

PROCEDURE IN CASE OF SUBSCRIBER CABLE FAILURE PANEL OFFICES

1. GENERAL

- 1.01 This section outlines the procedure to be followed in a panel office when a failure occurs on a subscriber cable.
- 1.02 In general, the indications of a subscriber cable failure are: the appearance of an abnormal number of lines on permanent signal holding trunks within a short time interval, overflows on permanent signal holding trunk groups, or in offices where senders are not arranged to automatically route to permanent signal holding trunks, the appearance of an abnormal number of sender permanent signals within a short time interval on which no response is received to a challenge.
- 1.03 Failures which involve a large number of subscriber lines may impair the service of subscribers not directly affected by the failure, due to the fact that the lines in trouble may hold considerable central office equipment out of service. Therefore, sufficient help should be assigned to the work of tracing and caring for the lines affected by the failure, in order that the equipment may be released for service as quickly as possible.
- 1.04 When a subscriber cable failure occurs, the proper persons in the various departments involved should be notified as soon as possible, in accordance with local instructions. In this connection, it may be desirable that the routine established for handling subscriber cable failures be reviewed frequently so as to insure smooth and immediate functioning when the occasion arises.
- 1.05 When a failure occurs at night, or at a time when sufficient help is not available to care for the emergency, the proper supervisor should be notified.

2. APPARATUS

- 2.01 Dial Hand Test Set (equipped with condenser and key).

3. METHOD

- 3.01 When the first indication of a possible cable failure is received, test the lines connected to the permanent signal holding trunks with as much speed as possible, in order to select several involved in the failure.

Note: In offices where permanent signal holding trunks appear at the Panel "A" Board, the lines may be tested from the test desk. Where permanent signal holding trunks appear at the trouble desk the lines may be tested at that point.

- 3.02 Trace several of the permanent signals which have been tested.

Note: The method of tracing permanent signals in panel offices is described in Section 215-155-301.

- 3.03 Obtain from the records, the cable pair assignments of the lines involved.
- 3.04 Operate the PST (permanent signal tone) key, if provided, to impose a tone on all lines connected to the permanent signal holding trunks. Overflow tone is normally imposed by the district selectors on lines which are associated with district selectors standing on permanent signal overflow terminals.
- 3.05 Connect one side of the dial hand test set to a convenient ground at the protector side of the main distributing frame. With the condenser of the hand test set cut in and using the free clip of the set, rapidly check each ring protector spring of all pairs in the cable in the involved count, for permanent signal or overflow tone. Remove the heat coils from all lines on which either permanent signal or overflow tone is heard.
- 3.06 On extensive failures, it will be necessary to make more than one test of the cable with the hand test set, as there may be a greater number of lines in trouble than there are district selector circuits available. In this case, as soon as selectors are released by the removal of heat coils, they will be connected to other lines which are in trouble, and, after the usual interval has elapsed, will again be routed to permanent signal holding trunks or permanent signal overflow terminals. Several tests of the cable count involved may be necessary before all of the lines in trouble are located.

Note: Restore the PST key to normal after the testing of the cable pairs for tone has been completed.

- 3.07 Check the district selectors serving the lines involved in the failure as soon as possible and if there are any resting on permanent signal holding trunk group overflow ter-

minals or if there are any which may have caused time alarms by holding established connections, they should be restored to normal, manually.

- 3.08 Make a list of the cable pairs found in trouble by means of the tone test and then test some of the pairs involved to determine, as nearly as possible, the nature of the trouble. The proper persons should be notified, as soon as the failure has been definitely established, in accordance with local instructions.

Note: The force handling the trouble should report, as soon as practicable, to the test room force, the circumstances of the failure, the approximate length of time that the lines will be out of service and the action being taken to restore service.

- 3.09 Obtain from the records, the final terminal numbers or circuit numbers associated with the cable pairs on the list.
- 3.10 If the number of lines in trouble exceeds the number of plugging-up circuits available, give first consideration to lines of an emergency or important nature.
- 3.11 Obtain plugging-up circuit assignments from the sender monitor operator, for as many lines as possible, and then connect the lines as soon as practicable.
- 3.12 When placing P.B.X. trunks on plugging-up circuits, if the entire group is in trouble, connect the plugging-up cord to the last trunk in the group and place make-busy cords on the sleeve terminals of the first and intermediate trunks at the horizontal side of the intermediate distributing frame.
- 3.13 When a large P.B.X. group is involved and there are sufficient make-busy cords available, connect the last trunk in each group of ten trunks to a plugging-up circuit and place make-busy cords on the first and intermediate trunks in each group as described above. If the entire group is not affected, place make-busy cords on the trunks in trouble.
- 3.14 If there is not a sufficient number of make-busy cords available to make intermediate trunks of large groups busy individually,

as described in paragraph 3.13, connect plugging-up circuits to the first and second choice trunks (more if necessary) and rearrange the wiring of the cut-off relay associated with the last trunk in the series having a plugging-up circuit, to correspond to the last trunk of a P.B.X. group.

- 3.15 Make a list of the terminal numbers of all lines which are left with the heat coils out and not associated with plugging-up circuits. A copy of this list should be forwarded to the Chief Operator and a second copy should be retained at the test desk. If required, the failure and the lines involved should be reported to the Commercial Department, in accordance with local instructions.
- 3.16 When lines are cleared from plugging-up circuits and other lines with heat coils out remain in trouble, obtain assignments from the sender monitor operator and connect the other lines in trouble to the plugging-up circuits as they become available. When P.B.X. trunks are restored to service, remove the make-busy condition at the intermediate distributing frame and restore any cut-off relays on which the wiring may have been changed, to the normal condition.
- 3.17 **Cable Failure Causing Open Circuits:** When an unusual number of "don't answer" or "no dial tone" reports are received, they may indicate a cable failure which has caused a number of open lines. Make an analysis of the reports and the lines involved to determine the nature of the failure and the cable count. Make tests of all lines which may be affected by the failure. List all lines which are found to be open and handle as outlined in paragraphs 3.08 to 3.16, inclusive.

Note: Heat coils need not be removed on open lines which are not connected to plugging-up circuits.

4. REPORTS

- 4.01 Any required reports pertaining to the failure should be filled out and forwarded in accordance with local instructions. Any necessary changes in existing records should also be made.

PROCEDURE IN CASE OF TRUNK CABLE FAILURE PANEL OFFICES

1. GENERAL

- 1.01 This section outlines the procedure to be followed when a failure occurs on a trunk cable in a panel office.
- 1.02 In general, a trunk cable failure is indicated by an abnormal number of stuck sender signals, off-normal incoming selectors, failure of the "B" trunk equipment to function properly, or mutilated and wrong displays in connection with call indicator equipment.
- 1.03 When a trunk cable failure occurs, notify the proper persons in the various departments involved as soon as possible, in accordance with local instructions. In this connection, it may be desirable that the routine established for handling trunk cable failures be reviewed frequently so as to insure smooth and immediate functioning when the occasion arises.
- 1.04 It may be considered unnecessary to treat certain slow failures as an emergency. In these cases, the usual methods of changing to good pairs, reporting and clearing the trouble should be followed.
- 1.05 Trunk groups between two offices are often assigned to two or more cables or routes in order to guard against complete interruptions to service resulting from failure of trunk cables. Where this is the case, it may not be considered necessary to provide other facilities to care for service if one of the routings is affected, particularly if the failure occurs during a period of light traffic and if there is a possibility of repairs being made prior to the period of heavy traffic.
- 1.06 The methods of rerouting outgoing calls and trunks, if this is found necessary, are described in part 3, as follows:
 - (a) Rerouting Calls Through Tandem Office.
 - (b) Rerouting Trunks Through Other Cables or Offices.
 - (c) Rerouting Calls Through Panel "A" Board.
- 1.07 In the case of 2 digit and 2-3 digit rotary translator type offices, methods (a) and (c) involve translator cross-connections which are individual to the sender and it may be desirable to give preference to method (b) for these offices.

2. APPARATUS

- 2.01 No. 184 (make-busy) Plugs, as required.
Methods (a) and (c)
- 2.02 Translator or Decoder Cross-Connection Wire, Tools and other Materials, as required.

Method (b)

- 2.03 Main Distributing Frame Cross-Connection Wire, Tools and other Materials, as required.

3. METHOD—OUTGOING TRUNK CABLE FAILURE

- 3.01 When an outgoing trunk cable failure is indicated, trace the stuck sender signals as quickly as possible in order to determine the trunks and cable affected. Then make a voltmeter test of all trunks in the particular cable or cables involved from the outgoing trunk testboard. A list of the cable pairs which are involved may be obtained by referring to the cable records. In small offices, however, it may expedite matters to test all trunks, particularly in those offices where cable records are not maintained in the central office or are not readily available.
- 3.02 Make busy the trunks which are found to be in trouble, by inserting No. 184 plugs into the associated make-busy jacks at the outgoing trunk testboard.
- 3.03 Make a list of the trunk numbers and cable pairs in trouble. As soon as the failure has been definitely established, notify the proper persons, in accordance with local instructions.

Note: The repair force handling the trouble should report, as soon as practicable, to the central office maintenance force, the circumstances of the failure, the approximate length of time that the trunks will be out of service and the action being taken to restore service.
- 3.04 Notify the terminating office of all trunks involved in the failure, the extent of the failure and the method of handling it, etc.
- 3.05 If all trunks in a group are involved or if a sufficient number of trunks are involved to seriously affect service, it is advisable to take immediate steps to reroute traffic to

the terminating office. This will depend, however, upon traffic conditions, total number of trunks to the office, the number of offices affected, the number of trunks available should the trunks be rerouted, etc. The methods of rerouting traffic are as follows:

(a) **Rerouting Calls Through Tandem Office**

- 3.06 This method consists of changing translator or decoder cross-connections for the trunk groups which are affected, so as to reroute the traffic through a tandem office of the call indicator or panel tandem type. This change, while it involves the changing of cross-connections, may be accomplished within a short interval of time.
- 3.07 While the number of trunks to the tandem office may not be large enough to handle the extra traffic, if the failure occurs during the busy hour, this means would, however, afford some measure of relief during the busy hour and may be capable of carrying all of the traffic, if the failure occurs at some other time of the day.

(b) **Rerouting Trunks Through Other Cables or Offices**

- 3.08 This method consists of changing cross-connections on the main distributing frame so as to reroute the trunks over pairs through other cables. With this arrangement it may be found that there are sufficient spare cable pairs available to reroute the trunks or additional pairs may be obtained, in some cases, by temporarily discontinuing trunks from other groups.
- 3.09 This method requires more time than that outlined in method (a), since it is necessary to work out a plan from the cable records and more time is required to make the main distributing frame cross-connection changes. Also, it may be necessary to reroute trunks through cables through intermediate offices which may or may not involve a change in the compensating resistance.

Note: In offices where translator cross-connections are individual to the sender, if the emergency routing alters the fundamental loop resistance slightly beyond the allowable limits, it may not be necessary to adjust the compensating resistance.

(c) **Rerouting Calls Through Panel "A" Board**

- 3.10 This method consists of changing the translator or decoder cross-connections to route

the calls to the panel "A" board, where the operator may complete them through a tandem or toll office. In addition, if trunks from the trunk switchboard to the subscriber switchboard are provided in manual offices, it is possible to route the calls from the panel "A" board through the trunk switchboard to the subscriber switchboard at which point the manual "A" operator may complete the connections to the terminating office in the same manner as if the calls originated from subscribers on that board. This latter method is not as efficient as routing through a tandem or toll board. However, it may be resorted to if all other means failed.

4. **METHOD—INCOMING TRUNK CABLE FAILURE**

- 4.01 In the event of a trunk cable failure involving incoming trunks, the method of procedure is determined by the originating office.
- 4.02 Disconnect the incoming selector equipment, as soon as possible, from cable pairs in trouble by the removal of heat coils at the main distributing or protector frame or, where cut-off type jacks are provided at the incoming selector frame, by inserting No. 184 plugs into the selector T jacks. Manually restore to normal any incoming selectors found off-normal, after the cable pairs have been disassociated.
- 4.03 When it is necessary to reroute incoming trunks, it may also be necessary to change cross-connections on the main distributing frame.
- 4.04 When it is necessary to reroute incoming trunks from a panel or key indicator office, or any other trunks in which compensating resistance is involved, a check should be made of the loop and compensating resistances. When required, change the compensating resistances in the incoming selectors affected so that the combined resistance is within the proper limits.
- 4.05 Any changes made should be restored when the trouble has been cleared and the trunks are returned to their original pairs.

5. **REPORTS**

- 5.01 Any required reports pertaining to the failure should be filled out and forwarded in accordance with local instructions. Any necessary changes in existing records should also be made.