911NA DATA TEST SET
DESCRIPTION AND OPERATION

CONTENTS PAGE

(DMS). It is used to test transmission and reception of low-speed data signals from terminal equipment such as teletypewriters (TTYs).

Fig. 1—911NA DTS—Cover in Place

1. GENERAL

1.01 This section provides a physical and functional description as well as the operating theory necessary for effective use of the 911NA data test set (DTS).

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The 911NA DTS will be referred to in this section as "the DTS".

1.04 The DTS (Fig. 1) is a small portable integrated test set which is comprised of a test sentence generator (TSG) and a distortion measuring set

1.05 The DTS provides all the features of the 911A DTS plus several additional features not provided by the 911A DTS. New features of the DTS include the following.

(a) Baudot and American National Standard Code for Information Interchange (ASCII) "fox" test messages are built in and, therefore, do not require separate plug-in matrix boards.

(b) Three selectable line lengths are available for the ASCII code:

(1) A short 38 characters-per-line test

(2) A normal 77 characters-per-line test

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(3) A long 137 characters-per-line test.

(c) Up to three selectable characters are generated for testing selective calling stations in either Baudot or ASCII codes.

(d) The DTS generates marking bias, spacing bias, switched bias, marking end distortion, spacing end distortion, switched end distortion, and switched combination distortion in 1-percent steps ± 1 from 0 to 49 and counts distortion peaks in 5-percent steps from 5 to 40.

(e) It recognizes odd or even parity errors and displays a count of 0 to 99 errors.

(f) It generates continuous one-character-at-a-time or repetitive character transmission.

(g) The DTS uses light-emitting diodes (LEDs) to display the state (mark or space) of each element of successive characters as they are received to provide character identification.

(h) It provides 13 crystal-controlled baud rates, from 45.5 to 1800 baud and is capable of using an external clock source.

Note: The external clock source ***must*** be 100 times the desired bit rate.

(i) Up to 95 percent of the DTS may be self-tested by setting the INPUT switch to TST which connects the TSG circuits of the DTS to the distortion measuring circuits of the DTS.

(j) The DTS provides for Electronic Industries Association (EIA), hub, and neutral modes of operation.

1.06 A 911P EIA test adapter (Fig. 2) may be used in conjunction with the DTS to aid in accessing the data set EIA interface when testing. The cords used for connection between the DTS and the 911P are provided with the DTS; however, the 911P must be ordered separately.

2. PHYSICAL DESCRIPTION

2.01 The DTS is an integrated unit measuring 10 inches high, 12 inches wide, 6 inches deep with the cover off, 8 inches deep with the cover on, and weighing approximately 20 pounds with its cover in place.

2.02 The cover (Fig. 3), in addition to providing protection for the front panel of the test set, provides a storage compartment which is used to store the test leads supplied with the test set and can also accommodate a 911P EIA test adapter.

2.03 The label shown in Fig. 4 is attached to the inside of the cover. It is comprised of three tables showing the following:

- Switch position and corresponding baud rate of the BAUDS switch on the DTS
- The 512 different combinations possible with the 4-row/8-level ASCII code
- The 58 different combinations possible with each 3-row/5-level teletype code.

2.04 The DTS is powered by a self-contained power supply which draws about 40 watts of 105- to 135-volt 50- to 60-Hz commerical power. The power supply is fused with a 1/2-amp fuse that is accessed by turning the four quick-release screws shown in Fig. 5 counterclockwise and removing the DTS from the case. The location of the fuse holder is shown in Fig. 6. Two spare fuses (not shown) are mounted on the rear of the unit.

2.05 The DTS is designed to operate efficiently in an environment with an ambient temperature range of 40 to 120°F and a relative humidity of 20 to 95 percent.

2.06 The front panel of the DTS is shown in Fig. 7. The left-hand side comprises the TSG, while the right-hand side is used as a DMS. For self-testing, the TSG is internally connected to the DMS when the INPUT switch is set to TST.

2.07 Figures 8 and 9 provide number-keyed callouts of all components located on the front panel of the DTS. Figure 8 and its associated Table A are concerned with the TSG and power, while Fig. 9 and its associated Table B are concerned with the DMS portion of the DTS.

3. FUNCTIONAL DESCRIPTON

3.01 The following functional description describes the 911NA DTS. Figure 10 shows a functional block diagram of the TSG and DMS which comprise the 911NA DTS. The TSG is connected to the

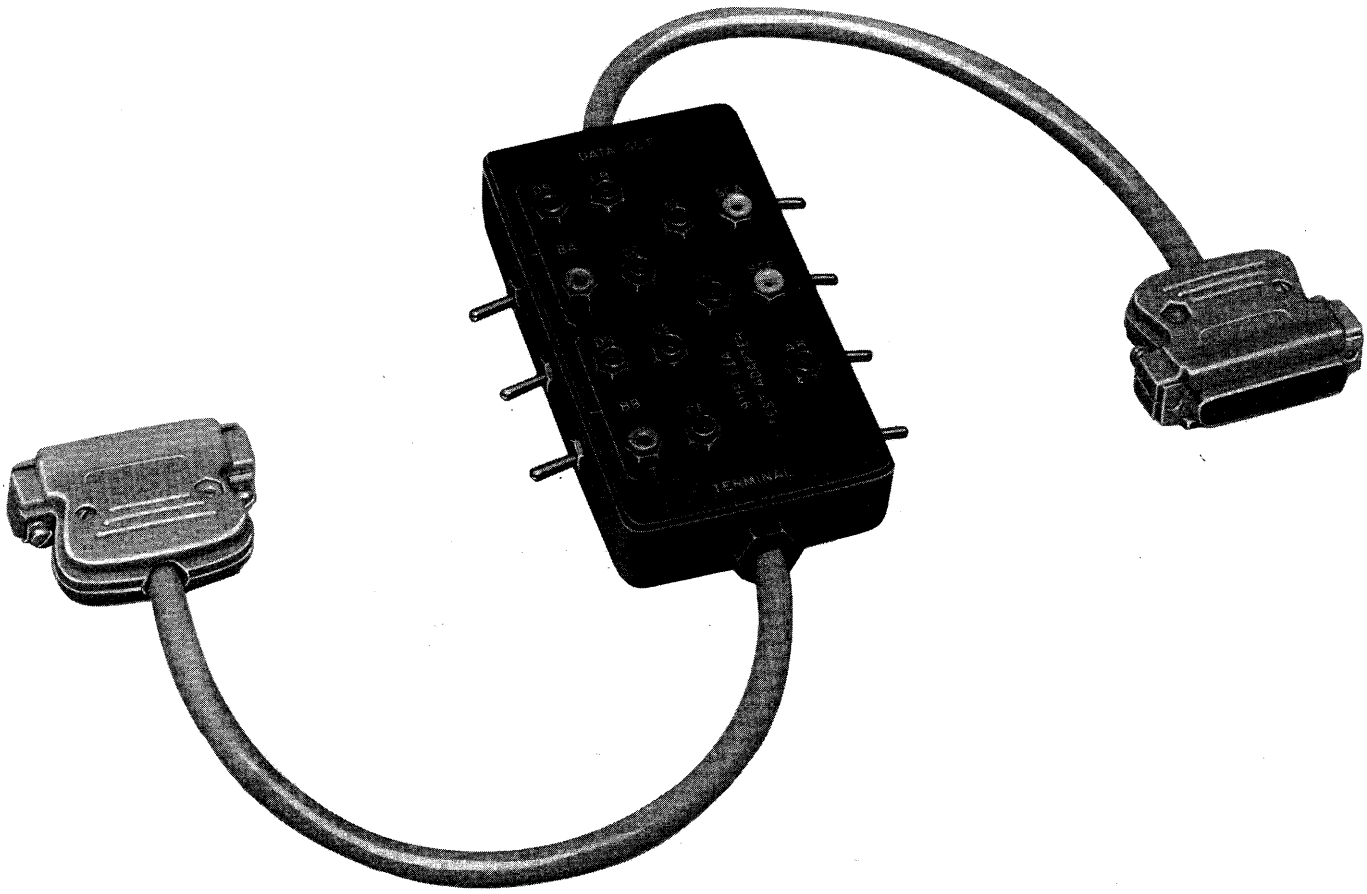

Fig. 2—911P EIA Test Adapter

DMS through the INPUT switch to facilitate self testing of the DTS.

A. Overall Function

3.02 The TSG is arranged to transmit the fox test message sentence or the 1-, 2-, or 3-character selectable message. The message is synchronized with other test equipment via the element (EL) or character (CH) framer outputs as required.

3.03 The type of equipment to be tested determines the settings of the CODE and BAUDS switches. These switches are common to both the TSG and the DMS; therefore, the generating and measuring sections are always set to the same code and speed.

3.04 The TSG will transmit either ASCII or Baudot codes with any of the following types of distortion in 1-percent increments ± 1 up to 49 percent:

- Marking bias (MB)
- Spacing bias (SB)
- Switched bias (SWB)
- Marking end (ME)
- Spacing end (SE)
- Switched end (SWE)
- Switched combination (SWC).

3.05 The TSG provides voltage output jacks for use with low voltage hub or EIA interface equipment. Additionally, neutral loop output jacks,

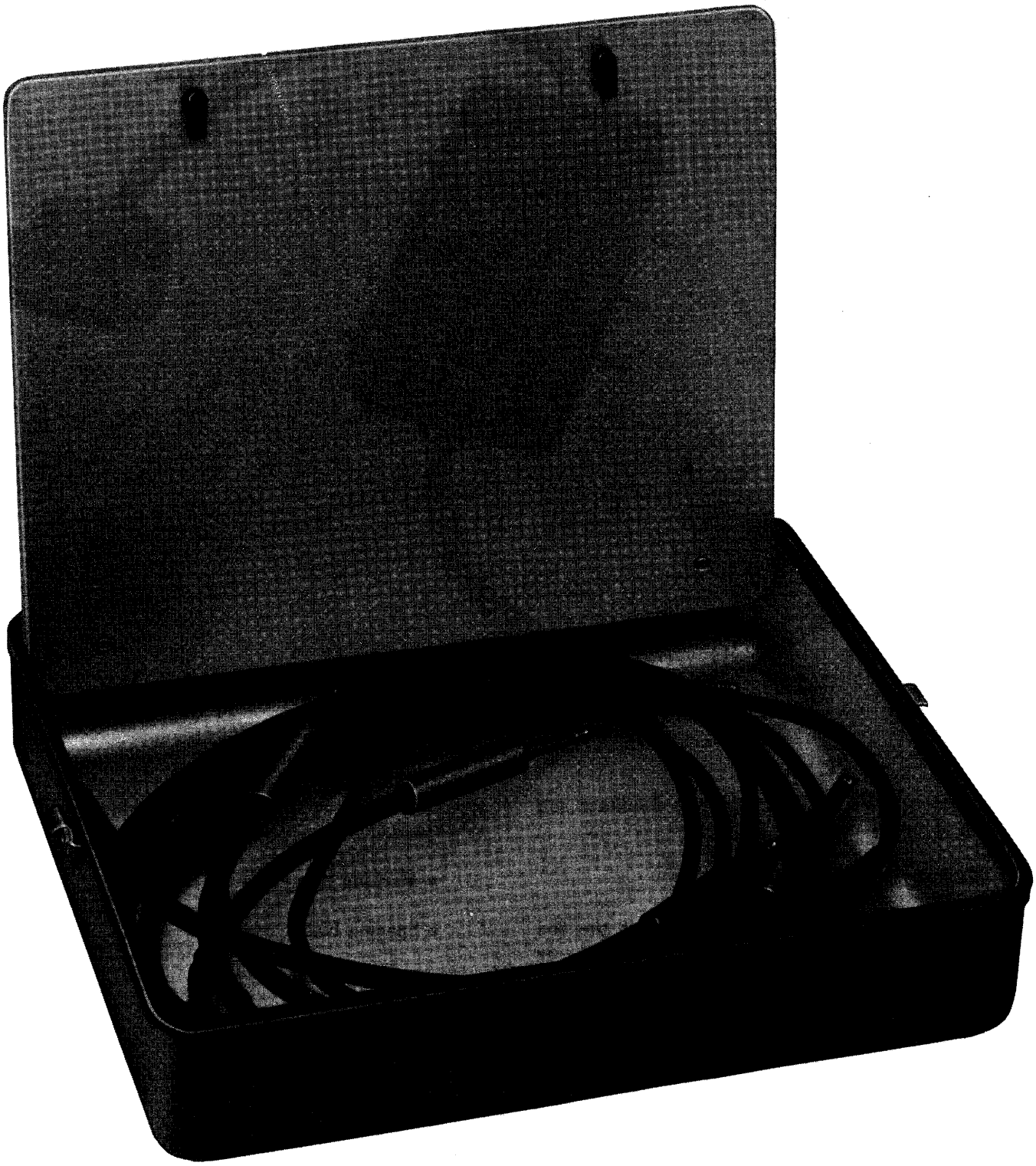

Fig. 3—Storage Compartment Inside 911NA DTS Cover

BAUDS	
1 45.5	11 1050
2 56.9	12 1200
3 61.1	13 1800
4 74.2	14
5 75	15
6 110	16
7 134.5	17
8 150	18
9 300	19
10 600	20 EXT

4 ROW/8 LEVEL ASCII CODE

BITS											
7→					●	●	●	●			
6→			●	●			●	●			
5→		●		●		●		●			
4↓ 3↓ 2↓ 1↓	0	1	2	3	4	5	6	7			
					0	NUL	DLE	SP	0	@	P	`	p
				●	1	SOH	DC1	!	1	A	Q	a	q
		●			2	STX	DC2	"	2	B	R	b	r
		●	●		3	ETX	DC3	#	3	C	S	c	s
	●				4	EOT	DC4	$	4	D	T	d	t
	●		●		5	ENQ	NAK	%	5	E	U	e	u
	●	●			6	ACK	SYN	&	6	F	V	f	v
	●	●	●		7	BEL	ETB	'	7	G	W	g	w
●					8	BS	CAN	(	8	H	X	h	x
●			●		9	HT	EM	)	9	I	Y	i	y
●		●			10	LF	SUB	*	:	J	Z	j	z
●		●	●		11	VT	ESC	+	;	K	[	k	{
●	●				12	FF	FS	,	<	L	\	l	¦
●	●		●		13	CR	GS	−	=	M	]	m	}
●	●	●			14	SO	RS	.	>	N	^	n	~
●	●	●	●		15	SI	US	/	?	O	_	o	DEL

◥ INDICATES 8th BIT MARKING FOR EVEN PARITY

● INDICATES MARK

3 ROW/5 LEVEL TELETYPE CODES

FIGS	WEA	↑	⊕	○	↗	3	→	↘	↓	8	↙	←	↖	·	◐	9	∅	1	4	BELL	5	7	◑	2	/	6	+	−	LTRS	FIGS	SP	CR	LF
	FRAC	−	⅝	⅛	$	3	¼	&		8	'	½	¾	·	⅞	9	0	1	4		5	7	⅜	2	/	6	"		BLK					
	COMM	−	?	:	$	3	!	&	#	8	'	(	)	·	,	9	0	1	4		5	7	;	2	/	6	"							
	LETTERS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z							
	1	●	●		●	●	●				●	●						●		●		●		●	●	●	●			●	●			
	2	●		●				●		●	●	●	●				●	●	●			●	●	●						●	●			●
	3			●			●		●	●		●		●	●		●	●		●			●	●		●	●				●		●		
	4		●	●	●		●	●			●	●		●	●	●			●					●		●					●	●		●	
	5		●					●	●				●	●			●	●	●		●		●	●	●	●	●				●	●			

Fig. 4—911NA DTS Cover Label

postive battery on tip (T+), and negative battery on tip (T−), are provided.

3.06 The DMS receives neutral current inputs via the T+ or T− input jacks and high or low EIA voltages or high voltage hub inputs via the VOLT input jack. The INPUT switch must be set to the corresponding type of signal being inputted as determined by the type of equipment being tested. When self-testing the DTS, the INPUT switch is set to TST.

3.07 The received signal is synchronized by the character framer to keep the DTS in time with the signal. Signals received by the DMS are displayed on the signals (SIGS) LED.

3.08 When the distortion level of the received signal is higher than the setting of the

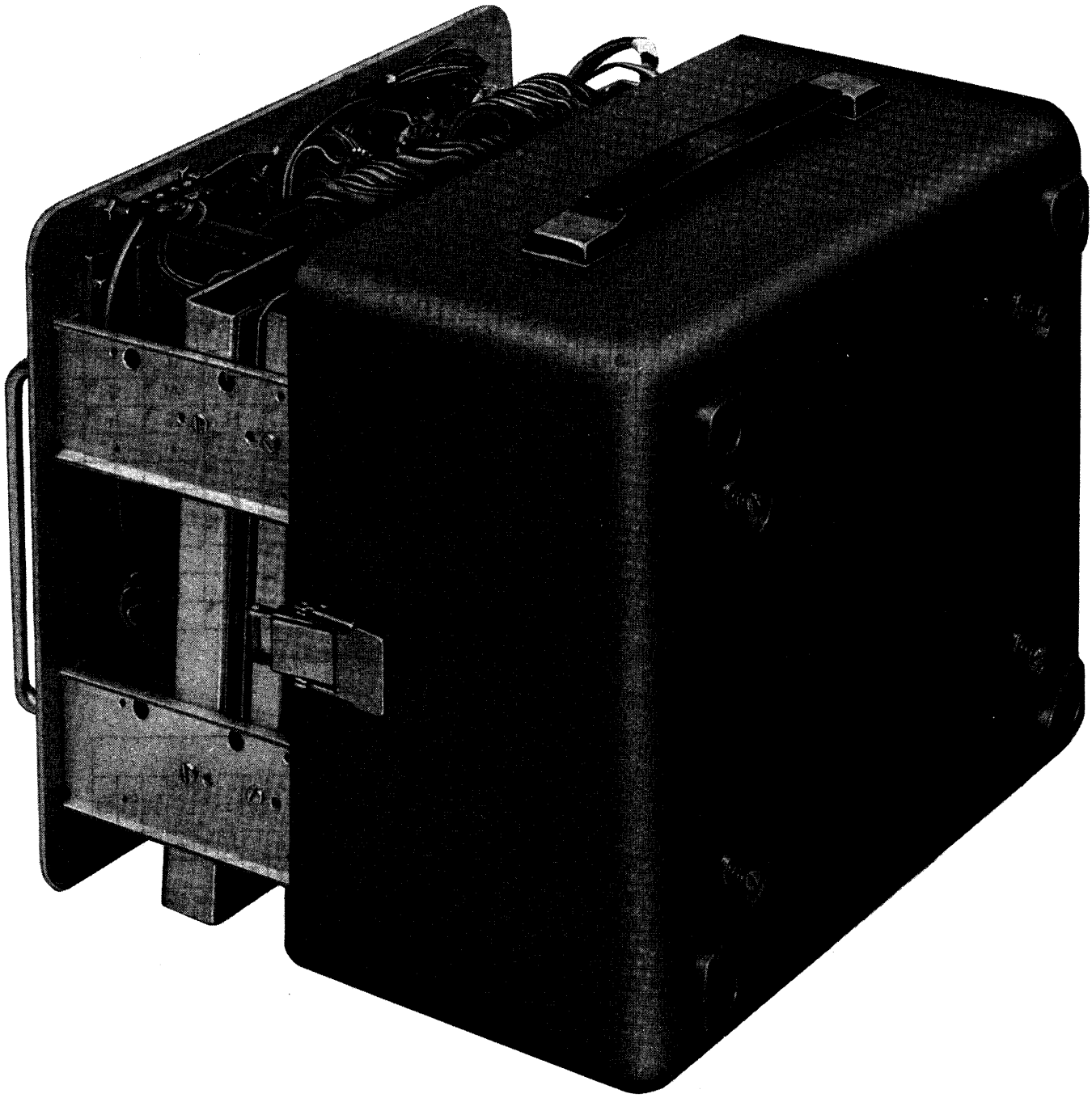

Fig. 5—911NA DTS—Rear Cover Removal

DISCR % (percent distortion discrimination), the appropriate distortion LED (MB, SB, ME, SE) lights, depending upon the type of distortion.

3.09 The 2-digit DISPLAY displays the percent of distorted characters, counts the actual number of distorted characters, or counts the number of parity errors, up to a maximum of 99.

3.10 The RECEIVED CHARACTERS LEDs are used to display the last character received,

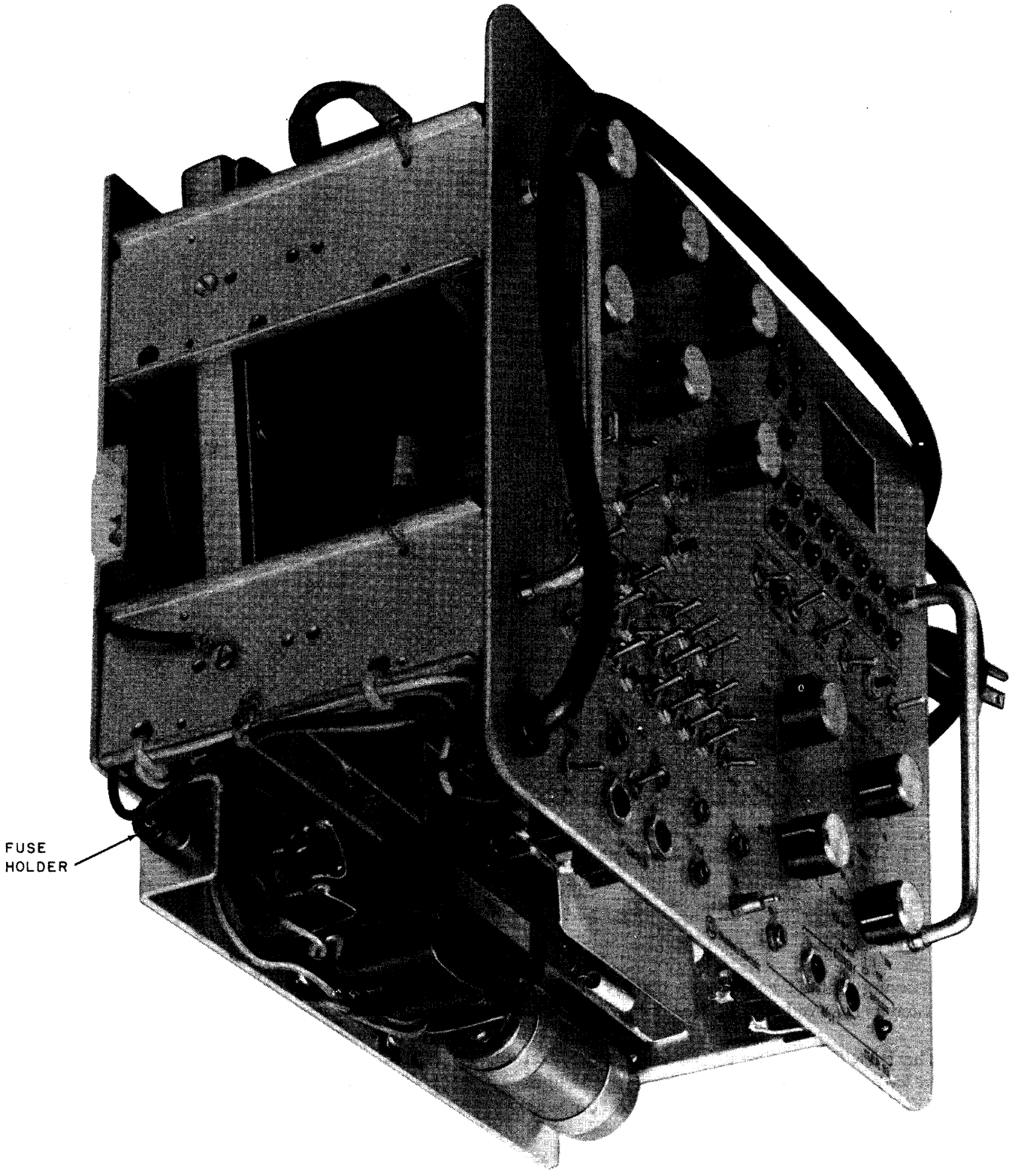

Fig. 6—911NA DTS—Rear Cover Removed

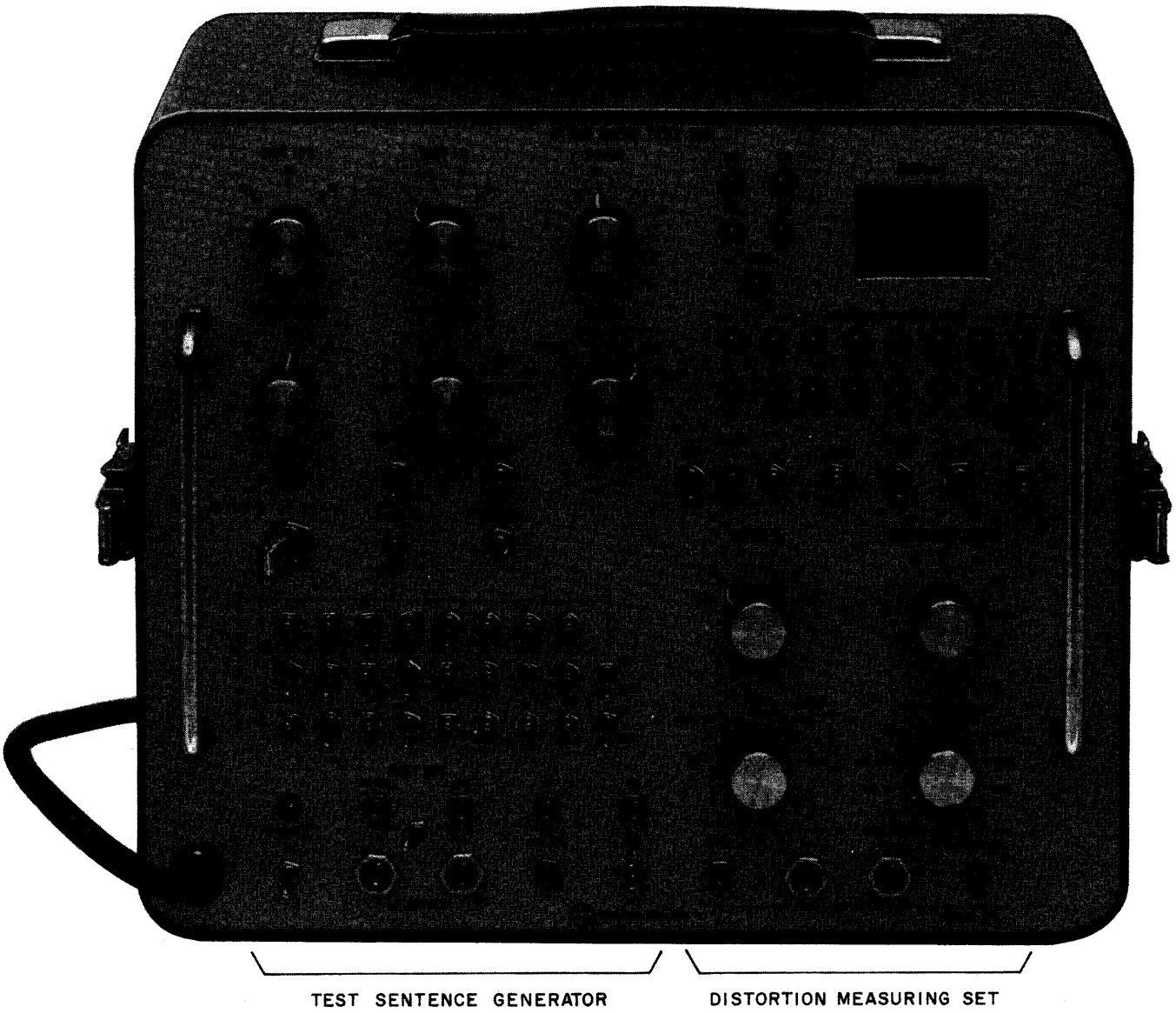

Fig. 7—911NA DTS Front Panel

when receiving Baudot code, or to display the last two characters received, when receiving ASCII code.

3.11 The PARITY portion of the DMS can be set to look for odd or even parity and will light the PARITY ERROR LED when a character with the wrong parity is received.

B. TSG Function

3.12 Figure 11 shows the six switches on the TSG that are used to set up the type test sentence to be generated.

3.13 The DIST 10% (distortion in 10-percent increments) and DIST 1% (distortion in 1-percent increments) are used to insert a specified amount of distortion in 1-percent increments ± 1 up to 49 percent.

3.14 The BAUDS switch provides access to the 13 different crystal-controlled baud rates provided by the DTS. Provision is also made for accessing an external clock connected to the EXT CLK jack. Table C shows the proper switch position for the desired baud rate.

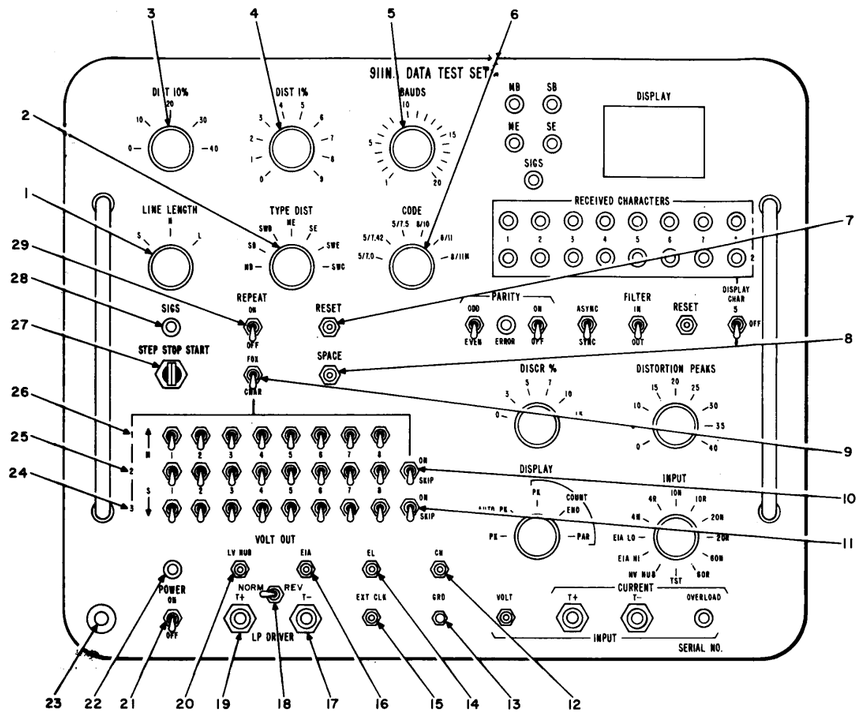

TABLE A

911NA DTS CONTROLS AND INDICATORS
TEST SENTENCE GENERATOR SIDE

KEY	CONTROL	FUNCTION
1	LINE LENGTH	SELECTS: S(SHORT - 38 CHAR/LINE) N(NORMAL - 77 CHAR/LINE) L(LONG - 138 CHAR/LINE)
2	TYPE DIST	CONTROLS TYPE OF DISTORTION GENERATED
3	DIST 10%	CONTROLS AMOUNT OF DISTORTION GENERATED IN 10% STEPS
4	DIST 1%	CONTROLS AMOUNT OF DISTORTION GENERATED IN 1% STEPS
5	BAUDS	SELECTS SPEED IN BAUDS OF SIGNAL GENERATED
6	CODE	SELECTS TYPE OF CODE FOR SIGNAL GENERATED
7	RESET	CLEARS ALL COUNTERS AND PREPARES THE TSG TO TRANSMIT THE 3-CHARACTER SELECTABLE MESSAGE OR FOX SENTENCES FROM THE BEGINNING
8	SPACE	TSG TRANSMITS CONTINUOUS SPACE WHILE DEPRESSED
9	FOX/CHAR	SELECTS EITHER FOX OR 3-CHARACTER SELECTABLE MESSAGE
10	ON/SKIP	ALLOWS THE SECOND CHARACTER OF THE 3-CHARACTER SELECTABLE MESSAGE TO BE TRANSMITTED OR SKIPPED
11	ON/SKIP	ALLOWS THE THIRD CHARACTER OF THE 3-CHARACTER SELECTABLE MESSAGE TO BE TRANSMITTED OR SKIPPED
12	CH	CHARACTER FRAMER PULSE OUTPUT JACK
13	GRD	GROUND TERMINAL - PROVIDES EXTERNAL GROUND FOR TEST SET
14	EL	ELEMENT FRAMER PULSE OUTPUT JACK
15	EXT CLK	EXTERNAL CLOCK INPUT JACK
16	VOLT OUT - EIA	EIA VOLTAGE OUTPUT INFORMATION FROM TSG
17	LP DRIVER T-	NEUTRAL LOOP OUTPUT - HAS NEGATIVE BATTERY ON TIP SIDE
18	NORM/REV	INTERFACE POLARITY SWITCH NORMAL OR REVERSE WORKS WITH VOLT OUT AND LP DRIVER
19	LP DRIVER T+	NEUTRAL LOOP OUTPUT - HAS POSITIVE BATTERY ON TIP SIDE
20	LV HUB	LOW VOLTAGE HUB OUTPUT SIGNALS FROM TSG
21	POWER ON/OFF	TURNS TEST SET ON AND OFF
22	POWER	PROVIDES POWER ON INDICATION
23		POWER CORD INPUT
24	3	THIRD CHARACTER OF 3-CHARACTER SELECTABLE MESSAGE
25	2	SECOND CHARACTER OF 3-CHARACTER SELECTABLE MESSAGE
26	1	FIRST CHARACTER OF 3-CHARACTER SELECTABLE MESSAGE
27	STEP STOP START	STEP POSITION-TRANSMITS ONE CHARACTER AT A TIME EACH TIME THE SWITCH IS ACTIVATED TO THE STEP POSITION STOP POSITION-GENERATOR OUTPUT MARKING START POSITION-TRANSMITS FOX CONTINUOUSLY OR TRANSMITS THE 3-CHARACTER SELECTED MESSAGE ONE TIME
28	SIGS	PROVIDES OUTPUT STATUS INDICATION OF TSG
29	REPEAT ON/OFF	REPEAT ON TRANSMITS SAME CHARACTER IN FOX MESSAGE CONTINUOUSLY OR TRANSMITS THE 3-CHARACTER SELECTED MESSAGE REPEATEDLY

Fig. 8—911NA DTS—Controls and Indicators Comprising TSG

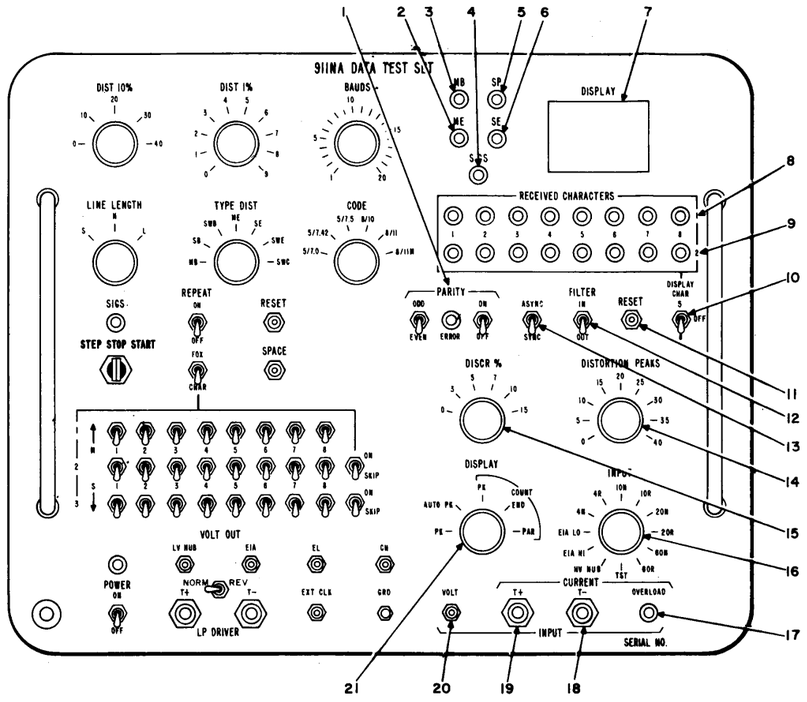

TABLE B

911NA DTS CONTROLS AND INDICATORS
DISTORTION MEASURING SIDE

KEY	CONTROL	FUNCTION
1	PARITY	(A) ODD/EVEN - SELECTS DESIRED PARITY (B) ERROR - LIGHTS WITH RECEPTION OF PARITY ERROR (C) ON/OFF - TURNS PARITY CHECK CIRCUITS ON OR OFF
2	ME	LIGHTS WHEN MARKING END DISTORTION RECEIVED
3	MB	LIGHTS WHEN MARKING BIAS RECEIVED
4	SIGS	LIGHTS WHEN MARKING SIGNAL RECEIVED
5	SB	LIGHTS WHEN SPACING BIAS RECEIVED
6	SE	LIGHTS WHEN SPACING END DISTORTION RECEIVED
7	DISPLAY	PROVIDES DECADE COUNTER READOUT FROM 0 TO 99
8	RECEIVED CHARACTERS 1	DISPLAYS LAST CHARACTER RECEIVED
9	RECEIVED CHARACTERS 2	DISPLAYS NEXT TO LAST CHARACTER RECEIVED (ASCII)
10	DISPLAY CHAR 5/OFF/8	CONDITIONS RECEIVED CHARACTERS FOR 5 OR 8 DIGIT CODE
11	RESET	RESETS DISPLAY, RECEIVED CHARACTERS, AND PARITY
12	FILTER IN/OUT	PREVENTS SPURIOUS IMPULSES
13	ASYNC/SYNC	ASYNC - WITH DISPLAY SET TO AUTO PK COUNTER AUTOMATICALLY RESET EVERY 16 CHARACTERS SYNC - WITH DISPLAY SET TO AUTO PK COUNTER AUTOMATICALLY RESETS EVERY 16 TRANSITIONS
14	DISTORTION PEAKS	PROVIDES FOR PERCENTAGE OF DISTORTION PEAKS
15	DISCR%	DETERMINES THE THRESHOLD POINT FOR LIGHTING THE MB,ME,SB, AND SE LAMPS
16	INPUT	CONDITIONS THE DTS FOR THE PROPER TYPE OF INPUT SIGNAL
17	OVERLOAD	LIGHTS WHEN INPUT CURRENT EXCEEDS 90MA
18	T - INPUT	INPUT JACK FOR NEGATIVE ON TIP CURRENT SIGNALS
19	T + INPUT	INPUT JACK FOR POSITIVE ON TIP CURRENT SIGNALS
20	VOLT INPUT	INPUT JACK FOR HIGH VOLTAGE HUB OR EIA
21	DISPLAY	SELECTS TYPE OF DISPLAY TO BE COUNTED

Fig. 9—911NA DTS—Controls and Indicators Comprising DMS

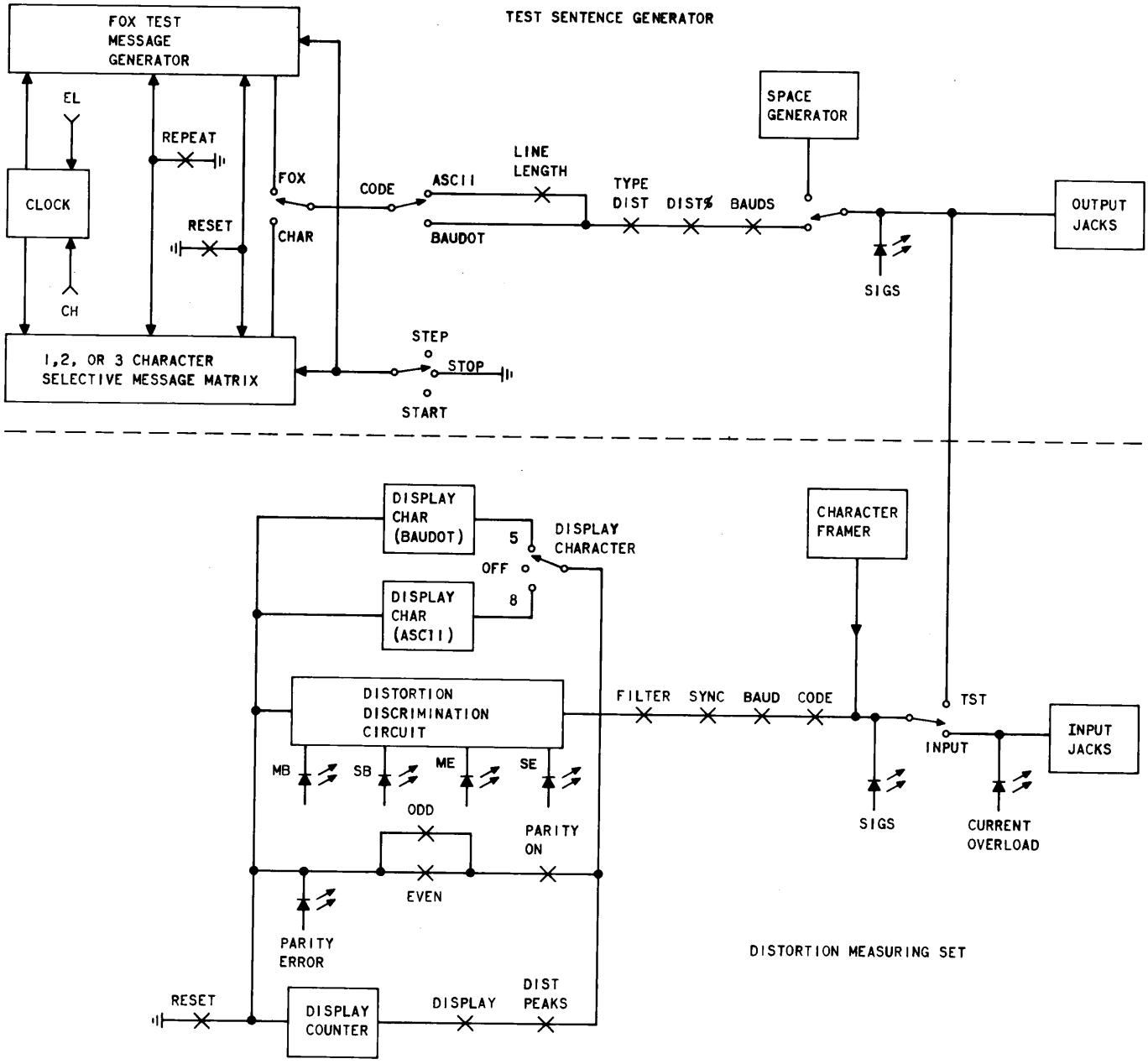

Fig. 10—911NA DTS—Functional Block Diagram

Note: The external clock source ***must*** be 100 times the desired bit rate.

3.15 The CODE switch is used to select the six different codes described in Table D.

3.16 When transmitting the fox test message using the ASCII code, three different line lengths may be selected as determined by the type of equipment to be tested. The three line lengths are as follows.

The fox test messages printed by a Model 37 TTY are shown. When the fox test message is printed by a Model 33 or Model 35 TTY, it will be in all capital letters.

(a) A short 38 characters-per-line test sentence (S). This line length is intended for use when testing sprocket-feed TTYs which print a limited number of characters per line, such as

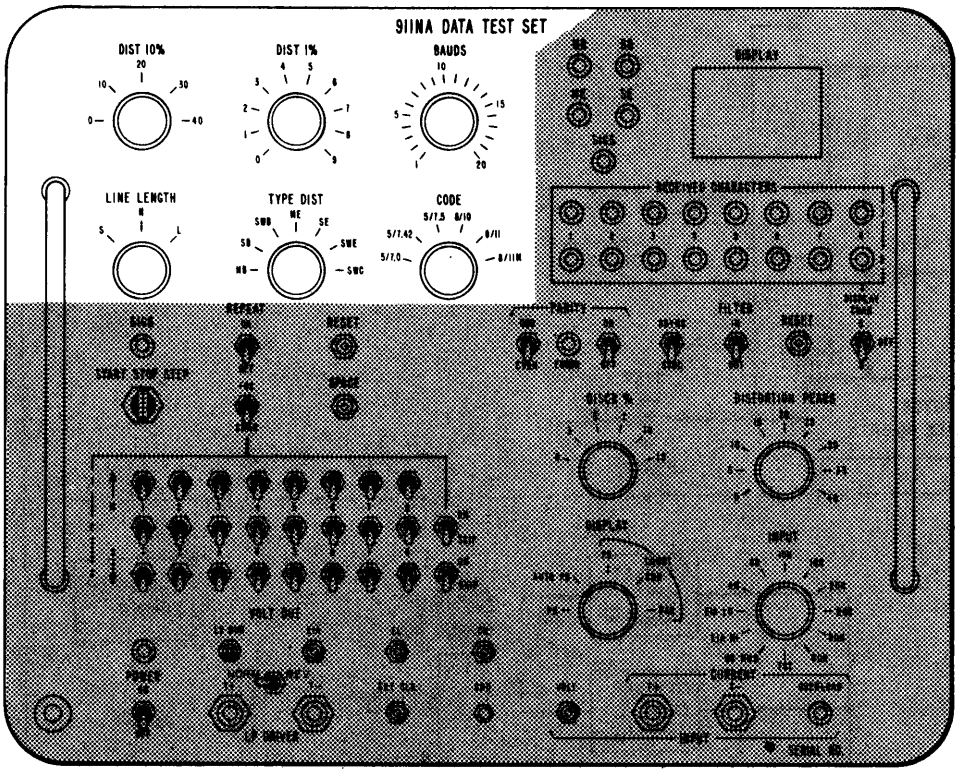

Fig. 11—Location of Switches Governing Type of Signal

machines used to prepare customer service orders. The characters printed are:

The Quick Brown Fox Jumped Over A

(b) A normal 77 characters-per-line test sentence (N). The characters printed are:

The Quick Brown Fox Jumped Over A Lazy Dog's Back 1234567890 Testing 0123.

(c) A long 137 characters-per-line test sentence (L). This line length is intended for use when testing TTYs equipped with wide platens. The characters printed are:

The Quick Brown Fox Jumped Over A Lazy Dog's Back 1234567890 Testing 0123 The Quick Brown Fox Jumped Over A Lazy Dog's Back Test 0123.

All three test sentences are preceded by four nonprint characters:

DELETE, CARRIAGE RETURN, LINE FEED, DELETE.

3.17 When transmitting the fox test message using the Baudot code, the following 80 characters-per-line test sentence is always generated:

THE QUICK BROWN FOX JUMPED OVER A LAZY DOGS BACK 1234567890 A1A TESTING.

The A1A character sequence is used to test the ability of the TTY to shift from the letters mode to the figures mode, and back to the letters mode at line speed. The Baudot test sentence is preceded by four nonprint characters:

LETTERS, CARRIAGE RETURN, LINE FEED, LETTERS.

3.18 The TYPE DISTORTION switch is used to insert the following types of distortion in the signal generated by the 911NA DTS.

TABLE C

BAUD SWITCH POSITIONS

SWITCH POSITION	BAUD RATE	SWITCH POSITION	BAUD RATE
1	45.5	11	1050.0
2	56.9	12	1200.0
3	61.1	13	1800.0
4	74.2	14	SPARE
5	75.0	15	SPARE
6	110.0	16	SPARE
7	134.5	17	OPTIONAL
8	150.0	18	OPTIONAL
9	300.0	19*	Strapped to position 20
10	600.0	20*	External clock

* Clock pulses from a synchronous-type data set cannot be used as a source of external clock signals since the clock source must be at 100 times the bit rate. See 3.28.

(a) MB—marking bias distortion—generated when the space-to-mark transitions are displaced before their proper time occurrence in relation to the beginning of the start pulse.

(b) SB—spacing bias distortion—generated when the space-to-mark transitions are displaced after their proper time occurrence in relation to the beginning of the start pulse.

(c) SWB—switched bias distortion—generated by alternating the MB and SB distortions every other character.

(d) ME—marking end distortion—generated when the mark-to-space transitions are displaced after their proper time occurrence in relation to the start pulse.

(e) SE—spacing end distortion—generated when the mark-to-space transitions are displaced before their proper time occurrence in relation to the start pulse.

(f) SWE—switched end distortion—generated by alternating the ME and SE distortions every other character.

(g) SWC—switched combination distortion—generated by alternating the MB, SB, ME, and SE distortions in each sequence of four characters.

The types of distortion generated by the TSG, in relation to an undistorted signal, are shown in Fig. 12.

To generate undistorted signals, operate the DIST 10% and DIST 1% switches to the zero position and the TYPE DIST switch to the SB position. Do not attempt to transmit zero distortion when the TYPE DIST switch is in any position other than SB.

3.19 Figure 13 shows the switches used to transmit the signal generated by the TSG. This signal is either the fox test message or a 1-, 2-, or 3-character selectable message.

3.20 The FOX/CHAR switch is used to select either the fox test sentence or the 1-, 2-, or 3-character selectable message. When set to FOX, the TSG transmits one of four fox test messages as determined by the CODE and LINE LENGTH switches.

3.21 When the FOX/CHAR is set to CHAR, the TSG transmits the characters programmed on the character switch matrix. To transmit one character, the ON/SKIP switches for characters two and three are set to SKIP. To transmit two characters, the ON/SKIP switch for the second character is set to ON, while the switch for the third character is set to SKIP. To transmit all three characters, both switches are set to ON.

When transmitting Baudot code using the 3-character selectable message, switches 6, 7, and 8 of each character must be set to mark.

3.22 The output of the TSG is either stepped (one-character-at-a-time) or continuous by use of the STEP/STOP/START switch. When set to STOP, the output of the TSG is held marking. When set to START with the REPEAT switch OFF, the TSG transmits the fox message continuously

TABLE D

CODE SWITCH SETTINGS

SWITCH POSITION	CODE	MEANING	FUNCTION
5/7.0	Baudot	5 information elements 1-element stop interval	Generates signal with start element, 5 info elements, and stop interval of 1-element length.
5/7.42	Baudot	5 information elements 1.42-element stop interval	Generates signal with start element, 5 info elements, and stop interval of 1.42 length.
5/7.5	Baudot	5 information elements 1.5-element stop interval	Generates signal with start element, 5 info elements, and stop interval of 1.5 length.
8/10	ASCII	8 information elements 1-element stop interval	Generates signal with start interval, 7 info elements, parity element, and stop element of 1-element length.
8/11	ASCII	8 information elements 2-element stop interval	Generates signal with start interval, 7 info elements, parity element, and stop element of 2-element lengths. Even parity generated in parity element.
8/11M	ASCII	8 information elements 2-element stop interval	Generates signal with start interval, 7 info elements, parity element, and stop element of 2-element lengths. Parity element always marking.

or transmits the 3-character selectable message once. With the REPEAT switch set to ON, the TSG transmits the same character in the fox message repeatedly or continuously transmits the entire selectable message. The TSG transmits one character at a time each time the STEP/STOP/START switch is set to the nonlocking STEP position.

3.23 The SIGS LED (signals light-emitting diode) is used to show the output status of the TSG. The SIGS LED is lighted when the output is marking, extinguished when the output is spacing, and flickers when transmitting signals.

3.24 Operation of the nonlocking RESET switch clears the TSG and prepares it to transmit the 3-character selectable message or fox test message from the beginning.

3.25 Depressing the nonlocking SPACE switch causes the TSG to transmit a continuous space signal.

3.26 Figure 14 shows the location of the TSG outputs, external clock input, ground connection, and power switch.

3.27 Outputs of the TSG may be in the form of LV HUB (low voltage hub), EIA, and current signals on LP DRIVER T+ (loop driver with tip positive) or LP DRIVER T− (loop driver with tip negative). Mark and space voltage potentials may be transposed via the NORM/REV switch.

In order for proper voltage representations of mark and space signals to appear at the output jacks of the TSG, the NORM/REV switch must be set to

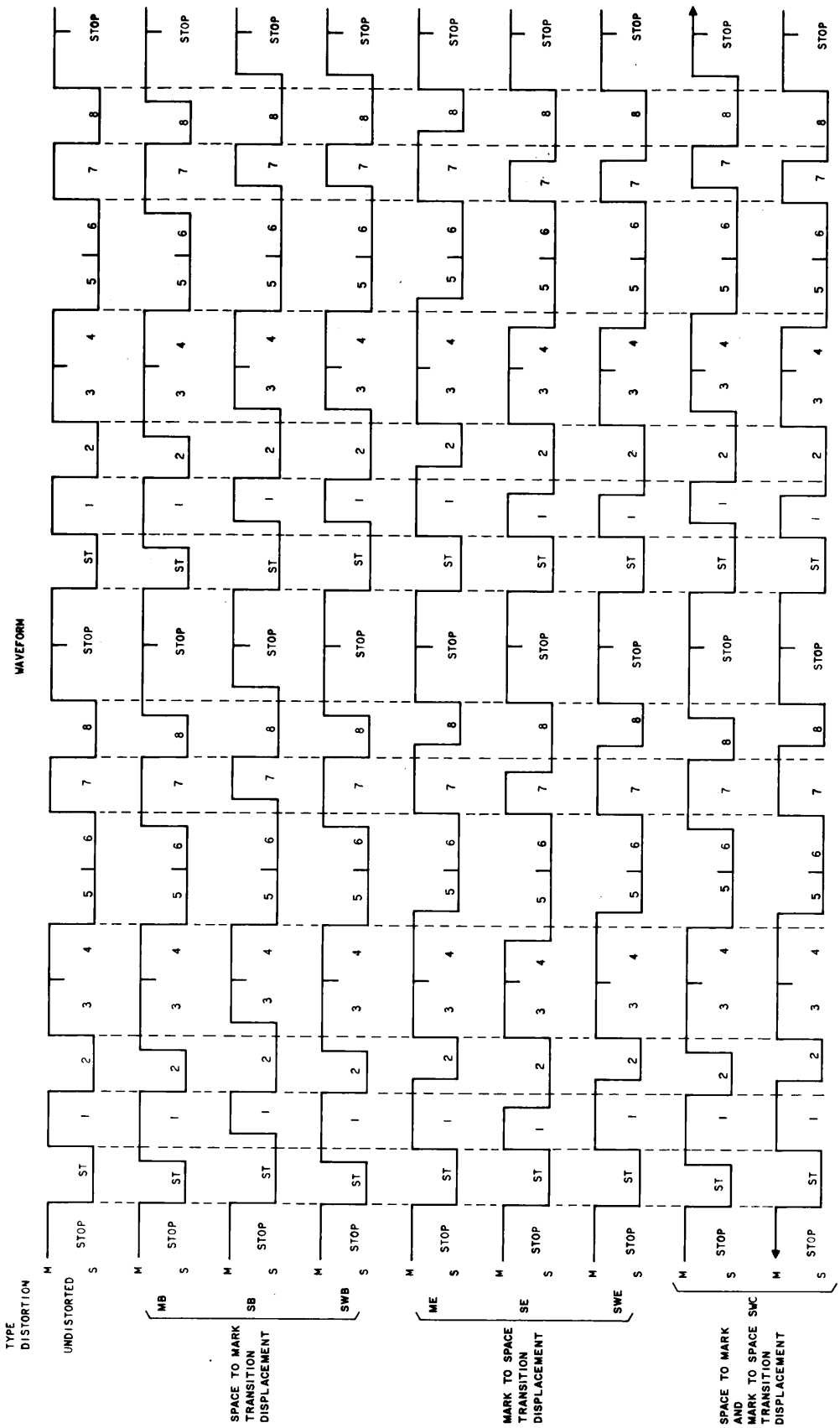

Fig. 12—911NA TSG—Types of Distortion

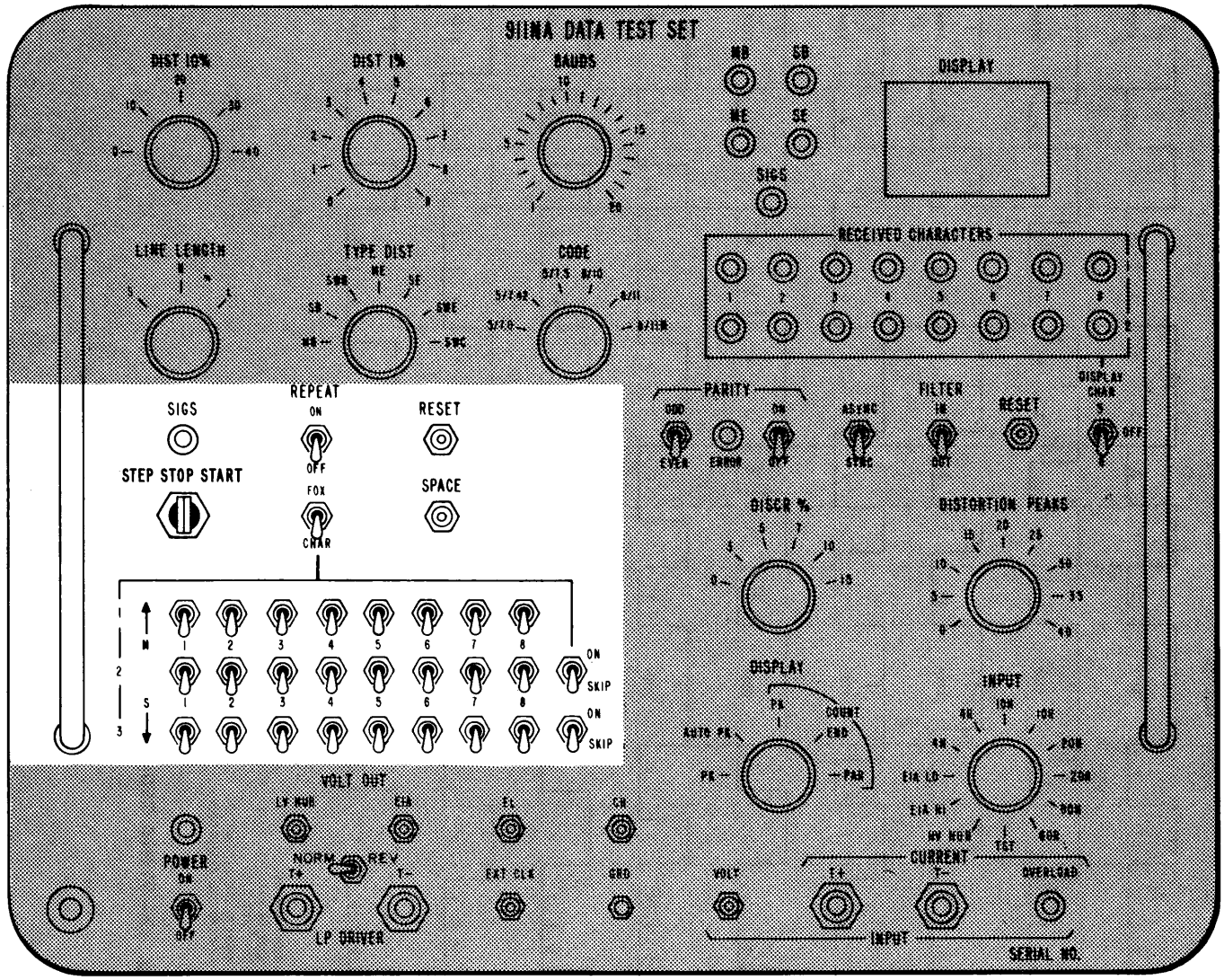

Fig. 13—Location of Switches Governing Test Message Characters

REV when connecting to LV HUB or T-, and must be set to NORM when connecting to EIA or T+.

3.28 When an external clock source is used, its frequency ***must*** be set to 100 times the desired baud rate. Additionally, the waveform of the clock source must be a square wave with an amplitude of +5 ±0.5 volts in respect to ground and be symmetrical to 50 ±10 percent. The frequency of the external clock must not exceed 960 kHz.

3.29 The EL (element) and CH (character) framer pulse jacks provide an access point to synchronize external test equipment if required.

C. DMS Function

3.30 The input area of the DMS is shown in Fig. 15. All voltage inputs are connected to the VOLT jack with the INPUT switch set to the proper position [EIA LO (normal EIA signals), EIA HI (provides a high impedance input for bridging on circuits without signal interference), HV HUB (No. 2 hub)] as required. Neutral current signals of 4, 10, 20, or 60 milliamperes, either normal or reversed, are connected via the T+ (positive on tip) or T− (negative on tip) input jacks. The INPUT switch must be set to the proper position as required. Input protection for the current inputs provides a short circuit and lights

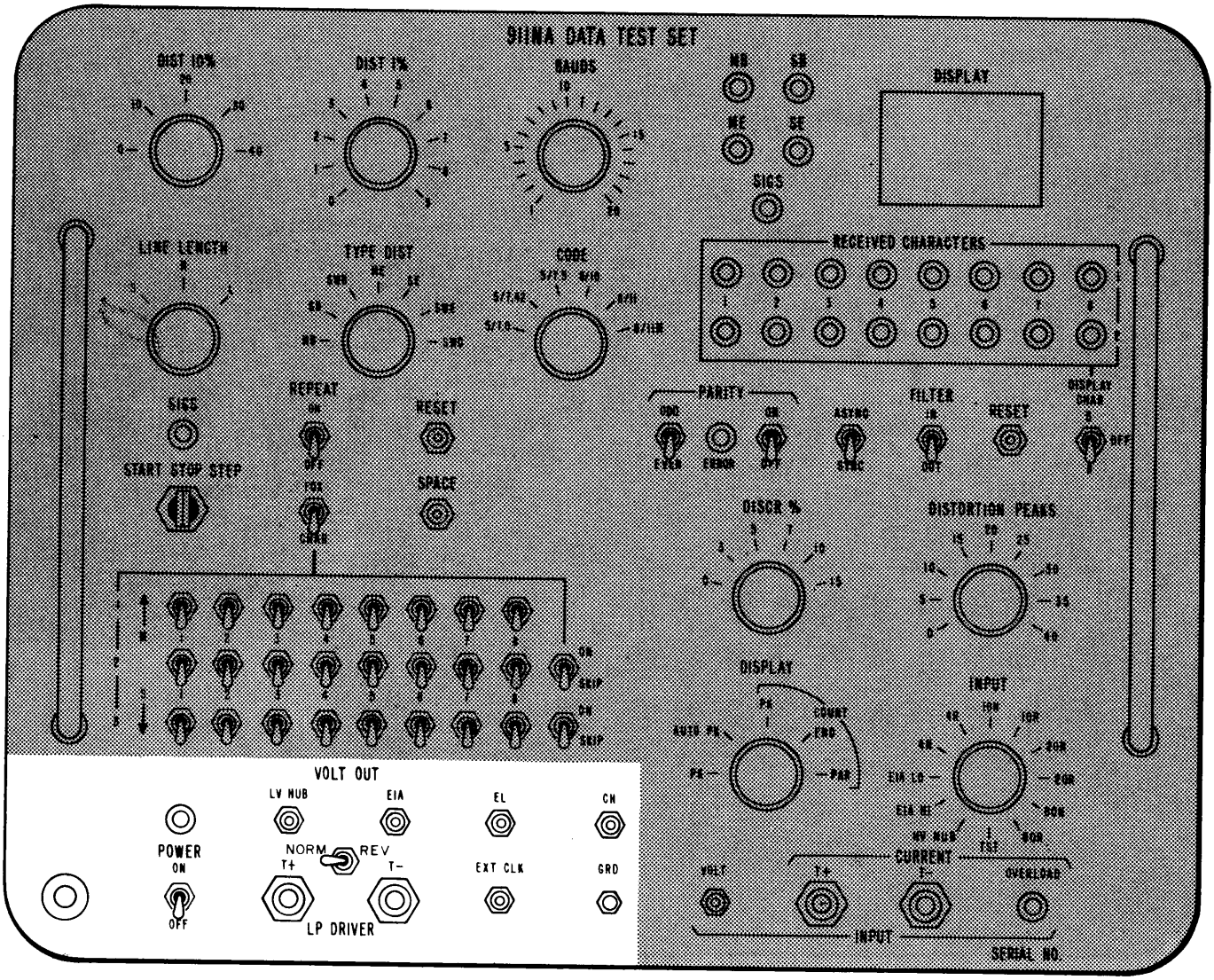

Fig. 14—Location of TSG Outputs

the OVERLOAD LED when the input current exceeds 90 milliamperes.

3.31 Input status of the DMS is displayed by the SIGS (signals) LED. The LED is lighted when a marking input is received, extinguished when a spacing input is received, and flashing when receiving signals.

3.32 To facilitate the back-to-back testing capability of the DTS, a TST (test) position is provided on the INPUT switch. In this position the measuring set is disconnected from the input interface and connected directly to the VOLT OUT EIA jack on the TSG.

3.33 Figure 16 shows the switches that are used to measure the amount, and the LEDs used to display the type, of distortion received by the DMS.

3.34 The 2-digit numerical DISPLAY indicates the type of information as determined by the DISPLAY switch. When set to PK (peak), the highest percent of received signal distortion is displayed and held until manually reset. Set to AUTO PK, with the ASYNC/SYNC switch set to ASYNC, the display automatically resets for each group of 16 characters received. Set to AUTO PK, with the ASYNC/SYNC switch set to SYNC, the DISPLAY automatically resets for each 16 transitions

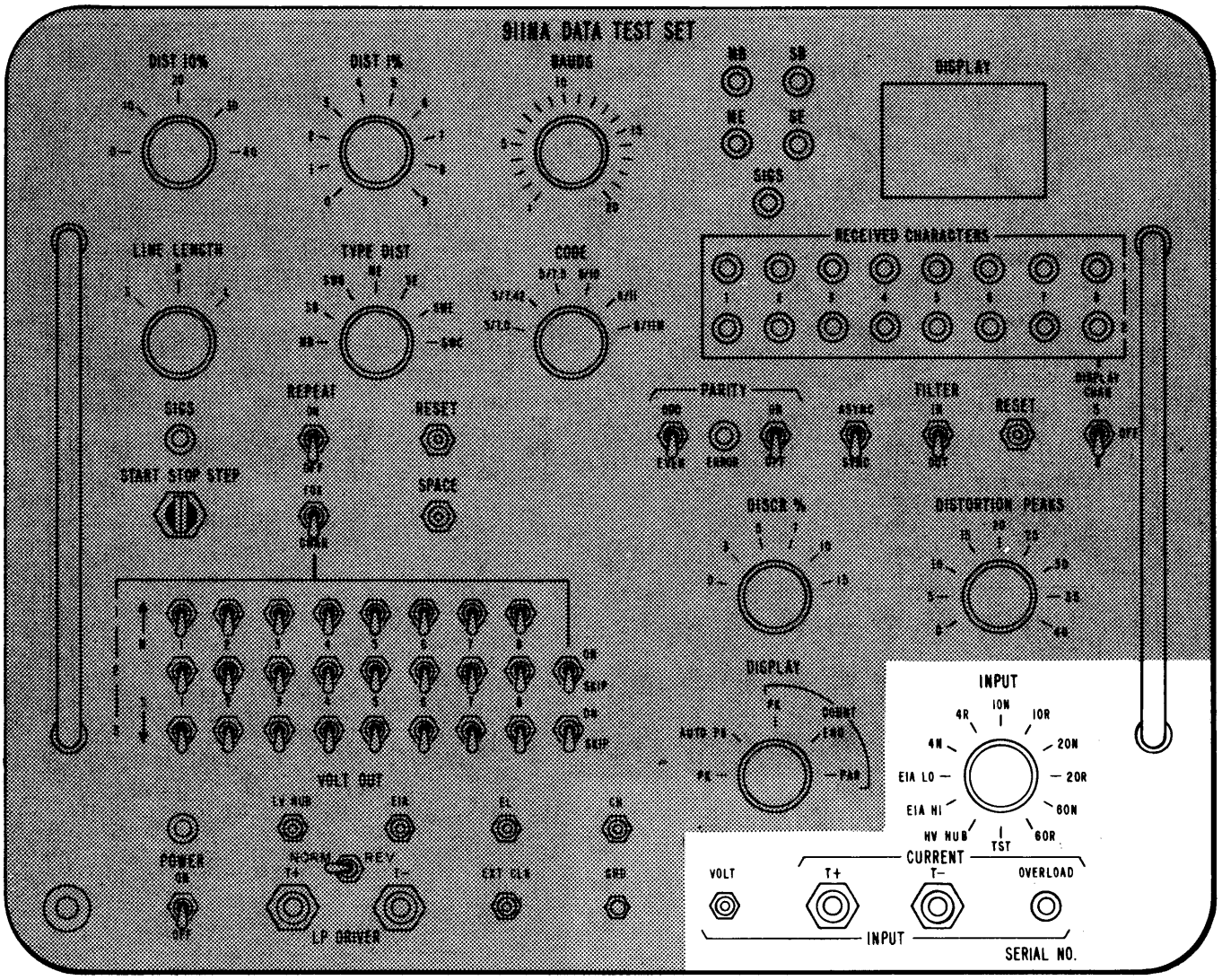

Fig. 15—Location of DMS Inputs

received. Set to COUNT PK, the DMS counts the number of distortion peaks received above the level set by the DISTORTION PEAKS switch. Set to COUNT END, the DMS counts the number of end distortion hits above the level set by the DISTORTION PEAKS switch. Set to COUNT PAR (count parity), the DMS counts the number of parity errors received. In the count positions, the DMS counts to a maximum of 99 and must be manually reset via the RESET switch.

3.35 The DISCR % (discrimination percent) switch determines the operating point of the type distortion LEDs. When the amount of distortion exceeds the 0-, 3-, 5-, 7-, 10-, or 15-percent setting of the switch, the appropriate LED lights, indicating the type distortion and the percent exceeded.

3.36 Setting the FILTER switch to the IN position prevents spurious impulses, such as those introduced by contact bounce, from being recognized as distortion in the incoming signal and, thereby, being counted by the DMS. Therefore, any transient shorter than approximately 100 microseconds is disregarded by the DMS.

3.37 The DMS measures both synchronous and asynchronous (start/stop) data signals, as determined by the ASYNC/SYNC switch. In the SYNC position, the DMS measures the distortion

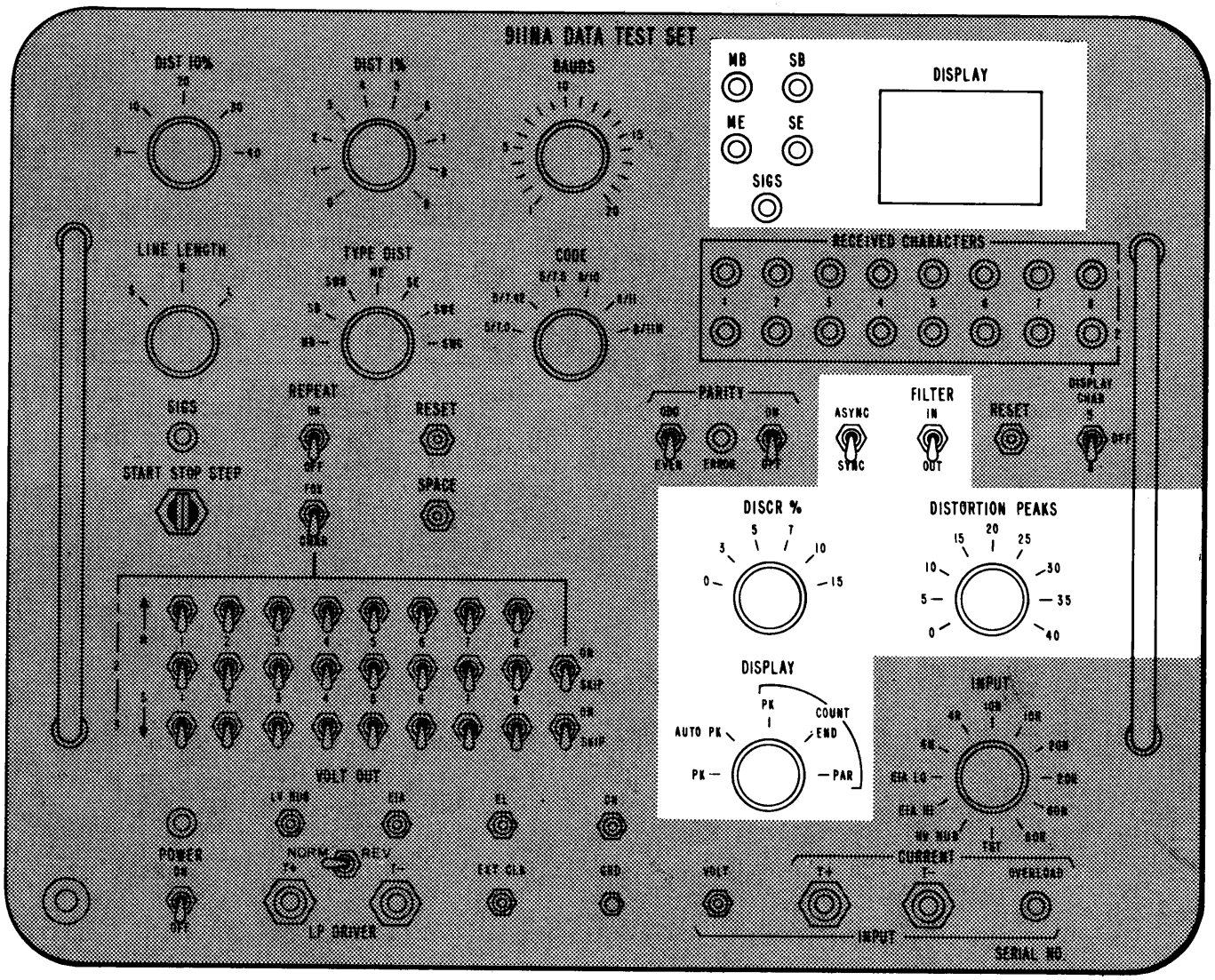

Fig. 16—Location of Switches Used in Measuring Received Signals and Displays

of each transition using the last transition as a reference, while in the ASYNC position, distortion is measured on a character-by-character basis using the start pulse as a reference.

> ***Note:*** Clock pulses from a synchronous-type data set cannot be used as a source of external clock signals, since the clock rate required by the test set is 100 times the desired baud rate.

3.38 Figure 17 shows the received characters and the parity error displays. Odd or even parity errors can be recognized by the DMS. When a parity error is received by the DMS while the parity switch is ON, the PARITY ERROR LED lights. The LED is extinguished by setting the PARITY ON/OFF switch to OFF or by momentarily operating the RESET switch.

3.39 The RECEIVED CHARACTERS LEDs display either ASCII characters (DISPLAY CHAR set to 8) or Baudot characters (DISPLAY CHAR set to 5). When displaying ASCII characters, the present character is displayed in position 1-1 through 1-8 and the character preceding it is displayed in position 2-1 through 2-8. When displaying Baudot characters, only the present character is displayed in positions 2-1 through 2-5. The LEDs are lighted for a mark and extinguished for a space.

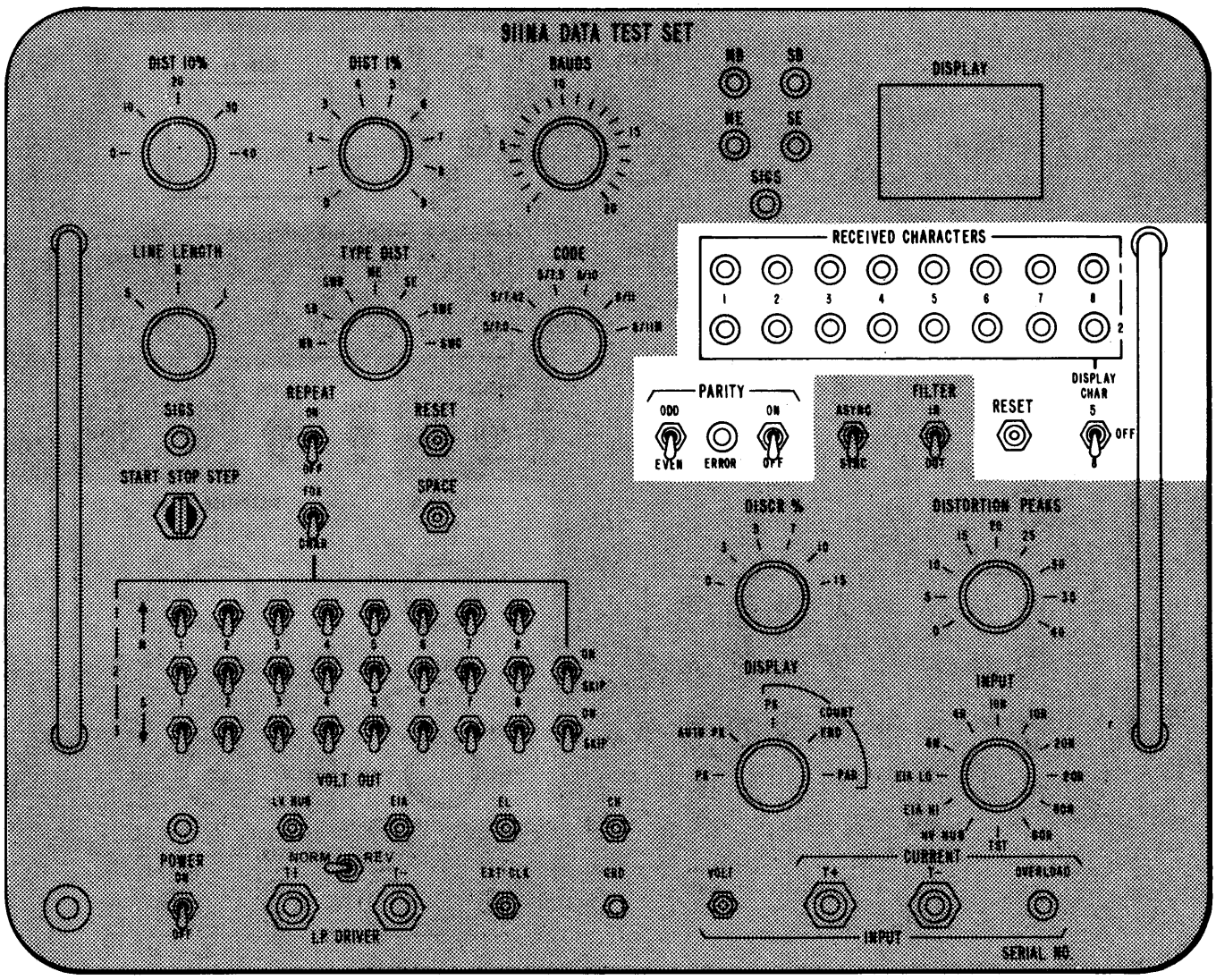

Fig. 17—Received Characters and Parity Displays

3.40 The RESET button is used to reset the display counter, the type distortion LEDs, the PARITY ERROR LED, and the RECEIVED CHARACTERS LEDs.

D. Power Supply

3.41 The power supply produces all the voltages required by the circuits of the test set. It converts 115-volt 60-Hz power into three regulated dc outputs of +12, −12, and +5.

4. OPERATING INSTRUCTIONS

4.01 The intent of this part is to give general information on testing which allows the user to better understand the use of the test set. Test procedures shown in this part are typical for terminal equipment with EIA or neutral loop current and they specify typical switch settings to transmit and receive signals. Detailed instructions for a test of a particular data system are found in the appropriate test section.

A. Transmitting Fox Test Message

4.02 To transmit the fox test message with 35-percent switched combination distortion

to a 37 automatic send-receive (ASR) TTY, set switches on the 911NA DTS as follows:

SWITCH	SETTING
DIST 10%	30
DIST 1%	5
BAUDS	8
LINE LENGTH	N
TYPE DIST	SWC
CODE	8/10
REPEAT	OFF
FOX/CHAR	FOX
STEP/STOP/START	STOP
NORM/REV	NORM
POWER	OFF

4.03 Connect the 911P EIA test adapter in series between the 37 ASR TTY interface and the data set interface, then connect the VOLT OUT EIA output jack to the BB-T lead of the 911P and the 911NA GRD to the 911P AB jack.

4.04 Apply power to the TTY, assure that it is ready to receive, and then apply power to the 911NA DTS.

4.05 Set the STEP/STOP/START switch to START. The TTY receives the fox test message repeatedly. When enough lines to analyze reception of the fox test message are received, set the STEP/STOP/START switch to STOP.

B. Transmitting 3-Character Selectable Message

4.06 To transmit the characters U and * with 35-percent marking end distortion to a 37 ASR TTY, set switches on the 911NA DTS as follows:

SWITCH	SETTING
DIST 10%	30
DIST 1%	5
BAUDS	8
TYPE DIST	ME
CODE	8/10
REPEAT	OFF
FOX/CHAR	CHAR
STEP/STOP/START	STOP
NORM/REV	NORM
POWER	OFF
CHAR matrix	
Character 1	
Switches 1,3,5,7	M (up)
Switches 2,4,6,8	S (down)
Character 2	
Switches 1,3,5,7	S (down)
Switches 2,4,6,8	M (up)
ON/SKIP	ON
Character 3	
ON/SKIP	SKIP

4.07 Connect the 911P EIA test adapter to the 37 ASR TTY interface, then connect the VOLT OUT EIA output jack to the BB-T lead of the 911P and the 911NA GRD to the 911P AB jack.

4.08 Apply power to the TTY, assure that it is ready to receive, and then apply power to the 911NA DTS.

4.09 Momentarily operate the STEP/STOP/START switch to STEP; the TTY receives U. Momentarily operate to STEP again; the TTY receives *. Set switch to START; the TTY receives U*. Disconnect test equipment and restore normal operating conditions.

C. Receiving Signals

4.10 To receive a test message and measure distortion from a 37 ASR TTY, set switches on the 911NA DTS as follows:

SWITCH	SETTING
BAUDS	8
CODE	8/10
INPUT	EIA LO
DISPLAY	PK
DISCR%	3
DISTORTION PEAKS	5
PARITY ODD/EVEN	EVEN
PARITY ON/OFF	ON
ASYNC/SYNC	ASYNC
FILTER	OUT
DISPLAY CHAR	8
POWER	OFF

4.11 Connect the 911P EIA test adapter to the 37 ASR TTY interface, then connect the VOLT INPUT jack to the BA-T lead of the 911P and the 911NA GRD to the 911P AB jack.

4.12 Apply power to the TTY and condition it to transmit a test tape that was previously prepared. Then apply power to the 911NA DTS.

4.13 Operate the TTY to transmit test tape. The DTS receives the message and provides the following indications.

(a) SIGS LED flashing.

(b) Assuming the TTY transmitted signal is composed of more than 3-percent switched combination distortion, MB, SB, ME, and SE LEDs flash sequentially.

(c) RECEIVED CHARACTERS LEDs display first character received in position 1-1 through 1-8. When second character is received, first character shifts to position 2-1 through 2-8 and second character received is displayed in position 1-1 through 1-8, etc.

(d) If a parity error is received, PARITY ERROR LED lights.

(e) Assuming the TTY is transmitting at a 7-percent distortion level, DISPLAY indicates 7-percent distortion received.

4.14 Set DISPLAY to COUNT PK, then momentarily operate the RESET button. DISPLAY counts the number of distortion peaks received above five percent to a maximum capacity of 99.

4.15 Set the DISTORTION PEAKS switch to 10, then momentarily operate the RESET button. DISPLAY indicates zero peak count above 10 percent.

4.16 Set DISPLAY to COUNT END, then momentarily operate the RESET button. DISPLAY indicates zero count.

4.17 Set the DISTORTION PEAKS switch to 5, then momentarily operate the RESET button. DISPLAY counts the number of end distortion peaks received above five percent to a maximum of 99.

4.18 Set the DISCR % switch to 10. The MB, SB, ME, and SE LEDs extinguish, indicating the distortion level received is below 10 percent.

4.19 Disconnect test equipment and restore normal operating conditions.

5. REFERENCES

5.01 Additional information on the DTS and 911P EIA test adapter may be obtained from the following sources:

SECTION	TITLE
103-813-510	911NA Data Test Set—Maintenance and Tests
103-813-111	911P EIA Test Adapter—Description and Operation

SECTION	TITLE
807-462-152	911-Type Data Test Sets for Generating Test Sentences and Measuring Distortion—Equipment Design Requirements—Data Systems

NUMBER	TITLE
CD- & SD-73094-01	Data Test Set No. 911NA
CD- & SD-73112-01	EIA Test Adapter No. 911P
EL-3102	911NA Data Test Set
EL-3772	911P EIA Test Adapter
J79911NA	911NA Data Test Set
J79911P	911P EIA Test Adapter