

DATA AUXILIARY SET 801C-L1/2

TEST PROCEDURES

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1. GENERAL

1.01 This section contains information required to perform installation and maintenance tests of data auxiliary set (DAS) 801C-L1/2.

1.02 When this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 DAS 801C-L1/2 provides automatic calling capability for data stations used on lines arranged for Touch-Tone® signaling. DAS 801C-L1/2 will be referred to in this section as an ACU (automatic calling unit).

2. INSTALLATION TESTS

2.01 The following procedures are to be performed at the time of installation to verify that the ACU is operating properly. These procedures utilize built-in test features and do not require any external test equipment. When data station trouble is experienced, these procedures should also

be performed prior to performing maintenance tests to aid in localizing data station trouble. If the ACU is suspected as being the cause of the trouble, replace it and repeat the tests before turning the equipment back to the customer.

2.02 DAS 801C-L1/2 contains built-in test features comprising four light emitting diodes (LEDs) and three test switches. The LEDs will be referred to in this section as indicators. The combination of indicators and switches allows the ACU to be checked independently of the customer-provided equipment.

A. Dial Tone Detection Test

2.03 This test determines if the ACU, when connected to a working telephone line, can recognize dial tone. The test uses the nonlocking TR (test receive) button and the PD and CR indicators. At the start of the test, the telephone line must be idle (CR indicator off and telephone on-hook). Operation of the TR button locally turns on the CRQ lead, lights the CR indicator, and initiates a dial tone request to the central office. When dial tone (or ground start) is returned and detected, the PD indicator lights. This indicates that the dial tone detection circuitry is operating properly.

- (1) Press the TR button.

Requirement: CR indicator lights and then PD indicator lights. Dial tone heard from speaker if used.

2.04 If the ACU fails the dial tone detection test, verify proper operation of the local loop as follows.

- (a) On lines equipped for loop start, lift the handset on the associated tel set (or data set) and verify that dial tone can be heard in the receiver. If dial tone is heard, this indicates the ACU is defective.

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- (b) On lines equipped for ground start, apply ground to the ring lead momentarily and verify that dial tone can be heard in the receiver. If dial tone is heard, this indicates the ACU is defective.

B. ACR Timer Test

2.05 This test verifies that the abandon call and retry feature of the ACU is operating properly. There are four ACR timing options available in the DAS 801C-L1/2: 7, 14, 28, and 56 seconds. This test uses the nonlocking TR button and the AR indicator. This test can be done as a continuation of the dial tone detection test or can be done separately.

2.06 To do the ACR timer test:

- (1) Press the TR button and wait until the PD indicator lights.
- (2) Keep the TR button pressed (after the PD indicator lights) for an additional period greater than the ACR timer interval.

Requirement: AR indicator lights.

- (3) Release the TR button. If the AR indicator fails to light, the ACU is defective.

C. Answer Tone Detection Test

2.07 This test checks that the ACU can recognize answer tone from the receiving data station. ACUs used with some data sets are optioned to detect beginning of answer tone (option X). ACUs used with most other data sets use the end of answer tone option (option W). If the ACU is equipped with options W and E, the test need not be done.

2.08 This test can be done in conjunction with a data set at the distant end, or the data test center can be used to supply a tone. Proceed as follows:

- (1) Using the associated tel set, dial the distant-end data set. (If a distant set is not available, call the DTC and request a 2025- or 2225-Hz tone for about 5 seconds).
- (2) When answer tone is heard in the telephone receiver, press the TR button on the ACU.

Requirement 1: PD and CR indicators light when TR button is pressed.

Requirement 2: If the ACU is equipped with the beginning of answer tone option (X), the AR indicator lights in less than 1 second. If the ACU is equipped with the end of answer tone option (W), the AR indicator lights when answer tone stops (usually within 3 seconds).

Note: Answer tone will not be heard in the handset after the TR button is pressed.

- (3) Release the TR button.

Requirement: CR and AR indicators go off. Disregard PD indicator.

- (4) Press the TR button.

Requirement: CR, and AR indicators light immediately. Disregard PD indicator.

D. Out Dialing Sequence Test

2.09 This test checks that the Touch-Tone oscillator in the ACU can generate the combinations of tones required for all 10 digits. This test uses the TT (test transmit) and SD (slow dialing) buttons and the CR and PD indicators.

2.10 This test is done by dialing the central office ring-back number. If the loudspeaker is used, it will be possible to hear the digits being transmitted. If the digits have been transmitted properly, the central office ringback responds with a double beep. By using the SD test button, it is possible to slow down the interdigit time to slow down the dialing rate in order to count the number of digits dialed.

2.11 Perform the test as follows.

- (1) If the ACU is not equipped with a loudspeaker, connect a 1011-type handset across tip and ring. The handset should be in the MONITOR position.
- (2) Using the tel set or associated data set, dial the number for central office ringback. Leave the handset off-hook.
- (3) Press the TT button until the sequence is completed.

Requirement: CR indicator lights and stays lighted, PD indicator blinks (ten times). Ten Touch-Tone combinations are heard followed by double beep.

- (4) Repeat (2) and (3); this time press TT and SD buttons.

Requirement: Same as (3) except sequence is slower.

2.12 If the ACU fails the out dialing sequence test, use the Touch-Tone pad on the associated tel set to place a call to central office ringback. Press numbers from 1 to 9 and then 0. If the Touch-Tone pad operates properly, the ACU is defective.

3. MAINTENANCE TESTS

3.01 Refer to Fig. 1 for an overall maintenance procedure. These tests are to be made when investigating a trouble report and should be performed after the built-in tests (2.03 through 2.12) have been performed. By using the 914-type data test set (DTS), the customer interface can be checked. If the trouble appears to be in the ACU, replace it and repeat the tests before turning the equipment back to the customer.

3.02 Tag defective ACUs to identify the nature of the trouble, and carefully pack and return them to the distributing house for repair.

A. Call Origination and Termination Tests

3.03 The call origination test provides a means to dial the DTC using the 914-type DTS (to simulate the customer-provided equipment [CPE]) to initiate a call and dial digits manually. The DTC to be called must be instructed that a test of an ACU is to be performed and upon answering the incoming call, answer tone (2025 or 2225 Hz as required by the ACU option) should be sent to the ACU. This test verifies that the ACU will correctly dial the digits given by the 914-type DTS. A test of the interdigital timer is also included.

Note: The ACU and a data set must be connected to the data line using connection information provided in the Installation and Connection Bell System Practice for the particular data set.

3.04 A 914-type DTS and a suitable timing device are required for this test.



Test set switches that are neither shown on the test connection diagram (Fig. 2) nor mentioned in text are not required for the test. Lamp indications not called for in the test are not pertinent and may be disregarded. Before making any test connections, ensure that all programming pins are removed from the matrix. Insert only those pins shown in the test connection diagram Fig. 2.

STEP

PROCEDURE

Note: This procedure should be read carefully and understood before proceeding. Manual dialing using the 914-type DTS requires that the digit to be dialed be set up in binary form on the 914B control switches. The time interval between the dialing of each digit should be minimized to prevent central office timeout.

- 1 Remove customer cords from the ACU and data set EIA connector. Interconnect the 914-type DTS with the ACU and data set as illustrated in Fig. 2.
- 2 Condition the 914-type DTS as shown in Fig. 2.
- 3 Pull out all A interface selector switches except 20A.
- 4 Depress all B interface selector switches except 20B.

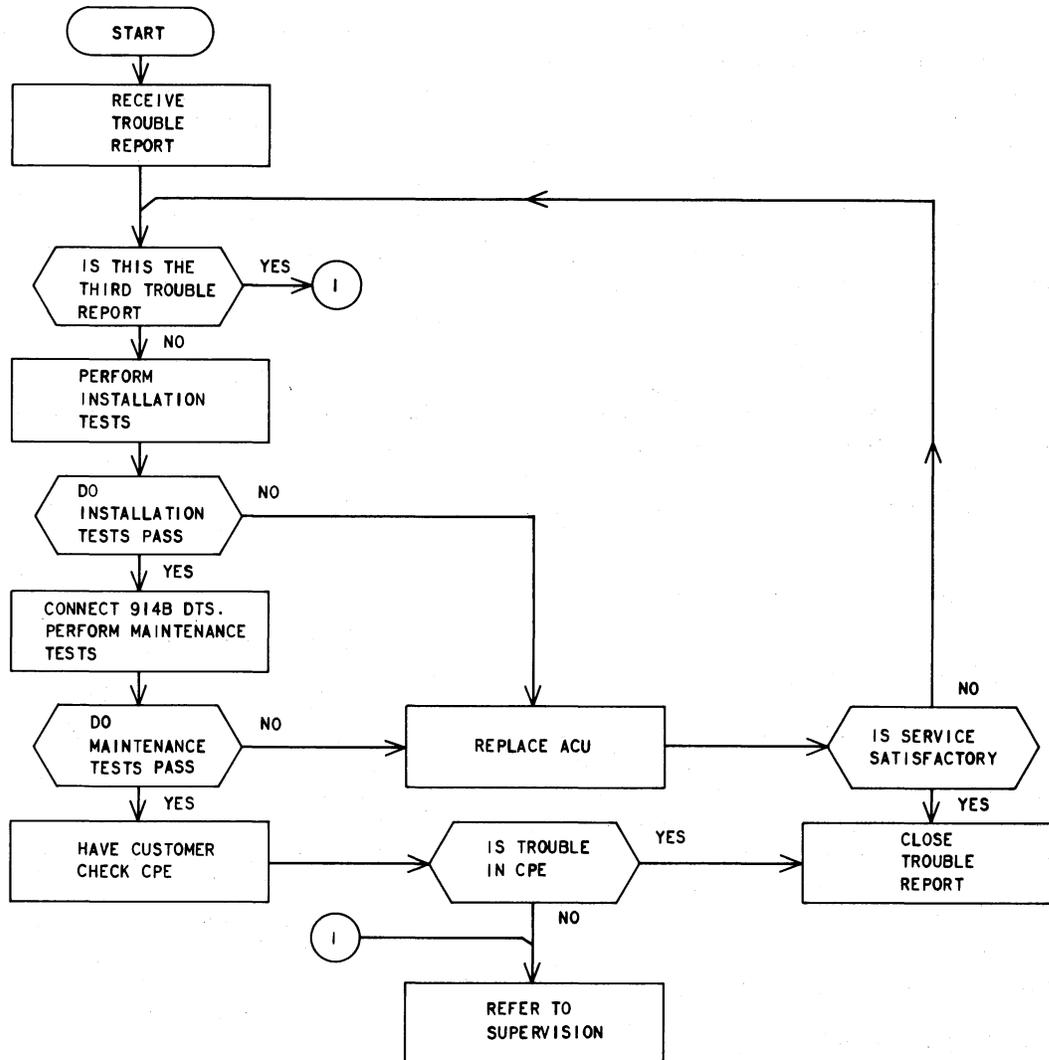


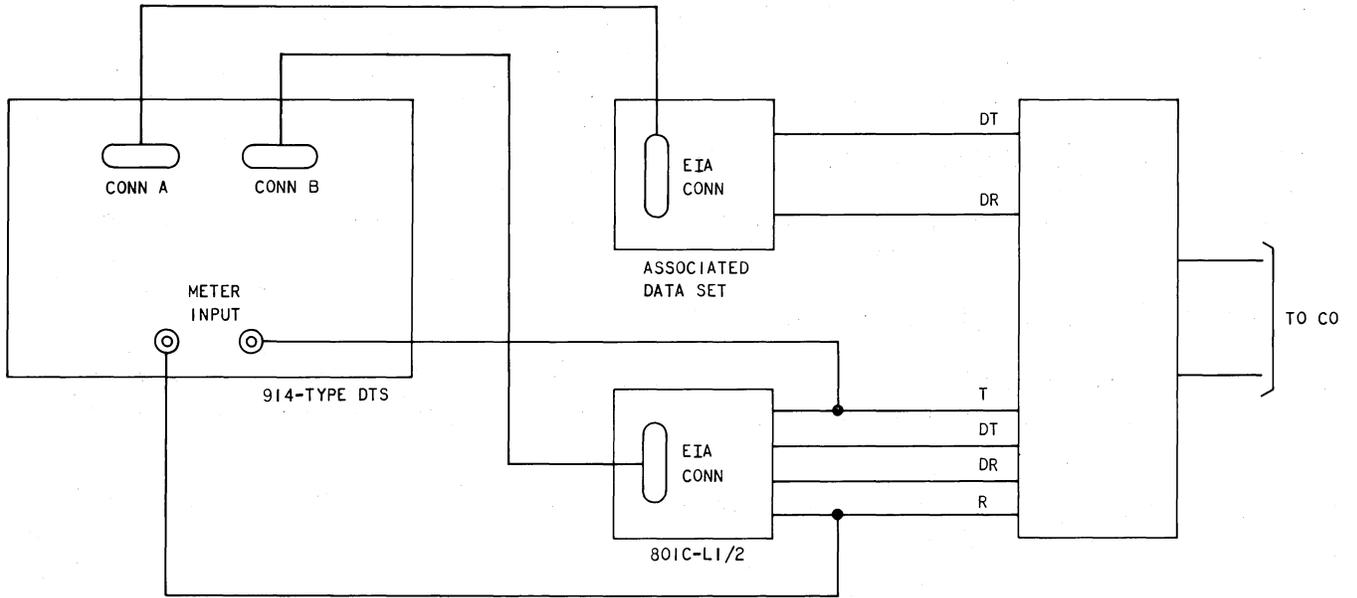
Fig. 1—Maintenance Flowchart

STEP

PROCEDURE

- 5 Program the matrix as shown in Fig. 2.
- 6 Connect leads supplied with the 914-type DTS from METER INPUT jacks to tip and ring of the connecting block.
- 7 Operate POWER switch on the 914-type DTS to the ON position.

Requirement: POWER lamp lights.



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

NOTES:

1. SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER (914C)
	TRMT SER (914B)
COUNTER	INTERVAL X1
FUNCTION	SPKR
RANGE	ACV-1
TRIGGER TP1	+/OPEN
SWITCHES S1-S7	OFF

2. 914 DTS SWITCHES AND LAMPS CORRESPOND TO THE FOLLOWING INTERFACE LEADS:

LAMP	SWITCH	FUNCTION
DS1		DLO
DS2		PND
DS3		ACR
DS4		COS (DSS)
	S1	CRQ
	S2	DPR
	S3	NB1
	S4	NB2
	S5	NB4
	S6	NB8

3. ALL B INTERFACE SELECTOR SWITCHES DOWN EXCEPT 20B.

Fig. 2—Call Origination Test

STEP	PROCEDURE
8	Insert the ACU power plug into a 120 Vac receptacle.
9	Operate switch S7 to the ON position. This conditions the data set to go into the data mode by turning on data terminal ready (DTR).
10	Operate switch S1 (CRQ) to the ON position.
	Requirement: Dial tone is heard through the 914-type DTS speaker, and DS1 (DL0) and DS2 (PND) indicators light. [Level of tone may be controlled by RANGE (ACV) switch.]
11	Using Table A and switches S3 through S6, set up the first digit of the DTC telephone number to be dialed.

TABLE A
BINARY-TO-DECIMAL CONVERSION

DIALING SWITCH SETTINGS					VERTICAL MONITOR SWITCH— VOLTAGE READINGS			
DECIMAL DIGIT	S3-NB1	S4-NB2	S5-NB4	S6-NB8	NB1 POS 14	NB2 POS 15	NB4 POS 16	NB8 POS 17
0	ON	ON	ON	ON	+	+	+	+
1	OFF	ON	ON	ON	—	+	+	+
2	ON	OFF	ON	ON	+	—	+	+
3	OFF	OFF	ON	ON	—	—	+	+
4	ON	ON	OFF	ON	+	+	—	+
5	OFF	ON	OFF	ON	—	+	—	+
6	ON	OFF	OFF	ON	+	—	—	+
7	OFF	OFF	OFF	OFF	—	—	—	+
8	ON	ON	ON	OFF	+	+	+	—
9	OFF	ON	ON	OFF	—	+	+	—
10	ON	OFF	ON	OFF	+	—	+	—
11	OFF	OFF	ON	OFF	—	—	+	—
12	ON	ON	OFF	OFF	+	+	—	—
13	OFF	ON	OFF	OFF	—	+	—	—
14	ON	OFF	OFF	OFF	+	—	—	—
15	OFF	OFF	OFF	OFF	—	—	—	—

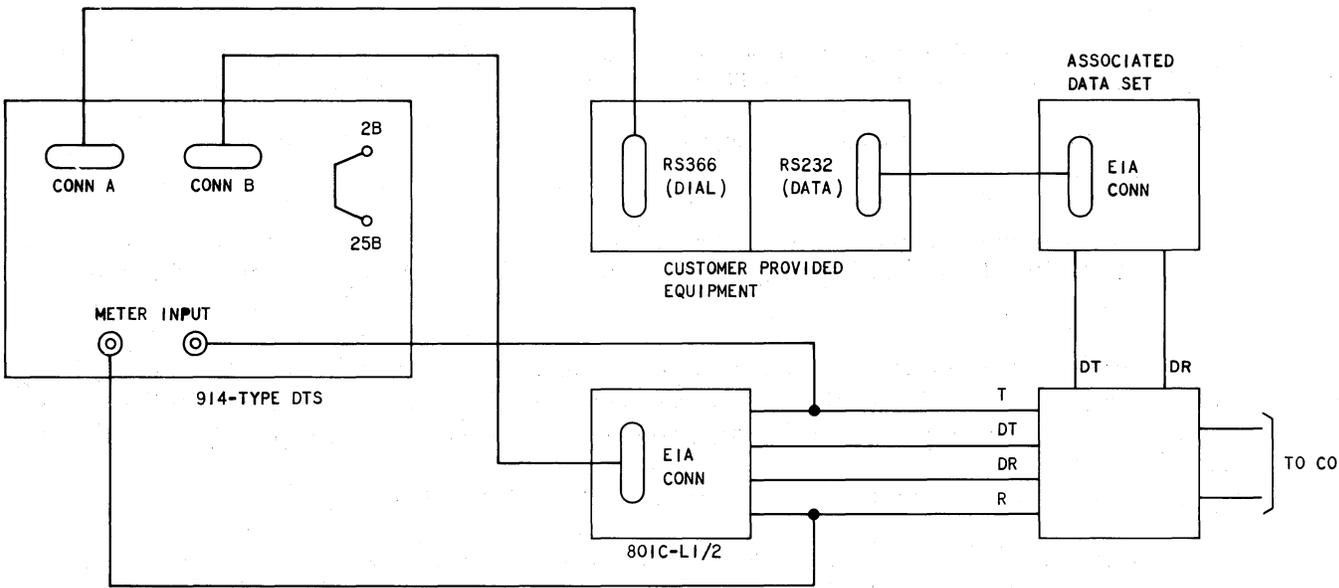
STEP	PROCEDURE
12	Operate switch S2 to the ON position. Requirement: DS2 indicator goes off (the digit present on the NB interface leads is being dialed by the ACU).
13	Operate switch S2 to the OFF position. Requirement: DS2 indicator lights.
14	Repeat Steps 13 through 15 for the remaining digits of the telephone number.
15	Using a 1011-type handset across tip and ring, verify that the correct telephone number has been reached.
16a	To test EON operation— Using Table A and switches S3 through S6, set up to send 12 to the ACU.
17a	Operate switch S2 to the ON position. Requirement: DS2 indicator goes off and DS4 lights when the line is transferred.
18a	Operate S2 to OFF.
	Call Termination Test
19b	If option Z (call termination by CRQ) is used— Operate S1 to OFF. Requirement: DS1 goes off.
20c	If option G (call termination through data set) is used— Operate S1 to OFF. Requirement: DS1 remains lighted.
21c	Operate S7 to OFF. Requirement: DS1 goes off.
22c	Enter talk mode on the associated tel set or data set. Requirement: DS1 lights.

B. Monitoring of Interface Leads

3.05 This test should be made when a trouble condition exists that cannot be detected by routine testing, for example, when the ACU is operating under control of the customer equipment.

This test requires coordination with the customer and allows monitoring of the interface leads to evaluate the interaction between the business machine and the ACU during a normal data call by the customer.

STEP	PROCEDURE
	<p>Note: This procedure must be read carefully and understood before proceeding so the time required between the dialing of digits is minimized. The telco employee controls DPR using the 914-type DTS and consequently controls the dialing rate.</p>
1	Remove the ACU power cord from the 120 Vac receptacle.
2	Connect the data auxiliary set and the customer equipment to the 914-type DTS as shown in Fig. 3.
3	Condition the 914-type DTS as shown in Fig. 3.
4	Program the matrix as shown in Fig. 3.
5	Depress all interface selector switches except 2B and 25A.
6	Insert the ACU power cord into a 120 Vac receptacle.
7	Operate POWER switch on the 914-type DTS to the ON position.
	<p>Requirement: POWER lamp should light.</p>
8	Request the customer to turn on the call request (CRQ) lead at the CPE.
9	Inform the customer to condition the NB interface leads with the digits to be dialed, and turn on DPR lead.
	<p>Requirement: DS1 indicator lights.</p>
10	When DS1 lights, move VERTICAL MONITOR switch through positions 14, 15, 16, and 17 in that order and record the polarity of each reading. These polarities may be used later in conjunction with Table A to convert the potentials (binary code) to a decimal digit. This digit may be compared to the known digit stored in the CPE.
	<p>Note: Since the meter polarity switch is in the NORMAL position, a meter deflection to the left (OFF SCALE) indicates a negative reading, and a deflection to the right indicates a positive reading.</p>
11	Operate switch S1 to the ON position.
	<p>Requirement: DS1 goes off (the digit present on the NB interface leads is now being dialed by the ACU).</p>



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

NOTES:
1. SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE MODE	VOLTAGE
VERTICAL MONITOR	14
FUNCTION	VOLT INT
RANGE	DCV-30
METER POLARITY	NOR

2. 914 DTS SWITCHES AND LAMPS CORRESPOND TO THE FOLLOWING INTERFACE LEADS:

LAMP	SWITCH	FUNCTION
DS1	SI	DPR FROM CPE DPR TO ACU

3. ALL A AND B INTERFACE SELECTOR SWITCHES DOWN EXCEPT 2B AND 25A. STRAP SWITCH 2B TO 25B

Fig. 3—Monitoring of Interface Leads

STEP

PROCEDURE

-
- 12 When DS1 lights, operate switch S1 to the OFF position.
- 13 Repeat Steps 10 through 12 until all the digits of the called station have been dialed (DS1 lights, position VERTICAL MONITOR to verify digit, operate switch S1, etc).
- 14 Position FUNCTION switch to SPKR and RANGE switch to ACV 1 after the last digit has been dialed.

Requirement: Shortly after the called station answers the call, answer tone of either 2025 or 2225 Hz is heard through the 914-type DTS speaker, and data lamp on the associated data set lights.

Note: It is important that this step be accomplished immediately after the last digit has been dialed, otherwise the answer tone may not be heard through the 914-type DTS speaker. The speaker may be used to monitor the remainder of the data call.

- 15 Remove all test connections to the 914-type DTS and the ACU.
- 16 If the ACU has correctly dialed the digits supplied by the customer and is working correctly, return the ACU to its normal operating condition. If any of the digits were incorrectly dialed, tag the defective ACU, describing the cause of trouble, and return it to the distributing house for repair.
-

4. GROUND NOISE TEST

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

4.02 Test equipment required for this test is as follows:

1—6H impulse counter (or equivalent)

1—914-type DTS

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

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

4.03 In this test, the impulse counter is connected between the grounds of the data set and the CPE. The impulse counter registers when potential differences of sufficient amplitude have developed between the separated grounds. The 914-type DTS is used to gain access to the ground interface leads.

4.04 Perform the test as follows.

- (1) Connect the 914-type DTS connector A to the customer connector on the data set. Connect the 914-type DTS connector B to the data set connector on the CPE. This test

assumes that protective ground from the CPE appears at the customer interface.

- (2) On the 914-type DTS, remove all programming pins from the matrix. Pull up all A and B interface selector switches.
- (3) Connect one clip 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.
- (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.

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