DATA SET 109D-TYPE
MULTIPLE DATA SET ARRANGEMENT
USING 28A1 DATA MOUNTING AND 27A1 DATA UNIT
TEST PROCEDURE

1. GENERAL

1.01 This section describes the test procedures to be followed when installing or troubleshooting the Data Set 109D-type multiple data set arrangement which uses the 28A1 Data Mounting and the 27A1 Data Unit as the associated mounting apparatus.

1.02 The tests covered are:

A. Power Source Output (Loaded): This test checks the +24 and −24 volt dc outputs of the 28A1 Data Mounting power source under loaded conditions.

B. Power Source Output (Unloaded): This test checks the +24 and −24 volt dc outputs of the 28A1 Data Mounting power source under unloaded conditions.

C. Interface Lead Tests: This test checks the CF, CC, BA, BB, and CD leads in private line (PL) or 10-type Data Line Concentrator System (DATREX*) installations.

*Service Mark of the Bell System

D. End-To-End Test: This test checks the distortion level of a data set loop and the ability to transmit and receive data over the transmission facility.

1.03 Both installation and maintenance test procedures are identical and therefore each test is presented only once. Test B need only be made if the requirements for Test A are not met.

1.04 The installation tests are designed to verify that the equipment has been assembled properly and that the installation is operative. Both Tests A and C should be made following the completion of the installation.

1.05 The maintenance tests should be performed in accordance with the maintenance philosophy and troubleshooting procedures given in the section entitled Data Set 109D-Type Multiple Data Set Arrangement Using 28A1 Data Mounting and 27A1 Data Unit—Maintenance (591-029-301). When performing Tests C and D, assistance is required at the concentrator and remote station end.

Before performing Test C, insure the proper word generator matrix is installed in the 911A Data Test Set(s).

1.06 When performing Tests C and D, take proper steps to ensure that the customer is not billed for test calls. Refer to the section entitled Crediting Charges On Test Calls (010-250-001).

1.07 ***Lettered Steps:*** A letter a, b, c, etc, added to a step number in Part 3 of this section indicates an action which may or may not be required, depending on local conditions. The condition under which a lettered step or series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

2.01 The test apparatus required for each test is shown in Table A. The details of each item are covered in the paragraph indicated by the number in parentheses.

TABLE A

APPARATUS	TEST				
	A	B	C	D	
				REMOTE STATION	MULTIPLE DATA SET ARRANGEMENT STATION
911A Data Test Set (2.02)	—	—	—	1*	1
Interface test adapter (2.03)	—	—	1	1*	1
Meter (2.04)	1	1	1	—	—
Cord (2.05)	—	—	—	1*	1
Cord (2.06)	—	—	—	1*	1

* At remote stations where use of the 911A Data Test Set is not feasible due to lack of access to the data set interface leads, the station terminal equipment may be used to originate or receive test messages.

2.02 The 911A Data Test Set (DTS) is the J-79911A DTS.

2.03 The interface test adapter is a 901B-L3 DTS (cover of 901B DTS).

2.04 KS-14510-L1 volt-ohm-milliammeter, or equivalent.

2.05 W1AD cord, 4 feet 7 inches long, equipped with one 35 cord tip and one 27 Mueller test clip with 29 Mueller insulator, black (used for connection of the interface test adapter and the 911A DTS).

2.06 W1AH cord, 6 feet long, equipped with one amp No. 6 terminal and one 45 Mueller pee-wee clip with one 47 Mueller insulator, black (used for connection of the interface test adapter to the 911A DTS).

3. METHOD

STEP	ACTION	VERIFICATION
A. Power Source Output (Loaded)		
1	Condition meter to measure 24 volts dc.	
2	At TB1 of 28A1 Data Mounting— Connect meter leads in accordance with Table B.	Meter indicates 20 to 30 Vdc.

TABLE B

FOR SLOTS	CONNECT METER LEADS TO	
	+	−
1 through 8	TB1 terminal 1	TB1 terminal 3
9 through 16	TB1 terminal 4	TB1 terminal 6

STEP	ACTION	VERIFICATION
3	Disconnect meter leads and reconnect in accordance with Table C.	Meter indicates 20 to 30 Vdc.

TABLE C

FOR SLOTS	CONNECT METER LEADS TO	
	+	−
1 through 8	TB1 terminal 3	TB1 terminal 2
9 through 16	TB1 terminal 6	TB1 terminal 5

4	Disconnect both meter leads.	

B. Power Source Output (Unloaded)

1	Condition meter to measure 24 volts dc.	
2	At TB1 of 28A1 Data Mounting— Disconnect power source leads.	
3	At power source leads— Connect negative meter lead to signal ground lead of power source.	
4	Connect positive meter lead to + lead of power source.	Meter indicates 20 to 30 Vdc.
5	Disconnect both meter leads.	
6	Connect positive meter lead to signal ground lead of power source.	
7	Connect negative meter lead to − lead of power source.	Meter indicates 20 to 30 Vdc.
8	Disconnect both meter leads and reconnect power source leads removed in Step 2.	

C. Interface Lead Test

1	At 27A1 Data Unit associated with data set to be tested— Disconnect CPT interface cable of data set to be tested.	
2	Connect plug of interface connecting cord of interface test adapter to connector of Step 1.	

STEP	ACTION	VERIFICATION
3	At interface test adapter— Insure all shorting bars are closed.	
4a	If data set being tested is in a DATREX installation and the 27A1 Data Unit is equipped with option S— Connect a strap wire (supplied with interface test adapter) between interface test adapter terminals 8 and 20.	
5	Condition VOM to measure 24 volts dc.	
6b	If data set being tested is in a DATREX installation— At interface test adapter— Connect negative (−) VOM lead to terminal 7 and positive (+) VOM lead to terminal 8.	Meter deflects upscale indicating presence of voltage (CF negative or off). At data set being tested— Lamp on faceplate lighted.
7b	Disconnect VOM leads from interface test adapter.	
8b	Connect + VOM lead to terminal 7 and − VOM lead to terminal 6.	Meter deflects upscale indicating presence of voltage (CC negative or off).
9b	Disconnect VOM leads from interface test adapter.	
	Note: See 1.06.	
10b	Using a nearby telephone— Call the remote station to be used for the test and request attendant not to initiate any calls until told to do so.	
11b	Request the attendant at the concentrator to force a connection between the trunk associated with the data set under test and the line associated with the remote station to be used for the test.	
12b	After forced connection is made— Request attendant at remote station being used for the test to initiate a call.	When remote station initiates call— At data set being tested— Lamp on faceplate extinguished.
13b	At interface test adapter— Connect − VOM lead to terminal 7 and + VOM lead to terminal 6.	Meter deflects upscale indicating presence of voltage (CC positive or on).
14c	If data set being tested is in a PL installation— At interface test adapter— Connect − VOM lead to terminal 7 and + VOM lead to terminal 6.	Meter deflects upscale indicating presence of voltage (CC positive or on). At data set being tested— Lamp on faceplate lighted.

STEP	ACTION	VERIFICATION
15c	Disconnect VOM leads from interface test adapter. ***Note:*** See 1.06.	
16c	Using a nearby telephone— Call remote station associated with data set being tested and request attendant to disconnect power from the station.	
17c	Connect + VOM lead to terminal 7 and − VOM lead to terminal 8.	Meter deflects upscale indicating presence of voltage (CF negative or off).
18c	Disconnect VOM leads from interface test adapter. ***Note:*** See 1.06.	
19c	Using a nearby telephone— Call remote station associated with data set being tested and request attendant to reconnect power to the station. ***Note:*** For data sets employing receive supervision, it will also be necessary to have the attendant initiate a call.	At data set being tested— Lamp on faceplate extinguished.
20c	At interface test adapter— Connect − VOM lead to terminal 7 and + VOM lead to terminal 8.	Meter deflects upscale indicating presence of voltage (CF positive or on).
21	Disconnect VOM leads from interface test adapter.	
22	Condition VOM to measure 12 volts dc.	
23	Connect + VOM lead to terminal 7 and − VOM lead to terminal 3.	Meter deflects upscale indicating presence of voltage (BB marking).
24d	If remote station terminal equipment is a teletypewriter— Request remote station attendant to simultaneously operate the REPEAT key and SPACE bar for about 15 seconds.	Meter deflects to near zero (spaces being received on BB).
25	Disconnect VOM.	
26	Verify with remote station attendant that the teletypewriter (TTY) is ***not*** running open (BA marking).	

STEP	ACTION	VERIFICATION
27	Momentarily connect a strap between terminals 6 (PL) or 8 (DATREX) and 2 of interface test adapter.	TTY at remote end runs open while strap is connected (BA spacing).
28b	If data set being tested is in a DATREX installation— At 27A1 Data Unit associated with data set being tested— Operate NORMAL OFF switch associated with data set being tested to the OFF position.	At data set being tested— Lamp on faceplate lighted.
29d	If no further tests are to be performed— Instruct attendant at remote station to disconnect and return data set to service.	

D. End-to-End Test

Multiple Data Set Arrangement Station End

1	At 27A1 Data Unit associated with data set to be tested— Disconnect customer-provided terminal (CPT) interface cable from connector of the data set to be tested.	
2	Connect interface connecting cord of interface test adapter to connector of Step 1.	
3	At interface test adapter— Insure all shorting bars are closed.	
4a	If the data set being tested is in a DATREX installation and the 27A1 Data Unit is equipped with option S— Connect strap (supplied with interface test adapter) between interface test adapter terminals 8 and 20.	
5	Connect spade-tipped end of W1AD cord to terminal 7.	
6	Connect alligator clip end of W1AH cord to terminal 2.	
7	At 911A DTS— Connect alligator clip end of W1AD cord to ground post adjacent to OUTPUT VOLT jack.	
8	Plug terminal end of W1AH cord into OUTPUT VOLT jack.	
9	Operate controls in accordance with Table D.	

STEP **ACTION** **VERIFICATION**

TABLE D

CONTROL	SETTING
BIAS	0
DIST 5%	0
DIST 1%	0
BAUDS	Rate provided by terminal equipment
CODE	Code used by terminal equipment
OUTPUT	EIA
AUTO-MAN-STEP	MAN
All other	OFF

Remote Station End

At remote stations where use of the 911A DTS is not feasible due to lack of access to the data set interface leads, etc, Steps 10 through 17 may be omitted and the station teletypewriter (TTY) may be used to receive the test message.

10 At data set interface connector—
Disconnect terminal equipment interface cable and connect interface connecting cord of interface test adapter.

11 At interface test adapter—
Insure all shorting bars are closed.

12 Connect plug of terminal equipment interface cable to connector on interface test adapter.

13 Connect spade-tipped end of W1AD cord to terminal 7.

14 Connect alligator clip end of W1AH cord to terminal 3.

15 At 911A DTS—
Connect alligator clip end of W1AD cord to ground post adajacent to VOLT IN jack.

STEP	ACTION	VERIFICATION
16	Plug terminal end of W1AH cord into VOLT IN jack.	
17	Operate controls in accordance with Table E.	

TABLE E

CONTROL	SETTING
INPUT	EIA
DIST %	0
BAUDS	Rate provided by terminal equipment
CODE	Code used by terminal equipment
PK-PIP	PK
PARITY	OFF
POLARITY	+
FILTER	OUT

Test Procedure

Note: See 1.06.

18b	If data set being tested is in a PL installation not equipped with receive supervision— Using a nearby telephone— Call remote station and have call placed to the data set being tested.	At data set being tested— Lamp on faceplate extinguished.
19c	If the data set being tested is in a DATREX installation— Using a nearby telephone— Call remote station to be used for test and request no calls be initiated until told to do so.	
20c	Request attendant at concentrator to force a connection between trunk associated with data set being tested and line associated with remote station being used for test.	
21c	Request remote station to initiate a call.	At data set being tested— Lamp on faceplate extinguished.

STEP	ACTION	VERIFICATION
22d	If 911A DTS ***is*** used at remote station end— At remote station end— Apply power to 911A DTS and operate RESET key of distortion measuring set (DMS).	
23d	At multiple data set end— Apply power to 911A DTS, operate RESET key of test sentence generator (TSG), and set AUTO MAN STEP switch to AUTO.	At remote station end— DMS indicates less than 10 percent distortion.
24d	Remove power from both 911A DTSs.	
25d	At multiple data set end— Perform Steps 11 through 15.	
26d	At remote station end— Perform Steps 4 through 8.	
27d	At multiple data set end— Apply power to 911A DTS and operate RESET key of DMS.	
28d	At remote station end— Apply power to 911A DTS, operate RESET key on TSG, and set AUTO MAN STEP switch to AUTO.	At multiple data set end— DMS indicates less than 10 percent distortion.
29d	Remove power from both DTSs.	
30e	If 911A DTS is ***not*** used at remote station end— At multiple data set end— Apply power to 911A DTS, operate RESET key of TSG, and set AUTO MAN STEP switch to AUTO.	At remote station end— TTY repeatedly prints out "THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK 1234567890 TESTING" error free. (Each test message will be preceded by two carriage returns, a rub out character, and a line feed).
31e	At multiple data set end— Remove power from the 911A DTS.	
32e	Perform Steps 11 through 15.	
33e	Apply power to 911A DTS and operate RESET key of DMS.	
34e	At remote station end— Repeatedly transmit the test message "THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK 1234567890 TESTING".	At multiple data set end— DMS indicates less than 15 percent distortion.
35e	Remove power from 911A DTS.	

STEP	ACTION	VERIFICATION
36	Disconnect all test connections and restore normal connections.	