

DATA AUXILIARY SET 811D1

TEST PROCEDURES

1. GENERAL

1.01 This section contains test procedures for the Data Auxiliary Set 811D1. The following tests are to be made at the time of installation and may be used for clearing routine trouble conditions. The tests are described in the following order:

A. Power Test

B. Data Auxiliary Set Preparation, Conditioning (With AC-DC Meter), and Back-to-Back Test (With Data Set 205C2)

C. End-to-End Test

1.02 No remote testing of Data Auxiliary Set 811D1 is provided.

1.03 The following test equipment is required to perform the tests listed above:

1—901B-2 Data Test Set

1—902B Data Test Set

2—903B Data Test Sets

1—KS-14510 volt-ohm-milliammeter

1—KS-19087 L2 connector

1—1011-type handset (or equivalent)

6—Clip leads with insulated alligator clips for connections to test points on data auxiliary set printed wiring boards.

2. CAUTIONS

2.01 The following cautions must be observed when working with Data Auxiliary Set 811D1:

- Always disconnect the ac power cord *before* removing or installing printed wiring boards.

- It is very easy to accidentally short the +18 vdc or -18 vdc power supply voltages (appearing on the rear of the data auxiliary set) to adjacent terminals. This must be avoided because application of +18 vdc or -18 vdc to *virtually any* other wire on the back of the data auxiliary set will result in transistor or diode destruction. Do not work on the terminal side of the equipment. Use test points and interface connectors only.

- In the event that it is necessary to repair or replace wires on the rear of the data auxiliary set, extreme care is required to avoid pulling on the connector terminals. Pulling on the connector terminals will deform the contacts and destroy the terminal. Use wire wrapping and unwrapping tools only.

- Before attempting any tests, check that all printed wiring boards are pushed all the way in and are seated securely in their respective connectors.

- Before applying operating voltages to the data auxiliary set, or troubleshooting (with power off), visually check the alignment of every terminal on the wiring side, and straighten, if necessary, to be sure adjacent terminals are not touching.

3. TESTING

3.01 The following tests are to be made at the time of installation. These tests can also be used to determine the condition of the data auxiliary set during a maintenance visit.

A. Power Test

3.02 Measure the ac line voltage applied to the 26A Power Unit with the KS-14510 test meter. The ac line voltage should measure between 105 and 129 volts.

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B. Data Auxiliary Set Preparation, Conditioning, and Back-to-Back Test

3.03 The following test of the data auxiliary set may be accomplished before the unit is rack-mounted and interconnected with associated equipment. These test procedures are written for use with the 900-type test sets listed in 1.02.

Data Auxiliary Set Preparation and Arrangement of External Test Equipment

3.04 Prepare the Data Auxiliary Set 811D1 as follows:

- (a) Check that terminal FG1 is strapped to terminal SG1. If a connecting wire is not present, temporarily strap the terminals together.
- (b) Strap the following pin terminals on the KS-19087 L2 connector:
 - (1) Strap terminals 2, 3, and 5.
 - (2) Strap terminals 8 and 14.
 - (3) Strap terminals 12, 15, 16, and 17.
- (c) Insert the connector prepared in 3.04 (b) into DATA SET 205 (P65) plug on Data Auxiliary Set 811D1.

3.05 Connect and prepare the 901B-2 test set as follows:

- (a) Position SELECTOR switch to 3.
- (b) Position A TEST switch to OFF.
- (c) Position B TEST switch to OFF.
- (d) Position ATT-UNATT switch to ATT.
- (e) Connect the 901B-2 test set cord to the interface adapter (the 901B-2 test set cover). Connect the interface adapter to CUSTOMER B1 jack (J63) on Data Auxiliary Set 811D1. The CUSTOMER A1 jacks (J64) on the data auxiliary set will not be used for the following tests.
- (f) Arrange the clips on the interface adapter as follows:

- (1) Open shorting clips 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, and 25.

- (2) Strap shorting clips EQ 15 to TST 21, EQ 14 to 19, and EQ 12 to TST 15.

3.06 Prepare the two 903B test sets as follows and connect the test equipment as shown in Fig. 1.

(a) 903B test set No. 1 (clock)

- (1) BIT RATE switch to 2400
- (2) RANDOM-DOT to DOT
- (3) TRIGGER to - (minus)

(b) 903B test set No. 2 (data)

- (1) BIT RATE switch to EXT CLOCK
- (2) RANDOM-DOT to DOT
- (3) TRIGGER to - (minus)

3.07 Connect power cord from each 903 test set to a 117-volt, 60-Hz source and position the power switch on each test set to ON. Connect the data auxiliary set ac power cord to the commercial power source and to the data auxiliary set.

3.08 Before attempting to test further, measure the data auxiliary set operating voltages. There are no test points to measure the +18.0 vdc and -18.0 vdc sources applied to the data auxiliary set, but an indication of power supply operation may be obtained by measuring the dc voltages available at test points TP 3 and TP 6 on board AR148 in slot location 05. Observe polarity and measure for the following indications with the KS-14510 test meter:

- (a) Between TP 3-05 and chassis ground: +6.2 (± 0.3) vdc
- (b) Between TP 6-05 and chassis ground: -6.2 (± 0.3) vdc

3.09 Voltage measurements for the remaining tests should be taken from terminals A, B, and C on the 901B-2 test set except where indicated. Observe polarity for each measurement. Terminal

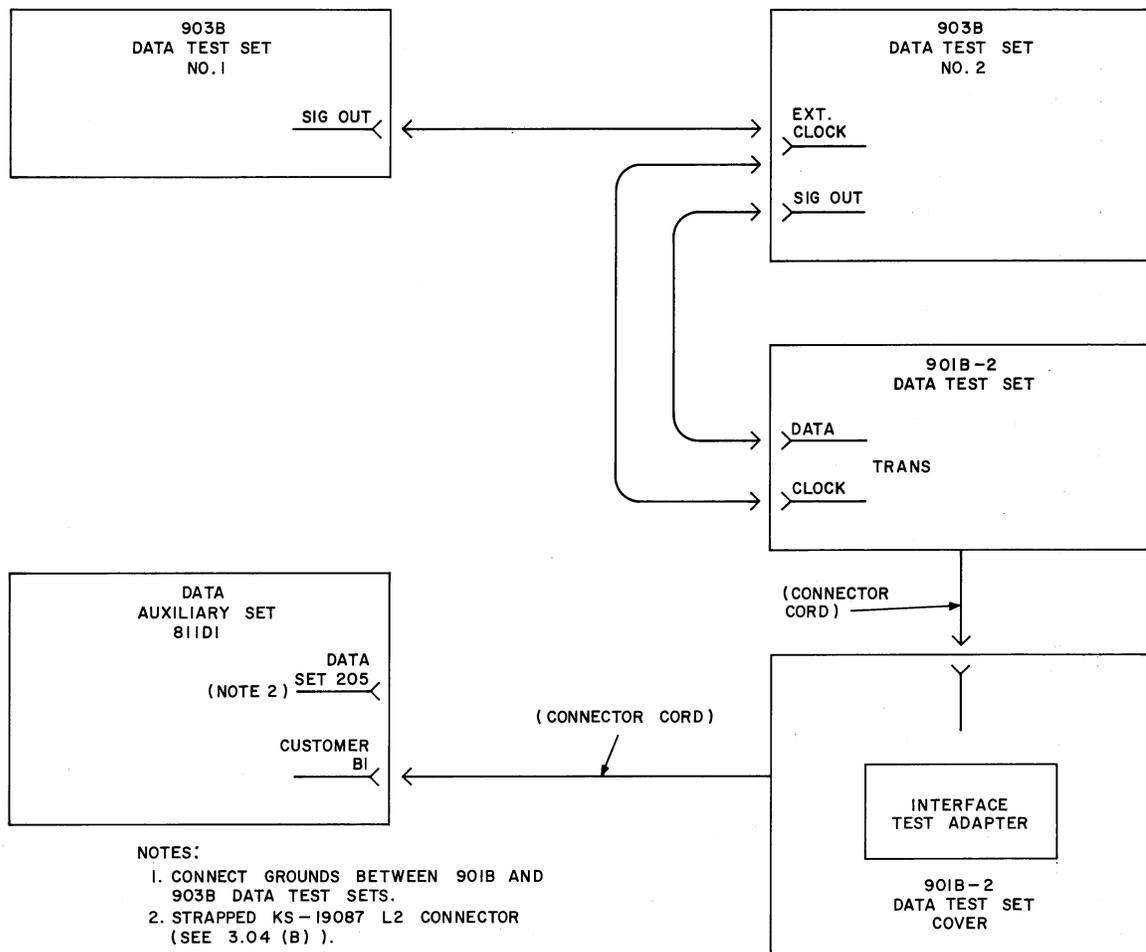


Fig. 1—Data Auxiliary Set 811D1, Test Set Connections

C is always at ground potential. All dc measurements are made between terminals A and C, and ac measurements are made between terminals B and C.

Scrambler Output Test

3.10 Simulate a Carrier ON condition by grounding test point TP 14 on AR158-11. Position the A TEST switch on the 901B-2 test set to 4.

(a) Momentarily ground test point TP 5 on AR9-01

- (1) The measured dc voltage should be +3.0 (± 0.2) vdc.
- (2) The measured ac voltage should be 4.8 (± 0.2) vac.

(b) Momentarily ground test point TP 14 on AR9-01.

- (1) The measured dc voltage should be -3.0 (± 0.2) vdc.
- (2) The measured ac voltage should be 4.8 (± 0.2) vac.

3.11 If the scrambler is not operating, the measured dc voltage for 3.10 (a) will be +6.0 (± 0.6) vdc and/or for 3.10 (b) will be -6.0 (± 0.6) vdc. The measured ac voltage will be 0.0 vac.

3.12 If the voltage requirements for 3.10 (a) and (b) are not met:

(a) Disconnect the data auxiliary set ac power cord.

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- (b) Carefully remove AR9-01 printed wiring board.
- (c) Replace the AR9 board with one known to be good.
- (d) Reconnect the data auxiliary set ac power cord.
- (e) Retest as instructed in 3.10 and 3.11.

3.13 If the voltage requirements are not met after using the instructions of 3.12, remove ac power to the data auxiliary set. Replace the original AR9 in the original location. Repeat 3.12 and substitute printed wiring boards AR149-03, AR148-05, and AR158-11 one at a time. If the requirements are not met after the above substitutions, replace the data auxiliary set.

Descrambler Output Test

3.14 The equipment should be conditioned as in 3.10 except position A TEST switch on the 901B-2 to 2.

- (a) The measured dc voltage should be 0.0 vdc.
- (b) The measured ac voltage should be 6.2 (± 0.6) vac.

3.15 If the descrambler is not operating, the measured dc voltage of 3.14 (a) will be $-6.2 (\pm 0.6)$ vdc and the measured ac voltage will be 0.0 vac.

3.16 If the requirements of 3.14 (a) and (b) are not met, follow the procedures given in 3.12 and 3.13, using printed wiring boards AR149-03, AR148-07, AR9-09, and AR158-11.

Scrambler-Descrambler Test

3.17 An overall test of the scrambler-descrambler circuits may be made by replacing the 1200-bit dotting signal used in the previous tests with steady logical "1's" or "0's." This is accomplished as follows:

- (a) With the equipment conditioned as in 3.14, remove the connection to the TRANSMIT DATA jack on the 901B-2 test set. This breaks the signal supplied from the 903B test set No. 2.

(b) Connect a clip lead from test point TP 3 on AR148-05 to the TRANSMIT DATA jack on the 901B-2 test set. The proper dc voltage indication should measure $+6.2 (\pm 0.6)$ vdc.

(c) Remove the clip lead from test point TP 3 on AR148-05 and connect it to TP 6 on AR148-05. The proper dc voltage indication should measure $-6.2 (\pm 0.6)$ vdc.

Carrier ON-OFF Delay (COOD) Test

3.18 With the equipment conditioned as in 3.17, make the following changes:

- (a) Remove the ground from test point TP 14 on AR158-11. Connect this ground lead to test point TP 12 on AR158-11.
- (b) Connect the positive lead of the KS-14510 test meter to terminal EQ 22 on the interface adapter. Connect the negative test lead to a convenient ground.

3.19 The KS-14510 test meter should indicate 0.0 vdc as connected in 3.18. Position the ATT-UNATT switch on the 901B-2 to UNATT. The test meter should indicate $+6.2 (\pm 0.6)$ vdc. Observe that the test meter indication change from 0.0 vdc to $+6.0 (\pm 0.6)$ vdc occurs approximately one second after operating the switch. Switching from UNATT position to ATT should change the test meter indication from $+6.0 (\pm 0.6)$ vdc to 0.0 vdc in approximately two seconds.

Back-to-Back Test (With Data Set 205C2)

3.20 The following test of the Data Auxiliary Set 811D1 may be accomplished when the unit is rack-mounted and connected to the associated equipment.

3.21 Prepare the data auxiliary set as follows:

- (a) Disconnect the ac power cord.
- (b) Check that terminals FG1 and SG1 are strapped.
- (c) Remove plugs from both CUSTOMER B1 jack (J63) and CUSTOMER A1 jack (J64).

3.22 Disconnect ac power to Data Set 205C2. Position the LINE-TEST key to TEST.

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(g) Condition the KS-14510 test meter to measure 12 VDC full scale. Connect the positive test lead to interface adapter terminal 22 and the negative test lead to terminal 7.

● 902B test set

- (a) BIT RATE to EXT SYNC
- (b) SELECTOR to DIST MEAS
- (c) TRIGGER to - (minus)

● 903B test set No. 1

- (a) BIT RATE to EXT CLOCK
- (b) RANDOM-DOT to RANDOM
- (c) TRIGGER to - (minus)

● 903B test set No. 2

- (a) BIT RATE to EXT CLOCK
- (b) RANDOM-DOT to RANDOM
- (c) TRIGGER to + (plus)

3.24 Reconnect the ac power to Data Set 205C2 and the data auxiliary set.

3.25 A check of the data auxiliary set power supply may be made as directed in 3.08.

3.26 Observe that the Data Set 205C2 LINE-TEST key is in TEST position and the KS-14510 test meter connected to the interface adapter indicates +6.2 (± 0.6) vdc, or a Carrier ON condition.

3.27 The Carrier ON-OFF Delay (COOD) function may be checked as follows:

(a) Operate the data set LINE-TEST key to LINE position. Approximately two seconds after the key has been operated, the KS-14510 test meter indication will change from +6.2 (± 0.6) vdc to 0.0 vdc.

(b) Operate the data set LINE-TEST key to TEST position. Approximately one second after the key has been operated, the KS-14510 test meter indication will change from 0.0 vdc to +6.2 vdc.

3.28 Perform the back-to-back error test by using the following sequence of operations:

- (a) The Data Set 205C LINE-TEST key must be in the TEST position.
- (b) Momentarily press the START switch on the No. 1 903B test set.
- (c) Momentarily press the START switch on the No. 2 903B test set.
- (d) Momentarily press the WORD SYNC & RESET switch on the 902B test set.
- (e) Allow the test setup to operate for five minutes. At the end of the test, the TOTAL ERRORS lamps on the 902B test set should indicate no errors after the WORD SYNC & RESET switch has been pressed.

C. End-to-End Test

3.29 This test is similar to the back-to-back test except transmission between data set stations is tested in both directions simultaneously. Identical test equipment must be used at both stations. At the local station, a 903B test set provides signals through a 901B-2 test set and cover to drive the data set. The data signals are transmitted to the far-end data set, through a connected 901B-2 test set and cover, and to a connected 902B test set. Both local and distant stations have a second 903B test set which generates a comparison signal and is connected into the 902B test set. The 902B test set can synchronize the two signals and count the number of errors in the Receive Data. The following test set arrangement allows for simultaneous checking of data set transmission and reception.

3.30 Prepare the 901B-2, 902B, and two 903B test sets at both local and distant stations as follows. The sets are interconnected as shown in Fig. 3.

● 901B-2 test set

SELECTOR to 3

A TEST to 9

B TEST to OFF

ATT-UNATT switch to UNATT

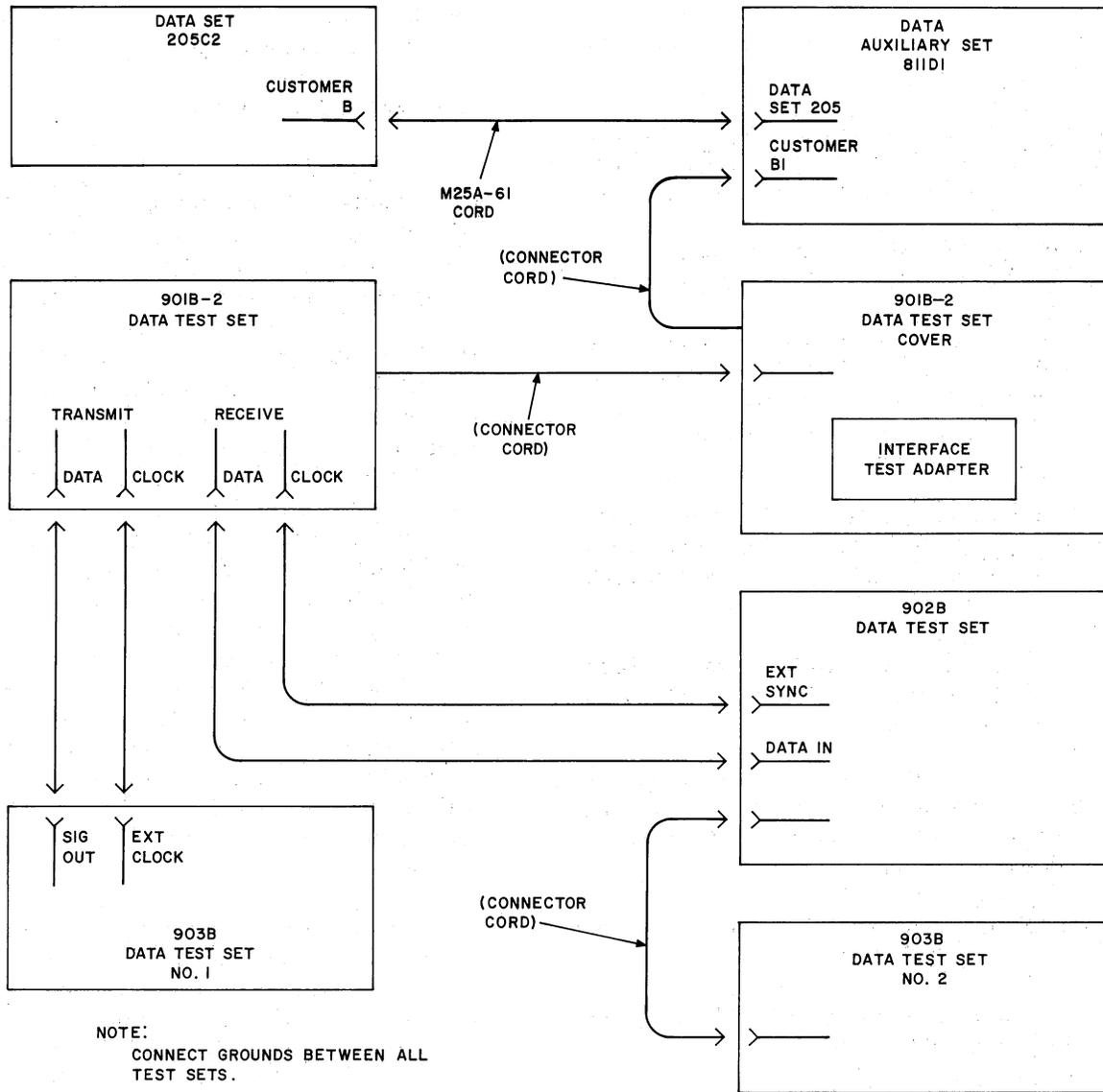


Fig. 3—Data Auxiliary Set 811D1, Test Set Connections For End-To-End Testing

- 902B test set
 - BIT RATE to EXT SYNC
 - SELECTOR to DIST MEAS
 - TRIGGER to - (minus)
- 903B test sets (both sets at both stations)
 - BIT RATE to EXT CLOCK
 - RANDOM-DOT to RANDOM

TRIGGER to + (plus)

Power to OFF

3.31 Arrange the clips on the interface adapter at both stations as follows:

- (a) Open shorting clips 11, 14, 23, 24, and 25.
- (b) Strap 9 to 19, 10 to EQ 11, 10 to 18, 20 to EQ 23, and TST 14 to EQ 25.

3.32 Carefully remove Data Set 205C2 Transmit-Receive Switch (AR95-019). Strap terminals

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3 and 4 and remove any strap between terminals 1 and 2 (if the board is not already strapped in this manner).

3.33 If necessary, operate and lock Data Set 205C2 LINE-TEST key in the LINE position and mate the cord plug with the 4-WIRE connector.

3.34 Connect the interface adapter cord to the data auxiliary set CUSTOMER B1 jack (J63).

Note: Place a strap between terminals FG1 and SG1 when the CUSTOMER A1 plug is to be disconnected, and remove the strap when CUSTOMER A1 plug is reconnected, if required to do so by the service order.

3.35 At each station, connect the ac power cord from both 903B test sets to the commercial power source. Operate the power switch on each test set to ON.

3.36 Connect the ac power cords from the Data Set 205C2 and Data Auxiliary Set 811D1 to the commercial power source.

3.37 Perform the end-to-end test by using the following sequence of operations. If possible, both local and distant stations should perform Steps (a), (b), and (c) simultaneously.

- (a) Momentarily press the START switch on the No. 1 903B test set.
- (b) Momentarily press the START switch on the No. 2 903B test set.
- (c) Momentarily press the WORD SYNC & RESET switch on the 902B test set.
- (d) The TOTAL ERRORS lamps on the 902B test set will indicate errors as they occur. To obtain total errors, add the values indicated

by all illuminated lamps. The bottom lamp will be illuminated when the error capacity of the counter has been exceeded and the indicated count is erroneous.

(e) To be sure that the 902B test set is counting errors, momentarily press the START switch on the No. 2 903B test set. The bottom TOTAL ERRORS lamp will be illuminated indicating maximum errors.

(f) Momentarily press the WORD SYNC & RESET switch on the 902B test set. Allow the test to continue for five minutes after which note the indicated error count and press the WORD SYNC & RESET switch again. Operate this test for three consecutive five-minute intervals. The error rate can be considered average if a total of 20 errors is recorded for the three test periods. If the error count approaches 100 for the three test periods, the transmission parameters of the line should be checked in accordance with Section 314-410-500. If the line checks satisfactorily, refer to Plant Staff through lines of organization. If these tests are satisfactory, disconnect the ac power from the data set, the data auxiliary set, and the test sets.

(g) Remove test equipment connections and replace original options in both the data set and the data auxiliary set before restoring to normal operation. Remove the strap between terminals FG1 and SG1 on the data auxiliary set before connecting the CUSTOMER A1 plug (if required to do so by the service order).

(h) Call the data test center for a final check before releasing the data set and data auxiliary set for customer service.