

37 TELETYPEWRITER KEYBOARD SEND-RECEIVE (KSR)

DATA STATION ARRANGEMENTS "DATA-PHONE[®]"

INSTALLATION

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1. GENERAL

1.01 This section describes the procedures to be followed when installing a Model 37 Keyboard Send-Receive (KSR) Teletypewriter (TTY) Data Station for DATA-PHONE service (Figure 1). The station operates at 150 words per minute and uses Data Set 103H1 and 37 TTY KSR which conforms to the EIA RS-232-B Interface Standard.

1.02 The standard 37 TTY KSR data station consists of the following components:

37 TTY KSR

Data Set 103H1 (consisting of Data Set 103E5, 17A or 48A Power Unit, and a housing)

Data Auxiliary Set (DAS) 804P5, 6, 7, or 8 (See Table A.)

2012B-49 Transformer (used only with DAS 804P8)

Hand Telephone Set 223C-52

1.03 The 37 TTY KSR data station is self-contained equipment which is intended to be completely assembled by the service center prior to shipment.

1.04 The customer must furnish a standard 3-wire grounding-type 106- to 129- volt, 59.5 to 60.5 hertz ac power receptacle (to accept a plug equipped with two parallel blades and a round-shaped grounding pin).

Note: The receptacle should not be under control of a switch.

1.05 Verify with plant service center (PSC) that the overall facilities meet transmission requirements specified in the section entitled Data Systems on Direct Distance Dialing (DDD) Network — DATA-PHONE Services — Transmission Requirements — DATA-PHONE Subscriber Lines (314-205-500).

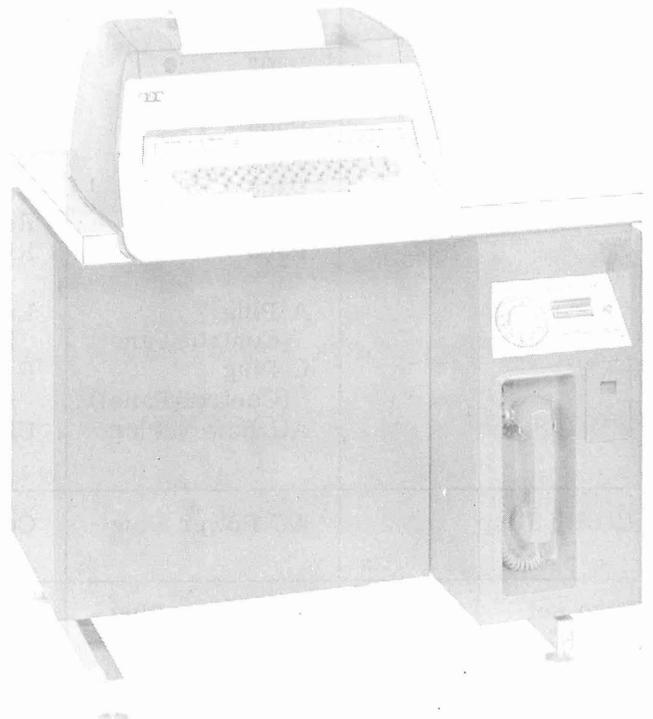


Figure 1 - 37 TTY KSR Data Station

TABLE A
DATA AUXILIARY SET (DAS)
COMPARISON*

DAS	IDENTIFYING FEATURE
804P5	Rotary Dial
804P6	TOUCH-TONE® Dial
804P7	TOUCH-TONE Dial With Card Dialer
804P8	Rotary Dial With Card Dialer

*For a more detailed comparison, see Sections 591-027-100 (Data Set 103H-type — Description and Operation) and 598-061-100 (Data Auxiliary Set 804P5, 6, 7, and 8 — Identification).

2. INSTALLATION

2.01 Verify that the location selected by the customer for the 37 TTY KSR data station is adequate for maintenance. The location meas-

urements should exceed 3 feet wide and 37 inches deep, and vertical obstructions should be more than 5 feet above the floor to allow sufficient room for 37 TTY KSR disassembly, if required.

2.02 Verify that the customer provided a power receptacle is within 8 feet of the selected location and adequately fused for 15 amperes required by the data station.

CAUTION: DO NOT CONNECT POWER TO THE 37 TTY KSR DATA STATION UNTIL INSTRUCTED TO DO SO.

2.03 Interconnections for the 37 TTY KSR data station components are shown in Figure 2. In addition, verify that all plugs and cables are properly connected and terminated. Use Table B as a guide in making this check.

TABLE B
CONNECTIONS

EQUIPMENT WITH CABLES	CONNECTORS	TERMINATION	AREA	FIG. REF.
Electrical Service Unit	P302	Copyright Plug	Typing Unit Cover	3
	P303	J8 Receptacle	Data Set	8
	P304	Receptacle	Base (Rear)	3
	P305	None	None	-
	P306	Left Receptacle	Typing Unit	3
	P307	Receptacle	Keyboard	3
	P308	Right Receptacle	Typing Unit	3
	A Plug (Control Panel)	Left Switch Receptacle	Control Panel Assembly	3
	C Plug (Control Panel)	Right Switch Receptacle	Control Panel Assembly	3
	AC Power Plug	Utility Strip	Left Compartment of Table	4
Utility Strip	AC Power Plug	Customer Furnished AC Receptacle	External	-
Data Set 103H1	AC Power Plug	Utility Strip	Left Compartment of Table	4
	Telephone Cord	44A Connecting Block or Equivalent	External	-
Data Auxiliary Set (804P5, 6, 7, or 8)	P2	J2 Receptacle	Data Set	8

Note: The 37 TTY KSR comes with TP326570 cable with J310 connector. This cable is used only for conversion to an ASR and is not used for KSR applications.

Note: To 2012B or equivalent transformer when attendant unit used is 804P8.

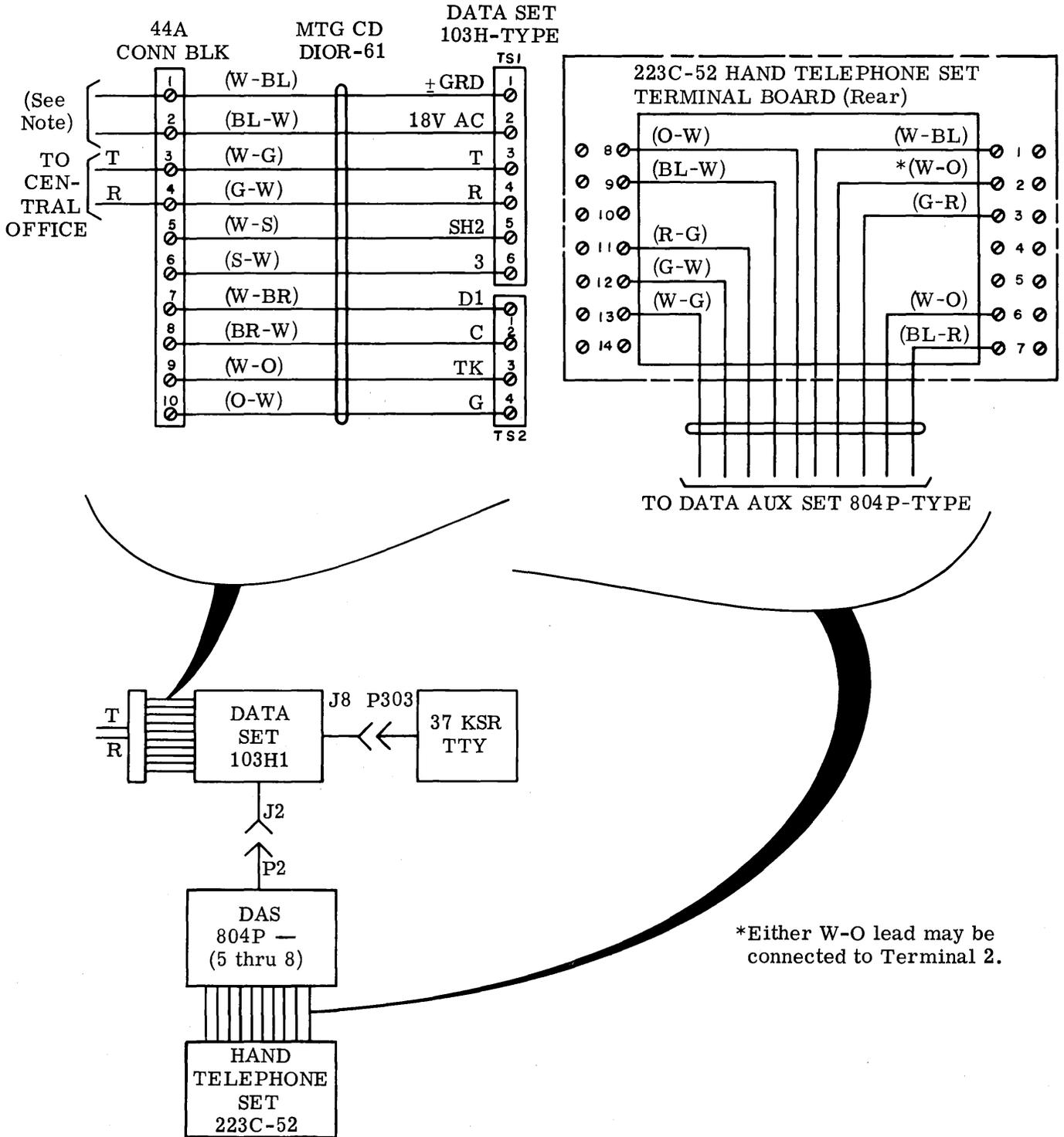


Figure 2 - Interconnection of 37 TTY KSR Data Station Components

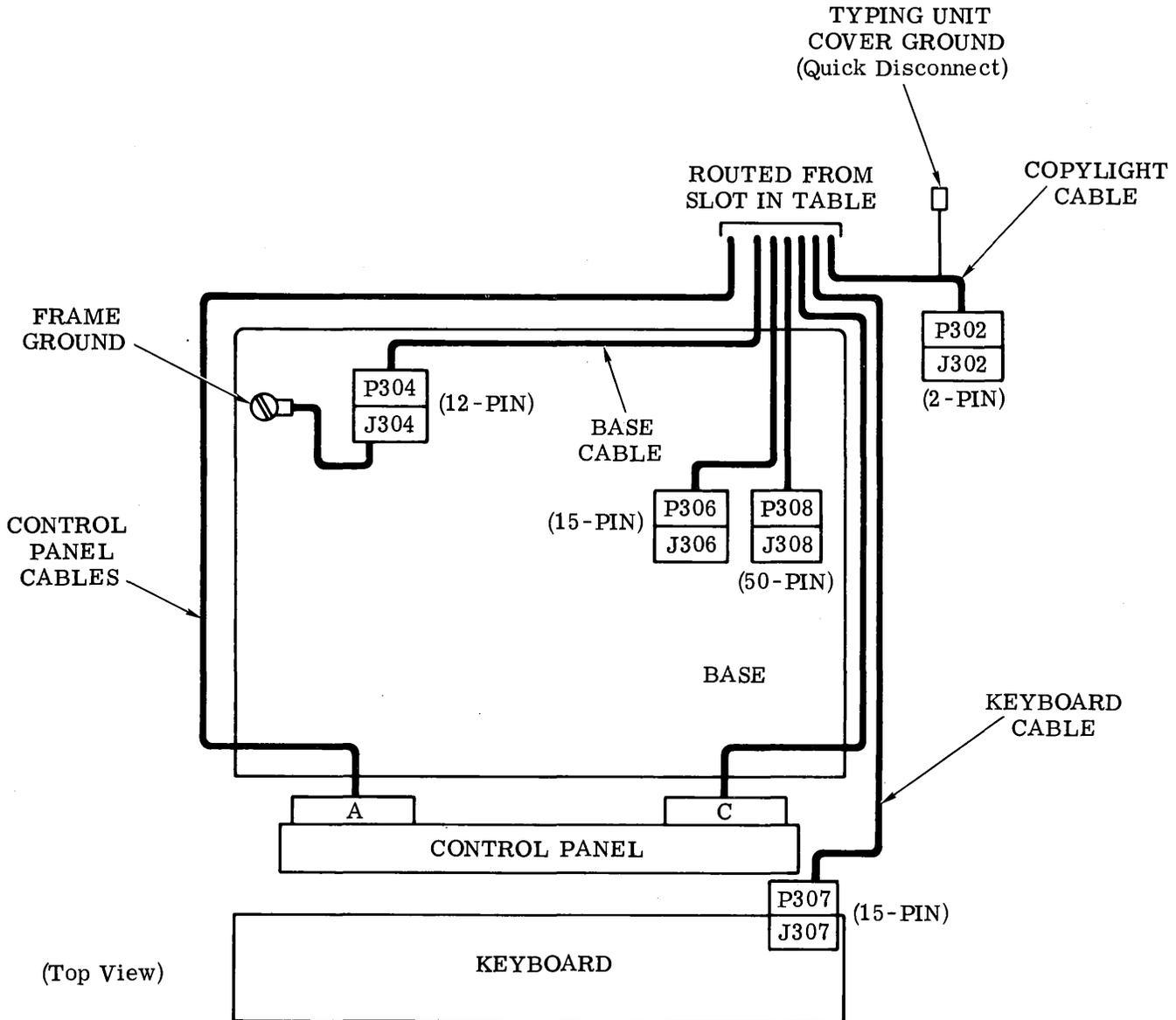


Figure 3 - 37 TTY KSR Connector Locations

ELECTRICAL SERVICE UNIT

2.04 To verify that the proper options are installed in the circuit cards of the 37 TTY electrical service unit and to encode the data station answer-back drum, the electrical service unit should be removed from the left compartment of the 37 TTY table (Figure 4). Remove as follows.

- (1) Unlatch the front panel by pushing down on the release lever in the panel slot while holding the panel. Allow panel to move forward a few inches to the safety catch.

- (2) Push up on the safety catch, rotate the front panel downward, and place it to the floor.

- (3) If lower (TP333170) or upper (TP333171) shipping brackets were used to secure the electrical service unit during shipment, remove them (Figure 4). The upper shipping bracket is secured by four TP34442 screws, TP128100 flat washers, and TP3646 lockwashers. The lower shipping bracket is secured by two TP151724 screws, TP125307 flat washers, TP2669 lockwashers and two TP162730 screws, TP125014 flat washers, and TP2449 lockwashers.

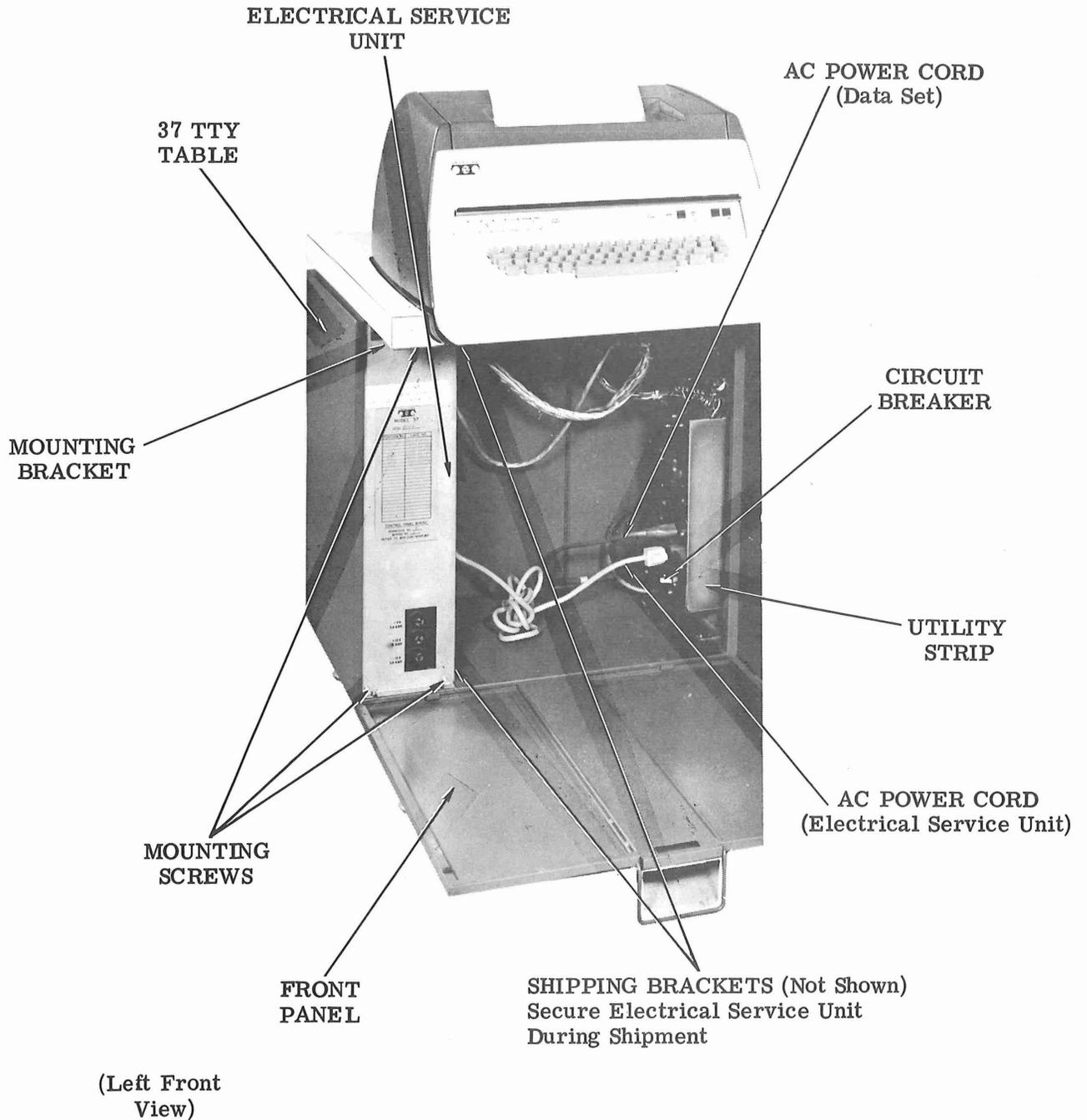


Figure 4 - 37 TTY Electrical Service Unit and Utility Strip Location in Two-Compartment 37 TTY Table

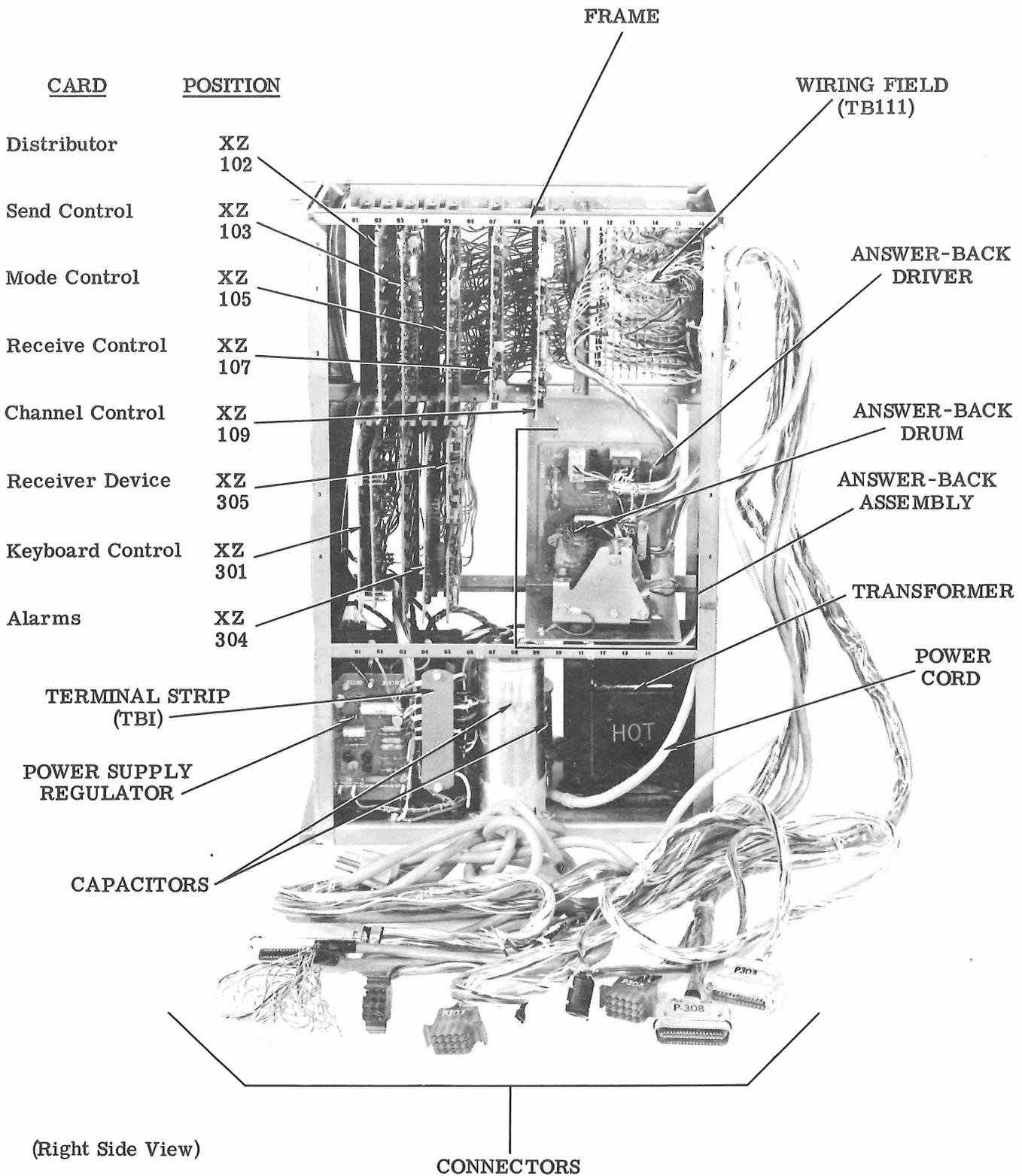


Figure 5 - 37 TTY KSR Electrical Service Unit —
Card Location and Miscellaneous Components

- (4) Remove one (late design) or two (early design) mounting screws which secure the top front of the electrical service unit to the table.
- (5) Loosen two screws which secure a mounting bracket to the top front of the electrical service unit (Figure 4) this will enable the mounting bracket to drop.
- (6) Remove two mounting screws which secure the bottom front of the electrical service unit to the table (Figure 4).
- (7) Verify that the circuit breaker (CB101) located on the utility strip is in the OFF position (Figure 4). Turn it off if it is on.
- (8) Grasp the 37 TTY KSR electrical service unit and slide it out onto the front panel.

CAUTION: BEFORE REMOVING ELECTRICAL SERVICE UNIT FROM TABLE AND/OR INSTALLING CIRCUIT CARD OR CABLE OPTIONS, TURN OFF CIRCUIT BREAKER OR PULL AC POWER PLUG TO REMOVE ELECTRICAL POWER.

2.05 Verify that the proper circuit cards and mechanisms are installed in the electrical service unit and that the proper options are enabled. Required options for the installation should be specified on the service order and/or work sheet. The available features and options are shown in Table C.

Note 1: Card and mechanism locations within the 37 TTY KSR electrical service unit are shown in Figure 5. Use the card identification label to itemize the cards and their locations.

Note 2: When removing a strap option on a circuit card, take care to avoid: (1) Damage to adjacent components and circuit board, (2) Shorting remaining portion of strap to adjacent circuit, and (3) Littering card with cut straps.

Note 3: When adding a circuit card strap option to a previously programmed card, use a soldering iron not larger than 25 watts. Take care to avoid damaging adjacent components or circuit board.

ANSWER-BACK ASSEMBLY

2.06 Encode the answer-back message onto the data station's answer-back drum. Proceed as follows.

- (1) Deflect brace extension downward, lift feed pawl, and remove answer-back drum from plastic block (Figure 6).

CAUTION: DO NOT OVEREXTEND FEED PAWL SPRING.

- (2) Determine all characters, including space, carriage return (CR), line feed (LF), and other control characters, which are required for the customer's answer-back message. The maximum number of characters that can be encoded into the answer-back drum depends upon the number of rows available for message encoding. The maximum number of rows available for encoding the message for different cycles of operation is shown in Table D.

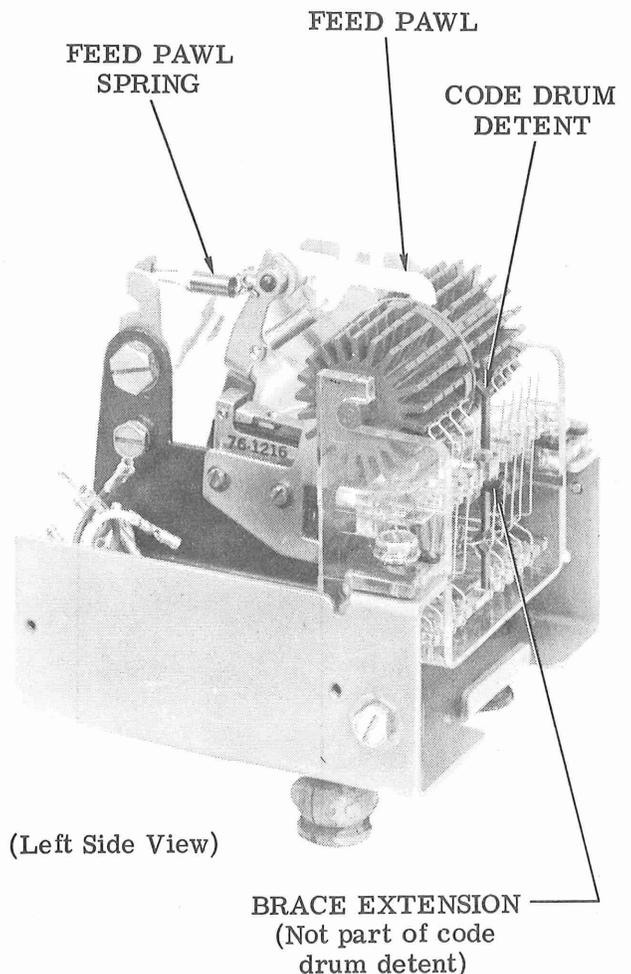


Figure 6 - Answer-Back Assembly

TABLE C
37 TTY KSR - FEATURES AND OPTION

FEATURE	CARD OR MECHANISM	OPTION	INSTALLATION PROCEDURE																																					
150 WPM operation with 10-unit code	Mode Control (XZ105)	10-Unit Code*	Do not remove strap "A".																																					
Full or half-duplex operation or full and half-duplex with line control	Receive Control (XZ107)	Dedicated Half-Duplex	Remove strap "B". See Note 1.																																					
		Dedicated Full-Duplex	Remove strap "A". See Note 1.																																					
		Line Control Operation*	1. Remove straps "A", "B", and "C". See Note 1. 2. Check mechanical portions of stunt box for appropriate codes.																																					
Typing Unit required on line to receive a call	Receive Control (XZ107)	Receiver Status Alarm*	Remove strap "C". See Note 1.																																					
Data Set Control of Motor. Disconnect on either EOT or Alarm Condition	Channel Control (XZ109)	Motor Control, EOT, and Alarm Disconnect*	Remove Straps "D", "E", "G", "H", "K", "M", "Y". Do not remove straps "A", "B", "C", "F", "L".																																					
Programmable answer-back message	Answer-Back Assembly (XZ310 - XZ315)	Answer-Back at beginning of call, on HERE IS, or on received ENQ*	Install TP326575 cable as follows:																																					
			<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">WIRE COLOR</th> <th style="text-align: left; border-bottom: 1px solid black;">TB111 CONNECTION</th> </tr> </thead> <tbody> <tr><td>White-Brown</td><td>A1</td></tr> <tr><td>White-Red</td><td>A2</td></tr> <tr><td>White-Orange</td><td>A3</td></tr> <tr><td>White-Yellow</td><td>A4</td></tr> <tr><td>White-Green</td><td>A5</td></tr> <tr><td>White-Blue</td><td>A6</td></tr> <tr><td>White-Purple</td><td>A7</td></tr> <tr><td>White-Slate</td><td>A8</td></tr> <tr><td>White-Black</td><td>A11</td></tr> <tr><td>Green-Slate</td><td>J3</td></tr> <tr><td>Blue-Green</td><td>H3</td></tr> <tr><td>Orange-Green</td><td>F3</td></tr> <tr><td>Red-Blue</td><td>C3</td></tr> <tr><td>Yellow</td><td>A13</td></tr> <tr><td>Green</td><td>A14</td></tr> <tr><td>Black</td><td>G3</td></tr> <tr><td>Blue</td><td>A10</td></tr> <tr><td>Brown</td><td>D3</td></tr> <tr><td>Brown</td><td>E3</td></tr> </tbody> </table>	WIRE COLOR	TB111 CONNECTION	White-Brown	A1	White-Red	A2	White-Orange	A3	White-Yellow	A4	White-Green	A5	White-Blue	A6	White-Purple	A7	White-Slate	A8	White-Black	A11	Green-Slate	J3	Blue-Green	H3	Orange-Green	F3	Red-Blue	C3	Yellow	A13	Green	A14	Black	G3	Blue	A10	Brown
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Green-Slate	J3																																							
Blue-Green	H3																																							
Orange-Green	F3																																							
Red-Blue	C3																																							
Yellow	A13																																							
Green	A14																																							
Black	G3																																							
Blue	A10																																							
Brown	D3																																							
Brown	E3																																							

*Required options.

Note 1: Card shipped with all straps installed.

Note 2: References to typing unit and stunt box indicate option is part electrical service unit and part associated components.

TABLE D

ROWS AVAILABLE FOR MESSAGE ENCODING

CYCLES OF OPERATION	TOTAL DRUM ROWS	ROWS AVAILABLE FOR CHARACTER
1	21	20
2	10(11)*	9
3	7	6

*Alternately one, then the other.

- (a) The answer-back drum may cycle one time or a fraction thereof for each message, ie, there may be one, two, or three message cycles per drum cycle.
- (b) Consider coding the drum for either 2- or 3-cycle operation for short messages. When the drum is encoded for multiple-cycle operation, each cycle must have the same message coded into it. For longer messages, code the drum for 1-cycle operation.
- (3) Obtain different cycles of operation by removing the appropriate tines from the "stop cam" and "character suppression" levels (Figure 7).

(a) Remove the character suppression tine from rows which are surplus after coding a message into the answer-back drum. The character suppression tine controls a blinding contact which, when operated, takes the answer-back off line. Thus, with the character suppression tine removed from surplus rows, the answer-back will operate blind while the drum steps to its rest (stop) position.

Note: The character suppression tine can also be used to eliminate coding errors. If a coding error is made or it is desirable to "erase" characters, remove the character suppression tine from the row(s) affected.

- (b) Do not remove the character suppression tine from rest (stop) position rows:

Cycle	Character Suppression Rest Position
1	ST Row
2	ST & 11 Rows
3	ST, 7, & 14 Rows

- (c) End each answer-back message with the ACK character.

(d) If the answer-back message includes the carriage return-line feed (CR LF) sequence, follow it with a "delete" fill character, ie, CR LF DEL. If new line operation is used (carriage return and line feed on the "line feed" character) add two "delete" fill characters, ie, LF DEL DEL.

- (4) Code each character into the drum by breaking and removing the tines indicated in Figure 7. Marking code levels shall have tines removed; spacing code levels shall have tines left intact. Start encoding the message onto the answer-back drum beginning with row 1 for the first character, row 2 for the second character, etc. The numbering of the rows of tines is embossed onto the right end of the answer-back drum. Either of the two following methods may be used for breaking off tines.

(a) Method 1: Use a TP95368 screwdriver to remove each tine. Place the end of the screwdriver blade at the base of the tine to be removed. While applying pressure against the base of the adjacent tine, press the side of the blade against the top of the tine to be removed until it breaks. If both tines adjacent to the tine to be removed have been broken off, apply the end of the screwdriver to the stub of either one in breaking off the unwanted tine. This method of removing a tine is indicated in the illustration showing the tine rows in Figure 7. In the illustration, pressure is being applied to the base of a row 20 tine and against the top of an adjacent tine in row 19 to break it off.

(b) Method 2: Use a TP161686 tine tool or a pair of TP108285 long-nosed pliers to remove each unwanted tine. Place the unwanted tine into slot of the tine tool, or grasp the unwanted tine firmly with the long-nosed pliers, and then, with the tool or the pliers held stationary, rotate the answer-back drum back and forth until the unwanted tine breaks off near its base. Use care not to damage adjacent tines.

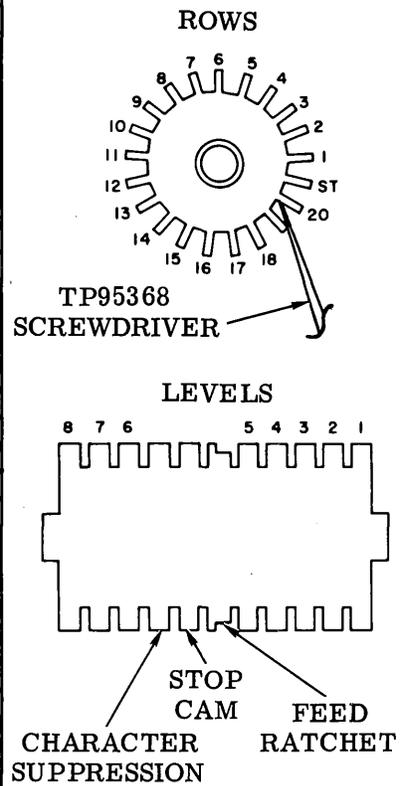
- 2.07 With the answer-back drum properly coded, replace drum in answer-back assembly as follows.

- (1) Lift the feed pawl while depressing the switch actuator arm.

SECTION 591-801-201

ASCII CHAR	CODE LEVELS MARKING	ASCII CHAR	CODE LEVELS MARKING
NUL	NONE	@	7-8
SOH	1-8	A	1-7
STX	2-8	B	2-7
ETX	1-2	C	1-2-7-8
EOT	3-8	D	3-7
ENQ	1-3	E	1-3-7-8
ACK	2-3	F	2-3-7-8
BEL	1-2-3-8	G	1-2-3-7
BS	4-8	H	4-7
HT	1-4	I	1-4-7-8
LF	2-4	J	2-4-7-8
VT	1-2-4-8	K	1-2-4-7
FF	3-4	L	3-4-7-8
CR	1-3-4-8	M	1-3-4-7
SO	2-3-4-8	N	2-3-4-7
SI	1-2-3-4	O	1-2-3-4-7-8
DLE	5-8	P	5-7
DC1	1-5	Q	1-5-7-8
DC2	2-5	R	2-5-7-8
DC3	1-2-5-8	S	1-2-5-7
DC4	3-5	T	3-5-7-8
NAK	1-3-5-8	U	1-3-5-7
SYN	2-3-5-8	V	2-3-5-7
ETB	1-2-3-5	W	1-2-3-5-7-8
CAN	4-5	X	4-5-7-8
EM	1-4-5-8	Y	1-4-5-7
SUB	2-4-5-8	Z	2-4-5-7
ESC	1-2-4-5	[1-2-4-5-7-8
FS	3-4-5-8	\	3-4-5-7
GS	1-3-4-5]	1-3-4-5-7-8
RS	2-3-4-5	^	2-3-4-5-7-8
US	1-2-3-4-5-8	_	1-2-3-4-5-7
SPACE	6-8	`	6-7
!	1-6	a	1-6-7-8
"	2-6	b	2-6-7-8
#	1-2-6-8	c	1-2-6-7
\$	3-6	d	3-6-7-8
%	1-3-6-8	e	1-3-6-7
&	2-3-6-8	f	2-3-6-7
' (APOS)	1-2-3-6	g	1-2-3-6-7-8
(4-6	h	4-6-7-8
)	1-4-6-8	i	1-4-6-7
*	2-4-6-8	j	2-4-6-7
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,	3-4-6-8	l	4-5-6-7
-	1-3-4-6	m	1-3-4-6-7-8
.	2-3-4-6	n	2-3-4-6-7-8
/	1-2-3-4-6-8	o	1-2-3-4-6-7
0	5-6	p	5-6-7-8
1	1-5-6-8	q	1-5-6-7
2	2-5-6-8	r	2-5-6-7
3	1-2-5-6	s	1-2-5-6-7-8
4	3-5-6-8	t	3-5-6-7
5	1-3-5-6	u	1-3-5-6-7-8
6	2-3-5-6	v	2-3-5-6-7-8
7	1-2-3-5-6-8	w	1-2-3-5-6-7
8	4-5-6-8	x	4-5-6-7
9	1-4-5-6	y	1-4-5-6-7-8
:	2-4-5-6	z	2-4-5-6-7-8
;	1-2-4-5-6-8	{	1-2-4-5-6-7
<	3-4-5-6		3-4-5-6-7-8
=	1-3-4-5-6-8	}	1-3-4-5-6-7
>	2-3-4-5-6-8	~	2-3-4-5-6-7
?	1-2-3-4-5-6	DELETE	1-2-3-4-5-6-7-8

MESSAGE DRUM



Note 1: Remove tine -- marking. Leave tine -- spacing.

Note 2: The eighth code level must be coded as shown for even parity operation.

Note 3: Remove the tines specified below to get proper cycle:

Cycles	Stop Cam	Char Supp
1	Row 6	Unused rows except ST row
2	Row 6 Row 17	Unused rows except ST & 11 rows
3	Row 6 Row 13 Row 20	Unused rows except ST, 7, & 14 rows

Figure 7 - Answer-Back Drum Code Chart

- (2) Insert and properly seat the drum.

Note: Code drum will not seat properly in the plastic block if installed backwards.

- (3) When replaced, the ST position (row with all tines left in) should be opposite contact wires.
- (4) Restore brace extension to normal position.

Note: If answer-back assembly fails to operate properly after installing drum, check the following adjustments found in Section 574-325-700 after positioning contact assembly to its rearmost position in retaining slots:

FEED PAWL - ADVANCED
FEED PAWL - RELAXED
OFF-NORMAL SWITCH
FEED BAIL SPRING

DATA SET 103H1

2.08 To verify that the proper options are installed in Data Set 103H1, the data set must be removed from the right compartment of the 37 TTY table. Remove as follows.

- (1) Open right compartment door by depressing door catch (Figure 8).
- (2) Loosen captive fastener holding the data set to the compartment floor.
- (3) Grasp the data set and pull out.
- (4) Place data set on floor in front of right compartment door.

2.09 Verify that the proper options are installed in Data Set 103H1 (Figure 9). Required options for the installation should be specified on the service order and/or work sheet. The available features or options for Data Set 103H1 are shown in Table E.

Note: Options are installed by tightening or loosening screws on terminal blocks located on the data set circuit packs.

2.10 Adjust the transmitted power level of the data set as follows.

- (1) Using the data station telephone line, place a call to the 1000-Hz, 1-mw terminal in the serving central office.

- (2) Using a 900-ohm transmission measuring set, measure the level of received tone.

- (3) Using Table F, locate the value in the 1000-Hz Measured Loss column equal to the measured value in (2).

- (4) Verify that the circuit breaker (CB101) located on the utility strip is in the OFF position (Figure 4).

- (5) Connect the power plug from the utility strip to the customer-provided ac receptacle.

Note: Where local regulations permit, a power cord plug retainer should be installed.

- (6) Connect the T(W-G) and R(G-W) leads from the line cord of the data set to the telephone line (Figures 2 and 9).

Note: As a suggestion, use 44A connecting block on customer's premises for terminating the T, R, and other line cord leads from the data set.

- (7) Set the function switch of KS-14510 L1 volt-ohm-millimeter (VOM) or equivalent VOM to 3 volts ac.

- (8) Connect the VOM test leads between terminals 10 and 13 on CP CJ9 of the data set (Figure 9).

- (9) Operate circuit breaker (CB101) located on utility strip to the ON position (Figure 4).

- (10) Verify that AUTO key is released (AUTO lamp is extinguished). If AUTO lamp is lit, operate AUTO key.

- (11) Operate DATA key; DATA lamp should light and dial tone should be heard in loudspeaker.

- (12) Dial telephone number of the 900-ohm terminating trunk in the serving central office.

- (13) When connection is established, operate DATA key and hold it operated.

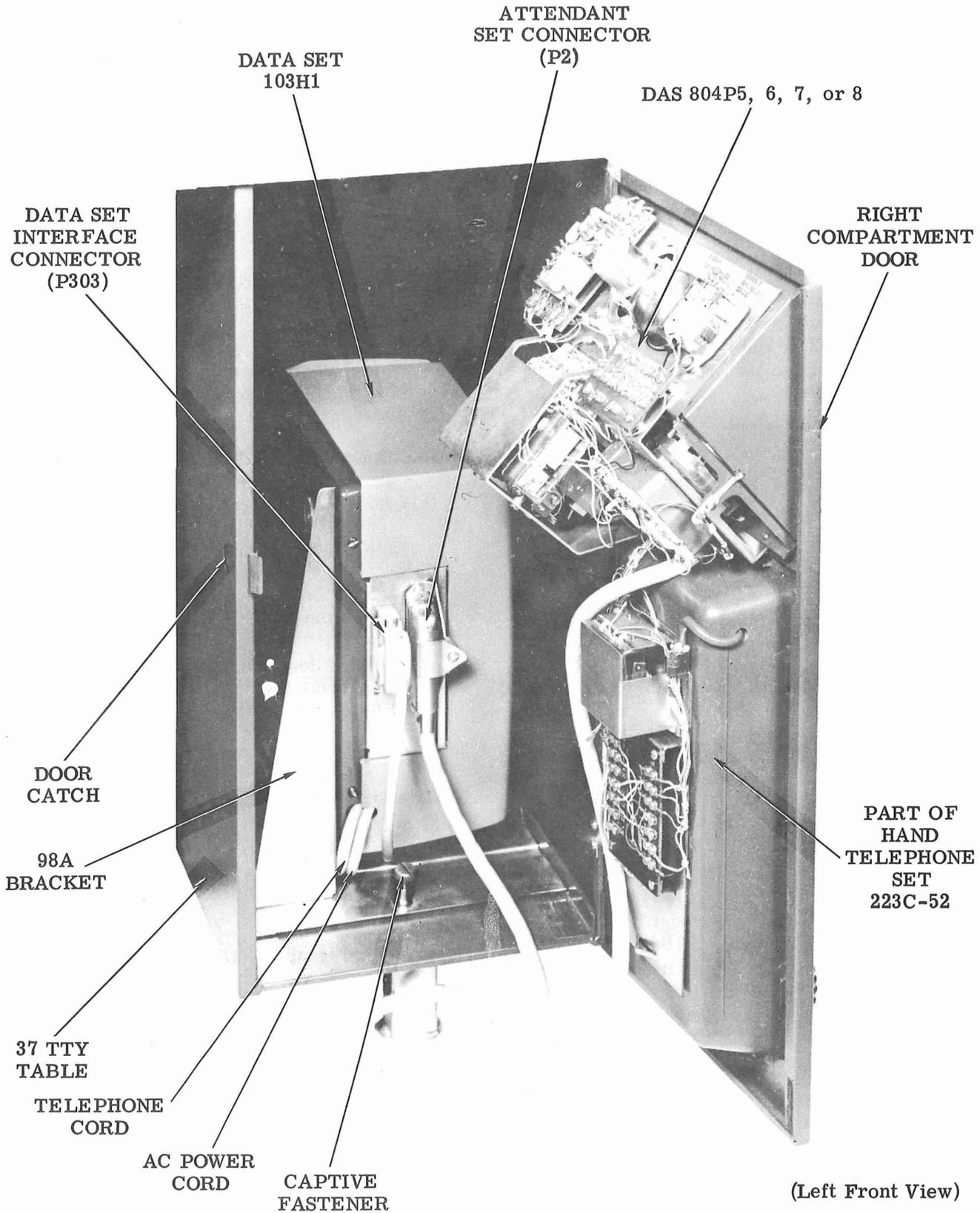


Figure 8 - Data Station Components Located in Right Compartment of a Two-Compartment 37 TTY Table

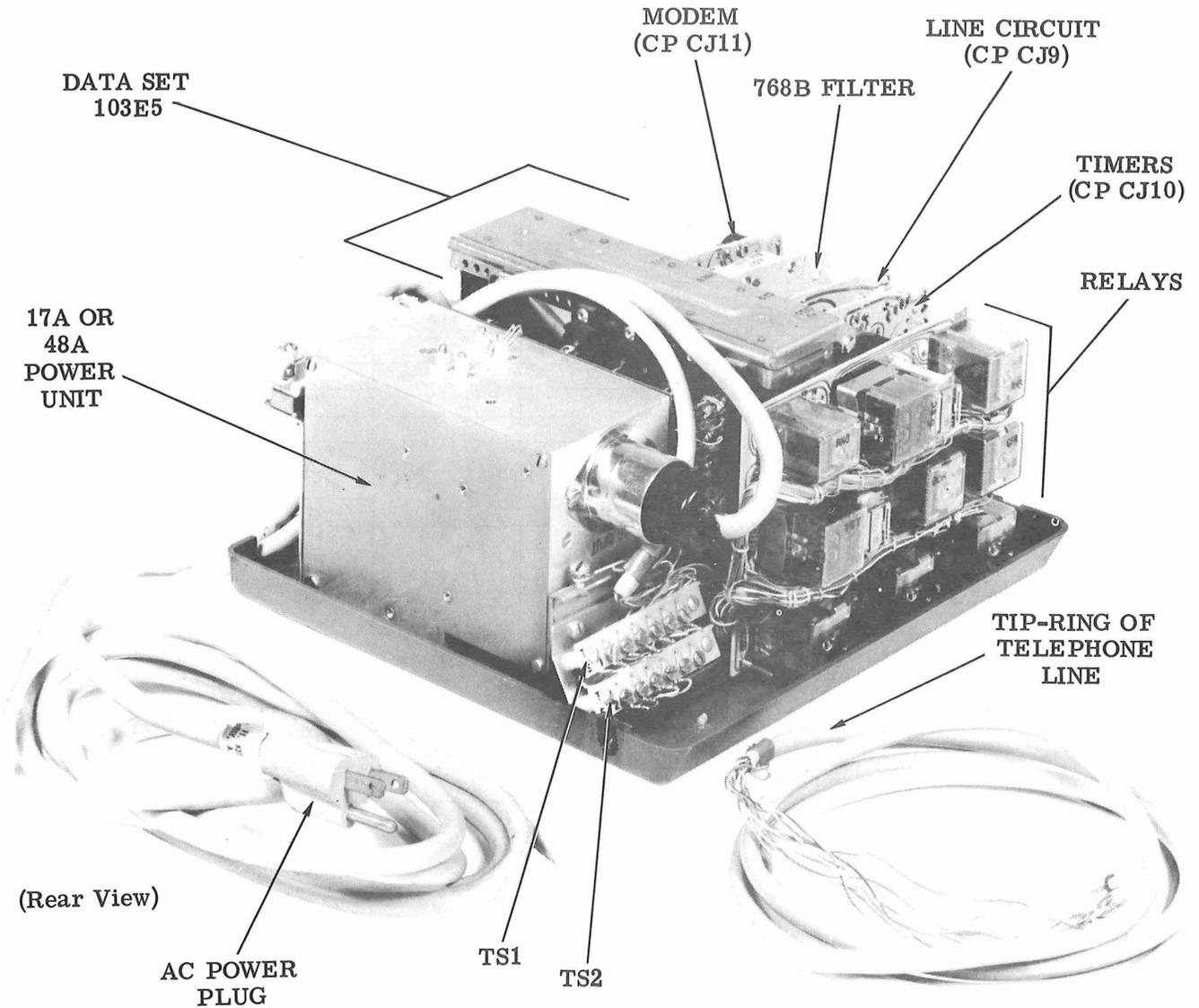


Figure 9 - Data Set 103H1 (Cover Removed)

- (14) Operate TEST key. Hold DATA key operated, release TEST key, and then release DATA key.
- (15) Using a screwdriver, adjust R34 on CP CJ11 (Figure 9) for the f_2 RMS voltage reading associated with the 1000 Hz measured loss value in (3).
- (16) At completion of R34 adjustment, operate CLEAR/TALK key.
- (17) Remove test leads from CP CJ9 and operate circuit breaker (CB101) to the OFF position.

3. INSTALLATION TESTS

3.01 Lubricate all components prior to placing the station into service. Complete lubricating instructions can be found in the following sections:

<u>Component</u>	<u>Section Number</u>
Answer-Back Unit	574-325-701
Keyboard and Base Assembly	574-321-704
Motor Unit	570-220-701
Typing Unit (Early Design)	574-320-701
Typing Unit (Late Design)	574-320-704
Typing Unit Cover and Pan	574-326-704

TABLE E
DATA SET 103H1 - FEATURES AND OPTIONS

FEATURES	OPTION	DESIG	CP NO.	SCREW SETTING	
				LOOSEN	TIGHTEN
Answer mode indication	CE on	X*	CJ9	1	2
	CE off	W		2	1
Space disconnect	Long	V*	CJ10		8
	Short	H			3, 8
	None	W/O V, H		3, 8	
Send disconnect	Yes	T*	CJ10		1
	No	W/O T		1	
Loss of carrier disconnect	Yes	S*	CJ10		4
	No	W/O S		4	
Common grounds	Yes	Q*	CJ9		10
	No	W/O Q		10	
Test	Answer/originate	W/O G*	CJ10	12	
	Originate only	G			12
Answer/originate transfer	Without	N*	CJ10		10
	With	W/O N		10	
Answer control	Combined	M*	CJ9		9
	Separate	W/O M		9	
CB and CF indications	Common	A	CJ9	5, 7	4, 6
	Separate	B*		4, 6	5, 7

*Required Options.

TABLE F
DATA SET 103H1
F2 TRANSMIT LEVEL (CP CJ11)

1000 HZ MEAS LOSS	DATA SET TRANSMIT LEVEL - DBM	F2 RMS VOLTAGE
Above 10 dB	—0	2.05
8 to 10 dB	—2	1.63
6 to 8 dB	—4	1.29
4 to 6 dB	—6	1.03
2 to 4 dB	—8	0.82
0 to 2 dB	—10	0.65

3.02 Check out the operation of the 37 TTY KSR DATA-PHONE Station by following the Operating Tests given in Field Maintenance Practices (FMP) 579-400-350.

4. REFERENCES

4.01 The following schematic drawings and circuit descriptions pertain to the 37 TTY KSR data station:

SD and CD-1D121-01 Data Set 103H1
SD and CD-1D136-02 Data Auxiliary Set 804P5, 6, 7, or 8
SD and CD-1D147-01 Data Set 103E5
SD and CD-3D037-01 Hand Telephone Set 223C-52
574-301-400 37 TTY KSR