DATA SETS 108D- AND 108E-TYPES
SINGLE PRIVATE LINE STATION ARRANGEMENT
USING DATA AUXILIARY SET 820D
MAINTENANCE

CONTENTS PAGE

1. GENERAL

1.01 This section provides the maintenance procedures to be followed when using the data station consisting of data set 108D- or 108E-type and AR17 circuit pack in data auxiliary set (DAS) 820D as part of a station-to-station private line system. The circuit layout should be checked for each station configuration. This section assumes that when the far end is a hub, the hub may have control of certain parts of the troubleshooting procedure. In this section, data sets 108D- and 108E-types will be referred to as data sets 108D and E.

1.02 The data station does not require routine or periodic maintenance; however, these maintenance procedures are used to aid in locating and clearing a trouble condition.

1.03 Preoperative tests and adjustments for replacement of DAS 820D-L1 when used with a customer-provided terminal (CPT) should be in accordance with the procedures outlined in Section 591-028-201. When the data station is used in a Bell System TTY, refer to the sections referenced in 4.01.

2. REMOVAL AND REPLACEMENT PROCEDURES

DAS 820D-L1 Removal and Replacement When Used With a CPT

2.01 ***Removal:***

(1) Disconnect power cord from customer receptacle.

(2) Disconnect the customer EIA interface cord from DAS 820D-L1 (J3 connector).

(3) Remove the DAS cover by loosening the four screws located around the base of the DAS (see Fig. 1).

(4) Tag and remove wiring connections from terminal board TB1 of DAS 820D-L1.

2.02 ***Replacement:***

(1) With the cover removed, position DAS 820D-L1 within the range of the customer EIA interface cord and the power receptacle.

(2) Connect T and R of the private line facility to terminals 1 and 2 (2-wire) or terminals 1 and 2, 3 and 4 of TB1 (4-wire).

(3) If a remote TEST button is to be installed, connect the button to terminals 5 and 6 of TB1.

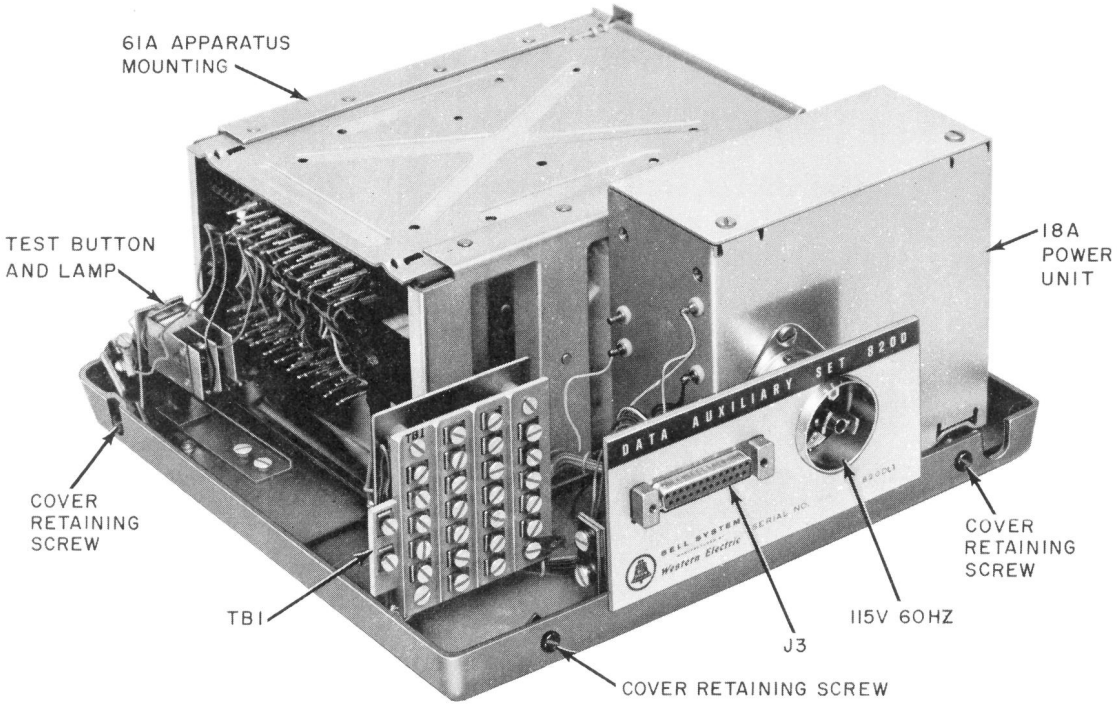

Fig. 1—DAS 820D Shown Without Cover and Power Cord

(4) If a remote TEST lamp is to be installed, connect the lamp (rated 24V) to terminals 11 and 12 of TB1.

(5) Verify that the proper options are installed and that both the AR17 CP and the data set are properly secured.

(6) Connect customer EIA interface cord to 25-pin connector J3 on the DAS.

(7) Connect the DAS power cord Hubbell connector to the DAS (if not already connected) and the other end to the customer receptacle.

(8) Verify proper send and receive levels as indicated on the circuit layout record (CLR). See Section 591-028-201 for send and receive level adjustments.

(9) Replace the DAS 820D-L1 cover by placing cover in position and tightening four retaining screws.

DAS 820D-L1 (Model 37 TTY) and DAS 820D-L1A (Model 33 or 35 TTY) Removal and Replacement When Used in a Bell System TTY

2.03 ***Removal:***

(1) Gain access to the DAS 820D through the rear panel of the 33 TTY stand, front panel of 35 TTY pedestal, or right door of 37 TTY pedestal, as applicable. Refer to practices referenced in 4.01 for more information on the data station used in a Bell System TTY.

Note: When the TTY is a 35 ASR, the chad container must be removed before the front panel can be removed.

(2) Disconnect power cord and interface cord from the DAS (and remove cover of DAS 820D-L1).

(3) Tag and remove wiring connections from TB1 of DAS 820D.

(4) Loosen screw clamps holding DAS 820D to 180A backboard, and lift DAS out of the cabinet (see Fig. 2).

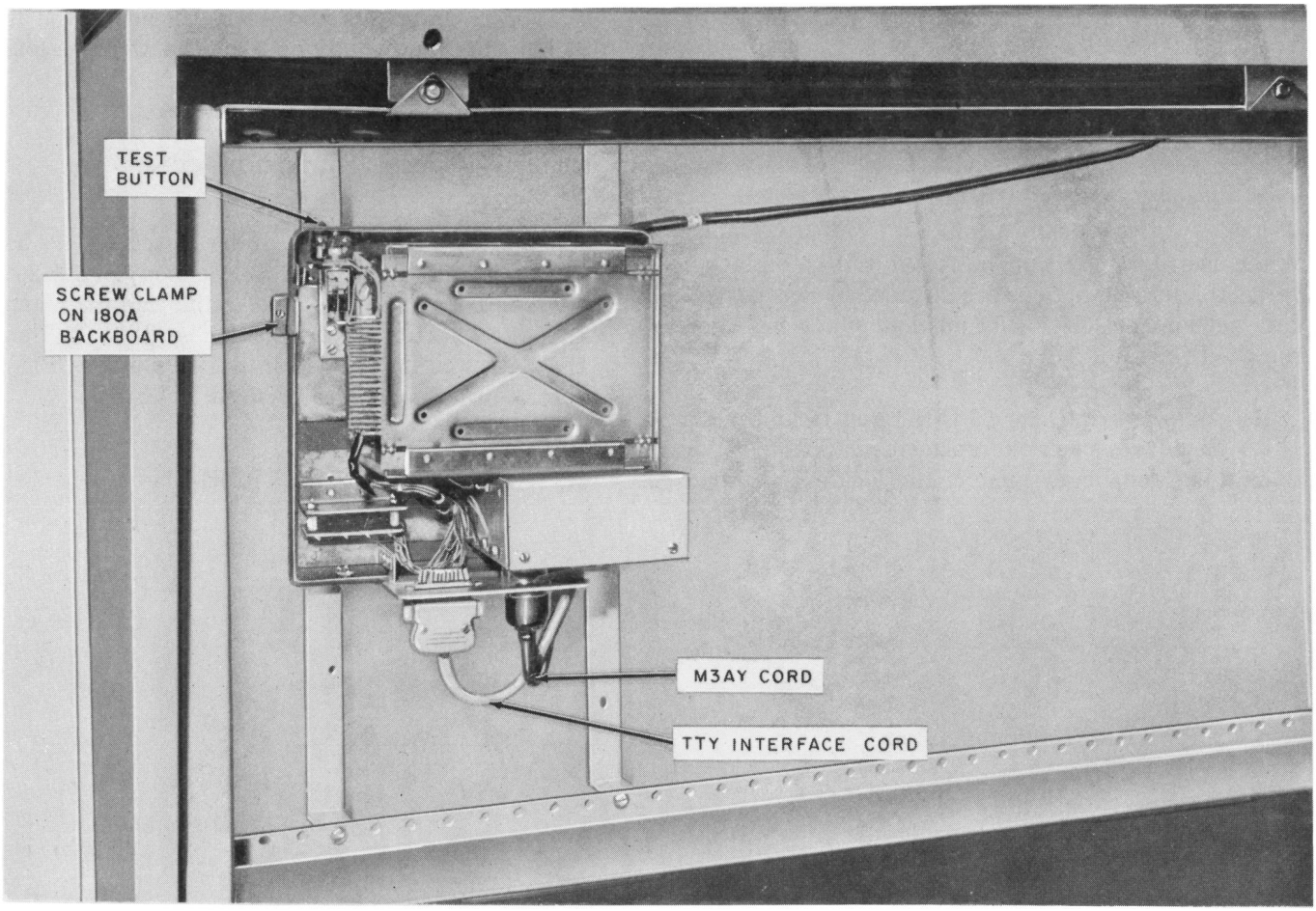

Fig. 2—Mounting of DAS 820D-L1A in the Pedestal of a Model 35 TTY

2.04 ***Replacement:***

(1) With cover removed (DAS 820D-L1), connect T and R of line facility to terminals 1 and 2 (2-wire) or terminals 1 and 2, 3 and 4 of TB1 (4-wire).

(2) If remote TEST button is to be installed, connect the button to terminals 5 and 6 of TB1.

(3) If a remote TEST lamp is to be installed, connect the lamp to terminals 11 and 12 of TB1.

(4) Verify that the proper options are installed and that both the AR17 CP and data set are properly secured.

(5) Connect interface cord to 25-pin connector J3 and power cord to power receptacle on DAS.

(6) Verify proper send and receive levels as indicated on the CLR. Refer to applicable section referenced in 4.01.

Data Set 108D or 108E and AR17 Circuit Pack Removal and Replacement

2.05 ***Removal:***

(1) If the cover of DAS 820D-L1 has not already been removed, remove it by loosening the four screws located around the base of the DAS.

Note: DAS 820D-L1A is not supplied with a cover.

(2) Remove locking strip, if provided.

(3) Remove the circuit pack by using the attached extracting handle. Remove the data set by using the 748A extracting tool.

2.06 ***Replacement:***

When the data set and/or AR17 CP is replaced, verify that proper options are installed in replacement data set and/or AR17 CP and that power has been removed from the DAS.

(1) With cover (DAS 820D-L1) and locking strip removed, position replacement AR17 CP or data set and firmly push it into locking position.

Note: Data sets and AR17 CP are keyed to help prevent positioning in the wrong slots (see Fig. 3).

(2) Replace locking strip, if provided.

(3) Verify proper send and receive levels as indicated on the CLR. See Section 591-028-201 for send and receive level adjustments when the data station is used with a CPT. When the data station is used in a Bell System TTY, refer to the sections referenced in 4.01.

(4) Replace cover on DAS 820D-L1.

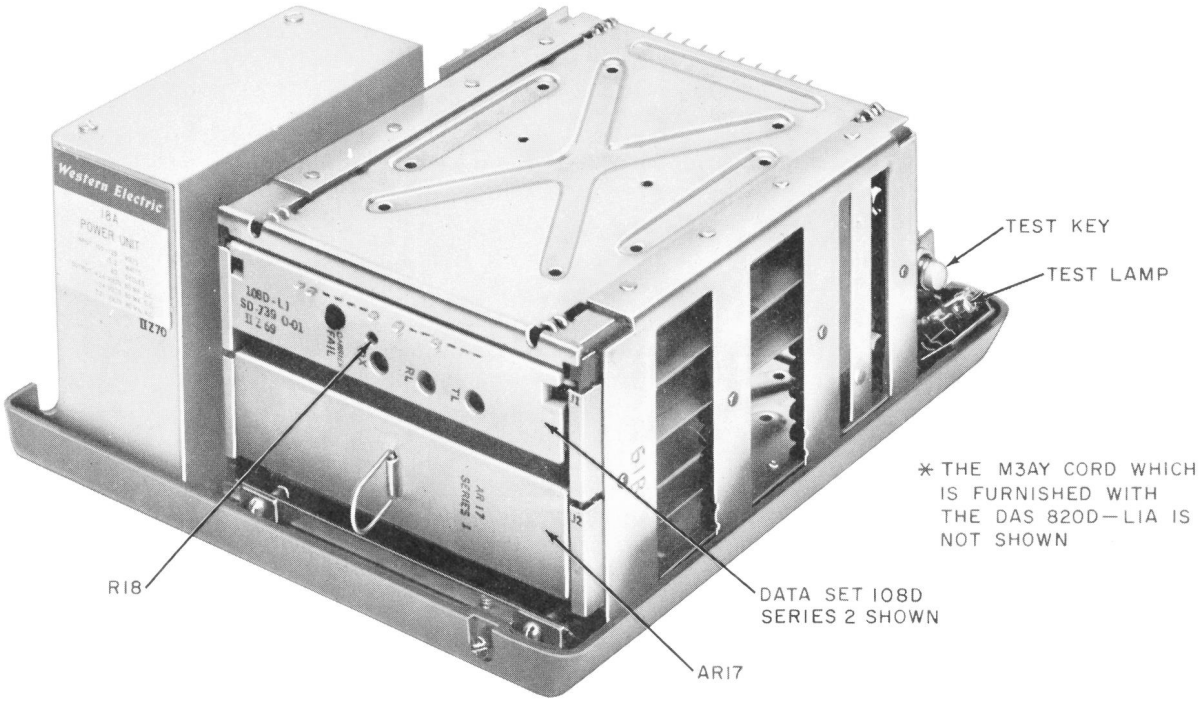

Fig. 3—DAS 820D-L1A Shown With Data Set and Circuit Pack in Place

3. TROUBLESHOOTING PROCEDURES

3.01 A suggested sequence of maintenance is given in the flowchart in Fig. 4. The blocks of the flowchart are numbered to provide easy reference. Although the numbers are for reference only and do not indicate the sequence of operation, they correspond to the step numbers of the associated step-procedure.

This troubleshooting procedure assumes that the proper options are installed, the data station at either end is not in the test mode, and that the carrier squelch on carrier fail option (if installed at either end) is removed while performing this troubleshooting procedure.

3.02 ***Maintenance Procedures:***

STEP	PROCEDURE
1	Momentarily operate the TTY MODE switch to OFF LINE or LOCAL position. The purpose of this step is to get a quick indication of power. The TTY motor should start running. If the station uses a CPT, depress DAS TEST button; TEST lamp should light. Depress TEST button again to remove DAS from test mode after checking for indication of power. ***Note:*** Station at either end must ***not*** be left in test mode unless it is specifically requested in this procedure. Test mode causes an automatic carrier squelch on carrier fail. This means the data set will cease transmission if receive carrier level drops to −50 dBm (4-wire) or −47 dBm (2-wire) for a period of 110 to 300 ms. The data set will also enter the preconnect mode (refer to Section 591-028-100), the CF lamp will light, and the BB lead to the terminal device will be clamped either marking or spacing, depending upon which option is installed in the data set. For these reasons and in order to isolate troubles, the carrier squelch on carrier fail option (if installed at either end) must also be removed while troubleshooting.
2	If there is an indication of power (ie, motor starts running or lamp lights), proceed to Step 6. If there is no indication of power, proceed to Step 3.
3	The customer source of power may not be available to the TTY or DAS. Measure voltage at connection to TTY or DAS and check for good connections from the customer receptacle to TTY or DAS.
4	If power is available and connected to TTY or DAS, proceed to Step 5. If power is ***not*** available or connected, proceed to Step 8.
5	If terminal device is Bell System TTY, proceed to Step 9. If terminal device is CPT, proceed to Step 25.
6	Since there is an indication of power at the TTY, perform a local copy test. A test message is typed to check the operation of the TTY. Since only the TTY is involved in this test, the trouble can be isolated to either the TTY at the station under test, or to the rest of the system. Testing and maintenance of the CPT is the customer reponsibility. Proceed to Step 7.
7	If the local copy test is satisfactory (ie, copy without error) or the terminal device is a CPT, proceed to Step 10. If the copy was ***not*** satisfactory, proceed to Step 9.

STEP	PROCEDURE
8	Since power is not available and/or connected to the TTY or DAS, the trouble can be resolved by locating the point at which power is lost and restoring power to the data station. After power is restored, return to Step 1 and perform as many steps as necessary to verify operation of station..
9	The trouble has been isolated to the TTY. Repair and/or adjust the TTY by referring to Section 574-000-000. Return to Step 1 and perform as many steps as necessary to verify operation of station.
10	Since the local copy test is satisfactory, the trouble is probably within the rest of the system. Excluding the terminal device, the line is the most probable cause of trouble. The CF lamp on the data set is an indicator of trouble in the receiving circuits of the data set or in the loop. Gain access to the data set for observation of the CF lamp. The CF lamp should be unlighted to indicate proper operation of the data set and loop (receive loop for 4-wire operation).
11	If the CF lamp is lighted, proceed to Step 12. If the CF lamp is unlighted, proceed to Step 21.
12	When the CF lamp is lighted, trouble exists in the receiving circuits of the near-end data set under test, in the loop, and/or in the transmitting circuits of the far-end station. To further isolate the trouble, proceed to Step 13.
13	Perform the far-end carrier test per Section 591-028-501. This test will indicate trouble in the data set at the station under test if the carrier is present on the loop. If the carrier is ***not*** present on the loop, either the loop has trouble or the far-end data set is not transmitting. Proceed to Step 14.
14	If the far-end carrier test indicates the presence of carrier, proceed to Step 15. If carrier from the far end is ***not*** present, proceed to Step 19.
15	If the data set is in the preconnect mode (refer to Section 591-028-100), it must receive a marking (data set 108D) carrier or marking or spacing (data set 108E) carrier for a period of 200 to 600 ms to establish connection. If the carrier meets the requirements for connection, proceed to Step 18. If it does ***not,*** proceed to Step 16.
16	The trouble is in the loop or the far-end data set. Call the far-end station and request that the TEST button be depressed momentarily. If the far-end station does ***not*** have a TEST button, a telephone company employee must be dispatched to the far-end station to perform modifications which will put the far-end station in the loop-back mode momentarily. Proceed to Step 17.
17	If the CF lamp remains unlit, the lamp itself may be bad (data set must be replaced) or the far-end station may be the source of trouble. Restore the far-end station TEST button to normal and proceed to Step 35. If the CF lamp lights, the loop is the probable source of trouble. Restore the far-end station TEST button to normal. Proceed to Step 19.
18	Since the far-end carrier test indicated the presence of carrier, the loop and the far-end stations are operating satisfactorily. The trouble has been isolated to the data set at the station under test. Replace the data set, return to Step 10, and perform as many steps as necessary to verify operation of the staion.

STEP	PROCEDURE
19	The loop resistance or data set padding is indicated as the source of trouble. Perform loop-loss measurement test per Section 591-028-501 to further isolate the trouble. Proceed to Step 20.
20	If the loop loss is within limits, the data set receive level at the station under test could need adjusting. Proceed to Step 33. If the loop is ***not*** within limits, the loop is the source of trouble. Increase receiver gain 6 dB per Section 591-028-201. Proceed to Step 36.
21	Short circuit the receive loop (terminals 1 and 2 for 2-wire and 3 and 4 for 4-wire) at TB1 on DAS. Check the CF lamp indication. Remove the short circuit and proceed to Step 22.
22	If the CF lamp lights when the line is shorted, proceed to Step 23. If the CF lamp does ***not*** light, proceed to Step 25.
23	If the CF lamp is unlighted and the lamp is good, the trouble has been isolated to the data set, AR17 CP, and/or data auxiliary set. To further isolate the trouble, perform the near-end carrier test per Section 591-028-501. Proceed to Step 24.
24	If the near-end carrier test indicates a presence of carrier, the data auxiliary set has been eliminated as the probable source of trouble. Proceed to Step 27 to further isolate the trouble. If the test indicates a carrier ***not*** present, proceed to Step 31.
25	Perform the power supply measurement test per Section 591-028-501 to determine if the data auxiliary set is the cause of trouble. Proceed to Step 26.
26	If the power measurement is satisfactory, the DAS has been eliminated as the probable cause of trouble. Proceed to Step 30. If the power measurement is ***not*** satisfactory, proceed to Step 29.
27	Perform a carrier shift test per Section 591-028-501.
28	If the carrier shifts satisfactorily, proceed to Step 37. If the shift is ***not*** satisfactory, proceed to Step 32.
29	Since the power supply is ***not*** operating properly, replace DAS 820D. Return to Step 10 and repeat as many steps as necessary to verify operation of the station.
30	Since data set CF lamp itself is bad, replace data set. Return to Step 10 and repeat as many steps as necessary to verify operation of the station.
31	Verify proper data set transmit level adjustment per Section 591-028-201.
32	If the data set transmit level cannot be adjusted to the proper level, replace the data set and repeat Step 23. If test still does not indicate presence of carrier, replace the AR17 circuit pack and return to Step 23. Repeat as many steps as necessary to verify proper operation of the system. Proceed to Step 44.
33	Verify the proper data set receive level (refer to Section 591-028-201).

STEP	PROCEDURE
34	Replace data set if loss cannot be compensated. Return to Step 10 and repeat as many steps as necessary to verify operation of the station.
35	Since the CF lamp did ***not*** light, the trouble has been isolated to the far-end station.
36	Since the loop loss is ***not*** within limits, try to compensate with switch options on the data set. If loss is too much to compensate, turn back loop for repair.
37	Perform loop-back test per Section 591-028-501.
38	If loop-back test is satisfactory, proceed to Step 44. If the test is ***not*** satisfactory, proceed to Step 39.
39	Perform distortion measurement per Section 591-028-501.
40	If the distortion measured is within limits specified, proceed to Step 44. If the distortion is ***not*** satisfactory, proceed to Step 41.
41	Since distortion is ***not*** satisfactory, perform trans-hybrid loss measurement per Section 591-028-501 if station is 2-wire line connection. If station is 4-wire, proceed to Step 43.
42	If the trans-hybrid loss measurement is within limits specified, proceed to Step 44. If the loss is ***not*** satisfactory, proceed to Step 43.
43	Since the trouble has ***not*** come clear, request help through proper channels.
44	Trouble may have come clear. Perform an operational test to verify trouble has been cleared.

4. REFERENCES

4.01 Detailed information on installation of the data station, gaining access to the DAS 820D, and adjustments for send and receive levels of the data station are found in the following applicable Bell System Practices (BSPs):

SECTION	TITLE
591-028-100	Data Sets 108D- And 108E-Types—Used in Station Applications—Description
591-028-101 -201 -501	Data Sets 108D- And 108E-Types—Single Private Line Station Arrangement Using Data Auxiliary Set 820D
591-801-202	37 Teletypewriter Keyboard Send-Receiver (KSR)—Station Arrangement—Nonswitched Point-to-Point—Private Line Service—Installation
591-802-201	37 Teletypewriter Automatic Send-Receiver (ASR)—Station Arrangement—Nonswitched Point-to-Point—Private Line Service—Installation
591-803-201	37 Teletypewriter Receiver Only (RO)—Station Arrangement—Nonswitched Point-to-Point—Private Line Service—Installation
591-815-201	33 and 35 Teletypewriter Station For General Purpose—Point-to-Point Private Line Service—Installation and Checkout

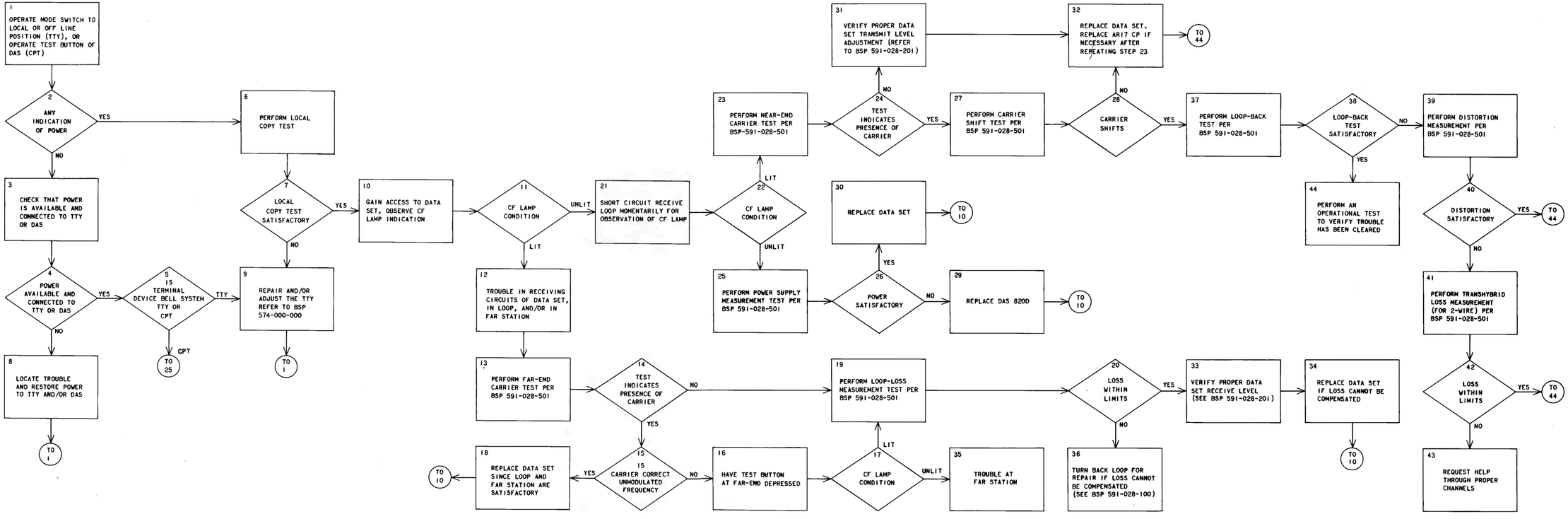

Fig. 4—Troubleshooting Procedure Block Diagram