

DATA SET 109E-TYPE
SINGLE PRIVATE LINE STATION
USING DATA AUXILIARY SET 820D-TYPE
MAINTENANCE PROCEDURES

1. GENERAL

1.01 This section provides information on maintaining data set 109E-type single private line (PL) stations. A data station, as described in this section, consists of data set 109E-type, data auxiliary set (DAS) 820D-type, and AR17 circuit pack, excluding the Bell System- or customer-provided terminal equipment. Information in this section is limited to the data station.

1.02 No routine maintenance is required for data set 109E-type single PL station. The data station is maintained by replacing the data set, circuit pack, or DAS as they prove defective.

1.03 Information pertaining to the terminal equipment may be obtained from the customer (for customer-provided terminal equipment) or, in case of a Bell System teletypewriter (TTY), from the appropriate Field Maintenance Practice (FMP).

1.04 All defective components should be carefully packed (in the original carton if possible) and returned to the distributing house. A tag should accompany the component describing the trouble.

1.05 Data set 109E-type single PL station may be arranged for station-to-station or station-to-hub operation (Fig. 1). This section provides maintenance information pertaining to both arrangements.

2. MAINTENANCE AIDS

2.01 Material listed in this part is suggested as aids in the performance of the maintenance procedures in this section. This list consists of reference sections and schematic diagrams, special tools required, and troubleshooting charts.

2.02 The following sections and schematic diagrams may be required when making a maintenance visit to the data station.

SECTION	TITLE
591-036-100	Data Set 109E-Type—Identification
591-036-102	Data Set 109E-Type—Single Private Line Station—Using Data Auxiliary Set 820D-Type—Description
591-036-202	Data Set 109E-Type—Single Private Line Station—Using Data Auxiliary Set 820D-Type—Installation Procedures
591-036-502	Data Set 109E-Type—Single Private Line Station—Using Data Auxiliary Set 820D-Type—Test Procedures
591-058-100	Data Auxiliary Set 802D-Type—Identification
SD- & CD-1D198-01	Data Systems Station—Data Set 109E-L1
SD- & CD-3D031-01	Data Auxiliary Sets 820D- and 820E-Type.

2.03 A suggested sequence of testing and trouble analysis is given in the Trouble Locating Procedure and Maintenance Flowchart (Fig. 2). The blocks of the flowchart are numbered to provide easy reference. The numbers are for reference only and do not indicate the sequence of testing, however, they correspond to the steps of the associated step procedure.

SECTION 591-036-302

2.04 The following tests and procedures are used to locate the cause of the trouble. Detailed information on the tests listed here and referred to in the trouble locating procedures is contained in the BSP entitled Data Set 109E-Type—Single Private Line Station—Using Data Auxiliary Set 820D-Type—Test Procedures (591-036-502).

- Power Supply Test
- Circuit Pack Exchange Procedure
- Loop Current Test
- Data Set Voltage Test
- Loop-Back Tests
- Loop Resistance Test
- End-to-End Test.

2.05 The following list of cords and equipment will be required to perform the previously referenced maintenance tests.

- 911A data test set (DTS)
- 901B-L3 DTS (interface test adapter)
- KS-14510-L1 volt-ohm-milliammeter (VOM)
- Data set 109E-type (spare)
- AR17 circuit pack (spare)
- 2W6A cord (current interface)
- 2W7A cord (current interface)
- W1AD cord (EIA interface)
- WIBB cord (EIA interface).

3. MAINTENANCE PROCEDURE

GENERAL

3.01 In order to perform the maintenance tests referenced in this BSP, it will be necessary to gain access to the data auxiliary set, data set, and circuit pack. The data auxiliary sets 820D1 and 820D-L1 are used with customer-provided terminals (CPTs) and supplied with a plastic cover.

To gain access to these units remove the cover as indicated in 3.02 of this BSP. Data auxiliary sets 820D2 and 820D-L1A are used in TTYs; plastic covers are not provided. Refer to the text on the TTY being used for information on obtaining access to the DASs.

DAS 820D1 and DAS 820D-L1 Cover Removal and Replacement

3.02 Removal:

- (1) Loosen, but do not remove, the four screws located around the base of the DAS.
- (2) Carefully lift the plastic cover free of the test key and off the base.

3.03 Replacement:

- (1) Position retaining wedges of the cover screws in such a manner as to receive cover lugs.
- (2) Place the plastic cover over the test key and lower the cover into place. Make sure the cover lugs are positioned so the retaining wedges will grip the lugs. Tighten the cover retaining screws.



Care must be taken to avoid stripping the threads when tightening cover screws.

OBTAINING ACCESS TO AND REMOVAL OF DATA AUXILIARY SET MOUNTED IN MODEL 35 TTY

3.04 The data auxiliary set is located in the kneewell of Model 35-type TTYs. To gain access to and remove the DAS proceed as follows:

- (1) Remove the chad container on the automatic send and receive (ASR) TTY by sliding it to the left, raising the right side, and sliding it to the right.
- (2) Operate the two pushbuttons located at the top of the lower compartment panel.
- (3) Depress the spring clips underneath the keyboard and pivot the lower compartment panel down.

- (4) Disengage the panel from the pivot screws and remove the panel.

Note: The procedure for a Model 35 receive only (RO) TTY is the same as the Model 35 ASR TTY with the exception that only one pushbutton fastener is used to hold the lower compartment panel and no chad container is used.

- (5) Remove the power and interface cords.
- (6) Tag or otherwise identify the loop leads and remove the leads from TSA of DAS 820D2 (TB1 for DAS 820D-L1A).
- (7) The DAS can be removed from the backboard by removing the spring clips.

OBTAINING ACCESS TO AND REMOVAL OF A DATA AUXILIARY SET MOUNTED IN MODEL 37 TTY

3.05 The data auxiliary set is located in the pedestal of the TTY. To gain access to and remove the DAS proceed as follows:

- (1) Open the pedestal door.
- (2) Unscrew the spring-ejected panel fastener from the jacknut.
- (3) Remove the power and interface cords.
- (4) Tag or otherwise identify the loop leads and remove the leads from TSA of DAS 820D2 (TB1 for DAS 820D-L1A).
- (5) Lift the 98A bracket and DAS out of the pedestal.
- (6) The DAS may be removed from the 98A bracket by removing the four screws holding it in place.

DATA SET 109E-TYPE AND AR17 CIRCUIT PACK REMOVAL AND REPLACEMENT

3.06 After obtaining access to the DAS and data set as previously indicated, the data set

and AR17 circuit pack can be removed by using a 748 tool.

3.07 When the data set or AR17 circuit pack is replaced, the replacing unit must have the same options installed as the unit being removed. The line resistance pads must also be set to provide the same resistance value as the unit being removed. For information on setting the resistance, refer to Section 591-036-202.

3.08 After replacing the data set or AR17 circuit pack, make sure they are firmly seated in their connectors. The DAS may be reinstalled or the cover replaced by reversing the procedures used to gain access to the set.

4. MAINTENANCE AIDS

4.01 The following procedures are suggested for use in isolating a data station trouble. The term "station" refers to data transmission equipment. The term "line" refers to the telephone pair or loop connected to the station data sets. The following procedures do not attempt to isolate troubles in the equipment associated with the data station.

4.02 For purposes of this section, a station-to-hub arrangement (Fig. 1) is defined as a local station (DAS 820D-type w/data set 109E-type) connected to a data set 109-type at the hub. A station-to-station arrangement (Fig. 1) is a local data station (DAS 820D-type w/data set 109E-type) connected to a remote data station (a DAS w/data set 109-type).

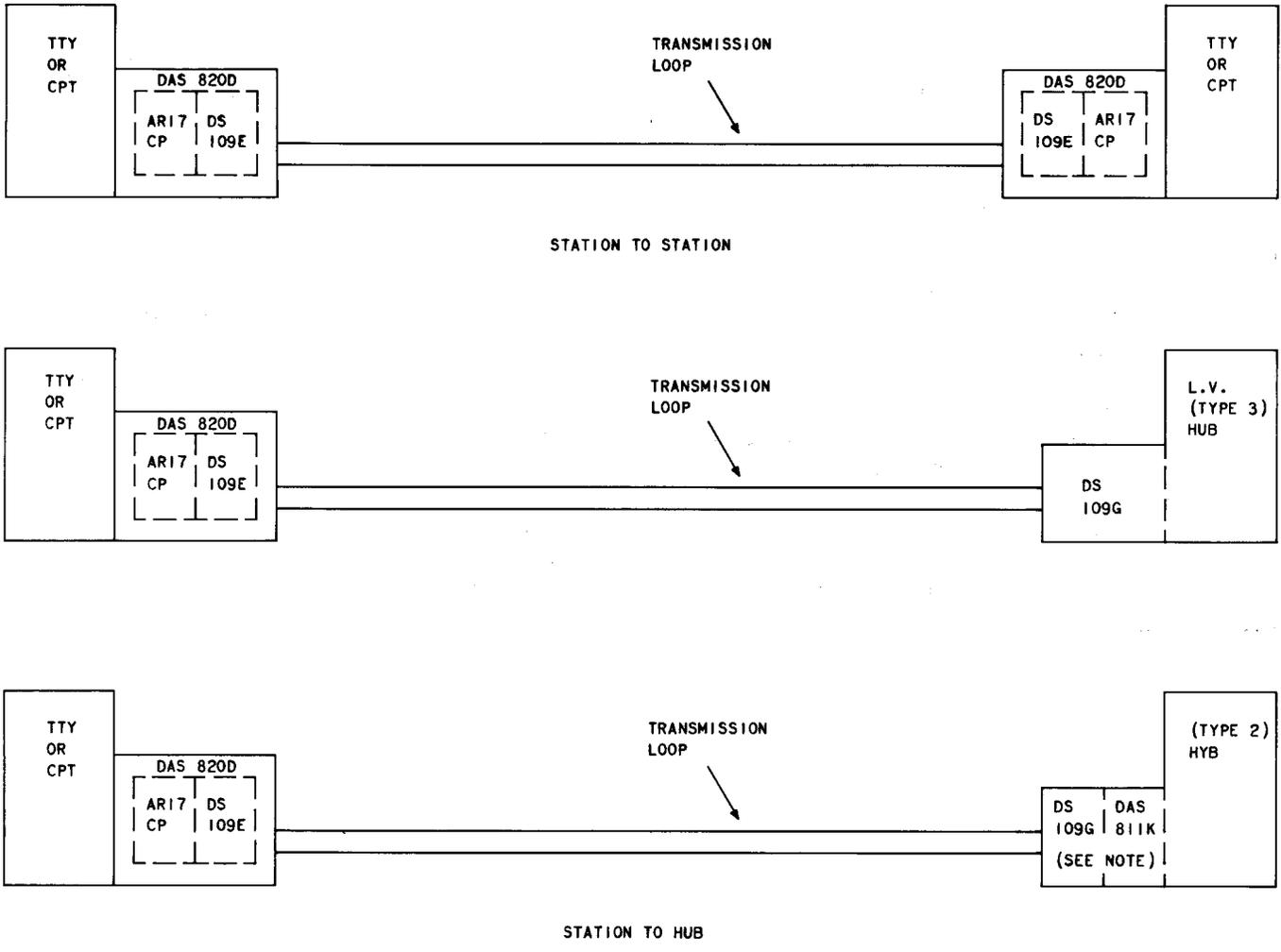
4.03 The following maintenance procedures are suggested for station-to-station arrangements. The procedures are numbered to correspond with the blocks of the Trouble Locating Procedure and Maintenance Flowchart in Figure 2. The numbers in this figure are for reference only; they do not necessarily indicate the sequence of testing.

4.04 When a station-to-hub installation is being tested, the procedures are modified only to the extent that the hub can be used as the points of access for measuring loop resistance and loop current. End-to-end testing is also facilitated by the access provided by the hub.

SECTION 591-036-302

STEP	PROCEDURE
1	A craft employee is dispatched to the station upon receipt and verification of a trouble condition.
2	Check that power is supplied to the data station and data auxiliary set. Verify that power is supplied to the data set via the data auxiliary set. Refer to the power supply test given in Section 591-036-502.
3	Attempt to operate the station in the local mode.
4	When the station operates properly in the local mode, proceed to Step 5. If trouble is experienced when local mode operation is attempted, refer to Step 11.
5	Perform the loop current test. Refer to Section 591-036-502.
6	When the loop current is between 3.0 and 3.2 mA, the loop current is acceptable. The line pads should be adjusted as indicated in Section 591-036-202 in order to obtain an acceptable loop current value. If an acceptable loop current cannot be obtained, proceed to Step 7. If the loop current limits are met, proceed to Step 10.
7	<p>Perform the loop resistance test to determine if the line is shorted or open.</p> <p>Note: The line pads used to adjust the loop current were set in Step 6 to the optimum value, therefore any change in loop resistance has already been compensated for as much as possible. Step 7 is performed to determine if the loop is shorted, open, or total loop resistance is too high to be acceptable (greater than 2000 ohms).</p>
8	If the loop is acceptable (not shorted, not open, and has a total resistance that is less than 2000 ohms) proceed to Step 10. If the loop is not acceptable, proceed to Step 9.
9	<p>When the loop has been found to be defective, the proper steps must be taken to have it repaired or replaced. After repair or replacement of the loop, an operational or loop-back test must be performed to verify that the trouble has been cleared. See Step 17.</p> <p>Note: When the loop has been repaired or replaced, refer to Section 591-036-202 for information on setting the line pad resistance to obtain the proper loop current.</p>
10	When previous testing verifies that the loop is acceptable, the data sets at each end should be suspected of causing the trouble condition. The data stations at each end should be checked by performing the applicable steps (starting with Step 11) for each station.
11	When a customer-provided terminal (CPT) is used, the customer should be informed of the results of the previous tests and requested to verify that the terminal equipment is operating properly. If a Bell System TTY is used as the terminal device, refer to the applicable field maintenance practice (FMP) for information on testing the TTY.
12	When testing of the terminal indicates that it is not operational, refer to Step 13. If the terminal equipment is operational proceed to Step 14.

STEP	PROCEDURE
13	Take the necessary steps to repair or have the terminal repaired. After the necessary repairs are made and the terminal is returned to service, an operational or loop-back test must be performed to verify the trouble condition has been cleared (Refer to Step 17).
14	Perform the circuit pack exchange procedure given in 591-036-502. The voltage test indicated in the previously referenced BSP can be used to determine if the operation of the data station is acceptable.
15	When the circuit pack exchange procedure fails to clear the trouble condition proceed to Step 16. If the previous voltage tests indicate that the data set is operating properly, proceed to Step 17.
16	If after performing the circuit pack exchange procedure the voltage test can <i>not</i> be met the DAS should be suspected of causing the malfunction. Inspect the DAS wiring for loose or broken connection or damaged connectors. The DAS can be removed from service and a known good DAS substituted. The voltage test indicated in the previous steps can be used to determine if the new data auxiliary set, circuit pack, and data set are operative. When substitution of a known good DAS is impractical or fails to clear the trouble, request help through proper lines of authority.
17	After locating and clearing a trouble condition, an operational or loop-back test must be performed to verify that the equipment is operating properly and service can be restored. Satisfactory operation or loop-back testing concludes this trouble clearing procedure.



NOTE:
 WHEN ONLY HALF-DUPLEX SERVICE IS PROVIDED AT THE STATION,
 DS 109B AND DAS 811C CAN BE USED AT THE TYPE 2 HUB.

Fig. 1—System Block Diagram

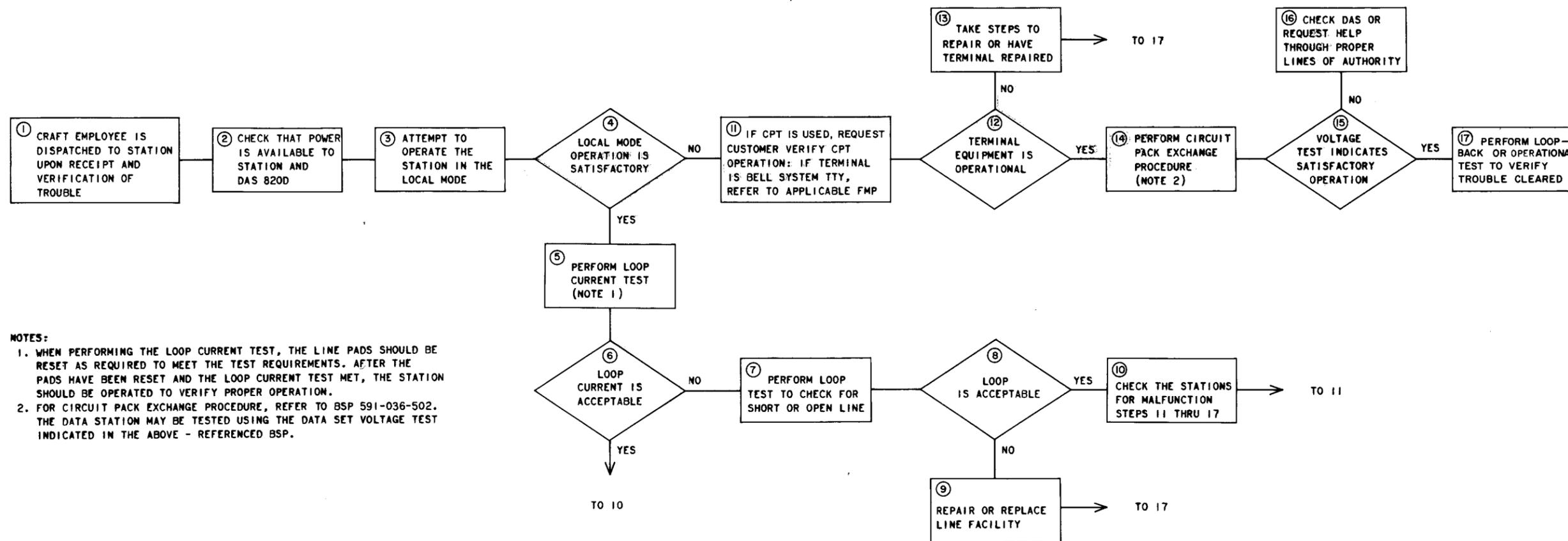


Fig. 2—Trouble Locating Procedure