

DATA SETS 108A- AND C-TYPES
MULTIPLE PRIVATE LINE STATION ARRANGEMENT
USING DATA AUXILIARY SET 820E-TYPE
TEST PROCEDURES

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- Carrier Monitoring Test
 - (a) Far-End Carrier
 - (b) Near-End Carrier
- Carrier Shift Test.

1.03 Data set 108A is intended to work with data set 108B-type for station-to-hub operation or with data set 108C or 108D-type for station-to-station service. Data set 108C is intended to work with data set 108A or 108E-type for station-to-station service only.

1.04 The following is a complete list of test equipment necessary to perform the tests outlined in this section:

Note: If the 911A data test set (DTS) is available, it should be used in place of the 902- and 903-type DTSs used in the distortion measurement test.

1. GENERAL

1.01 This section describes the test procedures to be performed and test requirements to be met at the time of installation or when investigating trouble conditions associated with data sets 108A- and C-types multiple private line station arrangement using data auxiliary set (DAS) 820E-type. In this section, data sets 108A- and C-types will be referred to as data sets 108A and C.

1.02 This section is to be used in conjunction with the section entitled Data Set 108-Type Single Private Line Station using Data Auxiliary Set 820D-type test (591-023-501). To avoid repetition, refer to Section 591-023-501 for information on the following test procedures:

- Data Carrier Detector (CF) Lead Test
 - (a) EIA Interface
 - (b) Current Interface

- 901B data test set (DTS)
- 902-type DTS
- 903-type DTS (two required)
- 911A DTS
- TTS-28, or equivalent
- W2DW cords, or equivalent (three required)
- W1AD cord, or equivalent (three required)
- 2W6A cord, or equivalent
- 2W7A cord, or equivalent.

1.05 Lettered Steps: A letter a, b, c, etc, added to a step number of this section indicates an action which may or may not be

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required, depending on local conditions. 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 same letter within the test. Where a condition does not apply, all steps designated by that letter should be omitted.

1.06 The test procedures given in this section are for one facility and must be repeated for each additional facility.

2. LOOP-BACK TEST

2.01 The loop-back test is required at the time of installation or when investigating trouble reports. This test ensures proper operation of the data station. If the service offering is a voiceband data circuit, the 904-type data test center (DTC) will perform the test; if it is a telegraph channel, the private line telegraph testboard will perform the test.

2.02 The loop-back test should be performed prior to dispatching a telephone company employee in response to a trouble report.

2.03 To condition a data set 108A or C multiple data station for the test mode, operate the key associated with the data set to be tested on the 6041G keyset. The associated lamp will light when using DAS 820E2. Since there is no ac connection on DAS 820E1 for the 6041G keyset lamps, the lamps will *not* light. To release the data set from test mode, operate the RELEASE key on the 6041G keyset.

A. Distortion Measurement Test Using 911A DTS

2.04 This test measures the loop-back distortion of the data system. The transmit lead of

the data set is driven by the test sentence generator (TSG). At the receive lead, the data set feeds the data signals to the distortion measuring set (DMS), which measures the distortion introduced by the loop-back mode.

2.05 Figures 1 and 2 show the equipment set up at the terminal for testing both directions of transmission when the station is equipped with EIA interface or current interface, respectively. This test checks the transmitter and receiver of both data sets at the near and far end and the two directions of transmission of the connecting facilities.

2.06 Verify that the test equipment is in good operating condition. Refer to the section entitled 911A, B, and C Data Test Sets—Description, Operation, and Maintenance (103-813-100).

2.07 The following equipment is required at the station:

- 901B DTS cover
- 911A DTS
- W1AD cord, or equivalent (two required for EIA interface)
- 1W2A cord, or equivalent (two required for EIA interface)
- 2W6A cord (current interface)
- 2W7A cord (current interface)

2.08 The following procedure is used to measure distortion using the 911A DTS.

STEP	PROCEDURE
1	Disconnect customer interface cord from the customer terminal in KS-20018-type cabinet, or equivalent
2a	If EIA interface— Make connections as shown in Fig. 1.

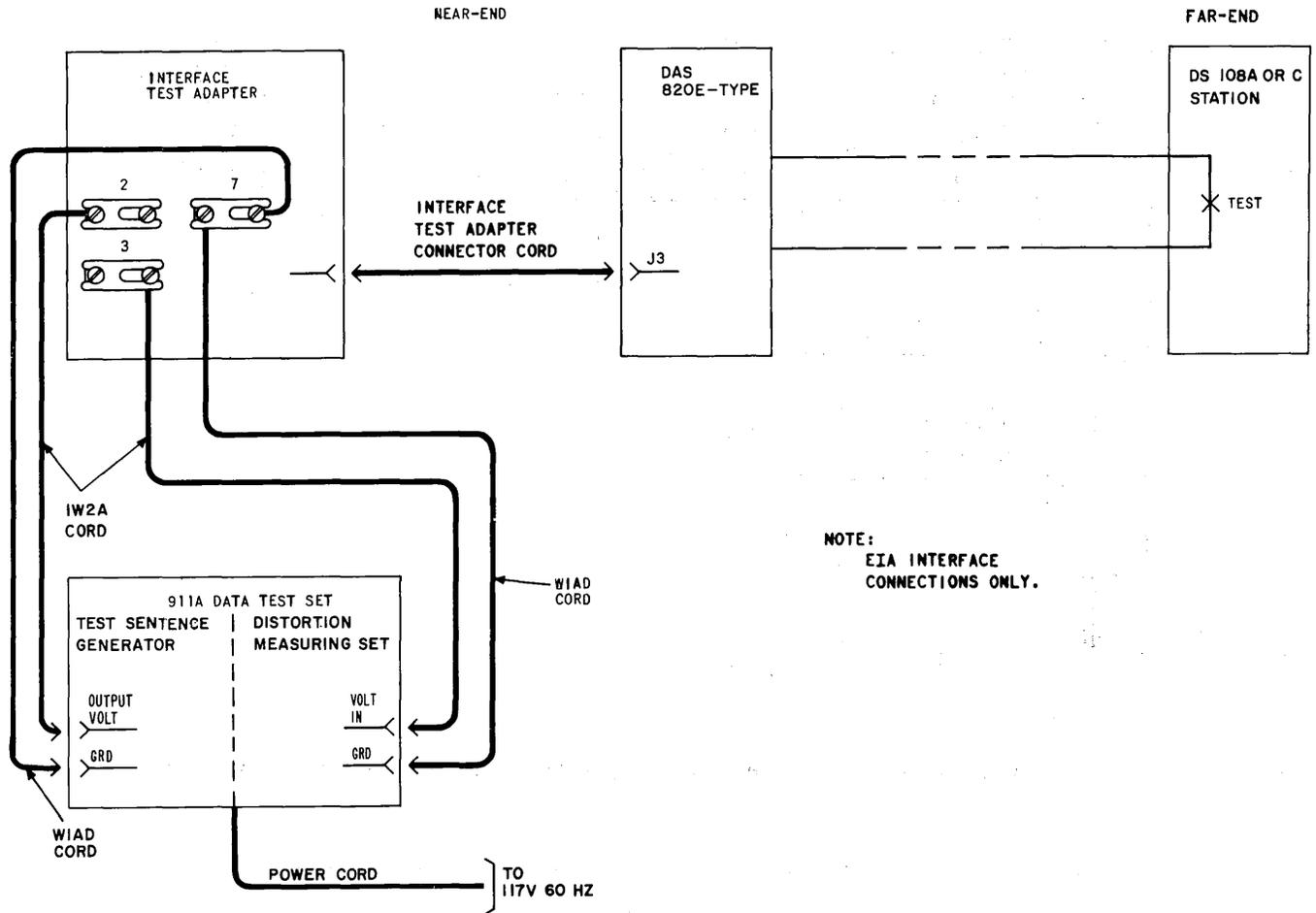


Fig. 1—Distortion Test Arrangement Using 911A Data Test Set—EIA Interface

STEP	PROCEDURE
3b	If current interface— Make connections as shown in Fig. 2.
4	Set controls of TSG as follows: <ul style="list-style-type: none"> ● AUTO. MAN. STEP to AUTO. ● BAUDS to speed desired ● BIAS to 0 ● CODE to code desired

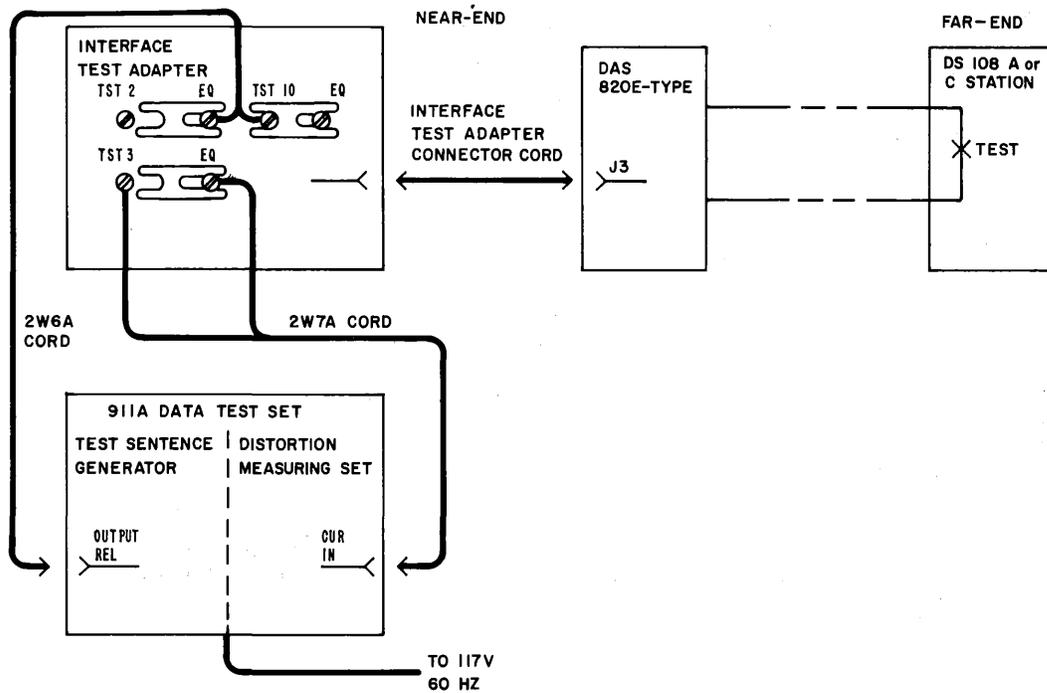


Fig. 2—Distortion Test Arrangement Using 911A Data Test Set—Current Interface

STEP	PROCEDURE
5	<ul style="list-style-type: none"> ● DIST 1% to 0 ● DIST 5% to 0 ● REPEAT to OFF ● RY OR U* to OFF ● OUTPUT to EIA for EIA interface; OUTPUT to REL for current interface. <p>Set controls of DMS as follows:</p> <ul style="list-style-type: none"> ● BAUDS to speed desired ● CODE to code desired ● DISCR % to 5 ● FILTER to OUT

STEP	PROCEDURE
	<ul style="list-style-type: none"> ● INPUT to EIA for EIA interface; INPUT to 20 REV for current interface ● PARITY to OFF ● AUTO. PK-PIP to PIP.
6	Turn POWER switch to ON.
7	Request that far end be placed in test mode.
8	Momentarily operate AUTO. PIP-PK switch to PK and then back to PIP.
9	Operate RESET switch on DMS.
	Requirement: Distortion displayed on pixie tubes should be 15 percent or less.
10	Set DIST 5% switch on TSG to 25.
11	Set BIAS switch on TSG to SWC.
12	Set DISCR switch on DMS to 0.
	Requirement: Distortion displayed on pixie tubes should be less than 40 percent.
	Note: This test checks the ability of the system to operate at a high distortion rate.
13	Remove test equipment; return station to pretest condition.

B. Distortion Measurement Test Using 902- and 903-Type DTSs

2.09 This test measures the distortion and error rate of the data system only if the station under test is arranged for EIA interface. If the 911A DTS is available, the loop-back test using the 911A DTS is preferred. If the 911A DTS is *not* available, the following test using the 902- and 903-type DTSs should be performed.

2.10 This test measures the distortion and error rate of the data system. The transmit lead is driven by the 903-type DTS (63-bit word generator). At the receive lead, the data set feeds the data signals to the 902-type DTS (distortion measuring and error checking set). Also at the receive lead, a 903-type DTS is used to deliver a signal identical to the signal sent from the transmitting end to the 902-type DTS. The 902-type DTS synchronizes

these two signals, measures the peak distortion, and counts the number of errors in the received data.

2.11 Figure 3 shows the equipment set up at the terminal for testing both directions of transmission. This test checks the transmitter and receiver of both data sets and the two directions of transmission of the connecting facilities.

2.12 Verify that test equipment is in good operating condition. Refer to appropriate sections in Part 6 covering operational and calibration tests for test equipment.

2.13 The following equipment is required at the station:

- 901B DTS cover

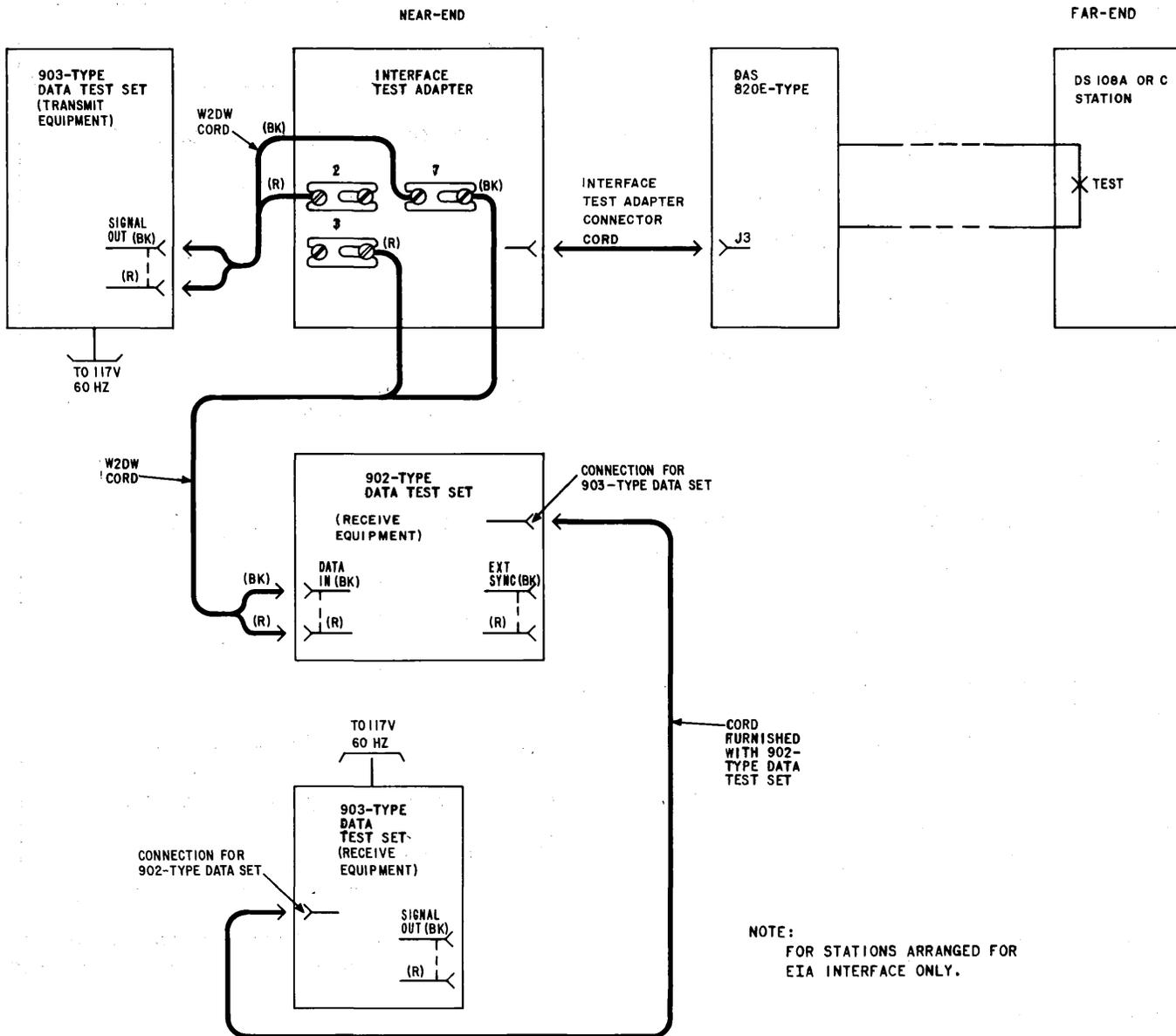


Fig. 3—Distortion Test Arrangement Using 902- and 903-Type Data Test Set

- 903-type DTS (two required)
 - 902-type DTS
 - W2WD cords, or equivalent (two required).
- 2.14 The following procedure is used to measure distortion.

STEP	PROCEDURE
1	Disconnect customer interface cord from the customer terminal in the KS-20018-type cabinet, or equivalent.

STEP	PROCEDURE
2	<p>Make connections as shown in Fig. 3.</p> <p><i>Transmit Equipment on Transmit Lead</i></p>
3	<p>Set 903-type DTS as follows:</p> <ul style="list-style-type: none"> ● RANDOM-DOT switch to RANDOM ● TRIGGER to + ● BIT RATE to desired speed (eg, 903B to 180 and 903C to 150 or 300). <p>Note: Set BIT RATE switch on 903B to 180. For compatible bit rate, use a 903B and 902B as receive equipment.</p> <p><i>Receive Equipment on Receive Lead</i></p>
4	<p>Set 902-type DTS as follows:</p> <ul style="list-style-type: none"> ● BIT RATE to desired speed <p>Note: On 902B DTS, set BIT RATE to 180 or 902C DTS BIT RATE to 150</p> <ul style="list-style-type: none"> ● Meter selection switch to DIST ADJ ● TRIGGER not required.
5	<p>Set 903-type DTS as follows:</p> <ul style="list-style-type: none"> ● BIT RATE to EXT CLOCK ● RANDOM-DOT to RANDOM ● TRIGGER to +.
6	<p>Turn POWER switches of both 903-type DTSs to ON.</p>
7	<p>Request that far end be placed in test mode.</p>
8	<p>Momentarily depress START button on transmitting 903-type DTS. (The transmitting set has no further duties.)</p> <p><i>902-Type DTS Adjustments</i></p>
9	<p>Adjust the DISTORTION control to indicate zero on the meter.</p>
10	<p>Operate meter selection switch to VOLT ADJ.</p>
11	<p>Adjust the VOLTS control to indicate zero on the meter.</p>

STEP	PROCEDURE
12	Operate meter selection switch to PHASE ADJ.
13	Adjust the PHASE control to indicate zero on the meter.
14	Operate meter selection switch to DIST. MEAS.
15	<p>Depress the WORD SYNC & RESET button momentarily and record the time.</p> <p>Note: The microammeter should settle down to some relatively stable value that indicates peak distortion. One microamp is equal to 1 percent distortion. For example, a meter indication of 8 microamps would be 8 percent peak distortion. The TOTAL ERRORS lamps lighted on the 902-type DTS indicate the number of errors in received data from the time the WORD SYNC & RESET button was released. For example, should the 8, 4, and 1 lamps be lighted, this would be an indication of a total of 13 errors.</p> <p>Requirement: 10 percent or less distortion; 2 or less errors in a 5-minute test.</p> <p>Note: For marginal cases of trouble (ie, customer complains of random errors), 15- to 30-minute tests should be made; same limits should be used.</p>
16	Disconnect test equipment; return station to pretest condition.

C. Loop-Back Test Using TTS-28 Test Set, or Equivalent

- Portable station test set TTS-28, or equivalent

- W1AD cord, or equivalent.

2.15 The following test equipment is required at the station:

- 901B DTS cover

2.16 The following procedure is used to perform the loop-back test using a TTS-28 test set, or equivalent:

STEP	PROCEDURE
1	Disconnect customer interface cord from the customer terminal in the KS-20018-type cabinet, or equivalent.
2	Connect the 901B DTS cover to the customer terminal (J3) of the DAS 820E-type under test.
3	Request that far end be placed in test mode.
4	Set FUNCTION switch on TTS-28 to 30V DC.
5a	<p>For EIA interface—</p> <p>Connect + lead of TTS-28 to terminal 7 (signal ground) of 901 DTS cover.</p>

STEP	PROCEDURE
6a	Connect - lead of TTS-28 to terminal 3 (BB lead) of 901 DTS cover. Requirement: Meter indicates 5 to 25 volts.
7a	Remove meter leads from 901 DTS cover.
8a	Clip one end of W1AD cord to terminal 2 (BA) and the other end to terminal 9 (+24V) of the 901 DTS cover.
9a	Connect - lead of TTS-28 to terminal 7 (signal ground) of 901 DTS cover.
10a	Connect + lead of TTS-28 to terminal 3 (BB lead). Requirement: Meter indicates 5 to 25 volts.
11b	For current interface— Connect + lead of TTS-28 to terminal 3 (BB lead) of 901 DTS cover.
12b	Connect - lead of TTS-28 to terminal 10 (-24 volts) of 901 DTS cover. Requirement: Meter indicates 0 volts.
13b	Open shorting bar of terminal 2 on 901 DTS cover.
14b	Connect one end of W1AD cord to terminal EQ2 and the other end to terminal 10 of 901 DTS cover. Requirement: Meter indicates 5 to 25 volts.
15	Remove test equipment; return station to pretest condition.

3. POWER SUPPLY MEASUREMENT

TTS-28 portable station test set, or equivalent, and the 901B DTS cover (interface test adapter).

3.01 The only equipment required at the station to perform the power unit voltage test is a

3.02 The following procedure should be used to measure the voltage of the 18B power unit.

STEP	PROCEDURE
1	Disconnect customer interface cord from the customer terminal in the KS-20018-type cabinet, or equivalent.
2	Connect the 901B DTS cover to the customer terminal (J3) of the DAS 820E-type under test.

STEP	PROCEDURE
3	Set FUNCTION switch on TTS-28 to 30V DC.
4	Connect – terminal of TTS-28 to interface test adapter, terminal 7 (ground).
5	Connect + terminal of TTS-28 to interface test adapter, terminal 9 (+ volts). Requirement: 24 \pm 3 volts.
6	Remove test leads.
7	Connect + terminal of TTS-28 to terminal 7 of interface test adapter.
8	Connect – terminal of TTS-28 to interface test adapter, terminal 10 (– volts). Requirement: 24 \pm 3 volts.
9	Remove test equipment; return station to pretest condition.

4. TRANS-HYBRID LOSS MEASUREMENT

4.01 The following procedure should be used to perform the trans-hybrid loss measurement test.



This measurement requires that a 900-ohm termination (quiet line) be placed on the line at either the far-end or the near-end office.

STEP	PROCEDURE
1	Request that the 900-ohm termination be placed on the line.
2	Check the send level of the data set by using TTS-28. (a) Set FUNCTION switch of TTS-28 to DBM BRDG 0 position. (b) Connect + and – terminals of TTS-28 and TP1 or TP2 of data set, respectively. (c) Read the meter and record reading.
3	Set FUNCTION switch of TTS-28 to DBM BRDG –10 position.
4	Connect + and – terminals of TTS-28 to a good ground and TP3 of data set, respectively. (Ground may be made at rear of DAS 820E-type on power connections.) Requirement: Meter indication should <i>not</i> be more positive than reading in (2) (c).

STEP	PROCEDURE
	<p><i>Note:</i> Meter actually reads at least a 10-dB difference due to the FUNCTION switch being set to -10.</p>

5. LOOP-LOSS MEASUREMENT

1000 Hz and 2300 Hz. The measurement is made as follows.

5.01 This measurement requires the use of the TTS-28 and an oscillator capable of furnishing

STEP	PROCEDURE								
1	Disconnect the private line facility from DAS 820E-type in the 20018-type cabinet.								
2	Set FUNCTION switch of TTS-28 to DBM 900Ω TERM 0 position.								
3	Connect + and - terminals of TTS-28 to private line facility.								
4	Request distant station or STC to send 1000 Hz to 0 dBm.								
5	Read TTS-28 meter.								
	<p><i>Note:</i> It may be necessary to set FUNCTION switch of TTS-28 to DBM 9000 TERM -10 position to obtain reading.</p>								
6	Request distant station or STC to send 2300 Hz at 0 dBm.								
7	Read TTS-28 meter.								
	<p><i>Note:</i> Meter readings are the actual measured loss (AML) of the private line facilities. These readings should be the same as the readings taken during installation of the data station. The circuit layout record card shows the expected measured loss (EML) when the facilities were designed. The readings taken in (5) and (7) should not deviate from the limits shown in Table A.</p>								
	<p><i>Requirement:</i> See Table A.</p>								
	<p style="text-align: center;">TABLE A LOOP LIMITS</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th data-bbox="602 1644 1024 1682">TYPE OF LOOP</th> <th data-bbox="1024 1644 1235 1682">AML LIMITS</th> </tr> </thead> <tbody> <tr> <td data-bbox="602 1682 1024 1740">Without Repeaters or Carriers</td> <td data-bbox="1024 1682 1235 1740">EML +1 dB</td> </tr> <tr> <td data-bbox="602 1740 1024 1799">With E7 Repeaters Only</td> <td data-bbox="1024 1740 1235 1799">EML +1 dB</td> </tr> <tr> <td data-bbox="602 1799 1024 1887">With All Other Repeaters and/ or Carriers</td> <td data-bbox="1024 1799 1235 1887">EML +2 dB</td> </tr> </tbody> </table>	TYPE OF LOOP	AML LIMITS	Without Repeaters or Carriers	EML +1 dB	With E7 Repeaters Only	EML +1 dB	With All Other Repeaters and/ or Carriers	EML +2 dB
TYPE OF LOOP	AML LIMITS								
Without Repeaters or Carriers	EML +1 dB								
With E7 Repeaters Only	EML +1 dB								
With All Other Repeaters and/ or Carriers	EML +2 dB								

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STEP	PROCEDURE
	<p>Note: The maximum AML possible for station-to-hub configurations should be -16 dB. The maximum AML for station-to-station configurations should be -24 dB.</p>
8a	If the AML is within limits, remove connections from TTS-28 and reconnect private line facility.
9b	If the AML is <i>not</i> within limits, the loop should be turned back for repair.

6. REFERENCES

6.01 The following documents pertain to data sets 108A or C multiple private line station arrangement:

SD- & CD-3D024-01 Data Set 108A

SD- & CD-3D032-01 Data Set 108C

SD- & CD-3D031-01 Data Auxiliary Sets 820D and 820E.

591-023-300 Data Set 108-Type Private Line System Station Application—Maintenance

591-023-302 Data Sets 108A- and C-Types Multiple Private Line Station Arrangement Using Data Auxiliary Set 820E-Type—Maintenance

598-059-100 Data Auxiliary Set 820E-Type—Identification

512-210-103 6041G Keypad—Identification, Installation, and Connections

SECTION

TITLE

591-023-100 Data Set 108-Type Private Line System Station Application—Description

590-010-201 Data Set Multiple Installation Information

591-023-102 Data Sets 108A- And C-Types Multiple Private Line Station Arrangement Using Data Auxiliary Set 820E-Type—Description

107-100-100 901A and 901B Data Test Sets—Identification and Operation

107-200-100 903-Type Data Test Sets—Description and Operation

591-023-202 Data Sets 108A- and C-Types Multiple Private Line Station Arrangement Using Data Auxiliary Set 820E-Type—Installation and Connections

107-300-100 902-Type Data Test Sets—Description and Operation

103-813-100 911A, B, and C Data Test Sets Description, Operation, and Maintenance