DATA AUXILIARY SET 801A1, 801A2, 801A3, AND 801A4 FOR AUTOMATIC CALLING TEST PROCEDURE

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1. GENERAL

1.01 This section describes the test procedures to be used on Data Auxiliary Sets 801A1, 801A2, 801A3, and 801A4. Information concerning the data set and business machine associated with the data auxiliary set is not included.

1.02 This section is reissued to provide maintenance test procedures using the 914B Data Test Set. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 Data Auxiliary Sets 801A1, 801A2, 801A3, and 801A4 are referred to in this section as automatic calling unit (ACU).

1.04 A letter ***a, b, c,*** or ***d*** added to a step number in Part 3 of this section indicates an action which may or may not be required depending on the type of data auxiliary set or option installed. The condition under which a lettered step or a series of lettered steps should be made is given in the Procedure column, and all steps governed by the same condition are designated by the letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

1.05 Information shown in Fig. 1 and Table A is provided as a means of identifying printed wiring board assemblies.

Note: Refer to Section 598-010-300 for replacement procedure.

2. INSTALLATION TEST USING DATA TEST CENTER

2.01 This test should be made at time of installation to ensure that the ACU can properly dial a number, detect a return signal, and transfer the line to the associated data set. To successfully complete this test, the ACU and the data set must be properly connected as outlined in the installation instructions for the data set. The data terminal ready (DTR) function from the business machine to the data set must also be set to the ON (positive) state.

2.02 No test equipment is required for this test.

2.03 Take proper steps to ensure that the customer is not billed for test calls. See section entitled Crediting Charges on Test Calls (010-250-001).

Note: When the originating central office is equipped with a dial testing circuit, the ACU dialing circuitry may be tested in accordance with local instructions. Dialing procedures for the ACU are given in Steps 3 through 7.

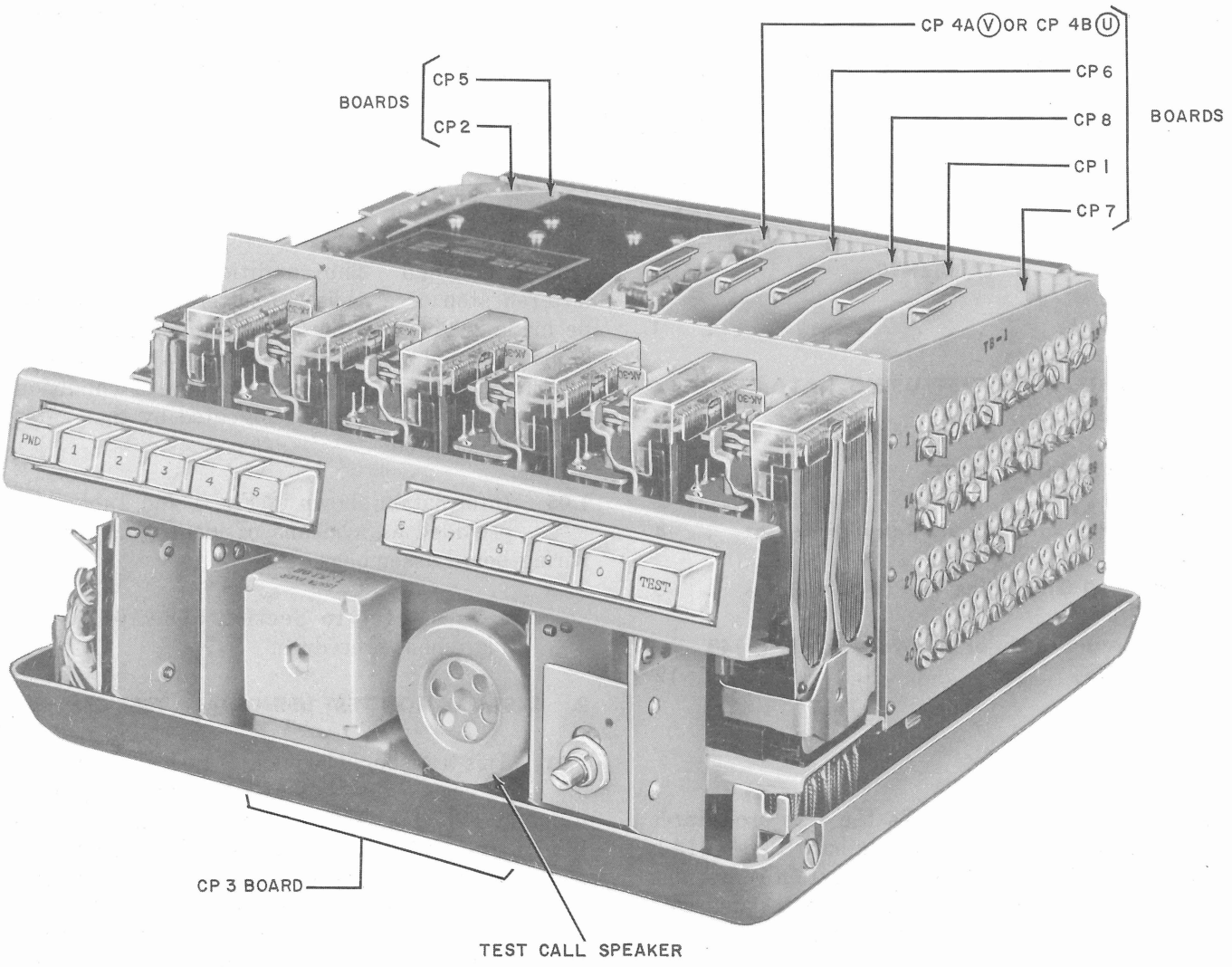


Fig. 1—Data Auxiliary Set 801A-Type—Front View With Cover Removed

TABLE A

PRINTED WIRING BOARD IDENTIFICATION

PRINTED BOARD DESIGNATION (SEE FIG. 1)	PRINTED BOARD FEATURES	PRINTED WIRING BOARD ASSEMBLY NO.
CP1	Answer Detector, Tuned Circuit, and Input Circuit	A835134
CP2	ACR Timer, Intercall Timer, and Monitor Amplifier	A835136
CP3	Monitor Test Speaker	A835130
CP4A	Voltage Interface to Business Machine	A835132
CP4B	Contact Interface to Business Machine	A835133
CP5	Interface Gates	A835131
CP6	Zero Gate, Dial Pulse Generator, and Interdigital Timer	A835135
CP7	Answer Detector	A835138
CP8	Pulse Counter and End of Number Detector	A835137

STEP	PROCEDURE
1	Call the data test center (DTC) and arrange for answer-back and transfer circuits to be checked in accordance with DTC procedures. ***Note:*** The DTC will request the ACU option (T or S) or data set type to determine which tone to send in response to test calls.
2	Set the abandon call and retry (ACR) timer to the 40-second position (extreme clockwise position).
3	Momentarily depress TEST button. ***Requirement:*** Dial tone is heard in the test speaker and lamps PND and TEST light.
4	Depress digit test button corresponding to the first number of the DTC telephone number and hold it depressed until PND lamp is extinguished. ***Note:*** Failure to hold digit button depressed until PND lamp is extinguished may result in a wrong digit being sent by the ACU.
5	When PND lamp goes out, release the numbered test button and wait for PND to light again.
6	Follow the procedure in Steps 4 and 5 and dial the remaining digits of the DTC telephone number (depress button, wait for PND lamp to extinguish, release button, wait for PND lamp to light, depress the next button, etc).

STEP	PROCEDURE
7	When a tone is heard through the test speaker which signifies that the DTC has answered the call, depress digit 9 button. This will send a pulse train to the DTC as a means of identification.
8a	When end of number (EON) mode of operation is to be tested— Simultaneously depress both the number 4 and 8 buttons. Hold the buttons depressed until PND lamp extinguishes. ***Note:*** When PND lamp extinguishes, the ACU has transferred the line to the data set. The data set can now detect answer tone (2025 or 2225 Hz from DTC) and go into data mode. When the ACR timer times out, the TEST lamp extinguishes and the ACU returns to an idle state.
9b	When ACU answer-tone detection is to be tested (801A1 and 801A2)— The DTC sends an answer tone that should be momentarily heard in the test speaker. When the ACU detects answer tone, the PND lamp extinguishes indicating the telephone (data) line is transferred to the data set which enters data mode if DTR is ON. The TEST lamp extinguishes at the end of the ACR timer interval. ***Note:*** If the PND lamp does not go out, the ACU is defective. If wrong number, busy tone, or other overflow tone is reached, disconnect by momentarily depressing PND button. The complete test sequence will then have to be repeated.
10	If the ACR timer was set to the 40-second interval for this test, reset it to the interval specified on the service order before placing it in service.

3. MAINTENANCE TESTS

3.01 These tests should be made when investigating a trouble condition and when maintenance is required. The type of tests to be run will depend upon the test equipment available.

A. Abandon Call and Retry Timer Test

3.02 The purpose of this test is to verify the ACR timer circuitry will signal the control unit when too much time has elasped between any two operations in the call-origination sequence.

STEP	PROCEDURE
1	Set the ACR timer to the 7-second position (extreme counterclockwise position).
2	Depress TEST key. ***Requirement:*** TEST lamp should light. In about 7 to 9 seconds, the TEST lamp will extinguish indicating that the ACR timer has functioned properly.
3	Repeat Steps 1 and 2 for the remaining ACR timer intervals as shown in Table B.

TABLE B

ACR TIMER ADJUSTMENT PROCEDURE

INTERVAL SELECTED (SECONDS)	ACR TIMER ADJUSTMENT	MEASURED INTERVAL (SECONDS)
7	Rotate adjustment screw to extreme counterclockwise position.	7 to 9
10	Rotate adjustment screw one position clockwise from extreme counterclockwise position.	10 to 12
15	Rotate adjustment screw two positions clockwise from extreme counterclockwise position.	15 to 18
25	Rotate adjustment screw three positions clockwise from extreme counterclockwise position.	25 to 30
40	Rotate adjustment screw to extreme clockwise position.	40 to 48

STEP	PROCEDURE
4	If the data auxiliary set passes the previous test, the abandon call and retry timer circuitry can be considered to be operating properly.

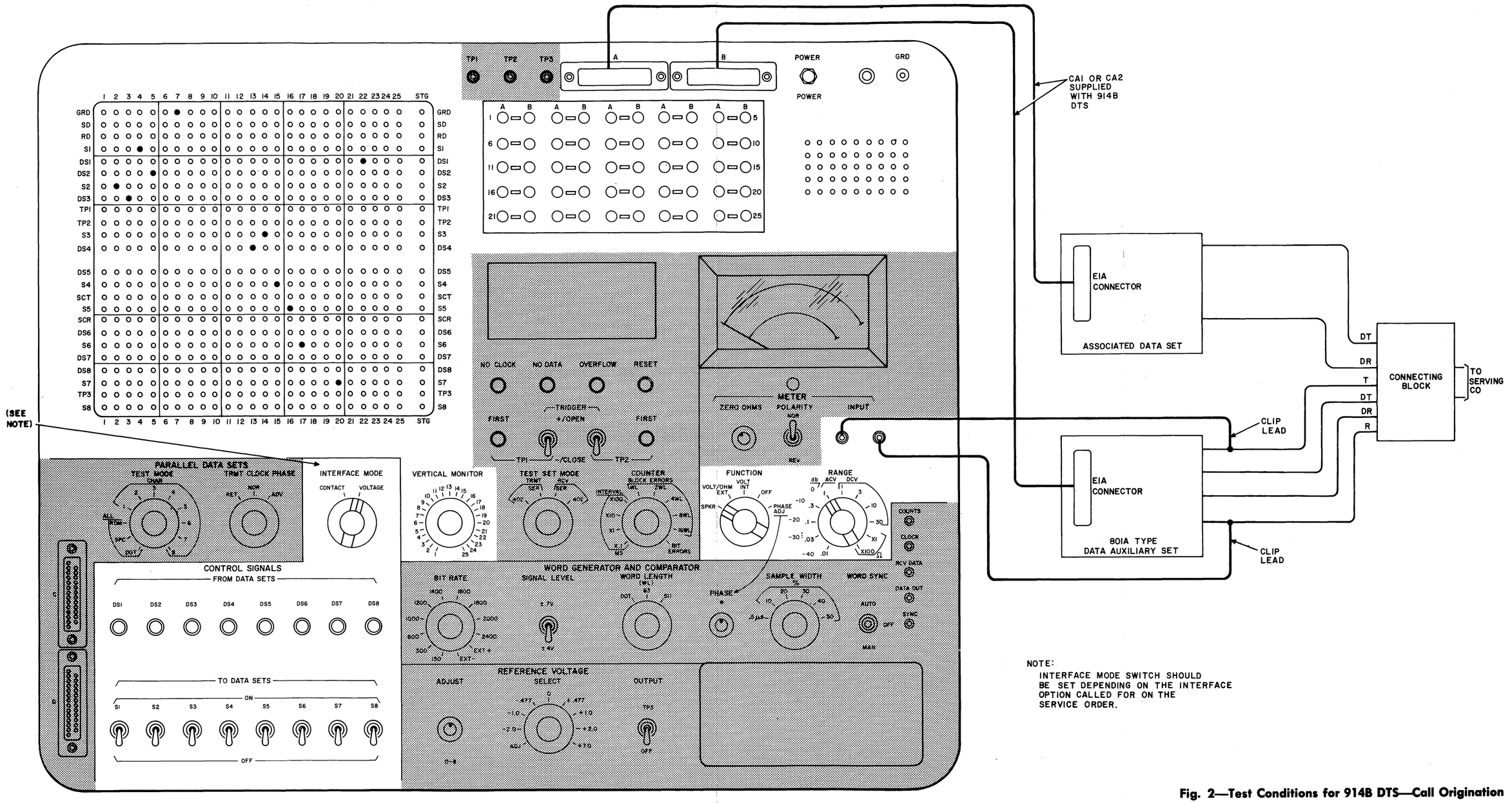
B. Call Origination Test (914B DTS)

3.03 This test provides a means to dial the DTC using the 914B DTS as a business machine simulator 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 for 3 to 5 seconds. The test verifies that the ACU correctly dials the digits presented by the 914B DTS and monitor interface function.

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

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

Note: 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 914B matrix. Insert only those pins shown in the test connections diagram (Fig. 2).



NOTE:
INTERFACE MODE SWITCH SHOULD BE SET DEPENDING ON THE INTERFACE OPTION CALLED FOR ON THE SERVICE ORDER.

Fig. 2—Test Conditions for 914B DTS—Call Origination Test

STEP	PROCEDURE
	Note: This procedure should be read carefully and understood before proceeding. Manual dialing using the 914B DTS requires the digit to be dialed be set up in binary form on the 914B DTS control switches. The time interval between the dialing of each digit should be minimized to prevent central office time out.
1	Disconnect AC power cord from the ACU.
2	Remove customer cords from the ACU and data set EIA connector. Interconnect the 914B DTS with the ACU and data set as illustrated in Fig. 2.
3	Condition the 914B DTS as shown in Fig. 2.
	Note: INTERFACE MODE switch should be set to VOLTAGE or CONTACT depending on the interface option called for on the 801A-type service order.
4	Pull out all A interface selector switches except 20A.
5	Depress all B interface selector switches except 20B.
6	Program the matrix as shown in Fig. 2.
7	Connect leads from METER INPUT jacks to tip and ring of connecting block.
8	Depress POWER switch on the 914B DTS to the ON position.
	Requirement: POWER lamp should light.
9	Insert the ACU power cord into a 120 Vac receptacle.
10	Set the ACR timer to the 40-second position (extreme clockwise position).
11	Condition the data set to go into the data mode.
	Note: For voltage interface, operate switch S7 on the 914B DTS to the ON position. This is the data terminal ready (DTR) function normally supplied to the data set by the business machine. For contact interface, consult the BSP for the data set being used to determine which interface leads must be conditioned. In some sets, these leads are 19, 20, and 21 and must be shorted together. In this case shorting pins would be placed at crosspoints 19, 20, and 21 on row GRD on the matrix.
12	Operate switch S1 (CRQ) to the ON position.
	Requirement: Dial tone should be heard through the 914B DTS speaker and lamps DS1 (DL0) and DS2 (PND) will light. [Level of tone may be controlled by the RANGE (ACV) switch.]
	Note: The ACU power indicator (PWI) may be monitored at any time with the VERTICAL MONITOR switch in position 6 and FUNCTION switch to VOLT INT, etc.

STEP	PROCEDURE
13	Using Table C and switches S3 through S6, set up the first digit of DTC number to be dialed.
14	Operate switch S2 to the ON position. ***Requirement:*** Lamp DS2 should extinguish (the digit present on the NB interface leads is now being dialed by the ACU).
15	Operate switch S2 to the OFF position. ***Requirement:*** Lamp DS2 should light. ***Note:*** After dialing the last digit of the DTC number, switch S2 should be in the OFF position.
16	Repeat Steps 13 through 15 for the remaining digits of the telephone number. ***Note:*** If the ACR timer interval is exceeded, lamp DS3 will light and the test must be repeated.
17	Verify the correct digits of the DTC telephone number have been dialed. ***Requirement:*** Telephone should ring upon completion of the call from the ACU.
18a	When ACU answer-tone detection is to be tested (801A1 and 801A2)— Answer tone should be heard coming from the DTC. DS2 (PND) extinguishes and DS4 (DSS) lights when the line is transferred to the data set.
19b	When EON operation is to be tested— Using Table C and switches S3 through S6, set up to send 12 to the ACU.
20b	Operate switch S2 to the ON position. ***Requirement:*** Lamp DS2 will extinguish and DS4 will light when the line is transferred to the data set. **Call Termination Test**
21c	If option Z (call termination by CRQ) is used— Operate S1 to OFF. ***Requirement:*** DS1 extinguishes.

TABLE C

914B SWITCH SETTINGS REQUIRED TO REPRESENT DECIMAL DIGITS TO BE DIALED

	VOLTAGE INTERFACE					CONTACT INTERFACE			
DIGIT	S-3 NB1	S-4 NB2	S-5 NB4	S-6 NB8	DIGIT	S-3 NB1	S-4 NB2	S-5 NB4	S-6 NB8
0	ON	ON	ON	ON	0	OFF	OFF	OFF	OFF
1	OFF	ON	ON	ON	1	ON	OFF	OFF	OFF
2	ON	OFF	ON	ON	2	OFF	ON	OFF	OFF
3	OFF	OFF	ON	ON	3	ON	ON	OFF	OFF
4	ON	ON	OFF	ON	4	OFF	OFF	ON	OFF
5	OFF	ON	OFF	ON	5	ON	OFF	ON	OFF
6	ON	OFF	OFF	ON	6	OFF	ON	ON	OFF
7	OFF	OFF	OFF	ON	7	ON	ON	ON	OFF
8	ON	ON	ON	OFF	8	OFF	OFF	OFF	ON
9	OFF	ON	ON	OFF	9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF	10	OFF	ON	OFF	ON
11	OFF	OFF	ON	OFF	11	ON	ON	OFF	ON
12	ON	ON	OFF	OFF	12	OFF	OFF	ON	ON
13	OFF	ON	OFF	OFF	13	ON	OFF	ON	ON
14	ON	OFF	OFF	OFF	14	OFF	ON	ON	ON
15	OFF	OFF	OFF	OFF	15	ON	ON	ON	ON

STEP	PROCEDURE
22d	If option G (call termination through data set) is used—
	Operate S1 to OFF.
	Requirement: DS1 remains on.
23d	Operate S7 to OFF.
	Requirement: DS1 extinguishes.
	ACR Timer Test

STEP	PROCEDURE
24	Set the abandon call and retry (ACR) timer to the 7-second position (extreme counterclockwise position).
25	Set S1 to ON.
	Requirement: DS1 and DS2 light. DS3 lights at end of ACR timer interval.
	Note: Time the interval from the moment switch S1 is operated to the ON position and lamp DS3 lights. Limits are given in Table B.
26	Turn off S1 for reset.
27	Repeat Steps 24 through 26 for remaining timer intervals given in Table B.
28	Terminate the call by operating switch S1 to the OFF position.
	Requirement: Lamps DS1 and DS2 should extinguish indicating an idle state.
29	Remove data test equipment and restore the ACU to its normal operation.

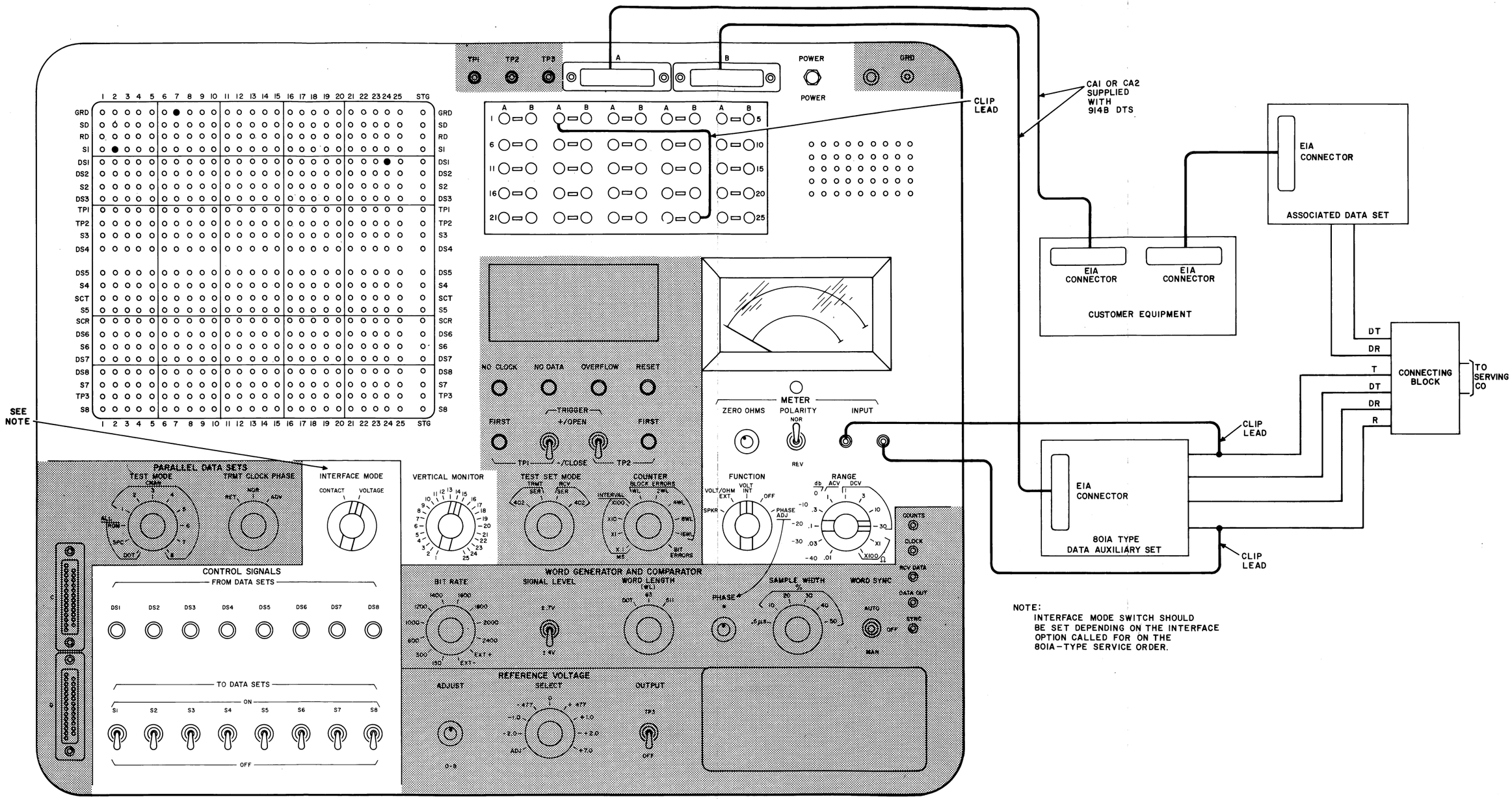
C. Monitoring of Interface Leads (914B DTS)

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 placed by the customer.

3.06 The following test equipment is required for this test:

- One clip lead
- 914B Data Test Set

STEP	PROCEDURE
	Note: This procedure must be read carefully and understood before proceeding so the time required between the dialing of digits is minimized. The tester controls DPR and consequently controls the dialing rate.
1	Remove the ACU power cord from the 120 Vac receptacle.
2	Set the abandon call and retry (ACR) timer to the 40-second position (extreme clockwise position).
3	Connect the customer cord and the data auxiliary set to the 914B DTS as shown in Fig. 3.



NOTE:
INTERFACE MODE SWITCH SHOULD BE SET DEPENDING ON THE INTERFACE OPTION CALLED FOR ON THE 80IA-TYPE SERVICE ORDER.

Fig. 3—Test Conditions for 914B DTS—Monitoring of Interface Leads

STEP	PROCEDURE
4a	If voltage interface is used (option V)—
	Condition the 914B DTS as shown in Fig. 3.
5b	If contact interface is used (Option U)—
	Condition the 914B DTS as follows:
	●INTERFACE MODE to CONTACT
	●METER FUNCTION switch to VOLT/OHM EXT
	●RANGE switch to X1 ohms
6	Program the matrix as shown in Fig. 3.
7	Depress all interface selector switches except for switches 2A and 24A.
8	Connect a clip lead between interface selector switch terminals 2A and 24B.
9	Insert the ACU power cord into a 120 Vac receptacle.
10	Depress POWER switch to the ON position located on the 914B DTS.
	Requirement: Power lamp will light.
11	Request the customer to turn on the call request (CRQ) lead at the business machine.
12	Inform the customer to condition the NB interface leads with the digit to be dialed and turn on DPR.
	Requirement: DS1 will light.
13a	If voltage interface (option V) is used—
	When lamp DS1 (DPR) lights, move the VERTICAL MONITOR switch to positions 14, 15, 16, and 17 in that order and record the polarity of each reading. Table D is used to convert these potentials (binary code) into a decimal digit which is to be compared to the known digit stored in the business machine.
	Note: Since the meter POLARITY switch is in the NORMAL position, a meter deflection to the left (off scale) indicates a negative voltage, and a deflection to the right indicates a positive voltage.
14b	If contact interface (option U) is used—
	When lamp DS1 lights, connect the RED METER INPUT lead to the center of interface switches 14, 15, 16, and 17 in that order. Record the resistance readings at these points. Table D is used to convert these readings (binary code) to a decimal digit. This digit can be compared to the known digit stored in the business machine.

TABLE D

METER READINGS FOR BINARY TO DECIMAL CONVERSION

VOLTAGE INTERFACE					CONTACT INTERFACE				
FUNCTION	NB1	NB2	NB4	NB8	NB1	NB2	NB4	NB8	FUNCTION
LEAD / DIGIT	14	15	16	17	14 (OHMS)	15 (OHMS)	16 (OHMS)	17 (OHMS)	LEAD / DIGIT
0	+	+	+	+	∞	∞	∞	∞	0
1	−	+	+	+	0	∞	∞	∞	1
2	+	−	+	+	∞	0	∞	∞	2
3	−	−	+	+	0	0	∞	∞	3
4	+	+	−	+	∞	∞	0	∞	4
5	−	+	−	+	0	∞	0	∞	5
6	+	−	−	+	∞	0	0	∞	6
7	−	−	−	+	0	0	0	∞	7
8	+	+	+	−	∞	∞	∞	0	8
9	−	+	+	−	0	∞	∞	0	9
10	+	−	+	−	∞	0	∞	0	10
11	−	−	+	−	0	0	∞	0	11
12	+	+	−	−	∞	∞	0	0	12
13	−	+	−	−	0	∞	0	0	13
14	+	−	−	−	∞	0	0	0	14
15	−	−	−	−	0	0	0	0	15

STEP	PROCEDURE
15	Operate switch S1 to the ON position (the digit present on the NB interface leads is now dialed by the ACU). ***Requirement:*** Lamp DS1 will extinguish. ***Note:*** Before operating switch S1 to the ON position to dial the last digit being presented to the ACU from the business machine, connect the leads from the METER INPUT jacks to tip and ring at the connecting block, set the RANGE switch to ACV 1 and FUNCTION switch to SPKR.
16	Operate switch S1 to the OFF position. ***Note:*** After the last digit has been dialed, ensure that switch S1 is in the OFF position.
17	Repeat Steps 12 through 16 until all the digits of the called station have been dialed (DS1 lights, position VERTICAL MONITOR to verify digit, operate switch S1, etc).
18	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 Hz or 2225 Hz should be heard through the 914B DTS speaker. Data lamp on the associated data set should light. ***Note:*** It is important that this be accomplished immediately after the last digit has been dialed, otherwise the answer tone may not be heard through the 914B DTS speaker. The speaker may be used to monitor the remainder of the data call.
19	Reset the ACR timer interval to the position called for on the service order.
20	Remove all test connections made to the 914B DTS and the ACU.
21	If the ACU has correctly dialed the digits supplied by the customer and is working properly, return the ACU to its normal operating conditions. If any of the digits were incorrectly dialed, tag the defective ACU and label the cause of trouble. Return the defective ACU to the distributing house for repairs.