AUTOMATED BIT ACCESS TEST SYSTEM
REMOTE TEST PROCEDURES
DIGITAL DATA SYSTEM

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1. GENERAL

1.01 This practice provides the remote test procedures to be used by a technician located at an SSC/CTC (Special Service Center/Centralized Test Center). By following these procedures and using the ABATS (Automated Bit Access Test System), the technician can sectionalize the trouble on a DDS (Digital Data System) 2-point or multipoint circuit when a customer reports trouble.

1.02 This practice is reissued for the following reasons:

(a) To add LOOPBACK and SECONDTEST commands to Table A

(b) To add LOOPTYPE, LOOPNUMBER, and TESTWORD parameters to Table B

(c) To add LBK and SCT commands to Table C

(d) To make minor changes to Fig. 4, 9, 10, 11, and 12

(e) To delete old Fig. 21.

Revision arrows are used to emphasize the more significant changes.

1.03 The technician must have an operational knowledge of the DDS network and a functional understanding of the various pieces of equipment used in the DDS. The technician must be able to analyze the test results obtained through the ABATS. Therefore, it is recommended that the technician have a thorough understanding of the following documents:

- Practice AT&T 314-900-100 — Overall Description of DDS
- Practice AT&T 314-901-300 — Maintenance Procedures for DDS
- Practice AT&T 314-901-520 — Description and Operation of ABATS
- Practice AT&T 314-901-530 — Manual Turn-Up and Test Procedures for 2-Point and Multipoint Private Line Circuits, DDS.

TESTING OBJECTIVES

1.04 Most troubleshooting and maintenance tests can be performed from an ABATS test terminal by entering the appropriate *TEST* command. For initial ABATS trouble sectionalization, the automatic test (e.g., *TEST* command) is recommended. However, to completely sectionalize trouble, some locally performed testing may be required. See the manual test procedures in Practice AT&T 314-901-530.

1.05 Test terminals at an SSC/CTC consist of a DATASPEED® 40/2 KD (keyboard display) terminal set, or equivalent. Test terminals can be equipped with a printer; in which case, simply depress the PRINT ON LINE key to obtain a printed copy of the test results.

1.06 Some test terminals are capable of interfacing and updating the database minicomputer (called the ABATS front-end system) by using a locally provided switch. The updating procedures are documented in Practice AT&T 314-901-532. The switch must be set to the desired mode, either maintenance testing or database updating.

DDS SERVICE AND PERFORMANCE OBJECTIVES

1.07 The service objectives and performance objectives are described in paragraphs 1.08 and 1.09, respectively. **The SSC/CTC technician must be fully aware of these objectives to efficiently sectionalize a trouble.**

1.08 The overall **DDS service objective** is to provide circuit availability 99.90 percent of the time for channels terminated in DSUs (data service units) or CSUs (channel service units). In order to meet this objective, the following maintenance goals have been established:

(a) After receiving the trouble report from the customer, sectionalize the trouble to one of the following areas within 15 minutes for 2-point

circuits or, 10 minutes plus 5 minutes for each station in multipoint circuits:

- DSU
- 4-wire local cable pairs including 56-kb/s repeaters and the CSU
- Private line portion of an off-net (analog) extension
- Facilities between hubs of the same or different DSAs (digital serving areas)

(b) Do not exceed the following outage intervals for the various DDS transmission facilities:

- 20 minutes for long-haul facilities; e.g., DUV (data under voice), DOM (data over message), DOV (data over voice), or other technologies used to provide facilities between DSAs
- 120 minutes for EA (exchange access) including CSU/DSU.

1.09 The **DDS performance objective** is to average at least 99.5 percent EFSs (error-free seconds) at 56 kb/s and even better performance at the lower bit rates of 9.6, 4.8, and 2.4 kb/s.

1.10 Procedures contained in this practice are to be used as an aid in achieving the objectives listed above and in minimizing the number of outage intervals that exceed 2 hours.

2. ABATS TEST TERMINAL COMMANDS AND DISPLAYS

2.01 This part describes the commands and displays available at the ABATS test terminal. A terminal can test more than one circuit at a time.

2.02 ▶The technician uses commands to initiate an action or a test request. See Table A for the commands and their meanings. Most commands have parameters associated with them. Parameter support and commands are explained in paragraphs 2.04 through 2.40.◀

2.03 Each command has one or more alternate forms as indicated in Table A. Additionally, the alternate command form may be abbreviated just enough to keep it unique (different from other commands).

A. Parameters

2.04 Most of the commands require or allow certain parameters to be entered along with the command. Parameters are used primarily with directed tests; e.g., loopback, straightaway, etc. Table B lists the parameters and their alternate keywords along with each parameter meaning.

2.05 Table C lists the commands and the required or optional parameters in the most common form. This table is intended as a job aid for the experienced ABATS test terminal technician.

B. Rules of Entry

2.06 All entries may be in uppercase or lowercase characters. All displays from the TC (test controller) are in uppercase characters. The entry line is limited to 80 characters or less.

2.07 Each entry line consists of one or more fields. The first field must be the command with subsequent fields containing parameters as needed. Field separators are required and may be any one of the following:

- Comma (,)
- Semicolon (;)
- Colon (:)
- Tab (tab).

2.08 Commands and their associated parameters are entered by one of two methods. The first method uses the command, the required parameter(s), and the desired optional parameter(s), which are typed on one line as follows:

TEST,CIRCUIT=DSDT12345,SEG=3,DIR=A.

The parameters are entered as "keyword=value".

2.09 In the second method, the keywords for the circuit and segment parameters could have been omitted. This is because the command line scanner assumes that the next two fields after the command are the circuit and segment parameters. This method is shorter because the keywords have been assumed. Using this method, the entry line is as follows:

TEST,DSDT12345,3,DIR=A.

2.10 Parameters are entered by using a keyword, an equal sign, and the value for the parameter. Three variations of entry are as follows:

(a) The circuit number may be entered in the second field immediately after the test command without the keyword.

(b) The segment number may be entered in the third field without the keyword.

(c) The pair parameter does not require a keyword for entry. In this case, the value of the pairs is entered and the system recognizes it in any order.

2.11 Parameters may be entered in any order, subject to the variations in paragraph 2.10. The command is always entered first. If a command is entered without specifying any parameters, the system prompts for all allowed parameters.

2.12 After the entire entry line is ready, the technician depresses the RETURN key and the minicomputer processes the command. Depressing the RETURN key indicates the entry is complete.

C. Parameter Exceptions to the Rules of Entry

2.13 Parameters are classified as either required or optional. For example, the circuit parameter is required for all commands which request a test except when using the *LATCH* command (electronically connected). The *TESTLENGTH (DURATION)* parameter is always optional. If the *DURATION* parameter is not specified, the system will default (automatically set test time) to a 15-second test or default to a 1-minute test when using the *TWOPOINT* command. See Table D for the parameter default values.

2.14 The *SEGMENT* parameter is required only when the circuit under test is a multipoint circuit. The *SEGMENT* parameter is not allowed on a 2-point circuit.

2.15 Sometimes, the *SEGMENT* parameter may be replaced by the *STATION* parameter. The *STATION* parameter must be in the ABATS database. If it is not found in the database, the system prompts for the *SEGMENT* parameter. In the prompting mode, the system first prompts for the station. The technician depresses the RETURN key, then the system prompts for segment, and a valid number must be entered.

2.16 Some parameters which are usually optional become required under certain conditions. For example, the *MJU* parameter is required when the segment under test traverses one or more MJUs. In this case, the *MJU* parameter must be used with the *SEGMENT* parameter to identify the section of the segment to be tested.

2.17 When an ABATS test terminal is latched to a circuit, it is possible that the command entry, i.e., *TEST*, is sufficient to perform the next desired action.

2.18 To prevent the system from prompting for all the parameters for a command, the technician may enter *GO* to stop the prompting. If the system is in the prompting mode and the technician does not enter *GO*, the system will prompt for all required and optional parameters. If the technician enters *GO* after the prompt for an optional parameter, the system stops prompting and starts testing.

D. Access Point Selection

2.19 An *AP (ACCESSPOINT)* parameter is selected (1) by the technician, (2) automatically by the ABATS, and (3) by test sequencing using the *TEST*

command. If the *AP* parameter is selected by the technician and the associated SC (sequence controller) is not busy, the *TEST* command is started. If the associated SC is busy with other test commands, the test is queued and the technician is notified. The SC may also be referred to as a microprocessor or micro.

2.20 If the *AP* parameter is selected automatically, certain rules are followed, depending on the type of circuit (2-point or multipoint).

Multipoint Circuit (Fig. 1)

2.21 The following selection rules apply to a digital type test on a multipoint circuit:

(a) The first choice for an access point is the one closest to the MJU from which the station segment originates.

(b) If the SC for the first choice access point is unavailable for testing, the SC in the next office toward the station from the MJU is selected. This process continues until an available SC is located.

2-Point Circuit

2.22 The following rules apply to a digital type test on a 2-point circuit:

(a) The first choice for a digital access point is the first one listed in the database. It is the closest point to the A or Z terminal of the circuit, depending on the database entry.

(b) If the SC for the first choice access point is unavailable for testing, the SC in the next office toward the station from the MJU is selected. This process continues until an available SC is located.

LATS (Line Access Test System) Access Point

2.23 On a multipoint circuit, there may or may not be a loop access point on the segment. The automatic access point selection in this case consists of locating the loop access point in the database, determining if the SC is available, and queuing or terminating the test depending on the status of the *QUEUE* parameter.

2.24 On a 2-point circuit, the local loop access point is not automatically selected because the access point is a required parameter for the loop-type test, e.g., *VMTEST* command.

Test Sequencing

2.25 Test sequencing is an enhancement to trouble sectionalization. The system attempts to determine at which level errors are occurring in an OCU loopback test. The levels where errors occur are at the DS-1 (digital signal-1), SRDM (subrate data multiplexer), or individual CST (customer).

2.26 If DS-1 errors are detected, the trouble is in the currently accessed T1 digital line (DS-1), and no additional tests are executed. If no errors are detected at the DS-1 level but errors are detected at the SRDM level, the circuit configuration (Fig. 2) will be examined by the TC (test controller) to determine the next action. If the SRDM currently accessed is part of a single T1DM section (span), the errors detected are an indication of a problem in the SRDM and no further tests will be executed. If the SRDM is part of a multiple T1DM section, an OCU loopback test will be initiated in the next T1 section downstream. If no errors are detected at the DS-1 and SRDM levels, but errors are detected at the CST level, an OCU loopback test should be initiated on the next SRDM section downstream. All rules are considered each time an *ACCESSPOINT* parameter is selected.

DISPLAYS

2.27 This subpart describes the three basic types of displays: (1) system information, (2) circuit information, and (3) test results.

A. System Information Display

2.28 The system information displays provide the *NEWS* and *HELP* commands and broadcast messages from the DNAC (Digital Network

Administration Center). The displays are typed in plain text; and, for interpretation of displays, a basic knowledge of the ABATS and DDS is required.

2.29 The *NEWS* command will produce a file of the relevant items for the day. The *NEWS* file is updated at any time by the DNAC personnel and appears in plain text. Figure 3 shows a *NEWS* example of a new feature for the ABATS. Other *NEWS* information may include a listing of hub offices equipped for ABATS or may include a statement that a particular SC is out of service and should not be accessed.

2.30 The *HELP* command produces a file designed to assist the technician in using the ABATS test terminal. The *HELP* file is separated into different categories. The first category contains general information to assist the technician (Fig. 4). The second category pertains to commands and their alternate forms (Fig. 5). The third category pertains to parameters (Fig. 6). Figure 7 is a display of the system information display for system prompting parameters.

2.31 A DNAC broadcast message (Fig. 8) is transmitted to all ABATS test terminals. The message must use less than 80 characters. The message is provided on a real-time basis and may or may not require action by the technician. The message usually pertains to system availability, troubles, or to problems which affect the technician.

B. Circuit Information Display

2.32 Circuit information displays are separated into 2-point or multipoint circuits. A display contains a common header and the database routing information.

2.33 The common header contains the individual circuit number, customer name, control office, customer identification number, and rate of customer service. It also contains a comment field which can be used by the control SSC/CTC to explain any special features about the circuit. A common header will accompany all database information displays.

2.34 The database information for a 2-point circuit contains the full circuit routing from customer location A to customer location Z and indicates the circuit test access points (Fig. 9). The database information for multipoint circuits is separated into three displays: (1) address, (2) high level, and (3) detailed segment routing.

2.35 The **address display** is available for 2-point and multipoint circuits (Fig. 10). The database information contains each station address listed in order by station number. This display aids the technician in quickly identifying which station or segment is being reported.

2.36 The **high level display** provides a list of MJU branch assignments. This list identifies which segment is connected to which branch of which MJU (Fig. 11). This display aids the technician when testing through MJUs to identify a segment that is common to a group of customers in trouble.

2.37 The **detailed segment routing display** lists the offices equipped with MJUs, local access assignment numbers, and test access points (Fig. 12). For interconnections of MJUs, the routing starts at a branch number of an upstream MJU and ends at branch zero (0) of the downstream MJU. The segment containing the customer master station ends at branch zero of the first MJU. For example, segment 01 of Fig. 1 starts at the master station 01 and ends at branch zero of MJU1/01.

2.38 The address display is produced by entering the *ADDRESS* command for 2-point or multipoint circuits. The *DISPLAY* command produces the high level display for a multipoint circuit or the full routing of a 2-point circuit. The *SEGMENT* parameter, along with the *DISPLAY* command, produces the routing of an individual segment on a multipoint circuit.

C. Test Results Displays

2.39 These displays are produced after entering a command. The test results are reported every 15 seconds (one minute for *TWOPOINT* command) during a digital test unless a longer time was

specified with the *INTERVAL* parameter. Each display contains the following information:

- Circuit number
- Test location or name of office
- Time of report specified in 24-hour time
- Monitor report — provided only once, at the beginning of a digital test except when the *MONITOR* command is used
- Name of test and direction
- Test results of a voltmeter test or a digital test.

2.40 The following figures show display examples of test results:

(a) Figure 13 shows the monitor results (four reports), which indicate data from direction A and IDLE code from direction Z.

(b) Figure 14 shows a diagnostic test result using the *TEST* command. Notice that the DSU, channel, and OCU loopbacks were attempted in the Z direction with only the OCU test looping back. No errors were counted in the Z direction for the DS-1 sync pulse, SRDM sync pulse, or CST signal level. For the A direction, the DSU and channel loopbacks were successful with no errors. An OCU loopback test was not attempted. The NO TEST SYNC report may be due to an open loop or nonpowered DSU.

(c) Figure 15 shows the test results of an OCU loopback command. The system defaulted to the Z direction because direction was not specified. The *TESTLENGTH* parameter was set for two minutes. Notice the system prompted for an access point, and the technician responded with three. The test results indicate there are errors at the DS-1 and CST levels and the T1DM presently accessed is taking errors.

(d) Figure 16 shows a diagnostic test result using the *VMTEST* command. All results are normal and may be compared to the WORD (work order record detail) document or to local records, such as CLRC (circuit layout record card), etc.

(e) Figure 17 shows resistance test results at access point 1 on a T-R pair. A directed voltmeter test is repeated three times because of a minimum test interval of 15 seconds, and to ensure a steady reading.

(f) Figure 18 shows typical resistance test results at access point 1 for all pair combinations. In this example, the DSU is optioned for a short loop with the fixed line build-out attenuator installed.

(g) Figure 19 shows foreign voltage test results using the *VOLTAGE* command. The *PAIR* parameter was specified for all pair combinations.

3. CUSTOMER TROUBLE REPORTS

3.01 The SSC/CTC is the primary point of contact for the DDS customer and should establish a good working relationship with each customer. The SSC/CTC personnel must strive to understand the different types of customer transmission protocols used over the DDS network and the problems associated with each protocol. Refer to typical protocol variations in paragraph 3.11.

3.02 When a customer trouble report is received, use Fig. 20 as a guide to question the customer to obtain the symptoms of the trouble. Proper questioning may eliminate the need to dispatch in cases such as faulty CPE (customer provided equipment), unplugged DSU or CSU, or no power at the customer outlet.

3.03 If a customer reports the circuit out of service more than twice in the same month, the proper escalation procedures in Practice AT&T 660-230-100 must be followed.

A. General Trouble Circuit Analysis

3.04 Customers report a variety of troubles; therefore, the technician must learn to identify the real problem behind the trouble report. For example, system errors can produce a garbled

message on a screen (or printer) or cause a central processing unit (customer computer) to repeatedly transmit a message in an attempt to receive an acknowledgement from the distant end.

B. 2-Point Circuit Analysis

3.05 Monitoring the circuit provides some clues to the condition of the circuit. Continuous data in both directions of transmission is typical of a 2-point circuit because most DSUs have the continuous request-to-send option installed. If data and idle code are alternately detected while monitoring on a 2-point circuit, check with the customer to determine what DSU options are being used. If the DSU is optioned for switched request-to-send, the circuit is most likely functioning normally. If the DSU is optioned for continuous request-to-send, the circuit is not functioning properly and the trouble may be a local loop, OCU, or DSU, which requires additional testing.

3.06 Other monitored examples of continuous data in both directions are as follows:

(a) Synchronization pulses may be observed between CPUs (central processing units) even if data is not being transferred. This occurs on a trunk line or on a circuit between two CPUs.

(b) Synchronization pulses are observed between two multiplexers which may be telephone company or customer provided. The multiplexer interfaces on the customer side of the DSU and can divide a subrate circuit up to five channels and a 56-kb/s circuit up to 20 channels. Some customer provided multiplexers may get more than the maximum number of channels mentioned above.

C. Multipoint Circuit Analysis

3.07 On multipoint circuits, only one remote (slave) station sends data to the master station at a time. Whenever continuous data is monitored from a remote station, the trouble indicated may be:

(a) Customer equipment "hung up" in constant transmit mode (also called streaming). The data terminal is transmitting a constant carrier signal, and communication with that station does not occur.

(b) Incorrect option installed at DSU. The master station DSU is usually optioned with continuous request-to-send, but may be optioned with switched request-to-send; in which case, the CPU constantly holds request-to-send high. The remote stations are usually optioned with switched request-to-send.

(c) A faulty local loop impairment, such as foreign voltage, grounded loop, etc.

(d) A faulty link that is using dataport channel units.

3.08 Some possible solutions for the troubles listed in paragraph 3.07 are as follows:

(a) Disconnect customer equipment

(b) Install correct options

(c) Locate and correct impairment

(d) Locate and terminate the faulty dataport link from the remaining circuit.

3.09 When a customer reports an inability to communicate with a station, the trouble may be a streaming remote station. On the master station segment of the multipoint circuit, monitor for continuous data from the remote stations. If continuous data is observed (from Z direction), monitor each branch of the MJUs in sequence until the trouble segment and station are identified. An interim solution to restoring service is to temporarily terminate the troubled segment at the DSX-0A (digital signal cross-connect) panel by removing the quad plug for the troubled segment and station.

3.10 When more than one remote station is out of service, a possible trouble might be a defective MJU or a defective link between MJUs. Question the customer and determine if all affected remote stations have reported trouble. The customer may report only one remote station out of service because only that station has notified the master station. Other remote stations may also be out of service. Confirm that only one remote station

is out of service by requesting the customer to test all remote stations.

D. Typical Protocol Variations

3.11 Some 2-point and multipoint circuits indicate alternate data and idle code when monitored. This condition may be a CPU-to-terminal type circuit in which one of the following types of protocol is used:

(a) The **contention protocol** is used when a terminal requests information from the CPU and the CPU responds with a message.

(b) The **bi-sync protocol** is used when the CPU sends out a poll message (request for acknowledgement) to a terminal and waits for a status response or message.

4. SECTIONALIZATION PROCEDURES

4.01 This part provides sectionalization procedures for 2-point and multipoint circuits and for sectionalization to 4-wire local loops. These procedures are followed during a trouble analysis by the SSC/CTC technician.

2-POINT CIRCUIT

4.02 ▶The maintenance responsibility of a 2-point circuit is allocated to the control SSC/CTC.◀

4.03 Upon receipt of a trouble report, the technician should first monitor the circuit for abnormal conditions by entering the *MONITOR* command. Listed below are some abnormal conditions with a short explanation of each.

(a) An **unassigned mux code** indicates that the multiplexer link or links (SRDM for subrate, T1DM for 56 kb/s) are not connected to an OCU or MJU. This code usually indicates a missing cross-connection or defective equipment. The technician should move the monitor access point toward the direction of the code to determine the location of the problem.

(b) A **mux-out-of-sync code** indicates that the multiplexer link or links (SRDM for subrate, T1DM for 56 kb/s) beyond the next office are not synchronized. This code usually indicates a facility problem. The best way to locate the fault is to monitor at the opposite end of the suspected facility. A mux-out-of-sync code may also indicate a single channel trouble with some T1WB4s or T1WB5s.

(c) An **abnormal service condition code** (also called abnormal station condition) is essentially an idle code without the second and third bits. This signal indicates that the OCU (200 series or OCU dataport) is not connected to the DSU. An open T1-R1 pair or a defective OCU or DSU will cause this indication.

(d) A **test code** or any of the **loopback codes** indicate someone in the network is testing the circuit.

(e) A **no decoded byte signal** means the signal does not match any signal or code recognized by the ABATS.

4.04 After a monitor analysis has been made, enter the *TEST* command. This command should be the first test in any series of diagnostic tests. The DAP (digital access point) may be selected automatically by the TC. The TC will initiate a DSU and a channel loopback test for both directions. If a trouble is indicated, the technician should analyze the test results to further sectionalize the trouble by using the following figures:

- Fig. 21 for 2-point circuit sectionalization
- Fig. 22 for multipoint circuit sectionalization when the segment in trouble has not been identified
- Fig. 23 for multipoint circuit sectionalization when the segment in trouble has been identified.

4.05 The preservice or in-service tests are explained in paragraphs 4.06 through 4.15. The *PREEMPT=NO* parameter should be used in the preservice tests to prevent interrupting test equipment being used for in-service tests.

A. End Link Test

4.06 The end link tests consist of using the DSU, channel or CSU, and OCU loopback tests from the nearest DAP to the station. The DAP should be in the serving bureau or hub office for that station. These tests are made in the direction toward the station. Since each test is entered separately, which is time consuming, the end link tests should be made only if the diagnostic test (paragraph 4.04) had errors or failed.

4.07 The test results are good (within limits) if the loopbacks indicate **less than two errors in 5 minutes or less than four errors in 15 minutes. Tests lasting less than 5 minutes must contain no errors.** If errors are counted, the SSC/CTC refers the trouble to the responsible serving bureau for that serving link.

B. Interhub Tests

4.08 The following tests should be made after the end link tests indicate all loopback tests are good (within limits), but the end-to-end circuit fails or the circuit failed the diagnostic test (paragraph 4.04). Another check to verify an interhub facility trouble is to obtain a DTSS (Digital Transmission Surveillance System) report (refer to Practice AT&T 314-984-101). If the DTSS report indicates a current trouble on the facility on which the circuit under test is routed, the trouble is very likely to be that facility. If the DTSS reports are not available, the technician can verify the trouble by using one of the methods explained below in paragraphs 4.09 through 4.13.

Method A (OCU Loopback Test)

4.09 The OCU loopback test is preferred because it will time-share the SC and associated test equipment in hub offices. Start at one end of the circuit and make an OCU loopback test toward the nearest station of the circuit. This establishes a good benchmark test for comparisons.

4.10 Move the access point one T1DM link at a time farther away from that station until the OCU loopback test fails. The last T1DM link tested will be the one with the problem. Now, reverse direction with the loopback test using the last DAP selected. This should produce a good test, proving the remainder of the circuit is good.

Method B (2-Point Test)

4.11 The 2-point test requires two access points in different hub offices at opposite ends of the circuit. If errors are detected, shorten the test circuit by one T1DM link and repeat the test. Continue in this manner until the defective link is located. Make the 2-point test as short as possible to alleviate any availability problems with the test equipment.

Test Limits for Methods A and B

4.12 The test limits for the loopback and 2-point tests are as follows:

- **Less than two errors** for a 5-minute test
- **Less than four errors** for a 15-minute test
- **No errors** for a test less than 5 minutes.

4.13 Determine the direction of errors and request assistance of the appropriate Facility Maintenance Center in clearing the error condition. Refer to Practices AT&T 314-984-101 and 682-000-015.

C. Loop Tests

4.14 The diagnostic *TEST* command automatically attempts the loop tests if a LATS 1 access point is available. These tests are made after a channel loopback test fails or detects errors and an OCU loopback test is good (within limits). For example, if an OCU loopback test is successful but the DSU and channel loopback tests are not, enter a directed DSU and channel loopback test. If trouble still persists on the local loop, specific 4-wire tests must be made. Refer to 4-wire local loop testing starting in paragraph 4.31.

D. 56-kb/s Repeater Tests

4.15 The SC will automatically make all channel loopback tests on a circuit containing 56 kb/s repeaters provided the repeater information is in the ABATS database. The repeater information indicates the number of repeaters on the circuit. For example, the SC makes a channel loopback test to the first repeater; and, if the test is good, the SC bypasses the repeater and makes another channel loopback test on the next section of the circuit. Channel loopback tests are not made beyond the first repeater unless the number of repeaters for the circuit is in the database.

MULTIPOINT CIRCUIT

4.16 A multipoint circuit consists of a master station and two or more remote stations. Data from the master station goes to all segments simultaneously. Data from the remote stations has to time share because only one remote station may transmit to the master station at any one time.

4.17 The performance objective for multipoint service (99.5 percent EFS) applies to communication between the master station and to each remote station while all other remote stations remain in the idle mode. This objective does not apply to any off-net extension stations.

4.18 A customer may identify the station(s) experiencing trouble. If the station is identified, the technician is required to sectionalize the trouble within 10 minutes plus 5 minutes for each station identified (paragraphs 1.07, 1.08, and 1.09). If the customer does not identify the station in trouble, allow an additional 2 minutes for each station tested. Return to the customer any operational portion of the multipoint circuit within 30 minutes.

4.19 Maintenance responsibility for a multipoint circuit is allocated to the control SSC/CTC. The office responsibilities are documented in Practice AT&T 660-230-100. Additional information on maintenance centers is given in Practice AT&T 314-900-300.

4.20 After questioning the customer and analyzing the trouble per paragraphs 3.01 through 3.11, the technician must decide if the segment in trouble has been identified. If the segment has not been identified, use Fig. 22. If the segment has been identified, use Fig. 23.

4.21 Determine if the trouble affects only one station or several stations. This should help to sectionalize the trouble to the smallest portion of a circuit that contains all the stations experiencing trouble. If the customer cannot provide this information, the customer must release the entire multipoint circuit so the technician can locate the stations experiencing trouble. If only one station is having trouble, make the segment test. If several stations are having trouble, make a link test between MJUs.

A. End Link and/or Segment Tests

4.22 These tests are used when one station is out of service or the technician wishes to test a segment or an end link of a multipoint circuit. A **station segment test** (*TEST* command) consists of an OCU, channel, and DSU loopback tests being made from the DAP nearest the MJU. An **end link test** consists of the OCU, channel, and DSU loopback tests being made from a DAP in the hub office serving that station. This test is only made if the segment test fails or has errors.

4.23 ▶Enter the *TEST* command, circuit number, and segment number parameters. The TC will automatically select the first available DAP nearest the MJU unless the DAP is specified. The TC attempts a DSU and channel loopback test toward the direction of the selected station. An OCU loopback test (*OCULOOP* command) is made only if the channel loopback test (*CHANLOOP* command) has errors. If the OCU loopback test fails or has errors, automatic sequencing to another DAP closer to the station will occur if any DAPs exist. Another OCU loopback test is attempted. Automatic sequencing will stop after completion of the first good OCU loopback test or after testing from the DAP closest to the station.◀

4.24 A directed test on an individual segment or end link is made by entering the desired command (***DSU, CSU, OCU, STRAIGHTAWAY,*** and ***VMTEST***) and the required parameters (e.g., ***SEGMENT*** and ***PAIR***). Other parameters may be used, such as ***DIRECTION, DURATION,*** and ***INTERVAL,*** when doing longer tests to find an intermittent problem.

4.25 The test requirements for a segment and/or end link test are as follows:

- **Less than two errors** for a 5-minute test
- **Less than four errors** for a 15-minute test
- **No errors** for tests less than 5 minutes.

B. Testing Through an MJU

4.26 These procedures are used to test through an MJU after an end link test and a segment test detect no trouble, but the customer is still experiencing trouble with one or more remote stations.

4.27 The technician decides to make a selective or a nonselective test. A **selective test** allows a technician to test a particular station from an access point on the upstream side of the MJU (testing the downstream direction only). A selective test requires the technician to enter the ***TEST*** command, the access point upstream of the MJU, and the segment or station under test. The TC automatically signals through the MJU to make the desired test. An example of an entry line for a selective test is:

DSU,DSDT79466,11,AP=4-2,DUR=2.

This example uses the default feature for direction, which is the Z direction.

4.28 A **nonselective test** allows a technician to make a transmission path check in both directions from a particular station through one or more MJUs. This test verifies that other stations are not affecting transmission to this station. The customer or technician at the station is required to set the DSU slide switch to the RT (remote test) or to the LL (local loop) loopback test position (see note). A nonselective test example is as follows:

STW,DSDT79466,11,AP=4-1,DIR=Z,DUR=2.

This example uses segment 11 of Fig. 1 and requires that station 11 be in the RT or LL loopback test position.

Note: This test can be made on a segment which has an analog extension. The analog data set is placed in the DL (digital loop) test mode.

4.29 The technician enters the ***STRAIGHTAWAY*** command, and the ***ACCESSPOINT, SEGMENT,*** and ***DIRECTION*** parameters. The BATS unit synchronizes on the straightaway test pattern which is looped at the station and verifies the transmission paths through the MJU.

4.30 The ***TWOPOINT*** command verifies the transmission path through MJUs without customer assistance. When using this command, two access points must be specified. For example, the same format is required for a multipoint circuit (AP=11-1, AP=11-4) or a 2-point circuit (AP=1, AP=4).

4-WIRE LOCAL LOOP

4.31 A 4-wire local loop is tested by the ***VMTEST, RESISTANCE, CAPACITANCE,*** and ***VOLTAGE*** commands and associated parameters. These tests are used during initial installation and maintenance periods. The LLRC (local loop record card), Form 6528, and the CLRC for the circuit under test, provide the following information:

(a) The cable pair that is a required parameter and the terminal resistance from the CLRC.

Note: If the resistance is not available, measure the loop and record.

(b) The option setting for the FLBO (fixed line build-out) network in the DSU or CSU and the OCU. Refer to the appropriate practices.

(c) The bit rate of the circuit.

4.32 These tests will not be affected by the normal DSU transmitting data signal on the T1-R1 pair. The data signal will not interfere with the dc measurements.

A. Voltmeter Test

4.33 The *VMTEST* command produces a series of diagnostic measurements as shown in Fig. 16. Abnormal conditions may occur during testing and are as follows:

- Capacitance indicates pair is open
- Foreign voltage measured between any two wires
- Any resistance to ground
- Any meter reading that fluctuates. The TC sends UNRELIABLE METER READING FOLLOWS message and the last reading is displayed.

B. Foreign Voltage

4.34 This test measures any foreign voltage that may be present on the loop. Any foreign voltage indicates that a cable fault exists. The test is made between the following points: T-T1, T-R1, R-T1, R-R1, T-R, T1-R1, and T, R, T1, R1 to ground. There should be no significant voltage between any of these points. The test results must be less than 1 volt ac or dc potential between any two wires. If the DSU is powered and connected, the measurement must be less than 4 volts ac on the T1-R1 pair.

C. Insulation Resistance

4.35 Resistance is measured between line terminals T, R, T1, and R1 to ground. This ensures adequate isolation between the cable conductors and ground. The test reading must be greater than 120K ohms of resistance between any conductor and ground.

D. Loop Plus Terminal Resistance

4.36 The loop plus terminal resistance is the summation of the following:

(a) The **loop resistance** consists of the cable pairs T-R, T1-R1. The transmit pair (T1-R1) is referred to as RL2 on an LLRC. The receive pair (T-R) is referred to as RL1. Each pair must be less than 4200 ohms resistance except for 56-kb/s repeatered loops. For 56-kb/s repeatered loops, the resistance of the bypassed repeaters must be included in the loop resistance. A bypassed central office repeater adds approximately 36 ohms resistance and an outside plant repeater adds approximately 5758 ohms resistance. If the loop resistance is greater than 200K ohms, an open loop is indicated and an open-loop capacitance test must be made.

(b) The **terminal resistance** of the DSU and CSU varies with the bit rate (see LLRC) and the FLBO network.

4.37 The LLRC is used as a guide during the loop plus terminal resistance calculation. The more recent measurements are compared with the LLRC if the original measurements were recorded during initial installation. The difference between the two tests must not exceed plus or minus 30 percent. If the loop plus terminal resistance is greater than 200K ohms, an open-loop capacitance test must be made.

E. Open Loop Capacitance Test

4.38 This test measures the capacitance of an open pair (T-R or T1-R1) and is made automatically when the *VMTEST* command is entered. The capacitance reading is converted graphically, using Fig. 24, into the cable pair length to the open fault. The graph is based on a characteristic cable pair capacitance of 0.083 μF per mile. This capacitance is applicable to the majority of telephone cable.

5. REFERENCES

5.01 The following practices are referenced for additional information:

DOCUMENT	DESCRIPTION
314-410-310	4-Wire Local Loop, Maintenance Procedures, Digital Data System
314-410-510	4-Wire Local Loop, Tests and Requirements, Digital Data System
314-900-100	Private Line Service, Overall Description, Digital Data System
314-901-520	Automated Bit Access Test System, Description and Operation, Digital Data System
314-901-530	2-Point and Multipoint Private Line Circuits, Manual Turn-Up and Test Procedures, Digital Data System
314-901-532	Automated Bit Access Test System, Remote Data Base Update Procedures, Digital Data System
314-910-100	Office Channel Units and Auxiliary Circuits, Description, Digital Data System
314-984-100	Digital Transmission Surveillance System, General Description, Digital Data System
314-984-101	Digital Transmission Surveillance System, Administrative Methods, Digital Data System
595-100-100	Digital Data System, 550A-Type Channel Service Unit, Description
595-200-100	Digital Data System, 500A-Type Data Service Unit, Description and Operation
660-230-100	Office Responsibilities, Administrative Methods, Digital Data System
682-000-015	Facility Control Office, Facility Maintenance and Administration Center, Assignment and Operating Responsibilities

6. GLOSSARY

6.01 The following terms and their meanings are words other than commands (Table A) and parameters (Table B). These terms are unique for the ABATS test terminal technician.

ABATS Front-End System: A system used to update the ABATS database. The updated database is transferred to the TC once a day for testing via the ABATS test terminals.

A and Z Direction: For a 2-point circuit, one end is designated as A and the other end is designated as Z. For a multipoint circuit, the master station is designated as A and the remote stations are designated as Z stations or terminals.

Access Point: The point where the BATS accesses the circuit for testing or monitoring in direction A or Z. The access point may be either a LATS I for local loops or a digital access point LATS II at 64 kb/s.

Default: The system is programmed to automatically set itself to a certain value or condition if not specified.

Diagnostic Test: A test, consisting of several subtests, that is used to locate troubles. For example, the **VMTEST** and *TEST* commands are used for diagnostic testing.

Digital Type Test: A test that uses data comparison to count errors at the DS-1 and DS-0A levels.

Directed Test: A specific test directed to an access point.

End Link Test: A test that consists of all loopback tests made from a digital access point in the hub office serving that station.

Loopback Test: A test that receives the same signal that was transmitted because the equipment at a distant location is placed in a loopback condition.

Prompts: The system is programmed to assist the technician by asking the next logical question while entering information.

Report: A response from a test or test attempt consisting of two or three lines which contain the circuit number, office name of access point, time of test or test attempt, and results.

Station Segment Test: A test consisting of all loopback tests made from the digital access point nearest the MJU.

7. ISSUING ORGANIZATION

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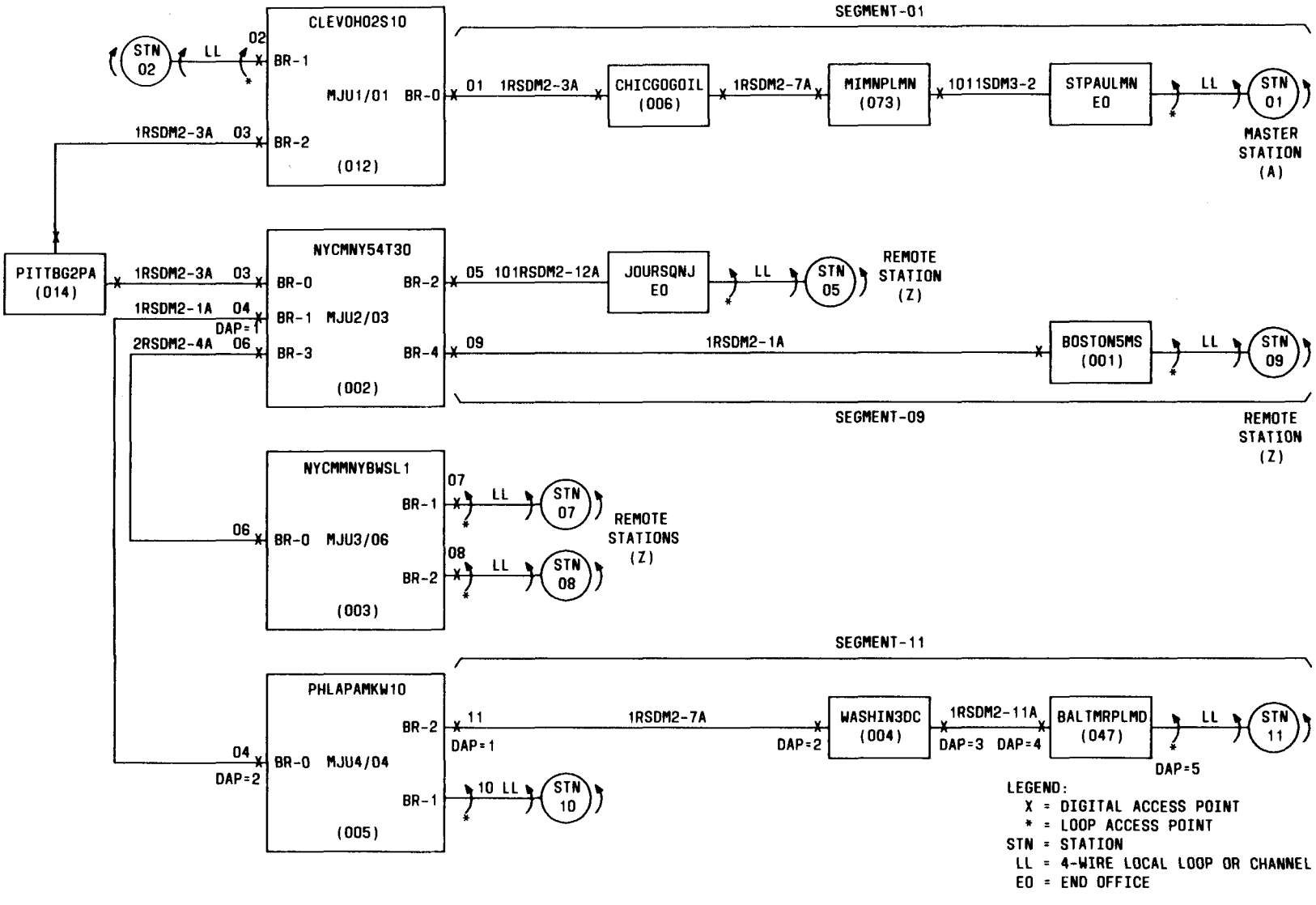


Fig. 1 - Example of Multipoint Circuit

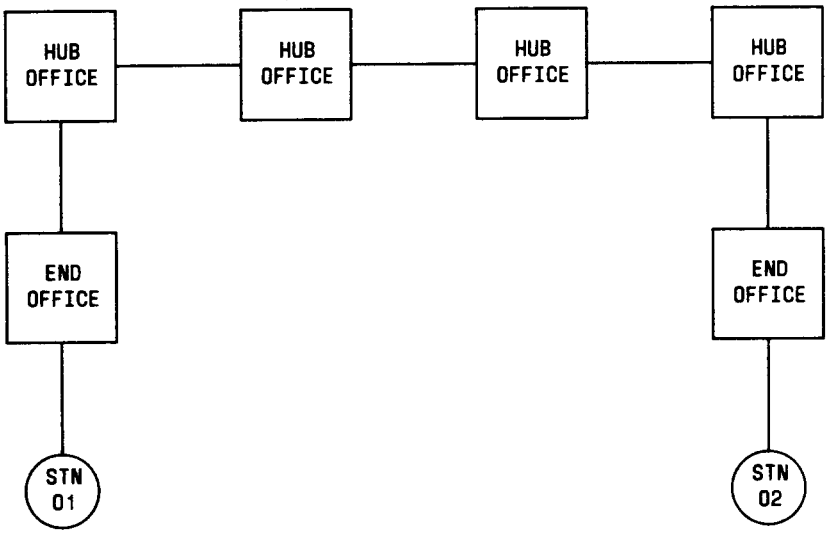


Fig. 2 - Example of 2-Point Circuit

```
NEWS ) INPUT LINE
**********                    NEW FEATURE                    **********

YOU  MAY NOW SPECIFY THE SEGMENT NUMBER PARAMETER FOR THE DISPLAY COMMAND.
THIS  WILL  ALLOW  YOU TO SEE THE ACCESS POINT INFORMATION FOR THE SEGMENT
YOU  ARE INTERESTED IN TESTING,  WITHOUT HAVING TO DISPLAY THE REST OF THE
CIRCUIT.  THIS  WILL  GREATLY  REDUCE THE TIME IT TAKES TO FIND THE ACCESS
POINT THAT YOU ARE INTERESTED IN.

YOU  DO  NOT HAVE TO SPECIFY THE SEGMENT NUMBER.  IF YOU DON'T SPECIFY IT,
THE   ENTIRE CIRCUIT WILL BE DISPLAYED.  IF YOU ARE PROMPTED FOR A SEGMENT
ENTERING  A  ZERO WILL CAUSE THE ENTIRE CIRCUIT TO BE DISPLAYED.  IF THERE
ARE NO  RECORDS FOR THE SEGMENT YOU SPECIFY,  YOU WILL GET ONLY THE COMMON
DATA RECORD DISPLAYED.
>
```

Fig. 3 - Example of System Information Display (NEWS Command)

```
ABATS/TS recognizes the following commands:

        ADDRESS          HELP          OCULOOP          STATUS
        BLOCK            INITIALIZE    OSTATUS          STRAIGHTAWAY
        CAPACITANCE      LATCH         RELEASE          TERMINATE
        CHANLOOP         LIST          RESET            TST
        CLEAR            LOOPBACK      RESISTANCE       TWOPOINT
        DISPLAY          MONITOR       RPT              UNBLOCK
        DSULOOP          NEWS          SECONDTEST       VMTEST
        ERRORS                                          VOLTAGE

and the following parameters:

        ACCESSPOINT      GO            PAIR             SEGMENT
        CIRCUIT          INTERVAL      PREEMPT          STATION
        CHANNEL          LOOPNUMBER    QUEUE            TESTWORD
        DIRECTION        LOOPTYPE      RATE             UNIT
        DURATION         OFFICE
```

Fig. 4 - Example of System Information Display—General Assistance Using HELP Command

```
TWOPOINT:
        THIS COMMAND REQUESTS TWO ABATS MICROPROCESSORS TO PERFORM
        STRAIGHTAWAY TESTS WITH EACH OTHER.  IT MAY ALSO BE ENTERED
        AS "PTP".

REQUIRED PARAMETERS:
        CIRCUIT ID, ACCESSPOINTS, TESTLENGTH

OPTIONAL PARAMETERS:
        SEGMENT/MJU, QUEUE, PREEMPT
```

Fig. 5 - Example of System Information Display—Specifying a Particular Command Using HELP Command

```
DIRECTION?

HELP

DIRECTION:   specifies whether the system should test toward the "A" terminal,
             or the "Z" terminal, or BOTH directions.
    value:   an A or Z or BOTH
```

Fig. 6 - Example of System Information Display—Specifying a Particular Parameter Using HELP Command

```
PAIR?
?
PAIRS:  Allows for the specification of the conductor pair combination
        to be tested sequentially. The pairs are formed from the T (tip)
        R (ring) and Ground cable elements.
values  Any pair of elements.                  For all pairs use all.
        List of pairs are acceptable.
        Example
        t-r  ;  tl-rl  ;  all  ;  (t-rl r-rl  tl-g)
```

Fig. 7 - Example of System Information Display—Systems Prompting for Particular Parameter

```
CHCGILCLS60 MICRO IS TEMPORARILY UNAVAILABLE.  ANY QUESTIONS, CONTACT DNAC.
```

Fig. 8 - Example of System Information Display—Broadcast Message

```
CIRCUIT:  DSEZ141241.ØØ2LL                                  PCO:  WASHDCSWS1Ø
CUSTOMER: NAME OF BUSINESS                                   ID:   95999A1
COMMENTS: CTS USER, SEE COMMENTS ON DSEZ141241..             RATE:  2.4  KB/S

POINT-POINT  A: CUSTPL          LPBKS:  OCD      RPTRS:
             Z: CUSTPL          LPBKS:  OCD      RPTRS:

OFFICE          ACCESS   AP#  ROUTING      CH  OFFICE          ACCESS   AP#

CUSTPL                        4LC              HRBGPAHAW1Ø
HRBGPAHAW1Ø                   1ØTØA        13  PHLAPAMKW1Ø
   HRBGPAHAW1Ø  Ø,Ø,1    1    1491T1E      12     PHLAPAMKW1Ø  Ø,Ø,14   2
PHLAPAMKW1Ø                   4LC              CUSTPL
```

Fig. 9 - Example of Circuit Information Display—2-Point Circuit

```
CIRCUIT:  DSEZ189460LL                                       PCO:  WASHDCSWS1Ø
CUSTOMER: NAME OF BUSINESS                                   ID:   95999A1
COMMENTS: CTS USER                                           RATE:  2.4  KB/S
                                                             SECONDARY CHANNEL

SEG     STN     ADDRESS
Ø1      M       9Ø1 TATNALL ST, WILMINGTON DE
Ø2      Ø2      9Ø1 TATNALL ST, WILMINGTON DE
Ø3      Ø3      7Ø1 FEDERAL ST, CAMDEN NJ
Ø5      Ø5      7Ø1 FEDERAL ST, CAMDEN NJ
Ø6      Ø6      7Ø1 FEDERAL ST, CAMDEN NJ
Ø7      Ø7      7Ø1 FEDERAL ST, CAMDEN NJ
```

Fig. 10 - Example of Circuit Information Display—Address Display of Multipoint Circuit

```
CIRCUIT:   DSEZ189460LL                                    PCO:    WASHDCSWS1Ø
CUSTOMER:  NAME OF BUSINESS                                ID:     95999A1
COMMENTS:  CTS USER                                        RATE:   2.4  KB/S
                                                           SECONDARY CHANNEL


WLMGDEWL        MJU[1]
                        0/01  /- MSTR STN
                        1/02  /- STATION
                        2/03  /- STATION
                        3/04  /- MJU-D[1] - PHLAPASLKZZ
                        4/    /- **FREE**

PHLAPASLKZZ     MJU-D[1]
                        0/04  /-
                        1/    /- **FREE**
                        2/    /- **FREE**
                        3/    /- **FREE**
                        4/09  /- MJU-D[2] - PHLAPASLKZZ

PHLAPASLKZZ     MJU-D[2]
                        0/09  /-
                        1/10  /- STATION
                        2/    /- **FREE**
                        3/    /- **FREE**
                        4/11  /- MJU-D[3] - PHLAPASLKZZ

PHLAPASLKZZ     MJU-D[3]
                        0/11  /-
                        1/12  /- STATION
                        2/    /- **FREE**
                        3/    /- **FREE**
                        4/13  /- MJU[1]   - CMDNNJCET05

CMDNNJCET05     MJU-[1]
                        0/13  /-
                        1/05  /- STATION
                        2/04A /- MJU[2]   - CMDNNJCET05
                        3/    /- **FREE**
                        4/    /- **FREE**

CMDNNJCET05     MJU-[2]
                        0/04A /-
                        1/06  /- STATION
                        2/07  /- STATION
                        3/    /- **FREE**
                        4/    /- **FREE**
```

Fig. 11 - Example of Circuit Information Display—High Level Display of Multipoint Circuit

```
CIRCUIT:   DSEZ189460LL                                    PCO:    WASHDCSWS10
CUSTOMER:  NAME OF BUSINESS                                ID:     95999A1
COMMENTS:  CTS USER                                        RATE:   2.4  KB/S
                                                           SECONDARY CHANNEL

SEG: 01      A: CUSTPL          LPBKS: OCD      RPTRS:
STN: M       Z: WLMGDEWL        LPBKS:          RPTRS:
OFFICE          ACCESS   AP#   ROUTING    CH   OFFICE          ACCESS   AP#
CUSTPL                         4LC             WLMGDEWL
WLMGDEWL        0-18-07  1     DSX0            WLMGDEWL
WLMGDEWL                       MJU[1]-0        WLMGDEWL
```

Fig. 12 - Example of Circuit Information Display—Detailed Segment Routing Display of Multipoint Circuit

```
MON,DSEZ172333.5LL,AP=1) INPUT LINE
DSEZ172333.5LL
KSCYMO09        13:33:59        BATS MONITOR RESULTS:
FROM TERM "A":DATA                      FROM TERM "Z":IDLE CODE

DSEZ172333.5LL
KSCYMO09        13:34:04        BATS MONITOR RESULTS:
FROM TERM "A":DATA                      FROM TERM "Z":IDLE CODE

DSEZ172333.5LL
KSCYMO09        13:34:09        BATS MONITOR RESULTS:
FROM TERM "A":DATA                      FROM TERM "Z":IDLE CODE

DSEZ172333.5LL
KSCYMO09        13:34:10        MON TERMINATED
```

Fig. 13 - Example of Test Results Information Display—MONITOR Command

```
TEST,DSEZ172333.5LL,AP=2 ) INPUT LINE
DSEZ172333.5LL
KSCYMOØ9        13:34:3Ø      BATS MONITOR RESULTS:
FROM TERM "A":DATA                    FROM TERM "Z":IDLE CODE

DSEZ172333.5LL
KSCYMOØ9        13:34:3Ø      ATTMEPTING DSU TEST TOWARD:Z
DSEZ172333.5LL
KSCYMOØ9        13:34:32      NO 'TEST' SYNC
DSEZ172333.5LL
KSCYMOØ9        13:34:33      ATTEMPTING CHN TEST TOWARD:Z
DSEZ172333.5LL
KSCYMOØ9        13:34:35      NO 'TEST' SYNC
DSEZ172333.5LL
KSCYMOØ9        13:34:35      ATTEMPTING OCU TEST TOWARD:Z
DSEZ172333.5LL
KSCYMOØ9        13:34:52      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z     DS1=Ø     SRDM=Ø     CST=Ø

DSEZ172333.5LL
KSCYMOØ9        13:34:52      ATTEMPTING DSU TEST TOWARD:A
DSEZ172333.5LL
KSCYMOØ9        13:35:Ø8      BATS ERROR COUNTERS:
DSU TEST FROM TERM:A     DS1=Ø     SRDM-Ø     CST=Ø

DSEZ172333.5LL
KSCYMOØ9        13:35:Ø8      ATTEMPTING CHN TEST TOWARD:A
DSEZ172333.5LL
KSCYMOØ9        13:35:25      BATS ERROR COUNTERS:
CHN TEST FROM TERM:A     DS1=Ø     SRDM-Ø     CST=Ø

DSEZ172333.5LL
KSCYMOØ9        13:35:25      TST TERMINATED
```

Fig. 14 - Example of Test Results Information Display—TEST Command

```
OCU,DSEZ172333.5LL,DUR=2) INPUT LINE
ACCESSPOINT? 3) SYSTEM PROMPT AND USER RESPONSE
DSEZ172333.5LL
ATLNGATL        13:44:54      BATS MONITOR RESULTS:
FROM TERM "A":DATA                    FROM TERM "Z":IDLE CODE

DSEZ172333.5LL
ATLNGATL        13:44:54      ATTEMPTING OCU TEST TOWARD:Z
DSEZ172333.5LL
ATLNGATL        13:45:1Ø      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z    DS1=Ø      SRDM=Ø     CST=Ø

DSEZ172333.5LL
ATLNGATL        13:45:26      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z    DS1=Ø      SRDM=Ø     CST=Ø

DSEZ172333.5LL
ATLNGATL        13:45:41      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z    DS1=Ø      SRDM=Ø     CST=Ø

DSEZ172333.5LL
ATLNGATL        13:45:56      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z    DS1=Ø      SRDM=Ø     CST=Ø

DSEZ172333.5LL
ATLNGATL        13:46:12      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z    DS1=Ø      SRDM=Ø     CST=Ø

DSEZ172333.5LL
ATLNGATL        13:46:27      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z    DS1=2      SRDM=Ø     CST=1

DSEZ172333.5LL
ATLNGATL        13:46:42      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z    DS1=3      SRDM=Ø     CST=2

DSEZ172333.5LL
ATLNGATL        13:46:57      BATS ERROR COUNTERS:
OCU TEST FROM TERM:Z    DS1=3      SRDM=Ø     CST=2

DSEZ172333.5LL
ATLNGATL        13:46:58      OCU TERMINATED
```

Fig. 15 - Example of Test Results Information Display—OCU Loopback Test Command

```
VMT,DSEZ172333.3LL,AP=1 )INPUT LINE
DSEZ172333.3LL
CNCNOHWSTØ4     13:59:49        LATS METER READING: +Ø.84 VAC   T1-R1
DSEZ172333.3LL
CNCNOHWSTØ4     13:59:52        LATS METER READING: +155. OHMS  T1-R1
DSEZ172333.3LL
CNCNOHWSTØ4     13:59:58        LATS METER READING: +Ø6.7 KOHM  T1-T
DSEZ172333.3LL
CNCNOHWSTØ4     14:ØØ:21        LATS METER READING: +Ø6.7 KOHM  T-R1
DSEZ172333.3LL
CNCNOHWSTØ4     14:ØØ:45        LATS METER READING: +Ø6.7 KOHM  T1-R
DSEZ172333.3LL
CNCNOHWSTØ4     14:ØØ:51        LATS METER READING: +Ø6.7 KOHM  R1-R
DSEZ172333.3LL
CNCNOHWSTØ4     14:ØØ:57        LATS METER READING: +Ø.59 KOHM  T-R
DSEZ172333.3LL
CNCNOHWSTØ4     14:ØØ:58        LATS METER READING: +Ø.ØØ VAC   T-R
DSEZ172333.3LL
CNCNOHWSTØ4     14:ØØ:57        VMT TERMINATED
```

Fig. 16 - Example of Test Results Information Display—VMTEST Command

```
VMR,DSEZ172333.3LL,AP=1,TR )INPUT LINE
DSEZ172333.3LL
CNCNOHWSTØ4     14:Ø7:Ø7        LATS METER READING: +Ø.59 KOHM  T-R
DSEZ172333.3LL
CNCNOHWSTØ4     14:Ø7:14        LATS METER READING: +Ø.59 KOHM  T-R
DSEZ172333.3LL
CNCNOHWSTØ4     14:Ø7:22        LATS METER READING: +Ø.59 KOHM  T-R
DSEZ172333.3LL
CNCNOHWSTØ4     14:Ø7:22        VMR TERMINATED
```

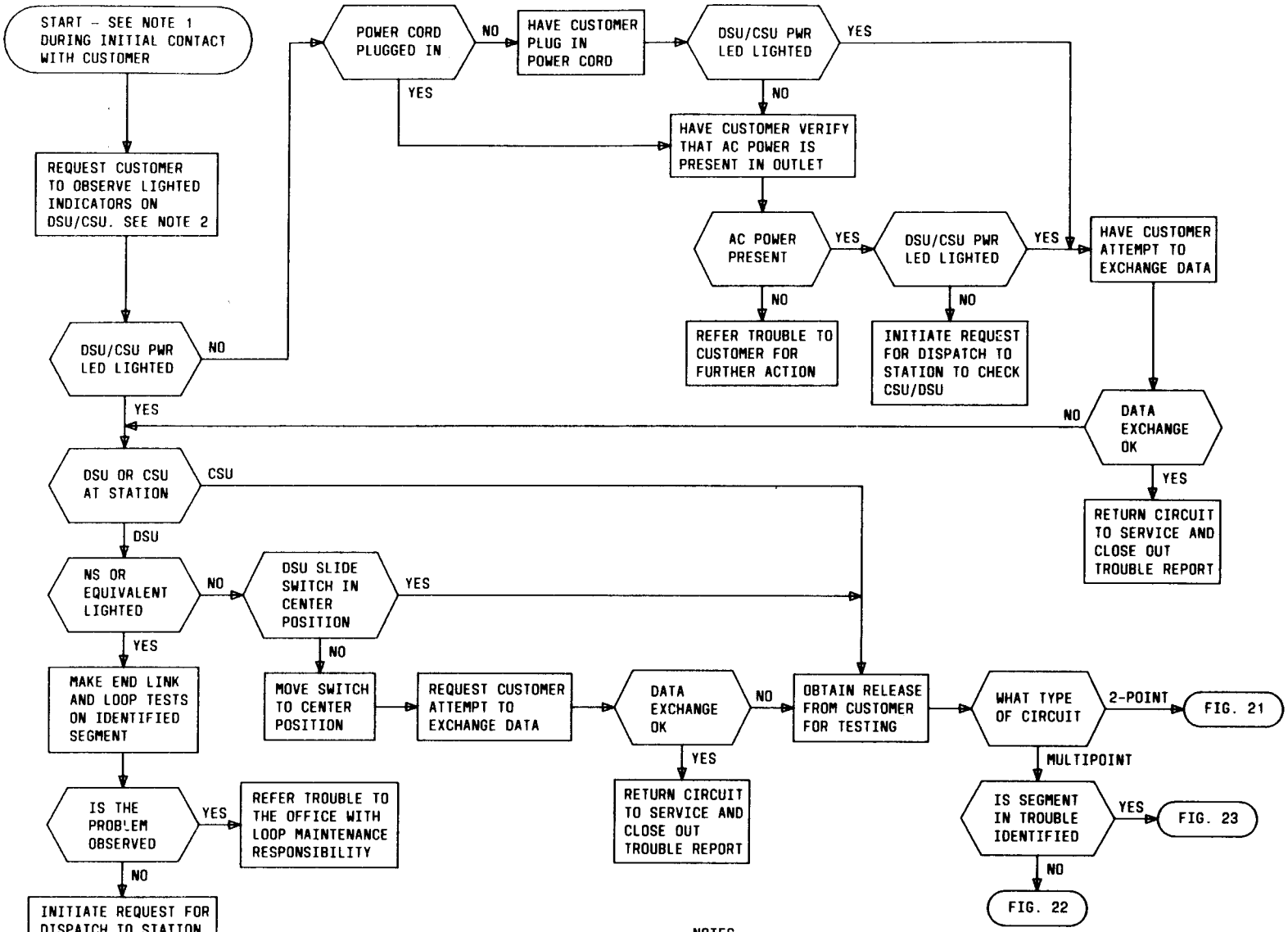
Fig. 17 - Example of Test Results Information Display—RESISTANCE Command of T-R Pair Only

```
VMR,DSEZ172333.3LL,AP=1,PAIR=ALL ) INPUT LINE
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø1:53        LATS METER READING: +155. OHMS  T1-R1
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø1:57        LATS METER READING: +Ø6.7 KOHM  T1-T
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:Ø3        LATS METER READING: OVER  MOHM  G-T1
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:Ø9        LATS METER READING: OVER  MOHM  G-R1
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:12        LATS METER READING: +Ø6.7 KOHM  T-R1
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:18        LATS METER READING: OVER  MOHM  T-G
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:24        LATS METER READING: OVER  MOHM  G-R
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:27        LATS METER READING: +Ø6.7 KOHM  T1-R
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:31        LATS METER READING: +Ø6.7 KOHM  R1-R
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:34        LATS METER READING: +Ø.59 KOHM  T-R
DSEZ172333.3LL
CNCNOHWSTØ4      14:Ø2:34        VMR TERMINATED
```

Fig. 18 - Example of Test Results Information Display—RESISTANCE Command for All Pairs

```
FOR,DSEZ172333.3LL,AP=1,PAIR=ALL ) INPUT LINE
DSEZ172333.3LL
CNCNOHWST04     14:02:59        LATS METER READING: +0.84 VAC   T1-R1
DSEZ172333.3LL
CNCNOHWST04     14:03:00        LATS METER READING: +00.0 VDC   T1-R1
DSEZ172333.3LL
CNCNOHWST04     14:03:02        LATS METER READING: +0.39 VAC   T1-T
DSEZ172333.3LL
CNCNOHWST04     14:03:03        LATS METER READING: +00.0 VDC   T1-T
DSEZ172333.3LL
CNCNOHWST04     14:03:05        LATS METER READING: +0.41 VAC   G-T1
DSEZ172333.3LL
CNCNOHWST04     14:03:06        LATS METER READING: -00.0 VDC   G-T1
DSEZ172333.3LL
CNCNOHWST04     14:03:07        LATS METER READING: +0.41 VAC   G-R1
DSEZ172333.3LL
CNCNOHWST04     14:03:08        LATS METER READING: -00.0 VDC   G-R1
DSEZ172333.3LL
CNCNOHWST04     14:03:10        LATS METER READING: +0.39 VAC   T-R1
DSEZ172333.3LL
CNCNOHWST04     14:03:11        LATS METER READING: +00.0 VDC   T-R1
DSEZ172333.3LL
CNCNOHWST04     14:03:14        LATS METER READING: +0.03 VAC   T-G
DSEZ172333.3LL
CNCNOHWST04     14:03:15        LATS METER READING: -00.0 VDC   T-G
DSEZ172333.3LL
CNCNOHWST04     14:03:19        LATS METER READING: +0.03 VAC   G-R
DSEZ172333.3LL
CNCNOHWST04     14:03:20        LATS METER READING: -00.0 VDC   G-R
DSEZ172333.3LL
CNCNOHWST04     14:03:22        LATS METER READING: +0.39 VAC   T1-R
DSEZ172333.3LL
CNCNOHWST04     14:03:23        LATS METER READING: +00.0 VDC   T1-R
DSEZ172333.3LL
CNCNOHWST04     14:03:24        LATS METER READING: +0.39 VAC   R1-R
DSEZ172333.3LL
CNCNOHWST04     14:03:26        LATS METER READING: +00.0 VDC   R1-R
DSEZ172333.3LL
CNCNOHWST04     14:03:27        LATS METER READING: -0.02 VAC   T-R
DSEZ172333.3LL
CNCNOHWST04     14:03:28        LATS METER READING: +00.0 VDC   T-R
DSEZ172333.3LL
CNCNOHWST04     14:03:29        VMF TERMINATED
```

Fig. 19 - Example of Test Results Information Display—VOLTAGE Command



NOTES:

1. IF THE CUSTOMER CANNOT PROVIDE THE INFORMATION NEEDED TO MAKE THE DECISIONS REQUIRED, REFER TO FIG. 22 OR 23.
2. IF THE STATION EXPERIENCING TROUBLE IS A SUBRATE OFF-NET EXTENSION. ALL DSU REFERENCES IN THIS FIGURE IMPLY THE DSU IN THE HUB OFFICE.

Fig. 20 - Customer Trouble Report Analysis

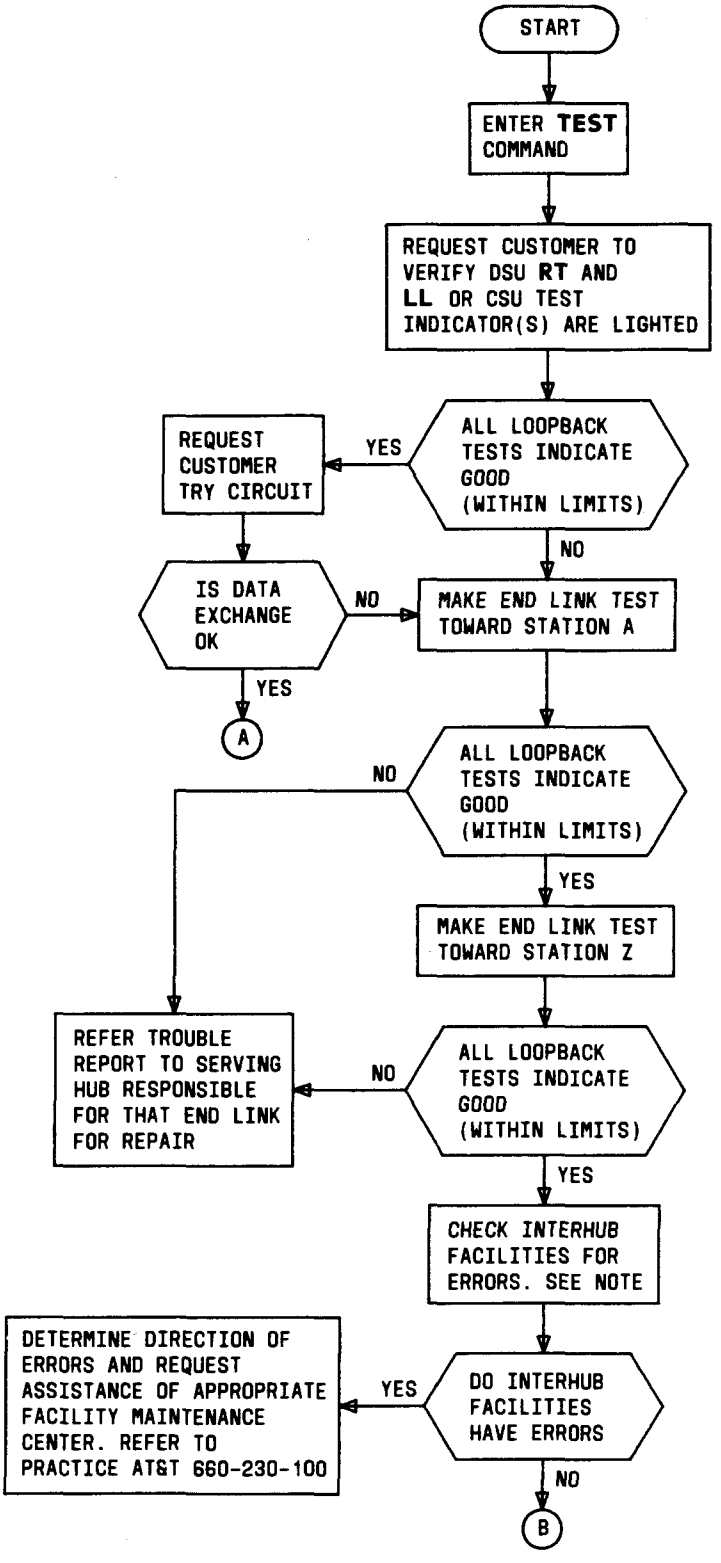


Fig. 21 - 2-Point Sectionalization (Sheet 1 of 2)

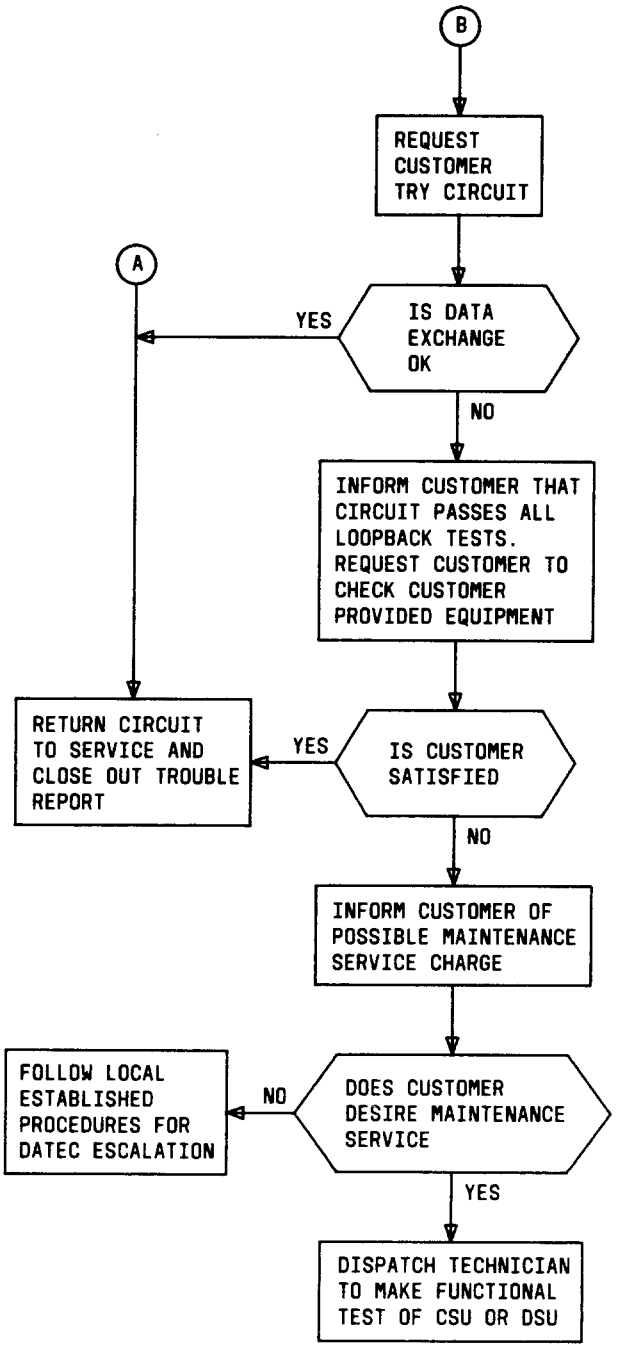


Fig. 21 - 2-Point Sectionalization (Sheet 2 of 2)

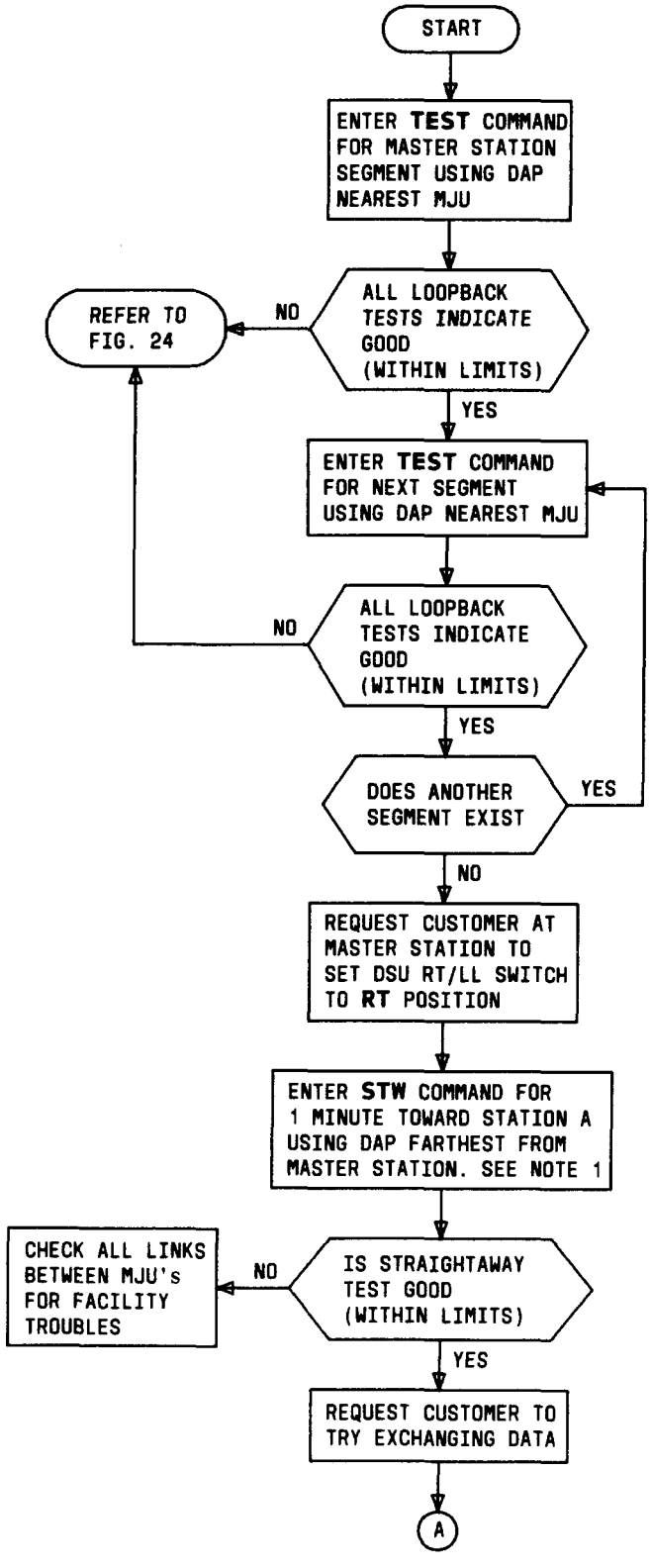
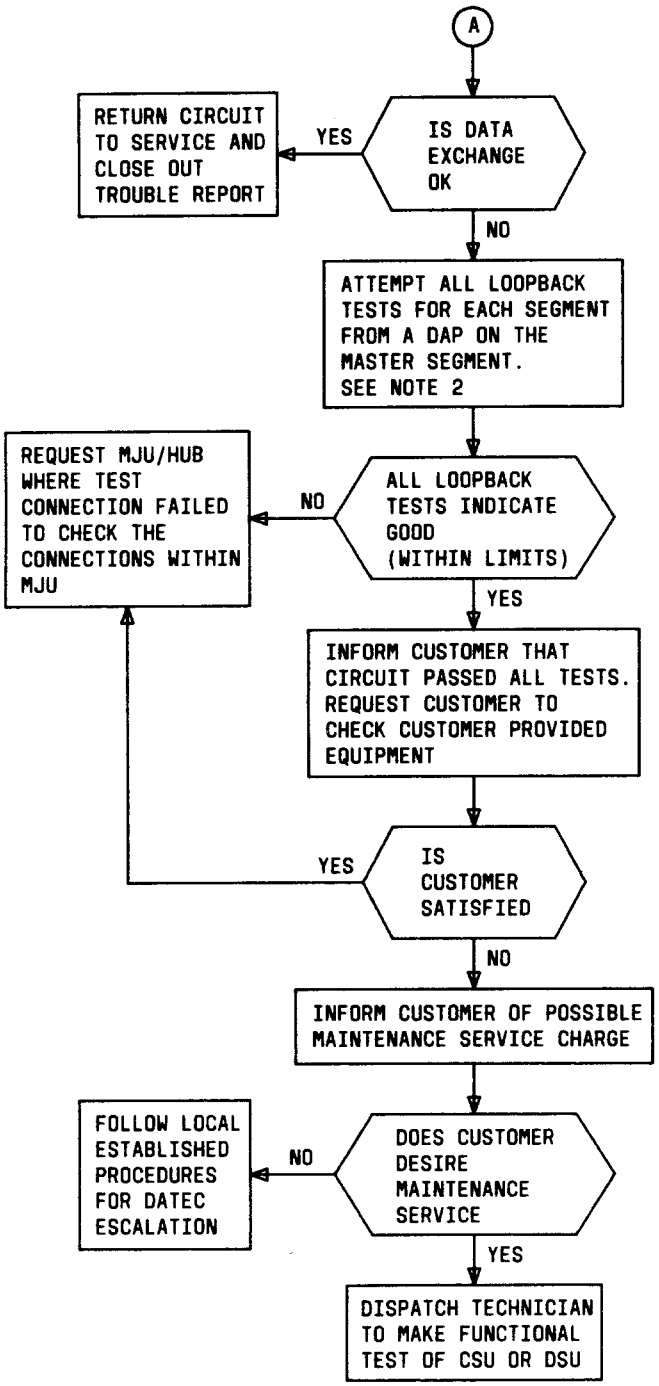


Fig. 22 - Multipoint Sectionalization When Segment in Trouble Is Not Identified (Sheet 1 of 2)



NOTES:
1. THE DAP SELECTED SHOULD BE THE ONE THAT TEST THE MOST LINKS BETWEEN MJU'S AND/OR THE MOST T1DM LINKS.
2. ANY SSC/CTC OR HUB OFFICE ON THE MASTER STATION SEGMENT CAN SIGNAL THROUGH EACH MJU TO TEST EACH SEGMENT.

Fig. 22 - Multipoint Sectionalization When Segment in Trouble Is Not Identified (Sheet 2 of 2)

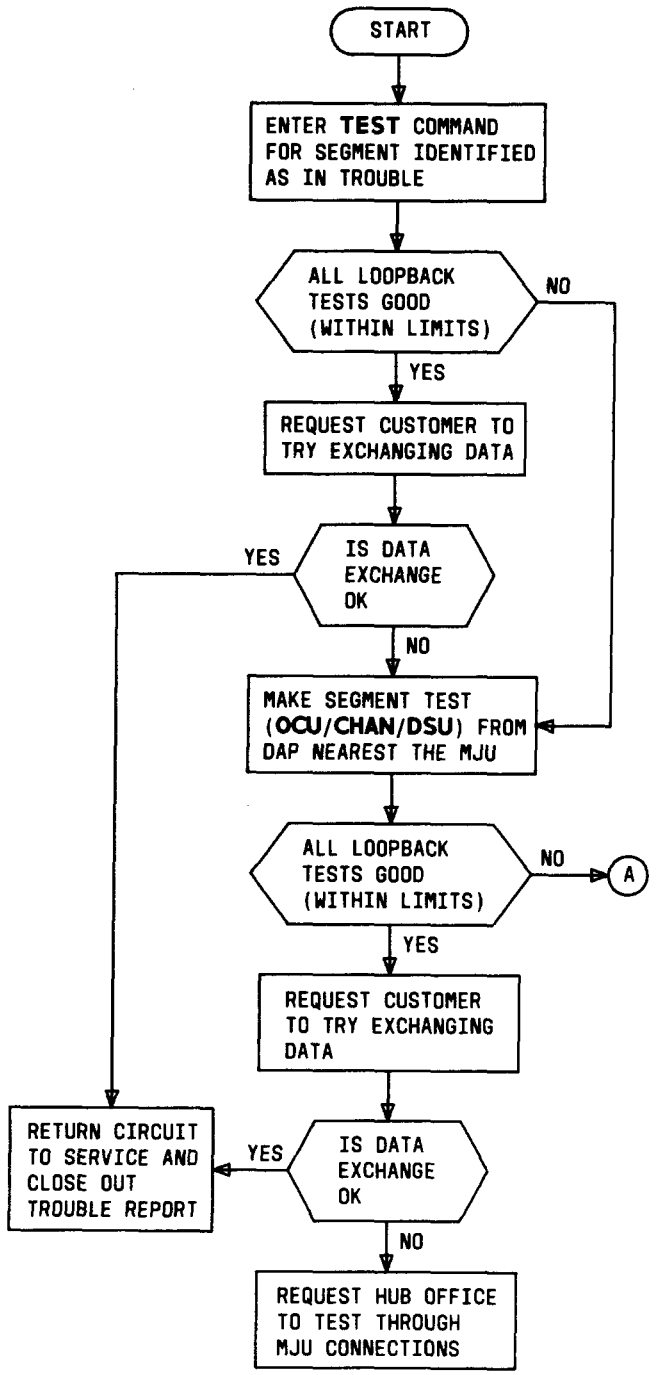
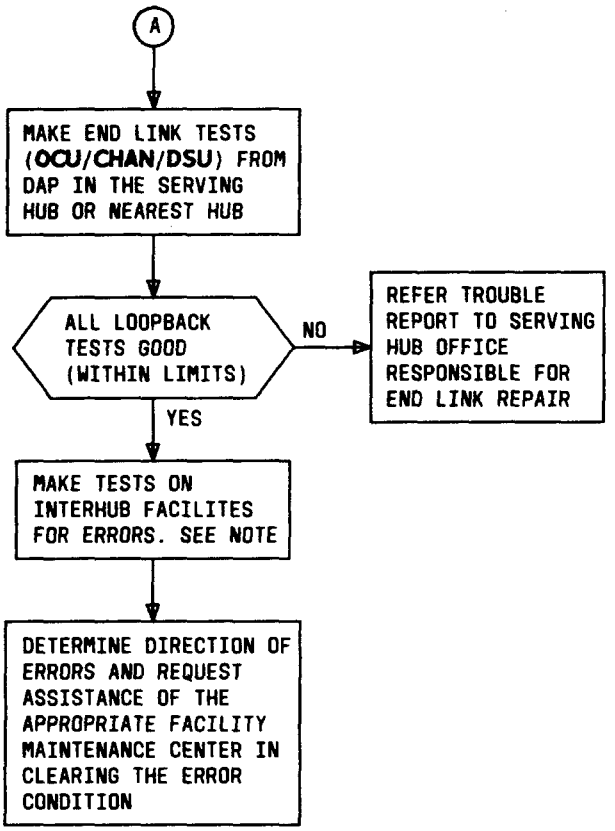


Fig. 23 - Multipoint Sectionalization When Segment in Trouble Is Identified (Sheet 1 of 2)



NOTE 1:
DIGITAL TRANSMISSION SURVEILLANCE SYSTEM REPORTS ARE A USEFUL TOOL AND SHOULD BE USED IN LOCATING FACILITY FAILURES OR IMPAIRMENTS. REFER TO PRACTICE AT&T 314-984-101.

Fig. 23 - Multipoint Sectionalization When Segment in Trouble Is Identified (Sheet 2 of 2)

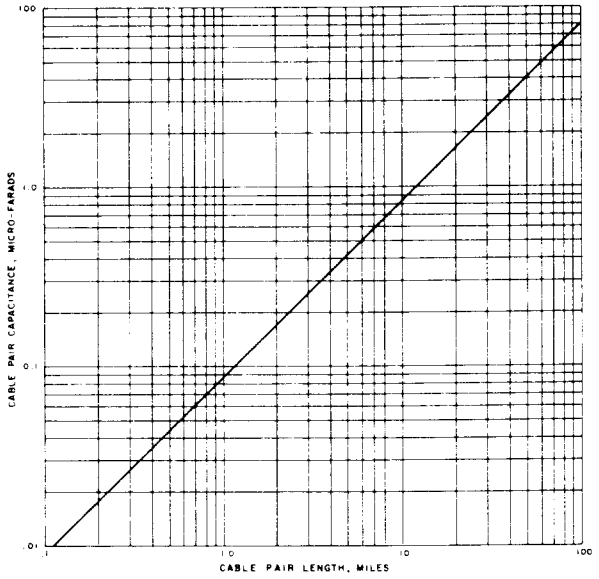


Fig. 24 - Capacitance/Mileage Nemograph

▶TABLE A◀

COMMAND MEANING

COMMAND AND ALTERNATE FORM(S)	MEANING
ADDRESS ADD ADR	Displays the contents of the station address file for a given circuit.
BLOCK BLK	Drops a leg off a specified MJU on a multipoint circuit. The leg will remain blocked until restored by the UNBLOCK command.*
CAPACITANCE VMC	Requests a LATS measurement of capacitance on any pair combination of a 4-wire loop to a particular station. A directed test.
CHANLOOP CSULOOP CSU CLB LBC	Requests a channel loopback test be performed on a circuit. A directed test.
CLEAR CLR	Clears the screen.
DISPLAY DSPLY DSP	Provides an overall layout of a specified 2-point circuit or a high level display of an individual segment of a multipoint circuit.
DSULOOP DSU DLB LBD	Requests a loopback test on a DSU be performed on a circuit. A directed test.
ERRORS ONES	Instructs the BATS to insert a burst of errors into the circuit on which technician is performing a straightaway test.
HELP ?	Requests information from the system that will aid the technician in using the system.
INITIALIZE INIT START	Requests the system to send a restart message to the SC in the office specified. A privileged user command for Digital Network Administration Center.
LATCH LCH	Indicates to the system that the technician wants to run a series of tests on the specified circuit. The LATCH command will automatically release after 5 minutes of no activity. The system will remind the technician every 30 seconds while latched. (See RELEASE command.)

▶TABLE A (Contd)◀

COMMAND MEANING

COMMAND AND ALTERNATE FORM(S)	MEANING
LIST LST DUMP	Requests a list of active tests within the system. A privileged user command only for the Digital Network Administration Center.
LOOPBACK LBACK LOOP LBK	Directs the system to activate any of the new latching loopbacks.
MONITOR MON	Bridges the BATS onto a circuit (at the DS-1 or DS-0 level), and monitors the bit patterns in both directions. A directed test.
NEWS N	Provides the technician with a means of quickly obtaining information relevant to the system.
OCULOOP OCU LBO OLB	Requests an OCU loopback test to be performed on a circuit. A directed test.
QSTATUS QSTS QS	Provides the technician with the queue delay time of a specific sequence controller. Only the privileged user may receive information on all sequence controllers by not specifying a particular office. This command provides the following: • Total delay time (4-digit number representing minutes and seconds) • List of scheduled tests by serial number • Circuit number(s) for scheduled test(s) • Name of Centralized Test Center or office requesting test(s) • The office name for the queue status • Test length of scheduled test(s) • Expected start time of scheduled test(s).
RELEASE RLS RLSE	Releases the circuit currently latched by that terminal. (See LATCH command.)
RPT	Provides error count at any time during a directed test interval.
RESET RST	Resets the LATS error counter and test duration for a straightaway test already in progress by the technician. The error count can be reset more than once but not the DURATION parameter.

▶TABLE A (Contd)◀

COMMAND MEANING

COMMAND AND ALTERNATE FORM(S)	MEANING
RESISTANCE VMR	Requests a LATS measurement of resistance on any conductor pair or on all pairs of the 4-wire local loop to a station. A directed test.
SECONDTEST SCT SCTEST	Activates the secondary channel test on a circuit equipped for secondary channel.
STATUS STS	Performs interface check on test equipment in a specified office.
STRAIGHTAWAY STW	Requests BATS to insert a work test (511 for subrate -- 2047 for 56 kb/s) into the specified circuit and look for the same pattern from the A or Z direction of the test. A directed test. The system will automatically set itself to a 1-minute duration if not specified.
TERMINATE ABORT STOP TER	Stops the test progress on the specified circuit.
TEST TST	Performs fully automatic sequenced tests on the circuit or segment that was specified.
TWOPOINT PTP	Requests two sequence controllers to perform straightaway tests with each other. The system will automatically set itself to a 1-minute duration if not specified. A directed test.
UNBLOCK UNBLK UNB	Unblocks a previously blocked leg of an MJU. (See BLOCK command.)
VMTEST VMT	Performs complete ac and dc voltage, resistance, and capacitance testing (as required) on a 4-wire local loop to a station.
VOLTAGE VMF FOR	Performs a foreign voltage (alternating or direct current) test on a specific conductor pair or on all pairs to a station. A directed test.

* This command is coded, but recognition of the command by ABATS will be ignored until the MJUs in the field are modified to support this function. (See UNBLOCK command.)

▶TABLE B◀

PARAMETER MEANING

PARAMETER AND ALTERNATE KEYWORD(S)	MEANING
ACCESSPOINT AP TESTPOINT ACC TP	This allows the technician to specify, on a particular circuit, where to access the circuit in order to perform the test. An access point is required for some commands and optional for others. If not specified, the system will automatically select an access point for some tests.
CIRCUIT CKT CIR	This allows the technician to specify which customer circuit will be tested.
DIRECTION DIR	This specifies whether the system should test toward the A or Z direction from the selected access point. On commands where direction is a valid optional parameter and the parameter is not specified, the Z station direction will be selected automatically. The only exception is the TEST command where both directions are tested.
GO	This may be entered in the entry line to indicate to the system NOT to prompt for any more optional parameters.
INTERVAL INT TIME	This informs the system how often to report the error count of a directed test. The system will default (automatically set itself) to 15 seconds if the interval is not specified except for PTP command, which is 1-minute.
MJU	This is used with the SEGMENT parameter to further identify which branch of an MJU will be tested.
OFFICE OFF HUB	This is used with the STATUS, QSTATUS, and INITIALIZE commands to specify which DDS hub office to check.
LOOPTYPE LTYPE	Used only with the LOOPBACK command to specify the generic name of the equipment to be looped back.
LOOPNUMBER LNUMBER LN	Used to specify which loopback is to be operated when there is more than one of the same generic equipment.
PAIR CONDUCTORS	This is used with a command to specify which pair combination of a 4-wire local loop on which to perform metallic tests.
PREEMPT PRE	This allows the technician to prevent the SC (sequence controller) from interrupting a manual test in progress at a hub. The ABATS will automatically interrupt the test equipment being used in a manual mode if this parameter is not used.
QUEUE Q	This allows the technician to specify whether or not a test should be queued (to schedule a test at a later time). Queuing is used when a selected SC is busy with other tests.
SEGMENT SEG	This is used to specify which segment of a multipoint circuit will be tested.

▶TABLE B (Contd)◀

PARAMETER MEANING

PARAMETER AND ALTERNATE KEYWORD(S)	MEANING
STATION STN	This may be used in lieu of the SEGMENT parameter to specify which station to test.
TESTLENGTH DUR LEN LENGTH DURATION	This allows the technician to specify the duration of a directed test. The system will automatically set itself to 15 seconds (to 1 minute for TWOPOINT command) if not specified. The duration may be up to 15 minutes. For 15-second test, enter zero.
TESTWORD TWORD	Used with the LOOPBACK command to specify which test pattern to use.
UNIT	Used to specify at which ABATS micro to initiate the STS or INIT command at locations which have two micros.

▶TABLE C◀

COMMANDS AND REQUIRED OR OPTIONAL PARAMETERS

COMMAND	PARAMETER (NOTE 1)															
	CKT	SEG (NOTE 2)	UNIT (NOTE 3)	STN	AP	DUR	INT	DIR	QUE	PRE	GO	PAIR	OFF	LTYPE	LN	TWORD
ADD	X															
BLK*	X	X														
VMC	X	X		O	X				O	O		X				
CSU	X	X		O	O	O	O	O	O	O	O					
CLR																
DIS	X	O														
DSU	X	X		O	O	O	O	O	O	O	O					
ONES	X															
?(Help)†																
INIT‡			X										X			
LBK	X	X		O	O	O	O	O	O	O	O			X	O	O
LCH	X															
LST‡																
MON	X	X		O	O	O	O	O	O	O	O					
N																
OCU	X	X		O	O	O	O	O	O	O	O					
QS§													X			
RLS																
REP	X															
RST	X															
VMR	X	X		O	X				O	O		X				
SCT	X	X		O	O	O	O	O	O	O	O					

See notes and footnotes at end of table.

♦TABLE C (Contd)♦

COMMANDS AND REQUIRED OR OPTIONAL PARAMETERS

COMMAND	PARAMETER (NOTE 1)															
	CKT	SEG (NOTE 2)	UNIT (NOTE 3)	STN	AP	DUR	INT	DIR	QUE	PRE	GO	PAIR	OFF	LTYPE	LN	TWORD
STS			X										X			
STW	X	X		O	X	O	O	O	O	O	O					
TER	X															
TST	X	X		O	O			O		O	O					
PTP	X				X	O	O		O	O	O					
UNB*	X	X														
VMT	X	X		O	X				O	O						
VMF	X	X		O	X				O	O		X				

Note 1: X = Required Parameter
O = Optional Parameter

Note 2: Required for multipoint circuit; not allowed for 2-point circuit.

Note 3: Required parameter only at locations with two micros.

* Ignored until MJU is modified.
† ? (Name of command or parameter is optional.)
‡ For privileged user only.
§ Optional for privileged user.

TABLE D

PARAMETER DEFAULTS

PARAMETER	DEFAULT
DIRECTION	Z
DURATION	15 Seconds*
INTERVAL	15 seconds
PREEMPT	Yes
QUEUE	Yes†

* 1 minute with TWOPOINT command.
† Cannot queue with automatic test sequencing.