PRIVATE LINE SERVICE
OVERALL MAINTENANCE
DIGITAL DATA SYSTEM

CONTENTS PAGE

1. GENERAL

1.01 This practice provides information on the overall maintenance of the DDS (Digital Data System). The emphasis is on general maintenance

features and capabilities of DDS. Other documents listed in Part 8 give detailed information on testing procedures and the use of test equipment.

1.02 This practice is reissued for the following reasons:

- To add new terms throughout this practice as a result of new technologies and divestiture
- To add a new Part 10 to include a glossary of terms
- To add Table B, DACS (Digital Access and Cross-Connect System), Issue 8 AMM180, Digroup Card Circuit for Programmable Facility Alarms and Performance Indicators
- To add references to the SNWG (Service Node Work Group)
- To delete references to the Network Terminal Equipment Center, Service Node Support Group, Service Node Equipment Center, and Serving Test Center.

Revision arrows are used to emphasize the more significant changes.

2. INTRODUCTION

2.01 Adding secondary channel capability to DDS customer circuits does not change the DDS performance and maintenance objectives. Secondary channel data is combined with the customer's primary channel data into a byte-formatted bit stream by the customer's CSU/DSU (Channel Service Unit/ Data Service Unit). Secondary channels will not be tested or the performance of the channels measured separately in the DDS network.

A. Performance and Maintenance Objectives

2.02 The performance and maintenance objectives for DDS include quality, availability, and maintainability. The data channels from customer premise to customer premise should meet an efficiency objective of at least 99.5 percent EFS (error-free seconds) at all customer speeds. The availability of a station-to-station circuit should average at least 99.90 percent (that is, annual downtime should not exceed 0.10 percent). The design goal is to minimize interruptions exceeding two hours. In order to achieve these performance objectives for inter-LATA (local access and transport area) circuits, the CTC (Centralized Test Center) personnel are responsible for receiving trouble reports; sectionalizing the trouble, to either circuit components provided by AT&T Communications or to the exchange access portion of the circuit; and coordinating the repair of all DDS circuits.

2.03 Other maintenance objectives for service outages in the DDS network are a maximum of 20 minutes for inter-LATA facilities, 30 minutes for intra-LATA facilities, and 120 minutes for loop facilities. Within 15 minutes after a trouble has been reported to the appropriate CTC, the fault should be isolated to the AT&T Communications DDS network or equipment, or to the circuit.

B. Maintenance Features

2.04 Several features in the DDS maintenance plan help achieve the performance and maintenance objectives. These features include:

(a) A single point of contact that is responsible for trouble reports

(b) A full-time, in-service performance monitoring and protection switching system for most transmission facilities and multiplexer terminals

(c) A centralized test access to all circuits that allows one test person to sectionalize the trouble

(d) A unique system of network signaling and control codes

(e) Portable test equipment that simplifies test access to strategic locations.

Table A gives a comparison of the maintenance features for the DDS multiplexing and terminal equipment.

C. Trouble Recognition

2.05 Errors, garbled data, or no data at all indicate a trouble condition. Also, when a trouble condition exists, the respective offices may receive alarm indications from the transmission terminals and multiplexing equipment.

3. ADMINISTRATIVE MAINTENANCE CENTERS

3.01 The CTC (Centralized Test Center) and the FMAC (Facility Maintenance and Administration Center) share in the responsibilities of meeting the overall maintenance objectives of the DDS.

A. Centralized Test Center

3.02 The CTC is responsible for receiving all trouble reports from the customer. This center tests, sectionalizes, and refers troubles to the responsible organizations for restoral of the network. The CTC has remote test access for all circuits under its control.

3.03 To perform its maintenance functions, the CTC must interface with the following centers:

- DFCG (Digital Facility Control Group)
- FMAC (Facility Maintenance and Administration Center)
- FTAG (Facility Technical Assistance Group)
- LEC (Local Exchange Company) - DDS Access Test Center
- LEC-DDS Hub
- SNWG (Service Node Work Group)
- TTWG (Toll Terminal Work Group).

B. Facility Maintenance and Administration Center

3.04 The FMAC coordinates the provisioning and maintenance activities for facilities in a geographical area. The FMAC is responsible for the following:

- Managing the maintenance lines that are used to restore a failed service
- Analyzing the failure reports from many offices
- Providing centralized facility expertise
- Coordinating the restoration of failed radio facilities providing inter-LATA service for DDS
- Interfacing with the FWG (Facility Work Group).

3.05 For T-Carrier restoration control, the FMAC uses the TCAS (T-Carrier Administration System). This function is a branch of the FMAC design that uses an automated E-type telemetry system. This system provides the central location with the up-to-date status of the T-Carrier network. The administrative activities are carried out at the FMAC; however, system failures are detected and analyzed automatically as they occur. This minimizes the outage time between the failure and the start of restoration activities.

4. AUTOMATIC MONITORING AND PROTECTION SWITCHING

A. T1 Line Protection

4.01 The DDS local access lines should be protected when (1) the working line is longer than 15 miles, or (2) the working line carries more than 20 stations. The 15 miles refers to route and not airline miles. The 20 stations refers to the total of all working stations (not forecasted) on inter-LATA or intra-LATA services. These objectives on the system are to defer the expense of protection until the station load is large enough to bear the expense.

B. Multiplexing Equipment Monitoring and Protection

4.02 The T1DM-PM (T1 data multiplexer - performance monitor) monitors all of the digital multiplexing equipment. The T1DM-PM must monitor this equipment so that errors generated by other parts of the DDS do not influence protection switching for the multiplexing equipment.

4.03 The T1DM-PM scans a maximum of 11 working T1DMs and one standby, depending on the bay arrangements. The T1DM-PM also monitors the input ports and the outputs of each T1DM (including the spares). The T1 facility switches to a spare if more than one out of three bytes are in error, the T1DM sync detector is faulty, or locally generated timing or outgoing framing synchronization is lost.

4.04 The SRDC (Subrate Data Cross-Connect System) is an enhancement to the DACS. The SRDC microprocessor provides access to circuits for testing as well as test features which are designed into the circuits; e.g., MJU (multipoint junction unit) branching. Circuit test access is the same as that for DACS without SRDC. The DACS/SRDC has up to four of the digroup ports dedicated to test access, and circuits are cross-connected to the ports for testing. Any DS-0A signal or any single user signal embedded within a DS-0B signal may be connected to the test port. The SRDC may provide bridge access or terminating access.

4.05 The SRDC provides for multipoint circuit testing and also makes it possible to loop any circuit back on itself. Both 2-point and multipoint circuits can be looped. The SRDC provides equipment maintenance functions which are very similar to those of the DACS and interact with the DACS. The frame provides continuous self-checking of the equipment by generating its own messages over the administrative links, and local and remote alarms when a fault is detected.

4.06 The DACS/SRDC provides complete redundancy in the transmission path with the exception of the digroup card. If a fault is detected on the active path, the DACS/SRDC will switch to the redundant path. If the messages are manually input, it is possible to run the diagnostic programs, exercise the alarms, and condition the frame for maintenance activities. The alarm indications provided by DACS/SRDC will be identical to the alarms presently generated by the DACS.

4.07 Facility performance monitoring is primarily a function of the DACS rather than the SRDC microprocessor. A large number of the performance parameters are measured by the AMM180 DACS digroup card. These parameters can be accessed over the administrative links and read from a remote location. Several of these parameters have adjustable threshold values which can be set from a remote location. A message is generated on the administrative link for several of these parameters when the thresholds are exceeded.

4.08 ▶The parameters for DACS with Issue 8 AMM180 digroup card circuit for programmable facility alarm threshold values and performance indicators are given in Table B.◀

4.09 The T1WB4 (T1 data/voice multiplexer) or the T1WB5 (T1 data/voice multiplexer) operates either with or without the D-type channel banks. If the associated D bank fails, the T1WB4 or T1WB5 automatically switches to independent operation and transmits the D bank alarm information to the other end. Both multiplexers automatically operate in the combined data/voice mode when maintenance personnel restore the failed D bank. The T1WB4 or T1WB5 has a built-in monitor and redundant common timing circuitry. The ports of the data/voice multiplexers are not protected.

4.10 When the T1WB4s and T1WB5s are chained, the D banks are excluded. If both the regular and standby lines fail, the T1WB4s and T1WB5s continue service at offices between the faulty link and the hub office. When an alarm condition occurs, only the T1WB4 or T1WB5 that terminates the faulty link receives the alarm. This prevents the undesired alarm from occurring in other offices in the chain.

4.11 When the monitor detects a failure, the SPM (subrate data multiplexer performance monitor) scans a maximum of 48 SRDM (subrate data multiplexer) terminals and automatically switches to the proper rate spare. The system switches to a spare if seven consecutive bytes are in error, the SRDM incoming framing sync detector is faulty, or the outgoing data stream contains incorrect framing. The 5-channel ISMX (integral subrate multiplexer) is not monitored and does not have a spare; however, internal redundancy protects the 10-channel ISMX.

5. MAINTENANCE METHODS

5.01 Remote test access for the ABATS (Automated Bit Access Test System) is available from an SSC-D/CTC (Special Service Center-Digital/Centralized Test Center) that is located away from the hub office. An SSC-D/CTC has testing responsibilities for all controlled service into any hub office. The ABATS will do all the tests required for Dataphone® digital service circuit provisioning and maintenance including secondary channel.

5.02 Test access is available for all customer channels within the DSA (digital serving area). The LATS 2 (Line Access Test System) provides DSX-0A test access. The DSAU (DS-1 signal access unit) provides DSX-1 test access. The test arrangements may be a KS-21899 DTS (data test set), also called the BATS (Bit Access Test System), or a LATS.

5.03 There are two types of LATS access arrangements available:

- LATS 1 provides metallic test access.
- LATS 2 provides DSX-0A test access. The DTSs transmit the coded test patterns through the 2-point or the multipoint test access arrangement. Figure 1 shows a 2-point and a multipoint test access arrangement.

5.04 The test access is via the DSAU and/or LATS 2. To verify proper operation of the channel, the latching loop-back test should be performed using the 2047 pseudorandom test word.

5.05 The existing test procedures should be used to test a multipoint circuit; or new test procedures, for multipoint circuits equipped with a new MJU. Because of increased capability available in new multipoint circuit equipment, new tests and testing capabilities are available. These include branch blocking and looping.

5.06 In the byte-organized portion of the DDS network, control codes are recognized by a zero in those eighth-bit positions used for control functions. Practice AT&T 314-900-100 gives these DDS control codes. Some of these control codes are used as follows:

(1) The appropriate code is forwarded on each affected channel when digital multiplexers detect out-of-frame conditions or disconnected ports.

(2) The CSU/DSU sends an idle code when the customer is not sending data.

(3) An OCU (office channel unit) generates an idle code toward the network when no digital signal is detected from the loop.

5.07 Each DDS office receives alarm indications from the transmission terminals and multiplexing equipment in that office. The alarm system sends the DDS office alarms to the maintenance group to isolate the fault. The alarms are not provided for that portion of the DDS from the customer to the OCU, including the 5-channel ISMX. However, there is a power supply alarm available in the OCU.

5.08 An analysis of information obtained from the customer trouble report, alarm indications, and monitoring tests suggests the sequence of loop-back tests to be performed at the SSC-D/CTC. Figure 2 shows the points at which a digital test signal can be automatically looped back toward the DDS hub. Points A, B, and C represent the CSU/DSU, channel, and OCU loop-back tests, respectively. In general, the loop-back tests can be used to isolate the trouble to either the customer equipment, loop, interoffice facilities, or AT&T Communications Network. The DS-0 DP allows 64 kb/s, or DS-0 rate, and provides the intraoffice bipolar nonreturn-to-zero signal format. Practice AT&T 314-901-300 gives detailed information on the loop-back tests.

5.09 To determine which facility, multiplexer terminal, or channel unit is at fault, other tests are necessary. The alarm indications help locate most trouble conditions; however, trouble conditions in OCUs, 5-channel ISMXs, T1WB4 or T1WB5 port circuitry, and office wiring are not indicated by alarms. These tests may require portable test equipment. All jack access for the test equipment is at the jack and connector panels or on the equipment between the OCU and the BATS panel (if provided) or DSAU.

6. TEST EQUIPMENT

6.01 The hubs, local offices, and customer premises require portable test equipment. This test equipment includes the digital receiver and digital transmitter and the equipment described in paragraphs 6.06 and 6.07.

6.02 The digital receiver (KS-20908 DTS) monitors signals and detects errors. It operates at the 64-kb/s office level and accepts bipolar signals. The light-emitting diodes show the received byte pattern and the presence of any of the DDS control codes. The receiver can generate 511- and 2047-bit test words for comparison with a received signal.

6.03 The digital transmitter (KS-20909 DTS) generates test signals and DDS control codes for loop-back and straightaway tests (for example, CTC-to-customer station). The loop-back tests use a 2047-bit test word and other tests use a 511-bit test word.

6.04 The control and test code generator can supply seven control codes at four outputs. It continuously provides a special (one of the seven) test code, 00011100, at six outputs. This special code has a strong 4-kHz tone in bipolar format that can be heard through earphones. The generator frees the

digital transmitter for other duties during prolonged testing.

6.05 The MSU (Multipoint Signaling Unit) is used with the digital transmitter and receiver to test various segments of a digital multipoint circuit. When the entire multipoint circuit is released, the control station should be connected to any selected remote station for more tests.

6.06 Several portable DTSs are available for use in the DDS. These are the 914B, 914C, and 921A DTSs. The 914B DTS generates a 511-bit, quasi-random test word for tests at data rates of 2.4, 4.8, and 9.6 kb/s. The error tests can be performed at the customer location with a CSU/DSU by using the transmitting and receiving sections of the test set. The 914C DTS performs the same functions as the 914B DTS but in the duplex mode (transmitting and receiving simultaneously). The 921A DTS provides serial testing capability for data sets and the CSU/DSU. The 921A DTS generates a 2047-bit, quasi-random test word for tests at the 56-kb/s data rate. Use of the 921A DTS for the DDS is similar to that of the 914B. An adapter cable makes the 921A DTS compatible with the CSU/DSU.

6.07 The KS-20775 error rate test set is used for testing DS-1 channels at the DSX-1. It generates or receives a 1,048,575-bit, quasi-random test word at the 1.544-Mb/s rate in the bipolar format. When necessary, the end-to-end tests should be performed through the inter-LATA or intra-LATA facilities in a metropolitan area.

7. MAINTENANCE ACCESS ARRANGEMENTS

A. DDS Hub Offices

7.01 A hub office that contains ABATS test equipment offers centralized test access at the KS-21899 DTS. The transmission and multiplexer terminals provide access for portable test equipment as shown in Fig. 3.

7.02 The KS-21899 DTS is primarily used as a testing device and can access the DS-1 (1.544 Mb/s) signal or the DS-0A (64 kb/s) signal. The KS-21899 DTS may operate under manual control or by an external controller (user-supplied). The DSAU (DS-1 signal access unit) provides signal access at the DS-1 level and the DS-0 interface provides signal access at the DS-0 level. The DS-0A signals are tested by examining data at various points on a customer channel for errors or control codes. Or, they can also be tested by inserting test signals on a customer channel and retrieving those signals for comparison. The DSAU is plugged into a shelf assembly between the second stage multiplexer (T1DM, T1WB4, or T1WB5) and the DSX-1 (DS-1 cross-connect).

7.03 The multipoint circuits have multiple test access and may be accessed at the main or branch ports of the multipoint circuit equipment.

7.04 Other test access at the hub office is available at bridging bipolar access points on transmission and terminal equipment. The T1DM, T1WB4, T1WB5, MJU, and SRDM have input and output test points on each of their 64-kb/s ports. There is also test access at the office side of the OCU. When the 64-kb/s stream contains more than one customer, the digital receiver can isolate the desired single-customer signal. A special jack-equipped extender board provides access at the OCU so the local loop can perform analog-type tests, and the DSX-1 provides monitor and split test access to DS-1 channels used in the DDS. In unusual cases of trouble, the dataport channel units use splitting jack access or a loop-back when a manual loop-back test plug is inserted. The normal OCU loop-back test pattern from the data test sets causes a loop-back of the OCU.

7.05 The HL96 multiplexes subrate dataport channels via an ISMX in the DDS hybrid, multiplexer end offices, and collection hubs. The ISMX provides jack access.

7.06 The SLC® 96 Carrier System provides up to 96 subscriber channels between a COT (central office terminal) and an RT (remote terminal), using T1 digital lines or other digital transmission facilities. The SLC 96 System can expand the service capability of the existing cable plant to loop 31 dB from the RT, thus potentially reaching any customer. Test access to and from the SLC 96 System is available to the DDS; i.e., from the COT toward the D4 channel bank and from the DTE (digital terminating equipment) toward the customer. The outside plant personnel are responsible for testing and maintaining the T1 Carrier lines or digital transmission facilities between the COT and RT of the SLC 96 System. Practices AT&T 363-202-400 and AT&T 363-202-401 give the test procedures for maintaining the SLC 96 System.

7.07 Although the collection hub has no testing responsibility, the test access points in the collection hub are the same as those in a DDS hub office with the exception of no remote test access (ABATS).

B. DDS Local Offices

7.08 The local offices use portable test equipment for all digital testing. Like the hub office, monitor test points at the DS-0 signal level are available at the multiplexers and channel units. Also, every signal path at the M-JCPs (multiplexer jack and connector panels) and SM-JCPs (subrate data multiplexer jack and connector panels) has splitting (transmit and receive) and bridging (monitor only) jacks at the 64-kb/s level. The ISMX connects at the logic level with the OCU and provides splitting and bridging jack access to each customer circuit at the logic level.

7.09 The local offices use the M-JCP and the SM-JCP with the T1DMs and T1WB4s. All of the large local offices use the digital system cross-connect (DSX-0), and the T1WB5 offices use QTPs (quad terminal panels). The QTP is one DSX-0 panel and routes the 64 kb/s DS-0 level signals to the ports of a T1WB5. The QTP allows T1WB5 port assignment but does not provide monitoring or test access.

8. MAINTENANCE TESTING

A. Service Verification

8.01 After repair work is completed, the SSC-D/CTC verifies that the service works properly by performing remote loop-back tests. The installation personnel install and test central office equipment for initial DDS service. Practice AT&T 314-901-200 gives the appropriate steps to provide the customer with the DDS.

B. Routine Tests

8.02 The normal routine test procedures associated with analog transmission systems are not recommended for the DDS. To ensure that service objectives are met, a more rapid means of fault detection and location is necessary.

C. Trouble Isolation

8.03 The first step in trouble isolation is a careful analysis of trouble report information. The trouble reports may originate from the customer, from system alarms, or from operating company communications.

8.04 Figure 4 gives an example of how the trouble is isolated according to DDS philosophy. Practice AT&T 314-901-300 gives more detailed procedures for locating the trouble condition.

D. End-to-End Testing

8.05 The normal testing procedures show most trouble conditions. If the customer is not satisfied, help should be obtained through normal lines of organization including the NTS (network technical support) or engineering personnel.

E. Equipment and Line Maintenance References

8.06 The following AT&T documents provide detailed maintenance and trouble-locating information for the various parts of the DDS.

PRACTICE	TITLE
107-402-100	921A Data Test Set — Description and Operation
107-600-100	KS-20909 Data Test Set (Transmitter) — Description and Operation — Digital Data System
107-601-100	KS-20908 Data Test Set (Receiver) — Description and Operation — Digital Data System
107-605-100	KS-21899 Data Test Set — Description
107-605-200	KS-21899 Data Test Set — Installation
107-605-300	KS-21899 Data Test Set — Operation
107-605-500	KS-21899 Data Test Set — Maintenance
314-410-310	4-Wire Local Loop — Maintenance Procedures

PRACTICE	TITLE
314-901-300	Digital Data System — Two-Point and Multipoint Private Line Circuit Maintenance Procedures
314-903-300	Digital Data System — DS-1 Facility Maintenance Activities
314-910-100	Office Channel Units and Auxiliary Circuits — Description — Digital Data System
314-910-300	Digital Data System — Office Channel Unit and Auxiliary Circuits — Maintenance Procedures
314-911-300	Digital Data System — Subrate Data Multiplexer — Maintenance and Trouble Location Procedures
314-912-300	Digital Data System — T1 Data Multiplexer — Maintenance and Troubleshooting
314-913-300	Digital Data System — Master Timing Supply Maintenance and Troubleshooting
314-913-310	Digital Data System — Nodal Timing Supply — Maintenance and Troubleshooting
314-913-315	Digital Data System — Secondary Timing Supply — Maintenance and Troubleshooting
314-913-320	Digital Data System — Local Timing Supply — Maintenance and Troubleshooting
314-914-300	Digital Data System — DSX-0 Cross-Connect — Maintenance
314-915-300	Digital Data System — T1WB4 Data/Voice Multiplexer — Initial Installation and Tests
314-915-310	Digital Data System — T1WB5 Data/Voice Multiplexer — Initial Installation and Tests
314-916-300	Digital Data System — Bay Clock, Power, and Alarms Circuit — Maintenance and Troubleshooting
314-917-300	Digital Data System — Multipoint Junction Units and Auxiliary Circuits — Maintenance and Troubleshooting Procedures
314-960-300	Digital Data System — DS-1 Signal Access Unit and Auxiliary Circuits — Maintenance and Trouble-Locating Procedures
314-983-300	Digital Data System — T1 Data Multiplexer Performance Monitor — Maintenance and Troubleshooting
314-983-310	Digital Data System — Subrate Data Multiplexer Performance Monitor — Maintenance and Troubleshooting
356-454-500	Digital Transmission Terminals for Analog Facilities — 1A Radio Digital System (1A-RDS) — General Test Information
363-202-400	SLC® 96 Subscriber Loop Carrier System — Central Office Terminal
363-202-401	SLC® 96 Subscriber Loop Carrier System — Remote Terminal — Pair Gain Systems
365-150-107	Dataport Operation — Description, Application, and Troubleshooting — D3B
365-200-504	Digital Transmission Systems — T1 Automatic Standby Unit — Trouble Location and Maintenance
595-100-300	Digital Data System — 550-A Type Channel Service Unit — Maintenance

PRACTICE	TITLE
595-200-300	Digital Data System — 500-A Type Data Service Unit — Maintenance.

8.07 The detailed maintenance and trouble-locating information on the microwave radio equipment used in DDS transmission is given in the appropriate practices in the 410 (TD2) and 411 (TD3) divisions.

9. SERVICE RESTORATION

9.01 The primary defense against service outage in the DDS is the automatic protection systems. These systems may fail to provide adequate protection if the protection channel is not available, the channel itself fails, the performance monitor malfunctions, or the performance of the facility gradually deteriorates. When system alarms or customer reports indicate any of these conditions, the second line of defense is to restore the service by patching or switching in alternate facilities.

9.02 The DDS circuits on TD or TH radio routes are restored using current administrative procedures set up by the FMACs. The DDS circuits involving T1 Carrier are restored using current methods. The FMAC is responsible for coordinating the activities to restore the service in order to meet the DDS service objectives.

10. ▶GLOSSARY OF TERMS◀

10.01 Listed below are the abbreviations (terms) that have been used in this practice:

TERM	DEFINITION
ABATS	Automated Bit Access Test System
BATS	Bit Access Test System
COT	Central Office Terminal
CSU	Channel Service Unit
CTC	Centralized Test Center
DACS	Digital Access and Cross-Connect System
DDS	Digital Data System
DFCG	Digital Facility Control Group
DSA	Digital Serving Area
DSAU	DS-1 Signal Access Unit
DSU	Data Service Unit
DTE	Digital Terminating Equipment
DTS	Data Test Set
EFS	Error-Free Seconds
ESF	Extended Superframe
FMAC	Facility Maintenance and Administration Center
FTAG	Facility Technical Assistance Group
FWG	Facility Work Group
ISMX	Integral Subrate Multiplexer
LATA	Local Access and Transport Area
LATS	Line Access Test System
LEC	Local Exchange Company
MCOS	Multiplexer Channel Out of Sync
M-JCP	Multiplexer Jack and Connector Panel
MJU	Multipoint Junction Unit
MSU	Multipoint Signaling Unit
NTS	Network Technical Support
OCU	Office Channel Unit
QTP	Quad Terminal Panel
RT	Remote Terminal

TERM	DEFINITION
SM-JCP	Subrate Data Multiplexer Jack and Connector Panel
SNWG	Service Node Work Group
SPM	Subrate Data Multiplexer Performance Monitor
SRDC	Subrate Data Cross-Connect System
SRDM	Subrate Data Multiplexer
SSC-D	Special Service Center - Digital
T1DM-PM	T1 Data Multiplexer - Performance Monitor
T1WB4	T1 Data/Voice Multiplexer
T1WB5	T1 Data/Voice Multiplexer
TCAS	T-Carrier Administration System
TTWG	Toll Terminal Work Group
UMC	Unassigned Multiplexer Channel

11. ISSUING ORGANIZATION

Published by
the AT&T Documentation Management Organization.

TABLE A

COMPARISON OF DDS EQUIPMENT MAINTENANCE FEATURES

FEATURE	T1DM	T1WB4 OR T1WB5	MJU
PROTECTION	(a) T1DM-PM self-checking (b) All T1DM circuits (includes per channel circuitry) (c) Manual return	(a) Integrated monitoring (b) Common circuits (ports not protected) (c) Automatic return	None
NETWORK SIGNALING	(a) Out of sync (b) Unassigned channel	(a) Out of sync (b) Unassigned channel (c) Coded bytes in voice slots to D-type bank*	Identifies hub office and branch in response to MSU command†
ALARMS	(a) T1DM-PM controlled (b) Single failure: Minor (c) Multiple failure: Major	(a) Single failure: Minor (b) Multiple failure: Major	Timing and power
LAMP INDICATIONS	(a) T1DM-PM controlled (b) Alphanumeric indication of common circuits, ports, or transmission failures	(a) No input from voice bank (b) T1WB4 or T1WB5 failure (c) Spare T1WB4 or T1WB5 failure (d) Transmission failure (e) Timing supply failure (f) Power failure	Timing and power failures
TEST ACCESS	Monitor only:‡ DS-1, DS-0	Monitor only:‡ DS-1, DS-0	Monitor Only‡
PROTECTION SWITCHING CRITERIA	(a) More than one out of three bytes in error (b) Loss of synchronization (c) Outgoing framing (d) Loss of local timing	(a) Loss of synchronization (b) Local timing (c) Outgoing framing	None

See footnotes at end of table.

TABLE A (Contd)

COMPARISON OF DDS EQUIPMENT MAINTENANCE FEATURES

FEATURE	SRDM	ISMX	DSU
PROTECTION	(a) SPM partial self-checking (b) All SRDM circuits (includes per channel circuitry) (c) Manual return	(a) 5-channel: None (b) 10-channel: Redundancy	None
NETWORK SIGNALING	None	None	(a) Idle (b) Zero suppression§
ALARMS	(a) SPM controlled (b) Single failure: Minor (c) Multiple failure: Major	(a) 5-channel: None (b) 10-channel: Alarmed	None
LAMP INDICATIONS	(a) SPM controlled (b) Alphanumeric indication of common circuits, ports, or transmission failures	Loss of framing	(a) Power (b) Remote Test A (c) Local and Remote Test B (d) Loss of signal
TEST ACCESS	Monitor only:‡ Single and multiple ports	(a) Test (insertion) ISMX-OCU interface (logic level signal) (b) Monitor only:‡ Single port of ISMX	None
PROTECTION SWITCHING CRITERIA	(a) Seven consecutive bytes in error (b) Loss of synchronization (c) Outgoing framing	None	None

See footnotes at end of table.

TABLE A (Contd)

COMPARISON OF DDS EQUIPMENT MAINTENANCE FEATURES

FEATURE	OCU OR DP	CSU	DSAU
PROTECTION	None	None	Switches to bypass mode
NETWORK SIGNALING	(a) OCU or DP to station: Reverses simplex current for channel loop-back test and generates bipolar format violations for zero suppression, idle, out-of-service, and DSU loop-back ¶ (b) OCU or DP to multiplexer: Idle	None	Extracts timing for proper signal regeneration
ALARMS	None**	None	Signal or power failure: Minor
LAMP INDICATIONS	None**	(a) Power (b) Remote Test B	Bypass mode indicated
TEST ACCESS	OCU:DS-0 (a) Monitor only ‡ (b) Dataport: Split jack access (c) Loop pair access via jack-equipped plug-in board	None	Use KS-21899 Data Test System
PROTECTION SWITCHING CRITERIA	None	None	None

* If an improper signal is received from the associated D bank; a code is inserted in the voice slots to provide alarm information to the far-end D bank.

† The MJU message sent to the MSU consists of both control and data bytes.

‡ Splitting access is available at CTCs and JCPs.

¶ Simplex current reversal causes channel loop-back. Zero suppression, idle, and out-of-service codes (represented by bipolar violation sequences on a loop) are decoded by the DSU.

§ Long zero sequences and idle conditions cause the DSU to send bipolar violation codes on the loop which are translated by the OCU or DP.

** T-Carrier system alarms and lamps for Dataport, on 24- or 48-channel basis.

➡TABLE B⬅

DACS ISSUE 8 AMM180 DIGROUP CIRCUIT
PROGRAMMABLE FACILITY ALARMS AND PERFORMANCE INDICATORS

ALARM THRESHOLD VALUES				FRAMING FORMAT	RANGE	DEFAULT VALUE	ALARM TYPE
(NOTE 1)	(NOTE 2)	(NOTE 3)		(NOTE 4)		(NOTE 5)	(NOTE 6)
01	SLIP			All	000 to 255	≥256	Major
02				—	000 to 255	≥4	Minor
03			BER	All	10^{-6}* to 10^{-3}	10^{-3}	Major
04				—	10^{-6}* to 10^{-3}	10^{-6}	Minor
05 —			ES	ESF 24th	00000 to 65535 —	≥864† —	Message only
06			SES	ESF 24th	000 to 255 —	≥255 —	Message only
07	COFA			All	000 to 511	≥511	Major
08				—	000 to 255	≥17	Minor
			red CFA	All	—	—	Major
			yellow CFA	All	—	—	Major
			AIS	All	—	—	Message only
			FrEr	24th‡	—	None	None — on demand only
			CRC-6	ESF	—	None	None — on demand only
	OOF			All	—	None	None — on demand only
		BPV		All	—	None	None — on demand only

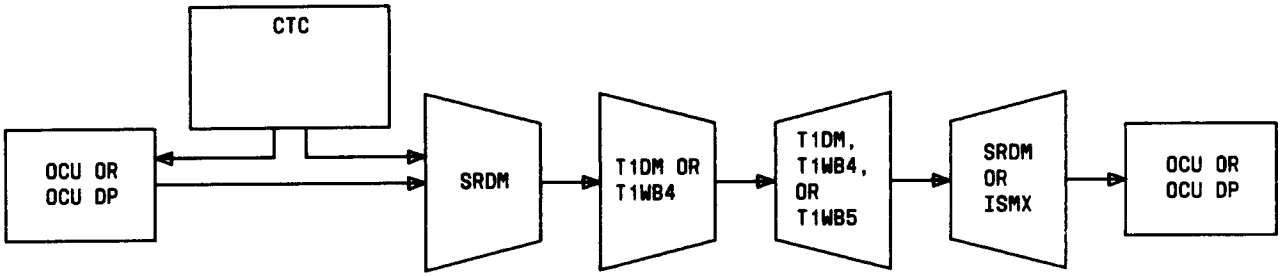
Notes:

1. These options (01 through 08) can be set in the AMM180 digroup card.
2. One or more events in 10 seconds count as one event.
3. One or more BPVs in 3 ms count as one BPV event.
4. Framing format options: ESF, 24th channel (T1DM), and D type.
5. Values apply to all formats; other threshold values may be selected or programmed as needed.
6. An alarm will always include a message that identifies the digroup and alarmed parameer.

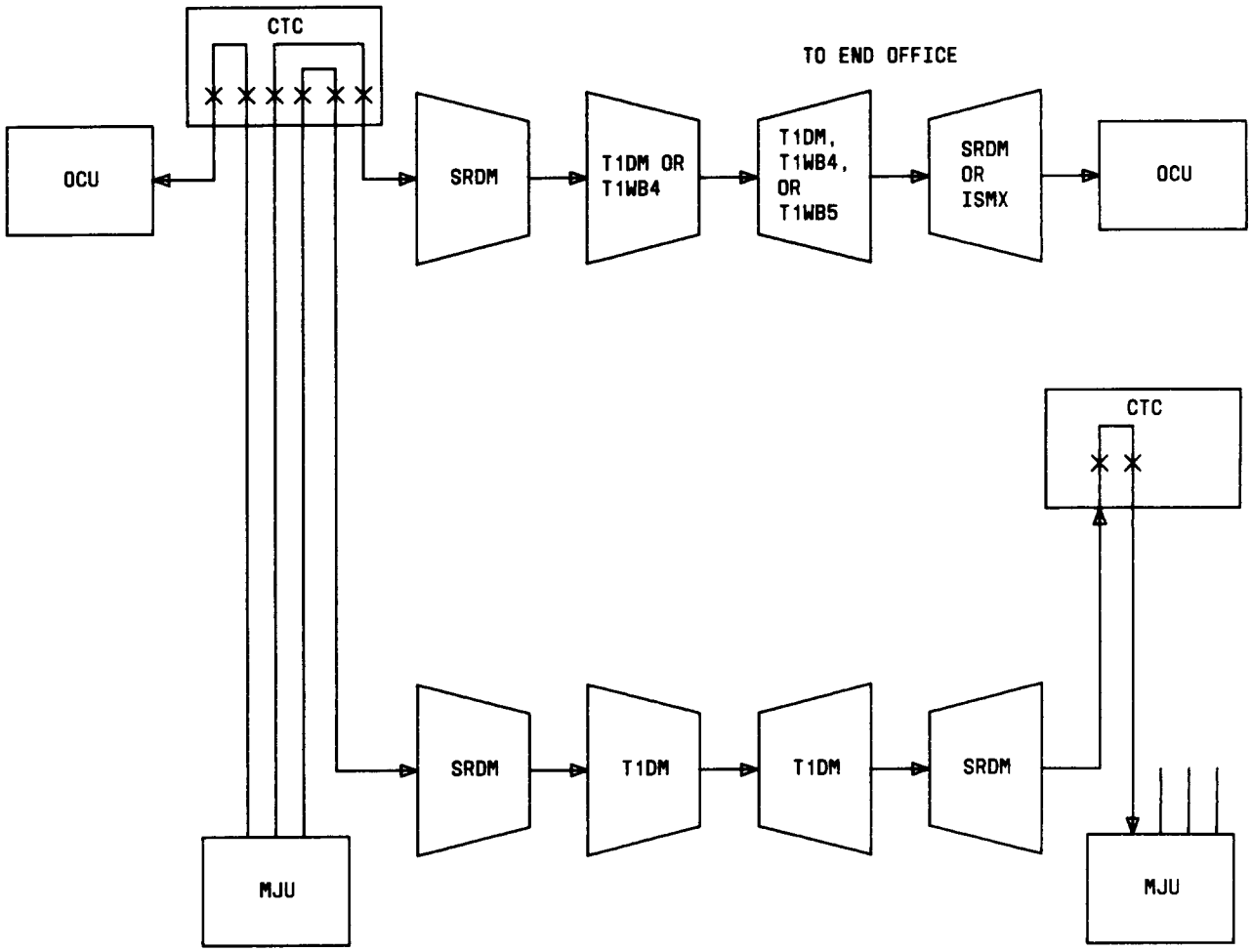
* 10^{-7} on T1DM and ESF framing.

† DDS requires that the ES alarm threshold be set to .065 ES per digroup mile (e.g., 3000 route miles x .065 = 195 ES threshold).

‡ Also available for the other framing formats.

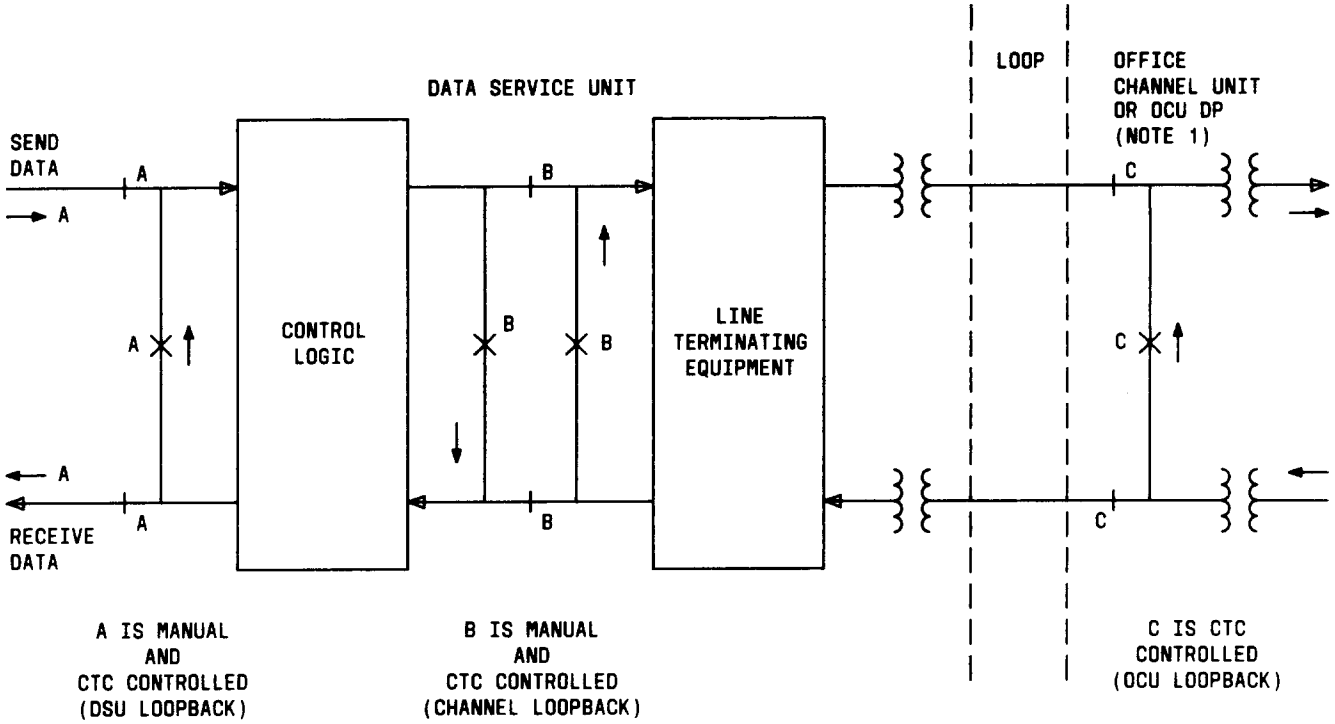


A. 2-POINT ARRANGEMENT



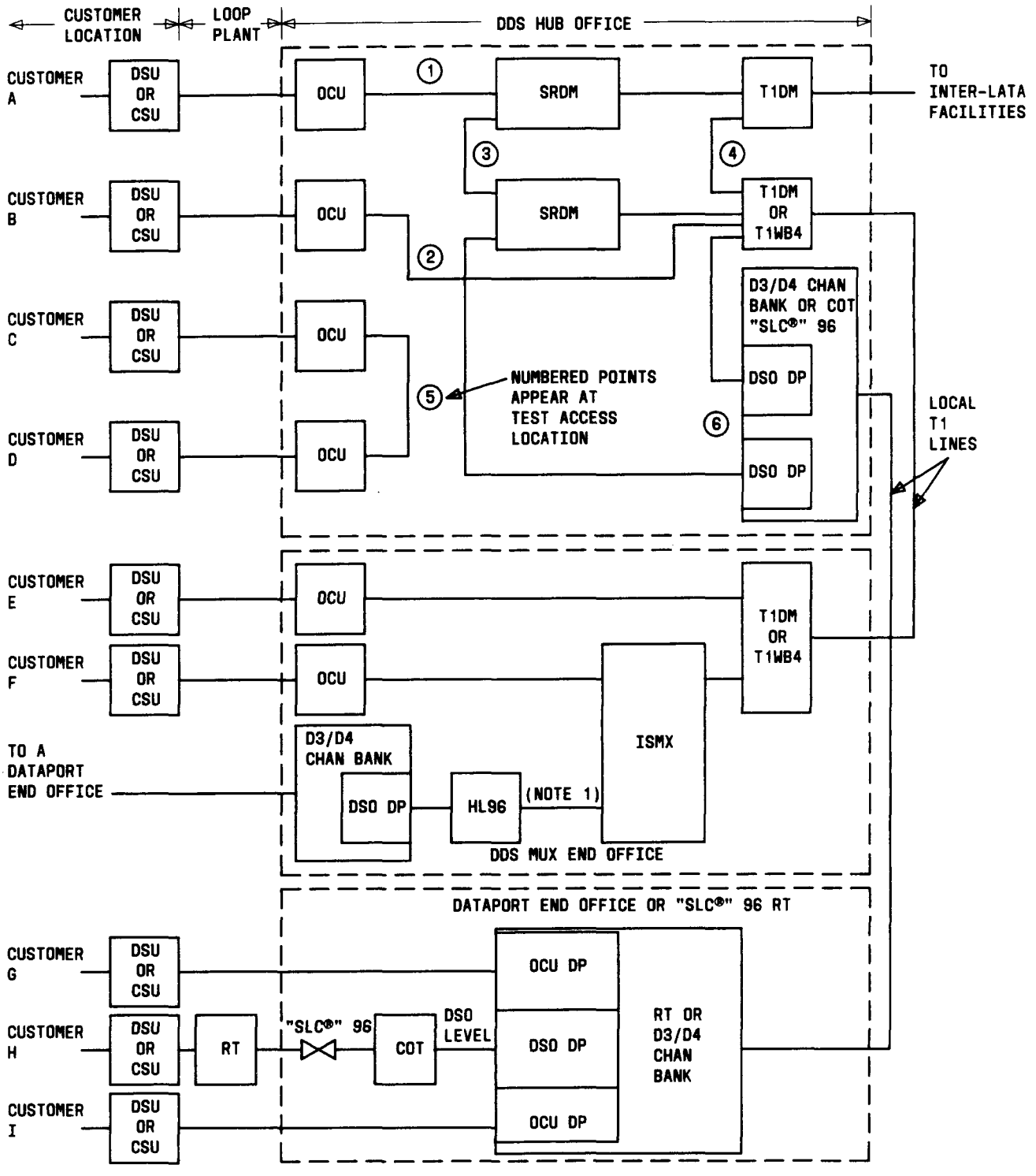
B. MULTIPOINT ARRANGEMENT

Fig. 1—2-Point and Multipoint Private Line Circuit Arrangements



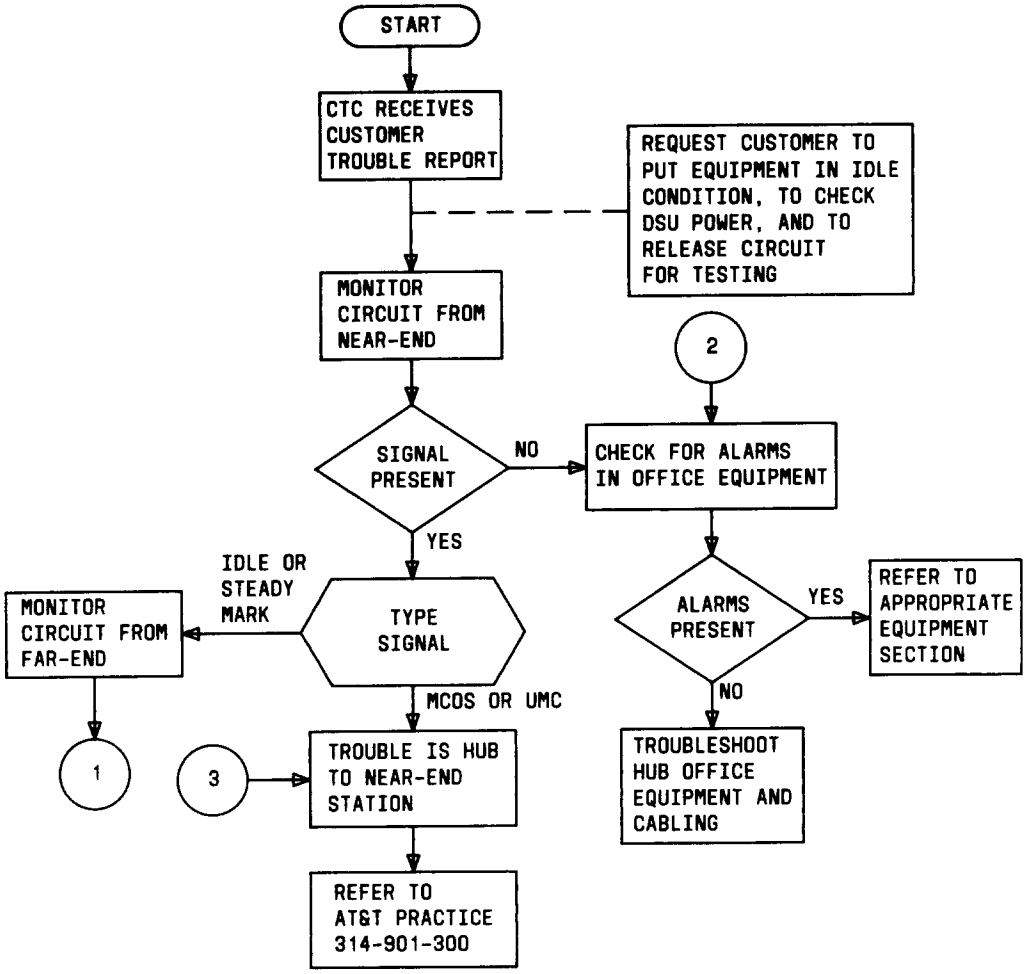
NOTE:
1. LOOPBACK PORTION ONLY IS SHOWN.

Fig. 2— Loop-back Tests



NOTE:
1. TEST ACCESS IS AVAILABLE BETWEEN THE HL96 AND ISMX USING A PORTABLE TEST SET.

Fig. 3— Test Access Points



LEGEND:

MCOS = MULTIPLEXER CHANNEL OUT OF SYNC (CONTROL CODE 00011010)
UMC = UNASSIGNED MULTIPLEXER CHANNEL (CONTROL CODE 00011000)
IDLE = IDLE CODE (CONTROL CODE X1111110)*
ALL "1s" (STEADY MARK) = (CONTROL CODE X1111111)*
* X = 0 FOR SUBRATE (2.4, 4.8, AND 9.6-KB/S) SERVICE,
1 FOR 56-KB/S SERVICE

Fig. 4— DDS General Trouble-Locating Procedure (Sheet 1 of 3)

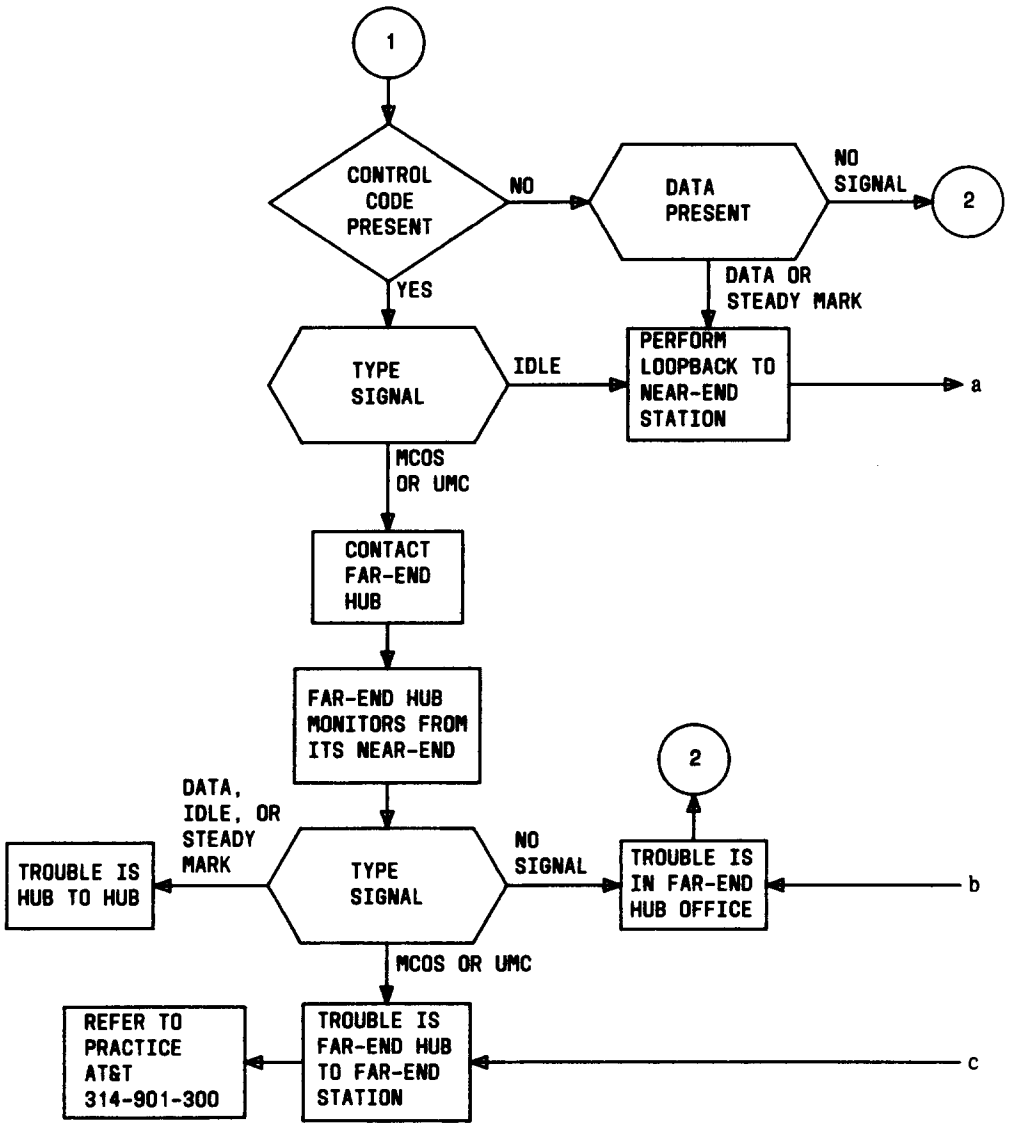


Fig. 4— DDS General Trouble-Locating Procedure (Sheet 2 of 3)

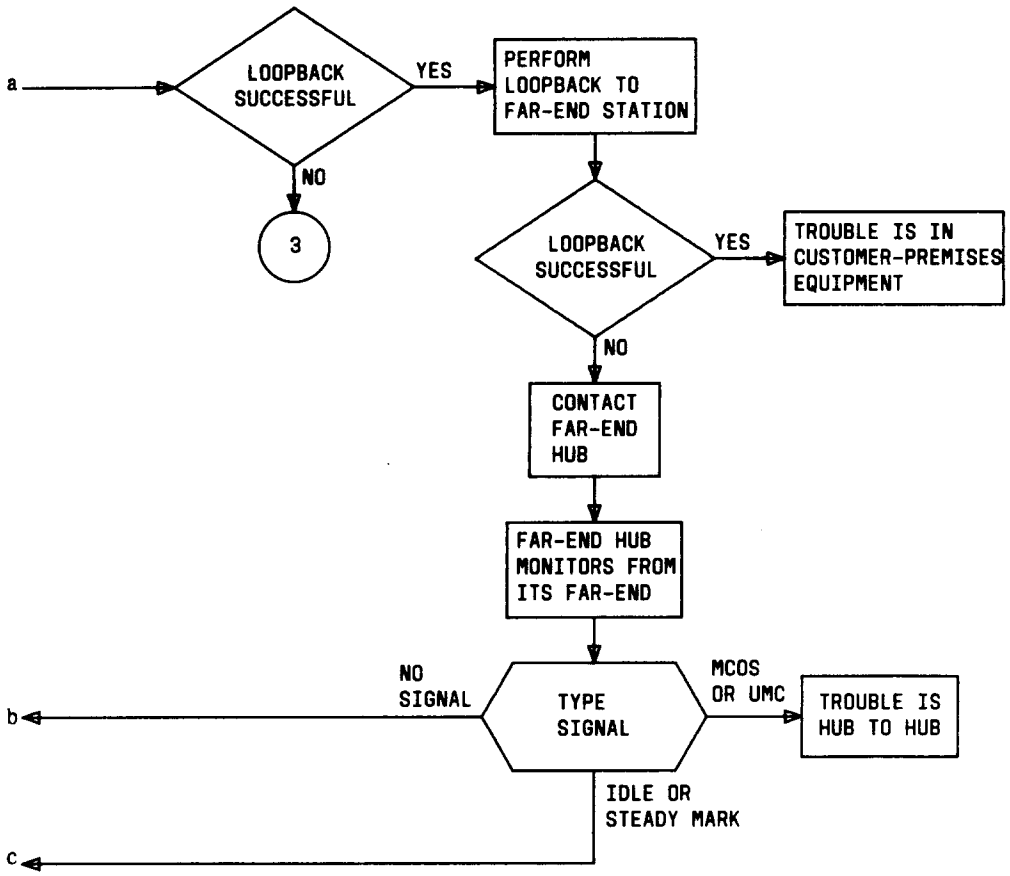


Fig. 4— DDS General Trouble-Locating Procedure (Sheet 3 of 3)