PRIVATE LINE STATION ARRANGEMENTS USING DATA AUXILIARY SETS 830A, 830B, AND 830C WITH DATA SETS 108- AND 109-TYPE MAINTENANCE

CONTENTS PAGE

1. GENERAL

1.01 The data auxiliary sets (DAS) 830A, 830B, 830C, and data set 108- or 109-type do not require routine or periodic maintenance. Maintenance is limited to the routine requirements of the terminal device (Bell System teletypewriter [TTY] or customer-provided terminal [CPT]) and the replacement of a defective data set or DAS.

1.02 This section is reissued to include DAS 830C which has been developed to be used in conjunction with DAS 830A for 20-mA current interface applications.

1.03 When a Bell System TTY is used as the terminal device, refer to the appropriate Field Maintenance Practice (FMP) for information on maintaining this equipment.

2. ACCESS REMOVAL AND REPLACEMENT INFORMATION

GENERAL

2.01 Information on obtaining access to DAS 830A and the associated data set is provided for each type of TTY by model (M33, 35, 37). General mounting and access information that is common to all TTY models is contained in 2.02.

2.02 When DAS 830A is mounted in any TTY, a 193A backboard (Fig. 1) is used. DAS 830A is secured to the backboard by four screw heads in keyhole slots. The 193A backboard provides the required spring tension to hold the screw heads in the slots. The screw head and slot arrangement allow for removal of DAS 830A after the backboard is mounted in the TTY. The brackets required to mount the backboard in the TTY are listed below.

- Model 33 TTY—102B Bracket

- Model 35 TTY—96B Bracket
- Model 37 TTY—98B Bracket.

Note: When DAS 830A is used with a CPT, it can be mounted on a backboard or set on a shelf or table. In this case, there is no problem of access to the unit. Refer to the applicable parts of 2.06 and 2.07 for information on replacing DAS 830A or the associated data set.

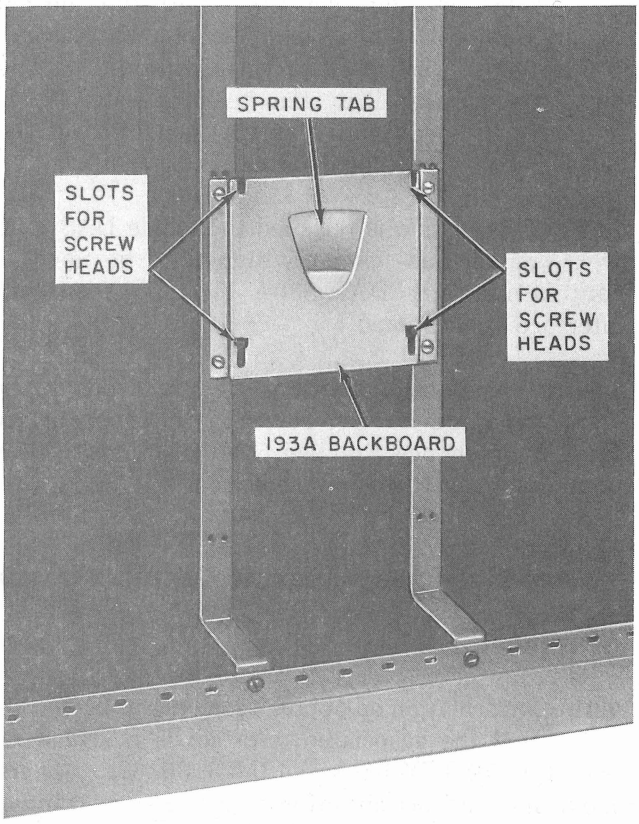


Fig. 1—193A Backboard for Mounting DAS 830A in a TTY

ACCESS TO DAS 830A IN MODEL 33 TTY

2.03 DAS 830A is mounted in the pedestal (stand) of the M33 TTY (Fig. 2). Access to the DAS 830A is obtained as follows:

(1) Remove the back cover of the TTY pedestal by removing the two screws at the top of the cover.

(2) Remove the back by lifting it up and away from the pedestal.

Note: DAS 830A may be mounted in the M33 pedestal using a TTY bracket No. TP187607. When a 9131 station controller is mounted in the TTY, DAS 830A will have to be removed from the TP187607 bracket.

(3) Refer to 2.06 for DAS 830A removal instructions.

(4) Reverse preceding procedures to reinstall back cover.

ACCESS TO DAS 830A IN MODEL 35 TTY

2.04 DAS 830A is located in the kneewell of a M35 TTY (Fig. 3). Access to DAS 830A is obtained as follows:

(1) Remove the chad container on automatic send-receive (ASR) TTYs (slide it to the left and raise the right side; slide it back to the right and remove).

(2) Operate the two pushbutton fasteners at the top of the kneewell (lower compartment) panel.

(3) Depress spring clip and pivot panel down.

(4) Disengage panel and remove.

Note: The procedure for a M35 RO TTY is the same as for an ASR TTY except there is only one pushbutton fastener and no chad container.

(5) Refer to 2.06 for DAS 830A removal instructions.

(6) Reverse preceding procedures to close the kneewell (lower compartment).

ACCESS TO DAS 830A IN MODEL 37 TTY

2.05 DAS 830A is located behind the door in the right pedestal of the TTY (Fig. 4). Access to DAS 830A is obtained by opening the pedestal door. The spring-loaded fastener that secures the 98B bracket in the TTY can be released and the bracket (with backboard and DAS) removed from

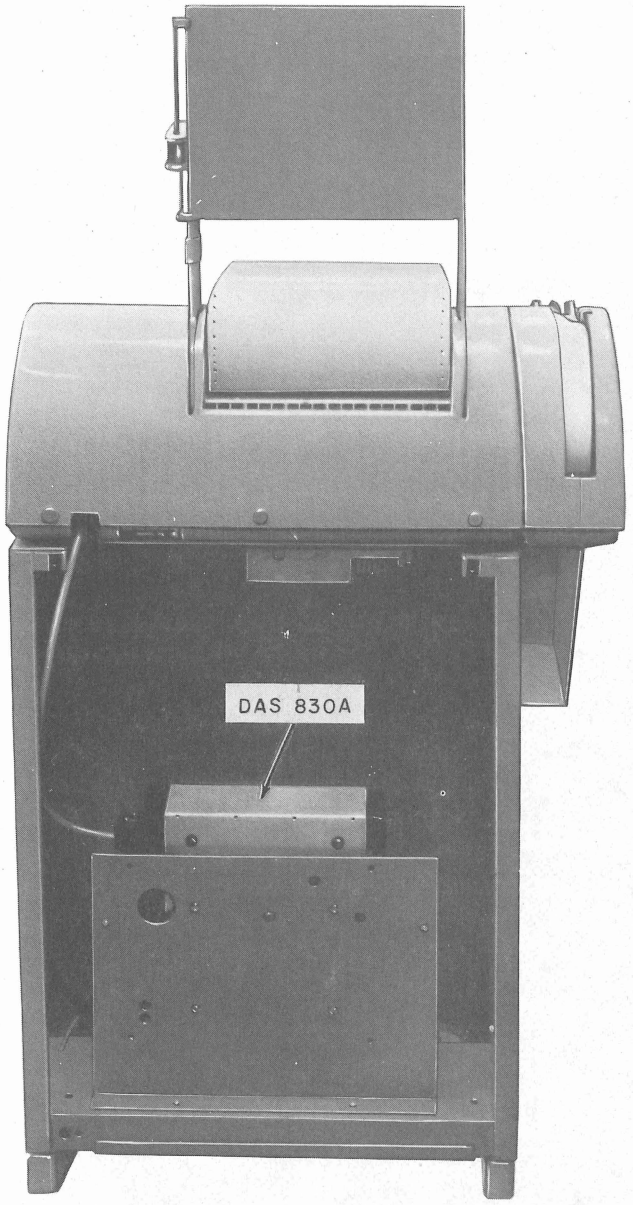


Fig. 2—DAS 830A Mounted in a Model 33 TTY

the pedestal when better access is required. Refer to 2.06 for DAS 830A removal instructions.

DAS 830A REMOVAL AND REPLACEMENT

THINK

When DAS 830A is replaced, the replacing unit must have the same options installed as were provided by the unit being replaced. The data set associated with DAS 830A will also have to be installed in the new unit.

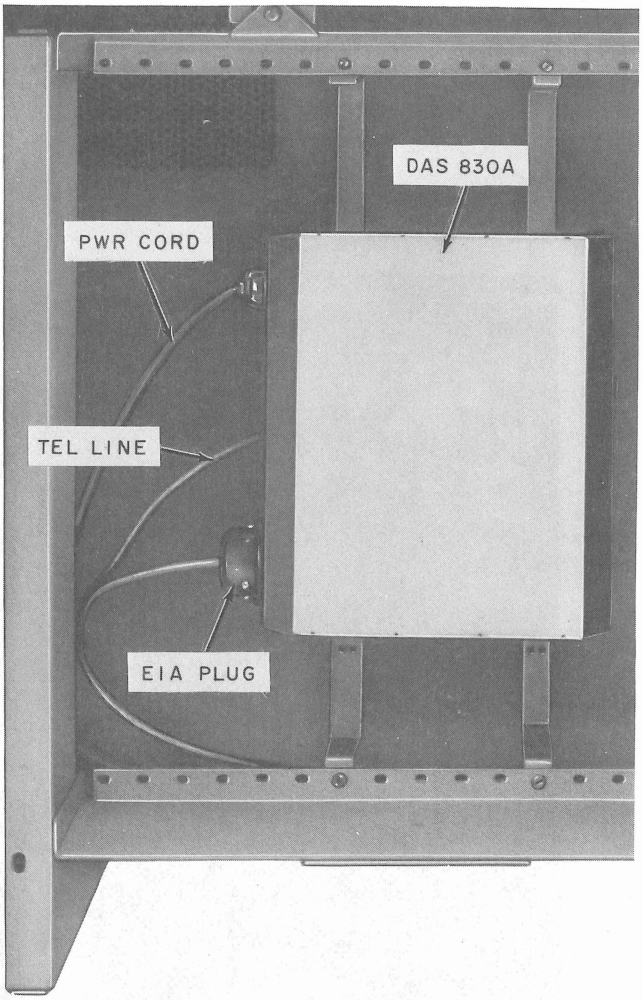


Fig. 3—DAS 830A Mounted in a Model 35 TTY

When a replacement data set is also used, it must be equipped with the proper options before installing it in DAS 830A.

2.06 Perform the following steps to remove or replace DAS 830A.

(1) Remove DAS 830A from the 193A backboard by sliding the DAS up to disengage the screw heads from the slots.

(2) Lift DAS 830A off the backboard. DAS 830A can now be removed from the TTY as far as the slack in the Electronic Industries Association (EIA) ▶25-pin connector◀ cord, power cord, and line cord will allow.

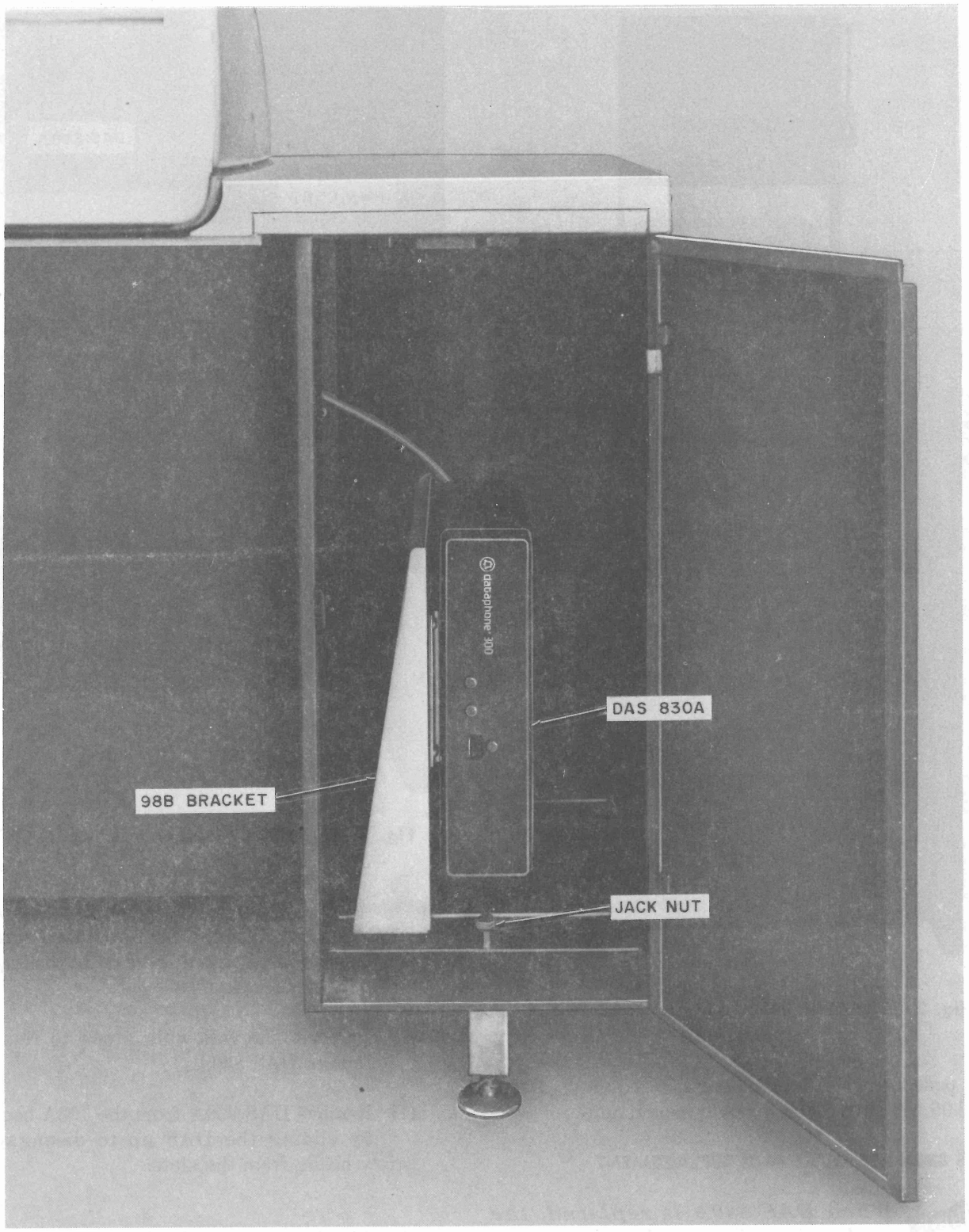


Fig. 4—DAS 830A Mounted in a Model 37 TTY

Note: When DAS 830A is being removed to obtain access to the data set, refer to 2.07 as the following procedures are not required.

(3) Unplug the power cord.

(4) Loosen the retaining screws and unplug the EIA connector.

(5) Remove the rear cover by gently squeezing it at the top and bottom, to release the cover retaining tabs, while pulling the cover away from the chassis.

Note: Removal of the rear cover makes the option switches and screw terminals accessible for checking or installing DAS 830A options.

(6) Remove line connections (and remote test switch connections when provided) from the screw terminals. Tag each lead when removed so the leads can be reconnected to the same terminals (maintains proper line polarity for data set 109-type).

(7) To reinstall DAS 830A, reverse the preceding procedures.

▶Check options provided by DAS 830A and make line connections before reinstalling the rear cover.◀ When a data set 109-type is associated with DAS 830A, the line polarity must be determined in order to correctly connect the line facilities. Refer to the section entitled Private Line Station Arrangements Using Data Auxiliary Sets 830A and 830B With Data Sets 108- and 109-Type—Installation and Connections (591-816-200).

DATA SETS 108- AND 109-TYPE REMOVAL AND REPLACEMENT

2.07 In order to remove and replace the data set, first gain access to and remove DAS 830A from the TTY as indicated in the preceding text. Remove the data set as follows:

(1) Remove the front cover from DAS 830 by gently squeezing it at the top and bottom, to release the cover retaining tabs (Fig. 5), while pulling the cover away from the chassis.

(2) ▶Remove the data set (using a 748A tool).◀

Note: Before replacing the data set, check to ensure that the proper options have been installed. Refer to Section 591-816-200.

(3) Reinstall the data set by carefully positioning it and sliding it into DAS 830A. Seat it firmly in the connector.

(4) Replace the front cover on DAS 830A.

ACCESS TO DAS 830B IN MODEL 33 TTY

2.08 Access to the DAS 830B mounted in a M33 TTY is obtained by removing the TTY cover as follows:

Caution: Disconnect the power cord from the 117-volt ac power receptacle before performing any of the following procedures.

(1) ▶Remove paper and paper roll spindle (Fig. 6).

(2) Remove two screws that secure the faceplate to the cover and remove faceplate by lifting vertically.

(3) Remove platen knob by pulling it to the left.

Note: On sprocket-feed typing units, the platen knob is held with a setscrew. Remove setscrew before attempting to remove the knob.

(4) Remove nameplate by pulling it down and out.

(5) Remove seven mounting screws (four in front and three in rear) that fasten the TTY cover to the subbase.

(6) If ASR TTY, remove screw from the left rear corner of the tape reader cover.

(7) Remove TTY cover by lifting vertically.

(8) DAS 830B can now be removed as indicated in 2.10.

(9) To reinstall the cover, reverse the preceding procedures.◀

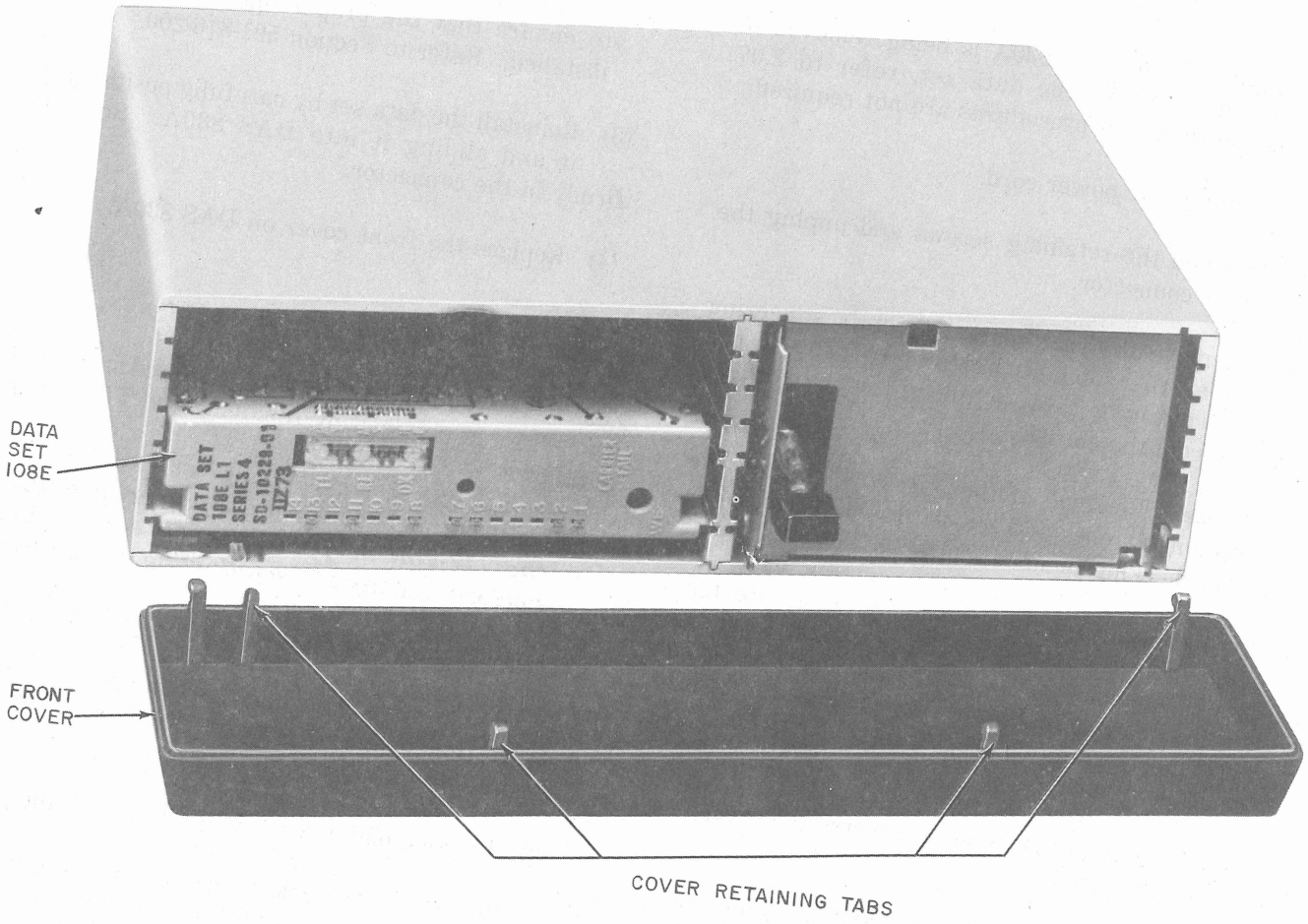


Fig. 5—DAS 830A—Front Cover Removal

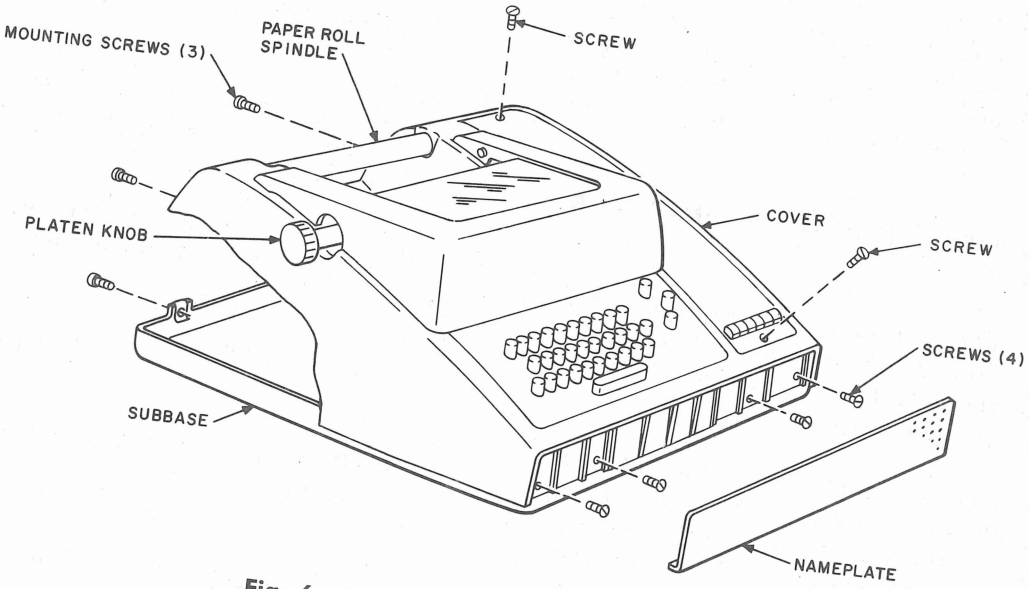


Fig. 6—33-Type TTY—Cover Removed

ACCESS TO DAS 830B IN MODEL 35 TTY

2.09 Access to a DAS 830B, mounted in a 35 TTY, is obtained by opening the cover as follows:

Caution: Disconnect the power cord from the 117-volt ac power receptacle before performing any of the following procedures.

(1) Operate two cover latches on each side of the upper cover and open the upper cover to its partially open-latched position.

(2) Remove two screws that secure the faceplate to the lower cover and remove faceplate by lifting vertically.

(3) Grasp handgrips located in front of the lower cover, operate cover latch, and raise cover.

(4) Verify that left rear stoparm is latched when lower cover is fully open.

(5) DAS 830B can now be removed as indicated in 2.10.

(6) To close the cover, reverse the preceding procedures.

DAS 830B REMOVAL AND REPLACEMENT

2.10 In order to remove and replace DAS 830B, gain access to the unit as indicated in the preceding text. Remove DAS 830B as follows:

(1) Unplug the TTY cables from DAS 830B, J1 ▶and P2.◀

(2) Unplug the EIA interface cord ▶(J1).◀

(3) When DAS 830B is mounted in a M33 TTY, refer to Fig. 7 and remove the three mounting screws that secure the baseplate to the call control unit. If a M35 TTY is used, refer to Fig. 8 and remove the two mounting screws under the pedestal panel.

(4) Lift DAS 830B out of the TTY. When installed in a 35 TTY, a nutplate located under the printed circuit board must be removed (Fig. 8).

Note: Before replacing DAS 830B, check to ensure that the proper options have been installed. Refer to Section 591-816-200.

(5) To reinstall DAS 830B, reverse the preceding procedures.

3. TROUBLE LOCATION

3.01 Data set 108A-, C-, D-, E-, or 109A-, D-, or E-type can be used with DAS 830A. Suggested sequences of testing and trouble analysis for data set 108-type, 109A, 109D, and 109E are given in the trouble locating procedure and maintenance flowcharts. Since trouble analysis depends on the type of data set used, the trouble location information is under the applicable data set heading.

3.02 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 or correspond to the steps of the associated step procedure.

3.03 The maintenance procedures are suggested steps to be followed in isolating a data station trouble. In these procedures the term "line" refers to the telephone pair or loop connected to the station data sets. The term "station" refers to the data tansmission equipment.

A. Data Sets 108A-, C-, D-, and E-Type

Maintenance Aids

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

SECTION	TITLE
591-023-100	Data Set 108-Type—Private Line System Station Application—Description
591-028-100	Data Sets 108D- and 108E-Type Used in Station Applications—Description
591-816-100	Private Line Station Arrangements Using Data Auxiliary ▶Sets 830A, 830B, and 830C◀ With Data Sets 108- and 109-Type— Description

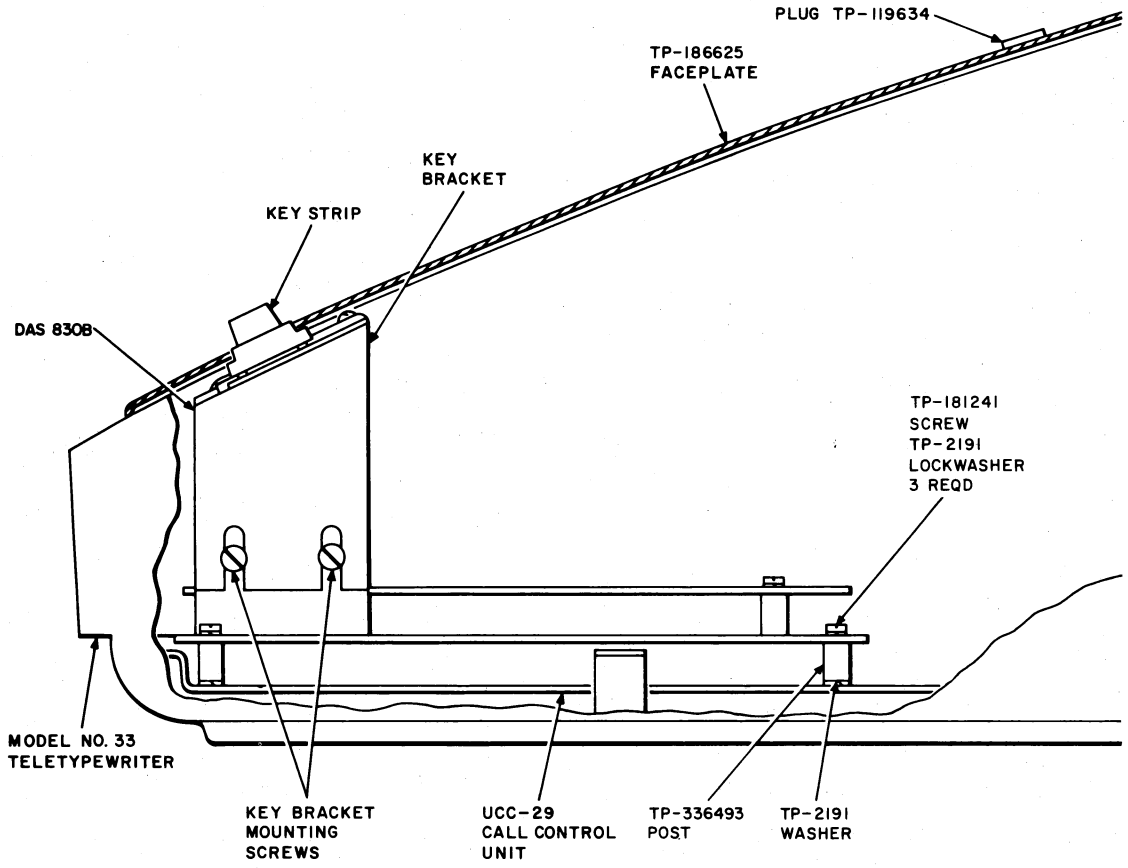


Fig. 7—Mounting Details—DAS 830B in a Model 33 TTY

SECTION	TITLE
591-816-200	Private Line Station Arrangements Using Data Auxiliary ▶Sets 830A, 830B, and 830C◀ With Data Sets 108- and 109-Type— Installation
591-816-500	Private Line Station Arrangements Using Data Auxiliary ▶Sets 830A, 830B, and 830C◀ With Data Sets 108- and 109-Type—Tests

SD- & CD-3D024-01 Data Set 108A

SD- & CD-3D032-01 Data Set 108C

SD- & CD-73060-01 Data Set 108D

SD- & CD-1D229-01 Data Set 108E

SD- & CD-1D250-01 Data Auxiliary Sets 830A, 830B, ▶and 830C◀

▶SD- & CD-30025-01 Data Set 109A

SD- & CD-1D172-01 Data Set 109D

SD- & CD-1D198-01 Data Set 109E

SD- & CD-3D031-01 Data Auxiliary Set 820D

SD- & CD-1D164-01 ET1 CP◀

3.05 The following procedures are contained in Section 591-816-500 for testing data set 108-type.

- Power Supply Test
- Data Set Exchange Procedure
- Carrier Shift Test
- Carrier Monitoring Test

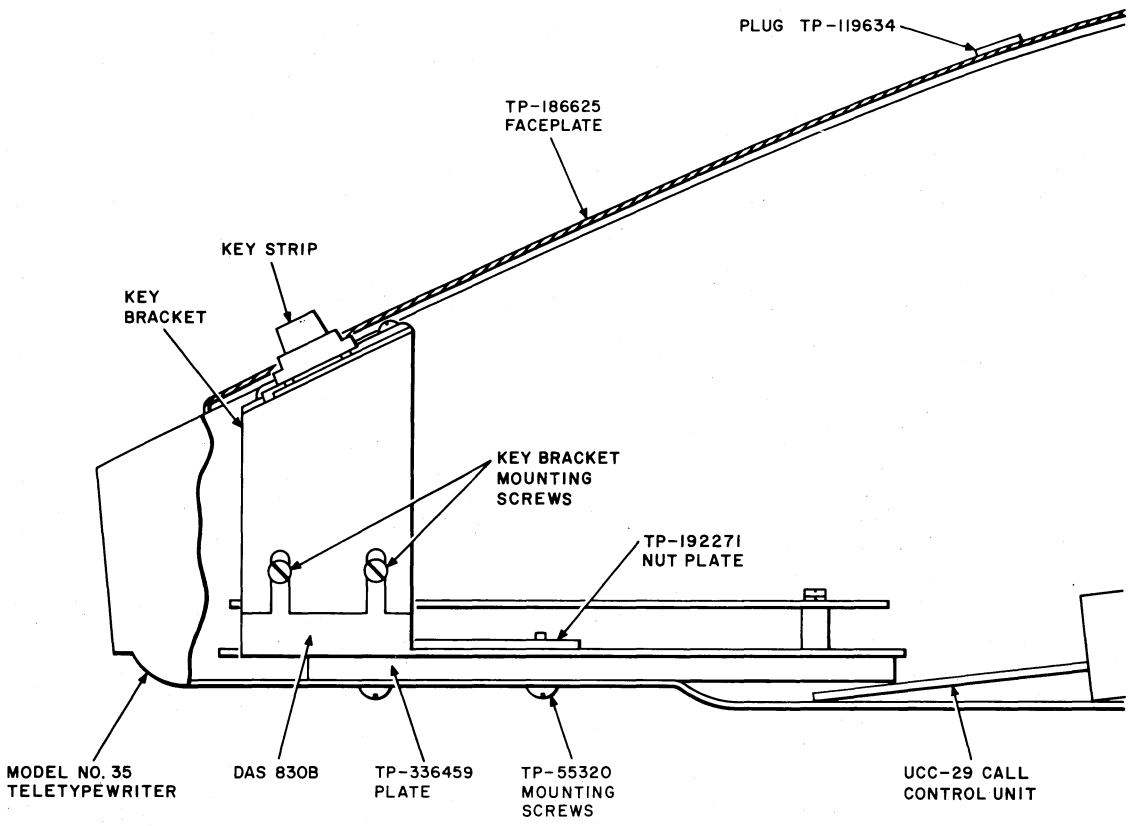


Fig. 8—Mounting Details—DAS 830B in a Model 35 TTY

- Loop-Back Voltage Test
- Distortion Measurement Test Using 911A DTS
- Distortion Measurement Test Using 902- and 903-type DTSs
- Loop Loss Test.

Maintenance Procedures

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.

3.06 When a station-to-hub installation is being tested, the procedures are modified only to the extent that the two wire line jacks in the facility position can be used as the point of access for measuring loop resistance and loop current. End-to-end testing is also facilitated by the access provided by the hub.

STEP	PROCEDURE
1	Dispatch a craft employee to the station upon receipt and verification of a trouble condition.

STEP	PROCEDURE
2	Check that power is supplied to the data station and terminal device. Verify that power is supplied to the data set via the DAS. Refer to the power supply test given in Section 591-816-500.
3	Attempt to obtain copy of a test message by operating the station in the local mode. If the terminal device is a TTY with DAS 830B ▶or 830C (Fig. 9),◀ perform local copy test in Section 591-816-200.
4	When the terminal operates properly in the local mode, proceed to Step 5. If trouble is experienced when local mode operation is attempted, proceed to Step 6.
5	Perform the data set exchange procedure in Section 591-816-500 and determine if operation of the data station is acceptable. Proceed to Step 7.
6	When a CPT is used, the customer should be informed of the results of the previous tests and be 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 FMP for information on testing the TTY.
7	If the data station is operating properly, return the data station to operational status and verify that data is transmitted and received without errors. If the data station is not operating properly, refer to Step 8 (and 108-type section of maintenance flowchart (Fig. 10).
8	Perform loop-loss measurement test in Section 591-816-500.
9	If loss is within limits, proceed to Step 11. If loss is ***not*** within limits, proceed to Step 10.
10	When the loop loss is ***not*** within limits, try to compensate with receive level switch options on the data set. If loss is too much to compensate, turn back loop for repair.
11	Perform the far-end carrier test in Section 591-816-500.
12	If the far-end carrier test indicates the presence of carrier, proceed to Step 13. If carrier from the far end is ***not*** present, proceed to Step 14.
13	If the data set is in the preconnect mode (refer to Section 591-028-100), it must receive a steady marking (data set 108A, C, or D) carrier or steady marking or spacing (data set 108E) carrier for a period of 600 ms to establish connection. If the carrier meets the requirements for connection, proceed to Step 15. If it does ***not,*** proceed to Step 14.
14	The trouble has been isolated to the far station. Start troubleshooting from that location. After trouble is located and cleared, perform operational test to verify trouble is cleared.
15	If this troubleshooting procedure has been unsuccessful in locating the trouble, the spare data set used for the exchange procedure might be defective or have the wrong options installed. If a spare data set is not available, the following tests will determine if the present data set is good. If the trouble is not located, request help through proper channels.

STEP	PROCEDURE
	• Near-End Carrier Test • Carrier Shift Test • Loop-Back Test • Distortion Measurement Test.

B. Data Set 109A-Type

Maintenance Aids

3.07 The following sections and schematic diagrams may be required, in addition to those listed in 3.04, when making a maintenance visit to a data station.

SECTION	TITLE
591-024-100	Data Set 109A-Type—Identification

▶SD- & CD-3D025-01 Data Set 109A-Type◀

3.08 The following test procedures for data set 109A are contained in Section 591-816-500.

- Power Supply Test
- Loop Resistance Test
- Circuit Pack Exchange Procedure
- End-to-End Test.

Maintenance Procedures

3.09 When a station-to-hub installation is being tested, the procedures are modified only to the extent that the two wire line jacks in the facility position can be used as the point of access for measuring loop resistance and loop current. End-to-end testing is also facilitated by the access provided by the hub.

STEP	PROCEDURE
1	Dispatch a craft employee to the station upon receipt and verification of a trouble condition.
2	Check that power is supplied to the data station and DAS. Verify that power is supplied to the data set via the DAS. Refer to the power supply test given in Section 591-816-500.
3	Attempt to operate the station in the local mode. If the terminal device is a TTY with DAS 830B or ▶830C (Fig. 9),◀ perform local copy test in Section 591-816-200.
4	When the terminal operates properly in the local mode, proceed to Step 5. If trouble is experienced when local mode operation is attempted, refer to Step 10.
5	Perform the data set exchange procedure given in Section 591-816-500 and determine if the operation of the data station is acceptable.

STEP	PROCEDURE
6	If the station is operating properly, return the station to operational status and verify that data is transmitted and received without errors. If the data station is not operating properly, refer to Step 7 and the 109-type section of the maintenance flowchart (Fig. 10).
7	With the aid of the remote station attendant or STC, perform the transmission loop resistance test outlined in Section 591-816-500.
8	If the transmission loop has shorted or the loop resistance has changed, proceed to Step 9. If the transmission loop has ***not*** changed, proceed to Step 15.
9	Readjust the line pads; repair or replace the transmission loop.
10	Perform the station-to-station or station-to-hub end-to-end test in Section 591-816-500.
11	If the end-to-end test is satisfactory, return the station to operational status and verify trouble is cleared. If the end-to-end test is ***not*** satisfactory, proceed to Step 15.
12	When a 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 FMP for information on testing the TTY.
13	When testing of the terminal indicates that it is ***not*** operational, refer to Step 14. If the terminal equipment is operational, proceed to Step 15.
14	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 test must be performed to verify the trouble condition has been cleared.
15	If preceding maintenance procedures do not indicate the source of the trouble, request aid through the proper channels.

C. Data Set 109E-Type

Maintenance Aids

3.10 The following section may be required, in addition to those listed in 3.04 and 3.07, when making a maintenance visit to the data station.

SECTION	TITLE
591-036-100	Data Set 109E-Type—Identification

3.11 The following test procedures for data set 109E are contained in Section 591-816-500.

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

- End-to-End Test.

3.12 When a station-to-hub installation is being tested, the procedures are modified only to the extent that the two wire line jacks in the facility position can be used as the point of access for measuring loop resistance and loop current. End-to-end testing is also facilitated by the access provided by the hub.

Maintenance Procedures

STEP	PROCEDURE
1	Dispatch a craft employee to the station upon receipt and verification of a trouble condition.
2	Check that power is supplied to the data station and terminal device. Verify that power is supplied to the data set via the DAS. Refer to the power supply test given in Section 591-816-500.
3	Attempt to obtain copy of a test message by operating the station in the local mode. If terminal device is TTY with DAS 830B or ▶830C (Fig. 9),◀ perform local copy test in Section 591-816-200.
4	When the terminal operates properly in the local mode, proceed to Step 5. If trouble is experienced when local mode operation is attempted, refer to Step 12.
5	Perform the data set exchange procedure and the voltage test in Section 591-816-500 and determine if station operation is acceptable.
6	When the data set exchange procedure fails to clear the trouble condition, refer to the 109-type section of the maintenance flowchart (Fig. 10) and proceed to Step 7. If the voltage test indicates that the data set is operating properly, proceed to Step 15.
7	Perform the loop current test. Refer to Section 591-816-500.
8	When the loop current is between 3.0 and 3.2 mA, the loop current is acceptable. If loop current is ***not*** acceptable, the line pads must be adjusted as indicated in Section 591-816-200 in order to obtain an acceptable loop current value. If an acceptable loop current cannot be obtained, proceed to Step 9. If the loop current limits are met, proceed to Step 15.
9	Perform the loop resistance test to determine if the line is shorted or open. ***Note:*** The line pads used to adjust the loop current were set in Step 8 to optimum value. Step 9 is performed to determine if the loop is shorted, open, or total loop resistance is too high to be acceptable (greater than 2000 ohms).
10	If the loop is acceptable (not shorted, not open, and has a total resistance that is less than 2000 ohms) proceed to Step 15. If the loop is ***not*** acceptable, proceed to Step 11.
11	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 16.) When the loop has been repaired or replaced, refer to Section 591-816-200 for information on setting the line pad resistance to obtain the proper loop current.

STEP	PROCEDURE
	Note: When 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 12) for each station.
12	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 FMP for information on testing the TTY.
13	When testing of the terminal indicates that it is ***not*** operational, refer to Step 14. If the terminal equipment is operational, proceed to Step 15.
14	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 16).
15	If after performing the data set exchange procedure the voltage test can ***not*** 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 deterine if the new DAS, 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.
16	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.

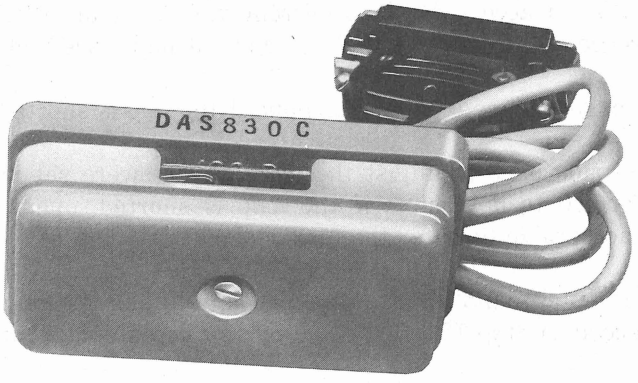
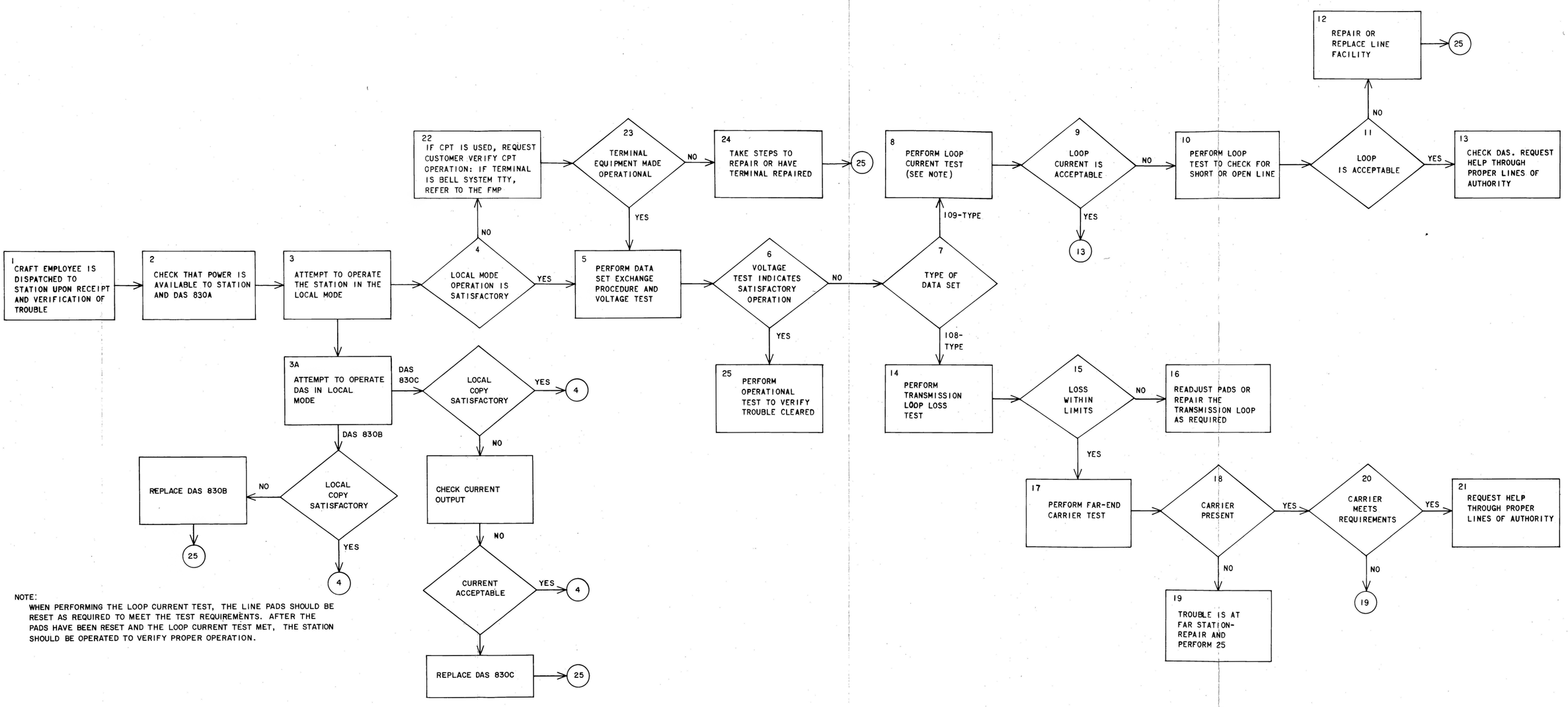


Fig. 9—DAS 830C



NOTE:
WHEN PERFORMING THE LOOP CURRENT TEST, THE LINE PADS SHOULD BE RESET AS REQUIRED TO MEET THE TEST REQUIREMENTS. AFTER THE PADS HAVE BEEN RESET AND THE LOOP CURRENT TEST MET, THE STATION SHOULD BE OPERATED TO VERIFY PROPER OPERATION.

Fig. 10—Maintenance Flowchart for Data Set 108- and 109-Type