D-101 DATASCOPE STANDARD PROM PACKAGE

USER'S GUIDE

Spectron Instruction Manual

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TABLE OF CONTENTS

SECTION 1

INTRODUCTION

1.1 The D-101 "STANDARD PURPOSE ROM PACK" consists of asynchronous and synchronous programs. Once the D-101 is connected, either as a monitor or as an interactive device within the circuit, the unit must be configured for compatibility with the interfacing data channel. (in terms of clock source, baud rate data format, etc.) This is accomplished in one of several ways. An autoconfiguration feature in the D-101 permits the unit to automatically acquire any one of a group of "standard" line configurations. For other (nonstandard) configurations, the parameters are entered into a configuration table by means of the front panel keyboard, with a menu-type display prompting the user for each entry.

1.2 For the "STANDARD PURPOSE ROM PACK" (Level III) programs, the configuration is included in the ROM and automatically loaded along with the program. This configuration can be edited to the user application.

1.3 The STANDARD ROM PACK provides the following capabilities:

- Correspondence and baudot in asynchronous,
- Transmit a FOX message or continuously,
- Transmit 80 characters,
- Attribute test (synchronous),
- Retransmit test (synchronous and asynchronous), and
- Poll and text response (synchronous).

1.4 **3270 PROTOCOL**

1.5 While 3270 Protocol provides for asynchronous transmission and point-to-point operation, the dominant protocol application is for synchronous transmission on multi-drop data links. In this configuration, a central 'HOST' controls all transmissions by 'POLLING' or 'SELECTING' remote 'STATIONS' and their attached 'DEVICES'. All transmission activity consists of POLLS or SELECTS, 'COMMANDS' from the HOST, DATA-LINK CONTROL SEQUENCES, and 'MESSAGES', which obey a predetermined set of rules—the PROTOCOL. (see Figure 1—1, 3270 LINE CONTROL SEQUENCES)

1.6 POLLS incorporate station poll addresses (SPA) and device addresses (GDA or DA) to invite transmission from any station device (GENERAL POLL) or a specific device (SPECIFIC POLL). The polled station responds with a message or 'No Traffic Response' (EOT data-link control sequence).

1.7 SELECTS incorporate station select addresses (SSA) and device addresses (DA) to request permission to send a command or message to the addressed station/device. Permission is granted (ACKO) or a reason is given (WACK or RVI).

1.8 COMMANDS are used to WRITE a message to the device, READ a message from the device, or CONTROL the device, e.g., copy the CRT buffer to the printer. Commands are defined by ESC sequences (see Table 1—1, 3270 Addressing and Control Characters) and may contain special 'COMMAND CHARACTERS', 'ORDERS', and text. (see Table 1—2, 3270 Message Formats)

1.9 MESSAGES from the station/device incorporate their addresses (SPA & DA) as well as text and special characters, e.g., AID, SENSE & STATUS, AC, and BUFFER or CURSOR ADDRESSES. Messages are used to keep the host informed of device status, ask for help, and respond to the host's request for job related information.

1.10 DATA-LINK CONTROL SEQUENCES are used to assure everyone that they are being understood properly so that communications may continue—or that something isn't going according to plan and provide a means of recovery.

1.11 **ERROR DETECTION**

1.12 3270 PROTOCOL supports transmission using either 7-bit ASCII or 8-bit EBCDIC codes. Commands and messages (but not data-link control sequences) make use of a special BCC character (or characters) to verify that the transmission has been error free. BCC is calculated beginning with the first character following the first SOH or STX character of the transmission and includes the ETB or ETX character which ends the transmission. SYN characters may be inserted into the message as it is being sent and **after** the BCC is computed. For this reason SYN is ignored when checking BCC for transmission errors.

1.13 **ASCII**

1.14 An 8th bit is appended to the 7-bit character as an error check (VRC). (This bit makes character parity **odd** for synchronous transmission or **even** for asynchronous transmission.)

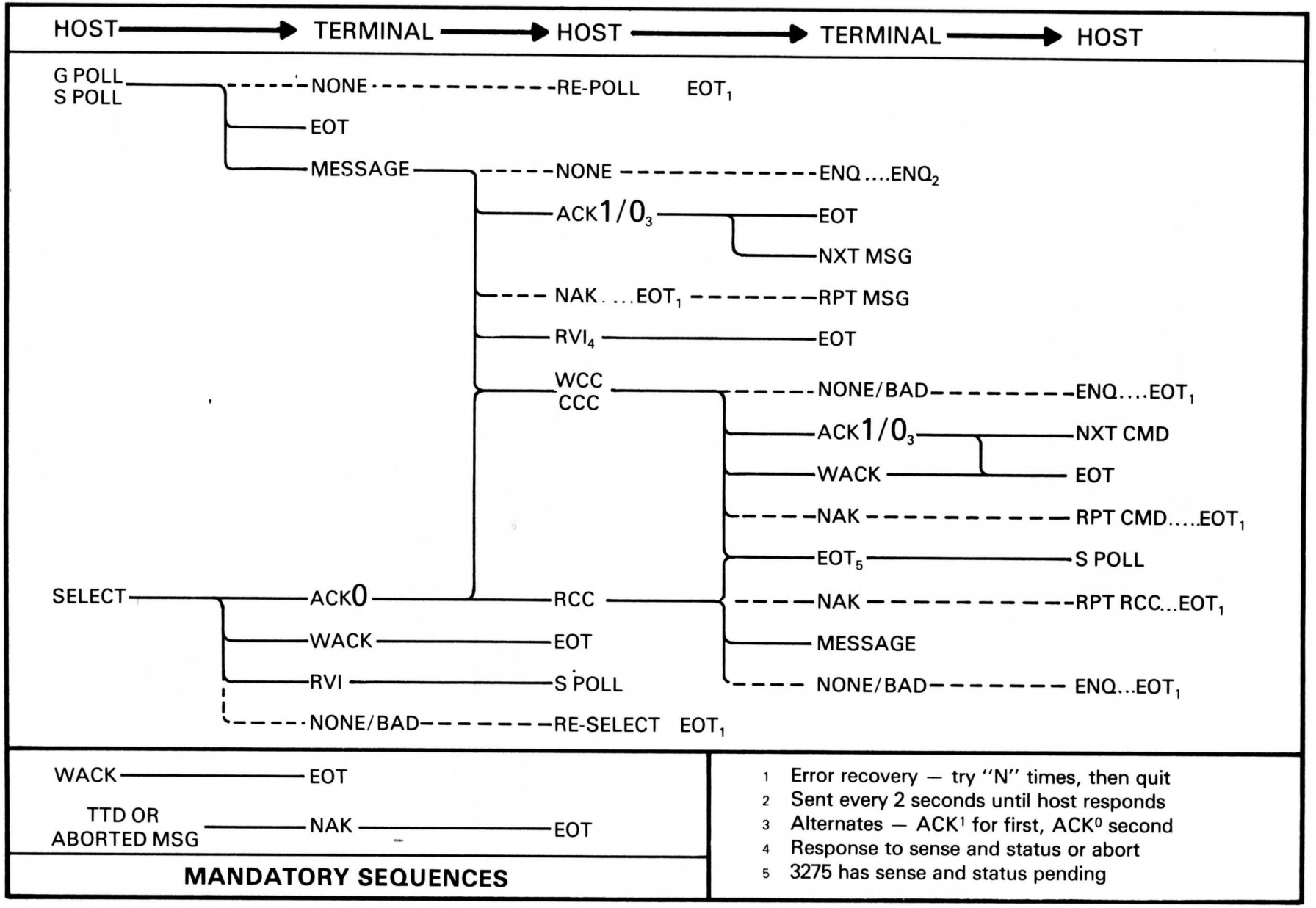
1.15 The BCC is a single character (parity per above) called the LRC. Each LRC bit value is set to make the corresponding bits of all checked characters, taken as a group, be of even parity.

NOTE

VRC and LRC together permit detection and correction of any single-bit error. However, it is common that parity be ignored and LRC alone be used to detect errors.

1.16 **EBCDIC**

1.17 Since all eight bits are used for characters, no VRC or parity is employed. The BCC consists of two characters calculated using the CRC/16 polynomial which makes undetected transmission errors virtually impossible.



B02599-00

Figure 1—1. 3270 Line Control Sequences.

Table 1–1. 3270 Addressing and Control Characters.

3270 ADDRESSING

EBCDIC					ASCII				
	SPA					SPA			
No	DA		SSA		No	DA		SSA	
0		40	-	60	0		20	-	2D
1	A	C1	/	61	1	A	41	/	2F
2	B	C2	S	E2	2	B	42	S	53
3	C	C3	T	E3	3	C	43	T	54
4	D	C4	U	E4	4	D	44	U	55
5	E	C5	V	E5	5	E	45	V	56
6	F	C6	W	E6	6	F	46	W	57
7	G	C7	X	E7	7	G	47	X	58
8	H	C8	Y	E8	8	H	48	Y	59
9	I	C9	Z	E9	9	I	49	Z	5A
10	¢	4A	¨A	6A	10	[	5B	¦	7C
11		4B	,	6B	11		2E	,	2C
12	<	4C	%	6C	12	<	3C	%	25
13	(	4D	_	6D	13	(	28	_	5F
14	+	4E	>	6E	14	+	2B	>	3E
15	|	4F	?	6F	15	!	21	?	3F
16	&	50	0	F0	16	&	26	0	30
17	J	D1	1	F1	17	J	4A	1	31
18	K	D2	2	F2	18	K	4B	2	32
19	L	D3	3	F3	19	L	4C	3	33
20	M	D4	4	F4	20	M	4D	4	34
21	N	D5	5	F5	21	N	4E	5	35
22	O	D6	6	F6	22	O	4F	6	36
23	P	D7	7	F7	23	P	50	7	37
24	Q	D8	8	F8	24	Q	51	8	38
25	R	D9	9	F9	25	R	52	9	39
26	!	5A		7A	26	]	5D		3A
27	$	5B	#	7B	27	$	24	#	23
28	*	5C	@	7C	28	*	2A	@	40
29	)	5D	'	7D	29	)	29	'	27
30	;	5E	=	7E	30	;	3B	=	3D
31	¬	5F	"	7F	31	↑	5E	"	22
GDA FOR GENERAL POLLS									

3270 CONTROL CHARACTERS

		CHAR	EBCDIC HEX	EBCDIC DISPY	7 BIT ASCII HEX	7 BIT ASCII DISPY	CHARACTER USAGE
SYNC		SYN	32	SY	16	SY	SYN SYN ESTABLISHES CHARACTER SYNC
		PAD	55	N	55	U	LEADING PAD ESTABLISHES BIT SYNC
		PAD	FF	''	FF	DT	TRAILING PAD (LINE TURN-AROUND)
MESSAGE FRAMING		SOH	01	SH	01	SH	START OF HEADER
		STX	02	SX	02	SX	START OF TEXT
		ITB	1F	US	1F	US	INTERMEDIATE TEXT BLOCK
		ETB	26	EB	17	EB	END OF TEXT BLOCK
		ETX	03	EX	03	EX	END OF TEXT
DATA-LINK CONTROL		EOT	37	ET	04	ET	END OF TRANSMISSION (NO TRAFFIC)
		ENQ	2D	EQ	05	EQ	ENQUIRE (REPEAT LAST TRANSMISSION)
		NAK	3D	NK	15	NK	NEGATIVE ACKNOWLEDGE (BAD BCC)
		ACK0	10 70	DL 0	10 30	DL 0	POSITIVE ACKNOWLEDGE (SELECT/EVEN MSG)
		ACK1	10 61	DL /	10 31	DL 1	POSITIVE ACKNOWLEDGE (ODD MSG'S)
		WACK	10 6B	DL ,	10 3B	DL ,	WAIT (POSITIVE ACKNOWLEDGE)
		RVI	10 7C	DL @	10 3C	DL <	REVERSE INTERRUPT
		TTD	02 2D	SX EQ	02 05	SX EQ	TEMPORARY TEXT DELAY
ORDERS	BUFFER	PT	05	HT	09	HT	PROGRAM TAB
		SBA	11	D1	11	D1	SET BUFFER ADDRESS
		EUA	12	D2	12	D2	ERASE UNPROTECTED BUFFER TO ADDRESS
		IC	13	D3	13	D3	INSERT CURSOR HERE
		SF	1D	IG	1D	GS	START OF NEW FIELD
		RA	3C	D4	14	D4	REPEAT CHARACTER TO ADDRESS
	PRINTR	NL	15	NL	0A	LF	NEW LINE
		EM	19	EM	19	EM	END OF MESSAGE
		FF	0C	FF	0C	FF	FORM FEED
	KBD	DUP	1C	IF	1C	FS	DUPLICATE
		FM	1E	IR	1E	RS	FIELD MARK
		SUB	3F	SB	1A	SB	SUBSTITUTE (REPLACES BAD CHARACTER)
COMMANDS	WCC	ESC 1	27 F1	EC 1	1B 31	EC 1	WRITE COMMAND
		ESC 5	27 F5	EC 5	1B 35	EC 5	ERASE/WRITE COMMAND
	RCC	ESC 2	27 F2	EC 2	1B 32	EC 2	READ BUFFER
		ESC 6	27 F6	EC 6	1B 36	EC 6	READ MODIFIED BUFFER
	CCC	ESC 7	27 F7	EC 7	1B 37	EC 7	COPY
		ESC ?	27 6F	EC ?	1B 3F	EC ?	ERASE ALL UNPROTECTED

Table 1—2. 3270 Message Formats.

GENERAL POLL	P S S E P S S S S G G E P A Y Y O A Y Y P P D D N A D N N T D N N A A A A Q D	ANY DEVICE AT SPA MAY SEND
SPECIFIC POLL	P S S E P S S S S D D E P A Y Y O A Y Y P P A A N A D N N T D N N A A Q D	DEVICE DA AT SPA MUST SEND
SELECT SEQUENCE	P S S E P S S S S D D E P A Y Y O A Y Y S S A A N A D N N T D N N A A Q D	WILL DEVICE DA AT SPA LISTEN?
WRITE COMMAND	P S S S E W E B P A Y Y T S 1 C ORDERS TEXT T C A D N N X C C X C D	WRITE THIS MESSAGE
ERASE/WRITE COMMAND	P S S S E W E B P A Y Y T S 5 C ORDERS TEXT T C A D N N X C C X C D	ERASE, THEN WRITE THIS MESSAGE
READ BUFFER COMMAND	P S S S E E B P A Y Y T S 2 T C A D N N X C X C D	SEND YOUR ENTIRE BUFFER
READ MODIFIED COMMAND	P S S S E E B P A Y Y T S 6 T C A D N N X C X C D	SEND YOUR NEWEST INPUT DATA
COPY COMMAND	P S S S E C D E B P A Y Y T S 7 C A T C A D N N X C C X C D	COPY FROM DA USING FORMAT CCC
ERASE ALL UNPROTECTED	P S S S E E B P A Y Y T S ? T C A D N N X C X C D	ERASE ALL UNPROTECTED BUFFER
SHORT READ	P S S S S D A E B P A Y Y T P A I T C A D N N X A D X C D	SENT IF CLEAR OR PA KEY HIT
SENSE & STATUS	P S S S S S D S S E B P A Y Y O % R T P A S S T C A D N N H X A 1 2 X C D	STATUS IS PENDING /ERROR/UNAVAIL
TEST REQUEST	P S S S S S B B E B P A Y Y O % / T B A A TEXT - T C A D N N H X A 1 2 X C D	READ MODIFIED SENT VIA FUNCT KEY
READ MODIFIED BUFFER	P S S S S D A C C S B B E B P A Y Y T P A I A A B A A TEXT - T C A D N N X A D 1 2 A 1 2 X C D	MODIFIED BUFF SENT VIA PF OR ENTER
READ ALL RESPONSE	P S S S S D A C C S A E B P A Y Y T P A I A A F C TEXT + T C A D N N X A D 1 2 X C D	ENTIRE BUFF SENT FOR DIAGNOSTICS
ABORTED MESSAGE	P S S S S E P A Y Y T TEXT U TEXT N A D N N X B Q D	SUB REPLACES CHAR WITH BAD PARITY
DATA-LINK CONTROLS	P S S D P A Y Y L A D N N C D	DLC IS 1 or 2 CHARS (e g , NAK, ACK0)

SPA STATION POLL ADDRESS SSA STATION SELECT ADDRESS GDA GENERAL DEVICE ADDRESS DA DEVICE ADDRESS	CA1/CA2 CURSOR ADDRESS BA1/BA2 BUFFER ADDRESS SS1/SS2 SENSE & STATUS	AC FIELD ATTRIBUTE CODE AID ATTENTION KEY IDENTIFY CCC COPY COMMAND CODE WCC WRITE COMMAND CODE
BCC 2 BYTE CRC FOR EBCDIC OR 1 BYTE LRC FOR ASCII		TEXT + / – (WITH/WITHOUT NULLS)

Key Depressed	AID
S/R	
PA1	%
PA2	>
R/TST	0
PF1	1
PF2	2
PF3	3
PF4	4
PF5	5
PF6	6
PF7	7
PF8	8
PF9	9
PF10	
PF11	#
PF12	@
CLEAR	—
none, KD	
none, P	Y

WCC							
Start Printer	Sound KD Tone	Put KD in LOCAL	Reset ACs to Unmodified	Print: NL char/line	Print: 40 char/line	Print: 64 char/line	Print: 80 char/line
			●	SP	&		0
		●		A	J	/	1
		●	●	B	K	S	2
	●			C	L	T	3
	●		●	D	M	U	4
	●	●		E	N	V	5
	●	●	●	F	O	W	6
●				G	P	X	7
●			●	H	Q	Y	8
●		●		I	R	Z	9
●		●	●	[	]	:	
●	●				$	.	#
●	●		●	<	*	%	@
●	●	●		(	)	—	'
●	●	●	●	+		>	=
				!	^	?	"

CCC								
Start Printer	Sound KD Tone	Copy: ACs	Copy: Protected Data	Copy: Unprotected Data	Print: NL char/line	Print: 40 char/line	Print: 64 char/line	Print: 80 char/line
		●			SP	&		0
		●		●	A	J	/	1
		●	●		B	K	S	2
		●	●	●	C	L	T	3
	●	●			D	M	U	4
	●	●		●	E	N	V	5
	●	●	●		F	O	W	6
	●	●	●	●	G	P	X	7
●		●			H	Q	Y	8
●		●		●	I	R	Z	9
●		●	●		[	]	:	
●		●	●	●		$	.	#
●	●	●			<	*	%	@
●	●	●		●	(	)	—	'
●	●	●	●		+		>	=
●	●	●	●	●	!	^	?	"

Status & Sense (S & S)					
Only on Specific Poll	S S_1	S S_2	On Gen'l/Spec Poll	S S_1	S S_2
Invalid Command	SP	A	Device No Longer Busy	B	SP
Device Unavailable	SP	&	Printer Paper Out	B	&
Command not Valid for Device	SP	-	Internal Timing Error	SP	B
Device Busy	H	SP	Block Forward Abort	SP	D
From Device Busy	H	A			
From Device Unavailable	SP	J			
Locked Buffer	D	A			

Orders	
Set Buffer Address	DC1 B B A_1A_2
Start Field	GS A C
Insert Cursor	DC3
Program Tab	HT
Repeat to Address	DC4 B B A_1A_2 C
Erase Unprotected to Address	DC2 B B A_1A_2

Specify Field as: Protected†	Numeric	Hidden	Highlighted*	Modified	A C Option 403a or b: SP	D	B	F
				●	A	E	C	G
			●		H	[		
			●	●	I			
		●			<	+		
		●		●	(	!		
	●				&	M	K	O
	●			●	J	N	L	P
	●		●		Q	]		
	●		●	●	R	$		
	●	●			*			
	●	●		●	)	^		
●						U	S	W
●				●	/	V	T	X
●			●		Y	;		
●			●	●	Z			
●		●			%	>		
●		●		●	_	?		
●	●				0	4	2	6
●	●			●	1	5	3	7
●	●		●		8			
●	●		●	●	9	#		
●	●	●			@	=		
●	●	●		●	'	"		

Specify Field as: Protected†	Numeric	Hidden	Blinked†	Intensified†	Modified	A C Option 403c: SP	D	B	F
					●	A	E	C	G
				●		H			
				●	●	I			
			●			[			
			●		●				
		●				<	+		
		●			●	(	!		
	●					&	M	K	O
	●				●	J	N	L	P
	●			●		Q			
	●			●	●	R			
	●		●			]			
	●		●		●	$			
	●	●				*			
	●	●			●	)	^		
●							U	S	W
●					●	/	V	T	X
●				●		Y			
●				●	●	Z			
●			●			;			
●			●		●	,			
●		●				%	>		
●		●			●	_	?		
●	●					0	4	2	6
●	●				●	1	5	3	7
●	●			●		8			
●	●			●	●	9			
●	●		●						
●	●		●		●	#			
●	●	●				@	=		
●	●	●			●	'	"		

Figure 1—2. 40/4 ASCII Control Characters.

EBCDIC CODE

UNDEFINED CODES ARE DISPLAYED AS SHOWN OR IN HEX

SECOND HEX DIGIT	FIRST HEX DIGIT 0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NU•	DL•	DS	30		&	-	0		&	-	0		&	-	0
1	SH•	D1•	SS	31	A	J	/	1	A	J	/	1	A	J	/	1
2	SX•	D2•	FS	SY•	B	K	S	2	B	K	S	2	B	K	S	2
3	EX•	D3•	23	33	C	L	T	3	C	L	T	3	C	L	T	3
4	PF	RE	BP	PN	D	M	U	4	D	M	U	4	D	M	U	4
5	HT•	NL	LF•	RS	E	N	V	5	E	N	V	5	E	N	V	5
6	LC	BS•	EB•	UC	F	O	W	6	F	O	W	6	F	O	W	6
7	DT•	IL	EC•	ET•	G	P	X	7	G	P	X	7	G	P	X	7
8	08	CN•	28	38	H	Q	Y	8	H	Q	Y	8	H	Q	Y	8
9	09	EM•	29	39	I	R	Z	9	I	R	Z	9	I	R	Z	9
A	MM	CC	SM	3A	¢	!	▮A	:	¢	!	▮A	:	¢	!	▮A	:
B	VT•	1B	2B	3B	.	$	,	#	.	$	,	#	.	$	,	#
C	FF•	IF	2C	D4•	<	*	%	@	<	*	%	@	<	*	%	@
D	CR•	IG	EQ•	NK•	(	)	_	'	(	)	_	'	(	)	_	'
E	SO•	IR	AK•	3E	+	;	>	=	+	;	>	=	+	;	>	=
F	SI•	US	BL•	SB•	|	¬	?	"	|	¬	?	"	|	¬	?	"

HEX	OTHER CHAR
09	RLF
13	TM
1B	CU1
27	PRE
2B	CU2
3B	CU3
6A	¦
79	`
A1	~
C0	{
CC	⌠
CE	⌡
D0	}
E0	\
EC	┌
FA	|

BP	BP	BYPASS	FS	FS	FIELD SEPARATOR	IL	IL	IDLE	RE	RES	RESTORE
CC	CC	CURSOR CONTROL	IF	IFS	INFO FIELD SEP	NL	NL	NEW LINE	MM	SMM	START MANUAL MESSAGE
DS	DS	DIGIT SELECT	IG	IGS	INFO GROUP SEP	PF	PF	PUNCH OFF	SM	SM	SET MADE
LC	LC	LOWER CASE	IR	IRS	INFO RECORD SEP	PN	PN	PUNCH ON	SS	SOS	START OF SIGNIFICANCE
UC	UC	UPPER CASE	US	IUS	INFO UNIT SEP	RS	RS	READER STOP	■	•	SEE ASCII CHART

SECOND HEX DIGIT	FIRST HEX DIGIT 8 (0)	9 (1)	A (2)	B (3)	C (4)	D (5)	E (6)	F (7)
0	NU	DL		0	@	P	`	p
1	SH	D1	!	1	A	Q	a	q
2	SX	D2	"	2	B	R	b	r
3	EX	D3	#	3	C	S	c	s
4	ET	D4	$	4	D	T	d	t
5	EQ	NK	%	5	E	U	e	u
6	AK	SY	&	6	F	V	f	v
7	BL	EB	'	7	G	W	g	w
8	BS	CN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SB	*	:	J	Z	j	z
B	VT	EC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	¦
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	↑	n	~
F	SI	US	/	?	O	←	o	DT

ASCII CODE

CONTROL CHARACTERS

NUL	NULL CHARACTER	DLE	DATA LINK ESCAPE (DC0)
SOH	START OF HEADING	DC1	DEVICE CONTROL 1 (XON)
STX	START OF TEXT	DC2	DEVICE CONTROL 2 (RON)
ETX	END OF TEXT	DC3	DEVICE CONTROL 3 (XOFF)
EOT	END OF TRANSMISSION	DC4	DEVICE CONTROL 4 (ROFF)
ENQ	ENQUIRY (WRU)	NAK	NEGATIVE ACKNOWLEDGE
ACK	ACKNOWLEDGE (RU)	SYN	SYNCHRONOUS IDLE
BEL	BELL	ETB	END TRANSMISSION BLOCK
BS	BACKSPACE	CAN	CANCEL
HT	HORIZONTAL TAB	EM	END OF MEDIUM
LF	LINE FEED	SUB	SUBSTITUTE
VT	VERTICAL TAB	ESC	ESCAPE
FF	FORM FEED	FS	FILE SEPARATOR
CR	CARRIAGE RETURN	GS	GROUP SEPARATOR
SO	SHIFT OUT	RS	RECORD SEPARATOR
SI	SHIFT IN	US	UNIT SEPARATOR
		DEL	(DT) DELETE

ODD PARITY: 1ST DIGIT = 0-7

EVEN PARITY: 1ST DIGIT = 8-F

HEX CHAR	1ST MSB ORDER	2ND LSB	< HEX DIGIT DISPLAY IS
32 =	0011	0010	NORMAL
▼	▼	▼	
CD =	1100	1101	INVERTED
▼			
4C =	0100	1100	REVERSED
▼	▼	▼	
B3 =	1011	0011	REVERSED & INVERTED

HEX NORMAL/REVERSE

BIN	NOR	REV	INV	INV REV
0000	0	0	F	F
0001	1	8	E	7
0010	2	4	D	B
0011	3	C	C	3
0100	4	2	B	D
0101	5	A	A	5
0110	6	6	9	9
0111	7	E	8	1
1000	8	1	7	E
1001	9	9	6	6
1010	A	5	5	A
1011	B	D	4	2
1100	C	3	3	C
1101	D	B	2	4
1110	E	7	1	8
1111	F	F	0	0

D-101 Interface Configurations With Pin Designations.

PIN NO.	EIA DESIGNATION		DATASCOPE DESIGNATION		DATASCOPE CONNECTORS ①				STATUS OF PIN FOR INTERFACE CONFIGURATIONS ②		
	LEAD	DESCRIPTION	NAME	MNEMONIC	TEST	BUS. MACH.	MODEM	AUX.	MONITOR	TERMINAL SIM. (TO MODEM)	MODEM SIM. (TO TERM.)
1	AA	Protective Ground	Frame (or Chassis) Ground	FG	A	A	A	A	Frame Ground	Frame Ground	Frame Ground
2*	BA	Transmitted Data	Send Data	SD	A	A	A	A	Bridged, SD input from DTE ③	Driven by D-101, enabled by CTS, SD output to DCE ④	Terminated, SD input from DTE ⑤
3*	BB	Received Data	Received Data	RD	A	A	A	A	Bridged, RD input from DCE ③	Terminated, RD input from DCE ④	Driven by D-101, RD output to DTE ⑤
4*	CA	Request to Send	Request to Send	RTS	A	A	A	A	Bridged, RTS input from DTE, D-101 can be configured to use RTS as a marker	Driven by D-101, RTS output to DCE	Terminated, RTS input from DTE
5*	CB	Clear to Send	Clear to Send	CTS	A	A	A	A	Bridged, CTS input from DCE, D-101 can be configured to use CTS as a marker	Terminated, CTS input from DCE (Must be active for SD output)	Driven by D-101, has programmable delay, CTS output
6*	CC	Data Set Ready	Data Set Ready	DSR	A	A	A	Open	Bridged, DSR input from DCE	Terminated, DSR input from DCE	Driven continuously by D-101 upon entry into Modem Sim mode, HIGH = ON
7	AB	Signal Ground (Common Return)	Signal Ground	SG	A	A	A	A	Signal Ground	Signal Ground	Signal Ground
8*	CF	Received Line	Carrier Detect	CD	A	A	A	A	Bridged, CD input from DCE, D-101 can be configured to use CD as a marker	Terminated, CD input from DCE	Driven (switched or always active) by D-101, CD output
9	–	(Reserved for Data Set Testing)	+ 12 V dc (Power to RCU)	–	S	S	Open	Open	–	–	–
10	–	(Reserved for Data Set Testing)	– 12 V dc (Power to RCU)	–	S	S	Open	Open	–	–	–
11*	–	(Unassigned)	TP IN (Read Test Point)	–	AT	AT	AT	Open	Bridged, calibrated (+ 3 2 V) EIA level detector for TP portion of LEAD STATE display	Bridged, calibrated (+ 3 2 V) EIA level detector for TP portion of LEAD STATE display	Bridged, calibrated (+ 3 2 V) EIA level detector for TP portion of LEAD STATE display

* Displayable by selecting Lead State Display

D-101 Interface Configurations With Pin Designations. (Cont'd.)

PIN NO.	EIA DESIGNATION		DATASCOPE DESIGNATION		DATASCOPE CONNECTORS ①				STATUS OF PIN FOR INTERFACE CONFIGURATIONS ②		
	LEAD	DESCRIPTION	NAME	MNEMONIC	TEST	BUS. MACH.	MODEM	AUX.	MONITOR	TERMINAL SIM. (TO MODEM)	MODEM SIM. (TO TERM.)
12	SCF	Sec. Received Line Signal Detector	Secondary Carrier Detect	SCD	A	A	A	Open	–	–	–
13	SCB	Secondary Clear to Send	Secondary Clear to Send	SCTS	A	A	A	Open	–	–	–
14	SBA	Secondary Transmitted Data	Secondary Transmitted Data	SSD	A	A	A	Open	–	–	–
15*	DB	Transmission Signal Element Timing (DCE Source)	Transmit Clock	SCT	A	A	A	Open	Bridged, internally or externally generated, used to clock send data ⑥	Terminated, externally generated, used to clock send data	–
16	SBB	Secondary Received Data	Secondary Received Data	SRD	A	A	A	Open	–	–	–
17*	DD	Receiver Signal Element Timing (DCE Source)	Receiver Clock	SCR	A	A	A	Open	Bridged, externally generated, used to clock receive data in ⑥	Terminated, externally generated, used to clock receive data in ⑥	–
18	–	(Unassigned)	TP OUT (Write Test Point)	–	AT	AT	AT	Open	Pin always EIA low (approx – 12 V) unless driven high (approx + 12 V) under control of ROM-module program	Pin always EIA low (approx – 12 V) unless driven high (approx + 12 V) under control of ROM-module program	Pin always EIA low (approx. – 12 V) unless driven high (approx + 12 V) under control of ROM-module program
19	SCA	Secondary Request to Send	Secondary Request to Send	SRTS	A	A	A	Open	–	–	–
20*	CD	Data Terminal Ready	Data Terminal Ready	DTR	A	A	A	A	Bridged, DTR input from DTE	Driven continuously by D-101 upon entry into Term Sim. mode	Terminated, DTR input from DTE

* Displayable by selecting Lead State Display

D-101 Interface Configurations With Pin Designations. (Cont'd.)

PIN NO.	EIA DESIGNATION		DATASCOPE DESIGNATION		DATASCOPE CONNECTORS ①				STATUS OF PIN FOR INTERFACE CONFIGURATIONS ②		
	LEAD	DESCRIPTION	NAME	MNEMONIC	TEST	BUS. MACH.	MODEM	AUX.	MONITOR	TERMINAL SIM. (TO MODEM)	MODEM SIM. (TO TERM.)
21*	CG	Signal Quality Detector	Signal Quality Detector	SQ	A	A	A	Open	Bridged, SQ input from DCE, D-101 can be configured to use SQ as a marker	Terminated, SQ input from DCE	Driven continuously by D-101 upon entry into Modem Sim. mode
22*	CE	Ring Indicator	Ring Indicator	RI	A	A	A	A	Bridged, RI input from DCE	Terminated, RI input from DCE	Bridged, Pin 22 jumpered to pin 18 for RI function
23	CH/CI	Data Signal Rate Selector (DTE/DCE Source)	Data Signal Rate Selector	DSRS	A	A	A	Open	–	–	–
24	DA	Transmit Signal Element Element Timing (DTE Source)	Sync Clock Transmit Circuit	SCTE	A	A	A	Open	Bridged, SCTE input from DTE ⑥	Driven by D-101 (internally generated) ⑥	Terminated, SCTE input from DTE ⑥
25	–	(Unassigned)	Interface Unit Clock	IU CLK	AI	AI	AI	Open	Bridged ⑥	Bridged ⑥	Bridged ⑥

* Displayable by selecting Lead State Display.

NOTES:

① Definitions of symbols used in DATASCOPE CONNECTORS column:

A = pin is active
S = pin is source of power for optional RCU. (Essentially, RCU is a line driver with high-impedance inputs, for connection of D-101 into system from a distance.)
AT = pin is active for testing
AI = pin carries Interface Unit Clock (supplied by RCU)

② Definitions of terms in STATUS OF PIN FOR INTERFACE CONFIGURATIONS column:

"Terminal Sim." = D-101 simulates DTE
"Modem Sim." = D-101 simulates DCE
"Bridged" = connected to a high impedance (30 kilohms min.)
"Terminated" = connected to a proper EIA terminating impedance (about 4 kilohms)
"Driven" = output supplied via an EIA driver (± 12 volts)

③ Internal Clocks: SD clocked in by internal send clock; RD clocked in by internal receive clock. External Clocks: With Modem source, SD clocked in by SCT (pin 15) and RD clocked in by SCR (pin 17); with SCTE source, both SD and RD clocked in by SCTE (pin 24); with IU source, both SD and RD clocked in by IU CLK (pin 25).

④ Internal Clocks: SD clocked out by internal send clock; RD clocked in by internal receive clock. External Clocks: With Modem source, SD clocked out by SCT (pin 15) and RD clocked in by SCR (pin 17); with IU source, SD clocked out and RD clocked in by IU CLK (pin 25).

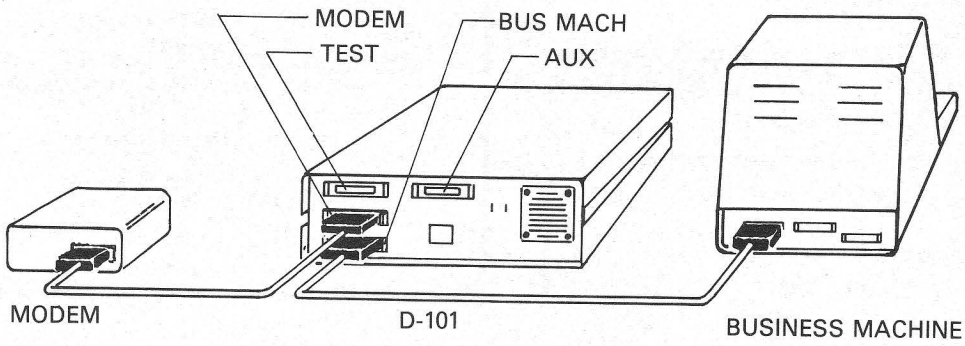
⑤ Internal Clocks: SD clocked in by internal send clock; RD clocked out by internal receive clock. External Clocks: With SCTE source, SD clocked in and RD clocked out by SCTE (pin 24); with IU source, SD clocked in and RD clocked out by IU CLK (pin 25).

⑥ May be used as data clock source. See NOTES 3, 4, 5 for applicability. Internal clock may be used as an alternative to these external clocks. Selection of the clock source is made in Configuration Edit mode as indicated by the displayed prompts. The possible alternative choices are A = Modem (SCT and SCR on pins 15 and 17, respectively), B = External (SCTE on pin 24), C = IU (IU Clock on pin 25), or Internal (selectable from 31 to 19,200 bps).

1.18 D-101 CONNECTION TO INTERFACE

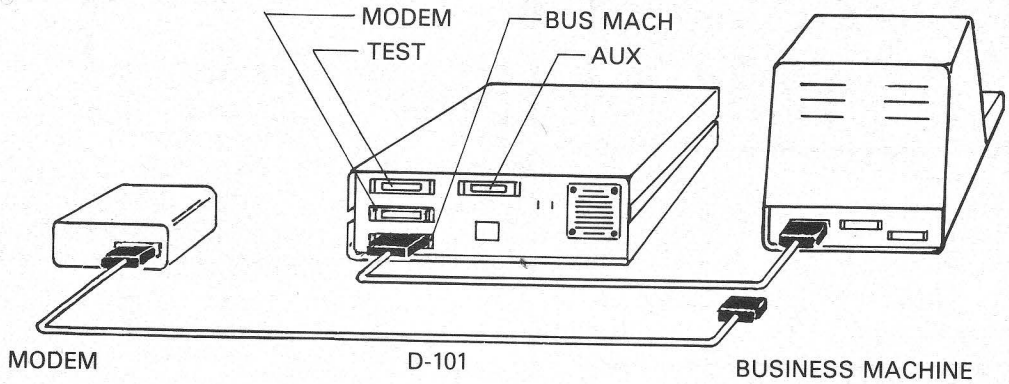
1.19 Depending upon the functions it is to perform, the D-101 must be connected to the RS-232 interface in one of three basic setups:

1. For passive monitoring/analysis of the data channel:



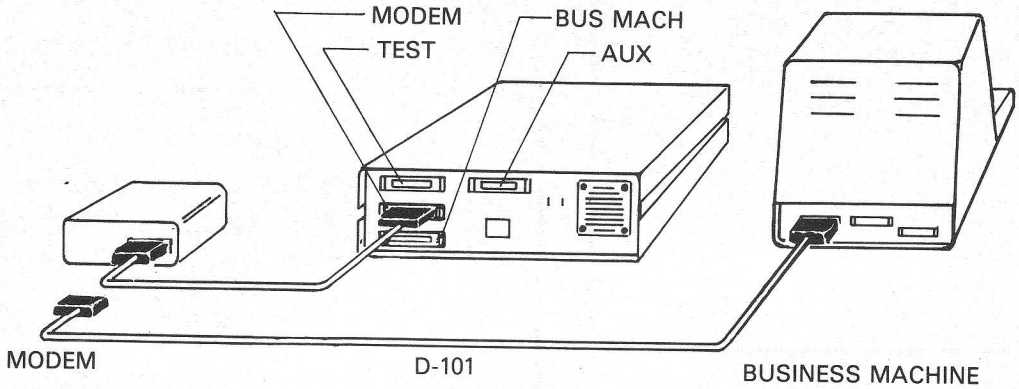
B02598-00

2. For simulation of a DCE (modem):



B02598-01

3. For simulation of a DTE (business machine):



B02598-02

Notes:

(1) For autoconfiguration, the D-101 must be connected for monitoring, as shown in setup 1.

(2) For any of the three setups, the existing data cable may be disconnected at either the modem end or the business machine end, whichever is most convenient.

1.20 PROGRAM LOAD FUNCTION

1.21 The STANDARD ROM package consists of several standard programs for ASYNCHRONOUS and BYSYNCHRONOUS testing. Each ROM pack has a directory of programs and is displayed before the program is loaded. Complete the following steps to load a program.

STEP 1 Insert the STANDARD ROM pack and press the COMMAND MODE button which will display the modes of operation.

```
0 - LEVEL I EDITOR
1 - PAGE REMARK
2 - PROGRAM LOAD
3 - CONFIGURATION
4 - MESSAGE EDITOR
5 - OPTION PROM
6 - OPTION MODULE
7 - AUTO-CONFIG
8 - DATA XTR
```

STEP 2 Press button TWO (PROGRAM LOAD) for type of load source.

```
0 - ROM
1 - LINE

SELECT SOURCE

MODE=PGM LOAD
```

STEP 3 PRESS BUTTON ZERO (ROM) to display program directory.

NOTE: ONE (LINE) is for loading programs from 1001.

STEP 4 Press the button that corresponds with the program desired to load the program.

```
STANDARD PACKAGE
   0 - ATRBTST
   1 - BFOX
   2 - CFOX
   3 - AFOX
   4 - POLL
   5 - POLRESP
SELECT PROGRAM #
  PAGE 1 OF 2
MODE=ROM
```

```
STANDARD PACKAGE
   0 - TXTRSP
   1 - FOX3
   2 - SHOOT
   3 - AREXMIT

SELECT PROGRAM #
  PAGE 2 OF 2
  MODE=ROM
```

STEP 5 Press RUN PROGRAM to activate program.

```
STANDARD PACKAGE
   0 - TXTRSP
   1 - FOX3
   2 - SHOOT
   3 - AREXMIT

*      LEVEL III      *
*PROGRAM LOADED*
MODE=CMD
```

1.22 MESSAGE EDITOR

1.23 Each program has several messages which can be modified to suit users application. For instance, the message used for polling specifies a GENERAL POLL control unit 0 (zero) and would not work if a SPECIFIC POLL is needed.

1.24 To modify an ADDRESS the user must locate the correct message of the program that is currently loaded. (SEE MESSAGE EDITOR FOR EACH PROGRAM)

1.25 In the COMMAND MODE press button 4 (MESSAGE EDITOR) which will display the NUMBER of total messages.

TOTAL MSG = 22

SELECT MSG # –

MODE = MSG EDIT

1.26 Select the message # number needed and press the ENTER key to display the message.

S S S S E FF S S S S ""E
Y Y Y Y T Y Y Y Y Q

MSG #1
MODE = MSG EDIT

1.27 Next, move the cursor under the character to be changed and enter the character or characters (IN HEX) that are needed.

NOTE: To display the message in HEX, press the HEX key.

32 32 32 32 37 FF 32 32 32 32 60 60 40 40 2D

MSG #1
MODE = MSG EDIT

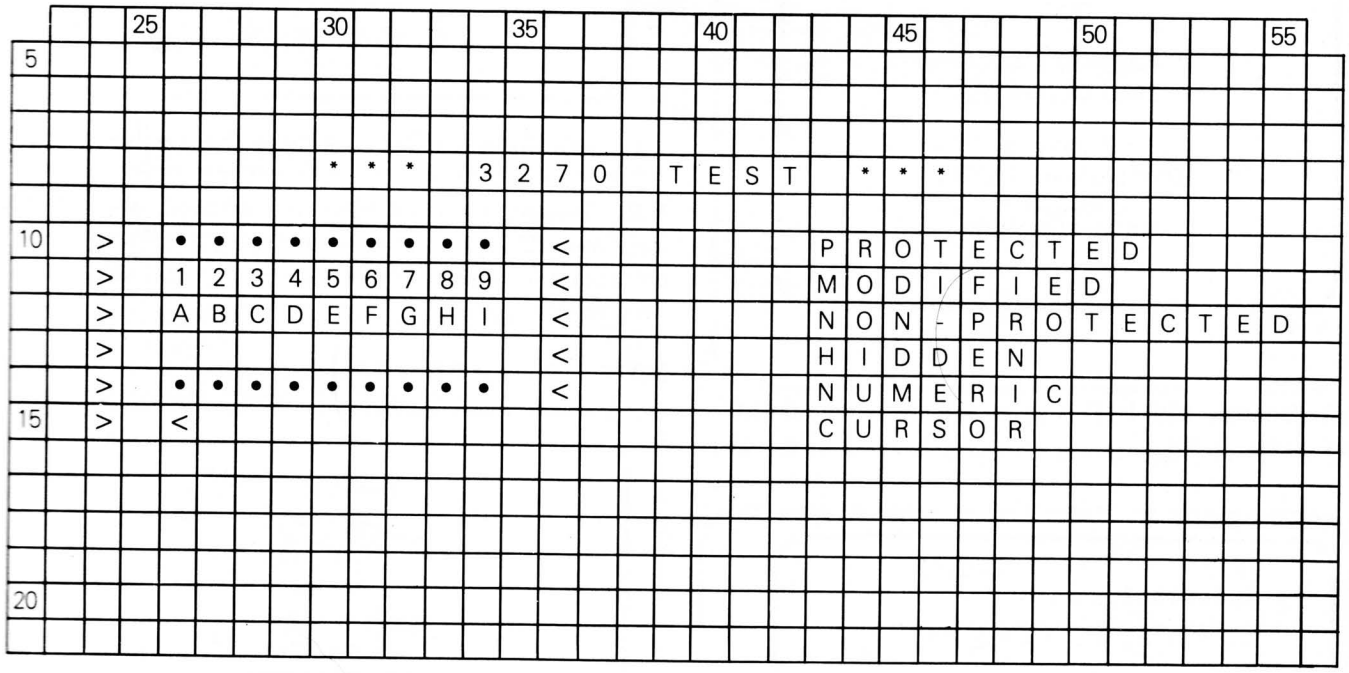
1.28 Now press the COMMAND MODE key and then the RUN PROGRAM key to execute the program.

PROGRAM INDEX

1.29 PROGRAM-ATRBTST: Attribute Test

1.30 This program displays and exercises the attributes of control unit 0 (zero) and device 0 (zero). The user can modify the address in the message editor.

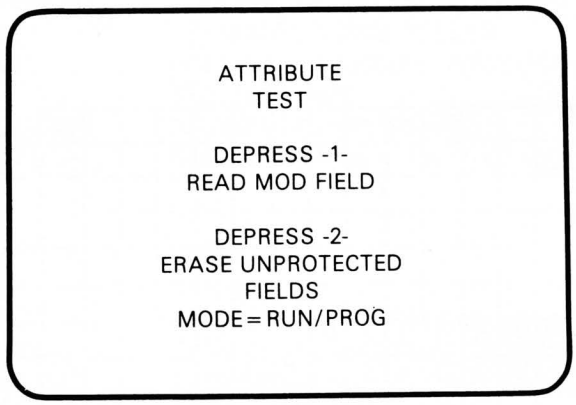
Terminal Display



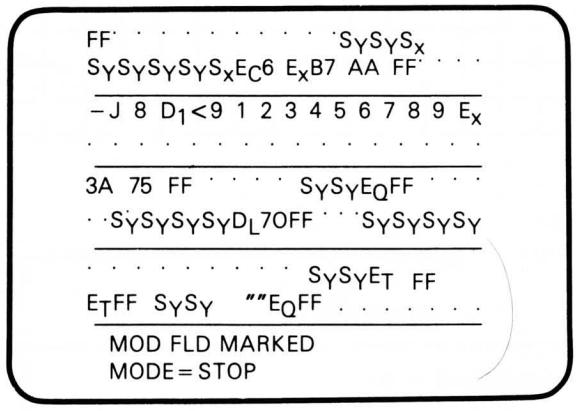
Terminal Attributes

CRT DISPLAY	ATTRIBUTE	COMMENT
3270 TEST	HIGHLIGHTED	Fields are intensified or blinked
> ..... <	PROTECTED	The field between the indicators cannot be overwritten from the keyboard. Space to the left of field contains the word "ERROR", which is erased by an EUA Order. If the word "ERROR" is displayed the EUA has not been properly processed.
> 123456789 <	MODIFIED	A field set as modified will cause the field to be sent to the LCU upon POLL AND READ MODIFIED command.
> ABCDEFGHI <	NON-PROTECTED	In this field operator may enter, alter, edit and update information.
	HIDDEN	Fields specified as HIDDEN are not printed or displayed. The word "ERROR" is between the indicators but should appear blank.
> ..... <	NUMERIC	This field accepts only numbers, commas, periods and dollar signs.
> <	CURSOR	Cursor appears between the field indicators.

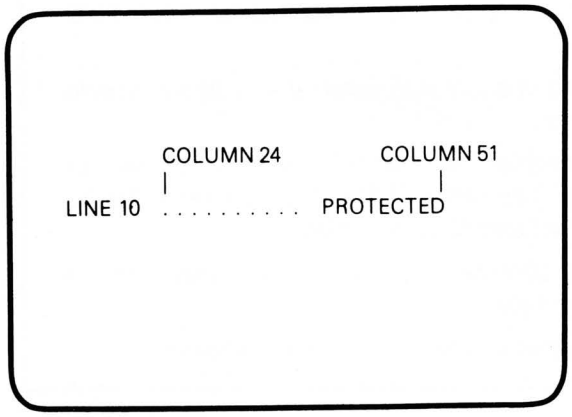
1.31 After the ATTRIBUTES are displayed (TERMINAL CRT), the D-101 will prompt the user for a READ MODIFIED FIELD or ERASE UNPROTECTED FIELDS.

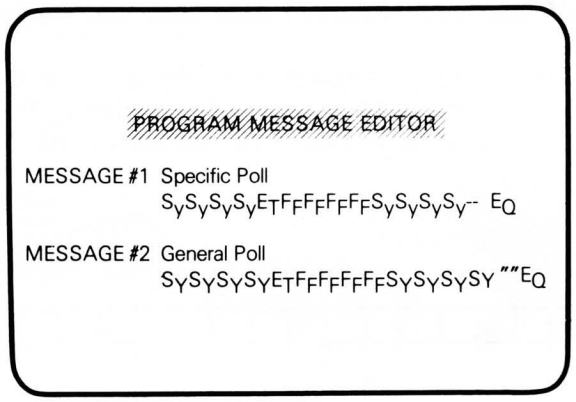


1.32 Depress key 1 (D-101) to display the modified field on the D-101.



1.33 Depress key 2 to erase all fields that are NOT PROTECTED.

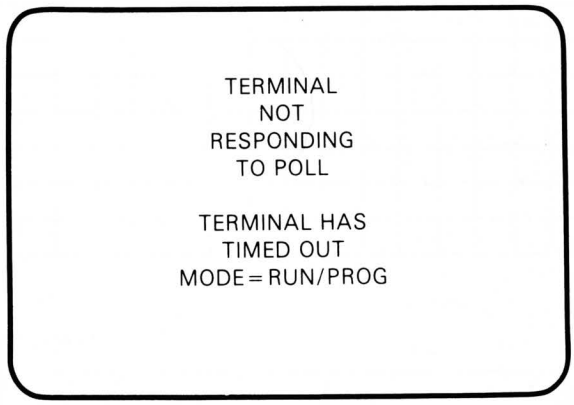




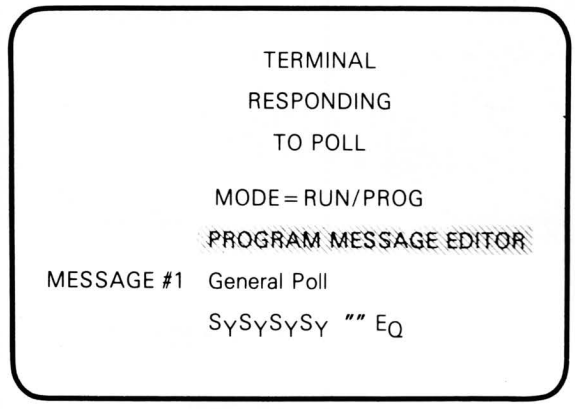
1.34 PROGRAM-POLL: Polling the Terminal

1.35 This program will POLL the terminal, wait for a response (EOT) and continue to POLL the terminal. The program will stop if the response is not an EOT (END OF TRANSMISSION).

NOTE: Depress DSPL DATA key for real-time display.



NO RESPONSE



1.36 PROGRAM-POLRESP: Response Time to a Poll

1.37 This program will give the user a response time of the terminal being polled. After a GENERAL POLL is received the timer is executed waiting for an EOT(END OF TRANSMISSION) to stop the timer.

```
RESPONSE TIME
IS EQUAL TO
TIMER 1

DEPRESS
CTR/TMR KEY

MODE=STOP
```

1.38 Press the CTR/TMR KEY for the response time located in TIMER 1.

```
TERMINAL
DID NOT RESPOND
WITHIN
3 SECOND
PERIOD
MODE=STOP
```

1.39 This message will be displayed if a response was not found in 3 seconds.

```
PROGRAM MESSAGE EDITOR

MESSAGE #1  MATCH STRING    ""EQ

MESSAGE #2  MATCH STRING    ET
```

1.40 PROGRAM-TXTRSP: Average Response Time of Text Messages

1.41 This program determines the average response time of text messages from a particular device and measures the time between a request being initiated from a device and the end of the text message response to that device.

```
TERMINAL ADDRESS
NOT FOUND

USE MESSAGE
EDITOR TO
SET ADDRESS IN
TEXT MSG #1

MODE=STOP
```

1.42 If above message is displayed check terminal address.

```
*TEST COMPLETED*
AVERAGE
RESPONSE TIME
IS EQUAL TO
TIMER #1
DIVIDED BY
COUNTER #1

MODE=STOP
```

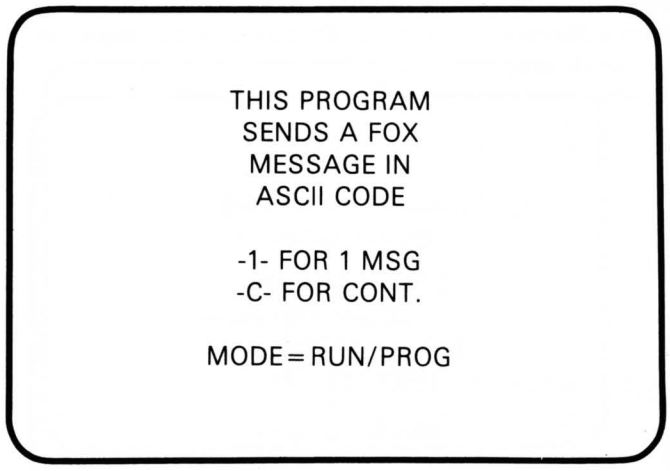
1.43 Divide COUNTER #1 into TIMER #1 for the average response time.

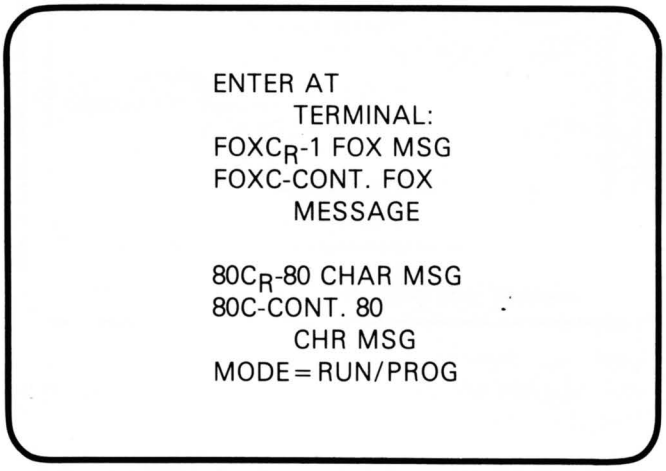
```
PROGRAM MESSAGE EDITOR

MESSAGE #1  DEVICE ADDRESS
            -- EQ (HEX 60 60 40 40 2D)
```

1.44 **PROGRAM-AFOX: ASYNC FOX Message**

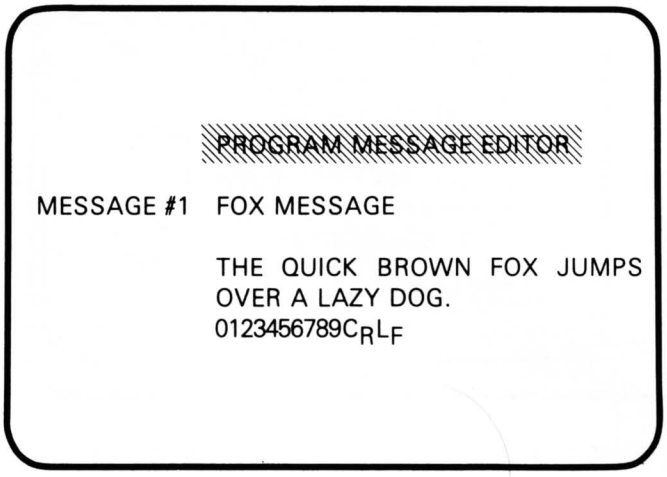
1.45 This program will generate a FOX message (ASCII CODE) once or continuously.

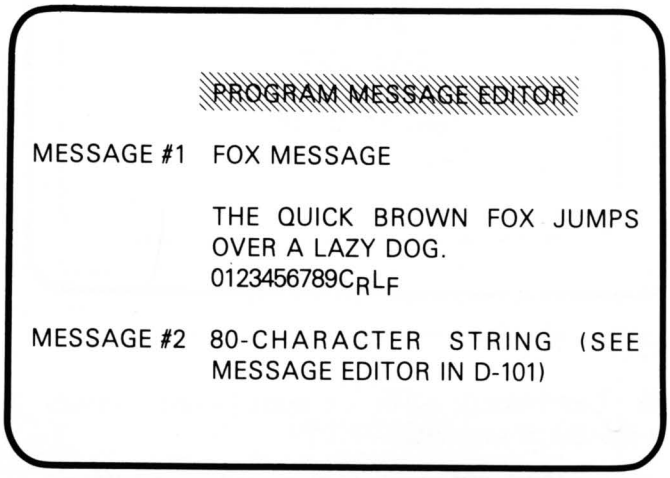




1.46 Depress KEY 1 for one message or KEY C for continuous.

1.49 Above display prompts user for TERMINAL entry.





1.47 **PROGRAM-FOX3: FOX Message or 80-Character String**

1.48 This program will transmit a FOX message or an 80-character string depending on the entry on the TERMINAL. If 80 CARRIAGE RETURN or FOX CARRIAGE RETURN is entered the message will be sent ONE time, OR if the letter "C" follows FOX and 80 (FOXC or 80C) the message will be sent continuously.

1.50 **PROGRAM-AREXMIT: Retransmit Test**

1.51 The user has the ability to type in any message ending with a CARRIAGE RETURN on the TERMINAL. When the D-101 detects a CARRIAGE RETURN, the message will be RETRANSMITTED back to the TERMINAL.

EXAMPLE: ENTRY FROM TERMINAL (This is a testC$_R$)
TO TERMINAL (YOUR MESSAGE WAS: This is a test)

THIS PROGRAM
WILL RETRANSMIT
ANY MESSAGE SENT
FROM THE TERMINAL

TERMINATE MSG
WITH A C_R

MODE = RUN/PROG

D-101 USER PROMPT

PROGRAM MESSAGE EDITOR

MESSAGE #1 MATCH STRING (C_R)

MESSAGE #2 MATCH STRING (L_F)

1.52 **PROGRAM-BFOX: Baudot Code "FOX" Message**

This program will generate a FOX message once or continuously. The configuration can be altered to the customer's application.

SPEED	:75
FRAMING	:ASYNC-5
PARITY	:NONE
DISPLAY	:FDX
CODE	:HEX
STOPBITS	:1
EOF = OD	:END OF TRANSMISSION

THIS PROGRAM
SENDS A FOX
MESSAGE IN
BAUDOT CODE

-1- FOR 1 MSG
-C- FOR CONT.

MODE = RUN/PROG

1.53 Depress KEY 1 for one message or KEY C for continuous.

PROGRAM MESSAGE EDITOR

MESSAGE #1 FOX MESSAGE
THE QUICK BROWN FOX JUMPS
OVER A LAZY DOG.
0123456789$C_R L_F$

1.54 **PROGRAM-CFOX: Correspondence Code "FOX" Message**

1.55 This program will generate a FOX message once or continuously. The configuration can be altered to the customer's application.

SPEED	:75
FRAMING	:ASYNC-7
PARITY	:ODD
DISPLAY	:FDX
CODE	:HEX
STOPBITS	:1
EOF = 3C	:END OF TRANSMISSION

THIS PROGRAM
SENDS A FOX
MESSAGE IN
CORRESPONDENCE
CODE

-1- FOR 1 MSG
-C- FOR CONT.
MODE = RUN/PROG

1.56 Depress KEY 1 for one message or KEY C for continuous.

PROGRAM MESSAGE EDITOR

MESSAGE #1 FOX MESSAGE
THE QUICK BROWN FOX JUMPS
OVER A LAZY DOG.
0123456789$C_R L_F$

1.57 USER CONFIDENCE TEST

1.58 The D-101 power on/reset user confidence test (also referred to as "self-test") is actually a series of automatically initiated tests of ROM, RAM, video display, input buffer, and front panel keyboard. All tests are automatically implemented except for the keypad test, which requires operator intervention (if the operator chooses to do it). The self-test is started upon depression of the D-101 rear panel POWER switch to its ON position; it may also be initiated by concurrent depression of the RESET and STOP/RESET keys.

1.59 The self-test consists of three separate tests which are executed in a continuous loop that is sustained until one of the following occurs:

a. An error is detected. If this occurs, the sequence of tests is halted, and an error message is automatically displayed. The error message (see Table A-1 for detailed descriptions of error messages) identifies the failing test and gives specific information regarding the failure (e.g., memory address where failure occurred, the input test data, and the data found to be in error).

b. The COMMAND key is depressed while test 3 is in effect (D101 CONF TEST displayed on screen). This action terminates testing and invokes the D-101 Command mode; this is the normal method of exiting the self-test.

1.60 Test 1 (ROM Verify Test) computes two 16-bit checksum values for each Operating System ROM and compares the results to stored checksum values. If an error is detected, the failing ROM is identified on the CRT.

1.61 Test 2 (RAM Verify Test) executes four separate tests of the 16K dynamic RAM and the video display RAM. If an error is detected, the failing RAM test number, memory address where the error occurred, test pattern involved, and error data are identified in the error message.

1.62 Test 3 (Video Display, Input Buffer Transfer, and Keypad Test) writes data to the input buffer to verify proper functioning of the display memory and input buffer data transfer, and also allows for keypad testing. (Operator intervention using the keyboard is required if keypad testing is desired.) All character sets included in the D-101 under test are displayed sequentially in full-screen patterns. The first display page of each set contains the characters corresponding to character codes 00-7F, and the second page of each set contains the characters corresponding to 80-FF. The third and fourth pages display the same sequence, but in shifted mode. The characters are displayed in ascending order of character code on each line. The display changes to the next display page once every five seconds.

1.63 For one complete cycle of test 3, the displays sequence (in order) through the hex, user (default = EBCDIC), ASCII, and EBCDIC code sets. The characters are displayed in "normal video" (white-on-black, full intensity) only for all code types except hex, resulting in four screens of characters (2 unshifted, then 2 shifted) for each of the non-hex code sets. Additionally, for the hex code set only, attribute modes are presented (also shifted and unshifted) and the following display sequence occurs, resulting in a total of 20 hex code displays:

a. Normal video

b. Negative video (screen ID = INVIMG)

c. Underlined, in normal video (screen ID = UNDLIN)

d. Low intensity (screen ID = LOWINT)

e. Dummy dot, in normal intensity (screen ID = DDOT)

1.64 The identifiers: D101 CONF TEST, character code range (00-7F or 80-FF), code type or attribute being tested, and unshifted/shifted status (blank or SHF) are displayed in the bottom area of the screen during test 3. If the FREEZE key is depressed while in test 3, the display will be frozen until the ENTER key is depressed. Depressing any key except the COMMAND or ENTER keys while the display is frozen will cause the hex code of the depressed key (i.e., key test value) to be displayed on line 10, character position 16. This permits manual testing of each key individually (if desired) by the operator. Proper functioning of the COMMAND and ENTER keys may be verified by observing that the appropriate response occurs when the key is depressed (COMMAND key invokes Command mode and ENTER key unfreezes display). The proper key test values are presented in Table E-1.

1.65 The displays in test 3 may be "stepped through" at an accelerated rate without waiting the full five seconds for displays to change by alternately depressing the FREEZE and ENTER keys repeatedly to activate the next display in the sequence. To use this feature properly, the two keys should not be depressed simultaneously or operated at rates that are too fast to permit the display to respond.

1.66 After each block of data is written into the input buffer, the transfer is verified by comparing the current input buffer block to the corresponding block written into the display memory. If an error is detected, the input buffer and display memory addresses and data involved in the failure are identified in the error message.

Table A-1. Self-Test Error Messages.

TEST NO.	TEST NAME	ERROR MESSAGE DESCRIPTION
1	ROM Verify	Error Message: ROM# CHECKSUM ERROR where: # = failing ROM number
2	RAM Verify	Error Message: RAM ERROR TEST# ADDR--xxxx tp ed where: # = RAM test number that failed (1-4) xxxx = memory address where error occurred tp = test pattern ed = error data
3	Video Display, Input Buffer Transfer and Keypad Test	Error Message: XFRERR-iiii = id vvvv = vd where: iiii = input buffer address id = input buffer data vvvv = video buffer address vd = video buffer data

Technical Specifications.

CATEGORY	SPECIFICATIONS
MECHANICAL DATA	• Case Construction: ABS plastic (fire retardant) • Color of Case: Blue • DIMENSIONS: 5 in. h x 14-1/2 in. w x 13-3/4 in. d (12.7 cm x 26.8 cm x 24.9 cm) • Weight: 14.5 lbs (6.6 kg)
ENVIRONMENTAL DATA	• Ambient Temperature Range: Operating, + 50 to 122 °F (+ 10 to + 50 °C); Storage, − 40 to + 149 °F (− 40 to + 65 °C) • Humidity: 10 to 80 percent, noncondensing • Altitude: 10,000 ft (3048 m)
DATA COMMUNICATION CHARACTERISTICS	• Transmission Rates: 31 to 19,200 bps with clock error less than ± 0.5 percent of bit rate • Transmission Modes: Asynchronous, Synchronous, and SDLC Direct or NRZI • Number of Start/Stop Bits (asynchronous mode): 1 start bit; 1, 1.5, or 2 stop bits • Character Length (including parity bit): 8, 7, 6, or 5 bits • Parity: Even, odd, or none • Data Justification: Toward least significant bit • Error Detection: Block Check Character generation and checking (LRC-8, CRC-16, or CRC-CCITT type)
VIDEO DISPLAY	• Display Type: Black and white, raster-scanned; alphanumeric dot matrix characters with two levels of intensity • CRT Type: 3-inch diagonal, with integral implosion protection; P4 (white) phosphor screen
DATA ENTRY AND OPERATING CONTROLS	• Front panel tactile-feedback membrane switches
POWER REQUIREMENTS	• AC Input Voltage: 115/230 Vrms ± 10 percent • Power: 140 watts • Fusing: 2A/250 V normal blow for 115 V ac; 1A/250 V normal blow for 230 V ac • Internal Power Supply Outputs: + 5, − 5, + 12, and − 12 V dc

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