

MODIFIED 8A1 AND 8B1 DATA SELECTIVE CALLING SYSTEM
GENERAL ELECTRIC RECORDS COMMUNICATION NETWORK
LOGIC AND TROUBLESHOOTING GUIDE

CONTENTS	PAGE
1. GENERAL	1
2. CONTROL CODES	2
3. FULL DUPLEX TRANSMISSION	3
4. HALF DUPLEX TRANSMISSION	6
5. TROUBLESHOOTING	8

1. GENERAL

1.01 This addendum to Issue 1 of Section 581-122-300 provides the additional information needed by maintenance personnel to be more effective in troubleshooting station apparatus on the General Electric Records Communication (RECOMM) network.

1.02 The General Electric RECOMM network consists of both half and full duplex circuits and is a modified version of the 8A1 and 8B1 data selective calling systems.

1.03 Two customer-owned and maintained communication processors (hereafter referred to as a processor) are provided to control all traffic on the network. Additional functions performed by the processor are:

(a) **System Control:** Polling and selection of stations on the line is accomplished under program control. Individual messages can be routed to more than one outlying station by proper coding.

(b) **Message Accumulation:** Messages are assembled, routed, and distributed under program control.

(c) **Storage:** Storage is provided for messages that cannot be transmitted for any reason.

(d) **System Monitoring:** Incomplete or improperly coded messages are rejected and a service message is automatically transmitted to the originating station. Information on service messages can be found in the customer directory located at each station console.

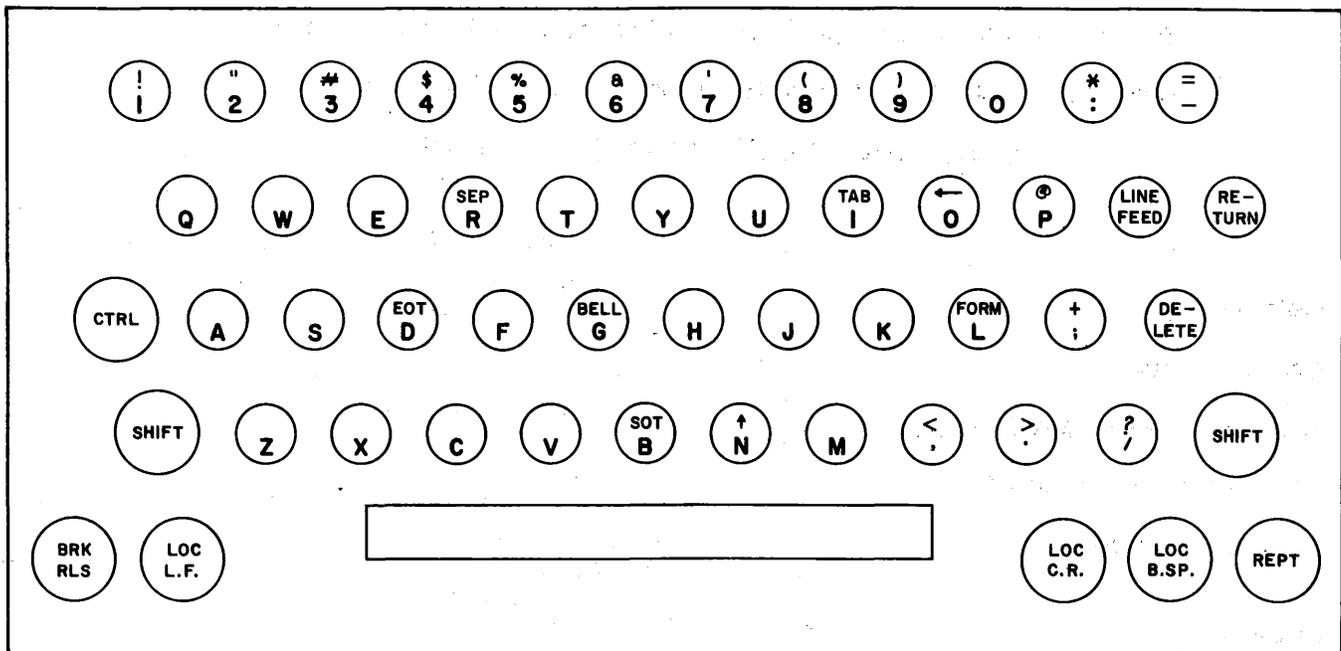
1.04 All message transmission is from the processor to the outlying station or vice versa. There is no direct transmission between stations. There are no provisions for keyboard entry in the RECOMM network.

1.05 In tape preparation, mnemonic codes are used instead of the call directing codes; the processor converts these codes to the appropriate call directing codes. In addition, the processor checks the message preamble for proper format and checks for an end of transmission code. If all of these are not correctly received, it automatically sends a service message to the station to inform the attendant that the message should be resent.

1.06 When a 35 receiving-only typing reprocessor (ROTR) is used, a single connect code is used to connect the teletypewriter to the ROTR.

1.07 Each send-receive and receive-only station is equipped with a controller to perform switching operations and to interface the station with the loop facility.

1.08 The keyboard arrangement is illustrated in Fig. 1. The control functions, such as EOT, SOT, etc., are obtained by operating the CTRL (control) key and the desired function key. The graphic symbols on the upper half of the keys are obtained by operating the SHIFT key and the appropriate key. Depressing the LOC. B. SP. key allows the tape to be backspaced one character for each operation of the key. Simultaneous operation of the REPT key and any



NOTE:
 GRAPHICS AND CONTROL CODES ON UPPER PORTION OF KEY CAPS
 OBTAINED IN CONJUNCTION WITH SHIFT AND CONTROL KEYS, RESPECTIVELY.

Fig. 1 — Keyboard Layout — 35 ASR

other key associated with a character will result in the character being repeated. The remaining keys are self-explanatory.

2. CONTROL CODES

2.01 All control codes are monitored by the processor and each station on the circuit. No outlying station can transmit without being selected by the processor. When a station is polled, the message transmitted must conform to the format programmed into the processor. The message format is illustrated for this network in the customer directory located at each station console. The second character of the transmitter start code (TSC), call directing code (CDC), and answer back (A/B) code is the same character.

2.02 Transmitter Start Code: The TSC is a 2-character code; the first character is DC₀, and the second one is assigned from the 26 alphabetical characters. When a TSC is generated by the processor, all stations sense the

code but only the station to which the code is assigned will respond.

2.03 Call Directing Code: The CDC is a 2-character code; the first character is S₁, and the second is one of the 26 alphabetical characters. The CDC is sensed by all receivers, but is recognized only where a stuntbox is coded with that specific combination. All CDCs are originated by the processor. The outlying stations use mnemonic codes in place of CDCs when preparing tape. After a message is received by the processor, it translates the mnemonic code to the proper CDCs for the stations involved.

2.04 Answer Back Code: The A/B code is a 2-character code; the first character is S₂, and the second is one of the 26 alphabetical characters. This code is returned to the processor after each CDC is sent to indicate that the station is ready to receive traffic. It is also returned after a TSC is sent if the station has no traffic.

2.05 Start of Transmission Code: The start of transmission (SOT) code is a single character (control B). After a CDC is sent from the processor and the A/B code returned, the processor sends SOT. This code will condition the called receiver to the nonselect print condition and all other receivers to the nonselect nonprint condition. A receiving station will not print the CDCs, A/B, or SOT codes. This code is also used as the first control character in tapes transmitted to the processor. The term SOT is used in the RECOMM network in place of, and is synonymous with, end of address.

2.06 End of Transmission Code: The end of transmission (EOT) code is a single character (control D). The EOT code is always followed by a minimum of 12 deletes when originated from an outlying station. On a half duplex circuit, it is used as a disconnect code and is recognized by the stuntbox, which stops the transmitter distributor (TD). In addition, the EOT restores all teletypewriters on the circuit to the nonprint select condition. On a full duplex circuit, the sending machine has no means of detecting this code. The code is detected by the processor, which then generates the X-OFF sequence on the receive side of the circuit to stop the TD. The EOT code is also used between addresses of a multiple-address message on both half and full duplex. In this case, the TD is stopped but is immediately restarted on receipt of its TSC.

2.07 Interrupt Code — S_0 DELETE: This code is generated only by the processor and is used on full duplex circuits. It precedes a CDC or TSC sent from the processor. In the case of a CDC, any TD sending will be stopped to permit an A/B from the station on the send side of the circuit from the station called. When preceding a TSC, any selected receivers are placed in a nonprint condition to prevent copying the TSC.

2.08 X-OFF: This code is generated by the processor and is used on full duplex circuits. It is sent on the receive side of the circuit to stop a station TD after the EOT code is received at the processor.

2.09 BELL-BELL: This code is generated by the station after receiving the CDC for the station if the paper supply is low. Under this condition, the CDC will not select the station.

2.10 Separate Code: This code (control R) is used on multiple-address messages after the last address. It indicates to the processor that all addresses have been transmitted and that the text of the message will follow.

2.11 Emergency Stop: A 400-ms break is generated by the processor on a half duplex circuit.

3. FULL DUPLEX TRANSMISSION

3.01 The send and receive sides in full duplex operation are electrically independent of each other. Traffic on one side does not appear on the other. It is significant to note that each sending station has a common receiver, the processor. Transmission to the processor is on the send side. All receiving stations have a common transmitter, the processor. Messages are relayed from the processor to the receivers on the receive side.

3.02 The transmitter distributor is operated from the send logic in the station control circuit, which responds to a TSC generated by the processor on the receive side; however, an S_0 or X-OFF code received on the receive side will also stop the TD. Once the TD is started, transmission continues until the tape clears the sensing head unless an S_0 or X-OFF code is received on the receive side.

3.03 Since the processor is the only receiving device on the send side, the TD does not wait for an A/B. Messages sent from a station will not be printed on the sending machine. Also, the TD disregards but transmits the EOT disconnect code. When the EOT code is received by the processor, it sends an X-OFF code on the receive side, which stops the TD. Since time is required to complete this sequence, an adequate trailer must be perforated in the tape between messages.

3.04 The processor will transmit a CDC to a station-receiving device on the receive side and wait as the station controller generates an A/B code on the send side. It is necessary, therefore, to stop any TD, if sending, before a CDC is received so that an A/B response can be transmitted on the send side without conflicting with

TD message transmission. This is accomplished by strict conformance with the full duplex receive side preamble format. An S₀ DELETE code will not appear on page copy but will appear in tape if a reperforator is the receiving device. An SOT code following the CDC restarts the TD and places the receiver in the print or reperforate condition.

3.05 If transmission from a TD is terminated, the processor may have to interrupt the receive side traffic in order to start another TD. This is accomplished by the processor interrupting the receive side traffic with an S₀ DELETE TSC. The S₀ DELETE places the receiver in a blind condition (nonprint); the 2-character TSC polls a station TD. If no traffic is available, the station controller responds with an A/B. The processor then advances to the next station by sending a subsequent TSC. If traffic is available, the TD will start an uninterrupted transmission of message preamble and text to the processor on the send side. Meanwhile, the processor generates an SOT code to unblind the receiver and then resumes message transmission to the selected receiver.

3.06 A TD may be stopped by the processor sending an S₀, DELETE, X-OFF sequence. A TSC is required to restart transmission.

3.07 The station controller generates a BELL-BELL code sequence after receipt of a CDC if the typing unit is low on paper. Under this condition, the station is not selected and the processor bypasses the station. A local alarm is generated and the station is now put on intercept. Upon clearing the alarm, the low-paper station must notify the processor to have the station removed from intercept.

3.08 When preparing multiple-address messages, an EOT code must be used between addresses. When received, this causes the processor to send an S₀, DELETE, X-OFF, TSC sequence which stops the TD and immediately restarts it. A Separate code (control R) is used between the last address and the message text to indicate to the processor that all addresses have been received. The Separate code also performs the same function as the SOT code.

3.09 Station Equipment: The full duplex stations consist of a model 35 ASR (non-selective) and a model 35 RO equipped for selective calling operation over full duplex facilities. The 35 RO is associated with the receive side of the circuit and the 35 ASR is associated with the send side. The keyboard, associated typing unit, and typing reperforator of the 35 ASR are always off-line for perforation of tape. A page copy is printed as the tape is perforated. The transmitter distributor is connected to the line under control of the 35 RO but may be transferred by operation of the power switch to LCL for editing tapes. Page copy is not printed when the tape is transmitted to the line. In several cases, receive-only stations are provided on full duplex circuits. These consist of a model 35 RO selective calling machine.

3.10 The functions and indications relative to this system that are different from the 8B1 system are as follows:

- (a) **Copy All Normal Switch:** This switch is disabled.
- (b) **Bid Lamp and Key:** This key has been internally strapped to the repeat position so that it is not necessary to operate the key. The Bid lamp lights when the contacts of the tape-out switch, the taut-tape arm, and the run position of the RUN-STOP-FREE TD switch are made simultaneously. This lamp indicates that a bid for the line has been entered.
- (c) **Mode Switch:** This switch is locked in the KT position.
- (d) **BREAK:** This key has been disabled.
- (e) **Guard Lamp:** A red lamp is mounted in the left rear of the message tray of all ASR machines. It lights when the TD is switched off-line.

3.11 Flow Chart I provides the polling sequence for full duplex transmission. Both TSC and CDC sequences are included for uninterrupted and interrupted transmission.

FLOW CHART I

POLLING SEQUENCE — FULL DUPLEX

(Format subject to change; consult the STC regarding any deviation.)

TSC SEQUENCE — S₀, DEL, X-OFF, DC₀, ALPHA

Case A: Uninterrupted Transmission	
<p>STATION RECEIVE S₀ DEL, X-OFF DC₀ ALPHA S₀ DEL X-OFF</p>	<p>STATION CONDITION Select nonprint Select nonprint No traffic A/B, or TD runs Text followed by EOT TD shuts off</p>
Case B: Interrupted Transmission	
<p>STATION RECEIVE S₀ DEL, X-OFF DC₀, ALPHA EOT, S₀ DEL *Now the processor sends out a CDC sequence to select a receiving unit for which there is traffic (see CDC sequence below). SOT</p>	<p>STATION CONDITION Select nonprint Select nonprint TD runs Stops TD Restarts TD</p>

CDC SEQUENCE — EOT, S₀, DEL, S₁, ALPHA

Case A: Uninterrupted Transmission	
<p>STATION RECEIVE EOT, S₀, DEL S₁ ALPHA SOT Text EOT</p>	<p>STATION CONDITION Select nonprint Selected nonprint A/B of S₂ ALPHA or BELL-BELL. If BELL-BELL, station automatically goes on intercept. If S₂, ALPHA Nonselect print Printing Select nonprint</p>

*For theory of interrupt sequence, see 2.07.

FLOW CHART I (Cont)

Case B: Interrupted Transmission	
<p style="text-align: center;">STATION RECEIVE</p> <p>EOT, S₀ DEL</p> <p>S₁ ALPHA</p> <p>SOT</p> <p>Text</p> <p>S₀, DEL, X-OFF</p> <p>*Now the processor sends out a TSC sequence to scan for traffic (see TSC sequence above).</p> <p>SOT</p> <p>Text continued</p>	<p style="text-align: center;">STATION CONDITION</p> <p>Select nonprint</p> <p>Selected nonprint A/B or BELL-BELL Assume send A/B</p> <p>Nonselect print</p> <p>Printing</p> <p>Nonselect nonprint</p> <p>Nonselect print</p> <p>Printing continued</p>

*For theory of interrupt sequence, see 2.07.

4. HALF DUPLEX TRANSMISSION

4.01 All transmission is between the station and processor. No transmission is permitted directly between stations. All traffic is under control of the processor. The control codes (CDCs and TSCs) are sent by the processor and preceded by an EOT code. The EOT code ensures that each station is in the select nonprint condition.

4.02 The TD is operated from the logic in the station control circuit, which responds to a TSC generated by the processor. An on-line station responds to a TSC with an A/B code if there is no tape in the transmitter. A TSC causes the TD to start uninterrupted transmission until the EOT code is detected by the station control circuit. Local copy is not obtained. With the exception of an emergency stop (400-ms break), no provision has been made in the processor for stopping a TD.

4.03 Each station can be connected by a CDC. Group or broadcast codes are not used. When a station is selected, it transmits an A/B signal to indicate to the processor that the sta-

tion is connected and ready to receive traffic. The EOT code which follows the message text restores all stations to the select nonprint condition. If a low-paper condition exists at a station when the CDC is received, a BELL-BELL code is returned to the processor. In this condition, the station does not connect and the processor bypasses the station. A local alarm is generated and the station is now put on intercept. Upon clearing the alarm, the low-paper station must notify the processor to have the station removed from intercept.

4.04 A transmission path for both send and receive must be provided to a receive-only location. This is required because the receive-only station generates an A/B code, which must be transmitted to the processor.

4.05 For tape preparation the station is switched off-line. During this condition, messages cannot be sent or received. There is no response from the station if the processor sends a TSC or CDC. A red guard light is lighted during the time the station is switched off-line.

4.06 Station Equipment: The half duplex stations consist of model 35 ASR for send-receive stations and model 35 RO for receive-only stations with suitable interconnection facilities. All stations (35 ASR or 35 RO) must be equipped for selective calling operation. The 35 ASRs are switched from the line during tape perforation to permit a page copy of the message

to be printed. No response can be received from the station under this condition. Page copy is not printed when the tape is transmitted to the line. The mode switch is locked in the KT position.

4.07 Flow Chart II provides the polling sequence for half duplex transmission. Both the TSC and the CDC sequences are included.

FLOW CHART II

POLLING SEQUENCE — HALF DUPLEX

(Format subject to change; consult the STC regarding any deviation.)

TSC SEQUENCE — S₀, DEL, X-OFF, EOT, DEL, DC₀, ALPHA

STATION RECEIVE	STATION CONDITION
S ₀ , DEL, X-OFF, EOT, DEL	Select nonprint
DC ₀ ALPHA	Select nonprint No traffic A/B, or TD runs Text EOT
EOT in tape	Clears the stuntbox and now in select nonprint

CDC SEQUENCE — EOT, DEL, S₁, ALPHA

STATION RECEIVE	STATION CONDITION
EOT, DEL	Select nonprint
S ₁ ALPHA	Select nonprint A/B returned or BELL-BELL. If BELL-BELL, station automatically goes to intercept.
SOT	If S ₂ , ALPHA
Text	Nonselect print
Text	Printing text
EOT	Select nonprint

5. TROUBLESHOOTING

5.01 Table A lists some typical troubles that may be encountered in the RECOMM network; references and suggestions for clearing

these troubles are also included. Tables B and C provide troubleshooting information applicable to the ASR and RO sets, respectively.

TABLE A
TYPICAL TROUBLES AND CLEARANCES — RECOMM NETWORK

TROUBLE	REFERENCE
Receiving Troubles	
Subsets and Channel Units	
Machine Dead — (a) Idle Line Motor Control (Bypass Switch) (b) Commercial Power (c) Thermal Cut Out Switch (Motors)	BSP 570-306-902 LL BSP 570-220-100
Receive Selector and Code Bar Assembly Reset Range Arm Print Solenoid (Contacts), (Printing Polling Patterns) Type Box and Positioning Mechanisms Defective Selector Magnet Driver Card Selector Magnet Assembly (Armature) Main Shaft Gears and Clutches Interrupt Sequence (Stuntbox)	BSP 574-220-700
Receiving Tape ROTR — Print Suppression Mechanism	BSP-574-233-700
Hits on Line — Could be incorrect adjustment of Line Local Relay #181810. Latest adjustment procedures for proper contact sequence operation will also prevent false starting of Idle Line Motor Control Unit.	TCN 664 July 1966
Shaft Couplers — The TP 193565 coupling should be used on a replacement basis. This will eliminate vibration loosening the allen setscrews.	TCN 622 Iss. 2, Aug. 1966
Dropping of 7th Pulse — The following changes and adjustments have a direct bearing on this problem: Change the No. 78533 Marking Lock Lever Spring to No. 182909 Spring. Change the tension requirement for this spring from 1-1/2 ounce to 3 ounces to 2 ounces to 4 ounces.	TCN 635 Iss. 1, June 1966

TABLE A (Cont)

TROUBLE	REFERENCE
<p>Receiving Troubles (Cont)</p> <p>Change the shift rocker lever adjustment to read as follows:</p> <p>With alternate left and right selection made and bail arm assembly roller on high part of cam, whichever yields the smallest clearance, take up the play in an upward direction at the lower end of the shift rocker lever with a force of 2 ounces. With the opposite selection made, clearance between raised end of shift rocker bar and lower end of associated shift breaker slide shall be equal within 0.010 inch.</p> <p>Change the shift drive pawl operating bail to:</p> <p>With shift drive pawl operating bail cam follower on high dwell of cam, clearance between shift rocker bar and lower end of raised shift breaker slide should be minimum 0.005 inch and maximum 0.025 inch when slide is held against stop. This adjustment to be held within a minimum of 0.005 inch and maximum of 0.035 inch when the 0.010-inch parallel requirement is held in the shift rocker lever adjustment.</p> <p>Change the shift selector arm bell crank adjustment from minimum "some" and maximum 0.008 inch to minimum 0.005 inch and maximum 0.020 inch.</p> <p>The No. 3598 Nut is used to mount the No. 150755 Stud to the No. 170079 Arm. This arm has been replaced by a No. 3606 Nut in order to eliminate possible interference between the present nut on the stud and the No. 119652 Retaining Ring. This Retaining Ring mounts the No. 170064 Lever to the No. 170054 Plate.</p> <p>If adjustments have been disturbed, recheck the following:</p> <p>(a) Selector magnet bracket (b) Marking lock lever spring</p>	<p>TCN 614 Iss. 1, Mar. 1966</p> <p>TCN 614 Iss. 1, Mar. 1966</p> <p>TCN 614 Iss. 1, Mar. 1966</p> <p>TC 2736 May 1965 Pg. 25, 26 BSP 574-220-800</p>

TABLE A (Cont)

TROUBLE	REFERENCE
<p>Receiving Troubles (Cont)</p> <ul style="list-style-type: none"> (c) Selector armature spring (d) Selector push lever spring (e) Transfer lever spring (f) Shift linkage (g) Shift rocker bearing bracket (h) Shift rocker lever (i) Shift drive pawl operating bail (j) Shift drive pawl guide bracket (k) Shift selector arm bell crank (l) Shift pawl selector link yield spring <p>Answer Back Troubles</p> <p>Answer Back Motors — (Latest design motor, TP 192120, end shield should have a date stamp of manufacture 11-65 or later; insurance against motors “freezing”.)</p> <p>Answer Back Motor Fuse (Improper Size) Req Fusetron 1.0 amp</p> <p>Answer Back Drum and Distributor</p> <p>Answer Back Bushings and Gears</p> <p>Answer Back Clutch and Springs</p> <p>Answer Back Assembly Cards “L, Z, D”</p> <p>Proper Indexing of Answer Back Drum</p> <p>Stunt Box Troubles</p> <p>Subset (Send or Receive)</p> <p>Commercial Power</p> <p>Station Off Line (HDX)</p> <p>General Receive Troubles (See “Receiving Troubles”)</p> <p>Sending Troubles</p> <p>Dirt or Foreign Matter in TD</p> <p>Defective Pinion Gear</p> <p>Signal Generator — (Missing strap TP 195648 from common terminal TP 154042 to toggle contact TP 179800.) The absence of this strap may cause errors to be generated from the keyboard.</p> <p>Tape (Defective or Incorrect Format)</p> <p>Interrupt Sequence</p> <p>Channel Unit and Subset</p> <p>Machine Dead (See “Receiving Troubles”)</p>	<p>TCN 669 Iss. 2, Sept. 1966</p> <p>TCN 732 Iss. 1, Nov. 1966</p>

TABLE A (Cont)

TROUBLE	REFERENCE
<p>Tape Stops</p> <p>Tape Out Contacts Taut Tape Arm Tape Gauge Tape Format Open Line (HDX) Problems on Receive Side of Circuit (HDX) General Receive Troubles (See "Receiving Troubles")</p> <p>Incomplete or Misdirected Messages</p> <p>Stuntbox Contacts Print Solenoid and Linkage Adjustments Incorrect Format (Originating Station) General Receive Troubles (See "Receiving Troubles")</p>	<p>BSP 574-225-700</p>

TABLE B
AUTOMATIC SEND RECEIVE SET (ASR)
TROUBLESHOOTING CHART
RECOMM NETWORK

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
1	Power — OFF (Power plug in 115-vac receptacle.) Motors and cabinet lamps are off. Selectors energized.	a. Motors and cabinet lamps are on.	Wiring of rotary power switch.	6380WD
		b. Motor on (one or both).	Wiring between motor and electrical service unit.	4348WD 6395WD 6935WD
2	Power — LCL Mode — KT Motors and cabinet lamps are on. Typing unit and tape punch selectors are energized.	a. Motors and cabinet lamps are off. Selectors de-energized.	Power line connections.	6935WD
			Wiring of rotary power switch.	6380WD
		b. Motors off.	Wiring between motor and electrical service unit.	4348WD 6395WD 6935WD
			Idle line motor control unit.	
			Motor thermal cutoff switch (keyboard motor only).	
		c. Motors run at incorrect speed	Power line frequency (60 Hz).	
		d. No cabinet illumination.	Copyright wiring continuity.	
			Copyright transformer.	6935WD
		e. Some copylights not illuminated.	Bulb and socket wiring.	
		f. Typing unit selector de-energized.	Signal line continuity.	5814WD 5983WD 6395WD 6470WD 6471WD 6935WD
Output of local power supply.	6935WD			
Output of selector magnet driver (500 milliamperes).				

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE	
2 (Cont)	(Cont)	(Cont)	Open between selector coils and selector magnet driver.	6474WD 6935WD	
			Open selector coils (7 ohms resistance per coil).	6474WD	
			Selector armature spring and selector range finder adjustments.		
			Station controller signal line continuity through H/L converter plug X, L/H converter plug Y, data set coupler plug W, and answer-back plug AC. Also, answer-back distributor brushes.	6471WD	
			g. Tape punch selector de-energized.	Signal line continuity.	5983WD 6395WD 6470WD 6471WD 6935WD
				Output of local power supply.	6935WD
				Output of punch-selector magnet driver (500 milliamperes).	
				Open between selector coils and selector magnet driver.	6474WD 6935WD
				Open selector coils (7 ohms resistance per coil).	6474WD
				Selector armature spring and selector range finder adjustments.	

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
2 (Cont)	(Cont)	(Cont)	Station controller signal line continuity through H/L converter plug X, L/H converter plug Y, data set coupler plug W, and answer-back plug AC. Also, answer-back distributor brushes.	6471WD
3	Power — LCL Mode — KT Tape in reader unit. Tape reader bat-handle switch placed in RUN position. Tape reader should operate.	a. Tape reader does not operate.	Improper wiring of mode switch.	6470WD
			Open across KT1 mode switch contact.	6903WD
			Circuit continuity of tape reader clutch trip magnet circuit.	5814WD 6935WD
4	Power — LCL Mode — KT All printing graphics properly typed from tape reader or keyboard transmission.	a. Typing unit runs closed (idle signal line).	Signal line for presence of space-mark pulses.	6935WD
			Keyboard signal generator for shorting or mechanical failure.	
			Wiring of signal generator contacts to electrical service unit.	6395WD 6935WD
			Typing unit selector magnet driver for blind across input leads.	
			Short across the KT mode switch contacts.	6470WD 6471WD 6935WD
			Output of selector magnet driver for space-mark transition.	

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
4 (Cont)	(Cont)	(Cont)	Selector adjustments.	
			Receive-break contact switch in keyboard. Should not be operated.	
			TDR relay. Should be de-energized. Otherwise, it will blind the keyboard signal generator contacts.	6471WD
5	Power — LCL Mode — KT While transmitting from tape reader, the margin indicator lamp should light when type box carriage advances to about 72nd character.	a. Lamp does not light.	Bulb and socket.	
			Switch and lamp wiring.	6395WD 6935WD
			Open across K7 mode switch contact.	6470WD
			Typing unit margin indicator switch adjustment.	
			Open contacts when switch is operated.	
6	Power — LCL Mode — KT Character counter should function when transmitting from the keyboard.	a. Character counter is disabled.	Closed condition across KT9 mode switch contacts.	6470WD 6935WD
			Solenoid mechanism for proper operation.	
			Adjustments of character counter mechanism.	
7	Power — LCL Mode — KT Transmit BELL code from keyboard by depressing BELL	a. Bell does not ring.	Typing unit selector for proper code selection.	

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
7 (Cont)	and CTRL keys simultaneously. Bell rings. Typing unit does not print.	(Cont)	BELL stunt-box contacts for open condition.	
			Bell circuit continuity.	6935WD
			Stuntbox function bar operation.	
			Stuntbox function bar coding.	
8	Power — LCL Mode — KT LF transmitted from keyboard. Typing unit feeds out paper or forms one or two lines. Typing unit does not print.	a. Paper or forms are not fed out.	Typing unit selector for proper code selection.	
			Stuntbox function bar operation.	
			Stuntbox function bar coding.	
			Typing unit line feed mechanism adjustments.	
9	Power — LCL Mode — KT CR transmitted from keyboard. Typing unit carriage returns. Typing unit does not print.	a. Carriage does not return.	Typing unit selector for proper code selection.	
			Stuntbox function bar operation.	
			Stuntbox function bar coding.	
			Typing unit carriage return mechanism adjustments.	
10	Power — LCL Mode — KT LCL LF key operated. Paper or forms feed out.	a. Paper or forms do not feed out.	Keyboard and typing unit local line feed mechanisms for proper adjustments.	

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
11	Power — LCL Mode — KT When LCL CR key is operated, the type box carriage returns to the left side of the typing unit.	a. Carriage does not return.	Keyboard and typing unit local carriage return mechanisms for proper adjustments.	
12	Power — LCL Mode — KT Sprocket Feed Only Tab code transmitted from keyboard. Typing unit tabs horizontally and does not print.	a. Typing unit does not horizontal tab.	Typing unit selector for proper code selection.	
			Stuntbox function bar for proper coding and operation.	
			Typing unit horizontal tab mechanism for proper adjustment.	
13	Power — LCL Mode — KT Sprocket Feed Only VT code transmitted from keyboard. Typing unit tabs vertically and does not print.	a. Typing unit does not vertical tab.	Typing unit selector for proper code selection.	
			Stuntbox function bar for proper coding and operation.	
			Typing unit vertical tab mechanism for proper adjustments.	
14	Power — LCL Mode — KT Sprocket Feed Only FORM code transmitted from keyboard. Forms are fed out of typing unit.	a. Forms are not fed out.	Possibility of paper jam in typing unit.	
			Typing unit selector for proper code selection.	

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
14 (Cont)	(Cont)	(Cont)	Stuntbox function bar for proper coding and operation.	
			Typing unit form-out mechanism for proper adjustments.	
15	Power — LCL Mode — KT LOC B. SP. key operated on keyboard. Backspace the tape one position for each operation of the key.	a. Tape punch does not backspace the tape.	Open condition in local backspace switch when operated.	
			Circuit continuity in connecting backspace switch and magnet.	6395WD 6935WD
			Open condition in backspace magnet coil.	
			Backspace mechanism adjustments in tape punch.	
16	Power — LINE Mode — KT Twist Key — NORM Blind removed from keyboard signal generator and BREAK lamp extinguished.	a. Keyboard signal generator shunted and BREAK lamp lit.	Mechanical adjustments between TP 192538 plug and receive-break switch.	
17	Power — LINE Mode — KT Twist Key — NORM Call Directing Code (CDC) is recognized by ASR.	a. CDC not recognized.	Stunt box CDC contacts.	6474WD
			Open wire at PTR or PUN relay.	6471WD
			Power switch in correct (LINE) mode.	
			EOA-UNIV stunt-box contact, slot 34 (may be latched open).	6474WD

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
17 (Cont)	(Cont)	(Cont)	Typing unit connector disconnected.	
			Open wire at PL or RL relay.	6471WD
			EOT stuntbox contact, slot 31 (may be open).	6474WD
18	Power — LINE Mode — KT Twist Key — NORM Typing unit goes to PRINT condition upon receipt of EOA (SOT).	a. Typing unit remains in NONPRINT condition.	Solenoid contact does not close.	6474WD
			Typing unit print suppression codebar does not move freely.	
			EOA-UNIV stuntbox contact, slot 34 (may be latched open).	6474WD
19	Power — LINE Mode — KT Twist Key — NORM Answer-back response to CDC.	a. No answer-back response.	Open wire in ABP relay circuit.	6471WD
			Open in answer-back clutch magnet.	6471WD
			Strap omitted between H-K1 and H-K2 (HDX).	6471WD
			Answer-back brushes broken or out of holder.	
			NU relay #2 contact open (FDX).	
			NU relay not operated (FDX).	
20	Power — LINE Mode — KT Twist Key — NORM BELL-BELL response to a CDC for low paper.	a. No BELL-BELL answer-back response from station after CDC is received on low paper.	Open wire in ABP relay circuit.	6471WD
			Strap omitted between H-K1 and H-K2 (HDX).	6471WD
			Relays PFA or PFB inoperative.	6471WD
			Answer-back brushes broken or out of holder.	

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
20 (Cont)	(Cont)	(Cont)	NU relay #2 contact open (FDX).	
			NU relay not operated (FDX).	
21	Power — LINE Mode — KT Twist Key — NORM Transmitter Start Code (TSC) is recognized by ASR.	a. TSC not recognized.	Stuntbody TSC contact (may not close momentarily).	6474WD
			Relay BD does not latch.	6471WD
			EOT stuntbox contact, slot 31 (may be open).	6474WD
			Relay SD in-operative.	6471WD
			Relay TSCI de-energized due to EOA-UNIV stuntbox contact, slot 34, being latched open.	6471WD 6474WD
			Wrong coding of stuntbox function bar tines in the suppression level.	
		b. Reader fails to start.	Bat-handle switch OFF.	
			Tape-out pin is up (operated).	
			Tight tape arm is operated.	
			Strap omitted between H-L3 and H-L4 (HDX).	6471WD
			NU relay #2 contact open (FDX).	
			NU relay not operated (FDX).	

TABLE B (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
22	Power — LINE Mode — KT Twist Key — NORM Normal, no traffic response to a TSC.	a. No response	Contact 3BD is faulty.	6471WD
			Answer-back clutch magnet is open.	6471WD
			Diode CR108 may be open.	

TABLE C
RECEIVE ONLY SET (RO)
TROUBLESHOOTING CHART
RECOMM NETWORK

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
1	Power — OFF Motors and cabinet lamps off. Typing unit selector energized.	a. Motors and cabinet lamps on.	Wiring of rotary power switch.	6380WD
		b. Motor on (one or both).	Wiring between motor and electrical service unit.	5857WD 6936WD
2	Power — LINE Motors and cabinet lamps on. Typing unit selector energized.	a. Motors and cabinet lamps off. Typing unit selector de-energized.	Power line connections.	6936WD
			Wiring of rotary power switch.	6380WD
		b. Motor off.	Wiring between motor and electrical service unit.	5857WD 6936WD
			Motor thermal cutoff switch.	
		c. Motor runs at incorrect speed.	Power line frequency (60 Hz).	
		d. No cabinet illumination.	Copyright receptacle and lamp wiring continuity.	
			Copyright transformer.	6936WD
		e. Some copylights not illuminated.	Bulb and socket wiring.	
		f. Typing unit selector de-energized.	Line-Local relay should be energized and contacts operated.	
			Signal line continuity.	
Output of selector magnet driver card.	6936WD			

TABLE C (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
2 (Cont)	(Cont)	(Cont)	Open between selector coils and selector magnet driver.	6936WD
			Open selector coils (7 ohms resistance per coil).	
			Selector armature spring adjustment.	
			Selector range finder adjustments.	
			Station controller signal line continuity through H/L converter plug X, L/H converter plug Y, data set coupler plug W, and answer-back plug AC. Also, answer-back distributor brushes.	6471WD
3	Power — LINE Block Solenoid Operated Printing characters transmitted from auxiliary or remote sending equipment. Typing unit properly prints each character.	a. Typing unit does not receive information (runs closed).	Signal line for presence of space-mark pulses.	6936WD
			Output of selector magnet driver.	
			Selector magnet driver wiring for possible blind across input leads.	
			Selector armature spring adjustment.	
		b. Typing unit selector receiving margin is short.	Output current from selector magnet driver (500 milliamperes).	

TABLE C (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
3 (Cont)	(Cont)	(Cont)	Selector magnet assembly for dirt or oil between magnets and armature.	
			Selector adjustments.	
			Motor speed.	
		c. Typing unit makes intermittent errors or garbles.	Selector range finder (may be at marginal setting).	
			Output current from selector magnet driver (500 milliamperes).	
			Selector magnet assembly for dirt or oil between magnets and armature.	
			Selector adjustments.	
			Motor speed.	
4	Power — LINE Block Solenoid Operated Connected to sending equipment. BELL code transmitted to RO. Bell rings and typing unit does not print.	a. Bell does not ring.	Selector mechanism for proper code selection.	
			Bell stuntbox contacts for open condition.	
			Bell circuit continuity.	6936WD
			Stuntbox function bar coding and operation.	
		b. Typing unit prints character.	Adjustments in area of type box clutch.	
5	Power — LINE Block Solenoid Operated	a. Paper or forms are not fed out.	Selector mechanism for proper code selection.	

TABLE C (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
5 (Cont)	Connected to sending equipment. LF code transmitted to RO. Typing unit feeds out paper or forms one or two lines, and typing unit does not print.	(Cont)	Stuntbox function bar coding and operation.	
			Typing unit line feed mechanism adjustments.	
6	Power — LINE Block Solenoid Operated Connected to sending equipment. CR code transmitted to RO. Typing unit carriage returns. Typing unit does not print.	a. Carriage does not return.	Selector mechanism for proper code selection.	
			Stuntbox function bar coding and operation.	
			Adjustments of typing unit carriage return mechanism.	
7	Power — LINE Block Solenoid Operated LOC LF key operated. Paper or forms feed out of typing unit.	a. Paper or forms do not feed out.	Adjustments of typing unit local line feed mechanism.	
8	Power — LINE Block Solenoid Operated LOC CR key operated. Type box carriage returns to left margin of typing unit.	a. Carriage does not return.	Typing unit local carriage return for proper adjustment.	
9	Power — LINE Block Solenoid Operated Sprocket Feed Only Connected to sending equipment. TAB code transmitted to RO. Typing unit tabs horizontally and does not print.	a. Typing unit does not horizontal tab.	Selector mechanism for proper code selection.	
			Stuntbox function bar coding and operation.	
			Typing unit horizontal tab mechanism for proper adjustment.	
10	Power — LINE Block Solenoid Operated	a. Typing unit does not vertical tab.	Selector mechanism for proper code selection.	

TABLE C (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
10 (Cont)	Sprocket Feed Only Connected to sending equipment. FORM code transmitted to RO. Forms are fed out of typing unit. VT code transmitted to RO. Typing unit tabs vertically and does not print.	(Cont)	Stuntbox function bar coding and operation.	
			Typing unit vertical-tab mechanism for proper adjustment.	
11	Power — LINE Block Solenoid Operated Sprocket Feed Only Connected to sending equipment. FORM code transmitted to RO. Forms are fed out of typing unit.	a. Forms are not fed out.	Possibility of paper jam in typing unit.	
			Selector mechanism for proper code selection.	
			Stuntbox function bar coding and operation.	
			Proper adjustment of typing unit form-out mechanism.	
12	Power — LINE Call Directing Code (CDC) transmitted to RO.	a. CDC not recognized.	Stuntbox CDC contacts.	6474WD
			Open wire at PUN or PTR relay.	6471WD
			EOA-UNIV stuntbox contact, slot 34 (may be latched open).	6474WD
			Typing unit connector disconnected.	
			Open wire PL or RL relay.	6471WD
			EOT stuntbox contact, slot 31 (may be open).	6474WD
13	Power — LINE Typing unit goes to PRINT condition upon receipt of an EOA.	a. Typing unit remains in NONPRINT condition.	Solenoid contact does not close.	6474WD

TABLE C (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
13 (Cont)	(Cont)	(Cont)	Typing unit print suppression code bar does not move freely.	
			EOA- UNIV stuntbox contact, slot 34 (may be latched open).	6474WD
14	Power — LINE Auxiliary tape punch begins perforating upon receipt of an EOA (SOT).	a. Tape punch remains in NONPUNCH condition.	Punch blind contact 6RCR may be closed.	6471WD
			EOA-UNIV stuntbox contact, slot 34 (may be latched open).	6474WD
15	Power — LINE Twist Key — NORM Answer-back response to CDC.	a. No answer-back response.	Open wire in ABP relay circuit.	6471WD
			Open in answer-back clutch magnet.	6471WD
			Strap omitted between H-K1 and H-K2 (HDX).	6471WD
			Answer-back brushes broken or out of holder.	
			NU relay #2 contact open (FDX).	
			NU relay not operated (FDX).	
16	Power — LINE BELL-BELL response to a CDC.	a. No BELL-BELL answer-back response from station after CDC is received.	Open wire in ABP relay circuit.	6471WD
			Strap omitted between H-K1 and H-K2 (HDX).	6471WD
			Relays PFA or PFB in-operative.	6471WD

TABLE C (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
16 (Cont)	(Cont)	(Cont)	NU relay #2 contact open (FDX).	
			NU relay not operated (FDX).	
			Answer-back brushes broken or out of holder.	
17	Power — LINE Transmitter Start Code (TSC) is recognized by RO for starting a tape reader (FDX).	a. TSC not recognized.	Stuntbox TSC contact, slot 4 (may not close momentarily).	6474WD
			Relay BD does not latch.	6471WD
			EOT stuntbox contact, slot 31 (may be open).	6474WD
			Relay SD in-operative.	6471WD
			Relay TSCI de-energized due to EOA-UNIV stuntbox contact, slot 34, being latched open.	6471WD 6474WD
			Wrong coding of stuntbox function bar tines in the suppression level.	
		b. Tape reader fails to start.	Bat-handle switch is OFF.	
			Tape-out pin is up (operated).	
			Tight-tape arm is operated.	
			NULL stuntbox contact, slot 32 (may be latched open). Coded S ₀	6474WD

TABLE C (Cont)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	WIRING DIAGRAM REFERENCE
18	Power — LINE Normal, no traffic response to a TSC.	a. No response.	Contact 3BD is faulty.	6471WD
			Answer-back clutch magnet coil is open.	6471WD
			Diode CR108 may be open.	