GROUPBAND DATA SYSTEMS
SWITCHED NETWORK AND 2-POINT PRIVATE LINE
TROUBLE LOCATION

CONTENTS PAGE

1. GENERAL

1.01 This section provides general trouble location information for groupband data channels carrying the line signals of the 303-type data set. These channels may either be part of a switched network or may be 2-point private lines. The network described in Section 314-609-110 is used in this section as an example of a switched network.

1.02 Troubles that activate audible and visual office alarms are located and cleared by following established office procedures and procedures covered by other Bell System Practices. Troubles that do not activate office alarms but are reported by the wideband data customer require the coordinated efforts of maintenance forces so that the trouble can be located and cleared in the most efficient manner.

1.03 The trouble report received from the customer can be useful in determing what initial procedures are necessary to locate the trouble. The trouble report will usually fall into one of two categories: no data being received or data being received with excessive errors. In the case of a switched network, a third category of trouble may be the inability to establish a wideband connection over the switched network. Each category of trouble will require a different approach in the initial trouble locating procedures. It is important that all details of the trouble report be documented and given consideration, even though some of the details may seem at first to be insignificant. ***The trouble must be defined before it can be located.***

1.04 If the customer still reports trouble after the transmission requirements have been met and the dynamic data tests are within limits, engineering assistance or the aid of a data specialist should be requested through lines of organization. At the time the request is made, the documented trouble report and all test information should be available for use by the engineer.

2. TROUBLE LOCATION PROCEDURES

A. General

2.01 The procedures contained in this section are used to locate a trouble condition by sectionalizing the wideband data circuit into the wideband subscriber or station lines, the data sets, and the wideband trunk(s) or interexchange facility. The wideband subscriber lines or station lines and the data sets are checked on a remote basis by following the procedures in the 314-602-5XX series of sections. The wideband trunk(s) or interexchange facility is checked by following the procedures in the 314-609-51X series of sections.

2.02 When the section (or sections) of the wideband data circuit which is causing the trouble condition has been determined, additional tests are performed on the section to determine the cause of the trouble condition.

2.03 When the cause of the trouble condition has been determined and corrective action taken, digital error rate tests are made to verify that the trouble has been cleared. The customer involved in the original trouble report should then be notified that the trouble has been cleared.

2.04 The procedures which follow are not intended to be directive, but instead, are to be used as examples of the general steps necessary for locating trouble. Actual procedures used should be those which will allow the trouble to be located and corrected with a minimum of time and effort. Before starting any testing procedures, verify with the customer that his business machine is operating satisfactorily.

> ***Note:*** Some customer business machines are not provided with loop-back or self-check features. In this case, customer verification may be difficult to obtain or may not be accurate.

B. Switched Network

2.05 Figure 1 shows the layout of a switched network as described in Section 314-609-110. This network allows a wideband subscriber served by toll office A, B, C, or D to dial a wideband connection to any other wideband subscriber served by the ***same*** toll office. Such a call will be defined as an ***intraswitch call.***

2.06 The network will also allow wideband connections to be established between wideband subscribers served by two ***different*** toll offices. These connections are always established by an operator at the control office (office C). Such a call will be defined as an ***interswitch call.***

2.07 A wideband data subscriber who encounters trouble on an ***intraswitch*** call will report the trouble to the WSB at the switching office serving that customer. When trouble is encountered on an ***interswitch*** call, the subscriber will flash or recall the operator. The operator will refer the trouble to the WSB at the operator location.

2.08 All trouble reports and corrective actions whether resulting from an ***intraswitch*** or ***interswitch*** call will be recorded on the switched services ticket Form E-5120. The use of this ticket and the trouble analysis procedures are listed in Sections 310-200-002 through 310-200-007. This form, when filled out, will provide historical data which can be used to identify marginal circuits and provide a basis for system improvements or equipment rearrangements. Also, when a trouble is reported on an intraswitch call, WSB personnel must make entries on a credit adjustment form. This form and a brief description of its use are included in Part 4 of this section.

Intraswitch Call

2.09 Figure 2 shows an intraswitch call. Generally. trouble reports for this type of call will fall into one of three categories:

- Inability to establish the connection
- No data being received

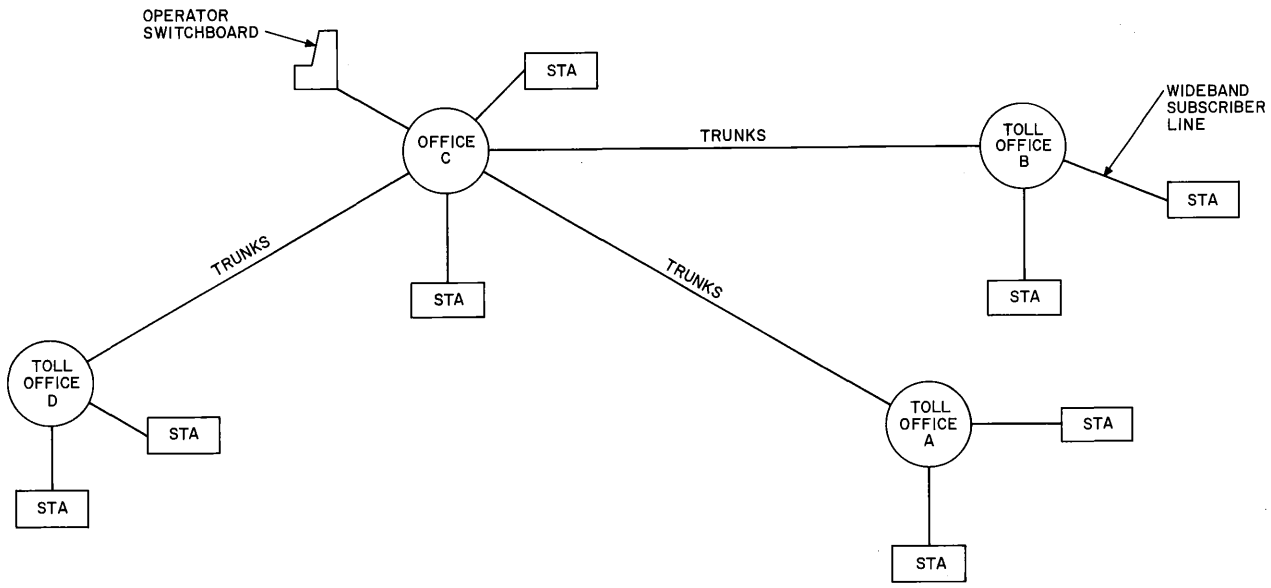

Fig. 1—Switched Network—Simplified Diagram

- Data received but containing excessive errors.

2.10 When the customer is unable to establish a data connection, the trouble probably lies in the 2-wire voice coordination channel. Since this channel is almost identical to a regular DDD network channel, the trouble should be referred, by the WSB attendant, to the office force responsible for the maintenance of the 2-Wire No. 5 Crossbar Switching System and associated 2-wire customer loops. If the trouble cannot be found in the voice coordination channel, the 4-wire wideband switch which is slaved to the 2-wire No. 5 crossbar switch should be checked for proper operation. This should include a continuity check of the slave control leads between the two switches.

2.11 If no data is being received or data is received containing excessive errors, the following procedures should be followed.

(a) The procedures in the 314-602-5XX series of sections should be performed in order to associate the trouble condition with the data set or the wideband subscriber line. Basically, these procedures check the wideband subscriber line by making digital error rate tests over the line with the data station placed in the remote test 1 (RT 1) condition. If the wideband subscriber line passes this test, the data set is checked by placing the data station in the remote test 2 (RM 2) condition and making digital error rate tests over the line using the data set as a regenerative repeater.

Note: These procedures should provide a quick go-no-go type of test. At this point, the object is to sectionalize the trouble to either the wideband subscriber line or the data set.

(b) If the data set is found to be the source of trouble, refer to Section 593-800-500.

(c) If the wideband subscriber line is found to be the source of trouble, additional tests are performed as covered in the 314-609-51X series of sections to determine the cause of trouble. These tests should be performed in the following sequence until the cause of trouble is found.

(1) Net loss at 25 kHz (314-609-511)

(2) Noise (314-609-512)

(3) Gain Frequency (314-609-511)

(4) Envelope Delay (314-609-513)

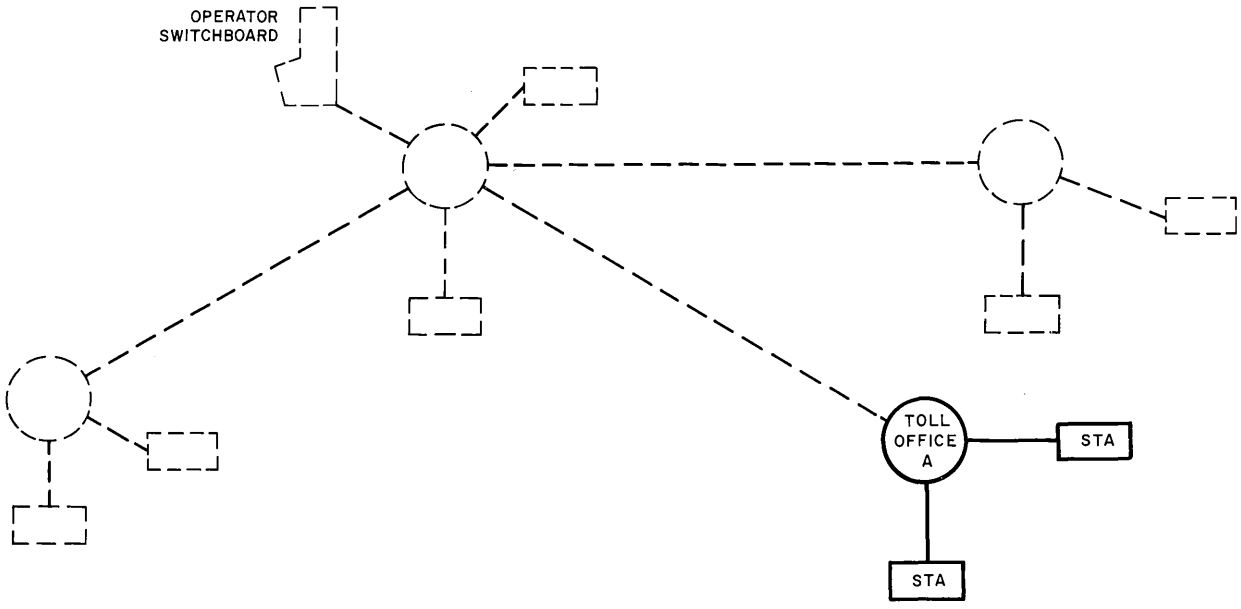

Fig. 2—Switched Network Intraswitch Call—Simplified Diagram

(d) When the cause of trouble has been found and corrected, digital error rate tests should again be performed to verify the corrective action.

(e) The customer should be notified that the trouble has been cleared.

Interswitch Call

2.12 Figures 3 and 4 show an interswitch call. Figure 3 shows an interswitch call which includes two wideband subscriber lines, two wideband switches, and one wideband trunk. Figure 4 shows an interswitch call which includes two wideband subscriber lines, three wideband switches, and two wideband trunks. Trouble location procedures for these types of connections will be initiated and coordinated by the WSB at the operator location.

2.13 All interswitch call trouble reports will be referred to the switchboard operater. The operator will note which wideband trunks are involved in the connection and will attempt to establish a new connection using different wideband trunks.

2.14 If the operator can establish an acceptable connection using different wideband trunks, the trouble probably lies in the original wideband trunks. If the use of different wideband trunks does not provide an acceptable connection, the trouble probably lies in the wideband subscriber lines or associated data sets. The operator should pass this information to the WSB attendant.

2.15 If trouble is suspected in the wideband subscriber lines or associated data sets, the WSB attendant at the operator location will contact the WSB attendants at each serving toll office associated with the two wideband subscriber lines. The WSB attendants will then test the wideband subscriber lines and data sets using the same procedures as those used for locating trouble associated with an intraswitch call. After the trouble is cleared, the WSB attendants should notify the WSB at the operator location as to the nature of the trouble and the corrective action taken.

2.16 If trouble is suspected in a wideband trunk, the WSB attendant at the operator location will contact the WSB attendant at the toll office at the opposite end of the wideband trunk. The WSB attendants at each end of the wideband trunk will proceed as follows to determine the cause of the trouble.

(a) The WSB attendant at the operator location will contact personnel at the 17E testboard and have the wideband trunk made busy.

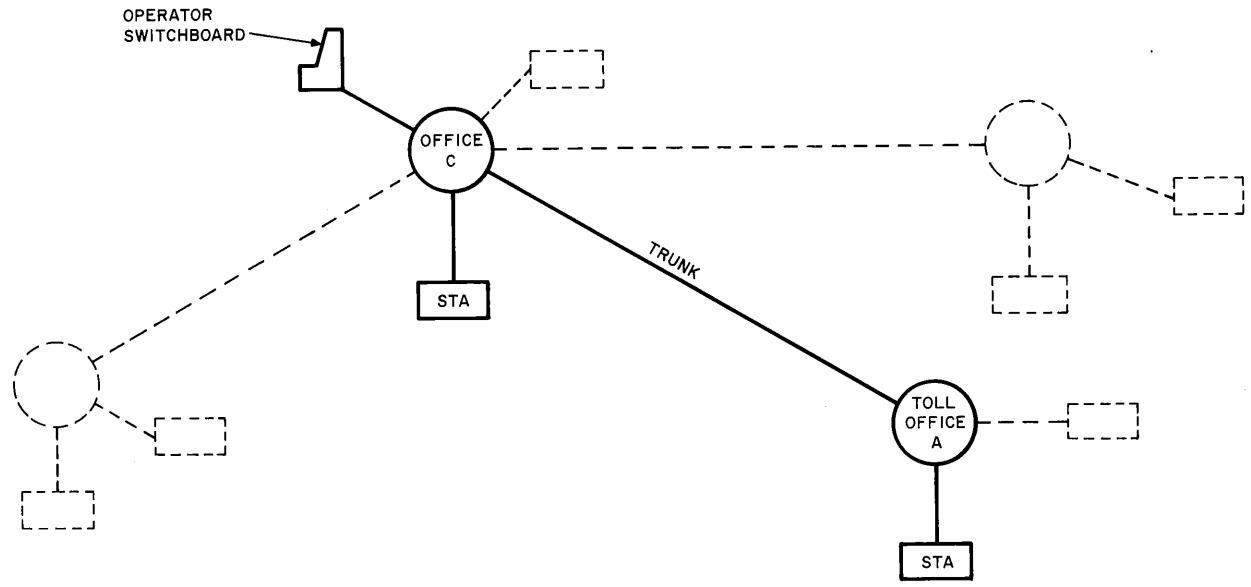

Fig. 3—Switched Network Interswitch Call Using One Trunk—Simplified Diagram

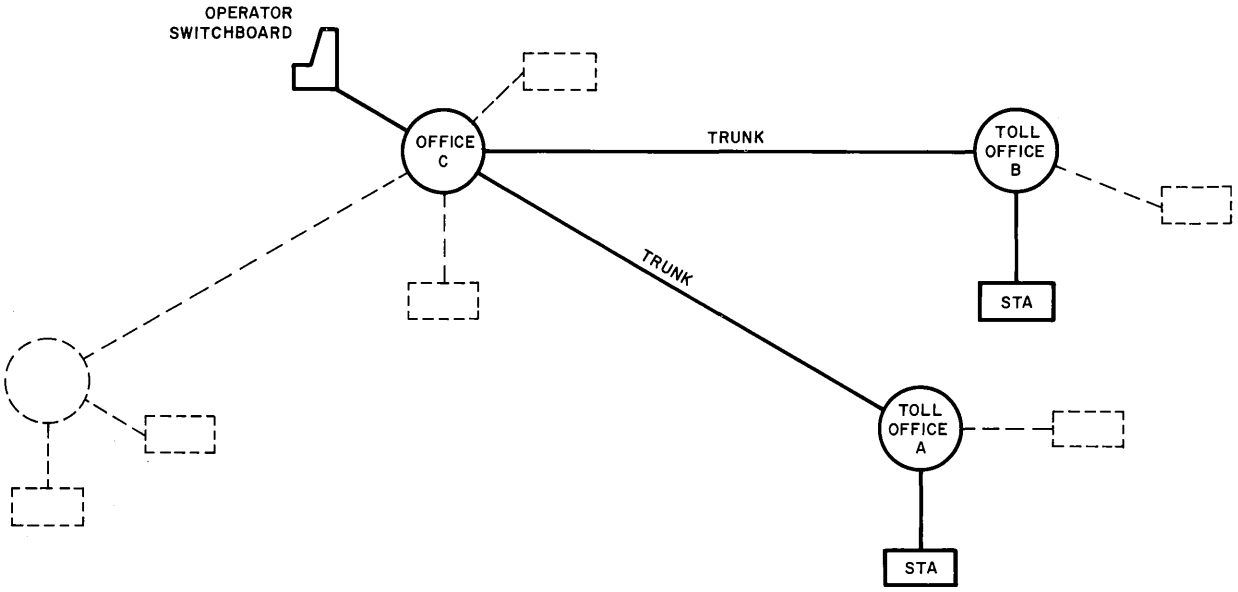

Fig. 4—Switched Network Interswitch Call Using Two Trunks—Simplified Diagram

(b) The following tests should be performed from the WSB at each end of the wideband trunk. These tests should be performed in the sequence given until the cause of trouble is found.

(1) Net loss at 25 kHz (314-609-511)

(2) Noise (314-609-512)

(3) Gain Frequency (314-609-511)

(4) Envelope Delay (314-609-513)

(c) When the cause of trouble has been found and corrected, digital error rate tests should be performed over the wideband trunk to verify the corrective action.

(d) If the wideband trunk meets the error rate objectives, personnel at the 17E testboard should be requested to release the make-busy condition.

C. 2-Point Private Line

2.17 Figures 5 and 6 show two possible circuit arrangements for a 2-point private line. Figure 5 shows a relatively simple 2-point private line with one serving test center which is also the circuit control office. Figure 6 shows a more complex 2-point private line with two serving test centers, one of which is the circuit control office.

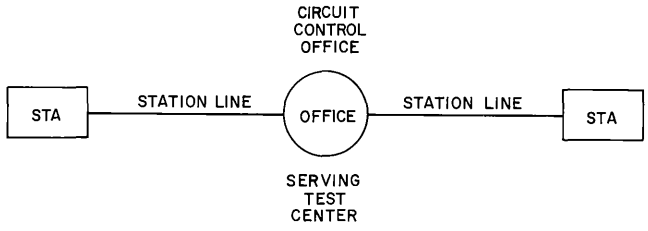

Fig. 5—2-Point Private Line With No Interexchange Facility—Simplified Diagram

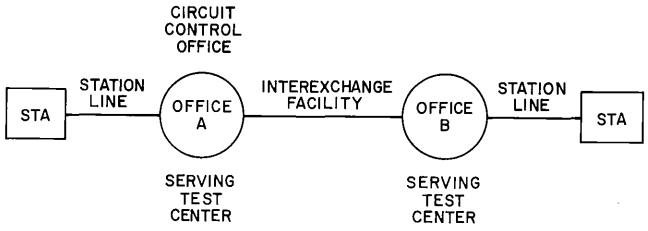

Fig. 6—2-Point Private Line With Interexchange Facility—Simplified Diagram

2.18 The wideband lines which connect the serving test center to the served wideband station are called ***station lines.*** The wideband channel which interconnects the two serving test centers is called an ***interexchange facility.***

2.19 For a 2-point private line, the customer will normally report trouble to personnel at his serving test center WSB. If the 2-point private line contains only one serving test center, as shown in Fig. 5, the serving test center will test both station lines. However, if the 2-point private line contains two serving test centers, as shown in Fig. 6, the serving test center receiving the trouble report will notify the circuit control office so that this office can coordinate the efforts of the two WSBs at the serving test centers.

2.20 If a trouble is reported on a 2-point private line which contains only one serving test center as shown in Fig. 5, the following procedures should be followed.

(a) Perform the procedures in the 314-602-5XX series of sections in order to associate the trouble with the data set or the station line. Basically, the procedures check the station line by making digital error rate tests over the line with the data station placed in the remote test 1 (RT 1) condition. If the station line passes this test, the data set is checked by placing the data station in the remote test 2 (RT 2) condition and making digital error rate tests over the line using the data set as a regenerative repeater.

Note: These procedures should provide a quick go-no-go type of test. At this point, the object is to sectionalize the trouble to either the station line or the data set.

(b) If the data set is found to be the source of trouble, refer to Section 593-800-500.

(c) If the station line is found to be the source of trouble, additional tests are performed as covered in the 314-609-51X series of sections, to determine the cause of trouble. These tests should be performed in the following sequence until the cause of the trouble is found.

(1) Net Loss at 25 kHz (314-609-511)

(2) Noise (314-609-512)

(3) Gain Frequency (314-609-511)

(4) Envelope Delay (314-609-513)

(d) When the cause of trouble has been found and corrected, digital error rate tests should again be performed to verify the corrective action.

(e) The circuit should be restored to customer use and the customer notified that the trouble has been cleared.

2.21 If a trouble is reported on a 2-point private line which contains two serving test centers, as shown in Fig. 6, the following procedures should be followed.

(a) Personnel at the serving test center receiving the trouble report will notify personnel at the circuit control office.

(b) Personnel at the circuit control office will direct personnel at each serving test center to perform the procedures in 2.20 in order to check the two station lines and data sets.

(c) If the trouble is not found in the station lines, the interexchange facility between the two serving test centers must be checked. The following tests should be performed in the sequence given until the cause of trouble in the interexchange facility is found.

(1) Net Loss at 25 kHz (314-609-511)

(2) Noise (314-609-512)

(3) Gain Frequency (314-609-511)

(4) Envelope Delay (314-609-513)

(d) When the cause of trouble has been found and corrected, digital error rate tests should be performed to verify the corrective action.

(e) The circuit should be restored to customer use and the customer notified that the trouble has been cleared.

3. PRECAUTIONS

3.01 Trouble can occur in equipment which is common to both the wideband data channel

and channels carrying other customer services. Certain troubles, such as loss of pilot, or changes in group or supergroup pilot signal levels in L-Type Multiplex Systems, or complete or partial failure in certain units of N or L carrier facilities, can affect the overall system gain and result in interference with other services. All precautions should be taken to avoid hits or disruption of service to other customers. When such troubles are encountered, the restoration procedures are to be performed only under the direction of the wideband circuit control office for 2-point private lines or the WSB at the operator location for the switched network.

4. CREDIT ADJUSTMENT

4.01 When a customer using the switched network encounters a service interruption or transmission difficulity, an adjustment must be made so that the customer will be charged only for the time that satisfactory service was received. This adjustment is initiated by the operator when trouble is reported on an interswitch call. However, on intraswitch calls where the trouble report is received by WSB personnel, WSB personnel must initiate the credit adjustment. In this case, the information necessary for credit adjustment is entered on Form E-5581 by the WSB personnel.

4.02 A portion of form E-5581 is shown in Fig. 7.

Included at the bottom of the form are instructions for its use. All entries in the form must be approved by the WSB supervisor. The number of minutes to be credited to or subtracted from the total call duration should be entered in column (c) of the form. When determining this number, it should be kept in mind that the charge for the service actually rendered should be equal to the charge for an equivalent amount of normal service at the regular rate. If the customer has not received the equivalent of any normal service, the entry in column (c) should result in no charge being made to the customer.

DATA-PHONE 50 CREDIT ADJUSTMENT RECORD

FORM E-558I
6-1-67

Originating Wideband Service Center ___ ___ ___ ___ ___ ___ ___ ___ ___ Period Covered ___ ___ ___ ___ ___ ___ ___

	Date Mo./Day	Time of Call	Adjusted No. of Minutes	To Number	From Number	Reason For Adjustment	By
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
37							
38							
39							
40							
41							

Column Detail

a - Month and Day Four Digit No. i.e., Jan. 5 = 0105, Dec. 22 = 1222

b - Time of Call Requiring Adjustment i.e., 8:22AM

c - Number of Credit Minutes:

d - Called Number i.e., NNX-XXXX

e - Calling Number i.e., " "

f - Cutoff, Poor Transmission, etc.

g - Initials of Person Making Entries

Send Daily To: _____

(If Nothing To Report So Indicate) _____

Approved By _____

Title _____

Sheet ___ of ___ Sheets

Fig. 7—Credit Adjustment Record