35 KEYBOARD SEND-RECEIVE TAPE PRINTER
TELETYPEWRITER SET
TROUBLESHOOTING

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1. GENERAL

1.01 This section is reissued to update the troubleshooting procedures for the 35 Keyboard Send-Receive Tape Printer Teletypewriter Set. The information presented in this section consists of operational and electrical checks designed to lead maintenance personnel, by use of the functional schematics to the circuit area in the equipment that is causing trouble.

1.02 A thorough knowledge of the sequence of operation for each functioning element is of fundamental importance. Refer to the appropriate section to clarify the operation and function of all teletypewriter set parts.

1.03 The functional schematic wiring diagrams referenced can be found in Section 574-204-400. The actual wiring diagrams can be found in the appropriate sections covering the individual components of the set.

1.04 Where equipment failures are due to mechanical maladjustments, the technician should refer to the adjustment section for the component in question to determine the correct procedure and adjustment.

1.05 Lubrication failures will seldom occur when normal periodic maintenance procedures are followed. See the lubrication section of the component to determine maintenance schedules.

2. TOOLS AND TEST EQUIPMENT

2.01 Tools required to make the adjustments and test the spring tensions are listed in Section 570-005-800.

2.02 Test equipment required is listed as follows.

(a) A volt-ohm-milliammeter for checking voltage, current, resistance (continuity) and capacitance.

(b) An eight level signal distortion test set to perform signal distortion tests on the signal generator.

(c) A signal analyzer, also required to perform signal distortion tests on the set.

3. TROUBLESHOOTING

3.01 Since teletypewriter sets are an assemblage of components, the first step in troubleshooting, if the trouble is not obvious, is to sectionalize the trouble to a particular component, then determine what specific mechanism or electrical part is faulty.

3.02 Failures of the equipment can be traced functionally by means of the troubleshooting chart. A step-by-step analysis of the behavior of the equipment in response to the tabulated checks will indicate the area of trouble in which to apply the remedial measures outlined below and referenced in the chart. Since, in most cases, each check step is conditioned by the procedure in preceding steps, examine the condition of all controls before rechecking any step or otherwise performing any troubleshooting check out of sequence.

(a) Comprehensive electrical analysis of the equipment is not generally required in troubleshooting. Reference to an open condition is to a circuit through which current will not flow, due either to a break, a poor connection or a poor or dirty contact mechanism. References to a closed condition is to a normally or intermittently open circuit through which current will flow, either due to a short or to a sticky, dirty or poorly adjusted contact mechanism.

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(b) Running Open is a condition created by an open signal circuit, resulting in operation of typing and printing mechanisms because of the absence of a stop signal to latch the function clutches.

(c) Running Closed is a condition created by a closed signal circuit, resulting in failure of typing and printing mechanisms to respond to a signal, due to the absence of the start and spacing elements in the signal, or to mechanical failure.

(d) Garbling is a condition in which the response of the typing and printing mechanisms does not correspond to the mechanical or signal input.

(e) Blind is a condition in which a unit is turned off or otherwise disconnected to assure nonresponse to various signal inputs.

Note: If troubleshooting checks indicate abnormal electrical conditions, refer to the functional schematics referenced in the chart. If the trouble appears to be mechanical, isolate the unit, and refer to the associated adjustment section for the unit isolated.

PROCEDURE

3.03 Make a visual inspection of the equipment to determine if the trouble is caused by loose line or power connections, improperly set switches, erratic motor speed, or improper range finder setting.

3.04 Arrange the equipment to operate on a test circuit and perform the procedures normally followed after the installation of a set, to sectionalize the trouble. These procedures are primarily performed after initial installation of new or repaired equipment but may be used to assist in locating troubles when they occur.

3.05 Localizing Electrical Troubles: Most electrical troubles are found at the various contacts in the equipment, which include switch contacts, plug-in connector and pin contacts, wiring field terminals, soldered contacts, (including spliced wires), and chassis ground contacts. Electrical circuits in the teletypewriter set have terminal connections at the points where test must be made. Do not disturb the wiring more than necessary when testing or inspecting. Maintenance personnel must be thoroughly familiar with the schematic and wiring diagrams and use them while making point-to-point checks of the circuits. Schematic wiring diagrams of external equipment to which the tape printer set is connected furnish information helpful for testing and localizing trouble.

3.06 Power Supply Checks: To be sure that proper operating conditions exist, check the input power, ac circuits, and dc circuits in turn before making other tests. These checks will, of necessity, include normal operation of the parts in these circuits and the requirements of all adjustments which would affect the indicated trouble as related to the parts. When check of an adjustment is indicated, care should be exercised not to disturb the adjustment or related adjustments.

3.07 Continuity, Resistance, and Capacitor Checks.

(a) Continuity: The continuity check is used to locate suspected open circuits. In making continuity checks, be sure that parallel current paths are disconnected. Make the tests by checking the continuity through the circuit suspected to be faulty by connecting the test leads so that the current can go only through the suspected circuit. Be sure no other part of the circuit is shunting the circuit being tested. If necessary, disconnect certain leads. Check all likely circuits in this manner. If, after checking all possible causes, the fault cannot be located, make a continuity test of the entire circuit. If continuity is indicated, test the other half of the circuit. Continue subdividing the circuit until the open point is definitely located.

(b) Resistance: The resistance check is used to locate suspected open or shorted coil windings, transformer windings, motor windings, fixed resistors and inductors. In making resistance checks, follow the same general procedures as those described for continuity checks.

(c) Capacitor: The capacitor check is used to locate shorted or leaking elements. To test, discharge the suspected capacitor with an insulated shorting jumper. Then disconnect one lead and connect the capacitor to an ohmmeter. Use the highest reading scale. A good capacitor will be indicated by the ohmmeter pointer first moving up the scale rapidly, then returning more slowly to the infinity mark. A capacitor which is open will give a reading of infinite ohms. A shorted capacitor will give a reading of constant

value between zero and infinity, depending upon the resistance of the short.

WARNING: BE EXTREMELY CAREFUL WHEN HANDLING CHARGED CAPACITORS. A SEVERE ELECTRICAL SHOCK MAY BE RECEIVED FROM THE CAPACITOR OR LEADS CONNECTED TO A POWER SUPPLY IN OPERATION.

3.08 Electrical Checks

(a) Check for external interruptions to the 115 volt ac or 48 volt dc power supply by checking the power cord connections on the terminal block at the rear of the set.

(b) Check for open fuse at rear of the tape printer keyboard. If open, rotate the associated motor by hand and check for excessive mechanical load before replacing the fuse. If a replaced fuse burns out immediately upon installation, check for shorted wiring in the motor, selector magnets, or the copylight transformer. Also check the fuse in the tape printer selector magnet driver, in sets so equipped.

3.09 Localizing Mechanical Troubles

(a) Although mechanical troubles can occur in teletypewriter sets, no difficulty should be experienced in locating the fault if the sequence of operation is checked through its various steps. When a mechanical function fails to operate, or operates in a faulty manner, the trouble may be in a particular adjustment, or series of adjustments, or it may be in a particular assembly. One method for checking troubles involves checking the individual requirement for all adjustments in the faulty subassembly or mechanism. Use the related data found in the detailed adjustment procedures to determine the sequence to be followed.

(b) A second method involves setting up by hand the selecting mechanism and completing the operation by manually rotating the motor, shaft, gear, or cam that normally drives the assembly. This second method is usually quicker when only one adjustment is faulty and the remainder of the mechanism is in good condition. In such cases only the related adjustments need be checked.

(c) In some instances, faulty operation may be observed only when the mechanism is power driven. The experience of the maintenance personnel and the overall condition of the equipment will indicate which method is the better approach to a particular trouble. In either mechanical or electrical troubles, additional aid in isolating the difficulty may be secured from records of previous troubles and adjustments.

3.10 Refer to the following troubleshooting charts for a more complete tabulation of possible troubles.

TROUBLE SHOOTING CHART

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	REFERENCE
1	With the power switch on and the motor control relay operated, the motor starts.	Motor does not start.	Check power line connections.	Schematic WDs
			Check fuses.	Actual and Schematic WDs
			Check motor thermal cut-off switch.	-
		Synchronous motor (on sets so equipped) runs at incorrect speed.	Check power line frequency.	-
		Governed motor (on sets so equipped) runs at incorrect speed.	Check 117 v ac line.	-
			Check motor and governor brushes.	-
			Check governor adjustments.	Adjustments
		Governed motor speed.	Check governor resistor and capacitor.	-
			Check for sticking governor contacts.	-
		No cabinet illumination.	Check copylight receptacle.	Schematic WDs
			Check copylight transformer.	Schematic WDs
		Cabinet copy lamps not illuminated.	Check bulbs and sockets.	Schematic WDs
2	Tape printer runs closed on idle signal; operates on signal impulse from keyboard.	Tape printer runs open on idle signal.	Check output from data set (if so used).	Schematic WDs
			Check output of selector magnet driver card.	Schematic WDs
			Check for open selector coils.	Schematic WDs
			Check for signal line continuity.	Schematic WDs
			Check selector adjustments.	Adjustments

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	REFERENCE
2 (cont'd)		Tape printer runs closed during signal impulse from keyboard.	Check output from data set (if so used).	Schematic WDs
			Check signal generator for shorting or mechanical failure.	Schematic WDs
			Check selector adjustments.	Adjustments
			Check for open signal line to the data set (if so used).	Schematic WDs
3	Transmit from keyboard to tape printer. Error-free copy will be printed on the tape printer.	Selector receiving margin short.	Check data set input (if so used).	Schematic WDs
			Check data set output (if so equipped). Signal line ground to connector pin D9.	
			Check current output from selector magnet driver on 500 ma sets.	Schematic WDs
			Check selector current on 60 ma sets.	Actual and Schematic WDs
			Check selector magnets.	Schematic WDs
			Check selector adjustments.	Adjustments
			Check motor speed.	
		Intermittent errors or garbling.	Check data set input (if so equipped).	Schematic WDs
			Check range finder (may be at marginal setting).	Adjustments
			Check current output from selector magnet driver 500 ma.	Schematic WDs
			Check selector current on 60 ma sets.	Actual and Schematic WDs
			Check selector magnets.	Schematic WDs
			Check selector adjustments.	Adjustments
			Check motor speed.	

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	CHECK	REFERENCE
4	When typing, the end-of-line indicator lamp will turn on at about the 70th character.	End-of-line indicator lamp does not light.	Check EOL bulb.	Schematic WDs
			Check EOL circuits for continuity.	Schematic WDs
			Check for open end-of-line switch.	Schematic WDs
		End-of-line indicator lamp lights, but not at about 70 characters.	Check mechanical adjustments of end-of-line indicator.	Adjustments
5	When the tape supply runs low, the LOW TAPE lamp will light.	LOW TAPE lamp does not light.	Check for open condition across low tape switch.	Schematic WDs
			Check LOW TAPE lamp socket connections and lamp.	Schematic WDs