

**83B1 AND 83B2 SELECTIVE CALLING SYSTEMS**

**TROUBLE SHOOTING GUIDES**

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**1. GENERAL**

**1.01** This issue supersedes Issue A. It is being reissued to include additional information to Table A and the figures. Revisions to the text are indicated by an arrow.

**1.02** This practice presents methods which may be used to isolate trouble at 83B1 and 83B2 stations. It includes tables that provide step by step procedures which may be used to localize troubles in the equipment. The trouble conditions covered in the tables are typical of those occurring in equipment in service and are based on a study of customer reports.

**1.03** Information contained in this section is not intended to replace or reduce the formal training required for station maintenance forces to maintain 83B1 and 83B2 station equipment.

**1.04** A 19-inch mounting plate is normally provided for mounting the control equipment in the cabinet associated with a 28ASR, 28RO or 28KSR station that is not equipped with a transmitter start, pushbutton calling or other additional equipment.

**1.05** A 23-inch mounting plate is normally provided, if the control equipment is mounted in a cabinet separate from the teletypewriter equipment or when additional equipment is required. At some of the earlier installations where the control equipment was mounted in the 28-type teletypewriter cabinet, a 23-inch mounting plate was provided. For this reason, steps should be taken to insure that the correct FS drawing is used to clear station troubles.

**1.06** The difference between the 19-inch and the 23-inch mounting panel is the method which is used to interconnect the control equipment to the 28-type teletypewriter cabinet circuit. The 83B1 or 83B2 basic circuit operation does not change.

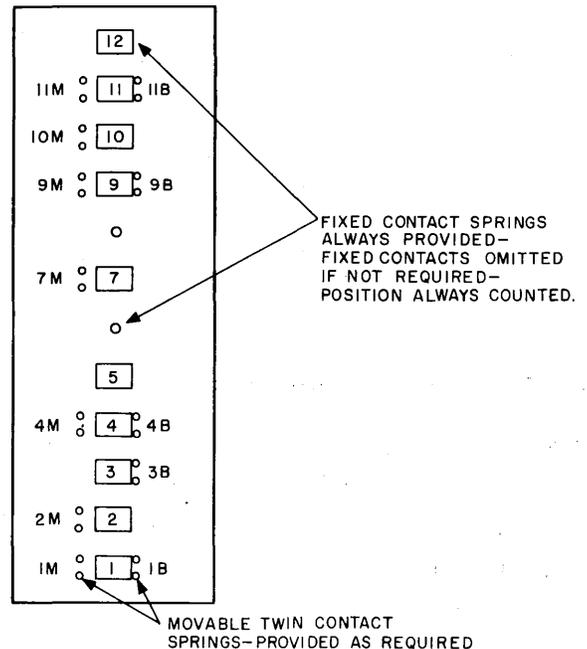
(a) When the 19-inch mounting panel is provided, interconnection of equipment is accomplished by use of a D cord and direct wiring from the A terminal strip provided on one of the mounting plates of the station control unit.

(b) The 23-inch mounting panel provides interconnection of the control circuit and teletypewriter cabinet through the use of D and C cords. A provision for adding additional equipment such as the Transmitter Start or Pushbutton Calling Circuit is made available through the use of the B connector and cord.

**2. RELAY AND DRAWING INFORMATION**

**2.01** Information on relay contact numbering and some of the basic symbols used on FS drawings is contained in this part. This information is intended to aid the maintenance man in understanding some of the basic circuit drawings he will be using. For more detailed information on Detached Contact Type Schematic Drawings (SDs), refer to Section 005-109-101.

**2.02** Contact information for relays is always contained in one of the Apparatus Figure drawings (C sheets). Wire spring relays are listed in tabular form with each column containing information for a particular relay. The numbers at the extreme left and right sides of the form refer to the contact position number, that is, number 12 at the top of the relay and number 1 at the bottom. If no contact arrangement or location is given, it can be interpreted that the contact is not being used in the circuit. If the contact is physically removed from the wire springs, the contact position should be counted when verifying a particular contact position. A typical arrangement of wire spring relay contacts is shown below in Fig. 1.



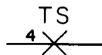
**Fig. 1 - Spring Relay Contact Numbering**

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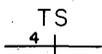
**2.03** Listed below are some of the symbols used on FS drawings and the meaning of the particular symbol.

**SYMBOL**

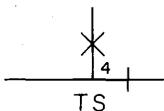
**MEANING**



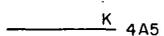
Make contact of a relay having contacts located in a definite numbered position. Circuit is open when relay is unoperated and closed when relay is operated. The number 4 designates the fixed or stationary spring.



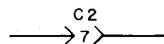
Break contact of a relay having contacts located in a definite numbered position. Circuit is closed when relay is unoperated and open when relay is operated. The number 4 designates the fixed or stationary spring.



Transfer contacts - The contact number and symbols are used in the same manner as explained above. The contact sequence, such as make-break, is covered in the Apparatus Figure.



Leads - K lead to sheet B4, at coordinate A5.



Connector terminals - Male and female contacts of mating connectors. C2 is the functional designation and the number 7 designates the contact terminal.

- 2 - 627A Armature Block Tool
- 1 - 360 Tool
- 1 - 639A Tool
- 1 - 651C Tool
- 1 - 651D Tool
- 2 - 2 ft. lead E/W alligator clips on each end

**4. TROUBLE CLEARING PROCEDURES**

**4.01** The trouble report should first be associated with one of the tables as covered in Part 5. Some reports may use different words to describe the trouble or may not include all conditions covered in the step by step procedures. However, comparison of the reported trouble with the proper table will generally indicate which steps should be used to isolate the trouble. Since any one of the isolation steps and trouble clearance procedures may clear the trouble, it may not be necessary to complete all steps listed for each trouble condition. The station equipment should be retested after some type of action has been completed on an isolation step that indicates a trouble condition exists. In some instances, application of the step by step procedures may be helpful in locating a *trouble not specifically covered by the table*.

**4.02** It is assumed that the station maintenance man will have obtained the proper release of the station equipment and that the station has been removed from the circuit prior to working on any teletypewriter equipment.

**4.03** Teletypewriter machine defects, such as "The keyboard is stiff;" "The machine is making a funny noise," etc., are not included in this section. These may be cleared by application of usual procedures.

**4.04** The trouble report should be analyzed and, if required, sending and receiving distortion tolerance tests should be made before working on the 83B1 or 83B2 control circuit. The typing unit may be tested by using a TP154650 clip to hold the print code bar in its print (spacing) position. The clip mounts on the code bar detent bracket. To prevent the possibility of a V answer back from being generated while receiving fox, make sure the select code bar is in the nonselect

**3. TOOLS AND TEST EQUIPMENT**

**3.01** The following tools and test equipment are desirable for maintenance work:

- 1 - Teletypewriter Maintenance Tools
- 1 - KS-14510-L1 Volt-Ohm-Milliammeter or Equivalent
- 1 - 164-Type Transmission Measuring Set or Equivalent

(spacing) position prior to starting test. The transmitter signal generator may be tested by placing a tape in the transmitter and manually operating the V and TS relay in the 83B1 or 83B2 station control unit. It will be necessary to condition the typing unit and stunt box for continuous sending by having the testboard send a V, CR, LF prior to starting the tape in the transmitter.

**4.05** It should be assumed that, where possible, the Telegraph Testboard has made all necessary tests to determine if the trouble locates in the facilities, at another station on the circuit, or at the station where the trouble report originated, before dispatching a man to the station.

**4.06** *To prevent damage to dry reed relay contacts, the following precautions should be observed when clearing trouble on the 83B1 or 83B2 station equipment.*

(a) When making continuity tests, all power to the station equipment should be disconnected. All continuity tests in this section can be made in this manner unless otherwise specified.

(b) When it is required to make tests with power connected to the station equipment, make sure the test leads of the volt-ohmmeter are used with extreme care to prevent possible shorting of circuits.

**4.07** When contacts of wire spring relays are used to make continuity tests, it is of utmost importance that extreme care be exercised to prevent accidental crossover of wire spring contacts. A 651-type tool should be used for these tests to minimize the possibility of contact crossover.

## 5. TROUBLE CLEARING TABLES

**5.01** Trouble shooting guides provided in this section are as follows:

Table A – Sending Failures—Control Equipment Mounted on 19-Inch Panel

Table B – Receiving Failures—Control Equipment Mounted on 19-Inch Panel

Table C – Sending Failures—Control Equipment Mounted on 23-Inch Panel

Table D – Receiving Failures—Control Equipment Mounted on 23-Inch Panel

Table E – Master Station—Scanner Failures

Table F – Pushbutton Calling Circuit Failures

**5.02** Fig. 2 through 7 and Attachment A, "Message Progress Chart" supplement the step by step trouble clearing procedures in the tables.

TABLE A — 83B1 OR 83B2 SENDING FAILURES — CONTROL EQUIPMENT MOUNTED ON 19-INCH PANEL

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
No BID lamp with tape in transmitter. Receive answer back on TSC.	1	Verify the following: K-KT-T switch in KT or T position. Send key on keyboard operated. Stop run switch on XMTR in run position.	If BID lamp does not light, proceed to next step.	
	2	Isolate trouble to TTY cabinet or control circuit.	Short terminals K1 and K5 on Key and Lamp panel. If BID lamp lights, trouble in the TTY cabinet is indicated. If BID lamp does not light, trouble in control circuit is indicated. Make appropriate continuity test using SD drawings.	SD-70832-B11-FS14 BSP Fig. 2
No answer back on TSC. Tape in transmitter. BID lamp lights. SEND lamp does not light.	3	With no tape in the transmitter, operate the TS relay manually to isolate trouble to operate path, lock path or circuit common to both paths of TS relay. It may be necessary to extinguish the alarm after the TS relay is operated.	Verify continuity as shown in BSP Fig. 3, if the TS relay does not remain operated.	SD-70832-01-B8-FS11 SD-70832-01-B11-FS14
	4	With type typing unit in a select non-print condition (FIGS H LTRS) verify that the function levers associated with QE or EM contacts are operated properly.	Proceed to next step.	SD-70832-01-C4
	5	Request the testboard to send the first character of TSC. Verify that the associated function level is operated and latched.	Check reset bail adjustment. Make several tests, rotating the main shaft of typing unit after each check. If adjustment varies or is difficult to make, check the reset roller bearing surface for wear. Also check the stunt box top guide plate and end plates for wear. (If top guide plate is worn, install TP195109 wear plates.)	BSP Section P34.612
			Trouble also indicates improper selection of function bar due to a coding error or maladjustment of shift slides causing a bow in code bars.	BSP Sections P34.460, P34.612
	6	Request the testboard to send the TSC. Verify that the function lever associated with the second character of TSC operates. The function lever should remain latched unless another character is received or sent.	Check items listed for failure of first character in Step 5.	
	7	After receipt of TSC, the TS relay should be operated and held operated through its lock path.	Verify continuity as shown in BSP Fig. 3.	SD-70832-01-B8-FS11 SD-70832-01-B11-FS14
			Verify continuity of stunt box contacts. Look for a worn contact arm, dirty contact or possible warped contact assembly top plate.	SD-70832-01-C4
Transmitter will not start, BID lamp lights. SEND lamp lights on TSC.	8	At stations equipped with a sprocket feed typing unit, verify that the transmitter control contacts associated with the tabulator or form out function are closed and the particular function is operating properly and meets BSP requirements.	Verify continuity as shown in BSP Fig. 5.	SD-70832-01-B8-FS11 BSP Sections P34.615, P34.618
	9	Isolate trouble to typing unit or control circuit by placing a short across terminals A4 and A6 of the 83B1 or 83B2 control equipment.	Proceed to next item.	BSP Fig. 5
	10	If test indicates trouble in the typing unit, verify continuity of typing unit circuit. (See TROUBLE CLEARANCE column.)	Remove the wire from terminal A4 on the 83B1 or 83B2 control assembly and make point to point checks using the wire removed from terminal A4 and checking towards terminal A6.  RESTORE WIRING WHEN COMPLETED.	BSP Fig. 5 SD-70832-01-B8-FS11 SD-70832-01-B11-FS14 SD-70832-01-B12-FS15

TABLE A — 83B1 OR 83B2 SENDING FAILURES — CONTROL EQUIPMENT MOUNTED ON 19-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Transmitter will not start. BID lamp lights. SEND lamp lights on TSC. (Cont)	10a	At 83B1 stations verify the operation of the function levers associated with the AV, BV or both contacts.	Depending on the type of trouble observed, check the following items. Worn stunt box top guide plate, and plates and contact arm.	Attachment A, SENDING STATION CDC and V ANSWER BACK RECEIVED
			Check the reset bail adjustment. Make several tests, rotating the main shaft after each check. If adjustment varies or is difficult to make, check the reset roller bearing and bushing surfaces for wear. Also check the stunt box top guide plate and end plates for wear.	BSP Section P34.612
			Check function bar for proper coding and wear.	BSP Section P34.460
	10b	At 83B2 stations verify the operation of the function levers associated with the M/V LTRS contact by having the test-board send CR-LF or by operating the K-KT-T switch to the K position and send the CR-LF. Make sure the BID lamp and SEND lamp are lighted before test is made.	Verify that the function bar associated with the M/V function lever is coded to include the second character of station TSC. Depending on station TSC, the bar may be coded for M and V, G and V or M, G and V. <i>Make stunt box checks listed in 10a above.</i>	Attachment A, SENDING STATION CDC and V ANSWER BACK RECEIVED  BSP Fig. 5  SD-70832-01-B8-FS11 SD-70832-01-B11-FS14 SD-70832-01-B12-FS15
	11	YV contacts can also be used to isolate trouble. (See BSP Fig. 5.)		
12	If test indicates the trouble is in the 83B1 or 83B2 control circuit, verify continuity as outlined in TROUBLE CLEARANCE column.		To verify continuity of the transmitter control circuit, remove the S connector from the typing unit, block the V and TS relay operated and check the circuit between terminal A4 and contact 45 of the DS relay. A resistance reading of approximately 5500 to 7500 ohms should be indicated depending upon the option applied to DS resistor.	BSP Fig. 5.  SD-70832-01-B8-FS11 SD-70832-01-B11-FS14 SD-70832-01-B12-FS15
			Check continuity of battery circuit between the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier and terminal A6. Approximately 190 to 200 ohms should be read.	
			Verify continuity of transmitter magnet circuit between contact 44 of DS relay and the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier. Approximately 1100 ohms should be read.	
			Make point to point continuity checks from contact 44 of DS relay to terminal K3 of K terminal strip mounted on Key and Lamp panel.	
			Verify common return circuit at contact 45 of DS relay. This can be done easily by making a continuity test between contact 45 of DS relay and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier.  Check DS capacitor for a short.  <b>RESTORE WIRING WHEN COMPLETED.</b>	BSP Fig. 4 and 5.
After receipt of TSC, transmitter starts but get no answer back on own CDC.	13	Trouble should be isolated to either a V answer back trouble or a transmitter control trouble.	Proceed to next step.	Attachment A, SENDING STATION CDC
	14	When the trouble occurs and the transmitter stops to wait for an answer back, verify the position of the tape in the transmitter. The first character of the next CDC should be directly over the sensing pins. Make sure the tape does not move while checking the tape position. Check tape for proper coding. (LTRS after each CDC.)	Check tape holes for proper gauge. Check transmitter feeding adjustment. DS relay controlling the transmitter may be releasing too slow or too fast depending on trouble observed.	BSP Sections P34.660, P34.633  SD-70832-01-B11-FS14
			Apply option ZH to make DS relay release slower and option ZG to make DS relay release faster.	SD-70832-01-B1-FS1  BSP Fig. 5.

TABLE A — 83B1 OR 83B2 SENDING FAILURES — CONTROL EQUIPMENT MOUNTED ON 19-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
After receipt of TSC, transmitter starts but get no answer back on own CDC. (Cont)	15	If tests indicate trouble in V answer back circuit, request the testboard to send a FIGS H LTRS V to the station, then the CDC for the station under test. Verify if V or some other character is being sent to the line by the VG relay. If a character other than V is generated proceed to the next step. If a V is generated, see TROUBLE CLEARANCE column.	If a V answer back is received by the testboard on the two characters of CDC, this indicates that the universal contacts or circuit are in trouble. The VS relay is probably releasing too soon and is actually garbling the LTRS after the CDC in the tape.	SD-70832-01-B9-FS12
			Adjust the universal contacts per BSP. Check universal contact circuit using Table B, Steps 5 and 6.	BSP Section P34.612
	16	Verify the VG potentiometer adjustment. (See TROUBLE CLEARANCE column.)	Using a CDC test tape, adjust the VG potentiometer for proper answer back margin at the testboard.	BSP Section P65.200
			If a V answer back is not received, check the V answer back circuit using Table B, Steps 7-10.	Table B, Steps 7-10
Transmitter starts, sends three characters and stops. Get alarm lamp and buzzer immediately.	17	With the station equipment in trouble condition, the V relay should be released and the TS relay operated. This trouble in most cases indicates a malfunction of the BB contact in the stunt box. Shorting of this contact will operate the AL relay which in turn releases the V relay thereby stopping the transmitter through the now released DS relay.	Verify the operation of the double blank function levers and contact. Verify that contacts are open under normal condition.	SD-70832-01-C4
			To make a continuity check of the BB circuit, remove the wire from terminal A5 and A6 of A terminal strip mounted on the control equipment. Use the wires removed from A5 and A6 for making point to point and over-all test of BB circuit.  RESTORE WIRING WHEN COMPLETED.	SD-70832-01-B8-FS11
Get answer back on TSC with tape in transmitter. BID lamp is lighted.	18	Verify if the station operates with regular or deferred polling.	BID lamp lighting indicates trouble is not in the 6th pin circuit of transmitter.	Attachment A, TAPE IN TRANSMITTER and RECEIVE TSC  BSP Fig. 2
	18a	When regular polling is used, verify V relay operation when tape is inserted in the transmitter.	When regular polling is used as a permanent polling procedure, contacts 52 and 53 of PR relay should be strapped.	SD-70832-01-B11-FS13
			With power disconnected, test for a short between contact 52 of PR relay and terminal L of V relay. If a short is read, loss of battery through the stunt box contact, FIGS H LTRS is indicated.	SD-70832-01-B10-FS13
			Check continuity of stunt box wiring. Check FIGS H LTRS contact for cleanliness and good contact operation.	SD-70832-01-B8-FS11 SD-70837-01-C4
			With station completely assembled and power disconnected, check continuity between terminal L of V relay and <b>POSITIVE</b> side of the <b>120-volt</b> rectifier. If 191 ohms is not read, an open circuit is indicated between the winding of V relay and terminal C57 of TTY cabinet. Make point to point tests.	SD-70832-B10-FS13
			When regular polling is optional, verify that the PR key is in the regular position and the PR lamp is lighted. If PR lamp does not light, check PR relay circuit for continuity.	SD-70832-01-B11-FS14
	18b	When deferred polling is used, verify that the V relay operates after first poll. Failure of the V relay to operate after TSC, indicates trouble in the QE or EM contacts of the stunt box or loss of battery. With power connected, place a tape in the transmitter and short contacts 52 and 53 of PR relay. If V relay operates, trouble in the QE or EM contact is indicated. If V relay fails to operate, loss of battery or common return is indicated.	Request the testboard to send FIGS H LTRS V and then the TSC for the station under test.	Attachment A, RECEIVE TSC
Verify function lever and contact operation using Steps 5-7. (In Step 7 substitute V relay for TS relay).			Table A, Steps 5-7	

TABLE A - 83B1 OR 83B2 SENDING FAILURES - CONTROL EQUIPMENT MOUNTED ON 19-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Get answer back on TSC with tape in transmitter. BID lamp is lighted. (Cont)	18c	Disconnect all power, and check battery circuit by verifying continuity between contact 12 of the A relay and the <i>POSITIVE</i> side of the <i>120-volt</i> rectifier. Approximately 190 to 200 ohms should be read.	If a proper resistance is not read, check continuity of stunt box wiring. Check FIGS H LTRS contact for cleanliness and good contact operation.	SD-70832-01-B10-FS13
	18d	With power disconnected, check the common return circuit by placing a tape in the transmitter and verify continuity between contact 22 of KS relay and the <i>NEGATIVE</i> side of the <i>120-volt</i> rectifier.	If a short is not read, check D cord and connectors for an open wire. If a short is read, check the A and V resistor for an open.	SD-70832-01-B10-FS13
BID lamp will not light when KS key is depressed.	19	Isolate trouble in KS relay operate path or contact by placing a short across contacts 22 and 23 of the KS relay and verifying if BID lamp lights.	If BID lamp does not light, replace lamp and test.	SD-70832-01-B10-FS13 BSP Fig. 2
			Verify that a short is read between contact 23 of the KS relay and the <i>NEGATIVE</i> side of the <i>120-volt</i> rectifier.	
			Make point to point continuity checks from contact 22 of the KS relay to the BID lamp as required.	
	20	If BID lamp lights, trouble in the KS relay operate path is indicated.	Verify that contacts 1 and 2 of KS key are operating properly. Check contacts for cleanliness and over travel.	SD-70832-01-B10-FS13
Verify that a short is read from the <i>POSITIVE</i> side of the <i>120-volt</i> rectifier and contact 24 of the KS relay.				
Check the KS relay for an open by measuring continuity from the <i>NEGATIVE</i> side of the <i>120-volt</i> rectifier to contact 25 of the KS relay. Make point checks as required.				
Station does not generate LTRS on KS bid.	21	At an ASR station, verify that the transmitter makes one revolution after TSC is received.	If the transmitter does not make any revolutions after the TSC is received, trouble in the transmitter control circuit is indicated. (See Step 8.)	Table A, Step 8
	22	At a KSR station, verify that the VG relay is operating on the TSC. If the VG relay does not operate, proceed to Table B, Step 2.	If the V answer back is received under normal operation, that is, without a bid being placed, trouble in the LTRS potentiometer is indicated. Adjust generator for LTRS as covered in BSP.	SD-70832-01-B9-FS12 BSP Section P65.200
Transmitter continues to run after CDC.  Or Transmitter sends several characters after CDC before stopping.	23	At 83B1 stations, trouble in the AV-BV contacts is indicated. If ZY option is used, a defective VS diode is also indicated.	Check stunt box contacts for a possible short. If option ZY is used, a slightly defective diode will permit the positive battery through contacts 44 and 45 of VS relay to pass through the VS diode and hold the DS relay operated. Check diode and replace as required.	SD-70832-01-C4 SD-70832-01-B8-FS11 SD-70832-01-B9-FS12
	23a	At 83B2 stations, trouble in the M/V LTRS, CR-LF and YV contacts if used is indicated. If ZY option is installed, a defective VS diode is also indicated.		

TABLE B — 83B1 OR 83B2 RECEIVING FAILURES — CONTROL EQUIPMENT MOUNTED ON 19-INCH PANEL

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE	
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
Station fails to answer back on TSC.	1	Verify that the trouble condition is an answer back failure and not a TAPE SENDING FAILURE.	If check indicates a tape sending problem, use appropriate trouble condition on Table A to isolate the trouble.	Table A	
	2	Request the testboard to send FIGS H LTRS V and the TSC code. Verify that the VG relay is operating and attempting to generate an answer back. If the VG relay does not operate, proceed to Step 4. (See TROUBLE CLEARANCE column.)	At KSR stations, verify that the TS relay is not operated and that the number 10 make contacts of TS relay are not shorted. If tests indicate no trouble or if TTY equipment is an ASR, proceed to next step.	BSP Fig. 7	
	3	If VG relay operates and a character other than V is generated.	Check contacts of VG relay for cleanliness.		
			Readjust VG potentiometer for best possible margin at testboard.	BSP Section P65.200	
			At 100 WPM check option ZW. Verify that resistor G4 is not open and that all wires from the resistor are connected.	SD-70832-01-B9-FS12	
	4	Check the AD and QE contacts at 83B1 stations or JA and EM contacts at 83B2 stations for cleanliness and good contact closure. Contact closure can be checked by removing the wire from terminals A2 and A3 of A terminal strip on 83B control equipment and measure continuity between each wire and terminal A10. Verify that function levers associated with the TSC are operating properly.	Make point to point continuity checks. Check stunt box for worn parts associated with contact under test. Check stunt box top guide plate and end plates for wear. (If top guide plate is worn, install TP195109 wear plates.)	SD-70832-01-B9-FS12 SD-70832-01-C4	BSP Fig. 7
			Check reset bail adjustment.		BSP Section P34.612
			Adjust VG relay per SD drawing and BSP.		SD-70832-01-F1 BSP Section 040-767-701
	5	Test universal contact circuit by removing the wire from terminal A2 of 83B control unit. MAKE SURE THERE IS NO TAPE IN TRANSMITTER AND THE V AND TS RELAY ARE NOT OPERATED. If a continuous V is not sent, have the testboard send FIGS H LTRS V. A continuous V should be generated. If only one character is sent, trouble in the universal circuit is indicated when option ZX is installed. If option ZY is installed the trouble could also locate in the M/V LTRS or AV-BV contact whichever applies to the particular station. (Issue 6 or later, ZY option is standard.)  RESTORE WIRING BEFORE PROCEEDING TO NEXT STEP.	<b>AT 83B1 STATIONS</b> Check the contact arm of universal contact assembly for a groove worn on end of arm. Replace if necessary. If new contact arm is not readily available, interchange with same type of arm associated with QE or AD contacts. Replace as soon as possible.	SD-70832-01-C4 Stunt box Drawing 1 (See examples 2 and 3 of legend.) SD-70832-01-B9-FS12	
			Check stunt box for worn parts associated with contact under test. Check stunt box top guide plate and end plates for wear. (If top guide plate is worn, install TP195109 wear plates.)		
			Recheck reset bail adjustment.		BSP Section P34.612
			<b>AT 83B2 STATIONS</b> Check the universal contacts for wear or pitting. Clean contact assembly and readjust per BSP. Install new assembly where required and recheck the universal contact adjustment.		BSP Section P34.612
			When applicable, verify that the function levers associated with the YV contacts are operating properly and that the YV contacts are not shorted.		SD-70832-01-C4 Attachment A, CROSS OFFICE CODING
	6	Check continuity of the universal contact circuit by removing the wire from terminals A1 and A10 of A terminal strip mounted on 83B control equipment. Using the two wires removed from terminals A1 and A10, verify that the universal circuit is open when the typing unit is in a closed or idle condition and that the universal circuit will go closed and open during one revolution of typing unit main shaft.  RESTORE WIRING BEFORE PROCEEDING TO NEXT STEP.	Make point to point check.  RESTORE WIRING WHEN COMPLETED.	SD-70832-01-B9-FS12 SD-70832-01-C4	

TABLE B - 83B1 OR 83B2 RECEIVING FAILURES - CONTROL EQUIPMENT MOUNTED ON 19-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
Station fails to answer back on TSC. (Cont)	7	On stations equipped with ZY option, check for a short between contact 45 of VS relay and terminal A4 of the A terminal strip on 83B control equipment. Due to the VS diode in the circuit, a high resistance may be read. Reverse the polarity of meter and recheck for a short.		Inspect wiring and check VS diode for an open.	SD-70832-01-B9-FS12 SD-70832-01-B8-FS11 BSP Fig. 7
	8	Remove the wire from terminals A4 and A6 of the A terminal strip mounted on 83B control equipment. Using the wires removed from A4 and A6, verify the electrical operation of AV-BV or M/V LTRS contact. On 83B2 stations, with the stunt box in a select condition, any character other than M, V, LTRS or the second character of the TSC should open the circuit and a V should close the circuit. At 83B1 stations, the first character of the CDC should open the AV or BV contact and a V should close the circuit.  RESTORE WIRING BEFORE PROCEEDING TO NEXT STEP.		Make point to point check.  RESTORE WIRING WHEN COMPLETED.	SD-70832-01-B8-FS11 SD-70832-01-C4 BSP Fig. 7
	9	Verify that the VS relay contacts are open when the VS relay is released.		With power removed, measure continuity between the Negative side of the rectifier mounted with 83B control equipment and contact 43 of VS relay. A short should be indicated. Move meter lead to contact 42 of VS relay, resistance above 4000 ohms should be indicated.	SD-70832-01-B9-FS12 BSP Fig. 7
				If a defective VS relay is indicated, replace relay if one is not readily available. If another relay is available, use the SC or RC relay, whichever is not being used. Make sure the wires removed from the SC or RC relay are individually taped to prevent possible shorting. Refer to App. Fig. 1 for contact association and numbering. Replace defective relay as soon as possible.  RESTORE WIRING WHEN COMPLETED.	SD-70832-01-C1
10	Check component parts of V generator circuit. Check capacitors for a short, resistors and relays for an open.		Replace defective components.	SD-70832-01-B9-FS12 SD-70832-01-C1 BSP Fig. 7	
Station fails to answer back on CDC.	11	Request the testboard to send FIGS H LTRS V and then the CDC. At KSR stations, verify that the TS relay is released. (See TROUBLE CLEARANCE column.)		If a V answer back is generated, proceed to next step. If a V answer back is not generated, proceed to Step 13.	
	12	If the VG relay operates and the station appears to be working properly, this indicates that the universal contact circuit is open on 83B1 and 83B2 stations or incorrect timing of universal contacts at 83B2 stations. Either of the above examples will permit the V to be generated while receiving the LTRS character between CDCs during normal tape transmission.		Adjust universal contacts per BSP.	BSP Section P34.612
				Test universal contact circuit per Steps 5 and 6.	SD-70832-01-C4 SD-70832-01-B9-FS12
13	If the station is shifted to the print condition and the VG relay fails to operate, this indicates a possible short in the universal contact circuit, failure of CDC function levers or contacts. <i>Before making other checks, test the universal contact circuit using Steps 5 and 6.</i>		If function lever of either character fails to operate properly, check the reset bail adjustment. Make several checks of reset bail adjustment rotating the main shaft after each test. If the reset bail adjustment varies, check the reset roller, for wear on bearing surfaces. Check stunt box top guide plate for wear. Install TP195109 wear plates when required.	BSP Section P34.612	

TABLE B — 83B1 OR 83B2 RECEIVING FAILURES — CONTROL EQUIPMENT MOUNTED ON 19-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Station fails to answer back on CDC. (Cont)	14	Request the testboard to send the first character of the CDC. Verify that the function lever associated with the first character of CDC is operated and latched. Request the second character of CDC and verify the operation of the function lever associated with second character of CDC. If another character is not sent or received the second function lever associated with the CDC will remain operated and latched.	Failure of function levers to operate also indicates possible improper selection of function bars due to wear or breakage of tines. Maladjustment of shift slide will bow the associated code bar causing abnormal wear of tines.	BSP Sections P34.460, P34.461, P34.612
	14a	To test the electrical circuit of the AD or JA contact, disconnect all power and manually operate the function lever associated with the AD or JA contact, whichever applies. Remove the wire from terminal A2 of the A terminal strip mounted on the 83B control equipment and make continuity test between the wire removed and terminal A10. Meter should indicate on open. In the same manner test from terminal A3 to A10.  RESTORE WIRING BEFORE PROCEEDING TO NEXT STEP.	Make point to point check using SD drawings.	SD-70832-01-B9-FS12
			At 83B2 stations, verify that the function levers associated with the YV contacts are operating properly and that the stunt box contacts are not shorted.	SD-70832-01-C4
15	If tests isolate trouble to V generator circuit, use procedure outlined in Steps 9 and 10.		Table B, Steps 9 and 10	
Do not receive answer back on 28 ROTR CDC.	16	Verify that power is connected to the ROTR and that the motor is running. When the power is disconnected to the ROTR, the line shunt relay in the electrical service assembly releases and puts a short on the answer back contact thus preventing an answer back from being sent to the line on the ROTR CDC.	Check fuse and power connections to ROTR.  If trouble is indicated in the line shunt relay, make continuity test with drawing information supplied with the station or PLSO.	BSP Section P34.308  Wiring information supplied on copy of requisition for station equipment.
	16a	Verify the operation of function levers associated with the ROTR CDC.  When the 19-inch panel is used for mounting station control equipment, the line relay in the electrical service unit of the ROTR is normally in series with the line. Blinding and unblinding of ROTR is usually accomplished by using stunt box contacts to control the output of armature and marking contact of ROTR line relay.  Any four slots which are available and adjacent and can be controlled by the FIGS H stripper bail are normally used.  Testing of function levers can be accomplished by using the keyboard of station equipment and sending the CDC for ROTR and lock out code. Levers operate as follows:  First lever operates on first character of CDC and latches to the rear position.  Second lever operates on second character of CDC and latches to the rear position.  Second lever operates a break contact to permit answer back operation.  The first and second lever will be released on next character received.  Third lever operates on any character or function and latches to the rear position under control of the FIGS H stripping bail.  The fourth lever operates on LF of lock out code and latches to the rear position under control of the FIGS H stripper bail.  The fourth lever operates a break contact to unblind the ROTR.	Depending on the type of trouble observed, check the following items.  Reset bail adjustment. Make this check several times, rotating the main shaft of typing unit after each check. If difficulty is experienced in making reset bail adjustment, check the bearing and bushing surfaces of the reset roller, trip lever shaft and mounting bracket for wear. Also check the stunt box top guide plate and end plates for wear. Verification of electrical circuit will have to be made from information supplied with the station.	BSP Section P34.612  Wiring information supplied on copy of requisition for station equipment.

TABLE B — 83B1 OR 83B2 RECEIVING FAILURES — CONTROL EQUIPMENT MOUNTED ON 19-INCH PANEL (Cont)					
TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
28 ROTR does not connect. Receive V answer back.	17	Verify operation of function levers as outlined in Step 16 above.		Make appropriate tests as outlined in Step 16.	
Open or grounded loop.	18	Isolate the trouble to the loop or station equipment by removing the station wire connections from the terminal block provided with the loop facilities and make appropriate tests with the Telegraph Testboard.		If the trouble isolates to the station equipment, make continuity tests of internal line connections on station equipment using Fig. 6 as a guide. Leave the station connections to external terminal block <b>removed</b> while making tests.  RESTORE ALL WIRING WHEN COMPLETED.	SD-70832-01-B12-FS15 SD-70832-01-B11-FS14, Note 3

TABLE C — 83B1 OR 83B2 SENDING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL					
TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
No BID lamp with tape in transmitter. Receive answer back on TSC.	1	Verify the following: K-KT-T switch in KT or T position. Send key on keyboard operated. Stop run switch on XMTR in run position.		If BID lamp does not light, proceed to next step.	
	2	Isolate trouble to TTY cabinet or control circuit.		Short terminals K1 and K5 of key and lamp panel. If BID lamp lights, trouble in the TTY cabinet is indicated. If BID lamp does not light, trouble in the control circuit is indicated. Make appropriate continuity tests using SD drawings.	SD-70832-B11-FS14 SD-70832-B4-FS3  BSP Fig. 2
No answer back on TSC. Tape in transmitter. Bid lamp lights. SEND lamp does not light.	3	With no tape in the transmitter, manually operate the TS relay to isolate trouble to operate path, lock path or circuit common to both paths of TS relay.  If an alarm condition is indicated after manually operating the TS relay, depress the AR key.		If TS relay does not remain operated, trouble in the lock path is indicated. To check the lock path of the TS relay, verify continuity between the number 1 <b>stationary</b> contact of the TS relay and the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier. Approximately 190 to 200 ohms should be read. If a higher resistance is read, an open circuit or dirty FIGS H LTRS contacts is indicated. Make point to point checks as required. If TS relay remains operated, trouble in operate path is indicated. Proceed to next step.	SD-70832-01-B1-FS1
	4	With typing unit in a select nonprint condition, FIGS H LTRS, verify that function levers associated with QE or EM contacts are operating properly.		Proceed to next step.	SD-70832-01-C4
	5	Request the testboard to send the first character of TSC. Verify that the associated function lever is operated and latched.		Check reset bail adjustment. Make several checks, rotating the main shaft after each check. If difficulty is experienced in making the reset bail adjustment, check the bearing and bushing surfaces of the reset roller for wear. Also check the stunt box top guide plate and end plates for wear.  Trouble also indicates an improper selection of function bar due to wear, breakage of tine or improper coding on recent change. Improper adjustment of shift slides can cause a bow in the associated code bar resulting in the breaking or wearing of function bar tines.	BSP Section P34.612  BSP Section P34.460

TABLE C — 83B1 OR 83B2 SENDING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
No answer back on TSC. Tape in transmitter. BID lamp lights. SEND lamp does not light. (Cont)	6	Request the testboard to send the TSC. Verify that the function lever associated with the second character of TSC operates. The function lever should remain operated as long as no other character is sent or received.		Check items listed for failure of first character in Step 5 above.	
	7	After receipt of TSC, the TS relay should be operated and held operated through its lock path.		Make point to point continuity checks of TS relay operate or lock path as required.	SD-70832-01-B1-FS1
		With all power disconnected, verify the continuity of the TS relay using the following procedure: Block the V relay operated, manually operate the function lever associated with the QE or EM stunt box contacts and measure continuity between the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier and the L side of the TS relay winding. Approximately 190 to 200 ohms should be read. If a higher resistance is read, an open or dirty contacts in the operate path of the TS relay is indicated.		Verify continuity of stunt box contacts. Look for worn contact arm, dirty contact, or possible warped contact assembly top plate.	SD-70832-01-C4
Transmitter will not start. BID lamp lights. SEND lamp lights on TSC.	8	At stations equipped with a sprocket feed typing unit, verify that the transmitter control contacts associated with the tabulator or form out function are closed and the particular function is operating properly and meets BSP requirements.		Circuit continuity can be checked at terminals C23 and C24 on TTY cabinet. (F option)	SD-70832-01-B1-FS1 BSP Fig. 5
	9	At 83B1 stations, verify the operation of the function levers associated with the AV or BV contacts. The function bar associated with the AV or BV contacts should be coded to operate on the first character of the CDC permitting the function lever to open the AV or BV contacts. The V answer back should release the operated function lever and permit the AV or BV contacts to close.		Depending on the type of trouble observed, check the following items; worn stunt box top guide plates, stunt box end plates, contact arm, and the reset bail adjustment.	Attachment A, SENDING STATION CDC and V ANSWER BACK RECEIVED
				Check reset bail adjustment several times. Rotate the main shaft after each check. If adjustment varies or is difficult to make, check the reset roller for worn bearing and bushing surfaces.	BSP Section P34.612
				Check function bar for proper coding and wear.	BSP Section P34.460
				If the function lever is operating properly, check continuity between the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier and the number <b>8 stationary</b> contact of the TS relay. Approximately 190 to 200 ohms should be read. If a higher resistance is read, an open, or dirty contacts in the AV-BV circuit is indicated. If proper resistance is read, proceed to Step 11. <b>Check wire spring contacts for possible cross over after making tests.</b>	SD-70832-01-B1-FS1
	9a	At 83B2 stations, with power connected, verify the operation of the function levers associated with the M/V LTRS contact by having the testboard send CR-LF or by operating the K-KT-T switch to the K position and send the CR-LF. Make sure the BID lamp and SEND lamp are lighted before test is made.		Verify that the function bar associated with the M/V function lever is coded to include the second character of station TSC. Depending on station TSC, the bar may be coded for M and V, G and V or M, G and V.	Attachment A, SENDING STATION CDC and V ANSWER BACK RECEIVED
If the M/V function lever is operating properly, check continuity between the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier and the number <b>8 stationary</b> contact of the TS relay. Approximately 190 to 200 ohms should be read. If a higher resistance is read, an open or dirty contact in the M/V LTRS path is indicated. If proper resistance is read, proceed to Step 11. <b>Check wire spring contacts for possible cross over after making tests.</b>				SD-70832-01-B1-FS1 BSP Fig. 5	
	10	YV contacts can also be used to isolate trouble. (See BSP Fig. 5.)			

TABLE C — 83B1 OR 83B2 SENDING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Transmitter will not start. BID lamp lights. SEND lamp lights on TSC. (Cont)	11	If tests indicate the trouble is in the 83B1 or 83B2 control circuit, verify continuity as outlined in TROUBLE CLEARANCE column.	With all power disconnected, the V and TS relay blocked operated, verify continuity between the number 8 <i>stationary</i> contact of the TS relay and contact 45 of the DS relay.	SD-70832-01-B1-FS1 BSP Fig. 5
			Make point to point continuity checks from contact 44 of DS relay to the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier.	
			Verify common return circuit at contact 45 of DS relay. This can be done easily by making a continuity test between contact 45 of the DS relay and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier.	
			Check DS capacitor for a short.	
			If all continuity checks indicate that the trouble is not in the circuit wiring, verify that the DS relay is operating. This can be accomplished by placing an ammeter across contacts 44 and 45 of the DS relay and checking current flow. If the DS relay operates properly, the contacts will close and a no current indication should be observed. If the contacts do not close, continuous current will be indicated. Replace relay as required. The SC or RC relay may be used as a substitute until a new relay is available. <b>Check wire spring contacts for possible cross over after making tests.</b>	SD-70832-01-B1-FS1 BSP Fig. 2
After receipt of TSC transmitter starts but get no answer back on own CDC.	12	Trouble should be isolated to either a V answer back trouble or a transmitter control trouble.	Proceed to next step.	Attachment A, SENDING STATION CDC.
	13	When the trouble occurs and the transmitter stops to wait for the answer back, verify the position of the tape in the transmitter. The first character of next CDC should be directly over the sensing pins. Make sure the tape does not move while making check. Check tape for proper coding. (LTRS after each CDC.)	Check tape holes for proper gauge. Check transmitter feeding adjustment. The DS relay controlling the transmitter may be releasing too slow or too fast depending on trouble observed.	BSP Sections P34.660, P34.663 SD-70832-01-B11-FS14
			Apply option ZH to make DS relay release slower and option ZG to make DS relay release faster.	SD-70832-01-B1-FS1 BSP Fig. 5
	14	If test indicates trouble in V answer back circuit, request the testboard to send a FIGS H LTRS V and the CDC for the station under test. Verify if a V or some other character is being sent to the line by the VG relay. (See TROUBLE CLEARANCE column.)	If a V answer back is received by the testboard on the two characters of the CDC, this indicates that the V generator is functioning properly. Test indicates that the universal contacts or circuit is permitting the V to be generated too soon. This will cause the LTRS character following the CDC under normal tape sending condition and the V answer back to garble. Check universal contacts per Table D, Steps 5 and 6.	Table D, Steps 5 and 6
	15	Verify VG potentiometer adjustment. (See TROUBLE CLEARANCE column.)	Using a CDC test tape, adjust the VG potentiometer for proper answer back margin at the testboard.	BSP Section P65.200
If trouble is still indicated, check the V answer back circuit using applicable steps in Table D.			Table D, Steps 13, 14, 15	
Transmitter starts, sends three characters and stops. Get alarm lamp and buzzer immediately.	16	With station equipment in the trouble condition, the V relay should be released and the TS relay operated. This trouble in most cases indicates a malfunction of the BB contact in the stunt box. Shorting of this contact will operate the AL relay which in turn releases the V relay thereby stopping the transmitter through the now released DS relay.	Verify the operation of the double blank function levers and contact. Verify that contacts are open under normal condition. Continuity tests can be made between the <b>POSITIVE</b> side of <b>120-volt</b> rectifier and the number 3 <b>make</b> contact of the TS relay.	SD-70832-01-C4 SD-70832-01-B1-FS1

TABLE C — 83B1 OR 83B2 SENDING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Get answer back on TSC with tape in transmitter. BID lamp is lighted.  Or  No tape pick up.	17	Verify if station operates with regular or deferred polling.		Attachment A, TAPE IN TRANSMITTER and RECEIVE TSC
	17a	When regular polling is used, verify V relay operation when tape is inserted in transmitter.	BID lamp lighting indicates trouble is not in the 6th pin circuit of transmitter.	
			When regular polling is used as a permanent polling procedure, contacts 52 and 53 of PR relay should be strapped.	SD-70832-01-B4-FS3
			With power disconnected test for a short between contact 52 of PR relay and terminal L of V relay. If a short is read, loss of battery through the stunt box contact FIGS H LTRS is indicated.	SD-70832-01-B4-FS3
			Check FIGS H LTRS contact for cleanliness and good contact operation.	SD-70832-01-B8-FS11 SD-70832-01-C4
			With station completely assembled and power disconnected, test continuity between terminal L of V relay and <b>POSITIVE</b> side of the <b>120-volt</b> rectifier. Approximately 190 to 200 ohms should be read. If a higher resistance is read, an open between the V relay and the S connector on TTY cabinet is indicated. Make point to point tests as required.	SD-70832-B4-FS3
			When regular polling is optional, verify that the PR key is in the regular position and the PR lamp is lighted. If PR lamp does not light, check PR relay circuit for continuity.	SD-70832-01-B11-FS14 SD-70832-01-B1-FS1
	17b	When deferred polling is used, verify that V relay operates after first poll. Failure of the V relay to operate after TSC indicates trouble in the QE or EM contacts of the stunt box or loss of battery.	Request the testboard to send FIGS H LTRS V and then the TSC for the station under test.	Attachment A, RECEIVE TSC
		With power connected, place a tape in the transmitter and short contacts 52 and 53 of PR relay. If the V relay operates, trouble in the QE or EM contact is indicated. If the V relay fails to operate, loss of battery or common return is indicated.	Verify function lever and contact operation using Steps 5-7. (In Step 7 substitute V relay for TS relay.)	Table C, Steps 5-7
		Disconnect all power and verify battery circuit by checking for a short between contact 12 of the A relay and the <b>POSTIVE</b> side of the <b>120-volt</b> rectifier. Approximately 190 to 200 ohms should be read.	If a short is not read, check continuity of stunt box wiring. Check FIGS H LTRS contact for cleanliness and good contact operation.	SD-70832-01-B4-FS3
	With power disconnected, check the common return circuit by placing a tape in the transmitter and testing for a short between contact 22 of KS relay and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier.	If a short is not read, check D cord and connectors for an open wire. If a short is read, check the A and V resistor for an open.	SD-70832-01-B4-FS3	
Transmitter continues to run after CDC.  Or  Transmitter sends several characters after CDC before stopping.	18	At 83B1 stations, trouble in the AV-BV contacts is indicated. If ZY option is used, a defective VS diode is also indicated.	Check stunt box contacts for a possible short.  If option ZY is used, a slightly defective diode will permit the positive battery through contacts 44 and 45 of VS relay to pass through the VS diode and hold the DS relay operated. Check diode and replace as required.	SD-70832-01-C4 SD-70832-01-B3-FS2 SD-70832-01-B1-FS1
	18a	At 83B2 stations, trouble in the M/V LTRS, CR-LF and YV contacts if used is indicated. If ZY option is installed, a defective VS diode is also indicated.		

TABLE C — 83B1 OR 83B2 SENDING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL (Cont)					
TROUBLE CONDITION	STEP	ISOLATION PROCEDURES		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
BID lamp will not light when KS key is depressed.	19	Isolate trouble to KS relay operate path or contact by placing a short across contacts 22 and 23 of the KS relay and verifying if BID lamp will light.		If BID lamp does not light, replace lamp and test.  Verify that a short is read between contact 23 of the KS relay and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier.  Make point to point continuity checks from contact 22 of the KS relay to the BID lamp as required.	SD-70832-01-B4-FS3
	20	If BID lamp lights, trouble in the KS relay operate path is indicated.		Verify that contacts 1 and 2 of KS key are operating properly. Check contacts for cleanliness and over travel.  Verify that a short is read from the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier and contact 24 of the KS relay.  Check the KS relay for an open by measuring continuity from the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier to contact 25 of the KS relay. Make point checks as required.  Verify that the KS relay is operating by placing an ammeter across contacts 22 and 23 of the KS relay. With power connected, current will be read if the contacts are open and no current will be indicated if the contacts are closed.	
Station does not generate LTRS on KS bid.	21	At an ASR station, verify that the transmitter makes one revolution after TSC is received.		If the transmitter does not make any revolutions after the TSC is received, trouble in the transmitter control circuit is indicated. (See Step 8.)	Table C, Step 8
	22	At a KSR station, verify that the VG relay is operating on the TSC. If the VG relay does not operate, proceed to Table B, Step 2.		If the V answer back is received under normal operation, that is, without a bid being placed, trouble in the LTRS potentiometer is indicated. Adjust generator for LTRS as covered in BSP.	SD-70832-01-B3-FS2 BSP Section P65.200 Table B, Step 2

TABLE D — 83B1 OR 83B2 RECEIVING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL					
TROUBLE CONDITION	STEP	ISOLATION PROCEDURES		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
Station fails to answer back on TSC.	1	Verify that the trouble condition is an answer back failure and not a TAPE SENDING FAILURE.		If check indicates tape sending problem, use Table C and appropriate trouble condition.	Table C, Steps 5-11
	2	Request the testboard to send FIGS H LTRS V and the TSC code. Verify that the VG relay is operating and attempting to generate an answer back. If the VG relay does not operate, proceed to Step 4.			
	3	If the VG relay operates and a character other than V is generated, see TROUBLE CLEARANCE column.		Check contacts of VG relay for cleanliness.  Readjust VG potentiometer for best possible margin at testboard.	BSP Section P65.200
				At 100 WPM check option ZW. Verify that resistor G4 is not open and that all wires from resistor are connected.	SD-70832-01-B3-FS2

TABLE D — 83B1 OR 83B2 RECEIVING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Station fails to answer back on TSC. (Cont)	4	Check the stunt box contacts AD and QE at 83B1 stations or JA and EM at 83B2 stations for cleanliness and good contact closure. Contact closure can be checked with an ohmmeter at the contact block terminals. Verify that the function levers associated with the TSC are operating properly.	Make point to point continuity checks. Check stunt box for worn parts associated with contact under test. Check stunt box top guide plate and end plates for wear. (If top guide plate is worn, install TP195109 wear plates.)	SD-70832-01-B3-FS2 SD-70832-01-C4
			Check reset bail adjustment.	BSP Section P34.612
			Adjust VG relay per SD drawing and BSP.	SD-70832-01-F1 BSP Section 040-767-701
	5	Test universal contact circuit by removing the wire from terminal C53 on TTY cabinet. <b>MAKE SURE THERE IS NO TAPE IN TRANSMITTER AND THE V AND TS RELAY ARE NOT OPERATED.</b> If a continuous V is not sent, have the testboard send a FIGS H LTRS V. A continuous V should be generated. If only one character is sent, trouble in the universal contact or circuit is indicated when option ZX is installed. If option ZY is installed, the trouble could also locate in the M/V LTRS or AV-BV contact whichever applies to the particular station. (Issue 6 or later ZY option is standard.)  <b>RESTORE WIRING BEFORE PROCEEDING TO NEXT STEP.</b>	<b>AT 83B1 STATIONS</b> Check the contact arm of universal contact assembly for groove worn on end of arm. Replace if necessary. If new contact arm is not readily available, interexchange with same type of arm associated with QE or AD contacts. Replace as soon as possible.	SD-70832-01-C4 Stunt box Drawing 1 (See example 2, 3 of legend.)
			Check stunt box for worn parts associated with contact under test. Check stunt box top guide plate and end plates for wear. (If top guide plate is worn, install TP195109 wear plates.)	
			Recheck reset bail adjustment.	BSP Section P34.612
			<b>AT 83B2 STATIONS</b> Check the universal contacts for wear or pitting. Clean contact assembly and readjust per BSP. Install new assembly where required and readjust universal contact assembly.	BSP Section P34.612
	6	Check continuity of the universal contacts by removing the typing unit from the TTY cabinet and measuring continuity at the contact terminals. Verify that universal contacts go open and closed as the typing unit main shaft is rotated. If test indicates no trouble in the contacts, place typing unit back in TTY cabinet and restore all connectors.  Test complete universal contact circuit by measuring continuity between contact 45 of the VS relay and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier. The ohmmeter should indicate a fluctuation from 7,000 to 12,000 ohms as the main shaft of the TTY assembly is rotated slowly.	Make point to point continuity checks.  <b>RESTORE WIRING WHEN COMPLETED.</b>	SD-70832-01-B3-FS2 SD-70832-01-C4
7	On stations equipped with ZY option, check the M/V or AV-BV contact circuit.	Remove the typing unit from the base and verify the electrical operation of AV-BV or M/V LTRS contact. On 83B2 stations, with the stunt box in a select condition, any character other than the second character of TSC, M, V or LTRS should open the circuit and a V should close the circuit. At 83B1 station, the first character of CDC should open the AV or BV contact and a V should close the circuit.  <b>RESTORE WIRING BEFORE PROCEEDING TO NEXT STEP.</b>	SD-70832-01-B1-FS1 SD-70832-01-C4	
8	With the M/V or AV-BV stunt box contacts closed, verify continuity from the number 1 terminal of VS diode and the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier. Approximately 190 to 200 ohms should be read. Verify continuity from the number 2 terminal of the VS diode and contact 45 of the VS relay. A short should be read.	Inspect wiring and check VS diode for an open. Replace diode as required.	SD-70832-01-B3-FS2 SD-70832-01-B1-FS1	

TABLE D - 83B1 OR 83B2 RECEIVING FAILURES - CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Station fails to answer back on TSC. (Cont)	9	Verify that VS relay contacts are open when the VS relay is released.	With power removed, measure continuity between the <i>NEGATIVE</i> side of the <i>120-volt</i> rectifier and contact 43 of VS relay. A short should be indicated. Move meter lead to contact 42 of VS relay, resistance above 4000 ohms should be indicated.	SD-70832-01-B3-FS2
			If defective VS relay is indicated, replace relay if one is readily available. If another relay is not available, use the SC or RC relay, whichever is not being used, as a substitute. Make sure the wires removed from the SC or RC relay are individually taped to prevent possible shorting. Refer to App. Fig. 1 for contact association and numbering. Replace relay as soon as possible.  RESTORE WIRING WHEN COMPLETED.	SD-70832-01-C1
	10	Check component parts of V generator circuit. Check capacitors for a short, resistors and relays for an open.	Replace any defective components.	SD-70832-01-B3-FS2
Station fails to answer back on CDC.	11	Isolate the trouble to the typing unit or V generator by verifying if an answer back is received on the station TSC. Make test per Step 2.	If a V answer back is received on the TSC, proceed to the next step.	Table D, Step 2
	12	Request the testboard to send the first two characters of CDC and verify that the VG relay operates. If the VG relay operates and the station is shifted to the print condition, this indicates that the universal contact circuit is open at 83B1 stations. At 83B2 stations, it indicates an open or incorrect timing. Either of the above examples will permit the V to be generated too soon causing a garble to be sent to the line.	Adjust universal contacts per BSP.	BSP Section P34.612
			Test universal contact circuit per Step 5.	SD-70832-01-C4 SD-70832-01-B3-FS2
	12a	If the station is shifted to the print condition and the VG relay fails to operate, this indicates a possible short in the universal contact circuit, failure of CDC function levers or contacts. Before making other checks, test the universal contact circuit using Steps 5 and 6.	If function lever of either character fails to operate properly, check the reset bail adjustment for several revolutions of the main shaft. If the adjustment varies, check the reset roller for wear on bushing or bearing surfaces. Check stunt box top guide plate for wear. Install TP195109 wear plates when required.	BSP Section P34.612 Table D, Steps 5, 6
	13	Condition the station for keyboard operation when feasible. Send the first character of CDC. Verify that function lever associated with first character of CDC is operated and latched. Send the second character of CDC and verify the operation of function lever associated with second character of CDC. If another character is not sent or received, the function lever associated with the second character of CDC will remain operated and latched.	Failure of the function levers to operate also indicates a possible improper selection of function bar due to wear or breakage of tines. Improper adjustment of shift slides can bow the associated code bar causing abnormal wear of tines.	BSP Sections P34.460, P34.461, P34.612
	14	To test the electrical circuit of the AD or JA contact, disconnect all power and manually operate the function lever associated with the AD or JA contact which ever applies and verify continuity between the <i>NEGATIVE</i> side of the <i>120-volt</i> rectifier and the number 11 stationary contact of the V relay. An open or high resistance should be read.	Make point to point check using SD drawings.	SD-70832-01-B3-FS2 SD-70832-01-C4
			Trouble could also isolate to the C2 or B1 cord and connectors. With all power removed and the S connector disconnected from the typing unit, verify that an open or resistance above 2000 ohms is read between the <i>NEGATIVE</i> side of the <i>120-volt</i> rectifier and contact 45 of the VS relay. If test indicates trouble, check the B and C cord and connectors for a possible short.	SD-70832-01-B3-FS2 SD-70832-01-G4 SD-70832-01-G5
15	If tests isolate trouble to V generator circuit, use procedure outlined in Steps 9 and 10.		Table D, Steps 9, 10	

TABLE D — 83B1 OR 83B2 RECEIVING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE	
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
No answer back on 28 ROTR CDC.	16	Verify that the power is connected and the ROTR motor is running. Loss of power to the ROTR, in most cases, will prevent the CDC contact from generating an answer back on the ROTR CDC only.	Check fuse and power connections to the ROTR.	BSP Section P34.308	
			If the power fuse is operated, check all clutches for broken parts and proper adjustment.	BSP Section P34.651	
	17	Isolate the trouble to the stunt box on typing unit or the V generator circuit by verifying that an answer back is received on the station TSC. Make the test as outlined in Step 2.	If a V answer is received on the TSC, check the operation of the function levers associated with the UE or AE contact. Use the same procedure as outlined in Step 14.	SD-70832-01-B3-FS2 SD-70832-01-C4	At some locations it may be necessary to use information supplied with the station to make slot verification on stunt box.
			To make electrical test on UE and AE contacts, proceed to next step.		
	18	At new installations, verify that a B3 plug is being used.	Check plug for correct wiring. (See App. Fig. 11 and CAD 17.)	SD-70832-01-C5 SD-70832-01-G5	
	19	Remove the wire from terminal C49 on TTY cabinet that is wired to the S connector. With all power connected, a steady V answer back should be generated. If necessary, send FIGS H LTRS V to start the V generator.	At 83B2 stations, verify that the YV contacts, if provided, are not operated and closed. Check wiring for a possible short. This can be done easily by removing the strap from terminal C45 to C58.	SD-70832-01-B3-FS2	
19a	If a repeated V answer back is generated, trouble in the UE or AE contact is indicated.	With all power disconnected, manually operate the function lever associated with the AE or UE contact and check for an open between the wire removed from terminal C49 and the wire on terminal C50. Make point to point checks as required. <b>RESTORE ALL WIRING WHEN COMPLETED.</b>	SD-70832-01-B3-FS2 SD-70832-01-C4		
19b	If a V answer back is not generated, trouble in the C2 and B3 cord and connectors is indicated. Disconnect all power and verify that all wiring and plugs are intact and connected to station control unit.	Remove the S connector from the typing unit. Verify that an open is read between terminals C49 and C50 on the TTY cabinet.	SD-70832-01-B3-FS2		
		If a short is read, remove the B3 plug to help isolate the trouble between the terminal strip on the TTY cabinet and the B connector or the B3 plug. Make further point to point checks as required. <b>RESTORE ALL WIRING WHEN COMPLETED.</b>	SD-70832-01-G4 SD-70832-01-G5		
28 ROTR will not connect on CDC. Answer back is received.	20	Isolate the trouble to the ROTR or the station control unit by removing the line relay from the electrical service unit associated with the ROTR. The ROTR should run open. If the ROTR runs open, replace the line relay and test. If the trouble is not cleared, proceed to next step.	If the ROTR does not run open, a short across terminals 1 and 4 of the ROTR line relay mounting or mechanical failure is indicated. Check the relay circuit per BSP or WD drawings.	BSP Sections P34.308, P34.309	
			Check the mechanical adjustments per BSP.	BSP Section P34.651	
	21	Verify that the line relay in the 83B1 or 83B2 control unit is following line signals by connecting a voltmeter across the 3 and 6 terminals of relay connection block. Also verify armature operation by placing the voltmeter across terminals 1 and 4 of relay mounting.	Replace relay. Check line connections per the SD drawing as required.	SD-70832-01-B4-FS3	
	22	If the line relay is responding to line signals, short contacts 52 and 53 of RC relay to verify that the ROTR will respond to the output signals of the line relay in the 83B1 or 83B2 control unit. This test will isolate the trouble to operation of RC relay or the line circuit of the ROTR line relay.	If the ROTR does not copy after contacts 52 and 53 are shorted, an open in the line circuit of the ROTR line relay is indicated. (Line relay in the ROTR is working inverse neutral.) Disconnect all power and measure continuity between the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier and terminal 1 of line relay connecting block in the control unit. A short should be read. A short should also be read between terminal 5 and contact 53 of RC relay.	SD-70832-01-B4-FS1 BSP Section P34.309	
Verify continuity between contact 52 of the RC relay and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier. If an open is read, verify that the ROTR line relay is installed. Make point to point checks from contact 52 of RC relay towards the winding of the ROTR Line Relay. <b>RESTORE ALL WIRING WHEN COMPLETED.</b>					

TABLE D — 83B1 OR 83B2 RECEIVING FAILURES — CONTROL EQUIPMENT MOUNTED ON 23-INCH PANEL (Cont)					
TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
28 ROTR will not connect on CDC. Answer back is received. (Cont)	23	If the trouble isolates to failure of the RC relay to operate, trouble in the stunt box wiring or contact is indicated. The function levers are apparently operating correctly due to the station answering back on the ROTR cut on code.		With all power disconnected, manually operate the function lever associated with the UE or AE contacts and verify continuity between contact 55 of the RC relay and the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier. Approximately 190 to 200 ohms should be read. If a higher resistance is read, open or dirty contacts is indicated.	SD-70832-01-C4
				Verify continuity between contact 51 of RC relay and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier. Approximately 5600 ohms should be read.	SD-70832-01-B1-FS1
				Verify continuity between contact 54 of RC relay and the <b>POSITIVE</b> side of the <b>120-volt</b> rectifier. Approximately 191 ohms should be read.	
				If continuity tests indicate no trouble in the wiring, using an ohmmeter across contacts 52 and 53 of the RC relay, verify relay operation when the ROTR code is received. No current reading after CDC indicates RC relay is operating properly.	
			Replace RC relay as required. The SC relay, if not being used, can be substituted until a new relay is available.  RESTORE ALL WIRING WHEN COMPLETED.		
Open or grounded loop.	24	Isolate the trouble to the loop or station equipment by removing the station wire connections from the terminal block provided with the loop facilities and make appropriate tests with the Telegraph Testboard.		If the trouble isolates to the station equipment, make continuity tests of internal line connections on station equipment using Fig. 6 as a guide. Leave the station connections to external terminal block <b>removed</b> while making tests.  RESTORE ALL WIRING WHEN COMPLETED.	SD-70832-01-B12-FS15 SD-70832-01-B11-FS15 Note 3  BSP Fig. 6

TABLE E — 83B1 OR 83B2 MASTER STATION — SCANNER FAILURES					
TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
Scanner stuck, not sending any TSCs.	1	Verify that all keys and switches are in the proper position.			CD-70831-01
	2	For proper isolation and trouble clearance procedure check the P relay. If the P relay is operated, trouble in the stepping circuit is indicated. (See TROUBLE CLEARANCE column.) If the P relay is released, trouble in the timing circuit is indicated, proceed to Step 3.		Check the condition of the V relay. If released, verify the continuity of V relay circuit. Check for a short between the number 2 <b>stationary</b> contact of the P relay and the <b>POSITIVE</b> side of the <b>48-volt</b> rectifier.	SD-70831-01-B1-FS1
				Resistance of approximately 700 ohms should be read between the number 2 <b>make</b> contact of the P relay and the number 1 <b>make</b> contact of the FH relay.	
				A short should be read between the number 1 <b>stationary</b> contact of the FH relay and the <b>NEGATIVE</b> side of the <b>48-volt</b> rectifier.	
			If the V relay is operated, trouble in step selector, stepping circuit, or the distributor is indicated.		

TABLE E - 83B1 OR 83B2 MASTER STATION - SCANNER FAILURES (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
Scanner stuck, not sending any TSCs. (Cont)	2 (Cont)			Check the step selector for broken or worn parts and proper adjustment. Pay particular attention to the interrupter spring contacts for cleanliness and proper adjustment.	BSP Sections 026-720-701, 026-720-801
				Verify that the E relay is operating and releasing properly.	SD-70831 or B2-FS3 BSP Section P34.303
				With all power disconnected, check the DSM circuit by measuring continuity between the <i>NEGATIVE</i> side of the <i>48-volt</i> rectifier and number 1 <i>make</i> contact of the E relay. Approximately 380 ohms should be read.	
				Check contacts of the A, E, and V relays that are associated with the DSM circuit for cleanliness and proper closure. <i>Check wire spring contacts for possible cross over after making tests.</i>	
			Check the distributor for broken or worn parts and proper adjustment.	BSP Section P34.630	
	3	Check the Transmitter Start Control Unit and verify if the FH or DS relay is operated. If the FH relay is operated the DS relay should be released. If the FH relay is released, the DS relay should be operated. If either the DS or the FH relay is operated, trouble in the timing circuit is indicated. Proceed to Step 4.		Check the output voltage of the <i>48-volt</i> rectifier. Readjust if necessary.	
				Check contacts 4 and 5 of the VS key for cleanliness and adjustment.	SD-70832-C4 BSP Section 032-724-701
				Verify continuity from the <i>NEGATIVE</i> side of the <i>48-volt</i> rectifier and the L terminal of the DS relay. Also check continuity from the U terminal of the DS relay and the <i>POSITIVE</i> side of the <i>48-volt</i> rectifier.	
	4	With the FH or DS relay operated verify that the tube timing circuit is functioning properly by removing the 276J Line Relay from the Transmitter Start Control Unit. The timing circuit should time out and start the scanner. If the timing circuit operates properly after the 276J relay has been removed, proceed to Step 5.		Replace the 376-type tube in the timing circuit. If the timing circuit fails to operate properly after the 376 tube has been replaced, remove the 376 tube and make continuity tests of timing circuit components from pins 2, 5, and 7 of T tube socket.	SD-70831-01-B3-FS4
	5	Verify that teletype signals are being received at the L relay socket by removing the 276J relay and checking current flow at pins 7 and 8 of the relay socket. Verify for proper polarity and that no current flow is read when the line relay associated with the station control unit, SD-70832-01, is in the spacing condition. Replace the 276J relay if current measurements are correct.		If current measurement indicates trouble, replace the line relay in the station control unit. If current measurement still indicates trouble, verify continuity between pin 8 of the 276J relay socket and pin 4 of the line relay associated with the station control circuit. Also check continuity from pin 7 of the 276J relay socket to the <i>NEGATIVE</i> side of the <i>120-volt</i> rectifier. Make point to point checks as required.	SD-70831-01-B3-FS4 SD-70832-01-B4-FS3 SD-70832-01-B6-FS9, (J option)
Scanner operating irregular, causes CDC to garble after tape pick up.	6	Verify that the busy indicate chain relays, BY1, BY2 and BY3, are operating properly. Irregular operation of the BY relays indicates a trouble in the universal contact or universal contact circuit. If the BY relays are operating properly, proceed to Step 8.		<b>AT 83B1 STATIONS</b> Check the contact arm of universal contact assembly for a groove worn on end of arm. Replace if necessary. If a new contact arm is not readily available, interexchange with same type of arm associated with QE or AD contacts. Replace as soon as possible.	SD-70832-01-C4 Stunt box Drawing 1 (See example 2 and 3 of legend)
				Check stunt box for worn parts associated with contact under test. Check stunt box top plate and end plates for wear. (If top guide plate is worn, install TP195109 wear plates.)	
				Recheck reset bail adjustment.	BSP Section P34.612
				<b>AT 83B2 STATIONS</b> Check the universal contacts for wear or pitting. Clean contact assembly and readjust per BSP if required. Install new assembly where required and recheck universal contact adjustments.	BSP Section P34.612

TABLE E — 83B1 OR 83B2 MASTER STATION — SCANNER FAILURES (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Scanner operating irregular, causes CDC to garble after tape pick up. (Cont)	7	Verify that the universal contact is open when the typing unit is in a closed and idle condition and that the universal circuit will go closed and open during one revolution of the typing unit main shaft.	Make point to point checks of stunt box wiring.	SD-70832-01-C4
			Verify that a short is read between the <i>stationary</i> contact 11 of the FH relay and terminal E of the B plug. Also verify that a short is read between terminal E of the B connector and terminal C67 on TTY cabinet.	SD-70831-01-B3-FS5 SD-70832-01-B3-FS2
			Make a continuity test between the <i>NEGATIVE</i> side of the 48-volt rectifier and the number 3 stationary contact of the FH relay.	SD-70831-01-B3-FS5
			Make further checks of the BY relays as required.	
	8	With power connected, manually operate the FH relay. Verify that the FH relay releases when the BY3 relay is manually operated.	Check the FH relay lock path for a possible short in the number 7 <i>break</i> contact of the BY3 relay.	SD-70831-01-B1-FS1
	9	With the scanner operating, have the testboard interrupt the scans by sending continuous LTRS from the monitor. Verify that the FH relay is released when the LTRS is being received and that the FH relay will not operate if a V is sent by the testboard monitor.	If the FH relay operates when a V is received, a shorted D1 diode is indicated. To check the D1 diode, disconnect all power and measure continuity between the number 5 <i>break</i> contact of the FH relay and the number 8 <i>break</i> contact of the V relay. If a short is read, reverse the leads of the ohmmeter. A very high resistance should be read. Replace the D1 diode when required.  Check for a possible short between terminals <i>a</i> and <i>r</i> in the B cord and connector.  CHECK WIRE SPRING CONTACTS FOR POSSIBLE CROSS OVER AFTER MAKING TESTS.	SD-70831-01-B1-FS1
Scanner is sending repeated characters.	10	Verify if the repeated character is one of the common characters of the TSC or if the scanner is repeating the complete TSC. If a common character of the TSC is being repeated, trouble in the distributor AUX contact or slow release of the armature is indicated.	Check the distributor AUX contact for cleanliness and proper adjustment.	BSP Section P34.630
			Check all mechanical adjustments of the distributor.	
			Replace the armature spring if the tension is found to be near the minimum requirement.	
			<i>Note:</i> On 28J or later models of the 28 distributor, verify that a new style, TP172760 armature is installed.	BSP Section P98.999.48
10a	If the complete code is being repeated, see TROUBLE COLUMN for clearance.	Verify that the <i>make</i> contact 10 of the A relay is open when the A relay is released. Check the spring tension of the driving pawl spring on the armature of the step selector.	Verify that the step selector is in proper mechanical adjustment.	BSP Section 026-720-701
		Check the distributor for worn parts and proper mechanical adjustment. (See note in Step 10 above for 28J distributors.)		BSP Section P34.630
Scanner times out at the end of each message.  Or  Scanner will only pick first station on polling.	11	The trouble condition indicates a failure of the FIGS H LTRS <i>make</i> contact on the stunt box or an open condition in the FH relay circuit. If the station control unit is operating properly when the station is sending tapes, this indicates that the function levers associated with the FIGS H LTRS contact are not causing the trouble. Proceed to Step 11a.	If investigation of trouble indicates the function levers associated with the FIGS H LTRS contact are not operating properly, check the stunt box top guide plate for wear. (Install TP195109 wear plates if required.)  Make several checks of the reset bail adjustment rotating the main shaft of the typing after each check. If the adjustment varies, check the reset roller for wear on the bearing and bushing surfaces. Check stunt box end plates for wear. Replace when required.	BSP Section P34.612

TABLE E — 83B1 OR 83B2 MASTER STATION — SCANNER FAILURES (Cont)					
TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
Scanner times out at the end of each message.  Or  Scanner will only pick first station on polling. (Cont)	11a	Testing FIGS H LTRS make contact.		If failure of the FIGS H LTRS contact is indicated, check the contact for cleanliness and good contact closure. Make point to point checks as required. Check contact assembly for a possible warped top plate.	SD-70832-01-C4 SD-70832-01-B3-FS2
	11b	Testing of FH relay circuit.		Check the FH relay circuit by verifying continuity between the <i>NEGATIVE</i> side of the <i>48-volt</i> rectifier and U side of FH relay winding. Approximately 700 ohms should be read. Verify that the VS key is in the normal position when making tests.	SD-70832-01-B3-FS2

TABLE F — 83B1 OR 83B2 PUSHBUTTON CALLING CIRCUIT FAILURES					
TROUBLE CONDITION	STEP	ISOLATION PROCEDURE		TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.			
Pushbutton selector not generating codes.	1	Verify that the trouble is not in the station control unit by attempting to send a message without the use of the Pushbutton Calling Circuit. Make sure the correct message format is used for the test.		Use the appropriate trouble condition in Table C to isolate the cause of the trouble.	
	2	Test the station equipment and verify if the step selector associated with the Pushbutton Calling Circuit is operating. If the step selector fails to operate, proceed to Step 3. If the step selector operates properly but no code is generated, proceed to Step 7.			
	3	With the power connected and the station in the select condition, FIGS H LTRS, depress one of the PB keys and verify that the PB and ST relays operate. If the test indicates a failure of the PB relay, see TROUBLE CLEARANCE column. If the test indicates a failure of the ST relay, proceed to Step 4. If both the PB and the ST relays operate on test, proceed to Step 5.		Manually operate the PB relay to isolate the trouble to its operate or lock path. If the PB relay locks up, isolate the trouble to the PB 1-20 or PB 21-40 keys if used by releasing the PB relay and operating the PB 1 key. Verify if the PB relay operates. Release the PB relay if operated and operate the PB 21 key. Verify if the PB relay re-operates.	SD-70835-01-B3-FS5
				If the PB relay operates in both of the above tests, check the common strapping of the number 1 contact of all PB keys for an open or loose connection.	
				If the PB relay fails to operate when either of the PB keys are depressed, check the continuity of the y lead in the L1 or H2 cord and connectors for an open.	
			If the PB relay does not lock up after being manually operated, disconnect all power and verify that a short is read between the number 12 <i>stationary</i> contact of the RA relay and the <i>POSITIVE</i> side of the <i>48-volt</i> rectifier.	SD-70835-01-B3-FS5	
			If an open is read, check the number 2 and 3 contacts of the CA key for cleanliness and proper overtravel. Check the common strapping of the number 2 contact on PB keys 1-20. Check leads DD and BB in the H1 cord and connector for an open.  RESTORE WIRING WHEN COMPLETED.		

TABLE F — 83B1 OR 83B2 PUSHBUTTON CALLING CIRCUIT FAILURES (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Pushbutton selector, not generating codes. (Cont)	4	With the PB relay operated, manually operate the ST relay. If the ST remains operated, trouble in the operate path is indicated. If the ST relay will not remain operated, trouble in the lock path is indicated.	If the test indicates trouble in the TS operate path, verify that off normal contacts 8 and 9 of the S selector in the Pushbutton Calling Circuit are closed and making good contact. Replace and readjust if necessary.	SD-70835-01-B1-FS1 BSP Sections 026-720-701, 026-720-801
			With all power disconnected, verify that a short is read between the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier and the number <b>8 stationary</b> contact of the ST relay. If an open is read, check the continuity of the common return circuit by verifying that a short is read between the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier and the <b>POSITIVE</b> side of the <b>48-volt</b> rectifier.	SD-70835-01-B4-FS6
			Verify the continuity of the <b>S</b> lead in the B cord and connector for an open. Check the number <b>12 break</b> contact of the TS relay in the Station Control Unit for cleanliness and contact follow. Verify that a short is read between the number <b>12 stationary</b> contact of the TS relay and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier.	SD-70835-01-B1-FS1 SD-70832-01-B1-FS1
	5	Depress one of the PB keys and manually operate the TRA relay. If the step selector operates, trouble in the TRA operate path is indicated. If the step selector fails to operate, verify that the V relay operates and the TRA relay remains operated. If the TRA and V relay operate properly, proceed to Step 6.	To check the TRA operate path, block the ST relay in Pushbutton Calling Circuit and the TS relay in the Station Control Unit operated. Verify that a short is read between terminal <b>U</b> of TRA relay winding and the <b>NEGATIVE</b> side of the <b>120-volt</b> rectifier.	SD-70835-01-B1-FS1 SD-70832-01-B1-FS1
			If the TRA relay will not remain operated, verify that the RB relay is <b>not</b> operating after the TRA is pulled up. A short in the <b>FIGS H LTRS make</b> contact on the stunt box may be causing the RB relay to operate through the operated TRB number <b>3 make</b> contact. This will cause the selector to home immediately after pick up on TSC.	SD-70835-01-B1-FS1 SD-70832-01-C4
	6	Verify that the step selector is functioning properly.	Check the step selector for worn or broken parts. Verify that interrupter spring contacts 1 and 2 are open when the step selector armature is operated. Replace any defective parts and readjust the step selector.	SD-70835-01-C2 BSP Section 026-720-701
			Check the contacts of all relays associated with the stepping circuit for cleanliness and proper contact follow.	SD-70835-01-B2-FS2
			Disconnect all power and block the E relay operated. Verify continuity between the <b>NEGATIVE</b> side of the <b>48-volt</b> rectifier and the number <b>11 and 12 stationary</b> contact of the E relay. Verify that a short is read between the number <b>11 and 12 break</b> contact of the E relay and the number <b>8 and 10 make</b> contact of the V relay on the Pushbutton Calling Circuit.  REMOVE ALL BLOCKING TOOLS AND RESTORE ALL WIRING.	

TABLE F — 83B1 OR 83B2 PUSHBUTTON CALLING CIRCUIT FAILURES (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Pushbutton selector, not generating codes. (Cont)	7	Check the distributor to verify if it is operating. If the distributor rotates and a code is not generated, a short in the distributor contact circuit is indicated. If the distributor does not rotate, trouble in the DSM control circuit or mechanical failure is indicated.	If shorted distributor contacts is indicated, block the TRA relay operated and isolate the trouble by removing the E plug from its connector. Check line to verify that short is removed. The B plug can also be removed to further isolate the trouble.	SD-70835-01-B5-FS8
			If the distributor does not operate, manually operate the distributor armature to verify mechanical operation. Make mechanical adjustments as required.	BSP Section P34.630
			<i>Note:</i> On 28J distributors, verify that a new style TP172760 armature is installed.	BSP Section P98.999.48
			To check the DSM circuit, disconnect all power and block the TRA relay operated. Check continuity between the <i>NEGATIVE</i> side of the 48-volt rectifier and the number 8 <i>make</i> contact of the E relay.	SD-70835-01-B2-FS2
			A short should be read between the number 8 stationary contact of the E relay and the wiper associated with <i>Bank 2</i> of the step selector. Make point to point checks as required.	
Pushbutton selector does not generate FIGS H LTRS.	8	Verify that the RB relay is not operating prior to the step selector reaching step number 50. Check indicator on step selector. The TRB relay should remain operated until the RB relay operates.	Check terminal 50 on Bank 1 of the step selector for a possible short. Check the RB relay circuit for a possible short to the common return lead.	SD-70835-01-B1-FS1
	9	With power connected, verify that the tube timing circuit is functioning properly by removing the line relay (L) associated with the Pushbutton Calling Circuit and manually hold the TRB relay to its operated position. If the station is equipped with a Transmitter Start Circuit, operate the VS key to the SP position before making test.	If the P relay does not operate in 2 seconds, replace the T tube in the Pushbutton Calling Circuit.	SD-70835-01-B3-FS4
			Make continuity tests from pins 2, 5, and 7 of the T tube socket if replacement of tube does not clear the trouble.	
9a	If the timing circuit operates properly with the line relay (L) removed from its socket, replace the 276J line relay in the Pushbutton Calling Circuit.	Replace the line relay in the Station Control Circuit if the trouble is not cleared after changing 276J relay. If timing trouble is still indicated, check the output of the line relay in the station control circuit per Table E, Step 5.	SD-70835-01-B3-FS4 SD-70832-01-B4-FS3  Table E, Step 5	
Pushbutton selector repeats the first character of CDC.	10	Verify that the A, B, and C relays are operating properly.	Check the distributor AUX contact for cleanliness and proper adjustment.	SD-70835-01-B2-FS2 SD-70835-01-E1-SC1
			Check the number 11 and 12 <i>make</i> contact of the ST relay for cleanliness and contact follow.	BSP Section P34.630
			Make continuity tests of the A, B, and C relay circuit as required.	
Pushbutton scanner running continuously. Sends first character of CDC, CAR, RET and LTRS.	11	Verify that all of the PB keys are fully released.	Reposition plastic top plate of pushbutton Key and Lamp panel as required.	
	12	Verify that the number 12 break contact of the RA relay is open when the RA relay is operated.	With power disconnected and the RA relay blocked operated, check continuity from the number 8 <i>make</i> contact of the PB relay and the number 7 <i>make</i> contact of the TRA relay. An open should be indicated. Check wire spring contacts for possible crossover after making tests.	SD-70835-01-B3-FS5

TABLE F — 83B1 OR 83B2 PUSHBUTTON CALLING CIRCUIT FAILURES (Cont)

TROUBLE CONDITION	STEP	ISOLATION PROCEDURE	TROUBLE CLEARANCE	REFERENCE
		IF TEST INDICATES NO TROUBLE, PROCEED TO NEXT STEP.		
Pushbutton scanner running continuously. Sends first character of CDC, CAR RET and LTRS. (Cont)	13	Isolate the trouble to a PB key, 1 to 20 or 21 to 40, by removing the H1 plug from its connector and checking leads y and DD of the H1 plug for a possible short. Remove plug H2 and check the y and DD leads for a possible short.	Check each PB key associated with cord that indicates trouble for a shorted 1 and 2 contact. To check the cord for a possible short, it may be necessary to remove the wire from the H1 or H2 cord that is wired to the number 2 contact of key PB 1 or PB 21.	SD-70835-01-B3-FS5
			To check the H1 or H2 connector and internal wiring of the circuit, it will be necessary to remove the wire from terminal L of the PB relay winding to prevent a possible false reading.  RESTORE ALL WIRING AND CONNECTORS WHEN COMPLETED.	

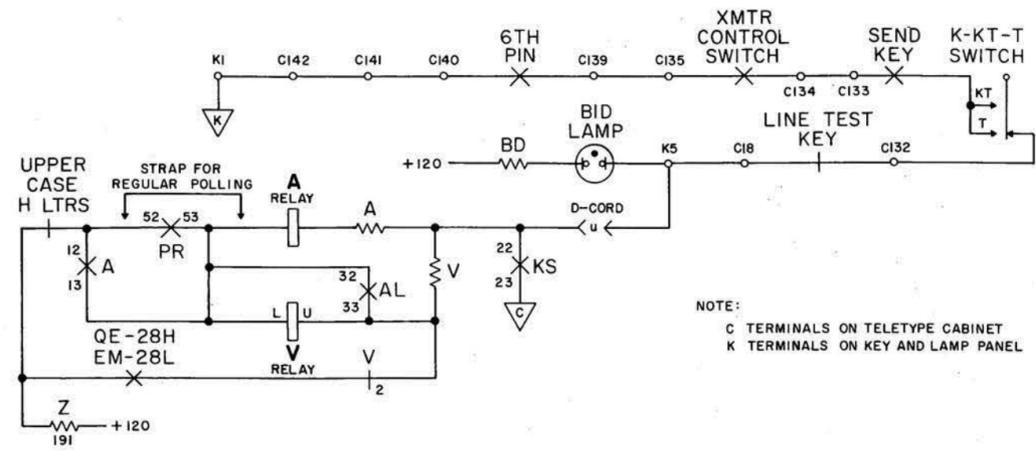


Fig. 2 - Bid Circuit - SD-70832-01

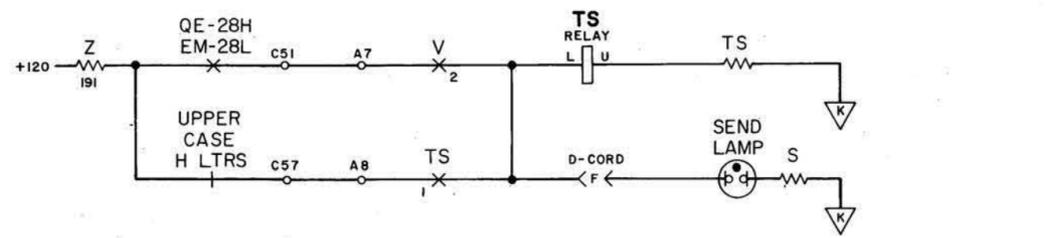


Fig. 3 - Transmitter Start TS Relay - SD-70832-01

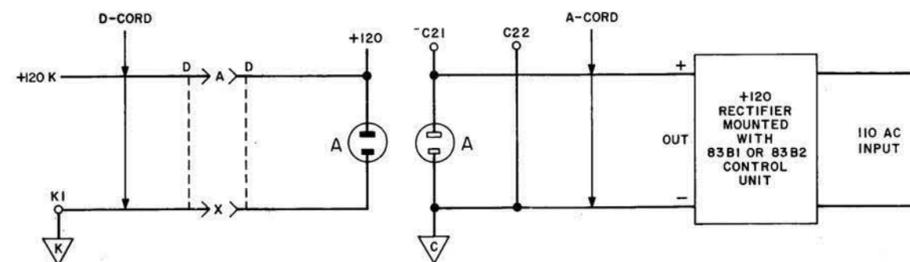


Fig. 4 - Power Circuit - SD-70832-01-B2-FS1 and B12-FS15

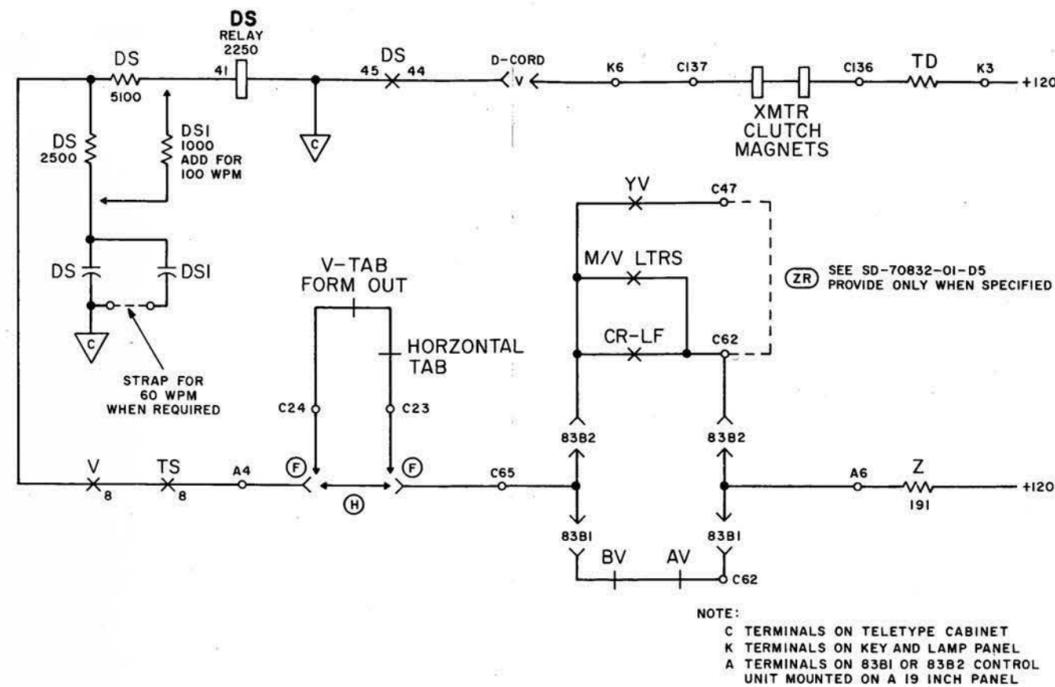


Fig. 5 - Transmitter Control Circuit - SD-70832-01

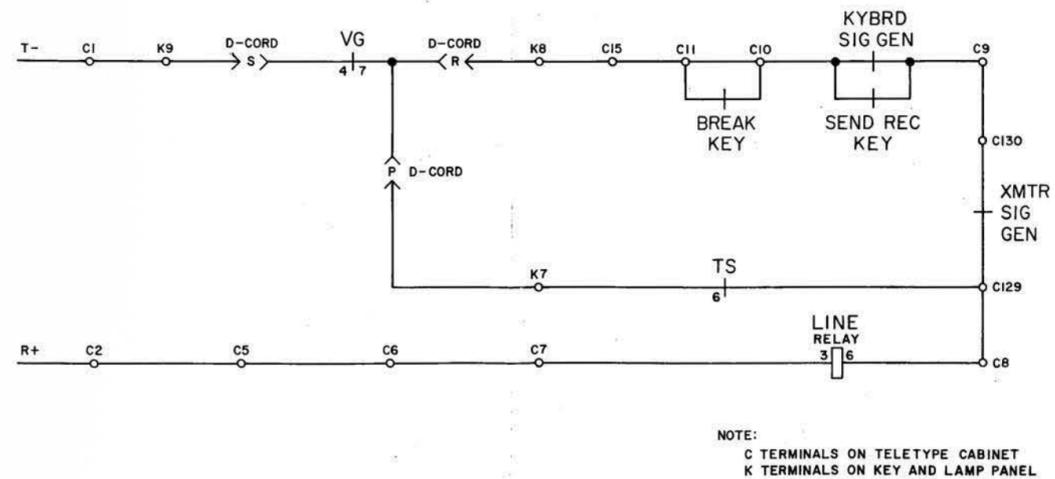


Fig. 6 - Line Connections - SD-70832-01-B12-FS15

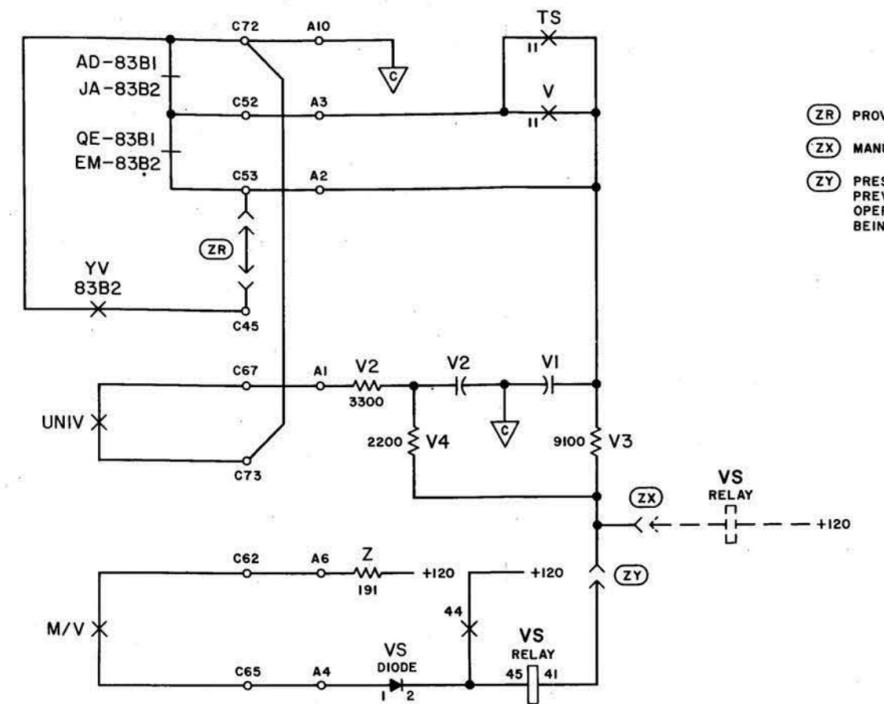


Fig. 7 - V and LTRS Generator - SD-70832-01-B9-FS12

- (ZR) PROVIDE WHEN SPECIFIED
- (ZX) MANUFACTURER DISCONTINUED.
- (ZY) PRESENT STANDARD WIRING. PREVENTS VS RELAY FROM OPERATING WHILE V IS BEING GENERATED.

- (ZQ) PRESENT STANDARD CONTACT PROTECTION FOR VS RELAY CONTACTS.
- (ZW) PROVIDES INCREASED RANGE ON VG POT. AT 100 WPM.
- (K) PROVIDES LTRS ANSWER BACK FOR A KSR STATION.

NOTE:  
VG AND LTRS POT. ARE ONLY USED TO ADJUST THE BIASING CURRENT OF THE VG RELAY. THE CURRENT FLOW IN THE SECONDARY WINDING OF THE VG RELAY IS FIXED.

ATTACHMENT A - 83B1 OR 83B2 MESSAGE PROGRESS CHART

TAPE IN TRANSMITTER	RECEIVE TSC	TAPE LEADER	SENDING STATION CDC	V ANSWER BACK RECEIVED	SENDING CDCs	RECEIVE CDC	CROSS OFFICE CODING	LOCKOUT CODE	TEXT AND TABULATION	END OF MESSAGE UPPER CASE H LTRS		
<p>BID lamp lights. A and V relays will operate if regular polling is used, (ZE option) or contacts 52 and 53 of PR relay are strapped and PR key is not provided.</p>	<p>QE or EM contact operates on stunt box.</p>	<p>83B1 STATION AV-BV contacts must be closed prior to receiving TSC to keep DS relay operated and xmtr sending.</p>	<p>83B1 STATION The function bar associated with AV contact being coded for first character of CDC, operates a function lever in the stunt box which in turn opens the AV contact allowing the transmitter to stop. Circuit design delays stopping of xmtr long enough to permit the second character and LTR of CDC to be sent to the line. Xmtr stops and waits for answer back. CDC shift slide operates to put typing unit in a print condition.</p>	<p>83B1 STATION The function bar coded to respond to a V operates an associated function lever which in turn releases operated AV function lever permitting the AV contact to close and restart the xmtr. The typing unit will print the V answer back.</p>	<p>Send station will print all CDC codes and the answer back from each code requiring an answer back. Xmtr action is the same as described under SENDING STATION CDC and V ANSWER BACK RECEIVED.</p>	<p>Unless specified each station receiving a valid CDC will be put in a print condition and will copy its own V answer back and all other CDCs. This does not apply to cross office stations.</p>	<p>When automatic cross office is not provided, the cross office ROTR will unblind after the lockout code has been sent. Station will answer back on the assigned connect code.</p>	<p>83B1 STATION Standard lockout code is V CR LF LTRS. Through sequential operation of function levers, the select code bar moves to the right on LF. This prevents operation of function bars associated with the CDC or TSC from operating in text.</p>	<p>On units equipped for tabulation or form out, the xmtr will stop during the function and restart at the end of the function. SEND lamp remains lighted during this operation.</p>	<p>At the sending station, the contacts associated with the UPPER CASE H LTRS function lever operate and open. This releases all xmtr control relays and restores circuit to normal. SEND lamp will be extinguished. BID lamp and PR lamp if lighted will go out if tape is not left in the xmtr.</p>		
	<p>DEF POLLING A and V relays will operate and station will answer back on first poll. Operation of V relay is delayed to permit answer back. TS relay operates on second consecutive polling permitting the SEND lamp to light and the xmtr to start.</p>	<p>83B2 STATION LTRS function lever on stunt box keeps M/V LTRS contact closed, DS relay operated and xmtr running.</p>	<p>83B2 STATION Receipt of V will operate the M/V function lever permitting the M/V LTRS contact to reclose and restart the xmtr. The typing unit will print the V answer back. Operation of the M/V contact will also recycle the V generator to allow additional V answer back to be generated if required.</p>	<p>83B1 STATION A lockout code must be inserted prior to inserting CDCs for another line to prevent the xmtr from stopping on a non-valid code or false connection of an unwanted station on a particular line.</p>							<p>Stations that received a valid CDC will have the print code bar to the right permitting the function to operate. At stations not receiving a valid CDC, the print code bar will be locked to the left, preventing the printing function from operating.</p>	<p>At stations where deferred polling is required, receipt of the EOM code will release any previously operated A and V relay.</p>
	<p>REG POLLING TS relay operates on first poll. SEND lamp lights and xmtr starts.</p>	<p>83B2 STATION The first character of the CDC releases the operated function lever associated with M/V LTRS contact causing the contact to open. The release of the M/V function lever blocks the LTRS function lever from operating on LTRS on CDC. The M/V LTRS contact opening, stops the xmtr. Circuit design delays stopping of xmtr long enough to permit second character of CDC and LTRS to be sent to the line. Xmtr stops and waits for answer back. CDC shift slide operates to put typing unit in a print condition.</p>	<p>83B2 STATION Automatic cross office coding has a provision for use of the YV contacts on stunt box. When specified the second character of the cross office CDC contains the Y character. Receipt of the Y plus the V answer back, will close the YV contact on the sending station, permitting the xmtr to send continuously without waiting for a V answer back on other CDCs. At all stations receiving the YV code, the V answer back circuit is deactivated, preventing the V from being generated.</p>	<p>83B2 STATION Standard lockout code is CR LF LTRS. Mechanically the lockout code operates the same as described above. In addition the CR LF contact will close permitting continuous operation of the xmtr.</p>							<p>Auxiliary stations that are under control of the 83B1 or 83B2 control circuit will be disconnected by the operation of the UPPER CASE H LTRS contact.</p>	
	<p>83B2 STATION Second character of TSC closes M/V LTRS contact and provides an operate path for xmtr control DS relay. Any character other than LTRS V or coded second character of TSC will cause M/V LTRS contact to open and prevent xmtr from starting.</p>											