37 AUTOMATIC SEND-RECEIVE (ASR) TELETYPEWRITER SET

FOR SWITCHED NETWORK SERVICE

TROUBLESHOOTING

(a) Use locally specified procedures (assistance, call supervisor, etc).

(b) Replace defective apparatus.

(c) Repair component using associated adjustment section or wiring diagrams.

(d) Temporarily restore any station service available. Example: If trouble has disabled only the transmitting facilities, use remaining facilities to restore RO service.

Note: Trouble Analysis (Part 4) is divided into five subparts:

1. Set (Local)   4. Punch and Reader
2. Keyboard   5. Set (On-Line)
3. Typing Unit

Use the subpart division and analysis appropriate to the trouble area being checked.

1. GENERAL

1.01   This section provides troubleshooting information for the 37 Automatic Send-Receive (ASR) Teletypewriter Set which is used in switched network service (Figure 1).

1.02   The information in this section includes test procedures to check set operation after installation, routine maintenance, or emergency maintenance. Each step of a test gives an action, the required verification, and a trouble analysis reference for use in case the equipment does not operate correctly. The trouble analysis part enables one to analyze specific troubles and gives a correction directly or references a specific adjustment found in appropriate adjustment section.

1.03   Perform each operating test step by step. If the equipment does not operate correctly and a correction is not given in Trouble Analysis (Part 4), consider the following:

Figure 1 - 37 Automatic Send-Receive (ASR)
Teletypewriter Set

Prepared for American Telephone and Telegraph Company by Teletype Corporation

CAUTION: BEFORE REMOVING OR REPLACING CIRCUIT CARDS OR FUSES, TURN OFF CIRCUIT BREAKER (CB101) LOCATED ON UTILITY STRIP OR PULL AC POWER PLUG TO REMOVE ELECTRICAL POWER.

1.04 An ASR set requires routine mainentance which consists of periodic lubrication of the teletypewriter set. In general, the lubrication interval for the ASR set operating at 150 words per minute is after the first 200 hours or 4 weeks of service. Thereafter, the TTY set should be lubricated every 1500 hours of operation or 6 months, whichever occurs first. These figures are for normal operating conditions. More frequent .servicing may be required for other than normal operating conditions. See the component lubrication sections for complete lubricating information.

Note 1: Gold-plated contacts should be cleaned at time of lubrication. The interval may be reduced, depending upon the signal circuit configuration, usage, and enviroment.

Note 2: Use twill jean cloth (KS2423) to clean gold-plated contacts. Do not use burnishers, files, etc, which will remove gold plating. Other materials and tools necessary to maintain this equipment can be found in Section 570-005-800.

1.05 To gain access to the typing unit for lubrication and adjustments, its cover must be raised or removed. To gain access to the reperforator (punch) either the reperforator cover or reperforator-transmitter (RT) cabinet top must be raised. For information on these operations and other component removal and replacement information, see Section 574-302-702. Disassembly and reassembly procedures for component mechanisms are given in the appropriate disassembly and reassembly sections.

CAUTION: WHEN OPENING RT CABINET TOP, CHECK TO SEE THAT CABINET TOP BLOCKING LINK DROPS INTO ITS INDENT TO PREVENT ITS ACCIDENTALLY CLOSING.

2. REFERENCES

ITEM	SECTION NUMBER
Adjustments:	
Answer-Back	574-325-703
Keyboard	574-321-703
Motor	570-220-700
Reader	592-801-700
Reperforator-Transmitter	
Cabinet	574-327-700
Nontyping Reperforator	574-329-700
Table	574-323-703
Typing Reperforator	574-330-700
Typing Unit	574-320-703
Typing Unit Cover	
and Pan	574-326-703
Disassembly and Reassembly:	
Removal and Replacement of	
Components (ASR Set)	574-302-702
Keyboard	574-321-705
Motor	570-220-702
Reader	592-801-702
Nontyping Reperforator	574-329-702
Typing Reperforator	574-330-702
Lubrication:	
Answer-Back	574-325-704
Keyboard	574-321-704
Motor	570-220-701
Nontyping Reperforator	574-329-701
Reader	592-801-701
Typing Reperforator	574-330-701
Typing Unit	574-320-704
Typing Unit Cover	
and Pan	574-326-704
Wiring Diagrams and Circuit Descriptions:	
ASR Set - WD Package	WDP0118
Circuit Cards (ASR Set)	
WD Package	WDP0127
RT Module - WD	
Package	WDP0129
Circuit Cards (RT Module)	
WD Package	WDP0128
Base - Actual	7874WD
Function Box - Actual	8363WD
Keyboard - Actual and	
Schematic	8500WD
Motor Unit - Actual	7828WD
Nontyping Reperforator -	
Actual	8494WD
Reader - Actual	5072WD
RT Cabinet - Actual	8497WD
RT Cabinet Doors - Actual	8558WD
Typing Unit - Actual	8362WD
	8364WD

3. TEST PROCEDURES

LOCAL OPERATING TESTS

Keyboard and Typing Unit Local

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
1	Operate KBD LOCAL and PRINTER LOCAL pushbuttons.	a. KBD LOCAL and PRINTER LOCAL lamps and copy lamps light. b. Typing unit motor starts.	2,1,3,9 4
2	Rapidly depress any keys.	a. Keyboard trips once for each character no double tripping. b. No keytop binds. c. Proper character printed.	19,22 20 23
3	Depress NEW LINE* key with typebox at various platen positions.	a. Observe line feed. b. There will also be carriage return if set is equipped with combined carriage return and line feed feature. c. On carriage return, observe, that there is no carriage bounce.	29a,29e,23 29w 28m
4	a. Depress TAB key. b. Depress RETURN key.	Observe horizontal tabulation if so equipped. Carriage moves to left margin.	29a,23 29w
5	a. Type "Quick Brown Fox" test message for at least two lines. b. Check ribbon feed and reversal in both directions, as reversing guide is manually operated while typing random characters.	Typing unit prints test message. Characters evenly spaced. EOL lamp on. Left and right margins even and printer stops at right margin. Ribbon will feed and reverse in both directions freely.	23,24a 26b,27b 15 28m,28n 32a,32b
6	Depress CONTRL and VT (K) keys simultaneously.	Observe vertical tabulation if so equipped. Some printers will optionally return the carriage to the left margin.	23,29a
7	a. Depress CONTRL and FF* (L) keys simultaneously. b. Again depress CONTRL and FF (L) keys simultaneously.	Observe a single page feed-out if so equipped. Some printers will optionally return the carriage to the left margin. No additional feed-out.	29a 29d

*Some Early Design Units have LINE SPACE in place of NEW LINE, PAGE in place of FF, and PREFIX in place of ESCAPE keytops.

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
8	Depress CONTRL and ENQ (E) keys simultaneously.	a. Answer-back should not operate. b. Typing unit cycles but does not space.	12 23,24,29
9	Depress CONTRL and BELL (G) keys simultaneously.	Bell rings.	29a,23,24
10	Depress HERE IS pushbutton.	Answer-back does not transmit.	12
11	Depress NULL key.	Typing unit cycles but does not space or print.	23,24
12	Depress DELETE key.	Typing unit cycles but does not space or print.	23,24
13	Position typebox to right margin. Type character O followed by two backspaces, and P followed by two backspaces. Repeat this sequence nine times.	Typing unit prints characters and then the carriage backspaces.	27e,23,24
14	Operate LOCAL RETURN pushbutton.	Carriage moves to left margin.	29z
15	Operate PAPER ADVANCE pushbutton.	Paper feeds out at three times normal line feed rate.	29y
16	Depress ESCAPE* key followed by the following keys: SPACE , . / + * ! '' # $ % & ' ( ) HE	Only E prints.	29c,29x,23,24,28
Half-Forward and Reverse Line Feed (if so equipped)			
17	a. Depress the x key, then depress ESCAPE followed by 9 key and then x key. b. Depress ESCAPE followed by 8 key and then x key. c. Depress ESCAPE followed by 7 key and then another x. Typical Example: Ex_xx^x d. Depress NEW LINE key twice.	X will be printed. Typing unit will line feed in forward direction by 1/2 of a full line and second x will be printed below first x. Typing unit will line feed in reverse direction by 1/2 of a full line, and then x will be printed on same line as the first x. Typing unit will line feed in reverse direction by a full line; and then x will be printed on line above the previous x. Carriage moves to left margin and optionally unit line feeds.	29g,29i,29x,28 29g,29i,29x,28 29h,28

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
Printing Character Extension (if so equipped)			
18	Depress CONTRL and SO keys and then depress QA1 x NEW LINE CONTRL SI w keys.	Typing unit will print character at right end of the no. 7 row of the typebox and then end character on the no. 8 row, then print 1, followed by w on the next line.	24a,29t
Horizontal Tab Set and Clear (if so equipped)			
19	a. Press TAB key and note location of any horizontal tabs presently set on spacing drum.		
	b. Press NEW LINE followed by ESCAPE and no. 2 key.	Printer line feeds and carriage moves to left margin.	29e,29w,29x,24, 23
		All horizontal tabs cleared as carriage moves to right margin.	29n
	c. Depress RETURN key.	Carriage moves to left margin.	29w
	d. Depress X keytop until print hammer is at indicator position 15.	X is printed.	24a
	e. Depress ESCAPE followed by no. 1 key.	A horizontal tab is set on spacing drum, if so equipped.	29l,29x,29m,29k
	f. Press X keytop until print hammer is at position 30.		
	g. Depress ESCAPE followed by no. 1 key.	A horizontal tab is set at location 30.	29l,29x,29m,29k
	h. Press X keytop until hammer is at position 50.		
	i. Depress ESCAPE followed by no. 1 key.	A horizontal tab is set at location 50.	29l,29x,29m,29k
	j. Press RETURN key.	Carriage moves to left margin.	29w
	k. Press TAB key 3 times. Watch location of print hammer after each tab.	Carriage moves to tabs just set at print position locations 15, 30, and 50.	29k
	l. Press RETURN key.	Carriage moves to left margin.	29w
	m. Press ESCAPE followed by no. 2 key.	The tab set previously will now be cleared as carriage moves to the right margin.	29n,29o,29x
	n. Operate RETURN key.	Carriage moves to the left margin.	29w

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
19 (contd)	o. Press TAB key.	Carriage moves across page to right margin past 15, 30, and 50 locations of tabs just cleared.	29k
	p. Depress RETURN key.	Carriage moves to the left margin.	28a,29w
		EOL lamp goes off.	15
	q. Use ESCAPE and no. 1 keys to set tabs at locations, noted at start of this test.		29k
Vertical Tab Set and Clear (if so equipped)			
20	a. Check the vertical tab disc on side of printer and note location of any tabs presently set on the disc.		
	b. Depress FF and then ESCAPE followed by no. 6 key.	Printer will feed out a form. Printer will line feed and all tab stops will be cleared.	29r,29x
	c. Press NEW LINE four times and type 12345.	Four line feeds optional carriage return and then 12345 is printed.	29e,29w,23,24, 28
	d. Depress ESCAPE followed by no. 5 key.	A tab stop will be set on the vertical tab disc.	29q,29x
	e. Depress NEW LINE key twice and then type 12345. Press ESCAPE followed by no. 5 key. Again, depress NEW LINE key twice, type 12345 and ESCAPE followed by no. 5 key.	12345 is printed twice and two more tabs set.	29w,29q,29x
	f. Manually turn platen backwards until each 12345 moves below ribbon.		
	g. Depress CONTRL and VT (K) keys simultaneously three times. Note location of 12345 characters.	Unit will vertically tab and stop at tabs just set; 12345 will be on same line as print hammer at each tabbing operation.	29p,29w,28
	h. Manually turn the platen backwards until each 12345 moves below the ribbon.		
	i. Depress ESCAPE followed by no. 6 key.	Vertical tabs previously set will be cleared as paper feeds out past each 12345 to next form tab stop.	29r,29s,29x
	j. Use ESCAPE and no. 5 key to set tabs at location as noted before start of test.		29q

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
	Red-Black Printing (if so equipped)		
21	a. Depress ESCAPE followed by no. 3 key. Observe the red printing magnet. Type a few characters.	Ribbon shifts to red. Characters will be printed in red.	32d,29x,28
	b. Depress ESCAPE followed by no. 4 key. Type a few characters.	Ribbon shifts to black. Characters printed in black.	32e,29x
	Character Counter — Count of 66 Characters (if so equipped)		
22	a. Operate RETURN keytop.	EOL lamp goes out if already on. Carriage moves to left margin.	
	b. Depress PRINTER LOCAL pushbutton.	PRINTER LOCAL lamp off and typing unit blinded. Printer motor still on.	11
	c. Depress spacebar about 60 times.	Printer will not respond. KBD EOL lamp does not go on. Character counter goes up to about 60.	11 15
	d. Type about 10 control characters.	KBD EOL lamp will not light.	16
	e. Type ESCAPE and no. 1 key sequence 10 times.	KBD EOL lamp will not light.	16
	f. Depress NULL key 10 times.	KBD EOL lamp will not light.	16
	g. Depress DELETE key 10 times.	KBD EOL lamp will not light.	16
	h. Depress BACK SPACE key 10 times.	Character count goes down to 50.	15
	i. Depress spacebar about 10 times.	Character count goes up to 60. KBD EOL lamp does not light.	15
	j. Depress spacebar 6 to 8 times until EOL lamp goes on.	KBD EOL lamp lights.	15
	(If character counter card is set for more than 66 characters, additional SPACE characters will be required to turn on EOL lamp.)		
	k. Depress NEW LINE key.	KBD lamp will go out (unless character counter card strap A is removed).	2c

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
23	a. Remove paper supply from typing unit and/or paper tray.	ALARM lamp lights, if printer has low paper switch or paper out switch.	30a,30b
	b. Replace paper supply in typing unit.	ALARM lamp goes out.	30a,30b

Reader and Punch Local

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
24	a. Operate PRINTER LOCAL, PUNCH LOCAL, and PUNCH ON pushbuttons.	All associated lamps light. PUNCH ON lamps goes on after PUNCH LOCAL lamp. Punch and reader motors start.	9a 34,35,36
	b. Depress DELETE key to feed out about 3 inches of tape.	DELETE punched in tape.	39,40
25	a. Type five r and y characters and then operate the Punch BACK SPACE pushbutton four times on the reperforator-transmitter (RT) module.	Reperforator (punch) and typing unit respond. Punch backspaces one character each time the pushbutton is operated without tearing the tape.	23,39,40,28 42a
	b. Again depress DELETE key for several inches of tape.	Check that the DELETE perforations fit all the previously punched code holes, except for first two characters after tape backspaces.	42b
26	Type "THE quick BROWN fox" test message for more than one line. Include some repeat control characters. If the set has tabulation, include this in the message. Add one DELETE fill character after each control character and two DELETEs after NEW LINE and Carriage Return.	Test message tape is cut.	39
27	Place a message tape in reader head. Operate control lever to RUN position. Depress READER LOCAL switch.	READER LOCAL lamp on. Reader operates. Typing unit and punch respond. The reader stops during tab operations. Reader may optionally hesitate after control characters. Check printed copy for errors.	9a 38b 37,39,24 38c
28	With tape in reader head, move reader control lever to STOP position. Operate READER STEP pushbutton on RT module.	Reader stops operating. Reader advances tape and reads one character. Typing unit and punch respond.	44 38a,37 24,39

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
29	a. With tape in reader head, move reader control lever to RUN position, lift up reader tight-tape bail.	Reader operates. Reader stops. TAPE ALARM lamp lights.	38b 44 43b
	b. Then, place tight-tape bail down.	TAPE ALARM lamp goes out. Reader operates. No errors in copy.	39
30	a. While the reader is running, lift the tight-tape bail on the RT door.	Reader stops. TAPE ALARM lamp on.	44 43b
	b. Release the tight-tape bail.	TAPE ALARM lamp off. Reader restarts.	
31	a. Tilt the dome of the RT module.		
	b. Operate the tape feed-out lever (tall lever behind the punch block, if so equipped).	Punch feed-out tape with delete characters.	40c
	c. While the reader is running, remove the tape supply.	TAPE ALARM lamp on. Reader continues to run.	43a
	d. Replace the tape supply in the holder.	TAPE ALARM lamp off.	
32	a. With reader operating, let trailing end of tape pass through head.	Reader stops. TAPE ALARM lamp lights.	45 43b
	b. Move control lever to STOP position.	TAPE ALARM lamp goes out.	43c
	c. Raise and then release reader tight-tape bail.	TAPE ALARM lamp goes on and then off.	43b
	d. Raise and then release RT door tape bail.	TAPE ALARM lamp goes on and then off.	
33	Move the reader control switch to the FREE position.	TAPE ALARM lamp goes on. Tape can be freely moved through reader gate in forward and reverse direction.	
34	If equipped with READER AUTO pushbutton, make a test tape for later use. The message should contain 10 xs, DC2 code combination, DELETE, 10 ys, DC4 code combination, DELETE, 10 zs, DC3 code combination and DELETE.		

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
35	a. Make up a test tape with r and y characters followed by DC1 control character, DELETE, and more r and y characters. b. Put this tape into reader head and, with READER LOCAL lamp on, depress READER AUTO pushbutton. Place reader control lever to RUN.	READER AUTO lamp will light. Reader will read tape and stop after reading the DC1 control character.	46a
36	Operate all lighted pushbuttons. Remove test tape from reader. End of Local Test	Copylights and all associated control panel pushbutton lamps go out. All motors stop.	18

ON-LINE OPERATING TESTS

Note 1: On-line operating tests presume that local tests have been performed and set operates correctly in local mode, and that options are in the standard no. 1 configuration per 7856WD.

Note 2: Certain elements of a set cannot be checked in the local mode. They must be checked on-line through a data set with either another teletypewriter set or a test center.

Telephone Line Tests

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
1	Lift handset of station under test; place call to a nearby phone.	Phone circuit is operable.	67
2	Replace handset of station under test; call station under test from nearby phone.	Station bell rings.	68
3	Lift, then replace, station handset.	Bell ringing tripped.	67
4	Again, call station under test from nearby phone.	Bell rings.	
5	Depress PRINTER LOCAL, then AUTO pushbuttons.	a. OFF LINE lamp lights. b. AUTO lamp lights. c. Ringing continues.	70
6	Remove paper roll and depress PRINTER LOCAL pushbutton.	a. Paper alarm lamp lights. b. PRINTER LOCAL pushbutton releases. c. PRINTER LOCAL lamp turns OFF.	

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCE
6 (contd)		d. Ringing continues. e. Motors do not start.	 60
7	Replace paper roll.	a. Bell ringing tripped. b. DATA lamp lights. c. Teletypewriter motor starts, copy-lights ON. d. Both DATA lamp and motor turn OFF after time-out interval of 13-15 seconds.	 69
8	Depress DATA pushbutton.	a. DATA lamp lights. b. Dial tone sounds.	69
9	Place call to nearby phone — use card dialer if available.	Phone rings.	
10	Answer called phone.		
11	Lift station handset and depress CLEAR/TALK pushbutton.	DATA lamp and motor turn OFF.	69
12	Depress DATA pushbutton and replace handset.	a. DATA lamp lights. b. Motor starts.	69
13	Hang up called phone; remove paper supply.	a. If equipped with "Disconnect on Paper Alarm" option, DATA lamp and motor turn OFF immediately. b. If not equipped with option, DATA lamp and motor remain ON for duration of time-out interval.	 69
14	Release AUTO pushbutton; replace paper supply.	AUTO light turns OFF.	
Teletypewriter and Data Set Tests			
15	Place call to a 904G- or 904H-type Data Test Center (DTC). Note: This procedure starts Test O, with the assumption that the data set has been tested and is operating properly.	a. Connection made. b. Request Test O, Model 37 DATA-PHONE/STATION Section 668-400-300. c. Give station telephone number.	

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCES
16	Arrange to have DTC ring station after discon- nect.		
17	Hang-up phone.		
18	a. Place previously prepared DC1 tape in reader of station under test with control lever in RUN position. b. Depress READER AUTO pushbutton.	READER AUTO pushbutton lights. Reader does not start.	9c
19	Depress AUTO pushbutton on station con- troller.	a. AUTO lamp lights. b. Reader does not start.	70 62
20	DTC rings station and connection is made.	a. Motors start. b. Copylights ON. c. DATA lamp lights. d. Answer-back trips. e. Message printed. f. PROCEED lamp lights. g. Reader starts, message printed. h. Reader stops when DC1 is sensed.	34,35,36 3 69 48 50 49 61 46a
21	a. Move Reader Control Lever to STOP. b. Remove tape from reader. c. Depress READER AUTO pushbutton.	READER AUTO lamp extinguishes.	
22	DTC will send distorted test message. After DTC sends 40 percent switch combinations, check copy for garble.	Printer copies DTC transmissions.	
23	After several lines of ungarbled 40 percent switch combinations copy, depress INTRPT pushbutton.	a. PROCEED lamp remains lighted. b. Printer stops copying DTC transmissions.	
24	a. If copy is garbled, depress INTRPT push- button. b. Type message – "NOT OK GO TO TALK" Then lift handset and press CLEAR/TALK pushbutton.	PROCEED lamp remains lighted. Printer copies keyboarded message. DATA lamp extinguishes. DTC picks up phone.	

STEP	ACTION		VERIFICATION		TROUBLE ANALYSIS REFERENCES
24 (contd)	c.	Verify that the complete Data Set Test (Test H) in Section 668-400-300 was successfully completed.			
	d.	If data set is ok, DTC will report that fact. At that point, terminate that call to DTC, and check and repair station ESU. Test can be resumed at step 22.			8
25	If copy is ok, type "OK" followed by several lines of repeat x characters.		Printer copies x characters.		
26	a.	The DTC will measure station distortion when the repeat x characters are sent.			
	b.	If distortion is 5 percent or less, DTC will send an Interrupt followed by OK.	PROCEED lamp will extinguish. Keyboard will be blinded. Printer copies ok.		54
	c.	If distortion exceeds 5 percent, DTC will send an Interrupt followed by "NOT OK DISTORTION - - % send EOT"	PROCEED lamp will extinguish. Keyboard will be blinded. Printer copies received message.		54
	d.	If not ok followed by amount of distortion is printed, depress PROCEED pushbutton and type "EOT" (Control D).	PROCEED lamp lights. Station disconnects. DATA lamp, PROCEED lamp and copy-lights extinguish. Motors stop.		63 / 59
	e.	Following termination of call, repair ESU. When repair is accomplished, place new call to DTC and resume test at step 22.			65
27	After distortion is ok, DTC will send character ENQ.		a. Station answer-back will trip.		48
			b. Printer will copy answer-back message.		50
			c. PROCEED lamp will light at end of answer-back message.		49
28	a.	DTC sends message: "Depress HERE IS pushbutton"	Station printer copies message.		
	b.	Depress HERE IS pushbutton.	Answer-back trips.		48
			Printer copies answer-back message.		50
29	a.	DTC sends message: "BLIND" followed by character "NAK" followed by "TYPE"	Station PROCEED lamp extinguishes.		51
	b.	Type series of repeat x characters.	Station keyboard is blinded.		52
			No copy.		47

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCE
30	a. DTC sends message: "UNBLIND" followed by character "ACK"	Station PROCEED lamp lights.	49
	b. Type series of repeat x characters.	Printer copies message.	50
31	a. DTC sends message: "TO FDX" followed by sequence of "ESC:" (escape colon) followed by "TYPE"	Station goes to full-duplex. Printer copies received message.	
	b. Type series of U * characters followed by "IN FDX"	Printer does not copy.	53
32	a. DTC send message: "TO HDX" followed by sequence of "ESC;" (escape semicolon) followed by "TYPE"	Station returns to half-duplex. Printer copies received message.	
	b. Type a series of r and y characters followed by "IN HDX"	Printer copies message.	57
33	a. DTC sends series of U * characters with incorrect parity.	ALARM lamp lights. Message may not be printed or may be garbled.	56
	b. Depress ALARM pushbutton.	ALARM lamp is extinguished.	
34	a. DTC sends message: "TYPE QUICK brown FOX"	Printer copies message.	
	b. Type complete QUICK brown FOX test message (alternate words upper and lower case).	Printer copies message. DTC checks received parity.	
35	a. DTC sends message: "TYPE CONTROLS"	Printer copies message.	
	b. Type the following control characters: US, GS, RS, FS, TAB, DC1, ETB, ENQ, DC2, DC4, EM, DLE, NULL, ESCAPE, SOH, DC3, V TAB, FF, DELETE, SUB, CAN, ETX, SYN, STX, SO, SI	No characters will be printed. The printer will perform the appropriate mechanical operations.	
36	a. DTC sends message: "OK" or "NOT OK GO TO TALK" depending upon results of step 35.	Station printer copies received message.	
	b. If "NOT OK GO TO TALK" is printed, lift handset and press CLEAR/TALK push-button.	DATA lamp extinguishes. DTC will enumerate errors.	
	c. If errors occured, terminate call and repair ESU. When repair is accomplished, place new call to DTC following interconnection, and resume test in step 34.		65

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCE
37	If DTC sends OK type "ASR"	DTC continues test. Printer copies ASR.	
38	Place previously prepared DC2, DC4, and DC3 coded tape in reader of station under test with control lever at STOP. Station PUNCH ON and READER AUTO lamps should be OFF.	Reader does not start.	34
39	a.　Type "SEND DC1" b.　DTC sends READER AUTO START followed by character DC1.	Reader does not start. Printer copies both send and received messages.	64
40	Depress READER AUTO pushbutton and type "SEND DC2" DTC sends "PUNCH ON" followed, by character "DC2" followed by a series of U * characters.	a.　READER AUTO pushbutton lights. b.　Printer copies both send and received messages. c.　Reader does not start. d.　PUNCH ON lamp lights. e.　Punch copies only U * characters.	9c 37 64 66a 39,40
41	DTC sends, Punch OFF, followed by character DC4, followed by a series of Q characters.	a.　PUNCH ON lamp extinguishes. b.　Punch does not copy Q characters. c.　Printer copies Q characters.	66a 41 37
42	DTC sends, Reader ON, followed by character DC1.	a.　Printer copies, Reader ON. b.　Station reader stops. c.　Printer copies typed message. d.　Punch and PUNCH ON lamp do not respond to DC2 character on tape. e.　Reader stops when it senses character DC3.	 58 66b 46
43	a.　DTC sends message: "OK" or "NOT OK GO TO TALK" — depending upon results of previous tests. b.　If "NOT OK GO TO TALK" is printed, lift handset and depress CLEAR/TALK pushbutton. c.　If DTC sends "NOT OK" etc, and enumerates errors, terminate call and check, and repair Reader Auto circuitry. When repair is accomplished, place new call to DTC and resume test at step 37.	Station printer copies received message. DATA lamp extinguishes. DTC will enumerate errors.	 58

STEP	ACTION	VERIFICATION	TROUBLE ANALYSIS REFERENCE
44	If DTC sends "OK" type character "EOT" (control D).	a. Station disconnects data lamp. b. PROCEED lamp, copylights extinguish. Motors stop.	59

End of On-Line Test

4. TROUBLE ANALYSIS

CAUTION: BEFORE REMOVING OR REPLACING CIRCUIT CARDS OR FUSES, TURN OFF CIRCUIT BREAKER (CB101) ON UTILITY STRIP OR PULL POWER PLUG.

Note: To minimize the chance of placing a card in the wrong position, remove only one card at a time. Check that the proper circuit card is in the proper slot per list on front of the electrical service unit. See 7856WD (part of WDP0127) for card options.

SET (LOCAL)

NO.	TROUBLE	CORRECTIVE PROCEDURE
1	Proper voltages absent.	Check if ac power cord is plugged into the wall receptacle. Check set circuit breaker is ON. Check set fuses F1, F2, and F3, with power off. Check all cable connectors and circuit cards are secure. Check 115 v ac across TB102 terminal board posts 1 and 3. Check voltage across the following power supply terminal board posts: +5 v dc across 1 and 5, -12 v dc across 3 and 5, and +12 v dc across 4 and 5. See Figure 5.
2	a. All control panel lamps do not light. b. Individual lamps fail. c. PTR EOL or KBD EOL lamp does not go off when NEW LINE key is depressed.	Check voltage as in trouble no. 1. Replace defective lamp. Check wiring to the lamp. See Figures 9 and 10. Remove optional clip on typing unit that disables NEW LINE feature and prevents carriage return on NEW LINE key operation. See trouble no. 15.
3	Copylights do not light.	Replace defective lamp(s). Check 115 v ac across TB102 terminal board posts 1 and 3. See Figure 5. Check 5-1/2 v ac across terminal board utility strip posts 5 and 3. Check for approximately 20 v dc at terminal board posts 6 and 7 — if absent, replace Receiving Device Card (Z305). Replace motor control relay.

NO.	TROUBLE	CORRECTIVE PROCEDURE
4	Typing unit motor does not start.	Check 115 v ac across TB102 terminal board posts 1 and 3. Check for approximately 20 v dc at terminal board posts 6 and 7 — if absent, replace Receiving Device Card (Z305). Depress red overload button (under motor). Replace Mode Control Card (Z105). Replace motor control relay.
5	Garbled or no copy when operating keyboard, but reader and answer-back work correctly.	Check trouble no. 23. Check Keyboard Trip Arm adjustment. Check voltage as in trouble no. 1. Check keyboard contact assembly for dirt. Replace Keyboard Control Card (Z301). See trouble no. 28 and Figure 4.
6	Garbled or no copy from reader, keyboard, and answer-back, but good copy from on-line signal source.	Check voltage as in trouble no. 1. Replace Local Distributor and/or Receive Control Cards (Z101 or Z107). See Figure 4.
7	a. Garbled or no copy from answer-back but keyboard works correctly and drum rotates.	Check answer-back drum coding. Check Contact Gap Open and Closed adjustments (YAB802 only). Check that answer-back contact wires are not crossed (TP327801 answer-back only). Replace Answer-Back Driver or Send Control Cards (Z314 or Z103).
	b. Drum does not rotate.	Check Answer-Back Armature Gap and Feed Pawl adjustments (TP327801 answer-back only). Check Feed Pawl, Code Drum, Armature Stop or Feed Pawl Backstop adjustments (YAB802 only). See if any off-normal tines are removed from drum. Check 1/2-amp slow-blowing fuse on Answer-Back Driver Card while power is off. Check for +12 v and -12 v on magnet terminals. Check resistance of magnet coil. If not 16 ohms ±2 ohms (TP327801 answer-back), or if not 17-1/2 ohms ±2 ohms (YAB802), replace the magnet coil.
	c. Drum rotates continuously.	Check Answer-Back Off-Normal Switch adjustments (TP327801 answer-back only). See if all off-normal tines are removed from drum (YAB802 only).
8	Garbled or no copy from keyboard, reader, answer-back, and other on-line signal source.	Check voltage as in trouble no. 1. Replace Receive Control and/or Receiving Device Cards (Z107 and Z305). Check associated typing unit troubles 24 through 29. Check that set is not in full-duplex. Check that printer is not in Shift Out mode (trouble no. 28b).

NO.	TROUBLE	CORRECTIVE PROCEDURE
9	a. KBD LOCAL, PRINTER LOCAL, PUNCH LOCAL or READER LOCAL lamps fail to go on. b. PUNCH ON lamp does not go on or off when switch is depressed while PUNCH LOCAL is on. c. READER AUTO lamp does not go on when pressed while PRINTER LOCAL and READER LOCAL are both on or both off.	Replace defective lamp. Check wiring to the lamp. See Figures 9 and 10. Replace Mode Control Card (Z105). Replace Alarms and Control Card or Mode Control Card (Z304 or Z105). Check wiring to the lamp. See Figures 9 and 10. Replace defective lamp. Check wiring to the lamp. See Figures 9 and 10. Replace Alarms and Automatic Control Card (Z304).
10	Horizontal tab, vertical tab, or page feed-out functions fail.	Check trouble no. 36. Replace Receive Control Card (Z107) and/or Alarms and Control Card (Z304).
11	Printer not blinded when PRINTER LOCAL lamp is off during local operation.	Replace Mode Control Card (Z105) and/or Receive Control Card (Z107).
12	Local answer-back transmits: (a) Anytime CONTRL ENQ (E) keytops are depressed or (b) Whenever HERE IS pushbutton switch is operated while set is off-line (local operation).	Replace Send Control Card (Z103).
13	Bell fails to ring.	Check trouble no. 29. Replace Alarms and Control or Alarms and Automatic Controls Card (Z304).
14	PTR EOL lamp fails.	Check margin indicator switch (located on base).
15	KBD EOL lamp fails.	Replace Keyboard Control and Character Counter Cards and/or Counter Control Card (Z301 and Z303). Check optional straps or Counter Control Card for proper line length.
16	Character counter counts control characters or DELETE characters and KBD EOL lamp lights.	Replace Character Counter Card and/or Counter Control Card (Z301 and Z303).
17	ALARM lamp fails — with paper supply removed from typing unit.	Check operation of low paper switch. Replace defective lamp. Replace Alarms and Automatic Controls Card (Z304).
18	Copylights, KBD LOCAL, PRINTER LOCAL, READER LOCAL, READER AUTO, PUNCH LOCAL, AND PUNCH ON lamps, and all motors remain on — after pushbuttons are operated at end of test.	Replace Mode Control and/or Receiving Device Cards (Z105 and Z305).
KEYBOARD		
19	Keyboard fails to trip, double trip, or runs continuously.	Check that "H" plate and spring are on keyboard trip arm. Check Trip Arm adjustment. Check Clutch Trip Lever adjustment. Check universal codebar and tie link operation.

NO.	TROUBLE	CORRECTIVE PROCEDURE
20	Key binds.	Check for broken keytop guideplate, displaced keylever or return spring underneath the keyboard frame, or bind in action of codebars and "Tee" levers.
21	Fully depressed keytop fails to generate repeat Space, NEW LINE, NULL, BACKSPACE, DELETE, −, ., *, UNDERSCORE or X.	Check for presence of optional nonrepeat clip (in frame under keylevers). Check for bind in keytop. Check for bind in universal tie link and/or nonrepeat lever.
22	Keyboard nonoperative with typing unit motor running.	Check and engage intermediate gear overload clutch.
23	a. Copy errors. Many characters garbled.	Check that contact wires are properly located on "Tee" levers. Remove keylever guideplate and check that all codebars and their tie links are engaged with "Tee" levers. Check Keyboard Trip Arm and Keyboard Reset Mechanism Trip Lever adjustments. Replace Keyboard Control Card (Z301). Check that keyboard contacts are clean. Check trouble no. 19.
	b. No upper case characters.	Check shift codebars and associated contact wires.
	c. No control characters.	Check control codebar and associated contact wires.

TYPING UNIT

Note 1: Disable retraction mechanism (by strapping back the reset slide) for manual operation.

Note 2: If after isolating a trouble and meeting the required adjustment, the trouble is still present, check associated springs per their individual requirement.

24	Selector Mechanism a. Garbling at selector.	Check range finder setting. Check for loose selector magnet wires and/or connectors. Check for missing springs in selector. Check for dirt or oil on selector magnet armature. Check Selector Magnet Bracket adjustment. Check armature extension for cracks. Replace Distributor and/or Receiving Device and/or Receiving Control Cards (Z101, Z305, or Z107).
	b. Typing unit running open (armature remains unattracted).	Check range finder setting. Check 500 ma at selector magnets. Check Selector Magnet Bracket adjustment. Replace Receiving Device Card (Z305).

NO.	TROUBLE	CORRECTIVE PROCEDURE
24 (contd)	c. Typing unit locked up marking (armature remains attracted).	Check range finder setting. Check position of all tab set and clear cables in stunt box (not out of their retaining brackets and touching switch block contacts). Check Armature Downstop Bracket adjustment. Check Selector Magnet Bracket adjustment. Replace Receiving Device Card (Z305).
25	Codebar Mechanism a. Garbling at codebars (codebar shiftbars positioned incorrectly).	Check code in selector. See Figure 11. Check typebox arrangement (Figure 2) to determine correct pallet is selected for codebars positioned. Check Codebar Shift Lever and Cam Follower Arm adjustment. Check Front and Rear Codebar Shift Levers adjustment. Check Intermediate Arm Backstop Bracket adjustment.
	b. Selected codebars not positioned.	Check Front and Rear Codebar Shift Lever adjustment. Check the position of the TP156301 retaining plate. Check operation of the retraction mechanism.
	c. Codebars bouncing back after being selected.	Check Codebar Detent adjustment. Check operation of retraction mechanism.
26	Positioning a. Horizontal – Typebox positioning incorrectly.	Check typebox arrangement (Figure 2) to determine code and location of character being printed versus character selected. Check code in selector and codebars. Check alignment of the codebar forks on codebars 1, 2, 3, and 4 with their clutch trip levers. See Figure 11. Perform horizontal positioning clutch test (Table A) to isolate clutch(es) not tripping.
	b. Horizontal – Character misalignment (incorrect spacing between characters).	Perform typebox alignment test (Table B). Perform typebox horizontal motion test (Table D). Check Oscillating Arm Detent Disc Phasing adjustment. Check Horizontal Aggregate – Dampener Synchronization adjustment. Check Coodinating Cable adjustment. Check Print Hammer Position adjustment. Check Print Hammer Latch adjustment. Check Spacing Gear Phasing adjustment. See trouble no. 27b.

NO.	TROUBLE	CORRECTIVE PROCEDURE
26 (contd)	c. Vertical — Typebox positioning incorrectly.	Check typebox arrangement (Figure 2) to determine code and location of character being printed versus character selected. Check code in selector and codebars. Perform vertical positioning clutch test (Table C) to isolate clutch(es) not tripping. Check Vertical Clutch Bite adjustment. Check alignment of the bellcranks to codebars 5, 6, and 7. Check Vertical Print Hammer Alignment adjustment.
	d. Vertical — Character misalignment.	Check Vertical Clutch Bite adjustment. Check Vertical Aggregate — Dampener Synchronization adjustment. Check Print Hammer Latch adjustment.
27	Spacing	
	a. No spacing.	Check Trip Shaft Cam Follower adjustment. Check Spacing Clutch Trip Lever adjustment. Check for a function operation in the stunt box. Check for the presence and operation of print and space suppression modification kit (magnet mounted on the rear of stunt box).
	b. Improper spacing between characters.	Perform character spacing test (Table E). Check for missing spacing pawl spring. Check Spacing Gear Phasing adjustment. Check Spacing Clutch Trip Lever adjustment. Check Typebox Rail Alignment adjustment. Check Coordinating Cable adjustment. See trouble no. 26b.
	c. Continuous spacing.	Check Spacing Clutch Trip Lever adjustment. If the unit is equipped with horizontal tab, check that the function lever in slot no. 17 of the stunt box is inserted in slot of slide located directly under slot no. 17.
	d. Improper spacing at left hand margin.	Check Left Hand Margin adjustment.
	e. No backspace.	Check code in selector; codebars and stunt box. Check the position of the suppression slide to the suppression bail. Check trouble no. 29a.
	f. Spacing on functions.	Check the position of the suppression slide to the suppression bail.

NO.	TROUBLE	CORRECTIVE PROCEDURE
28	**Printing**	
	a. No printing.	Check code in selector and codebars (Figure 11). Check Trip Shaft Cam Follower adjustment. Check Print Clutch Trip Arm adjustment. Check Square Shaft Drive Arm adjustment. Check Print Hammer Latch adjustment. Check for a function selection in the stunt box and see trouble no. 29b. Check for the presence and operation of the print suppression modification kit (magnets mounted on the rear of stunt box).
	b. Printing only numerics and symbols.	Check for a SO (Shift Out) function in the stunt box, select SI (Shift In) function.
	c. Improper printing.	Check code in selector and codebars. Use typebox arrangement (Figure 2) to determine code and location of character being printed versus character selected. See troubles: 24a, 25a, 26a, 26c, 28d, and 28e.
	d. Printing one horizontal character off.	Check typebox arrangement (Figure 2) to determine code and location of character being printed versus character selected. Perform horizontal positioning clutch test (Table A). Check Print Hammer Latch adjustment. Check Print Hammer Position adjustment.
	e. Printing one vertical character off.	Check typebox arrangement (Figure 2) to determine code and location of character being printed versus character selected. Check Vertical Print Hammer Alignment adjustment. Check Print Hammer Latch adjustment.
	f. Character density uneven (top or bottom).	Check Typebox Alignment adjustment. Check Vertical Print Hammer Alignment adjustment. Check Ribbon Retract Position adjustment. Check Ribbon Print Position adjustment. See trouble no. 28g.
	g. Character density uneven (when using a replacement typebox).	Install the original typebox and check or make the Typebox Alignment adjustment as needed. Remove the typebox. For replacement typebox(es) providing: Light density on the top of a printed character; adjust typebox plate tab (located on the bottom of the typebox) by slightly bending tab towards the rear of the typing unit. For light density on the bottom of a printed character; adjust typebox plate tab (located on the bottom of typebox) by slightly bending tab towards the front of the typing unit.

NO.	TROUBLE	CORRECTIVE PROCEDURE
28 (contd)		Install the replacement typebox and type a few characters. It may be necessary to refine bending adjustment of the tab. CAUTION: OVERBENDING OF THE TAB CAN RESULT IN BREAKAGE.
	h. Breaking off type pallets.	Check Retraction Reset Slide adjustment. Check Stop Plate adjustment. Check Print Hammer Position adjustment. Check Vertical Print Hammer Alignment adjustment. Check Print Hammer Latch adjustment. Check Vertical Aggregate-Dampener Synchronization adjustment. Check Aggregate-Dampener Synchronization adjustment.
	i. Print position pointer binding.	Check Pointer Clearance adjustment.
	j. Print position pointer improperly aligned.	Check Print Position Pointer adjustment.
	k. Left hand margin not aligned.	Check Left Hand Margin adjustment. Check Dashpot and Side Vent Screw adjustment.
	l. Right hand margin not aligned.	Check Right Hand Margin adjustment.
29	Functions	
	a. No functions.	Check code in selector and codebars (Figure 11). Check stunt box arrangement (Figure 3) to determine slot, and then check slot for operation of selected function. Check Trip Shaft Cam Follower adjustment. Check Function Clutch Trip Arm adjustment. Check Stripper Blade adjustment. Check Function Reset Bail Blade adjustment. Check for the presence and operation of the print, space, and function suppress modification kit (magnets mounted on the rear of the stunt box).
	b. Improper function.	Check code in selector and codebars (Figure 11). Check stunt box arrangement (Figure 3) to determine slot, and then check slot for operation of selected function. Check function bars for coding and/or broken tines. If ESCAPE No. 10 modification kit is used, check No. 10 Blocking Bar adjustment. If Shift-Out is used, check Shift-Out Shift-Fork Mechanism and Aperture adjustment.
	c. Character other than "e" printed when selection is Escape followed by * $, # % + " h e.	Check trouble no. 29b.
	d. Typing unit feeds out two or more forms in succession without intervening line feed.	Check Blocking Lever adjustment (VT).

NO.	TROUBLE	CORRECTIVE PROCEDURE
29 (contd)	e. No line feed.	Check selection in selector, codebars, and stunt box. See Figures 3 and 11. Check Line Feed Clutch Trip Lever Adjusting Screw adjustment. Check Line Feed Clutch Trip Lever Eccentric Post adjustment.
	f. Improper line feed.	Check Line Feed Clutch Phasing adjustment.
	g. No half-forward or half-reverse line feed.	Check selection in selector, codebar, and stunt box. Check Pressure Bail (Friction Feed) adjustment. Check Line Feed Clutch Phasing adjustment. Check Line Feed Trip Lever Adjusting Screw adjustment. Check Line Feed Clutch Trip Lever Eccentric Post adjustment. Check for the presence and operation of the TP332374 ESCAPE No. 10 modification kit. See stunt box arrangement (Figure 3) for location. Check for the presence and operation of the TP334717 line feed clutch trip bail modification kit (line feed area, underside of unit).
	h. No reverse line feed.	Check selection in selector, codebars, and stunt box. See stunt box arrangement (Figure 3) for slot location. Check Pressure Bail (Friction Feed) adjustment. Check Line Feed Clutch Phasing adjustment. Check Line Feed Clutch Trip Lever Adjusting Screw adjustment. Check Line Feed Clutch Trip Lever Eccentric Post adjustment. Check for the presence and operation of the TP332374 ESCAPE No. 10 modification kit. See stunt box arrangement (Figure 3) for slot location. Check for the presence of TP334717 line feed clutch trip bail modification kit (located in line feed area, underside of unit).
	i. Improper half-forward or half-reverse line feed.	Check Pressure Bail (Friction Feed) adjustment. Check Bracket Line-Up (Friction Feed) adjustment. Check Line Feed Clutch Phasing adjustment. Check Line Feed Clutch Trip Lever Adjusting Screw adjustment. Check Line Feed Clutch Trip Lever Eccentric Post adjustment.
	j. Continuous line feed.	Check Line Feed Clutch Trip Lever Adjusting Screw adjustment. Check Line Feed Clutch Trip Lever Eccentric Post adjustment. If the unit is equipped with vertical tab, check that the function lever in slot no. 41 of the stunt box is inserted in slot of slide located directly under slot no. 41.

NO.	TROUBLE	CORRECTIVE PROCEDURE
29 (contd)	k. No horizontal tab.	Check selection in selector and codebars. See stunt box arrangement (Figure 3) for slot location and check stunt box for operation. Check Trip Bail adjustment.
	l. No horizontal tab set.	Check selection in selector and codebars. See stunt box arrangement (Figure 3) for slot location and check stunt box for operation. Check for missing tab stop on tab ring. Check Eccentric Post adjustment. Check Tab Set Arm Cable adjustment.
	m. Horizontal tab is set when tab clear signal is received.	Check horizontal tab set and clear cables for being reversed at the function levers. See stunt box arrangement (Figure 3) for location.
	n. No horizontal tab clear.	Check code in selector and codebars. See stunt box arrangement (Figure 3) for slot location and check stunt box for operation. Check Tab Clear Arm adjustment. Check Latch Arm adjustment. Check Latch Release adjustment.
	o. Horizontal tab is cleared when tab set signal is received.	Check horizontal tab set and clear cables for being reversed at the function levers. See stunt box arrangement (Figure 3) for location.
	p. No vertical tab.	Check code in selector and codebars. See stunt box arrangement (Figure 3) for slot location and check stunt box for operation. Check Slide Retainer adjustment. Check Blocking Levers adjustment. Check Line Feed Clutch Trip Lever Adjusting Screw adjustment.
	q. No vertical tab set.	Check code in selector and codebars. See stunt box arrangement (Figure 3) for slot location and check stunt box for operation. Check Mounting Plate adjustment. Check Tab Set Arm Cable adjustment. Check that platen is not at 1/2-line feed position.
	r. No vertical tab clear.	Check selection in selector and codebars. See stunt box arrangement (Figure 3) for slot location and check stunt box for operation. Check Tab Clear Arm Cable adjustment. Check Latch adjustment. Check Latch Release adjustment. Check that platen is not at 1/2-line feed position.
	s. Vertical tab is set when tab clear signal is received. Vertical tab is cleared when tab set signal is received.	Check vertical tab set and clear cables for being reversed at the function levers. See stunt box arrangement (Figure 3) for slot location.

NO.	TROUBLE	CORRECTIVE PROCEDURE
29 (contd)	t. No shift-out; will not print optional characters in 7th or 8th row of the typebox.	Check selection in selector and codebars. See stunt box arrangement (Figure 3) for slot location and check stunt box for operation. Check Shift-out Shift-Fork Mechanism adjustment. Check Aperture adjustment.
	u. No shift-in; will not print upper or lower case character (optional feature).	Check code in selector and codebars. See stunt box arrangement (Figure 3) for slot location and check stunt box for operation.
	v. No control functions.	When dropping the no. 8 pulse (marking) move the range finder up a few points.
	w. No carriage return.	Check code in selector and codebars. Check for disabling clip on slot no. 5 (CR) in stunt box. Check position of carriage return lever to the carriage return latch.
	x. No ESCAPE No. 10 operation.	Check Blocking Bar adjustment. Check for the presence of the no. 10 blocking bar spring.
	y. No local line feed.	Check Local Line Feed adjustment.
	z. No local carriage return.	Check Local Carriage Return adjustment.
30	Paper	
	a. Improper low paper switch operation.	Check Actuating Lever Clearance adjustment. Check switch wiring (Figure 6).
	b. Improper paper out switch operation.	Check Paper Out Lever Clearance adjustment. Check switch wiring (Figure 6).
	c. Paper jamming (sprocket).	Check Paper Finger adjustment. Check Paper Guide adjustment.
31	Retraction Improper typebox retraction.	Check Retraction Reset Shaft adjustment. Check Retraction Slide adjustment. Check Blocking Pawl adjustment. Check Ratchet Stop adjustment. Check Stop Plate adjustment.
32	Ribbon	
	a. Ribbon not advancing.	Check Ribbon Feed Pawl Drive Clamp (Right and Left) adjustments. Check Ribbon Feed Brackets (Right and Left) adjustments.
	b. Ribbon not reversing.	Check Connecting Rod Final adjustment. Check Ribbon Feed Brackets (Left and Right) adjustments.

NO.	TROUBLE	CORRECTIVE PROCEDURE
32 (contd)		Check Feed Pawl Drive Clamp (Right and Left) adjustments. Check the Check Pawl (Right and Left) adjustments.
	c. Printed character imcomplete.	Check Ribbon Guide to Platen adjustment. Check Ribbon Feed Bracket (Right and Left) adjustments. Check Ribbon Retract Position adjustment. Check Ribbon Print Position adjustment. Check Oscillator Downstop adjustment.
	d. Will not shift-out of black position.	Check selection in selector, codebars, and stunt box. Check Ribbon Print Position – Red adjustment. Check Magnet Assembly (Armature Attracted) adjustment. Check Magnet Assembly to Blocking Slide adjustment. Check magnet wire connection (Figure 6). Check for the presence and operation of the TP332374 ESCAPE No. 10 modification kit. See stunt box arrangement (Figure 3) for slot location. Check the operation of the ESCAPE No. 10 fork-shift mechanism in the stunt box and the no. 10 Blocking Bar adjustment. Replace two-color ribbon circuit card (Z405).
	e. Will not shift-out of red position.	Check selection in selector, codebars, and stunt box. Check Ribbon Print Position – Black adjustment. Check Magnet Assembly (Armature not Attracted) adjustment. Check the operation of the ESCAPE No. 10 fork-shift mechanism in the stunt box and no. 10 Blocking Bar adjustment. Replace two-color ribbon circuit card (Z405). Check magnet wire connection (Figure 6).
33	Print Indicator	
	a. Improper vertical alignment.	Check Vertical Position of Indicator Bracket adjustment.
	b. Improper horizontal alignment.	Check Horizontal Position of Indicator Bracket adjustment.

The following analysis is to verify proper clutch operation in the horizontal and vertical positioning mechanisms, typebox alignments, and spacing. Disable the retraction mechanism and alternately select each of the paired characters shown—produce a "rolling" action (example: to check no. 1 clutch, select Rubout ∿ Rubout∿---etc). Observe indicated clutch(es) operation, typebox alignment(s), and character spacing in the following tables.

TABLE A

HORIZONTAL POSITIONING CLUTCHES								
Depress Keytops	SHIFT Delete	SHIFT ∧	SHIFT ∧	SHIFT \	SHIFT \	UNSHIFT X	UNSHIFT X	UNSHIFT P
Character Selected	Rubout	∿	∿	¦	¦	x	x	p
Positioning Clutch(es) Tripped	1, 2, 3, 4	1	1	2	2	3	3	4

UNSHIFT Delete	UNSHIFT Q	UNSHIFT Delete	UNSHIFT S	UNSHIFT Delete	UNSHIFT W
Rubout	q	Rubout	s	Rubout	w
1, 2, 3, 4	2, 3, 4	1, 2, 3, 4	3, 4	1, 2, 3, 4	4

Note: If the above clutches do not trip, check the following troubles: 24a, 25a, 25b, and 26a.

TABLE B

TYPEBOX ALIGNMENT – HORIZONTAL MOTION		
Depress Keytops	SHIFT A	SHIFT N
Character Selected	A	N

Note: If the above alignment is off, check the following troubles: 26b, 27b, and 28f.

TABLE C

VERTICAL POSITIONING CLUTCHES						
Depress Keytops	UNSHIFT Delete	UNSHIFT 0	UNSHIFT 0	SHIFT ?	SHIFT Delete	SHIFT 0
Character Selected	Rubout	o	o	/	Rubout	0
Positioning Clutch(es)	5, 6, 7	5	5	7	5, 6, 7	5, 6

Note: If the above clutches do not trip, check the following troubles: 24a, 25a, 25b, and 26c.

TABLE D

TYPEBOX ALIGNMENT – HORIZONTAL MOTION-VERTICAL CORRECTION		
Depress Keytops	SHIFT E	UNSHIFT U
Character Selected	E	U

Note 1:   Disable the retraction mechanism and alternately select each of the paired characters shown for one completed line length.

Note 2:   Check the right and left halves of the page separately. The characters must be evenly spaced as gauged by eye.

Note 3:   If the characters are offset as follows: E uE uE uE, the u is misplaced to the right: See Typebox Rail Final adjustment.

Note 4:   If the characters are offset as follows: Eu Eu Eu Eu, the u is misplaced to the left: See Typebox Rail Final adjustment.

TABLE E

CHARACTER SPACING (For One Complete Line Length)		
Depress Keytop	UNSHIFT X	
Character Selected	X	XXXXXXX

Note: The characters should be evenly spaced as gauged by eye. If not evenly spaced see trouble no. 27b.

Use the following message for FINAL TEST:

ThE qUiCk BrOwN fOx JuMpEd OvEr ThE lAzY dOg'S bAcK 123456789 tImEs.
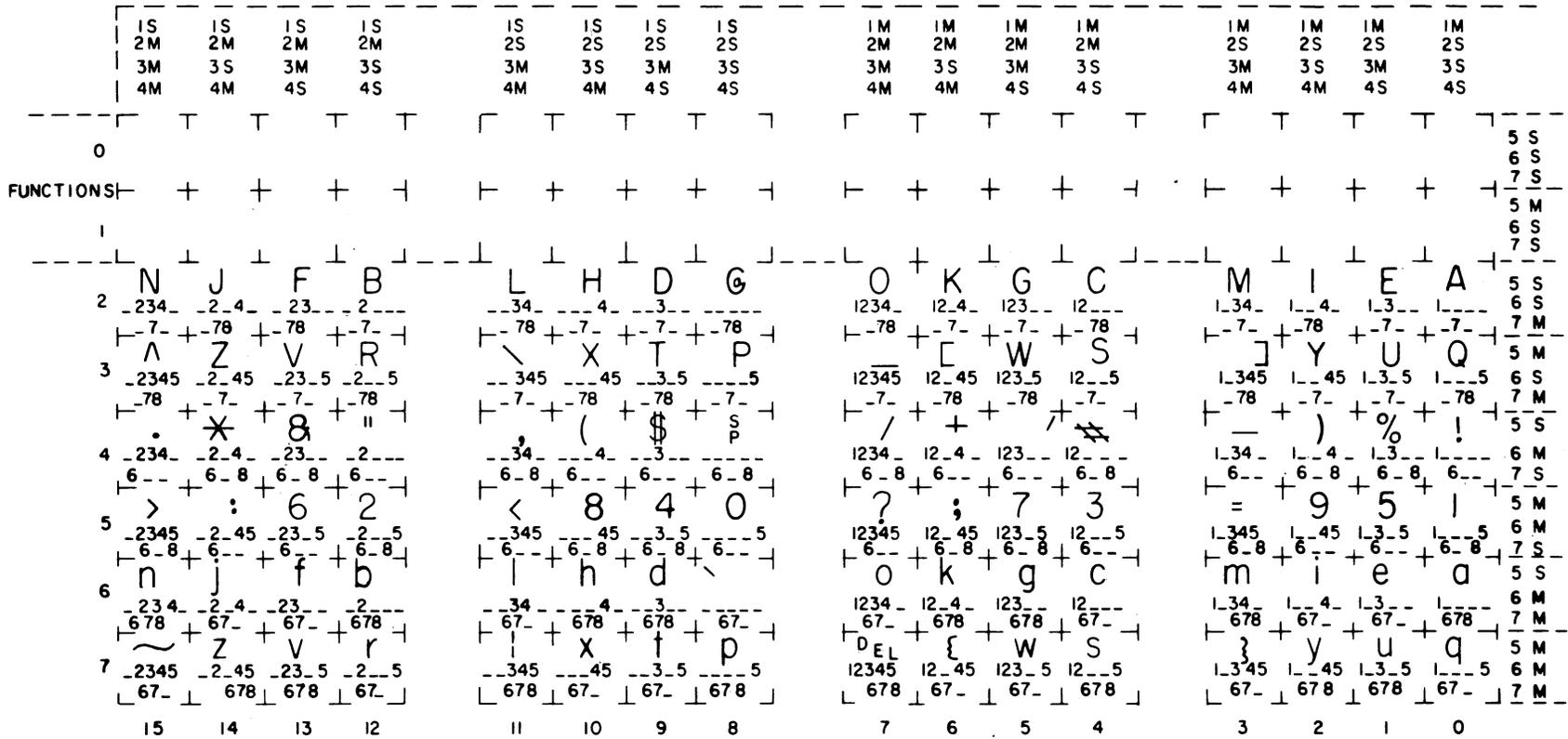
Figure 2 - 6-Row Typebox Arrangement

	IS 2M 3M 4M	IS 2M 3S 4M	IS 2M 3M 4S	IS 2M 3S 4S		IS 2S 3M 4M	IS 2S 3S 4M	IS 2S 3M 4S	IS 2S 3S 4S		IM 2M 3M 4M	IM 2M 3S 4M	IM 2M 3M 4S	IM 2M 3S 4S		IM 2S 3M 4M	IM 2S 3S 4M	IM 2S 3M 4S	IM 2S 3S 4S	

FUNCTIONS

0 — 1

Row 2: N J F B L H D G O K G C M I E A

Row 3: ^ Z V R \ X T P ̄ [W S] Y U Q

Row 4: . * 8 " , ($ SP / + ↗ ⚡ _) % !

Row 5: > : 6 2 < 8 4 0 ? ; 7 3 = 9 5 |

Row 6: n j f b l h d \ o k g c m i e a

Row 7: ~ z v r ! x t p DEL { w s } y u q

Column numbers: 15 14 13 12   11 10 9 8   7 6 5 4   3 2 1 0

Note 1: Carriage Return (CR) and Line Feed (LF) Codes: CR 1 _ 3 4 _ _ _ 8 Marking and LF _ 2 _ 4 _ _ _ _ Marking.

Note 2: The 8th BIT MARKING for even parity.

Note 3: Typebox arrangement ASCII 68 (American National Standard Code for Information Interchange) as viewed from print hammer.

SLOT NO.	FUNCTION	FUNCTION BAR	FUNCTION PAWL	FUNCTION LEVER	SPRING PLATE OR LATCH PLATE	CONTACT ASSEM OR CABLE BRACKET	LATCH RELEASE BAIL OR STUD	ASCII 68 CODE	SPECIAL
1	DC-1	319790	152653	152642	152660	326104			
2	DC-4	319793	152653	152642	152660				
3									
4	NEW LINE (LF & VT)	306220	152653	152298	154613			LF	CLIP 157274 (Not Shown)
5	CAR RET (CR & FF)	319804	152653	152298	154613				
6	ESCAPE TERMINATE	319796	"	319481	"				PRESTRIPPER
7	ESCAPE NO. 9	306214	"	162059	152089				FORK-SHIFT MECH
8	ESCAPE HOLD	319802	"	152642	152660				
9	BACKSPACE	306206	"	"	"	326103			
10	DC-3	319792	"	"	"				
11	ETX	319797	"	"	"				
12	EOT	306204	"	"	"				
13	FUNCTION SUPPRESS	319794	"	152641	"	326152			
14	DELETE	306221	"	152641	"				
15	HT SET	319810	"	326158	"			ESC 1	
16	HT CLEAR	319811	153604	326158	"			ESC 2	
17	HORIZONTAL TAB	306203	153598	326172	"	326101			PRESTRIPPER
18	DC-2	319791	152653	152642	"				
19	BELL	306205	152653	152642	152660				
20									
21	RED	319809	152653	152642	152660	326101		ESC 3	
22	BLACK	319808	"	"	"			ESC 4	
23	HALF DUPLEX	319817	"	"	"			ESC :	
24	FULL DUPLEX	319818	"	"	"			ESC :	
25	ESCAPE NO. 10	306214	152653	162059	154613				FORK-SHIFT MECH
26									
27	ENQ	306209	152653	152642	152660	326101			
28	ACK	306207	152653	152642	152660				
29	NACK	306208	"	"	"				
30	SHIFT-OUT	306211	"	161649	152089		↑	.	FORK-SHIFT MECH (C)
31	SHIFT-SUPPRESSION	319795	"	152641	152660				
32	SHIFT-IN	306210	"	163944	152660				
33									
34									
35	REVERSE LINE FEED	319814	152653	152642	152660			ESC7	
36	1/2 REVERSE LINE FEED	319815	152653	"	"			ESC8	
37	1/2 LINE FEED	319816	152653	"	"	326152		ESC9	
38	LINE FEED	306202	"	152642	319654				
39	VERTICAL TAB SET	319812	152653	326158	152660			ESC 5	
40	VERTICAL TAB CLEAR	319813	153604	326158	152660			ESC 6	
41	VERTICAL TABULATION	306212	153598	326172		326106			
42	FORM FEED	306213	159653	152642	152660				

Note: Control bracket TP326152, function bars TP319808
and TP319813 have 11 tines.

Figure 3 - Typical Stunt Box Arrangement

NO.	TROUBLE	CORRECTIVE PROCEDURE
PUNCH AND READER		
34	Punch and reader motors do not start, but typing unit motor goes on.	Check that ac power cord from RT module is plugged into the utility strip in KSR set. With power off, check fuses on reader base and electrical service unit, and red overload button on punch motor. If there is not 115 v ac on reader base terminal board TB202, posts 1 and 4 with READER LOCAL lamp on, replace relay K201 and/or Receiving Device Card (Z107) in RT module, or Mode Control Card (Z105), or Channel Control Card (Z109) in KSR set. See Figure 7.
35	Reader motor does not start, but punch motor will start.	Check 3/8-amp slow-blowing fuse on RT module while power is off. Check for a bind in the mechanism, by turning the main shaft over by hand. See trouble no. 38b and Figure 7.
36	Punch motor does not start, but reader motor will start.	Depress red overload button on punch motor. Check for a bind in the mechanism, by turning the motor and punch main shaft over by hand. See trouble no. 39b.
37	Garbled or no copy from reader, but good copy can be made from keyboard.	Check the code contacts visually for operation and clean if necessary. Remove the reader drive belt and turn main shaft by hand. Switch should be at RUN and READER LOCAL lamp on. Use a multimeter and check on TB112 for 5 v dc, and then 0 v dc as a mark is read, followed by a tape feed. At a mark, the code contacts shall be closed and then reopen about the middle one-third of main shaft revolution. Check test tape for correct 10 holes per inch spacing. Check Magnetic Pickup, Feed Pawl, and Feed Wheel Detent adjustments. Replace Reader Driver Card (Z108) in RT. See Figure 8. Replace the reader.
38	a. Reader does not step one character when READER STEP pushbutton is operated. b. Reader does not start when reader switch is put to RUN, with tape in reader and READER LOCAL lamp is on, or reader runs when READER LOCAL lamp is off in local mode of operation.	If partial feed operation, check Feed Pawl, Feed Wheel Detent, and Magnet Assembly adjustments. If no feed operation, replace Reader Driver Card (Z108) in RT module. Replace Reader Control Card (Z108) in RT module, or Alarms and Control Card (Z304) in KSR. See troubles 34 and 35.

NO.	TROUBLE	CORRECTIVE PROCEDURE
38 (contd)	c. Reader does not stop during tabulation operation.	Check operation and wiring of the tab switch on the printer. See Figure 6. Replace Receive Control and/or Send Control Cards (Z107 or Z103).
39	a. Punch reperforates incorrect copy, but typing unit gives correct printed copy.	Check range finder setting (should be near 50). Check Range Finder Knob Phasing adjustment. Check for dirt or oil on selector magnet armature. Check for springs missing from selector mechanism. Check for loose selector magnet wires and/or loose punch connector. Check Selector Magnet Bracket adjustment. Replace Receiving Device Card (Z107) in RT module and/or Receive Control Card (Z107) in KSR set. Check selector and function Clutch Shoe Lever and Clutch BIDREC Gap adjustments. Check Punch Mounting Plate (Final) adjustment. Check Toggle Operating Arm adjustment. Check Punch Pin Penetration adjustment. Check Punch Slide Downstop Position adjustment. Check Reset Bail Trip Lever adjustment. Check Latchlever Clearance adjustment.
	b. Punch does not start when PUNCH ON button is operated with PUNCH LOCAL lamp on with traffic from reader or keyboard.	Replace Receiving Device Card (Z107) in RT module. Replace Receive Control Card (Z107) in KSR.
40	a. Punch does not trip.	Check Selector Clutch Stop Arm adjustment. Check Selector Magnet Bracket adjustment.
	b. Punch runs open.	Check Selector Clutch Stop Arm adjustment. Check Selector Magnet Bracket adjustment. Selector magnets may be lacking 500 ma.
	c. Tape does not feed out of punch when feed-out lever is operated.	Check Trip Lever Manually Operated adjustment for feed-out lever.
41	Punch copies traffic while PUNCH ON lamp is off.	Replace Alarms and Automatic Controls Card (Z304) and/or Receive Control Card (Z107) in KSR set.
42	a. Punch does not backspace when PUNCH BACK SPACE pushbutton is operated.	Check that magnet is energized. Check Feed Pawl Clearance adjustment. Check Feed Pawl Eccentric adjustment. Check Final Manual or Power adjustment.
	b. Holes are not properly over-punched after tape is backspaced.	Check Final Manual or Power adjustment for backspace, Feed Pawl and Ten Characters Per Inch adjustments.
43	a. TAPE ALARM lamp does not light with tape supply removed from punch.	Check operation of low-tape switch. Replace defective lamp. Replace Reader Driver Card (Z108) in RT module. See troubles 2 and 1.

NO.	TROUBLE	CORRECTIVE PROCEDURE
43 (contd)	b. TAPE ALARM lamp does not light on tape-out condition when reader switch is at RUN or FREE, or at tight-tape condition when the reader switch is at RUN or STOP.	Check operation of reader tight-tape arm and contacts, and tape-out pin and contacts or switch on door. Replace defective lamp. Replace Reader Driver Card (Z108) in RT module. See troubles 2 and 1.
	c. TAPE ALARM lamp is on when tape is out of reader when reader switch is at STOP.	Replace Reader Driver Card (Z108) in RT module.
44	Reader does not stop on tight-tape condition or when RUN-FREE-STOP switch is moved from RUN.	Check Start-Stop Contact Assembly Bracket adjustment. Check Tight-Tape Arm adjustment on reader or door. Replace Reader Driver Card (Z108) in RT module. See Figure 7.
45	Reader does not stop on tape-out condition at reader.	Check Tape-Out Contact Assembly adjustment. Check Tape-Out Contact Assembly Bracket adjustment. Check Tape-Out Pin adjustment. Replace Reader Driver Card (Z108) in RT module. See Figure 7.
46	a. Reader does not stop when it reads or receives the DC1 or DC3 characters when READER AUTO lamp is on.	Check that reader is reading characters correctly. Check that typing unit function box contact is operating on DC1 or DC3. See trouble no. 29. If not operating, check reader and/or Reader Driver Card (Z108) in RT module, Local Distributor Card (Z101), Receive Control Card (Z107), and Receiving Device Card (Z305) in KSR set. If contact operates, replace Alarms and Automatic Controls Card (Z304) in KSR set and/or Reader Driver Card (Z108) in RT module.
	b. Tape winder tears feed holes in tape.	Check routing of tape as shown on diagram under tape reel on door. Check threading of tape on tape sensor or tensioner.
	c. Tape winder inoperative.	Check that the release button in tape sensor post is not jammed, or that the sensor is not sticking in the track. Check Tape Handling Mercury Switch adjustment. Check condition and wiring of winder switch. Check for 115 v on winder motor.
SET (ON-LINE)		
47	Typing unit prints output of keyboard before ACK character is received in on-line mode.	Replace Send Control Card (Z103) and/or Channel Control Card (Z109) in KSR set.
48	Answer-back does not operate after connection is established ENQ is received, or after HERE-IS switch is pushed while set is in on-line mode.	Replace Send Control Card (Z103). Check that Clear to Send has been received from data set. See trouble no. 7.

NO.	TROUBLE	CORRECTIVE PROCEDURE
49	PROCEED lamp does not light upon receipt of ACK character.	Replace PROCEED lamp. Check coding of answer-back drum and operation of answer-back unit. See trouble no. 7. Check that typing unit function box contact operates on ACK character. See trouble no. 29. Replace Answer-Back Driver Card (Z314), Send Control Card (Z103) and/or Channel Control Card (Z109), or Line Distributor Card (Z102) in KSR set.
50	Typing unit does not print after receipt of ACK character or operation of PROCEED switch.	Check coding of answer-back drum and that drum is in "home" position. See trouble no. 7. Check that typing unit function box contact operates on ACK character. See trouble no. 29. Replace Answer-Back Driver Card (Z314), Keyboard Control Card (Z301), Channel Control Card (Z109), and/or Send Control Card (Z103) in KSR set. Set may be in full-duplex mode. Check option on 7856WD.
51	PROCEED lamp does not turn off upon receipt of NAK character.	Check that typing unit function box contact operates on NAK character. See Figure 3. If not operating, check keyboard and/or Keyboard Control Card (Z301), Line Distributor Card (Z102), Receive Control Card (Z107), and Receiving Device Card (Z305) in KSR set. See trouble no. 29. If NAK contact operates, check Channel Control Card (Z109) and/or Send Control Card (Z103) in KSR set.
52	Typing unit prints output of keyboard or reader will continue to read tape after receipt of NAK character.	See trouble no. 51.
53	Typing unit prints output of keyboard in full-duplex mode (after ESCAPE (:) is received in printer).	Check that typing unit function box contact operates on ESCAPE :. If not operating, check keyboard and/or Keyboard Control Card (Z301), Line Distributor Card (Z102), Receive Control Card (Z107), and Receiving Device Card (Z305) in KSR set. If ESCAPE : contact operates, replace Receive Control Card (Z107) in KSR set. Check that option straps A and B are removed or cut on Receive Control Card (Z107) in KSR set.
54	PROCEED lamp fails to go out when interrupt signal is received.	Replace Channel Control Card (Z109), Receive Control Card (Z107), and/or Send Control Card (Z103) in KSR set.
55	Typing unit prints output of keyboard with PROCEED lamp out.	Replace Channel Control Card (Z109) in KSR set.
56	ALARM lamp fails to light on receipt of parity error.	Replace defective lamp. Check that some characters were garbled to verify signal transmission parity errors. Replace Receive Control Card (Z107) in KSR set.

NO.	TROUBLE	CORRECTIVE PROCEDURE
57	Typing unit does not print output of keyboard while in half-duplex mode (ESCAPE ;).	Check that straps A and B are cut or removed on Receive Control Card (Z107) in KSR set. Check that typing unit function box contact operates on ESCAPE ; . If not operating, check keyboard and/or Keyboard Control Card (Z301), Line Distributor Card (Z102), Receive Control Card (Z107), and Receiving Device Card (Z305) in KSR set. Check typing unit. (See trouble no. 29.) If ESCAPE ; contact operates, replace Receive Control Card (Z107) in KSR set.
58	With tape in reader head, reader does not start upon receipt of DC1 character when READER AUTO lamp is on.	Check that reader control lever is in either RUN or STOP position. Check that typing unit function box contact operates. If not operating, check keyboard and/or Keyboard Control Card (Z301), Line Distributor Card (Z102), Receive Control Card (Z107), and Receiving Device Card (Z305) in KSR set. Check typing unit. See trouble no. 29. If DC1 contact operates, replace Alarms and Automatic Controls Card (Z304) in KSR set and Reader Driver Card (Z108) in RT module.
59	PROCEED lamp fails to go out upon receipt of EOT character.	Check that typing unit function box contact operates on EOT. If not operating, check keyboard and/or Keyboard Control Card (Z301), Line Distributor Card (Z102), Receive Control Card (Z107), and Receiving Device Card (Z305) in KSR set. Check typing unit. See trouble no. 29. If EOT contact operates, replace Channel Control Card (Z109), Receive Control Card (Z107), and/or Send Control Card (Z103) in KSR set.
60	Motors start in on-line mode while low-paper condition exists.	Replace Receive Device Card (Z305), Channel Control Card (Z109), and/or Mode Control Card (Z105) in KSR set.
61	Reader does not start after answer-back sends ACK character with READER AUTO lamp on and reader control lever in RUN position.	Check that reader motor is running. Check that typing unit function box contact operates when ACK is sent. If not operating, check suppression tine on answer-back drum, the coding of drum, and that drum is in "home" position. See trouble no. 7. Also check Answer-Back Driver Card (Z314), Line Distributor Card (Z102), Receive Control Card (Z107), and/or Receiving Device Card (Z305) in KSR set. Check typing unit. See trouble no. 29. If ACK contact operates, replace Channel Control Card (Z109) and/or Send Control Card (Z103) in KSR set.
62	Reader starts when reader control lever is placed into RUN position before ACK is received and with READER AUTO lamp on.	Replace Channel Control Card (Z109) and/or Send Control Card (Z103) in KSR set.

NO.	TROUBLE	CORRECTIVE PROCEDURE
63	PROCEED lamp does not go on when pushed while set is in on-line mode.	See trouble no. 2. Replace Channel Control and/or Send Control Cards (Z109 or Z103) in KSR set.
64	Reader starts after set receives a DC1 character when READER AUTO lamp is off.	Replace Alarms and Automatic Controls Card (Z304) in KSR set.
65	Garbled characters or excessive distortion sent from set while in on-line mode.	Replace Line Distributor Card (Z102) or Send Control Card (Z103) in KSR set. See trouble no. 23.
66	a. With the READER AUTO lamp on, punch fails to start after receiving DC2 character from DTC, or fails to stop after receiving DC4 character from DTC. b. With the READER AUTO lamp on, local punch starts after local reader reads DC2 character in test tape.	Replace Alarms and Automatic Control Card (Z304) and/or Receive Control Card (Z107) in KSR set. Replace Alarms and Automatic Control Card (Z304) and/or Receive Control Card (Z107) in KSR set.
67	Telephone not operating.	a. Check telephone line connection. b. Check receiver and transmitter. c. Check Data Auxiliary Set connections. d. Check off-hook switch.
68	Ringer not operating.	a. Check ringer connections. b. Check Data Auxiliary Set connections.
69	Data set operating properly — handshaking does not occur or time-out sequence is incorrect.	a. Check request to send output from Send Control Card (Z103). Replace card if defective. b. Check data terminal ready output from Channel Control Card (Z104). Replace card if defective.
70	AUTO lamp does not light.	Replace lamp.

Figure 4 - ASR Signal Circuits

Figure 5 - AC Power Wiring Diagram

G
J308
SB Connector

19   1

R-BR — DC3 — 20
O-G — DC4 — 3
22
BR-Y — ESC3
S — ESC4 — 24
7
R-S — ESC: — 26
R-O — ESC; — 9
28
BR-G — TAB NC
BL-G — TAB NO — 30
P — FF
13
32
15
34
W-BK — SO
O-S — DLE-EOT — 36

DC1 — G
DC2 — Y
5
Common — BK
EOT — R
ETX — BR-BL
ACK — R-BL
NAK — R-G
ENQ — BK-BL
Bell — BR
Spare — BL
17

Wires Go To Stunt Box Contacts

D
P306
Connector

1   3
A-(1)-O —   — A-(2)-W-R-G
7   9
B-(1)-BK
E-(1)-BL-S —   — C-(2)-W-O-BR
13   15
C-(1)-BR-S

(B)
Connectors

D-7-BK — (1) ≪ (2) — F-(1)-BK

E

D-13-BL-S — (1) ≪ (2) — F-(2)-BL-S

Low Paper Sw   Paper Out Sw

NC
1   NO   3   (2) NO
(C)   (1) C
2   (3) NC
F
Optional
E-(2)-BL-S
B-(2)-BK   B-(2)-BK

E-(2)-BL-S

Selector Magnets

A
(1) — D-1-O
(2) — D-3-W-R-G
(3)
(4)

C
Ribbon Magnet
304M

(1) (2)

D-14-BR-S — — D-15-W-O-BR
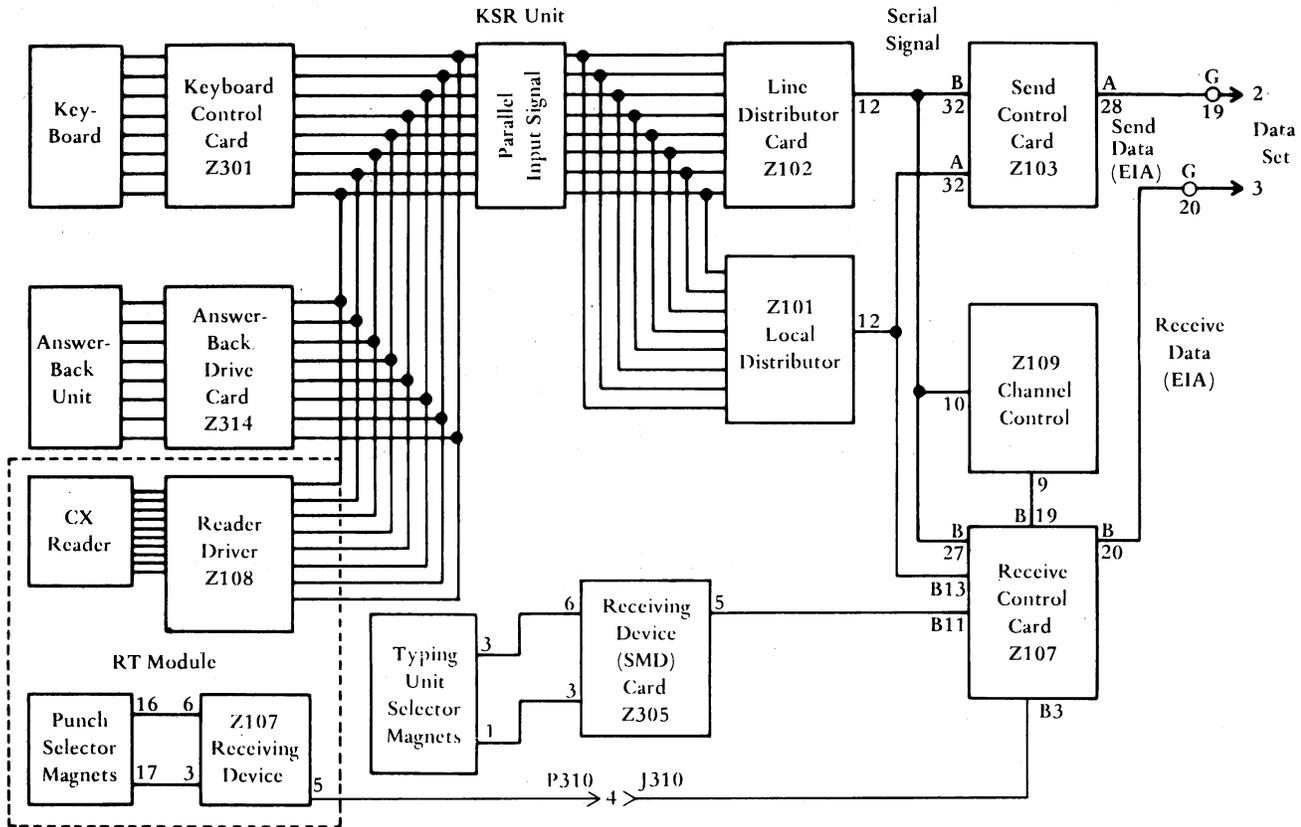
Figure 6 - Typical Printer Actual Wiring Diagram
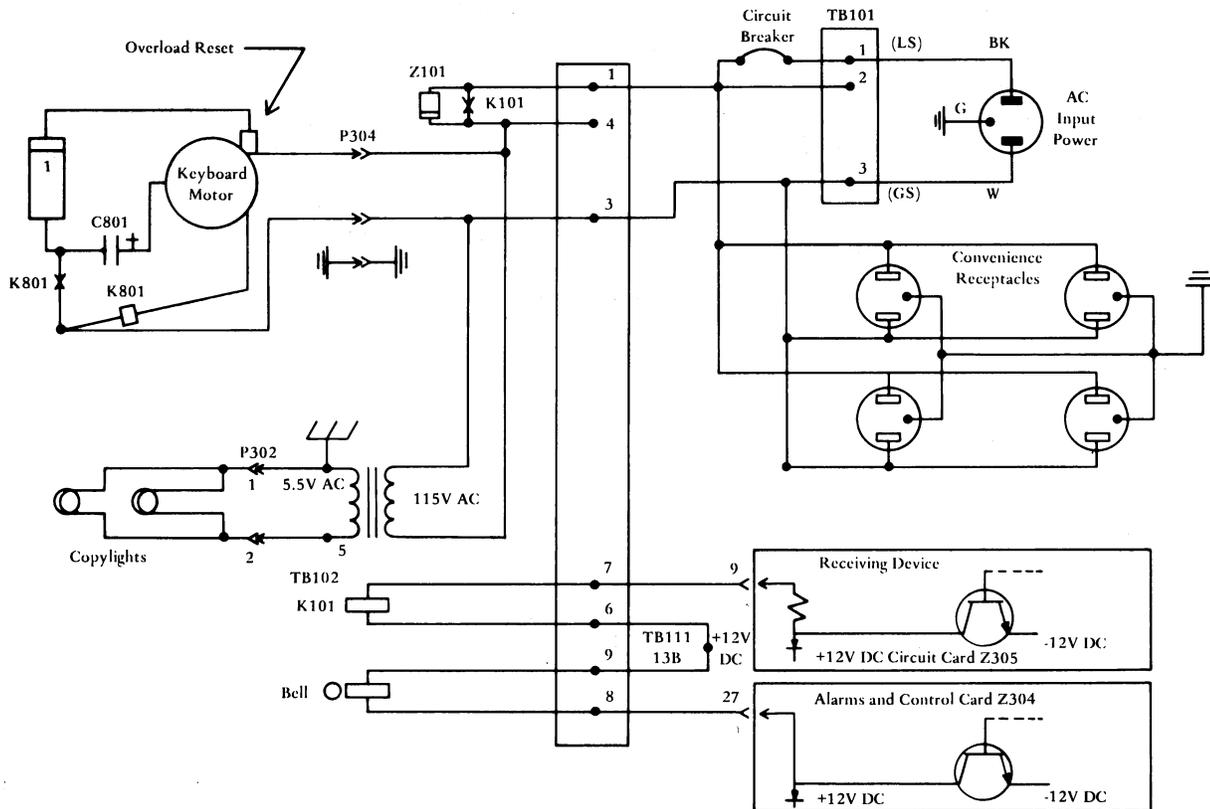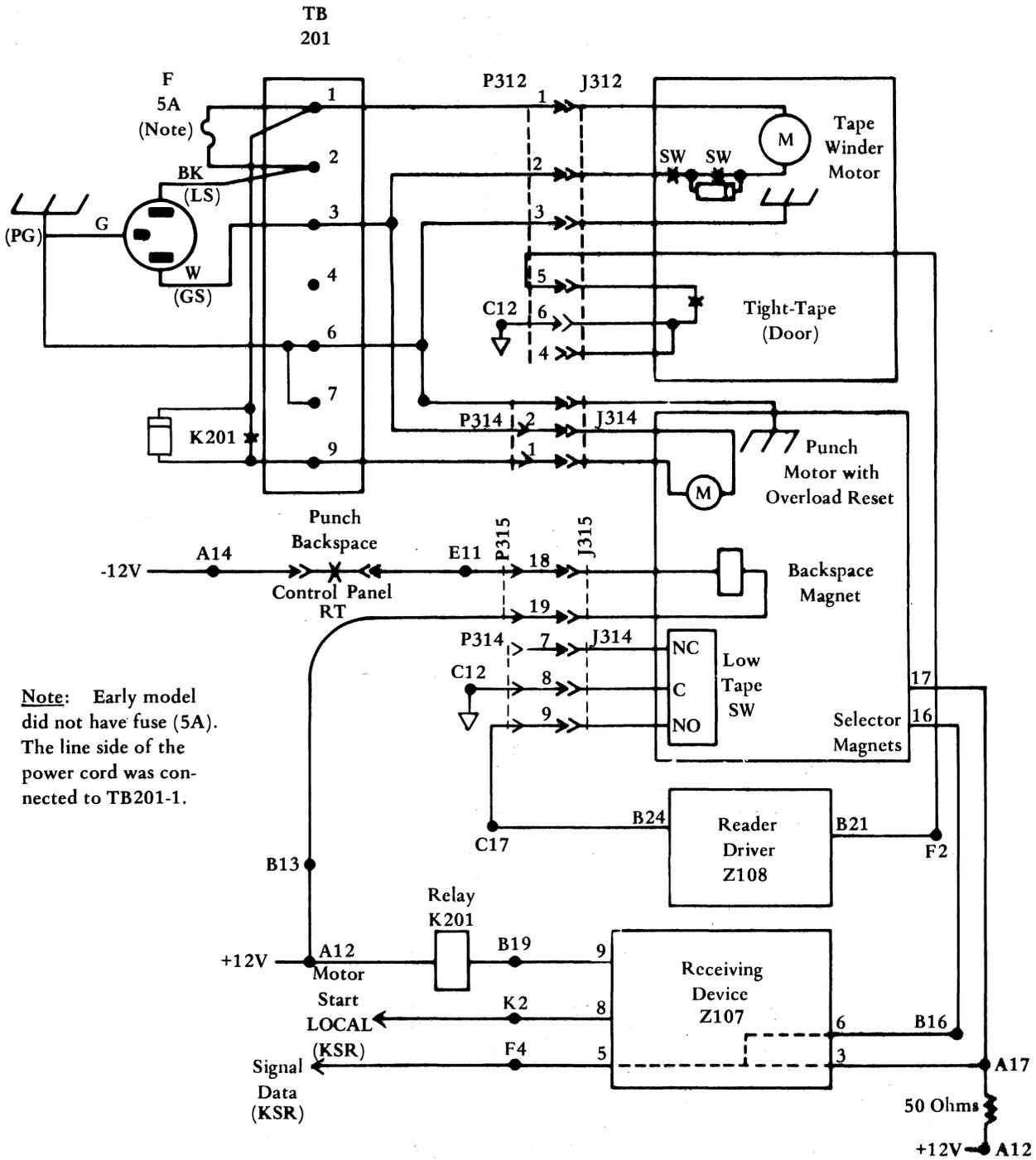
Note: Early model did not have fuse (5A). The line side of the power cord was connected to TB201-1.

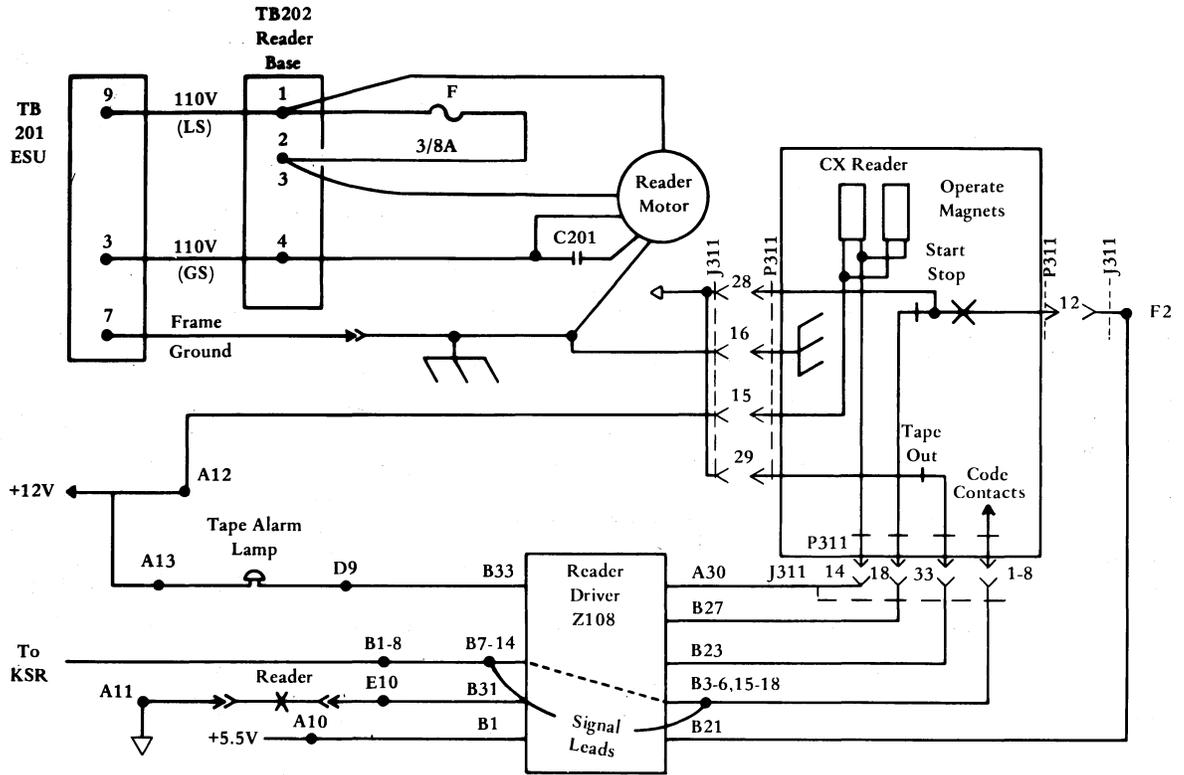Figure 7 - RT Cabinet Power Circuits

Figure 8 - Reader Controlled Signal Circuits

Figure 9 - Console Control Panel Wiring (Left Part)
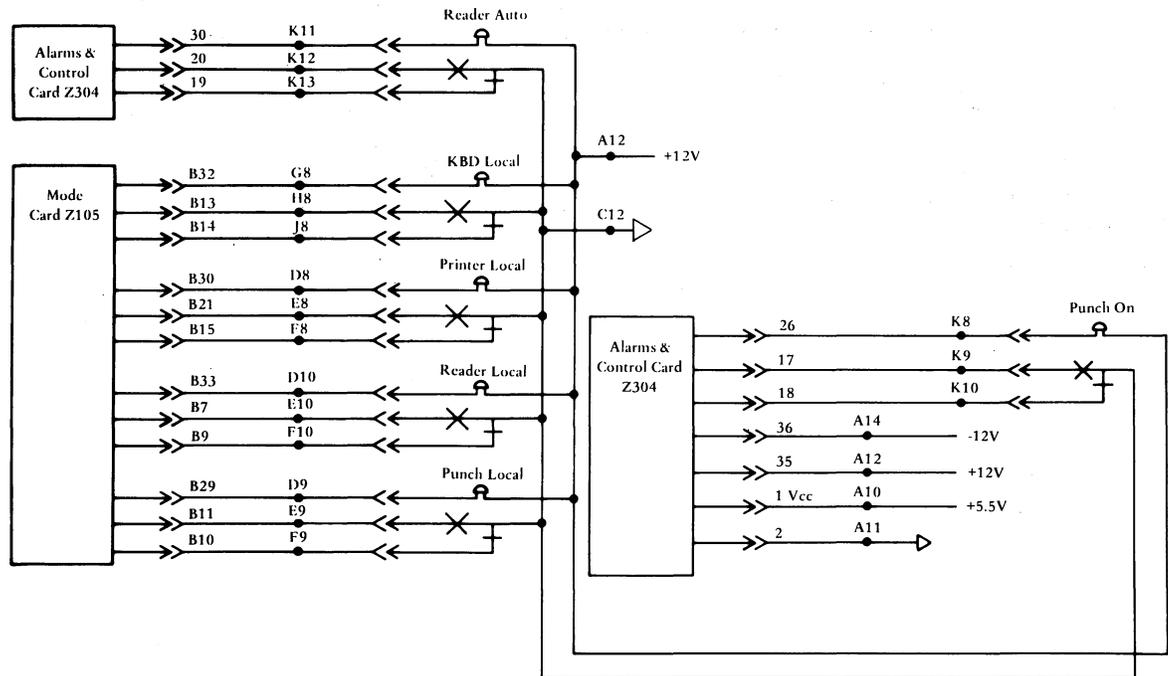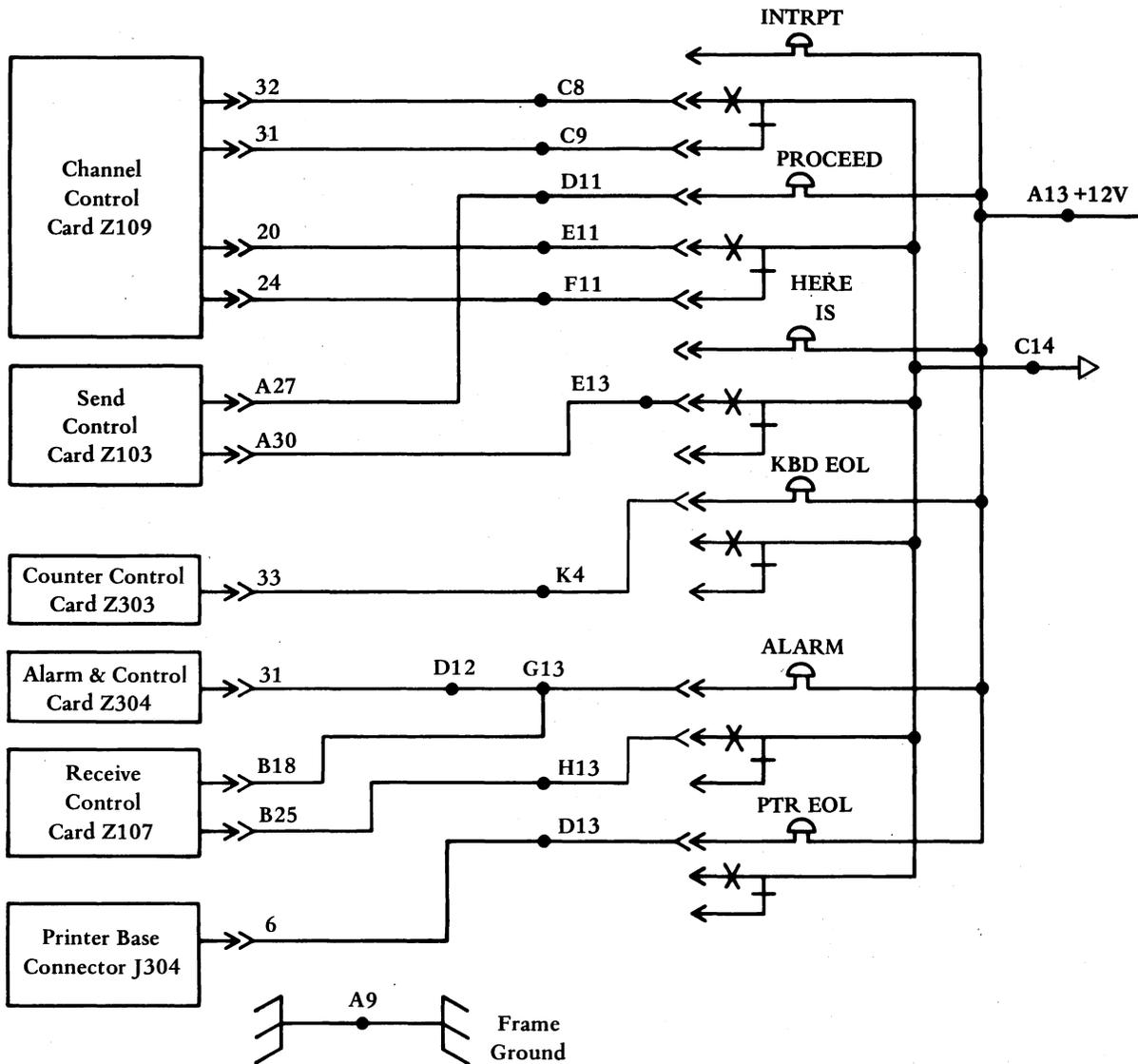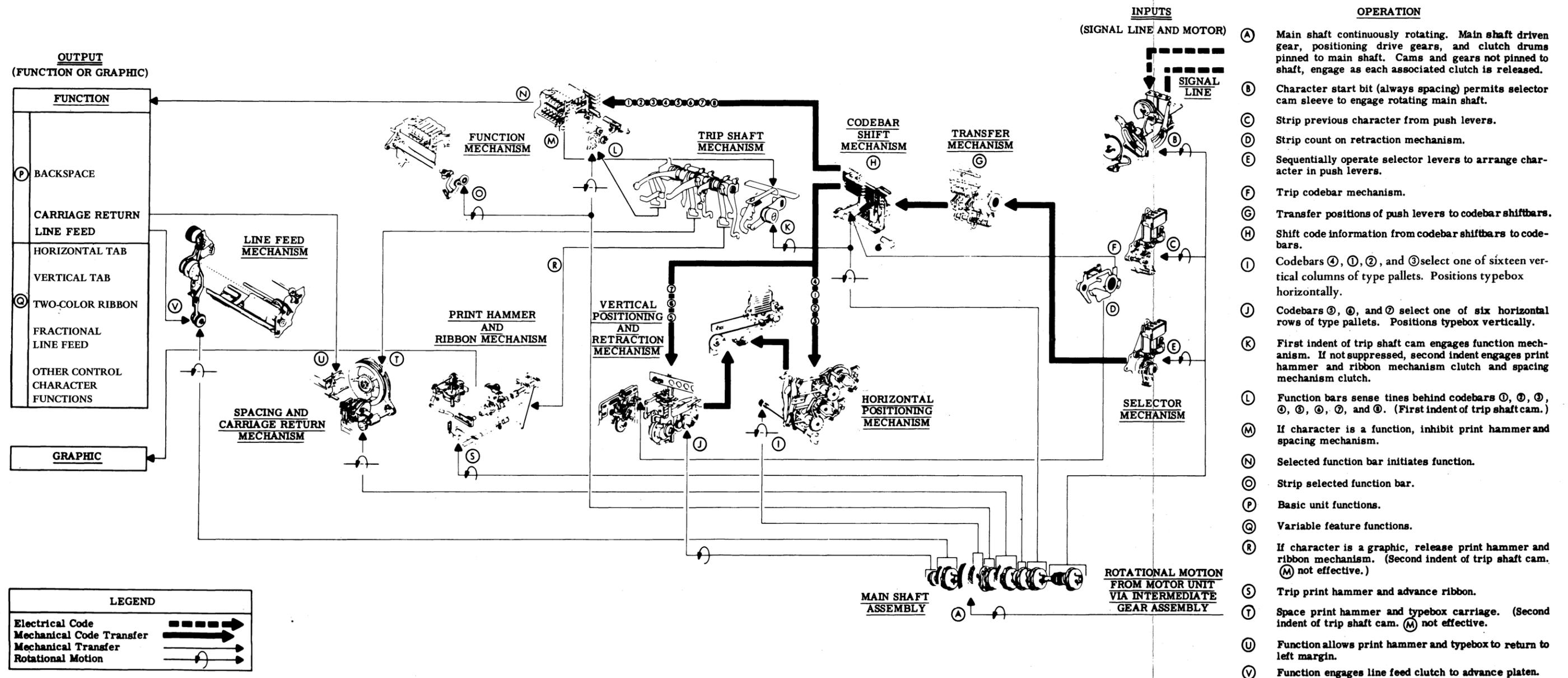
Figure 10 - Console Control Panel Wiring (Right Part)

Figure 11 - Typing Unit Operation

OUTPUT (FUNCTION OR GRAPHIC)

FUNCTION

Ⓟ BACKSPACE

CARRIAGE RETURN
LINE FEED
HORIZONTAL TAB
VERTICAL TAB
Ⓠ TWO-COLOR RIBBON
FRACTIONAL LINE FEED
OTHER CONTROL CHARACTER FUNCTIONS

GRAPHIC

LINE FEED MECHANISM

FUNCTION MECHANISM

TRIP SHAFT MECHANISM

CODEBAR SHIFT MECHANISM

TRANSFER MECHANISM

PRINT HAMMER AND RIBBON MECHANISM

VERTICAL POSITIONING AND RETRACTION MECHANISM

HORIZONTAL POSITIONING MECHANISM

SPACING AND CARRIAGE RETURN MECHANISM

SELECTOR MECHANISM

MAIN SHAFT ASSEMBLY

ROTATIONAL MOTION FROM MOTOR UNIT VIA INTERMEDIATE GEAR ASSEMBLY

INPUTS (SIGNAL LINE AND MOTOR)

SIGNAL LINE

LEGEND

Electrical Code	
Mechanical Code Transfer	
Mechanical Transfer	
Rotational Motion	

OPERATION

Ⓐ Main shaft continuously rotating. Main shaft driven gear, positioning drive gears, and clutch drums pinned to main shaft. Cams and gears not pinned to shaft, engage as each associated clutch is released.

Ⓑ Character start bit (always spacing) permits selector cam sleeve to engage rotating main shaft.

Ⓒ Strip previous character from push levers.

Ⓓ Strip count on retraction mechanism.

Ⓔ Sequentially operate selector levers to arrange character in push levers.

Ⓕ Trip codebar mechanism.

Ⓖ Transfer positions of push levers to codebar shiftbars.

Ⓗ Shift code information from codebar shiftbars to codebars.

Ⓘ Codebars ④, ①, ②, and ③ select one of sixteen vertical columns of type pallets. Positions typebox horizontally.

Ⓙ Codebars ⑤, ⑥, and ⑦ select one of six horizontal rows of type pallets. Positions typebox vertically.

Ⓚ First indent of trip shaft cam engages function mechanism. If not suppressed, second indent engages print hammer and ribbon mechanism clutch and spacing mechanism clutch.

Ⓛ Function bars sense tines behind codebars ①, ②, ③, ④, ⑤, ⑥, ⑦, and ⑧. (First indent of trip shaft cam.)

Ⓜ If character is a function, inhibit print hammer and spacing mechanism.

Ⓝ Selected function bar initiates function.

Ⓞ Strip selected function bar.

Ⓟ Basic unit functions.

Ⓠ Variable feature functions.

Ⓡ If character is a graphic, release print hammer and ribbon mechanism. (Second indent of trip shaft cam. Ⓜ not effective.)

Ⓢ Trip print hammer and advance ribbon.

Ⓣ Space print hammer and typebox carriage. (Second indent of trip shaft cam. Ⓜ not effective.)

Ⓤ Function allows print hammer and typebox to return to left margin.

Ⓥ Function engages line feed clutch to advance platen.