

DATA SET 212A-L1A/2A
TRANSMITTER-RECEIVER
TEST PROCEDURES

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1. GENERAL

1.01 This section contains test procedures using the 914-type data test set (DTS) and the

self-test capabilities of data set (DS) 212A. These procedures are to be used when testing DS 212A on an initial installation or during a maintenance visit.

1.02 This section is reissued to provide BSP coverage for DS 212A-L1A/2A. Data set 212A-L1A/2A provides all the features and options of DS 212A and has additional interface circuits, options, and simplified testing. These features are described in Sections 592-034-100 and 592-034-200.

A. Test Capabilities

1.03 Test circuitry built into DS 212A permits the following self tests to be performed.

- Analog Loopback Self Test
- Digital Loopback Self Test
- End-to-End Self Test
- Remote Digital Loopback Self Test (High-Speed Mode).

1.04 If a 914-type DTS is used, the analog loopback, digital loopback, and end-to-end tests can be done using pseudorandom data. By use of the 914-type DTS, the customer interface circuits are tested and a more precise indication of bit and block errors can be obtained. The 914-type DTS can also be used to perform a test of the data set automatic answer and interface circuits.

B. Restrictions on Use of Loopback Tests Using 914C DTS

1.05 When DS 212A-L1 is configured to operate in the high-speed mode and the transmitter option (WI) (transmitter timing—SLAVE) is installed,

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the analog loopback, digital loopback, and remote digital loopback capabilities cannot be used with external test equipment. This restriction does not apply to DS 212A-L1A. In addition, the remote digital loopback capability cannot be used in the low-speed mode.

2. INSTALLATION TESTS

2.01 This part provides the sequence in which tests are to be performed following installation of the data set. This test sequence provides a method of verifying that the installation is satisfactory. The self-test features of the data set are used for all installation testing; external equipment is not required.

2.02 Before proceeding with the tests, verify that the local loop meets requirements specified for type 2 Dataphone® lines in Section 314-205-501. Refer to Fig. 1 for the installation test sequence.

3. MAINTENANCE TESTS

3.01 This part provides the sequence in which tests are to be performed during a maintenance visit. This test sequence provides a method of isolating a trouble to the data set, the transmission facility, or the customer-provided equipment (CPE).

3.02 When a trouble report is received, the DTC is responsible for isolating the trouble to the data set or transmission facility. The procedure for doing this is shown in Fig. 2.

3.03 If it is suspected that the trouble is in the data station equipment, a telco employee must be dispatched to conduct more extensive tests. The following equipment should be taken on a trouble visit:

- Spare DS 212A-L1/2 or DS 212A-L1A/2A
- 914C DTS (for conducting error tests through the interface).

3.04 Refer to Fig. 3 or the sequence in which tests are to be performed by the telco employee at the data station. If the data set is replaced, the defective data set should be tagged with a tag describing the nature of the trouble, carefully packed and returned to a service center for repair. Verify that the replacement data set is equipped with the proper options before placing the data set in service.

3.05 If the trouble persists, proceed as follows:

- (a) Check that the options installed in the data set agree with those specified on the service order.
- (b) Verify that the CPE has been tested and is operating properly.
- (c) Check for physical damage to the data station equipment.

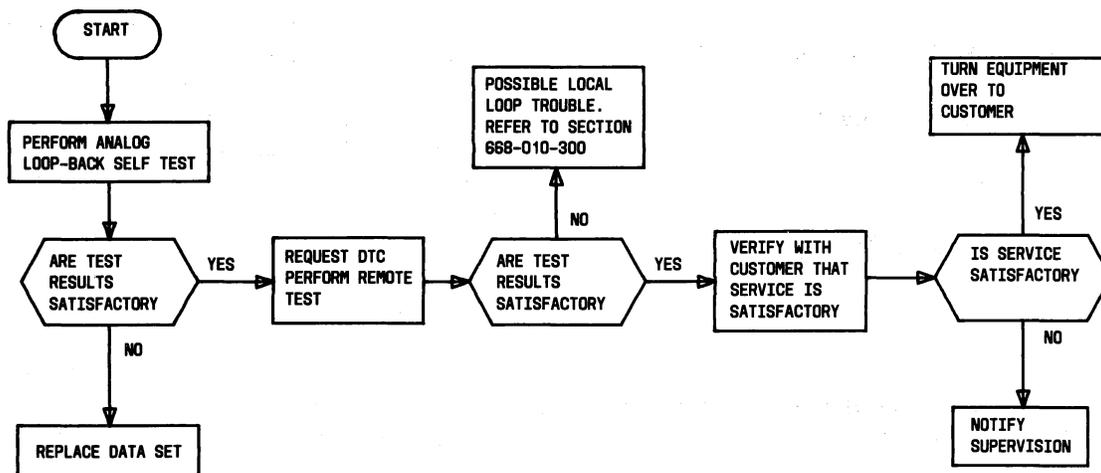


Fig. 1—Installation Test Sequence

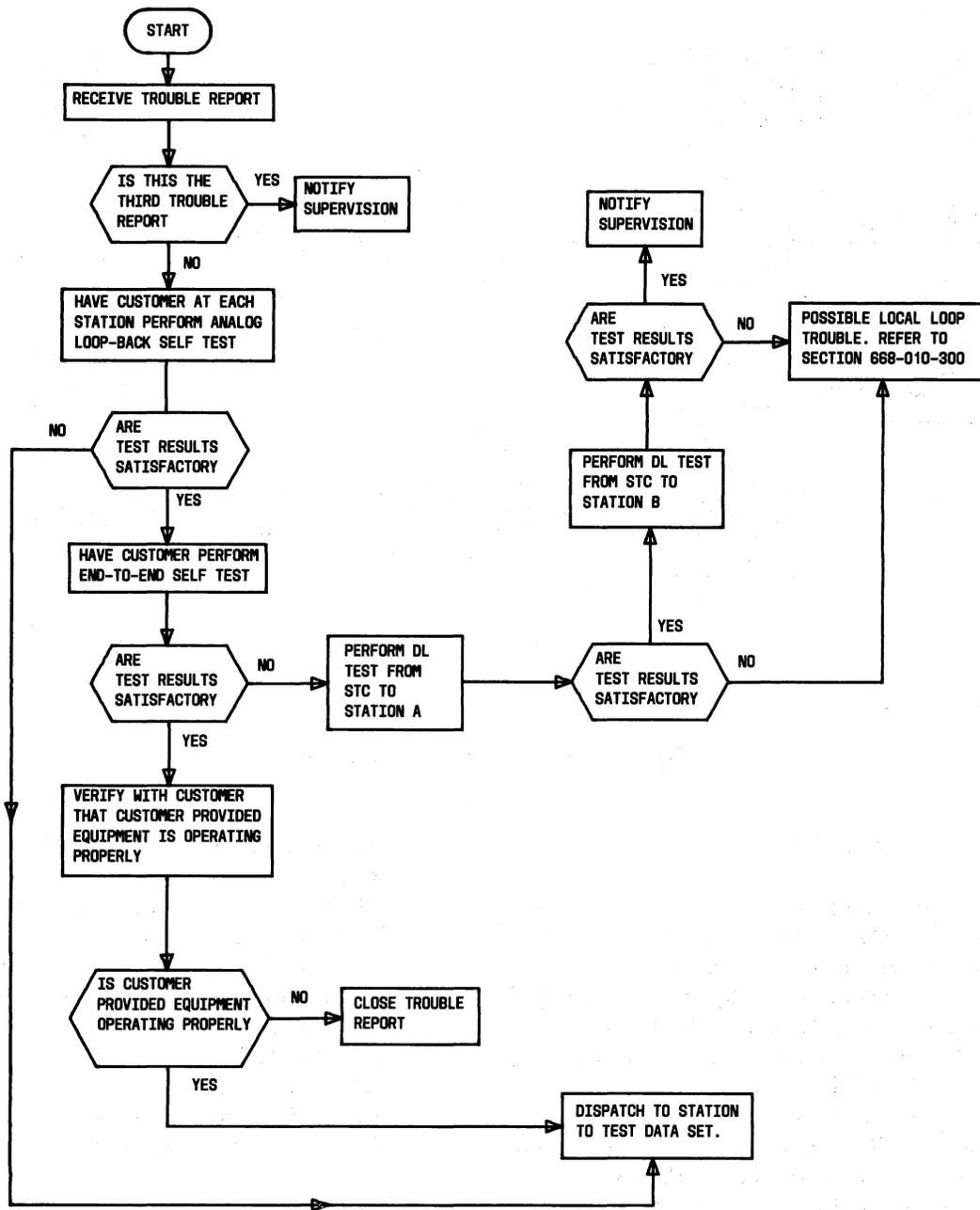


Fig. 2—Clearing Trouble Report

- (d) Verify that all cords and connectors are properly connected.
- (e) Check for intermittent trouble in the station wiring.
- (f) Verify that the data set and CPE are connected to a common ground.

- (g) If the trouble persists, request help from immediate supervisor.

4. TEST PROCEDURES

4.01 This part provides the procedures for the installation and maintenance tests.

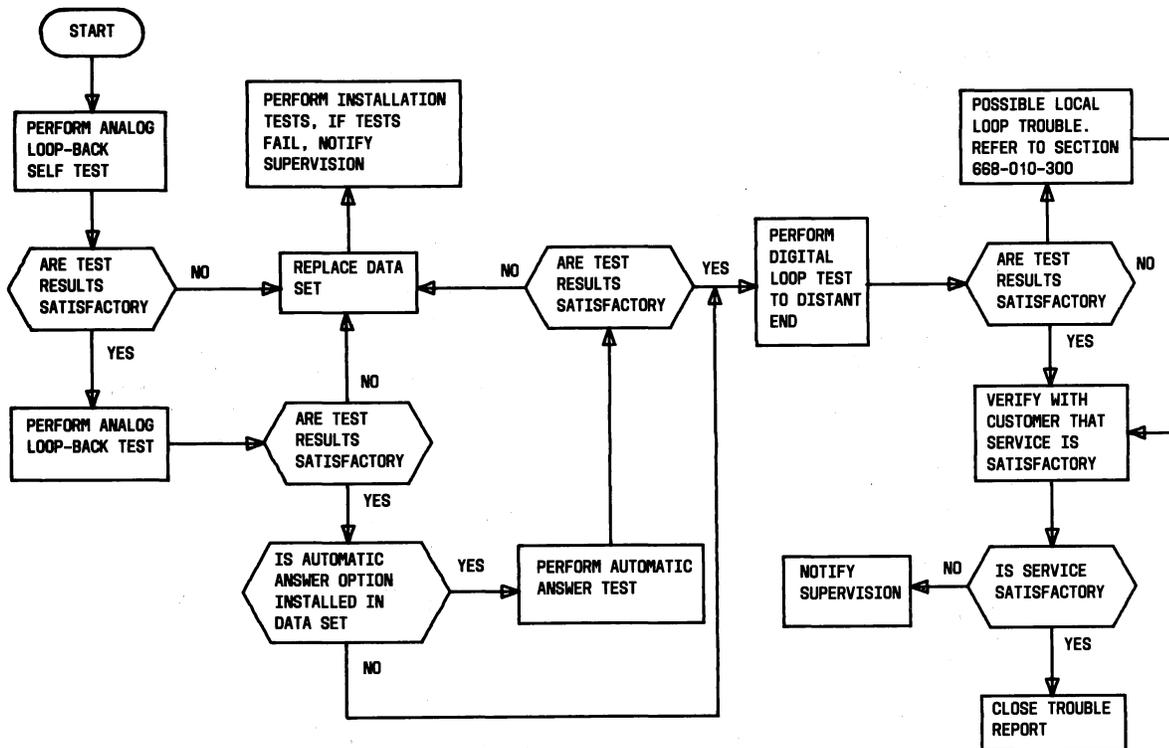


Fig. 3—Maintenance Test Sequence

A. Analog Loopback Self Test

4.02 The analog loopback self test checks the data set transmitter and receiver. The customer interface is not checked. Test data (dotting pattern) generated by the data set is looped from the transmitter output to the receiver input. The received data is compared to the transmitted data. This test can be performed in either the high-speed or low-speed mode. If the data set is operating in the low-speed mode, the MC lamp blinks if the distortion threshold (25 percent) is exceeded. If the data set is operating in the high-speed mode, the MC lamp blinks if a bit error is detected in the received data. The speed is controlled by the HS switch. Perform the test in the speed mode used by the CPE. Perform the test as follows:

- (1) Set the speed mode of the test by setting the position of the HS button (IN for high-speed mode).
- (2) Press the AL and ST switches on the data set.

Requirement: The MB, TR, and the TM indicators are lighted. The MC indicator goes off after the SD and RD indicators light. Disregard the TR indicator on DS 212A; the TR indicator is either lighted or off depending on the state of the lead from the CPE. The TR indicator is lighted anytime ST or DL is pressed on DS 212A-L1A. The MR lamp is lighted if data set is equipped with option ZF. The HS indicator is either lighted or off, depending on the speed mode of the data set.

- (3) Observe the MC indicator for 1 minute.

Requirement: MC indicator does not blink.

- (4) Release the AL and ST switches.

B. Digital Loopback Self Test

4.03 This test takes advantage of the digital loopback capability of the data set at one end and the self-test (pattern generating and comparing) capability of the data set at the other end. The test is performed by putting one data

set in the DL mode, placing the other data set in the ST mode, placing a call, and then going to the data mode. The MC indicator on the data set which is in the ST mode blinks when data distortion of a single bit exceeds 25 percent (low-speed) or if a received error occurs (high-speed).

Note: In the low-speed mode, the distant data set may be 103J or 113D.

4.04 Perform this test at the speed mode used most often by the CPE or in the speed mode which is causing difficulty. The speed mode is selected by use of the HS button. The test is performed as follows:

- (1) Place a call to the distant end. If the distant data set is already in the DL mode, it will answer automatically.
- (2) If the distant data set does not answer automatically, instruct the attendant at the distant end to press the DL switch and go to the data mode.
- (3) On the local data set, press the ST switch and go to the data mode. Observe that TR, MR, SD, and RD are lighted.
- (4) Observe the MC indicator for 2 minutes.

Requirement:

- Low-Speed—The MC indicator stays off, indicating that both data sets and the line facilities are operating properly. If the MC indicator blinks or remains lighted, the round trip distortion is exceeding 25 percent. Since the distortion in the two directions may be additive, no conclusion about the proper operability of the data sets and the line facility may be drawn.

- High-Speed—Maximum of four blinks

- (5) Release the ST switch on the local data set. Call the distant end and have the DL switch released.

C. Remote Digital Loopback Self Test

4.05 This test takes advantage of the remote digital loopback and self-test capabilities of the local data set and can be used to test both

data sets and the communication channel in the high-speed mode only. The local data set is placed in the self-test mode by pressing the ST button. **The distant data set is placed in the remote digital loopback mode by pressing the RDL switch on the local data set.** The local data set pattern generator is used to send a signal to the distant end, where it is looped back and retransmitted. The error-detecting circuitry causes the MC indicator on the local data set to blink when an error is detected in the received data.



If the distant data set is equipped with option YL (receiver responds to digital loop—OUT) or option ZG (automatic answer—OUT), this test cannot be done.

4.06 The test is performed as follows:

- (1) Press the HS, RDL, and ST switches on the local data set and verify that the TM indicator lights.
- (2) Dial a call to the distant data set.
- (3) When the distant data set has answered, place the local data set in the data mode. MR, SD, RD, and HS indicators light.
- (4) Then observe the MC indicator on the local data set for 2 minutes.

Requirement: Maximum of six blinks

Note: If the MC indicator is lighted continuously, this may indicate that the distant data set is not in DL mode.

- (5) Release the RDL and ST switches on the local data set. Return the data set to the speed mode used by the CPE.

D. End-to-End Self Test

4.07 This test can be used to check the local data set, the distant data set, and the communication channel. This test is performed by pressing the ST switch at each end, placing a call from one end to the other, and then going to the data mode. Each data set sends the test pattern to the other end. The speed mode of the test is selected at the originating station. The error-detecting

circuitry at each end monitors the received data signal and causes the MC indicator to blink if the distortion threshold (25 percent) is exceeded (low-speed) or if an error is detected (high-speed).

Note: For low-speed testing, the distant end may be a DS 103J or 113D.

4.08 The test is performed as follows:

- (1) Call the distant end and arrange to conduct an end-to-end self test. At the originating station, the speed mode is selected by use of the HS button.
- (2) Press the ST switch on the front of each data set. Verify that the TM indicator lights.
- (3) Go to the data mode at each end MR lights. Verify that the MC indicator goes off after the SD and RD indicators light. Disregard the TR indicator on DS 212A; the TR indicator is lighted or off, depending on the state of the CD lead from the CPE. The TR indicator is lighted anytime ST or DL is pressed on DS 212A-L1A. The HS indicator is lighted or off, depending on the speed mode of the test.
- (4) Observe the MC lamp on the front of the data set for 2 minutes.

Requirement:

- Low-Speed—The MC indicator stays off, indicating that both data sets and the line facilities are operating properly. If the MC indicator blinks or remains lighted, the distortion is exceeding 25 percent.
 - High-Speed—Maximum of two blinks
- (5) At the end of the test, go to the talk mode and then release the ST switch.

E. Analog Loopback Test With 914C DTS

4.09 This test checks the data set interface and transmitter and receiver circuits. Test data is generated by a data test set (DTS) and looped back from the data set transmitter output to the receiver input. The received data is compared to the original data by the DTS and errors are indicated on the DTS counter.

4.10 Perform this test in the speed mode used most often by the CPE or in the speed mode which is causing difficulty.

Low-Speed

4.11 Perform the test as follows:

- (1) Connect and condition the test equipment as shown in Fig. 4.
- (2) Apply power to the data set and then to the test equipment.
- (3) Verify that the data set is in the low-speed mode (HS button out) if option XK is installed. Speed selection is automatic when option XJ is installed.
- (4) Press the AL button on the data set. Verify that the data set TM indicator lights. On the DTS, verify that DS3 (CF) and then DS1 (CB) light and the NO DATA lamp goes off.
- (5) On the 914C DTS, set the FUNCTION switch to PHASE ADJ.
- (6) Adjust the PHASE control to zero the meter.
- (7) Move the FUNCTION switch to OFF.
- (8) Operate the WORD SYNC switch to MAN and release when the counter stops.
- (9) Reset the counter on the 914C DTS.
- (10) Conduct the test for 1 minute.

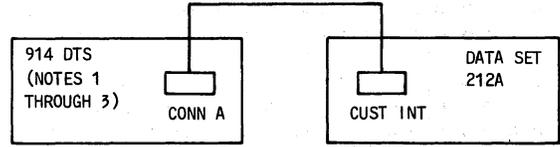
Requirement: No errors

- (11) Upon completing the test, disconnect test equipment and restore data set to pretest condition.

High-Speed

- (1) Connect and condition the test equipment as shown in Fig. 5.
- (2) Install options YH (1200 bps operation—SYNC) and YC (internal transmitter timing).
- (3) Apply power to the data set and then to the DTS.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	
GRD	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	GRD
SD	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SD
RD	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	RD
SI	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SI
DS1	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS1
DS2	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS2
S2	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S2
DS3	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS3
TP1	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	TP1
TP2	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	TP2
S3	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S3
DS4	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS4
DS5	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS5
S4	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S4
SCT	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SCT
S5	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S5
SCR	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SCR
DS6	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS6
S6	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S6
DS7	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS7
DS8	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS8
S7	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S7
TP3	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	TP3
S8	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S8



NOTES:

1. SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE SELECTOR	ALL DEPRESSED
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER
COUNTER	BIT ERRORS
FUNCTION	OFF
SAMPLE WIDTH	.5US
RCV BIT RATE	300
TRANSMIT BIT RATE	300
RCV WORD LENGTH	63
TRANSMIT WORD LENGTH	63
SIG LEV	±4V
S1	OFF
S6	ON
S7	OFF

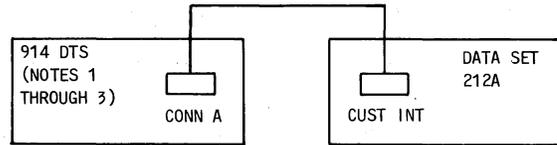
2. INSERT RED PROGRAMMING PINS IN 914 DTS MATRIX IN POSITIONS INDICATED ABOVE
 3. 914 DTS SWITCHES AND INDICATORS CORRESPOND TO THE FOLLOWING INTERFACE LEADS

SWTICH	INDICATOR	FUNCTION
S1 S6 S7	DS1	CLEAR TO SEND (CB)
	DS2	DATA SET READY (CC)
	DS3	RCVD LINE SIGNAL DETECTOR (CF)
		MAKE BUSY/ANALOG LOOP (CN)
		DATA TERMINAL READY (CD)
		SPEED SELECT ORIGINATE

Fig. 4—Analog Loopback, Digital Loopback and End-to-End Test Setup—Low-Speed

SECTION 592-034-500

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	
GRD	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	GRD
SD	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SD
RD	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	RD
SI	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SI
DS1	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS1
DS2	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS2
S2	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S2
DS3	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS3
TP1	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	TP1
TP2	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	TP2
S3	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S3
DS4	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS4
DS5	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS5
S4	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S4
SCT	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SCT
S5	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S5
SCR	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	SCR
DS6	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS6
S6	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S6
DS7	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS7
DS8	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	DS8
S7	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S7
TP3	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	TP3
S8	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	S8



NOTES:

1. SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE SELECTOR	ALL DEPRESSED
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER
COUNTER	BIT ERRORS
FUNCTION	OFF
SAMPLE WIDTH	.5US
RCV BIT RATE	EXT +
TRANSMIT BIT RATE	EXT +
RCV WORD LENGTH	63
TRANSMIT WORD LENGTH	63
SIG LEV	+4V
S1	OFF
S4	OFF
S6	ON
S7	ON

2. INSERT RED PROGRAMMING PINS IN 914 DTS MATRIX IN POSITIONS INDICATED ABOVE
3. 914 DTS SWITCHES AND INDICATORS CORRESPOND TO THE FOLLOWING INTERFACE LEADS

SWITCH	INDICATOR	FUNCTION
	DS1	CLEAR TO SEND (CB)
	DS2	DATA SET READY (CC)
	DS3	RCVD LINE SIGNAL DETECTOR (CF)
S1		MAKE BUSY/ANALOG LOOP (CN)
S4		REMOTE DIGITAL LOOPBACK
S6		DATA TERMINAL READY (CD)
S7		SPEED SELECT ORIGINATE

Fig. 5—Analog Loopback, Digital Loopback and End-to-End Test Setup—High-Speed

- (4) Press the AL and HS buttons on the data set if option XK is installed. Speed selection is automatic when option XJ is installed. Verify that the data set TM indicator lights. On the DTS, verify that the DS3 (CF) and then the DS1 (CB) indicators light and that the NO DATA indicator goes off.
- (5) Operate the WORD SYNC switch to MAN and release when the counter stops.
- (6) Reset the counter on the DTS.
- (7) Conduct the test for 1 minute.

Requirement: No errors

- (8) Upon completing the test, disconnect test equipment and restore the data set to pretest condition. If option YH was installed in (2), restore original option at this time.

F. Digital Loopback Test With 914C DTS

4.12 This test checks the transmitter and receiver of both data sets and the connecting facility. The distant data set can be a 103J or 113D. The customer interface at the distant data set is not checked. Test data is generated by the DTS and transmitted by the local data set. This data is looped back from the receiver output to the transmitter input of the distant data set and retransmitted. The data is received by the local data set and is compared to the original data. Data errors are indicated on the counter of the DTS.



For DS 212A-L1 this test cannot be done in the high-speed mode if option WI (transmitter timing—SLAVE) is installed in the local data set. This restriction does not apply to DS 212A-L1A—option WI is overridden.

- 4.13** Perform this test at the speed mode used most often by the CPE or in the speed mode which is causing difficulty.
- 4.14** The DS 212A type has the capability to force the distant data set into a digital loopback mode. The test can only be used when the data set is in the high-speed mode. The remotely activated digital loopback takes place at the distant data set only if options YK (receiver responds to digital loop—IN) and ZH (automatic answer—IN)

are installed at that end and the CD (data terminal ready) lead is *on*.

4.15 Perform the test as follows:

Low-Speed

- (1) Connect and condition the test equipment as shown in Fig. 4.
- (2) Verify that the data set is in the low-speed mode (HS button out).
- (3) Apply power to the data set and then to the DTS.
- (4) Request the attendant at the distant end to press the DL switch on the data set.
- (5) Dial the distant data set and go to the data mode at the local data set. On the 914C DTS, verify that DS2 lights, then DS3, and then DS1. Verify that the NO DATA lamp goes off.
- (6) On the DTS, set the FUNCTION switch to PHASE ADJ.
- (7) Adjust the PHASE control to zero the meter.
- (8) Move the FUNCTION switch to OFF.
- (9) Operate the WORD SYNC switch to MAN and release when the counter stops.
- (10) Reset the counter on the 914C DTS.
- (11) Conduct the test for 5 minutes.

Requirement: One error or less

- (12) Upon completing the test, disconnect test equipment and restore data set to pretest condition.

High-Speed

- (1) Connect and condition the test equipment as shown on Fig. 5.
- (2) Install option YH (1200-bps operation—SYNC).
- (3) Apply power to the data set and to the DTS.

- (4) Press the HS button on the data set if option XK is installed. Speed selection is automatic when option XJ is installed.
- (5) If the remote digital loop feature is being used (refer to paragraph 4.14), and option XM is installed, press RDL button on the front of the data set. If option XL is installed operate S4 on DTS to on. If the remote digital loop feature is not being used, request the attendant at the distant end to press the DL button on the data set.
- (6) Dial the distant data set and go to the data mode at the local data set. On the 914C DTS, verify that DS2 lights, then DS3, then DS1. Verify that the NO DATA lamp goes off.
- (7) On the DTS, operate the WORD SYNC switch to MAN and release when the counter stops.
- (8) Reset the counter on the DTS.
- (9) Conduct the test for 5 minutes.

Requirement: Ten errors or less

- (10) Upon completing the test, disconnect test equipment and restore data set to pre-test condition. If option YH was added in (2), restore original option at this time.

G. End-to-End Test Using 914C DTS

4.16 The end-to-end test checks the transmitter and receiver of both data sets and the connecting facility. The customer interface at both data sets is also checked. Identical test data is generated by DTSs at both data sets. This data is transmitted by one of the data sets and compared to the data generated by the DTS at the receiving data set. Data errors are indicated on the DTS counter.

4.17 Perform this test at the speed mode used most often by the CPE. If the CPE is arranged to operate dual mode, perform the test in the speed mode which is causing difficulty.

4.18 Perform the test as follows:

Low-Speed

- (1) At both stations, connect and condition the test equipment as shown in Fig. 4.
- (2) Apply power to the data set and then to the DTS.
- (3) Establish voice communication between data stations and arrange to conduct an end-to-end test.
- (4) Go to the data mode at both ends. On the 914C DTS, verify that DS2 lights, then DS3, then DS1.



Verify that the NO DATA indicator on the 914C DTS is off. This indicates that a valid connection has been established. If the NO DATA lamp lights during the test, the test must be restarted.

- (5) Move FUNCTION switch to PHASE ADJ.
- (6) Adjust the PHASE CONTROL to zero the meter.
- (7) Move the FUNCTION switch to OFF.
- (8) Operate the WORD SYNC switch to MAN and release when the counter stops.
- (9) Reset the counter on the 914C DTS.
- (10) Conduct a 15-minute test.

Requirement: 5 errors or less

- (11) Upon completing the test, disconnect test equipment and restore data set to pretest condition.

High-Speed

- (1) At both data stations, connect and condition the test equipment as shown in Fig. 5.
- (2) Install option YH (1200 bps operation—SYNC) at both ends.

- (3) Apply power to the data set and then to the DTS.
- (4) Press the HS button at the originating end if option XK is installed. Speed selection is automatic when option XJ is installed.
- (5) Establish voice communication between data stations and arrange to conduct an end-to-end test.
- (6) Go to the data mode at both ends. On the 914C DTS, verify that DS2 lights, then DS3, then DS1.



Verify that the NO DATA indicator on the DTS is off. This indicates that a valid connection has been established. If the NO DATA indicator lights during the test, the test must be restarted.

- (7) Operate the WORD SYNC switch to MAN and release when the counter stops.
- (8) Reset the counter on the DTS.
- (9) Conduct the test for 15 minutes.

Requirement: 18 errors or less

- (10) Upon completing the test, disconnect test equipment and restore data set to pre-test condition. If option YH was added in (2), restore the original option at this time.

H. Automatic Answer Test

4.19 This test checks the ability of the data set to answer a call, go to the data mode, and terminate the call. The data set under test must be equipped with option ZH (automatic answer—IN). The test is performed as follows:

- (1) Connect and condition the test equipment as shown in Fig. 6 **except turn off S2.**
- (2) Apply power to the data set and then to the DTS.
- (3) Place a call to the data set under test.

Requirement: DS5 lights (ring indicator **on**) during ringing period. DS5 goes off (ring

indicator **off**) during silent period. Data set does **not** answer call.

- (4) During a silent period of the ring cycle, set S2 to ON (data terminal ready **on**).

Requirement: At the end of the next ringing cycle, the data set answers the call and DS2 lights (data set ready is **on**). This indicates that the data set is in the data mode. DS5 (ring indicator) may remain lighted if data set is equipped with option X (answer mode indication CE—ON).

- (5) In less than 15 seconds after DS2 lights, move S2 to OFF (data terminal ready **off**).

Requirement: DS2 goes off (data set ready is **off**). This indicates that the data set has terminated the call.

- (6) Upon completing the test, disconnect test equipment and restore data set to pretest condition.

I. Interface Tests

4.20 This test checks the ability of the data set to respond to interface control and to provide indications through the interface. The signals which the data set will respond to and the indications given depend on the options installed. In this test, the DS 212A interface is checked using a 914C DTS. Some of these tests require assistance from the data test center (DTC).

4.21 Test of CN Circuit: This test checks the ability of the local data set to go into the analog loopback mode under control of the CN interface lead. The data set must be equipped with option YE (CN circuit—IN). Perform the test as follows:

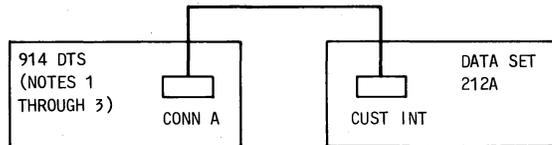


For DS 212A-L1 or DS 212A-L1A with options XO or XN installed, insert red programming pins in both S1-18 and S1-25. For DS 212A-L1A with option XR installed, remove pin from S1-25 and insert pin in DS 4-25.

- (1) Connect and condition the test equipment as shown in Fig. 6 **except S2 must be off.**

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	
GRD	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	GRD
SD	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SD
RD	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	RD
S1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S1
DS1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS1
DS2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS2
S2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S2
DS3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS3
TP1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TP1
TP2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TP2
S3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S3
DS4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS4
DS5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS5
S4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S4
SCT	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SCT
S5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S5
SCR	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SCR
DS6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS6
S6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S6
DS7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS7
DS8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS8
S7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S7
TP3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TP3
S8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S8



NOTES:

1. SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE SELECTOR	ALL DEPRESSED
FUNCTION	OFF
INTERFACE MODE	VOLTAGE
RCV BIT RATE	300
TRANSMIT BIT RATE	300
S1	OFF
S2	ON

2. INSERT RED PROGRAMMING PINS IN 914 DTS MATRIX IN POSITIONS INDICATED

3. 914 DTS SWITCHES AND INDICATORS CORRESPOND TO THE FOLLOWING INTERFACE LEADS

SWITCH	INDICATOR	FUNCTION
	DS1	CLEAR TO SEND (CB)
	DS2	DATA SET READY (CC)
	DS3	RCVD LINE SIG DETECTOR (CF)
	DS4	SPEED INDICATION (CI)
	DS5	RING INDICATOR (RI)
S1		MAKE BUSY/ANALOG LOOP (CN)
S2		DATA TERMINAL READY (CD)

Fig. 6—Interface Tests

(2) Apply power to the data set and then to the DTS.

(3) Set switch S1 to ON. This turns **on** the CN interface lead.

Requirement: Data set MB indicator lights. If the data set is equipped with option ZF (CC indication for analog loop—ON), the MR indicator on the data set and the DS2 indicator on the DTS are lighted.

(4) To verify that the data set is in the analog loopback mode and to verify proper operation of the send data and receive data interface leads, move switch S2 (CD) to ON.

Requirement: On 914C DTS, DS3 lights, then DS1 lights and DS6 (BB) shows received data.

(5) Move S2 to OFF.

Requirement: DS1, DS3, and DS6 (BB) indicators go off.

4.22 Test of Receive Space Disconnect

Feature: This test checks the ability of the data set to disconnect (go on-hook) upon receiving a space signal from the distant data set. The data set must be equipped with option V (receive space disconnect—IN). The test is performed as follows:

- (1) Connect and condition the test equipment as shown in Fig. 6.
- (2) Apply power to the data set and then to the DTS.
- (3) Have the DTC go to the low-speed mode and place a call to the local data set.
- (4) If option ZG (automatic answer—OUT) is installed, answer the call, go to the data mode, and place the handset on-hook. Verify that DS2 goes on, followed by DS3 and DS1.
- (5) The DTC sends at least 4 seconds of spacing.

Requirement: DS1, DS2, and DS3 indicators go off (data set drops the call).

4.23 Test of CB and CF Indications Option:

When option A (CB and CF indications—COMMON) is selected, the clear-to-send (CB) interface circuit is forced **off** whenever the received line signal detector (CF) interface circuit goes **off**. This test checks proper operation of this feature. Perform the test as follows:

- (1) Connect and condition the test equipment as shown on Fig. 6.
- (2) Ensure that option R (loss of carrier disconnect—OUT) is installed in the data set.

(3) Apply power to the data set and then to the DTS.

(4) Have the DTC go to the low-speed mode and place a call to the local data set.

(5) If option ZG (automatic answer—OUT) is installed, answer the call, go to the data mode, and place the handset on-hook. Verify that DS2 goes on, followed by DS3 and DS1.

(6) Have the DTC go from the data mode to the talk mode without dropping the call (or go from TEST to TALK on 904 DTC).

Requirement: DS1 (CB) and DS3 (CF) go off **at the same time**. Disregard other indicators.

4.26 Test of Speed Mode Option: When the data set is equipped with option YO (speed mode—HIGH), the data set will not pass data through the interface when in the low-speed mode. This test checks that low-speed data is blocked at the interface.

- (1) Connect and condition the test equipment as shown in Fig. 6.
- (2) Press the AL and HS switches on the data set.

Requirement: DS1 and DS3 are lighted. DS6 flickers.

(3) Place the data set in the low-speed mode by releasing the HS button.

Requirement: DS1 (CB), DS3 (CF), and DS6 (BB) go off.

J. Ground Noise Test

4.27 If the data set and CPE are not connected to the same ground, errors may be caused by a potential difference between data set ground and CPE ground. To detect the presence of noise potentials, a test should be made using the 6-type impulse counter. This counter is used to count the number of impulse noise peaks during a measured time period. The counter registers only the peaks which exceed a preset level and which are separated by approximately 150 ms or more.

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4.28 Test equipment required for this test is as follows:

- 1—6H impulse counter (or equivalent)
- 1—914-type DTS
- 1—2W6A test cord for 6H impulse counter (310 plug on one end, alligator clips connected to tip and ring on the other end).

Note: For information pertaining to the 6H impulse counter, refer to the section entitled 6H and 6HR Impulse Counters (J94006H and J94006HR)—Description, Operation, and Maintenance (103-620-101). If the 6H impulse counter is not available, a 6A impulse counter may be used. For information pertaining to the 6A impulse counter, refer to the section entitled J94006A (6A) Impulse Counter—Description Operation, and Maintenance (103-620-100).

4.29 In this test, the impulse counter is connected between the grounds of the data set and the CPE. The counter registers when potential differences of sufficient amplitude have developed between the separated grounds. The 914-type DTS is used to gain access to the ground interface leads. If a 914-type DTS is not available, any suitable method of access (such as 901 test adapter) may be used.

4.30 The 6H impulse counter is connected and the test is performed as follows.

- (1) Connect the 914-type DTS connector A to the customer connector on the data set. Connect the 914-type DTS connector B to the data set connector on the CPE. This test assumes that protective ground from the CPE appears at the customer interface.
- (2) On the 914-type DTS, remove all programming pins from the matrix. Pull up all A and B interface selector switches.
- (3) Connect one clip to the 2W6A cord to switch 1B and the other clip to any clear, bare metal on the data set housing. Verify that power is applied to data set and CPE.
- (4) Insert the 310 plug into the 310 MEAS jack on the 6H impulse counter.
- (5) On the 6H impulse counter, set the DIAL-MEAS switch to MEAS and set the DBRN dial to 90.
- (6) Reset the counter on the 6H impulse counter to 0.
- (7) Set the minutes control to 15. After the 15-minute test has elapsed, record the number of indications on the counter.
- (8) Remove clips of 2W6A cord and connect to 7A and 7B.
- (9) Reset the counter on the 6H impulse counter to 0.
- (10) Set the minutes control to 15. After the 15-minute test has elapsed, record the number of indications on the counter.

4.31 At the end of both of the 15-minute periods, there should be no indications on the counter of the 6H impulse counter. If there is an indication on the counter, the grounds must be bonded together according to local instructions. At the end of the test, disconnect the test equipment and restore the data set to pretest condition.