

DATA SET 110C MAINTENANCE

1. GENERAL

1.01 This section covers the maintenance philosophy of the 110-system which is shown in Fig. 1. The data set 110C is a part of this system.

1.02 No routine maintenance is required on the Data Set 110C. The maintenance is therefore limited to the replacement of the data set and defective fuses.

1.03 If the Data Set 110C is found to be defective, the set must be replaced and returned for repairs.

2. REPLACEMENT PROCEDURES FOR THE FUSES, THE DATA SET, AND THE MANUAL LOOP BACK CARD

2.01 A defective fuse in either the master fuse panel (J3A011A-1) (see Fig. 2) or the mounting shelf for the data set (see Fig. 3) will produce the following indications:

(a) A defective fuse in the master fuse panel will cause the following:

- (1) The PWR OFF lamp on the frame (see Fig. 2) will light.
- (2) The fuse indicator of the defective fuse will protrude from the fuseholder.
- (3) The office alarm will be actuated, if connected.
- (4) The master scanner of the ESS office will produce a printout that describes the frame location of the defective fuse.

(b) A defective fuse in the data set mounting shelf (see Fig. 3) will produce the same indications as a defective fuse in the master fuse panel. A defective fuse in the mounting shelf will also cause the data set (to which it is assigned) to produce the same indications that

are produced when the data set detects a current failure on the receive loop.

Note: If a current failure alarm has been indicated for a data set and the PWR OFF lamp of the frame is lit, check the fuses that are assigned to the data set.

2.02 To replace a defective fuse, use the following procedure:

- (a) Locate the defective fuse.
- (b) Depress the AUD ALM OFF key on the control panel of the frame (see Fig. 2). This will cause the audible office alarms to be turned off while the defective fuse is being replaced.

Note: Ensure that the OFF NOR lamp is lit after depressing the AUD ALM OFF key. When the OFF NOR lamp is lit, the office audible alarms have been cut off.

- (c) Remove the defective fuse by unscrewing the fuseholder in a counterclockwise motion.
- (d) Replace the defective fuse in the fuseholder with the same rated 70-type fuse.
- (e) Reinsert the fuseholder with the good fuse into the unit by screwing the fuseholder in a clockwise motion.
- (f) To complete the replacement procedure for a defective fuse, depress the AUD ALM OFF key on the control panel (see Fig. 2). This switches the control of the office audible alarms to the office alarm circuit and causes the OFF NOR lamp to go out.

Note: Be sure that the OFF NOR lamp is extinguished before leaving the frame to ensure that the office audible alarms have been returned to normal operation.

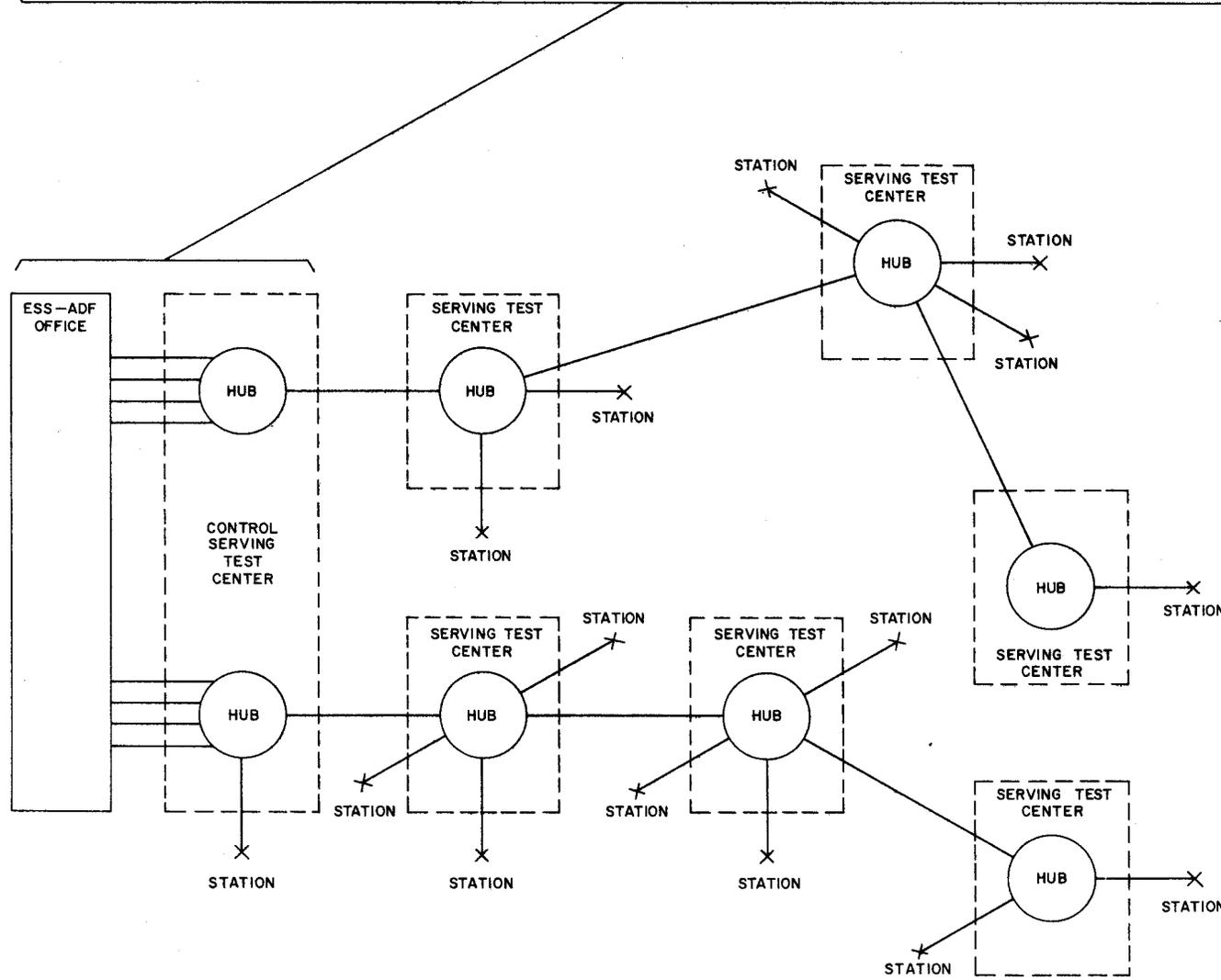
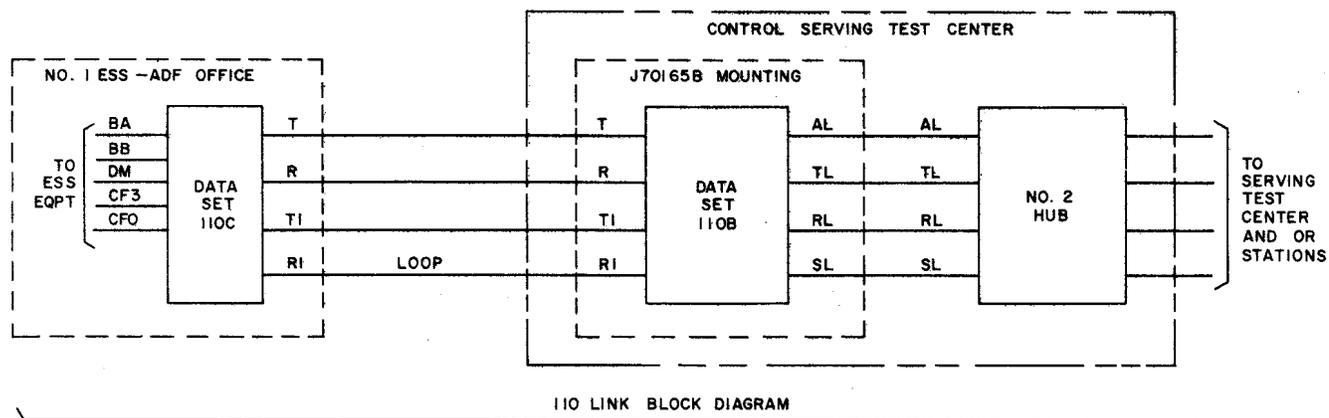


Fig. 1—System Block Diagram

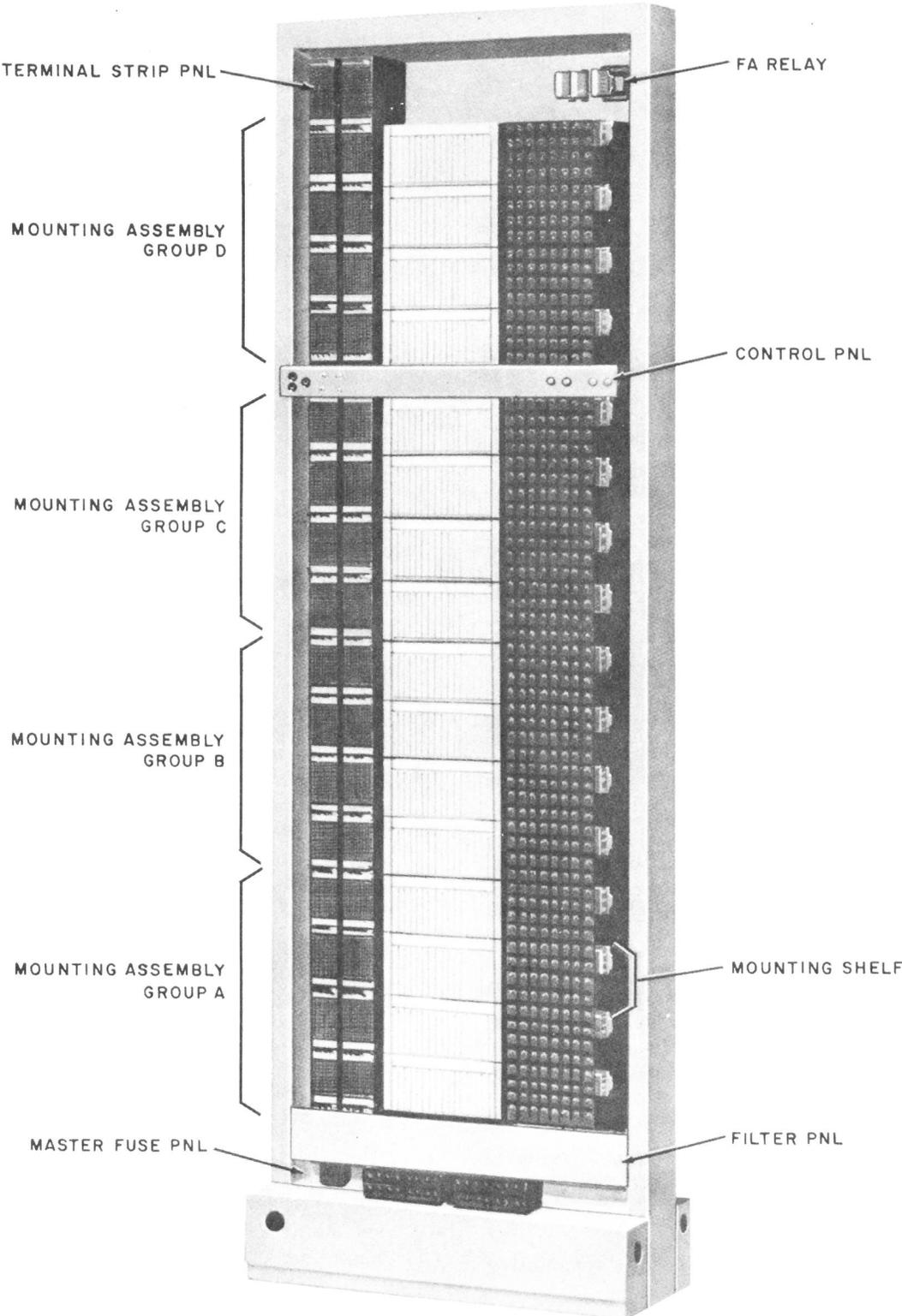


Fig. 2—Short Link DC Data Set Frame (J3A011A-1), Front View

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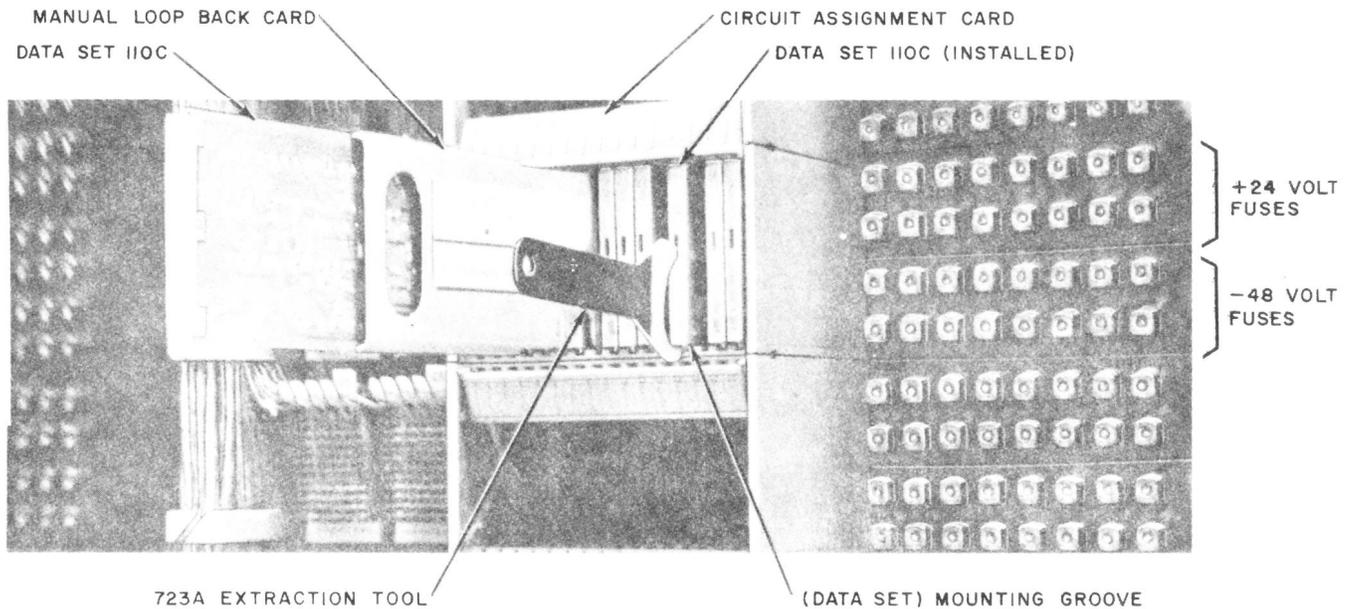


Fig. 3—Mounting Shelf For Data Set 110C

2.03 The procedure for removing the Data Set 110C from the mounting shelf in the Short Link DC Data Set Frame (see Fig. 2 and 3) is as follows:

- (a) Depress the AUD ALM OFF key on the control panel (see Fig. 2) to switch off the office audible alarms. When this is done, the OFF NOR lamp will light on the control panel.
- (b) Remove the fuses on the mounting shelf that are assigned to the data set to be removed by unscrewing the fuseholders in a counterclockwise motion. The PWR OFF lamp will light.
- (c) Attach the standard ESS equipment removal tool 723A (see Fig. 3), to the faceplate of the data set to be removed.
- (d) Pull the data set straight out of the mounting shelf using the 723A tool.

2.04 The procedure for installing a new data set in the mounting shelf of the Short Link DC Data Set Frame is as follows:



To prevent damaging the data set or the data set connector of the mounting shelf, ensure that when putting a data set in the mounting shelf the soldered components on the data set are facing left and the printed wiring is facing right.

- (a) Insert the new data set into the grooves of the mounting shelf where the data set which was removed in 2.03 had been located.
- (b) Push the data set straight into the mounting shelf with even force on the faceplate of the data set.

Note: The force used must be sufficient to ensure a good connection between the data set and the connector in the back of the mounting shelf.

- (c) Reinsert the fuseholders which were removed in 2.03. This is done by screwing the fuseholders into the mounting shelf in a clockwise motion.

(d) To complete the replacement of the data set, depress the AUD ALM OFF key on the control panel (see Fig. 2) and note that the OFF NOR lamp and the PWR OFF lamp are extinguished.

2.05 As part of the maintenance philosophy for the system shown in Fig. 1, it will be necessary to place a Manual Loop-back Card and a 158B Adapter in the system at the No. 1 ESS-ADF office. The procedure to add this to the system is as follows:

(a) Perform the procedure as outlined in 2.03.



To prevent damaging the loop-back card, the data set, or the data set connector in the mounting shelf, insert the Manual Loop-back Card and the data set into the mounting shelf as shown in Fig. 3.

(b) Insert the Manual Loop-back Card into the grooves of the mounting shelf where the data set had been located.

(c) Push the Manual Loop-back Card into the mounting shelf with sufficient force to ensure a good connection between the card and the connector of the mounting shelf.

(d) Insert the removed data set into the connector on the end of the Manual Loop-back Card (see Fig. 3).

Note: Be sure that the data set seats securely into the connector of the Manual Loop-back Card.

(e) Perform the operations outlined in (c) and (d) of 2.04.

2.06 To take the Manual Loop-back Card out of the system, the following procedure must be used:

(a) Perform the operations outlined in (a) and (b) of 2.03 for the data set position where the Manual Loop-back Card is now located. This is done by unscrewing fuseholders in a counterclockwise motion.

(b) Remove the data set from the connector of the Manual Loop-back Card. This can be done by placing one hand on the connector, grasping the faceplate of the data set with the other hand, and pulling the data set straight out of the connector of the Manual Loop-back Card.

(c) Pull the Manual Loop-back Card straight out of the mounting shelf by grasping the connector of the card.

(d) Reinstall the data set into the mounting shelf by using the basic procedure as outlined in 2.04.

3. MAINTENANCE PHILOSOPHY

3.01 Figure 4 shows a flow chart for the maintenance philosophy of the system as shown in Fig. 1.

3.02 The flow chart is divided into two parts, Condition I and Condition II. The difference between the two conditions is as follows:

(a) Condition I is to be used when a distinctive alarm has not been actuated in either the No. 1 ESS-ADF office or the Control Serving Test Center (CSTC), but the customer at either end of the system (Fig. 1) reports trouble with the quality of the received data.

(b) Condition II is to be used when a distinctive alarm has been actuated in either the No. 1 ESS-ADF office or the CSTC. The alarms in either office will be actuated because the following things have happened:

- The Data Set 110B in the CSTC has detected a signal failure on the receive loop.
- The Data Set 110C in the No. 1 ESS-ADF office has detected a signal failure on the receive loop.

3.03 Each condition of the flow chart is divided into steps which are represented by the numbered blocks in Fig. 4. The steps of each condition are sequentially numbered. The number of the step denotes when the operation of a step shall take place in the overall maintenance philosophy of the system.

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3.04 The following is a description of the operation to be taken in each step of Condition I:

- **Step 1**—Trouble is reported by the customer of the system (Fig. 1) to the Serving Test Center (STC) for the customer location. If the STC traces the reported trouble to the Control Serving Test Center (CSTC), the STC will notify the CSTC of the trouble condition. The CSTC will control the testing under Condition I (Fig. 4).
- **Step 2**—The CSTC will measure the distortion on the characters received at the hub from the stations. If the hub is arranged for full-duplex operation, the measurement will be made on the receiving leg of the hub. If the hub is arranged for half-duplex operation, the measurement will be made on the receive side of the hub. The distortion measurement will be made as outlined in the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501).
- **Step 3**—By means of a Distortion Measurement (DIST) request, the CSTC will now request that the No. 1 ESS-ADF office make a distortion measurement of the system at the ESS office end. This measurement will be made as outlined in the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501).
- **Step 4**—The CSTC will compare the readings of the distortion measurement on the send hub with the readings of the distortion measurement from the No. 1 ESS-ADF office. If the two readings compare within 5 percent of each other, which is acceptable, the CSTC will now proceed to Step 5 of Condition I. If the two readings do not compare within 5 percent of each other, the CSTC shall refer to Step 2 of Condition II and proceed with the check of the system as outlined under Condition II (Fig. 4).
- **Step 5**—The CSTC will now measure the distortion on the characters sent by the ESS-ADF office. This measurement will be made as outlined in the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501).

- **Step 6**—If the distortion measurement which was made in Step 5 of Condition I is less than 5 percent, the trouble that is being experienced in the system (Fig. 1) is not in the link between the CSTC and the No. 1 ESS-ADF office. The CSTC must now refer to the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501) to find the trouble which is affecting the system (Fig. 1). If the distortion measurement is more than 5 percent, the CSTC will refer to Step 2 of Condition II and proceed with the check of the system as outlined under Condition II (Fig. 4). This is the last step of Condition I.

3.05 The following is a description of the operation to be taken in each step of Condition II:

- **Step 1A**—The Control Serving Test Center (CSTC) has an alarm, which is connected to a Data Set 110B. This type alarm will be actuated when the data set recognizes a signal failure on the receive loop as described in the section entitled Data Set 110B, Description (312-803-100). The CSTC will control the check of the system (Fig. 1) under Condition II.
- **Step 1B**—The No. 1 ESS-ADF reports to the CSTC via the primary maintenance channel that an alarm, which is connected to a Data Set 110C, has been actuated. This type alarm will only be actuated when the data set recognizes a signal failure on the receive loop as described in the section entitled Data Set 110C, Description (312-804-100).
- **Step 2**—The CSTC will first restore service to the customers which were affected by the alarm conditions that were reported in either Step 1A or Step 1B. The customer service is restored by switching it to the spare data line number as outlined in the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501). The switching of the service must be coordinated by the CSTC with the No. 1 ESS-ADF office. The CSTC will also switch the service of the customers who were affected by the trouble reported in Condition I if the distortion measurements,

which are compared in Step 4 of Condition I, are not within 5 percent of each other or if the distortion measurement of Step 6 in condition I is more than 5 percent.

- **Step 3**—The CSTC must now patch the Data Set 110B of the suspected defective system to a full-duplex hub as outlined in the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501).
 - **Step 4**—The CSTC will now request the No. 1 ESS-ADF office to place the manual loop-back card into the suspected defective system and to replace the Data Set 110C of the system with a known operational Data Set 110C. The method for placing the manual loop-back card in the system and replacing the Data Set 110C is described in Part 2 of this section. With the manual loop-back card in the system at the ESS office, a complete loop from the send hub to the receive hub is made for testing of the system from the CSTC.
 - **Step 5**—The CSTC will now test the system by transmitting a Fox Test over the send hub and taking a distortion measurement on the receive hub. The equipment required for the test and the method for making the test is covered in the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501).
 - **Step 6**—If the distortion measurement which was made in Step 5 is less than 10 percent, the Data Set 110C which was replaced in Step 4 is defective. The trouble has now been cleared. If the distortion measurement which was made in Step 5 is more than 10 percent, the Data Set 110C which was replaced in Step 4 is not defective. The CSTC will proceed to the other steps of Condition II to locate the trouble in the system.
 - **Step 7**—The CSTC will now replace the Data Set 110B of the suspected defective system with a known operational Data Set 110B. The replacement procedure of this data set is covered in the section entitled Data Set 110B, Maintenance (312-804-300).
- The CSTC will now request the No. 1 ESS-ADF office to reinstall the Data Set 110C which was replaced in Step 4. The Data Set 110C will be reinstalled in the same manner it was replaced in Step 4 but the manual loop-back card will be left in the system.
- **Step 8**—The CSTC will now test the system as previously described in Step 5 of Condition II.
 - **Step 9**—If the distortion measurement which was made in Step 8 is less than 10 percent, the Data Set 110B which was replaced in Step 7 is defective. The trouble in the system has now been cleared. If the distortion measurement which was made in Step 8 is more than 10 percent, the Data Set 110B which was replaced in Step 7 is not defective. The CSTC will proceed to the other steps of Condition II to locate the trouble in the system.
 - **Step 10**—The CSTC will now reinstall the Data Set 110B which was replaced in Step 7. The data set should be reinstalled in the same manner as replaced in Step 7. The CSTC will now test the transmission lines between the CSTC and the No. 1 ESS-ADF office of the system as outlined in the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501). If the transmission lines of the system are acceptable after the testing, the trouble which was reported in Steps 1A and 1B of Condition II, or Step 4 or 6 of Condition I is not in the link between the CSTC and the No. 1 ESS-ADF office. The CSTC must now refer to the section entitled Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures (660-209-501) to find the trouble which is affecting the system (Fig. 1). If the transmission lines of the system are not acceptable after testing, the CSTC will proceed to Step 11.
 - **Step 11**—After the defective transmission lines of the system have been repaired or brought up to acceptable standards, the CSTC must repeat Steps 8 and 9 of Condition II and if necessary Step 10. If Steps 8

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and 9 are completed successfully, the trouble in the system has been cleared.

3.06 After the trouble has been cleared, the system (Fig. 1) can be returned to operational status only after the manual loop-back card is removed from the system. The CSTC must request the No. 1 ESS-ADF office to remove the manual loop-back card which was added in Step 4 of Condition II. The manual loop-back card is removed as outlined in 2.08 of this section.

3.07 For additional information about the maintenance of the system as shown in Fig. 1, refer to the following list:

- (a) Bell System Practice: 660-209-500 (Control Serving Test Center (CSTC)—Description of Access Equipment, Features and Operations).
- (b) Bell System Practice: 660-209-501 (Control Serving Test Center (CSTC)—Testing and Trouble Clearing Procedures).

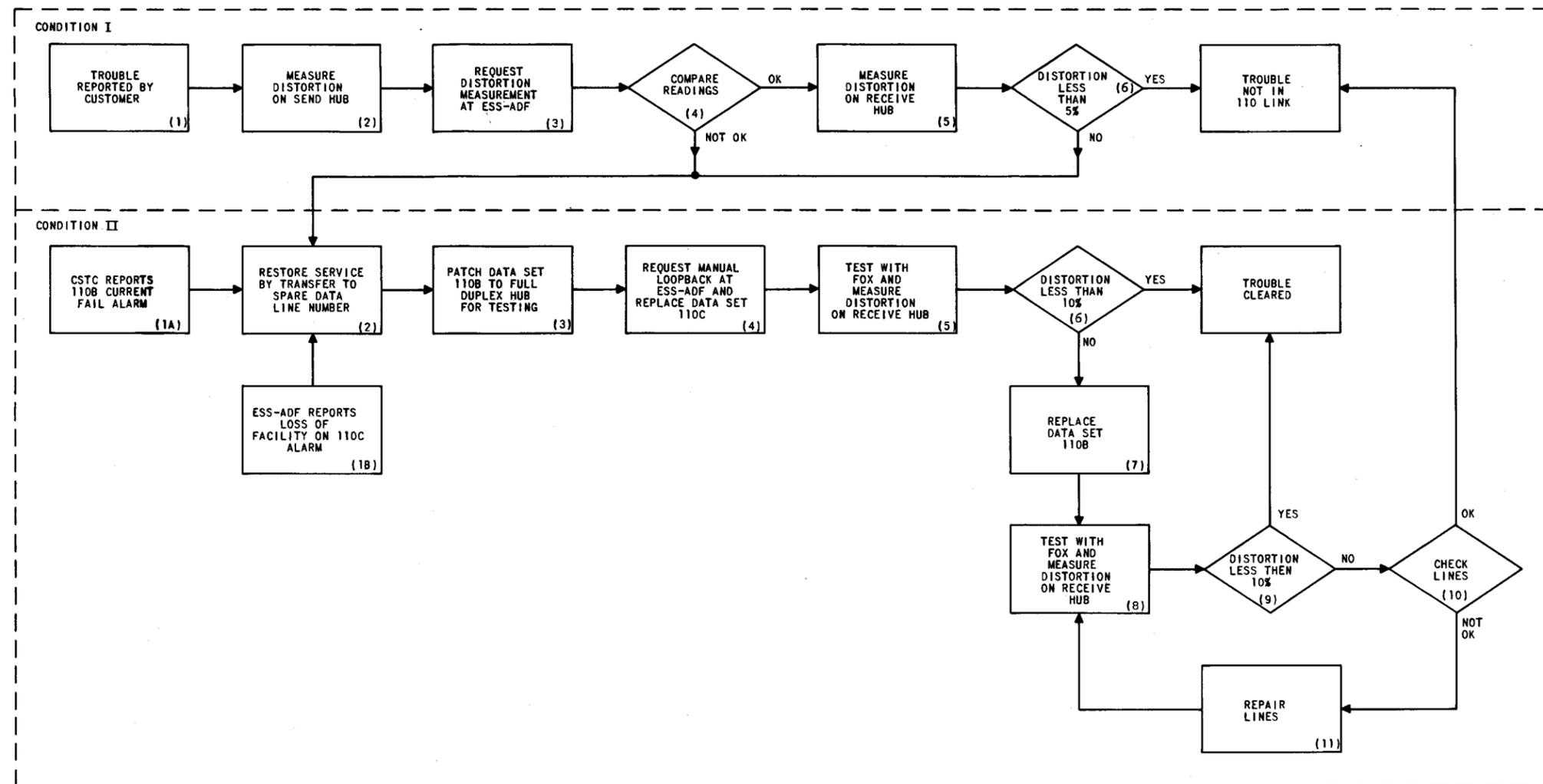


Fig. 4—Flow Chart For Maintaining the 110-System