

**2100A DATA CONTROL UNIT
(DIAGNOSTIC CONSOLE)
DESCRIPTION AND OPERATION
"DATAPHONE®" II SERVICE**

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1. GENERAL

1.01 This section contains the physical and functional description and operating procedure for the 2100A-L1 data control unit (DCU) diagnostic console (DC) shown in Fig. 1.

1.02 This section is reissued to include information about a new adapter (comcode 842993925) and to revise Uniform Service Order Code (USOC) information. Revision arrows are used to emphasize the more significant changes.

1.03 The DC works by itself or in conjunction with another DC or with 2200A-L1 DCU network controller (NC). The NC provides greatly expanded control and diagnostic capabilities. For more information regarding the NC refer to Section 592-102-100. The DC and NC are referred to jointly as diagnostic control devices (DCDs).

1.04 The DC is a part of the network diagnostic system (NDS) of DATAPHONE® II service. The DC expands the diagnostic features of data sets (DSs) 2024-, 2048-, and 2096-type of the DATAPHONE II service.

1.05 Data control unit 2100A provides control and diagnostic functions to DATAPHONE II service data set networks.

1.06 The DC provides approximately the same control and diagnostic features as the data sets with the following additions.

- Additional tests and commands for expanded capabilities.
- Capability to extend the duration of certain tests.
- Rapid selection of certain frequently used tests or commands by means of user assignable keys.

- Ability to access any data set on the network to which it is connected.
- Ability to gather, display and keep up to date network faults and their location.
- Capability of testing extended service networks.

1.07 The following is a technical specification summary of the DC:

Power Requirements: 105 to 129 volts, 34 watts maximum, at 57 to 63 Hz

Ambient Temperature Range: +40 to +120°F

Relative Humidity Range: 5 to 95 percent, noncondensing

Operating Mode (On Control Channel and Remote Port): Half-duplex, 1200 bps

2. PHYSICAL DESCRIPTION

2.01 The DC measures 16 inches wide, 9 inches deep, and 6 inches high and weighs approximately 14 pounds. The DC may be desktop or (with adapters) rack mounted.

2.02 A power cord and an interface cable are present at the rear of the DC. The plug on the power cord is designed to be inserted into a 117-volt, 15A ac outlet. ♦The interface cable is terminated in a 25-pin male connector which is plugged into an adapter (comcode 842993925) equipped with two 10-pin control channel connectors and one 25-pin Electronic Industries Association (EIA) RS-232C connector. The interface cable may be extended to a maximum of 50-feet using M25A cable or cables.♦

2.03 Control Channel Interface: The DC interfaces the local data set mountings and, if required, a local NC or another DC via the 1200 bps duplex control channel operating in half-duplex mode. ♦Connection of the control channel to the data set mountings is via the adapter 10-pin control channel connector. Connection of the control channel to an NC or a second DC may be via the adapter 10-pin control channel connector also.♦

2.04 Remote Access Interface: The DC also permits remote access by the telephone com-



Fig. 1—2100A-L1 Data Control Unit (Diagnostic Console)

pany (telco) test center or the customer to the local data sets. Data sets 202T (private line) or 212AR (switched network) connected to the adapter 25-pin EIA connector are required for this application.

2.05 Instruction Card: The door below the front panel opens to reveal an instruction card containing the DC test and command menus (Fig. 2).

2.06 The following paragraphs provide a description of the DC front panel (Fig. 3) indicators, displays, and switches arranged by functional groups.

2.07 Front Panel Switches and Indicators: Physical characteristics of switches and indicators may be found accompanying the functional description in Part 3.

3. FUNCTIONAL DESCRIPTION

DIAGNOSTIC CONSOLE FUNCTIONAL GROUPS

A. NETWORK FAULTS Functional Group

3.01 The network faults portion of the diagnostic console provides the user with the capability to continuously monitor and display faults on any network to which the DC is connected. The network fault information is continuously updated (faults are added and deleted) and displayed on four displays.

3.02 Network Faults Address Display (LOCAL—PORT—NETWORK): This is a 10-digit light emitting diode (LED) display that shows the address of a particular fault. The 3-digit LOCAL display shows the address of the data set to which the DC is connected. A dot appearing in the left most display indicates the fault in the display is the first fault in the active or hold list. The 1-digit



Fig. 2—Diagnostic Console Front View With Hinged Door Open

PORT display shows the port number (1 through 4) of a multiplexed 2096-type data set at the backbone or outboard tributary location associated with the fault location. The 6-digit NETWORK display shows the addresses (two digits per address) of a maximum of two intermediate control type data sets located between the central location control data set and the faulty tributary location on an extended network. A lighted "C" appearing under a NETWORK address display indicates that the data set at the address on the display is a control data set. In the normal mode, the fault display will cycle through the faults in the active list automatically with each one displayed for a few seconds.

3.03 TOTAL FAULTS—ACTIVE Display: A 2-digit LED display that shows the total number of faults in the active list. The total number of faults is equal to the faults in the active list plus the faults in the hold list. Two dots appearing in the ACTIVE display indicate that the address of the fault being displayed in the fault display is from the active list.

3.04 TOTAL FAULTS—HOLD Display: A 2-digit LED display that shows the number of faults in the hold list. The total number of faults is equal to the faults in the active list plus the faults in

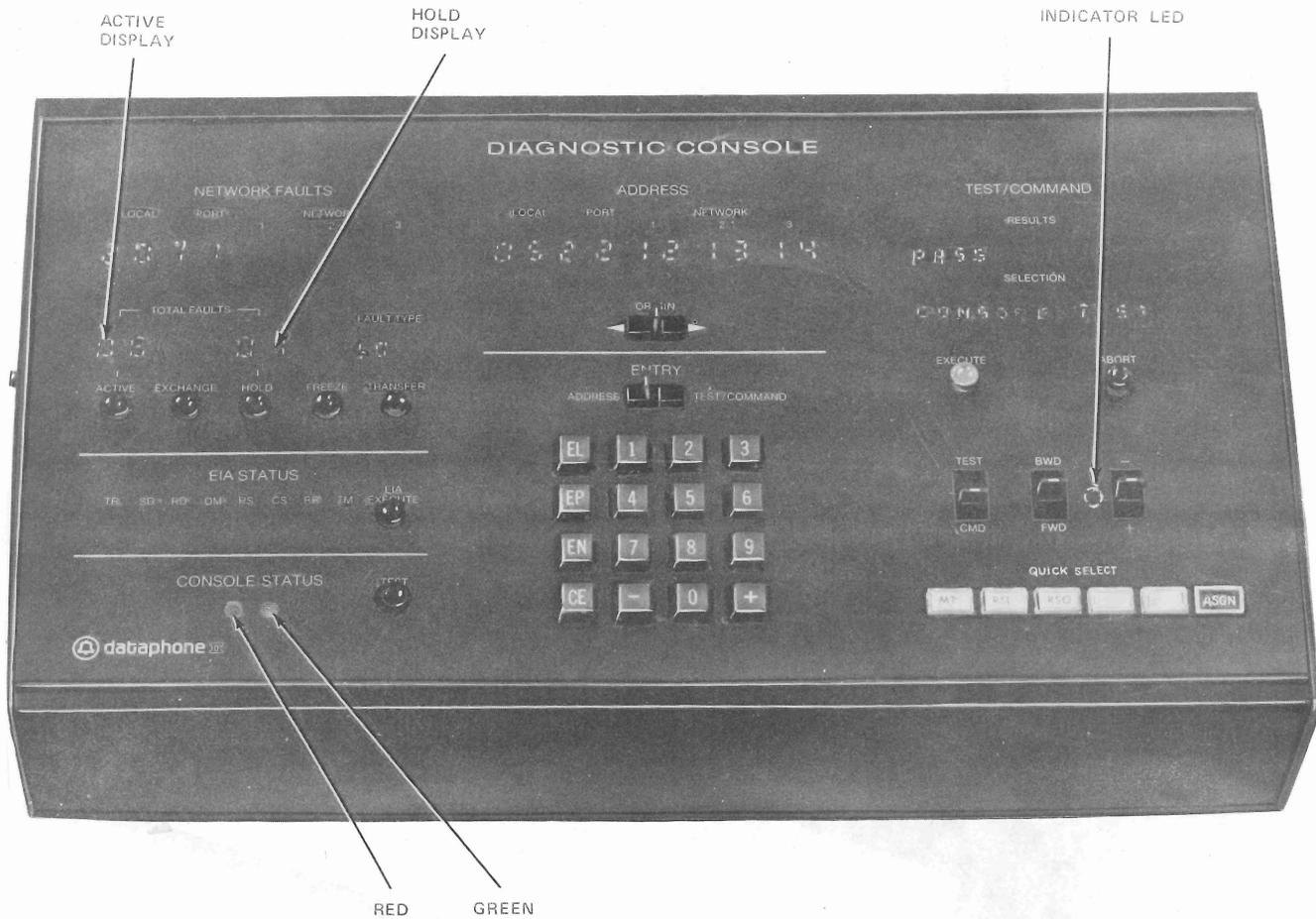


Fig. 3—Diagnostic Console Front Panel

the hold list. Two dots appearing in the HOLD display indicate that the address of the fault being displayed in the fault display is from the hold list.

3.05 FAULT TYPE Display: A 4-character alphanumeric display that shows the type of fault associated with the address appearing in the fault display. The types of faults that can be reported are shown in Table A. When the network faults functional group is disabled **OFF** will appear in the display.

3.06 ACTIVE Switch: A momentary contact pushbutton switch that causes an address from the active list to appear on the NETWORK FAULTS display each time it is depressed. The ad-

dress will be displayed for a few seconds unless the **ACTIVE** switch is depressed again.

3.07 EXCHANGE Switch: A momentary contact pushbutton switch that permits faults to be transferred from the active list to the hold list or vice versa.

3.08 HOLD Switch: A momentary contact pushbutton switch that causes an address from the hold list to appear on the NETWORK FAULTS display each time it is depressed. The address will be displayed for a few seconds unless the **HOLD** switch is depressed again.

3.09 FREEZE Switch: A momentary contact pushbutton switch that permits the automatic

TABLE A
INDICATED FAULTS
DC FAULT TYPE DISPLAY

FAULT NAME	FAULT TYPE DISPLAY INDICATES	REMARKS
Modem	MD	Data set failure at address shown in NETWORK FAULTS — address display.
Facility	FA	Receive signal quality or receive signal level out of specifications. Reported by data set at address shown in NETWORK FAULTS — address display.
Streaming Terminal	SR	Streaming option of reporting data set has timed out.
No Response	NR	No response on diagnostic channel or control channel after 3 tries.

scan of the active or hold faults to be interrupted. The fault address appearing in the TOTAL FAULTS/ACTIVE or TOTAL FAULTS/HOLD display when the FREEZE switch is depressed will remain in the display until the freeze mode is exited. (The dots in the appropriate display will flash when frozen.)

3.10 TRANSFER Switch: A momentary contact pushbutton switch that copies the address in the NETWORK FAULTS address display to the ADDRESS display.

3.11 C Lamps: In the NETWORK portion of the 10-digit display these lamps light to indicate private line control data sets used in extended service applications.

B. EIA STATUS Functional Group

3.12 EIA STATUS Indicators: The eight red LED indicators display the status of selected EIA customer interface leads. The LED indicators display the status of the following interface leads:

- Terminal Ready (TR)
- Send Data (SD)

- Receive Data (RD)
- Data Mode (DM)
- Request-to-Send (RS)
- Clear-to-Send (CS)
- Receiver Ready (RR)
- Test Mode (TM)

3.13 EIA EXECUTE Switch: A momentary contact switch which, when depressed, causes the EIA STATUS indicators to display the status of the interface leads on the data set determined by the location of the origin dots in the ADDRESS display. The indicators will provide a snapshot of the status of the interface leads at the time the EIA EXECUTE command is received by the designated data set. The indications may be on, off, or changing.

C. CONSOLE STATUS Functional Group

3.14 CONSOLE STATUS Indicators: These two LED indicators (one red, one green) indi-

cate the status of the DC. The green LED remains lighted during normal operation and the red LED lights when DC self-test circuitry has detected a malfunction with the DC or when the battery switch is *off*.

3.15. CONSOLE TEST Switch: A momentary contact pushbutton switch used to test the LED indicators and displays as well as the internal circuitry. The result is a PASS or FAIL indication.

D. ADDRESS Functional Group

3.16 ADDRESS Display (LOCAL-PORT—NETWORK): The switch and display in this section are used to display the address of the data set to receive the tests and/or commands sent from the DC. The 10-character ADDRESS display and three "C" indicators show the entered data set address in the same pattern as the fault display located in the NETWORK FAULTS section.

3.17 ORIGIN Switch: This is a 3-position, nonlocking, spring-loaded paddle switch with off being in the middle (normal) position. This switch moves a pair of origin dots in the displays from left to right or vice versa. The address that is in the same display as the origin dots will be the address to receive the commands and/or tests shown in the SELECTION display.

3.18 C Lamps: In the NETWORK portion of the ADDRESS display these lamps light to indicate private line control data sets. These lamps are only lighted when an address is copied to this display from NETWORK FAULTS display.

E. ENTRY Functional Group

3.19 ENTRY Switch: This is a 2-position toggle switch that selects the mode in which the keyboard is to be used. In the ADDRESS position, the switch allows the keyboard to enter a selected address in the ADDRESS display. In the TEST/COMMAND position, the switch allows the keyboard to be used with the TEST/COMMAND portion of the DC when required.

3.20 ENTRY Keyboard: This keyboard contains ten numeric keys and six special function keys shown in Table B.

F. TEST/COMMAND Functional Group

3.21 The TEST/COMMAND section of the DC provides the tests and commands that are used to

test and control the networks and data sets chosen in the ADDRESS display and internal functions of the DC. This section also displays the results of chosen tests and commands.

3.22 RESULTS Display: The 12-character display shows all responses to tests or commands.

3.23 SELECTION Display: This 12-character display shows the test or command chosen from the test or command menu (Tables C and D).

3.24 EXECUTE Switch: A momentary-contact pushbutton switch that directs the DC to initiate the test or command shown in the SELECTION display and send it to the data set shown in the ADDRESS display and for that location that contains the origin dots to execute the test or command.

3.25 ABORT Switch: A momentary-contact pushbutton switch that aborts any test or command that has been activated by depressing the EXECUTE switch. Only the last executed test or command can be terminated by the ABORT switch.

3.26 TEST/CMD Switch: This is a 3-position, paddle switch that locks in each position. This switch is used to select either the test (TEST) or command (CMD) menu that will appear in the SELECTION display.

3.27 BWD/FWD Switch: This is a 3-position, nonlocking, spring-loaded paddle switch. This switch permits the test or command menu, as selected by the TEST/CMD switch, to be moved in either the forward (FWD) or backward (BWD) direction until the desired test or command appears in the SELECTION display. Operation of this switch also clears the RESULTS display.

3.28 -/+ (Minus/Plus) Switch: This is a 3-position, nonlocking, spring-loaded paddle switch. This switch is used to proceed through subtests and subcommands after the primary test or command has been chosen using the BWD/FWD switch. In addition, some results, such as a data set option list (when received by the DC) are reviewed using the -/+ switch. With the switch in the - (minus) or + (plus) position the option list is moved in the backward or forward direction, respectively. The LED indicator adjacent to the switch will light when use of the -/+ switch is required.

3.29 QUICK SELECT Fixed Function Keys: These five assignable keys and one ASGN (as-

TABLE B

**16-BUTTON KEYBOARD SPECIAL
FUNCTION KEYS**

KEY	FUNCTION
+, -	Used to add and delete options in the <i>modem options</i> command.
CE	Clear Entry — This key is used to clear the last entry made from the keyboard.
EL	Enter Local Address — operation of this key will clear the LOCAL portion of the ADDRESS display and permit the entry of three characters from the keyboard.
EP	Enter Port — operation of this key will clear the PORT portion of the ADDRESS display and permit the operator to enter a single character in this portion of the ADDRESS display.
EN	Enter Network Address — operation of this key will clear the NETWORK address portion of the ADDRESS display and then permit the entry of up to six characters from the keyboard.

signed) key are pushbutton momentary-contact keys. These keys allow an operator to select a particular test or command simply by depressing one of the five QUICK SELECT keys. The ASGN key permits each of the program keys to store one specific test or command from the test or command menu, respectively. The five QUICK SELECT keys are used to recall the stored tests or commands and display them on the SELECTION display. The selected test or command can then be executed in the same manner as a test or command that had been chosen using the TEST/CMD, BWD/FWD and -/+ switches.

INTERFACE

A. Control Channel Interface

Local Control Channel Interface-In (CC-IN)

3.30 This interface connects the DC to an NC or a second or subsequent DC. The CC-IN connector pin assignments, lead designations, and functions are shown in Table E.

Control Channel Interface-Out (CC-OUT)

3.31 This interface connects the DC to data set mountings or to another DC or NC. The CC-OUT connector pin assignments, lead designations, and functions are shown in Table F.

B. Remote Access Interface (REMOTE)

3.32 Diagnostic console access to remotely located data sets may be accomplished in three ways. The recommended method (described first) and two alternative methods are described below.

3.33 The recommended method involves a DCD at each location. These devices are linked by the EIA RS-232C 25-pin REMOTE connector on the DC. On 4-wire private line facilities a DS 202T is used at each location and on switched network facilities a DS 212AR is used at each location. An advantage of this method is that it leaves the CC-IN and CC-OUT connectors free for local use.

TABLE C

DIAGNOSTIC CONSOLE TEST MENU

TEST NAME (Note 1)	SELECTION DISPLAY	DISRUPTIVE TEST? (Note 2)	MAY BE DIRECTED TO:		REMARKS
			CONTROL DS	TRIBUTARY DS	
Modem Self Test	MODEM TEST				
Modem Test-Single	MT-SINGLE	Yes	✓	✓	
Modem Test-Continuous	MT-CONTS	Yes	✓	✓	
Automatic Network Test	AUTO NET TST	Yes	✓		
End-to-End BLER	END-END BLER				Timed Tests
End-to-End Blocks = 0100	EE-BLKS = 0100	Yes	✓		
End-to-End Blocks = ****	EE BLKS = ****	Yes	✓		
Digital Test	DIGITAL TEST				
Dig. Test Msgs = 0001	DT MSGS = 0001	Yes	✓		
Dig. Test Msgs = ****	DT MSGS = ****	Yes	✓		
Receive Signal Level	RCV SIG LEV	No	✓	✓	
Receive Signal Quality	RCV SIG QUAL	No	✓	✓	Timed Tests
Receive Signal Profile	RCV SIG PROF	No	✓	✓	
Send Test Tone	SEND TONE				Non-Timed Tests
Send 1004 Hz Tone	1004 HZ TONE	Yes	✓	✓	
Send 1804 Hz Tone	1804 HZ TONE	Yes	✓	✓	
Send 2804 Hz Tone	2804 HZ TONE	Yes	✓	✓	
Clear Test Tone	CLEAR TONE	Yes	✓	✓	
Circuit Loss	CIRCUIT LOSS				Timed Tests
CL-IN 1004 Hz	CL-IN 1004	Yes	✓	✓	
CL-IN 1804 Hz	CL-IN 1804	Yes	✓	✓	
CL-IN 2804 Hz	CL-IN 2804	Yes	✓	✓	
CL-OUT 1004 Hz	CL-OUT 1004	Yes	✓	✓	
CL-OUT 1804 Hz	CL-OUT 1804	Yes	✓	✓	
CL-OUT 2804 Hz	CL-OUT 2804	Yes	✓	✓	
Modem Loopback	MODEM LPBK				Non-Timed Tests
Analog Loopback	ANALOG LPBK	Yes	✓	✓	
Digital Loopback	DIGITAL LPBK	Yes	✓	✓	
Clear Loopback	CLEAR LPBK	Yes	✓	✓	
Report Terminal Power	RPT TERM PWR	No	✓	✓	Timed Tests
Abort Test	ABORT TEST	Yes	✓	✓	
Console Test*	CONSOLE TEST	No			
EIA Status†	EIA STATUS	No	✓	✓	

Note 1: Subtest names are indented.

Note 2: Nondisruptive tests may be performed without **console key** enabled.

*Initiated by depressing TEST switch.

† Initiated by depressing EIA EXECUTE switch.

TABLE D

DIAGNOSTIC CONSOLE COMMAND MENU

COMMAND NAME (Note 1)	SELECTION DISPLAY	DISRUPTIVE COMMAND? (Note 2)	MAY BE DIRECTED TO:	
			CONTROL DS	TRIBUTARY DS
Modem Disable/Enable	MODEM DSBL/ENAB			
Disable Modem	DISABL MODEM	Yes	/	/
Enable Modem	ENABLE MODEM	Yes	/	/
Modem Status	MODEM STATUS	No	/	/
Make Busy	MAKE BUSY			
Make Busy Enable	MB-ENABLE	Yes		
Make Busy Release	MB-RELEASE	Yes		
Service Line	SERVICE LINE			
Service Line Connect	SL-CONNECT	Yes		
Service Line Release	SL-RELEASE	Yes		
Standby Facility	STANDBY FAC			
Standby Fac Connect	SF-CONNECT	Yes	/	/
Standby Fac Release	SF-RELEASE	Yes	/	/
Modem Identity	MODEM IDENT	No	/	/
DC Poll List	DC POLL LIST			
DC Poll List - Display	DCPL - DISPLAY	No		
DC Poll List - Acquire	DCPL - ACQUIRE	Yes		
DC Poll List - Add	DCPL - ADD ****	Yes		
DC Poll List - Delete	DCPL - DEL ****	Yes		
DC Poll List - Skip	DCPL - SKP ****	Yes		
Modem Poll List	MD POLL LIST			
Modem Poll List - Disp	MDPL - DISPLAY	No	/	
Modem Poll List - Acq	MDPL - ACQUIRE	Yes	/	
Modem Poll List - Add	MDPL - ADD ***	Yes	/	
Modem Poll List - Del	MDPL - DEL ***	Yes	/	
Modem Poll List - Skip	MDPL - SKP ***	Yes	/	
Modem Options	MD OPTIONS	*	/	/
DS 2096 Chg Mux Mode	2096 CHG MUX			
Op Mode 1-96	OP MODE 1-96	Yes	/	/
Op Mode 1-72	OP MODE 1-72	Yes	/	/
Op Mode 1-48	OP MODE 1-48	Yes	/	/
Op Mode 2-72,24	OP MODE 2-72,24	Yes	/	/
Op Mode 2-48,48	OP MODE 2-48,48	Yes	/	/
Op Mode 2-24,24	OP MODE 2-24,24	Yes	/	/
Op Mode 3-48,24	OP MODE 3-48,24	Yes	/	/
Op Mode 4-24	OP MODE 4-24	Yes	/	/
Automatic Fault Reporting	FAULT REPTG			
Fault Reports - Enable	FR - ENABLE	Yes		
Fault Reports - Disable	FR - DISABLE	Yes		
Fault Reports - Clear	FR - CLEAR LST	Yes		
Diagnostic Console Key	CONSOLE KEY			
Console Key Status	CK-STATUS	No		
Console Key Locked	CK - LOCK ****	No		
Console Key Unlocked	CK - UNLK ****	No		
Change Console Key	CHG *****	No		

Note 1: Subcommand names are indented.

Note 2: Nondisruptive commands may be performed without *console key* enabled.

* **No** when options are displayed, **yes** when options are changed.

TABLE E

LOCAL CONTROL CHANNEL-IN (CC-IN)

PIN NO.	LEAD DESIGNATION	FUNCTION
3	SDI	Send Data In
4	RDI	Receive Data In
5	SG	Signal Ground
6	RCI	Receive Common In
7	RSI	Request-to-Send In
8	CSI	Clear-to-Send In
9	SCI	Send Common In

TABLE F

LOCAL CONTROL CHANNEL-OUT (CC-OUT)

PIN NO.	LEAD DESIGNATION	FUNCTION
1	FG	Fixed Ground
3	SDO	Send Data Out
4	RDO	Receive Data Out
5	SG	Signal Ground
6	RCO	Receive Common Out
7	RSO	Request-to-Send Out
8	CSO	Clear-to-Send Out
9	SCO	Send Common Out

3.34 The first alternative method involves connecting the CC-OUT connector of the DC to the CC-IN connector of the data set via a data link similar to the one described above using DS 202T or DS 212AR.

3.35 The second alternative method is a combination of those described above. Here the DS 202T or DS 212AR data link connects the DC REMOTE connector to the CC-IN connector on the data set. If this last method is used no security of access to the data sets and associated networks can be employed.

3.36 The DC REMOTE connector pin assignments, lead designations, and functions are shown in Table G.

TEST MENU

3.37 The DC provides tests which may be directed to the data sets in the network to which the DC is connected. All these tests may be directed to private line control data sets. A limited number of these tests may be directed to private line tributary or switched network data sets. Each of the tests in the test menu (Table C) is described below.

A. Modem Self Test (MODEM TEST)

3.38 This test checks the transmitter, receiver, and the start-up capability of the data set under test.

3.39 Modem self test (Fig. 4) involves start-up and transmission of an approximately 500-bit message 100 times. This test is run one time if subtest modem test-single (MT-SINGLE) is selected or continuously if subtest modem test-continuous (MT-CONTS) is selected.

B. Automatic Network Test (AUTO NET TEST)

3.40 This test (Fig. 5) can be directed only to private line control data sets. The purpose of the automatic network test is to quickly and effectively test all data sets contained in a control data set's poll list. The automatic network test checks the control data set and tributary data set, transmitter and receiver, and the telephone facility connecting them.

3.41 The control data set generates a 63-character (504 bits) message and transmits it on the primary channel to each tributary data set on its poll list. The tributary data set receives the message, checks it for errors, starts up (multipoint tributaries), and transmits a good copy back to the control data set. (This message also contains an error indication if one was generated by the original transmission.) The control data set checks the new message for errors and records this information. This exchange of messages is accomplished for each tributary data set on the control data set's poll list. If two or more message errors are recorded when testing with a particular tributary then the test to that tributary is considered to have failed. After the control data set has cycled through the poll list 50 times the

TABLE G

REMOTE ACCESS INTERFACE (REMOTE)

PIN NO.	FUNCTION	LEAD DESIGNATION RS-232C
1	Protective Ground	AA
2	Transmitted Data	BA
3	Received Data	BB
4	Request-to-Send	CA
5	Clear-to-Send	CB
6	Data Set Ready	CC
7	Signal Ground	AB
20	Data Terminal Ready	CD
21	Remote Digital Loopback	RL*
23	Speed Select	CH*
25	Make Busy/Analog Loopback	CN*

* Non-EIA RS-232C lead.

test information is ready to be sent to the DC. When this information is received by the DC the total number of tributaries and the list of tributaries that failed the test will be indicated in the RESULTS display.

C. End-to-End Block Error Test (END-END BLER)

3.42 This test (Fig. 6) can be directed only to private line control data sets or switched network data sets. The purpose of the end-to-end block error test is to provide block error information both inbound and outbound of the data set selected as the origin of the test. The operator may choose the test length using the preassigned test length of 100 blocks using EE-BLKS=0100 or using EE-BLKS=**** and specifying the number of blocks.

3.43 When the test is initiated by the diagnostic console operator, the data set selected as the origin of the test transmits a 504-bit (63-characters) block message to a selected remote data set. The re-

ote data set checks for block errors and sends the error information to the test origination data set. The remote data set then transmits a new 504-bit block message back to the test origination data set. The test origination data set checks this message and records the presence of any block errors. This process is repeated 100 times if subtest EE-BLKS=0100 is used or the number of times chosen by the operator is subtest EE-BLKS=**** is used.

3.44 The approximate times required to execute the EE-BLER=0100 subtest for each DATAPHONE II service data set are: DS 2024-type 1.5 minutes, DS 2048-type 1.25 minutes, and DS 2096-type 1 minute.

D. Digital Test (DIGITAL TEST)

3.45 This test (Fig. 7) can be directed only to private line control data sets. Digital test checks the control data set and tributary data set transmitter and receiver and the telephone facility connecting

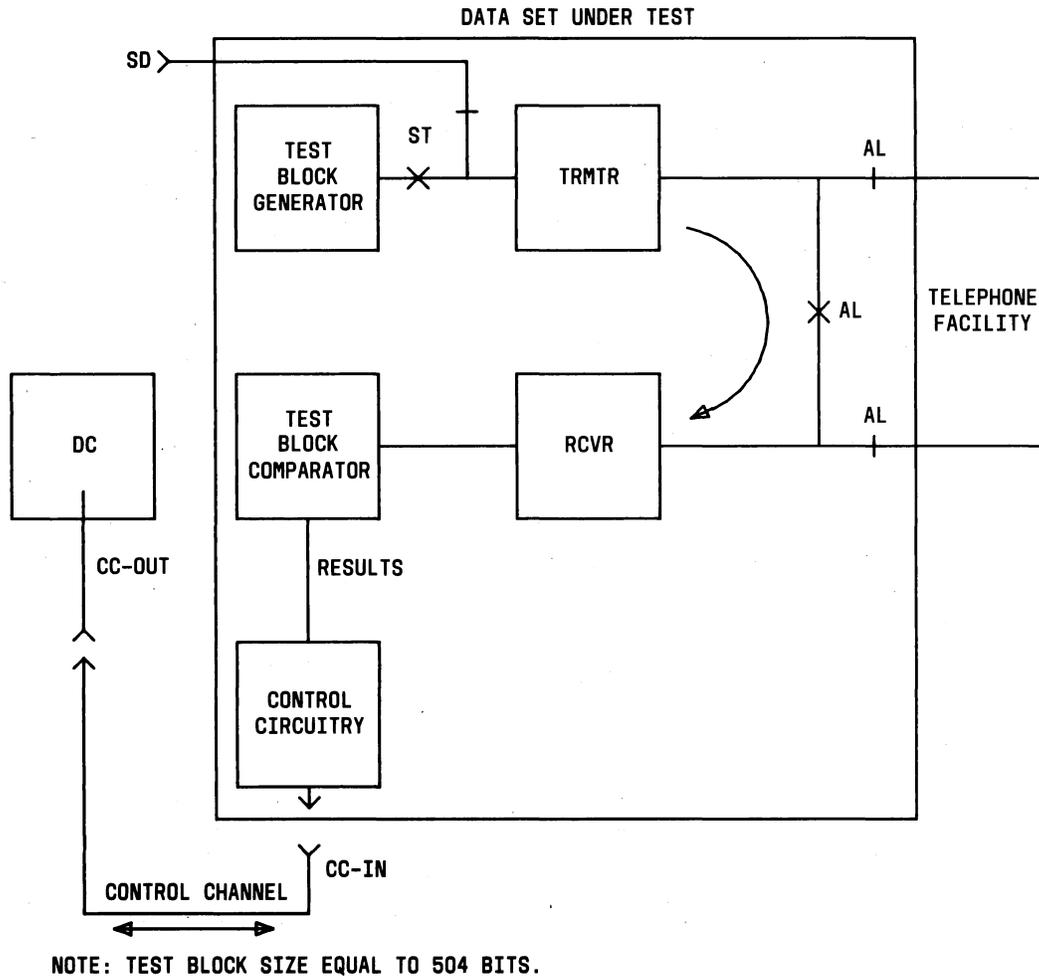


Fig. 4—Modem Self Test

them. Digital test employs two subtests: digital test equal to 1 (DT-MSGS=0001) and digital test messages equal to an operator chosen figure (DT-MSGS=****). One message is equal to 100,000 bits using a standard 511-bit pseudorandom word.

E. Receive Signal Level (RCV SIG LEV)

3.46 This test command directs the selected data set to measure the level of the signal at the input of the receiver and send the result back to the DC. The RESULTS display indicates the level in dBm as "LEVEL -xxDBM" where "x" is the level to the closest whole number.

F. Receive Signal Quality (RCV SIG QUAL)

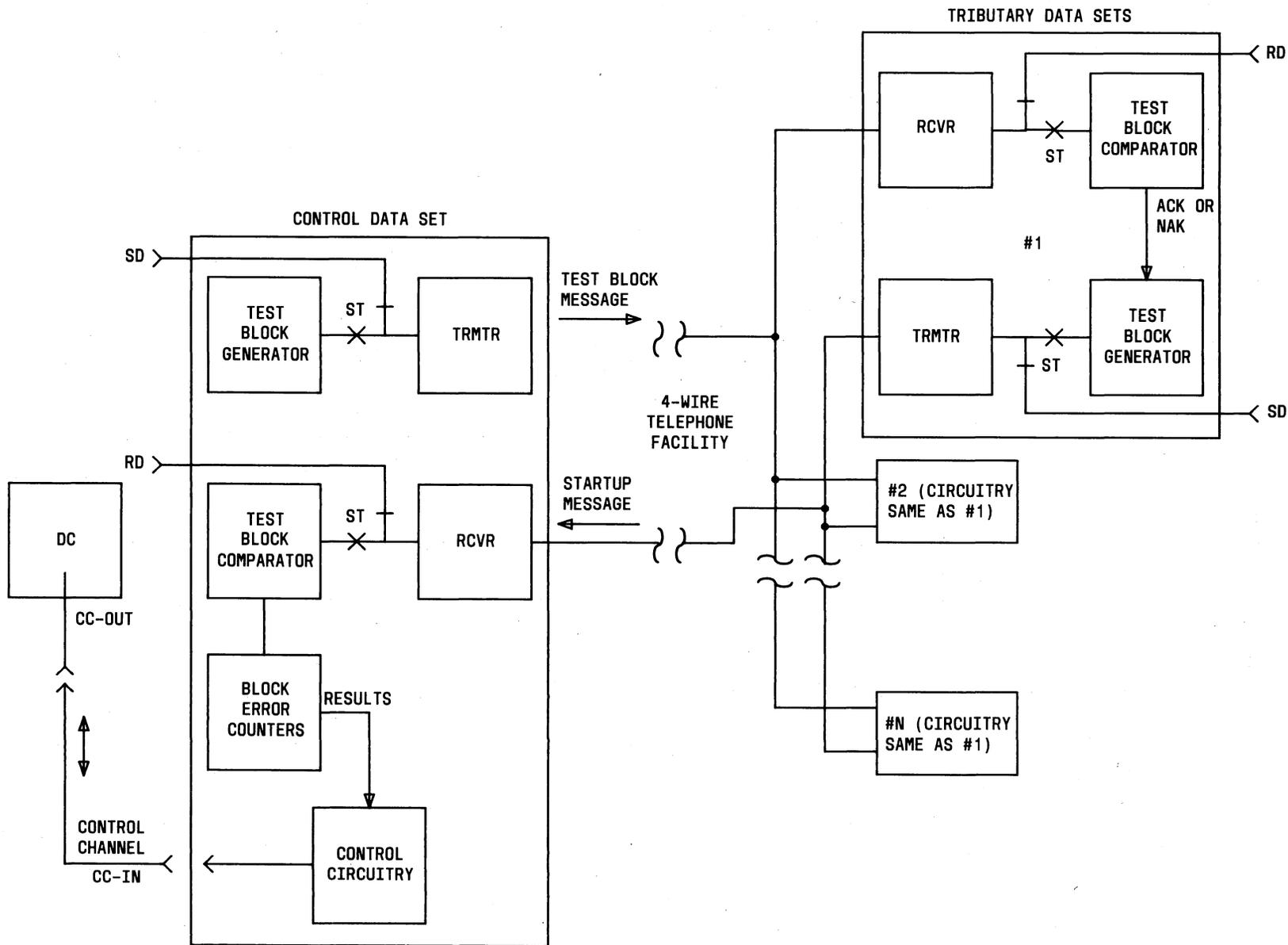
3.47 This test command directs the selected data set to determine the quality of its received sig-

nal and send this information to the DC. The receive signal quality will be indicated in the RESULTS display as "SIG QUAL x" where "x" is a number between 0 and 9. **Higher** numbers (eg, SIG QUAL 9) indicate degraded signal quality.

G. Receive Signal Profile (RCV SIG PROF)

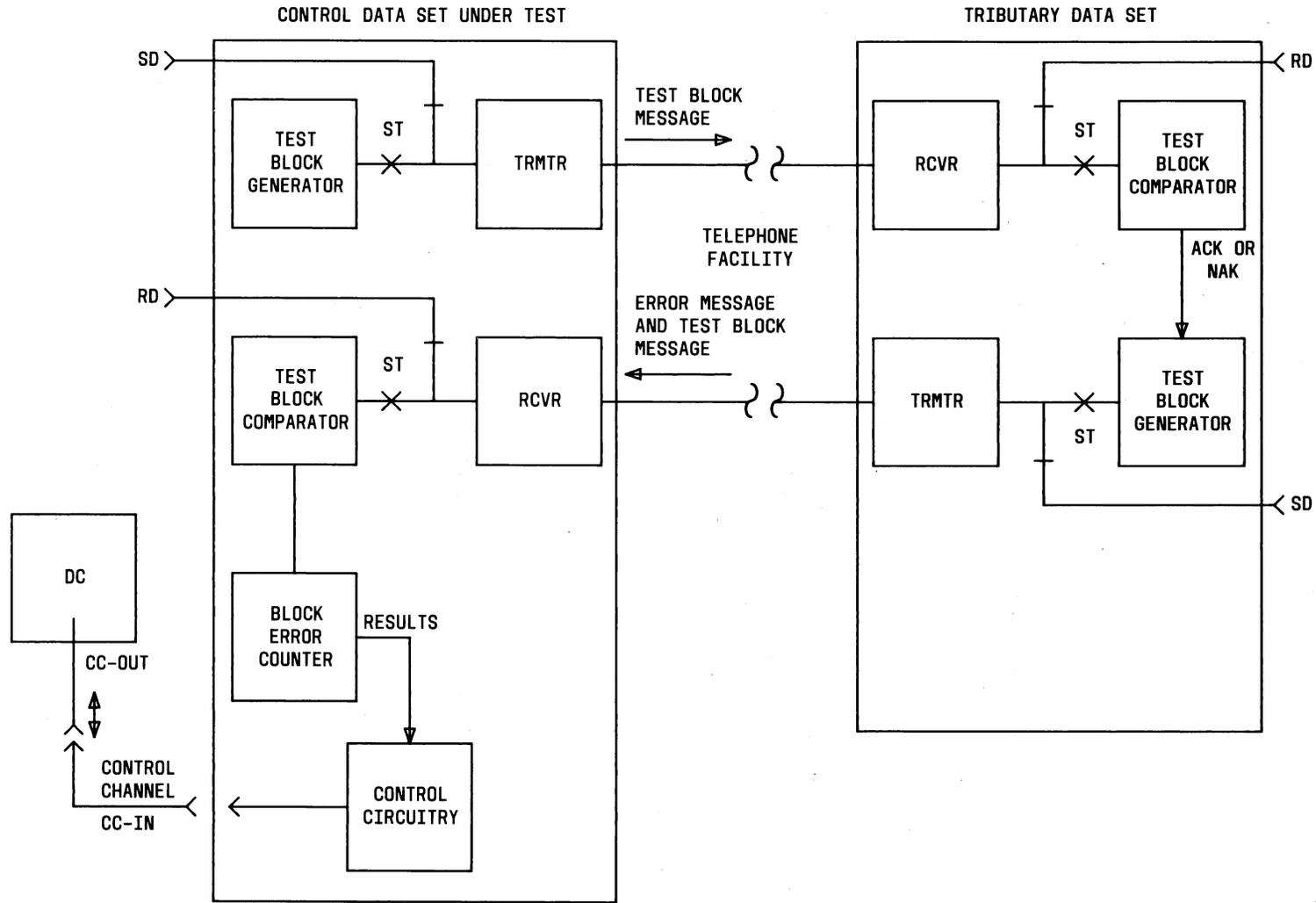
3.48 This test command directs the selected data set to sample selected analog transmission parameters and transmit the information back to the DC.

3.49 Table H lists the parameters indicated by this test command and the form of display of each in the RESULTS display. Each, except receive signal level (self-explanatory), indicates a number between 0 and 9. **Higher** numbers (eg, NOISE=9) indicate a degraded signal.



NOTE: TEST BLOCK SIZE EQUAL TO 504 BITS.

Fig. 5—Automatic Network Test



NOTE: TEST BLOCK SIZE EQUAL TO 504 BITS.

Fig. 6—End-to-End Block Error Rate Test

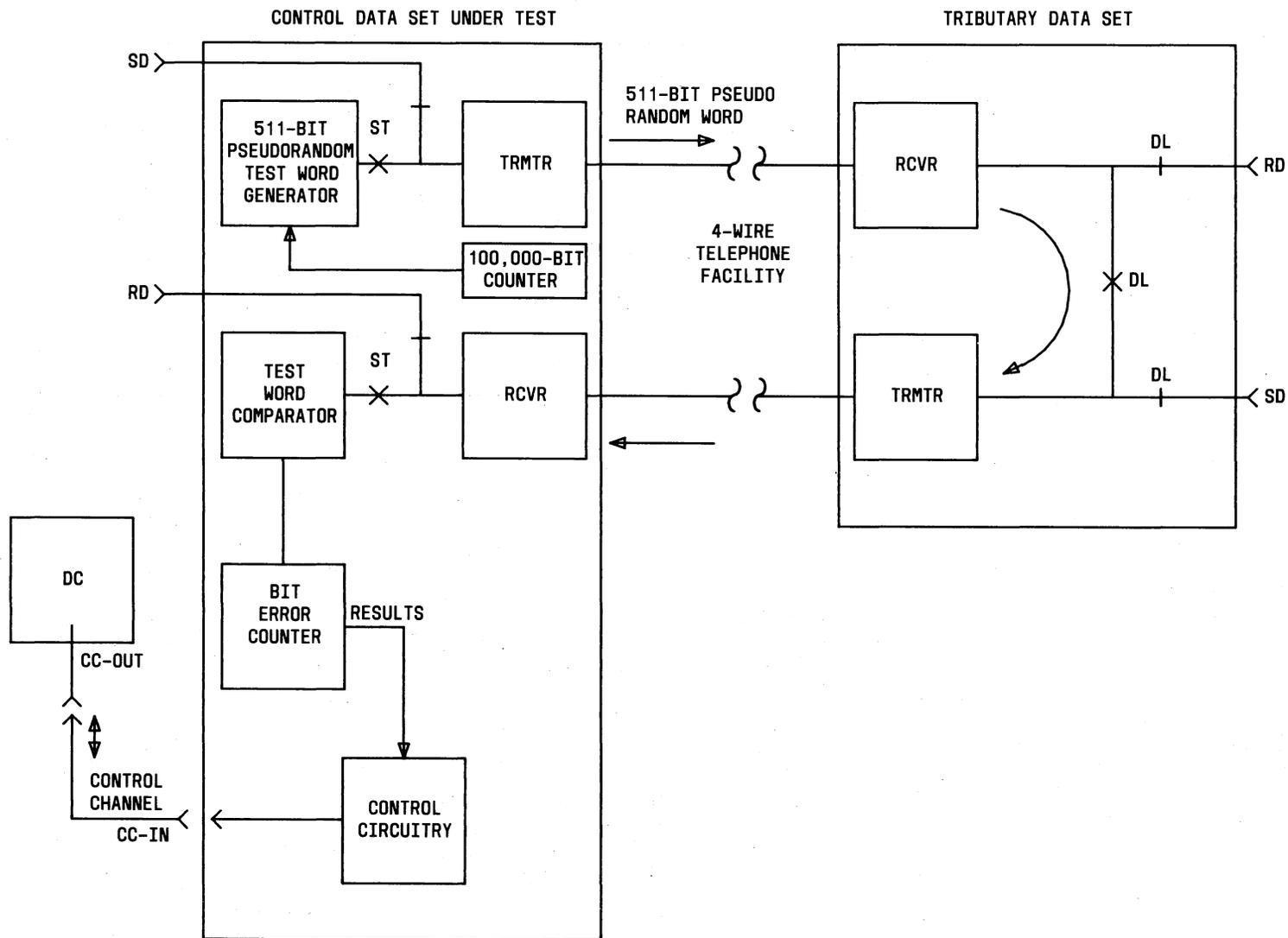


Fig. 7—Digital Test

TABLE H

**SIGNAL PROFILE TEST COMMAND ANALOG
TRANSMISSION PARAMETERS**

Parameter	RESULTS Display Indication
Receive Signal Level	LEVEL- _ _DBM
Receive Signal Quality	SIG QUAL = X
Noise	NOISE = X
Phase Jitter	PHASE JTR = X
Frequency Shift	FREQ SHIFT = X

H. Send Test Tone (SEND TONE)

3.50 This is a nontimed disruptive series of tests (Fig. 8) which can be directed to any data set in the network. Three subtests (1004 HZ TONE, 1804 HZ TONE, and 2804 HZ TONE) are used to direct a data set to send a tone continuously at the frequency selected. The fourth subtest (CLEAR TONE) turns off the tone being sent.

I. Circuit Loss (CIRCUIT LOSS)

3.51 This is a timed disruptive series of tests which can be directed to all data sets. There are six circuit loss (CL) subtests. Three subtests are CL-IN at 1004, 1804, and 2804 Hz (Fig. 9). Three subtests are CL-OUT at the same frequencies (Fig. 10). These subtests permit the user to measure the loss of the analog voice bandwidth circuit at three different frequencies both inbound to and outbound from a selected control data set.

3.52 After any subtest has been executed the RESULTS display will indicate the circuit loss (eg, LOSS=17DB).

J. Modem Loopback (MODEM LPBK)

3.53 This test command directs a selected data set to enter or exit the analog and digital loopback modes. To implement this test three subtests: analog loopback (ANALOG LPBK), digital loopback (DIGITAL LPBK), and clear loopback (CLEAR LPBK), are provided.

3.54 In the analog loopback subtest (Fig. 11) the output of the data set transmitter is connected

to the input of the data set receiver. If the user at any time desires to measure the power level of the data set transmitter he may accomplish this by entering this mode and directing a receive signal level test to the same data set.

3.55 In the digital loopback subtest (Fig. 12) the output of the receiver is looped to the input of the transmitter.

3.56 The clear loopback (CLEAR LPBK) subtest is used to take a data set out of analog or digital loopback subtest mode.

K. Report Terminal Power (RPT TERM PWR)

3.57 This test command is used to determine if the data terminal equipment (DTE) connected to a selected data set is powered. When the test is initiated the data set examines customer interface lead request-to-send (RS) for a predetermined voltage level. Upon completion of the test the RESULTS display will indicate "POWER ON" or "POWER OFF".

L. Abort Test (ABORT TEST)

3.58 This test command is used to clear (abort) ongoing tests initiated at the data set.

3.59 When this test command is complete (the intended data set is out of the test mode) the RESULTS display will indicate COMPLETED.

COMMAND MENU

3.60 The DC provides commands which may be used to control the DC itself and directed to

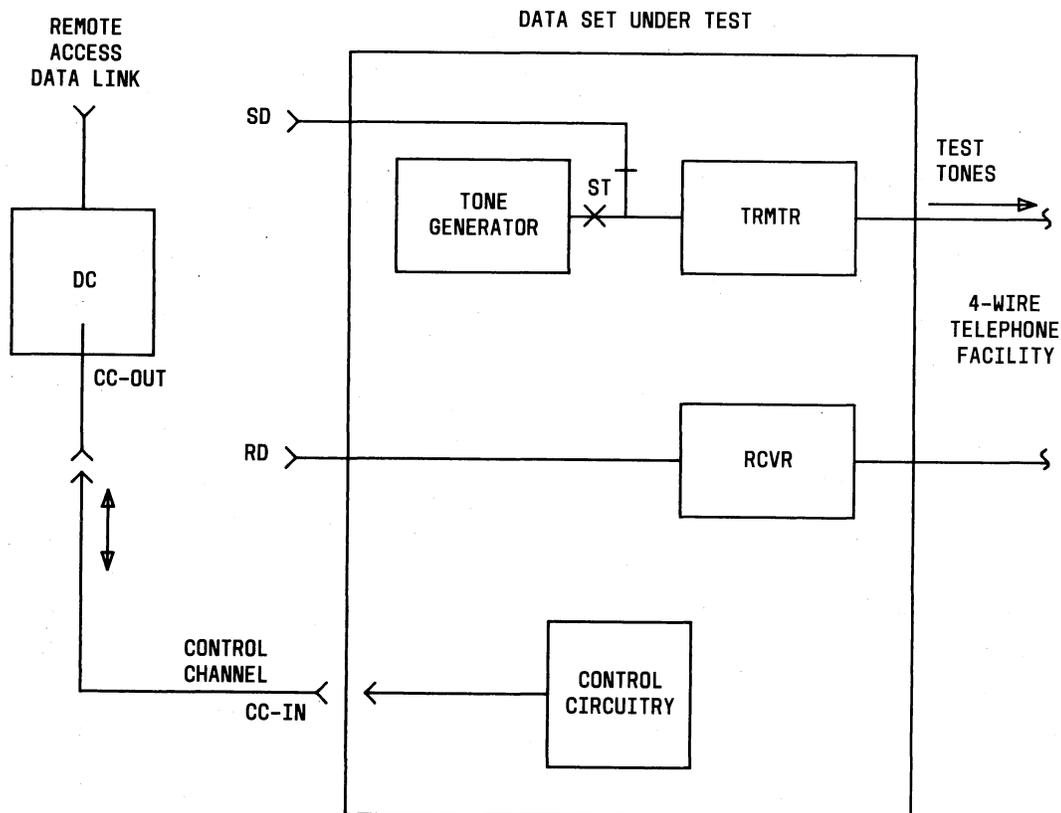


Fig. 8—Send Test Tone

data sets in the network to which the DC is connected. These commands are listed in Table D and described below.

A. Modem Disable/Enable (MODEM DSAB/ENAB)

3.61 This command may be directed to private line data sets only. It is used to remove the primary channel transmitter and receiver of the data set from the network or restore it to the network. The subcommand disable modem (DISAB MODEM) is used to remove a data set from the network. When a data set is disabled the transmitter output is looped to the receiver input in a local loopback configuration. In this condition the clear-to-send (CS) and data mode (DM) customer interface leads are held *off*.

3.62 The subcommand enable modem (ENABLE MODEM) is used to reconnect a disabled data set transmitter and receiver to the network for normal operation.

B. Modem Status (MODEM STATUS)

3.63 This command permits the DC operator to interrogate any data set in the network to learn the data set fault and mode status. Refer to Table I.

C. Make Busy (MAKE BUSY)

3.64 This command will direct a switched network data set to enter or exit the make busy mode. The make busy mode, when enabled, causes the data set to make itself appear busy to incoming telephone calls. Two subcommands are used with this command: make busy enable (MB-ENABLE) places a data set in the make busy mode and make busy release (MB-RELEASE) removes the data set from the make busy mode. Reserved for future use.

D. Service Line (SERVICE LINE)

3.65 This command will direct a switched network data set to connect to or release from a service

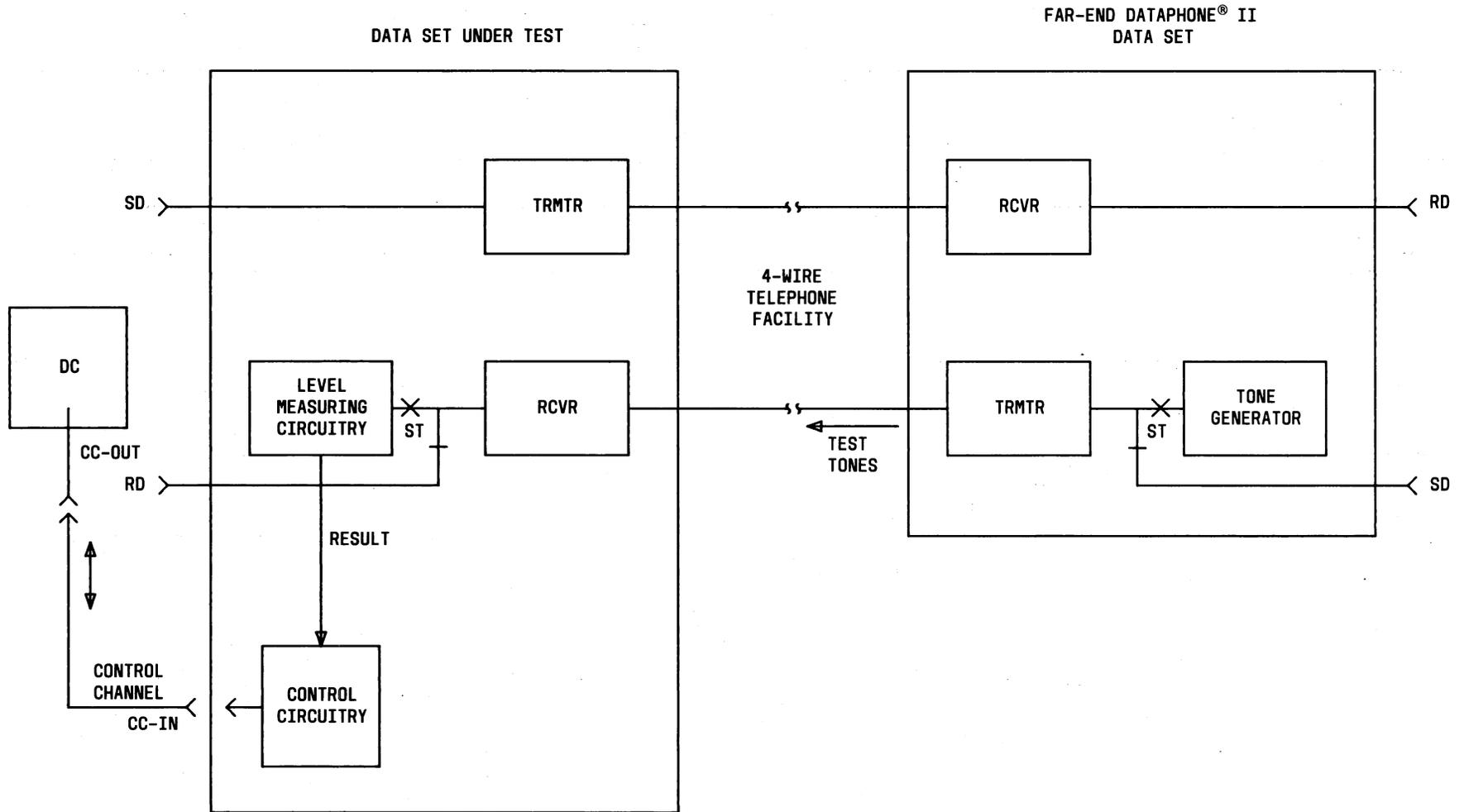


Fig. 9—Circuit Loss-In Subtest

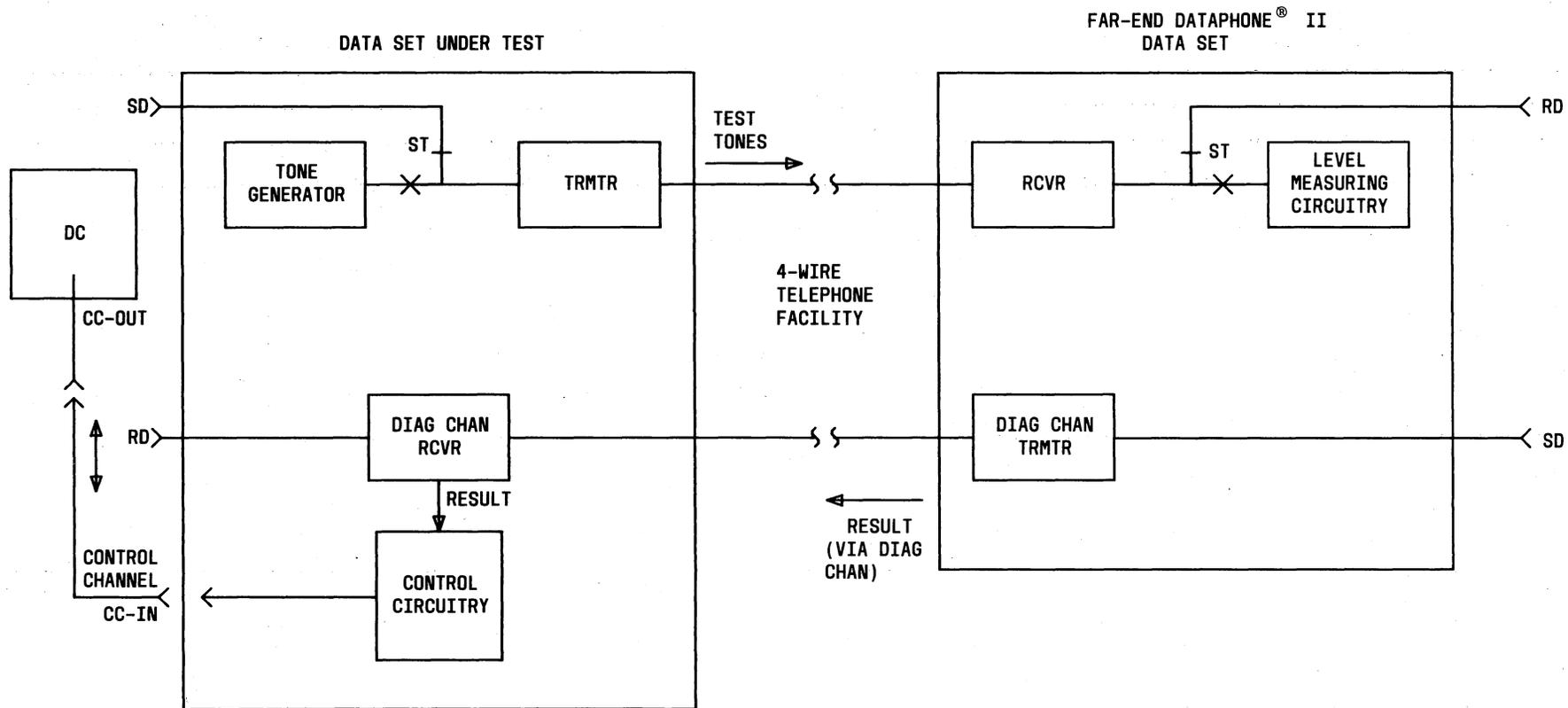


Fig. 10—Circuit Loss-Out Subtest

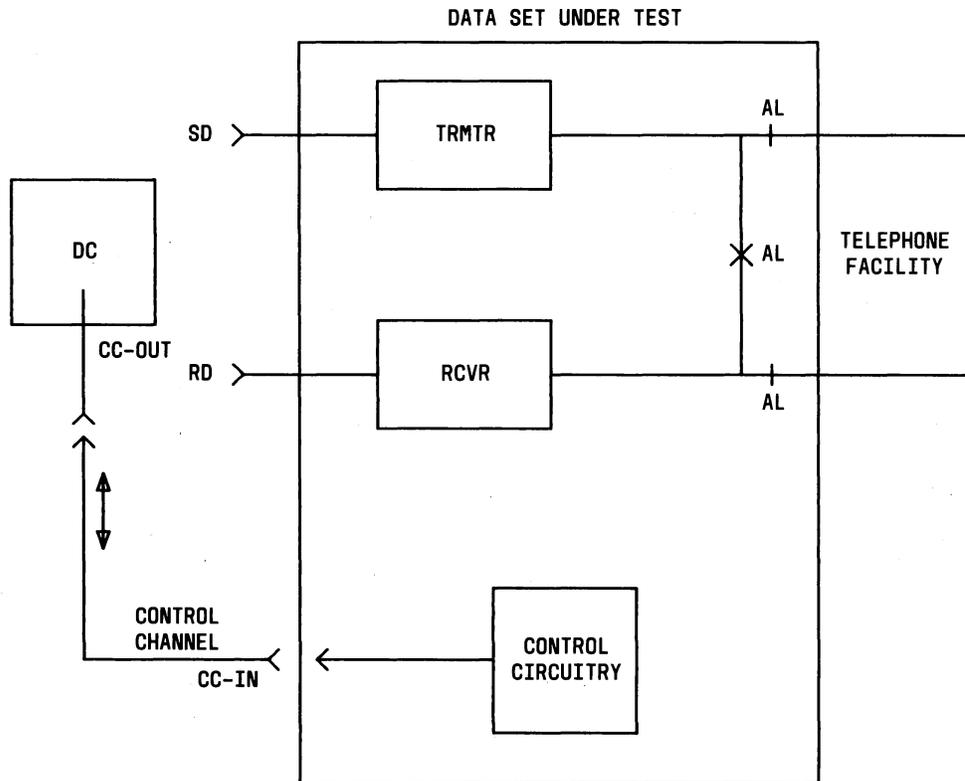


Fig. 11—Analog Loopback Subtest

line. When a data set is transferred to a service line the line normally assigned to it is automatically made busy. Two subcommands are used with this command: service line connect (SL-CONNECT) to transfer the data set to the service line and service line release (SL-RELEASE) to transfer it back to the normally assigned line. Reserved for future use.

E. Standby Facility (STANDBY FAC)

3.66 This command directs a private line data set to connect to or release from a standby (backup) facility. Two subcommands are used to accomplish these tasks: standby facility connect (SF CONNECT) places a data set on a standby telephone facility and standby facility release (SF RELEASE) removes the data set from the standby facility and restores it to the original facility.

F. Modem Identity (MODEM IDENT)

3.67 This command enables the DC operator to learn certain facts about any data set in the

network. These facts are: the type of data set and, if a DS 2096A, the multiplex mode.

G. Diagnostic Console Poll List (DC POLL LIST)

3.68 This command is used to display, acquire, add to, skip, and delete from the poll list of a DC. These tasks are accomplished using five subcommands:

- DC Poll List—Display (DCPL-DISPLAY)
- DC Poll List—Acquire (DCPL-ACQUIRE)
- DC Poll List—Add (DCPL-ADD ***)
- DC Poll List—Delete (DCPL-DEL ***)
- DC Poll List—Skip (DCPL-SKIP***)

3.69 The DCPL-DISPLAY subcommand will display the entire poll list in the RESULTS display one address at a time and show them as

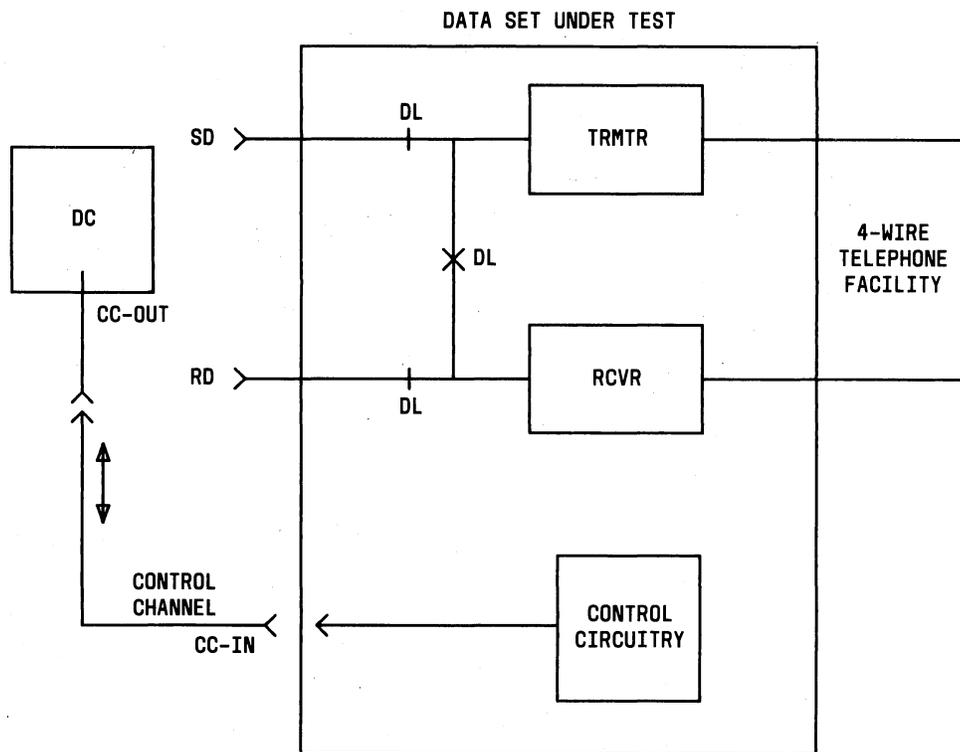


Fig. 12—Digital Loopback Subtest

ACTIVE, SKIP, or (if the poll list has *no* addresses) EMPTY.

3.70 The DCPL-ACQUIRE subcommand directs the DC to poll all possible local addresses (from 011 to 328) and to place those addresses responding on the poll list. This subcommand can require up to 3 minutes for execution.

3.71 The DCPL-ADD *** and DCPL-DEL *** subcommands are used to add and delete individual poll list addresses. The local address to be added or deleted is entered via the keyboard.

3.72 The DCPL-SKIP *** subcommand causes an address *on* the poll list to be skipped (not polled) in normal polling.

H. Modem Poll List (MD POLL LST)

3.73 This command enables the operator to display, acquire, add to, skip, and delete from the

poll list of private line control data sets. These tasks are accomplished using five subcommands:

- Modem Poll List—Display (MDPL-DISPLAY)
- Modem Poll List—Acquire (MDPL-ACQUIRE)
- Modem Poll List—Add (MDPL-ADD **)
- Modem Poll List—Delete (MDPL-DEL **)
- Modem Poll List—Skip (MDPL-SKIP **)

3.74 The MDPL-DISPLAY subcommand will cause the DC to display the entire poll list of the control data set shown in the ADDRESS display. This *poll list* will be displayed in the RESULTS display one address at a time as ACTIVE, SKIP, or EMPTY.

3.75 The MDPL-ACQUIRE subcommand directs the selected control data set to acquire a new

TABLE I

MODEM STATUS COMMAND DISPLAYS

Condition	RESULTS Display Indication
Data set in data mode with no fault condition	NORMAL
Disable mode	DSAB
Test mode	TEST
Maintenance mode	MTCE
Standby Facility	STY FA
Make busy mode	MB
Data mode off	DM OFF
Modem fault	MD
Facility fault	FA
Streaming fault	SR
No response fault	NR

poll list. The control data set then polls every possible network address. (The maximum number of addresses polled is optional with the data set.) Each network address for which it receives a response is added to the poll list.

3.76 The MDPL-ADD ** and MDPL-DEL ** subcommands are used to add and delete network addresses of tributary data sets. The network address to be added or deleted is entered via the keyboard.

3.77 The MDPL-SKIP ** subcommand causes an address *on* the poll list to be skipped (not polled) in normal polling.

I. Modem Options (MD OPTIONS)

3.78 This command enables the DC operator to display, add, or delete options of any selected data set. The DC options command combines the DATAPHONE II service data set "display options" and "change options" commands. This combining of data set commands permits the DC to simultaneously display, by category, those data set options that are presently installed as well as those not presently installed but available. In addition, at the time of dis-

play, the DC operator is able to make additions to and deletions from the displayed list. This modified list may then be sent to the selected data set to change its option list.

J. DS 2096 Operating Mode (2096 CHG MUX)

3.79 This command may be directed to DS 2096-type control data set to select line speed and multiplexer configuration. To accomplish this eight subcommands are used:

- One 9600 bps channel (MODE 1-96)
- One 7200 bps channel (MODE 1-72)
- One 4800 bps channel (MODE 1-48)
- Two 4800 bps channels (MODE 2-48, 48)
- Two 2400 bps channels (MODE 2-24, 24)
- One 7200 bps channel and one 2400 bps channel (MODE 2-72, 24)
- One 4800 bps channel and two 2400 bps channels (MODE 3-48, 24)
- Four 2400 bps channels (MODE 4-24)

K. Automatic Fault Reporting (FAULT REPTG)

3.80 This command permits the operator to enable or disable the automatic reporting of network faults by the DC and to clear all network faults from the active and hold fault lists. These tasks are accomplished using three subcommands:

- Fault Reports—Enable (FR-ENABLE)
- Fault Reports—Disable (FR-DISABLE)
- Fault Reports—Clear (FR-CLEAR LST)

3.81 The FR-ENABLE subcommand directs the DC to begin polling the data sets on the DC poll list for fault information. The NETWORK FAULTS section will be enabled.

3.82 The FR-DISABLE subcommand directs the DC to stop polling the data sets on the DC poll list for fault information. OFF will be shown in the FAULT TYPE display.

3.83 The FR-CLEAR subcommand is used to clear (remove) all faults from the active and hold lists of network faults.

L. Diagnostic Console Key (CONSOLE KEY)

3.84 This command functions as an electronic key to permit the operator to lock and unlock the DC. The user must supply a four digit number which must be used to either lock or unlock the DC. The functions of this command are accomplished using the following subcommands: console key lock (CK-LOCK ****) and console key unlock (CK-UNLK ****). Four numeric characters of the user's choice are added to each subcommand. To change the console key the subcommand change (CHG *****) is used. The status of the DC may be determined using CK-STATUS.

3.85 When locked the only tests or commands the DC will perform are those designated **nondisruptive** in Tables C and D. If an attempt is made to initiate a **disruptive** command the RESULTS display will indicate DC LOCKED. If an incorrect key code is used the RESULTS display will indicate TRY AGAIN.

ADDRESSING

3.86 Communication between the diagnostic console and the data sets on any selected network is via addresses that are assigned at installation time. These addresses allow the user to communicate with any data set on a network via the local data sets that are connected to the DC.

3.87 There are four types of device addresses used by DATAPHONE II service devices to communicate with each other. These are described below:

- **Diagnostic Control Device Address (1 digit):** This address permits communication to exist between a particular DCD and the directly connected data sets over the control channel. A directly connected data set must know to which DCD to send test and command results as more than one DCD may be connected on the 1200 bps serial control channel. This is particularly important in the case where a remote DCD accesses a local DCD to gain access to a particular network.
- **Local Address (3 digits):** This address is used by the DC user to access a specific local data set and hence a specific network. This address consists of three digits and is set via a dual in-line package (DIP) switch on the

stand-alone and multiple data set mountings. The local address is derived by arranging data sets in groups of eight with an upper limit of 32 groups possible for a total of 256 possible local addresses. The first two digits of the local address specify the group the local data set is in and the last digit is the position within the group (eg, for local address 237 the local data set is in group 23 position 7). The first two digits may be any number from 01 through 32. The last digit may be any number from 1 through 8. Therefore, to provide 256 local addresses the largest address will be 328. Since the local address is used to directly access the local data set, it is not necessary to specify the network address of that data set.

- **Port Address (1 digit):** For those networks that use 2096-type data sets in the multiplexer mode the port number must be specified. This address consists of one digit and will be 1, 2, 3, or 4.
- **Network Address (2 digits):** This address is contained within the data set and is set via the command menu of each data set. It is using this address that data sets on a network communicate with each other.

SECURITY

3.88 There are two types of security provided by the DC for the user: one deals with local security and the other with remote access security. These security features are described below:

- **Local Access Security:** The **console key** command permits the user to restrict the execution of tests and commands for any connected network to authorized personnel only. A console key code (entered via the keyboard) is required to both lock and unlock the disruptive tests and commands found in the TEST/COMMAND section.
- **Remote Access Security:** A remote user may gain access to any network connected to the diagnostic console by matching a preassigned password. This password is the same word used in the **console key** command above. This security feature is independent of the local security feature described above although the password is the same.

4. OPERATION

4.01 This part contains procedures for carrying out DC operations from the front panel of the DC.

4.01 The DC front panel, its associated indicators and controls, and the control circuitry contained within the DC permit the operator to check network status, check DC status, and to exercise the extensive test and command menus.

4.03 The following paragraphs contain operating procedures for each functional group of DC controls and indicators.

OPERATION OF CONTROLS AND INDICATORS**A. NETWORK FAULTS Functional Group**

4.04 Active Fault List: All faults reported to the DC are initially stored on the "active" fault list. New faults are added to this list as they are reported and the active fault list total is always shown in the ACTIVE display (Fig. 3). Lighted **dots** in this display indicate the address being displayed is from this list.

4.05 Hold Fault List: Faults stored on the active fault list may be transferred to the "hold" fault list if the operator wishes. The EXCHANGE switch will accomplish the transfer and the number of faults on the hold list is always shown in the HOLD display (Fig. 3). Lighted **dots** in this display indicate the address being displayed is from this list.

4.06 In the NETWORK FAULTS display a dot is used in the left most display of the LOCAL address to indicate position number one of the active and hold fault lists. A new fault reported to the DC is placed at the top (position one) of the active list. Likewise, faults that are transferred to the hold list are put at the top of the hold list with the oldest fault in the list in last position. When a fault is transferred

from the hold list back to the active list it is also placed at the top of the active list. Therefore, the operator can scan the active and hold fault lists and determine the beginning of the lists by looking for the dot in the left most LOCAL address display. Total faults is the sum of the two fault lists. To accomplish transfers between active and hold fault lists use the following procedure.

4.07 Whenever a trouble has been reported to the telco by the operator it can be transferred from the active to the hold list. Then, after this action has been taken, only those in the active list require immediate attention by the operator. This also permits the operator to use the ACTIVE display to contain the most recently detected faults.

4.08 Whenever a primary leg of a multipoint circuit fails all the remote points on the circuit will be reported as no response (NR) type faults and hence this one circuit will tend to fill the active fault list. Although there is only one fault there will be as many faults reported as there are remote data sets. The hold fault list provides a means to isolate these faults for independent analysis thus permitting the active list to be more easily analyzed.

4.09 In normal operation the NETWORK FAULTS address display and FAULT TYPE display will show the faults in the active list. The list will be cycled through automatically with each fault displayed for 5 seconds. The two dots in the active display will be lighted to indicate the active list of faults is being displayed. If the operator wishes to review the list of active faults the ACTIVE switch is operated (Fig. 3). Each depression of the switch will display a new fault. This new fault will remain in the display for 5 seconds or until the ACTIVE switch is again depressed.

4.10 Examples of the way the active and hold lists may be used together to best organize faults are contained below:

STEP	ACTION	VERIFICATION
1	Observe NETWORK FAULTS and FAULTS TYPE displays for desired address and fault.	NETWORK FAULTS and FAULT TYPE displays indicate desired address and fault.
2	Depress FREEZE.	Displays remain unchanged except dots (on ACTIVE or HOLD) flash.

STEP	ACTION	VERIFICATION
3	Depress EXCHANGE.	Number of faults in one list will be reduced by one and the number in the other increased by one.
4.11	If the operator desires to examine a particular fault and perform testing associated with that fault the address of the fault location must be copied to the ADDRESS display.	
4.12	With the NETWORK FAULTS functional group in the "freeze" mode operation of the ACTIVE or HOLD switch (depending upon which had control before FREEZE was depressed) will "freeze" the next address on the proper list in the NETWORK FAULTS display.	
4.13	The freeze mode interrupts the automatic scanning operation of the active fault list and the automatic return from the hold to the active fault list. The freeze mode will be exited when the FREEZE switch is depressed.	
4.14	Automatic Fault Clearing From the Active and Hold Fault Lists: Just as faults are automatically reported so are they automatically deleted from both the active and the hold fault lists when the fault has been cleared.	
B. EIA STATUS Functional Group		
4.15	When the EIA EXECUTE switch (Fig. 3) is depressed the DC will request the status of these leads of the data set shown in the ADDRESS display with the origin dots. Each time the EIA EXECUTE button is depressed the EIA STATUS LEDs will be cleared so they may be loaded with the new data. This function may be executed at any time. The LEDs show only a single snapshot of the selected leads and are not updated periodically. The EIA STATUS LEDs will indicate the state of the lead sampled as on, off, or changing.	
4.16	When this test is executed, the eight leads (TR, SD, RD, DM, RS, CS, RR, and TM) are sampled simultaneously. The selected data set updates this information every 5 seconds. Since the lamps only show a one-half second snapshot, the operator may have to execute this test a number of times for current information.	
C. CONSOLE STATUS Functional Group		
4.17	The DC continually monitors its own status and indicates fault detection by lighting the CONSOLE STATUS red LED (Fig. 3). When the DC is operating normally the green CONSOLE STATUS LED will be lighted.	
Diagnostic Console Test Procedure		
4.18	Depress CONSOLE STATUS-TEST and observe the following:	
	(1) All LEDs and displays in NETWORK FAULTS, EIA STATUS, and ADDRESS functional groups light for approximately 5 seconds, then extinguish. CONSOLE STATUS indicates red, then returns to green.	
	(2) All LEDs in the TEST/COMMAND functional group light for approximately 5 seconds, then extinguish.	
	(3) SELECTION display indicates CONSOLE TEST and RESULTS display indicates IN PROGRESS while internal testing is being completed.	
	(4) When all testing is complete RESULTS display indicates PASS or FAIL. If the enable switch (Fig. 13) is closed then a FAIL indication will be followed by a 5-digit error code message. These messages are decoded as follows:	
	<ul style="list-style-type: none"> ● FAIL 10000 = Random access memory (RAM) failure ● FAIL 01000 = Remote port hardware failure ● FAIL 00100 = Control channel port hardware failure ● FAIL 00010 = Read-only memory (ROM) failure ● FAIL 00001 = Battery failure or battery switch turned off. 	

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(5) The -/+ LED lights. The -/+ switch may be operated to display the DC address as DC ADRS=x, where "x" is a number from 1 to 8.

(6) Operating the -/+ switch again causes the RESULTS display to indicate the current version of software used by the DC. The software version is displayed as SFTWR V_ _ _ _ _.

D. ADDRESS Functional Group

4.19 This functional grouping of switch, display, and indicators (Fig. 3) is used to hold the destination address of tests and commands.

4.20 Two methods may be employed to place an address in the ADDRESS display:

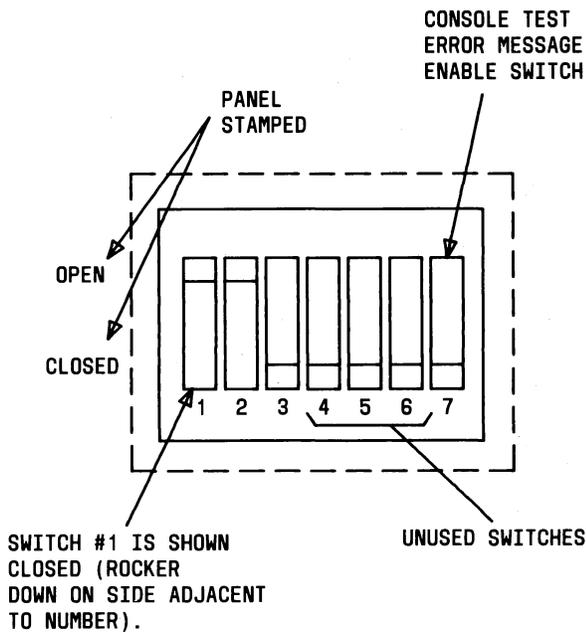
- With the ENTRY switch in the ADDRESS

position the ENTRY keyboard may be used to enter a selected address.

- As described under the NETWORK FAULTS functional group an address may be copied from NETWORK FAULTS to ADDRESS.

4.21 The ORIGIN key is used to move (locate) two origin dots in the ADDRESS display. The position of these origin dots in the display instructs the DC to send the test or command shown in the SELECTION display to that particular data set. This feature permits an address to be loaded into the ADDRESS display and tests or commands performed on it without changing the address information.

4.22 The three lamps that back light the letter "C" (located under the NETWORK portion of the address display) are used to indicate that the address



2.

DC ADDRESS	SWITCH POSITION AND STATE		
	1	2	3
1	X	X	X
2	0	X	X
3	X	0	X
4	0	0	X
5	X	X	0
6	0	X	0
7	X	0	0
8	0	0	0

0 REPRESENTS OPEN
X REPRESENTS CLOSED

NOTE:
SWITCH IS SHOWN AS VIEWED THROUGH THE DOOR OPENING. (ADDRESS SHOWN ON SWITCH = 5)

Fig. 13—DCD Address Switches and Console Test Error Message Enable Switch

of the data set directly above (when lamp is on) is a private line control data set. This feature is available **only** when the address has been transferred from the NETWORK FAULTS display.

E. ENTRY Functional Group

4.23 ENTRY (ADDRESS—TEST/COMMAND) Switch: This switch selects the keyboard mode. In ADDRESS the keyboard is used to load addresses in the ADDRESS display and in TEST/COMMAND the keyboard is used in conjunction with test and command routines.

4.24 ENTRY Keyboard: Used to load data in the ADDRESS display or SELECTION display. Refer to Table C for specific key functions.

F. TEST/COMMAND Functional Group

4.25 RESULTS Display: Indicates responses to tests or commands.

4.26 SELECTION Display: Indicates the test or command the operator wishes to execute.

4.27 EXECUTE Switch: Directs the DC to initiate a test or a command.

4.28 ABORT Switch: Directs the DC to abort any test or command that is in progress. The

abort is activated after the EXECUTE switch is operated and is deactivated by the operation of the TEST/CMD switch, the BWD/FWD switch, the QUICK SELECT keys, or a new address entered in the ADDRESS display.

4.29 The ABORT switch can only cause the last executed test or command to be terminated. When operated, the RESULTS display shows ABORTED when the DC receives verification the test or command has been aborted.

4.30 TEST/CMD SWITCH: Selects either the test menu or the command menu.

4.31 BWD/FWD Switch: Selects the desired test or command from the test or command menu.

4.32 -/+ (Minus/Plus) Switch: Selects subitems associated with a particular test or command and may be used to proceed through multiple results of some operations.

4.33 QUICK SELECT Fixed Function Keys:
These keys provide the user with full access to selected functions found in the test and command menus. Five of the keys may be assigned with any test or command to match the user's operation. The ASGN key is an interlock to prevent the accidental setting and clearing of the five QUICK SELECT keys. If a QUICK SELECT key **not** assigned is depressed the RESULTS display will indicate UNASSIGNED. Key assignment procedure is as follows:

STEP	ACTION	VERIFICATION
1	Place TEST/CMD switch in desired position.	SELECTION display indicates first test or command from appropriate menu.
2	Using BWD/FWD and -/+ switches as necessary select desired test; subtest, command, or subcommand.	SELECTION display indicates desired test, subtest, command, or subcommand.
3	Depress and hold ASGN key. Depress desired QUICK SELECT key.	RESULTS display indicates ASSIGNED.
4	Place TEST/CMD switch in normal position.	RESULTS display clears and returns to normal indication.

GENERAL INFORMATION FOR EXERCISING THE TEST MENU AND COMMAND MENU

4.34 Both the test menu and the command menu (Tables C and D) are stored in the DC in continuous fashion. That is, the operator can go in either a forward or a backward direction from any point in either menu with equal effectiveness.

4.35 To illustrate this consider the first test in the test menu. (The first test is the test whose acronym or abbreviation appears in the SELECTION display when the TEST/CMD switch is first placed in the TEST position.) This test is adjacent to the *second* test in the *forward* direction and the *last* test in the *backward* direction.

4.36 This method of storing and providing access to lists of data also applies to such things as option lists and poll lists.

4.37 When exercising tests and commands on DATAPHONE II service data sets it is good practice (as it is with any procedure) to first read through the entire procedure before proceeding with the test or command.

4.38 Tests and commands may be entered in the SELECTION display in two ways, either via the operation of the TEST/CMD, the BWD/FWD, and the -/+ switches or via the QUICK SELECT fixed function keys.

4.39 If the QUICK SELECT keys are used to enter a test or command then when the key is depressed the SELECTION display will first be cleared of any previous test or command and the chosen one will be displayed. This selected test or command will then be executed when EXECUTE is depressed.

4.40 If the test or command does not appear on the QUICK SELECT keys, then the test or command menu must be accessed. These are accessed via the TEST/CMD switch. Some tests and commands require further information (DS 2096 multiplex mode change, control data set poll lists, etc.) and this information is provided by operating the -/+ switch to display the additional information. When the -/+ switch must be operated, the LED next to the switch will light to remind the user to operate the switch.

4.41 When the TEST/CMD switch is in the normal (center) position and the console status switch

is not operated the RESULTS displays may show RMT PORT ACT when the remote port is active.

CONTENTION SITUATIONS

4.42 In contention situations the DC operator will be unable to exercise a chosen test or command. These situations and the DC responses are described below. All messages and definitions are shown in Table J.

4.43 *Engaged Data Set:* The operator directs a test or command to a selected data set that is in the process of performing a test or command. The RESULTS display will indicate BUSY WAIT. The DC will continue to try to exercise the selected command and when it is successful the RESULTS display will change to IN PROGRESS and the results of the selected test or command will be indicated. The operator may abort the test or command using the ABORT key. The user may also terminate the test or command that is in progress using the ABORT TEST command. Care should be exercised in using the ABORT TEST command because another operator in the network may be performing a test.

4.44 *Communication Breakdown to a Data Set:* A test or command is executed to a selected data set and a response is not received within 10 seconds. In this situation the RESULTS display shows COMM BRKDN (communication breakdown). The -/+ switch should be operated to determine where the breakdown is located. The messages that will be displayed are:

- CONTROL CHAN—The DC cannot communicate with the selected local data sets.
- ADRS = ___—The reported address has received the test or command but cannot communicate with the next data set downstream. (An NR fault should be detectable at some data set address.)

When this response is received the operator should examine the network fault lists to determine if a associated fault exists and examine the selected address as to correctness and existence.

4.45 *Subtest or Subcommand Selection Required:* If the EXECUTE switch is operated prematurely (ie, when the -/+ switch should be used to select a subtest or subcommand) the RESULTS

TABLE J

CONTENTION MESSAGES AND DEFINITIONS

MESSAGE	DEFINITION
BUSY-WAIT	Indicates the selected test or command cannot be immediately executed by the selected data set because it is performing a test or command. The DC will continue to try to exercise the selected test or command until successful.
COMM BRKDWN	Communication breakdown — The diagnostic console is unable to communicate with the selected data set address.
NOT IN MENU	The selected test or command cannot be performed by addressed data set. The test or command is not in the data set's menu.
MODE CNFLCT	Mode Conflict — The addressed data set is in a mode that will not permit the selected test or command to be executed.
TRY AGAIN	The results of the selected test or command received from the addressed data set are not in the correct format, not complete, etc.
DC LOCKED	Message indicates the selected disruptive tests or commands cannot be executed because the disruptive tests or commands are locked.
INVALID KEY	Key Code used in CONSOLE KEY subcommands is incorrect or entered in SELECTION display incorrectly.
INVD ENTRY	Invalid entry — The keyboard information entered in the SELECTION display is invalid or incomplete.
USE -/+ SWCH	Use -/+ switch — Selected test or command menu cannot be executed.
INV LOC ADRS	Invalid local address — Local address shown in ADDRESS display incorrect.
INV PORT ADRS	Invalid port address — Port address shown in ADDRESS display incorrect.
INV NET ADRS	Invalid network address — The network address shown in the ADDRESS display is incorrect.
INV TRB ADRS	Invalid tributary address: The network address (in ADDRESS display) of the tributary data set involved in the selected test or command is incorrect.

TABLE K

PARTIAL UNIVERSAL SUFFIX TABLE

USOC SUFFIX	A	B
01	1	3
02	2	3
03	1	4
04	2	4

TABLE L

DC USOC SUFFIX DECISION MATRIX

DECISION	DESCRIPTION
A1	Desk mounted
A2	Rack mounted
B3	With remote access
B4	Without remote access

display will indicate USE -/+ SWCH until the -/+ switch is operated or the mode is exited.

4.46 Insufficient or Incorrect Address: If an attempt is made to execute a test or command with insufficient or incorrect information in the ADDRESS display, the RESULTS display will indicate one of the following indications:

- INV LOC ADRS (invalid local address) for local address error
- INV PRT ADRS (invalid port address) for port address error
- INV NET ADRS (invalid network address) for network address error
- INV TRB ADRS (invalid tributary address) for tributary address error.

4.47 Garbled or Inconsistent Result: The received results from a selected data that are garbled or are not consistent with the executed test or command. The RESULTS display will show TRY AGAIN. The operator should execute the command again.

4.48 Test or Command Rejection by Selected Data Set: In these cases the RESULTS display will indicate:

- NOT IN MENU when the test or command is not in the repertoire of a selected data set
- MODE CNFLCT (mode conflict) when a test or command is rejected because the data set is in a conflicting mode (eg, END-END BLER cannot be executed with data set in analog loopback mode). The -/+ switch is operated to determine the location that is reporting the mode conflict which is displayed as: ADRS=____.

ADDRESS DISPLAY LOADING PROCEDURES

4.49 The ADDRESS display is used to indicate the address of the data set or sets to which tests and commands are to be directed. The methods of loading (placing) addresses in this display are described below.

4.50 Copying an Address from the NETWORK FAULTS Display:

STEP	ACTION	VERIFICATION
1	Depress ACTIVE or HOLD until desired fault location is indicated in NETWORK FAULTS display.	NETWORK FAULTS display indicates desired address and FAULT TYPE indicates fault.
2	Depress TRANSFER.	ADDRESS display clears and then indicates the NETWORK FAULTS address. Origin dots are lighted adjacent to the rightmost address. Backlighted letter C is on under private line control data sets.
3	If required, operate ORIGIN switch to position origin dots where desired.	Origin dots indicate the desired data set.
Note: For END-END BLER and DIGITAL TEST the origin dots must be set to the address of the control data set and a tributary data set placed in the last position of the ADDRESS-NETWORK display.		

4.51 Loading an Address via the ENTRY Keyboard:

STEP	ACTION	VERIFICATION
At ENTRY Keyboard:		
1	Place ENTRY switch at ADDRESS. Depress EL and enter 3-digit local address.	ADDRESS-LOCAL display indicates entered address.
2	If addressed data set is a multiplexed DS 2096A depress EP and enter 1-digit port number.	ADDRESS-PORT display indicates entered port number.
3	Depress EN and enter up to three network addresses (6 digits).	ADDRESS-NETWORK display indicates entered network address(s).
4	Operate ORIGIN switch to position origin dots where desired.	
	Note: For END-END BLER and DIGITAL TEST the origin dots must be set to the address of the control data set and a tributary data set placed in the last position of the ADDRESS-NETWORK display.	

TEST MENU PROCEDURES

optioned as private line tributary data sets.

4.52 The tests that can be performed from the DC are shown in Table C. These tests consist primarily of channel tests, end-to-end error tests and data set self tests. All the tests may be directed to private line control data sets but only a portion of the tests in the test menu may be directed to data sets

4.53 Apparatus: No equipment or tools are required to perform these test procedures.

4.54 Unless otherwise noted all actions and verifications are made at the DC front panel.

A. MODEM TEST**MT-SINGLE and MT-CONTS**

STEP	ACTION	VERIFICATION
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST. LED indicator adjacent to -/+ switch lights.
2	Operate -/+ switch to + to select desired subtest: MT-SINGLE or MT-CONTS	SELECTION display indicates MT-SINGLE or MT-CONTS.

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STEP	ACTION	VERIFICATION
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by PASS or FAIL.
4	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
B. AUTO NET TST		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Place BWD/FWD switch to FWD momentarily.	SELECTION display indicates AUTO NET TST.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by PASS or FAILURES = xx (where "xx" is the number of failed locations).
4	Operate and hold -/+ switch in + to display each failed location in sequence.	RESULTS display indicates each failed location in sequence (eg, TRIB ADRS 04, TRIB ADRS 05, etc).
5	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indicator.
C. END-END BLER (Private Line Control Data Sets Only)		
EE-BLKS=0100 and EE-BLKS=****		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and hold BWD/FWD switch in FWD until SELECTION display indicates END-END BLER.	SELECTION display indicates END-END BLER. LED indicator adjacent to -/+ switch lights.
3	Operate -/+ switch to + to select either substest EE BLKS = 0100 or substest EE BLKS = ****	SELECTION display indicates selected substest (either EE-BLKS=0100 or EE-BLKS=****).
4	If substest EE-BLKS=**** is selected: Place ENTRY switch in TEST/COMMAND and at keyboard enter desired number of blocks (four digits must be entered including leading zeros).	SELECTION display indicates EE-BLKS=xxxx (where xxxx indicates desired number of blocks).
5	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by BLOCKS = xxxx. LED adjacent to -/+ switch lights.

STEP	ACTION	VERIFICATION
6	Operate -/+ switch in + momentarily. <i>Note:</i> The EE BLKS = 0100 subtest requires approximately 90 seconds for execution on DS 2024-type, 75 seconds on DS 2048-type and 60 seconds on DS 2096-type	RESULTS display indicates BK ER/I = xxxx (block errors/in) followed by BK ER/O = xxxx (block errors/out).
7	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
D. DIGITAL TEST (Private Line Control Data Sets Only)		
DT-MSG=0001 and DT-MSG=****		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and Hold BWD/FWD switch in FWD until SELECTION display indicates DIGITAL TEST.	SELECTION display indicates DIGITAL TEST. LED indicator adjacent to -/+ switch lights.
3	Operate -/+ switch to + to select either subtest DT-MSG=0001 or subtest DT-MSG=****	SELECTION display indicates selected subtest (either DT-MSG=0001 or DT-MSG=****).
4	If subtest DT-MSG=**** is selected: Place ENTRY switch in TEST/COMMAND and at keyboard enter desired number of messages (four digits must be entered including leading zeroes).	SELECTION display indicates DT-MSG=xxxx (where xxxx indicates desired number of messages).
5	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by MSGS=xxxx. LED adjacent to -/+ switch lights.
6	Operate -/+ switch to + momentarily.	RESULTS display indicates BIT ERS=xxxx (number of bit errors).
7	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
E. RCV SIG LEV		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and hold BWD/FWD switch in FWD until SELECTION display indicates RCV SIG LEV.	SELECTION display indicates RCV SIG LEV.

SECTION 592-101-100

STEP	ACTION	VERIFICATION
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by LEVEL-xxDBM (where "xx" is the level to the closest whole number).
4	PLACE TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

F. RCV SIG QUAL

1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and hold BWD/FWD switch in until SELECTION display indicates RCV SIG QUAL.	SELECTION display indicates RCV SIG QUAL.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by SIG QUAL=x (where "x" is a number between 0 and 9).
4	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

G. RCV SIG PROF

1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates RCV SIG PROF.	SELECTION display indicates RCV SIG PROF.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by LEVEL-xx DBM. LED adjacent to -/+ switch lights.
4	Operate -/+ switch to + momentarily.	RESULTS display changes to SIG QUAL = x.
5	Operate -/+ switch to + momentarily.	RESULTS display changes to NOISE = x.
6	Operate -/+ switch to + momentarily.	RESULTS display changes to PHASE JTR = x.
7	Operate -/+ switch to + momentarily.	RESULTS display changes to FREQ SHIFT = x.
8	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

STEP	ACTION	VERIFICATION
H. SEND TONE		
1004 HZ TONE, 1804 HZ TONE, and 2804 HZ TONE		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates SEND TONE.	SELECTION display indicates SEND TONE. LED indicator adjacent to -/+ switch lights.
3	Operate -/+ switch to + to select desired subtest: 1004 HZ TONE, 1804 HZ TONE, or 2804 HZ TONE.	SELECTION display indicates 1004 HZ TONE, 1804 HZ TONE, or 2804 HZ TONE.
4	Depress EXECUTE.	RESULTS display indicates IN PROGRESS.
	Note: As the above subtests are nontimed, the data set under test will continue to transmit the selected tone until the CLEAR TONE subtest is executed as described below:	

CLEAR TONE

5	Operate -/+ switch to + momentarily.	SELECTION display indicates CLEAR TONE.
6	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
7	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

I. CIRCUIT LOSS**CIR LOSS-IN and CIR LOSS-OUT**

1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
	Note: The ADDRESS display must be loaded with both the control and tributary addresses. The control data set must be designated (using the ORIGIN switch) as the origin of the test. The associated tributary data set must appear in the ADDRESS display as the next address to the right of the controlled data set address.	

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STEP	ACTION	VERIFICATION
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates CIRCUIT LOSS.	SELECTION display indicates CIRCUIT LOSS. LED indicator adjacent to -/+ switch lights.
3	Operate -/+ switch to + to select desired subtest: CL-IN 1004, CL-IN 1804, CL-IN 2804, CL-OUT 1004, CL-OUT 1804, or CL-OUT 2804.	SELECTION display indicates selected subtest.
4	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by LOSS=xxDB (where "xx" equals the loss).
5	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

J. MODEM LPBK

ANALOG LPBK and DIGITAL LPBK

1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and hold BWD/FWD switch in FWD until SELECTION display indicates MODEM LPBK.	SELECTION display indicates MODEM LPBK. LED indicator adjacent to -/+ switch lights.
3	Operate -/+ switch to + to select desired subtest: ANALOG LPBK or DIGITAL LPBK.	SELECTION display indicates ANALOG LPBK or DIGITAL LPBK.
4	Depress EXECUTE. <i>Note:</i> As both the above subtests are nontimed, the data set under test will remain in the loopback mode until removed using the procedure described below or aborted via the ABORT procedure.	RESULTS display indicates IN PROGRESS followed by COMPLETED.

CLEAR LPBK

5	Operate -/+ switch to + momentarily.	SELECTION display indicates CLEAR LPBK.
6	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.

STEP	ACTION	VERIFICATION
7	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
K. RPT TERM PWR		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates RPT TERM PWR.	SELECTION display indicates RPT TERM PWR.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by POWER ON or POWER OFF.
4	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
L. ABORT TEST		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in TEST.	SELECTION display indicates MODEM TEST.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates ABORT TEST.	SELECTION display indicates ABORT TEST.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
4	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

COMMAND MENU PROCEDURES

4.55 The commands that are available from the DC are shown in Table D. These are accessible either via the CMD position of the TEST/CMD switch and the FWD/BWD switch or from the QUICK SELECT keys. Unless otherwise noted all actions and verifications are made at the DC front panel.

4.56 Before initiating any test ensure that the desired address is indicated in the ADDRESS

display and the origin dot is located in the display of the data set to be commanded.

4.57 Detailed procedures for executing each command are given below. These procedures do not have to be used if a command has been placed on a QUICK SELECT key. If a QUICK SELECT key is employed, the operator only needs to depress the key followed by the EXECUTE switch to initiate the command.

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STEP	ACTION	VERIFICATION
A. MODEM DSAB/ENAB DISAB MODEM		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB. LED indicator adjacent to -/+ switch lights.
2	Operate -/+ switch to + momentarily.	SELECTION display indicates DISAB MODEM.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
4	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
ENABLE MODEM		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB. LED indicator adjacent to -/+ switch lights.
2	Place -/+ switch to - momentarily.	SELECTION display indicates ENABLE MODEM.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
4	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
B. MODEM STATUS		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate and hold BWD/FWD switch in FWD until SELECTION display indicates MODEM STATUS.	SELECTION display indicates MODEM STATUS.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by NA MODE FLT (network address, mode, fault). LED adjacent to -/+ switch lights.
4	Operate -/+ switch momentarily.	RESULTS display indicates network address and mode and fault information as shown in Table I.

STEP	ACTION	VERIFICATION
5	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
C. MAKE BUSY (Reserved for future use.)		
MB-ENABLE		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates MAKE BUSY.	SELECTION display indicates MAKE BUSY. LED indicator adjacent to -/+ switch lights.
3	Place -/+ switch in + momentarily.	SELECTION display indicates MB-ENABLE.
4	Depress EXECUTE.	RESULTS display indicates in PROGRESS followed by COMPLETED.
	Note: The following procedure is used when it is desired to return the data set to the in-service mode.	
MB-RELEASE		
5	Place -/+ switch in + momentarily.	SELECTION display indicates MB-RELEASE.
6	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
7	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
D. SERVICE LINE (Reserved for future use.)		
SL-CONNECT		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates SERVICE LINE.	SELECTION display indicates SERVICE LINE. LED indicator adjacent to -/+ switch lights.
3	Place -/+ switch in + momentarily.	SELECTION display indicates SL-CONNECT.
4	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
	Note: The following procedure is used when	

SECTION 592-101-100

STEP	ACTION	VERIFICATION
	it is desired to return the data set to the switched network telephone line.	
SL-RELEASE		
5	Place -/+ switch in + momentarily.	SELECTION display indicates LS-RELEASE.
6	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
7	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
E. STANDBY FAC (Private Line Data Sets Only)		
SF-CONNECT		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates STANDBY FAC.	SELECTION display indicates STANDBY FAC. LED indicator adjacent to -/+ switch lights.
3	Place -/+ switch in + momentarily.	SELECTION display indicates SF-CONNECT.
4	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
	<i>Note:</i> The following procedure is used when it is desired to return the data set to the normal facility.	
SF-RELEASE		
5	Place -/+ switch in + momentarily.	SELECTION display indicates SF-RELEASE.
6	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
7	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
F. MODEM ID		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.

STEP	ACTION	VERIFICATION
2	Operate and hold BWD/FWD switch in FWD until SELECTION display indicates MODEM ID.	SELECTION display indicates MODEM ID.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by TYPE xxxxx (where "xxxxx" will be 2024A, 2024B, 2048A, 2048B, 2048C, or 2096A). If a DS 2096A the LED adjacent to the -/+ switch lights.
4	Operate -/+ switch momentarily.	RESULTS display indicates MODE xxxxxxxx (where "xxxxxxx" will be 1-96; 1-72; 1-48; 2-48; 2-72,24; 2-24; 3-48,24; or 4-24).
5	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

G. DC POLL LIST

1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate and hold BWD/FWD switch in FWD until SELECTION display indicates DC POLL LIST.	SELECTION display indicates DC POLL LIST. LED indicator adjacent to -/+ switch lights.

Note: Each subcommand procedure is described below. The operator needs only to perform the desired procedures.

DCPL-DISPLAY

3	Place -/+ switch to + momentarily.	SELECTION display indicates DCPL-DISPLAY.
4	Depress EXECUTE. Note: If a multiplexed DS 2096A is on the poll list it will be displayed as xxx Y-ACTIVE (or SKIP) where xxx-x is the local address and Y is the number of ports used.	RESULTS display indicates IN PROGRESS followed by EMPTY or xxx ACTIVE or xxx SKIP (where xxx is the local address of the first data set on the poll list). LED adjacent to -/+ switch lights.
5	Operate -/+ switch to review poll list. Note: If desired operations within this command are completed proceed to Step 17.	RESULTS display indicates poll list (as above) in local address sequence.

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STEP	ACTION	VERIFICATION
DCPL-ACQUIRE		
6	Operate -/+ switch in + until SELECTION display indicates DCPL-ACQUIRE.	SELECTION display indicates DCPL-ACQUIRE.
7	Depress EXECUTE. <i>Note:</i> If desired operations within this command are completed proceed to Step 17.	RESULTS display indicates LOC ADRS xxx as each local address is polled followed by COMPLETED.
DCPL-ADD***		
8	Operate -/+ switch in + until SELECTION display indicates DCPL-ADD ***	SELECTION display indicated DCPL-ADD ***
9	Place ENTRY switch in TEST/COMMAND and ENTRY keyboard enter local address of data set to be added to poll list.	SELECTION display indicates DCPL-ADD xxx (where "xxx" is the local address just entered).
10	Depress EXECUTE. <i>Note:</i> If desired operations within this command are completed proceed to Step 17.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
DCPL-DEL ***		
11	Operate -/+ switch in + until SELECTION display indicates DCPL-DEL ***. SELECTION display indicates DCPL-DEL ***	
12	At ENTRY keyboard enter local address of data set to be deleted from poll list.	SELECTION display indicates DCPL-DEL xxx (where "xxx" is the local address just entered)
13	Depress EXECUTE. <i>Note:</i> If desired operations within this command are completed proceed to Step 17.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
DCPL-SKIP***		
14	Operate -/+ switch in + until SELECTION display indicates DCPL-SKIP***	SELECTION display indicated DCPL-SKIP***
15	At ENTRY keyboard enter local address of data set to be skipped.	SELECTION display indicates DCPL-SKIP*** (where "****" is the local address just entered).
16	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.

STEP	ACTION	VERIFICATION
17	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
H. MD POLL LIST (Private Line Control Data Sets Only)		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates MD POLL LIST.	SELECTION display indicates MD POLL LIST LED indicator adjacent to -/+ switch lights.
	Note: Each subcommand procedure is described below. The operator needs only to perform the desired procedures.	
MDPL-DISPLAY		
3	Place -/+ switch to + momentarily.	SELECTION display indicates MDPL-DISPLAY.
4	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by EMPTY or xx ACTIVE or xx SKIP (where xx is the network address of the first tributary data set in the control data set poll list).
5	Operate -/+ switch to review poll list.	RESULTS display indicates poll list (as above) in network address sequence.
	Note: If desired operations within this command are completed proceed to Step 17.	
MDPL-ACQUIRE		
6	Operate -/+ switch in + until SELECTION display indicates MDPL-ACQUIRE.	SELECTION display indicates MDPL-ACQUIRE.
7	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
	Note: If desired operations within this command are completed proceed to Step 17.	
MDPL-ADD**		
8	Operate -/+ SELECTION display indicates MDPL-ADD**	SELECTION display indicates MDPL-ADD**
9	Place ENTRY switch in TEST/COMMAND and at ENTRY keyboard enter local address of data set to be added to poll list.	SELECTION display indicates MDPL-ADDxx (where "xx" is the local address just entered)

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STEP	ACTION	VERIFICATION
10	Depress EXECUTE. Note: IF desired operations within this command are completed proceed to Step 17.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
MDPL-DEL**		
11	Operate -/+ switch in + until SELECTION display indicates MDPL-DEL**	SELECTION display indicates MDPL-DEL**.
12	At ENTRY keyboard enter local address of data set to be deleted from poll list.	SELECTION display indicates MDPL-DELxx (where "xx" is the local address just entered).
13	Depress EXECUTE. Note: If desired operations within this command are completed proceed to Step 17.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
MDPL-SKIP**		
14	Operate -/+ switch until SELECTION display indicates MDPL-SKIP**	SELECTION display indicates MDPL-SKIP**
15	At ENTRY keyboard enter local address of data set to be skipped .	SELECTION display indicates MDPL-SKIP** (where "xx" is the local address just entered)
16	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
17	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
I. MD OPTIONS		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate and hold BWD/FWD switch in BWD until SELECTION display indicates MD OPTIONS.	SELECTION display indicates MD OPTIONS.
3	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by a display containing the first category of options (both installed and available). For example, A-1_ _4 showing A-category options 1 and 4 installed with 2 and 3 available (represented by underscores). The LED indicator adjacent to the -/+ switch lights.

STEP	ACTION	VERIFICATION
4	To examine the next category of options: Place -/+ switch momentarily in +.	RESULTS display indicates the next option category. For example, B-234_ _7 showing B-category options 2, 3, 4, and 7 installed; 1, 5, and 6 available; and any unavailable option is represented by a blank (such as position 8 above).
5	To add or delete any of these B-category options while they are indicated in RESULTS: Place ENTRY switch in TEST/COMMAND. Using the ENTRY keyboard depress "-" followed by the number of an option to be deleted and "+" followed by the number of an option to be added. For example, depress -3, -4, +5 with the step 4 example in the RESULTS display.	RESULTS display indicates B-2_ _5_7.
6	After all available categories of options have been reviewed: Place -/+ switch in + momentarily.	RESULTS display indicates SEND NEW OPT.
7	Depress EXECUTE. Note: If step 7 is not taken the new or revised option list will be cleared from the DC <i>without</i> being transmitted to the selected data set.	Results display indicates IN PROGRESS followed by COMPLETED and SELECTION display changes from MD OPTIONS to SEND NEW OPT.
8	To transmit an <i>identical</i> option set to another data set: Place ENTRY switch in ADDRESS. At ENTRY keyboard type in desired address.	ADDRESS display indicates desired address.
9	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
10	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

J. 2096 CHG MUX

All Subcommands

1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate and hold BMD/FWD switch in FWD until SELECTION display indicates 2096 CHG MUX.	SELECTION display indicates 2096 CHG MUX. LED indicator adjacent to -/+ switch lights.
3	Operate -/+ switch in + to select desired subcommand: MODE 1-96; MODE 1-72; MODE	SELECTION display indicates: MODE 1-96; MODE 1-72; MODE 1-48; MODE 2-72,24; MODE

STEP	ACTION	VERIFICATION
	1-48; MODE 2-72,24; MODE 2-48,48; MODE 2-24,24; MODE 3-48,24; MODE 4-24.	2-48,48; MODE 2-24,24; MODE 3-48,24; MODE 4-24.
4	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
5	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.
K. FAULT REPTG		
1	Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Operate the hold BWD/FWD switch in BWD until SELECTION display indicates FAULT REPTG.	SELECTION display indicates FAULT REPTG. LED indicator adjacent to -/+ switch lights.
FR-ENABLE		
3	Operate -/+ switch in + to select desired subcommand: FR-ENABLE (this step), FR-DISABLE (step 5), or FR-CLEAR LST (Step 7).	SELECTION display indicates FR-ENABLE.
4	Depress EXECUTE. <i>Note:</i> If desired operation within this command are completed proceed to step 9.	RESULTS display indicates IN PROGRESS followed by COMPLETED.
FR-DISABLE		
5	Place -/+ switch in + momentarily.	SELECTION display indicates FR-DISABLE.
6	Depress EXECUTE. <i>Note:</i> If desired operations within this command are completed proceed to step 9.	RESULTS display indicates IN PROGRESS followed by COMPLETED. FAULT TYPE display indicates OFF.
FR-CLEAR LST		
7	Operate and hold -/+ switch in + until SELECTION display indicates FR-CLEAR LST.	SELECTION display indicates FR-CLEAR LST.
8	Depress EXECUTE.	RESULTS display indicates IN PROGRESS followed by COMPLETED. NETWORK FAULTS is cleared of all active and hold faults.
9	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

STEP	ACTION	VERIFICATION
L. CONSOLE KEY		
1	Ensure that the ADDRESS display contains the proper information. Refer to ADDRESS Display Loading Procedures. Place TEST/CMD switch in CMD.	SELECTION display indicates MODEM DSAB/ENAB.
2	Place BWD/FWD switch in BWD momentarily.	SELECTION display indicates CONSOLE KEY. LED indicator adjacent to -/+ switch lights.
CK-STATUS		
3	Place -/+ switch in + momentarily.	SELECTION display indicates CK-STATUS.
4	Depress EXECUTE.	RESULTS display indicates DC LOCKED or DC UNLOCKED.
CK-LOCK****		
5	Place -/+ switch in + momentarily.	SELECTION display indicates CK-LOCK****
6	Place ENTRY switch in TEST/COMMAND. Enter a 4-digit number via the ENTRY keyboard.	SELECTION display now indicates CK-LOCK _ (where “_” is the number entered). The number entered is not displayed for security reasons.
7	Depress EXECUTE.	RESULTS display indicates DC LOCKED.
Note 1: If it is desired to leave the DC locked, proceed to step 12.		
Note 2: When the DC is locked only nondisruptive tests or commands can be executed.		
CK-UNLK****		
8	Place -/+ switch in + momentarily.	SELECTION display indicates CK-UNLK ****
9	Place ENTRY switch in TEST/COMMAND. Enter the same 4-digit number used to unlock the DC via the ENTRY keyboard.	SELECTION display now indicates CK-UNLK _(where “_” is the number entered). The number entered is not displayed for security reasons.
10	Depress EXECUTE.	RESULTS display indicates DC UNLOCKED.
Note: If an incorrect 4-digit number is entered the results display will indicate INVALID KEY. To change console key number see below.		

SECTION 592-101-100

STEP	ACTION	VERIFICATION
CHG *****		
11	Place -/+ switch in + momentarily.	SELECTION display indicates CHG *****
12	Place ENTRY switch in TEST/COMMAND. Enter the <i>old</i> 4-digit console key number followed by the <i>new</i> 4-digit console key number.	SELECTION display now indicates CHG xxxxyyyy (where "xxxx" is the <i>old</i> console key number and "yyyy" is the <i>new</i> console key number).
13	Depress EXECUTE.	RESULTS display indicates COMPLETED.
14	Place TEST/CMD switch in normal position.	RESULTS display returns to normal indication.

5. UNIFORM SERVICE ORDER CODE (USOC) INFORMATION

5.01 USOC Structure: The USOC structure for DATAPHONE II service consists of three basic elements. These elements are a 3-character *hardware designation*, a 2-character *universal suffix*, and *field identifiers*.

5.02 USOC Hardware Designation: The 3-character USOC assigned to the DC is 21D. This code identifies the DC and the appropriate cords and adapters.

5.03 USOC ++ Universal Suffix: The suffix for the DC is decoded using the Universal Suffix Table, a portion of which is reproduced in Table K. The decision matrix for the DC is shown in Table L. As an example 21D01 decodes as a DC desk mounted with remote access.

5.04 Field Identifier (FID): A single FID is used with the DC USOC to designate the DC address field. This FID, diagnostic apparatus address (DAA) follows the USOC (eg, 21D++/DAA 1). The address itself will be a number between 1 and 8.

5.05 The USOC will be a continuous line entry in the service and equipment portion of the service order.

6. REFERENCES

6.01 Additional information concerning DATAPHONE II service diagnostic control devices and data sets is contained in the following Bell System Practices:

SECTION	TITLE
592-031-100	Data Set 202T-Type—Transmitter- Receiver—Description and Operation
592-039-100	Data Set 212AR-L1A/2A— Description and Operation
592-040-110	Switched Network Data Sets 2024 and 2048—Description and Operation—Stand Alone-Multiple DATAPHONE® II Service
592-040-120	Private Line Data Sets 2024, 2048, and 2096—Description and Operation—Stand Alone-Multiple DATAPHONE® II Service
592-040-210	Switched Network Data Sets 2024 and 2048—Installation and Connections—Stand Alone-Multiple—DATAPHONE® Service
592-040-220	Private Line Data Sets 2024, 2048, and 2096—Installation and Connections—Stand Alone-Multiple DATAPHONE® II Service
592-040-510	Switched Network Data Sets 2024 and 2048—Test Procedures—Stand Alone-Multiple—DATAPHONE® II Service
592-040-520	Private Line Data Sets 2024, 2048, and 2096—Test Procedures—

SECTION	TITLE	SECTION	TITLE
	Stand Alone—Multiple— DATAPHONE® II Service		and Connections— DATAPHONE® II Service
592-101-200	2100A Data Control Unit (Diagnostic Console)—Installation and Connections— DATAPHONE® II Service	592-102-500	2200A Data Control Unit (Network Controller)—Test Procedures— DATAPHONE® II Service
592-101-500	2100A Data Control Unit (Diagnostic Console)—Test Procedures— DATAPHONE® II Service	592-102-101	2200A-L1A Data Control Unit (Network Controller) Description and Operation, DATAPHONE® II Service
592-102-100	2200A Data Control Unit (Network Controller)—Description and Operation—DATAPHONE® II Service	592-102-201	2200A-L1A Data Control Unit (Network Controller) Installation and Connections DATAPHONE® II Service
592-102-200	2200A Data Control Unit (Network Controller)—Installation	592-102-501	2200-L1A Data Control Unit (Network Controller) Test Procedures DATAPHONE® II Service