

**DATA AUXILIARY SET 801CR-L1/2**  
**TEST PROCEDURES**

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**1. GENERAL**

**1.01** This section contains information required to perform installation and maintenance tests for data auxiliary set (DAS) 801CR-L1/2. Data auxiliary set 801CR-L1/2 replaces DAS 801C-list type and meets the requirements of the FCC Registration Program for use with data sets in registered arrangements.

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

**1.03** Data auxiliary set 801CR-L1/2 provides automatic calling capability for a data station and is referred to in this section as an ACU (automatic calling unit).

**1.04** Before proceeding with any tests of the ACU, verify the following.

(a) The telephone line meets standard dc talk, signaling, and supervision requirements.

(b) The ACU options agree with the service order.

**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 the trouble. If the trouble seems to be in the ACU, replace it and repeat the tests before turning the equipment back to the customer.

**2.02** Data auxiliary set 801CR-L1/2 contains built-in test features comprising four light emitting diodes (LEDs) and three test switches. The LEDs function as status indicators for four of the interface leads. The combination of status indicators and test switches allows the ACU to be checked independently of the customer-provided equipment.

**A. Dial Tone Detection Test**

**2.03** This test checks that the ACU, when connected to a working telephone line, can initiate a request for dial tone and recognize dial tone from the central office (CO). The test uses the nonlocking TR (test receive) switch and the CR and PD indicators. At the start of the test, the telephone line must be idle (CR indicator off and telephone on-hook). Operation of the TR switch locally turns *on* the CRQ lead, lights the CR indicator, and initiates a dial tone request to the CO. 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.

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**2.04** Perform the test as follows.

- (1) Depress TR switch.

**Requirement:** CR indicator lights and then PD indicator lights. Dial tone heard from loudspeaker, if used.

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

- (a) On lines equipped for loop start, lift handset on associated telephone set (or data set) and verify that dial tone can be heard in receiver. If dial tone is heard, ACU is defective.
- (b) On lines equipped for ground start, apply ground to ring lead momentarily and verify that dial tone can be heard in receiver. If dial tone is heard, ACU is defective.

### B. ACR Timer Test

**2.06** This test checks that the abandon call and retry timer in the ACU is operating properly. There are four ACR timing options available in the ACU: 7, 14, 28, and 56 seconds. This test uses the nonlocking TR switch and the AR indicator. This test can be performed as a continuation of the dial tone detection test or can be performed separately.

**2.07** Perform the test as follows.

- (1) Depress TR switch and wait until PD indicator lights.
- (2) Keep TR switch depressed (after PD indicator lights) for an additional period greater than ACR timing interval.

**Requirement:** AR indicator lights.

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

### C. Answer Tone Detection Test

**2.08** This test checks that the ACU can recognize answer tone from a distant-end data set. The test uses the nonlocking TR switch and the AR, CR, and PD indicators. ACUs used with some data sets are optioned to detect beginning of answer

tone (option X). ACUs used with most other data sets are optioned to detect end of answer tone (option W).

**2.09** This test can be performed with a data set at the distant end, or a data test center (DTC) can be used to supply an answer tone. Perform the test as follows.

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

**Requirement 1:** CR and PD indicators light when TR switch is depressed.

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

**Note:** Answer tone will not be heard in receiver after TR switch is depressed.

- (3) Release TR switch.

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

- (4) Depress TR switch.

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

### D. Out Dialing Sequence Test

**2.10** This test checks that the ACU can translate the binary inputs correctly and generate the combinations of tones required for all 10 digits. This test uses the nonlocking TT (test transmit) and SD (slow dialing) switches and the CR and PD indicators.

**2.11** This test is performed by dialing the CO ringback number. If a loudspeaker is used, the digits being transmitted can be heard when the TT switch is depressed. If the digits have been transmitted properly, the CO responds with

a double beep. Depressing the SD switch slows down the dialing sequence so that the number of digits dialed can be counted.

**2.12** Perform the test as follows.

- (1) If ACU is not equipped with loudspeaker, connect 1011-type handset across tip and ring. Handset should be in MONITOR position.
- (2) Using telephone set or associated data set, dial CO ringback number. Leave handset off-hook.
- (3) Depress TT switch until 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 depress TT and SD switches.

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

**2.13** If ACU fails the out dialing sequence test, use the TOUCH-TONE pad on the associated telephone set to place a call to the CO ringback number. Depress 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. The maintenance tests are to

be performed when investigating a trouble report and should be performed after the built-in tests (paragraphs 2.03 through 2.13) have been performed. By using the 914-type data test set (DTS), the customer interface can be checked. If the trouble seems 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 the ACUs to the distributing house for repair.

**A. Call Origination and Termination Tests**

**3.03** The call origination test checks that the ACU will correctly dial a DTC using the digits provided by a 914-type DTS. The DTC to be called must be informed that a test of an ACU is to be performed and to send an answer tone (2025 or 2225 Hz as required by the ACU option installed) when the incoming call is answered. The call termination test checks that the ACU will correctly terminate a call when directed by the 914-type DTS.

**Note:** The ACU and a data set must be connected to the telephone (data) line using connection information provided in the installation and connection section for the particular data set.

**3.04** Perform the tests as follows.

STEP	PROCEDURE
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**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 DTS control switches. The time between the dialing of digits should be minimized to prevent central office time-out.

- 1 Connect DTS to ACU and data set as shown in Fig. 2.
- 2 Set DTS switches as shown in Fig. 2.
- 3 Pull out all A interface selector switches except 7A and 20A.

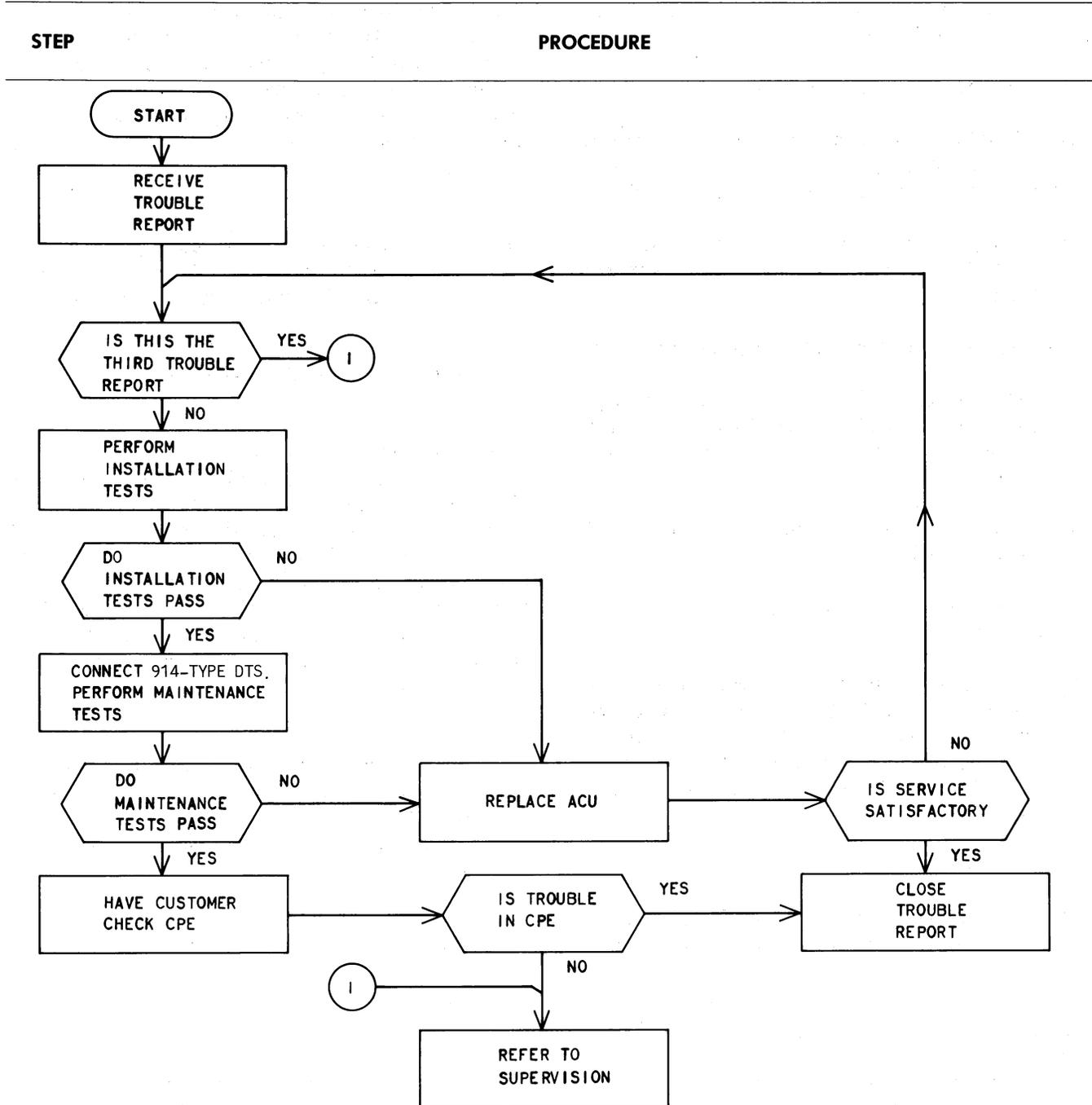
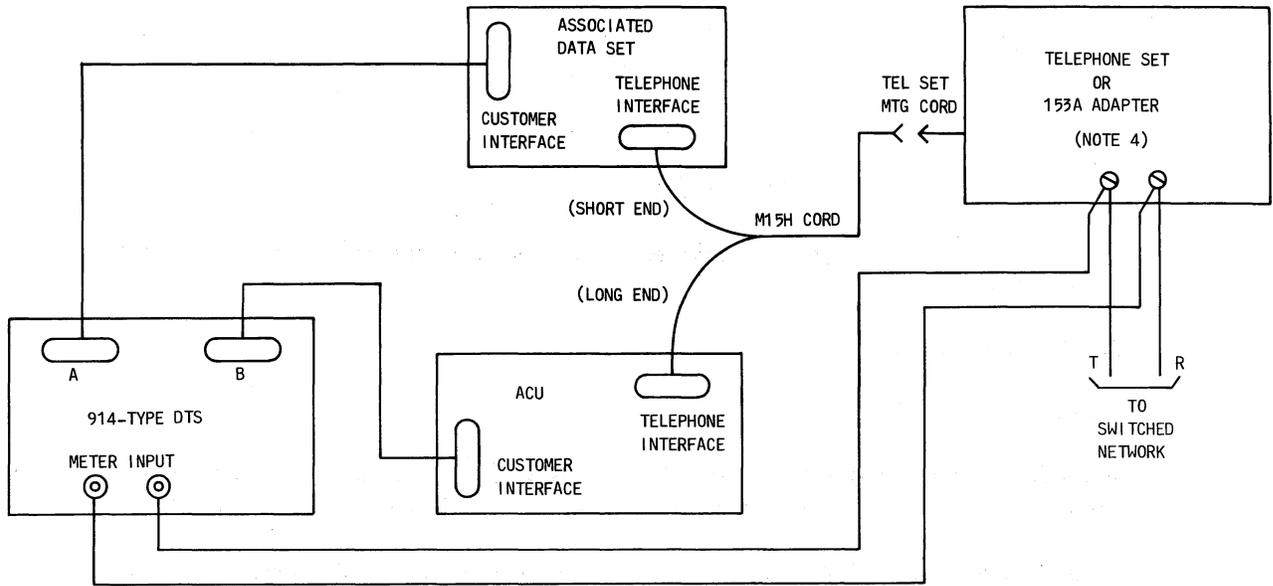


Fig. 1—Maintenance Flowchart

- 4 Depress all B interface selector switches except 20B.
- 5 Program matrix as shown in Fig. 2.
- 6 Connect leads supplied with DTS from METER INPUT jacks to tip and ring as shown in Fig. 2.
- 7 Set DTS POWER switch to ON.



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	NBB
	S7	DTR

3. ALL A INTERFACE SELECTOR SWITCHES UP EXCEPT 7A AND 20A. ALL B INTERFACE SELECTOR SWITCHES DOWN EXCEPT 20B.

4. CONNECT 914-TYPE DTS METER INPUT LEADS TO TIP AND RING (TERMINALS RT AND RR ON TELEPHONE SET OR TERMINALS B AND R ON 153A ADAPTER).

	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

Fig. 2—Call Origination and Termination Tests

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STEP	PROCEDURE
	<b>Requirement:</b> POWER lamp lights.
8	Set S7 to ON. This conditions data set to go into data mode by turning <b>on</b> data terminal ready (DTR).
	<b>Call Origination Test</b>
9	Set S1 (CRQ) to ON.
	<b>Requirement:</b> Dial tone is heard through DTS loudspeaker, and DS1 (DL0) and DS2 (PND) light. (Level of tone may be controlled by RANGE (ACV) switch.)
10	Using Table A and S3 through S6, set up first digit of DTC telephone number to be dialed.
11	Set S2 (DPR) to ON.
	<b>Requirement:</b> DS2 goes off (digit present on NB interface leads is being dialed by ACU).
12	Set S2 to OFF.
	<b>Requirement:</b> DS2 lights.
13	Repeat Steps 10 through 12 for remaining digits of DTC telephone number.
14	Using 1011-type handset across tip and ring, verify that correct telephone number has been reached.
	<b>Note:</b> Steps 17 through 19 test end-of-number (EON) operation.
15	Using Table A and S3 through S6, set up to send 12 to ACU.
16	Set S2 to ON.
	<b>Requirement:</b> DS2 goes off and DS4 lights when line is transferred.
17	Set S2 to OFF.
	<b>Call Termination Test</b>
18	If option Z (terminate call via ACU) is used— Set S1 to OFF.
	<b>Requirement:</b> DS1 goes off.
19	If option G (terminate call via data set) is used— Set S1 to OFF.
	<b>Requirement:</b> DS1 remains lighted.

STEP

PROCEDURE

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	ON	-	-	-	+
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	-	-	-	-

20 Set S7 to OFF.

**Requirement:** DS1 goes off.

21 Enter talk mode on associated telephone set or data set.

**Requirement:** DS1 lights.

22 Remove all test connections and restore all equipment to normal operating condition.

**B. Monitoring of Interface Leads**

**3.05** This test should be performed when a trouble condition exists that cannot be detected by routine testing, for example, when the ACU is operating under control of the customer-provided equipment (CPE). This test

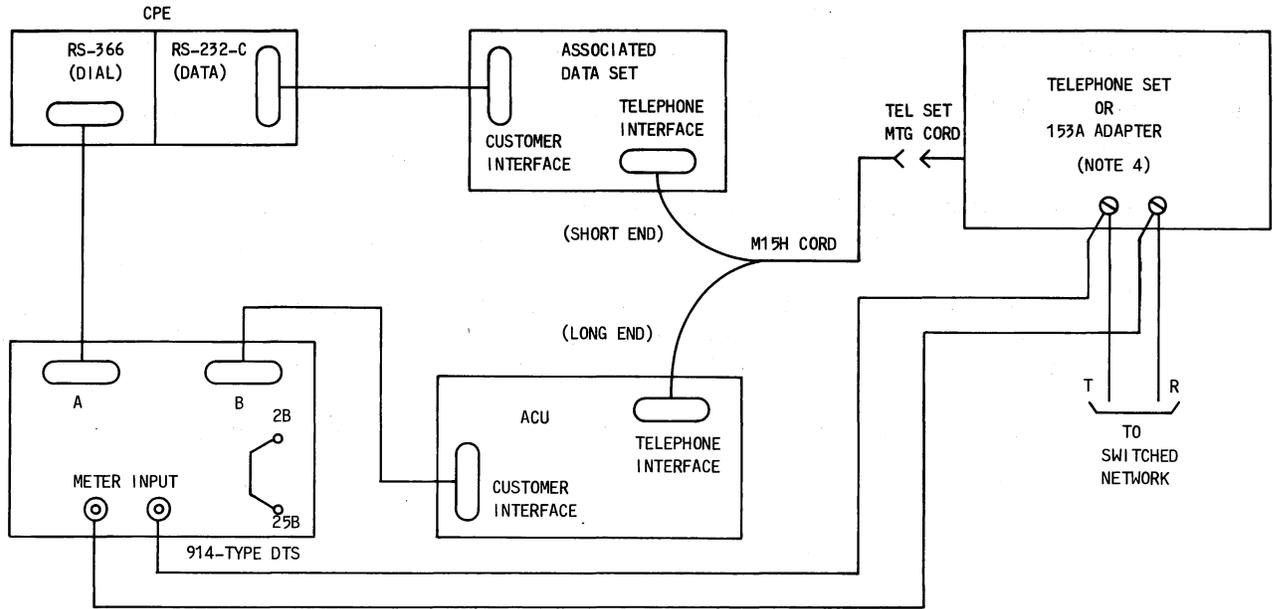
requires coordination with the customer and allows monitoring of the interface leads to evaluate the interaction between the CPE and the ACU during a normal data call by the customer.

**3.06** Perform the test as follows.

STEP	PROCEDURE
	<p><b>Note:</b> This procedure should be read carefully and understood before proceeding so the time between the dialing of digits is minimized. The telephone company (telco) employee controls DPR using the 914-type DTS and consequently controls the dialing rate.</p>
1	Connect DTS to ACU and CPE as shown in Fig. 3.
2	Set DTS switches as shown in Fig. 3.
3	Depress all A and B interface selector switches except 2B and 25A.
4	Strap interface selector switch 2B to 25B.
5	Program matrix as shown in Fig. 3.
6	Connect leads supplied with DTS from METER INPUT jacks to tip and ring as shown in Fig. 3.
7	Set DTS POWER switch to ON.
	<p><b>Requirement:</b> POWER lamp lights.</p>
8	Request customer to turn <b>on</b> call request (CRQ) lead at CPE.
9	Request customer to condition NB interface leads with digits to be dialed, and to turn <b>on</b> DPR lead at CPE.
	<p><b>Requirement:</b> DS1 lights.</p>
10	When DS1 lights, rotate VERTICAL MONITOR switch through positions 14, 15, 16, and 17 in that order and record polarity of each reading. These polarities can be used with Table A to convert the polarities (binary code) to decimal digits. These digits can be compared to the known digits stored in the CPE.
	<p><b>Note:</b> Since meter polarity switch is in normal position, a meter deflection to the left (off scale) indicates a negative polarity, and a deflection to the right indicates a positive polarity.</p>
11	Set S1 to ON.
	<p><b>Requirement:</b> DS1 goes off (digit present on NB interface leads is being dialed by ACU).</p>

STEP

PROCEDURE



	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
SI	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SI
DS1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS1
DS2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS2
S2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S2
DS3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS3
TP1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TP1
TP2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TP2
S3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S3
DS4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS4
DS5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS5
S4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S4
SCT	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SCT
S5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S5
SCR	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SCR
DS6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS6
S6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S6
DS7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS7
DS8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS8
S7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S7
TP3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TP3
S8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S8

NOTES:

1. SET SWITCHES ON 914 DTS AS FOLLOWS:

SWITCH	SETTING
INTERFACE 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	S1	DPR FROM CPE DPR TO ACU

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

4. CONNECT 914-TYPE DTS METER INPUT LEADS TO TIP AND RING (TERMINALS RT AND RR ON TELEPHONE SET OR TERMINALS B AND R ON 153A ADAPTER).

Fig. 3—Monitoring of Interface Leads

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STEP	PROCEDURE
12	When DS1 lights, set S1 to OFF.
13	Repeat Steps 11 through 14 until all digits of called station have been dialed.
14	Set FUNCTION switch to SPKR and RANGE switch to ACV 1 after last digit has been dialed.  <b>Requirement:</b> Shortly after called station answers call, answer tone of either 2025 or 2225 Hz is heard through loudspeaker, and data lamp on associated data set lights.  <b>Note:</b> It is important that this step be accomplished immediately after last digit has been dialed, otherwise answer tone may not be heard through DTS loudspeaker. The loudspeaker can be used to monitor remainder of call.
15	Remove all test connections and restore all equipment to normal operating condition.