

**DATA SETS 108D- AND E-TYPE MULTIPLE  
PRIVATE LINE STATION ARRANGEMENT USING  
28A1 DATA MOUNTING AND 27B1 DATA UNIT  
TEST PROCEDURES**

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trouble conditions associated with data sets (DS) 108D- or 108E-type multiple private line station arrangement. Information is limited to the multiple data set arrangement using the 28A1 data mounting and the 27B1 data unit. In this section, data sets 108D- and E-type will be referred to as data sets 108D and E.

**1.02** This section is to be used in conjunction with Sections 591-028-202 and 591-028-302.

**1.03** The following is a complete list of test equipment necessary to perform the test 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.

- 911A Data test set
- 901B Data test set cover (interface test adapter J79901B)
- 902-Type data test set
- 903-Type data test sets (two required)
- Portable station test set TTS-28, or KS-20538-L1 volt-ohm-milliammeter (VOM)
- 1013-Type handset (dial hand test set)
- Portable telegraph carrier test set (TCTS) (KS-19935-L7)

*Note:* The TCTS includes the auxiliary power supply.

**1. GENERAL**

**1.01** This section describes the test procedures and associated test requirements to be met at the time of installation or when investigating

- W2DW Cords (two required)
- W1AD Cords, or equivalent (three required)
- 1W2A Cords, or equivalent (two required)

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**1.04** In order to test the near-end station used in a private line arrangement, it is necessary to perform the following:

- Remove the carrier squelch on carrier fail option (option R in 27B1 data unit) if it is installed at either end.
- Ensure that data set is *not* in test mode.

**Note:** If the carrier squelch on carrier fail option is *not* removed at a station and a carrier fail condition occurs, the station cannot transmit until the data set at the station receives a connect signal. This condition will cause difficulty isolating receive, loop, or far-end transmit problems. The test mode automatically installs a carrier squelch on carrier fail which can result in the same problem.

- Reestablish connection to DS 108E by sending an unmodulated (steady) marking or spacing frequency.
- Reestablish connection to DS 108D by sending an unmodulated (steady) marking frequency.

**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 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 data set and must be repeated for each additional data set.

**2. CARRIER MONITORING TEST**

**2.01** This test determines the presence of both near- and far-end carriers. Equipment necessary for this test consists of the following:

- 1013-Type handset
- KS-19935-L7 Telegraph carrier test set (TCTS) and two W1AD cords.

**A. Far-End Carrier—Audible Indication**

**2.02** The following procedure should be used to determine the presence of far-end carrier at the station when using the 1013-type handset.



*Verify that carrier squelch on carrier fail option has been disabled at the far end and the far end is not in the test mode.*

STEP	PROCEDURE
1	Gain access to cabinet as required.
2	Operate 1013 handset TALK MON switch to MON.
3a	For a 2-wire line facility, unplug data set to be tested.
4a	Go to connecting block and connect leads of 1013 handset to 2-wire facility.
5b	For 4-wire line facility, connect leads of 1013 handset to data set TP6 and TP13.
6	Monitor incoming carrier frequency. <b>Requirement:</b> An audible tone is heard. <b>Note:</b> Modulated incoming carrier will <i>not</i> extinguish the data set CF lamp if it is lighted (refer to 1.04).
7	Remove 1013 handset and restore station to pretest condition.

**B. Near-End Carrier—Audible Indication**

**2.03** The following procedure should be used to determine the presence of near-end carrier using a 1013 handset.



*Verify that near end is not in test mode.*

STEP	PROCEDURE
1	Gain access to cabinet as required.
2	Operate 1013 handset TALK MON switch to MON.
3	Connect leads of 1013 handset to data set TP1 and TP2 (2-wire or 4-wire).
4a	If carrier squelch on carrier fail option (option R) is installed, remove it from 27B1 data unit by removing CSQ spade tip lead from RS screw terminal.
5	Monitor outgoing carrier frequency.  <b>Requirement:</b> An audible tone is heard.  <b>Note:</b> Near-end carrier will be the louder of two tones heard in 2-wire arrangements. In 4-wire operation, only near-end carrier is present on data set TP1 and TP2.
6b	If carrier squelch on carrier fail option (option R) was originally in 27B1 data unit, reinstall it.
7	Remove 1013 handset and restore station to pretest condition.

**C. Far-End or Near-End Carrier Frequency Measurement**

**2.04** The following procedure measures the carrier frequency of the far end or near end, depending on the lettered step indicated. The test equipment used is a KS-19935-L7 TCTS and two WIAD cords.

STEP	PROCEDURE
1	Using a nearby telephone, instruct the far-end station not to send data until instructed to return station to normal operation.
2	Gain access to cabinet as required.

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STEP	PROCEDURE
3	Connect one end of the auxiliary power supply interconnection power cord (stored in the CABLES AND SPARE FUSES section of the auxiliary power supply) to the PWR jack of the auxiliary power supply.
4	Connect the other end of the interconnection power cord to the PWR jack of the TCTS.
5	<p>Operate the controls of the TCTS as follows:</p> <ul style="list-style-type: none"> <li>● AM/FM to FM</li> <li>● SW/DW/F to F</li> <li>● SPKR switch to ON</li> <li>● HI-M/LO-M to HI-M</li> <li>● LEVEL dBm to -17</li> <li>● CHANNEL SELECT F1 or F2 as required.</li> </ul> <p><b>Note:</b> For near-end transmit frequency measurement, set CHANNEL SELECT to F1 for DS 108D or F2 for DS 108E. For far-end receive frequency measurement, set CHANNEL SELECT to F1 for DS 108E or F2 for DS 108D.</p> <p><b><i>Far-End Carrier Frequency Measurement</i></b></p>
6a	For 2-wire line facilities, connect alligator clip ends of the two W1AD cords to DS TP1 and TP2.
7b	For 4-wire line facilities, connect alligator clip ends of the two W1AD cords to DS TP6 and TP13.
	<p><b><i>Near-End Carrier Frequency Measurement</i></b></p> <p><b>Note:</b> Verify that near end is not in test mode.</p>
8c	For 2-wire or 4-wire line facilities, connect the alligator clip ends of the two W1AD cords to data set TP1 and TP2.
9c	If carrier squelch on carrier fail option is installed, remove it from 27B1 data unit by removing CSQ spade tip lead from RS screw terminal.
10	Connect spade-tip ends of the two W1AD cords to VF-1 and VF-2 screws of TB1 on back of the TCTS.
11	Connect the power cord of the auxiliary power supply (with TCTS) to an available 120V 60-Hz ac power source.
12	Operate the PWR switch of auxiliary power supply to ON.

STEP	PROCEDURE
13d	<p>Monitor far-end incoming carrier frequency F1 (DS 108E) or F2 (DS 108D).</p> <p><i>Note:</i> If far-end station transmits a mark, the SIGS M-ON lamp of the TCTS lights. If far-end station transmits a space, the SIGS M-ON lamp will <i>not</i> light. The lamp will blink to indicate modulated carrier (refer to 1.04).</p> <p><i>Requirement:</i> FREQUENCY DEVIATION meter indicates not less than <math>-6</math> and not more than <math>+6</math> Hz from F1 frequencies for DS 108E (1270-Hz mark and 1070-Hz space) or from F2 frequencies for DS 108D (2225-Hz mark and 2025-Hz space).</p>
14e	<p>Monitor near-end carrier frequency F1 (DS 108D) or F2 (DS 108E).</p> <p><i>Note:</i> The SIGS M-ON lamp of the TCTS lights.</p> <p><i>Requirement:</i> The FREQUENCY DEVIATION meter indicates not less than <math>-6</math> and not more than <math>+6</math> Hz from F1 frequency for DS 108D (1270-Hz mark) or from F2 frequency for DS 108E (2225-Hz mark).</p>
15	Operate the PWR switch of the auxiliary power supply to OFF.
16	Disconnect all test cords.
17e	If performing near-end carrier frequency measurement, return carrier squelch on carrier fail option (option R) on 27B1 data unit if required.
18	Return the near-end station and the far-end station to normal operation.

### 3. CARRIER SHIFT TEST

- W1AD Cords (three required).

**3.01** This test determines if the near-end carrier can be shifted. The following test equipment is required at the station:

- 901B DTS Cover (interface test adapter)
- 1013-Type handset or KS-19935-L7 TCTS (portable)

#### A. Audible Indication

**3.02** The following procedure using the 1013 handset is used to determine if the near-end carrier can be shifted.

STEP	PROCEDURE
1	Gain access to cabinet as required.
2a	If carrier squelch on carrier fail option is installed, remove it from the 27B1 data unit by removing CSQ spade tip lead from RS screw terminal.
3	Verify that near-end station is <i>not</i> in test mode.

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STEP	PROCEDURE
4	Remove customer interface cord from J1 of the 27B1 data unit and plug cord from 901B cover (interface test adapter) into J1.
5	Operate 1013 handset TALK MON switch to MON.
6	Connect leads from 1013 handset to data set TP1 and TP2 (2-wire or 4-wire mounted in slot 1 of 28A1 data mounting).
7	Connect one end of W1AD cord to terminal 2 (BA lead) of interface test adapter.
8	Using free end of W1AD cord, momentarily touch terminal 2 (-24V) and then terminal 1 (+24V) of TB1 on the 28A1 data mounting while monitoring with 1013 handset.  <b>Requirement:</b> Shift in tone is heard.  <b>Note:</b> Repeat Steps 4, 6, and 8 for additional data sets as required. In Step 4, plug interface test adapter cord into J2, J3, etc, for each test. In Step 6, connect 1013 handset to TP1 and TP2 of data set mounted in slots 3, 5, 7, etc, of the 28A1 data mounting for each test. Repeat Step 8 as given. (Return customer interface cord to J1 at end of test and repeat for J2, J3, etc, as required.)
9b	If carrier squelch on carrier fail was originally installed in 27B1 data unit, reinstall it.
10	Remove test equipment, restore customer-provided interface cord, and restore station to pretest condition.

**B. Frequency Measurement**

**3.03** The following procedure using the KS-19935-L7 TCTS is used to measure the frequency of the near-end carrier when it is shifted.

STEP	PROCEDURE
1	Gain access to cabinet as required.
2a	If carrier squelch on carrier fail option is installed, remove it from the 27B1 data unit by removing CSQ spade tip lead from RS screw terminal.
3	Verify that near-end station is <i>not</i> in test mode.
4	Connect the auxiliary power supply (with TCTS) interconnection power cord (stored in its CABLES AND SPARE FUSES section) to the PWR jack of the auxiliary power supply.
5	Connect the other end of the power cord to the PWR jack of the TCTS.

STEP	PROCEDURE
6	Operate the controls of the TCTS as follows: <ul style="list-style-type: none"> <li>● AM/FM to FM</li> <li>● SW/DW/F to F</li> <li>● SPKR switch to ON</li> <li>● HI-M/LO-M to HI-M</li> <li>● LEVEL dBm to -17</li> <li>● CHANNEL SELECT F1 or F2 as required (F1 for DS 108D or F2 for DS 108E).</li> </ul>
7	Connect alligator clip ends of two of the W1AD cords to data set TP1 and TP2 (2-wire or 4-wire).
8	Connect spade-tip ends of the two W1AD cords to VF-1 and VF-2 screws on the back of the TCTS.
9	Connect spade end of the third W1AD cord to terminal 2 (BA lead) of the interface test adapter.
10	Connect the alligator clip of the third W1AD cord to terminal 2 (-24V) of TB1 on the 28A1 data mounting.
11	Operate the PWR switch of the auxiliary power supply to ON. <p><b>Requirement:</b> The meter will indicate not less than -6 and not more than +6 Hz. A continuous tone is heard.</p> <p><b>Note:</b> If near-end station is sending a mark, the SIGS M-ON lamp of TCTS is lighted.</p>
12	Disconnect the third W1AD cord (connected in Step 10) from terminal 2 (-24V) of TB1 28A1 data mounting.
13	Connect the third W1AD cord to terminal 1 (+24V) of TB1 on the 28A1 data mounting. <p><b>Requirement:</b> A shift in tone is heard. FREQUENCY DEVIATION meter indicates not less than -6 and not more than +6 Hz. Near-end station is sending a space and SIGS M-ON lamp is extinguished.</p>
14	Operate the PWR switch of the auxiliary power supply to OFF. <p><b>Note:</b> Repeat Steps 7, 11, 12, 13, and 14 for each data set mounted in the 28A1 data mounting.</p>
15b	If carrier squelch on carrier fail option was originally installed in 27B1 data unit, reinstall it.
16	Remove test equipment and restore station to pretest condition.

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**4. LOOP-BACK TEST**

**4.01** The loop-back test is required when investigating trouble reports or at the time of installation to ensure 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. When the service is station-to-station operation, the far end is placed in the test mode.

**4.02** Usually, for station-to-hub arrangement, the loop-back test will have been performed prior to dispatching a telephone company employee in response to a trouble report.

**4.03** The data station is conditioned for loop-back testing by operating the test switch associated with the data set to be tested. Eight test switches are located on the 27B1 data unit. One test switch

is provided for each of the eight data sets mounted in the 28A1 data mounting. Test switch 1 is associated with the data set mounted in slot 1 of the 28A1 data mounting. Since data sets 108D or E are mounted in every odd slot (1, 3, 5, 7, etc) of the 28A1 data mounting, test switch 2 is associated with the data set mounted in slot 3 (test switch 3—data set in slot 5, etc).

**4.04** The following procedure is used to perform loop-back test using equipment at the near station as follows:

- 901B DTS cover (interface test adapter)
- KS-20538 VOM, or TTS-28
- W1AD cord, or equivalent.

<b>STEP</b>	<b>PROCEDURE</b>
1	Gain access to cabinet as required.
2	Remove customer interface cord from J1 of 27B1 data unit for data set mounted in slot 1.
3	Connect interface test adapter cord to J1 of the 27B1 data unit.
4	Request that far end be placed in the test mode.
5	Set FUNCTION switch of VOM to 30 VDC.
6	Connect + (positive) terminal of VOM to interface test adapter, terminal 7 (signal ground).
7	Connect - (negative) terminal of VOM to interface test adapter, terminal 3 (BB lead). <b>Requirement:</b> Meter should read between 10 and 16 volts (mark).
8	Remove meter leads from interface test adapter (901B data test set cover).
9	Clip one end of W1AD cord to terminal 2 (BA lead) of the interface test adapter, and clip other end to terminal 1 (+24V) of TB1 on the 28A1 data mounting.
10	Connect - (negative) terminal of VOM to interface test adapter, terminal 7 (signal ground).
11	Connect + (positive) terminal of VOM to interface test adapter, terminal 3 (BB lead). <b>Requirement:</b> Meter should indicate between 7 and 11 volts (space).



STEP	PROCEDURE
12	<p>Connect interface test adapter cord to J2 of the 27B1 data unit and repeat Steps 6 through 11. (Repeat for J3 through J8 as required.)</p> <p><i>Note:</i> Return customer interface cord to J1 at end of test and repeat for J2, J3, etc, at end of test.</p>
13	Remove test equipment and return station to pretest condition.

## 5. DISTORTION MEASUREMENT TEST

stations and the two directions of transmission of the connecting facilities.

### A. Distortion Measurement Test Using 911A Data Test Set

**5.02** The following procedure is used to measure distortion using equipment as follows:

**5.01** This test measures the loop-back distortion of the data system. The transmit lead is driven by the test sentence generator. At the receive lead, the data set feeds the data signals to the distortion measuring set, which measures the distortion introduced by the loop-back mode. This checks the transmitter and receiver of both

- 901B Data test set cover
- W1AD Cords, or equivalent (two required)
- 911A Data test set
- 1W2A Cords, or equivalent (two required)

STEP	PROCEDURE
1	Gain access to cabinet as required.
2	Remove customer interface cord from J1 of the 27B1 data unit.
3	Connect interface test adapter cord to J1 of the 27B1 data unit.
4	Make connections as shown in Fig. 1.
5	<p>Set controls of test sentence generator (TSG) as follows:</p> <ul style="list-style-type: none"> <li>● AUTO. MAN. STEP to AUTO.</li> <li>● BAUDS to speed desired (maximum is 300)</li> <li>● BIAS to 0</li> <li>● CODE to code desired</li> <li>● DIST 1% to 0</li> <li>● DIST 5% to 0</li> <li>● REPEAT to OFF</li> </ul>

STEP	PROCEDURE
6	<ul style="list-style-type: none"> <li>● RY OR U* to OFF</li> <li>● OUTPUT to EIA.</li> </ul> <p>Set controls of distortion measuring set (DMS) as follows:</p> <ul style="list-style-type: none"> <li>● BAUDS to speed desired</li> <li>● CODE to code desired</li> <li>● DISCR% to 5</li> <li>● FILTER to OUT</li> <li>● INPUT to EIA</li> <li>● PARITY to ON</li> <li>● AUTO. PK—PIP to PIP.</li> </ul>

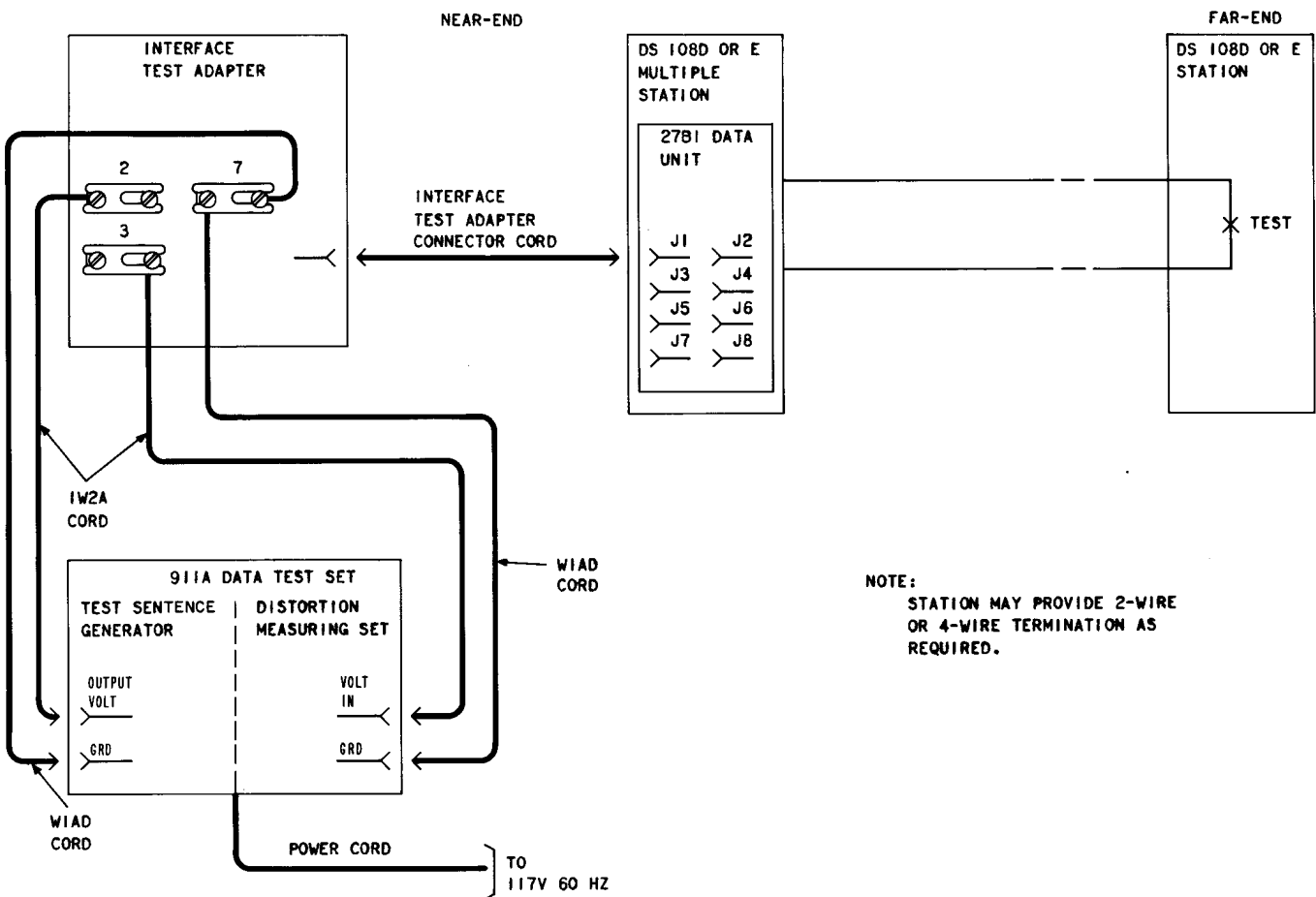


Fig. 1—Distortion Test Arrangement Using 911A Data Test Set

STEP	PROCEDURE
7	Turn power switch ON.
8	Momentarily operate AUTO. PK—PIP switch to PK and then back to PIP.
9	Operate RESET switch on DMS.  <b>Requirement:</b> Distortion displayed on pixie tubes should be 15 percent or less.
10	Set DIST 5% switch on test sentence generator to 25.
11	Set BIAS switch to SWC.
12	Set DISCR% switch on distortion measuring set to 0.  <b>Requirement:</b> Distortion displayed on pixie tubes should be equal to or less than 35 percent.  <b>Note:</b> This checks the ability of the system to operate with high distortion.
13	Connect interface test adapter cord to J2 of the 27B1 data unit and repeat Steps 5 through 12. (Repeat for J3 through J8 as required.)  <b>Note:</b> Return customer interface cord to J1 at end of test and repeat for J2, J3, etc, at end of test.
14	Remove test equipment and return station to pretest condition.

#### B. Distortion Measurement Test Using 902- and 903-Type Data Test Sets

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

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

**5.04** The following procedure is used to measure distortion using equipment as follows:

- 901B Data test set cover (interface test adapter)
- 903-Type data test sets (two required)
- 902-Type data test set
- W2DW Cords, or equivalent (two required).

STEP	PROCEDURE
1	<p>Gain access to cabinet as required.</p> <p><b>Caution:</b> <i>Do not connect the 903-type data test set until all other equipment is connected and all of their switches have been placed to proper settings.</i></p> <p><b>Transmit Equipment on Transmit Lead</b></p>
2	<p>Set 903-type DTS as follows:</p> <ul style="list-style-type: none"> <li>● RANDOM—DOT to RANDOM</li> <li>● TRIGGER to +</li> <li>● BIT RATE to speed desired.</li> </ul> <p><b>Note:</b> Set BIT RATE on 903B to 180. For compatible bit rate, use a 903B and a 902B at the receive lead. Set BIT RATE on 903C to 300. For compatible bit rate, use a second 903C and a 902C at the receive lead.</p> <p><b>Receive Equipment on Receive Lead</b></p>
3	<p>Set 902-type DTS as follows:</p> <ul style="list-style-type: none"> <li>● BIT RATE to speed desired</li> </ul> <p><b>Note:</b> On 902B data test set, set BIT RATE to 180. On 902C DTS, set BIT RATE to 300.</p> <ul style="list-style-type: none"> <li>● Meter selection switch to DIST ADJ</li> <li>● TRIGGER—not required.</li> </ul>
4	<p>Set 903-type DTS as follows:</p> <ul style="list-style-type: none"> <li>● BIT RATE to EXT CLOCK</li> <li>● RANDOM—DOT to RANDOM</li> <li>● TRIGGER to +.</li> </ul>
5	<p>Remove customer interface cord from J1 of the 27B1 data unit.</p>
6	<p>Connect interface test adapter cord to J1 of the 27B1 data unit.</p>
7	<p>Make connections as shown in Fig. 2.</p>
8	<p>Turn POWER switches of both 903-type DTSs to ON.</p>
9	<p>Request that far end be placed in test mode.</p>

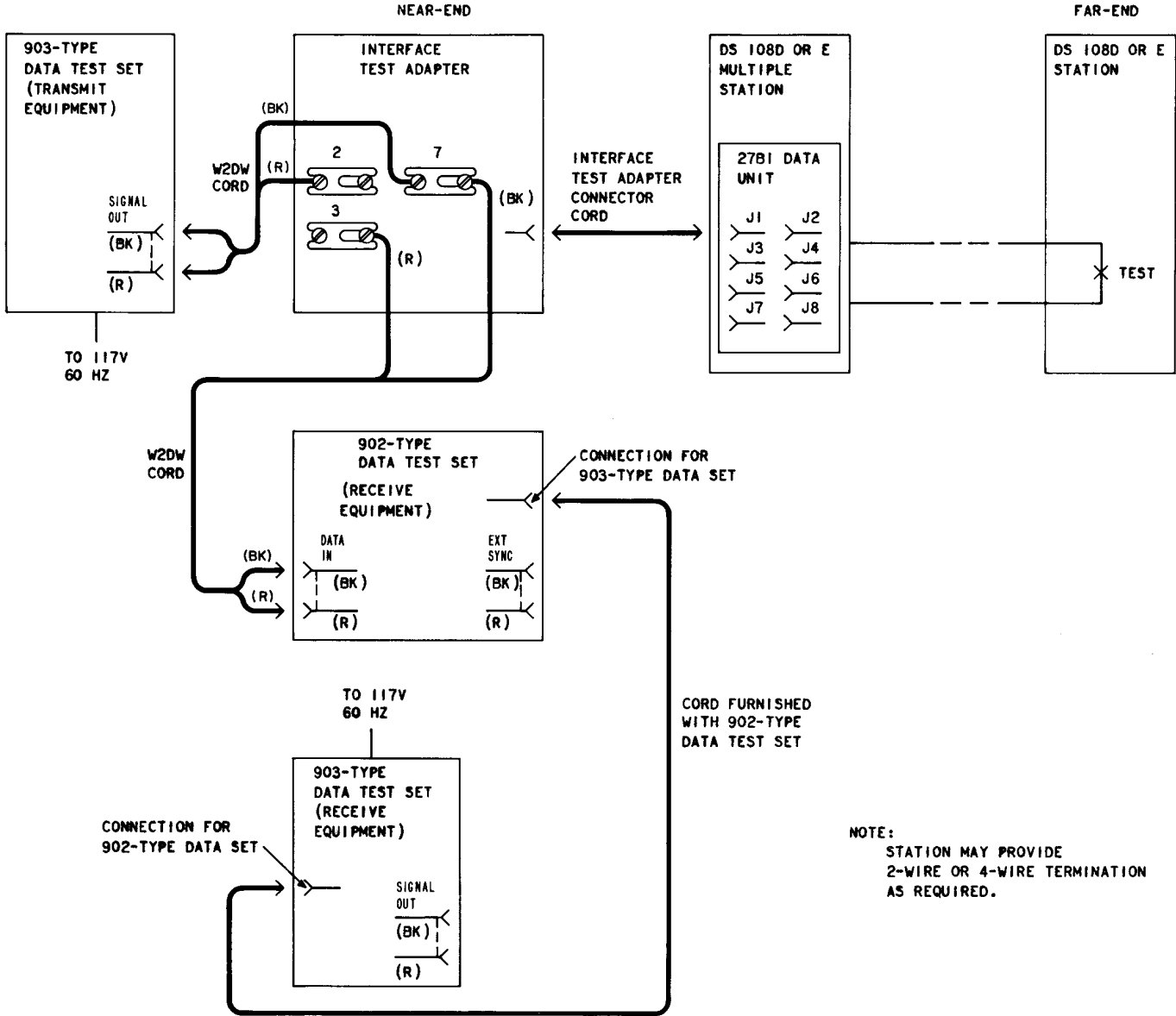


Fig. 2—Distortion Test Arrangement Using 901-, 902-, and 903-Type Data Test Set

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STEP	PROCEDURE
10	Momentarily depress START button on both the transmitting and receiving 903-type data test sets. (The transmitting station has no further duties until end of test period.)
	<b><i>902-Type DTS Adjustments</i></b>
11	Adjust the DISTORTION control to indicate zero on the meter.
12	Operate meter selection switch to VOLT ADJ.
13	Adjust the VOLTS control to indicate zero on the meter.
14	Operate meter selection switch to PHASE ADJ.
15	Adjust the PHASE control to indicate zero on the meter.
16	Operate meter selection switch to DIST. MEAS.
17	Depress the WORD SYNC & RESET button momentarily and record the time.
	<p><b><i>Note:</i></b> 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 &amp; 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><b><i>Requirement:</i></b> 10 percent or less distortion; 2 or less errors in a 5-minute test.</p> <p><b><i>Note:</i></b> 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>
18	Connect interface test adapter cord to J2 and reconnect customer interface cord to J1. Repeat test for J3 through J8 as required.
19	Disconnect test equipment and return station to pretest condition.

**6. POWER SUPPLY MEASUREMENT**

**6.01** The following procedure is used to measure the voltage of the KS-20575 rectifier mounted on the 28A1 data mounting. The voltage measurements are taken from TB1 on the 28A1 data mounting with a KS-20538-L1 VOM or equivalent.

STEP	PROCEDURE
1	Gain access to cabinet as required.
2	Set FUNCTION switch on VOM to 30 Vdc.
3	Connect VOM as follows: <ul style="list-style-type: none"> <li>● Negative lead to terminal 3 of TB1 on 28A1 data mounting</li> <li>● Positive lead to terminal 1 of TB1 on 28A1 data mounting.</li> </ul> <p><b>Requirement:</b> 24 <math>\pm</math>3 Volts</p>
4	Disconnect both VOM leads and reconnect as follows: <ul style="list-style-type: none"> <li>● Negative lead to terminal 6 of TB1.</li> <li>● Positive lead to terminal 4 of TB1.</li> </ul> <p><b>Requirement:</b> 24 <math>\pm</math>3 Volts</p>
5	Disconnect both VOM leads and reconnect as follows: <ul style="list-style-type: none"> <li>● Negative lead to terminal 2 of TB1</li> <li>● Positive lead to terminal 3 of TB1.</li> </ul> <p><b>Requirement:</b> 24 <math>\pm</math>3 Volts</p>
6	Disconnect both VOM leads and reconnect as follows: <ul style="list-style-type: none"> <li>● Negative lead to terminal 5 of TB1</li> <li>● Positive lead to terminal 6 of TB1.</li> </ul> <p><b>Requirement:</b> 24 <math>\pm</math>3 Volts</p>
7	Remove test leads and return station to pretest condition.

## 7. TRANSHYBRID LOSS MEASUREMENT

**7.01** The following procedure is used to perform the transhybrid loss measurement test using a TTS-28 or equivalent.

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STEP	PROCEDURE
1	<p><b>Note:</b> This measurement requires that a 900-ohm termination be placed on the line at either the far or the near serving office.</p>
1	Gain access to cabinet as required.
2	Request the 900-ohm termination to be placed on the line.
3	Check the send level of the data set as follows:
	(a) Set FUNCTION switch of TTS-28 to DBM BRDG 0 position.
	(b) Connect + and – terminals of TTS-28 to TP1 and TP2 of data set mounted in slot 1 of 28A1 data mounting.
	(c) Read the meter and record reading.
4	Set FUNCTION switch of TTS-28 to DBM BRDG –10 position.
5	Connect + and – leads of TTS-28 to terminal 3 (signal ground) of TB1 on the 28A1 data mounting and TP7 of the data set, respectively.
	<b>Requirement:</b> Meter indication should <i>not</i> be more positive than reading in 3 (c).
	<b>Note:</b> Meter actually reads at least a 10-dB difference due to the FUNCTION switch being set to –10.
6	Repeat Steps 2 through 5 for each data set mounted in the 28A1 data mounting.
7	Remove leads and restore station to pretest condition.

**8. LOOP-LOSS MEASUREMENT**

**8.01** This measurement requires the use of the TTS-28 and an oscillator capable of furnishing 1000 Hz and 2300 Hz (at far end or STC). The measurement is made as follows:

STEP	PROCEDURE
1	Gain access to cabinet as required.
2	Disconnect the proper private line facility lines from the 28A1 data mounting.
3	Set FUNCTION switch of TTS-28 to DBM 900Ω TERM 0 position.
4a	If 2-wire service, connect + and – terminals of TTS-28 to telephone lines associated with leads 1 and 26.



STEP	PROCEDURE								
5b	If 4-wire service, connect + and - terminals of TTS-28 to telephone lines associated with leads 2 and 27.								
6c	Request distant station or STC to send 1000 Hz at 0 dBm if near-end data set is 108E.								
7d	Request distant station or STC to send 2300 Hz at 0 dBm if near-end data set is 108D.								
8	<p>Read and record TTS-28 meter indication.</p> <p><b>Note:</b> It may be necessary to set FUNCTION switch of TTS-28 to DBM 900Ω TERM -10 position to obtain reading.</p> <p><b>Requirement:</b> See Table A.</p> <p style="text-align: center;"><b>TABLE A</b> <b>LOOP LIMITS</b></p> <table border="1"> <thead> <tr> <th>TYPE OF LOOP</th> <th>AML LIMITS</th> </tr> </thead> <tbody> <tr> <td>Without repeaters or carriers</td> <td>EML 1 dB</td> </tr> <tr> <td>With E7 repeaters only</td> <td>EML 1 dB</td> </tr> <tr> <td>With all other repeaters and/or carriers</td> <td>EML 2 dB</td> </tr> </tbody> </table> <p><b>Note:</b> Meter readings are the actual measured loss (AML) of the line facilities. These readings should be the same as the readings taken during installation of the data station. The station layout card shows the expected measured loss (EML) when the facilities were designed. The reading taken in Step 8 should not deviate from the limits shown in Table A. If the EML is <i>not</i> within limits, the loop should be turned back for repair.</p>	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								
9	Reconnect proper private line facility as required.								
10	Repeat test (Steps 2 through 9) for each data set mounted in 28A1 data mounting. Refer to Table B for additional TTS-28 connections (2-wire or 4-wire).								
11	Remove leads and restore station to pretest condition.								

**TABLE B  
CONNECTION REQUIREMENTS FOR LOOP-LOSS MEASUREMENT**

DATA SET SLOT	2-WIRE		4-WIRE	
	R	T	T1	R1
1	1	26	2	27
3	3	28	4	29
5	5	30	6	31
7	7	32	8	33
9	9	34	10	35
11	11	36	12	37
13	13	38	14	39
15	15	40	16	41

**9. REFERENCES**

**9.01** The following documents pertain to data set 108D or E multiple private line station:

SD- & CD-73060-01 Data Set 108D

SD- & CD-1D229-01 Data Set 108E

SD- & CD-1D176-01 Data Systems Station 28-Type Data Mounting

SD- & CD-1D183-01 Data Systems 27-Type Data Unit

**SECTION**

**TITLE**

591-028-100

Data Sets 108D- and 108E-Types Used in Station Applications, Description

591-028-102

Data Sets 108D- and E-Types, Multiple Private Line Station Arrangement Using 28A1 Data Mounting and 27B1 Data Unit, Description

591-028-202

Data Sets 108D- and E-Types, Multiple Private Line Station Arrangement Using 28A1 Data Mounting and 27B1 Data Unit, Installation and Connections

**SECTION**

**TITLE**

590-100-114

27A1 and 27B1 Data Units, Identification

591-028-302

Data Sets 108D- and E-Types, Multiple Private Line Station Arrangement Using 28A1 Data Mounting and 27B1 Data Unit, Maintenance.

590-102-124

28A1 Data Mounting, Identification