

**DATA SET 208BR-L1C TRANSMITTER-RECEIVER
TEST PROCEDURES USING THE
914-TYPE DATA TEST SET (DTS)**

CONTENTS	PAGE	CONTENTS	PAGE
1. GENERAL	2	REPAIR PROCEDURE TESTS USING SINGLE 914 DTS AT LOCAL END	12
2. TEST FACILITIES AVAILABLE	2	G. Power Supply Test	12
A. Self-Test Features	2	H. Automatic Answer Test	14
B. Tests Using Single 53A1 Data Unit at Local End	4	I. CA-CB Interval Test	15
C. Tests Using 914-Type DTS at Local End	4	J. Transmit Level Test	15
D. Remote Test From DTC	4	K. CA-CF Interval Test	17
3. INSTALLATION TESTING	4	L. Analog Loopback Start-Up Test	17
4. CLEARING TROUBLE REPORT AND MAINTENANCE TESTING	5	M. Analog Loopback Test Using a Pseudo-Random Word	18
5. TEST PROCEDURES	8	N. Remote Start-Up Test (Remote DS 208B-L1B or 208BR-L1C Only	20
TRUE SELF TESTS	8	DATA ERROR TESTS USING TEST SETS AT BOTH ENDS	21
A. Analog Loopback Self Test (Steady State)	8	O. End-to-End Start-Up Tests With 53A1 Data Units	21
B. End-to-End Self Test (Error Run)	8	P. End-to-End Start-Up Test Using 914 DTSs	21
C. End-to-End Self Test (Start-Up)	11	Q. End-to-End Test Using a Pseudo-Random Word	22
D. End-to-End Self Test (Remote Start-Up)	11	R. Start-Up Test Using 53A1 DU at Far End and 914-Type DTS at Near End	23
TESTS USING 53A1 DATA UNIT AT LOCAL END	12	MISCELLANEOUS TESTS	23
E. Analog Loopback Start-Up Test	12	S. Remote Test From DTC	23
F. Remote Start-Up Test	12		

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CONTENTS	PAGE
T. Ground Noise Test Using 914 DTS and 6H Impulse Counter	24

1. GENERAL

- 1.01 This section contains procedures to be used when testing data set (DS) 208BR-L1C on an initial installation, during a maintenance visit, or when investigating reported trouble.
- 1.02 When this section is reissued, the reason for reissue will be presented in this paragraph.
- 1.03 Routine maintenance is not required for DS 208BR-L1C. Local data set repairs should be limited to circuit pack (CP) replacement. It is recommended that the data set *not* be returned to the distributing house for CP replacement.
- 1.04 The CP complement for DS 208BR-L1C is listed in Table A. The D-180881 maintenance kit contains spare CPs as listed in Table A.

TABLE A

CIRCUIT PACK COMPLEMENT FOR DS 208BR-L1C

CIRCUIT PACK CODE	QUANTITY PER DATA SET
HG2B	1
HG3B	1
HG4B	1
HG11B	1
HG12B	2
HG13B	1
HG14C	1
HG15C	1
HG16C	1
HG20B	1
HG21B	1
HG22B	1
HG26B	1
HG27B	1

- 1.05 To gain access to the CPs, remove front cover and locking bar. Remove circuit packs by pulling forward on plastic tab. To replace a

CP, align it in the proper slot and push gently into place. Replace locking bar before replacing front cover. It is not necessary to remove power from the data set prior to removal of CPs or interface connectors.

2. TEST FACILITIES AVAILABLE

- 2.01 Test circuitry built into DS 208BR-L1C permits testing the data set in analog loopback and end-to-end modes without the use of external test equipment. The same tests can also be made in greater depth using the 53A1 data unit (DU) and/or the 914-type data test set (DTS). Remote test circuitry enables the data set to be tested and evaluated by telephone company (telco) data test center (DTC) personnel.

A. Self-Test Features

- 2.02 The self-test features of the data set make use of pushbutton switches and lamps on the front of the data set. For a description of switches and lamps, refer to the section entitled Data Set 208BR-L1C Transmitter-Receiver—Description and Operation (592-038-100). Table B gives the test switch positions and lamp status during test and normal operation.

Lamp Test

- 2.03 The lamp test (LP) switch is a nonlocking button which when depressed lights the TR, MR, RS, CS, CO, and ER lamps to ensure proper operation of these lamps. The LP switch can be depressed at any time, as it does not affect normal data set operation. The LP switch is also used to inject errors (spaces) for test purposes. This feature is enabled only when the ST switch is depressed.

Analog Loopback Test

- 2.04 The analog loopback test checks operation of the terminal equipment with the data set by allowing the terminal to loop back test signals through the data set. The terminal should be connected to the data set, the DSR-*on*-in-AL-mode option should be installed in the data set, and the AL switch on the data set should be depressed to perform the test. The terminal should be able to operate full duplex and verify that the test signal is being sent through the local data set and back to the terminal without errors. This test can also

TABLE B

DATA SET 208BR-TYPE SWITCH POSITIONS AND LAMP STATUS

SWITCH OR LAMP	NORMAL OPR.	ALST	END-TO-END* SELF TEST		REMOTE TEST	ANALOG LOOPBACK TEST	LAMP TEST
			XMT END	RCV END			
LP Switch†		Note 1	Note 1				X
AL Switch†		X				X	
ST Switch†		X	X	X			
RO Switch†				X			
RT Switch†					X		
ON Lamp	ON	ON	ON	ON	ON	ON	ON
TR Lamp	Note 2	OFF	ON	ON	ON	Note 2	ON
MR Lamp	Note 3	OFF	ON	ON	ON	ON	ON
RS Lamp	Note 4	ON	ON	OFF	Note 5	Note 4	ON
CS Lamp	Note 6	ON	ON	OFF	Note 6	Note 6	ON
CO Lamp	Note 7	ON	OFF	ON	Note 7	Note 7	ON
ER Lamp	Note 8	Note 9	ON	Note 9		Note 8	ON

* Or end-to-end start-up test.

† X = switch depressed; blank = switch not depressed.

Note 1: Depress LP switch to inject errors (steady space).

Note 2: Under control of customer interface.

Note 3: Monitors state of CC circuit. MR lamp will be ON when CC-ON-IN-AL-mode option is in set and AL switch is depressed, or when set is in data mode.

Note 4: ON when line signal is being transmitted.

Note 5: ON for approximately 2 seconds after CO lamp goes OFF.

Note 6: ON after completion of CA-CB interval (50 or 150 ms). Stays ON for completion of data transmission.

Note 7: ON when line signal is being received.

Note 8: ON when CO lamp is OFF. When CO lamp is ON, indicates state of adaptive equalizer. When both CO and ER lamps are ON, equalizer is retraining.

Note 9: OFF except when errors occur.

Note 10: ON when CO lamp is OFF. When CO lamp is ON, ER lamp is OFF except when errors occur.

be performed with the aid of a 53A1DU instead of the terminal. Refer to Section 590-100-138.

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. Depressing the AL button connects the data set transmitter to its own receiver through an internal pad on the data set side. Depressing the ST button forces the internal request-to-send (CA) *on*, transmits a steady mark on data set BA lead and enables the ER lamp to be used to indicate received errors (spaces). Depressing the LP switch causes steady spaces to be sent.

End-to-End Self Test

2.06 The end-to-end self-test mode is entered, after a call connection has been established, by depressing the ST switch at the transmitting end and the ST and RO (receive only) switches at the receiving end and then transferring to data mode. This conditions the transmitting end to transmit steady marks. The ER lamp at the receiving end indicates any errors made in transmission. The direction of transmission can be reversed by releasing the RO switch at the receiving end (which now becomes the transmitting end) and depressing the RO switch at the transmitting end (which now becomes the receiving end). Depressing the LP switch causes steady spaces to be sent which are detected as errors at the receiving end.

B. Tests Using Single 53A1 Data Unit at Local End

2.07 A series of tests can be made using the same options that the customers uses. The 53A1 DU is recommended for use on customer premises to aid in isolating causes of start-up errors between data set, terminal, and line. The DU provides a nearly complete test of the data set and facility because it simulates customer terminal operation. With the DU replacing the terminal at the customer interface, the following tests may be made:

- Analog loopback
- End-to-end—with 53A1 DU at both ends

- Remote test—with 53A1 DU at near end only
- Far-end-to-914 DTS—with 53A1 DU at far end.

Refer to Section 590-100-138 for further details.

C. Tests Using 914-Type DTS at Local End

2.08 In this series of tests, the 914-type DTS is used to provide a more thorough test of the data set. By using the 914-type DTS, the customer interface is checked and facilities are available to perform an actual error count.

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

D. Remote Test From DTC

2.09 The RT switch is the only switch depressed. The remaining operations are performed by the DTC, which reports the results at the end of the test. When testing is completed, the DTC must send a minimum of 3 seconds of space signals for automatic disconnect.

3. INSTALLATION TESTING

3.01 Before proceeding with tests, verify that the channel is installed and meets requirements specified in the section entitled Data Systems—DATA-PHONE® Service and Data Access Arrangements on Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines (314-205-501) (DATAPHONE Type III).

3.02 Perform the sequence of tests shown in Fig. 1.

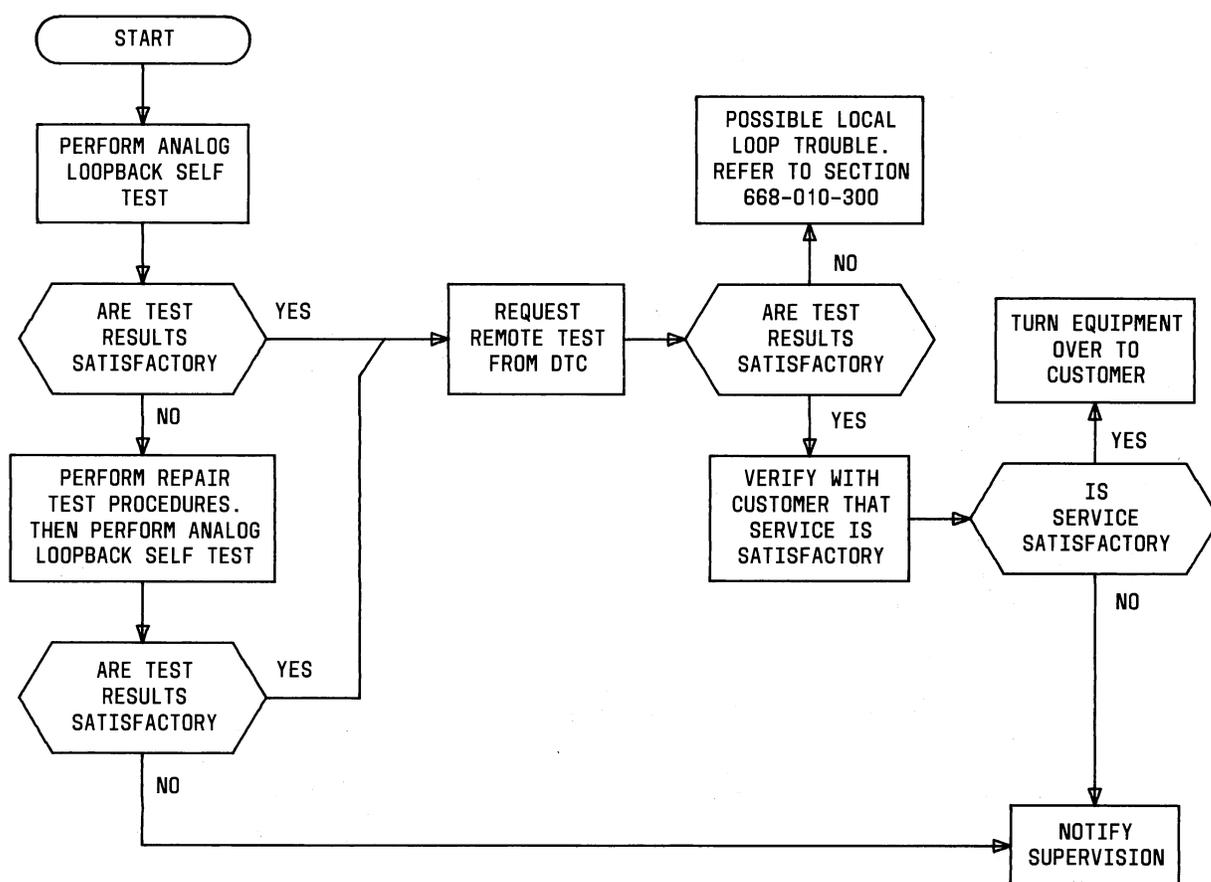


Fig. 1—Installation Test Sequence

4. CLEARING TROUBLE REPORT AND MAINTENANCE TESTING

4.01 The first step in clearing a trouble report is to isolate the fault to the data set, transmission facilities, or customer equipment. This is done by following the flowchart in Fig. 2. If tests indicate that the data set is at fault, a telco employee must be dispatched to the data set to conduct more extensive tests, as shown in Fig. 3. The following maintenance aids should be taken to the data station on a maintenance visit:

- 914C DTS or 914B DTS and 903-type DTS
- 53A1 data unit (optional)
- 6H impulse counter or equivalent
- KS-14510 volt-ohm-milliammeter (VOM) or equivalent

- D-180881 maintenance kit.

4.02 To assure proper and complete repair of defective data sets in the field, a first-hand evaluation of the problem in the original environment is necessary, to maintain product reliability. Once the trouble has been isolated to the data set, the repair test procedures in Fig. 4 should be used to isolate the trouble within the data set to a particular CP. It is assumed that the self-test procedures have been applied by the customer and have been unsuccessful prior to dispatching a telco employee to the customer premises. If a dispatch is necessary the following procedure is recommended.

4.03 At customer premises, follow the maintenance test sequence outlined in Fig. 3. If CP replacement is necessary, remove the suspected CP and insert a replacement per Fig. 4. If the trouble **clears**, reinsert the original CP to observe whether or not the trouble will reappear. The

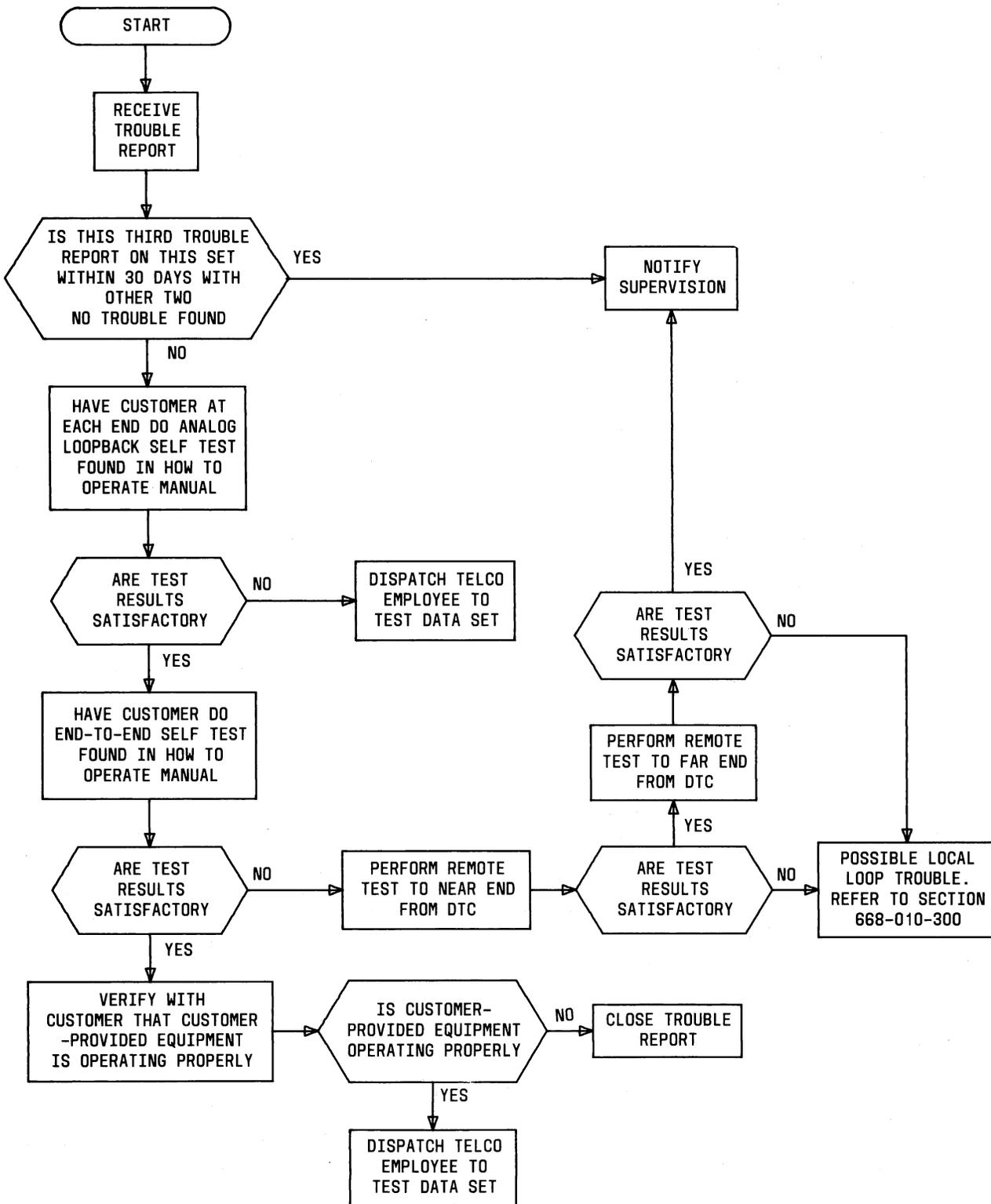


Fig. 2—Clearing Trouble Report

4.04 If the trouble persists and a cause cannot be found at the customer premises, it is recommended that the set be taken to a local test station where more intensive tests may be performed. If the trouble is still not found and specifically identified, the data set should be returned to the factory for testing and repair. When a CP is returned, carefully pack the CP in the shipping carton supplied with the maintenance kit. Mark the carton with data set code, CP code, and date of manufacture. For example:

DATA SET 208BR-L1C

CP HG27B II '78

Send the properly packed and marked carton to the telco supplies operation group and notify that group in the normal manner that a replacement CP is needed.

4.05 It is evident that in all the tests, one of the CP replacements recommended is HG27B. This is the interface CP and the majority of data and control signals appear on this CP. If HG27B (or any other CP) has been replaced earlier in the test and further on it is a recommended replacement again, omit that replacement and proceed to the next CP in the CP replacement list in Fig. 4.



When CP HG27B is replaced, install correct options before proceeding with test. Refer to Section 592-038-200 for option information.

4.06 After the data set has been repaired and tested, verify to the customer that service is satisfactory by allowing the customer to make a data call.

5. TEST PROCEDURES

5.01 This part provides a description of the various test procedures and a step-by-step procedure 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.

TRUE SELF TESTS

A. Analog Loopback Self Test (Steady State)

5.03 The analog loopback self test provides a test of the data set without the use of external test equipment.

5.04 Perform the following procedure.

- (1) Apply power to the data set.
- (2) Depress LP switch.

Requirement: All lamps are lighted.

- (3) Depress AL switch first, then depress ST switch.

Requirement: ON, RS, CS, and CO lamps are lighted. ER, MR, and TR lamps are extinguished.

Note: The ER lamp must extinguish immediately after the CO lamp lights. If there is a delay, the data set is defective. If the ER lamp is lighted or blinks, the data set has failed the analog loopback self test.

- (4) Depress LP switch to inject errors.

Requirement: ER lamp lights.

- (5) End of test. Depress to release AL and ST switches to restore set to its normal operating condition.

B. End-to-End Self Test (Error Run)

5.05 This test checks the operation of both far-end and a near-end data set and the telephone channel.

5.06 Perform the following procedure.

- (1) Call the far-end data set and arrange to perform the end-to-end self test.
- (2) Request that the ST switch be depressed on the far-end data set, and that the far-end data set be transferred to data mode by depressing the DATA button on the telephone set.

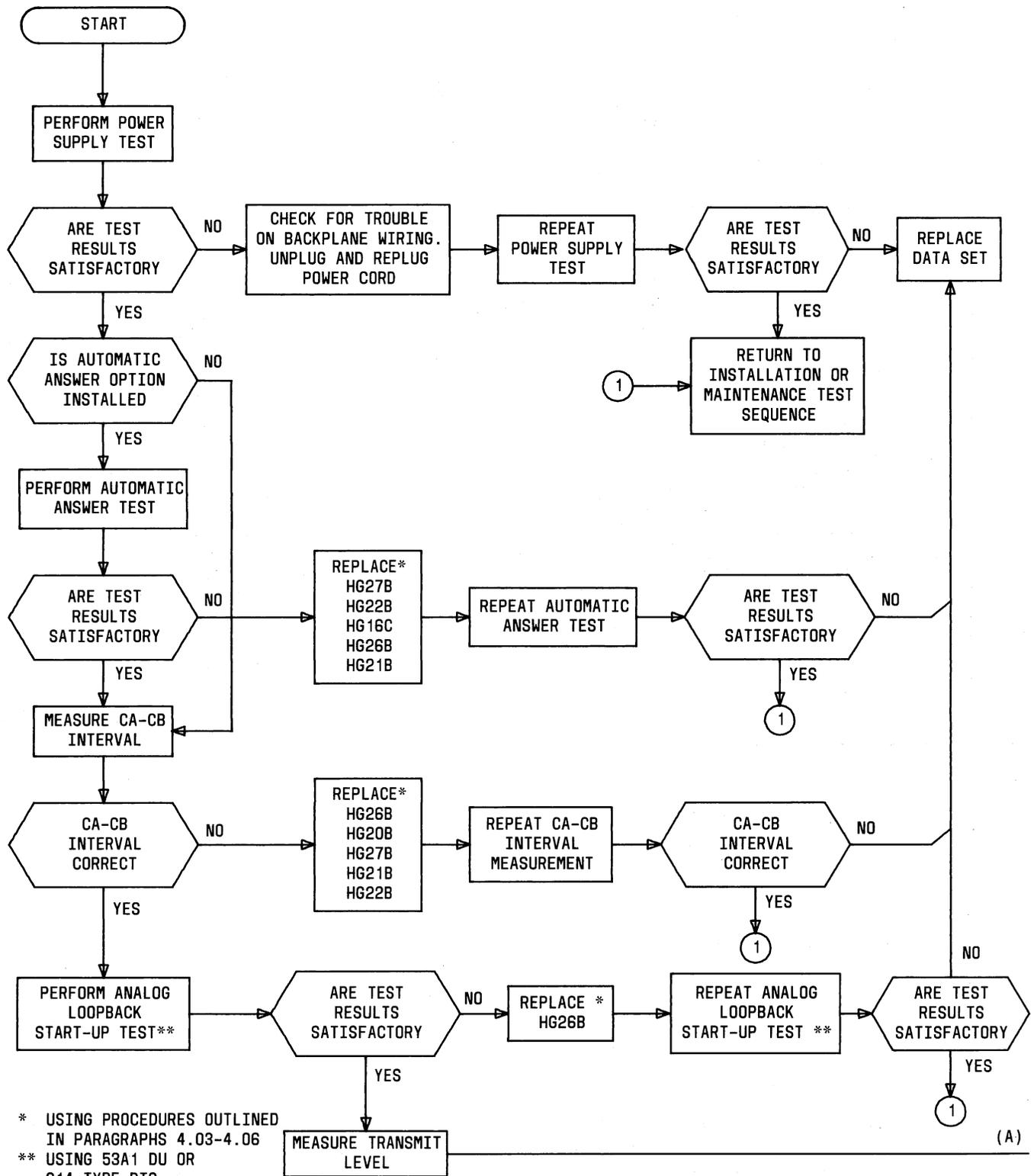
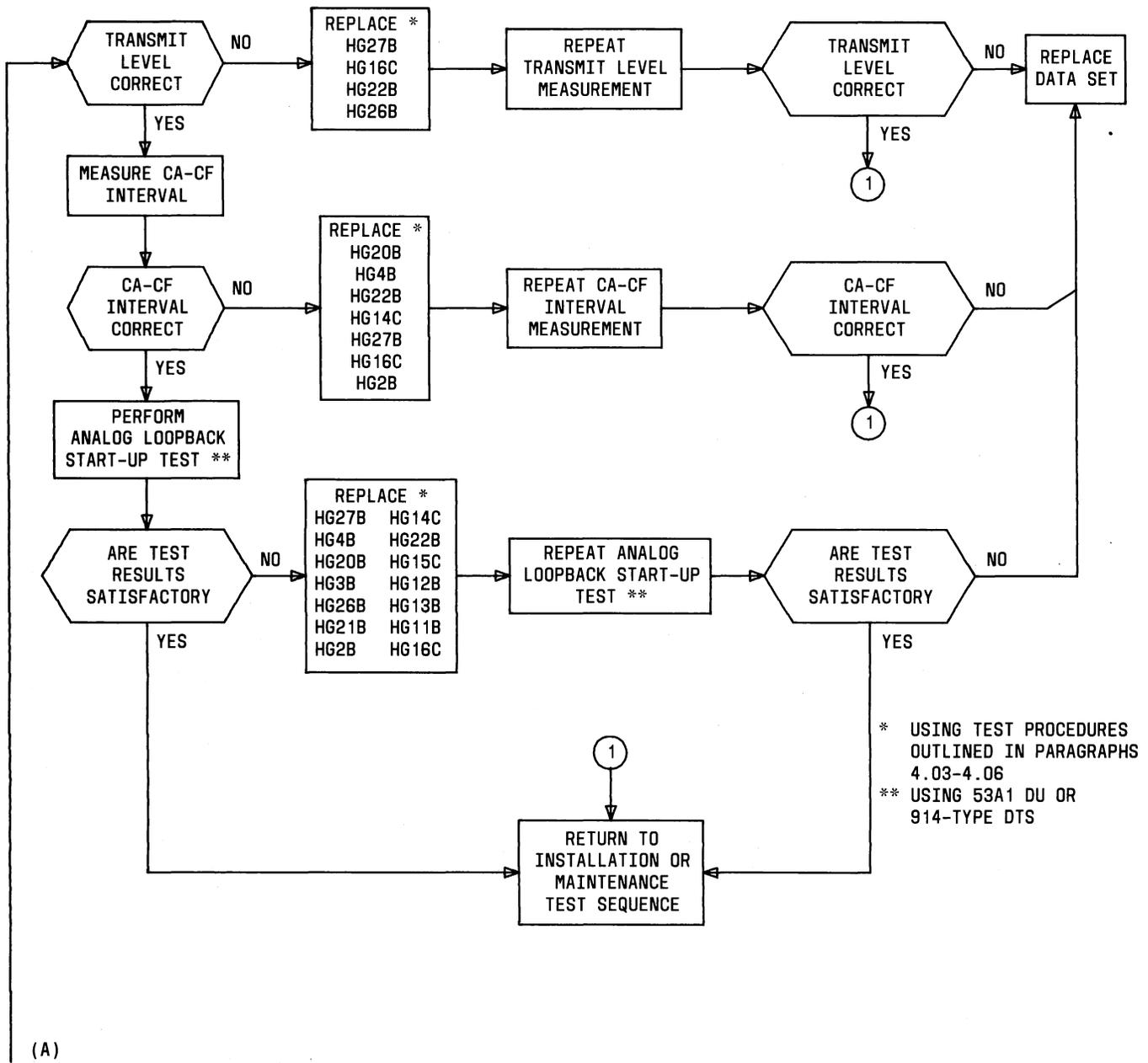


Fig. 4—Repair Test Procedures (Sheet 1 of 2)



* USING TEST PROCEDURES OUTLINED IN PARAGRAPHS 4.03-4.06
 ** USING 53A1 DU OR 914-TYPE DTS

Fig. 4—Repair Test Procedures (Sheet 2 of 2)

Requirement: The ON, RS, CS, and ER lamps on the far-end data set are illuminated. The TR and MR lamps are illuminated.

Requirement: The ON and CO lamps are illuminated. The RS, CS, and ER lamps are extinguished. The TR and MR lamps are illuminated.

(3) Depress ST and RO switches on near-end data set, and then transfer to data mode by depressing the DATA button on the telephone set.

(4) Conduct at least a 5-minute error run.

Requirement: The ER lamp on the near-end data set remains extinguished and does not

blink more than an average of three times in any 1-minute period.

- (5) At a prearranged time, the attendant at the **far-end** data set should depress the LP switch after the 5-minute error run.

Requirement: ER lamp lights on near-end data set.

- (6) After a prearranged time, return to talk mode to discuss results of test. If the test failed for any reason, terminate the call, place a second call to involve a different connecting path, and repeat the test.

- (7) To repeat the test in the opposite direction, have the RO button depressed on the far-end set, release the RO button on the near-end data set, and return both data sets to data mode.

Requirement: The near-end data set meets the requirements of step (2) and the far-end data set meets the requirements of steps (3), (4), and (5).

- (8) End of test. Return data sets to their normal operating condition by releasing the ST buttons and the RO button at the end where it had been depressed.

C. End-to-End Self Test (Start-Up)

5.07 This test checks the start-up performance with the 4-dB and 8-dB slope compromise equalizers.

5.08 To perform the end-to-end start-up test perform the following procedure.

- (1) Call a distant data set and arrange for the test. (The distant data set should be one the customer will normally call or receive calls from.)
- (2) Request that the ST switch be depressed on the distant end data set, and that the data set be transferred to data mode.

Requirement: The ON, RS, CS, and ER lamps on the distant data set are illuminated. The TR and MR lamps are illuminated.

- (3) Depress ST and RO switches on the local data set, then transfer to data mode by depressing the DATA button on the telephone set.

Requirement: The ON and CO lamps are illuminated. The TR and MR lamps are illuminated. The ER lamp will flash each time an error is detected.

- (4) Install the 4-dB slope compromise equalizer (option WU). Request the distant operator to depress and release RO at 5-second intervals for 1 minute.

Requirement: Observe that the local CO lamp illuminates at the same time the ER lamp is extinguished, without flickering.

- (5) If the ER lamp flickers more than twice during the start-up interval [step (4)], install the 8-dB slope compromise equalizer (option ZS) and repeat step (4).

- (6) If one slope produces substantially less flicker of the ER lamp than the other slope, use the slope compromise equalizer producing the least flicker. Unless the 8-dB slope compromise equalizer produces **significantly** less flicker of the ER lamp, use the 4-dB slope compromise equalizer (option WU).

- (7) End of test. Return data sets to normal by having the distant end operator release the ST switch, and release the ST and RO switches on the local data set.

D. End-to-End Self Test (Remote Start-Up)

5.09 This procedure tests a **remote** data set by making use of the ST and RO switches on a near-end data set to send blocks of data to a far-end data set, which is in remote test mode. Start-up errors made at the far-end data set will cause SPACE signals to be returned to the local data set. A MARK (no errors) will cause the near-end ER lamp to remain extinguished; a SPACE (one or more errors) will cause the near-end ER lamp to illuminate. If the ER lamp illuminates as a result of one operation of the RO switch, it is counted as one error.

5.10 Perform the following procedures:

- (1) Have the far-end data set placed in RT mode.
- (2) Depress ST and RO switches on local data set.
- (3) Call the far end, check for auto answer, then go to DATA mode.
- (4) Release RO (RS = *on*) for at least 2 seconds to send blocks of data to the far end. The data set under test (far-end) samples RD for 1.25 seconds (6000 bits), beginning on a positive transition of COD.
- (5) Depress RO (RS = *off*) to receive 2-second MARK (no errors) or SPACE (one or more errors) from the far end. (MARK = ER lamp extinguished when CO lamp is lighted; SPACE = ER lamp lighted when CO lamp is lighted.)
- (6) Repeat steps (4) and (5) a minimum of 19 times, (ie, 20 blocks of data).

Requirement: No more than 1 error in 20 blocks.

- (7) If more than 1 block in 20 is reported in error at the far end, the test should be extended to 100 times, or a more specific test such as subpart N should be used.

Requirement: No more than 6 errors in 100 blocks.

- (8) At near end, quickly depress and release the LP switch within 1.25 seconds after RO is released. This should force an error and cause a SPACE to be returned. Since LP *in* and RO *out* cause a steady space to be transmitted, the LP switch should not be depressed for more than 2 seconds after RO is released, or the far end will go on-hook and auto answer will be inhibited. RT switch at far end must be released before auto-answer is reestablished.

TESTS USING 53A1 DATA UNIT AT LOCAL END

E. Analog Loopback Start-Up Test

5.11 Using a 53A1 data unit in place of the customer terminal at the local end, perform

an analog loopback start-up test in accordance with the section entitled "53A1 Data Unit—Description, Operation, and Tests" (590-100-138).

F. Remote Start-Up Test

5.12 Using a 53A1 data unit in place of the customer terminal at the local end, perform a remote start-up test in accordance with Section 590-100-138.

REPAIR PROCEDURE TESTS USING SINGLE 914 DTS AT LOCAL END

G. Power Supply Test

5.13 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 volt-ohm-milliammeter (VOM).

5.14 Perform the following procedure.

- (1) Connect the data set to the 914-type DTS as shown in Fig. 5. 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 lamp lights.

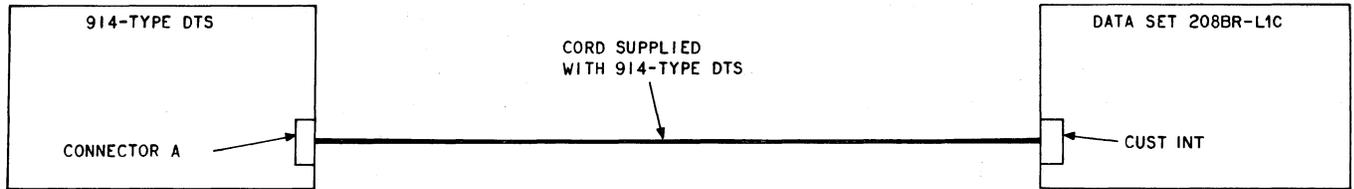
- (3) If the ON lamp fails to light or lights momentarily and goes out, check the ac source voltage with a VOM.

Requirement: 105 to 129 volts RMS

- (4) Move the FUNCTION switch to VOLT INT and POLARITY to NORM. Measure the voltage on terminal 9 of customer interface.

Requirement: 11 to 13 volts

- (5) Move the FUNCTION switch to OFF and move the VERTICAL MONITOR switch to 25.
- (6) Move the FUNCTION switch to VOLT INT and measure the voltage on terminal 25 of customer interface.



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

SWITCH	SETTING
INTERFACE SELECTOR A SWITCHES	DEPRESSED
INTERFACE MODE	VOLTAGE
VERTICAL MONITOR	9
TEST SET MODE	SER(914C) RCV SER(914B)
COUNTER	INTERVAL XI
FUNCTION	OFF
RANGE	30 DCV
BIT RATE	EXT +
METER POLARITY	NOR
TP1 TRIGGER	+ / OPEN
TP2 TRIGGER	+ / OPEN
S1 (RS)	OFF
S2 (SD)	OFF
S3 (DTR)	OFF

INDICATOR LIGHTS	
DS1	RS
DS2	CS
DS3	COD
DS4	SD
DS5	RD
DS6	DTR
DS7	DSR
DS8	RI

Fig. 5—Repair Test Setup

Requirement: 4 to 6 volts

(7) Move the FUNCTION switch to OFF, move the VERTICAL MONITOR switch to 10, and move the POLARITY switch to REV.

(8) Move the FUNCTION switch to VOLT INT and measure the voltage on terminal 10 of customer interface.

Requirement: 11 to 13 volts

- (9) Move the FUNCTION switch to OFF.
- (10) End of test. Remove test equipment and return to pretest condition.

H. Automatic Answer Test

5.15 The automatic answer test checks the ability of the data set to answer and terminate calls properly. The CC, CD, and CE leads are checked along with an audio verification that the answer tone and 600-Hz tone are generated. The only test equipment required for this test is a 914-type DTS.

5.16 Perform the following procedure.

- (1) Remove the front cover of the data set. Verify that the following options are installed:
 - Compromise Equalizer IN (S2B UP and S2C UP)
 - DSR *off* in Analog Loopback Mode (S3A DOWN)
 - Manual Answer (S3B UP)
 - Transmitter Internally Timed (S3C DOWN)
 - -4 dBm Transmit Level (S1A DOWN; S1B UP; S1C DOWN; S2A UP)
- (2) Verify that all pushbutton switches located on the front of the data set except the "50" switch are in the OUT (normal) position. The "50" switch may be IN or OUT depending on the option installed.
- (3) Verify that the data set is connected to the associated telephone set and the telephone set is connected to a working telephone line.
- (4) Connect the data set to the 914-type DTS and set the controls per Fig. 5. Apply power first to the data set then to the DTS.
- (5) Depress the nonlocking lamp test (LP) switch.

Requirement: On the data set, the TR, MR, RS, CS, CO, and ER lamps light.

- (6) From a nearby telephone, dial a call to the data station.

Requirement: On the 914-type DTS, DS8 (RI) and on the telephone set, the lamp under the line key associated with the data set under test light during the ringing cycle (approximately 2 seconds) and then go off during the quiet period (approximately 4 seconds).

- (7) On the 914-type DTS, move switch S3 (DTR) to ON. The data station telephone set will continue to ring. After two or three ring cycles, move switch S3 to OFF.
- (8) On the data set, install the automatic answer option (S3B DOWN). The data station telephone set will continue to ring. At the end of a ringing cycle, move switch S3 (DTR) on the DTS to ON.

Requirement: On the 914-type DTS, the DS6 (DTR) lamp lights; on the data set, the TR lamp lights. On the DTS, the DS8 (RI) lamp lights during the next ring cycle and at the end of ringing extinguishes. During ringing and at the end of this ring cycle, the lamp under the line key associated with the data set lights. Approximately 2 seconds after end of ringing, a high-pitched tone is heard for approximately 2 seconds (2021-Hz answer tone). At the end of this tone, the DS7 (DSR) lamp on the DTS and the MR lamp on the data set light. A lower pitched tone (600-Hz idle tone) should now be heard.

The data set has now automatically answered the call and switched to data mode.

- (9) On the 914-type DTS, set switch S1 (RS) to ON.

Requirement: The 600-Hz idle tone ceases and a data signal is now heard.

- (10) Set S1 OFF.

Requirement: The data signal ceases and the 600-Hz tone is heard.

- (11) On the 914 DTS, set S3 to OFF.

Requirement: The MR and TR lamps on the data set, the DS6 (DTR) and DS7 (DSR) lamps on the 914-type DTS, and the lamp under the line key on the data station telephone

set extinguish, indicating the data set has terminated the call.

- (12) End of test. Remove test equipment and return to pretest condition.

I. CA-CB Interval Test

5.17 The CA-CB interval test checks both the 50-ms and 150-ms request-to-send/clear-to-send (CA-CB) intervals. As part of the test the transmitter clocks, as well as certain interface signals, are checked. The only test equipment required for this test is a 914-type DTS and a 3300-ohm (yellow) pin or equivalent circuit.

5.18 Perform the following procedure.

- (1) Connect the data set to the 914-type DTS and set the controls as shown in Fig. 5. Set BIT RATE switch to 2000.
- (2) Place yellow pin in matrix position S1-9 or a 3300-ohm resistor across 9 and 4 on the interface selector switches on the 914-type DTS.
- (3) Apply power to the data set and then to the DTS.
- (4) Depress AL button on data set.
- (5) On the DTS, add red pins to the programmable matrix in the following positions: 4-TP1, 5-TP2.
- (6) If a 914C DTS is used, place TEST SET MODE to INTERVAL and START A ONLY—A or B switch to START A ONLY. If a 914B DTS is used, set TEST SET MODE switch to TRMT SER position.
- (7) Verify that the "50" switch on the data set is depressed and the transmitter internally timed option (S3C DOWN) is installed.
- (8) Verify that switch S1 (RS) is OFF.
- (9) On the DTS, zero the counter by pressing the RESET button.
- (10) Move switch S1 to ON and record the CA-CB interval on the counter.

Requirement: 48 to 56 ms.

(11) To remeasure the CA-CB interval, move switch S1 to OFF and press the RESET button. When S1 is moved to ON, the CA-CB interval will appear on the counter.

(12) On the data set, release the "50" switch. On the DTS, move switch S1 to OFF, move the counter switch to INTERVAL X10, and reset the counter.

(13) Move switch S1 to ON, and record the CA-CB interval on the counter.

Requirement: 14 to 18 on counter (corresponds to 140 to 180 ms).

(14) To remeasure the CA-CB interval, move switch S1 to OFF and press the RESET button. When S1 is moved to ON, the CA-CB interval will appear on the counter.

(15) Move S1 to OFF.

(16) End of test. Remove test equipment and return to pretest condition.

J. Transmit Level Test

5.19 The transmit level test measures the 2021-Hz answer tone signal, the data transmit level, and the 600-Hz idle tone. These levels are measured at two different settings of the transmitter level adjust pad. The only test equipment required is a 914-type DTS.

5.20 Perform the following procedure.

- (1) Remove the front cover of the data set and install the following options:
 - Compromise Equalizer IN: See Table C.
 - CC *off* in Analog Loop Mode (S3A DOWN)
 - Manual Answer (S3B UP)
 - Transmitter Internally Timed (S3C DOWN)
 - -4 dBm Transmit Level (S1A DOWN; S1B UP; S1C DOWN; S2A UP).
- (2) Verify that the data set is connected to the associated telephone set and the telephone set is connected to the telephone line.

SECTION 592-038-500

- (3) Verify that all switches on the data set except the "50" switch are in the OUT (normal) position. The "50" switch may be IN or OUT, depending on the option installed.
- (4) Connect the data set to the 914-type DTS and set the controls as shown in Fig. 5.
- (5) Apply power to the data set and then to the DTS.
- (6) On the 914-type DTS, move switch S3 (DTR) to ON.
- (7) From a nearby telephone, dial the data station. When the data station telephone set rings, answer it and go into data mode by depressing the nonlocking DATA button on the telephone set.
- (8) On the DTS, set the RANGE switch to 0 DB, and set the FUNCTION switch to VOLT/OHM EXT.
- (9) Connect the meter INPUT terminals of the 914-type DTS across the telephone line tip and ring leads at the connecting block.
- (10) If a 914C DTS is used, set TERM IN—OUT switch to OUT.

- (11) At the data station telephone set, remove the handset from the cradle. Enter talk mode by depressing TALK button. Now depress DATA button.

Requirement: As the data set goes through the answer sequence, the answer tone (2021 Hz) is generated for approximately 2 seconds. During these 2 seconds, the meter on the 914-type DTS indicates the value given in ANSWER TONE 1 column of Table C for each of the compromise equalizer options.

The previous step should be repeated until an accurate reading can be recorded.

Note: the 914 DTS will not measure the answer tone level accurately because of the short duration of the tone and therefore audible verification of the presence of this tone must suffice. Data and 600-Hz tone levels are also difficult to measure accurately because of the variable impedance of a telephone line connected to the data set. The difference between the data level and the 600-Hz level should be in the order of 7 to 9 dB as shown in Table C. The levels of Table C are calculated levels established in a laboratory under ideal conditions of line termination.

TABLE C

**DATA SET 208BR-TYPE TRANSMIT LEVEL METER INDICATIONS
(ALL READINGS IN dBm WITH RESPECT TO 600Ω)**

DATA SET	COMPROMISE EQUALIZER OPTION	NOTE 1			NOTE 2		
		ANSWER TONE 1	DATA 1	600 Hz 1	ANSWER TONE 2	DATA 2	600 Hz 2
208BR-L1C	8-dB SLOPE (S2B-DOWN; S2C-UP)	-4 (+1, -2)	-4 (+1, -2)	-13 (±2)	-11 (±2)	-11 (±2)	-20 (±2)
	4-dB SLOPE (S2B-UP; S2C-UP)	-4 (+1, -2)	-4 (+1, -2)	-11 (±2)	-11 (±2)	-11 (±2)	-18 (±2)

Note 1: -4 dBm Transmit Level (S1A-DOWN; S1B-UP; S1C-DOWN; S2A-UP)

Note 2: -11 dBm Transmit Level (S1A-DOWN; S1B-DOWN; S1C-UP; S2A-DOWN)

- (12) On the 914-type DTS, move switch S1 (RS) to ON.

Requirement: The meter indicates the value given in DATA 1 column of Table C for each of the compromise equalizer options.

- (13) Move switch S1 to OFF.

Requirement: The meter indicates the value given in the 600 Hz 1 column of Table C for each of the compromise equalizer options.

- (14) On the data set, install the -11 dBm transmit level option (S1A DOWN; S1B DOWN; S1C UP; S2A DOWN).

- (15) At the data station telephone set, remove handset from cradle and enter talk mode by depressing TALK button. Now depress DATA button.

Requirement: As the data set goes through the answer sequence, the answer tone (2021 Hz) is generated for approximately 2 seconds. During these 2 seconds, the meter on the DTS indicates the value given in ANSWER TONE 2 column of Table C for each compromise equalizer option.

- (16) The previous step should be repeated until an accurate reading can be recorded.

- (17) Move switch S1 to ON.

Requirement: The meter indicates the value given in DATA 2 column of Table C for each compromise equalizer option.

- (18) Move switch S1 to OFF. Move RANGE SWITCH to -10 dB if necessary (see Table C).

Requirement: The meter indicates the value given in the 600 Hz 2 column of Table C for each compromise equalizer option.

- (19) Terminate the call by moving switch S3 (DTR) on DTS to OFF. Move FUNCTION switch to OFF. Disconnect meter INPUT terminals from the telephone line.

- (20) End of test. Return all equipment to pretest condition.

K. CA-CF Interval Test

5.21 The CA-CF interval test measures the length of time it takes for CF to turn **on** after a request-to-send signal is given. The test also checks that the received line signal propagates through the receiver analog circuitry and checks receiver clocks and certain interface signals. The only test equipment required is a 914-type DTS and the 3300-ohm (yellow) pin or equivalent circuit.

5.22 Perform the following procedure.

- (1) Connect data set to 914-type DTS as shown in Fig. 5. Set BIT RATE switch to 2000.
- (2) Depress AL button on data set.
- (3) Apply power to data set and then to the 914-type DTS.
- (4) Insert red programming pins into matrix at TP1-4 and TP2-8.
- (5) Insert yellow resistor pin into matrix at S1-9 (or 3300-ohm resistor across 9 and 4 of the interface selector switches).
- (6) If 914C DTS is used, set TEST SET MODE switch to INTERVAL, and START A ONLY—A or B switch to START A ONLY. If 914B is used, set TEST SET MODE switch to TRMT SER.
- (7) Move switch S1 (RS) to OFF and reset the counter to 0.
- (8) Move switch S1 to ON and read the CA-CF interval on the counter.

Requirement: 46.0 to 56.0 ms

- (9) To remeasure CA-CF interval, move S1 to OFF and reset counter. When S1 is set to ON, the CA-CF interval will appear on the counter.
- (10) End of test. Return all equipment to pretest condition.

L. Analog Loopback Start-Up Test

5.23 This test uses a 914-type DTS to check start-up. The RS switch on the 914-type

DTS is used to initiate the transmission of blocks of data through the data set, which is placed in AL mode. Start-up errors will cause the counter on the 914-type DTS to register one count for each block of data in which one or more errors is made.

5.24 Perform the test as follows:

- (1) Connect equipment and condition the 914-type DTS as shown in Fig. 6.
- (2) Place the data set in analog loop mode by pressing the AL switch.
- (3) Zero the counter on the 914-type DTS by depressing the RESET switch.
- (4) Operate S1 (RS) switch on 914-type DTS to **on** for at least 2 seconds to send blocks of steady MARK (S2 **off**).

Requirement: NO CLOCK and NO DATA lamps on the 914-type DTS are illuminated. Counter does not indicate any counts.

- (5) Operate switch S1 (RS) to **off** to terminate start-up interval test. The counter on the

914-type DTS may register a few counts (hits on the RD lead at turnoff) which should be ignored.

- (6) Zero the counter on the 914-type DTS and repeat steps (4) and (5) 19 times, to send a total of 20 blocks of data.

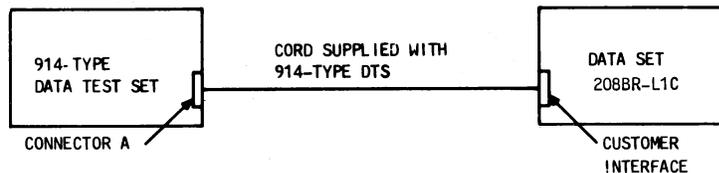
Requirement: Zero errors on the counter during the start-up interval.

M. Analog Loopback Test Using a Pseudo-Random Word

5.25 The analog loopback test checks that random data can be transmitted through the data set without errors. The received signal is compared with the transmitted signal and any errors are recorded by the 914-type DTS. The test equipment required for this test is a 914C DTS or a 903-type DTS and a 914B DTS. When using the 903-914B DTS combination, a 63-bit word is used. When using a 914C DTS, a 511-bit word is used.

5.26 Perform the following procedure.

- (1) Connect equipment as shown in Fig. 7.



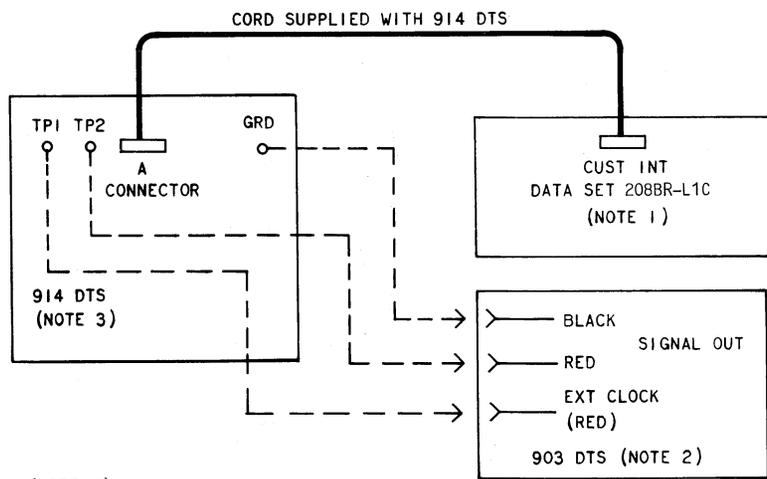
914 DTS MATRIX

COLOR OF PIN	COLUMN	ROW	OBSERVE OR CONTROL
RED	2	S2	SD
RED	4	S1	RS
YELLOW (3KΩ)	9	S1	CONTACT BOUNCE
RED	8	DS6	OBSERVE CO
WHITE (DIODE)	3	TP1	} CHECK ERRORS
YELLOW (3KΩ)	17	TP1	
RED	19	TP1	
RED	19	SCR	
RED	3	DS3	OBSERVE RD
RED	20	S8	DTR
RED	7	GRD	

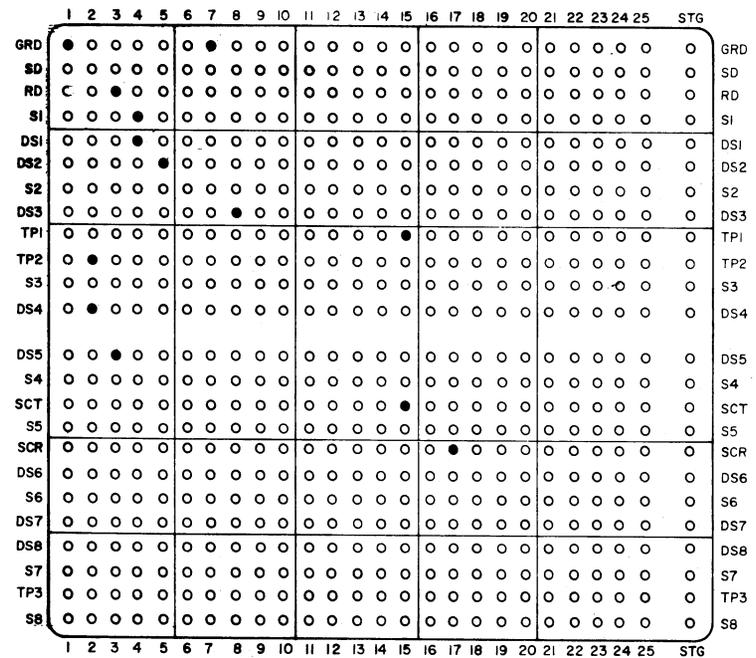
914 DTS CONTROLS

TEST SET MODE - SER OR RCV SER
 BIT RATE - EXT +
 COUNTER - INTERNAL X 1

Fig. 6—Test Setup Using 914-Type DTS



(NOTE 4)



NOTES:

1. VERIFY THE FOLLOWING OPTIONS ARE INSTALLED:

OPTION	SETTING
TRANSMITTER INTERNALLY TIMED	S3C DOWN
CC OFF IN AL MODE	S3A DOWN
COMPROMISE EQUALIZER IN	S2B UP S2C UP

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

CONTROL	SETTING
BIT RATE	EXT CLOCK
TRIGGER	(-) NEGATIVE
RANDOM-DOT	RANDOM

3. SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE SELECTOR	ALL DEPRESSED
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER (914C) RCV SER (914B)
BIT RATE(S)	EXT + 16WL (63 BIT WORD) 2WL (511 BIT WORD)
COUNTER	OFF
FUNCTION	OFF
SIGNAL LEVEL	±4V
SAMPLE WIDTH	0.5 μ SEC
WORD SYNC	AUTO
SI-S8	OFF
WORD LENGTH(S)	63 OR 511

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

Fig. 7—Analog Loopback and End-to-End Test Setup

- (2) Depress AL button on data set.
- (3) Apply power to data set and then to the DTSSs.
- (4) On 914-type DTS, move S1 (RS) to ON and reset counter by depressing RESET button. If a 903-type DTS is used, momentarily depress START button.

Requirement: On the 914-type DTS, the DS1 (RS), DS2 (CS), and DS3 (COD) lamps are lighted. Lamps DS4 (SD) and DS5 (RD) are dimly lighted. The counter is not counting.

- (5) To verify that the equipment is connected properly and that the counter is functioning, remove programming pin from crosspoint RD-3 and set counter switch on 914 DTS to BIT ERRORS.

Requirement: On the 914-type DTS, the error counter counts rapidly and shortly afterward the NO DATA and OVERFLOW lamps light.

- (6) Reinsert programming pin into crosspoint RD-3, return counter switch to selected word length (2WL or 16WL), and reset counter.

Requirement: On the 914-type DTS, the error counter stops counting and the NO DATA and OVERFLOW lamps extinguish.

- (7) Conduct a 10-minute error run and record number of errors.

Requirement: No errors recorded.

- (8) End of test. Return all equipment to normal operating condition.

N. Remote Start-Up Test (Remote DS 208B-L1B or 208BR-L1C Only)

5.27 This test uses a 914-type DTS to check start-up of both far-end and near-end data sets. The far-end set must be a DS 208B-L1B or a DS 208BR-L1C. The RS switch on the near-end 914-type DTS is used to initiate transmission of blocks of data to the far-end set, which is in RT mode. Start-up errors made at the far end will cause SPACE signals to be returned to the near-end data set. A lamp at the RD input to the 914-type DTS will indicate the error status of the far-end data set. MARK signals (no errors) will cause the RD lamp on the near-end data set to remain extinguished. SPACE signals (one or more errors) will cause the RD lamp on the near-end data set to illuminate. If the RD lamp illuminates as a result of one operation of the RS switch, it is counted as one error. Errors made in the start-up of the near-end receiver are displayed as actual error counts on the 914-type DTS.

Note: This test requires a 914-type DTS and a test person knowledgeable in using the DTS at the near end only.

5.28 Perform the test as follows:

- (1) Connect equipment as shown in Fig. 8.
- (2) Condition the 914-type DTS as shown in Fig. 6.
- (3) Have attendant at far end place data set in RT mode.
- (4) Call the far end, check for auto answer, and go to data mode at the near end (switch S8 must be **on**).
- (5) Operate switch S1 (RS) to **on** for at least 2 seconds to send blocks of steady MARK

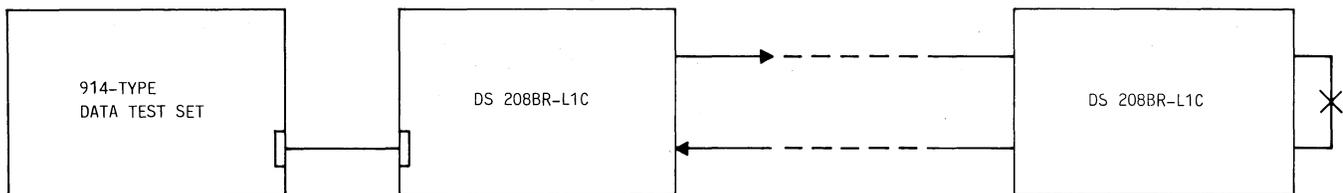


Fig. 8—Remote Start-Up Test Setup

to far end (switch S2 **off**. Data set under test samples RD lead for 1.25 seconds (6000 bits), beginning on a positive transition of COD.

(6) Operate switch RS to **off** to receive 2-second MARK (no errors) or SPACE (one or more errors) from far end. [MARK = RD (DS3) lamp extinguished; SPACE = RD (DS3) lamp lighted for 2 seconds].

(7) There are three possible conditions to monitor at the 914-type DTS during the test interval (ie, the 2 seconds after RS is turned **off**).

(a) A steady SPACE sent back from the far-end data set (RD lamp illuminated and counter counting continuously on 914-type DTS) means that the far-end data set has made one block error.

(b) A steady MARK sent back from the far-end data set (RD lamp extinguished and counter on 914-type DTS not counting) means that both data sets are performing satisfactorily.

(c) A steady MARK returned from the far-end data set (RD lamp extinguished and counter on 914-type DTS counting) means that the near-end set is making start-up errors.

(8) The counter on the 914-type DTS may register a few counts (hits) on the RD lead when CO lamp (DS6) switches **off**. These counts are not start-up errors and should be ignored. Allow sufficient time between repetitions of the test to permit clearing the counter on the 914-type DTS.

(9) Repeat steps (5) and (6) 19 times, producing a total of 20 blocks.

Requirement: No more than 1 error in 20 blocks of data.

(10) If more than 1 block in 20 is reported in error from the far-end data set, repeat steps (5) and (6) 100 times to send 100 blocks of data.

Requirement: No more than 6 errors in 100 blocks of data.

(11) Errors may be forced by quickly operating and releasing the SD switch within 1.25 seconds after the RS switch is turned **on**. The far-end receiver should detect the error and return a 2-second block of steady SPACE. If the SD switch remains **on** for more than 2 seconds after RS is turned **on**, the far-end data set will go on-hook and auto answer will be inhibited. This procedure may be used to end the test.

DATA ERROR TESTS USING TEST SETS AT BOTH ENDS

O. End-to-End Start-Up Tests With 53A1 Data Units

5.29 Using a 53A1 data unit at each end in place of the customer terminal, perform data error test in accordance with Section 590-100-138.

P. End-to-End Start-Up Test Using 914 DTSs

5.30 This test checks the start-up interval at either end. A 914-type DTS and test personnel knowledgeable in using the DTS are required at both ends.

5.31 Perform the test as follows:

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

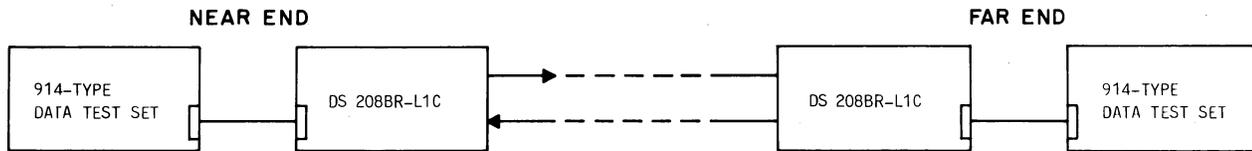
(2) Condition the 914-type DTS at each end according to the direction of test as shown in Fig. 9. (The basic condition of the 914-type DTS is the same as shown in Fig. 6.)

(3) By prearrangement with the far-end test person, establish a procedure whereby the near-end test person will initiate a data start periodically. The far-end test person should observe the 914-type DTS at each start interval and reset the counter between intervals.

(4) Place data set at each end in DATA mode.

(5) **Near-End Test Person:** Operate S1 (RS) to **on** for an estimated 1 second to send one block of steady MARK to far end (S2 is **off**). (One second is equivalent to one 4800-bit block.)

Note: Turning S1 and S2 to ON will force errors to occur at the far end.

**TO TEST FAR-END START-UP:**

(NO SWITCHES DEPRESSED ON
EITHER DATA SET EXCEPT
"50" SWITCH)

NEAR - END DTS

S1 - ON FOR 1 SECOND
- OFF FOR 1 SECOND
S2 - OFF (SEND MARKS)
S8 - ON

FAR - END DTS

S1 - OFF
S2 - EITHER
S8 - ON
MODE - SER OR RCV SER
BIT RATE - EXT +
COUNTER - INTERVAL X 1
MATRIX - PER FIG 8

TO TEST NEAR - END START-UP:

REVERSE ABOVE CONDITIONS

Fig. 9—End-to-End Start-Up Test Setup

Far-End Test Person: Observe counter on 914-type DTS when CO lamp illuminates (indicating carrier is present). Errors during start-up will cause the counter on the 914-type DTS to register.

Requirement: Zero errors on the counter during start-up interval.

- (6) **Near-End Test Person:** Operate S1 (RS) to OFF.

Far-End Test Person: Observe that CO lamp extinguishes. Reset counter on 914-type DTS if necessary. Hits on the counter that occur as CO extinguishes are not counted as errors.

- (7) **Near-End Test Person:** After 5 seconds (to permit counter reset at far end), repeat steps (5) and (6) until 20 one-second blocks of data have been sent (ie, 20 **ON** and **OFF** operations of the RS switch). After a prearranged number of tests (or time interval), return to talk mode to discuss test results.

Far-End Test Person: After a prearranged number of tests (or time interval) return to talk mode and discuss test results.

- (8) If more than one error is observed in 20 blocks, repeat steps (5) and (6) 100 times. There shall be no more than 5 errors in 100 blocks of data (approximately 4800 bits per block).

- (9) If desired, the test can be reversed (Fig. 9). Perform steps (4) through (7) with the far-end sending data and the near-end receiving data and observing the counter on the 914-type DTS.

Q. End-to-End Test Using a Pseudo-Random Word

5.32 The end-to-end test should be made only when it is necessary to identify facility troubles which the data set has been occasionally experiencing over a period of time. The test is made using two data stations remote from each other or a DTC and a station. The test consists of transmitting random data (63-bit or 511-bit words formed into 1000-bit blocks) and establishing a block error rate. If the 511-bit word is available, it should be used, as it provides a more critical test. Two 914-type DTSs, one at the transmitting end and one at the receiving end, are required.

5.33 Perform the following procedure.

STEP	TRANSMIT	RECEIVE
1	Establish test connections and set switches as shown in Fig. 7. <i>Note:</i> Information regarding the setup for the 903-type DTS may be disregarded.	Establish test connections and set switches as shown in Fig. 7.
2	Remove programming pins from TP1-15, TP2-2, and RD-3.	Remove programming pins from TP1-15 and TP2-2.
3	Insert programming pin at SD-2, S3-20, and DS6-20.	Insert programming pin at S3-20 and DS6-20.
4	Set TEST SET MODE to SER (914C) or TRMT SER (914B).	Set COUNTER switch to BLOCK ERRORS 16 WL, (63-bit word) or 2 WL (511-bit word).
5	Apply power to the data set and then to the 914-type DTS.	Apply power to the data set and then to the 914-type DTS.
6	Call the receiving end to coordinate test procedure.	Coordinate test procedure with transmitting end.
7	On the 914 DTS, move switch S3 (DTR) to ON.	On the 914 DTS, move switch S3 (DTR) to ON.
8	Go to data mode.	Go to data mode.
9	Set S1 (RS) to ON.	Reset counter.
10	To verify equipment is operating properly, set switch S1 (RS) to OFF.	Counter should count at least once and shortly thereafter the NO DATA lamp should illuminate.
11	Set switch S1 (RS) to ON.	Reset counter. The NO DATA lamp should extinguish.
12	Conduct 10-minute error run.	Counter should record less than 30 counts (less than 30 block errors).
13	At end of 10-minute interval, go to talk mode. If test is required in other direction, set up as receiving station.	At end of 10-minute interval, go to talk mode and give results. If test is required in other direction, set up as transmitting station.
14	End of test. Return equipment to normal operating condition.	End of test. Return equipment to normal operating condition.

R. Start-Up Test Using 53A1 DU at Far End and 914-Type DTS at Near End

5.34 Using a 53A1 DU at the far end and a 914-type DTS at the near end, perform a start-up test in accordance with Section 590-100-138.

MISCELLANEOUS TESTS

S. Remote Test From DTC

5.35 The remote test from the DTC checks data set performance, station wiring, and the local

SECTION 592-038-500

loop. No external test equipment is required for this test except a telco DTC.

5.36 Perform the following procedure.

- (1) Call the nearest DTC and request that a remote test of the data set be conducted.
- (2) After agreeing with the DTC to perform the test, depress RT switch, depress the "50" switch (if not already depressed), and hang up.

Requirement: The TR lamp is *on*. MR lamp is extinguished.

- (3) The DTC will place a call to the set. The set will answer automatically and enter data mode. The DTC will then perform the test and cause the set to terminate the call by sending a 3-second space level.
- (4) The DTC will place a second call to the data station to report results of the test. Answer the second call and receive the test results.
- (5) After receiving test results from the DTC, release RT and "50" switches (if necessary) and hang up to return data set to its normal operating condition.

T. Ground Noise Test Using 914 DTS and 6H Impulse Counter

5.37 If the data set and business machine are not at the same ground potential, errors may be caused by a potential difference between data set ground and business machine 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 the section entitled 6H and 6HR Impulse Counters (J94006H and J94006HR)—Description, Operation, and Maintenance (103-620-101). If the 6H impulse counter is not available, a 6A impulse counter may be used. For information pertaining to the 6A impulse counter, refer to the section entitled J94006A (6A) Impulse Counter—Description, Operation, and Maintenance (103-620-100).

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

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