"DATAPHONE®" DATA COMMUNICATIONS SERVICE

OVERALL MAINTENANCE PROCEDURES

DATA SYSTEMS ON THE PUBLIC SWITCHED NETWORK

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1. GENERAL

1.01 This section describes the overall analysis and trouble clearing procedures for data services on the Switched Telecommunications or Public Switched Networks (PSN), hereafter called switched data services. Initially, only telephone company provided data sets were connected to the network and the service was called DATAPHONE service. However, with the advent of interconnection, customer provided equipment (CPE) was permitted to be directly connected using some means of network protection. With the Registration Program, network protection is achieved by having equipment registered and connections made using voice jacks or data jacks. These changes, along with the various methods that customers can use to access the switched network, have complicated the investigation of trouble reports on switched data services. This section contains the overall plan for trouble investigation and maintenance of switched data services in a complex, multivendor environment.

1.02 This section is reissued for the following reasons:

    (a) To change information relating to customer trouble reports involving international data service.

    (b) To change direct distance dialing (DDD) network designation to PSN.

    (c) To include reference information on the Data General Bell System Practice sections.

Since this is a general revision, no revision arrows have been used to denote significant changes.

1.03 Trouble reports on switched data services will be received by the appropriate maintenance center. An integral part of the maintenance plan is the Data Test Center (DTC) capability. This section covers the handling, controlling, and clearing of all trouble reports. The maintenance center may often find it necessary and advantageous to request the assistance of other work groups in locating, sectionalizing, and clearing data troubles.

1.04 To provide a systematic approach to the location and clearing of trouble, divide the plan into the following phases:

    (a) Trouble Investigation—Phase I—Remote Tests

    (b) Trouble Investigation—Phase II—On-Site Tests

    (c) Trouble Investigation—Phase III—Escalate to Data Technical Support (DATEC).

1.05 Descriptive information common to the transmission of data on the PSN, private line (PL) services, and Switched Service Networks (SSN) is covered in the following sections:

- Data General, Analog Transmission Parameters, Description (Section 314-010-100)

- Data General, Data Testing Principles (Section 314-010-101)

- Data General, Data Services Support (Section 314-010-102)

- Data General, Interconnection/ Interpositioning (Section 314-010-103).

A basic understanding of the Data General sections is recommended prior to the use of this section.

A. Description of Overall Maintenance Plan

1.06 Switched data services involves the use of local loop, foreign exchange (FX), wide area telecommunications service (WATS), remote exchange (RX), and PBX station lines to access the PSN. Various publications describe the PSN to customers and define those data services that the telephone company (TELCO) supports or does not support.

1.07 The customer is normally the first party to recognize the existence of a trouble condition. It is essential that telephone personnel obtain a clear understanding of the problem at the outset of the investigation through a *trouble report analysis*. The procedure for performing this analysis is given in Section 668-010-300. From preliminary analysis, it should be possible to determine the type of trouble and the locations experiencing it. If the trouble is properly analyzed, erroneous and/or misdirected reports should be eliminated.

B. Additional Maintenance Considerations—Voice Jacks and Data Jacks

1.08 The voice jack and/or data jack provide the means for registered data sets (both TELCO and CPE) to be connected to the PSN. When a CPE data set is used, the error rate performance is not specified nor is the data set to be tested by the DTC or other TELCO personnel. Descriptive information on the voice and data jacks is given in Section 590-101-103.

Test Requirements

1.09 The customer may have his local access line terminated in either a voice jack or a data jack. Transmission tests are required at installation for FX, RX, and remote WATS lines as indicated in Section 314-205-501. However, the installation tests for loops and local WATS lines are the same as normal business service, whether terminated in a voice jack or data jack. That is, only a normal line test is required. With a data jack, however, insertion loss is measured as part of the data jack installation.

1.10 In case of problems at installation or during a trouble report, the following parameters should be measured on the access line:

Voice Jack

- Insertion Loss

- C-Notched Noise

- Impulse Noise

Data Jack

- Insertion Loss

- C-Notched Noise

- Impulse Noise

- Slope (404 to 2804 Hz).

The requirements for these various parameters are given in Section 314-205-501. If the requirements cannot be met, the circuit should be referred to the circuit provision center (CPC) for design on an expedited basis.

Levels of Support

1.11 Since it is not possible to control the transmission parameters that affect data transmission in all possible arrangements, there is a need to define the two levels of support. These terms are defined below.

Data Support

1.12 Fully supported switched data services are services terminated in data jacks for which

the telephone company has published end-to-end performance standards. End-to-end performance is supported on 85 percent of the connections for fully supported services. These performance standards are called minimum acceptable performance (MAP) criteria and are described in Section 314-205-503.

1.13 When TELCO data sets are terminated in data jacks, end-to-end digital error performance is also supported over a long period of time. Digital error performance criteria are:

- Asynchronous data transmission—no more than one bit error in 100,000 bits transmitted

- Synchronous data transmission—no more than 1-1000 bit block in error out of 100-1000 bit blocks transmitted.

Voice Quality Support

1.14 The second level of support is satisfactory voice quality only. A trouble report on this category of service should be handled as a normal voice type trouble report. Each element of the end-to-end connection should meet its standard objectives. Representative examples of this category are:

- Data services connected via voice jacks

- Service on an FX line to a station more than 200 miles from the dial tone office

- Service from any station to any other station through other common carrier or CPE facilities or equipment

- Service from any private switched network off-net to a station on the public switched network

- Stations coupled acoustically or inductively

- Service to any country other than the 50 states and Canada.

Trouble Reports Involving Satellite Trunks

1.15 While most data systems will operate satisfactorily over satellite trunks, there are some data arrangements which may experience difficulties resulting in trouble reports. The guidelines for handling these reports are as follows:

(a) If a trouble report is received and a satellite trunk is suspected to be the cause, call the local DATEC team and verify that satellite routing between the cities the customer is calling is available. If satellite routing is not possible, normal trouble testing procedures should be followed to clear the trouble.

(b) If the trouble cannot be cleared using normal testing procedures or if satellite trouble is confirmed, escalate the trouble to DATEC.

Trouble Reports Involving International Location

1.16 If a customer trouble report is received which involves an international location, the following steps should be taken:

(a) Perform standard tests on the local access line as specified in Section 314-205-501. In addition, any TELCO provided equipment (eg, data set, terminal, etc) should be checked to ensure that it is operating properly.

   Note: Tests of the network or far-end equipment should not be made.

(b) If the results of the above tests indicate no trouble, the bureau should inform the customer and close the trouble report.

(c) If the customer is not satisfied, the International Data Coordinating Center (IDCC) should be informed by the bureau. The IDCC is located at the Long Lines Organization in Morris Plains, New Jersey. It may be contacted by calling 201-631-4515 or 4516. This center may contact and communicate with the customer.

2. SWITCHED DATA SERVICE—OVERALL MAINTENANCE PLAN

2.01 The overall maintenance plan consists of three different phases. The first two phases present a suggested procedure for investigating and isolating trouble. The third phase is entered only when the trouble cannot be cleared through normal testing or when a third consecutive trouble report on the same trouble is received within a 30-day period. The phases are arranged to allow performing the easiest tests on the most probable causes first, followed by the more difficult and time consuming on-site tests last (if needed).

2.02 The existence of a complex, multivendor environment requires that trouble investigation

be made promptly in order to isolate the trouble cause to either TELCO or CPE. Trouble isolation is quickly made by performing remote test procedures and by using self-test features of the data set(s) if available. Additionally, the multivendor environment requires that CPE be checked to ensure proper operation. If the telephone company dispatches repair personnel and the trouble cause is not TELCO equipment, the customer may be assessed a maintenance of service charge (MSC). Therefore, it is important that unnecessary dispatch of repair personnel be avoided. A dispatch of repair personnel should only be made when it is determined, by the results of remote tests, that TELCO equipment is the trouble cause and a dispatch is necessary. The administration of the MSC is described in Section 660-101-312.

A. Trouble Investigation—Phase 1—Remote Tests

2.03 The procedures given in Phase I, Chart 1, consist of those remote tests performed by DTC personnel on the customer local access line and the TELCO data sets. These tests normally are made in response to the first trouble report from the customer. However, they may also be made in response to additional reports on the same service.

Note: When three similar trouble reports on the same service are received within 30 days and have been closed out as "test OK," "came clear," "found OK," "no trouble found," etc, escalate immediately to Phase III.

CHART 1

TROUBLE INVESTIGATION—PHASE I—REMOTE TESTS

APPARATUS:

Data Test Center equipment

STEP   **PROCEDURE**

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1   The Special Service Center (SSC)/DTC receives a trouble report from the customer.

2   The SSC/DTC analyzes the customer trouble report using the questions given for this analysis in Section 668-010-300. This analysis should indicate the probable location of trouble such as near-/far-end, CPE/TELCO, loop/data set, network, etc.

3   If customer report indicates local loop trouble, perform the normal dc tests on the near-end local loop to confirm or eliminate trouble such as opens, shorts, crosses, etc.

              Note: If trouble appears to be caused by excessive noise or loss, proceed to Phase II and perform transmission tests on the access line as given in Section 314-205-501.

4   If results of the dc tests are not satisfactory, the SSC/DTC will arrange for repairing or changing the loop.

5   If the customer report indicates TELCO data set trouble or if the trouble persists and the loop meets test requirements, the SSC will notify the DTC serving the area and instruct them to perform a test of the near-end data set.

CHART 1 (Contd)

STEP	PROCEDURE
6	If the near-end TELCO data set tests defective, dispatch repair personnel to replace the defective data set.
7	If the near-end data set tests satisfactorily and the trouble persists, the DTC should test the far-end data set if TELCO supplied.
8	If the far-end data set tests defective, the DTC will inform the SSC of the test results. The SSC will inform the proper repair group for appropriate action.
9	If the near- and far-end data sets both test OK, the customer will be advised so that they may contact their business machine people and possibly avoid a maintenance of service charge.
10	If the service is restored satisfactorily, the trouble report will be closed. If the customer is not satisfied with the service and there is no evidence of additional trouble on CPE, proceed to Phase II.

B. Trouble Investigation—Phase II—On-Site Tests

2.04 If the source of trouble is not apparent from tests and information obtained in Phase I, further investigation is necessary to identify the section of data system that is malfunctioning. The activities in Phase II, Chart 2, are intended to further isolate the source of trouble by dispatching repair personnel to perform dynamic tests on TELCO data sets connected via data jacks and, if necessary, perform transmission tests on the access lines. These activities are initiated by the failure of Phase I to isolate the problem.

CHART 2

TROUBLE INVESTIGATION—PHASE II—ON-SITE TESTS

APPARATUS:

Data Test Center equipment

Transmission test equipment

STEP	PROCEDURE

1	If customer provided equipment tests satisfactorily and service is not restored, the SSC will dispatch a data repair person to the customer site. The customer will be advised by the SSC/DTC that a maintenance of service charge may be assessed if no trouble is found in TELCO equipment.
2	The data repair person will perform a dynamic test to the proper DTC if data set and data jack are TELCO supplied. If data set is not TELCO, perform transmission tests on the access line only and go to Step 5.
3	If the results of the dynamic tests are not satisfactory, replace the data set and repeat the dynamic test.
4	If the results of the dynamic tests are satisfactory, and the trouble persists, the data repair person will perform transmission tests on the access line as given in Section 314-205-501.
5	If the results of the transmission tests do not meet the limits given in Section 314-205-501, corrective action should be made by notifying the CPC for action on an expedited basis.
6	If the results of the transmission tests are satisfactory and the trouble persists and if the data sets are TELCO provided, the data repair person will perform an end-to-end self-test of TELCO data sets where data jacks are used if these test capabilities are available.
7	If the end-to-end self-tests are unsatisfactory, replace the defective TELCO data set.
8	If the end-to-end self-tests are satisfactory and the customer is not satisfied with the service and there is no evidence of additional trouble, proceed to Phase III.

C. Trouble Investigation—Phase III—Escalate to Data Technical Support (DATEC)

2.05 There are three levels of data technical support available for assisting field forces on data service problems. The first level of technical support is the DATEC support personnel in an area or division organization. Local DATEC may then contact the second level of technical assistance from DATEC support personnel at the company headquarters or the third level of support from AT&T headquarters.

2.06 Technical escalation of data service problems is appropriate under the following conditions:

(1) The service meets Bell System specifications but does not meet the customer's performance expectations.

(2) The service does not meet Bell System specifications and the problem source cannot be identified.

(3) The service has generated a high incidence of trouble reports.

2.07 When DATEC personnel have received trouble report(s), they may direct that certain tests be repeated or additional tests be performed. These tests may include the following:

(a) End-to-end transmission (MAP)

(b) End-to-end error performance (if TELCO supplied data set)

(c) Hold and trace.