DATA SET 201C

TRANSMITTER-RECEIVER

TEST PROCEDURES USING 914-TYPE DATA TEST SET

CONTENTS PAGE

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) 201C. These procedures are to be used when testing DS 201C on an initial installation or during a maintenance visit. The procedures to be used when investigating a trouble report are contained in Section 592-029-300.

1.02 This section is reissued to provide test procedures that conform to current equipment and requirements. Since this reissue is a general revision, arrows normally used to indicate changes have been omitted.

1.03 This section is divided into six parts. Part 1, General, describes the test modes and the restrictions on their use. Part 2, Installation Tests, specifies the tests to be performed on an initial installation. Part 3, Maintenance Tests, specifies the tests to be performed during a maintenance visit. Part 4, Supplementary Tests, specifies special purpose tests that ordinarily are not required during installation and maintenance. Part 5, Test Procedures, provides the procedures for all installation, maintenance, and supplementary tests. Part 6, References, lists publications that provide additional test information.

Test Capabilities

1.04 Test circuitry built into DS 201C permits the following self tests to be performed: analog loop-back, digital loop-back, and end-to-end. The test circuitry also facilitates the remote test of the data set from a test center. The analog loop-back, digital loop-back, and end-to-end tests can also be performed by use of external test equipment such as the 914-type DTS. The automatic answer and ground noise tests require the use of external test equipment.

Restrictions on Use of Self Tests

1.05 If DS 201C is used as a remote extension of a DS 209A-L1 multiplex system or as a subrate off-net extension of the digital data system (DDS), the following restrictions apply to the use of the self tests:

(a) The analog loop-back self test cannot be performed at a remote extension with options as installed. If the M23B cord is temporarily removed at the remote extension, this test can be performed.

(b) The digital loop-back self test cannot be performed from a remote extension (with options as installed) in toward DS 201C collocated with DS 209A-L1. If the M23B cord is temporarily removed at the remote extension, this test can be performed.

(c) The digital loop-back self test cannot be performed from a remote extension (with options as installed) in toward a hub office of the DDS. If the internal timing option is temporarily installed at the remote extension, this test can be performed.

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 test equipment is not required.

Switched Network

2.02 Before proceeding with the tests, verify that the local loop and the end-to-end facilities meet the requirements specified in Section 314-205-501. For a 2-wire switched network, the installation test sequence is shown in Fig. 1.

Private Line

2.03 Before proceeding with the tests, verify that the private line meets the requirements specified in Section 314-410-500. For a 2-wire private line, the installation test sequence is shown in Fig. 2. For a 4-wire private line, the installation test sequence is shown in Fig. 3.

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). It is assumed that the maintenance procedures in Section 592-029-300 have been followed prior to dispatching a telephone company (telco) employee to the data station.

Switched Network

3.02 For a 2-wire switched network, the maintenance test sequence is shown in Fig. 4.

Private Line

3.03 For a 2-wire private line, the maintenance test sequence is shown in Fig. 5. For a 4-wire private line, the maintenance test sequence is shown in Fig. 6.

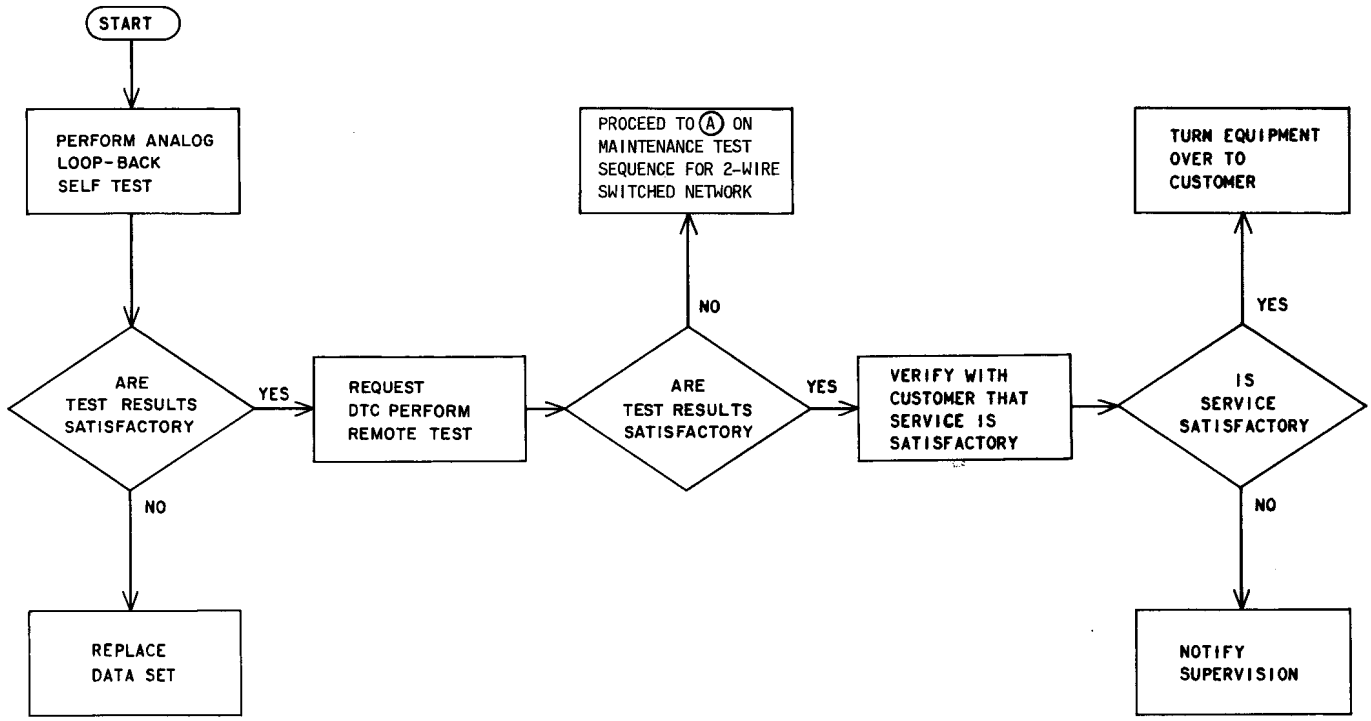


Fig. 1—Installation Test Sequence (2-Wire Switched Network)

4. SUPPLEMENTARY TESTS

4.01 The ground noise test ordinarily is not required during installation and maintenance visits but should be performed when needed. This test is performed to detect the presence of noise potentials caused by a potential difference between data set and CPE grounds.

5. TEST PROCEDURES

5.01 This part provides the procedures for the installation, maintenance, and supplementary tests.

A. Analog Loop-Back Self Test

5.02 The analog loop-back self test checks the data set transmitter and receiver. The customer interface is not checked. Test data generated by the data set is looped back from the transmitter output to the receiver input through an internal attenuator. The received data is compared to the original data. Data errors and data set condition are indicated by the status of the data set indicator lamps.

5.03 Perform the test as follows:

Note: Refer to Table A for data set switch positions and lamp status.

(1) Ensure that data set is not transmitting or receiving data.

(2) Depress AL and ST switches on data set.

(3) Observe lamps on data set for at least 30 seconds.

Requirements: MC lamp is off continuously (does not blink). All other lamps are lighted.

(4) Depress RO switch on data set.

Requirements: RS and CS lamps go off. MC lamp lights. If data set is optioned for switched carrier (option XA, XD, or XE), CO lamp goes off. If data set is optioned for continuous carrier (option XB or XC), CO lamp remains lighted.

(5) Release RO switch on data set.

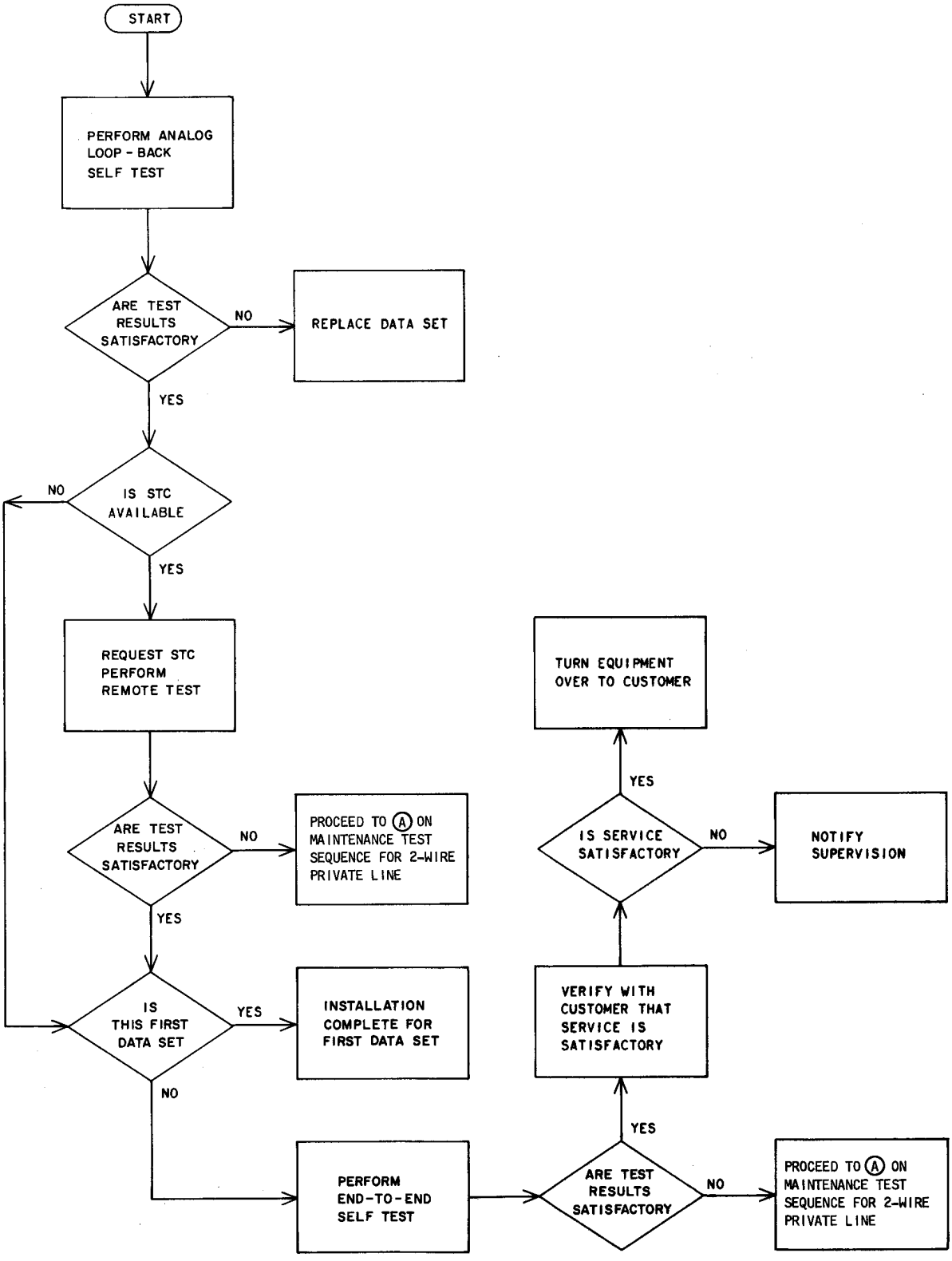


Fig. 2—Installation Test Sequence (2-Wire Private Line)

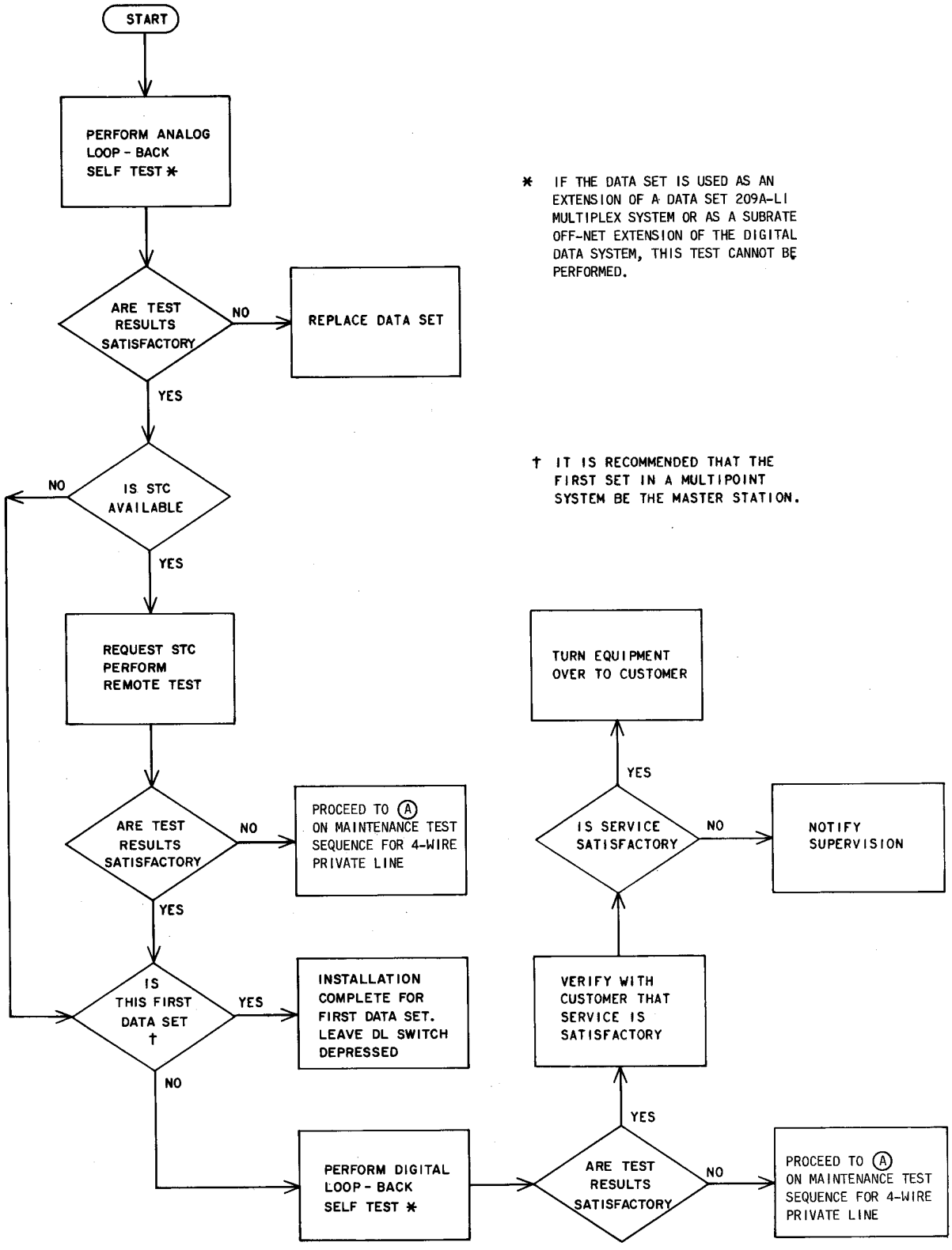


Fig. 3—Installation Test Sequence (4-Wire Private Line)

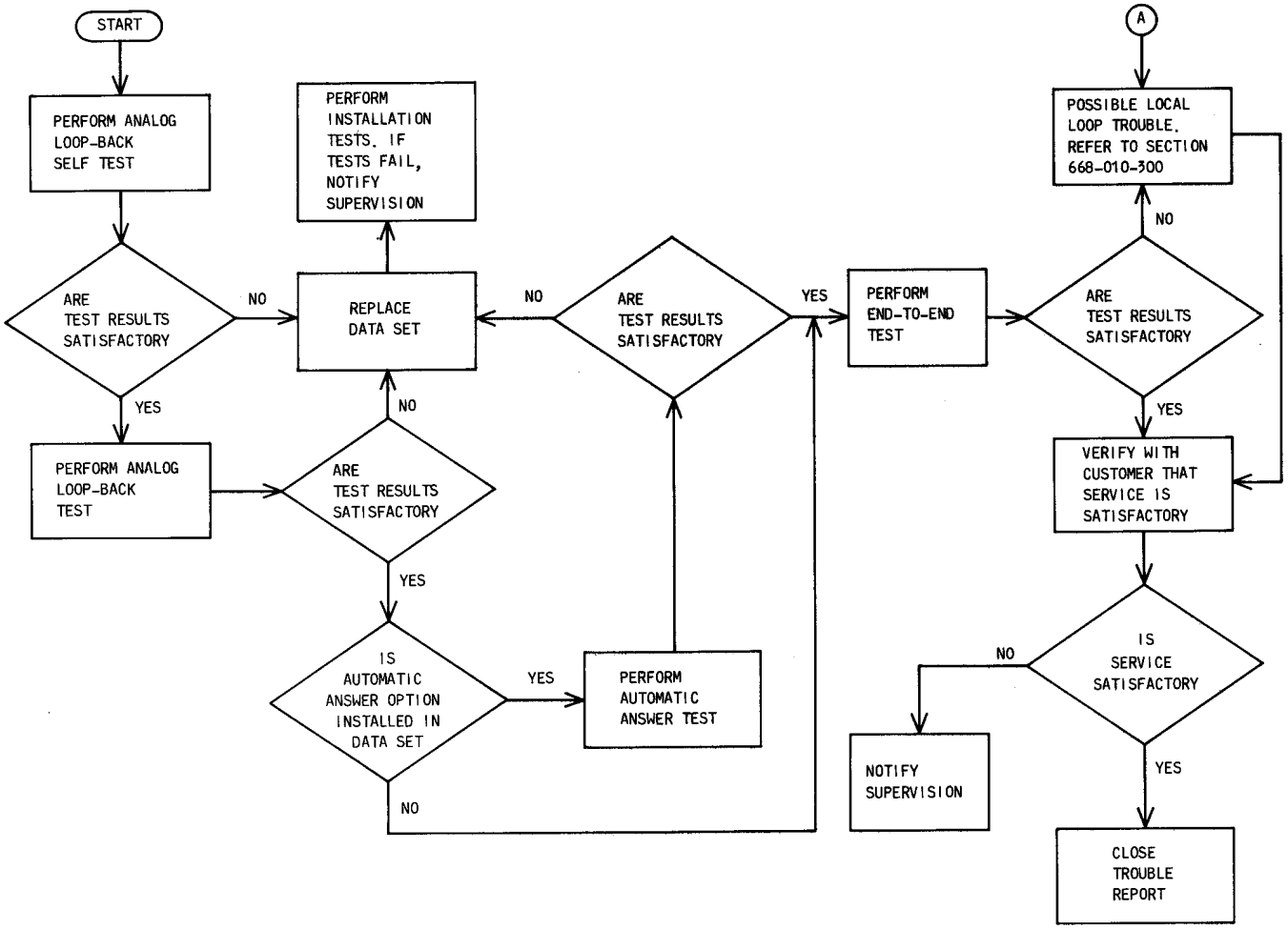


Fig. 4—Maintenance Test Sequence (2-Wire Switched Network)

Requirement: All lamps are lighted except MC.

(6) Release ST and AL switches on data set.

Requirement: TM lamp goes off.

B. Digital Loop-Back Self Test (4-Wire Private Line)

5.04 The digital loop-back self test checks the transmitter and receiver of both data sets and the facilities connecting the data sets. The customer interfaces are not checked. Test data generated and transmitted by the near-end data set is looped back from the receiver output to the transmitter input of the far-end data set and retransmitted. This data is received by the near-end data set and compared to the original data. Data errors and data set condition are indicated by the status of the indicator lamps on the near-end data set.

5.05 Perform the test as follows:

Note: Refer to Table A for data set switch positions and lamp status.

(1) Ensure that data set is not transmitting or receiving data.

(2) Depress ST switch on data set.

Requirement: TM lamp lights.

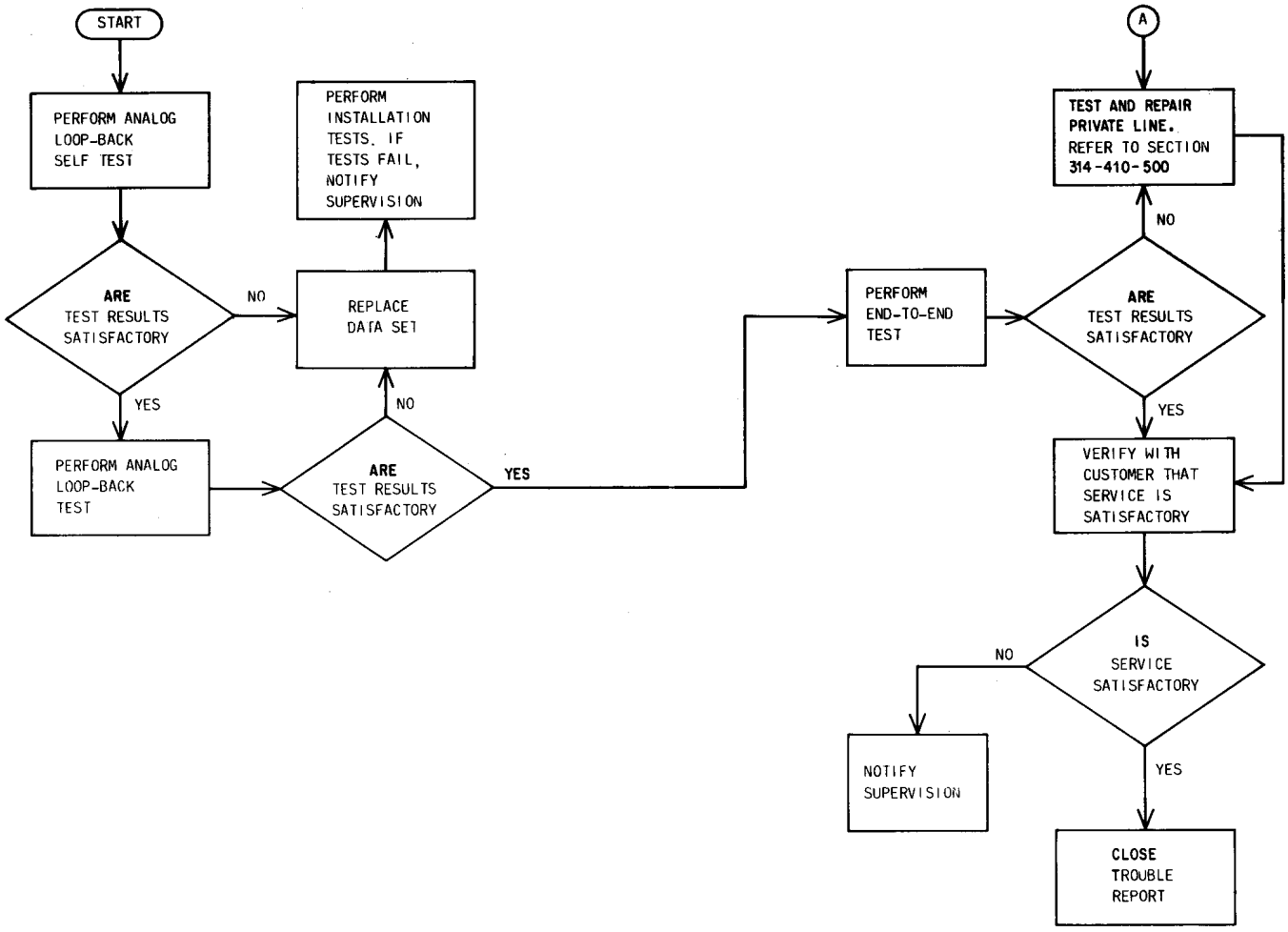


Fig. 5—Maintenance Test Sequence (2-Wire Private Line)

(3) Contact far-end data station and have DL switch on data set depressed. Verify that TM lamp is lighted.

Requirement: On near-end data set, all lamps are lighted except MC.

(4) Observe MC lamp for ten 1-minute periods.

Requirement: MC lamp does not blink more than an average of two blinks per 1-minute period.

(5) Contact far-end data station and have DL switch on data set released. Verify that TM lamp is off.

(6) Release ST switch on data set.

Requirement: TM lamp goes off.

C. End-to-End Self Test

5.06 The end-to-end self test checks the transmitter and receiver of both data sets and the facilities connecting the data sets. The customer interfaces are not checked. Identical test data is generated by both data sets, transmitted by one of the data sets, and compared to the data generated by the receiving data set. Data errors and data set condition are indicated by the status of the indicator lamps on the data sets.

2-Wire Switched Network

5.07 For the 2-wire switched network, a complete end-to-end self test involves making one

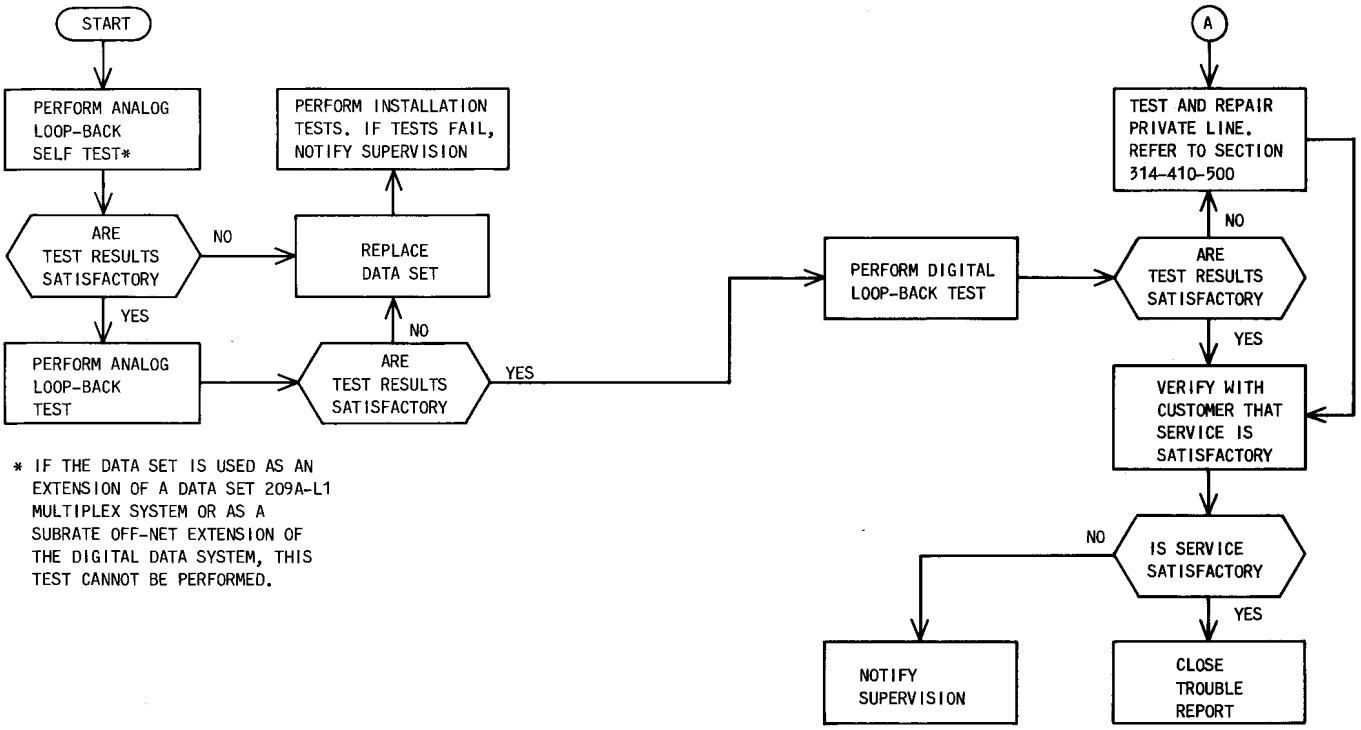


Fig. 6—Maintenance Test Sequence (4-Wire Private Line)

6-minute test run. Both data sets alternately transmit and receive blocks of data for about 2 seconds. Perform the test as follows:

(1) Establish voice communication between the data stations and arrange to conduct an end-to-end self test.

(2) Ensure that both data sets are not transmitting or receiving data.

(3) On near-end data set, depress ST switch.

Requirement: TM lamp lights.

(4) On far-end data set, depress RT switch.

Requirement: TM lamp lights.

(5) At both data stations, end voice communication.

(6) At near-end data station, make a call to far-end data station. Far-end data set automatically answers and transmits a 2025-Hz answer tone for about 2 seconds, immediately followed by a block of data for about 2 seconds (see note). After answer tone and the 2-second block of data (if present) are heard at near-end data set, depress DATA button on associated telephone set.

Requirements: On telephone set, DATA lamp is lighted. On data set, all lamps are lighted, except CO.

Note: Data sets equipped with CP JB2 digital board, series 6 or higher, do not send the 2-second block of data.

TABLE A

DS 201C SWITCH POSITIONS AND LAMP STATUS

SWITCH OR LAMP	NORMAL OPERATION	ANALOG LOOP-BACK		END-TO-END SELF TEST				DIGITAL LOOP-BACK SELF TEST		REMOTE TEST (2-WIRE SWITCHED NETWORK ONLY)
				2-WIRE		4-WIRE				
		SELF TEST	EXTERNAL TEST	XMT END	RCV END	NEAR END	FAR END	NEAR END	FAR END	
RO* Switch					X					
AL* Switch		X	X							
ST* Switch		X		X	X	X	X	X		
RT* Switch										X
DL* Switch									X	
ON Lamp	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted
TR Lamp	Note 1	Lighted	Note 1	Lighted	Lighted	Lighted	Lighted	Lighted	Note 1	Lighted
MR Lamp	Note 2	Lighted	Off	Lighted	Lighted	Lighted	Lighted	Lighted	Off	Off
RS Lamp	Note 3	Lighted	Note 3	Lighted	Off	Lighted	Lighted	Lighted	Lighted	Note 4
CS Lamp	Note 3	Lighted	Note 3	Lighted	Off	Lighted	Lighted	Lighted	Lighted	Note 4
CO Lamp	Note 5	Lighted	Note 5	Off	Lighted	Lighted	Lighted	Lighted	Lighted	Note 5
MC Lamp	Note 6	Note 7	Note 6	Lighted	Note 7	Note 7	Note 7	Note 7	Off	Note 8
TM Lamp	Off	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted

Note 1: Under control of customer interface.

Note 2: Monitors state of data set ready lead.

Note 3: Lighted when data is being transmitted.

Note 4: Lighted for about 2 seconds after CO lamp goes off.

Note 5: Lighted when line signal is being received.

Note 6: Lighted when CO lamp is off, off when CO lamp is lighted.

Note 7: Off except when errors occur.

Note 8: Lighted when RS lamp is lighted, off except for errors when CO lamp is lighted.

* X = Switch depressed, Blank = Switch not depressed.

(7) On near-end data set, depress RT switch.

Requirements: RS, CS, CO, and MC lamps change state about every 2 seconds and follow turnaround sequence indicated below. All other lamps remain lighted continuously.

LAMP INDICATION	DURATION	MEANING
RS, CS, MC — lighted CO — off	About 2 seconds	Block is being transmitted
RS, CS, MC — off CO — lighted	About 2 seconds	Block is being received

(8) If an error occurs in either direction, MC lamp remains lighted continuously or turnaround sequence stops.

(9) To clear error condition, release RT switch on near-end data set when CO lamp is lighted. Wait about 5 seconds and depress RT switch.

(10) On near-end data set, observe lamp pattern for four 1-1/2 minute periods.

Requirement: Error condition does not occur more than an average of once per 1-1/2 minute period.

Note: If an error condition occurs when RT switch is first depressed, clear error condition but do not count it.

(11) Establish voice communication between the data stations and discuss the test results.

(12) On far-end data set, release RT switch.

Requirement: TM lamp goes off.

(13) On near-end data set, release RT and ST switches.

Requirement: TM lamp goes off.

2-Wire Private Line

5.08 For a 2-wire private line, a complete end-to-end self test involves making one 10-minute test run in each direction. Perform the test as follows

Note: Refer to Table A for data set switch positions and lamp status.

(1) Establish voice communication between the data stations and arrange to conduct an end-to-end self test.

(2) Ensure that both data sets are not transmitting or receiving data.

(3) On transmitting data set, depress ST switch.

Requirement: All lamps are lighted except CO.

(4) On receiving data set, depress ST and RO switches.

Requirement: All lamps are lighted except RS, CS, and MC.

(5) On receiving data set, observe MC lamp for ten 1-minute periods.

Requirement: MC lamp does not blink more than an average of two blinks per 1-minute period.

(6) Perform the end-to-end self test in the opposite direction. The receiving data set now becomes the transmitting data set.

(7) On original receiving data set, release RO switch.

Requirement: All lamps are lighted except CO.

(8) On original transmitting data set, depress RO switch.

Requirement: All lamps are lighted except RS, CS, and MC.

(9) On current receiving data set, observe MC lamp for ten 1-minute periods.

Requirement: MC lamp does not blink more than an average of two blinks per 1-minute period.

(10) On current receiving data set, release RO switch.

Requirement: All lamps are lighted except CO.

(11) On both data sets, release ST switch.

Requirement: On both data sets, TM lamp goes off.

4-Wire Private Line

5.09 For a 4-wire private line, a complete end-to-end self test involves making one 10-minute test run in each direction. The runs are made simultaneously (duplex). Perform the test as follows:

Note: Refer to Table A for data set switch positions and lamp status.

(1) Establish voice communication between the data stations and arrange to conduct an end-to-end self test.

(2) Ensure that both data sets are not transmitting or receiving data.

(3) On both data sets, depress ST switch.

Requirement: On both data sets, all lamps are lighted except MC.

(4) On both data sets, observe MC lamp for ten 1-minute periods.

Requirement: On both data sets, MC lamp does not blink more than an average of two blinks per 1-minute period.

(5) On both data sets, release ST switch.

Requirement: On both data sets, TM lamp goes off.

D. Remote Test

5.10 The remote test allows a test center to check the data set transmitter and receiver and the facilities connecting the data set and the test center. The customer interface is not checked.

2-Wire Switched Network

5.11 For the 2-wire switched network, a data test center (DTC) and the data set generate test data. The DTC and the data set alternately transmit and receive blocks of this data for about 2 seconds. The received data is compared to the original data. Perform the test as follows:

Note: Refer to Table A for data set switch positions and lamp status.

(1) Contact DTC and request a remote test.

(2) When directed by DTC, depress RT switch.

Requirement: TM lamp lights.

(3) DTC performs remote test.

(4) When directed by DTC, release RT switch.

Requirement: TM lamp goes off.

2-Wire Private Line

5.12 For a 2-wire private line, an end-to-end self test is performed with a serving test center replacing one of the data sets. Refer to 5.08 for the required test procedures.

4-Wire Private Line

5.13 For a 4-wire private line, test data is generated and transmitted by a serving test center (STC). This data is looped back from the receiver output to the transmitter input of the data set and retransmitted. The data is received by the STC and compared to the original data. Perform the test as follows:

Note: Refer to Table A (digital loop-back self test—far end) for data set switch positions and lamp status.

(1) Contact STC and request a remote test.

(2) When directed by STC, depress DL switch.

Requirement: TM lamp lights.

(3) STC performs remote test.

(4) When directed by STC, release DL switch.

Requirement: TM lamp goes off.

E. Analog Loop-Back Test

5.14 In this test, the power supply voltages are measured, an analog loop-back error run is performed, and the CA-CB (RS-CS) interval is checked. The error run checks the data set transmitter and receiver and the customer interface. Test data is generated by a data test set (DTS) and looped back from the data set transmitter output to the receiver input through an internal attenuator. The received data is compared to the original data by the DTS. Data errors are indicated by the DTS counter. The CA-CB interval check measures the interval between the time the request-to-send (CA) lead is turned ***on*** and the clear-to-send (CB) lead turns ***on.***

5.15 The following test equipment is required:

1—914C DTS ***or***

1—914B DTS ***and*** 1—903-type DTS.

5.16 Perform the test as follows:

(1) Connect and condition test equipment as shown in Fig. 7.

(2) Apply power to data set and then to test equipment.

(3) Depress AL switch on data set.

Requirement: TM lamp lights.

(4) On 914-type DTS, set S1 to ON. (If 903-type DTS is used, momentarily depress START button.)

Requirement: DS1, DS2, and DS3 are lighted.

(5) Set FUNCTION to VOLT INT.

Requirement: +11.0 to +14.5 volts.

(6) Set FUNCTION to OFF, POLARITY to REV, and VERTICAL MONITOR to 10.

(7) Set FUNCTION to VOLT INT.

Requirement: -12.2 to -15.0 volts.

(8) Set FUNCTION to OFF, POLARITY to NOR, RANGE to DCV-10, and VERTICAL MONITOR to 19.

(9) Set FUNCTION to VOLT INT.

Requirement: +4.75 to +5.25 volts.

(10) Set FUNCTION to OFF.

(11) Set WORD SYNC momentarily to MAN.

(12) Depress RESET and allow counter to operate for 5 minutes.

Requirement: No errors indicated.

(13) Set S1 to OFF.

(14) Condition test equipment as follows:

(a) On 914C DTS, set TEST SET MODE to INTERVAL, COUNTER to INTERVAL—X1, and RCV BIT RATE to 1200.

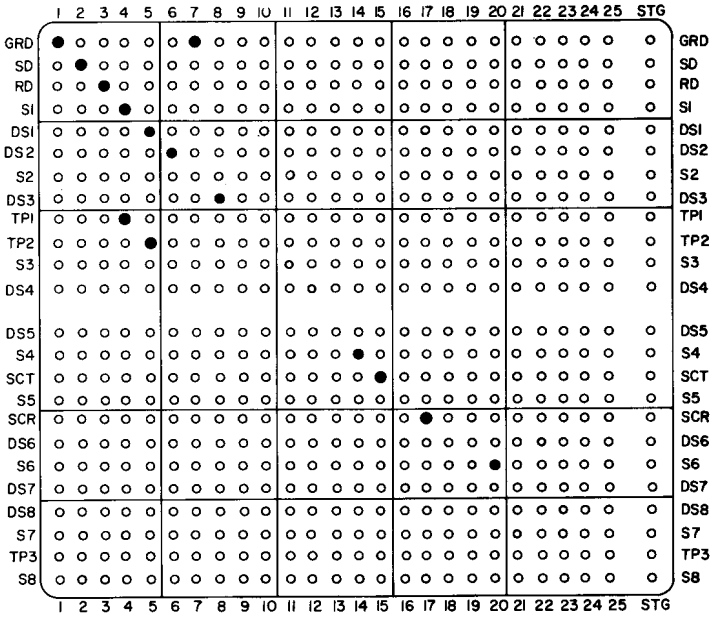
(b) On 914B DTS, set TEST SET MODE to TRMT SER, COUNTER TO INTERVAL—X1, and BIT RATE to 1200.

(15) On 914-type DTS, depress RESET and then set S1 to ON. CA-CB interval will appear on counter.

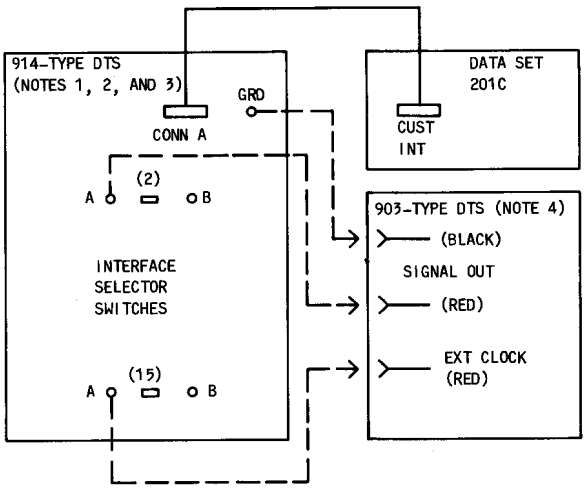
Requirements:

- Option XA—7 to 11 ms
- Option XB—7 to 11 ms
- Option XC—0 to 2 ms
- Option XD—138 to 158 ms
- Option XE—138 to 158 ms.

Note: To measure CA-CB interval for option XD or XE, set COUNTER to INTERVAL—X10. Counter indicates 14 to 16.



914-TYPE DTS MATRIX



NOTES:

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

SWITCH	SETTING
INTERFACE	
SELECTOR A	ALL DEPRESSED (NOTE 5)
INTERFACE MODE	VOLTAGE
VERTICAL MONITOR	9
TEST SET MODE	SER (914C)
	RCV SER (914B)
COUNTER	BIT ERRORS
FUNCTION	OFF
RANGE	DCV-30
POLARITY	NOR
SAMPLE WIDTH	.5μS
TRIGGER-TP1	+/OPEN
TRIGGER-TP2	+/OPEN
START (914C)	A OR B
RCV BIT RATE (914C)	EXT+
RCV WORD LENGTH (914C)	63
TRANSMIT BIT RATE (914C)	EXT+
TRANSMIT WORD LENGTH (914C)	63
SIG LEV (914C)	±4V
BIT RATE (914B)	EXT+
WORD LENGTH (914B)	63
SIGNAL LEVEL (914B)	±4V
S1	OFF
S4	OFF
S6	ON

2. INSERT RED PROGRAMMING PINS IN 914-TYPE DTS MATRIX IN POSITIONS INDICATED.
3. 914-TYPE DTS SWITCHES AND INDICATOR LAMPS CORRESPOND TO THE FOLLOWING INTERFACE LEADS:

SWITCH	LAMP	LEAD	EIA
S1		REQUEST TO SEND (RS)	CA
	DS1	CLEAR TO SEND (CS)	CB
	DS2	DATA SET READY (DSR)	CC
	DS3	RECEIVED LINE SIGNAL DETECTOR (CO)	CF
S4		NEW SYNC (NS)	
S6		DATA TERMINAL READY (DTR)	CD

4. 903-TYPE DTS IS REQUIRED WITH 914B DTS. SET SWITCHES ON 903-TYPE DTS AS FOLLOWS:

SWITCH	SETTING
BIT RATE	EXT CLOCK
TRIGGER	+ (POSITIVE)
RANDOM-DOT	RANDOM

5. IF 914B DTS IS USED, PULL OUT INTERFACE SELECTOR SWITCHES A(2) AND A(15).

Fig. 7—Analog and Digital Loop-Back Test Setup

(16) To remeasure CA-CB interval, set S1 to OFF, depress RESET, and set S1 to ON.

(17) Release AL switch on data set.

Requirement: TM lamp goes off.

(18) Remove all test equipment and restore data set to pretest condition.

F. Digital Loop-Back Test (4-Wire Private Line)

5.17 The digital loop-back test checks the transmitter and receiver of both data sets and the facilities connecting the data sets. The customer interface at the far-end data set is not checked. Test data is generated by a DTS and transmitted by the near-end data set. This data is looped back from the receiver output to the transmitter input of the far-end data set and retransmitted. The data is received by the near-end data set and compared to the original data by the DTS. Data errors are indicated by the DTS counter.

5.18 The following test equipment is required:

1—914C DTS ***or***

1—914B DTS ***and*** 1—903-type DTS.

5.19 Perform the test as follows:

(1) Connect and condition test equipment as shown in Fig. 7, except on 914-type DTS set COUNTER to BLOCK ERRORS—16WL.

(2) Contact far-end data station and have DL switch on data set depressed.

Requirement: TM lamp lights.

(3) Apply power to data set and then to test equipment.

(4) On 914-type DTS, set S1 to ON. (If 903-type DTS is used, momentarily depress START button.)

Requirement: DS1, DS2, and DS3 are lighted.

(5) Set WORD SYNC momentarily to MAN.

(6) Depress RESET and allow counter to operate for 15 minutes. Record total errors indicated.

Requirement: Total errors are less than 23.

(7) Set S1 to OFF.

(8) Contact far-end data station and have DL switch on data set released.

Requirement: TM lamp goes off.

(9) Remove all test equipment and restore data set to pretest condition.

G. End-to-End Test

5.20 The end-to-end test checks the transmitter and receiver of both data sets and the facilities connecting the data sets. The customer interfaces are 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 by the DTS counter.

5.21 The following test equipment is required at both transmitting and receiving data stations.

(a) For half-duplex tests (2-wire service):

1—914-type DTS.

(b) For duplex tests (4-wire service):

1—914C DTS ***or***

1—914B DTS ***and*** 1—903-type DTS.

2-Wire Switched Network

5.22 For the 2-wire switched network, a complete end-to-end test involves making one 15-minute test run in each direction. If the test fails in either direction, it is repeated one time. These test calls should be made during busy hours to assure that all calls do not use the same trunks and routes. Perform the test as follows:

(1) Establish voice communication between the data stations and arrange to conduct an end-to-end test.

(2) At both stations, connect and condition test equipment as shown in Fig. 8 except as follows:

(a) At receiving station, on 914-type DTS set S1 to OFF.

(b) At transmitting station, if 914B DTS is used set TEST SET MODE to TRMT SER.

(3) At both stations, apply power to data set and then to test equipment.

(4) Establish a test call between the stations.

The receiving station should verify that the 914-type DTS NO DATA and NO CLOCK lamps are off. This indicates that a valid connection has been established between the stations. If either lamp lights during the test, the receiving station must contact the transmitting station and arrange to retest.

(5) At receiving station, on 914-type DTS set WORD SYNC momentarily to MAN.

(6) At receiving station, on 914-type DTS depress RESET and allow counter to operate for 15 minutes. Record total errors indicated.

Requirement: Total errors are less than 23.

(7) If requirement in (6) is not met, repeat (4) through (6) one time.

(8) Perform the end-to-end test in the opposite direction. The receiving station now becomes the transmitting station.

(9) At original receiving station, on 914-type DTS set S1 to ON. (If 914B DTS is used, set TEST SET MODE to TMRT SER.)

(10) At original transmitting station, on 914-type DTS set S1 to OFF. (If 914B DTS is used, set TEST SET MODE to RCV SER.)

(11) Repeat (4) through (7).

(12) At both stations, remove all test equipment and restore data sets to pretest condition.

2-Wire Private Line

5.23 For a 2-wire private line, a complete end-to-end test involves making one 15-minute test run in each direction. Perform the test as follows:

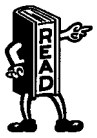
(1) Establish voice communication between the data stations and arrange to conduct an end-to-end test.

(2) At both stations, connect and condition test equipment as shown in Fig. 8 except as follows:

(a) At receiving station, on 914-type DTS set S1 to OFF.

(b) At transmitting station, if 914B DTS is used set TEST SET MODE to TRMT SER.

(3) At both stations, apply power to data set and then to test equipment.



The receiving station should verify that the 914-type DTS NO DATA and NO CLOCK lamps are off. This indicates that a valid connection has been established between the stations. If either lamp lights during the test, the receiving station must contact the transmitting station and arrange to retest.

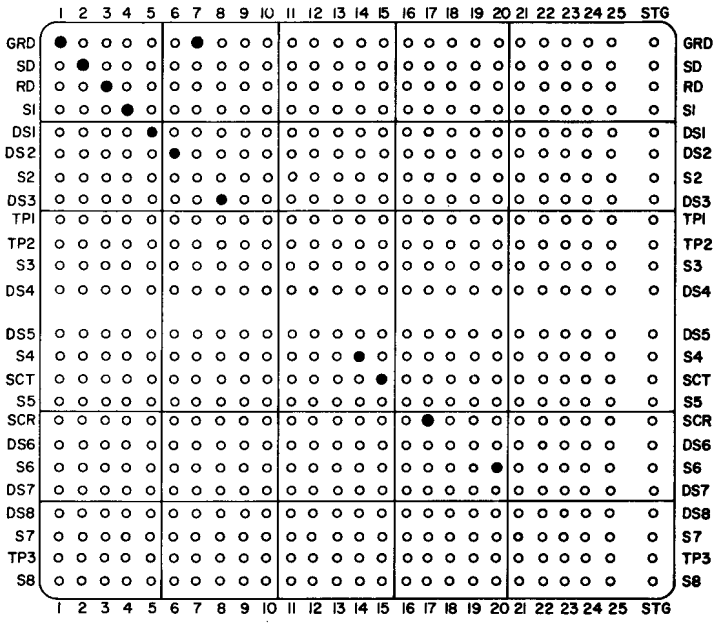
(4) At receiving station, on 914-type DTS set WORD SYNC momentarily to MAN.

(5) At receiving station, on 914-type DTS depress RESET and allow counter to operate for 15 minutes. Record total errors indicated.

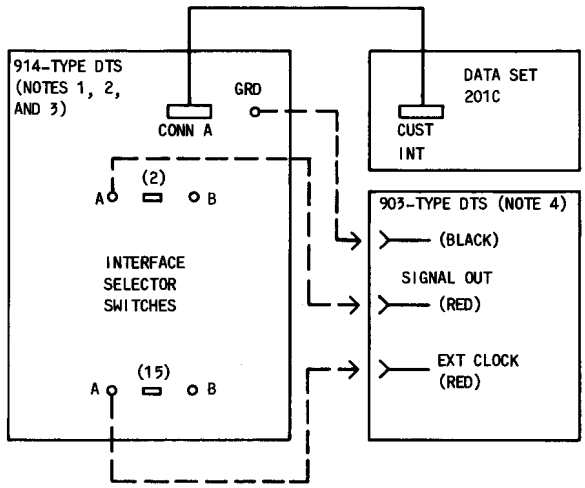
Requirement: Total errors are less than 23.

(6) Perform the end-to-end test in the opposite direction. The receiving station now becomes the transmitting station.

(7) At original receiving station, on 914-type DTS set S1 to ON. (If 914B DTS is used, set TEST SET MODE to TMRT SER.)



914-TYPE DTS MATRIX



NOTES:

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

SWITCH	SETTING
INTERFACE	
SELECTOR A	ALL DEPRESSED (NOTE 5)
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER (914C)
	RCV SER (914B)
COUNTER	BLOCK ERRORS-16WL
FUNCTION	OFF
SAMPLE WIDTH	.5μS
RCV BIT RATE (914C)	EXT+
RCV WORD LENGTH (914C)	63
TRANSMIT BIT RATE (914C)	EXT+
TRANSMIT WORD LENGTH (914C)	63
SIG LEV (914C)	±4V
BIT RATE (914B)	EXT+
WORD LENGTH (914B)	63
SIGNAL LEVEL (914B)	±4V
S1	ON
S4	OFF
S6	ON

2. INSERT RED PROGRAMMING PINS IN 914-TYPE DTS MATRIX IN POSITIONS INDICATED.
3. 914-TYPE SWITCHES CORRESPOND TO THE FOLLOWING INTERFACE LEADS:

SWITCH	LEAD	EIA
S1	REQUEST TO SEND (RS)	CA
S4	NEW SYNC (NS)	
S6	DATA TERMINAL READY (DTR)	CD

4. 903-TYPE DTS IS REQUIRED WITH 914B DTS FOR DUPLEX TESTS. SET SWITCHES ON 903-TYPE DTS AS FOLLOWS:

SWITCH	SETTING
BIT RATE	EXT CLOCK
TRIGGER	+ (POSITIVE)
RANDOM-DOT	RANDOM

5. IF 914B DTS IS USED FOR DUPLEX TESTS, PULL OUT INTERFACE SELECTOR SWITCHES A(2) AND A(15).

Fig. 8—End-to-End Test Setup

(8) At original transmitting station, on 914-type DTS set S1 to OFF. (If 914B DTS is used, set TEST SET MODE to RCV SER.)

(9) Repeat (4) and (5).

(10) At both stations, remove all test equipment and restore data sets to pretest condition.

4-Wire Private Line

5.24 For a 4-wire private line, a complete end-to-end test involves making one 15-minute test run in each direction. The runs are made simultaneously (duplex). At both data stations, perform the test as follows:

(1) Establish voice communication between the data stations and arrange to conduct an end-to-end test.

(2) Connect and condition test equipment as shown in Fig. 8.

(3) Apply power to data set and then to test equipment.

(4) If 903-type DTS is used, momentarily depress START button.

Both stations should verify that the 914-type DTS NO DATA and NO CLOCK lamps are off. This indicates that a valid connection has been established between the stations. If either lamp lights during the test, the stations must arrange to retest.

(5) On 914-type DTS, set WORD SYNC momentarily to MAN.

(6) On 914-type DTS, depress RESET and allow counter to operate for 15 minutes. Record total errors indicated.

Requirement: Total errors are less than 23.

(7) Remove all test equipment and restore data sets to pretest condition.

H. Automatic Answer Test (2-Wire Switched Network)

5.25 The automatic answer test verifies that the data set will automatically answer and end a call.

5.26 The following test equipment is required:

1—914-type DTS.

5.27 Perform the test as follows:

(1) Connect and condition test equipment as shown in Fig. 9.

(2) Apply power to data set and then to test equipment.

Note: If data set is optioned for ring indication on EIA interface (options YF and YG installed), omit (5) through (7). If data set is optioned for ring indication on contact interface (option YH installed), omit (3) and (4).

(3) Have a call made to data set.

Requirements: DS8 lights (ring indicator ***on***) during ringing period. DS8 goes off (ring indicator ***off***) during silent period. Data set does ***not*** answer call.

(4) During silent period of ringing cycle, set S7 to ON (data terminal ready ***on***).

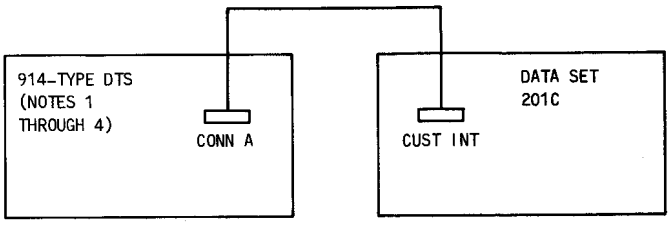
Requirements: At end of next ringing cycle, data set answers call. After about 4 seconds, DS7 lights (data set ready ***on***). This indicates that data set is in data mode.

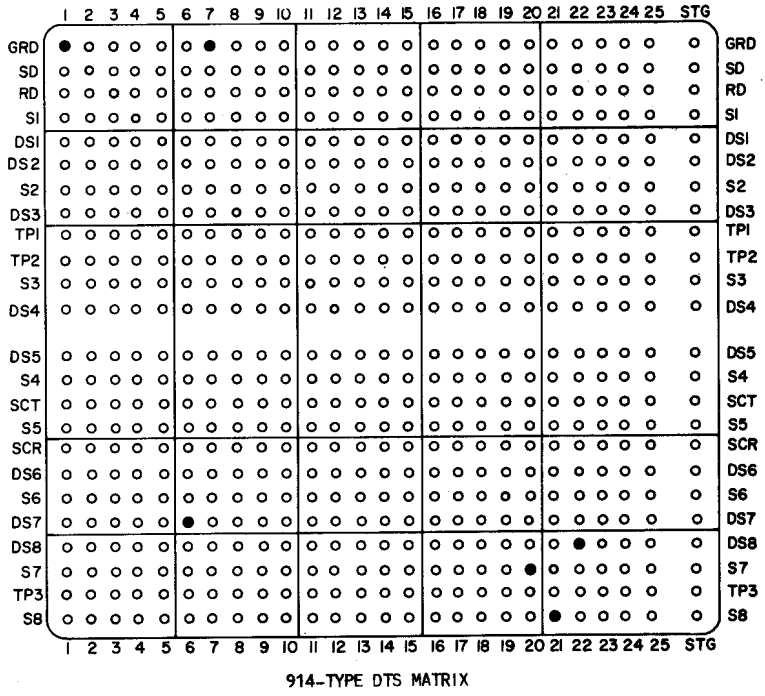
(5) Set FUNCTION to VOLT/OHM EXT.

(6) Have a call made to data set.

Requirements: Zero ohms (contact closure) during ringing period. Open circuit (contact open) during silent period. Data set does ***not*** answer call.

(7) During silent period of ringing cycle, set S7 and S8 to ON (data terminal ready and ready ***on***).





914-TYPE DTS MATRIX

NOTES:

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

SWITCH	SETTING
INTERFACE SELECTOR A	ALL DEPRESSED
INTERFACE MODE	VOLTAGE
FUNCTION	OFF
RANGE	OHMS-X1
S7	OFF
S8	OFF

2. INSERT RED PROGRAMMING PINS IN 914-TYPE DTS MATRIX IN POSITIONS INDICATED.
3. CONNECT METER INPUT RED AND BLACK TERMINALS TO INTERFACE SELECTOR SWITCHES A(22) AND A(23), RESPECTIVELY.
4. 914-TYPE DTS SWITCHES AND INDICATOR LAMPS CORRESPOND TO THE FOLLOWING INTERFACE LEADS:

SWITCH	LAMP	LEAD	EIA
	DS7	DATA SET READY (DSR)	CC
	DS8	RING INDICATOR (RI)	CE
S7		DATA TERMINAL READY (DTR)	CD
S8		READY (RDY)	

Fig. 9—Automatic Answer Test Setup

Requirements: At end of next ringing cycle, data set answers call. After about 4 seconds, DS7 lights (data set ready ***on***). This indicates that data set is in data mode.

(8) Set S7 to OFF (data terminal ready ***off***) to end call.

Requirement: DS7 goes off (data set ready ***off***).

(9) Remove all test equipment and restore data set to pretest condition.

I. Ground Noise Test

5.28 If the data set and the 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 that exceed a preset amplitude and that are separated by about 150 ms or more.

5.29 The following test equipment is required:

1—6H impulse counter ***or*** equivalent

1—914-type DTS ***or*** interface test adapter (cover of 901B DTS)

1—2W6A test cord (310 plug on one end, alligator clips connected to tip and ring on other end).

Note: Refer to Section 103-620-101 for information on the 6H impulse counter. If the 6H impulse counter is not available, a 6A impulse counter may be used. Refer to Section 103-620-100 for information on the 6A impulse counter.

5.30 In this test, the impulse counter is connected between the grounds of the data set and the CPE. The impulse 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. It is assumed that protective ground from the CPE appears at the customer interface.

5.31 Perform the test as follows:

(1) Using the interface cables provided with the 914-type DTS, connect the 914-type DTS connector A to the customer connector on the data set, and connect the 914-type DTS connector B to the data set connector on the CPE.

(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 of 2W6A cord to interface selector switch 1A and connect other clip to switch 1B.

(4) Verify that power is applied to data set and CPE.

(5) Insert 310 plug of 2W6A cord into 310 MEAS jack on 6H impulse counter.

(6) Set 6H impulse counter DIAL-MEAS switch to MEAS.

(7) Set 6H impulse counter DBRN dial to 90.

(8) Reset counter on 6H impulse counter to 0.

(9) Set 6H impulse counter MINUTES control to 15. At the end of the 15-minute period, record number of counter indications.

(10) Remove clips of 2W6A cord from 1A and 1B and connect to 7A and 7B.

(11) Repeat (8) and (9).

5.32 At the end of both 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 data set and CPE grounds must be bonded together according to local instructions. At the end of the test, remove all test equipment and restore the data station to pretest condition.

6. REFERENCES

6.01 Additional information concerning the testing of DS 201C is contained in the following publications:

SECTION	TITLE
103-620-100	J94006A(6A) Impulse Counter—Description, Operation, and Maintenance
103-620-101	6H and 6HR Impulse Counters (J9006H and J9006HR)—Description, Operation, and Maintenance
107-101-100	914-Type Data Test Sets—Description and Operation
107-200-100	903-Type Data Test Sets—Description and Operation
314-205-501	Data Systems—DATA-PHONE® Service and Data Access Arrangements on Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines
314-410-500	Voice Bandwidth Private Line Data Circuits—Tests and Requirements
592-029-100	Data Set 201C—Transmitter-Receiver—Description and Operation
592-029-200	Data Set 201C—Transmitter-Receiver—Installation and Connections
592-029-300	Data Set 201C—Transmitter-Receiver—Maintenance
666-511-501	Test of Data Services Provided by Data Set 201C From a Private Line Testroom
668-010-300	Data Systems—DATA-PHONE® Service on Direct Distance Dialing Network—Data Test Center—Trouble Analysis Procedures
999-100-138	Data Set 201C—How to Operate Manual

6.02 Detailed information concerning DS 201C is contained in CD- and SD-1D239-01.