"DATASPEED® " MAGNETIC TAPE TERMINAL

CHECKOUT AND TROUBLESHOOTING

CONTENTS PAGE

1. GENERAL

1.01 This section contains the checkout and troubleshooting procedures for the Dataspeed Magnetic Tape Terminals (Figure 1). It is reissued to add information on the data blocking and auto rewind features and to permit standard distribution. Changes and additions are indicated by marginal arrows. Issues 1 and 2 of this section were limited printings and did not receive standard distribution.

1.02 The checkout procedure is provided in two tables. Table A covers local checkout of the control panel switches (Figures 2 and 3) and send and receive functions. Table B covers on-line testing of magnetic tape terminals equipped with 200 series data sets.

1.03 The troubleshooting and repair procedures are written to enable isolation of troubles to major assemblies and substitution of known good assemblies. Defective assemblies can then be forwarded to a repair center with comprehensive repair and test facilities.

1.04 Refer to the troubleshooting and repair procedures and the circuit card replacement charts in Part 3 when troubles occur during checkout.

2. CHECKOUT PROCEDURE

2.01 The operational tests should be made in the sequence given in Tables A and B. All checkout procedures should be performed after routine servicing or repair of a magnetic tape terminal.

2.02 A special magnetic tape test cartridge (TP337400) is available for checkout procedures. If a test cartridge is made locally, it should contain the basic control codes FS, GS, LF, and EOT (plus additional characters if the terminal includes a character recognition expander card), in addition to alpha-numerics (THE QUICK BROWN FOX . . . 1234 . . .) so that the search and read functions can be tested. For terminals equipped with the auto rewind feature, the tape should also include provisions for checking the rewind operation.

2.03 The terminal should be checked for any visual defects (loose connectors, bad fuses, etc). Check to see that the magnetic tape head is clean to insure peak efficiency of the set. This will prevent problems described in the checkout procedures.

CAUTION: DO NOT REMOVE AC POWER WITH TAPE LOADED IN TAPE TRANSPORT.

Prepared for American Telephone and Telegraph Company by Teletype Corporation

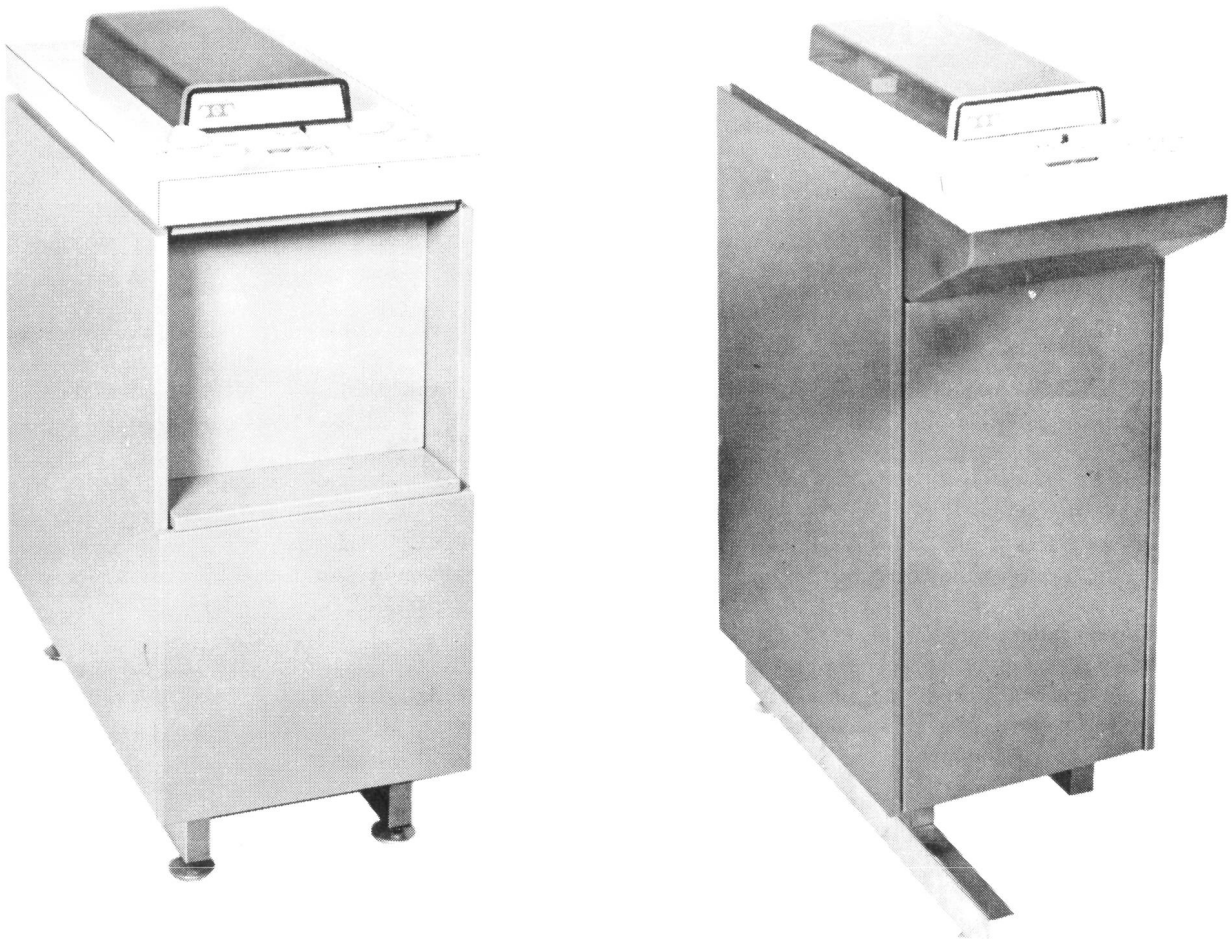
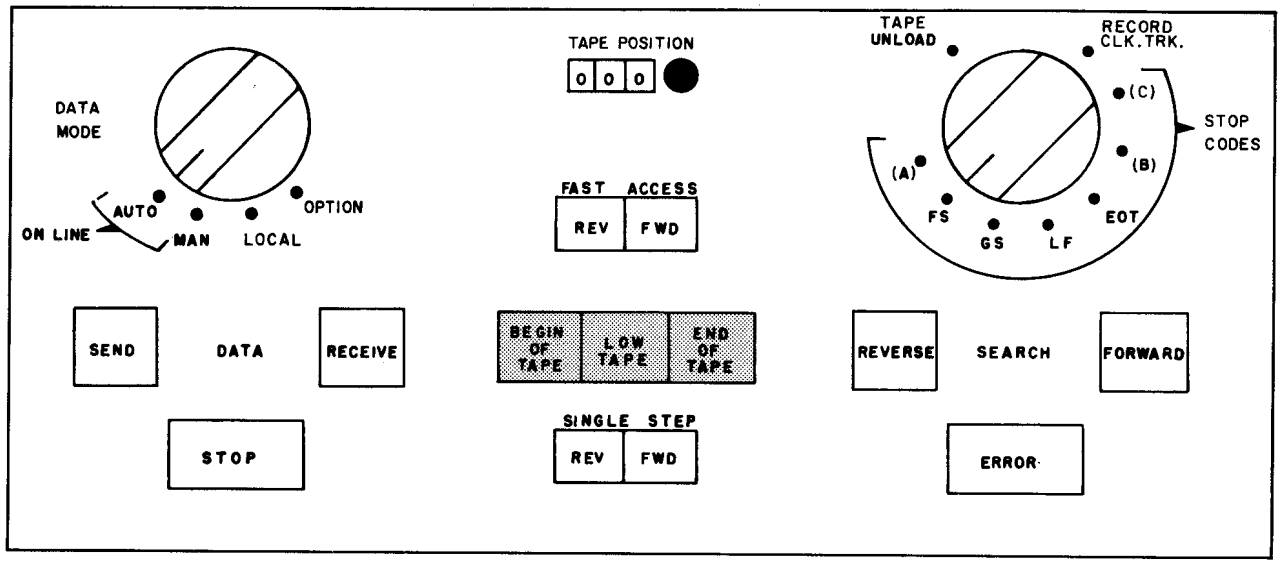


Figure 1 - Magnetic Tape Terminals for Stand-Alone Operation or 33, 35, or 37 Adjunct Use (Left) and for Use With Parallel Devices Such as the CDT (Right)



Note: Late design panel shown. Early design panel does not have OPTION position on DATA MODE switch, and positions (A), (B), and (C) of function switch are not labeled.

Figure 2 - Control Panel for Stand-Alone or 33, 35, or 37 Adjunct

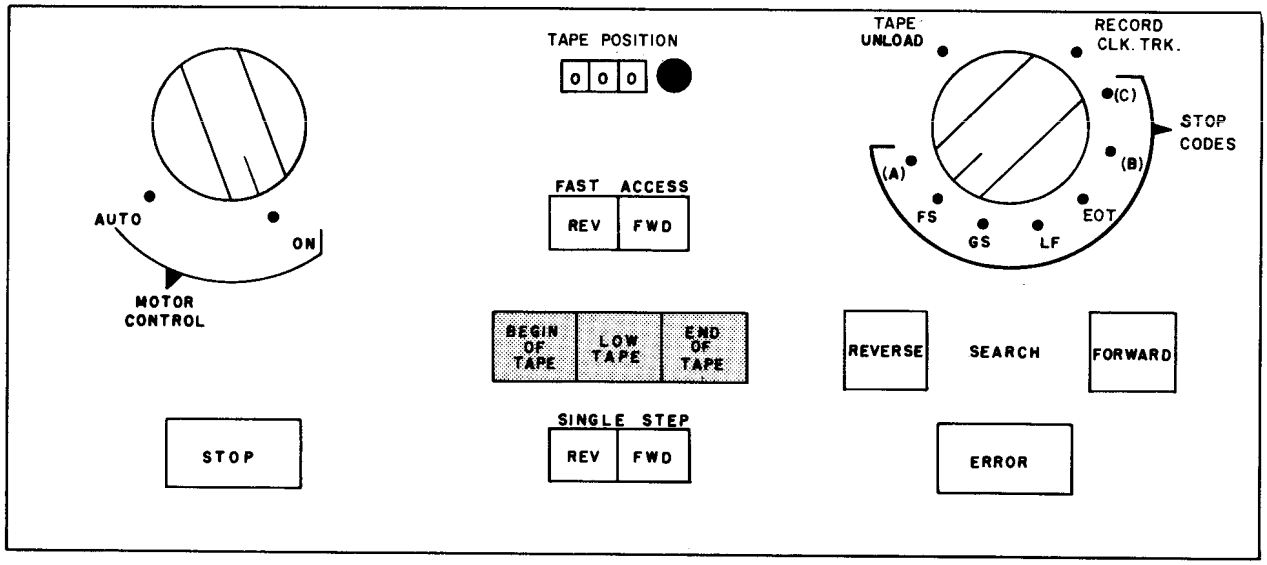


Figure 3 - Control Panel for Adjunct to Parallel Interface Terminal

TABLE A

CHECKOUT PROCEDURE – OFF-LINE

STEP	OPERATION CONDITION	RESPONSE
1	Place the maintenance switch to the ON position.	STOP lamp lights.
2	Place function selector switch to the FS position.	No effect.
3	The pinch roller engagement lever should be in the RELEASE position.	No effect.
4	Load the test cartridge (TP337400 or equivalent) onto the tape transport (record interlock plug in top position).	No effect.
5	Move the pinch roller engagement lever to the ENGAGED position.	Photosensor lamp on tape transport will light.
6	For 33/35/37 adjunct tape terminals, place the DATA MODE switch to the LOCAL position. For stand-alone terminals, place it to the ON LINE MAN position. For parallel device adjunct terminals, place the MOTOR CONTROL switch to the ON position.	37 EIA interface only, teletypewriter motor turns on. All other, no effect.
7	Depress the SINGLE STEP FWD switch.	Tape set motor turns on. BEGIN OF TAPE lamp lights momentarily. In stand-alone or 33/35/37 adjunct sets, DATA SEND lamp also lights momentarily. Tape advances to the first available character (approx. 2 feet). STOP lamp blinks with tape movement.
8	Depress the SEARCH REVERSE switch.	SEARCH REVERSE lamp lights. STOP lamp blinks. Tape stops when beginning of tape is reached. BEGIN OF TAPE lamp lights. SEARCH REVERSE lamp turns off.

TABLE A

CHECKOUT PROCEDURE – OFF-LINE (Continued)

STEP	OPERATION CONDITION	RESPONSE
9	Successively depress FAST ACCESS REV, SINGLE STEP REV, and SEARCH REVERSE switches. In stand-alone or 33/35/37 adjunct, also depress DATA RECEIVE switch.	No response should be observed, since the beginning of tape condition inhibits all reverse functions except UNLOAD.
10	Depress tape position indicator (counter) button to zero the counter.	Counter resets to 000.
11	Depress the FAST ACCESS FWD switch for several seconds.	Tape advances rapidly and counter advances. STOP lamp blinks. When FAST ACCESS FWD switch is released, tape will stop and counter will stop advancing. STOP lamp will remain lit.
12	Move the function selector switch to the REC. CLK. TRK. position.	No response should be observed since this function can only be initiated when in the beginning of tape condition.
13	Return the function selector switch to the FS position.	No effect.
14	Hold the FAST ACCESS FWD switch depressed until the LOW TAPE alarm lights.	The STOP lamp blinks. The LOW TAPE alarm lights when low tape marker is detected on tape. The counter will read approximately 1020 $\pm$30. (Note that a three-digit counter is used and a reading of 1020 would appear as 020.)
15	In stand-alone or 33/35/37 adjunct terminals only, depress the DATA RECEIVE pushbutton.	The DATA RECEIVE lamp will not light since the receive mode cannot be initiated in the low tape condition.
16	Depress the FAST ACCESS FWD switch until END OF TAPE alarm comes on.	Forward tape movement will stop when END OF TAPE alarm lights. The counter will read approximately 1090 $\pm$30.

TABLE A

CHECKOUT PROCEDURE – OFF-LINE (Continued)

STEP	OPERATION CONDITION	RESPONSE
17	Successively depress SEARCH FORWARD and SINGLE STEP FWD. In stand-alone or 33/35/37 adjunct tape terminals, also depress DATA SEND and DATA RECEIVE.	No response should be observed since all forward tape motion is inhibited by the END OF TAPE alarm.
18	Depress the FAST ACCESS REV switch and hold depressed (approximately 25-30 seconds) until the counter indicates a number below 100.	STOP lamp blinks. LOW TAPE and END OF TAPE lamps extinguish after markers are detected on tape. Counter reverse counts. Reverse tape movement at 33 inches/second should be observed.
19	Set the function selector switch to each of the search characters provided in the terminal (FS, GS, LF, EOT and, if provided, the characters programmed in expander circuit card (TP322465) or auto rewind card (TP322485) in connector XZ5). Depress the SEARCH FORWARD or SEARCH REVERSE switch to find the selected characters prerecorded on the test tape (TP337400 or equivalent) being used. Note: If TP337400 test tape is used, search characters on TP322465 or TP322485 card will have to be manually added to test tape.	SEARCH FORWARD (or SEARCH REVERSE) lamp lights. STOP lamp will blink while tape is being searched. Tape movement will stop, and SEARCH lamp will extinguish, immediately after selected search character has been read. Tape movement also stops when beginning of tape or end of tape are reached, or when the STOP switch is depressed.
20	Successively depress the SINGLE STEP FWD and SINGLE STEP REV SWITCH.	If tape terminal is adjunct to 33, 35, or 37 teletypewriter, or to a parallel interface such as a CDT, check the character readout on single step in the forward direction. The character is not sent in the single step reverse direction. By stepping back and forth over the same character it can be observed by the readout that only a single step is being taken in either direction.
21	Place the function selector switch to the UNLOAD position.	Tape should move in reverse direction at fast access speed. STOP lamp blinks. Tape should be rewound completely into cartridge and motor should turn off after a short time-out.
22	Move function selector switch from UNLOAD to FS.	STOP lamp stops blinking.

TABLE A

CHECKOUT PROCEDURE – OFF-LINE (Continued)

STEP	OPERATION CONDITION	RESPONSE
23	Disengage pinch roller engagement lever.	Photosensor lamp extinguishes.
24	Load a new or totally erased cartridge onto the tape transport.	Photosensor lamp lights when pinch roller engagement lever is in ENGAGED position.
25	Place function selector switch to REC. CLK. TRK. position. Depress FAST ACCESS FWD for about 5 seconds or until tape drive shifts to low speed. Allow the clock track to be recorded for at least 10 counts on the counter, then move the function selector switch out of REC. CLK. TRK. position.	Tape set motor turns on and tape moves forward at fast access speed. BEGIN OF TAPE lamp flashes, and tape motion slows down. STOP lamp blinks and counter counts while clock track is recorded. Tape stops when switched out of REC. CLK. TRK.
26	To check that the clock track has been recorded, depress SINGLE STEP REV switch.	Tape should move in reverse direction and stop at recorded clock track position for each depression of the switch. (Movement will be barely perceptible.) If clock track has not been recorded, tape will move continuously in reverse direction until beginning of tape is reached (BEGIN OF TAPE alarm lamp lights). ERROR lamp should not light during this operation.
27	After checking single step reverse action for two or three character positions, depress REV FAST ACCESS button to bring tape to beginning of tape position.	Tape reverses to beginning of tape. BEGIN OF TAPE alarm lamp lights. Tape stops.
28	Depress SINGLE STEP FWD switch.	BEGIN OF TAPE lamp goes out and tape moves smoothly about 1-1/2 inches and stops at first character position. If clock track has not been recorded, tape will advance continuously until end of tape is reached, or until STOP button is depressed.
29	With the tape returned to the beginning of tape position, another check may be preferred using the search mode. Depress the SEARCH FORWARD pushbutton.	SEARCH FORWARD lamp lights and tape moves forward incrementally through area where clock track is recorded. Beyond area where clock track is recorded, the sound will be very quiet and smooth, indicating continuous nonincremental motion. ERROR lamp should not light.
30	Depress STOP pushbutton.	Tape stops and SEARCH FORWARD lamp goes out.

TABLE A

CHECKOUT PROCEDURE – OFF-LINE (Continued)

STEP	OPERATION CONDITION	RESPONSE
31	Depress SEARCH REVERSE pushbutton until tape reaches beginning of tape.	When tape enters area where clock track is recorded (check counter to determine that it occurs at same count where record clock track was stopped), tape motion will slow down slightly and a high pitched vibrating sound will be heard due to the incremental motion. At beginning of tape, BEGIN OF TAPE alarm lamp will light, tape will stop, and SEARCH REVERSE lamp will go out.
32	Place function selector switch in REC. CLK. TRK. position and record clock track on entire length of tape. (Time required; about 6-1/2 minutes.)	STOP lamp will blink while clock track is being recorded. Tape moves forward. Near end of tape, LOW TAPE alarm lamp lights, followed by END OF TAPE lamp, and tape stops.
33	Place function selector switch in UNLOAD position.	Tape should move in reverse direction at fast access speed; END OF TAPE and LOW TAPE lamps should extinguish. STOP lamp blinks. Tape should be rewound completely into cartridge, and motor should turn off after a short time-out.
34	Take function selector out of UNLOAD position. Carefully pick up cartridge, place record interlock plug in bottom side of cartridge (opposite side of index label), and reload cartridge in tape transport.	STOP lamp stops blinking when function selector is taken out of UNLOAD position.
35	In stand-alone or 33/35/37 adjunct tape terminals, depress DATA RECEIVE pushbutton. In adjunct to parallel interface terminal, select tape terminal as receiver by depressing appropriate key on control panel of adjunct terminal.	No response should be observed (in stand-alone or 33/35/37 adjunct tape terminals, DATA RECEIVE lamp should remain off) since record inhibit function is being utilized. No alarm lamps should be lit.
36	Unload cartridge. Carefully pick up cartridge, restore record interlock plug to top side, and load cartridge in tape transport.	

TABLE A

CHECKOUT PROCEDURE – OFF-LINE (Continued)

STEP	OPERATION CONDITION	RESPONSE
37	Depress SINGLE STEP FWD.	BEGIN OF TAPE lamp flashes and tape advances (about 16 inches) to first character position.
38	In 33/35/37 adjunct tape terminal, place DATA MODE switch in LOCAL and depress DATA RECEIVE pushbutton. In parallel device adjunct, place MOTOR CONTROL switch in ON position and select tape terminal as receiver.	In 33/35/37 adjunct sets, DATA RECEIVE lamp lights.
39	With related terminal set for local transmission, transmit from keyboard of related terminal to magnetic tape terminal. Choose a message of convenient length and include any characters programmed for send operation on character recognition expander card (TP322465) if this optional card is included in tape set. Start message with FS (shift control L on 33/35 teletypewriter and control FS on 37 teletypewriter or CDT). End message with EOT unless the stop on EOT feature is disabled (strapping option on TP322464 card in late design units only).	STOP lamp blinks, indicating data is being recorded. Tape movement is barely perceptible.
40	Depress STOP pushbutton in 33/35/37 adjunct sets, or deselect tape set as receiver in parallel device adjunct to clear receive mode when message is complete.	STOP lamp remains on steadily. In 33/35/37 adjunct tape terminals, DATA RECEIVE lamp extinguishes.
41	Place function selector switch in FS position and depress SEARCH REVERSE pushbutton.	SEARCH REVERSE lamp lights during search mode. STOP lamp blinks as tape moves in reverse direction. Tape stops, and SEARCH REVERSE lamp extinguishes, when FS is detected at beginning of message. STOP lamp remains on steadily.
42	In 33/35/37 adjunct tape terminals, depress DATA SEND pushbutton. In parallel device adjunct, select tape terminal as sender by depressing appropriate key on control panel of adjunct terminal.	In 33/35/37 adjunct terminal, DATA SEND lamp lights. STOP lamp blinks, tape moves forward, and message is received and printed or displayed. Message should check with originally transmitted copy. If tape terminal includes character recognition expander card (TP322465 in position 5), response to selected send characters will depend on programmed options (see Chart 1). Details of programming and special operating options of this card are described in Section 578-300-200. Tape terminal automatically stops and clears to stop mode when EOT is detected.

TABLE A

CHECKOUT PROCEDURE – OFF-LINE (Continued)

STEP	OPERATION CONDITION	RESPONSE
42 (contd)		Note: The stop on EOT feature may be disabled at the option of the user (strapping option on TP322464 card) on late design units that include character recognition expander card TP322465. If this option is exercised, tape terminal will stop on character A of the character recognition expander card as indicated in Chart 1.
43	In 33/35/37 adjunct tape terminals, depress DATA RECEIVE pushbutton. In parallel device adjunct tape terminals, select tape terminal as receiver.	In 33/35/37 adjunct tape terminal, DATA RECEIVE lamp lights.
44	Using keyboard, of associated terminal, type two lines of data as follows: GS (shift control M on 33 or 35, or control GS on keyboard of 37 or CDT) THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK. (CR LF) THE RYRYR BROWN FOX JUMPED OVER THE LAZY DOGS BACK. (EOT)	Magnetic tape forward movement is barely perceptible as characters are recorded. STOP lamp will blink as each character is recorded. Associated terminal will print message being keyboarded.
45	Depress STOP pushbutton in 33/35/37 adjunct, or deselect tape terminal as receiver in parallel device adjunct. Place function selector switch to LF position and depress SEARCH REVERSE pushbutton.	SEARCH REVERSE lamp lights. Magnetic tape terminal will reverse to LF character at end of first part of message sent in Step 44 and stop. SEARCH REVERSE lamp extinguishes.
46	Depress SINGLE STEP FWD switch six times. Note: It is assumed that the RYRYR code group in the second part of the message of Step 44 is in error. Steps 46 through 49 will be used to correct this error by re-recording the erroneous part of the tape.	STOP and SEND lamps will blink each time SINGLE STEP FWD switch is depressed. Adjunct terminal will print each character of second part of message (Step 44) as it is sent from magnetic tape terminal: (LF) THE R
47	Depress SINGLE STEP REV switch once.	STOP lamp will blink once, but associated terminal will not print in single step reverse operation. Tape will reverse step one character, so the R is just ahead of the read/write head.

TABLE A

CHECKOUT PROCEDURE – OFF-LINE (Continued)

STEP	OPERATION CONDITION	RESPONSE
48	In 33/35/37 adjunct, depress DATA RECEIVE pushbutton. In parallel device adjunct, select tape terminal as receiver.	In 33/35/37 adjunct, DATA RECEIVE lamp lights.
49	Type the word QUICK on the keyboard of the associated terminal.	STOP lamp blinks, indicating signals being received by magnetic tape set. Errored tape should now be corrected.
50	Depress STOP pushbutton in 33/35/37 adjunct or deselect tape terminal as receiver in parallel device adjunct.	In 33/35/37 adjunct, DATA RECEIVE lamp extinguishes.
51	Select GS on function selector switch.	No effect.
52	Depress SEARCH REVERSE pushbutton.	SEARCH REVERSE lamp lights. Magnetic tape terminal will reverse and stop at the GS character that was placed at the start of message in Step 44.
53	In 33/35/37 adjunct, depress DATA SEND pushbutton. In parallel device adjunct, select tape terminal as sender.	DATA SEND lamp lights (stand-alone or 33/35/37), STOP lamp blinks, and tape moves in forward direction. Associated terminal prints corrected message. Transmission stops when EOT is detected (unless stop on EOT feature is disabled).
54	In parallel device adjunct, turn MOTOR CONTROL switch to AUTO. a. Select tape terminal as sender by depressing appropriate key on control panel of adjunct terminal. b. Select tape terminal as receiver by depressing appropriate key on control panel of adjunct terminal.	Tape terminal motor turns off. Tape terminal motor turns on and remains on until terminal is removed from send mode. Note: If tape contains message, printout occurs in normal manner. Tape terminal motor turns on and remains on until tape terminal is removed from receive mode.

TABLE A

CHECKOUT PROCEDURE – OFF-LINE (Continued)

STEP	OPERATION CONDITION	RESPONSE
55	If tape terminal is used with a 37 KSR to provide ASR operation, turn DATA MODE switch to OPTION (late design units only).	Tape terminal motor turns off.
	a. Depress DATA RECEIVE pushbutton on tape terminal, and set 37 teletypewriter for local punch operation.	Tape terminal motor turns on and remains on until local punch mode is deselected.
	b. Depress DATA SEND pushbutton on tape terminal, and set 37 teletypewriter for local reader operation.	Tape terminal motor turns on and remains on until local reader mode is deselected.
56	Unload tape cartridge and proceed to TABLE B – CHECKOUT PROCEDURE – ON-LINE if terminal is equipped with a high speed data set (200 series or equivalent).	

CHART 1

SHUNT SCREW OPTIONS FOR CHARACTER RECOGNITION EXPANDER CARD

SHUNT SCREW	OPERATING OPTION			
	DIS (Disabled)	SO (Search Only)	SS (Search and Send)	CCD (Control Code Delay)
5A	Character A has no effect on operation of tape set.	Tape set in search mode; function selector set for character A. Recognition of character A causes tape set to stop, and drop out of search mode.	Tape set in search mode; function selector set for character A. Or, tape set in send mode regardless of character selected. Recognition of character A causes tape set to stop, and drop out of search or send mode.	Not programmable.
5B*	Character B has no effect on operation of tape set.	Tape set in search mode; function selector set for character B. Recognition of character B causes tape set to stop, and drop out of search mode.	Tape set in either search or send mode; function selector set for character B. Recognition of character B causes tape set to stop, and drop out of search or send mode.	Not programmable.
5C	Character C has no effect on operation of tape set.	Tape set in search mode; function selector set for character C. Recognition of character C causes tape set to stop, and drop out of search mode.	Not programmable.	Tape set in send mode; function selector set for character C. Recognition of character C inhibits further transmission but tape set remains in send mode. Transmission continues when SEND button is pressed, when a prearranged function causes stunt box contact closure (local), or when remote terminal turns reverse channel off and back on (on-line).
ERR*	Parity error does not control operation of tape set.	Tape set in local search mode; function selector set for error. Detection of a parity error causes error lamp to light, and tape set to stop and drop out of search mode.	Not programmable.	Tape set in local search or send mode; function selector set for error. Detection of a parity error lights the error lamp and inhibits further transmission, but tape set remains in search or send mode. Transmission continues when ERROR button is pressed.

*One of these options must be disabled if the other is used. Thus, if character B is to be recognized, the ERR shunt screw must be disabled; if the error control function is to be used, the 5B shunt screw must be disabled.

TABLE B

CHECKOUT PROCEDURE – ON-LINE W/HIGH-SPEED DATA SET

STEP	OPERATION CONDITION	RESPONSE
1	Load a cartridge recorded with clock track (record interlock plug in top position) and position the tape to blank area.	
2	Place DATA MODE switch in the ON-LINE MAN. position.	No effect.
3	Place data set in talk mode and call a station with send/receive capabilities and proper send/baud/code level etc, to communicate with the magnetic tape terminal being tested. (Note: The called station may be another magnetic tape terminal.) Have called station return to talk mode when data has been sent.	No effect. Note: The test message should contain an FS or GS at start of message and an EOT at end of message. If not, an FS or GS can be inserted when tape is loaded on tape transport via adjunct teletypewriter keyboard.
4	When called station is ready to send data, depress DATA RECEIVE pushbutton on magnetic tape terminal and then depress DATA pushbutton on data set.	DATA RECEIVE lamp lights. DATA lamp on data set lights. Within a few seconds the STOP lamp on magnetic tape terminal will start blinking and forward movement of tape can be noted.
5	Upon completion of message, depress STOP pushbutton.	DATA RECEIVE lamp extinguishes. STOP lamp returns to steady on condition.
6	Depress TALK pushbutton on data set. Have called station select their set as a receiver.	DATA lamp on data set extinguishes. (EOT should be inserted here if test message does not have an EOT. Place mode selector switch to LOCAL, depress DATA RECEIVE pushbutton, and keyboard EOT.)
7	Place function selector switch on magnetic tape terminal to FS or GS, whichever search code has been placed at beginning of test message received, and depress SEARCH REVERSE pushbutton.	SEARCH REVERSE lamp lights. STOP lamp blinks as tape moves in reverse direction. SEARCH REVERSE lamp extinguishes and tape movement stops when search character is detected.
8	Depress DATA SEND pushbutton.	DATA SEND lamp lights.
9	Have called station go into data mode.	1025 Hz tone is heard.

TABLE B

CHECKOUT PROCEDURE – ON-LINE W/HIGH-SPEED DATA SET (Continued)

STEP	OPERATION CONDITION	RESPONSE
10	Depress DATA pushbutton on data set.	DATA lamp on data set lights. STOP lamp on magnetic tape terminal blinks and tape moves forward until EOT is detected. When EOT is detected, the tape should be stopped and the magnetic tape terminal will switch out of the send mode and stop. The DATA SEND lamp extinguishes and the STOP lamp remains on.
11	Return data set to talk mode and request called station operator to check copy. It should match the originally transmitted message.	
12	Disconnect should occur when handset of data set is placed on cradle.	
13	Place mode selector switch in the ON LINE AUTO. position. Position tape to beginning of test message and depress DATA SEND pushbutton.	DATA SEND lamp will light and motor will remain off.
14	Have other station call via the data set. (For applications where reverse channel signal is used, have other station stop receiver momentarily and then restart receiver. Sender should stop while receiver is off, then restart when receiver is restarted.)	When connection is completed the magnetic tape terminal motor will turn on and data transmission will start. STOP lamp will blink indicating a function is in process and forward tape movement will occur.
15	EOT is sent by magnetic tape terminal. Note: In late design terminals which include character recognition expander card (TP322465), the stop on EOT feature may be disabled at the option of the user by clipping a wire strap on circuit card TP322464. If this option is exercised, stop is initiated by character recognition expander circuit card as indicated in Chart 1.	Tape stops and the terminal will switch out of the send mode to the receive mode, and DATA RECEIVE lamp lights. Magnetic tape terminal will remain idle in the receive mode awaiting return data and the call will not be disconnected unless line remains idle for a given period (2 minutes in early design units, 45 seconds in late design units). When timer times out, data set will initiate a disconnect sequence and will go on-hook. Tape set motor will turn off, and DATA lamp on data set will go out, but DATA RECEIVE lamp on tape set will remain on. (If the data set is manually switched to the local, manual, or talk mode, it will not time out.)

TABLE B

CHECKOUT PROCEDURE – ON-LINE W/HIGH-SPEED DATA SET (Continued)

STEP	OPERATION CONDITION	RESPONSE
16	If tape terminal is arranged to provide data blocking on the C setting of the function selector switch, the following steps can be used to check the blocking feature: Note: To provide this feature, the tape terminal must include a character recognition expander circuit card (TP322465) or auto rewind for local print-out circuit card (TP322485) in position 5. If a TP322465 card is used, character C must be programmed for the CCD option. The remote receiver must be programmed to turn off reverse channel upon recognition of the prearranged stop code, or after data transmission has ceased for a given time duration. a. Prepare a message on the tape in which blocks of data are separated by the prearranged stop code (character C of card TP322465 or the selected stop code, RS or ∧, of card TP322485. b. Initiate a call to the remote station and define the nature of the test. Request the remote station to go into the receive mode. Remote station must provide reverse channel before transmission can begin. c. Set function selector to C position and depress DATA SEND pushbutton.	DATA SEND lamp lights and STOP lamp blinks as data is sent. When stop character causes remote station to turn off reverse channel, STOP lamp remains on steadily. DATA SEND lamp remains on, since blocking feature causes transmission to stop but tape set remains in send mode. STOP lamp resumes blinking when remote receiver turns reverse channel back on. Sequence repeats for each block of data sent. Disconnect occurs as explained in Step 15 when EOT (or alternate character if TP322465 card is used and Stop on EOT is disabled) is detected at end of message.

TABLE B

CHECKOUT PROCEDURE – ON-LINE W/HIGH-SPEED DATA SET (Continued)

STEP	OPERATION CONDITION	RESPONSE
17	If tape set includes TP322485 auto rewind circuit card, the auto rewind feature can be checked as follows:	
	a. Call the remote terminal and describe the nature of the test. Have the operator at the remote terminal prepare a test message properly formatted with an FS at the beginning of message and EOT at the end of message.	
	b. Set up the tape set for auto on-line operation. Place the function selector switch in the A position and depress the DATA RECEIVE button.	DATA RECEIVE lamp lights. Motor remains off.
	c. Remote station rings magnetic tape terminal. Note: Response outlined is for basic rewind operation. Review options outlined in Chart 2 before proceeding with operating test.	Ringer on data set rings once. TALK and DATA lamp on data set light. Tape set motor turns on. STOP lamp blinks to indicate message is being received. When EOT is detected at end-of-message, DATA RECEIVE lamp goes out. Tape set goes off-line and adjunct motor turns on. SEARCH REVERSE lamp lights and STOP lamp blinks as tape set reverse searches. SEARCH REVERSE lamp goes out when FS is reached. SEND lamp lights and STOP lamp blinks as message is sent to and printed out by local teletypewriter. SEND lamp goes out and STOP lamp remains on steadily when end of message is reached. RECEIVE lamp lights to indicate tape set is ready to receive new message.

3. TROUBLESHOOTING AND REPAIR

GENERAL

3.01 The following steps should be observed in troubleshooting and repairing the magnetic tape terminal:

(a) Itemize troubles systematically.

(b) Analyze troubles with respect to related circuits.

(c) Isolate trouble to that assembly which includes the failing components.

(d) Remove the assembly with failing components. Make basic check to see that a new assembly, if installed, would not be similarly destroyed.

(e) Replace the defective assembly with a known good one.

(f) Return the defective assembly to a repair center that has adequate facilities to perform comprehensive testing and repairing.

3.02 When troubleshooting the magnetic tape terminal, analyze operation with respect to the schematic diagrams and circuit descriptions in wiring diagram package WDP0247. Adjustment procedures for the tape transport are contained in Section 578-300-700. Do not probe, manipulate, or otherwise conduct random adjustments or substitutions until the nature of the trouble and its possible solution is realized. A haphazard approach could very likely result in further complications.

3.03 Repair of the tape terminal on location should be confined to troubles of a minor nature (ie, replacement of lamps, fuses, or circuit cards, and minor tape transport adjustments or refinements). Troubles of a more serious nature should be isolated to the specific assembly.

CHART 2

OPTIONS FOR AUTO REWIND CARD

PURPOSE OF OPTION	DESCRIPTION
Rewind Upon Premature Channel Disconnect With function selector in position A, provides automatic rewind to beginning of message if channel disconnect occurs during on-line transmission. After rewind, tape set switches back to on-line send mode to await new call.	Option Screw 5A on Card TP322485 5A on rear of card: Option enabled 5A on front of card: Option disabled
Rewind Over Data Received and Printed Out Locally With function selector in position A, upon recognition of EOT at end of received message, tape set automatically rewinds to beginning of message and awaits next message. If selected, this option effectively increases the data capacity by re-using the tape.	Option Strap 5B on Card TP322485 5B cut: Option enabled 5B intact: Option disabled
Rewind Over Data Transmitted On-Line With function selector in position A, upon recognition of EOT at end of transmitted message, tape set automatically rewinds to beginning of message and awaits next transmission. If selected, this option effectively increases the data capacity by re-using the tape.	Option Strap 5C on Card TP322485 5C cut: Option enabled 5C intact: Option disabled
On-Line Data Blocking in Conjunction With Auto Rewind With function selector in position A, tape set sends message in predetermined blocks during on-line send portion of transmission.	Option Strap 5D on Card TP322485 5D intact: Option enabled 5D cut: Option disabled
Stop Code Selection Permits selection of either an RS or ∧ character as the stop code for the data blocking function (on-line send) or for an additional search character (search mode).	Option Screw RS/∧ on Card TP322485 Insulator in RS position: RS selected as stop code Insulator in ∧ position: ∧ selected as stop code

The defective assembly should then be replaced with a known good assembly and returned to a service center for repair.

3.04 The following test gear and apparatus are required for troubleshooting the magnetic tape terminal:

(a) Standard maintenance tools (screwdrivers, pliers, gauges, etc, as found in Section 570-005-800)

(b) Volt-ohm milliammeter (VOM) or vacuum tube voltmeter (VTVM)

(c) Recording head cleaner (TP337401)

(d) Magnetic tape test cartridge (TP337400 or locally made test tape)

(e) Soft cotton swabs or cloth

(f) Local test facilities to perform on-line sending and receiving tests

3.05 The spare parts listed in Chart 3 are required for troubleshooting the magnetic tape terminal. The spare parts indicated with their respective quantities are recommended for each ten terminals being serviced. The optional spare parts listed in Chart 4 are used in specific types of installations. They should be ordered by determining the types of terminals used locally, and should be stocked accordingly. In both charts, items marked with an asterisk (*) are recommended for more extensive servicing.

3.06 Replacement parts and parts ordering information for the tape terminal can be obtained from Section 578-300-800.

TROUBLESHOOTING

3.07 Do not insert, remove, connect, or disconnect any electronic component of the magnetic tape terminal while the maintenance ON-OFF switch (located on the ac distribution panel) is in the ON position. Only the magnetic tape cartridge may be safely inserted or removed from the unit with ac power applied. In addition to presenting a safety hazard to maintenance personnel, improper removal or insertion of components with ac power applied could result in chain reaction type destruction of the integrated circuit packages. The integrated circuit packages are low power devices and are extremely susceptible to damage if inadvertently subjected (even for a very short duration) to voltages above their ratings.

3.08 Care must be taken to see that all circuit card assemblies are fully seated to assure good connection to all circuit components. When removing or inserting circuit card assemblies, care must be taken not to bend or distort the connector pins. To minimize the chances of placing a card in the wrong position on the connector board, it is recommended that only one card be removed at a time unless otherwise instructed.

3.09 To eliminate the chance of recording spurious characters in power-no-power conditions during troubleshooting, always keep the unit in the unloaded condition when disconnecting or connecting the ac power cord, or when positioning the maintenance switch ON or OFF. It is recommended that a tape cartridge with messages of no value other than for test purposes be used while troubleshooting so that the unload function need not be exercised every time it is necessary to remove power from the unit.

3.10 Voltage and continuity checks are specified in the troubleshooting chart (Chart 5) to help locate the source of trouble. The following procedures should be followed in performing the checks:

(a) Unless otherwise specified, all indicated dc voltages are measured between the designated terminal and circuit ground (pins A34 and B34 of all connector board card positions).

(b) Voltage checks are to be made with power on and with the unit operating (to the extent possible) as specified in the test procedure. Extreme caution must be observed in placement of voltmeter probes to avoid shorting or application of improper voltages or signals.

(c) Continuity checks are to be made with the maintenance switch in the OFF position. When lack of continuity is suspected, look for a broken lead or poor solder connection at terminals, card connector pins, or within cable connectors. Use schematic and actual wiring diagrams to trace wires. Where visual checks are insufficient, use either a continuity checker (lamp or buzzer type) or an ohmmeter to make continuity checks. When using an ohmmeter or continuity checker, the components being checked must be removed or disconnected from the magnetic tape terminal's electronics module to avoid possible destruction of components by application of excessive voltage obtainable from the internal batteries of some checking devices. Where it is necessary to use an ohmmeter or continuity checker on the connector board of the electronics module, all circuit cards must be removed from the connector board.

CAUTION: EXTREME CARE MUST BE EXERCISED IN LAMPING OUT OR TROUBLESHOOTING SO THAT AT NO TIME WILL A VOLTAGE GREATER THAN 0.25 V DC BE APPLIED TO THE INPUT/OUTPUT LEADS OF THE RECORDING HEAD. FAILURE TO OBSERVE THIS CAUTION CAN RESULT IN BURNING OUT COILS IN THE HEAD.

(d) Perform the voltage checks in the order indicated. They are listed in the order of signal progression. Based upon whether a correct or incorrect voltage is measured, perform the indicated subchecks to isolate the cause of failure.

(e) Voltages specified as X $>$ +5 v dc or X $<$ +5 v dc are to be interpreted, respectively, as the measured voltage, X, should be greater than +5 volts dc, or less than +5 volts dc. Where ground is specified, 0 volt should be measured between the specified terminal and the circuit ground terminal.

(f) Power supply voltages may be checked at the following terminals on the connector board at any of the card connector positions.

Pin	A1,	B1	+5 v dc
Pin	A2,	B2	+12 v dc
Pin	A33,	B33	-12 v dc
Pin	A3,	B3	+28 v dc (except card positions 1, 2, 3, 4, 5, 6)
Pin	A34,	B34	Ground

CHART 3

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	NUMBER PER SET	RECOMMENDED QUANTITY
TP142709	Fuse, 2.0 amp, SL-BL	1	5
TP143630	Fuse, 3/4 amp	2	10
TP171658	Fuse, 3 amp	1	5
TP185734	Fuse, 2-1/4 amp, SL-BL	1	5
TP321955	Fuse, 2-1/2 amp	1	5
TP333588	Control Panel Lamp	9	10
(See Note 1)	Photosensor Lamp	1	2
TP322461	Circuit Card Assembly	1	1
TP322462	Circuit Card Assembly	1	1
TP322463	Circuit Card Assembly	1	1
TP322464	Circuit Card Assembly	1	1
TP322466	Circuit Card Assembly	1	1
TP322467	Circuit Card Assembly	1	1
TP322468	Circuit Card Assembly	1	1
TP303869	Cricuit Card Assembly	1	1
TP322470	Circuit Card Assembly	1	1
TP322472	Circuit Card Assembly	1	1
TP337407	Circuit Card Assembly (Extender)	Test Purpose Only	1*
TP337045	Rocker Switch	2	1*
TP337266	Rotary Switch	2	1*
TP337274	Pushbutton Switch	6	1*
(See Note 2)	Photosensor Assembly	1	1
TP337350	Power Supply	1	1*
TP337286	Synchronous Motor, 60 Hz	1	1*
TP337061	Helical, Gear T19	1	1*
TP337269	Motor Start Relay	1	1
TP337318	Solid State Switch	1	1
TP337060	Gear Shift Assembly	1	1*
TP337010	Reel Drive Assembly	1	1*
TP337222	Three-Digit Counter	1	1*
TP337175	Magnetic Head	1	1*
TP337100	Tape Drive Assembly	1	1*
TP337106	Toothed Belt	2	1
TP337193	Toothed Belt	1	1
TP337223	Timing Belt	1	1
TP337455	Tape Cleaner (Late Design Only)	3 (1 Active Cleaner and 2 Spares)	10
TP337478	Phototransistor (For TP337472 Photosensor Assembly Only)	2	4

Note 1: TP337227 Photosensor Lamp used in TP337220 Photosensor Assembly; TP337473 Photosensor Lamp used in TP337472 Photosensor Assembly.

Note 2: TP337220 Photosensor Assembly (early design) or TP337472 Photosensor Assembly (late design).

CHART 4

OPTIONAL SPARE PARTS

PART NO.	DESCRIPTION	NUMBER PER SET	RECOMMENDED QUANTITY
TP322465	Circuit Card Assembly (Expander)	1	1*
TP322471	Circuit Card Assembly (Distributor)	1	1
TP322473	Circuit Card Assembly (Interface for 200 Series Data Set)	1	1*
TP322474	Circuit Card Assembly (Interface for 33/35)	1	1*
TP322475	Circuit Card Assembly (Interface for 37)	1	1*
TP322476	Circuit Card Assembly (Interface for 37)	1	1*
TP322477	Circuit Card Assembly (Parallel Device Interface)	1	1*
TP322478	Circuit Card Assembly (Parallel Device Interface)	1	1*
TP322479	Circuit Card Assembly (Interface for Stand Alone)	1	1*
TP322480	Circuit Card Assembly (Interface for 33/35)	1	1*
TP322485	Circuit Card Assembly (Auto Rewind)	1	1*
TP337393	Control Subpanel Assembly	1	1*
TP337428	Control Panel Assembly	1	1*

3.11 The note "See Component Replacement Guide" is specified at numerous places in the troubleshooting chart. Components related to a particular trouble symptom are indicated for substitution in the component replacement guide in a numerical sequence specifying the order in which the substitutions should be made. Note that the trouble symptom numbering scheme used in the Component Replacement Guide corresponds to the numbering in the troubleshooting chart so that a quick cross reference between related notes and procedures can be achieved. When instructed to see the Component Replacement Guide, perform the indicated circuit card substitutions one at a time in the sequence specified until the trouble is corrected. Keep the maintenance switch in the OFF position when removing or inserting a card. By performing the voltage checks specified, it is possible to localize trouble causes more definitely and thereby minimizing the number of substitutions necessary to find and correct the trouble.

CHART 5

TROUBLESHOOTING

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>1</td><td>Magnetic tape terminal does nothing – all functions inoperative.

Note: It may be necessary to release and re-engage the pinch roller engagement lever to reset the circuitry if line voltage has been off for any reason (ie, if power line failure occurs, or if power to equipment is turned off after operating hours).</td><td>a. Check to see that ac input cord is connected to a live source of 117 v ac, 60 Hz power, and that maintenance switch is in ON position.

b. Make sure the pinch roller engagement lever is properly moved to the ENGAGED position when the tape cartridge is loaded so the capstan interlock switch will be activated. Failure to activate this switch will disable all electrical functions in the unit.

c. Check all power supply voltages and replace fuses if blown. Also check for overvoltage by turning power off and then on to reset overvoltage protection circuit. If fuses continue to blow, disconnect the output connector from the power supply and replace the fuse. If fuses continue to blow with the output connector disconnected, the power supply is at fault and must either be repaired or replaced. Reconnect the output connector to the power supply.

d. If it is suspected that a shorted condition in one of the circuit cards is causing a power supply fuse to blow, use the following procedure to locate the shorted component. With the maintenance switch OFF remove all the circuit cards. Turn switch ON. If the fuse does not blow, turn the switch OFF and insert one card in its proper position on the connector board. Turn switch ON. Continue this procedure of successively inserting cards until the one is found which causes fuses to blow. Replace this card with a new circuit card which is known to be good. Be sure to insert all of the remaining circuit cards into the proper position on the connector board.

e. Similarly, if the photosensor lamp on the tape transport is burned out, all unit functions will be inhibited. To check the photosensor lamp (not necessary if lamp does light) disconnect connector J212 from the tape transport and test filament continuity with an ohmmeter between pins 4 and 6 of J212 on the tape transport. If an open filament circuit is detected install a new lamp (TP337227) and perform the adjustments indicated in Section 578-300-700. If the old lamp tests good, reconnect J212 and perform the following voltage check:
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Pinch roller engagement lever operated to ENGAGED position.</td><td>Photosense</td><td>X > +2 v dc, but X < +4 v dc</td><td>XZ7/A17</td></tr>
</table>
1. If correct voltage is measured, replace circuit card TP322467.
2. If incorrect voltage is measured, check cabling continuity in photosensor circuitry, or replace circuit card TP322467.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>1
(contd)</td><td></td><td>f. Check to see that all connectors internal to the unit are properly mated and that all circuit card assemblies are firmly seated in their proper positions on the connector board.

g. Check motor and drive mechanism to see that all belts are engaged, all components are free – not seized or jammed, all gears have proper backlash etc. Clear any mechanical problems. Check and refine, as necessary, the gear shift mechanism adjustments in Section 578-300-700.</td></tr>
<tr><td>2</td><td>Motor does not run.</td><td>a. Recheck Step 1, Check g.

b. Check the motor fuse (located on tape deck lower level – 2-1/4 amp, SL-BL) and replace if blown.

c. Perform the power supply voltage checks as outlined in 3.10 (f). If correct, check the following: fuses, connections, power supply cabling, and power supply.

d. Check output from the electronics module to operate the motor control relay. With tape loaded, hold the FAST ACCESS FWD switch depressed and measure the following voltage:

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>FAST ACCESS FWD operated</td><td>Motor control</td><td>Ground</td><td>XZ7/B22</td></tr>
</table>
If incorrect, see Component Replacement Guide.

e. Check the motor and motor start relay. With tape loaded, hold the FAST ACCESS FWD switch depressed. Check ac voltage to the motor:

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Terminals</th></tr>
<tr><td>FAST ACCESS FWD operated</td><td>Motor start relay</td><td>115 v ac</td><td>(4) and (5) on relay</td></tr>
</table>
If 115 v ac is present but the motor does not run (be sure that motor shaft and mechanism are free – not seized or jammed), replace motor start relay or motor.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>2
(contd)</td><td></td><td>
f. Check motor control relay. With tape loaded, hold the FAST ACCESS FWD switch depressed. Check the following voltages on the terminals of the motor control relay (located on tape transport lower deck):
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Terminals</th></tr>
<tr><td>FAST ACCESS FWD</td><td>Motor control relay</td><td>115 v ac</td><td>"Line"</td></tr>
<tr><td>FAST ACCESS FWD</td><td>Motor control relay</td><td>+5 v dc</td><td>"Switch Closure"</td></tr>
</table>
1. If 115 v ac is not present, check ac input cabling, fuse, connectors, etc. Check to see that the unit is plugged into a live source of 115 v ac power, and that maintenance switch is in ON position.
2. If +5 v dc is present (also 115 v ac is present) but motor does not run, replace the motor control relay.
3. If +5 v dc is not present, check cabling, connectors, etc, between the tape transport and electronics module.
g. If the photosensor lamp on the tape transport is burned out or disabled, all unit functions will be disabled. If the lamp does not light, check the following voltage with the pinch roller engagement lever in the ENGAGED position:
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Pinch roller eng. lever ENGAGED</td><td>Photosense</td><td>X >+2 v dc</td><td>XZ7/A17</td></tr>
</table>
1. If correct, the photosensor lamp should be lighted. Check connectors, cabling, etc, between control panel and electronics module. Also check lamp for burn out.
2. If incorrect, see Component Replacement Guide.
</td></tr>
<tr><td>3</td><td>Motor always ON – When ac is applied, motor turns on before tape is loaded or before any mode is selected.</td><td>Check voltage output from electronics module to operate the motor control relay. With no tape loaded, pinch roller engagement lever in RELEASE position, and no forward mode selected, measure the following voltage:</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>3
(contd)</td><td></td><td>
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Unit plugged into ac</td><td>Motor control</td><td>+5 v dc</td><td>XZ7/B22</td></tr>
</table>
1. If correct, check motor control relay and related wiring.
2. If ground is measured (or other incorrect voltage) see Component Replacement Guide.
</td></tr>
<tr><td>4</td><td>Magnetic tape will not move in forward and/or reverse direction – all applicable modes. Motor does run.</td><td>
a. Check all power supply voltages and replace fuses if blown.
b. Check to see if mechanical drive is disabled.
1. Overload clutch maladjusted or damaged.
2. Drive pulley or belt disengaged.
3. Drive mechanism jammed.
4. Defective electromagnetic clutch.
5. Open connection to clutch.
c. Voltage checks. With VOM or VTVM connect plus (+) lead to +28 volts, pin A3 or B3 of connector board. If VTVM is used, make sure the ground probe of the VTVM is floating with reference to the magnetic tape terminal ground. Measure the following voltages:
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td rowspan="3">Hold FAST ACCESS FWD switch down.</td><td>Fwd clutch coil</td><td>X > +2 v dc</td><td>XZ9/B4</td></tr>
<tr><td>Rev clutch coil</td><td>X < 0.2 v dc</td><td>XZ9/B6</td></tr>
<tr><td>Brake coil</td><td>X < 0.2 v dc</td><td>XZ9/B30</td></tr>
<tr><td rowspan="3">Hold FAST ACCESS REV switch down.</td><td>Fwd clutch coil</td><td>X < 0.2 v dc</td><td>XZ9/B4</td></tr>
<tr><td>Rev clutch coil</td><td>X > 2 v dc</td><td>XZ9/B6</td></tr>
<tr><td>Brake coil</td><td>X < 0.2 v dc</td><td>XZ9/B30</td></tr>
</table>
</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>4
(contd)</td><td></td><td>1. If voltages are incorrect, proceed to Component Replacement Guide.

2. If voltages are correct, check connectors, cabling, and forward or reverse clutch coils.

d. See Component Replacement Guide.</td></tr>
<tr><td>5</td><td>Alarm lamps do not light (BOT, LT, EOT), however, unit does respond correctly to alarm condition (ie, all forward motion of tape is inhibited at end of tape even though the EOT lamp does not light).</td><td>a. Check continuity of lamp filament by removing circuit card TP322468 from XZ8 in the electronics module and place ohmmeter from XZ9-A3 to XZ8-B20 (BOT filament), XZ9-A3 to XZ8-A23 (LT filament), and XZ9-A3 to XZ8-A21 (EOT filament). Replace lamp if filament is open. Replace with TP333588.

b. Voltage Checks

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>BOT alarm</td><td>BOT lamp driver</td><td>X < +5 v dc</td><td>XZ8/B20</td></tr>
<tr><td>LT alarm</td><td>LT lamp driver</td><td>X < +5 v dc</td><td>XZ8/A23</td></tr>
<tr><td>EOT alarm</td><td>EOT lamp driver</td><td>X < +5 v dc</td><td>XZ8/A21</td></tr>
</table>

If voltage measured is correct, check lamp burn-out, connectors, and cabling from panel to electronics module.

c. See Component Replacement Guide.</td></tr>
<tr><td>6</td><td>Failure to alarm (BOT, LT, EOT); failure to respond to alarm condition.</td><td>a. Check the tape cartridge to be sure that the three reflective markers are present on the tape (marker on lower half of tape at BOT, on upper half of tape at LT, and on both upper and lower halves of tape at EOT).

b. It is important that sufficient light from the photosensor lamp be returned by the reflective markers on the tape to the phototransistors. This requires that the lamp be sufficiently bright and that it be carefully aligned with the tape. Check this area and remove any foreign material which might obstruct the photosensor light. A shiny surface (a nonmagnetic material should be used to avoid possible tape erasure) placed between the lamp and tape should trigger the alarm circuitry. If the alarm circuitry can be triggered by the shiny surface but does not respond reliably to the reflective markers on the tape, the photosensor lamp is improperly aligned with the tape. Make photosensor lamp beam adjustments in Section 578-300-700.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>6
(contd)</td><td></td><td>c. If TP322468 card is not equipped with potentiometers for photosensor current adjustment, perform the following voltage checks:

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Move tape to beginning where BOT alarm should be activated.</td><td>BOT alarm</td><td>X < 1 v dc</td><td>XZ8/B22</td></tr>
<tr><td>Move tape forward until photosensor lamp illuminates reflective marker on upper half of tape.</td><td>LT alarm</td><td>X < 1 v dc</td><td>XZ8/A17</td></tr>
<tr><td>Move tape forward until photosensor lamp illuminates reflective markers on both upper and lower halves of the tape.</td><td>EOT alarm</td><td>X < 1 v dc
AND
X < 1 v dc</td><td>XZ8/B22
AND
XZ8/A17</td></tr>
</table>
If voltage measured is incorrect, check phototransistor(s), connectors, and cabling from tape transport to electronics module.

d. For TP322468 cards equipped with adjustment potentiometers, perform the electrical adjustments as indicated in Section 578-300-700.

e. See Component Replacement Guide.</td></tr>
<tr><td>7</td><td>Control panel lamp(s) does not light.</td><td>a. Check all power supply voltages and replace fuses if blown.

b. If individual lamp does not light, check continuity of lamp filament by removing bulb from socket and checking with an ohmmeter. Replace lamp if filament is open. If an ohmmeter is not available, substitute a new lamp (TP333588) for the suspected defective lamp.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>7
(contd)</td><td></td><td>
c. Voltage checks
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Depress SEND switch</td><td>SEND lamp driver</td><td>X < +5 v dc</td><td>XZ10/B22</td></tr>
<tr><td>Depress RECEIVE switch</td><td>RECEIVE lamp driver</td><td>X < +5 v dc</td><td>XZ10/B24</td></tr>
<tr><td>Depress SEARCH FORWARD switch</td><td>SEARCH FORWARD switch lamp driver</td><td>X < +5 v dc</td><td>XZ10/B32</td></tr>
<tr><td>Depress SEARCH REVERSE switch</td><td>SEARCH REVERSE switch lamp driver</td><td>X < +5 v dc</td><td>XZ10/A31</td></tr>
<tr><td>Depress STOP switch</td><td>STOP lamp driver</td><td>X < +5 v dc</td><td>XZ10/B30</td></tr>
</table>
1. If voltage measured is incorrect, proceed to Component Replacement Guide.
2. If measured voltage is correct, check lamp burn-out, connectors, cabling from panel to electronics module, and switch wiring.
d. See Component Replacement Guide. Note that the lamp driver for ERROR lamp only is located in card TP322464 and drivers for all other control panel lamps are in card TP322470.
</td></tr>
<tr><td>8</td><td>Load Function Failures
a. Cartridge in place; tape engaged with take-up reel; pinch roller engagement lever in ENGAGED position; SINGLE STEP FWD depressed; SEND lamp turns on; tape does not advance to first character; motor turns on.</td><td>
a. For 33 or 35 adjunct, make sure option screws on card TP322474 or TP322480 are programmed correctly (see Section 578-300-200). For 37 R-T adjunct, make sure PRINTER LOCAL and READER LOCAL lamps of 37 are on.
b. Recheck Step 1, Check g.
c. Depress the STOP switch to drop out of the SINGLE STEP FWD mode. Depress the FAST ACCESS FWD switch and see if the tape moves forward. If not, perform the following voltage checks:
With VOM, or VTVM connect plus (+) lead to +28 v pin 3 of connector board. If VTVM is used, make sure ground probe is floating with reference to the magnetic tape set ground.
</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>8
(contd)</td><td></td><td>
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Hold FAST ACCESS FWD switch down</td><td>Fwd clutch coil</td><td>X > +2 v dc</td><td>XZ9/B4</td></tr>
<tr><td></td><td>Rev clutch coil</td><td>X < +0.2 v dc</td><td>XZ9/B6</td></tr>
<tr><td></td><td>Brake coil</td><td>X < +0.2 v dc</td><td>XZ9/B30</td></tr>
</table>
1. If voltages are incorrect, proceed to Component Replacement Guide.
2. If voltages are correct, check connectors, cabling from transport to electronics module, and forward clutch coil.
d. See Component Replacement Guide.</td></tr>
<tr><td></td><td>b. Same as Step 8. a. except tape advances but does not stop until end of tape.</td><td>a. Symptom indicates that no clock track or data is recorded on the cartridge. Check by loading a cartridge which is known to be recorded.
b. See Component Replacement Guide.</td></tr>
<tr><td>9</td><td>Unload Function Failures
a. Nothing happens when switch is placed in UNLOAD position.</td><td>a. Make sure that the magnetic tape set is not selected in a mode such as receive when the switch is placed in the UNLOAD position.
b. Voltage Check
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Switch in the UNLOAD position.</td><td>UNLOAD switch</td><td>Ground</td><td>XZ7/A21</td></tr>
</table>
1. If correct, proceed to the Component Replacement Guide.
2. If incorrect, check connections, cabling, switch wiring, and switch.
c. See Component Replacement Guide.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td rowspan="2">9
(contd)</td><td>b. Motor does not stop when tape is fully returned to the cartridge.</td><td>a. Load the tape and check operation of the BOT alarm circuitry. Be sure that reverse tape motion is inhibited with activation of this alarm. If not, repeat BOT alarm voltage check, Step 5, Check b.

b. See that motor turn-off circuitry is working. If the mode selector switch of a stand-alone or 33/35/37 adjunct is in the ON LINE AUTO position, or if the MOTOR CONTROL switch of a parallel device adjunct is in the AUTO position, the motor should be off. When ac power is applied, the motor should not turn on until a forward mode has been selected. If not, repeat Step 3.

c. See Component Replacement Guide.</td></tr>
<tr><td>c. Tape is not pulled fully into cartridge. Motor stops too soon.</td><td>a. Check mechanical condition of magnetic tape and cartridge. A damaged BOT leader on tape could cause a jam at pinch roller or tape guide.

b. See Component Replacement Guide.</td></tr>
<tr><td>10</td><td>Fast Access Function Failure

a. No forward and/or reverse fast access</td><td>a. Check pinch roller engagement lever to be sure that it is fully engaged.

b. Recheck Step 2, Check a.

c. Voltage Checks

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Hold FAST ACCESS FWD switch depressed</td><td>FAST ACCESS FWD switch</td><td>Ground</td><td>XZ7/B24</td></tr>
<tr><td>Hold FAST ACCESS REV switch depressed</td><td>FAST ACCESS REV switch</td><td>Ground</td><td>XZ7/B26</td></tr>
</table>
1. If incorrect, check connections, cabling from the panel to the electronics module, switch wiring, and switch.

2. If correct, perform the voltage checks as outlined in Step 4, Check c.

d. See Component Replacement Guide.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td rowspan="2">10
(contd)</td><td>b. On forward and reverse fast access, high speed drive does not turn on.</td><td>a. For the drive mechanism checks see Section 578-300-700. Check spring clutch magnet coil and trip lever adjustments and the spring clutch gear assembly endplay adjustments.

b. Voltage Checks

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Hold FAST ACCESS FWD or REV switch depressed.</td><td>Gear shift coil</td><td>Ground</td><td>XZ7/B30</td></tr>
</table>

If correct, check connections, cabling from panel to electronics module, and scan coil (260 ohms).

c. See Component Replacement Guide.</td></tr>
<tr><td>c. On forward and reverse fast access, tape does not move fast enough and mechanical drive makes alternating high and low pitch sound as if motor were running in and out of synchronization.</td><td>a. Overload clutch is slipping. Readjust per Section 578-300-700.

b. Voltage Check

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Terminals</th></tr>
<tr><td>Motor on</td><td>Motor control</td><td>X > 3 v ac</td><td>Across (3) and (4) of motor control relay</td></tr>
</table>

c. If incorrect, replace TP337118 motor control relay.</td></tr>
<tr><td>11</td><td>Record Clock Track Failures

a. With BOT alarm on, switch in REC. CLK. TRK. position, tape does not move.</td><td>a. Recheck Step 1, Check g.

b. Check operation of the BOT alarm circuitry to be sure that reverse motion such as reverse search, reverse fast access, or reverse single step is inhibited with this alarm activated. If not, repeat BOT alarm voltage check as outlined in Step 6, Check c.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

STEP	TROUBLE SYMPTOMS	CHECK
11 (contd)		c. Voltage Check Condition: Switch in REC. CLK. TRK. position. — Function: Switch — Measured Voltage: Ground — Card/Pin: XZ8/A13 If incorrect, check connections, cabling, and switch. d. See Component Replacement Guide.
	b. In recording clock track, tape does not stop when EOT alarm turns on.	a. Check operation of the tape out alarm to be sure that forward motion such as forward fast access, is inhibited with this alarm activated. If not, repeat EOT alarm voltage check as outlined in Step 6, Check c. b. See Component Replacement Guide.
	c. After recording clock track, tape reads other then DELETE characters, or does not step incrementally for each character.	See Component Replacement Guide.
	d. After recording clock track, tape reads DELETE characters properly but in the receive mode, tape does not step incrementally for each character.	See Component Replacement Guide.
12	Search Function Failures a. Nothing happens when SEARCH switch (FWD and/or REV) is depressed.	a. Check motor and drive mechanism to see that all belts are engaged, all components are free – not seized or jammed, all gears have proper backlash, etc. Clear and refine as necessary all related adjustments in Section 578-300-700.

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMTPOMS</th><th>CHECK</th></tr>
<tr><td>12
(contd)</td><td></td><td>b. If nothing happens in both forward and reverse search, check operation of the magnetic tape terminal to be sure all tape motion is not inhibited such as foward and reverse fast access. If so, proceed to Step 1, Check a.

c. See Component Replacement Guide.</td></tr>
<tr><td></td><td>b. Tape does not stop on the desired search character.</td><td>a. If unit also makes readout errors, check tape head, rollers, and guides for excessive accumulation of loose oxide or foreign materials. If present, clean with magnetic tape head cleaning solution. See Section 578-300-700 for cleaning of recording head. Extreme caution must be taken to avoid scratching of the head.

b. Check the magnetic tape set to see if it searches to other characters. If so, see voltage check below:

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Switch to desired character</td><td>FS</td><td>Ground</td><td>XZ4/A9</td></tr>
<tr><td></td><td>GS</td><td>Ground</td><td>XZ4/A23</td></tr>
<tr><td></td><td>LF</td><td>Ground</td><td>XZ4/A21</td></tr>
<tr><td></td><td>EOT</td><td>Ground</td><td>XZ4/A27</td></tr>
<tr><td></td><td>Char. A*</td><td>Ground</td><td>XZ5/A9</td></tr>
<tr><td></td><td>Char. B*</td><td>Ground</td><td>XZ5/A13</td></tr>
<tr><td></td><td>Char. C*</td><td>Ground</td><td>XZ5/A17</td></tr>
</table>

If voltage is incorrect, check connectors, cabling from transport to electronics module, switch wiring, and switch.

c. See Component Replacement Guide.</td></tr>
<tr><td></td><td>c. Tape does not stop; STOP lamp does not flash.</td><td>See Component Replacement Guide.</td></tr>
<tr><td></td><td>d. Search too slow.</td><td>See Component Replacement Guide.</td></tr>
<tr><td></td><td>e. Always searches in one direction regardless of whether FWD or REV was selected.</td><td>See Component Replacement Guide.</td></tr>
<tr><td></td><td>f. Search too slow; reverse direction only.</td><td>See Component Replacement Guide.</td></tr>
</table>

*For tape terminals with character recognition expander card (TP322465) only.

CHART 5

TROUBLESHOOTING (Continued)

STEP	TROUBLE SYMPTOMS	CHECK
13	Send Function Failures	
	a. No output – tape does not move, however, magnetic tape unit searches properly.	See Component Replacement Guide.
	b. No output – tape does move.	a. See Component Replacement Guide. b. Check tape drive mechanism adjustments in Section 578-300-700. c. Check associated teletypewriter set.
	c. Output garbled	a. Check tape head, rollers and guides for excessive accumulation of loose oxide or foreign materials. If present, clean with magnetic tape head cleaning solution. See Section 578-300-700 for cleaning of recording head. Extreme caution must be taken to avoid scratching of the head. b. See Component Replacement Guide. c. Check tape drive mechanism adjustments in Section 578-300-700. d. Check associated teletypewriter set.
→	d. First character (or characters) only are garbled.	a. Replace TP322466 and TP303869 cards. b. Check pinch roller parallelism and supply tape guide roller adjustments as indicated in Section 578-300-700. Failure condition arises when the tape seeks a different vertical position for forward and reverse travel. It would be observed when reading just after tape was moved in a reverse direction.
	e. Consistent (repeatable) errors are read from a tape that used to read out correctly; other cartridges read correctly.	a. If ac power to the magnetic tape set is turned ON or OFF with a cartridge loaded, spurious bits can be recorded on the tape which would be read out as errors. To prevent the condition, do not unplug the ac power cord or turn the maintenance switch ON or OFF with a cartridge loaded on the tape transport. To correct a message tape after this condition has caused recorded errors to appear, standard correction procedures should be attempted; however, if spurious bits have been recorded in the clock track, it will be necessary to completely re-record the cartridge starting with re-recording of the clock track. Similarly, messages on tape can be destroyed or erased partially or completely if the tape cartridges are subjected to magnetic fields. Care should be taken to keep recorded cartridges away from magnets, motors, or coils which may emit electromagnetic fields, and steel objects such as screwdrivers and wrenches which sometimes become magnetized.

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td rowspan="3">14</td><td>Receive Function Failures

a. No response. Tape does not move.</td><td>a. Check all power supply voltages and replace fuses if blown.
b. Recheck Step 1, Check g.
c. Check record interlock plug and record interlock switch.
d. See Component Replacement Guide.
e. Check associated teletypewriter set.</td></tr>
<tr><td>b. Tape moves, but nothing is recorded.</td><td>a. See Component Replacement Guide.
b. If no clock track is recorded on the tape, no data will be recorded. To determine if clock track is recorded on a tape, load the cartridge on the tape deck and depress the SINGLE STEP FWD switch. The tape (of a cartridge just loaded) should advance to the first character on the tape and stop. The tape should advance one additional character and stop for each additional time the SINGLE STEP FWD switch is depressed. Note that an individual character step is a very slight motion (approximately 0.008 inch) and is difficult to perceive by eye. If no character is read when SINGLE STEP FWD is depressed, the tape will not stop until end of tape, when the tape will be stopped on an EOT alarm.</td></tr>
<tr><td>c. Only garble is read back from tape just recorded but previously recorded tapes read correctly.</td><td>See Component Replacement Guide.</td></tr>
<tr><td>15</td><td>On-Line Failures

a. In attendant operation, operator drops the connection when the DATA button on the data set is depressed.</td><td>a. Voltage Checks

<table><tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr><tr><td>Depress DATA button on data set.</td><td>Data terminal READY</td><td>X > +3 v dc</td><td>XZ13/A19</td></tr></table>
1. If incorrect, see Component Replacement Guide and check data set.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

STEP	TROUBLE SYMPTOMS	CHECK
15 (contd)		2. If correct, check connector, cabling to data set, and data set options (N option must be used in data set). b. See Component Replacement Guide.
	b. With data set in data mode and magnetic tape terminal selected as a sender, tape does not move.	a. Perform overall transmission test to insure proper operation of data set. Determine test procedure from instruction manual for data set used. (For 200 series data set, refer to Section 314-205-500.) Verify operation of receiving terminal. b. Voltage Checks

Condition	Function	Measured Voltage	Card/Pin
Call established with on-line receiver having reverse channel.	Receive reverse channel	X > +3 v dc	XZ13/A6
Call established with on-line receiver having reverse channel.	Request to send	X > +3 v dc	XZ13/B16
Call established with on-line receiver having reverse channel.	Clear to send	X > +3 v dc	XZ13/A7

1. If voltage(s) for condition 1 is incorrect, check connector, cabling to data set, and data set.

2. If voltage for condition 2 is incorrect, see Component Replacement Guide.

3. If voltage for condition 3 is incorrect, check connector, cabling to data set, and data set.

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>15
(contd)</td><td></td><td>c. See Component Replacement Guide.
d. Refer to Step 13.</td></tr>
<tr><td></td><td>c. With data set in data mode and magnetic tape set selected as a receiver, tape does not move.</td><td>a. Refer to Step 15 b, Check a. 1. Check remote on-line sender to see if it is transmitting data. If not, perform the following voltage checks:
b. Voltage Checks
<table><tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr><tr><td>Call established with on-line sender</td><td>Carrier detect</td><td>X >+3 v dc</td><td>XZ13/B6</td></tr><tr><td>Call established with on-line sender</td><td>Send reverse channel</td><td>X >+3 v dc</td><td>XZ13/A18</td></tr></table>If voltages for the first condition above are incorrect, check connector, cabling (TP337380) to data set, and data set.</td></tr>
<tr><td></td><td>d. Set does not answer calls with mode switch in the ON LINE AUTO. mode.</td><td>a. Make sure tape set is preselected in either send or receive mode, and that data set is set for auto mode.
b. Make sure Q option is used in data set.
c. See Component Replacement Guide.</td></tr>
<tr><td></td><td>e. Set answers calls automatically with mode switch in the ON LINE MAN mode.</td><td>See Component Replacement Guide.</td></tr>
<tr><td></td><td>f. Set answers calls automatically, preselected in the send mode, but does not revert to the receive mode after the send mode clears. LOW TAPE lamp off.</td><td>See Component Replacement Guide.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

STEP	TROUBLE SYMPTOMS	CHECK
16	Low Speed Teletypewriter Interface Failures (33/35)	
	a. With local mode selected and magnetic tape set in send mode tape moves, but no copy appears on teletypewriter.	See Component Replacement Guide.
→	b. Magnetic tape set selected to send but data is not transmitted (tape does not move).	a. Check options on interface card (XZ14). b. Voltage Checks Condition: Local mode and send mode selected — Function: Local switch — Measured Voltage: Ground — Card/Pin: XZ14/B7 Condition: Local mode and send mode selected — Function: Present next character (PNC) hold — Measured Voltage: +5 v dc — Card/Pin: XZ14/A4 1. If voltage for first condition is incorrect, check connectors, cabling to control panel, switch wiring, and switch. 2. If voltage for second condition is incorrect, check cabling to local equipment. c. See Component Replacement Guide.
	c. Keyboard of local set blinded at all times.	a. Make sure magnetic tape set maintenance switch is on, photolamp is on, and fuses are good. b. Check cabling to local equipment. c. See Component Replacement Guide.
	d. Magnetic tape set selected to receive and data not recorded.	See Component Replacement Guide.

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td rowspan="3">17</td><td>Low Speed Teletypewriter Interface Failures (37 EIA)

a. Local mode selected; 37 motors held off.</td><td>a. Check and correct any alarm conditions in 37 type set.

b. Voltage Check (Magnetic Tape Set)

<table><tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr><tr><td>Local mode selected</td><td>Data terminal ready (DTR) (37)</td><td>X > +3 v dc</td><td>XZ14/A30</td></tr></table>
1. If incorrect, check cabling (TP337369) to 37 terminal, and refer to 37 KSR troubleshooting (Section 574-301-300).

2. If correct, see Component Replacement Guide.</td></tr>
<tr><td>b. With magnetic tape local send mode selected, tape moves but printer does not respond.</td><td>See Component Replacement Guide.</td></tr>
<tr><td>c. Magnetic tape set selected to receive and data not recorded.</td><td>See Component Replacement Guide.</td></tr>
<tr><td>18</td><td>Low Speed Teletypewriter Interface Failures (37 R-T Interface)

a. Local send selected tape does not move.</td><td>a. Make sure 37 is in Reader Local.

b. Voltage Check

<table><tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr><tr><td>Local Send</td><td>Send message out</td><td>0 v dc</td><td>XZ14/A21</td></tr><tr><td>Local Send</td><td>Send ready (37)</td><td>0 v dc</td><td>XZ14/B9</td></tr><tr><td>Local Send</td><td>PNC-1</td><td>0 v dc</td><td>XZ14/B17</td></tr></table></td></tr>
</table>

CHART D

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td>18
(contd)</td><td></td><td>1. If any or all measurements are incorrect, see Component Replacement Guide.

2. If all are correct, check cabling (TP337374) to 37 terminal and 37 operation in Section 574-300-350.</td></tr>
<tr><td></td><td>b. Local receive selected data not recorded.</td><td>Voltage Checks

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Local Receive</td><td>Receive select (37)</td><td>0 v dc</td><td>XZ14/B6</td></tr>
<tr><td>Local Receive</td><td>Receive message (37)</td><td>0 v dc</td><td>XZ14/B19</td></tr>
<tr><td>Local Receive</td><td>Receive message out</td><td>0 v dc</td><td>XZ14/A14</td></tr>
<tr><td>Local Receive</td><td>Receive ready (37)</td><td>0 v dc</td><td>XZ14/B5</td></tr>
<tr><td>Local Receive</td><td>Receive</td><td>+5 v dc</td><td>XZ14/B4</td></tr>
</table>
1. If any or all measurements are incorrect, see Component Replacement Guide.

2. If all are correct, check cabling (TP337374) to 37 terminal and 37 operation in Section 574-300-350.</td></tr>
<tr><td>19</td><td>Parallel Device Interface Failures

a. Send selected, tape does not move.</td><td>Voltage Checks

<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Send</td><td>Send message out</td><td>0 v dc</td><td>XZ14/A21</td></tr>
</table></td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

<table>
<tr><th>STEP</th><th>TROUBLE SYMPTOMS</th><th>CHECK</th></tr>
<tr><td rowspan="3">19
(contd)</td><td rowspan="3"></td><td>
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Send</td><td>Send ready</td><td>0 v dc</td><td>XZ14/B9</td></tr>
<tr><td>Send</td><td>PNC-1</td><td>0 v dc</td><td>XZ14/B17</td></tr>
</table>
1. If any or all measurements are incorrect, see Component Replacement Guide.
2. If all correct, check cabling (TP337373) to adjunct terminal, and adjunct terminal operation in appropriate troubleshooting section.
</td></tr>
<tr><td>b. Receive selected data not recorded.</td><td>
Voltage Checks
<table>
<tr><th>Condition</th><th>Function</th><th>Measured Voltage</th><th>Card/Pin</th></tr>
<tr><td>Local Receive</td><td>Receive select</td><td>0 v dc</td><td>XZ14/B6</td></tr>
<tr><td>Local Receive</td><td>Receive message</td><td>0 v dc</td><td>XZ14/B19</td></tr>
<tr><td>Local Receive</td><td>Receive message out</td><td>0 v dc</td><td>XZ14/A14</td></tr>
<tr><td>Local Receive</td><td>Receive ready</td><td>0 v dc</td><td>XZ14/B5</td></tr>
</table>
1. If any or all measurements are incorrect, see Component Replacement Guide.
2. If all are correct, check cabling (TP337373) to adjunct terminal, and adjunct terminal operation in appropriate troubleshooting section.
</td></tr>
<tr><td>c. Garbled data in Receive</td><td>See Component Replacement Guide.</td></tr>
<tr><td>20</td><td>CDT Interface Failures, including cluster controller applications.</td><td>All checks in electronics module same as for Parallel Device Interface (Step 19). Additional checks related to accessory module DMAM800 (circuit cards TP322969 and TP322976) and cable (TP337447 or TP337448) to related equipment. For CDT troubleshooting information, see Section 578-120-300. For cluster controller troubleshooting, see Section 578-150-300.</td></tr>
</table>

CHART 5

TROUBLESHOOTING (Continued)

STEP	TROUBLE SYMPTOMS	CHECK
21	Auto Rewind Failures (tape sets with auto rewind circuit card TP322485 only).	Check overall function of tape set in nonrewind modes. If basic functions involved in rewind operation are satisfactory (ie, send, receive, reverse search), replace circuit card TP322485.

4. MAGNETIC TAPE TEST CARTRIDGE

4.01 A magnetic tape test cartridge (TP337400) which is recorded with messages for test purposes is available. Approximately one half of the cartridge is recorded with typical test messages which are useful for trouble-shooting and checking out 4200 series magnetic tape sets. The remaining portion of the test cartridge is blank except for the clock track, and may be used for testing in the receive mode. The control codes which appear on the test cartridge are:

1 for FS (File Separator)
2 for GS (Group Separator)
3 for LF (Line Feed)
4 for EOT (End of Transmission)
5 for Carriage Return
6 for Rubout
7 for Vertical Tab
8 for Horizontal Tab
9 for Form Feed

4.03 The test message figures that follow (Figure 4 through Figure 10) indicate the test messages that are recorded on the test tape cartridge (TP337400) at the tape position indicator (counter) number shown in the figure. Even parity ASCII (American National Standard Code for Information Interchange) is used unless otherwise specified.

Note 1: Test messages shown are for equipment with standard width platen. For wide platen units (ie, 132 character), test tape must be prepared locally with check for full-line operation.

Note 2: Test messages shown include only upper case graphics. If terminal has lower case capabilities, include lower case graphics in locally made test tape.

Note 3: Test messages shown include only basic search codes (FS, GS, LF, EOT). If terminal includes character recognition expander card (TP322465), add user selected search codes in locally prepared test message.

```
153
4200 SERIES TEST MESSAGE NO. 001:53
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
4153
4200 SERIES TEST MESSAGE NO. 002:53
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
4153
4200 SERIES TEST MESSAGE NO. 003:53
2THE QUICK BROWN FOX . . .

                    etc (total of 060 messages)

                        . . . THE LAZY DOG'S BACK 1234567890 TIMES.66653
4153
4200 SERIES TEST MESSAGE NO. 060:53
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
4

(followed by rubouts until counter position 100)
```

Figure 4 - Test Message Recorded at Counter Number 000

```
153
4200 SERIES TEST MESSAGE NO. 101:53
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX . . .

                    etc (total of 75 QBF lines)

                        . . . THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
4153
4200 SERIES TEST MESSAGE NO. 102:53
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX . . .

                    etc (total of 75 QBF lines)

                        . . . THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
4
          (followed by rubouts until counter position 200)
```

Figure 5 - Test Message Recorded at Counter Number 100

```
153
4200 SERIES TEST MESSAGE NO. 201:53
2AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA53
 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA53
 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA53
2BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB53
 BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB53
 BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB53
2CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC53
 CCCCCCCCCCCCCCCCCCCCCCC . . .

              etc (alphabet through Z, three lines each)

                                    . . . ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ53
2111111111111111111111111111111111111111111111111111111111111111111111153
 11111111111111111111111111111111111111111111111111111111111111111111153
 11111111111111111111111111111111111111111111111111111111111111111111153
2222222222222222222222222222222222222222222222222222222222222222222222253
 22222222222222222222222222222222222222222222222222222222222222222222253
 22222222222222222222222 . . .

              etc (numerics through 0, three lines each)

                                    . . . 999999999999999999999999999999999953
2000000000000000000000000000000000000000000000000000000000000000000000053
 00000000000000000000000000000000000000000000000000000000000000000000053
 00000000000000000000000000000000000000000000000000000000000000000000053
2!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!53
 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!53
 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!53
2"""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""53
 """""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""53
 """""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""""53
2#####################################################################53
 #####################################################################53
 ####################### . . .

          etc (three lines each, ASCII characters for # $ % &
                        ' ( ) * ? . , : ; @)

                                    . . . @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@53
 @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@53
4

          (followed by rubouts until counter position 300)
```

Figure 6 - Test Message Recorded at Counter Number 200

```
153
4200 SERIES TEST MESSAGE NO. 301:53
2U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*53
2U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*53
2U*U*U*U*U*U*U*U*U*U*U*U*U*U* . . .

                    etc (total of 75 lines of U*)

                                . . . *U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*53
2U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*U*53
4153
4200 SERIES TEST MESSAGE NO. 302:53
2U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U*53
2U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U*53
2U*U*U *U*U* U*U*U *U*U* . . .

                    etc (total of 75 lines of U*U*U *U*U*)

                                . . . U*U*U *U*U* U*U*U *U*U* U*U*U *U*U*53
2U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U* U*U*U *U*U*53
4
```

(followed by rubouts until counter position 400)

Figure 7 - Test Message Recorded at Counter Number 300

```
153
4200 SERIES TEST MESSAGE NO. 401:53
7
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
7
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
9
4153
4200 SERIES TEST MESSAGE NO. 402:53
7
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
7
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
9
4153
4200 SERIES TEST MESSAGE NO. 403:53
7
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN . . .

            etc (total of 15 messages)

                          . . . 818283 8TIMES.66653
9
4153
4200 SERIES TEST MESSAGE NO. 415:53
7
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
7
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
2THE 8QUICK 8BROWN 8FOX 8JUMPED 818283 8TIMES.66653
9
4

  (followed by rubouts until counter position 450)
```

Figure 8 - Test Message Recorded at Counter Number 400

```
153
4200 SERIES TEST MESSAGE NO. 451 (ODD PARITY):53
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
4153
4200 SERIES TEST MESSAGE NO. 452 (ODD PARITY):53
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
4153
4200 SERIES TEST MESSAGE NO. 453 (ODD PARITY):53
2THE QUICK BROWN FOX . . .

                    etc (total of 10 messages)

                       . . . THE LAZY DOG'S BACK 1234567890 TIMES.66653
4153
4200 SERIES TEST MESSAGE NO. 460 (ODD PARITY):53
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
2THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.66653
4
          (followed by rubouts until counter position 500)
```

Figure 9 - Test Message Recorded at Counter Number 450
(Odd Parity and ASCII)

```
153
MAGNETIC TAPE CARTRIDGE (TEST)53
3
TABLE OF CONTENTS:53
3
2SHORT QBF TEST MESSAGES . . . . . .INDEX NO. 00053
2LONG QBF TEST MESSAGES. . . . . .INDEX NO. 10053
2ABC 123 TEST MESSAGE. . . . . .INDEX NO. 20053
2U*U*U* TEST MESSAGES. . . . . .INDEX NO. 30053
2HT VT FF TEST MESSAGES. . . . . .INDEX NO. 40053
2ODD PARITY TEST MESSAGES. . . . . .INDEX NO. 45053
2TABLE OF CONTENTS . . . . . .INDEX NO. 50053
3
3
NOTE:  TO FULLY UTILIZE THE "HT VT FF" TEST MESSAGES, HORIZONTAL TABS53
SHOULD BE PRESET AT POSITIONS 10, 20, 30, 35, 45, 50, 55 AND 65.53
3
3
3
4
```

Figure 10 - Test Message Recorded at Counter Number 500

COMPONENT REPLACEMENT GUIDE

Note 1: The STEP corresponds to the STEP in the troubleshooting chart.

Note 2: The numbers to the right of the TROUBLE SYMPTOM indicate the order of substitution. "X" indicates no logical sequence.

STEP	TROUBLE SYMPTOM	CIRCUIT CARDS: READ AMP TP322461 (BASIC) XZ1	WRITE AMP TP322462 (BASIC) XZ2	BUFFER TP322463 (BASIC) XZ3	CHAR. RECOG TP322464 (BASIC) XZ4	CHAR. REC EXP TP322465 (OPTION) XZ5	BASIC CONTROL TP322466 (BASIC) XZ6	DEVICE CONTROL TP322467 (BASIC) XZ7	ALARM/PHOTOSENSOR TP322468 (BASIC) XZ8	CL/BRK DRIVE TP303869 (BASIC) XZ9	TERMINAL CONTROL TP322470 (BASIC) XZ10	DISTRIBUTOR TP322471 (OPTION) XZ11	TERMINAL TIMING TP322472 (BASIC) XZ12	DATA SET INT. TP322473 (OPTION) XZ13	INT. 33/35 TP322474 (OPTION) XZ14	INT. EIA TP322475 (OPTION) XZ14	INT. 37 TP322476 (OPTION) XZ14	INT. STAND ALONE TP322479 (OPTION) XZ14	INT. 33/35 TP322480 (OPTION) XZ14	POWER SUPPLY FUSES	MOTOR FUSE	PHOTOSENSOR LAMP	TAPE TRANSPORT
1	Magnetic tape set does nothing. All functions inoperative.	X	X	X	X	X	X	3	X	X	X	X	X	X	X	X	X	X	X	X	1	2		
2	Motor does not run.							4	5												3	2	1	
3	Motor always on.							1	2															
4	Magnetic.tape does not move in forward and/or reverse directions — all applicable modes. Motor does run.						4	2		3											1			
5	Alarm lamps do not light (BOT, LT, EOT), however unit does respond correctly to alarm conditions (ie, all forward motion of tape is inhibited at end of tape even though the EOT lamp does not light).								1															
6	Failure to alarm (BOT, LT, EOT); failure to respond to alarm conditions.							2	1															
7	Control panel lamp(s) do not light.				3			4			2										1			
8	Load function failures a. Cartridge in place; tape engaged with take-up reel; pinch roller engagement lever in ENGAGED position; SINGLE STEP FWD switch depressed; tape does not advance to first character. b. Same conditions as a. except tape advances but does not stop until end of tape.			7 3			2 4	4 5	5	6	3 1	8 6	1 2											
9	Unload function failures a. Nothing happens when switch is placed in UNLOAD position. b. Motor does not stop when tape is fully returned to cartridge. c. Tape is not pulled fully into the cartridge. Motor stops too soon.						4 3	1 1 1	2 2	3														
10	Fast access function failures a. No forward and/or reverse fast access. b. High speed drive does not turn on for forward and reverse fast access.						2	1 1	3 2	4 3														5 4
11	Record clock track failures a. With BOT alarm ON and switch in REC. CLK. TRK. position, tape does not move. b. In recording clock track, tape does not stop when EOT alarm turns on. c. After recording clock track, tape reads other than delete characters or does not step incrementally for each character. d. After recording clock track, tape reads delete characters, but in the receive mode tape does not step incrementally for each character.	5 2	4	1			3 2 1	1 1 3	2 2 6 3															
12	Search function failures a. Nothing happens in search mode, forward and/or reverse. b. Tape does not stop on selected character. c. Tape does not stop and STOP lamp does not blink.	4		5	1		5 1	3	4	6 4	1 3 3		2 2 2											

*Terminals with TP322465 expander card only. Replace first if tape stops on basic characters (FS, GS, LF, EOT) but not on expander characters.

COMPONENT REPLACEMENT GUIDE (Continued)

Note 1: The STEP corresponds to the STEP in the troubleshooting chart.

Note 2: The numbers to the right of the TROUBLE SYMPTOM indicate the order of substitution. "X" indicates no logical sequence.

		CIRCUIT CARDS																						
		BASIC	BASIC	BASIC	BASIC	OPTION	BASIC	BASIC	BASIC	BASIC	BASIC	OPTION	BASIC	OPTION	OPTION	OPTION	OPTION	OPTION	OPTION					
		READ AMP TP322461	WRITE AMP TP322462	BUFFER TP322463	CHAR. RECOG TP322464	CHAR. REC EXP TP322465	BASIC CONTROL TP322466	DEVICE CONTROL TP322467	ALARM/PHOTOSENSOR TP322468	CL/BRK DRIVE TP303869	TERMINAL CONTROL TP322470	DISTRIBUTOR TP322471	TERMINAL TIMING TP322472	DATA SET INT. TP322473	INT. 33/35 TP322474	INT. EIA TP322475	INT. 37 TP322476	INT. STAND ALONE TP322479	INT. 33/35 TP322480	POWER SUPPLY FUSES	MOTOR FUSE	PHOTOSENSOR LAMP	TAPE TRANSPORT	
STEP	TROUBLE SYMPTOM	XZ1	XZ2	XZ3	XZ4	XZ5	XZ6	XZ7	XZ8	XZ9	XZ10	XZ11	XZ12	XZ13	XZ14	XZ14	XZ14	XZ14	XZ14					
12 (Cont.)	d. Searches at wrong speed (too slow) in both directions.			3			4			1			2										5	←
	e. Searches in one direction only.						3	2		4	1												5	←
	f. Searches at wrong speed in reverse direction only.									1													2	←
13	Send function failures																							
	a. No output. Tape does not move, however set searches properly.										1	3	2	4	5				5					←
	b. No output. Tape does move.		7	5			3					1	6	2	4				4					←
	c. Output garbled.	6		5			2					1		3	4				4				7	←
14	Receive function failures																							
	a. No response. Tape does not move.	6					8	3		7	1		2	4	5				5					←
	b. Tape moves, but nothing is recorded.	3	1	2			4																	←
15	Data set interface																							
	a. In attended operation, connection is dropped when operator depresses the DATA push-button on the data set.													1										
	b. With data set in data mode and magnetic tape set selected as a sender, tape does not move.												2	1										
	c. With data set in data mode and magnetic tape set selected as a receiver, tape does not move.												2	1										
	d. Set does not answer calls with mode selector switch in ON LINE AUTO. position.													1										
	e. Set answers call automatically with mode selector switch in the ON LINE MAN. position.													1										
	f. Set answers calls automatically, preselected in send mode, but does not revert to receive mode after the send mode clears on EOT.				3						2		1											←
16	Low speed teletypewriter interface (33/35)																							
	a. With local send selected, no copy appears on teletypewriter.											2			1									
	b. With local send selected, tape does not move.				5		4					3	2		1									←
	c. Keyboard of local set always blinded.														1									
	d. In local receive, no data is recorded.												3		1									
17	Low speed teletypewriter interface (37 EIA)																							
	a. 37 motors held off.															1								
	b. With local send selected, 37 printer does not respond.							5			3	2	4			1								
	c. In local receive mode, data is not recorded.										3	2	4			1								
18	Low speed teletypewriter interface (37 R-T interface)																							
	a. In local send mode, tape does not move.						4	2			3						1							
	b. In local receive mode, data is not recorded.							4			3		2				1							

COMPONENT REPLACEMENT GUIDE (Continued)

Note 1: The STEP corresponds to the STEP in the troubleshooting chart.

Note 2: The numbers to the right of the TROUBLE SYMPTOM indicate the order of substitution.

		CIRCUIT CARDS																								
		BASIC	BASIC	BASIC	BASIC	OPTION	OPTION	BASIC	BASIC	BASIC	BASIC	BASIC	OPTION	BASIC	OPTION	OPTION	OPTION	OPTION	OPTION	OPTION	OPTION	OPTION	OPTION	DMAM800 ACCES. MODULE	
		READ AMP TP322461	WRITE AMP TP322462	BUFFER TP322463	CHAR. RECOG TP322464	CHAR. REC EXP TP322465	AUTO REWIND TP322485	BASIC CONTROL TP322466	DEVICE CONTROL TP322467	ALARM/PHOTOSENSOR TP322468	CL/BRK DRIVE TP303869	TERMINAL CONTROL TP322470	DISTRIBUTOR TP322471	TERMINAL TIMING TP322472	DATA SET INT. TP322473	PARALLEL INT. TP322478	INT. 33/35 TP322474	INT. EIA TP322475	INT. 37 TP322476	INT. STAND ALONE TP322479	INT. 33/35 TP322480	PARALLEL INT. TP322477	SEND INTERFACE TP322976	RECEIVE INTERFACE TP322969
STEP	TROUBLE SYMPTOM	XZ1	XZ2	XZ3	XZ4	XZ5	XZ5	XZ6	XZ7	XZ8	XZ9	XZ10	XZ11	XZ12	XZ13	XZ13	XZ14	XZ14	XZ14	XZ14	XZ14	XZ14	XZ01	XZ02
19	Parallel device interface																							
	a. Send selected, tape does not move.							4	2			3										1		
	b. Receive selected, data is not recorded.							4	2			3										1		
	c. Receive mode, garbled data.			5	4			3								2						1		
20	CDT interface																							
	a. Send selected, tape does not move.							5	3			4										2	1	
	b. Receive selected, data is not recorded.							5	3			4										2		1
	c. Receive mode, garbled data.			6	5			4								3						2		1
21	Auto rewind failure — All basic functions normal but tape set does not respond to functions programmed on auto rewind card.						1					2												