

**WIDEBAND DATA STATION USING DATA SET 303
4-WIRE POINT-TO-POINT PRIVATE LINE (COMMERCIAL SERVICE)
TEST PROCEDURES**

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A. Local Test	9	1. GENERAL	
B. End-to-End Test	13	1.01 This section describes local and end-to-end test procedures for testing the wideband data station. A test of the remote test circuit is also described. These are point-to-point tests and are to be made at the time of installation. They can also be used in clearing trouble conditions.	
C. Remote Test Feature	14	1.02 This section is reissued to add information on the dc-coupled balanced line signal-type Data Set (DS) 303 and to revise the format. Since this is a general revision, change arrows have been omitted.	
DATA SET 303, DATA AUXILIARY SET 806B-TYPE AND DATA AUXILIARY SET 804A1	15	1.03 These tests are arranged in a logical sequence and specify the steps necessary to determine that the data station is operating properly.	
A. Local Test	16	1.04 In this procedure, the indication resulting from switch operation occurs simultaneously with the operation of that switch unless otherwise specified. Controls or indicators not mentioned in the text have no bearing on the test being performed and should be ignored.	
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SECTION 593-800-500

1.05 The craft employee should become familiar with the options installed in the data station. The indications of certain tests are determined by which options are in the data station.

Note: The options wired into DS 303 and the other associated apparatus should be recorded on the label placed in the data station cabinet. If the coding of DS 303 is changed by the addition or removal of circuit packs, this should be noted on the label also. This label indication will prevent the problem of identifying the options and changes in apparatus on a subsequent repair visit.

1.06 Lettered Steps: 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 beneath

the PROCEDURE 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 Tests are provided for the different configurations of the data station. The test title denotes the system configuration for which the tests are intended.

1.08 Data Set 303 has at least 90 different codes. Each code is designated DS 303 followed by a letter and a number. The letter designates speed and does not affect which tests are to be performed. The speed must, however, be determined and is used in data test set preparation. To aid in determining the particular DS 303 arrangement, refer to Table A.

TABLE A

DATA STATION CONSISTING OF	PERFORM TEST												
	2.05	2.09	2.15	2.19	2.24	2.29	2.33	2.37	2.42	2.46	2.50	2.55	2.60
303 only	X	X											
303, T1WM-4	X	X											X
303, 809	X	X										X	
303, 806			X	X	X								
303, 806, 809			X	X	X							X	
303, 806, T1WM-4			X	X	X								X
303, 806, 804						X	X	X					
303, 806, 804, 809						X	X	X				X	
303, 806, 804, T1WM-4						X	X	X					X
303, 806, 804, 404									X	X	X		
303, 806, 804, 404, 809									X	X	X	X	
303, 806, 804, 404, T1WM-4									X	X	X		X

1.09 Some business machines are capable of performing local tests. It is desirable to use the customer's equipment to determine if the business machine and/or station is operating properly.

1.10 When the indication or action is as specified, proceed to the next step. If the indication is not as specified in the testing procedure, refer to the corresponding step number in the Troubleshooting Chart.

Note 1: When testing data stations equipped with a scrambler, the NO DATA lamp indication may not be as indicated in the test. This does not necessarily indicate a trouble condition.

Note 2: If a trouble is isolated to a 16A1 Data Unit, replace the 0.5 ampere fuse accessible from the rear of the unit.

1.11 Before proceeding with any test of the data station, verify that:

- Wideband and voiceband loops have been tested and meet requirements as specified in appropriate BSPs.
- Telephone portion of installation meets standard dc talk, signaling, and supervision requirements.
- Strapping options agree with service order.
- Routine trouble condition has been isolated as specified in Section 593-800-300.
- All connections and connectors are properly made.

2. DATA STATION TEST

2.01 The test of a 303-type Data Station is essentially the same, whether the station is operating synchronously or nonsynchronously, dc-coupled balanced line or restored polar. The differences are noted in the following procedure.

A synchronous station which is also to be operated nonsynchronously should be tested both synchronously and nonsynchronously. The clock in the 912A Data Test Set (DTS) is used to test synchronous data sets with external timing. For synchronous sets with internal timing, the data set clock is used.

DATA SET 303

A. Local Test

2.02 General: This test will require the tester to temporarily connect the transmitter output of DS 303 to the receiver input of DS 303 and terminate the transmit and receive leads of the transmission facility. After these connections are made, the DS 303 may be considered to be in its local test mode. In the local test mode, the 912A DTS applies a test signal to the transmitter portion of DS 303. This signal is looped back to the receiver. The receiver output is applied to the 912A DTS and compared with the transmitted test signal. Any variation between the two signals will be registered as an error rate. The maximum allowable error rate is specified in each test.

2.03 Equipment Required:

- 1—912A Data Test Set equipped with J79912AA interface unit
- 2—135-ohm resistors equipped with alligator clips

2.04 Preparation:

- (a) If the data terminal is to be tested in the nonsynchronous mode, connect the wideband data cable to the NON SYNC connector on the DS 303.
- (b) If the data terminal is to be tested in the synchronous mode, connect the wideband data cable to the SYNC connector on the DS 303.
- (c) Operate the controls on the 912A DTS as specified in Chart 1.

CHART 1

SWITCHES	SETTINGS
TRANSMIT — BIT RATE	EXT — (Synchronous with internal clock option Z installed in DS 303) or 19.2 (303B) } 50 (303C) } Synchron- 230.4 (303D) } nous opera- 200 (303E) } tion with 40.8 (303G) } external clock op- tion E in- stalled in DS 303 or 19.2 (303B) } 50 (303C, 303G) } Nonsyn- 230.4 (303D, 303E, 303J) } chronous operation
TRANSMIT — TEST SIGNAL	2087
TRANSMIT — TRIGGER	+
TRANSMIT — OUTPUT	NORMAL
RECEIVE — BIT RATE	EXT (Synchronous operation) or 19.2 (303B) } 50 (303C, 303G) } Non- 230.4 (303D, 303E, 303J) } synchron- ous operation

SWITCHES	SETTINGS
RECEIVE — TIMING	0
RECEIVE — TEST SIGNAL	2087
RECEIVE — TRIGGER	+
RECEIVE — INPUT	NORMAL
RECEIVE — WORD SYNC	AUTO
RECEIVE — COUNTER	OFF
INTERFACE UNIT — TEST MODE	UNBAL
INTERFACE UNIT — MODE	NONSYNC
INTERFACE UNIT — SEND REQ	ON
INTERFACE UNIT — LOCAL TEST	OFF
INTERFACE UNIT — DATA TERM READY	OFF
POWER	OFF



Tag leads in (d) below for future identification.

(d) At DS 303, disconnect from TB2 the following leads to the far-end terminal:

- T lead from terminal 24
- R lead from terminal 13
- T1 lead from terminal 23
- R1 lead from terminal 12.

(e) Using locally provided wire, make the following connections at TB2:

- Strap terminal 24 to terminal 23.
- Strap terminal 13 to terminal 12.

(f) Using a locally provided 135-ohm termination, terminate the T1 and R1 leads disconnected in (d) above, as follows:

- (1) Connect one end of the 135-ohm termination to lead designated T1.
- (2) Connect the opposite end of the 135-ohm termination to lead designated R1.

(g) Using a locally provided 135-ohm termination, terminate the T and R leads disconnected in (d) above, as follows:

- (1) Connect one end of the 135-ohm termination to lead designated T.
- (2) Connect the opposite end of the 135-ohm termination to lead designated R.

(h) If either the Y or X option is installed in DS 303, the option must be removed for the duration of the local test.

2.05 Procedure:

STEP	PROCEDURE
1	If Data Auxiliary Set (DAS) 809B1 is provided, perform test of 2.55. If T1WM-4 is provided, perform test of 2.60.
2	At 912A DTS, operate POWER switch to ON.
3	Observe that the CLEAR TO SEND, DATA SET READY, and AGC lamps are lighted, and the NO SYNC and NO DATA lamps are extinguished.
4a	If T option is not provided, operate the SEND REQ switch to OFF. Observe that the CLEAR TO SEND and AGC lamps are extinguished. Observe that the NO DATA, NO SYNC, and DATA SET READY lamps are lighted.
5a	If T option is not provided when Q option and scrambler (16A1 Data Unit or CP AR134) are provided, the AGC lamp remains lighted.
6b	If T option is provided, operation of the SEND REQ switch should have no effect on any lights.
7a	If T option is not provided, operate the SEND REQ switch to ON. Observe that the AGC, DATA SET READY, and CLEAR TO SEND lamps are lighted. Observe that the NO DATA and NO SYNC lamps are extinguished.
8c	If testing nonsynchronously and the A option (permanent NON SYNC) is provided, operate the MODE switch to SYNC. Observe that no lamp indications change.

STEP	PROCEDURE
9c	If testing nonsynchronously and the A option is not provided, operate MODE switch to SYNC. Observe that the NO SYNC and NO DATA lamps are lighted. Observe that the DATA SET READY, AGC, and CLEAR TO SEND lamps are extinguished.
10	At 912A DTS, operate the MODE switch to NON SYNC.
11	Reset the counter by depressing the RESET button.
12	Operate COUNTER switch to ON. The counter should not count.
	 <p data-bbox="370 634 885 697"><i>A momentary burst of errors is permissible in 13d and 14d.</i></p>
13d	If the data station is the restored polar line signal type: When testing nonsynchronously and the data station is equipped with CP AR125, 127, or 157, set TIMING switch to +20, then -20. The counter should not count.
14d	If the data station is the restored polar line signal type: When testing nonsynchronously and the data station is equipped with CP AR126, 128, or 413, set TIMING switch to +30, then -30. The counter should not count.
15	At the RECEIVER portion of the 912A DTS, operate INPUT switch to INVERTED. Observe that the NO SYNC lamp lights, and the counter counts errors very rapidly.
16	At the RECEIVER portion of the 912A DTS, operate INPUT switch to NORMAL and observe that the counter does not count.
17	Operate COUNTER switch to OFF.
18	<p data-bbox="240 1276 1279 1308">At DS 303, remove the following straps at TB2 that were connected in 2.04 (e):</p> <ul data-bbox="305 1339 998 1434" style="list-style-type: none"> ● Remove strap between terminal 24 and terminal 23. ● Remove strap between terminal 13 and terminal 12.
19	<p data-bbox="240 1476 1401 1528">At DS 303, remove the two 135-ohm terminations installed in 2.04 (f) and (g) and reconnect wire to TB2 as follows:</p> <ul data-bbox="305 1560 738 1780" style="list-style-type: none"> ● Connect T lead to terminal 24. ● Connect R lead to terminal 13. ● Connect T1 lead to terminal 23. ● Connect R1 lead to terminal 12.
20	Reinstall the X or Y option if it was removed in 2.04 (h).

B. End-to-End Test

(One WDTS and one interface unit are required at each end of the facility.)

Note: When performing an end-to-end test, the transmitted and received data must pass through the T1WM-4 modem if provided. Refer to 2.56 and perform the T1WM-4 modem test.

2.06 General: This is a test of the wideband data channel from the near end to the far end. Test equipment is required at both transmit and receive stations. Unless otherwise specified, perform the procedure at both the near end and far end. The 912A DTS applies a test signal to the transmitter portion of the DS 303. The transmitter output is sent to the distant DS 303 receiver. The 912A DTS monitors the 303 receiver to determine if the signal is detected properly by the data set.

2.07 Equipment Required:

2—J79912A Wideband Data Test Sets (WDTS) each equipped with J79912AA interface unit.

2.08 Preparation:

- (a) It is necessary to establish voice contact with the far-end data station over a separate telephone.
- (b) If the data station is to be tested in the nonsynchronous mode, connect the wideband data cable to the NON SYNC connector on the DS 303.
- (c) If the data station is to be tested in the synchronous mode, connect the wideband cable to the SYNC connector on the DS 303.
- (d) Operate the controls on the 912A WDTS as indicated in Chart 2.

2.09 Procedure:

STEP	PROCEDURE
21a	At this point, the data path should be complete in both directions. Observe that the AGC, CLEAR TO SEND and DATA SET READY lamps are lighted. Observe that the NO DATA and NO SYNC lamps are extinguished.
21.1a	At near end, if the T option is not provided in DS 303, operate the SEND REQ switch to OFF. Observe that the near-end CLEAR TO SEND lamp extinguishes.
22a	Request the far-end tester to verify that the NO DATA and NO SYNC lamps are lighted and the AGC lamp is extinguished. Note 1: If the T option is not provided in DS 303 when Q option and scrambler (16A1 Data Unit or CP AR134) are provided, the AGC lamp remains lighted. Note 2: If the R option is not installed in DS 303 and DAS 809B1 is provided, the AGC lamp will remain lighted.
23b	If the T option is provided, operation of the SEND REQ switch will have no effect.
24a	If the T option is not provided in DS 303, operate the SEND REQ switch to ON and observe that the CLEAR TO SEND lamp lights. Request the far-end tester to verify that the AGC lamp lights and the NO DATA and NO SYNC lamps extinguish.

CHART 2

SWITCHES	SETTINGS						
TRANSMIT — BIT RATE	<p>EXT — (Synchronous with internal clock option Z installed in DS 303)</p> <p style="text-align: center;"><i>or</i></p> <table style="border: none;"> <tr> <td style="border: none;"> <p>19.2 (303B)</p> <p>50 (303C)</p> <p>230.4 (303D)</p> <p>200 (303E)</p> <p>40.8 (303G)</p> </td> <td style="border: none; padding-left: 10px;"> <p>Synchro- nous opera- tion with external clock op- tion E in- stalled in DS 303</p> </td> </tr> <tr> <td colspan="2" style="text-align: center;"><i>or</i></td> </tr> <tr> <td style="border: none;"> <p>19.2 (303B)</p> <p>50 (303C, 303G)</p> <p>230.4 (303D, 303E, 303J)</p> </td> <td style="border: none; padding-left: 10px;"> <p>Nonsyn- chronous operation</p> </td> </tr> </table>	<p>19.2 (303B)</p> <p>50 (303C)</p> <p>230.4 (303D)</p> <p>200 (303E)</p> <p>40.8 (303G)</p>	<p>Synchro- nous opera- tion with external clock op- tion E in- stalled in DS 303</p>	<i>or</i>		<p>19.2 (303B)</p> <p>50 (303C, 303G)</p> <p>230.4 (303D, 303E, 303J)</p>	<p>Nonsyn- chronous operation</p>
<p>19.2 (303B)</p> <p>50 (303C)</p> <p>230.4 (303D)</p> <p>200 (303E)</p> <p>40.8 (303G)</p>	<p>Synchro- nous opera- tion with external clock op- tion E in- stalled in DS 303</p>						
<i>or</i>							
<p>19.2 (303B)</p> <p>50 (303C, 303G)</p> <p>230.4 (303D, 303E, 303J)</p>	<p>Nonsyn- chronous operation</p>						
TRANSMIT — TEST SIGNAL	2087						
TRANSMIT — TRIGGER	+						
TRANSMIT — OUTPUT	NORMAL						
RECEIVE — BIT RATE	<p>EXT (Synchronous operation)</p> <p style="text-align: center;"><i>or</i></p> <table style="border: none;"> <tr> <td style="border: none;"> <p>19.2 (303B)</p> <p>50 (303C, 303G)</p> <p>230.4 (303D, 303E, 303J)</p> </td> <td style="border: none; padding-left: 10px;"> <p>Non- synchronous operation</p> </td> </tr> </table>	<p>19.2 (303B)</p> <p>50 (303C, 303G)</p> <p>230.4 (303D, 303E, 303J)</p>	<p>Non- synchronous operation</p>				
<p>19.2 (303B)</p> <p>50 (303C, 303G)</p> <p>230.4 (303D, 303E, 303J)</p>	<p>Non- synchronous operation</p>						

SWITCHES	SETTINGS
RECEIVE — TIMING	0
RECEIVE — TEST SIGNAL	2087
RECEIVE — TRIGGER	+
RECEIVE — INPUT	NORMAL
RECEIVE — WORD SYNC	AUTO
RECEIVE — COUNTER	OFF
INTERFACE UNIT — TEST MODE	UNBAL
INTERFACE UNIT — MODE	NONSYNC
INTERFACE UNIT — SEND REQ	ON
INTERFACE UNIT — LOCAL TEST	OFF
INTERFACE UNIT — DATA TERM READY	OFF
POWER	ON

STEP	PROCEDURE
25b	If the T option is provided in DS 303, at 912A WDTS operate the SEND REQ switch to OFF. Observe that the CLEAR TO SEND and AGC lamps are lighted and the NO DATA and NO SYNC lamps are extinguished.
26	Perform Steps 21a through 25b in the opposite direction.
	 <p data-bbox="422 499 941 562"><i>The following step can be performed in both directions simultaneously.</i></p>
27	<p data-bbox="332 657 1485 814">Determine error rate by using TOTAL ERRORS counter on 912A DTS. To make error count: Depress RESET button, set COUNTER switch to ON, observe time, time for 5 minutes (DS 303J, 2 minutes), set COUNTER switch to OFF, record count, and repeat. Make at least three error counts for 5 minutes (DS 303J, 2 minutes) each. The average of all runs should be less than that indicated in Table B.</p> <p data-bbox="332 846 1485 909">Note 1: If the count during any one of the three counts is greater than 100 times the indicated average, it may be discarded and one more error count made.</p> <p data-bbox="332 940 1485 972">Note 2: These measurements correspond to an error rate objective of one in one million.</p> <p data-bbox="332 1003 1485 1066">Note 3: When testing a data set code 303J, the time of each error run is reduced from 5 minutes to 2 minutes.</p>

TABLE B

DATA SET	AVERAGE ERROR COUNT	TIME OF EACH ERROR RUN
303B	6	5 Min.
303C	15	5 Min.
303D	69	5 Min.
303E	60	5 Min.
303G	12	5 Min.
303J	56	2 Min.

C. Remote Test Feature

2.10 There are no facilities for remote testing a data station consisting of a DS 303 only.

DATA SET 303 AND DATA AUXILIARY SET 806B-TYPE

2.11 Operation of DS 303 with DAS 806B-type is similar to that of DS 303 only. However, the addition of DAS 806B-type does provide line interfacing, local test, remote test 1 (RT1), and remote test 2 (RT2) facilities. These facilities provide for testing the data station performance on a local loop-back basis or on a remote loop-back basis.

A. Local Test

2.12 General: When the data station is placed in the local test mode, relay action connects the transmitter portion of the data station to the receiver portion and terminates the wideband lines. The 912A DTS applies a test signal to the transmitter portion of DS 303. The transmitter output is looped back to the DS 303 receiver input. The 912A DTS monitors the 303 receiver to determine if the signal is detected properly by the data set.

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2.13 Equipment Required:

- 1—912A Wideband Data Test Set
- 2—310-type plugs equipped with 135-ohm termination.

2.14 Preparation:

- (a) Disconnect the data set transmitter and receiver from the line facilities as follows:
 - (1) Insert a 310-type plug equipped with a 135-ohm termination into the WB TRANSMITTING—LINE jack on DAS 806B-type.
 - (2) Insert a 310-type plug equipped with a 135-ohm termination into the WB RECEIVING—LINE jack on DAS 806B-type.
- (b) If the data station is to be tested in the nonsynchronous mode, connect the wideband

data cable from the 912A DTS connector to the NON SYNC connector on DS 303.

- (c) If the data station is to be tested in the synchronous mode, connect the wideband data cable from the 912A DTS connector to the SYNC connector on DS 303.
- (d) Verify that the LOCAL TEST key on DAS 806B-type is in the *horizontal* position.
- (e) Set the switches on the 912A DTS as shown in Chart 3.
- (f) If either the X or Y option has been installed, the option must be removed for the duration of the local test.

2.15 Procedure:

Note: If DAS 809B1 is provided, perform test of 2.55. If T1WM-4 is provided, perform test of 2.60.

STEP	PROCEDURE
28	At 912A DTS, observe that the CLEAR TO SEND, DATA SET READY, NO DATA, and NO SYNC lamps are lighted. Observe that the AGC lamp is extinguished.
29	At 912A DTS, operate LOCAL TEST switch to ON. Observe that the NO DATA, DATA SET READY, and NO SYNC lamps are extinguished. Observe that the AGC and CLEAR TO SEND lamps are lighted. Observe that the LT lamp on DAS 806B-type is lighted.
30a	If T option is not provided in DS 303, at the 912A DTS operate the SEND REQ switch to OFF. Observe that the CLEAR TO SEND lamp extinguishes immediately with the operation of the switch. Observe that the NO DATA and NO SYNC lamps are lighted.
31e	If M option is provided in DS 303, the AGC lamp should extinguish approximately 2 seconds later.
32f	If Q option is provided in DS 303, the AGC lamp should remain lighted.
33b	If T option is provided in DS 303, operate the SEND REQ switch to OFF. Observe that no lamp indications change.
34a	If T option is not provided in DS 303, at 912A DTS operate the SEND REQ switch to ON. Observe that the AGC and CLEAR TO SEND lamps light without delay. (If the Q option is provided, the AGC lamp will already have been lighted.) Observe that the NO DATA and NO SYNC lamps are extinguished.

CHART 3

SWITCHES	SETTINGS
TRANSMIT — BIT RATE	EXT — (Synchronous with internal clock option Z installed in DS 303) or 19.2 (303B) } 50 (303C) } Synchron- 230.4 (303D) } nous opera- 200 (303E) } tion with 40.8 (303G) } external clock op- tion E in- stalled in DS 303 or 19.2 (303B) } 50 (303C, 303G) } Nonsyn- 230.4 (303D, 303E, 303J) } chronous operation
TRANSMIT — TEST SIGNAL	2087
TRANSMIT — TRIGGER	+
TRANSMIT — OUTPUT	NORMAL
RECEIVE — BIT RATE	EXT (Synchronous operation) or 19.2 (303B) } 50 (303C, 303G) } Non- 230.4 (303D, 303E, 303J) } synchron- operation

SWITCHES	SETTINGS
RECEIVE — TIMING	0
RECEIVE — TEST SIGNAL	2087
RECEIVE — TRIGGER	+
RECEIVE — INPUT	NORMAL
RECEIVE — WORD SYNC	AUTO
RECEIVE — COUNTER	OFF
INTERFACE UNIT — TEST MODE	UNBAL
INTERFACE UNIT — MODE	NONSYNC
INTERFACE UNIT — SEND REQ	ON
INTERFACE UNIT — LOCAL TEST	OFF
INTERFACE UNIT — DATA TERM READY	OFF
POWER	ON

STEP	PROCEDURE
35c	If DS 303 is being tested nonsynchronously: If the A option is not provided, at 912A DTS operate the MODE switch to SYNC. Observe that the NO DATA and NO SYNC lamps are lighted. Observe that the AGC and CLEAR TO SEND lamps are extinguished.
36c	If DS 303 is being tested nonsynchronously: If the A option is provided, at 912A DTS operate the MODE switch to SYNC. Observe that no lamp indications change.
37	At the 912A DTS, reset the counter by depressing the RESET button.
38	Operate COUNTER switch to ON. The counter should not count.  <i>A momentary burst of errors is permissible when operating the TIMING switch in 39d and 40d.</i>
39d	If the data station is the restored polar line signal type: When testing nonsynchronously and the data station is equipped with CP AR125, 127, or 157, set TIMING switch to +20, then -20. The counter should not count.
40d	If the data station is the restored polar line signal type: When testing nonsynchronously and the data station is equipped with CP AR126, 128, or 413, set TIMING switch to +30, then -30. The counter should not count.
41	At the 912A DTS, operate the COUNTER switch to OFF.
42	At the 912A DTS, operate the LOCAL TEST key to OFF. Observe that the LT lamp on DAS 806B-type is extinguished.
42.1	If local test is to be initiated from the business machine, disconnect the 912A DTS and restore the normal data station connections. The business machine may now initiate the local test by placing an ON signal on the LT interface lead. This causes DS 303 to ground the LTA lead to DAS 806B-type. A ground on the LTA lead causes the same relay action as initiating the test from either the DAS 804A1 or DAS 806B-type.  <i>Reinstall the X and Y options if they were removed in 2.14(f).</i>
43	At DAS 806B-type, operate the LT key to the vertical position and observe that the LT lamp is lighted. At the 912A DTS, observe that the NO DATA, DATA SET READY and NO SYNC lamps are extinguished. Observe that the AGC and CLEAR TO SEND lamps are lighted.
43.1	At DAS 806B-type, operate the LT key to the horizontal position.
44	Remove the two 135-ohm terminations installed in 2.14 (a).

B. End-to-End Test

Note: When performing an end-to-end test, the transmitted and received data must pass through the T1WM-4 modem if provided. Refer to 2.60 and perform the T1WM-4 modem test.

2.16 General: This is a test of the wideband data channel from a near-end station to a far-end station. Test equipment is required at both stations. The 912A DTS sends a test signal to the transmit portion of the near-end DS 303. The transmitter output is applied to the far-end DS 303 receiver via transmission facilities. The far-end 912A DTS monitors the 303 receiver to determine if the signal is detected properly by the data set.

2.17 Equipment Required:

2—912A Wideband Data Test Sets equipped with J79912AA interface unit. (One WDTS and

one interface unit are required at each end of the facility.)

2.18 Preparation:

- (a) Operate controls on 912A DTS as in 2.14 (e).
- (b) Establish voice contact with the far-end data station.
- (c) If the data station is to be tested nonsynchronously, connect the wideband data cable from the 912A DTS connector to the NON SYNC connector on DS 303.
- (d) If the data station is to be tested synchronously, connect the wideband data cable from the 912A DTS connector to the SYNC connector on DS 303.

2.19 Procedure:

STEP	PROCEDURE
45a	At this point, the data path should be complete in both directions. Observe that the AGC, CLEAR TO SEND, and DATA SET READY lamps are lighted. Observe that the NO DATA and NO SYNC lamps are extinguished.
45.1a	If T option is not provided in DS 303: At near end, operate the SEND REQ switch to OFF and observe that the near-end CLEAR TO SEND lamp extinguishes.
46a	If T option is not provided in DS 303, request the far-end tester to verify that the NO DATA and NO SYNC lamps are lighted and the AGC lamp is extinguished. Note: If the R option is not provided in DS 303 and DAS 809B1 is provided, the AGC lamp will be lighted.
47b	If T option is provided in DS 303, operation of the SEND REQ switch will have no effect. Observe that the CLEAR TO SEND and AGC lamps are lighted. Observe that the NO DATA and NO SYNC lamps are extinguished.
48a	If T option is not provided, at the near end operate the SEND REQ switch to ON and observe that the CLEAR TO SEND lamp lights. At the far end, observe that the NO DATA and NO SYNC lamps are extinguished and the AGC lamp is lighted.

STEP	PROCEDURE
49	Perform Steps 45a through 48a in the opposite direction.  <p><i>The following step can be performed in both directions simultaneously.</i></p>
50	Determine error rate by using TOTAL ERRORS counter on 912A DTS. To make error count: Depress RESET button, set COUNTER switch to ON, observe time, time for 5 minutes (DS 303J, 2 minutes), set COUNTER switch to OFF, record count, and repeat. Make at least three error counts for 5 minutes (DS 303J, 2 minutes) each. The average of all runs should be less than that indicated in Table C. <p>Note 1: If the count during any one of the three counts is greater than 100 times the indicated average, it may be discarded and one more error count made.</p> <p>Note 2: These measurements correspond to an error rate objective of one in one million.</p> <p>Note 3: When testing a data set code 303J, the time of each error run is reduced from 5 minutes to 2 minutes.</p>

TABLE C

DATA SET	AVERAGE ERROR COUNT	TIME OF EACH ERROR RUN
303B	6	5 Min.
303C	15	5 Min.
303D	69	5 Min.
303E	60	5 Min.
303G	12	5 Min.
303J	56	2 Min.

C. Remote Test Feature

2.20 There are two remote tests, RT1 and RT2. The combination of the two tests provides the Serving Central Office or data test center with a means of testing the transmission facilities as well as the data station. The RT1 provides a turn-around connection at the line interface. The

RT2 provides a turn-around connection at the business machine interface. The remote test capability is provided for stations equipped with DAS 806B2, 806B4, or 806B7.

2.21 Steps 51 through 56 provide a means of performing a local test of the remote test feature and also of determining that the station's RT1, RT2, and back-to-normal operation sequence is proper. However, the complete remote test should be performed from a wideband test bay.

2.22 Equipment Required:

2—912A Wideband Data Test Sets, each equipped with J79912AA interface unit. (One WDTS and one interface unit are required at each end of the facility.)

2.23 Preparation: Prepare the data station for test as follows:

- (a) At both near end and far end: If the data station is to be tested in the nonsynchronous mode, connect the wideband data cable to the NON SYNC connector on the DS 303.

(b) At both near end and far end: If the data station is to be tested synchronously, connect the wideband data cable to the SYNC connector on the DS 303.

(c) It is necessary to establish voice contact with the far-end data station.
 (d) Set switches on the 912A DTS as indicated in 2.14(e).

2.24 Procedure:

STEP	PROCEDURE
51	At both near end and far end, observe that the CLEAR TO SEND, AGC, and DATA SET READY lamps are lighted. Observe that the NO DATA and NO SYNC lamps are extinguished.
52	At near end, depress and hold LRT key on DAS 806B-type until RT1 relay is heard to operate (approximately 6 seconds). If the RT1 relay has operated, the RT1 lamp will light when the LRT key is released.
53	The near-end data station is now in the RT1 mode, and the facility is looped to the far end. Observe that the near-end DATA SET READY, CLEAR TO SEND, and AGC lamps on the 912A DTS are extinguished. Observe that the NO SYNC and NO DATA lamps are lighted.
54	At the far end, observe that the CLEAR TO SEND, AGC, and DATA SET READY lamps are lighted. Observe that the NO DATA and NO SYNC lamps are extinguished.
55	At near end, depress LRT key on DAS 806B-type again and hold (approximately 6 seconds) until both the LT and RT1 lamps are lighted. The data station is now looped on the customer's side of DS 303. Observe that the near-end CLEAR TO SEND and DATA SET READY lamps are extinguished. Observe that the NO DATA and AGC lamps are lighted. Ignore the NO SYNC lamp. Observe that the far-end lamp indications are as in Step 54.
56	At near end, depress LRT key and hold (approximately 6 seconds) until RT1 lamp extinguishes. Release key and observe that the LT lamp extinguishes. If DAS 804A1 is not provided, observe that the lamp indications are as in Step 51.
57	If DAS 804A1 is provided as part of the data station: After returning the data station to the normal mode, the station will no longer be in the data mode. TEST and VB DATA lamps on DAS 804A1 should be extinguished.
58	Repeat Steps 51 through 57 from the far end. <i>Note:</i> Before testing from the far end, the data station must be returned to the data mode.

DATA SET 303, DATA AUXILIARY SET 806B-TYPE, AND DATA AUXILIARY SET 804A1

2.25 The operation of this station arrangement is essentially the same as the station

arrangement excluding DAS 804A1. The addition of DAS 804A1, however, includes a telephone and provides control for the normal switching functions required by the data set.

SECTION 593-800-500

A. Local Test

2.26 General: The local test of this station arrangement may be performed at the DAS 804A1, DAS 806B-type, or 912A DTS. The local test results should be the same in each case.

2.27 Equipment Required:

- 1—912A Wideband Data Test Set equipped with a J79912AA interface unit
- 2—Patch cords at least 4 feet long equipped with 310-type plugs
- 4—310-type plugs equipped with 135-ohm terminations.

2.28 Preparation:

- (a) Prepare data station for test as in 2.14; however, operate the DATA TERM READY switch to ON.

- (b) Insert one 310-type plug into DAS 806B-type VB RECEIVING—LINE jack.
- (c) Insert one 310-type plug into DAS 806B-type VB TRANSMITTING—LINE jack.
- (d) Insert one patch cord between DAS 806B-type VB TRANSMITTER MON jack and the 912A DTS INTERFACE, TRMT jack.
- (e) Insert one patch cord between DAS 806B-type RECEIVER—MON jack and the 912A DTS INTERFACE, RCV jack.
- (f) At DAS 804A1, depress the TALK key.

2.29 Procedure:

Note: If DAS 809B1 is provided, perform test of 2.55. If T1WM-4 is provided, perform test of 2.60.

STEP	PROCEDURE
59	If the N option is provided in DS 303 and testing synchronously, or if the S option is provided in DS 303 and testing nonsynchronously, the WB DATA lamp on the DAS 804A1 should be lighted. Observe at the 912A DTS that the CLEAR TO SEND and DATA SET READY lamps are lighted.
60	If the options and conditions of Step 59 are not met, at DAS 804A1 remove handset from the cradle and depress the VB DATA key. Observe that the VB DATA lamp lights. Return the handset to DAS 804A1 cradle. Observe that after approximately 5 seconds the WB DATA lamp lights. Observe at the 912A DTS, that the CLEAR TO SEND and DATA SET READY lamps are lighted.
61	Perform operation of 2.15. However, do not remove the terminations as called for in Step 44.
62	At DAS 804A1, depress the TEST key and observe that DAS 804A1 lamps are as indicated in Table D.
63	Observe that the NO DATA, NO SYNC, and DATA SET READY lamps are extinguished. Observe that the AGC and CLEAR TO SEND lamps are lighted. Observe that the LT lamp on DAS 806B-type is lighted.
64	Take the data station out of the test mode by depressing the TALK key and observe that the TEST and VB DATA lamps are extinguished.
65	At the 912A DTS, observe that the AGC lamp is extinguished. Observe that the NO DATA and NO SYNC lamps are lighted.

STEP	PROCEDURE														
	<p data-bbox="857 275 964 300">TABLE D</p> <table border="1" data-bbox="597 321 1227 768"> <thead> <tr> <th data-bbox="597 321 867 380">LAMP</th> <th data-bbox="867 321 1227 380">INDICATION</th> </tr> </thead> <tbody> <tr> <td data-bbox="597 380 867 443">RING</td> <td data-bbox="867 380 1227 443">Extinguished</td> </tr> <tr> <td data-bbox="597 443 867 506">TEST</td> <td data-bbox="867 443 1227 506">Lighted</td> </tr> <tr> <td data-bbox="597 506 867 569">AUTO</td> <td data-bbox="867 506 1227 569">Extinguished</td> </tr> <tr> <td data-bbox="597 569 867 632">WB DATA</td> <td data-bbox="867 569 1227 632">Extinguished</td> </tr> <tr> <td data-bbox="597 632 867 695">TALK</td> <td data-bbox="867 632 1227 695">Extinguished</td> </tr> <tr> <td data-bbox="597 695 867 768">VB DATA</td> <td data-bbox="867 695 1227 768">Lighted</td> </tr> </tbody> </table>	LAMP	INDICATION	RING	Extinguished	TEST	Lighted	AUTO	Extinguished	WB DATA	Extinguished	TALK	Extinguished	VB DATA	Lighted
	LAMP	INDICATION													
	RING	Extinguished													
	TEST	Lighted													
	AUTO	Extinguished													
	WB DATA	Extinguished													
	TALK	Extinguished													
VB DATA	Lighted														
66	If local test is to be initiated from the business machine, disconnect the 912A DTS and restore the normal data station connections. The business machine may now initiate the local test by placing an ON signal on the LT interface lead. This causes DS 303 to ground the LTA lead to DAS 806B-type. A ground on the LTA lead causes the same relay action as initiating the test from either the DAS 804A1 or DAS 806B-type.														
67	Reinstall the X or Y option if it was removed in 2.28.														
68	Remove the two patch cords and four 135-ohm terminations installed in 2.28.														

B. End-to-End Test

Note: When performing an end-to-end test, the transmitted and received data must pass through the T1WM-4 modem if provided. Refer to 2.60 and perform the T1WM-4 wideband modem test.

2.30 General: The purpose of this test is the same as the purpose of the end-to-end test in 2.16. In addition, this test will check the control functions of the DAS 804A1.

2.31 Equipment Required:

2—912A Wideband Data Test Sets equipped with J79912AA interface unit. (One WDTS and one interface unit are required at each end of the facility.)

2.32 Preparation:

- (a) At both near end and far end, if the data station is to be tested in the nonsynchronous mode, connect the wideband data cable from the 912A DTS connector to the NON SYNC connector on DS 303.
- (b) At both near end and far end, if the data station is to be tested in the synchronous mode, connect the wideband data cable from the 912A DTS connector to the SYNC connector on DS 303.
- (c) Operate controls on 912A WDTS as specified in 2.14(e).
- (d) It is necessary to establish voice contact with the far-end data station over a separate telephone circuit.

2.33 Procedure:

STEP	PROCEDURE
69	<p>Place each data station in the talk mode in the following manner. On both DAS 804A1s, remove the handsets from the cradles and depress the TALK keys. Observe that the TALK lamps light. At far end, replace the handset on-hook. At near end, depress the RING key. The far-end DAS 804A1 should ring and the RING lamp should flash. After the far end answers, repeat this procedure in the other direction.</p> <p> <i>If the S option is installed in DS 303 and nonsynchronous tests are being made, or if the N option is installed in the DS 303 and synchronous tests are being made, the WB DATA lamp should be lighted. If WB DATA lamp is lighted, proceed to Step 74.</i></p>
70	<p>At both near end and far end, the DATA SET READY, CLEAR TO SEND, and AGC lamps should be extinguished. The NO DATA and NO SYNC lamps are lighted.</p> <p><i>Note 1:</i> If a DAS 809B1 is used and the R option is not installed in DS 303, the AGC lamp should be lighted.</p> <p><i>Note 2:</i> If Q option and scrambler (16A1 Data Unit or CP AR134) is provided, the AGC lamp remains lighted.</p> <p> <i>The following step has a delayed indication.</i></p>
71	<p>If the T option is installed in DAS 806B-type: At both ends, with the handsets off-hook, momentarily depress the VB DATA key. Observe that the TALK key extinguishes and the VB DATA key lights. After approximately 5 seconds, the WB DATA lamp lights. Observe that the DATA SET READY and CLEAR TO SEND lamps are lighted. Hang up the handsets.</p>
72	<p>If the T option is not installed in DAS 806B-type, with handset off-hook, depress the TALK key. Observe that the TALK lamp lights. Operate DATA TERM READY switch to ON.</p> <p> <i>The following step has a delayed indication.</i></p>
73	<p>If the T option is not installed in DAS 806B-type: At both ends, depress the VB DATA key and observe that the VB DATA lamp lights and the TALK lamp extinguishes. Approximately 5 seconds later, the WB DATA, DATA SET READY, and CLEAR TO SEND lamps should light. Hang up the handsets.</p>

STEP	PROCEDURE																					
74	At this point, the data paths should be complete in both directions. Observe that the AGC, CLEAR TO SEND, and DATA SET READY lamps are lighted and the NO DATA and NO SYNC lamps are extinguished.																					
75a	If the T option is not provided in DS 303: At near end, operate SEND REQ switch to OFF and observe that the near-end CLEAR TO SEND lamp extinguishes.																					
76	<p>If the T option is not provided in DS 303, request the far-end operator to verify that the NO DATA and NO SYNC lamps are lighted and the AGC lamp is extinguished.</p> <p>Note 1: If DAS 809B1 is provided and R option is not installed in DS 303, the AGC lamp will remain lighted.</p> <p>Note 2: If Q option and scrambler (16A1 Data Unit or CP AR134) are provided, the AGC lamp will remain lighted.</p>																					
77	If T option is not provided in DS 303: At the near end, set the SEND REQ switch to ON and observe that the CLEAR TO SEND lamp lights. Request the far-end operator to verify that the AGC lamp lights and the NO DATA and NO SYNC lamps extinguish.																					
78b	If T option is provided, operate the SEND REQ switch to OFF. At near end and far end, observe that the AGC, CLEAR TO SEND, and DATA SET READY lamps are lighted. Observe that the NO DATA and NO SYNC lamps are extinguished.																					
79	Perform Steps 75a through 78b in the opposite direction.																					
80	Determine error rate by using TOTAL ERRORS counter on 912A DTS. To make error count: Depress RESET button, set COUNTER switch to ON, observe time, time for 5 minutes (DS 303J, 2 minutes), set COUNTER switch to OFF, record count, and repeat. Make at least three error counts for 5 minutes (DS 303J, 2 minutes) each. The average of all runs should be less than that indicated in Table E.																					
TABLE E																						
<table border="1"> <thead> <tr> <th data-bbox="587 1358 766 1444">DATA SET</th> <th data-bbox="766 1358 1010 1444">AVERAGE ERROR COUNT</th> <th data-bbox="1010 1358 1221 1444">TIME OF EACH ERROR RUN</th> </tr> </thead> <tbody> <tr> <td data-bbox="587 1444 766 1507">303B</td> <td data-bbox="766 1444 1010 1507">6</td> <td data-bbox="1010 1444 1221 1507">5 Min.</td> </tr> <tr> <td data-bbox="587 1507 766 1570">303C</td> <td data-bbox="766 1507 1010 1570">15</td> <td data-bbox="1010 1507 1221 1570">5 Min.</td> </tr> <tr> <td data-bbox="587 1570 766 1633">303D</td> <td data-bbox="766 1570 1010 1633">69</td> <td data-bbox="1010 1570 1221 1633">5 Min.</td> </tr> <tr> <td data-bbox="587 1633 766 1696">303E</td> <td data-bbox="766 1633 1010 1696">60</td> <td data-bbox="1010 1633 1221 1696">5 Min.</td> </tr> <tr> <td data-bbox="587 1696 766 1759">303G</td> <td data-bbox="766 1696 1010 1759">12</td> <td data-bbox="1010 1696 1221 1759">5 Min.</td> </tr> <tr> <td data-bbox="587 1759 766 1833">303J</td> <td data-bbox="766 1759 1010 1833">56</td> <td data-bbox="1010 1759 1221 1833">2 Min.</td> </tr> </tbody> </table>		DATA SET	AVERAGE ERROR COUNT	TIME OF EACH ERROR RUN	303B	6	5 Min.	303C	15	5 Min.	303D	69	5 Min.	303E	60	5 Min.	303G	12	5 Min.	303J	56	2 Min.
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STEP	PROCEDURE
81	<p>Note 1: If the count during any one of the three counts is greater than 100 times the indicated average, it may be discarded and one more error count made.</p> <p>Note 2: These measurements correspond to an error rate objective of one in one million.</p> <p>Note 3: When testing a data set code 303J, the time of each error run is reduced from 5 minutes to 2 minutes.</p> <p>At DAS 804A1, take the data station out of the data mode by lifting the handset and depressing the TALK key. Observe that the VB DATA and WB DATA lamps extinguish and the TALK lamp lights. Hang up the handset.</p> <p>Note: If the S option is installed in DS 303 and nonsynchronous tests are being made, or if the N option is installed in DS 303 and synchronous tests are being made, the WB DATA lamp on DAS 804A1 should be lighted.</p> <p> Perform Steps 82 through 88 only if the G option is installed in DAS 804A1 and the T option is not installed in DAS 806B-type.</p> <p>It is desirable to establish voice communication with the far-end data station on another telephone.</p> <p>Request far-end operator to:</p> <ol style="list-style-type: none"> (1) Depress AUTO key on DAS 804A1 and observe that the AUTO lamp lights. Leave handset on-hook. (2) Set DATA TERM READY switch on 912A DTS to ON. <p>At near-end station, depress TALK key, lift handset off-hook, and momentarily depress the RING key.</p> <p>Request the far-end operator to observe that the far-end DAS 804A1 rings briefly, then the VB DATA lamp lights. After approximately 5 to 7 seconds, the WB DATA lamp lights.</p> <p>At near end, listen to the handset to ascertain that the far-end data station generates several seconds of 2025-Hz tone.</p> <p>Set far-end DATA TERM READY switch to OFF. Repeat Step 84. Observe that the far-end DAS 804A1 rings and RING lamp flashes, but the station does not answer. (VB DATA lamp does not light.)</p> <p>Repeat Steps 84 through 87 in the opposite direction, ie, the far-end station performs the test.</p>

C. Remote Test Feature

2.34 The purpose and function of the remote test feature is the same as in 2.20 and 2.21.

2.35 Equipment Required: The same equipment is required as in 2.22.

2.36 Preparation:

(a) Prepare the data station for test as in 2.23. If option N is provided in DS 303 and testing

synchronously, or if option S is provided in DS 303 and testing nonsynchronously, proceed to 2.37 **Procedure**, otherwise go to (b) below.

(b) At the 912A DTS, operate the DATA TERM READY switch to ON.

(c) At both near end and far end, put the data station in the data mode by lifting the handset, depressing the TALK key, depressing the VB DATA key until the VB DATA lamp lights, hanging up the handset, and observing that the WB DATA lamp lights.

2.37 Procedure:

STEP	PROCEDURE
88.1	Perform procedure in 2.24.
88.2	At the near-end DAS 804A1, place handset on cradle. At the far end, remove the handset from the cradle and depress the TALK key. Observe that the far-end TALK lamp is lighted.
88.3	At the near end, depress and hold the LRT key on DAS 806B-type until the RT1 relay is heard to operate (approximately 6 seconds). If the RT1 relay has operated, the RT1 lamp will light when the LRT key is released. At the far end, verify that 2025-Hz answer-back tone is heard for several seconds. At near-end DAS 804A1, verify that the VB DATA and TEST lamps are lighted.
88.4	At the near-end DAS 806B-type, depress the LRT key again and hold (approximately 6 seconds) until both the LT and RT1 lamps are lighted. At the far end, verify that 2025-Hz answer-back tone is heard for several seconds.
88.5	At the near end, depress LRT key on DAS 806B-type again and hold (approximately 6 seconds) until the RT1 lamp extinguishes. Release the key and observe that the LT lamp extinguishes. Verify that all lamps are extinguished on the near-end DAS 804A1.

DATA SET 303, DATA AUXILIARY SET 806B-TYPE, DATA AUXILIARY SET 804A1, AND DATA SET 404B1

2.38 The test of the wideband portion of this data station arrangement is the same as if DS 404B1 were not provided. The addition of DS 404B1, however, provides the data terminal with a voiceband data channel.

A. Local Test

2.39 General:

(a) When the data station is placed in the local test mode, relay action connects the transmitter portion of the data station to the receiver portion and terminates the telephone lines. This loop

SECTION 593-800-500

provides a quick means of testing the transmitting and receiving portions of DS 404B1. The 912A DTS controls the transmitter in DS 404B1 and provides the facilities for selecting the desired multifrequency signal to be transmitted. This signal is looped back to the 404B1 receiver at the telephone line side of the station. The 912A monitors the 404B1 receiver to determine if the signal is detected properly by the data set.

(b) The local test mode can be initiated from DAS 806B-type, DAS 804A1, 912A DTS, or the business machine.

2.40 Equipment Required:

- 1—J79912A Wideband Data Test Set equipped with a J79912AA interface unit
- 2—310-type plugs equipped with 135-ohm terminations.

2.41 Preparation:

(a) Connect the low-speed cable from the connector on the 912A DTS to the low-speed interface connector J1 (25-pin connector) stamped CUST on the rear of DS 404B1. Connect high-speed interface cable to NON SYNC connector on DS 303.

(b) Set COUNTER switch on 912A DTS to OFF. Remove the handset from the cradle of the DAS 804A1, depress the TALK key, and then replace the handset.

(c) Set the POWER switch on the 912A DTS to ON, and the switches to the positions indicated as follows:

SWITCHES	SETTINGS
INTERFACE—TEST MODE	UNBAL
INTERFACE—MODE	NON SYNC
INTERFACE—SEND REQ	OFF
INTERFACE—LOCAL TEST	OFF
INTERFACE—DATA TERM READY	OFF

(d) Insert one 310-type plug into VB TRANSMITTER—LINE jack. Insert one 310-type plug into VB RECEIVER—LINE jack.

2.42 Procedure:

Note: Ignore the WB DATA lamp while performing the voiceband test.

STEP	PROCEDURE
89	At DAS 804A1, depress the TEST key and ascertain that the conditions are as indicated in Table F.
90	Observe that one RECEIVE A and one RECEIVE B lamp lights on the 912A DTS approximately 5 seconds after the TEST key is depressed.
91	Check operation of the low-speed data channel. Set TRANSMIT A switch and TRANSMIT B switch to the positions indicated in Table G and observe that the corresponding lamps light.
92	Depress TALK key on DAS 804A1 and observe that all lamps on DAS 806B-type and DAS 804A1 extinguish and the RECEIVE A and B lamps on the 912A DTS extinguish.
92.1	At DAS 806B-type, remove the 135-ohm plug terminations from VB DATA LINE jacks.

TABLE F

LAMP	INDICATION
RING	Extinguished
TEST	Lighted
AUTO	Extinguished
TALK	Extinguished
VB DATA	Lighted

B. End-to-End Test

2.43 General: The voiceband end-to-end test is an overall test of the low-speed data system. The 912A DTS controls the transmitter in DS 404B1 and provides the facilities for selecting a particular multifrequency signal to be transmitted. This signal is received by the far-end station and is displayed on the far-end 912A DTS. The tester at the far-end data station transmits the same signal back to the near-end data station and thus verifies to the tester at the near-end station that the correct data has been received.

2.44 Equipment Required:

2—912A Wideband Data Test Sets equipped with a J79912AA interface unit.

2.45 Preparation:

(1) Condition the 912A DTS as described in 2.41 and set TRANSMIT A and B switches to A4 and B4, respectively.

TABLE G

SWITCH SETTING	INDICATION
A0	A0 Lamp Lights
A1	A1 Lamp Lights
A2	A2 Lamp Lights
A3	A3 Lamp Lights
A4	A4 Lamp Lights
B0	B0 Lamp Lights
B1	B1 Lamp Lights
B2	B2 Lamp Lights
B3	B3 Lamp Lights
B4	B4 Lamp Lights

(2) It is desirable to establish voice contact with the far-end data station over a separate telephone circuit.

(3) Condition both data stations for the talk mode by removing the handset from the cradle and depressing the TALK key. Observe that on DAS 804A1 the TALK lamp is lighted. Verify satisfactory voice connections.

2.46 Procedure:

Note: Ignore WB DATA lamp while performing voiceband test.

STEP	PROCEDURE
93g	If T option is not provided in DAS 806: At both ends, depress VB DATA keys. Observe that all lamps on the DAS 804A1 are extinguished.
94g	If T option is not provided in DAS 806B-type, operate DATA TERM READY switches on both 912A DTSs to ON. At each end, depress TALK keys and observe that the associated lamps light.
	 <p data-bbox="418 541 933 634"><i>Notify the far-end craft employee that the next step requires that he listen for the indication.</i></p>
95	At near end, depress VB DATA key. Observe that the VB DATA lamp lights and TALK lamp extinguishes. The far-end craft employee should be able to hear the 2025-Hz answer-back tone for several seconds after the VB DATA key is depressed. At the end of the answer-back tone, voiceband data tones should be heard.
96	At near end, depress TALK key. Repeat Step 95 in the opposite direction.
97	Return both data stations to the data mode by depressing the VB DATA key. Restore the handsets to their respective cradles at each end.
98	<p data-bbox="240 1035 1393 1108">By using TRANSMIT A and B switches and A and B lamps in the following manner, ascertain that the low-speed data channel is operating properly:</p> <ol data-bbox="256 1140 1393 1329" style="list-style-type: none"> <li data-bbox="256 1140 1393 1266">(1) Set TRANSMIT A switch to A0 on the near-end 912A DTS. The A0 lamp on the far-end data set lights. This is verified by the operator of the far-end data set by positioning the TRANSMIT A switch to A0. When the A switch is set to A0 on the far-end data test set, the A0 lamp on the near-end 912A DTS lights. <li data-bbox="256 1297 1182 1329">(2) Repeat the procedure for A1, A2, A3, A4, B0, B1, B2, B3, and B4.
99	<p data-bbox="240 1360 1141 1392">Take both stations out of the data mode by performing the following:</p> <ol data-bbox="256 1423 1393 1581" style="list-style-type: none"> <li data-bbox="256 1423 1393 1486">(1) Remove handset from the cradle of the DAS 804A1 and depress TALK key. Talking path is now complete. <li data-bbox="256 1518 1393 1581">(2) Observe that the DATA lamps on both DAS 804A1s are extinguished and the TALK lamps are lighted. Hang up handsets.

C. Remote Test Feature**2.48 Equipment Required:**

2.47 General: The purpose and function of this remote test is the same as in 2.20 and 2.21.

2—912A Wideband Data Test Sets equipped with J79912AA interface unit. (One test set and one interface unit are required at each end of the facility.)

2.49 Preparation: At both near end and far end:

(1) Connect the low-speed cable from the connector on the 912A DTS to the low-speed interface connector J1 (25-pin connector) stamped CUST on the rear of DS 404B1. Connect high-speed interface cable to NON SYNC connector on DS 303.

(2) Remove the handset from the cradle of the DAS 804A1, depress the TALK key, and then replace the handset.

(3) At the 912A DTS, operate the POWER switch to ON and the switches to the positions indicated as follows:

SWITCHES	SETTINGS
INTERFACE—TEST MODE	UNBAL
INTERFACE—MODE	NON SYNC
INTERFACE—SEND REQ	OFF
INTERFACE—LOCAL TEST	OFF
INTERFACE—DATA TERM READY	ON

2.50 Procedure:

STEP	PROCEDURE
100	At far end: At DAS 806B-type, depress and hold the LRT key until RT1 relay is heard to operate (approximately 6 seconds). If the RT1 relay has operated, the RT1 lamp will light when the LRT key is released.
101	At near end: At DAS 804A1, remove the handset, depress the VB DATA key and observe that the VB DATA lamp lights.
102	The far-end data station should now be in the RT1 mode, and the facility is looped to the near end. The near-end data station should be in the data mode. At the near-end 912A DTS, observe that one RECEIVE A lamp and one RECEIVE B lamp are lighted (corresponding to switch positions of Table G).
103	At the far end, observe that all RECEIVE A and RECEIVE B lamps are extinguished.
104	At the far-end DAS 806B-type, depress LRT key again and hold (approximately 6 seconds) until both the LT and RT1 lamps are lighted. The far-end data station is now looped on the customer's side of DS 404B1.
105	Observe that the RECEIVE A and RECEIVE B lamps on the near-end 912A DTS light corresponding to switch setting in Table H.
106	At far end, depress the LRT key and hold (approximately 6 seconds) until RT1 lamp extinguishes. Release key and observe that the LT lamp extinguishes. Observe at the far-end DAS 804A1 that all lamps are extinguished. Observe that the near-end DAS 804A1, VB DATA, and WB DATA lamps are lighted. Observe that all RECEIVE A and B lamps are extinguished.
107	Perform Steps 100 through 106 from the opposite direction.

TABLE H

SWITCH SETTING	LIGHTED LAMPS
A0 — B0	A0 — B4
A1 — B0	A1 — B0
A1 — B1	A1 — B1
A2 — B2	A2 — B2
A3 — B3	A3 — B3
A4 — B4	A4 — B4

DATA AUXILIARY SET 809B1

2.51 The DAS 809 is not used in a station arrangement which includes a T1WM-4 modem. The DAS 809B1 is used in a restored polar data station with 19.2 kilobits-per-second data. The transmitter-receiver converts the DS 303

2.55 Procedure:

STEP	PROCEDURE
	Note: It will be necessary to proceed with the local test of the particular data station until the data station is in the local test mode as indicated by the 912A DTS AGC lamp being lighted.
108h	If DAS 806B-type is provided, depress the BLT key on DAS 806B-type. The RT1 lamp lights and remains lighted after BLT key is released. Ignore all other lamps.
109j	If DAS 806B-type is not provided: At DS 303 TB1, remove the leads to DAS 809B1 and install the V option as follows: <ul style="list-style-type: none"> (a) Strap terminal 25 to terminal 26. (b) Strap terminal 28 to terminal 29.
110	The DAS 809B1 is now out of the 303 data path. Observe that the 912A DTS AGC lamp remains lighted. If lamp was not lighted, observe that it now lights.
111	Operate the 912A DTS COUNTER switch to ON. Observe that the counter does not count.
112	Operate COUNTER switch to OFF.

baseband data signal into a vestigial sideband form for transmission over the wideband lines. The DAS 809B1 must be tested as part of a 303-type Data Station.

A. Local Test

2.52 General: The DAS 809B1 is provided with a baseband local test (BLT) feature. This BLT provides the data station with facilities to switch the DAS 809B1 transmit and receive circuits out of the transmission paths during a local test of the 303 Data Station.

2.53 Equipment Required:

1—912A Wideband Data Test Set equipped with J79912AA interface unit.

1—DC voltmeter

2.54 Preparation: The data station should be prepared in accordance with the preparation for the local test of the station arrangement to be tested.

STEP	PROCEDURE
113h	If DAS 806B1 is provided, operate the DCVM to 12 VDC full scale.
114h	Connect the positive (+) lead of the meter to terminal 31 of TB1 on DS 303 and the negative (-) lead to terminal 27. The meter should indicate less than +0.5 Vdc. (The indication may be slightly negative.) The AGC lamp should be lighted.
115h	Return the station to the local test mode by first operating the LOCAL TEST switch on the 912A DTS to OFF. Observe that both the LT and RT1 lamps extinguish.
116j	If DAS 806B1 is not provided, remove the V option installed in Step 109j. Reinstall leads disconnected in Step 109j.
117	If DAS 806B1 is provided, operate LOCAL TEST switch on 912A DTS to ON. Observe that the LT lamp lights and the meter indicates greater than 5.5 Vdc.
118	The test of DAS 809 has now been completed. Return to original test of the data station.

T1WM-4 WIDEBAND MODEM

Note: These tests should be performed only after it has been determined that the associated station equipment is functioning properly according to local test.

2.56 This test will determine if the T1WM-4 is operating properly by allowing the tester to perform an error rate count. To perform an error rate count, the transmitter output of the T1WM-4 must be looped back to the receiver input of the T1WM-4. In this loop-back condition, the 912A DTS transmits a test signal through the data set into the T1WM-4. The transmitted output of the T1WM-4 is looped back to the receiver input of the T1WM-4 by placing the T1WM-4 in the LT mode. The 912A DTS monitors the received test signal. Any variation between transmitted and received signals will be registered as an error count.

A. Local Test

2.57 General: All stations, whether synchronous or nonsynchronous, must pass this test. The test of T1WM-4 is essentially the same whether operating synchronously or nonsynchronously. The differences are noted in the following procedure.

2.58 Equipment Required:

1—912A Wideband Data Test Set equipped with a J79912AA interface unit

2.59 Preparation:

- (a) If the data station is to be tested in the nonsynchronous mode, connect the wideband data cable to the NON SYNC connector on the DS 303.
- (b) If the data station is to be tested in the synchronous mode, connect the wideband data cable to the SYNC connector on the DS 303.
- (c) Operate the controls on the 912A DTS as shown in Chart 4.

2.60 Procedure: Condition the data terminal to transmit and receive data as follows:

- (a) If data terminal consists of DS 303 and T1WM-4 only: At the 912A DTS, operate the SEND REQ switch to ON. Observe that the CLEAR TO SEND and DATA SET READY lamps are lighted.

CHART 4

SWITCHES	SETTINGS
TRANSMIT — BIT RATE	EXT — (Synchronous with internal clock option Z installed in DS 303) or 19.2 (303B) } 50 (303C) } Synchron- 230.4 (303D) } nous opera- 200 (303E) } tion with 40.8 (303G) } external clock op- tion E in- stalled in DS 303 or 19.2 (303B) } 50 (303C, 303G) } Nonsyn- 230.4 (303D, 303E, 303J) } chron- ous operation
TRANSMIT — TEST SIGNAL	2087
TRANSMIT — TRIGGER	+
TRANSMIT — OUTPUT	NORMAL
RECEIVE — BIT RATE	EXT (Synchronous operation) or 19.2 (303B) } 50 (303C, 303G) } Non- 230.4 (303D, 303E, 303J) } synchronous operation

SWITCHES	SETTINGS
RECEIVE — TIMING	0
RECEIVE — TEST SIGNAL	2087
RECEIVE — TRIGGER	+
RECEIVE — INPUT	NORMAL
RECEIVE — WORD SYNC	AUTO
RECEIVE — COUNTER	OFF
INTERFACE UNIT — TEST MODE	UNBAL
INTERFACE UNIT — MODE	NONSYNC
INTERFACE UNIT — SEND REQ	OFF
INTERFACE UNIT — LOCAL TEST	OFF
INTERFACE UNIT — DATA TERM READY	OFF
POWER	ON

(b) If data terminal consists of DS 303, DAS 806B-type, and T1WM-4, verify that the DAS 806B-type LT key on the 10A Data Unit is in the horizontal position and the LT lamp is extinguished. At the 912A DTS, operate the SEND REQ switch to ON. Observe that CLEAR TO SEND and DATA SET READY lamps are lighted.

(c) If data terminal consists of DS 303, DAS 806B-type, DAS 804A1, and T1WM-4, verify

that DAS 806B-type LT key on the 10A Data Unit is in the horizontal position. Verify that the LOCAL TEST key on DAS 804A1 is not operated or lighted. If WB DATA lamp on DAS 804A1 is not lighted, remove the handset from the cradle and depress the VB DATA key and hold until VB DATA lamp lights. Release key, return the handset to the cradle, and observe that the WB DATA lamp lights in approximately 5 seconds. At 912A DTS, operate SEND REQ switch to ON. Observe that the CLEAR TO SEND and DATA SET READY lamps are lighted.

STEP	PROCEDURE
119	At the T1WM-4 modem, remove the REC CONV SIG plug-in unit and observe that the MODEM ALM lamp lights. At the T1WM-4 ALM CONT board, observe that the AR lamp is lighted.
120	At the T1WM-4 ALM CONT board, turn the LT key to the vertical position.
121	Press and release the ACO button.
122	Replace the REC CONV SIG plug-in unit.
123	On the T1WM-4, observe that the AR and MODEM ALM lamps are extinguished.
124	Observe that the ACO and LT lamps are lighted.
125	At this point, the T1 lines should be terminated, and the T1WM-4 wideband data output should be looped back through the data set to the 912A DTS. At the 912A DTS, observe that the NO DATA and NO SYNC lamps are extinguished.
126	At the 912A DTS, reset COUNTER by operating and releasing the RESET button. Operate the COUNTER switch to ON. Observe that the counter does not count.
127	Operate COUNTER switch to OFF.
128	At the T1WM-4 ALM CONT board, return the LT key to the horizontal position and observe that all T1WM-4 lights are extinguished.

3. TROUBLESHOOTING

3.01 General:

(a) The preceding tests are designed to determine if the data station is operating properly. If the data station does not meet the conditions

specified in the tests, refer to the Troubleshooting Chart to determine the most probable cause of the trouble.

(b) The step numbers in the Troubleshooting Chart correspond to the test step numbers. When performing a test and indications are not

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as specified, refer to the same step number in the Troubleshooting Chart. For those steps where the desired indications are qualified by notes, those qualifications are treated in the Troubleshooting Chart by use of the same note numbers as in the corresponding steps.

(c) There will not be a step in the Troubleshooting Chart for each step in the test charts. Some of the steps in the test charts specify procedure and do not require an indication.

3.02 *Equipment Required:*

1—748A extractor tool (WECO)

3.03 *Troubleshooting Procedure:* Before performing any troubleshooting procedure, check the following for obvious causes of trouble:

- Loose cords, connectors, connections, etc.
- Incorrect interconnections or options.
- Broken wires.
- Physical damage.
- Verify correct power.
- RT or BLT.

3.04 If the control or indicator does not pass the test as specified, refer to the Troubleshooting Chart for the correct condition of the control or indicator and the most probable cause of trouble as indicated in the "Data Set", "Circuit Pack", and "Remarks" columns. If the unit under the "Data Set" column is verified to be operating properly and the trouble still exists, a point-to-point check of the interconnecting wiring is necessary.

3.05 *Use of Remote Test Feature:*

(a) Remote tests can be used to make certain checks of the station as an aid in isolating trouble. Although the remote tests do not check the control functions, they do provide a means of checking the station and transmission facilities. In RT2, a signal can be sent from a distant station to the station under test. The signal is received, looped at the customer's interface,

and transmitted back to the distant station. If the signals received at the distant station are the same as those transmitted, then the station under test can be assumed to be operating properly. If the signals received at the distant station are not the same as those transmitted, then the station under test or the facility is operating improperly.

(b) Make sure that the station is conditioned for the test being performed. If the RT1 lamp is lighted but should not be, the station may have been accidentally put in a remote test condition or baseband local test condition. To return the station to the normal operating condition, disconnect the power cord from the power receptacle. Reconnect the power cord and condition the system as specified in the test being performed.

3.06 *Replacing Circuit Packs:*

(a) When performing steps of a certain test and the data station fails, this may indicate a specific circuit pack, in which case the circuit pack most likely to be bad will be indicated. When data station trouble has been isolated to a particular data set or data auxiliary set, the trouble may be corrected by replacing a circuit pack.

(b) When replacing a circuit pack, verify that the correct options, and no others, are installed on the new circuit pack for that particular data station arrangement.

(c) If the trouble cannot be isolated to a particular circuit pack within a data set or data auxiliary set, replace all circuit packs within the defective data set or data auxiliary set as follows:

- (1) Replace circuit packs one at a time until trouble is corrected.
- (2) Reinstall all original circuit packs one at the time, except for the new one which corrected the trouble. It will, of course, remain in the data set.
- (3) If, after replacing an original circuit pack, the data set does not function properly, that circuit pack is obviously defective and should also be replaced.

TROUBLESHOOTING CHART

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
3 through 16	As indicated in test	As indicated in test	DS 303	All	Replace CP AR135. If AGC lamp does not light and DAS 809B1 is provided, refer to paragraph 2.55.
21a through 26	As indicated in test	As indicated in test	DS 303 or transmission facility		If both near-end and far-end data stations have met local test requirements, the transmission facility is quite likely bad.
27	COUNTER	Proper error count	DS 303 or transmission facility		If error count is too high, most likely the facility is noisy or bad. (The DS 303 could have been marginal in local test and the trouble might be in DS 303.)
28	CLEAR TO SEND DATA SET READY NO DATA NO SYNC AGC	Lighted Lighted Lighted Lighted Extinguished	DS 303 DS 303	AR135 AR307 AR129	If DAS 809B1 is provided and the AGC lamp does not light, refer to paragraph 2.55. Verify that LT and RT1 lamps on DAS 806B-type are extinguished. The data station might have been left in remote test or local test. If trouble still exists, remove 10A Data Unit (J3) from DAS 806B-type. If the lights return to normal, the trouble is in 10A Data Unit. *Only one of these CPs will be provided in data set.
29	NO DATA DATA SET READY	Extinguished Extinguished	DAS 806B-type DS 303 DS 303	10A Data Unit AR307 AR129 AR130 AR135 AR135	If replacing the 10A Data Unit does not correct the trouble, replace DS 303 CPs. If DAS 809B1 is provided, refer to paragraph 2.55. *Only one of these CPs will be provided in the data set.

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
29 (Cont)	NO SYNC	Extinguished		AR133 AR142 AR143 AR144 AR145 AR220 AR241 AR407	*Only one of these CPs will be provided in the data set.
	AGC	Lighted	DS 303	AR307 AR129	
	CLEAR TO SEND	Lighted	DS 303	AR135	
	LT on DAS 806B-type	Lighted	DAS 806B-type	10A Data Unit	
30a	As indicated in test	As indicated in test	DS 303	AR135	
31e	AGC	Extinguished	DS 303	AR135 AR133	
32f	AGC	Lighted	DS 303	AR133	
33b	All lamps	Same as Step 29	DS 303		Operation of the SEND REQ switch should have no effect on any lamps. If lamp indications do change, T option is not properly installed.
34a	AGC	Lighted	Same	Same	
	CLEAR TO SEND	Lighted	as	as	
	NO DATA	Extinguished	Step 29	Step 29	
	NO SYNC	Extinguished			
35c	NO DATA	Lighted	DS 303	AR135	
	NO SYNC	Lighted			
	AGC	Extinguished			
	CLEAR TO SEND	Extinguished			

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
36c	All lamps	Same as Step 35c	DS 303	AR135	
38	COUNTER	Should not count			If counter does count, trouble is probably in DS 303 or the 912A DTS. Verify that the TIMING switch on the 912A is set to zero. (See Steps 39, 40.)
39d	COUNTER	Should not count	DS 303	AR130 AR131 AR132 } * AR129 } * AR307 } * AR125 } * AR127 } * AR157 } *	*Only one of these CPs will be provided in the data set.
40d	COUNTER	Should not count	DS 303	AR126 } * AR128 } * AR413 } * AR130 } * AR131 } * AR132 } * AR129 } * AR307 } *	*Only one of these CPs will be provided in the data set.
42	LT lamp	Extinguished	DAS 806B-type	10A Data Unit	
43	LT lamp NO DATA NO SYNC DATA SET READY	Lighted Extinguished Extinguished Extinguished	DAS 806B-type	10A Data Unit	
43.1	LT lamp	Extinguished	DAS 806B-type	10A Data Unit	
45a	CLEAR TO SEND DATA SET READY AGC NO DATA NO SYNC	Lighted Lighted Lighted Extinguished Extinguished			If both near-end and far-end data stations have met local test requirements, the transmission facility is quite likely bad.

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
45.1a	CLEAR TO SEND	Extinguished	DS 303	AR135	
46a	At far end: NO DATA NO SYNC AGC	Lighted Lighted Extinguished			If data station meets the requirements of local test, the trouble is probably due to noise generated in the facility.
47b	AGC CLEAR TO SEND NO DATA NO SYNC	Lighted Lighted Extinguished Extinguished	DS 303	AR135	
48a	CLEAR TO SEND At far end: NO DATA NO SYNC AGC	Lighted Extinguished Extinguished Lighted	DS 303	AR135	If near-end data station has met local test requirements, perform a local test of the far end. If far-end tests are satisfactory, the facility is bad.
50	COUNTER	Proper error count	DS 303 or transmission facility		See Step 27.
51	CLEAR TO SEND AGC DATA SET READY NO DATA NO SYNC	Lighted Lighted Lighted Extinguished Extinguished			See remarks for Step 45a.
52	RT1	Lighted	DAS 806B-type	AR122 or 10A Data Unit	
53	At near end: DATA SET READY	Extinguished	At near end: DAS 806B-type	10A Data Unit	

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
53 (Cont)	CLEAR TO SEND AGC NO SYNC NO DATA	Extinguished Extinguished Lighted Lighted	At near end: DAS 806B-type	10A Data Unit	The far-end data station is transmitting data to the near end, being looped in DAS 806B-type via RT1 contacts and received by far end.
54	At far end: CLEAR TO SEND DATA SET READY AGC NO DATA NO SYNC	Lighted Lighted Lighted Extinguished Extinguished	At near end: DAS 806B-type	10A Data Unit	
55	At near end: LT RT1 CLEAR TO SEND DATA SET READY At far end: As indicated in Step 54	Lighted Lighted Extinguished Extinguished As indicated in Step 54	At near end: DAS 806B-type At near end: DAS 806B-type DS 303	10A Data Unit or AR122 10A Data Unit or AR122 AR135	
57	TEST	Extinguished	DAS 806B-type	10A Data Unit	Verify that the LT key on 912A DTS is in the OFF position, the TEST key on DAS 804A1 is not depressed, and the LT key on DAS 806B-type is in the horizontal position.

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
57 (Cont)	VB DATA	Extinguished	DAS 804A1 DAS 806B-type	10A Data Unit	When replacing DAS 804A1, verify that the replacing DAS 804A1 has been modified to operate with a 303-type data station arrangement.
59	WB DATA	Lighted	DAS 804A1		
	CLEAR TO SEND	Lighted	DS 303	AR135	
	DATA SET READY	Lighted	DS 303	AR135	
60	CLEAR TO SEND	Lighted	DAS 804A1 DS 303	AR135	
	DATA SET READY	Lighted	DAS 804A1 DS 303	AR135	
	WB DATA	Lighted after approximately 5 seconds	DAS 804A1 DAS 806B-type	10A Data Unit	
	VB DATA	Lighted	DAS 804A1		
62 through 65	As specified in test	As specified in test	DAS 804A1 DAS 806B-type	10A Data Unit	
69	TALK Far-end DAS 804A1	Lighted Ringing heard and RING key flashes	DAS 804A1		Trouble may be in private line terminal equipment. At near-end DAS 806B-type, connect a voltmeter from TB1-35 to ground and depress RING key. If meter indicates other than zero volts, replace near-end DAS 804A1. If meter indicates zero volts, check private line terminal or far-end data station.
70	DATA SET READY	Extinguished	DS 303 DAS 804A1	AR135	If +18 volts is present on TB2-28, replace DAS 804A1. If +18 volts is not present, replace CP AR135.
	CLEAR TO SEND	Extinguished	DS 303	AR135	

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
70 (Cont)	AGC	Extinguished	DS 303	AR130	Trouble may be due to noise generated on the line. Perform local test. *Only one of these CPs will be provided in the data set.
Note 1	AGC	Lighted	DAS 809B1	AR129 } AR307 }	
Note 2	AGC	Lighted	DS 303	AR113	
				AR133 16A1 Data Unit or AR134	
71	VB DATA	Lighted	DAS 804A1 DAS 806B-type	10A Data Unit	Check private line terminal.
	TALK	Lighted	DAS 804A1		
72	TALK	Lighted	DAS 804A1		
73	WB DATA	Lighted	DAS 804A1 DAS 806B-type	10A Data Unit	Check private line terminal.
	VB DATA	Lighted	DAS 804A1 DAS 806B-type	10A Data Unit	
	TALK	Extinguished	DAS 804A1		
	DATA SET READY CLEAR TO SEND	Lighted Lighted	DS 303	AR135	
74	AGC	Lighted			If AGC is not lighted, trouble could be in far-end or near-end station or the facility. Sectionalize by performing a local test of each station. If both local tests are satisfactory, trouble is probably the facility.
	CLEAR TO SEND DATA SET READY	Lighted Lighted	DS 303	AR135	

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
74 (Cont)	NO DATA NO SYNC	Extinguished Extinguished			If NO DATA and/or NO SYNC lamps are lighted, the trouble may be near-end or far-end data station or the facility. Perform a local test of each end to sectionalize the trouble.
75	CLEAR TO SEND	Extinguished	DS 303	AR135	
76 Note 1 Note 2	NO DATA NO SYNC AGC AGC AGC	Lighted Lighted Extinguished Lighted Lighted	DAS 809B1 DS 303	AR113 AR133 16A1 Data Unit or AR134	See Step 74. *Only one of these CPs will be provided in the data set.
77	CLEAR TO SEND AGC NO DATA NO SYNC	Lighted Lighted Extinguished Extinguished			See Step 74.
78	AGC CLEAR TO SEND DATA SET READY NO DATA NO SYNC	Lighted Lighted Lighted Extinguished Extinguished			See Step 74.
80	COUNTER	Proper error count			If count is too high, the trouble is probably in the facility.
81	VB DATA WB DATA	Extinguished Extinguished	DAS 806B-type DAS 804A1 DAS 804A1 DAS 806B-type	10A Data Unit 10A Data Unit	

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
81(Cont) Note	TALK WB DATA	Lighted Lighted	DAS 804A1 DS 303 DAS 806B-type	AR135 CS1 } * CS3 }	*Only one of these CPs will be provided in the data auxiliary set.
83	AUTO	Lighted	DAS 806B-type DAS 804A1	CS1 } * CS3 }	*Only one of these CPs will be provided in the data auxiliary set.
85	Far-end DAS 804A1 RING VB DATA WB DATA	Ringer sounds Flashes Lighted } Lighted }	 DAS 804A1		Trouble is probably in private line terminal equipment. Could be in near-end or far-end DAS 804A1.
86	2025-Hz Tone	Several seconds burst of tone	Far-end DAS 804A1		
87	Far-end DAS 804A1 RING VB DATA	Rings Flashes Extinguished	Far-end DAS 804A1		See Step 85.
88.2	Far-end TALK	Lighted	Far-end DAS 804A1		
88.3	Near-end RT1 lamp VB DATA TEST	Lighted } Lighted } Lighted }	Near-end DAS 806B-type	10A Data Unit	
88.4	Near-end LT RT1 lamps 2025-Hz. Answer- back tone	Lighted } Lighted } Heard for several seconds }	Near-end DAS 804A1		
88.5	Near-end RT1 LT DAS 804A1: All lamps	Extinguished } Extinguished } Extinguished }	Near-end DAS 806B-type	10A Data Unit	

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
89	RING TEST AUTO TALK VB DATA	Extinguished Lighted Extinguished Extinguished Lighted	DAS 804A1 DAS 806B-type	10A Data Unit	
90	RECEIVE-A and B lamps	Lighted after 5 seconds	DAS 806B-type DS 404B1 DAS 804A1	10A Data Unit	If only one lamp lights (A not B or B not A), trouble is in DS 404B1. See Step 91.
91	RECEIVE-A and B lamps	Lighted lamps correspond to switches.	DS 404B1		CP AR97 affects either or both channels. CP AR99 affects either or both channels. CP AR101 affects A0 and B0. CP AR103 affects A1, A2, A3, A4. CP AR 104 affects B1, B2, B3, B4. CP AR106 affects either or both channels. Filter FL1 affects either or both channels.
92	All DAS 804A1 lamps	Extinguished	DAS 804A1		
93	VB DATA TALK	Extinguished Extinguished	DAS 806B-type DAS 804A1	CP CS1 }* CP CS3 }	*Only one of these CPs will be provided in the data auxiliary set.
94	TALK	Lighted	DAS 806B-type DAS 804A1	10A Data Unit CP CS1 }* CP CS3 }	*Only one of these CPs will be provided in the data auxiliary set.
95	Answer-back tone heard at far-end DAS 804A1	Several seconds	Near-end DAS 804A1		

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
98	RECEIVE-A and B lamps	Lighted lamps correspond to switch settings.	DS 404B1 or facility		Perform Step 91 of the Local Test procedure. If local test results are satisfactory, the trouble is probably in the facility.
99	TALK	Lighted	DAS 804A1 or private line terminal equipment		
100	Far-end RT1	Lighted	DAS 806B-type	AR122 10A Data Unit	
101	VB DATA	Lighted	DAS 804A1 DAS 806B-type	10A Data Unit	
102	RECEIVE-A and B lamps	Lighted lamps correspond to switches.	DS 404B1 or facility or far-end DAS 806B-type		See Steps 91 and 98. If local test results were satisfactory, the trouble is probably due to the length of the facility being doubled by looping at the other end.
103	RECEIVE-A and B lamps	Extinguished	Far-end DAS 806B-type	10A Data Unit	
104	LT RT1	Lighted Lighted	Far-end DAS 806B-type	AR122 10A Data Unit	
105	RECEIVE-A and B lamps	Lighted			The far-end station is now in the RT2 mode, looped on the customer's side of the data set. If one RECEIVE A and one RECEIVE B lamp are not lighted, perform a local test of the far-end data station. If local test results are satisfactory, check far-end RT2 relay in DS 404B1.

TROUBLESHOOTING CHART (Cont)

STEP	CONTROL OR INDICATOR	NORMAL CONDITION	DEFECTIVE DATA SET OR DATA AUXILIARY SET	REPLACE CIRCUIT PACK (SEE PART 3)	REMARKS
106	RT1 LT	Extinguished Extinguished Far end: All DAS 804A1 lamps Extinguished	Far-end DAS 806B- type	AR122 10A Data Unit	
108	RT1	Lighted	DAS 809B1 DAS 806B- type	CP CK1 10A Data Unit	If AGC lamp was not lighted but did light when the BLT key was depressed, the trouble is in DAS 809B1.
110	AGC	Lighted	DS 303 DAS 806B- type DAS 809B1	10A Data Unit CP CK1	If AGC lamp is not lighted, be sure that the DAS 809B1 BLT relay has operated and that DAS 809B1 is out of the 303 data path. If AGC lamp is still extinguished, it must be determined that the DS 303 is in the local test mode. Return to local test of the 303 data station and proceed until the AGC lamp is lighted.
111	COUNTER	Proper error count			If counter counts errors, the trouble is not in DAS 809B1. Refer to local test of applicable 303 data station arrangement.
114	Meter AGC	+0.5 Vdc Lighted	DAS 809B1 DS 303	AR112 AR129 } * AR307 }	*Only one of these CPs will be provided in the data set.
115	LT RT1	Extinguished Extinguished	DAS 806B- type	10A Data Unit	
117	LT	Lighted	DAS 809B1	AR112	
119 thru 128					If Steps 119 through 128 are not as specified in the test, the trouble is probably in the T1WM-4 modem. Refer to Section 365-121-500.

4. F56426 WIDEBAND DATA TEST SET

4.01 The tests described in Part 2 are designed for use with the 912A DTS. Table I provides a cross reference between the controls and indicators of the 912A DTS and the controls and indicators of F56426 Wideband Data Test Set. By making a minor modification to the test set using this cross reference and the accompanying notes, the preceding tests can be performed with the F56426 Wideband Data Test Set.

4.02 It is necessary to modify the wideband data test set by removing grounds from the test set ends of shields on lead M in both the SYNC and NON SYNC high-speed cables. This modification can be made where the shields are connected to ground at the ALT key.

Note: This modification does not affect in any way the operation of the test set with Data Sets 303A-type.

4.03 The SD and RD switches on the F56426 Wideband Data Test Set must be set to either SYNC or NON SYNC. Set the switches to the positions corresponding to the connector on DS 303 into which the wideband cable is plugged.

4.04 Refer to Trial Instruction No. 260 for a detailed discussion of the F56426 Wideband Data Test Set.

5. REFERENCES

5.01 The circuit descriptions (CDs) and schematic drawings (SDs) for the apparatus included in the wideband data station using DS 303-type are as follows:

CD-1D100 and SD-1D100-01—Data Set 303-Type

CD-1D099 and SD-1D099-01—Data Set 303-Type, Application

CD-1D067 and SD-1D067-01—Data Auxiliary Set 809B1

CD-1D069 and SD-1D069-01—Data Set 404B1

CD-1D041 and SD-1D041-01—Data Auxiliary Set 804A1

CD-1D097 and SD-1D097-01—Data Auxiliary Set 806B-Type

CD-1D061-01 and SD-1D061-01—Typical Data Set Applications

5.02 Bell System Practices covering the various equipment in the station are given below:

SECTION	TITLE
593-012-100	Data Set 303-Type, Identification
590-100-106	10A-Type Data Unit, Identification
590-100-113	16A1 Data Unit, Identification
365-122-100	T1 Carrier System Terminal, J8713F Line Terminating Unit, Description
365-121-100	T1 Carrier System Terminal, T1WM-4 Wideband Modem, Description
598-034-100	Data Auxiliary Set 809B1, Identification
594-024-100	Data Set 404B1, Identification
598-030-100	Data Auxiliary Set 804A-Type, Identification
598-042-100	Data Auxiliary Set 806B-Type, Identification

TABLE I

CROSS REFERENCE BETWEEN CONTROLS ON 912A DTS AND F56426 DTS

912A DTS	F56426 DTS
TRANSMIT — BIT RATE	TRANS MODE BIT RATE
TRANSMIT — TRIGGER	(No corresponding control)
TRANSMIT — TEST SIGNAL — 2047 — 2087 — 131071 — 131111 — DOT	TRANS WORD — RANDOM — DOT
TRANSMIT — OUTPUT	(No corresponding control)
RECEIVE — BIT RATE	RECV MODE BIT RATE
RECEIVE — TRIGGER	(No corresponding control)
RECEIVE — TEST SIGNAL — 2047 — 2087 — 131071 — 131111 — DOT	RECV WORD — RANDOM — DOT
RECEIVE — INPUT	No corresponding control (internally wired in normal)
RECEIVE — WORD SYNC	RESET (must depress to synchronize)
RECEIVE — TIMING	No corresponding control (internally wired in 0 position)
RECEIVE — COUNTER	Refer to TI 260 and addendum for procedure on disabling counter.
RECEIVE — NO DATA Lamp	No corresponding control. Set METER switch to DATA. (Refer to Note 1.)
RECEIVE — NO SYNC lamp	No corresponding control. Set SCALE CHANGE switch to 0-50. (Refer to Note 1.)
INTERFACE — TEST MODE — BAL — UNBAL — LOOPED	Interface switch to BAL Interface switch to UNBAL Set both the SD and RD switches to LOC position.
INTERFACE — MODE	ALT
INTERFACE — SEND REQ	SR When test procedure specifies setting and/or SEND REQ or LOCAL TEST to ON, LT set SR or LT to the position that corresponds to the connector on the 303 into which the wideband cable is plugged.
INTERFACE — LOCAL TEST	

TABLE I (Cont)

CROSS REFERENCE BETWEEN CONTROLS ON 912A DTS AND F56426 DTS

912A DTS	F56426 DTS
INTERFACE — DATA TERM READY	DTR (Refer to Note 2.)
(No corresponding control)	SD and RD switches — Set to position that corresponds to the connector on the 303 into which the wideband cable is plugged.
A Channel	A Channel
B Channel	B Channel
CLEAR TO SEND Lamp	CLEAR TO SEND — SYNC or NON SYNC — According to the connector on the 303 into which the wideband cable is plugged.
INTERFACE — AGC	AGC
INTERFACE — RECEIVE A	A Channel (lamp)
INTERFACE — RECEIVE B	B Channel (lamp)
DATA SET READY Lamp	See Note 3.
POWER	AC POWER

Notes:

- To detect presence of "no data" and "no sync" signals during wideband unbalanced interface tests, perform the following:
On F56426 Wideband Data Test Set, set METER switch to DATA and set SCALE CHANGE switch to 0-50. With KS-14510 Multimeter set to 3 VDC scale, connect the meter across the RD test point and ground of the test set. Ground can be obtained on the ground portion of any of the coaxial connectors. The voltage to be measured can be either negative or positive. When a test indicates that the NO DATA and NO SYNC lamps should be extinguished, the voltage should be $+0.35 \pm 0.3V$. When the NO DATA and NO SYNC lamps are to be lighted, the voltage should be either $+1.6 \pm 0.3V$ or $-0.9 \pm 0.3V$.
- When the procedure specifies setting DATA TERM READY switch to ON, strap in wired data terminal ready (T) option 27 to 28 on TB1 in DAS 806B. Remove T option when DATA TERM READY switch is to be OFF.
- The F56426 Wideband Data Test Set does not provide leads in the high-speed cables for testing the data set ready function. Use KS-14510 Multimeter and a 100 ohm resistor. Connect the resistor between pin 38 of J7 in DS 303 and ground for synchronous operation. Connect the resistor between pin 37 and ground for nonsynchronous operation. Monitor across the resistor. The meter should indicate greater than $+2.35 Vdc$ when the tests indicate that the DATA SET READY lamp should be lighted and less than $+0.5 Vdc$ when the lamp is extinguished.