DATA SET 401E-TYPE

TRANSMITTER

TEST PROCEDURES

CONTENTS PAGE

1. GENERAL

1.01 This section describes test procedures for data set 401E-type. These tests are to be made at the time of installation and as a means of clearing routine trouble.

1.02 This section is reissued to provide the following:

(a) Information on the use of an Automatic Data Test System (ADTS) with data set 401E-type.

(b) A simplified Fig. 1.

Since this reissue constitutes a general revision, arrows normally used to indicate changes have been omitted.

1.03 Before proceeding with any tests of the data set, verify the following:

(a) Data loop has been tested and meets requirements as specified in the section entitled Data Systems—DATA-PHONE® Service and Data Access Arrangements on Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines (314-205-501).

(b) The telephone portion of the installation meets standard dc talk, signaling, and supervision requirements.

(c) Data set options agree with service order information.

Take necessary steps to ensure customer is not billed for test calls. Refer to the section entitled Crediting Charges on Test Calls (010-250-001).

1.04 A letter a, b, c, etc, added to a step number in a test indicates an action which may or may not be required depending on local conditions. 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.

1.05 Tests contained in this section are divided into two parts. Part 2 contains tests to be performed at the time of installation and Part 3 contains tests to be performed during maintenance visits.

2. INSTALLATION TEST PROCEDURE

2.01 The remote test in this part should be performed immediately after the data set has been installed to ensure that the installation is ready to be placed in service. If the data set fails to meet test requirements, replace the data set. In addition to this test, the telephone company

(telco) employee should observe whenever possible that data can be transmitted and/or received using the customer provided equipment (CPE) and data sets at both the near-end and far-end data terminals.

2.02 Although the remote test is primarily for use at time of installation, consideration should be given to its use during maintenance visits if the nature of the trouble indicates that this type of test would be useful.

Data set 401E-type can be statically tested by an Automatic Data Test System (ADTS). For information on communicating with the automatic data test center, refer to the section entitled J1P005 Automatic Data Test System (ADTS)—Operation From Field Locations (590-010-500).

Remote Test

2.03 This test should be performed to assure that the data set is operating properly and is capable of being tested from the data test center (DTC). The data set telephone and test circuits are checked by this procedure.

2.04 Perform the test as follows:

STEP	PROCEDURE
1	Make usual tests for satisfactory speech level and ringer operation.
2	Make tests of 35-type TOUCH-TONE® dial in accordance with the section entitled Station Dials—35-Type—Identification and Maintenance (501-164-115).
3	Using the telephone portion of the data set, call DTC and request a remote test of the data station using the section entitled Data Test Center—904A- and 904C-Types—Test Procedure—Data Set 401E (668-104-502).
4	Determine and inform DTC if: • Voice answer-back (Y option) used • Electrical answer-back (Z option) used • Interface cord connected to data set.
5	Operate data, TEST A, and TEST B keys under direction of DTC.
6	DTC performs remote test of data set.
7a	Answer-back, if used, will be heard from CPE loudspeaker (Y option), or data set handset (Z option) upon completion of test.
8	Return to talk mode to discuss test results with DTC.
9	Restore equipment to normal operating condition.

3. MAINTENANCE TEST PROCEDURES

3.01 The tests in this part are to be used as a troubleshooting aid during maintenance visits. Use of the end-to-DTC interface test should enable the telco employee to isolate the trouble to either the CPE or the data set. Data sets found to be defective should be returned to the Western Electric

Company distributing houses for repair. Sets should be tagged to indicate the nature of the trouble.

Local Test (901-Type DTS)

3.02 The following procedure permits audible monitoring of the data set transmitter output at the data set under test. Therefore, the test should be used only as an indication of the functionality of the data set and should not be used to replace the remote test.

3.03 The following test equipment is required:

- 901-type data test set (DTS)
- 1011-type handset or equivalent.

3.04 Perform the test as follows:

STEP	PROCEDURE
1	When using the 901A DTS, set SELECTOR switch to 401A, C, E. When using the 901B DTS, set SELECTOR switch to 6. On either DTS, set A TEST and B TEST switches to OFF. Set UNATT-ATT switch to ATT. ***Note:*** The 1011-type handset is required for testing data sets 401E1, 401E2, and 401E4. The integrated telephone handset may be used for testing data sets 401E3 and 401E5.
2	Connect the DTS cord to the data set interface connector.
3	Establish connections to a quiet line. If no quiet line is available, dial any single digit to remove dial tone. It may be necessary to repeat this if the interval for the following test exceeds the time-out period.
4	Connect a 1011-type handset to tip and and ring of the telephone line. The switch must be in the MON position.
5	Pull up the data key.
6	Rotate the A TEST switch of the data test set to position 1. A 600-Hz tone should be heard in the handset receiver.
7	Move the 1011-type handset to terminals C and D of the DTS. Operate the switch to TALK. The same tone should be heard at a higher level. ***Caution: The handset must not be held close to the ear because of the high level of oscillator tone.***
8	Rotate the A TEST switch from positions 2 through 14. Table A shows the frequency that should be heard at each position of the A TEST switch.
9	Remove all test equipment and restore the data set to pretest condition.

STEP	PROCEDURE

TABLE A

A TEST POSITION	NOMINAL FREQUENCY (Hz)	REQUIRED VALUES (Hz)
1	600	598-612
2	697	690-704
3	770	763-777
4	852	845-859
5	941	934-948
6	1098	1100-1114
7	1209	1202-1216
8	1336	1329-1343
9	1477	1470-1483
10	1633	1626-1640
11	1950	1958-1972
12	2050	2043-2057
13	2150	2143-2157
14	2250	2243-2257

Local Test (914-Type DTS)

3.05 The following procedure permits audible monitoring of the data set transmitter output at the data set under test. Therefore, the test should be used only as an indication of the functionality of the data set and should not be used to replace the remote test.

3.06 The following test equipment is required:

- 914-type DTS
- 1011-type handset or equivalent.

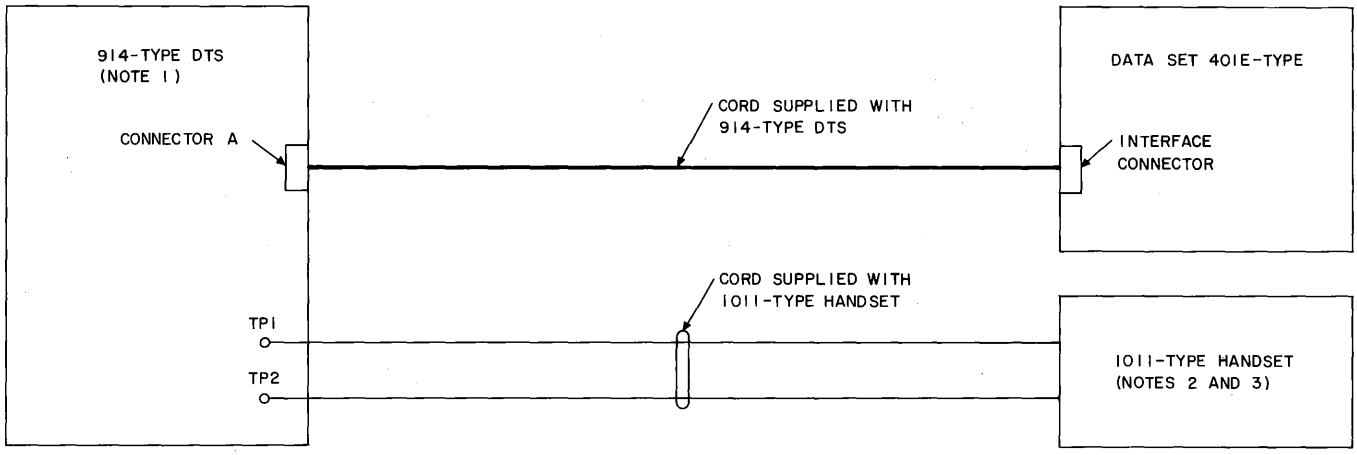
Test set switches not shown in the test equipment setup (Fig. 1) or not mentioned in text are not required for the test. Before making any test connections, ensure that all programming pins are removed from the DTS matrix. Insert only those pins shown in Fig. 1.

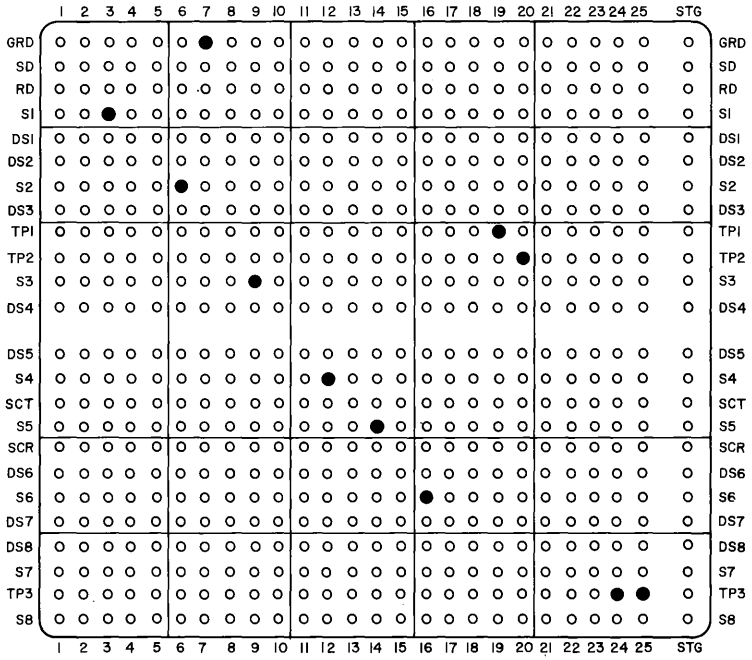
3.07 Perform the test as follows:

STEP	PROCEDURE
1	Establish test connections and switch settings as shown in Fig. 1. ***Note:*** The 1011-type handset is required for testing data sets 401E1, 401E2, and 401E4. The integrated telephone handset may be used for testing data sets 401E3 and 401E5.

STEP	PROCEDURE
2	Program the DTS matrix by inserting red programming pins (shorting) as shown in Fig. 1. ***Note:*** Data set 401E-type is powered from the telephone line. No commercial 60-Hz, 120-volt power is required for the DTS for this test.
3	Establish connections to a quiet line. If no quiet line is available, dial any single digit to remove dial tone. It may be necessary to repeat this if the interval for the following test exceeds the time-out period. ***Caution: The handset must not be held close to the ear because of the high level of oscillator tone.***
4	Pull up the data key. A 600-Hz tone should be heard in the handset receiver.
5	Insert shorting pins in the DTS matrix and set toggle switches as shown in Table B, Steps 1 through 8, ***in sequence.*** The corresponding frequencies should be heard in the handset receiver.
6	Remove all test equipment and restore the data set to pretest condition.

STEP	PROCEDURE





NOTES:

1. SET SWITCHES ON 914-TYPE DTS AS FOLLOWS:

SWITCH	SETTING
A INTERFACE SELECTOR	ALL DEPRESSED
INTERFACE MODE	CONTACT
COUNTER	BIT ERRORS
S1 (A1)	OFF
S2 (A4)	OFF
S3 (B1)	ON
S4 (B4)	ON
S5 (C1)	ON
S6 (C3)	ON

2. SET TALK-MON SWITCH TO TALK.
3. 1011-TYPE HANDSET NOT REQUIRED FOR DATA SET 401E3 OR 401E5.

Fig. 1—Test Equipment Setup

TABLE B

STEP	INSERT PIN IN MATRIX		SET TOGGLE SWITCHES	NOMINAL FREQUENCY (Hz)	REQUIRED VALUES (Hz)
	ROW	COLUMN			
1	GRD	3		697	690-704
2	GRD	4		770	763-777
3	GRD	5		852	845-859
4	GRD	6		941	934-948
5			S1-ON S2-ON S3-OFF S4-OFF	1098	1100-1114
6	GRD	9		1209	1202-1216
7	GRD	10		1336	1329-1343
8	GRD	11		1477	1470-1483
9	GRD	12		1633	1626-1640
10			S3-ON S4-ON S5-OFF S6-OFF	1950	1958-1972
11	GRD	14		2050	2043-2057
12	GRD	15		2150	2143-2157
13	GRD	16		2250	2243-2257

End-to-DTC Interface Test (901-Type DTS)

3.08 This test permits the DTC to measure the frequency of each data channel transmitted in response to contact closures applied to the data set interface. Answer-back tone is also checked.

3.09 Detailed test instructions are provided for telco employees in the left column. A summary of associated actions performed at the DTC is shown in the right column to provide coordination and to minimize testing time.

3.10 The following test equipment is required:

- 901-type DTS
- 1011-type handset or equivalent.

3.11 Perform the test as follows:

STEP	DATA STATION	DATA TEST CENTER
	Data Channels Test	
1	On the 901-type DTS— Set A TEST switch to OFF. Set B TEST switch to OFF. Set UNATT-ATT switch to ATT. Set SELECTOR switch to 401A, C, E (901A). Set SELECTOR switch to 6 (901B).	

STEP	DATA STATION	DATA TEST CENTER
2	Connect the DTS cord to the data set interface connector.	
3	Using the data set telephone, call DTC and request DTC to perform end-to-DTC interface test of the data set using Section 668-104-502.	
4	Hang up.	DTC operator conditions test equipment to perform test.
5	When station bell rings, lift handset. ***Requirement:*** Ringing tripped. Voice communication satisfactory.	DTC calls station under test.
6	Determine from DTC, the time required to measure each data frequency transmitted in Steps 7 and 8.	
7	Pull up data key.	DTC goes to test mode.
8	In cooperation with DTC, rotate the A TEST switch from position 1 through 14.	DTC measures each frequency as sent from data station.
9	Depress data key and discuss test results with DTC.	DTC goes to talk mode.
Answer-Back Test		
10a	If testing data set 401E2 or 401E4— Connect 1011-type handset across terminals C and D of the DTS.	
11a	Pull up data key.	DTC goes to test mode.
12a	Answer-back tone heard in 1011-type handset receiver (401E2 or 401E4) or data set telephone receiver (401E3 or 401E5).	DTC sends 1017 Hz for 5 seconds.
13	Depress data key and discuss test results with DTC.	DTC goes to talk mode.
14	Remove all test equipment and restore the data set to pretest condition.	

End-to-DTC Interface Test (914-Type DTS)

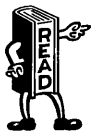
3.12 This test permits the DTC to measure the frequency of each data channel transmitted in response to contact closures applied to the data set interface. Answer-back tone is also checked.

3.13 Detailed test instructions are provided for telco employees in the left column. A

summary of associated actions performed at the DTC is shown in the right column to provide coordination and to minimize testing time.

3.14 The following test equipment is required:

- 914-type DTS
- 1011-type handset or equivalent.



Test set switches not shown in the test equipment setup (Fig. 1) or not mentioned in text are not required for the test. Before making any test connections, ensure that all programming pins are removed from the DTC matrix. Insert only those pins shown in Fig. 1.

3.15 Perform the test as follows:

STEP	DATA STATION	DATA TEST CENTER
	Data Channels Test	
1	Establish test connections and switch settings as shown in Fig. 1.	
2	Program the DTS matrix by inserting red programming pins (shorting) as shown in Fig. 1. ***Note:*** Data set 401E-type is powered from the telephone line. No commercial 60-Hz, 120-volt power is required for the DTS for this test.	
3	Using the data set telephone, call DTC and request DTC to perform end-to-DTC interface test of the data set using Section 668-104-502.	
4	Hang up.	DTC operator conditions test equipment to perform test.
5	When station bell rings, lift handset. ***Requirement:*** Ringing tripped. Voice communication satisfactory.	DTC calls data station under test.
6	Determine from DTC the time required to measure each data frequency transmitted in Steps 7 through 9. ***Caution: The handset must not be held close to the ear because of the high level of oscillator tone.***	
7	Pull up data key. ***Requirement:*** 600-Hz tone heard in handset receiver.	
8	Momentarily remove and replace programming pin in matrix, column 24, row TP3.	DTC goes to test mode and measures frequency of tone.

STEP	DATA STATION	DATA TEST CENTER
	Requirement: 600-Hz tone silenced when pin is removed, restored when pin is replaced.	
9	In cooperation with DTC, insert shorting pins (red) in the DTS matrix and set toggle switches as shown in Table B, Steps 1 through 13, ***in sequence.***	DTC measures each frequency as sent from data station.
	Requirement: Data signal frequencies are heard in handset receiver as shown in Table B.	
10	Depress data key and discuss test results with DTC.	DTC goes to talk mode.
Answer-Back Test		
11a	If data set is equipped with answer-back—Pull up data key.	DTC goes to test mode.
12a	Answer-back tone heard in 1011-type handset receiver (401E2 or 401E4) or data set telephone receiver (401E3 or 401E5).	DTC sends 1017 Hz for 5 seconds.
13a	Depress data key and discuss test results with DTC.	DTC goes to talk mode.
14	Remove all test equipment and restore the data set to pretest condition.	

3.16 Data set 401E-type will operate satisfactorily with a maximum of 10 ohms resistance per data channel as applied by the CPE to the data set interface. A more stringent test of the data set may be obtained by substituting a gray (10-ohm) programming pin, in place of the shorting pin used to simulate the CPE contact closures, in Table B.