

**DATA SET 103E-TYPE DATA STATION  
USING KS-20093 CABINETS  
TEST PROCEDURE**

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(103E-type data station) on customer premises and housed in a KS-20093 cabinet.

**1.02** This section is reissued to provide the following:

(a) Information on the use of an Automatic Data Test System (ADTS) with a 103E-type data station.

(b) Procedures for using the 914C data test set (DTS).

Since this reissue is a general revision, arrows normally used to indicate changes have been omitted.

**1.03** Before proceeding with any tests of the data station, verify that:

(a) Data loop meets requirements specified in Section 314-205-501.

(b) Telephone portion of installation meets standard dc talk, signaling, and supervision requirements.

(c) Data station options agree with service order.



*Take necessary steps to ensure customer is not billed for test calls. Refer to the section entitled **Crediting Charges on Test Calls (010-250-001)**.*

**1. GENERAL**

**1.01** This section describes the test procedures for a data set 103E-type multiple data station

**2. INSTALLATION TEST PROCEDURES**

**2.01** The tests in this part should be performed after data set 103E-type data station is completely assembled and/or modified (including the telephone lines and data auxiliary sets 801-type, when provided) and **prior** to connection to the customer provided equipment (CPE).

**NOTICE**

Not for use or disclosure outside the Bell System except under written agreement



**Data set 103E-type data station can be statically tested by an ADTS. For information on communicating with the automatic data test center, refer to the section entitled J1P005 Automatic Data Test System (ADTS)—Operation From Field Locations (590-010-500).**

**2.02** These test procedures cover installations that are equipped with line-hunting type telephone lines.



**Installations not equipped with line-hunting type telephone lines require the following modification to the test procedures. Whenever calls are originated to the 103E-type data station, the call must be placed to the assigned telephone number for the particular data set under test.**

**2.03** Test procedures for data auxiliary sets (DAS) 801-type, when installed in the 103E-type data station, are covered in the sections listed in Part 4.

**A. 103E-Type Data Station (Originate and Answer Service)**

**2.04** The following procedures provide the installation tests for a 103E-type data station equipped for both originate and answer service. These tests should be performed in the sequence in which they are presented.

**Preparation for Tests**

**2.05** The following test equipment is required:

2—914-type data test sets (DTS) (designated No. 1 and No. 2 for clarity)

1—21A transmission measuring set (TMS), or equivalent (not required if the data set transmit levels are specified on the service order)

1—Operating telephone, external to the data station.

**2.06** Condition 914-type DTS No. 1 and No. 2 as shown in Fig. 1.

**Note:** Do not connect DTS to data station at this time.

**2.07** The following data station options must be installed or removed as directed before performing the installation tests:

(a) For DAS 804J-type:

(1) Options removed:

- None

(2) Option installed:

- Z (31-32) (15-16) (40-41) (23-24) (25-26)

(b) For 2A1 data mountings:

(1) Options removed:

- Z (41-42)

- Y (21-22)

(2) Options installed:

- R (1-2) (3-4)

- S (11-12) (13-14)

**Note:** Install R and S options only if DAS 801-type is not provided.

- N (31-32) (33-34-35)

- Q (36-37) (38-39-40)

(a) For telephone lines with sleeve lead:

- T (23-24) (27-28)

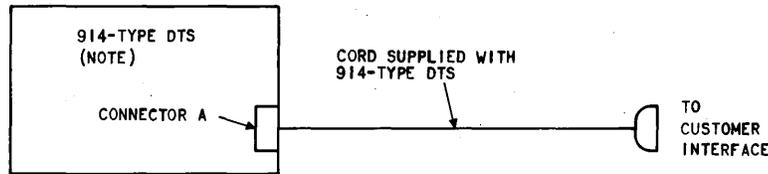
- V (43-44) (47-48)

**Note:** Remove W and X options before installing T and V options.

(b) For telephone lines without sleeve lead (2-wire):

- W (24-25) (26-27)

- X (44-45) (46-47)



	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
TPI	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TPI
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

NOTE:  
SET SWITCHES ON 914-TYPE DTS NO. 1 AND NO. 2 AS FOLLOWS:

SWITCH	SETTING
INTERFACE	
SELECTOR A	ALL DEPRESSED
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER (914C)
	TRMT SER (914B)
COUNTER	BLOCK ERRORS WL
FUNCTION	OFF
RANGE	30 DCV
TRANSMIT BIT RATE (914C)	300
BIT RATE (914B)	300
TRANSMIT WORK LENGTH (914C)	63
WORD LENGTH (914B)	63
SIG LEV (914C)	±4V
SIGNAL LEVEL (914B)	±4V
SI (CD)	ON (DTS NO. 1)
	OFF (DTS NO. 2)
S2	OFF
S3	ON

Fig. 1—Test Equipment Setup

**Note:** Remove T and V options before installing W and X options.

(c) For data set (DS) 103E-type:

(1) Options removed:

**Note:** Options on DS 103E-type are removed by loosening option screws, unless otherwise specified.

- V—Long space disconnect
- H—Short space disconnect
- T—Send disconnect
- G—Originate-only test
- W—Answer mode indication—CE off

- M—Answer control combined (not available on DS 103E6)
- A—CB and CF indications—common
- Z—Inverted frequencies (DS 103E2 only)

(2) Options installed:

**Note:** Options on DS 103E-type are installed by tightening option screws, unless otherwise specified.

- Transmit level—adjust R34 potentiometer on DS 103E5 and 103E6 for maximum clockwise position (minimum transmit level). On DS 103E2, loosen screws 9 and 11, and tighten screws 4, 5, 6, 7, 8, and 12.
- Desensitizing pad—loosen screws 1, 2, and 4 (DS 103E2 only).

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- Y—Normal frequencies (DS 103E2 only).
- X—Answer mode indication—CE ON
- N—W/O ANS/ORG transfer
- S—Loss of carrier disconnect
- Q—Common grounds
- B—CB and CF indications separate
- ZD—CC indication early (DS 103E6 only)

**Operational Test**

**2.08** The operational test is a functional check of the complete data station.

**2.09** Perform the test as follows:

STEP	ACTION	VERIFICATION
1	Apply power to data station by plugging cord from KS-20129-L1 power strip into a customer-provided 117-volt 60-Hz power outlet.	AUTO and PICKUP lamps light. <b>Select field</b> lamps wink for all data station positions equipped with data sets. Interrupter runs. AC relay on 1A1 data mounting operates.
2	Depress AUTO key.	Relays AB and AC change state. AUTO lamp extinguishes.  <b>Note:</b> AC if operated should release, AB if released should operate.
3	Depress MAKE BUSY key.	MAKE BUSY lamp lights. PICKUP lamp extinguishes. MBR and PUR relays operate.
4	Depress BUSY RLS key.	MAKE BUSY lamp extinguishes. BUSY RLS lamp lights. RBR relay operates. MBR relay releases.
5	Sequentially depress <b>select field</b> keys for all data station positions equipped with data sets.  <b>Note:</b> A fully equipped data station will require depressing <b>select field</b> keys 1 through 40.	
6	Depress PICKUP key.	PICKUP lamp lights. BUSY RLS lamp extinguishes. PUR and RBR relays release.
7	Originate a call from external telephone to data station service line.	Ringer sounds.
8	Depress SERV LINE key.	SERV LINE lamp lights.
9	Pick up handset on DAS 804J-type.	Ringing stops and voice continuity exists.
10	Replace handset on DAS 804J-type and depress TALK key.	SERV LINE lamp extinguishes and SERV LINE key releases.

STEP	ACTION	VERIFICATION
11	Hang up external telephone.	
12	Connect DTS No. 1 to customer interface connector J1 for DS No. 1 (Fig. 2), and apply power to DTS.	<i>Select field</i> lamp No. 1 stops winking.
13	Depress MAKE BUSY key.	MAKE BUSY lamp lights. PICKUP lamp extinguishes.
14	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 winks.
15	Originate call to data station from external telephone.	Data station appears busy.
16	Hang up external telephone.	
17	Depress BUSY RLS key.	MAKE BUSY lamp extinguishes. BUSY RLS lamp lights.
18	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 extinguishes.
19	Depress PICKUP key.	PICKUP lamp lights. BUSY RLS lamp extinguishes.
20	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 flutters. PICKUP lamp extinguishes. TERM RDY lamp lights. TRMT DATA lamp blinks.
21	Originate call to data station from external telephone.	Buzzer sounds and RING IND lamp lights during ringing cycle.
22	Pick up handset on DAS 804J-type.	Ringling stops. TS relay operates. Voice continuity exists. RING IND lamp remains lighted.
23	Depress DATA key.	SET RDY and DATA lamps light. TS relay releases. TALK key releases. A tone is heard at originating station.
24	Replace handset on DAS 804J-type.	
25	Depress TALK key and pick up handset on DAS 804J-type.	SET RDY and DATA lamps extinguish. TS relay operates. The transmitted tone is squelched. Voice continuity exists.
26	Replace both handsets.	TS, SS, and PUR relays release. <i>Select field</i> No. 1, TRMT DATA, TERM

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STEP	ACTION	VERIFICATION
		RDY, and RING IND lamps extinguish. PICKUP lamp lights.
27	Depress <i>select field</i> key No. 1.	PICKUP lamp extinguishes. <i>Select field</i> lamp No. 1 flutters. TERM RDY lamp lights. TRMT DATA lamp blinks.
28	Originate call to data station from external telephone.	Buzzer sounds and RING IND lamp lights during ringing cycle.
29	Depress AUTO key.	SET RDY, RING IND, DATA, and AUTO lamps light. A tone is transmitted back to originating station for approximately 27 seconds (DS 103E5 and 103E6) or 12 seconds (DS 103E2). At the end of this time, SET RDY, RING IND, and DATA lamps extinguish and the transmitted tone is squelched.
30	Hang up external telephone.	
31	Depress AUTO key.	AUTO lamp extinguishes.
32	Depress PICKUP key.	PICKUP lamp lights. <i>Select field</i> No. 1, TRMT DATA, and TERM RDY lamps extinguish.
33	Originate call to data station from external telephone.	<i>Select field</i> No. 1 lamp flashes. A tone is heard at the originating station for approximately 27 seconds (DS 103E5 and 103E6) or 12 seconds (DS 103E2). At the end of this time, <i>select field</i> No. 1 lamp extinguishes and the tone is squelched.
34	Hang up external telephone.	
35	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 flutters. PICKUP lamp extinguishes. TERM RDY lamp lights. TRMT DATA lamp blinks.
36	Depress LINE TRFR key.	LINE TRFR lamp lights.
37	Originate call to data station from external telephone.	Data station appears busy.
38	Momentarily hang up external telephone and then dial service line telephone number.	Ringer and buzzer sound and RING IND lamp lights during ringing cycle.

STEP	ACTION	VERIFICATION
39	At <i>beginning</i> of <i>second</i> ring, depress TEST key until TEST lamp lights.	TEST lamp lights. RING IND lamp remains lighted. Tone is transmitted to originating station.
40	Momentarily lift and replace handset on DAS 804J-type.	Flutter of <i>select field</i> lamp No. 1 changes to wink. TRMT DATA, TERM RDY, RING IND, and TEST lamps extinguish. PICKUP lamp lights.
41	Hang up external telephone.	<i>Select field</i> lamp No. 1 extinguishes.
42	Depress TRFR RLS key.	LINE TRFR lamp extinguishes.
43	Repeat Steps 12 through 42 for remaining data sets, using DS No. 2, No. 3, etc, instead of No. 1.	
44	Disconnect DTS No. 1 from customer interface connector.	

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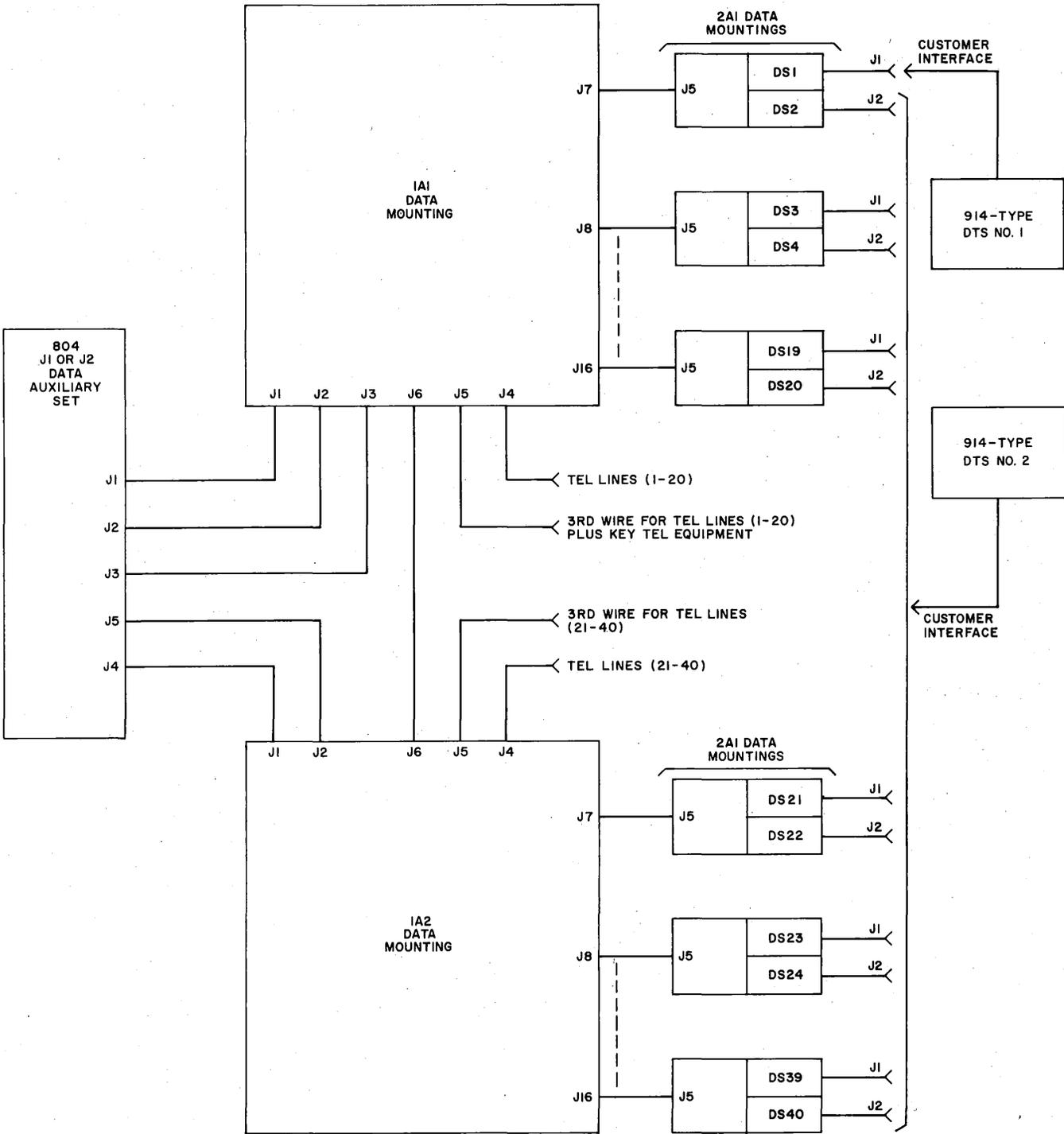


Fig. 2—Interface Voltage Test Setup

**Loop-Back Test**

2.11 Perform the test as follows:

2.10 The loop-back test establishes DS No. 1 as a standard for checking all other data sets in the data station.

STEP	ACTION	VERIFICATION
1	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 flutters. PICKUP lamp extinguishes.
2	Depress LINE TRFR key.	LINE TRFR lamp lights.
3	Verify that AUTO lamp is extinguished (if lighted, depress AUTO key).	
4	Call nearest data test center (DTC) by using external telephone, and request a loop-back test on DS No. 1. Give DTC telephone number of data station service line.	
	<b>Note:</b> If data station is equipped with DAS 801-type requiring ground-start lines, the service line will be wired for ground-start operation. To manually originate a call on the service line, depress DIAL TONE key on DAS 804J-type until dial tone is heard.	
5	DTC calls the service line to perform the loop-back test on DS No. 1.	Ringer and buzzer sound and RING IND lamp lights during ringing cycle.
6	At beginning of second ring, depress TEST key until TEST lamp lights.	TEST lamp lights. RING IND lamp remains lighted. Tone is transmitted to DTC.
7	At conclusion of loop-back test, depress PICKUP key.	PICKUP lamp lights. <i>Select field</i> lamp No. 1 winks.
8	Depress TRFR RLS key.	LINE TRFR lamp extinguishes. <i>Select field</i> lamp No. 1 extinguishes.

## Interface Voltage Test

## 2.13 Perform the test as follows:

2.12 The interface voltage test uses DS No. 1 as a standard to check all other data sets in the data station.

STEP	ACTION	VERIFICATION
1	Connect DTS No. 1 to customer interface connector J1 for DS No. 1 (Fig. 2); connect DTS No. 2 to J2 for DS No. 2; and apply power to both DTS.	All <i>select field</i> lamps (except No. 1 and No. 2) wink.
2	Using DTS No. 1 and No. 2, check interface voltages for DS No. 1 and No. 2 as follows:  (a) Set FUNCTION switch to OFF.  (b) Set VERTICAL MONITOR switch to appropriate terminal.  (c) Set METER POLARITY switch to NOR or REV, as required.  (d) Set FUNCTION switch to VOLT INT.  <i>Note:</i> Omit checking interface voltages for DS No. 1 on subsequent tests (DS No. 3, No. 4, etc).	Interface voltages correspond to Table A.
3	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 flutters. TERM RDY lamp lights. TRMT DATA lamp blinks. PICKUP lamp extinguishes.
4	Depress TALK and LINE TRFR keys.	LINE TRFR lamp lights.
5	Pick up handset on DAS 804J-type.  <i>Note:</i> If data station is equipped with DAS 801-type requiring ground-start lines, the service line will be wired for ground-start operation. To manually originate a call on the service line, depress DIAL TONE key on DAS 804J-type until dial tone is heard.	Dial tone is heard.
6	Originate a call from DAS 804J-type to the telephone number assigned to the data station.  <i>Note:</i> In case of a misdial, hang up, depress select field key No. 1, and redial.	<i>Select field</i> lamp No. 2 flashes with incoming ringing current.
7	On DTS No. 2, set switch S1 to ON.	DS No. 2 answers and sends back a tone.

STEP	ACTION	VERIFICATION
8	Depress DATA key within 10 seconds after receiving tone from DS No. 2.  <i>Note:</i> If not accomplished, set switch S1 on DTS No. 2 to OFF, and revert to misdial procedure of Step 6.	DATA lamp lights.
9	Hang up handset on DAS 804J-type.	CLR SEND, SET RDY, TERM RDY, and CARR DET lamps light. TRMT DATA and RCV DATA lamps blink.
10	Using DTS No. 1 and No. 2, check interface voltages for DS No. 1 and No. 2.  <i>Note:</i> Omit checking interface voltages for DS No. 1 on subsequent tests (DS No. 3, No. 4, etc).	Interface voltages correspond to Table B.
11	On DTS No. 1, momentarily set switch S2 to ON.	TERM BSY lamp momentarily lights.
12	Depress PICKUP key.	PICKUP lamp lights. <i>Select field</i> lamp No. 1 lighted steady. All interface monitor lamps extinguish.
13	Depress <i>select field</i> key No. 2.	<i>Select field</i> lamp No. 2 flutters. PICKUP lamp extinguishes. CLR SEND, SET RDY, TERM RDY, RING IND, CARR DET, and DATA lamps light. TRMT DATA and RCV DATA lamps blink.
14	On DTS No. 2, momentarily set switch S2 to ON.	TERM BSY lamp momentarily lights.
15	Depress TALK key and momentarily pick up handset on DAS 804J-type and replace.	All interface monitor lamps extinguish. <i>Select field</i> lamp No. 2 extinguishes. PICKUP lamp lights. <i>Select field</i> lamp No. 1 winks.
16	Depress TRFR RLS key.	<i>Select field</i> No. 1 and LINE TRFR lamps extinguish.
17	On DTS No. 2, set switch S1 to OFF.	
18	Disconnect DTS No. 2 from customer interface connector.	
19	Repeat Steps 1 through 10 and 12 through 18 for remaining data sets, using DS No. 3, No. 4, etc, instead of No. 2.	

STEP	ACTION	VERIFICATION
20	Disconnect DTS No. 1 and No. 2 from customer interface connectors.	
21	Restore data station to pretest condition.	
22	Verify that options installed in data station agree with service order.	

TABLE A  
INTERFACE VOLTAGES

TERM	DATA SET 103E2		DATA SET 103E5 & 103E6	
	NO. 1	NO. 2	NO. 1	NO. 2
1	0	0	0	0
3	-19 ±3	-19 ±3	-7 ±2	-7 ±2
5	-19 ±3	-19 ±3	-19 ±3	-19 ±3
6	-19 ±3	-19 ±3	-19 ±3	-19 ±3
7	0	0	0	0
8	-19 ±3	-19 ±3	-19 ±3	-19 ±3
9	+19 ±3	+19 ±3	+19 ±3	+19 ±3
10	-19 ±3	-19 ±3	-19 ±3	-19 ±3
20	+4 ±0.5	-4 ±0.5	+4 ±0.5	-4 ±0.5
22	-19 ±3	-19 ±3	-19 ±3	-19 ±3
25	-4 ±0.5	-4 ±0.5	-4 ±0.5	-4 ±0.5

TABLE B  
INTERFACE VOLTAGES

TERM	DATA SET	
	NO. 1	NO. 2
1	0	0
2, 3	—	—
5	+19 ±3	+19 ±3
6	+19 ±3	+19 ±3
7	0	0
8	+19 ±3	+19 ±3
9	+19 ±3	+19 ±3
10	-19 ±3	-19 ±3
20	+4 ±0.5	+4 ±0.5
22	-19 ±3	+19 ±3
25	-4 ±0.5	-4 ±0.5

#### Transmit Level Adjustments

**2.14** The F2 transmit level must be adjusted for all DS 103E5 and 103E6 in the data station. The F2 and F1 transmit levels and the desensitizing pad level must be adjusted for all DS 103E2 in the data station. The required levels should be specified on the service order. If these levels are not specified on the service order, the 1000-Hz line loss must be measured before the adjustments can be made.

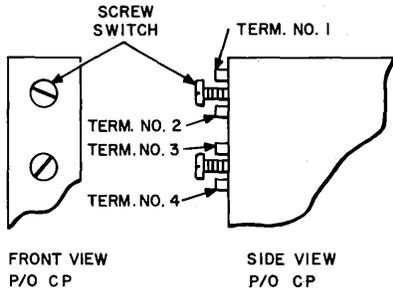
**2.15 DS 103E5 and 103E6 (Transmit Level Specified on Service Order):** If the F2 transmit level for DS 103E5 and 103E6 is specified on the service order, perform the following procedure:

- (1) On DTS No. 1, set FUNCTION switch to VOLT/OHM EXT.
- (2) Connect test leads supplied with DTS No. 1 to METER INPUT terminals on DTS No. 1.
- (3) Connect DTS No. 1 to customer interface connector for data set to be adjusted.
- (4) Depress **select field** key for data set to be adjusted. Corresponding **select field** lamp flutters.

- (5) Depress TALK key.
- (6) Verify that AUTO lamp is extinguished (if lighted, depress AUTO key).
- (7) Originate call to data station from external telephone.
- (8) Pick up handset on DAS 804J-type and depress DATA key.
- (9) Hang up handset on DAS 804J-type.
- (10) Connect DTS No. 1 test leads to terminals 10 and 13 on the screw switch option board of CP CJ9 or terminals 9 and 10 of CJ14 on data set to be adjusted. Refer to Fig. 3 for information on identification and numbering of the terminals.
- (11) Using Table C, adjust R34 on CP CJ11 or CJ15 on data set to be adjusted for the F2 RMS voltage corresponding to the F2 DBM value specified on the service order. Ignore the 1000-Hz measured loss column in the table.
- (12) Repeat Steps (3) through (11) above for remaining DS 103E5 and 103E6.
- (13) Remove all test equipment and restore data station to pretest condition.

**2.16 DS 103E5 and DS 103E6 (Transmit Level Not Specified on Service Order):** If the F2 transmit level for DS 103E5 and 103E6 is not specified on the service order, perform the following procedure:

- (1) Originate a call to the 1000-Hz 1-mW terminal in the serving central office, using the assigned line for the data set to be adjusted.
- (2) Using the TMS, measure the 1000-Hz loss while the line is terminated with 900 ohms. Data set and DAS 804J-type must be on-hook for this measurement.
- (3) Perform Steps (3) through (10) (2.15).
- (4) Using Table C, adjust R34 on CP CJ11 or CJ15 on data set to be adjusted for the F2 RMS voltage corresponding to the 1000-Hz measured loss obtained in Step (2) above.



NOTE:  
 TERMINALS ARE NUMBERED FROM TOP OF CP DOWN AS SHOWN. THE TERMINAL NUMBER IS NOT DETERMINED BY OR DEPENDENT ON A SCREW SWITCH NUMBER.

**Fig. 3—Circuit Pack Terminal Identification and Numbering**

TABLE C

DATA SET 103E5 AND 103E6  
 F2 TRANSMIT LEVEL (CP CJ11 AND CJ15)

1000 Hz MEASURED LOSS DB	F2	
	DBM	RMS VOLTAGE
Above 12	0	2.05
10-12	-2	1.63
8-10	-4	1.29
6-8	-6	1.03
4-6	-8	0.82
2-4	-10	0.65
0-2	-12	0.51

- (5) Repeat Steps (1) through (4) above for remaining DS 103E5 and 103E6.
- (6) Remove all test equipment and restore data station to pretest condition.

**2.17 DS 103E2 (Transmit Levels Specified on Service Order):** If the F2 and F1 transmit levels and the desensitizing pad level for DS 103E2 are specified on the service order, perform the following procedure:

- (1) Using Table D, adjust F2 and F1 transmit levels and desensitizing pad level for data set to be adjusted to the values specified on

the service order. Ignore the 1000-Hz measured loss column in the table.

- (2) Repeat Step (1) above for remaining DS 103E2.
- (3) Remove all test equipment and restore data station to pretest condition.

**2.18 DS 103E2 (Transmit Levels Not Specified on Service Order):** If the F2 and F1 transmit levels and the desensitizing pad level for DS 103E2 are not specified on the service order, perform the following procedure:

- (1) Originate a call to the 1000-Hz 1-mW terminal in the serving central office, using the assigned line for the data set to be adjusted.
- (2) Using the TMS, measure the 1000-Hz loss while the line is terminated with 900 ohms. Data set and DAS 804J-type must be on-hook for this measurement.
- (3) Using Table D, adjust F2 and F1 transmit levels and desensitizing pad level for data set to be adjusted to the *equal* F1 and F2 levels corresponding to the 1000-Hz measured loss obtained in Step (2) above.
- (4) Repeat Steps (1) through (3) above for remaining DS 103E2.
- (5) Remove all test equipment and restore data station to pretest condition.

**B. 103E-Type Data Station (Answer-Only Service)**

**2.19** The following procedures provide the installation tests for a 103E-type data station modified for answer-only service. These tests should be performed in the sequence in which they are presented.



*If the service lines for the 103E-type data station have been modified for answer-only operation, the following tests cannot be performed.*

**Preparation for Tests**

**2.20** The following test equipment is required:

- 2-914-type data test sets (DTS) (designated No. 1 and No. 2 for clarity)

TABLE D

DATA SET 103E2  
 TRANSMIT LEVEL (CP CJ4) AND DESENSITIZING PAD (CP CJ5)

1000 Hz MEAS. LOSS DB	TRANSMIT LEVEL				DESENSITIZING PAD		
	DB		LOOSEN	TIGHTEN	DB	LOOSEN	TIGHTEN
	F2	F1					
Above 12	0	0	4, 12	5, 6, 7, 8, 9, 11	0	1, 2, 4	—
—	0	-4	4, 11	5, 6, 7, 8, 9, 12	0	1, 2, 4	—
10-12	-2	-2	5, 12	4, 6, 7, 8, 9, 11	0	1, 2, 4	—
—	-2	-6	5, 11	4, 6, 7, 8, 9, 12	0	1, 2, 4	—
8-10	-4	-4	6, 12	4, 5, 7, 8, 9, 11	2	1, 2	4
—	-4	-8	6, 11	4, 5, 7, 8, 9, 12	2	1, 2	4
6-8	-6	-6	7, 12	4, 5, 6, 8, 9, 11	4	1, 4	2
—	-6	-10	7, 11	4, 5, 6, 8, 9, 12	4	1, 4	2
4-6	-8	-8	8, 12	4, 5, 6, 7, 9, 11	6	2, 4	1
—	-8	-12	8, 11	4, 5, 6, 7, 9, 12	6	2, 4	1
2-4	-10	-10	9, 12	4, 5, 6, 7, 8, 11	6	2, 4	1
—	-10	-14	9, 11	4, 5, 6, 7, 8, 12	6	2, 4	1
0-2*	-12	-12	9, 12	4, 5, 6, 7, 8, 11	6	2, 4	1

Note: Factory-furnished strapping is “— (F2 - 0, F1 - -4)”

\* Requires external insertion loss pad (refer to Section 591-025-201 for pad arrangements).

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1—Operating telephone, external to the data station.

**2.21** Condition 914-type DTS No. 1 and No. 2 as shown in Fig. 1, except omit programming pin at matrix position S3-19.

**Note:** Do not connect DTS to data station at this time.

**2.22** The following data station options must be installed or removed as directed before performing the installation tests:

(a) For DAS 804J-type:

(1) Options removed:

- None

(2) Option installed:

- Z (31-32) (15-16) (40-41) (23-24) (25-26) (ringer black lead to 52) (tel network terminal A to 50)

(b) For 2A1 data mountings:

(1) Options removed:

- Z (41-42)
- Y (21-22)

(2) Options installed:

- R (1-2) (3-4)
- S (11-12) (13-14)
- N (31-32) (33-34-35)
- Q (36-37) (38-39-40)

(a) For telephone lines with sleeve lead:

- T (23-24) (27-28)
- V (43-44) (47-48)

**Note:** Remove W and X options before installing T and V options.

(b) For telephone lines without sleeve lead (2-wire):

- W (24-25) (26-27)
- X (44-45) (46-47)

**Note:** Remove T and V options before installing W and X options.

(c) For data set (DS) 103E-type:

(1) Options removed:

**Note:** Options on DS 103E-type are removed by loosening option screws, unless otherwise specified.

- V—Long space disconnect
- H—Short space disconnect
- T—Send disconnect
- G—Originate-only test
- X—Answer mode indication—CE ON
- A—CB and CF indications—common
- Z—Inverted frequencies (DS 103E2 only)

(2) Options installed:

**Note:** Options on DS 103E-type are installed by tightening option screws, unless otherwise specified.

- Transmit level—adjust R34 potentiometer on DS 103E5 and 103E6 for maximum clockwise position (minimum transmit level). On DS 103E2, loosen screws 9 and 11, and tighten screws 4, 5, 6, 7, 8, and 12.
- Desensitizing pad—loosen screws 1, 2, and 4 (DS 103E2 only).
- Y—Normal frequencies (DS 103E2 only).
- W—Answer mode indication—CF OFF
- N—W/O ANS/ORG transfer

- M—Answer control combined (not optional on DS 103E6)
- S—Loss of carrier disconnect
- Q—Common grounds
- B—CB and CF indications separate

- ZD—CC indication early (DS 103E6 only)

**Operational Test**

**2.23** The operational test is a functional check of the complete data station.

**2.24** Perform the test as follows:

STEP	ACTION	VERIFICATION
1	Apply power to data station by plugging cord from KS-20129-L1 power strip into a customer-provided 117-volt 60-Hz power outlet.	AUTO and PICKUP lamps light. All <i>select field</i> lamps indicate an off-hook condition. AC relay on 1A1 data mounting operates.
2	Depress AUTO key.	Relays AB and AC change state. AUTO lamp extinguishes.  <i>Note:</i> AC if operated should release, AB if released should operate.
3	Depress MAKE BUSY key.	MAKE BUSY lamp lights. PICKUP lamp extinguishes. MBR and PUR relays operate.
4	Depress BUSY RLS key.	MAKE BUSY lamp extinguishes. BUSY RLS lamp lights. RBR relay operates. MBR relay releases.
5	Sequentially depress <i>select field</i> keys for all data station positions equipped with data sets.  <i>Note:</i> A fully equipped data station will require depressing <i>select field</i> keys 1 through 40.	
6	Depress PICKUP key.	PICKUP lamp lights. BUSY RLS lamp extinguishes. PUR and RBR relays release.
7	Originate a call from external telephone to data station service line.	Ringer sounds.
8	Depress SERV LINE key.	SERV LINE lamp lights.
9	Pick up handset on DAS 804J-type.	Ringing stops and voice continuity exists.
10	Replace handset on DAS 804J-type and depress TALK key.	SERV LINE lamp extinguishes and SERV LINE key releases.

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STEP	ACTION	VERIFICATION
11	Hang up external telephone.	
12	Connect DTS No. 1 to customer interface connector for DS No. 1 (Fig. 2), and apply power to DTS.	<i>Select field</i> lamp No. 1 stops winking.
13	Depress MAKE BUSY key.	MAKE BUSY lamp lights. PICKUP lamp extinguishes.
14	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 winks.
15	Originate call to data station from external telephone.	Data station appears busy.
16	Hang up external telephone.	
17	Depress BUSY RLS key.	MAKE BUSY lamp extinguishes. BUSY RLS lamp lights.
18	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 extinguishes.
19	Depress PICKUP key.	PICKUP lamp lights. BUSY RLS lamp extinguishes.
20	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 flutters. PICKUP lamp extinguishes. TERM RDY lamp lights. TRMT DATA lamp blinks.
21	Originate call to data station from external telephone.	RING IND lamp lights during ringing cycle.
22	Depress AUTO key.	SET RDY, DATA and AUTO lamps light. RING IND lamp extinguishes. A tone is transmitted back to originating station for approximately 27 seconds (DS 103E5 and 103E6) or 12 seconds (DS 103E2). At the end of this time, SET RDY and DATA lamps extinguish and transmitted tone is squelched.
23	Hang up external telephone.	
24	Depress AUTO key.	AUTO lamp extinguishes.
25	Depress PICKUP key.	PICKUP lamp lights. <i>Select field</i> No. 1, TRMT DATA, and TERM RDY lamps extinguish.

STEP	ACTION	VERIFICATION
26	Originate call to data station from external telephone.	<b>Select field</b> No. 1 lamp remains extinguished. A tone is heard at the originating station for approximately 27 seconds (DS 103E5 and 103E6) or 12 seconds (DS 103E2). At the end of this time, the tone is squelched.
27	Hang up external telephone.	
28	Depress <b>select field</b> key No. 1.	<b>Select field</b> lamp No. 1 flutters. PICKUP lamp extinguishes. TERM RDY lamp lights. TRMT DATA lamp blinks.
29	Depress LINE TRFR key.	LINE TRFR lamp lights.
30	Originate call to data station from external telephone.	Data station appears busy.
31	Momentarily hang up external telephone and then dial service line telephone number.	Ringer sounds and RING IND lamp lights during ringing cycle.
32	At <b>beginning</b> of <b>second</b> ring, depress TEST key until TEST lamp lights.	TEST lamp lights. RING IND lamp extinguishes. Tone is transmitted to originating station.
33	Momentarily lift and replace handset on DAS 804J-type.	Flutter of <b>select field</b> lamp No. 1 changes to wink. TRMT DATA, TERM RDY, and TEST lamps extinguish. PICKUP lamp lights.
34	Hang up external telephone.	<b>Select field</b> lamp No. 1 extinguishes.
35	Depress TRFR RLS key.	LINE TRFR lamp extinguishes.
36	Repeat Steps 12 through 35 for remaining data sets, using DS No. 2, No. 3, etc, instead of No. 1.	
37	Disconnect DTS No. 1 from customer interface connector.	

**Loop-Back Test**

**2.25** The loop-back test establishes DS No. 1 as a standard for checking all other data sets in the data station.

**2.26** Perform the test as follows:

**Note:** Disconnect wire to TB1-10 of 2A1 data mounting for DS No. 1. This wire must remain disconnected until loop-back and interface voltage tests are completed.

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STEP	ACTION	VERIFICATION
1	Depress <i>select field</i> key No. 1.	<i>Select field</i> lamp No. 1 flutters. PICKUP lamp extinguishes.
2	Depress LINE TRFR key.	LINE TRFR lamp lights.
3	Verify that AUTO lamp is extinguished (if lighted, depress AUTO key).	
4	Call nearest data test center (DTC) by using external telephone, and request a loop-back test on DS No. 1. Give DTC telephone number of data station service line.	
5	DTC calls the service line to perform the loop-back test on DS No. 1.	Ringer sounds and RING IND lamp lights during ringing cycle.
6	At beginning of second ring, depress TEST key until TEST lamp lights.	TEST lamp lights. RING IND lamp extinguishes. Tone is transmitted to DTC.
7	At conclusion of loop-back test, depress PICKUP key.	PICKUP lamp lights. <i>Select field</i> lamp No. 1 winks.
8	Depress TRFR RLS key.	LINE TRFR lamp extinguishes. <i>Select field</i> lamp No. 1 extinguishes.

Interface Voltage Test

2.28 Perform the test as follows:

2.27 The interface voltage test uses DS No. 1 as a standard to check all other data sets in the data station.

STEP	ACTION	VERIFICATION
1	Connect DTS No. 1 to customer interface connector J1 for DS No. 1 (Fig. 2); connect DTS No. 2 to J2 for DS No. 2; and apply power to both DTS.	All <i>select field</i> lamps (except No. 1 and No. 2) wink.
2	Using DTS No. 1 and No. 2, check interface voltages for DS No. 1 and No. 2 as follows:  (a) Set FUNCTION switch to OFF.  (b) Set VERTICAL MONITOR switch to appropriate terminal.  (c) Set METER POLARITY switch to NOR or REV, as required.	

STEP	ACTION	VERIFICATION
	(d) Set FUNCTION switch to VOLT INT.	Interface voltages correspond to Table A.
	<b>Note:</b> Omit checking interface voltages for DS No. 1 on subsequent tests (DS No. 3, No. 4, etc).	
3	Depress <i>select field</i> key No. 1.	<b>Select field</b> lamp No. 1 flutters. TERM RDY lamp lights. TRMT DATA lamp blinks. PICKUP lamp extinguishes.
4	Depress TALK and LINE TRFR keys.	LINE TRFR lamp lights.
5	Pick up handset on DAS 804J-type.	Dial tone is heard.
6	Originate a call from DAS 804J-type to the telephone number assigned to the data station.	
	<b>Note:</b> In case of a misdial, hang up, depress <i>select field</i> key No. 1, and redial.	
7	On DTS No. 2, set switch S1 to ON.	Data set No. 2 answers and sends back a tone.
8	Depress DATA key within 10 seconds after receiving tone from DS No. 2.	DATA lamp lights.
	<b>Note:</b> If not accomplished, set switch S1 on DTS No. 2 to OFF, and revert to misdial procedure of Step 6.	
9	Hang up handset on DAS 804J-type.	CLR SEND, SET RDY, TERM RDY, and CARR DET lamps light. TRMT DATA and RCV DATA lamps blink.
10	Using DTS No. 1 and No. 2, check interface voltages for DS No. 1 and No. 2.	Interface voltages correspond to Table B.
	<b>Note:</b> Omit checking interface voltages for DS No. 1 on subsequent tests (DS No. 3, No. 4, etc).	
11	On DTS No. 1, momentarily set switch S2 to ON.	TERM BSY lamp momentarily lights.
12	Depress PICKUP key.	PICKUP lamp lights.
		<b>Select field</b> lamp No. 1 lighted steady. All interface monitor lamps extinguish.

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STEP	ACTION	VERIFICATION
13	Depress <i>select field</i> key No. 2.	<i>Select field</i> lamp No. 2 flutters. PICKUP lamp extinguishes. TRMT DATA and RCV DATA lamps blink. CLR SEND, SET RDY, TERM RDY, CARR DET, and DATA lamps light.
14	On DTS No. 2, momentarily set switch S2 to ON.	TERM BSY lamp momentarily lights.
15	Depress TALK key and momentarily pick up handset on DAS 804J-type and replace.	All interface monitor lamps extinguish. <i>Select field</i> lamp No. 2 extinguishes. PICKUP lamp lights. <i>Select field</i> lamp No. 1 winks.
16	Depress TRFR RLS key.	<i>Select field</i> No. 1 and LINE TRFR lamps extinguish.
17	On DTS No. 2, set switch S1 to OFF.	
18	Disconnect DTS No. 2 from customer interface connector.	
19	Repeat Steps 1 through 10 and 12 through 18 for remaining data sets, using DS No. 3, No. 4, etc, instead of No. 2.	
20	Disconnect DTS No. 1 and No. 2 from customer interface connectors.	
21	Reconnect wire to TB1-10 of 2A1 data mounting for DS No. 1.	
22	Restore data station to pretest condition.	
23	Verify that options installed in data station agree with service order.	

**Transmit Level Adjustments**

**2.29** The F2 transmit level must be adjusted for all DS 103E5 and 103E6 in the data station. The F2 and F1 transmit levels and the desensitizing pad level must be adjusted for all DS 103E2 in the data station. The required levels must be specified on the service order.

**2.30 DS 103E5 and 103E6:** Perform the following procedure:

- (1) On DTS No. 1, set FUNCTION switch to VOLT/OHM EXT.

- (2) Connect test leads supplied with DTS No. 1 to METER INPUT terminals on DTS No. 1.
- (3) Connect DTS No. 1 to customer interface connector for data set to be adjusted.
- (4) Depress *select field* key for data set to be adjusted. Corresponding *select field* lamp flutters.
- (5) Depress TALK key.
- (6) Verify that AUTO lamp is extinguished (if lighted, depress AUTO key).

- (7) Originate call to data station from external telephone.
- (8) Pick up handset on DAS 804J-type and depress DATA key.
- (9) Hang up handset on DAS 804J-type.
- (10) Connect DTS No. 1 test leads to terminals 10 and 13 on the screw switch option board of CP CJ9, or terminals 9 and 10 of CJ14 on data set to be adjusted. Refer to Fig. 3 for information on identification and numbering of the terminals.
- (11) Using Table C, adjust R34 on CP CJ11 or CJ15 on data set to be adjusted for the F2 RMS voltage corresponding to the F2 DBM value specified on the service order. Ignore the 1000-Hz measured loss column in the table.
- (12) Repeat Steps (3) through (11) above for remaining DS 103E5 and 103E6.
- (13) Remove all test equipment and restore data station to pretest condition.

**2.31 DS 103E2:** Perform the following procedure:

- (1) Using Table D, adjust F2 and F1 transmit levels and desensitizing pad level for data set to be adjusted to the values specified on the service order. Ignore the 1000-Hz measured loss column in the table.
- (2) Repeat Step (1) above for remaining DS 103E2.
- (3) Remove all test equipment and restore data station to pretest condition.

### 3. MAINTENANCE TEST PROCEDURES

**3.01** During maintenance visits, the use of installation tests should be considered if the nature of the trouble indicates that this type of test would be useful. Maintenance tests on individual data sets suspected of causing a trouble report should be performed per 2.11 (for originate and answer station) or 2.26 (for answer-only station) with the data set in question used instead of DS No. 1.

### 4. REFERENCES

**4.01** Additional information concerning the testing of data set 103E-type data station is contained in the following publications:

SECTION	TITLE
107-101-100	914-Type Data Test Sets—Description and Operation
314-205-501	Data Systems—DATA-PHONE® Service and Data Access Arrangements on Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines
590-010-500	J1P005 Automatic Data Test System (ADTS)—Operation From Field Locations
591-025-101	Data Set 103E-Type Data Station Using KS-20093 Cabinets—Description and Operation
591-025-201	Data Set 103E-Type Data Station Using KS-20093 Cabinets—Installation and Connections
591-025-301	Data Set 103E-Type Data Station Using KS-20093 Cabinets—Maintenance
598-010-500	Data Auxiliary Sets 801A1, 801A2, 801A3, and 801A4 for Automatic Calling—Test Procedures
598-010-501	Data Auxiliary Sets 801A5 and 801A6 for Automatic Calling—Test Procedures
598-012-500	Data Auxiliary Sets 801C1 and 801C2 for Automatic Calling—Test Procedures
598-012-501	Data Auxiliary Sets 801C3 and 801C4—Test Procedures
598-012-502	Data Auxiliary Set 801C-L1/2—Test Procedures
668-101-503	Data Test Center—904A- and 904C-Types—Test Procedures—Data Sets 103A3, 103E-, 103G-, and 103H-Types—Loop-Back Test