

**LOCAL LOOP  
TESTS AND REQUIREMENTS  
DIGITAL DATA SYSTEM**

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**NOTICE**

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**1. GENERAL**

**1.01** This section provides test procedures for local loop cable pairs during installation and maintenance to ensure that the pairs are suitable for digital data system (DDS) service. These tests also apply to loops used with 56-Kb/s off-network extensions of DDS circuits.

**1.02** This section is reissued for the following reasons:

- (a) To delete all references to the ED 3C948 tool which was never manufactured
- (b) To add references to the J98726-MF Channel Unit Extender (ED 3C 296-01 tool)
- (c) To add references to the J1C141MF-1,L1 Channel Unit Extender.

Since these changes constitute a general revision, arrows normally used to denote changes have been omitted.

**1.03** For loops equipped with 56-kb/s repeaters, the central office (CO) and outside plant (OP) repeaters must be bypassed (using either the automatic or manual bypass) in Tests A through G. The tests covered are:

**Test A. Foreign Voltage:** This procedure checks for foreign voltage on the cable pairs at the serving central office (SCO).

**Test B. Insulation Resistance:** This test checks the resistance between the cable pairs and ground at the office channel unit (OCU) location in the SCO.

**Test C. Loop Plus Terminal Resistance:** The loop resistance test measurement is the sum of the resistance of the cable pair (R<sub>L</sub>), the input resistance (R<sub>I</sub>) of the data service unit (DSU) or channel service unit (CSU), and the resistance of any bypassed 56-kb/s repeaters in the loop. The resistance of the cable pair was measured during the installation tests and should be recorded on the circuit layout record card (CLRC) or loop record card. The DSU (or CSU) input resistance depends on bit rate if the fixed line build out (FLBO) network is installed.

**Note:** A CO repeater inserts approximately 36 ohms in the bypassed mode. An OP repeater inserts about 5700 ohms in the bypassed mode. The polarity of the test meter leads must be applied as follows: negative to tip and positive to ring.

**Test D. OCU Simplex Voltage:** This test verifies that voltage is present to provide simplex current to the loop. The test is made at the OCU location using the 789A tool. For the Dataport configuration, the test is made using tool ED 3C947 for D3 channel banks, the J98726-MF Channel Unit Extender (CHAN UN EXT) for D4 channel banks, and the J1C141MF-1, L1 CHAN UN EXT for the 96 channel Subscriber Loop Carrier (SLC-96) terminals.

**Test E. Foreign Voltage:** This procedure checks for foreign voltage on the cable pairs at the SCO. This test requires that the DSU/CSU be removed at the station end and the line pairs be opened. The voltage reading between any test point should be less than 1 volt.

**Test F. Insulation Resistance:** This test checks the resistance between the cable pairs and ground at the OCU location in the SCO. This test requires that the DSU/CSU be removed at the station end and the line pairs be opened.

**Test G. Loop Resistance:** The loop resistance procedure verifies, at the OCU or OCUDP location in the SCO, that the loop resistance of each cable pair meets the maximum resistance requirement for initial installation. For subsequent tests, this resistance value should meet the benchmark resistance value recorded on the CLRC or the loop record card.

**Note:** A CO repeater inserts approximately 36 ohms in the bypassed mode. An OP repeater inserts about 5700 ohms in the bypassed mode. The polarity of the test meter leads must be applied as follows: negative to tip and positive to ring.

**Test H. Insertion Loss:** This measurement is made on a nonrepeated line at two test frequencies for 2.4- and 4.8-kilobits per second (kb/s) service: one test frequency for 9.6-kb/s service and three test frequencies for 56-kb/s service. The substrate insertion loss measurements are made at a frequency equal to one-half of the bit rate to check that the receive signal level will be within the normal operating range of the line receiver. In addition, it is made at 4.8 kHz to check that all load coils have been removed from the cable pairs. For 56-kb/s service, the insertion loss measurement is made for each repeater section at 28, 48, and 82 kHz.

**Test I. Background Circuit Noise:** This test is made using the 6F voiceband noise measuring set (NMS) equipped with a 50-kHz weighting network. This set is used to measure both background circuit noise and impulse noise counts. For best results, the measurement should be made during a busy-hour period in the central office. The

measurement is made on the T, R pair at the station and the T1, R1 pair at the SCO. For repeated lines, the measurement is made on the T, R pair on the network side of the repeater and the T1, R1 pair on the station side of the repeater.

**Test J. Impulse Noise:** The impulse noise test follows the background circuit noise test. The same setup is used for making both tests.

**Note:** Tests I and J must be made separately for each repeater section of a loop equipped with 56-kb/s repeaters; ie, from OCU to first repeater, first repeater to second repeater, and second repeater to DSU or CSU.

**1.04** The maintenance procedures consist of one-employee dc tests (A through D) for trouble isolation. The tests are made in the SCO at the OCU mounting or at the local test desk (LTD). The two-employee tests may also be required to locate trouble in case the one-employee dc tests do not locate the trouble.

**1.05** The cable pair installation tests are two-employee dc and ac tests (E through J) made between the OCU location and the station. For repeated lines, the tests are also made at the repeaters. These tests are made prior to the installation of DDS station equipment (DSU/CSU). When making these tests, any 56-kb/s repeaters in the loop must be in the bypassed mode. Results of these tests should be recorded on the loop record cards for use during maintenance periods. The installation tests should be performed as soon as the cable pairs are assigned in order to correct any transmission difficulties prior to the plant test date.

**1.06** The 4-wire circuits used for DDS service interconnect either a 500A-type DSU or a 550A-type CSU located at the customer station with 56-kb/s repeaters or an OCU or OCUDP in the SCO. The DDS provides full-duplex synchronous operation for data service at bit rates of 2.4-, 4.8-, 9.6-, or 56-kb/s.

TEST ACCESS AT OFFICE AND STATION

1.07 A typical arrangement showing test access for DDS 4-wire cable pair tests on the local loop is shown in Fig. 1. The OCU associated with the faulty loop is removed and the 789A tool or the Dataport equivalent is inserted in its place. The Dataport equivalent is the ED 3C947 tool used for D3 channel banks, the J98726-MF CHAN UN EXT used for D4 channel banks, or the J1C141MF-1, L1

CHAN UN EXT used for SLC-96 terminals. The ED 3C947 tool and the channel unit extenders are shown in Fig. 2. These tools contain two jacks and six test points. The jacks accept 310-type plugs and provide access to the T, R (OCU transmit), and T1, R1 (OCU receive) cable pairs. The six pin-type connector test points accept meter test probes and connect to the T, R, T1, and R1 cable pairs and to ground (GRD) and office battery (BAT).

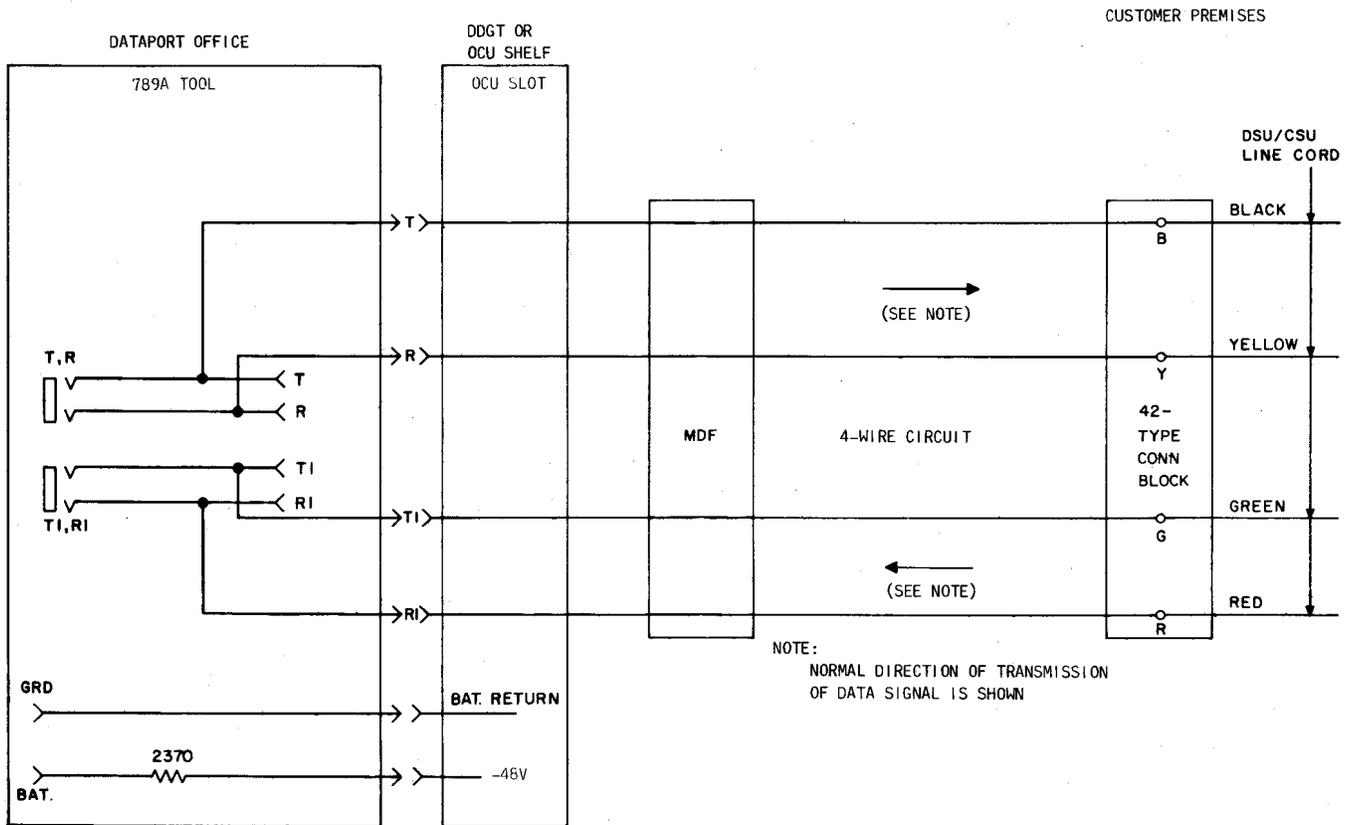


Fig. 1—Test Access for DDS Cable Pair Tests

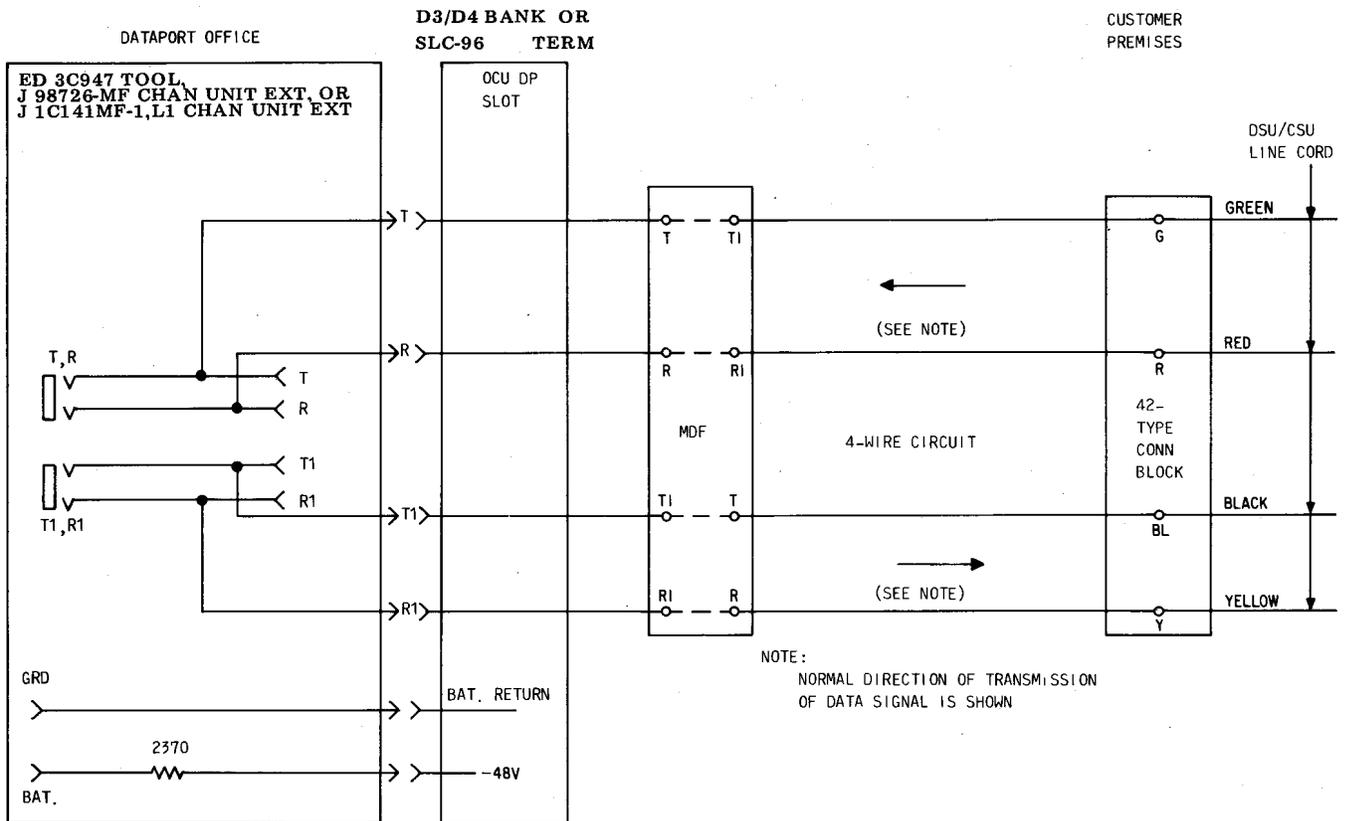


Fig. 2—Test Access for DDS Cable Pair Tests—Dataport Facilities

1.08 Tests A, B, C, E, F, and G may be made at the LTD. Access is obtained at the main distributing frame (MDF) using MDF test cords. At the LTD, measurements are made either toward the DSU/CSU or the OCU. When long test trunks are used, the resistance of the test trunks must be measured and subtracted from the overall loop resistance.

**Caution:** A dc loop current in excess of 250 mA may damage the DSU/CSU at the station end. Do not use test equipment that applies a current greater than 250 mA, such as a breakdown test set, to the cable pairs unless the OCU or OCUDP has been removed and the DSU/CSU has been disconnected from the pairs. In addition, a dc voltage in excess of 50 volts applied to repeatered loops can cause damage to the repeater. Do not use test equipment that applies a voltage greater than 50 volts to the cable pair on repeatered loops.

#### TEST ACCESS AT 56-KB/S REPEATERS

1.09 Test access at the CO repeater to the local loop providing 56-kb/s service is provided by four jacks mounted on the front of the repeater housing. Additional information on test access and tests on the CO repeater are given in Section 314-920-500.

1.10 Test access at the OP repeater to the local loop providing 56-kb/s service is provided by terminals on the 31A connector block.

**Note:** Circuit pack LA5 must be removed from the 468F apparatus case before performing dc or ac tests on the local loop pairs. Additional information on test access and repeater tests are given in Section 640-251-107.

1.11 The SCO (one-employee) dc tests on loops providing 56-kb/s service require that the repeaters in the loop section be bypassed. This must be done in order to provide continuity to

## SECTION 314-410-510

the station and back to the CO. The CO or OP repeater is bypassed either by manually operating the bypass switch on the front of the CO repeater housing, or by removing simplex current to the loop at the OCU bay. Simplex current is removed at the OCU bay by unplugging the OCU and inserting the 789A tool or the Dataport equivalent in its place. This removes the simplex current to the CO repeater or powering unit which automatically bypasses all repeaters (CO or OP) in the loop. The ac tests are made on a per-repeater-section basis and do not require operation of the repeater bypass.

### 2. TEST EQUIPMENT

**2.01** This part provides a listing and brief description of the test equipment required for testing DDS local loops. In many instances, equivalent test equipment may be used instead. Other noise-measuring sets having 50-kHz weighting filters and 135-ohm impedance may be used in place of the 6F NMS specified. Other transmission measuring sets capable of operation up to 85 kHz with 135-ohm impedance may be used in place of the HP 3550B.

#### APPARATUS REQUIRED FOR SERVING CENTRAL OFFICE (One-Employee) TESTS

**2.02** The test apparatus required at the SCO for the one-employee tests is described as follows.

- One portable volt-ohm-milliammeter (VOM), KS-14510-L1 or KS-16979-L1 or equivalent.
- One 789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UNIT EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals.

When the service rides Dataport on SLC-96, the SCO could be a remote terminal not necessarily located in a CO.

#### APPARATUS REQUIRED FOR SERVING CENTRAL OFFICE-TO-STATION (Two-Employee) TESTS

**2.03** The serving central office-to-station tests require the efforts of two employees, one at each end of the local channel. For this reason, the following list of equipment is separated into

two parts: (1) equipment required at the office and (2) equipment required at the station. When the service rides Dataport on SLC-96, the SCO could be remote terminal not necessarily located in a CO.

#### Serving Central Office Equipment

**2.04** The required test equipment is as follows.

- One portable VOM, such as the KS-14510-L1 or KS-16979-L1 or equivalent volt-ohm-meter, having a meter of at least 20,000 ohms per volt.
- One 789A tool for standard configuration or the Dataport equivalent. The Dataport equivalent is the ED 3C947 tool used with D3 banks, the J98726-MF CHAN UN EXT used with D4 banks, or the J1C141MF-1,L1 CHAN UNIT EXT used with SLC-96 terminals.
- One P2ES or equivalent cord (specify 8- or 12-foot cord length for use with 7- or 11-foot bays).
- One HP-3550B test set or equivalent.
- One 6F voiceband NMS with 50-kHz network (497F).
- One 135-ohm resistor.
- One 386B plug (310 plug with 135-ohm termination).

#### Station Equipment

**2.05** The required test equipment and apparatus are as follows:

- One 6F voiceband NMS with 50-kHz network (497F)
- One HP-3550B test set
- Two 135-ohm resistors.

#### APPARATUS REQUIRED AT 56-KB/S REPEATER

**2.06** The test equipment and apparatus required at the 56-kb/s repeater location are as follows:

- One 6F voiceband NMS with 50-kHz network (497F)
- One HP-3550B test set (or a Hewlett-Packard model 403B voltmeter, a 146A repeat coil, and a 600-ohm resistor)
- Two 135-ohm resistors.

### 3. OVERALL LOOP TESTS

#### TEST RECORDS

**3.01** Five local loop record cards, one for each bit/rate speed, plus a card for loops containing 56-kb/s repeaters, are available and should be used to record measurement results by the craft employee at the SCO. These cards are designated as E-6528-1, E-6528-2, E-6528-3, E-6528-4, and E-6528-4R and are shown in Fig. 3, 4, 5, 6, and 7, respectively.

**3.02** Each card lists the various measurements to be made and provides blocks of spaces to be used for recording measurement results. Any additional information which may be helpful in maintaining the local loop should also be recorded on the card.

#### SERVING CENTRAL OFFICE (One-Employee) TESTS

**3.03** The SCO tests should be performed on cable pairs from the SCO during maintenance periods. When the service rides Dataport on SLC-96, the SCO could be a remote terminal not necessarily located in a CO.

**3.04** The procedures consist of dc measurements that can be performed by one employee and should be made in the following order:

- (a) Foreign Voltage
- (b) Insulation Resistance
- (c) Loop Plus Terminal Resistance
- (d) OCU Simplex Voltage.

If any of the test requirements are not met, proceed according to instructions given in Section 314-410-310.

**Note:** Bypass the 56-kb/s repeaters if used in the loop section. Refer to paragraph 1.11. Restore repeaters to normal operation after completing these tests.

**Caution:** Do not apply a dc voltage in excess of 50 volts to the loop when repeaters are in the bypass mode. Test voltage must be applied as follows: negative to tip, positive to ring.

**3.05** If the simplex voltage measurement is made at the LTD or MDF, the simplex voltage is measured between T and T1 and also between R and R1, looking toward the OCU or OCUDP. The first measurement is made with the STC transmitting a 2047-bit word; the second measurement is made with the STC transmitting the channel loop-back code. The polarity of the simplex voltage must reverse in the second measurement. If no voltage is measured, check the following.

- (a) Be sure the OCU or OCUDP is plugged into the bay.
- (b) Verify cable pair continuity between OCU or OCUDP and MDF or LTD.
- (c) Check simplex current fuse in BCPA or LTS. (OCU only)
- (d) Replace OCU or OCUDP (install the FLBO network option listed on the CLR).

#### SERVING CENTRAL OFFICE-TO-STATION (Two-Employee) TESTS

**3.06** This part provides test procedures that consist of dc and ac tests on the cable pair which are performed between the customer data station and the SCO.

**3.07** The tests are performed by two craft employees. This normally will be one employee at the customer station and the other employee in the SCO. On local loops providing 56-kb/s service, these tests must also be made at the repeater(s) and more than two employees will be involved in the tests. This may require coordination effort by the SCO. The DSU (or CSU) must be disconnected from the cable pairs before making these tests. In addition, the OCU is removed and replaced by the 789A tool or the Dataport equivalent during these tests.

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FORM E-6528-1

DATE \_\_\_\_\_

LOCAL LOOP RECORD CARD

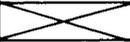
DDS

2.4 KB/S

CIRCUIT	SYSTEM	OCU

MAINTENANCE TESTS 314-410-510 1-EMPLOYEE TESTS (CO) CONNECT DSU/CSU FOR 1-EMPLOYEE TESTS

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
A FOREIGN VOLTAGE	T - R, T1 - R1, T - G, R - G, T1 - G, R1 - G	LESS THAN ± 1 VDC	
B INSULATION RESISTANCE	T - G, R - G, T1 - G, R1 - G	MORE THAN 120 K Ω	
C LOOP + TERMINAL RES	T1 TO R1 = (RL2 + 35 Ω) ± 30%	FOR RL2 SEE TEST G	
	DSU/CSU-WW OPTION IN T TO R = (RL1 + 35 Ω) ± 30%	FOR RL1 SEE TEST G	
	DSU/CSU-WV OPTION IN T TO R = (RL1 + 1030 Ω) ± 30%		
D OCU SIMPLEX VOLTAGE	AT 789A TOOL GRD TO BAT.	- 47 ± 7 VDC OR - 24 ± 6 VDC	

CABLE AND PAIR	T - R								
		PAIR	CABLE	PAIR	CABLE	PAIR	CABLE	PAIR	CABLE
	T1 - R1								

REMARKS

DDS

2.4 KB/S

CIRCUIT	SYSTEM	OCU

NAME	ADDRESS	TEL. #	INST. DATE

INSTALLATION TESTS 314-410-510 2-EMPLOYEE TESTS (CO) DISCONNECT DSU/CSU FOR 2-EMPLOYEE TESTS

STC TEL. #

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
E FOREIGN VOLTAGE	T - R, T1 - R1, T - G, R - G, T1 - G, R1 - G	LESS THAN ± 1 VDC	
F INSULATION RESISTANCE	T - R, T1 - R1, R - R1, T - R1, R - T1 T - T1, T - G, R - G, T1 - G, R1 - G	MORE THAN 300 K Ω	
G LOOP RESISTANCE	T - R   RL1 *   T1 - R1   RL2 *	LESS THAN 4200 Ω	
H INSERTION LOSS HP - 3550 B	1.2 KHZ - 135 Ω	T, R   T1, R1	LESS THAN OR EQUALS 34 dB AND EQUALS EML + 5 or -2.5
	4.8 KHZ - 135 Ω	*	LESS THAN OR EQUALS TWICE AML at 1.2 KHZ
I BACKGROUND NOISE 6F OR 6FR	50-KHZ FILTER 600 Ω BRDG	*	MAX 42 dBm
J IMPULSE NOISE 6F OR 6FR	135 Ω TERM	*	58 dBm - 15 MIN 7 OR LESS COUNTS

\* RECORD READING (OVER)

Fig. 3—Example of Local Loop Record Card of 2.4-Kb/s Service (ORANGE)

FORM E-6528-2  
DATE \_\_\_\_\_

LOCAL LOOP RECORD CARD

DDS

4.8 KB/S

CIRCUIT	SYSTEM	OCU

MAINTENANCE TESTS 314-410-510 1-EMPLOYEE TESTS (CO) CONNECT DSU/CSU FOR 1-EMPLOYEE TESTS

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
A FOREIGN VOLTAGE	T - R, T1 - R1, T - G, R - G, T1 - G, R1 - G	LESS THAN ± 1 VDC	
B INSULATION RESISTANCE	T - G, R - G, T1 - G, R1 - G	MORE THAN 120 K Ω	
C LOOP + TERMINAL RES	T1 TO R1 = (RL2 + 35 Ω) ± 30%	FOR RL2 SEE TEST G	
	DSU/CSU-WW OPTION IN T TO R = (RL1 + 35 Ω) ± 30%	FOR RL1 SEE TEST G	
	DSU/CSU-WV OPTION IN T TO R = (RL1 + 920 Ω) ± 30%		
D OCU SIMPLEX VOLTAGE	AT 789A TOOL GRD TO BAT.	- 47 ± 7 VDC OR - 24 ± 6 VDC	

CABLE AND PAIR	T - R								
		PAIR	CABLE	PAIR	CABLE	PAIR	CABLE	PAIR	CABLE
	T1 - R1								

REMARKS

DDS

4.8 KB/S

CIRCUIT	SYSTEM	OCU

NAME	ADDRESS	TEL. #	INST. DATE

INSTALLATION TESTS 314-410-510 2-EMPLOYEE TESTS (CO) DISCONNECT DSU/CSU FOR 2-EMPLOYEE TESTS STC TEL. #

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
E FOREIGN VOLTAGE	T - R, T1 - R1, T - G, R - G, T1 - G, R1 - G	LESS THAN ± 1 VDC	
F INSULATION RESISTANCE	T - R, T1 - R1, R - R1, T - R1, R - T1, T - T1, T - G, R - G, T1 - G, R1 - G	MORE THAN 300 K Ω	
G LOOP RESISTANCE	T - R   RL1 *   T1 - R1   RL2 *	LESS THAN 4200 Ω	
H INSERTION LOSS HP - 3550 B	2.4 KHZ - 135 Ω	T, R *   T1, R1 * LESS THAN OR EQUALS 34 dB AND EQUALS EML + 5 or -2.5	
	4.8 KHZ - 135 Ω	*   * LESS THAN OR EQUALS AML AT 2.4 KHZ + 15	
I BACKGROUND NOISE 6F OR 6FR	50-KHZ FILTER	*   * MAX 39 dBm	
J IMPULSE NOISE 6F OR 6FR	600 Ω BRDG 135 Ω TERM	*   * 55 dBm - 15 MIN 7 OR LESS COUNTS	

\* RECORD READING (OVER)

Fig. 4—Example of Local Loop Record Card of 4.8-Kb/s Service (YELLOW)

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FORM E-6528-3  
DATE \_\_\_\_\_

**LOCAL LOOP RECORD CARD**

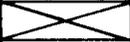
DDS

9.6 KB/S

CIRCUIT	SYSTEM	OCU

MAINTENANCE TESTS 314-410-510 1-EMPLOYEE TESTS (CO) CONNECT DSU/CSU FOR 1-EMPLOYEE TESTS

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
A FOREIGN VOLTAGE	T - R, T1 - R1, T - G, R - G, T1 - G, R1 - G	LESS THAN ± 1 VDC	
B INSULATION RESISTANCE	T - G, R - G, T1 - G, R1 - G	MORE THAN 120 K Ω	
C LOOP + TERMINAL RES	T1 TO R1 = (RL2 + 35 Ω) ± 30%	FOR RL2 SEE TEST G	
	DSU/CSU-WW OPTION IN T TO R = (RL1 + 35 Ω) ± 30%	FOR RL1 SEE TEST G	
	DSU/CSU-WV OPTION IN T TO R = (RL1 + 475 Ω) ± 30%		
D OCU SIMPLEX VOLTAGE	AT 789A TOOL GRD TO BAT.	- 47 ± 7 VDC OR - 24 ± 6 VDC	

CABLE AND PAIR	T - R								
		PAIR	CABLE	PAIR	CABLE	PAIR	CABLE	PAIR	CABLE
	T1 - R1								

REMARKS

DDS

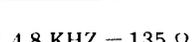
9.6 KB/S

CIRCUIT	SYSTEM	OCU

NAME	ADDRESS	TEL. #	INST. DATE

INSTALLATION TESTS 314-410-510 2-EMPLOYEE TESTS (CO)  
DISCONNECT DSU/CSU FOR 2-EMPLOYEE TESTS

STC TEL. #

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
E FOREIGN VOLTAGE	T - R, T1 - R1, T - G, R - G, T1 - G, R1 - G	LESS THAN ± 1 VDC	
F INSULATION RESISTANCE	T - R, T1 - R1, R - R1, T - R1, R - T1, T - T1, T - G, R - G, T1 - G, R1 - G	MORE THAN 300 K Ω	
G LOOP RESISTANCE	T - R   RL1 *   T1 - R1   RL2 *	LESS THAN 4200 Ω	
H INSERTION LOSS HP - 3550 B	4.8 KHZ - 135 Ω	LESS THAN OR EQUALS 34 dB AND EQUALS EML + 5 or -2.5	
			
I BACKGROUND NOISE 6F OR 6FR	50-KHZ FILTER 600 Ω BRDG	MAX 31 dB <sub>rn</sub>	
J IMPULSE NOISE 6F OR 6FR	135 Ω TERM	47 dB <sub>rn</sub> - 15 MIN 7 OR LESS COUNTS	

\* RECORD READING (OVER)

**Fig. 5—Example of Local Loop Record Card for 9.6-Kb/s Service (GREEN)**

FORM E-6528-4  
DATE \_\_\_\_\_

LOCAL LOOP RECORD CARD

DDS

56 KB/S

CIRCUIT	SYSTEM	OCU

MAINTENANCE TESTS 314-410-510 1-EMPLOYEE TESTS (CO) CONNECT DSU/CSU FOR 1-EMPLOYEE TESTS

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
A FOREIGN VOLTAGE	T - R, T1 - R1, T - G, R - G, T1 - G, R1 - G	LESS THAN ± 1 VDC	
B INSULATION RESISTANCE	T - G, R - G, T1 - G, R1 - G	MORE THAN 120 K Ω	
C LOOP + TERMINAL RES	T1 TO R1 = (RL2 + 35 Ω) ± 30%	FOR RL2 SEE TEST G	
	DSU/CSU-WW OPTION IN T TO R = (RL1 + 35 Ω) ± 30%	FOR RL1 SEE TEST G	
	DSU/CSU-WV OPTION IN T TO R = (RL1 + 220 Ω) ± 30%		
D OCU SIMPLEX VOLTAGE	AT 789A TOOL GRD TO BAT.	- 47 ± 7 VDC OR - 24 ± 6 VDC	

CABLE AND PAIR	T - R								
		PAIR	CABLE	PAIR	CABLE	PAIR	CABLE	PAIR	CABLE
	T1 - R1								

REMARKS

DDS

56 KB/S

CIRCUIT	SYSTEM	OCU

NAME	ADDRESS	TEL. #	INST. DATE

INSTALLATION TESTS 314-410-510 2-EMPLOYEE TESTS (CO) DISCONNECT DSU/CSU FOR 2-EMPLOYEE TESTS STC TEL. #

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
E FOREIGN VOLTAGE	T-R, T1-R1, T-G, R-G, T1-G, R1-G	LESS THAN ± 1 VDC	
F INSULATION RESISTANCE	T-R, T1-R1, R-R1, T-R1, R-T1, T-T1, T-G, R-G, T1-G, R1-G	MORE THAN 300 K Ω	
G LOOP RESISTANCE	T - R   RL1 *   T1 - R1   RL2 *	LESS THAN 4200 Ω	
H INSERTION LOSS HP - 3550 B	28.0 KHZ - 135 Ω   T, R *   T1, R1 *	LESS THAN OR EQUALS 34 dB AND EQUALS EML + 5 or -2.5	
	82.0 KHZ - 135 Ω   *   *	LESS THAN OR EQUALS AML at 28 KHZ + 20	
	48.0 KHZ - 135 Ω   *   *	(EQUALS SUM OF AML AT 28 KHZ + AML AT 82 KHZ DIVIDED BY 2) ± 2.5	
I BACKGROUND NOISE 6F OR 6FR	50-KHZ FILTER 600 Ω BRDG	* *   MAX 28 dBm	
J IMPULSE NOISE 6F OR 6FR	135 Ω TERM	* *   +1 dBm - 15 MIN 7 OR LESS COUNTS	

\* RECORD READING (OVER)

Fig. 6—Example of Local Loop Record Card for 56-Kb/s Service (BLUE)

SECTION 314-410-510

FORM E-6528-4R  
DATE \_\_\_\_\_

LOCAL LOOP RECORD CARD

DDS 56 KB/S WITH REPEATER (S)

CIRCUIT	SYSTEM	OCU
---------	--------	-----

MAINTENANCE TESTS 314-410-510 1-EMPLOYEE TESTS FROM OCU LOCATION WITH ALL REPEATERS BYPASSED AND THE DSU/CSU CONNECTED

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
A FOREIGN VOLTAGE	T-R, T1-R1, T-G, R-G, T1-G, R1-G,	LESS THAN ± 1 VDC	
B INSULATION RESISTANCE	T-G, R-G, T1-G, R1-G	MORE THAN 120K Ω	
C	LOOP + TERMINAL RES	$T1 \text{ to } R1 = [\text{Sum of All } \#RL2s + \phi N \times 5740 + 80]$	TEST RES CANNOT VARY
	DSU/CSU-WV OPTION IN	$T \text{ to } R = [\text{Sum of All } \#RL1s + \phi N \times 5740 + 80]$	MORE THAN ± 30%
	DSU/CSU-WV OPTION IN	$T \text{ to } R = [\text{Sum of All } \#RL1s + \phi N \times 5740 + 265]$	
D OCU SIMPLEX VOLTAGE	AT 789A TOOL GRD TO BAT.	-47 ± 7 VDC OR -24 ± 6 VDC	

CABLE AND PAIR	T-R								
	<del>T-R</del>	PAIR	CABLE	PAIR	CABLE	PAIR	CABLE	PAIR	CABLE
	T1-R1								

REMARKS # For RL1 & RL2 See test G φ N = Number of Outside Plant Repeaters

DDS REPEATER SECTION 56 KB/S WITH REPEATER (S)

(Check One)  OCU TO REPEATER  REPEATER TO REPEATER  REPEATER TO STATION

CIRCUIT	SYSTEM	OCU
NAME	ADDRESS	TEL. INST. DATE

INSTALLATION TESTS 314-010-510 2-EMPLOYEE TESTS REPEATERS AND DSU/CSU DISCONNECTED FOR 2-EMPLOYEE TEST

STC TEL

TEST	TEST CONDITION	REQUIREMENTS	INITIALS
E FOREIGN VOLTAGE	T-R, T1-R1, T-G, T1-G, R1-G	LESS THAN ± 1 VDC	
F INSULATION RESISTANCE	T-R, T1-R1, R-R1, T-R1, R-T1, T-T1, T-G, R-G, T1-G, R1-G	MORE THAN 300K Ω	
G RPTR SECT. LOOP RES	T-R   RL1 *   T1-R1   RL2 *	LESS THAN 1140Ω	
H INSERTION LOSS HP-3550 B	28.0 KHZ AT 135Ω TERMINATION	LESS THAN OR EQUALS 31dB AND EQUALS EML +5 OR-2.5 dB	
	82.0 KHZ AT 135Ω TERMINATION	LESS THAN OR EQUALS AML AT 28 KHZ + 20	
	48.0 KHZ AT 135Ω TERMINATION	EQUALS SUM OF AML AT 28 KHZ + AML AT 82 KHZ DIVIDED BY 2) ± 2.5	
I BACKGROUND NOISE 6F OR 6FR	50 - KHZ FILTER 600Ω BRDG	MAX 28 dBrn	
J IMPULSE NOISE 6F OR 6FR	135Ω TERMINATION	44 dBrn FOR 15 MINUTES 7 OR LESS COUNTS	
K SIMPLEX VOLTAGE at J70177AT SHELF	TIP OF TRMT PR TO TIP OF RCV PR	NET. SIDE * -24±5V OR -50±10V	
	PIN JACK (J5) TO PIN JACK TO (J6)	STA SIDE * +1.5V TO +140.0V	

\* RECORD READING

(OVER)

Fig. 7—Example of Local Loop Record Card for 56 Kb/s Service with Repeater

**Required Tests**

**3.08** The cable pair initial installation tests (E through J) should be made on each pair of the 4-wire loop before installation of the DSU or CSU or repeaters. The preliminary testing of the cable pairs should be completed far enough in advance to allow time to locate and correct problems that may exist. For maintenance, perform the tests as required.

**DC Tests**

**3.09** The following tests are performed on the cable pairs to locate foreign voltage, opens, shorts, crosses, or grounds.

**3.10** The dc tests are similar to the SCO (one employee) tests. They differ in that they require the coordinated effort of two craft employees; the DSU (or CSU) is not connected to the 4-wire circuit when the tests are made.

**Note:** If 56-kb/s service is provided, these tests may also be made from the repeater location to the CO or station end. The test procedures should be modified accordingly.

These tests are as follows:

- (a) Foreign Voltage
- (b) Insulation Resistance
- (c) Loop Resistance.

**AC TESTS**

**3.11** The following tests are performed on the cable pairs to ensure that they meet the insertion loss and noise requirements for DDS.

**Note:** If 56-kb/s service is provided, these tests may also be made from the repeater location to the CO and to the station end. The test procedures should be modified accordingly.

These tests are to be made prior to the start of DDS service:

- (a) Insertion Loss
- (b) Background Circuit Noise

**(c) Impulse Noise.**

If the noise requirements cannot be met, the problem may be caused by pair imbalance. Refer this type of problem to the cable repair group.

**Insertion Loss**

**3.12** When performed during initial installation, this test will verify that the cable loss is correct, all load coils have been removed, and no long-bridged taps are on the pairs. The actual measured loss (AML) is compared with the expected measured loss (EML) on the CLR. The insertion loss requirements are given in Table A. The AML is recorded on the CLR as a benchmark value. Insertion loss measured during a maintenance test must be within  $\pm 3$  dB of the value measured at installation; however, insertion loss at 1/2 the bit rate must always be less than or equal to 34 dB. Insertion loss at 1/2 the 56-kb/s rate (28 kHz) must be less than or equal to 31 dB on a loop section with a repeater, or 29 dB on a loop section with only a simplex power unit.

**3.13** This test requires two HP-3550B test sets or equivalent (one at each end), a 789A tool, and a P2ES cord at the office location.

**Background Circuit Noise**

**3.14** All noise measurements are made using four 135-ohm resistors to terminate both cable pairs at each end. At the OCU location in the SCO, the following equipment or apparatus will be required:

- One 6F or 6FR NMS with 50-kHz network (497F)
- One 135-ohm resistor
- One 386B plug (310 plug with 135-ohm resistor termination)
- One 789A tool or Dataport equivalent. The Dataport equivalent is the ED 3C947 tool used for D3 channel banks, the J98726-MF CHAN UN EXT used for D4 channel banks or the J1C141MF-1,L1 CHAN UN EXT used for SLC-96 terminals.
- One P2ES, or equivalent, cord.

TABLE A

## INSERTION LOSS LIMITS FOR INITIAL INSTALLATION TESTS

BIT RATE KB/S	TEST FREQ (KHZ)	MEASURED LOSS LIMITS (DB)
2.4	1.2	AML is less than or equals 34 and AML equals the EML value +5 or -2.5*†
	4.8	AML is less than or equals twice the value of the AML measured at 1.2 kHz
4.8	2.4	AML is less than or equals 34 and AML equals the EML value +5 or -2.5*†
	4.8	AML is less than or equals AML value at 2.4 kHz +15
9.6	4.8	AML is less than or equals 34 and AML equals the EML value +5 or -2.5*†
56‡	28	AML is less than or equals 34 and AML equals the EML value +5 or -2.5*†
	82	AML is less than or equals the AML value at 28 kHz +20
	48	AML equals the sum of the AML at 28 kHz plus the AML at 82 kHz divided by 2. This quantity may vary + or -2.5.

\* Maximum EML is 31 dB.

† Contact transmission engineer when AML exceeds 34 dB and/or  
AML exceeds EML +5 or -2.5 dB.

‡ For 56-kb/s repeatered loops, the limit applies to each repeater  
section.

**3.15** At the station, the following equipment will  
be required:

- One 6F NMS with 50-kHz network (497F)
- Two 135-ohm resistors.

**3.16** If all pair test requirements are met in this  
part, the 4-wire channel is suitable for initial  
DDS service.

#### 4. REFERENCES

**4.01** The following sections contain additional  
information on test equipment and maintenance  
procedures:

SECTION	TITLE		
100-520-101	KS-14510 Meter (Portable Volt-Ohm-Milliammeter) — Description and Operation	365-150-107	Dataport Operation—Description, Installation, and Tests—D3B Channel Bank
103-626-100	6F and 6FR Voiceband Noise Measuring Sets—(J94006F and J94006FR)—Description, Operation, and Maintenance	365-170-100	Description—D4 Channel Bank
		365-170-120	Dataport Channel Units—Channel Unit Description—D4 Channel Bank
314-410-310	Digital Data System—Local Loop—Maintenance Procedures	634-310-501	Locating Cable Faults With the 96A Test Set
314-910-100	Digital Data System—Office Channel Unit (OCU) Assembly—Description	640-251-106	468F Apparatus Case—Description and Installation
314-918-100	Digital Data System—Digital Data Group Terminal—Description	640-251-107	468F Apparatus Case—Splicing and Acceptance Testing
314-920-100	Digital Data System—Digital 56-kb/s Repeater—Description	666-600-500	Digital Data System—950A Testboard (J70176A and B)—Inspection and Maintenance.
314-920-500	Digital Data System—Digital 56-kb/s Repeater—Test Procedures		
363-202-100	“SLC” <sup>®</sup> 96 Subscriber Loop Carrier System—General Description		
363-202-401	“SLC” <sup>®</sup> 96 Subscriber Loop Carrier System—Remote Terminal		
363-202-601	“SLC” <sup>®</sup> 96 Subscriber Loop Carrier System—Remote Terminal Cabinet (AT-8908M)—Installation of Shelves		

#### 5. CHART PROCEDURES

**5.01** This part includes procedures for the lineup of local loops on the DDS. These procedures are also used for maintenance and trouble testing as referenced by Section 314-410-310. An understanding of the text in Parts 1 through 3 and familiarity with the specified test equipment should be accomplished before attempting to use the chart procedures.

SERVING CENTRAL OFFICE TESTS

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CHART 1

FOREIGN VOLTAGE

---

**APPARATUS:**

Portable volt-ohm-milliammeter (VOM), KS-14510-L1 or KS-16979-L1 or equivalent

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

---

**STEP**

**PROCEDURE**

---

- 1 Set the KS-14510-L1 meter range switch to the 60 VOLT DC scale. Remove the OCU and insert the 789A tool into the slot. For the Dataport configuration, insert the Dataport equivalent.
  
- 2 At the 789A tool or Dataport equivalent, connect the meter test probes to the following test points. Measure the voltage between:
  - T and R
  - T1 and R1
  - T and GRD
  - R and GRD
  - T1 and GRD
  - R1 and GRD.

**Requirement:** Voltage reading less than 1 volt.

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**CHART 2**
**INSULATION RESISTANCE**


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**APPARATUS:**

Portable volt-ohm-milliammeter (VOM), KS-14510-L1 or KS-16979-L1 or equivalent

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

---

**STEP****PROCEDURE**

- 
- |   |  |
|---|--|
| 1 | Set the KS-14510-L1 meter range switch to the OHMS X10,000 scale and zero adjust the meter.                        |
| 2 | At the 789A tool or Dataport equivalent, connect the meter to the following test points and GRD: T1, R1, T, and R. |

**Requirement:** The insulation resistance reading between each test point and GRD must be greater than 120 kohms.

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**CHART 3**
**LOOP PLUS TERMINAL RESISTANCE**


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**APPARATUS:**

Portable volt-ohm-milliammeter (VOM), KS-14510-L1 or KS-16979-L1 or equivalent

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

STEP	PROCEDURE
1	Set the KS-14510-L1 meter range switch to the OHMS X100 scale and zero adjust the meter.
2	At the 789A tool or Dataport equivalent, connect the meter first to test points T and R, and then to T1 and R1. Read the resistance of each connection. (See Note under Test C of paragraph 1.03.)

**Requirement:** The measured resistance must be as follows:

$$R (T1 \text{ to } R1) = (RL2 + 35) \text{ ohms } \pm 30\%$$

$$R (T \text{ to } R) = (RL1 + RI) \text{ ohms } \pm 30\%.$$

**Note:** On repeatered loops, the resistance of the bypassed repeaters in the loop must be included. Refer to Fig. 7 for the value of this resistance. The values of RL1 and RL2 are from installation measurements recorded on the loop record cards and the values of input resistance (RI) are as follows.

- If the DSU or CSU uses FLBO option WW, RI is 35 ohms.
- If the DSU or CSU uses FLBO option WV, RI is as follows:

Bit Rate (KB/S)	Resistance Ohms (RI)
2.4	1030
4.8	920
9.6	475
56.0	220

#### CHART 4

#### OCU SIMPLEX VOLTAGE

#### APPARATUS:

Portable volt-ohm-milliammeter (VOM), KS-14510-L1 or KS-16979-L1 or equivalent

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

STEP	PROCEDURE
<i>At the OCU Location</i>	
1	Set the voltmeter to the 60 VOLT DC scale.
2	Connect the + probe to the GRD test point and the - test probe to the BAT test point on the 789A tool or the Dataport equivalent.
3	Measure the voltage.
<b>Requirement:</b>	
If office supply is -48 Vdc, measured voltage should be -49 Vdc minimum and -54 Vdc maximum.	
If office supply is -24 Vdc, measured voltage should be -18 Vdc minimum and -39 Vdc maximum.	

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**SERVING CENTRAL OFFICE-TO-STATION TESTS**


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**CHART 5****FOREIGN VOLTAGE****APPARATUS:**

At the office

Portable VOM, such as the KS-14510-L1 or KS-16979-L1 or equivalent

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

At the station

None required

---

STEP	PROCEDURE
1	At the data station, disconnect the DSU (or CSU) from the 42A connecting block and leave the cable pairs open-circuited.
2	At the office location, set the KS-14510-L1 meter range switch to the 60 VOLT DC scale.
3	Remove the OCU and insert the 789A tool or the Dataport equivalent into the slot. At the 789A tool or the Dataport equivalent, connect the meter to the following test points and check for a voltage reading:  T to R  T1 to R1  T to GRD  R to GRD  T1 to GRD  R1 to GRD.  <b>Requirement:</b> Voltage reading less than 1 volt.
4	If voltage readings meet the above requirement, proceed to the insulation resistance test procedures.
5	If a voltage reading exceeded the requirement on any wire or pair, the faulty pair must be repaired or replaced.

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CHART 6

INSULATION RESISTANCE

---

**APPARATUS:**

At the office

Portable VOM, such as the KS-14510-L1 or KS-16979-L1 or equivalent

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

At the station

None required

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**STEP****PROCEDURE**

---

- 1 At the data station, verify that the two cable pairs are open-circuited and not shorted to each other or ground.
- 2 At the office location, set the KS-14510-L1 meter range switch to the OHMS X10,000 scale and zero adjust the meter.
- 3 At the 789A tool or the Dataport equivalent connect the meter to the following test points and measure the resistance:

T and R, R and R1

T and R1, R and T1

T and T1, T1 and R1.

**Requirement:** Each insulation resistance reading must be greater than 300 kohms.

- 4 Connect the meter between the following test points and measure the resistance:

T and GRD

R and GRD

T1 and GRD

R1 and GRD.

**Requirement:** Each insulation resistance reading must be greater than 300 kohms.

- 5 If the requirements of Steps 3 and 4 are met, proceed to the loop resistance test procedures.
- 6 If the requirements of Steps 3 and 4 are **not** met, the faulty cable pair must be repaired or replaced.

**CHART 7**  
**LOOP RESISTANCE**

**APPARATUS:**

At the office

Portable VOM, such as the KS-14510-L1 or KS-16979-L1 or equivalent

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

At the station

None required

**STEP**

**PROCEDURE**

- 1 At the data station, short the T, R pair on the connecting block as follows:

500A DSU Line Cord Colors

		T	R	T1	R1
L1/2, L1/3, L1/5	SERIES 2	B	Y	G	R
L1/4, SERIES 3					

- 2 At the office location, set the KS-14510-L1 meter range switch to the OHMS X100 scale and zero adjust the meter.
- 3 Connect the meter to the 789A tool or the Dataport equivalent test points T and R. Read the resistance value.

**Requirement:** The resistance reading must be less than 4200 ohms and the value is recorded as RL1 on the CLRC. If the test is not an initial installation test, then the loop resistance must equal RL1 ±30 percent.

**Note:** On repeatered loops, the resistance of the bypassed repeaters in the loop must be included. Refer to Fig. 7 for the value of this resistance.

- 4 At the data station, remove the short from the T, R pair and place it across the T1, R1 pair on the connecting block as shown in Step 1.
- 5 At the office location, connect the meter to the 789A tool or the Dataport equivalent test points T1 and R1. Read the resistance value.

**Requirement:** The resistance reading must be less than 4200 ohms and the value is recorded as RL2 on the CLRC. If the test is not an initial installation test, then the loop resistance must equal  $RL2 \pm 30$  percent. (Refer to Note in Step 3.)

- 6 If the requirements of Steps 3 and 5 are met, remove the short on the cable pair and proceed to the ac tests.
- 7 If the requirements of Steps 3 and 5 are *not* met, the faulty cable pair must be repaired or replaced.

## AC TESTS

### CHART 8

#### INSERTION LOSS

#### APPARATUS:

At the office

789A tool for OCU configuration or for Dataport configuration the ED3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1, L1 CHAN UN EXT for SLC-96 terminals

P2ES or equivalent cord (specify 8- or 12-foot cord length for use with 7- or 11-foot bays).

HP-3550B test set or equivalent.

At the station

HP-3550B test set

135-ohm resistors(Z).

## STEP

## PROCEDURE

*At the Central Office or SLC-96 Remote Terminal*

- 1 Operate the controls on the HP-3550B as follows:

***Oscillator:***

FREQ to applicable test frequency (Table A)

RANGE to X1000 for 2.4-, 4.8-, and 9.6-kb/s service

X10K for 56-kb/s service

AMPLITUDE to minimum (ccw).

**Note:** Connect one side of the oscillator OUTPUT to the oscillator ground terminal.

***Voltmeter:***

FUNCTION to ON

RANGE to 0 dB.

**Note:** Connect the black terminal on the voltmeter input to the voltmeter ground terminal.

***Patch Panel:***

MEAS—CAL to CAL

IMPEDANCE to 135 OHMS (input and output)

FREQ to < 5 KC for 2.4-, 4.8-, and 9.6-kb/s service

< 5 KC for 56-kb/s service DB to 0.

**Note:** Connect the OUTPUT and INPUT center taps (CT) to the voltmeter ground terminal.

- 2 Connect the output of the HP-3550B to the T, R jack on the 789A tool or the Dataport equivalent using the P2ES cord.
- 3 With the patch panel MEAS—CAL switch in the calibrate position, adjust the oscillator AMPLITUDE control to obtain a 0-dBm reading on the voltmeter.
- 4 Operate the patch panel MEAS—CAL switch to MEAS.

***At the Data Station***

- 5 Connect the HP-3550B test set input to the T, R line pair at the customer terminal block with a twisted pair, make connections to ground terminals as given in Step 1, and operate the test set controls as follows:

**Patch Panel:**

MEAS—CAL to MEAS

IMPEDANCE to 135 OHMS (input and output)

FREQ to < 5 KC for 2.4-, 4.8-, or 9.6-kb/s service

< 5 KC for 56-kb/s service.

**Voltmeter:**

FUNCTION to ON

RANGE to 0 dB.

- 6 Decrease the voltmeter RANGE setting until a meter reading is obtained.
- 7 Read the received level and record the results at each applicable frequency setting on the CLR.

**Requirement:** Refer to Table A.

**Note:** The insertion loss (dB) = 0 dBm (transmit level) - received level (dBm). For example, received level = -20 dBm, then insertion loss = +20 dB.

- 8 Repeat Steps 1 through 7 at each test frequency for the T1, R1 pair.

**Requirement:** Refer to Table A.

- 9 If test results are good, disconnect test equipment from both ends and proceed to the noise measurement test procedures.
  - 10 If test results do not meet the requirements, notify cable assignment desk and have value of EML checked on records.
-

CHART 9

BACKGROUND CIRCUIT NOISE

---

**APPARATUS:**

At the office

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

6F voiceband NMS with 50-kHz network (497F)

135-ohm resistor

386B plug (310 plug with 135-ohm termination)

At the station

6F voiceband NMS with 50-kHz network (497F)

135-ohm resistors (2)

---

**STEP**

**PROCEDURE**

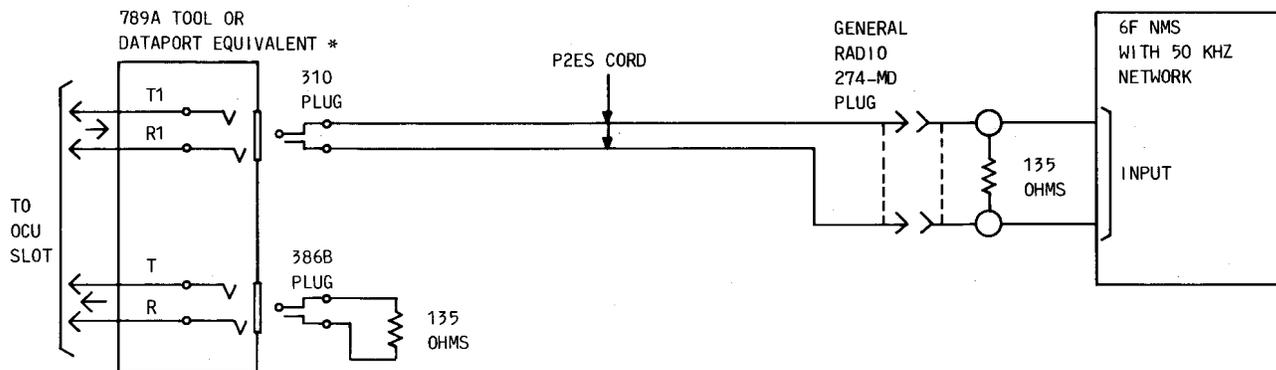
---

**At the Data Station**

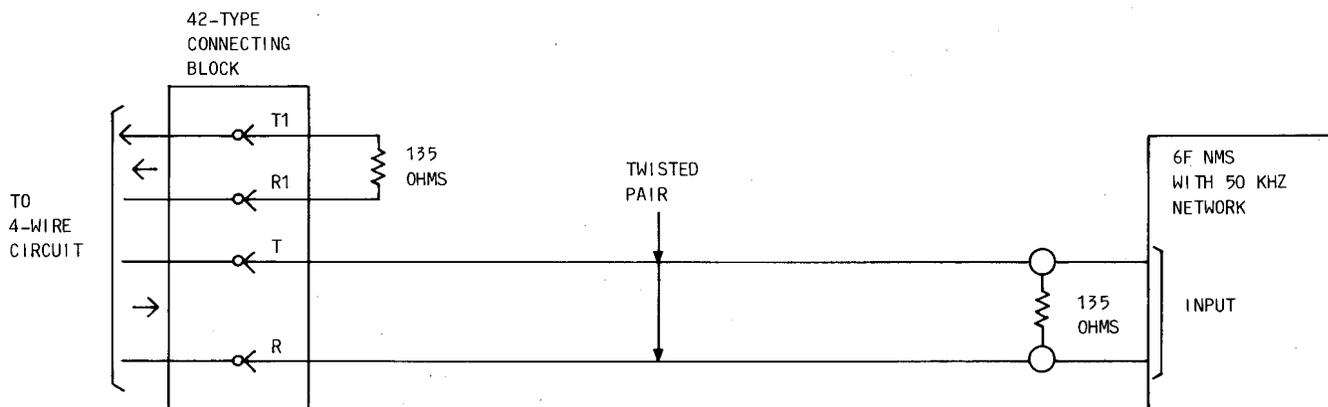
- 1 Connect the 6F NMS to the T, R pair as shown in Fig. 8.
- 2 Connect the 135-ohm resistor to the binding post (BP) input of the 6F NMS.
- 3 Connect a 135-ohm resistor between the T1, R1 pair on the customer terminal block.

**At the OCU**

- 4 Insert the 386B plug into the T, R jack of the 789A tool or the Dataport equivalent.
- 5 Connect a 135-ohm resistor to the BP input of the 6F NMS.
- 6 Using the P2ES cord, connect the 6F NMS to the T1, R1 jack of the 789A tool or the Dataport equivalent.



OFFICE-OCU LOCATION



STATION-DSU/CSU LOCATION

\* DATAPORT EQUIVALENT--ED-3C947 TOOL, J98726MF CHAN UNIT EXT, OR J1C141MF-1, L1 CHAN UNIT EXT

Fig. 8—Test Connection for Noise Measurement Tests

***At Both Locations***

- 7 Plug in the 50-kHz weighting network on the 6F NMS and calibrate the set.
- 8 After calibration is complete, set the FUNCTION switch to 600 OHM BRIDGING on the 6F NMS.
- 9 Adjust the DBRN dial to obtain a meter reading in the upper half of the meter scale. The background noise level is the sum of the DBRN dial setting and the meter reading.

***Requirement:*** Refer to Table B.

- 10 If the background circuit noise requirement is met, proceed to the impulse noise test procedures.
- 11 If the background circuit noise requirement is ***not*** met, begin trouble repair work on the cable pair or request a new pair assignment.

TABLE B

BACKGROUND CIRCUIT NOISE LIMITS

BIT RATE (KB/S)	MAXIMUM NOISE LEVEL (DBRN)
56.0*	28
9.6	31
4.8	39
2.4	42

\* For 56-kb/s repeatered loops, the limit applies to each repeater section.

*Note:* Many NMSs equivalent to the 6F (with 50-Kb noise weighting) have 135-ohm inputs. In using these sets, the 135-ohm resistor bridged across the NMS is not used. To account for use of a 135-ohm set, add 7 dB to the test requirements in Table B.

**CHART 10**  
**IMPULSE NOISE**

---

**APPARATUS:**

At the office

789A tool for OCU configuration or for Dataport configuration the ED 3C947 tool for D3 banks, the J98726-MF CHAN UN EXT for D4 banks, or the J1C141MF-1,L1 CHAN UN EXT for SLC-96 terminals

6F voiceband NMS with 50-kHz network (497F)

135-ohm resistor

386B plug (310 plug with 135-ohm termination)

At the station

6F voiceband NMS with 50-kHz network (497F)

135-ohm resistors (2)

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STEP	PROCEDURE
1	Verify that the equipment is connected as given in Steps 1 through 8 of paragraph 3.24.  <i>At Both Locations</i>
2	Adjust the 6F NMS for the impulse noise threshold given in Table C.
3	Reset the counter to 00 and make a 15-minute run. At the end of this time, read the total number of counts recorded on the counter.  <i>Requirement:</i> Refer to Table C.
4	If the impulse noise requirement is met, disconnect all test equipment and test leads from the circuit.
5	Remove the 135-ohm resistors from the customer terminal block at the station.
6	If the impulse noise requirement is <i>not</i> met, request a new nonloaded pair assignment.

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TABLE C

## IMPULSE NOISE LIMITS

BIT RATE (KB/S)	THRESHOLD (DBRN)	MAXIMUM NUMBER OF IMPULSE NOISE COUNTS/15 MIN
56.0*	44	7
9.6	47	7
4.8	55	7
2.4	58	7

\* For 56-kb/s repeatered loops, the limit applies to each repeater section.

*Note:* Many NMSs equivalent to the 6F (with 50-Kb noise weighting) have 135-ohm inputs. In using these sets, the 135-ohm resistor bridged across the NMS is not used. To account for use of a 135-ohm set, add 7 dB to the test requirements in Table B.