# DATA SET 109F USED IN DATREX* SERVICE

# MAINTENANCE

## 1. GENERAL

**1.01** This practice provides information on the maintenance requirements and procedures to be followed when using a Data Set 109F as part of a system providing DATREX service.

*Service Mark of the Bell System.

**1.02** The Data Set 109F does not require routine or periodic maintenance or service.

**1.03** The data station is maintained by replacing the data set if it proves defective and by making the required repairs and/or adjustments to the teletypewriter.

**1.04** This practice provides information on the Data Set 109F only and does not contain information on the associated teletypewriter. For information on the teletypewriter, consult the applicable Field Maintenance Practice (FMP) for the type of TTY being used.

**1.05** When a Data Set is replaced, the defective unit should be carefully packed (in original type cartons if available) and returned to the distributing house. A tag describing the trouble should be affixed to the data set.

## 2. MAINTENANCE AIDS

**2.01** No special equipment is required to perform the maintenance activities on the data set. A KS-14510-L5 volt-ohm-milliammeter or equivalent can be used to make any of the checks called for in the maintenance procedure.

**2.02** The maintenance procedures used to isolate the trouble condition to a specific location or piece of equipment in the system are contained in the section entitled 10-Type Data Line Concentrator System (DATREX*)—Maintenance Procedures (591-810-300). These system maintenance procedures are generally performed first in an attempt to isolate the trouble and avoid dispatching to the station unnecessarily. When the preceding tests have not been made, it should be verified that the station is in trouble before dispatching a telephone company employee to the station.

**2.03** Before starting the maintenance procedures outlined in this section, a visual inspection of the data set and TTY should be made. This check should also include all the cords and connections to the TTY.


***A copy of the section entitled Data Set 109F Used in DATREX* Service—Installation and Connections (591-035-201) will be required to check the station installation.***

**2.04** Determine the options required at the station, and using the installation BSP, check the connections required to install these options. The connections made to the TTY should also be checked to verify that none of these connections have become loose or broken. After verifying that the data set is properly installed and that there are no damaged connections, etc, proceed with the maintenance procedure outlined in Part 4 of this section.

## 3. MAINTENANCE PROCEDURES

**3.01** Access to the Data Set 109F is obtained by opening or removing the cover on the TTY. The method of obtaining access to the data set is different for the 33-type and 35-type teletypewriters. When a 33-type TTY is used, the cover must be removed to gain access to the data set. When a 35-type TTY is used, the cover can be opened to provide access.

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

### Cover Removal—Model 33-Type Teletypewriter

**3.02** To remove the TTY cover proceed as follows.

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

(2) If ASR TTY, remove LOCAL—ON LINE switch knob by loosening setscrew and pulling knob off shaft.

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

(4) 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 removing knob.

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

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

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

(8) Remove TTY cover by lifting vertically.

**Removal of Data Set 109F-Type From Model 33-Type Teletypewriter**

**3.03** Remove the Data Set 109F as indicated in the following steps.

(1) Remove the grey plastic collar from the data set keystrip.

(2) Disconnect the TTY leads and loop leads from the data set. Mark or tag each lead so it can be correctly connected when a data set is reinstalled.

*Note:* The cord from the TTY is terminated with spade lugs on one end and a plug on the other end. An alternate method of removing the data set is to disconnect the plug end of the cord from the TTY UCC-29 instead of removing the spade-ended lugs from the data set.

(3) Remove the three mounting screws that hold the data set baseplate to the posts on the call control unit (refer to Fig. 2). Two of these screws are located at the back of the data set and the other screw is located at the front.

(4) Lift the data set vertically to remove it from the teletypewriter.

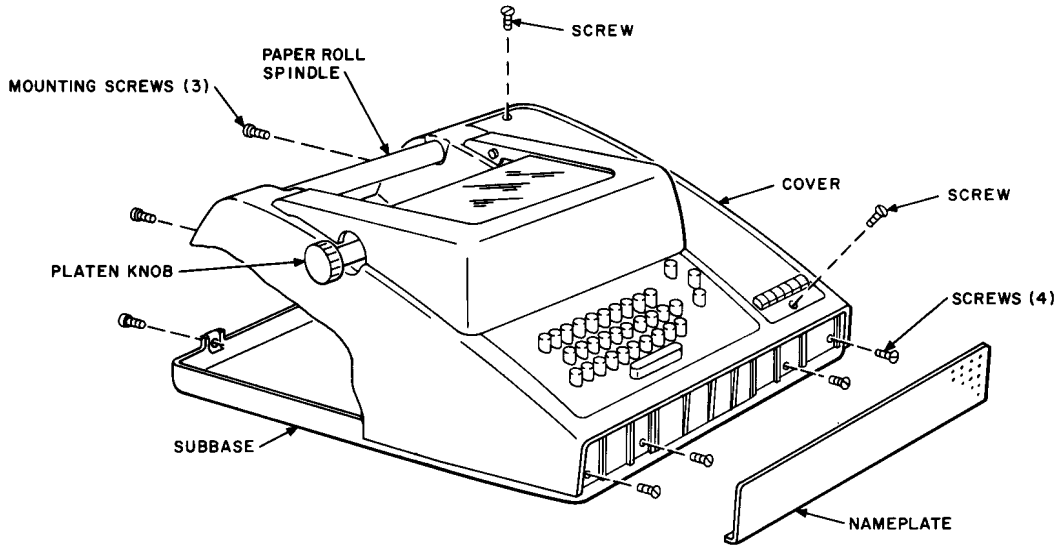


**Fig. 1—33-Type TTY Data Station—Cover Removal**

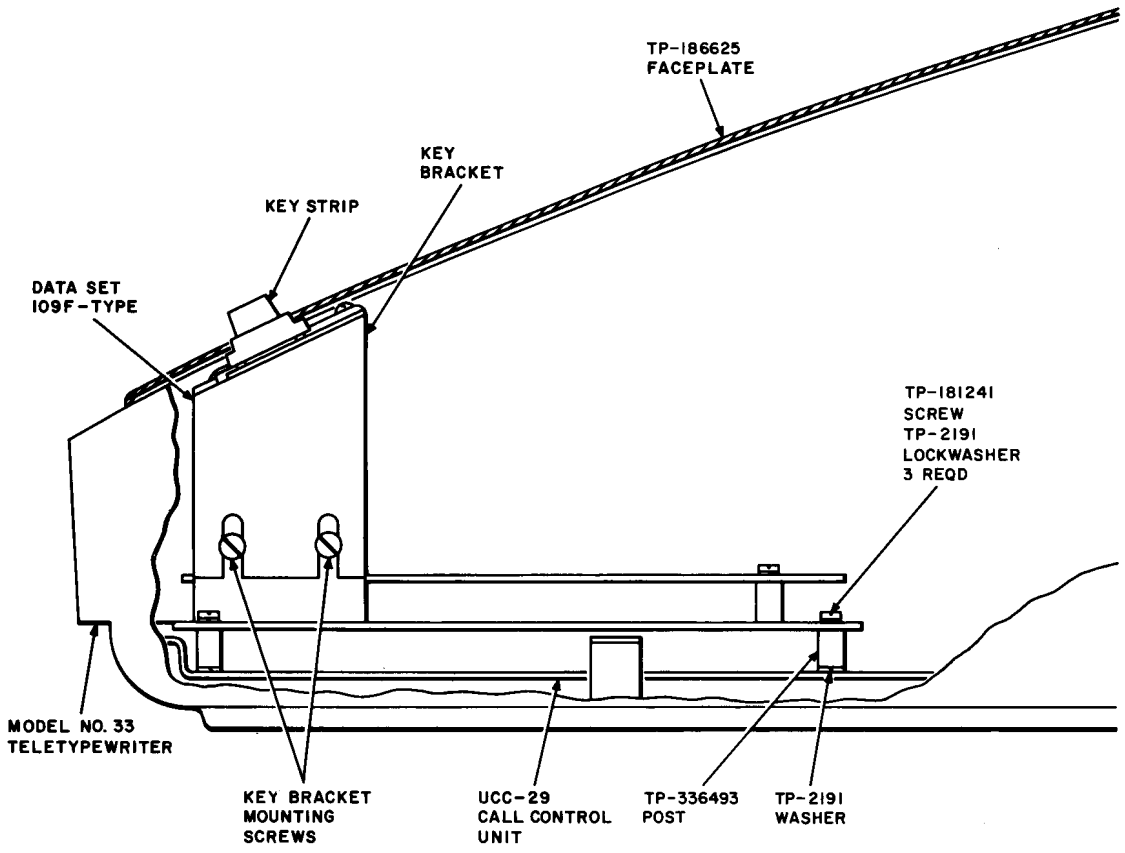


**Fig. 2—Cross Section Diagram Showing the Mounting of Data Set 109F in a 33-Type Teletypewriter**

**Reinstallation of Data Set 109F-Type in Model 33-Type Teletypewriter**

**3.04** Perform the following steps to reinstall the Data Set 109F-type in a 33-type teletypewriter.

*Note:* For additional information on the installation and connections required to install the data set, refer to the section entitled Data Set 109F Used in DATREX* Service—Installation and Connections (591-035-201).

(1) Replace the grey plastic collar over the data set keystrip and seat it firmly.

*Note:* To facilitate installation of the data set, the spade-ended leads of the TTY cord can be connected before installing the data set. The data set and cord are then installed as a unit in accordance with the following instructions. If the leads were not marked when the data set was disconnected, refer to the section entitled Data Set 109F Used in DATREX* Service—Installation and Connections (591-035-201) for information on making the required connections.

(2) Position the data set in front of the call control unit (UCC 29). The screw slots in the metal baseplate of the data set must line up with the posts on the call control unit baseplate (refer to Fig. 2).

(3) Insert the mounting screws through the three slots in the data set baseplate and into the posts of the call control unit.

(4) Position the data set so that the plastic key collar will be located in the center of the faceplate opening.

(5) If the teletypewriter leads have not been previously installed, connect the teletypewriter

leads to the data set. If the leads were not marked when they were disconnected, refer to the section entitled Data Set 109F Used in DATREX* Service—Installation and Connections (591-035-201) for information on making the required connections.

*Note:* If the TTY cord has previously been disconnected from the call control unit (UCC-29), it should be reconnected at this time.

(6) Connect the loop leads to the data set. Observe the marking of the loop leads as the data set will not operate if the line is improperly polled. Refer to the previously referenced installation practice for information on connecting the loop to the data set.

(7) Adjust the height of the key bracket so the top of the keystrip collar is flush with the TTY faceplate when the TTY cover is reinstalled (Fig. 2).

(8) Replace the TTY cover by reversing the procedure given in 3.02.

(9) After completing the reassembly of the station, reconnect the power cord to the power receptacle.

**Opening Cover—Model 35-Type Teletypewriter**

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

**3.05** To open the cover on a 35-type TTY, proceed as follows.

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

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

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

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

**Removal of Data Set 109F-Type From Model 35-Type Teletypewriter**

**3.06** Remove the Data Set 109F as indicated in the following steps.

(1) Remove the grey plastic collar from the data set keystrip.

(2) Disconnect the TTY leads and loop leads from the data set or unplug the TTY cord at the UCC 29. If the leads are removed from the data set, mark or tag each lead as it is removed so it can be correctly reconnected when a data set is reinstalled.

*Note:* The cord from the teletypewriter terminates in spade lugs which are secured under screw terminals at the rear of the data set.

(3) Remove the two mounting screws from beneath the pedestal pan (refer to Fig. 3).

(4) Lift the data set vertically to remove it from the teletypewriter (refer to Fig. 3). The TP-192271 nutplate is now removed from between the baseplate and the data set circuit pack EU2.

**Reinstallation of Data Set 109F in a Model 35-Type Teletypewriter**

*Note:* For additional information on the installation and connections required to install the data set, refer to the section entitled Data Set 109F Used in DATREX* Service—Installation and Connections (591-035-201).

**3.07** To reinstall a data set in the teletypewriter, proceed as follows.

(1) Position the TP-336459 plate in the TTY pedestal pan so the holes in the plate line up with the holes in the pan.

(2) Place the TP-192271 nutplate between the data set EU2 circuit pack and metal baseplate of the data set (refer to Fig. 3). The holes in the baseplate and nutplate must align.

(3) Position the data set in the TTY so the holes in the pedestal pan, plate, data set baseplate, and nutplate are in alignment.

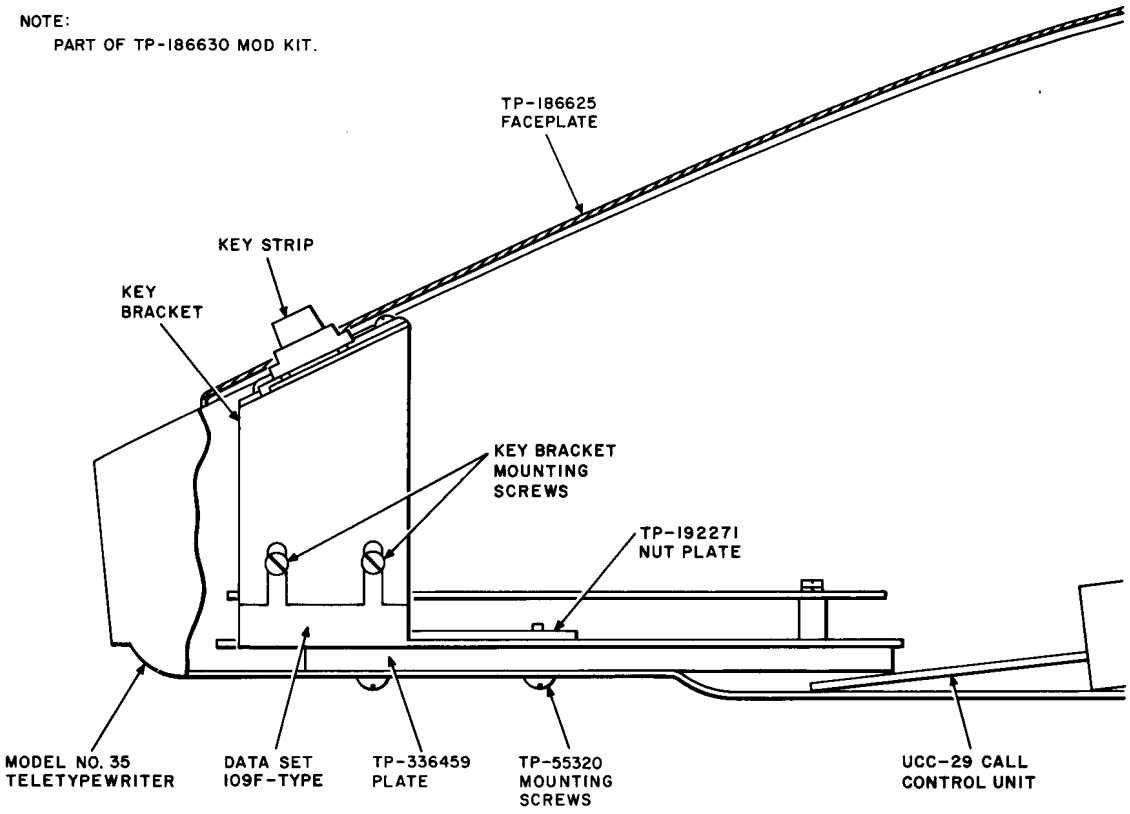


**Fig. 3—Cross Section Diagram Showing the Mounting of Data Set 109F in a 35-Type Teletypewriter**

(4) Insert the mounting screws TP-336494 through the holes and start the scews into the nutplate (refer to Fig. 3).

(5) Before tightening the mounting screws, position the data set so the plastic key collar will be located in the center of the faceplate opening. After positioning the data set, tighten the mounting screws.

*Note:* If the TTY cord has previously been disconnected from the call control unit (UCC-29), it should be reconnected at this time.

(6) Connect the teletypewriter leads to the data set if the cord has not already been connected. If the leads were not marked when they were disconnected, refer to the section entitled Data Set 109F Used in DATREX* Service—Installation and Connections (591-035-201).

(7) Connect the loop leads to the data set. Observe the marking of the loop leads as the data set will not operate if the tip and ring are reversed. Refer to the previously referenced installation practice for information on connecting the loop to the data set.

(8) Adjust the height of the key bracket so the top of the keystrip collar is flush with the TTY faceplate when the TTY cover is closed (refer to Fig. 3).

(9) Close the teletypewriter cover and replace the screws in the faceplate, securing it to the TTY cover.

## 4. TROUBLESHOOTING PROCEDURES

**4.01** A suggested sequence of maintenance is given by the Trouble Locating Procedure and Maintenance Flow Chart in Fig. 4. The blocks of the flow chart 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 steps of the associated step procedure.

**4.02** This data station maintenance procedure should be performed by a craft employee of the local telephone company.

**4.03** In the following Step—Procedure and Fig. 4, the term "station" refers to the data transmission equipment connected to the line side of the concentrator. The term "line" refers to the telephone pair or loop connected between the station data set and the concentrator. The following procedure does not attempt to isolate trouble in the concentrator or in equipment associated with the trunk side of the concentrator since this is covered by other BSPs.

| STEP | PROCEDURE |
|---|---|
| 1 | When trouble is experienced with the DATREX system, it is reported to the telephone company and a trouble report is filled out from the information supplied by the customer. |
| 2 | After a trouble report is received, it should be analyzed to determine, if possible, the cause or location of the trouble condition. |
| 3 | If an analysis of the trouble report indicates the trouble condition could not be caused by the station on the line side of the concentrator (line station), proceed to Step 4. When the cause of the trouble seems to be at the line station or cannot be pinpointed from the trouble report, omit Step 4 and proceed to Step 5. |
| 4 | When analysis of the trouble report indicates the trouble is located at the concentrator or other specific location instead of the line station, a telephone company craft employee will have to be dispatched to the probable trouble location to clear the trouble condition. When the trouble condition is located and corrected, this completes the trouble clearing procedures given in this practice, and Step 5 through 26 can be omitted. |
| 5 | When analysis of the trouble report indicates the trouble is located at the line station or in cases where the location of the trouble cannot be pinpointed, a telephone craft employee will have to be dispatched to the station. |
| 6 | Upon arrival at the station, the telephone company employee should perform a visual inspection of the station to determine if there is any physical damage or obvious reason for the reported trouble. |
| 7 | When there has been some physical damage to the station (eg, broken cord or connectors, etc) proceed to Step 8. If a visual inspection of the station does not locate anything that could cause the trouble condition, proceed to Step 9. |
| 8 | Make the necessary repairs and/or replacements to restore the station to service. Proceed to Step 27 and perform an operational test of the station to verify the station is operative and the trouble condition has been cleared. |
| 9 | Attempt normal operation of the station. |
| 10 | When the station operates satisfactorily, proceed to Step 11. When trouble occurs during the attempt to operate the station, proceed to Step 12. |

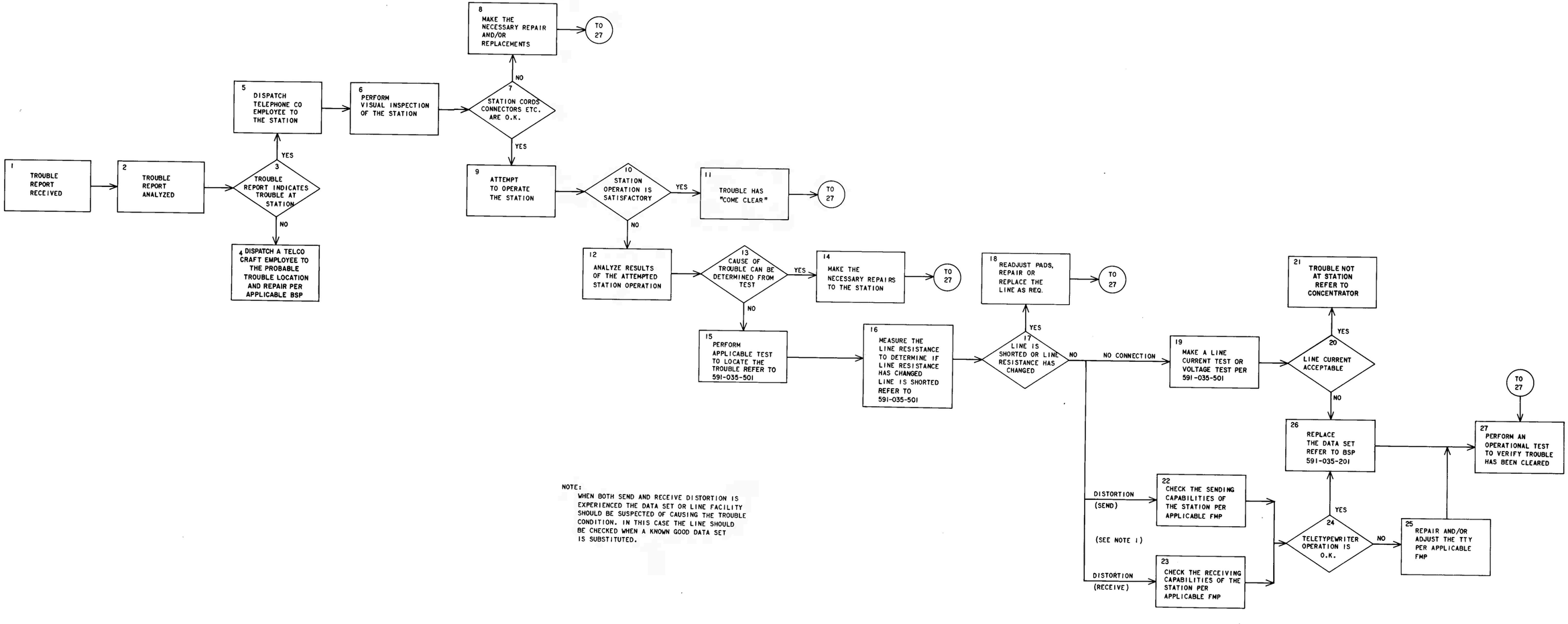


**Fig. 4—Trouble Locating Procedure and Maintenance Flow Chart**

| STEP | PROCEDURE |
|---|---|
| 11 | When the station operates properly, the trouble condition may have "come clear." In order to verify the station operation, proceed to Step 27 and perform the indicated operational test. |
| 12 | When the station does not operate properly, analyze the operation or failure of the station to operate to determine the cause of the trouble. |
| 13 | If the cause of the trouble is obvious from the attempted operation (eg, mechanical problems with TTY, etc) proceed to Step 14. When the cause of the trouble is not apparent, proceed to Step 15. |
| 14 | Make the required repairs and/or adjustments to clear the trouble condition. After the trouble has been corrected, proceed to Step 27 and perform an operational test to verify the operation of the station as part of th DATREX system. |
| 15 | When the cause of the trouble cannot be determined by analyzing the malfunction that occurs when trying to operate the station, perform the applicable tests indicated by the following steps and by Section 591-035-501. |
| 16 | Measure the line resistance to determine the line resistance value and verify the line is not shorted. Refer to the section entitled Data Set 109F Used in DATREX* Service—Test Procedures (591-035-501) for information on making this test. |
| 17 | When the line is not shorted, compare the measured resistance value with the line order or line circuit card. If the resitance has not changed appreciably, proceed to Step 19. If the line is shorted or there has been a large change in the line resistance, proceed to Step 19. |
| 18 | When the line is shorted, it must be repaired or replaced. If the resistance value of the line has changed, determine if the data set pads can be adjusted to compensate for this change. When the data set pads can be changed to give an acceptable total resistance value, the data set pad should be reset and the station retested to determine if the trouble condition has been cleared. When the data set pads cannot be adjusted to provide an acceptable resistance, the line will have to be repaired or replaced. Upon completion of the repair or replacement, proceed to Step 27 and test the operation of the station to verify the trouble condition has been cleared.<br><br>***Note:*** For information on setting the data set pads, refer to the section entitled Data Set 109F Used in DATREX* Service—Installation and Connections (591-035-201). |
| 19 | When the previous tests indicate that the line is satisfactory and the station will not connect, perform a line-current test or voltage test to determine if the data set is supplying an acceptable request-for-service signal. When making this test, refer to the section entitled Data Set 109F Used in DATREX* Service—Test Procedures (591-035-501). |
| 20 | When the line current test indicates the data station is supplying an acceptable connection signal to the concentrator, proceed to Step 21. When the connection signal is unacceptable, proceed to Step 26. |

| STEP | PROCEDURE |
|---|---|
| 21 | When the line current is acceptable, the station is not the cause of the trouble experienced with connecting to the concentrator. In this case, the trouble is referred to the concentrator. This completes the trouble clearing procedure given in this practice and the remaining steps of this procedure can be omitted.<br><br>***Note:*** Steps 22 and 23 refer to the TTY FMPs for making distortion tests with the station teletypewriter and determining if the teletypewriter is operating properly. An alternate method of locating possible trouble is to perform the end-to-end distortion test given in the section entitled Data Set 109F Used in DATREX* Service—Test Procedures (591-035-501). This test does not use the line-side TTY or terminal equipment on the trunk side of the concentrator; therefore, an acceptable distortion test indicates that the data set is functioning properly and the TTY or terminal equipment should be suspected of causing the trouble condition (see Step 25). When the test indicates high distortion, the data set may be the cause of the trouble (proceed to Step 26). |
| 22 | Send distortion, ie, distortion transmitted to the line by the station, may result from dirty or damaged send contacts in the TTY or a malfunction of the data set. Refer to the applicable Field Maintenance Practice (FMP) for information on testing the teletypewriter to determine if the TTY is causing the trouble condition. |
| 23 | Receive distortion may result from a distorted signal coming in from the line or a malfunction of the data set or teletypewriter. Refer to the applicable FMP for information on testing the TTY to determine if it is the cause of the distortion. |
| 24 | When an end-to-end test, or TTY test, and local operation of the station indicates the TTY is operating properly, proceed to Step 26. If the TTY is in trouble, proceed to Step 25. |
| 25 | Repair and/or adjust TTY per applicable FMP. After clearing the TTY trouble condition, proceed to Step 27 and perform an operational test to determine if the trouble condition has been cleared. |
| 26 | A known good data set can be substituted to determine if the data set was the cause of the trouble. When a replacement data set is substituted, it must be equipped with all the required options and features provided by the data set that is being replaced. Refer to the section entitled Data Set 109F Used in DATREX* Service—Installation and Connections (591-035-201) for information on providing the required features and options. Refer to the applicable parts of this section for information on gaining access, removal, and reinstallation of the data set. When a known good data set is substituted, the line to the concentrator should be checked. |
| 27 | Perform an operational test of the data staion to verify that the trouble condition has been cleared before returning the station to service. Refer to the section entitled Data Set 109F Used in DATREX* Service—Test Procedures (591-035-501).<br><br>***Note:*** If the trouble condition has not been located and eliminated by the preceding Step-Procedure, request help through proper lines of authority, to clear the trouble condition. The other components of the DATREX system should be suspected of causing the trouble condition. |

**4.04** After completion of the maintenance procedures and verification that the trouble condition has been eliminated, the station is returned to service.

## 5. REFERENCES

**5.01** For additional information on the concentrator when it is used as part of a DATREX System, refer to the following BSPs and the additional practices referenced therein.

(a) 10-Type Data Line Concentrator System (DATREX*)—Description (591-810-100)

(b) 10-Type Data Line Concentrator System (DATREX*)—Maintenance (591-810-300)

(c) 10-Type Data Line Concentrator (DATREX*) (591-811-Series).