DATA SET 401H-TYPE TRANSMITTER

TEST PROCEDURES

1. GENERAL

1.01 This section describes test procedures for data set (DS) 401H-type.

1.02 This section is reissued to delete reference to the C4 frequency (2350 Hz), to refer to 914-type data test set (DTS) instead of 914B, and to make minor corrections throughout the text. Due to extensive revision, arrows ordinarily used to indicate changes have been omitted.

1.03 Remote test features are not provided with DS 401H-type. All tests must be made by a telephone company (telco) employee using the specified 900-type DTS. Tests are made with the business machine disconnected and the 901B or the 914-type DTS connected to the interface. The tests that follow are to be performed in conjunction with the data test center (DTC).

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 Before proceeding with any test, make sure the following conditions have been met.

- The overall facilities have been tested and meet the transmission requirements specified in the section entitled Data Systems—Dataphone® Service, Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines (314-205-501).

- The telephone portion of the installation meets standard dc, talk, signaling, and supervision requirements. Refer to the section entitled Telephone Sets and Associated Stations Apparatus—Selection of Indoor Locations (502-120-200).

1.05 Be sure that the data set is wired in accordance with the section entitled Data Set 401H-Type Transmitter—Installation and Connections (594-022-200).

1.06 A letter a, b, c, etc, added to a step number in Part 2 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 a series of lettered steps should be made is given in the DATA STATION 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.

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

2. TEST PROCEDURES

2.01 The test to be performed will be determined by the type of test equipment available. Data sets found to be defective should be tagged to indicate the nature of the trouble and returned to a Western Electric Company distributing house for repair.

End-to-DTC Interface Test With 901B DTS

2.02 The following test checks the frequency of the signals transmitted by DS 401H-type. This test also checks the operation of the answer-back receiver of DSs 401H5 and 401H6.

2.03 The following test equipment is required to perform these tests:

- 901B DTS

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

- 1011-type handset or equivalent.

STEP	DATA STATION	DATA TEST CENTER
1	Set switches on the 901B DTS as follows: SELECTOR to position 6 A TEST to OFF B TEST to position 1 UNATT—ATT to ATT.	
2	Connect the 901B DTS to the interface connector of the data set through the interface test adapter (Fig. 1). ***Note:*** Verify that all test adapter shorting clips are closed.	
3a	When testing DSs 401H5 and 401H6, strap terminals 1 and 25 together on the interface test adapter.	
4	Condition VOM to measure resistance (R x 1000) and connect leads across terminals 21 and 24 of the 901B DTS interface test adapter. ***Requirement:*** The meter should read 200,000 ohms or more.	
5	Connect the 1011-type handset across tip and ring with TALK—MON switch to TALK.	

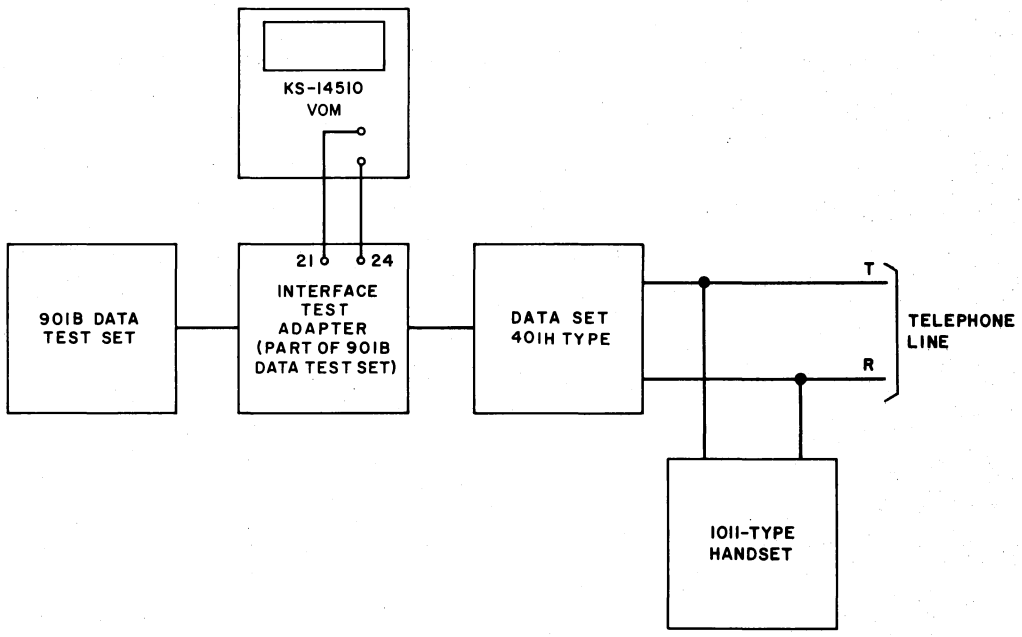

Fig. 1—Typical Test Arrangement

STEP	DATA STATION	DATA TEST CENTER
6	Call the DTC on associated telephone set or 1011-type handset and request an End-to-DTC Interface Test. Give type of data set and telephone number of location. Place telephone on-hook or the TALK—MON switch on the 1011-type handset to MON. Place the UNATT—ATT switch on 901B DTS to UNATT.	DTC operator will specify time interval necessary to measure frequency of the transmitted frequencies.
7	Monitor the DTC call with the 1011-type handset on MON.	DTC calls data set.
	***Ringing will be heard directly in handset. Do not hold handset directly to ear at this time.***	
8	The data set will detect ringing for about 1.5 seconds, go off-hook with 2 seconds of silence, transmit answer tone (2025 Hz) for 4 seconds, and after an interrupt, transmit rest tones. ***Requirement:*** When the data set begins transmitting rest tones, the VOM should indicate zero ohms.	DTC measures frequency of answer tone.
9	Operate the A TEST switch to all positions indicated in Table A for the time interval agreed upon in Step 6. Monitor the tones on the 1011-type handset.	DTC measures frequency of transmitted tones.
10	Lift the associated telephone handset or operate the key on the 1011-type handset to TALK, operate the UNATT—ATT switch to ATT, establish contact with the test center, and obtain test results.	DTC goes to talk mode and informs telco employee at data station of test results.
11b	If any of the frequency measurements of Step 9 must be repeated: Set the UNATT—ATT switch to UNATT and strap terminals DT to ACU on the line and option terminal strip of the data set. ***Note:*** Terminals 5 and 6 on CP BE26 of DSs 401H4, H5, and H6 correspond to DT and ACU, respectively.	DTC operator arranges DTC to perform the first frequency measurement which must be repeated.
12b	Operate TALK—MON switch on 1011-type handset to MON.	
13b	Remove the strap between DT and ACU.	

STEP | DATA STATION | DATA TEST CENTER

TABLE A

TRANSMITTING FREQUENCIES

"A" TEST SWITCH ON 901B DATA TEST SET TO POSITION	LISTEN FOR FREQUENCY	FREQUENCY, Hz
OFF	REST	*
1	A0	600
2	A1	697
3	A2	770
4	A3	852
5	A4	941
6	B0	1098
7	B1	1209
8	B2	1336
9	B3	1477
10	B4	1633
11	C0	1950
12	C1	2050
13	C2	2150
14	C3	2250

* 600, 1098, and 1950 Hz in a composite signal.

The DTC cannot establish contact while the UNATT—ATT switch is in the UNATT position. Before any test, arrange a schedule for contact with the DTC. Set UNATT—ATT switch to UNATT after arranging schedule with DTC.

14b Operate the A TEST switch to the position corresponding to the lowest frequency to be repeated (Table A) for the agreed upon time interval.

DTC measures the retransmitted frequency which was missed in Step 9.

15b Repeat Step 14b for any other missed frequencies if necessary.

STEP	DATA STATION	DATA TEST CENTER
	Note: This ends the test for DS 401H1 through 401H4. Ensure that the strap between DT and ACU is removed or these data sets will cause a permanent busy on the line facilities.	
16a	When testing a DS 401H5 or 401H6. Operate 1011-type handset switch to TALK and request an answer-back receiver test. ***Note:*** Duration of the tones listed below and the interval between tones should be arranged to allow sufficient time for the checks to be made. 1780 to 1790 Hz 1012 to 1022 Hz 2020 to 2030 Hz (DS 401H5 only).	DTC operator arranges DTC to transmit a specific frequency on-line to a station at a specific level. Discuss tone interval and duration with telco employee at data station.
17a	Disconnect strap placed in Step 3a.	
18a	On the interface test adapter, short EQ terminals 5 and 6.	
19a	Place the telephone on-hook ***or*** return the TALK—MON switch on the 1011-type handset to MON. Open shorting clips 18, 22, and 23.	
20a	Condition VOM to measure resistance (R x 10,000) and take readings at the interface test adapter when tone is heard in handset.	
Answer-Back B Test		
21a	On the interface test adapter, measure resistance between EQ terminals: 18 and 21 ***Requirement:*** ∞ ohms 21 and 22 ***Requirement:*** ∞ ohms 21 and 23	DTC transmits 1785 $\pm$5 Hz at $-$8 dBm.

STEP	DATA STATION	DATA TEST CENTER
	Requirement: 0 ohms	
	Note: DS 401H6 will disconnect from the line upon receiving 1017 Hz in the following steps.	
	Answer-Back A Test	
22c	When testing DS 401H6:	
	Ensure that data set has disconnected from line.	DTC transmits 1017 $\pm$5 Hz at $-$8 dBm.
23d	When testing DS 401H5:	
	Measure resistance between EQ terminals:	
	18 and 21	
	Requirement: ∞ ohms	
	21 and 22	
	Requirement: 0 ohms	
	21 and 23	
	Requirement: ∞ ohms	
	Answer-Back C Test	
24d	Measure the resistance between EQ terminals:	
	18 and 21	
	Requirement: 0 ohms	
	21 and 22	
	Requirement: ∞ ohms	
	21 and 23	DTC transmits 2025 $\pm$5 Hz at $-$8 dBm.
	Requirement: ∞ ohms	

End-to-DTC Interface Test With 914-Type DTS

2.04 The following test checks the frequency of the signals transmitted by DS 401H-type. This test also checks the operation of the answer-back receiver of DSs 401H5 and 401H6.

2.05 The following test equipment is required to perform this test:

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

Test set switches not shown on the test connection diagram (Fig. 2) 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 914-type DTS matrix. Insert only those pins shown in the test connection diagram (Fig. 2).

STEP	DATA STATION	DATA TEST CENTER
1	Arrange the 914-type DTS as shown in the test connection diagram (Fig. 2).	
2	Connect 914-type DTS to 117-volt 60-Hz power receptacle and operate POWER switch to on.	
3	Operate switch S1 to ON.	
4	Call DTC on associated telephone or 1011-type handset and request an End-to-DTC Interface Test. Give data set type and telephone number. Inform the DTC of the time interval needed to program the 914-type DTS.	DTC operator informs telco employee of time intervals needed to make frequency measurements.
5	Place telephone set on-hook ***or*** 1011-type handset to MON.	
6	Monitor DTC call. ***Note:*** Data set will detect ringing for 1.5 seconds, go off-hook with 2 seconds of silence, transmit answer tone (2025 Hz) for 3 seconds, then transmit three rest tones as a composite signal.	DTC calls data set number and measures frequency of answer tone.
7	Operate the switches and insert a single P1-type programming pin into the crossover points listed in Table B in the order shown. Leave the pin in place long enough for the DTC operator to measure and record the frequency of the transmitted signals, then remove the pin. Signal tone ceases and rest tones appear.	DTC operator measures and records the frequency of each of the signals listed in Table B.
8	Remove pin from TP1 and 19 crossover point. ***Requirement:*** Rest tones cease when the pin is removed.	
9	Operate 1011-type handset to TALK.	When rest tones stop, DTC operator goes to talk mode and discusses test results. If any frequency measurements were missed, request the telco employee at the data station to transmit them again.

STEP	DATA STATION	DATA TEST CENTER
10a	If any of the frequency measurements of Step 7 were missed: Insert pin into TP1 and 19 crossover point.	
11a	Strap terminals DT to ACU on the data set line and option terminal strip. Operate the 1011-type handset switch to MON. ***Note:*** For DSs 401H4, H5, and H6, DT and ACU are terminals 5 and 6, respectively, of CP BE26.	DTC receives rest tones.
12a	Remove the DT-to-ACU strap and transmit the frequencies requested by the DTC operator (Table B). ***Note:*** This ends test for DSs 401H1, H2, H3, and H4.	
13b	When testing DS 401H5: Operate S1 switch to OFF.	
14b	Operate the 1011-type handset to TALK and request that the following tones be transmitted one at a time for 10 seconds each: 1780 to 1790 Hz at −8 dBm 1012 to 1022 Hz at −8 dBm 2020 to 2030 Hz at −8 dBm.	
15b	Strap terminals 5 and 6 of CP BE26 together.	
16b	Operate 1011-type handset to MON.	
17b	When DTC transmits the tones, observe that lamps DS2, DS3, and DS4 light in turn for 10 seconds each.	DTC transmits 1785-, 1017-, and 2025-Hz tones in turn for 10 seconds each.
18b	Remove strap from terminals 5 and 6 on CP BE26. This ends the test for DS 401H5.	
19c	When testing DS 401H6: Operate S1 switch to OFF.	

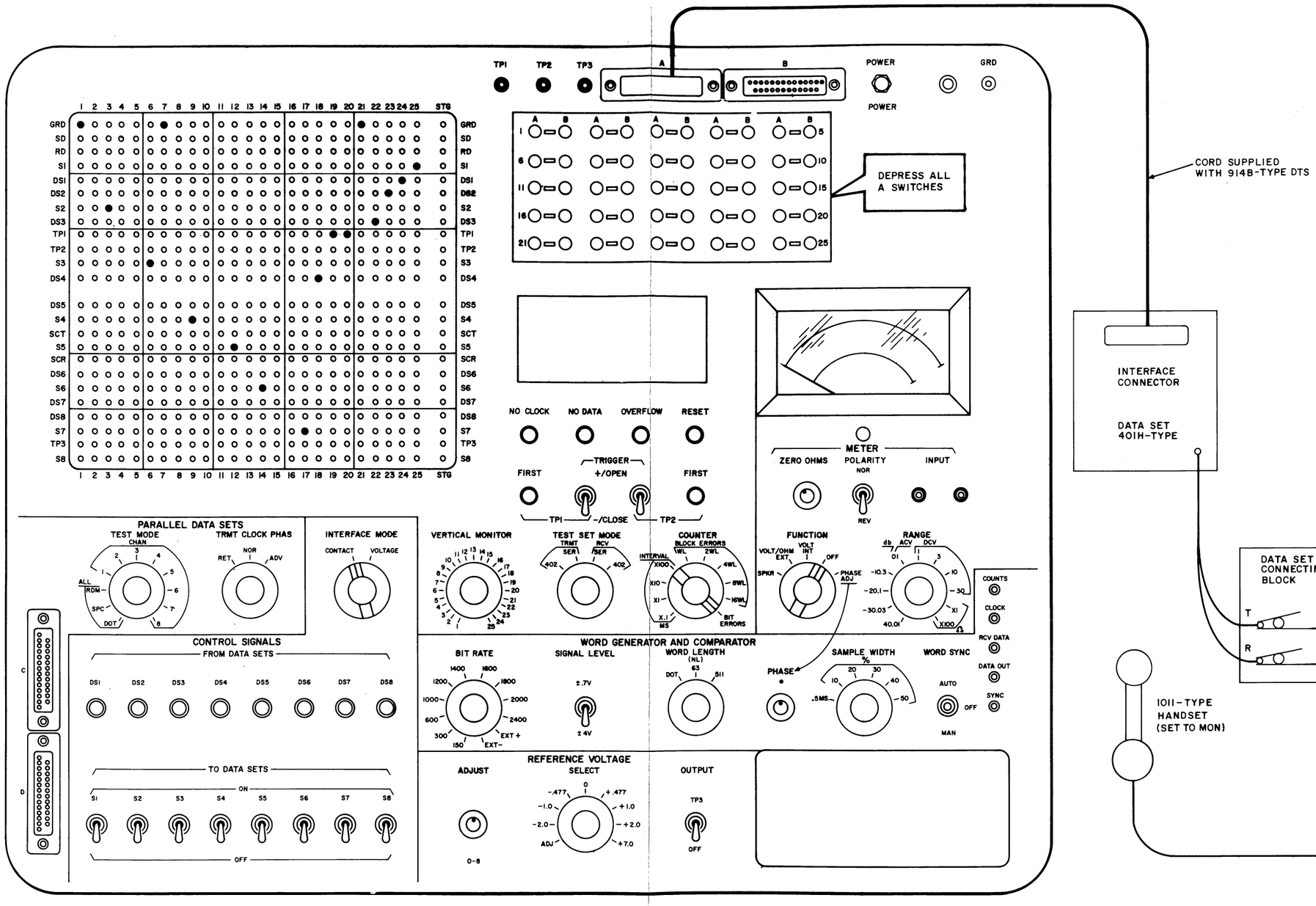

Fig. 2—Test Connection Diagram

STEP	DATA STATION	DATA TEST CENTER

TABLE B

SWITCH AND MATRIX SETUP FOR 914 DTS

FREQUENCY (Hz)		SET TOGGLE SWITCH	INSERT PIN IN MATRIX	
			ROW	COLUMN
600	Group A	Switches S4 through S7 to ON and switches S2 and S3 to OFF.	—	—
697			GRD	3
770			GRD	4
852			GRD	5
941			GRD	6
1098	Group B	Switches S2 and S3 to ON and switches S4 and S5 to OFF.	—	—
1209			GRD	9
1336			GRD	10
1477			GRD	11
1633			GRD	12
1950	Group C	Switches S4 and S5 to ON and switches S6 and S7 to OFF.	—	—
2050			GRD	14
2150			GRD	15
2250			GRD	16

Note: The toggle switches must be operated to the positions listed for a particular group *before* the programming pins are inserted. All the switches listed for a particular group must be positioned as shown to transmit any one frequency of that group.

20c	Call the DTC on the 1011-type handset and request that the following tones be transmitted one at a time for 10 seconds each: 1780 to 1790 Hz at −8 dBm. 1012 to 1022 Hz at −8 dBm.	
21c	Strap terminals 5 and 6 of CP BE26 together.	
22c	Operate 1011-type handset to MON.	
23c	Remove strap from terminals 5 and 6 of CP BE26.	DTC transmits 1785 Hz and 1017 Hz for 10 seconds each.
24c	Observe that lamp DS3 lights for 10 seconds. ***Note:*** DS 401H6 will disconnect when 1017 Hz is received. This ends the test for DS 401H6.	