

**DATA SET 208A-TYPE  
TRANSMITTER-RECEIVER  
TEST PROCEDURES**

CONTENTS	PAGE	CONTENTS	PAGE
1. GENERAL . . . . .	1	D. Digital Loopback Test Using 914-Type DTS . . . . .	14
2. TEST FACILITIES AVAILABLE . . . . .	2	E. Digital Loopback Self Test to Distant End (DS 208A-L1A and DS 208A-L1B) . . . . .	15
DS 208A-L1 . . . . .	2	F. Compromise Equalizer Test . . . . .	15
DS 208A-L1A AND DS 208A-L1B . . . . .	2	G. Equalizer Start-Up Test . . . . .	18
A. Self Test Features (DS 208A-L1A and DS 208A-L1B Only) . . . . .	2	H. Power Supply Test . . . . .	23
Status Indicator Test . . . . .	2	I. CA-CB Interval Test . . . . .	23
Analog Loopback Self Test . . . . .	5	J. Transmit Level Test . . . . .	24
End-to-End Self Test . . . . .	5	K. CG-CF Interval Test . . . . .	25
Digital Loopback Test to Distant End . . . . .	5	L. End-to-End Self test (DS 208A-L1A and DS 208A-L1B) . . . . .	26
Restrictions on Use of Self Test (DS 208A Used With DS 209A or DDS Off-Net) . . . . .	5	M. End-to-End Test Using 914-Type DTS . . . . .	26
B. Tests Using the 914-Type DTS . . . . .	5	6. SUPPLEMENTARY TEST . . . . .	27
3. INSTALLATION TESTS . . . . .	5	7. REFERENCES . . . . .	29
4. MAINTENANCE TESTS . . . . .	6	1. GENERAL	
5. TEST PROCEDURES . . . . .	9	1.01 This section contains information concerning procedures to be used when testing data set (DS) 208A-type on an initial installation or during a maintenance visit. Overall procedures to be followed when investigating the trouble report are outlined in Section 592-027-300. When DS 208A-type is used as an extension of a DS 209A-L1 multiplex system, overall procedures are contained in Section	
A. Analog Loopback Self Test (DS 208A-L1A and DS 208A-L1B Only) . . . . .	9		
B. Analog Loopback Test Using 914-Type DTS . . . . .	10		
C. Digital Loopback Test From STC . . . . .	10		

**NOTICE**

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TABLE B

## DATA SET 208A-L1A OR -L1B TEST SWITCH POSITIONS AND INDICATOR STATUS

SWITCH OR INDICATOR	NORMAL OPERATION	ANALOG LOOPBACK SELF TEST	REMOTE LOOPBACK FROM STC	REMOTE LOOPBACK* SELF TEST TO DISTANT END	END-TO-END SELF TEST		INDICATOR TEST
					LOCAL DATA SET	DISTANT-END DATA SET	
LP Switch							X
AL Switch		X					
ST Switch		X		X	X	X	
DL Switch			X				
ON Indicator	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted	Lighted
MR Indicator	Note 1	Off	Off	Off	Off	Off	Lighted
RS Indicator	Note 2	Lighted	Note 4	Lighted	Lighted	Lighted	Lighted
CS Indicator	Note 3	Lighted	Note 3	Lighted	Lighted	Lighted	Lighted
CO Indicator	Note 4	Lighted	Note 4	Lighted	Lighted	Lighted	Lighted
ER Indicator	Note 6	Note 5	Note 6	Note 5	Note 5	Note 5	Lighted

X = Switch depressed; Blank = Switch not depressed.

\* = Assumes distant-end data set is in digital loop mode.

*Note 1:* Monitors state of data set ready circuit.

*Note 2:* Lighted when CA is ON (could be off when line signal is being transmitted if data set is optioned for switched request to send and continuous carrier).

*Note 3:* Lighted after completion of CA-CB interval (7.5 or 50 ms). Stays lighted for completion of data transmission.

*Note 4:* Lighted when line signal is being received.

*Note 5:* Off except when errors occur.

*Note 6:* Lighted when CO indicator is off. When CO indicator is lighted, indicates state of adaptive equalizer. When lighted, equalizer is retraining.

### Analog Loopback Self Test

**2.05** The analog loopback self test mode is entered by depressing the analog loop (AL) and self test (ST) locking switches. Depression of the AL switch connects the data set transmitter to its own receiver through a channel simulator on the data set side. Depressing the ST switch forces the internal request-to-send (CA) lead **on**, transmits a steady mark on the data set internal SD lead, and enables the ER indicator to be used to indicate received errors.

### End-to-End Self Test

**2.06** The end-to-end self test mode is entered by depressing the ST switches at both data sets (DS 208A-L1A or DS 208A-L1B). This action causes both transmitters to turn on and transmit steady marks. At both receivers, test circuits enable the ER indicator to be used to indicate any errors made in transmission.

### Digital Loopback Test to Distant End

**2.07** In this test the distant-end data set is placed in the digital loop (DL) mode to act as a regenerator. The local data set is placed in the self test mode by depressing the ST switch. The local transmitter is then turned on and transmits steady marks to the distant-end receiver, where the recovered data present on the BB interface lead is looped around to the BA lead at the customer interface. Also connected at the customer interface are signal quality detector (CG) to request-to-send (CA) and serial clock receive (DD) to serial clock transmitter external (DA). These interface leads are disconnected so that the associated CPE cannot monitor them. The distant-end transmitter now transmits this data back to the local receiver, where the ER indicator is conditioned to indicate any errors made in transmission.

### Restrictions on Use of Self Test (DS 208A Used With DS 209A or DDS Off-Net)

**2.08** If either DS 208A-L1A or DS 208A-L1B is used as a remote extension of a DS 209A-L1 multiplex system or as a subrate off-net extension of DDS, the self-test features can be used with the following restrictions:

- (a) Analog loopback self test cannot be performed at a remote extension with options as

installed. If the internal timing option is temporarily installed at the remote extension, this test can be performed.

- (b) Analog loopback self test cannot be performed from a remote extension in toward DS 208A-type collocated with DS 209A-L1 with options as installed. If the internal timing option is temporarily installed at the remote extension, this test can be performed.

- (c) Digital loopback test cannot be performed from a remote extension in toward a hub office of the DDS with data set options as installed. If the internal timing option is temporarily installed at the remote extension, this test can be performed.

### B. Tests Using the 914-Type DTS

**2.09** The 914-type DTS is used to perform all tests necessary to install and maintain DS 208A-L1. By using the 914-type DTS, the customer interface is checked, timing intervals and transmit levels are measured; certain power supply voltages are checked, and actual error runs are performed.

**2.10** In addition to the data set self tests, the 914-type DTS is used to provide a more thorough series of tests for DS 208A-L1A and DS 208A-L1B.

**Caution:** *Certain 914B DTSs are susceptible to power line transients which may cause the fuse in the 914 DTS 5-volt power supply to fail. To avoid this problem, do not unplug the data set while power is applied to the 914B. If the fuse in the 914 DTS 5-volt supply fails, the counter indicates continuously and cannot be reset.*

### 3. INSTALLATION TESTS

**3.01** After the data set has been installed, it must be tested for acceptable operation. Refer to Fig. 1 for the sequence of tests to be performed. If trouble exists and appears to be start-up errors, perform the appropriate equalizer start-up test given in Part 5.

## 4. MAINTENANCE TESTS

**4.01** Maintenance tests consist of an equalizer start-up test, end-to-end tests, a ground noise test, and a repair test sequence that provides a method of isolating a trouble within the data set to a circuit pack (CP) or group of CPs. It is assumed that the maintenance procedures outlined in Section 592-027-300 have been followed prior to dispatching the telephone company (telco) employee. If the probable cause of trouble is in the private line (PL) facilities, refer to Section 314-410-500. If the probable cause of trouble is in data auxiliary set (DAS) 828A or 829-type, refer to Part 7 for the appropriate BSP.

**4.02** DS 208A-L1 can be converted to DS 208A-L1A by removing HG9 CP and replacing it with HG23 CP, and replacing the front cover with front cover 840807655. When this conversion is made, ensure that the customer receives a copy of the data set How to Operate Manual (999-100-105).

**4.03** Due to backplane wiring changes required by the employment of large scale integration (LSI) in DS 208A-L1B, DS 208A-L1A **cannot** be converted to DS 208A-L1B. The transmitter and descrambler CP used in DS 208A-L1B is coded HG26 and replaces HG5, HG6, and HG17 used in previous DS 208A-types. Before replacing CPs in DS 208A-type, identification of the data set must be determined using the code stamped under the chassis or printed on the option label. Care must be taken **not** to insert HG26 CP in DS 208A-L1 or 208A-L1A. Although no equipment damage will occur, HG5, HG6, and HG17 CPs will not function if inserted in a DS 208A-L1B chassis. All other circuit packs with the same code can be used interchangeably in DS 208A-type. A summary of the CPs contained in each DS 208A-type is given in Table C.

**4.04** The overall repair tests sequence, contained in the flowchart shown in Fig. 2, consists of five basic functional tests:

- Power Supply Test
- CA-CB Interval Test
- Transmit Level Test
- CG-CF Interval Test

## ● Analog Loop-back Test.

The tests are written so that the flowchart may be entered at any point without performing all preceding tests. The equalizer start-up test, end-to-end test, and ground noise test are not included in Fig. 2. These tests should be performed as required.

**4.05** When any test shown in Fig. 2 (except the power supply test) fails, perform the following procedure: Refer to the list of CPs involved in the test being performed. Replace each CP individually (in order of appearance on the list) and repeat the test after each CP replacement. If after a CP is replaced the test fails, in order to avoid replacing a CP which may not be defective, reinstall the original CP and replace the next CP on the list. Repeat this procedure until all the recommended CPs have been replaced.

**Note:** This procedure of CP replacements does not check for multiple circuit pack failures unless the circuit packs in question are related to different tests in the repair sequence.

**4.06** The repair sequence shown in Fig. 2 should quickly isolate the trouble to a CP or group of CPs. It is evident that, in all the tests, one of the CP replacements recommended is HG9 (208A-L1) or HG23 (208A-L1A and 208A-L1B). This is the interface CP and the majority of data and control signals appear on this CP.

**4.07** Whenever HG9 or HG23 CP is replaced, install the correct options before proceeding with the test.

**4.08** If a defective CP is located, it must be tagged with the nature of the trouble, carefully packed in the shipping carton provided with the maintenance kit, and returned to a Western Electric repair center for repair. No attempt should be made to repair CPs in the field. After the data set has been repaired and tested, verify with the customer that service is satisfactory by requesting the customer to make a data call.

**4.09** In the unusual instance when the data set is obviously malfunctioning but maintenance tests do not clear up the cause of trouble, it is recommended that the problem be referred to supervision according to local instructions.

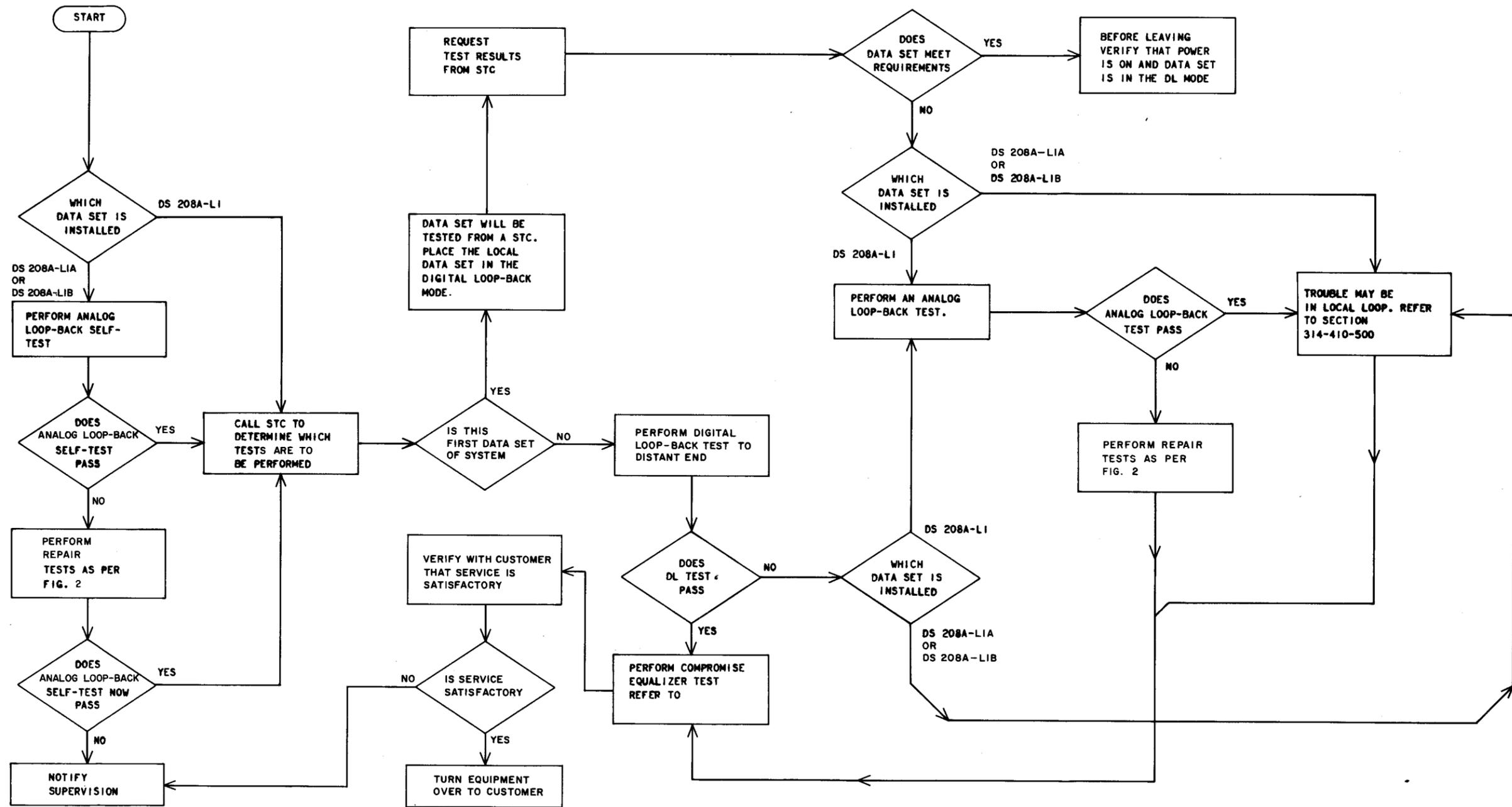


Fig. 1—Installation Testing Flowchart

**TABLE C**  
**CIRCUIT PACK COMPLEMENT FOR DS 208A-TYPE**

DS 208A-L1 (MD)		DS 208A-L1A (MD)		DS 208A-L1B	
CIRCUIT PACK	SEE NOTE	CIRCUIT PACK	SEE NOTE	CIRCUIT PACK	SEE NOTE
HG2		HG2		HG2	
HG3		HG3		HG3	
HG4		HG4		HG4	
HG5 (A&M)		HG5 (A&M)		—	
HG6 (A&M)		HG6 (A&M)		—	
HG7		HG7		HG7	
HG8		HG8		HG8	
HG9 (MD)		—		—	
HG11		HG11		HG11	
HG12	1	HG12	1	HG12	1
HG13		HG13		HG13	
HG14 (MD)		HG14B	3	HG14B	3
HG15 (MD)		HG15B	3	HG15B	3
HG16 (MD)		HG16B	3	HG16B	3
HG17 (A&M)		HG17 (A&M)		—	
HG21	2	HG21		HG21	
—		HG23	4	HG23	4
—		—		HG26	5

*Note 1:* Two HG12 CPs are required in each data set.

*Note 2:* Early models of DS 208A-L1 may contain HG1 CP.

*Note 3:* HG14B, HG15B, and HG16B are direct replacements for HG14, HG15, and HG16, respectively.

*Note 4:* HG9 CP is replaced by HG23 in DS 208A-L1A and DS 208A-L1B.

*Note 5:* HG5, HG6, and HG17 are replaced by HG26 in 208A-L1B.

**4.10** Proceed to Fig. 2 to begin the repair test sequence.

## **5. TEST PROCEDURES**

**5.01** This part provides a description of the various test procedures and step-by-step instructions for performing the tests.

**5.02** If a procedure requires that an option be installed in the set which is not specified on the service order or circuit layout record card, remove the option at the end of the test and verify that all specified options are installed in the set.

## **A. Analog Loopback Self Test (DS 208A-L1A AND DS 208A-L1B)**

**5.03** The analog loopback self test is entered by depressing the AL and ST locking switches located on the front of the data set. Depressing the AL switch connects the transmitter to the receiver through a channel simulator. Depressing the ST switch turns **on** the data set internal request-to-send lead, transmits steady marks on the data set internal SD lead, and conditions the ER indicator to be used to indicate errors. Since steady marks are being transmitted, any spaces detected by the error circuitry constitute errors.

## SECTION 592-027-500

One bit error lights the ER indicator for approximately 100 ms.

**5.04** Perform the following procedure for the analog loopback self test.

- (1) Apply ac power to DS 208A-L1A or DS 208A-L1B.
- (2) Depress and hold the LP switch.

**Requirement:** All indicators on the data set are lighted.

- (3) Release the LP switch and depress the AL and then the ST switch.

**Requirements:** The ON, RS, CS, and CO indicators are lighted. The MR and ER indicators are off.

**Note:** If the ER indicator is lighted or blinks, the data set has failed the analog loopback self test.

- (4) End of test. Depress, then release the AL and ST switches to restore the data set to normal operating condition.

### B. Analog Loopback Test Using a 914-Type DTS

**5.05** The analog loopback test using a 914-type DTS is functionally the same as the analog loopback self test. The 914-type DTS provides a more inclusive test of the data set customer interface circuits and data set scrambler/descrambler circuits by transmitting random data and monitoring the received data for errors. The test equipment required for this test consists of a 914C DTS or a 903-type DTS and a 914B DTS. When using the 914C DTS, a 511-bit word is used; when using the 903/914B DTS combination, a 63-bit word is used. The 511-bit word is preferred to test the scrambler/descrambler circuits more comprehensively.

**5.06** Perform the following procedure:

- (1) Connect the equipment as shown in Fig. 3.

**Note:** This test is written to make use of a 914C DTS. If a 914C DTS is not available, connect the 903-type DTS to the 914B DTS and set the controls as shown in Fig. 3.

- (2) Place the DS 208A-type in the AL mode.
- (3) Apply power to the data set and then to the DTS.
- (4) If a 903-type DTS is used, depress and release the START switch.
- (5) At the 914-type DTS, position S1 (CA) to ON and reset the counter by depressing the RESET switch.

**Requirements:** On the 914-type DTS, DS1 (CA), DS2 (CB), DS3 (CG), DS4 (CF), and DS7 (QM) are lighted. DS5 (BA) and DS6 (BB) are *dimly* lighted. DS8 (CC) is off. The counter is not indicating.

- (6) Verify that the test equipment is functioning properly by pulling interface selector switch 3A out on the 914-type DTS.

**Requirement:** On the 914-type DTS, the counter indicates rapidly, and shortly thereafter the NO DATA and OVERFLOW lamps light.

- (7) Depress the interface selector switch 3A.
- (8) Reset the counter to zero by pressing the RESET switch.
- (9) Perform a 2-minute error run and record the number of errors.

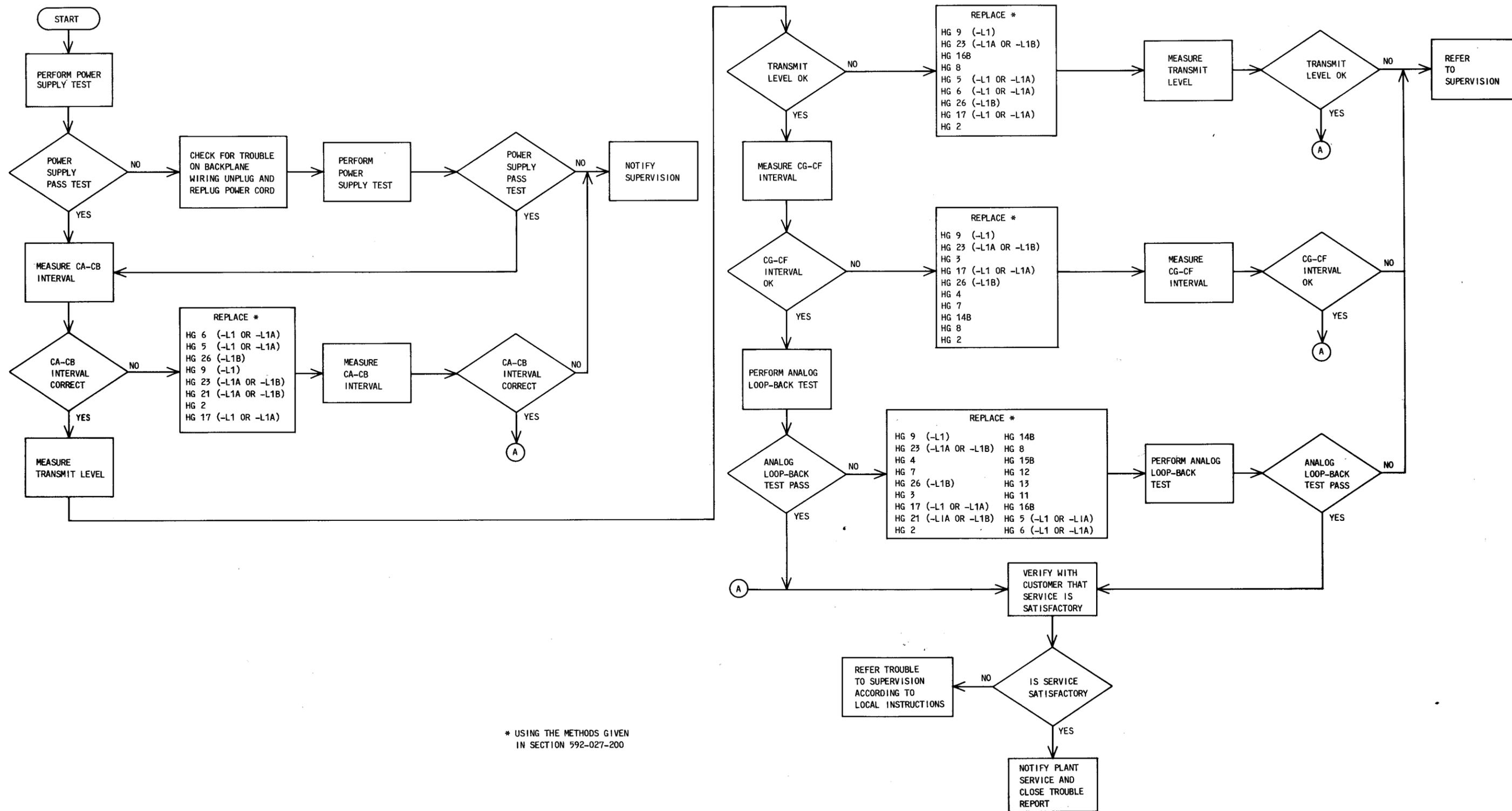
**Requirement:** DTS counter registers 0 block errors during a 2-minute error run.

- (10) End of test. Restore the data set to normal operating condition.

### C. Digital Loopback Test From STC

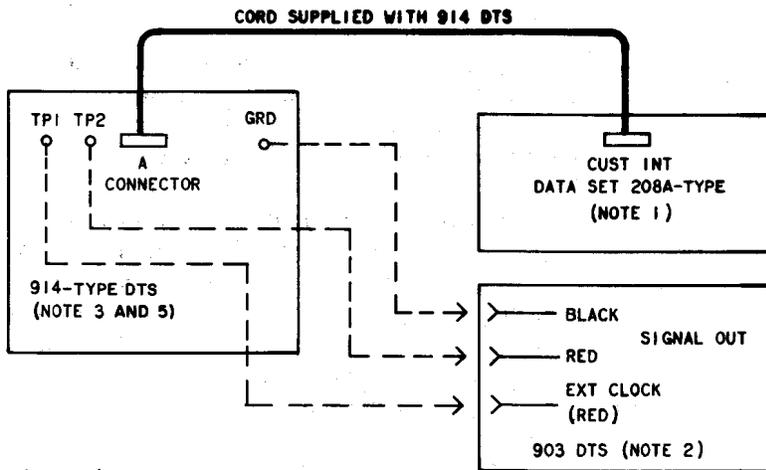
**5.07** When instructed by the STC, place the data set in the digital loopback (DL) mode.

- (1) If testing a DS 208A-L1, position the test switch to the right (DL position) and verify that the DL indicator is lighted.
- (2) If testing a DS 208A-L1A or DS 208A-L1B, depress the DL switch and verify that the MR indicator is off.

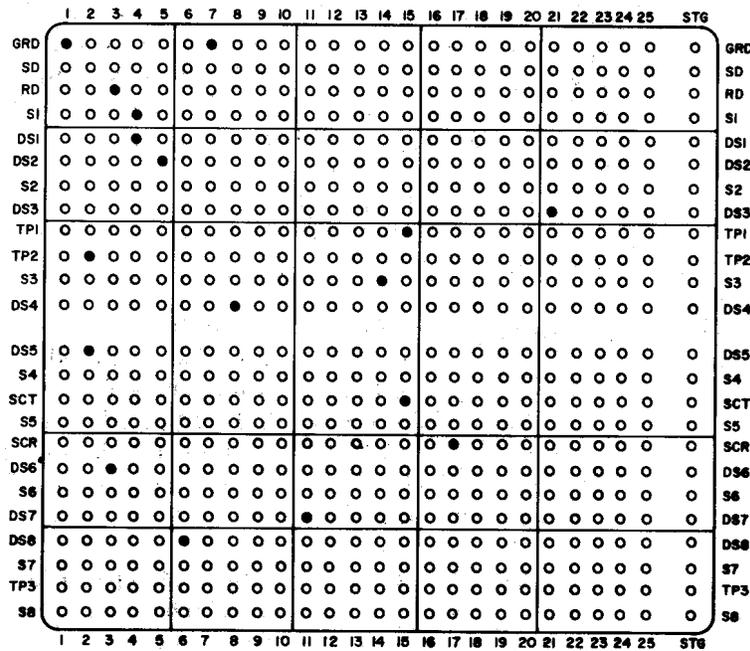


\* USING THE METHODS GIVEN IN SECTION 592-027-200

Fig. 2—Repair Test Sequence



(NOTE 4)



NOTES:

1. VERIFY THE FOLLOWING OPTIONS ARE INSTALLED:

OPTION	SETTING
DSR OFF IN AL MODE (DS208A-LIA OR -LIB)	SIA DOWN
NO COMP EQL TEST (DS208A-LIA OR -LIB)	SIB UP
SWITCHED REQUEST-TO-SEND	SIC DOWN
TRANSMITTER INTERNALLY TIMED	S3A DOWN
SWITCHED CARRIER	S4B DOWN

2. IF 903 AND 914B DTS ARE USED, CONNECT 903 AS SHOWN AND SET THE FOLLOWING 903 CONTROLS.

CONTROL	SETTING
BIT RATE	EXT CLOCK
RANDOM-DOT	RANDOM

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

SWITCH	SETTING
INTERFACE SELECTOR	ALL DEPRESSED
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER (914C DTS) RCV SER (914B DTS)
BIT RATE(S)	EXT +
COUNTER	2WB (914C DTS) 16WL (914B DTS)
FUNCTION	OFF
SIGNAL LEVEL	±4V
SAMPLE WIDTH	.5µS
WORD SYNC	AUTO
S1-S8	OFF
WORD LENGTH(S)	63 (IF 903 DTS IS USED) 511 (IF 914C DTS IS USED)

4. IF 914C IS USED REMOVE PINS FROM TP1-15 AND TP2-2. INSERT PIN IN SD-2.

5. 914 DTS INDICATORS CORRESPOND TO THE FOLLOWING INTERFACE LEADS

LAMP	FUNCTION	EIA
DS1	REQUEST TO SEND (RS)	CA
DS2	CLEAR TO SEND (CS)	CB
DS3	SIGNAL QUALITY DETECTOR	CG
DS4	RECEIVED LINE SIGNAL DETECTOR (CO)	CF
DS5	TRANSMITTED DATA (SD)	BA
DS6	RECEIVED DATA (RD)	BB
DS7	EQUALIZER MODE (QM)	NON-EIA
DS8	DATA SET READY (DSR)	CC

Fig. 3—Test Setup Using 914-Type and 903-Type DTSs

5.08 After receiving the test results from the STC, restore the data set to normal operating condition as follows.

- (1) If testing a DS 208A-L1, position the test switch to the center position and verify that the AL and DL indicators are off.
- (2) If testing a DS 208A-L1A or DS 208A-L1B, depress to release the DL switch and verify that the MR indicator is lighted.



***If the DL loopback test is successful, depress the DL switch to permit a digital loopback test to be performed when the distant end is installed. Notify the customer to leave the data set in the DL mode.***

**D. Digital Loopback Test Using a 914-Type DTS**

5.09 When instructed by the STC, this test is performed in conjunction with a distant-end data set. The distant-end data set must be in the digital loopback (DL) mode and should have been previously tested by the STC. This test verifies that data can be sent from the local transmitter to the distant-end receiver, looped back on the digital side to the distant-end transmitter, and be transmitted back to the local receiver. The received data (BB) lead at the local receiver is then checked for errors.

5.10 Perform the following procedure for the digital loopback test to distant end.

- (1) Connect the equipment and set the controls of the 914-type DTS as shown in Fig. 3.

**Note:** Verify that switch S1 (CA) is OFF.

- (2) On the data set option panel (HG9 or HG23), verify that options are installed as shown in Fig. 3.

- (3) If testing DS 208A-L1, position the test switch on the local data set to the center position and verify that both AL and DL indicators are off.

- (4) If testing DS 208A-L1A or DS 208A-L1B, ensure all switches are released and the MR indicator is lighted.

- (5) Verify that the distant-end data set is in the DL mode.

- (6) Apply power to the data set and then to the 914-type DTS.

**Requirements:** At the data set, the AL, DL, RS, and CS indicators are off and the ON indicator is lighted. At the 914-type DTS, the DS8 (CC) lamp is lighted. If the distant-end data set is optioned for continuous carrier, the data set CO indicator and the 914-type DTS DS3 (CG) and DS4 (CF) lamps are lighted. If the distant-end data set is optioned for switched request-to-send and switched carrier, the data set CO indicator is off and the ER indicator is lighted.



***Record whether the distant-end data set is optioned for switched or continuous carrier. This information will be required for the compromise equalizer test, if performed.***

- (7) At the 914-type DTS, position switch S1 to ON. This turns **on** request-to-send to the local transmitter.

**Requirements:** At the data set, the ON, RS, CS, and CO indicators are lighted; the ER, AL, and DL indicators are off. At the 914-type DTS, DS1 (CA), DS2 (CB), DS3 (CG), DS4 (CF), DS7 (QM), and DS8 (CC) lamps are lighted. The NO CLOCK and NO DATA lamps are off.

- (8) Reset the counter on the 914-type DTS by depressing the RESET switch. The counter indicates transmission errors that occur.

- (9) Verify that the test equipment is functioning properly by pulling interface selector switch 3A out on the 914-type DTS.

**Requirement:** On the 914-type DTS, the counter indicates rapidly; shortly thereafter, the NO DATA and OVERFLOW lamps light.

- (10) Depress the interface selector switch 3A.

- (11) Reset the counter to zero by depressing the RESET switch.

- (12) Conduct a 10-minute error run.

**Requirement:** Total is less than 30 block errors.

- (13) If the compromise equalizer options are *not* to be tested, restore the customer options according to the service order and restore the data station to normal.

**E. Digital Loopback Self Test to Distant End (DS 208A-L1A and DS-208A-L1B)**

5.11 This test is performed in conjunction with a distant-end data set in the DL mode that has been previously tested by the STC. The local data set is placed into the self test mode by depressing the locking ST switch. This turns on the local transmitter and applies steady marks to the data set internal SD lead. The steady marks are transmitted to the distant-end receiver, where the recovered data is looped around to the transmitter on the digital side of the data set. The distant-end transmitter now transmits this data back to the local receiver, where the ER indicator is used to indicate any errors made in transmission.

5.12 Perform the following procedure:

- (1) Verify that the distant-end data set is in the DL mode.
- (2) On the DS-208A-L1A or DS 208A-L1B option panel (HG23), verify that the following options are installed:
  - Switched request-to-send (S1C down)
  - Switched carrier (S4B down)
  - Transmitter internally timed (S3A down)
  - DAS not used (S3C down)
  - New sync not used by customer (S4C down).
- (3) Apply power to the data set.

**Requirements:** The ON and MR indicators are lighted and the RS and CS indicators are off. If the distant-end data set is optioned for continuous carrier, the CO indicator is lighted. If the distant-end data set is optioned for switched request-to-send and switched carrier, the CO indicator is off and the ER indicator is lighted.



**Record whether the distant-end data set is optioned for switched or continuous carrier. This information will be required for the compromise equalizer test, if performed.**

- (4) Depress the self-test (ST) locking switch.

**Requirements:** The ON, RS, CS, and CO indicators are lighted and the MR indicator is off. Since the ER indicator responds to errors received, it is off.

- (5) Perform a 10-minute error run.

**Requirement:** The ER indicator is off and does not blink more than an average of 3 times in any 1-minute period.

- (6) If the compromise equalizer options are *not* to be tested, restore the customer options according to the service order and return the data station to normal.

**F. Compromise Equalizer Test**

5.13 If the data set under test is optioned for switched carrier, this test is **required** on initial data set installation to determine the correct compromise equalizer option. Testing of the compromise equalizer options is **not** required if the data set is optioned for continuous carrier operation. In this case, the compromise equalizer should be set for symmetric compromise equalization (S2B up; S2C up).

5.14 When the compromise equalizer test is required, the test procedure is to be performed after the digital loopback test to distant end. The distant-end data set (master station) should have been tested previously by the STC and must be in the DL test mode.

5.15 This test determines how well a receiving data set can retrain using an 8-phase signal instead of receiving a start-up sequence. By turning *on* request-to-send at the local data set, carrier is transmitted to the distant-end data set. When the transmitted line signal is interrupted and then reestablished at the local data set, the distant-end data set is forced to retrain without receiving a start-up sequence. Since the distant-end data set is in DL mode, errors which occur at the distant-end data set will be retransmitted back to

**SECTION 592-027-500**

the local data set as the distant-end data set retrains. The number of errors occurring during the retrain is an indication of the match between the local transmitter compromise equalizer and the channel characteristics. By comparing the four options of the local transmitter compromise equalizer and selecting the one that produces the least errors at the distant-end receiver, the optimum match of the compromise equalizer to the channel characteristics is obtained.

**5.16 Perform the following procedure:**

(1) Ensure that the distant-end data set is in the DL test mode and equipped with the following options:

- Symmetric compromise equalization (S2B up; S2C up)
- Retrain automatically (S3B up)
- 1-second holdover disabled (S4A up)
- Continuous carrier (S4B up).

**Note:** These options are normally installed in a master data set on a multipoint network.

(2) Position the 914-type DTS switches and controls as shown in Fig. 4.

(3) Ensure that the following options are installed in the data set under test:

- Switched request-to-send (S1C down)
- Symmetric compromise equalization (S2B up; S2C up)
- Transmitter internally timed (S3A down)
- Retrain automatically (S3B up)
- 1-second holdover (S4A down)
- Switched carrier (S4B down)
- New sync not used (S4C down).

**Note:** Except for the compromise equalizer option, these options are normally installed in remote data sets on a multipoint network.

(4) If testing DS 208A-L1A or DS 208A-L1B, install the following additional option:

- Compromise equalizer test enabled (S1B down).

(5) Ensure that the data set under test is in the data mode (all test switches released).

(6) Apply power, first to the data set and then to the 914-type DTS.

(7) At the 914-type DTS, ensure switch S1 (CA) is OFF.

**Requirements if testing DS 208A-L1:** At the data set, RS, CS, AL, DL, and ER indicators are off. CO and ON indicators are lighted.

**Requirements if testing DS 208A-L1A or -L1B:** At the data set, MR, RS, CS, and ER indicators are off. ON and CO indicators are lighted.

(8) At the 914-type DTS, position switch S1 to ON.

**Requirements if testing DS 208A-L1:** At the DTS, DS1 (CA), DS2 (CB), DS3 (CG), DS4 (CF), DS7 (QM), and DS8 (CC) lamps are lighted. DS5 (BA) and DS6 (BB) lamps are off.

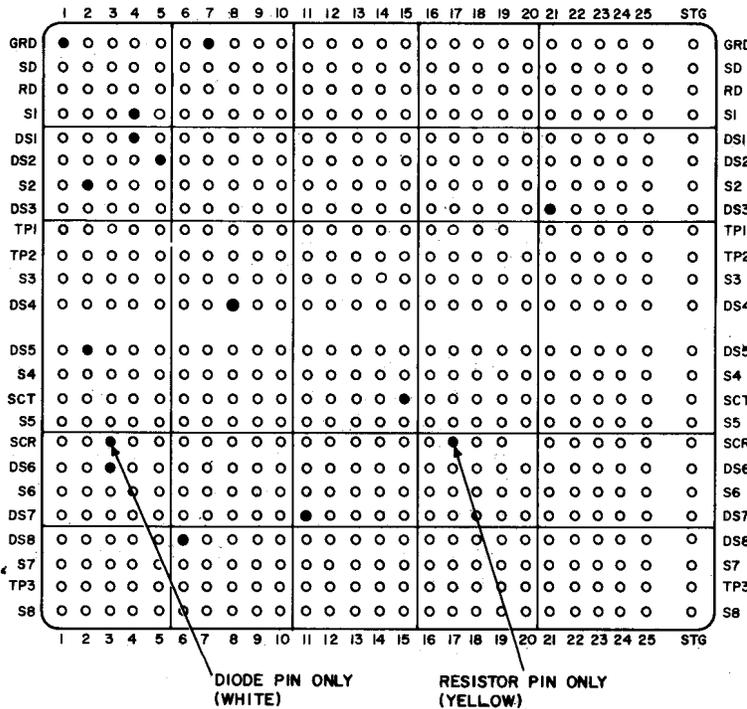
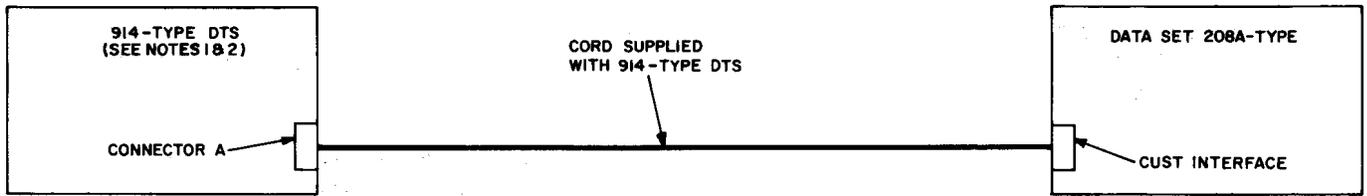
**Requirements if testing DS 208A-L1A or -L1B:** At the DTS, DS1 (CA), DS2 (CB), DS3 (CG), DS4 (CF), and DS7 (QM) lamps are lighted. DS5 (BA), DS6 (BB), and DS8 (CC) lamps are off.

**Note:** If either the ER indicator (located on the data set) or DS7 (QM) lamp (located on the DTS) blinks, discontinue testing until the blinking ceases.

(9) At the DTS, position switch S1 to OFF.

**Requirements if testing DS 208A-L1:** At the DTS, DS3, DS4, DS7, DS8, NO CLOCK, and NO DATA lamps are lighted. DS1, DS2, DS5, and DS6 lamps are off.

**Requirements if testing DS 208A-L1A or -L1B:** At the DTS, DS3, DS4, DS7, NO



NOTES:

1. SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE SELECTOR A	DEPRESSED
SWITCHES	
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER(914C); RCV SER(914B)
COUNTER	2WL
TPI TRIGGER	+ / OPEN
TP2 TRIGGER	+ / OPEN
FUNCTION	OFF
BIT RATE	EXT +
WORD LENGTH	511
S1 (CA)	OFF
S2 (BA)	OFF

2. 914 DTS INDICATORS CORRESPOND TO THE FOLLOWING INTERFACE LEADS.

LAMP	FUNCTION	EIA
DS 1	REQUEST TO SEND (RS)	CA
DS 2	CLEAR TO SEND (CS)	CB
DS 3	SIGNAL QUALITY DETECTOR	CG
DS 4	RECEIVED LINE SIGNAL DETECTOR (CO)	CF
DS 5	TRANSMITTED DATA (SD)	BA
DS 6	RECEIVED DATA (RD)	BB
DS 7	EQUALIZER MODE (QM)	NON-EIA
DS 8	DATA SET READY (DSR)	CC

Fig. 4—Compromise Equalizer Test Setup

CLOCK, and NO DATA lamps are lighted.  
DS1, DS2, DS5, DS6, and DS8 lamps are off.

- (10) At the DTS, position switches S1 and S2 to ON.
- (11) At the DTS, depress the WORD SYNC switch to MAN and release.

**Requirement:** The DTS counter indicates. If not, repeat (11) until the counter begins

indicating. After completing (11), do not depress the WORD SYNC switch for the remainder of the test.

- (12) At the DTS, position S2 to OFF.

**Requirement:** The counter stops indicating and the NO CLOCK lamp lights.

**Note:** The counter should stop indicating unless the compromise equalizer of the

distant-end data set is grossly misadjusted to the channel, the data sets are defective, or the channel is defective.

- (13) Reset the DTS counter.
- (14) If testing DS 208A-L1, remove and then reinsert HG5 CP. When HG5 CP is reinserted, the NO CLOCK lamp may turn off and the counter begin to indicate rapidly. Wait for the NO CLOCK lamp to light, if it had turned off, before removing HG5 again.

**Note:** HG5 CP must be withdrawn from the connector before being reinserted.

- (15) If testing DS 208A-L1A or -L1B, momentarily depress and release the nonlocking LP switch. When the LP switch is released, the NO CLOCK lamp may turn off and the counter begin to indicate rapidly. Wait for the NO CLOCK lamp to light, if it had turned off, before depressing the LP switch again.
- (16) Repeat (14) or (15) for a total of six times and record the cumulative indication of the DTS counter and the positions of option switches S2A, S2B, and S2C.

**Note 1:** If during the procedures the counter exceeds 99, record the trial number on which this occurs together with a count of 100 and reset the counter. (For example, if on the fourth trial the counter exceeds 99, reset the counter and continue the test. If, at the end of the sixth trial, the DTS counter indicates 46, the total for the test should be recorded as 146.)

**Note 2:** In order to reset the counter, the NO CLOCK lamp on the DTS must be lighted.

- (17) Position the compromise equalizer to the nonequalization condition (S2C down).
- (18) Reset the DTS counter.
- (19) Repeat (14) or (15) for a total of six times, with each trial allowing the DTS counter to indicate until the NO CLOCK lamp lights.

**Note:** The notes given in (14) and (16) also apply to (19).

- (20) Record the counter indication and the positions of option switches S2A, S2B, and S2C.
- (21) Position the compromise equalizer to hi-end compromise equalization (S2A up, S2B down, S2C up).
- (22) Reset the DTS counter and repeat (14) or (15) for a total of six times (each time allow the counter to indicate until the NO CLOCK lamp lights). Record the cumulative indication of the DTS counter and the positions of option switches S2A, S2B, and S2C.
- (23) Position the compromise equalizer for symmetric and hi-end compromise equalization (S2A down, S2B down, S2C up).
- (24) Reset the DTS counter and repeat (14) or (15) for a total of six times (each time allow the counter to indicate until the NO CLOCK lamp lights). Record the cumulative indication of the DTS counter and the positions of option switches S2A, S2B, and S2C.

**Requirement:** The compromise equalizer option which gives the minimum indication on the counter is the optimum. If two options give minimum but identical indications, position the word length (WL) switch on the 914 DTS to 1WL and repeat the test. Install the compromise equalizer option according to the test results.

- (25) Upon completion of the test, restore the data set options specified on the service order and return the data set to normal.

#### G. Equalizer Start-Up Test

5.17 The purpose of the equalizer start-up test is to verify that a data set which is optioned for switched carrier can start up error-free to the distant end. In order for this to occur, the following conditions must exist:

- The local data set has the correct compromise equalizer option installed.
- The data sets at each end of the circuit are functioning properly.

- The connecting channel meets the requirements given in Section 314-410-500.

**5.18** The equalizer start-up test should be performed on maintenance visits *only* when the data set is optioned for switched carrier. If switched carrier is installed in both data sets, this test must be performed at each data set. However, the compromise equalizer test should have been performed prior to this start-up test.

**5.19** This test consists of switching the CA (request-to-send) lead *on* at the local data set and counting any errors received from the distant-end data set (in DL mode) immediately after the CA lead is turned *on*. With the correct transmit compromise equalizer options, basic channel conditioning, and a working adaptive equalizer in the receiver, no errors should occur when CA is switched *on*. An error or burst of errors, occurring in response to CA being switched *on*, indicates that a receiver is not attaining equalization during the start-up sequence. Errors can result from an incorrect transmit compromise equalizer option at either end of the circuit.

#### Switched Carrier Both Directions

**5.20** This test can be performed by one telco employee at either end of the circuit. Both data sets should have been self-tested and remotely tested by the STC before the equalizer start-up test is performed.

**5.21** Perform the following procedure:

- (1) Ensure that the distant-end data set is in the DL test mode and equipped with the following options:

- Automatic retrain (S3B up)
- Switched request to send (S1C down)
- Switched carrier (S4B down).

**Note:** These options are normally installed for switched carrier operation.

- (2) At the local data set, position the 914-type DTS switches and controls as shown in Fig. 5.

- (3) Install the following options in the local data set under test:

- Switched request to send (S1C down)
- Switched carrier (S4B down)
- Internal timing (S3A down)
- Automatic retrain (S3B up).

**Note:** These options are normally installed for switched carrier operation.

- (4) Ensure that the local data set under test is in the data mode (all test switches released).
- (5) Apply power to the data set and then to the DTS.
- (6) At the DTS, position S1(CA) and S2(BA) to ON.

**Requirement:** The counter indicates rapidly.

- (7) Position S1 and S2 to OFF.
- (8) Reset the DTS counter by momentarily depressing the RESET switch.
- (9) Position S1 to ON.

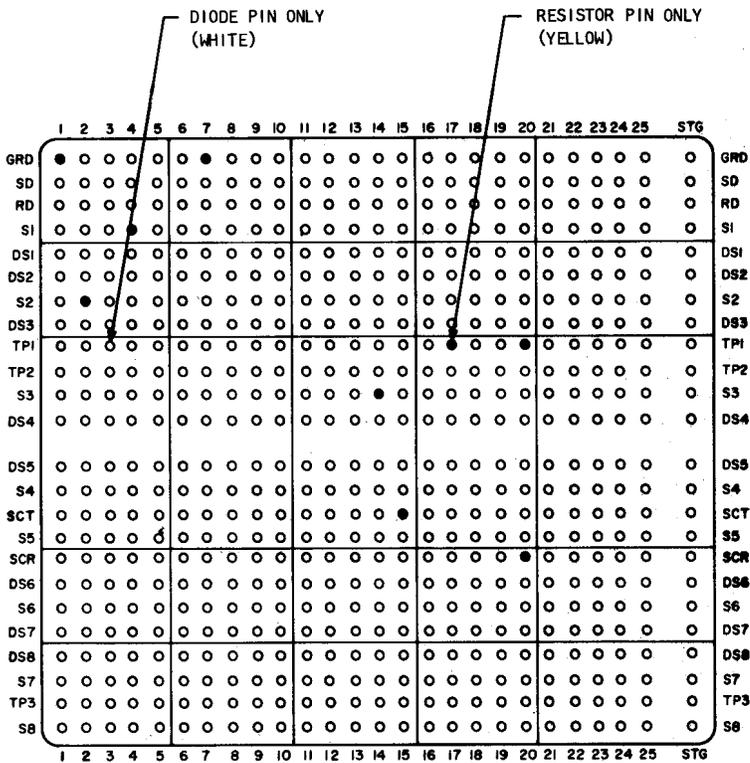
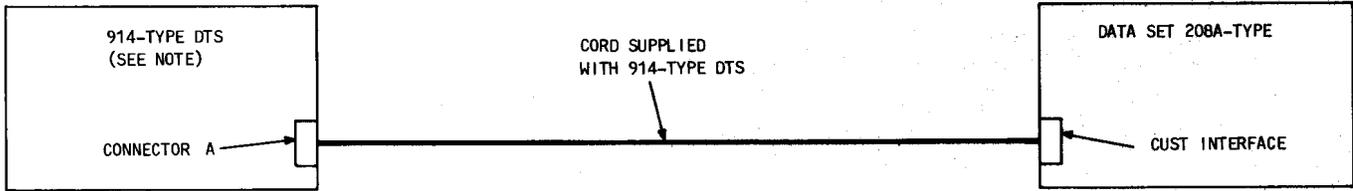
**Requirement:** The counter indicates *start-up* errors that occur immediately after CA is switched *on*.

**Note:** Disregard any transient errors that may occur when S1 is positioned to OFF. If either data set has 1-second holdover enabled (S4A up) installed, a burst of errors will occur as S1 is positioned to OFF.

- (10) If no start-up errors occur, repeat (8) and (9) for a total of six trials.



**If no start-up errors occur in six trials, the compromise equalizer option at each end of the channel is correct. In this case, leave the compromise equalizer option as installed and restore all options as specified on the service order. If start-up errors do occur, this indicates incorrect compromise equalizer**



NOTE:  
SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE SELECTOR A SWITCHES	DEPRESSED
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER(914C): RCV SER(914B)
COUNTER	INTERVAL X.1
TP1 TRIGGER	+ / OPEN
TP2 TRIGGER	+ / OPEN
FUNCTION	OFF
BIT RATE	EXT +
S1 (CA)	OFF
S2 (BA)	OFF
S3 (NS)	OFF

Fig. 5—Start-Up Test Setup

**option in the distant-end data set, the local data set, or both. The compromise equalizer option of the local data set will be checked first.**

- (11) Note the local compromise equalizer option and change to a different option.
- (12) Repeat (6) through (10) until an option is found that results in no start-up errors or until all possible options have been tried without success.
- (13) If no option is satisfactory, a telco employee must be dispatched to the distant-end data set. Each data set compromise equalizer is adjusted in turn while the data set at the other end of the channel is optioned for continuous carrier.
- (14) Perform the compromise equalizer test using the procedure given in 5.16.
- (15) When both data sets have been tested, restore them to switched carrier option and repeat (6) through (13).
- (16) If errors still occur, either the data set is defective and repair procedures given in Fig. 2 must be performed, or the channel does not meet specifications and must be tested as instructed in Section 314-410-500.
- (17) End of test. Restore data set options as specified on the service order and return to pretest conditions.

#### Switched Carrier One Direction

**5.22** This test can be performed by either of two methods. If the telco employee is located at the data set optioned for continuous carrier (master data set), this option (S4B up) can be temporarily removed and switched carrier option (S4B down) installed. Since both data sets are now optioned for switched carrier, the procedure given in 5.21 can be performed. Alternatively, if a telco employee is located at each end of the

channel, a half-duplex test can be performed as follows:

- (1) Ensure that the distant-end data set is equipped with the following options:
  - Switched request-to-send (S1C down)
  - Switched carrier (S4B down)
  - Transmitter internally timed (S3A down)
  - New sync not used by customer (S4C down).

**Note:** These options are normally installed in a remote station of a multipoint network.

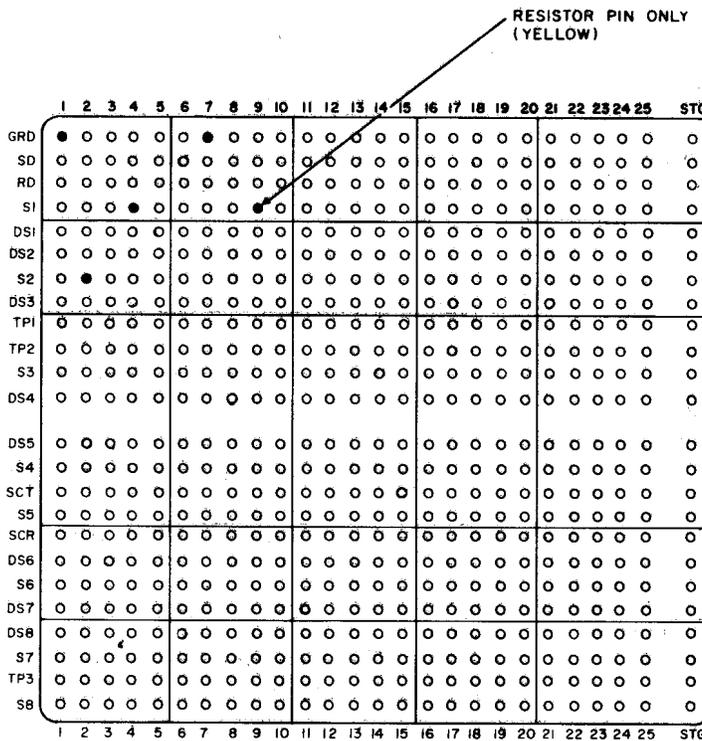
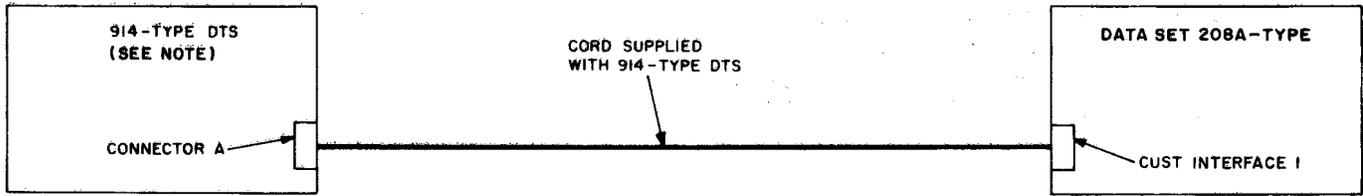
- (2) At the distant end, position the 914-type DTS switches and controls as shown in Fig. 6.
- (3) At the local end, position the 914-type DTS switches and controls as shown in Fig. 5.
- (4) Ensure that the local data set is equipped with the following options:
  - 1-second holdover disabled (S4A up)
  - Retrain automatically (S3B up)
  - Transmitter internally timed (S3A down).

**Note:** These options are normally installed in a master station of a multipoint network.

- (5) Ensure that both data sets (local and distant-end) are in the data mode (all test switches released).
- (6) Apply power to both data sets and then to both DTSs.
- (7) At the distant-end DTS, position S1 (CA) and S2 (BA) to ON.

**Requirement:** The local counter indicates rapidly.

- (8) Position S1 and S2 to OFF.
- (9) At the local DTS, reset the counter by momentarily depressing the RESET switch.



NOTE:  
SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE SELECTOR A	DEPRESSED
SWITCHES	
INTERFACE MODE	VOLTAGE
TEST SET MODE	INTERVAL (914C); RCV SER(914B)
COUNTER	INTERVAL X.1
FUNCTION	OFF
BIT RATE	2000
TPI.TRIGGER	+ / OPEN
TP2 TRIGGER	+ / OPEN
S1 (CA)	OFF
S2 (BA)	OFF

Fig. 6—Interval Test Setup

**Requirement:** NO CLOCK lamp is lighted.

(10) At the distant end, position S1 to ON.

**Requirement:** At the local end, the DTS counter indicates start-up errors that occur immediately after CA is switched *on*.

**Note:** Disregard transient errors that may occur when S1 (CA) is positioned to OFF.

(11) If no start-up errors occur, repeat (9) and (10) for a total of six trials.



*If no errors are counted in six trials, the compromise equalizer option at the distant end of the channel is correct. Restore all options as specified on the service order or record card. If start-up errors do occur, this indicates an incorrect compromise equalizer option in the distant-end data set. In this*

**case, the compromise equalizer option is the distant-end data set must be changed.**

- (12) At the distant end, note the compromise equalizer option and change to a different option.
- (13) Repeat (7) through (11) until an option is found that results in no start-up errors or until all possible settings have been tested without success.
- (14) If errors still occur, either data set may be defective or the channel may not meet requirements. Perform data set repair procedures given in Fig. 2 or test the channel per Section 314-410-500.
- (15) End of test. Remove test equipment and return to pretest conditions.

#### H. Power Supply Test

**5.23** The power supply test checks that ac voltage appears at the power supply input and then measures the +12, +5, and -12 volt supply voltages at the customer interface. The only test equipment required is a 914-type DTS and a VOM to measure the ac input voltage if a trouble occurs.

**5.24** Perform the following procedure:

- (1) Connect the data set to the 914-type DTS. The only programming pins required in the matrix are at crosspoints GRD-1 and GRD-7.
- (2) Apply power to the data set and then to 914-type DTS.

**Requirement:** The data set ON indicator lights.

- (3) If the ON indicator fails to light or lights momentarily and goes off, check the ac source voltage with a volt-ohm-milliammeter (VOM).

**Requirement:** 105 to 130 volts RMS.



**DS 208A-type is equipped with an overvoltage protection circuit in the power unit which protects the data set if the output voltages rise excessively.**

**To reset the power unit, unplug the power cord and plug it in again. The data set is also provided with a self-resetting thermal overload switch which shuts off the power unit if the power unit temperature rises excessively.**

- (4) Position the VERTICAL MONITOR switch to 9 and the RANGE switch to 30 DCV.
- (5) Position the FUNCTION switch to VOLT INT and measure the voltage on the CI9 lead (pin 9 of customer interface).

**Requirement:** 11.0 to 13.0 volts.

- (6) Position the FUNCTION switch to OFF and the VERTICAL MONITOR switch to 25.
- (7) Position the FUNCTION switch to VOLT INT and measure the voltage on the CI25 lead (pin 25 of customer interface).

**Requirement:** 4.0 to 6.0 volts.

- (8) Position the FUNCTION switch to OFF, the VERTICAL MONITOR switch to 10, and the POLARITY switch to REV.
- (9) Position the FUNCTION switch to VOLT INT and measure the voltage on the CI10 lead (pin 10 of customer interface).

**Requirement:** 11.0 to 13.0 volts.

- (10) Position the FUNCTION switch to OFF.
- (11) End of test. Remove test equipment and return to pretest conditions.

#### I. CA-CB Interval Test

**5.25** The CA-CB interval test checks both the 7.5-ms and 50-ms request-to-send/clear-to-send (CA-CB) intervals. As part of the test, the transmitter clocks and certain interface signals are checked. Although requirements are given for the two possible options, the data set under test need not be checked for proper operation of both. Check only the CA-CB interval provided by the option specified on the service order. This test is required only when the data set under test is optioned

for switched request-to-send. The only test equipment required for this test is a 914-type DTS and the 3010-ohm (yellow) pin or equivalent circuit as described in 1.05.

5.26 Perform the following procedure.

- (1) Connect the data set to the 914-type DTS and set the controls as shown in Fig. 6.
- (2) If a 914C DTS is used, position START switch to A ONLY.
- (3) Apply power to the data set and then to the DTS.
- (4) On the 914-type DTS, add red pins to the programmable matrix in the following positions: TP1-4, TP2-5.
- (5) Install the following options in the data set:
  - Switched request-to-send (S1C down)
  - Transmitter internally timed (S3A down)
  - Carrier option specified by service order [XA (S4B down) or XB (S4B up)]
- (6) On the 914 DTS, ensure that switch S1 is OFF. Reset the counter by pressing the RESET switch.
- (7) Position switch S1 to ON and record the CA-CB interval on the counter.

**Requirements:**

Option XA—45 to 52 ms

Option XB—7.0 to 8.7 ms.

**Note:** If testing option XB, position the DTS COUNTER switch to INTERVAL X.1, resulting in a meter indication of 70 to 87.

- (8) To remeasure the CA-CB interval, position switch S1 to OFF and depress the RESET switch. When S1 is positioned to ON, the CA-CB interval appears on the counter.
- (9) End of test. Remove test equipment and restore data set to normal operating condition.

**J. Transmit Level Test**

5.27 In this test, the meter on the 914-type DTS is used to measure the transmit level of the data set. The following equipment is required for this test:

- (1) One 914-type DTS
- (2) One KS-19252-L2 bridging adapter
- (3) Two B25A cables
- (4) One 66E3 connector block.
- (5) One 310 plug.

**Note:** If a DAS 829 is used, the transmit level can be measured at the TRANS MON jack on the DAS 829 by using a 310 plug. If that is possible, proceed to (5) after connection has been made.

5.28 Perform the following procedure.

- (1) Connect the DTS to the data set with the cord provided with the DTS.
- (2) If the M8K cord from the data set is connected directly to the DAS, perform the following procedure.
  - (a) Disconnect the M8K cord from the DAS.
  - (b) Connect the 50-pin side of the M8K cord to a plug on the KS-19252-L2 bridging adapter.
  - (c) Connect the connector end of a B25A cable to the remaining plug on the KS-19252-L2 bridging adapter.
  - (d) Connect the other end of B25A cable to the 66E3 connector block.
  - (e) Connect the connector end of a B25A cable to the plug on the DAS where the M8K cord was previously connected.
  - (f) Connect the other end of this B25A cable to the connector on the KS-19252-L2 adapter.

(3) If the M8K cord from the data set is connected to a B25A cable (or any extension cable), perform the following procedure.

- (a) Disconnect the M8K cord from the B25A (or extension) cable.
- (b) Connect the 50-pin side of the M8K cord to a plug on the KS-19252-L2 bridging adapter.
- (c) Connect the connector end of a B25A cable to the remaining plug on the KS-19252-L2 bridging adapter.
- (d) Connect the other end of this B25A cable to the 66E3 connector block.
- (e) Connect the connector end of a B25A cable to the cable to which the M8K cord was previously connected.
- (f) Connect the other end of this B25A cable to the connector on the KS-19252-L2 bridging adapter.

(4) On the 66E3 connector block, connect the meter input to terminals 7 and 8.

**Note:** If a D25C-61 cord or equivalent is used in a locally engineered PL termination, connect the meter input to terminals 14 and 16.

- (5) On the 914-type DTS, set the RANGE switch to 0 dB and set the FUNCTION switch to VOLT/OHM EXT.
- (6) If using the 914C DTS, position the TERM switch to IN.
- (7) Insert the red pins in the programmable matrix at the following positions: GRD-1, GRD-7, and S1-4.
- (8) Apply power to the data set and then to the DTS.
- (9) Position switch S1 to ON.
- (10) Install switched carrier option (S4B down) and switched request-to-send option (S1C down) in the data set.

(11) If testing DS 208A-L1, verify that the data set test switch is in the center (normal) position and that the AL and DL indicators are off. If testing DS 208A-L1A or -L1B, verify that all switches are in the out (normal) position.

(12) Apply power to the data set and then to the 914-type DTS. Measure the data set transmit level.

**Requirement:** -3 dBm to +3 dBm.

(13) On the 914-type DTS, position switch S1 to OFF.

**Requirement:** Transmit level drops to less than -20 dBm.

(14) End of the test. Remove the test equipment and return the data set to pretest conditions.

#### K. CG-CF Interval Test

**5.29** In this test, the interval between CG (initial detection of carrier) and CF (indication to the customer that the data set is in the proper state to receive data) is measured. The only test equipment required is the 914-type DTS and the yellow pin (3010 ohms) or the special circuit as described in 1.05.

**5.30** Perform the following procedures.

- (1) Connect the data set to the 914-type DTS and position the controls as shown in Fig. 6.
- (2) If a 914C DTS is used, position START switch to A ONLY.
- (3) Install switched request-to-send (S1C down) and switched carrier (S4B down) options.
- (4) Apply power to the data set and then to the 914-type DTS.
- (5) Place the DS 208A-type in the AL mode.
- (6) At the 914-type DTS, add red pins to the programmable matrix positions TP1-21 and TP2-8.

(7) Verify switch S1 is positioned to OFF. Reset the counter by depressing the RESET switch.

(8) Position switch S1 to ON and read the CG-CF interval on the counter.

**Requirement:** 38.0 to 44.0 ms.

(9) To remeasure the CG-CF interval, position switch S1 to OFF and reset the counter. Position switch S1 to ON and read the CG-CF interval on the counter.

(10) End of test. Remove test equipment and return the data set to pretest conditions.

#### L. End-to-End Self Test (DS 208A-L1A and DS 208A-L1B Only)

**5.31** The performance of the data channel is quickly tested by the end-to-end self test. Depressing the ST switch on both data sets conditions the respective transmitters to transmit steady marks. At both receivers, test circuits enable the ER indicator to be used to indicate any errors made in transmission. This test checks the transmitter and receiver of both data sets and the two directions of transmission of the connecting facility. The customer interface circuits are not tested by the end-to-end self test.

**5.32** Perform the following procedure for the end-to-end self test.

(1) Ensure that the data sets are connected to the facility and that ac power is applied.

**Requirement:** ON and MR indicators are lighted.

(2) Depress the ST switch on each data set.

**Requirement:** ON, RS, CS, and CO indicators are lighted. MR and ER indicators are off.

(3) Perform a 5-minute error run.

**Requirement:** Acceptable performance is indicated by a total of 15 or fewer blinks of the ER indicator.

(4) End of test. Restore both data sets (local and distant-end) to normal operating condition.

#### M. End-to-End Test Using 914-Type DTS

**5.33** The end-to-end test is performed when it is necessary to identify facility troubles which the data set has been occasionally experiencing over a period of time. This test checks the transmitter and receiver of both data sets and the two directions of transmission of the connecting facility. The end-to-end test consists of transmitting a random word and establishing an error rate at the receiving end. The block size is measured in approximately 1000-bit blocks.

##### *End-to-End Test (Duplex)*

**5.34** Perform the following procedure for a duplex end-to-end test using a 63- or 511-bit random word.

(1) Connect equipment at both data set locations and set the controls of the 914C DTS as shown in Fig. 3.

**Note:** This test is written to make use of a 914C DTS. If a 914C DTS is not available, connect a 903-type DTS to a 914B DTS as shown in Fig. 3.

(2) Apply power to the data set and then to the 914-type (903-type) DTS.

(3) At the 914-type DTS, position S1 (CA) to ON.

(4) Establish voice communications between the data stations and verify that neither of the data sets is in a test mode.

(5) If using a 903-type DTS, depress and release the START switch.

**Requirements:** At each data set, the ON, MR, RS, CS, and CO indicators are lighted. The ER indicator is off. At each 914-type DTS, the DS1, DS2, DS3, DS4, DS5, DS6, and DS8 lamps are lighted.



**The attendant at each data station must verify that NO DATA and NO CLOCK lamps are off. This indicates that a valid connection has been established between data stations. If either lamp lights during the test, the test must be restarted.**

- (6) At both data stations, simultaneously depress the DTS RESET and perform a 10-minute error run and record the total errors.

**Requirement:** Total errors are fewer than 30 block errors.

- (7) End of test. Restore the data set to normal operating condition. Verify that the correct options are installed in the data set before notifying the customer that service is restored.

### **End-to-End Test (Half-Duplex)**

**5.35** Perform the following procedure for a half-duplex end-to-end test using a 63- or 511-bit random word.

- (1) Connect equipment at both data set locations and set the controls of the 914-type DTS as shown in Fig. 3.

**Note:** The 903-type DTS is not required for a half-duplex test.

- (2) Apply power to the data set and then to the 914-type DTS.
- (3) On the 914-type DTS at the transmitting end only, position S1 (CA) to ON.
- (4) Establish voice communications between the data stations and verify that neither of the data sets is in a test mode.
- (5) On the 914-type DTS at the transmitting end only, position the TEST SET MODE switch to TRMT SER (914B DTS) or SER (914C DTS).
- (6) On the 914-type DTS at the receiving end only, position the TEST SET MODE switch to the RCV SER (914B DTS) or SER (914C DTS).

**Requirement:** See Table D.



**The attendant at the receiving station should verify that NO DATA and NO CLOCK lamps are off. This indicates that a valid connection has been established between data stations. If either lamp lights during the test, the receiving station attendant**

**must contact the transmitting station and agree to retest.**

- (7) On the 914-type DTS at the receiving end, depress the DTS RESET and perform a 10-minute error run and record the total errors.

**Requirement:** Total errors are fewer than 30 block errors.

- (8) At the end of the prearranged time interval, establish voice communication to discuss the test results and agree to repeat the end-to-end test in the opposite direction if necessary. The transmitting data station now becomes the receiving data station. Repeat (5) through (7).

- (9) End of test. Restore the data set to normal operating condition. Verify that the correct options are installed in the data set before notifying the customer that service is restored.

## **6. SUPPLEMENTARY TEST**

**6.01** This test is not required for either installation or maintenance, but is designed to aid in locating a source of intermittent errors introduced into the data communication channel.

### **Ground Noise Test**

**6.02** If the data set and CPE are not at 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 6H impulse counter.

**Note:** For information pertaining to the 6H impulse counter, refer to Section 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 Section 103-620-100.

**6.03** Connect the 6H impulse counter and perform the test as follows.

- (1) Use a 2W6A test cord or equivalent (310 plug on one end; alligator clips connected to tip and ring on the other end). 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

TABLE D

## TRANSMIT - RECEIVE TEST REQUIREMENTS

TRANSMITTER								RECEIVER							
208A-L1				208A-L1A OR -L1B				208A-L1				208A-L1A OR -L1B			
INDICATORS ON DATA SET		INDICATORS ON 914 DTS		INDICATORS ON DATA SET		INDICATORS ON 914 DTS		INDICATORS ON DATA SET		INDICATORS ON 914 DTS		INDICATORS ON DATA SET		INDICATORS ON 914 DTS	
ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
ON	CO*	DS1 (CA)	DS3 (CG)	ON	CO*	DS1 (CA)	DS3 (CG)	ON	RS	DS3 (CG)	DS1 (CA)	ON	RS	DS3 (CG)	DS1 (CA)
RS	AL	DS2 (CB)	DS4 (CF)	MR		DS2 (CB)	DS4 (CF)	CO	CS	DS4 (CF)	DS2 (CB)	MR	CS	DS4 (CF)	DS2 (CB)
CS	DL	DS5† (BA)	DS6 (BB)	RS		DS5† (BA)	DS6 (BB)		ER	DS5‡ (BA)	DS5§ (BA)	CO	ER	DS5‡ (BA)	DS5§ (BA)
ER		DS8 (CC)	DS7 (QM)	CS		DS8 (CC)	DS7 (QM)		AL	DS6† (BB)				DS6† (BB)	
				ER					DL	DS7 (QM)				DS7 (QM)	
										DS8 (CC)				DS8 (CC)	

\* If the receiving end data set is equipped with continuous carrier, the CO indicator will be lighted and the ER indicator will be off.

† Dimly lighted (random data appears on these leads).

‡ If 914C DTS is used, this indicator will be dimly lighted.

§ If 914B DTS is used.

	SECTION	TITLE
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.	103-620-100	J94006A (6A) Impulse Counter—Description, Operation, and Maintenance
(3) Connect one clip of the 2W6A cord to switch 1A and connect the other clip to switch 1B. Verify that power is applied to data set and CPE.	103-620-101	6H and 6HR Impulse Counters (J9006H and J9006HR)—Description, Operation, and Maintenance
(4) Insert the 310 plug into the 310 MEAS jack on the 6H impulse counter.	314-410-500	Private Line Data Circuits—Voice Bandwidth Circuits for Miscellaneous Data—Overall Tests and Requirements
(5) On the 6H impulse counter, position the DIAL-MEAS switch to MEAS and the DBRN dial to 90.	592-027-100	Data Set 208A-Type—Transmitter-Receiver—Description and Operation
(6) Reset the counter on the 6H impulse counter to 0.	592-027-150	Data Set 208A-Type—Transmitter-Receiver—Supplementary Information
(7) Position the MINUTES control to 15. After the 15-minute test has elapsed, record the number of indications on the counter.	592-027-300	Data Set 208A-Type—Transmitter-Receiver—Installation and Connections
(8) Remove clips of 2W6A cord from 1A and 1B and connect to 7A and 7B.	592-027-501	Data Set 208A-Type—Transmitter-Receiver—Test Procedures Using 921A Data Test Set
(9) Reset the counter on the 6H impulse counter to 0.	598-080-500	Data Auxiliary Set 828A—Data Service Unit—Maintenance and Test Procedures
(10) Position the MINUTES control to 15. After the 15-minute test has elapsed, record the number of indications on the counter.	598-082-500	Data Auxiliary Set 829-Type Channel Interface Units—Voiceband Private Line Channels—Test Procedures
<b>6.04</b> 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 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.	666-511-503	Test of Data Service Provided by Data Set 208A-Type from a Private Line Test Room
	666-511-504	Test of Data Service Provided by Data Set 209A-L1 from a Private Line Test Room
<b>7. REFERENCES</b>	999-100-105	Data Set 208A-Type—How to Operate Manual
<b>7.01</b> The following Bell System Practices provide additional information pertaining to test procedures for DS 208A-type.		