TEST 13 ABORTED  
is printed, the Horizontal Tab option was not specified with switch register bit 11 during "Starting Up" procedure. The diagnostic proceeds to the next selected test.

If test 13 was properly selected, the horizontal tab test proceeds automatically.



### ACTION

Verify that four rows of X's are printed.

First row: X's in positions 2, 6, 10, etc.

Second row: X's at 3, 7, 11, etc.

Third row: X's at 4, 8, 12, etc.

Fourth row: X's at 5, 9, 13, etc.

Fifth row: Blank.

### EXPLANATORY INFORMATION

This pattern is the result of horizontal tabs being cleared, set, and executed, with each tab execution followed by X printed for each set of positions.

Note that fifth row must be blank. All Tab positions were cleared, a tab executed and X output. X should *not* print.

*Result:* If test 14 was selected, the message  
ECHO BACK TEST  
INPUT CHARACTER(S)  
TERMINATE INPUT WITH CONTROL s  
is printed.

### ACTION

Input any sequence of characters up to 256 in number terminated by CONTROL lower case s.

### EXPLANATORY INFORMATION

Input is automatically terminated at 256 characters, if no CONTROL s is input.

*Result:* The message  
NUMBER OF REPETITIONS?  
is printed.

### ACTION

Key in decimal number  $n$  from 1 to 99 followed by LINE FEED.

### EXPLANATORY INFORMATION

No leading zeros or characters other than numbers are to be input.

Exact characters input are repeated  $n$  times. RETURNS and LINE FEED should be inserted if the total echo back output exceeds the length of line. Otherwise, printer will lock at end of line.

*Result:* Invalid entry causes the message  
ILLEGAL INPUT!  
NUMBER OF REPETITIONS?  
to be printed. Recover by repeating decimal number entry.



Valid entry causes the message  
 $n$  REPETITIONS!

to be printed. The input character string is echoed back to terminal printed exactly as input  $n$  times.

#### ACTION

Verify that characters are printed exactly as entered for as many times as specified.

#### EXPLANATORY INFORMATION

If termination of Echo Back test is desired before normal completion, press INTERRUPT pushbutton just above 2762A keyboard.

*Result:* If test 15 is selected, it is next entered. If the message  
DMA NOT CONFIGURED  
is printed, the DMA option was not configured via the Diagnostic Configurator and the test is aborted.

If test was properly configured, the pattern  
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789  
is printed, if DMA cycle operated properly.

At end of complete run of diagnostic, the message  
PASS  $n$   
is printed where  $n$  is the current number of times continuous diagnostic cycle has been repeated. If switch 12 is set, test will repeat from beginning without HALT. Otherwise, the message  
DIAG COMP  
is printed indicating diagnostic run is completed. A HALT follows with MDR = 102077<sub>8</sub>; A-register holds tests selected for just-completed run. To restart diagnostic follow *Restart Procedure*, below.

#### c. *Restart Procedures*

- Restart from a 102077<sub>8</sub> HALT:

#### ACTION

Set A-register to the new selection of tests to be run, where A-register bit  $i$  set means test  $i$  is to be executed.

Press RUN.

#### EXPLANATORY INFORMATION

If A-register is cleared at this point, all tests will be executed.

*Result:* Diagnostic execution proceeds with new group of selected tests.

- Restart from any break in diagnostic execution:

**ACTION**

Set P-register to 2000<sub>g</sub>.

Set switch register to diagnostic options required according to format in Table 2.

**EXPLANATORY INFORMATION**

This procedure is essentially restarting at b. under "Starting Up" procedures, above.

Press RUN.

*Result:* Diagnostic execution proceeds under control of options specified.

- Restart from scratch by going back to "Starting Up" procedure, a., above.

Table 3. 2762A Character Set and ASCII Codes

7 Bit Code	Character	Key(s)	7 Bit Code	Character	Key(s)
000	NUL	CTL `	100	@	Shift `
001	SOH	CTL a	101	A	Shift a
002	STX	CTL b	102	B	Shift b
003	ETX	CTL c	103	C	Shift c
004	EOT	CTL d	104	D	Shift d
005	ENQ	CTL e	105	E	Shift e
006	ACK	CTL f	106	F	Shift f
007	BEL	CTL g	107	G	Shift g
010	BS	BS	110	H	Shift h
011	HT	HT	111	I	Shift i
012	LF	LF	112	J	Shift j
013	VT	VT	113	K	Shift k
014	FF	FF	114	L	Shift l
015	CR	RETURN	115	M	Shift m
016	SO	CTL n	116	N	Shift n
017	SI	CTL o	117	O	Shift o
020	DLE	CTL p	120	P	Shift p
021	DC1	CTL q	121	Q	Shift q
022	DC2	CTL r	122	R	Shift r
023	DC3	CTL s	123	S	Shift s
024	DC4	CTL t	124	T	Shift t
025	NAK	CTL u	125	U	Shift u
026	SYN	CTL v	126	V	Shift v
027	ETB	CTL w	127	W	Shift w
030	CAN	CTL x	130	X	Shift x
031	EM	CTL y	131	Y	Shift y
032	SUB	CTL z	132	Z	Shift z
033	ESC	ESC +	133	[	Shift {
034	FS	CTL ;	134	\	Shift
035	GS	CTL }	135	]	Shift }
036	RS	CTL ~	136	^	Shift ~
037	US	CTL _	137	`	Shift ~
040	SP	Space bar	140	,	,
041	!	Shift 1	141	a	a
042	"	Shift 2	142	b	b
043	#	Shift 3	143	c	c
044	\$	Shift 4	144	d	d
045	%	Shift 5	145	e	e
046	&	Shift 6	146	f	f
047	'	Shift 7	147	g	g
050	(	Shift 8	150	h	h
051	)	Shift 9	151	i	i
052	*	Shift :	152	j	j
053	+	Shift ;	153	k	k
054	,	,	154	l	l
055	-	-	155	m	m
056	.	.	156	n	n
057	/	/	157	o	o
060	0	0	160	p	p
061	1	1	161	q	q
062	2	2	162	r	r
063	3	3	163	s	s
064	4	4	164	t	t
065	5	5	165	u	u
066	6	6	166	v	v
067	7	7	167	w	w
070	8	8	170	x	x
071	9	9	171	y	y
072	:	:	172	z	z
073	;	;	173	{	{
074	<	Shift ,	174		
075	=	Shift -	175	}	}
076	>	Shift .	176	~	~
077	?	Shift /	177	DEL	DEL

## Halt Summary

Table 4 lists octal HALT codes and their significance.

**Table 4. HALT Codes and Significance**

MDR Code	Significance
102000	Initializing HALT for Test 7
1020nn	Terminal Printer test failure HALT; <i>nn</i> = test number.
102076	End of test number <i>n</i> ; A-register holds <i>n</i> value.
102077	End of complete pass through diagnostic; A-register holds last test selection.
103000	Error HALT; no test device select code specified at Start Up time.
103001	Configurator program not loaded.
1060nn	Unexpected trap cell HALT; <i>nn</i> = select code of device; this HALT is unrecoverable and necessitates reload.
107076	Initializing HALT after loading select code into switch register.
107077	HALT to allow new test selection in A-register.

## Diagnostic Messages

There are two general categories of messages output to the operator: program/operator communication messages and Terminal Printer test failure (error) messages. Table 5 lists diagnostic messages ordered by their likely order of appearance. Communication messages are coded with a "C," error messages with an "E" in the table. Communication messages are printed if switch register bit 10 is clear. Error messages are printed if switch register bit 11 is clear. Memory Data Register contents (MDR) are listed in the HALT Code column; A- or B-register contents, if applicable, are also listed in this column enclosed by parentheses.

All test header messages and test complete messages are not included in table. An example of such a message is:

```
PRINTER TEST
.
.
.
PRINTER TEST COMPLETE
```

Table 5. Messages to Operator

Message	C/E	Octal MDR (A- & B-reg) (HALT Code)	Test	Meaning
HP 2762A TERMINAL PRINTER DIAGNOSTIC	C			Diagnostic header message .
STF0-CLF0-SFS0-SFC0 FAILURE (A=X)	E	102001 (A-register=X)	1	Basic interrupt failed; Value X indicates type code: X = 1 means CLF0-SFS0 = 2 means CLF0-SFC0 = 3 means STF0-SFS0 = 4 means STF0-SFC0
INT AFTER CLF0	E	102002	2	Basic interrupt control failed.
STFTSC-CLFTSC- SFSTSC-SFCTSC FAILURE (A=X)	E	102003 (A-register=X)	3	Basic card control failure for Test device Select Code (TSC). Value X indicates type code: X = 0 means SKF signal held up = 1 means CLF TSC-SFC TSC = 2 means CLF TSC-SFS TSC = 3 means STF TSC-SFC TSC = 4 means STF TSC-SFS TSC
STF <sub>ss</sub> SET TSC FLAG	E	102004	4	Select code screen test failed; ss = select code that caused failure.
INT DURING HOLD OFF INSTRUCTION	E	102005 (A-register=1)	5	Interrupt occurred during I/O in- struction or JMP.
SECOND INT OCCURRED	E	102005 (A-register=2)	5	TSC interrupted again after inter- rupts were turned back on.
NO INT	E	102005 (A-register=3)	5	No interrupt occurred with TSC CONTROL and FLAG SET and interrupt system ON.
INT INCORRECT	E	102005 (A-register=4)	5	Interrupt system did not execute interrupt properly.
CLC0 OR CLC TSC FAILED (A=X)	E	102006 (A-register=X)	6	Interrupt occurred after CLC 0 or CLC TSC; Value X indicates type code: X = 1 means CLC TSC = 2 means CLC 0
PRESS PRESET (EXTERNAL & INTERNAL)	C	102000	7	Operator keys-in PRESET at com- puter operator panel; restarts at program location 2 <sub>g</sub> .
FLAG DID NOT SET AFTER POPIO	E	102007 (A-register=1)	7	PRESET did not set the flag.

Table 5. Messages to Operator (Continued)

Message	C/E	Octal MDR (A- & B-reg) (HALT Code)	Test	Meaning
INT SYSTEM NOT CLEARED AFTER PRESET	E	102007 (A-register=2)	7	Manual entry of PRESET did not clear interrupt.
BASIC I/O COMP	C	—	—	All Basic I/O tests (1-7) selected have been completed.
DATA REGISTER PICKING UP BITS	E	102010 (A-register = 1, B-register= <i>data</i> )	8	Eight bit data register is picking up bits; B-register holds actual <i>data</i> received.
DATA REGISTER DROPPING BITS	E	102010 (A-register=2, B-register= <i>data</i> )	8	Eight bit data register is dropping bits; B-register holds actual <i>data</i> received.
BUSY STATUS	E	102011 (A-register=1)	9	Clock ENABLE bit was set when test device interface card was idle.
NO BUSY STATUS	E	102011 (A-register=2)	9	Clock ENABLE bit did not set when the clock was started.
BUSY WENT DOWN BUT NO INT	E	102011 (A-register=3)	9	Clock ENABLE bit cleared signaling completion, but I/O flag for device being tested did not set.
OSC FAST	E	102011 (A-register=4)	9	Oscillator is running too fast.
OSC SLOW	E	102011 (A-register=5)	9	Oscillator is running too slow.
CLOCK DID NOT TIME OUT	E	102011 (A-register=6)	9	Clock ENABLE is still up; no interrupt has occurred.
VT & FF OPTION NOT CONFIGURED TEST 12 ABORTED	C	—	12	Bit 10 of switch register not set during start up procedure.
VT & FF TEST PUNCH VT&FF DISC INSTALL VTFF DISC AS DESCRIBED IN MOD TYPE CONTROL s TO SIGNAL READY	C	—	12	Install VTFF disc with following characteristics: a. VT holes at lines 16, 33 and 49 b. FF hole at line 66 Key in CONTROL <i>lower case s</i> to continue, when disc is installed.
HT OPTION NOT CONFIGURED TEST 13 ABORTED	C	—	13	Bit 11 of switch register not set during start up procedure.

Table 5. Messages to Operator (Continued)

Message	C/E	Octal MDR (A- & B-reg) (HALT Code)	Test	Meaning
ECHO BACK TEST INPUT CHARACTER(S) TERMINATE INPUT WITH CONTROL s	C	—	14	Input any sequence of characters up to 256 in number terminating input with CONTROL <i>lower case s</i> .
NUMBER OF REPETITIONS?	C	—	14	Key in decimal number from 1 to 99 followed by LINE FEED.
ILLEGAL INPUT! NUMBER OF REPETITIONS?	C	—	14	Invalid entry of repetition number; remake decimal number entry followed by LINE FEED.
<i>n</i> REPETITIONS!	C	—	14	Heading for <i>n</i> repetitions of echo back character string.
DMA NOT CONFIGURED	C	—	15	DMA option not configured via Diagnostic Configurator. Test is aborted.
DMA TIMEOUT	E	102017	15	DMA cycle did not complete properly.
—	E	102020	10-15	Flag logic failed during output.
PASS <i>nn</i>	C	—	—	Message at end of diagnostic indicating number of passes <i>nn</i> diagnostic has executed.
DIAG COMP	C	102077	—	Diagnostic execution has completed.







## ***Test Sections***

The 2762A Terminal Printer diagnostic test sections are divided into two groups: Basic I/O Tests and Peripheral tests. A brief summary is given of each test.

### **BASIC I/O TESTS**

#### **Test 1**

A test is performed of the ability to clear, set, and test the interrupt system. The assembly language test sequence is the following:

```
STF 0  
CLF 0  
SFC 0  
SFS 0  
STF 0  
SFC 0  
SFS 0
```

#### **Test 2**

Test is performed for the absence of interrupt when the Test device Select Code (TSC) flag flip-flop (FF) is set, the TSC control FF is set, and the interrupt system is off.

### Test 3

Test is performed for the ability to clear, set, and test the TSC flag. Assembly language test sequence is the following:

<i>STF</i>	<i>TSC</i>
<i>CLF</i>	<i>TSC</i>
<i>SFC</i>	<i>TSC</i>
<i>SFS</i>	<i>TSC</i>
<i>STF</i>	<i>TSC</i>
<i>SFC</i>	<i>TSC</i>
<i>SFS</i>	<i>TSC</i>

### Test 4

Select code screen test is performed. The flag of every select code ( $10_8$  through  $77_8$ ) except the TSC is set. A check is made to insure that the TSC flag is not set in the process.

### Test 5

A test is performed of the ability of the TSC to interrupt. With the flag and control FF's set and the interrupt system on, there should be an interrupt on the TSC channel.

Test is then made for the interrupt to occur where expected. The interrupt should *not* occur before a string of priority-affecting instructions are executed.

Finally it is verified that another interrupt does not occur when the interrupt system is turned back on.

### Test 6

A test is performed with the interrupt system on and the TSC control and flag FF's set to insure that no interrupt occurs following a *CLC TSC* instruction. A *CLC TSC* instruction should reset the TSC control FF. The check is also made to insure that a *CLC 0* instruction indirectly resets the TSC control FF.

### Test 7

Test is performed to insure that the PRESET switch (External and Internal, if applicable) sets the TSC flag (POPIO signal line) and clears the interrupt system.

## PERIPHERAL TESTS

### Test 8

The eight bit Data Register is checked for dropping or picking up bits.

### Test 9

Oscillator tolerance is checked. If the oscillator fails tolerance test, an error message is printed. The clock enable bit (busy bit) is checked for proper operation. Each time this test is entered, oscillator and clock enable are checked 20 times.

### Test 10

All functions of the printing mechanism are checked. All printing characters are output twice followed by all non-printing characters. A Line Feed test follows and then a Back Space test is performed. Four lines are then printed to verify horizontal and vertical alignment; two lines of H's overprinted with I's, followed by two lines of T's. A ripple-print test is performed next consisting of 95 lines containing 75 (or 118) characters each. Each successive line is printed with the character sequence rotationally shifted one place.

### Test 11

The keyboard I/O mechanism is checked. A line of characters is output. The program then accepts as input the same sequence of characters keyed in by the operator. The octal code of the manually input characters is compared and, if found in error, the *incorrect* octal code is printed out.

At the end of this program-prompted character input sequence, the program accepts any character keyed in. If the character is printable, it is echoed; if not, the octal equivalent is output.

### Test 12

The Vertical Tab and Form Feed (VTFF) option is tested, if installed on the 2762A Terminal Printer. The test requires the operator to install his own VTFF disc. A series of vertical tabs and form feeds are output to 2762A Terminal Printer with corresponding printouts to allow operator to visually verify results.

### Test 13

The Horizontal Tab option is tested, if installed on the 2762A Terminal Printer. A series of horizontal tabulations are performed with corresponding printouts to allow the operator to visually verify results.

## Test 14

The keyboard I/O mechanism is again checked via an echo back test. The operator specifies a sequence of characters and number of repetitions. The program then repeats the sequence of characters as many times as specified.

## Test 15

The DMA interface cycle is tested. This test is executed only if the DMA operation has been specified during configuration via the Diagnostic Configurator. A print pattern A through Z and 0 through 9 is printed through the DMA hardware. It is assumed that the DMA hardware of the computer is working correctly and only the service request logic of the 2762A Terminal Printer Interface card is being tested.

## TEST LIMITATIONS

Four types of Interface Board priority characteristics exist. One type is tested by the diagnostic. Two types require special procedures. One type is outside the scope of the diagnostic.

- a. Testing of whether Interface Board receives priority is made.
- b. Testing of whether the Interface Board can be denied priority requires a special procedure. The user must extract an unused higher priority board and then run the diagnostic. If the Interface Board has been denied priority, the message  

NO INT

is printed and a HALT with MDR = 102005<sub>8</sub> occurs.
- c. Testing of whether the board can deliver priority to others also requires a special procedure. Test this by running a diagnostic on a lower priority interface board for some other device.
- d. Testing of whether the board can deny priority is outside the scope of this diagnostic.





```

\]^_`abcdefghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI
l]^_`abcdefghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI
^_`abcdefghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI
_`abcdefghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJ
`abcdefghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJK
abcdefghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKL
bcdefghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLM
cdefghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
defghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
efghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
fghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
ghijklmnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
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mnopqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
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opqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
pqrstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
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rstuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
stuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
tuvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
uvwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
vwxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
wxyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
xyz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
yz(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
z(!)~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
~ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO

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PRINTER TEST COMPLETE

Figure 1. Printer Test (Page 3 of 3)





