

**DATA AUXILIARY SET 829-TYPE
CHANNEL INTERFACE UNITS
VOICEBAND PRIVATE LINE CHANNELS
TEST PROCEDURES**

CONTENTS	PAGE	CONTENTS	PAGE
1. GENERAL	1	A. Private Line	25
2. TEST EQUIPMENT	2	B. Alternate Voice	27
3. INSTALLATION TESTS	3	C. 4-Wire Dial Backup	28
PRIVATE LINE	3	5. REFERENCES	32
ALTERNATE VOICE	5		
A. Distant End Available	5		
B. Distant End Not Available	6		
4-WIRE DIAL BACKUP	7		
A. Single Installation (Manual Dialing With 48B1 Data Unit)	7		
B. Single Installation (Manual Dialing With 48ER1 Data Unit)	10		
C. Single Installation (Automatic Dialing With Station Dial)	13		
D. Single Installation (Automatic Dialing With Automatic Calling Unit)	15		
E. Single Installation (Automatic Answering With Two Calls Answered)	19		
F. Single Installation (Automatic Answering With Automatic Call Back)	21		
G. Multiple Installation (Manual Dialing With 48B1 or 48ER1 Data Unit)	23		
4. TROUBLE ISOLATION TESTS	25		

1. GENERAL

1.01 This section contains installation and maintenance test procedures for data auxiliary set (DAS) 829-type and the supplementary data units and data mountings. This section does not contain the tests for modems used in conjunction with the DAS and the supplementary apparatus.

1.02 This section is reissued to add information on the 48ER1, 48FR1, and 48G1 data units and the 44A2, 46A2, 46C2, 59A1, and 62A1 data mountings. Since this reissue is a general revision, arrows normally used to indicate changes have been omitted.

1.03 DAS 829-type functions as a channel interface unit (CIU) to provide a prewired and tested standard termination for 4-wire private line voiceband data channels. Basic station arrangements use the DAS 829-type CIU to provide 4-wire data only service. Other station arrangements use the DAS 829-type CIU and the supplementary apparatus to provide 4-wire data with alternate voice, dial backup, and switched dial backup service. Two-wire data only and data with alternate voice service are also provided.

NOTICE

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

1.04 A choice of six codes for the DAS 829-type CIU provides proper termination of channels having various loop facilities.

- DAS 829A-L1 or -L1A for short loops
- DAS 829B-L1 or -L1A for longer nonloaded loops
- DAS 829C-L1 or -L1A for longer loaded loops.

1.05 A choice of seven data units combined with a DAS 829-type CIU provides the following features:

- 48A1 data unit for 4-wire or 2-wire alternate voice service.
- 48B1 data unit for 4-wire dial backup service with manual dialing.
- 48C1 data unit (switching matrix) for switching any one of four 4-wire modems to either one of two 4-wire dial backup channels.
- 48D1 data unit (interface adapter) for use with a 46C-type and/or 46B1 data mounting to concentrate control leads in an 18- or 30-button CALL DIRECTOR® key telephone set.
- 48ER1 data unit for 4-wire dial backup service with manual or automatic dialing. This data unit complies with all requirements of the FCC Registration Program. The registration number for the 48ER1 data unit is AS593M-67751-PC-E. The ringer equivalence number for each line is 0.5A.
- 48FR1 data unit for 4-wire dial backup service with automatic answering. This data unit complies with all requirements of the FCC Registration Program. The registration number for the 48FR1 data unit is AS593M-67757-PC-E. The ringer equivalence number for each line is 0.5A.
- 48G1 data unit for 2-wire to 4-wire conversion.

1.06 A choice of seven data mountings house single or multiple arrangements of DAS 829-type CIUs and/or 48-type data units without any change in wiring.

- 44A1 or 44A2 data mounting houses one DAS 829-type CIU.
- 45A1 data mounting houses one DAS 829-type CIU or one DAS 829-type CIU with the following data units: one 48A1 or 48B1, or one 48A1 and one 48B1.
- 46A1 or 46A2 data mounting houses up to eight DAS 829-type CIUs.
- 46B1 data mounting houses up to eight 48A1 or 48G1 data units.
- 46C1 data mounting houses one or two 48B1 data units and up to six 48C1 data units.
- 46C2 data mounting houses one or two 48B1 or 48ER1 data units and up to six 48C1 data units.
- 59A1 data mounting houses one DAS 829-type CIU or one DAS 829-type CIU with the following data units: one 48A1, 48B1, 48ER1, 48FR1, or 48G1; or one 48A1 and one 48B1, 48ER1, or 48G1.
- 62A1 data mounting houses one DAS 829-type CIU or one DAS 829-type CIU and one 48G1 data unit.

1.07 The test procedures given in this section are performed prior to transmission tests. The DAS 829-type CIU and the supplemental data units are considered to be part of the private line channel; transmission tests, such as slope, envelope delay, noise, etc, should be made through them. These test procedures do not replace the station-to-station or station-to-serving test center lineup procedures. These test procedures serve to assure the installer that the station is operational.

2. TEST EQUIPMENT

2.01 The following test equipment is required at the station and is used in testing the DAS 829-type CIU and the supplemental data units:

- 1—Voiceband transmission test set, TTS-4B or equivalent, with bridging measurement capability
- 2—2P4B patch cords (310 plug on both ends)

- 1—KS-21253-L5 adapter
- 1—1013B handset
- 1—Portable volt-ohm-milliammeter (VOM), KS-14510-L1 or equivalent (for maintenance tests)
- 2—2W6A patch cords (310 plug on one end and clip leads on other end) (for maintenance tests)
- 1—171C adapter (for maintenance tests)
- 1—66E-type connecting block (for maintenance tests).

3. INSTALLATION TESTS

3.01 These tests are to be performed at the time of installation to verify that the

equipment is operating properly. In addition to transmission test sets required for installing the private line channel, a Northeast Electronics transmission test set TTS-4B or equivalent, is required. The sequence in which installation tests are to be performed is specified in Fig. 1.

PRIVATE LINE

3.02 The operating performance of the installed DAS 829-type CIU can be checked by performing the tests specified in Section 314-410-500 through the TRANS TST and REC TST jacks of the DAS 829-type CIU. These tests can be performed end-to-end or to the serving test center (STC). Proceed as follows:

STEP	PROCEDURE
1	Install options in DAS 829-type CIU as directed in Section 598-082-200 and as specified on service order and/or circuit layout record card. <i>Note:</i> If CIU is a DAS 829B- or C-type, adjust receive amplifier as described in Steps 2 through 7. If CIU is a DAS 829A-type, proceed to Step 8.
2	Place TTS-4B test set close to CIU and apply power to equipment. Allow test set to warm up and stabilize, then calibrate test set, using instructions printed on test set case.
3	Set controls on test set as follows: <ul style="list-style-type: none"> • SEND FREQ to 1000 • SEND LEVEL to estimated receive level at input to CIU amplifier • SEND IMP to 600Ω • FUNCTION to SEND + TALK + REC • REC IMP to 600Ω
4	Connect a 2P4B cord between SEND 310 jack on test set and REC IN jack on CIU.
5	Connect another 2P4B cord between REC 310 jack on test set and REC TST jack on CIU.
6	Adjust receive fine gain control on CIU to obtain a level reading on test set meter equal to value specified on service order (usually -16 dBm).

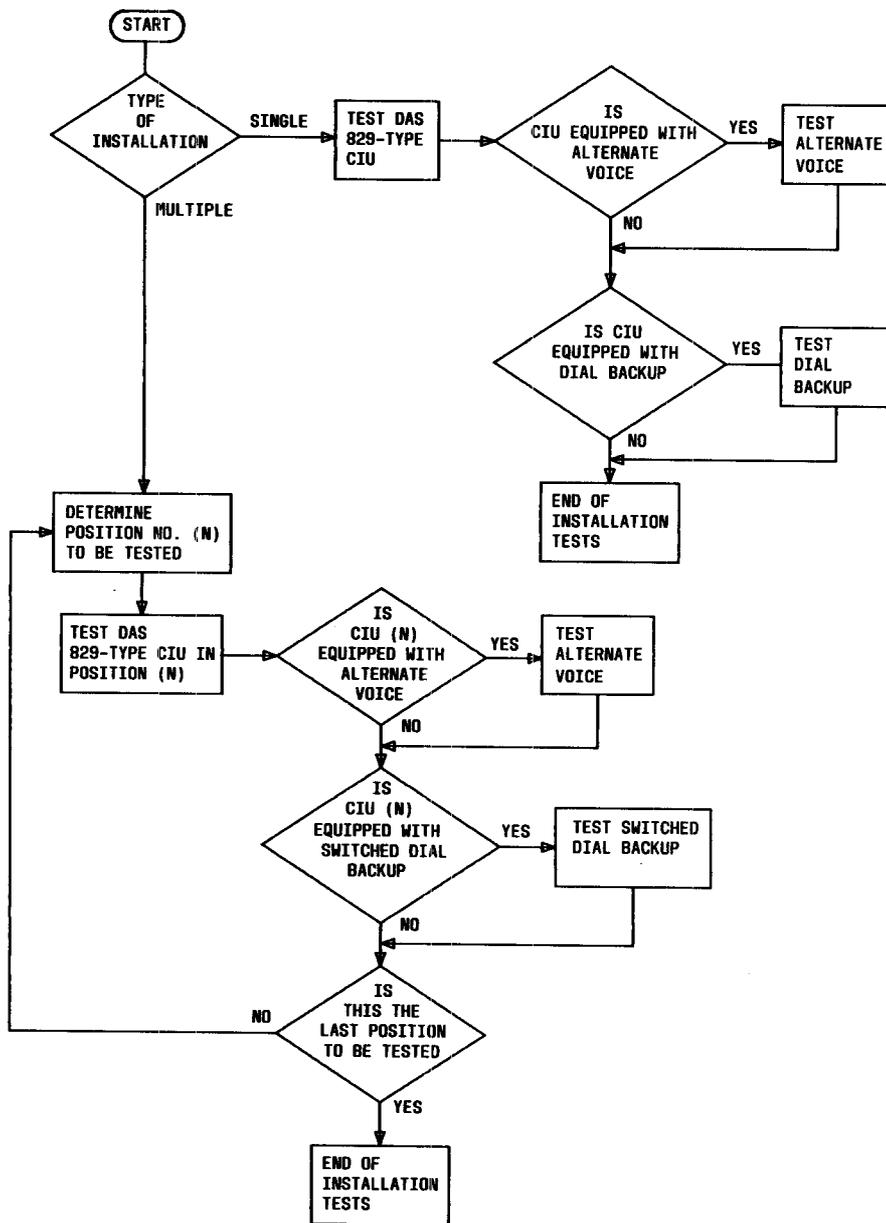


Fig. 1—Installation Test Sequence

STEP	PROCEDURE
7	Disconnect test set from CIU.
8	Perform tests for type of private line channel being installed as specified in Section 314-410-500. For 4-wire private line channels, tests to STC or distant end must be made through TRANS TST and REC TST jacks on CIU. For 2-wire private line channels, tests to STC or distant end must be made through 2W TST jack on 48G1 data unit, except tests that require a 4-wire interface.
9	Have STC perform loopback tests for benchmark purposes.
10	Refer to Fig. 1 for any remaining tests. If any remaining tests require use of TTS-4B test set, do not turn off power switch. This avoids having to recalibrate test set for each test.

ALTERNATE VOICE

- Distant end not available.

3.03 This test checks the ability to switch from the data to the voice mode, checks the signaling, checks the associated telephone set for proper visual and audible indications, and checks the voice path. Two methods of testing are provided:

A. Distant End Available

- Distant end available

3.04 If both ends are installed, perform the test of the alternate voice equipment as follows:

STEP	PROCEDURE
1	Take local handset off-hook.
2	Depress PL TALK button. Requirement: PL TALK lamp lights.
3	Depress RING button until ringback is heard (about 10 seconds). Distant end should receive ringing and answer call. Note: If distant end is in loopback mode, ringing will not be detected.
4	When distant end has answered call, request distant end to signal local end by depressing RING button until ringback is heard. Inform distant end that call will not be answered until ringing times out.
5	Place local handset on-hook.

STEP	PROCEDURE
6	When ringing is heard, do not take local handset off-hook. Allow ringing to time out. An audible indication is heard. Requirement: PL TALK lamp flashes in response to audible indication. After about 40 seconds, ringing ceases.
7	When ringing has timed out, take local handset off-hook and answer call. Verify that alternate voice path operates properly.
8	Refer to Fig. 1 for any remaining tests.

- B. Distant End Not Available** using a TTS-4B test set. The test set must be capable of transmitting a 2600-Hz tone. Perform the test as follows:
- 3.05** If the distant end has not been installed, the alternate voice equipment can be tested

STEP	PROCEDURE
1	Verify handset is on-hook and CIU is not in loopback mode.
2	Set controls on TTS-4B test set as follows: SEND FREQ to 2600 SEND LEVEL to -20 SEND IMP to 600Ω FUNCTION to SEND + TALK + REC REC IMP to BRDG
3	Connect a 2P4B cord between SEND 310 jack on test set and REC MON jack on CIU. Requirement: PL TALK lamp lights when an audible indication is heard.
4	Remove 2P4B cord from REC MON jack. Requirement: PL TALK lamp remains lighted and audible indication continues for about 40 seconds.
5	After ringing times out, plug 2P4B cord back into REC MON jack. When audible indication begins and PL TALK lamp lights, take handset off-hook.
6	Depress PL TALK button.

STFP	PROCEDURE
	Requirement: Audible indication stops. PL TALK lamp lights steady.
7	Listen in handset for 2600-Hz tone.
	Requirement: Tone is heard in handset.
8	Remove 2P4B cord from test set and CIU.
9	Connect 2P4B cord between REC 310 jack on test set and TRANS MON jack on CIU.
10	Whistle or blow into telephone handset.
	Requirement: Test set meter reads same level as sound. A loud sound should produce a peak meter reading in range of -10 to +10 dBm.
11	Depress RING button.
	Requirement: Test set meter reads signal level of about 0 dBm.
12	Refer to Fig. 1 for any remaining tests.

4-WIRE DIAL BACKUP

3.06 This test checks the ability of the 48B1 or 48ER1 data unit to switch from a 4-wire private line to a 4-wire dial backup channel, and checks the associated telephone set or station dial for proper operation. A procedure is provided for adjusting the transmit and receive levels.

Note: If a DAS 801CR-L1/2 automatic calling unit (ACU) is installed with the 48ER1 data

unit, test the ACU using the test procedures in Section 598-088-500.

A. Single Installation (Manual Dialing With 48B1 Data Unit)

3.07 This installation consists of a DAS 829-type CIU and a 48B1 data unit housed in a 45A1 or 59A1 data mounting. The data mounting may also house a 48A1 data unit. The presence of a 48A1 data unit does not affect this test. A key telephone set is used to originate and answer calls. Perform the test as follows:

STEP	PROCEDURE
1	Install options in 48B1 data unit as directed in Section 598-082-200 and as specified on service order and/or circuit layout record card. Note: Steps 2 and 3 are for adjusting transmit attenuator AT1 on 48B1 data unit.
2	Measure loop loss of line 1 (T2, R2) using a 900-ohm loop termination and the milliwatt supply in serving central office.

STEP	PROCEDURE
3	Set transmit attenuator AT1 on 48B1 data unit as follows: Attenuator setting = 11.5 dBm - line loss. For example, if line loss is 4 dB, attenuator setting = 11.5 dBm - 4 dB = 7.5 dB. Since attenuator is adjustable in 1-dB steps, in this example it would be set to provide 8 dB of loss (slide switches on attenuator would be set so that only number 8.0 is exposed). Note 1: The 11.5 dBm is arrived at by subtracting a 0.5 dB loss through transformer on 48B1 data unit from the -12 dBm required level at serving central office. Note 2: Steps 4 through 11 are for adjusting receive gain control R9 on 48B1 data unit.
4	Set controls on TTS-4B test set as follows: FUNCTION to REC + TALK REC IMP to 600Ω REC LEVEL to +7
5	Take handset off-hook and depress DDD2 button. Requirement: Dial tone is heard in handset.
6	Dial milliwatt supply in serving central office.
7	When connection to milliwatt supply is completed, depress and release HOLD button. Requirement: DDD2 lamp lights and DDD2 button releases on up-stroke of HOLD button.
8	Place handset on-hook.
9	Connect a 2P48 cord between REC 310 jack on test set and REC TST jack on 48B1 data unit.
10	Measure receive level of milliwatt supply and adjust receive gain control R9 on 48B1 data unit for a reading of +3.7 dBm on test set meter.
11	Take handset off-hook, depress and release REL button, and place handset on-hook. Requirement: DDD2 lamp goes off, indicating call is ended.
12	Disconnect test set from 48B1 data unit. Note: Steps 13 through 24 check telephone set, switching functions, and ring detection functions of 48B1 data unit.
13	Take handset off-hook and depress DDD1 button.

STEP	PROCEDURE
14	<p>Requirement: DDD1 lamp does not light. Dial tone is heard in handset.</p> <p>Dial directory number of DDD2 line.</p> <p>Requirement: Audible indication is heard. DDD2 lamp flashes in response to audible indication.</p>
15	<p>When audible indication is heard, depress and release HOLD button.</p> <p>Requirement: DDD1 lamp lights and DDD1 button releases on up-stroke of HOLD button. Audible indication continues.</p>
16	<p>Depress DDD2 button.</p> <p>Requirement: Audible indication stops and DDD2 lamp stops flashing.</p>
17	<p>Depress and release HOLD button.</p> <p>Requirement: DDD2 lamp lights and DDD2 button releases on up-stroke of HOLD button. Station is now in dial backup mode.</p>
18	<p>Depress and release REL button.</p> <p>Requirement: Both DDD1 and DDD2 lamps go off. Station is now released from dial backup mode.</p>
19	<p>Take handset off-hook and depress DDD2 button.</p> <p>Requirement: DDD2 lamp does not light. Dial tone is heard in handset.</p>
20	<p>Dial directory number of DDD1 line.</p> <p>Requirement: Audible indication is heard. DDD1 lamp flashes in response to audible indication.</p>
21	<p>When audible indication is heard, depress and release HOLD button.</p> <p>Requirement: DDD2 lamp lights and DDD2 button releases on up-stroke of HOLD button. Audible indication continues.</p>
22	<p>Depress DDD1 button.</p> <p>Requirement: Audible indication stops and DDD1 lamp stops flashing.</p>
23	<p>Depress and release HOLD button.</p> <p>Requirement: DDD1 lamp lights and DDD1 button releases on up-stroke of HOLD button. Station is now in dial backup mode.</p>

STEP	PROCEDURE
24	Depress and release REL button. Requirement: Both DDD1 and DDD2 lamps go off. Station is now released from dial backup mode.
25	Refer to Fig. 1 for any remaining tests.

B. Single Installation (Manual Dialing With 48ER1 Data Unit) 59A1 data mounting. The data mounting may also house a 48A1 data unit. The presence of a 48A1 data unit does not affect this test. A key telephone set is used to originate and answer calls. Perform the test as follows:

3.08 This installation consists of a DAS 829-type CIU and a 48ER1 data unit housed in a

STEP	PROCEDURE
1	Install options in 48ER1 data unit as directed in Section 598-082-200 and as specified on service order and/or circuit layout record card.
2	For nonregistered arrangements, perform Steps 3 through 6. For registered arrangements, verify that transmit (XMT) and receive (REC) switches on 48ER1 data unit are set to 8 dB fixed loss loop as specified in Table A, then proceed to Step 7. Note: Steps 3 and 4 are for adjusting transmit (XMT) switch on 48ER1 data unit.
3	Measure loop loss of line 1 (T2, R2) using a 600-ohm loop termination and the milliwatt supply in serving central office.
4	Set 4-pole transmit (XMT) switch on 48ER1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated. Note: Steps 5 and 6 are for adjusting receive (REC) switch on 48ER1 data unit.
5	Measure loop loss of line 2 (T3, R3) using a 600-ohm loop termination and the milliwatt supply in serving central office.
6	Set 4-pole receive (REC) switch on 48ER1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated. Note: Steps 7 through 23 check telephone set, switching functions, and ring detection functions of 48ER1 data unit.

STEP

PROCEDURE

TABLE A

**SWITCH SETTINGS FOR TRANSMIT AND RECEIVE
LEVEL ADJUSTMENT**

1000-Hz LOOP LOSS IN dB FOR LINE DDD1 (OR DDD2)		SWITCH DESIGNATED TRANS (OR REC)			
LOSS GREATER THAN OR EQUAL TO	LOSS LESS THAN	POLE			
		1	2	3	4
		POSITION*			
0	1	1	0	0	1
1	2	0	1	0	1
2	3	1	1	0	1
3	4	1	0	1	0
4	5	0	1	1	0
5	6	1	1	1	0
6	7	1	0	0	0
7	8	0	1	0	0
8	—	1	1	0	0
8 dB fixed loss loop		1	1	0	0

*1 = on (contact closed)

0 = off (contact open)

- 7 Set controls on TTS-4B test set as follows:
- SEND FREQ to 1000
- SEND LEVEL to 0 (CAL)
- SEND IMP to 600Ω
- FUNCTION to SEND + TALK + REC
- REC IMP to 600Ω
- 8 Connect a 2P4B cord between REC 310 jack on test set and REC TST jack on 48ER1 data unit.
- 9 Take handset off-hook and depress DDD1 button.

STEP	PROCEDURE
10	<p>Requirement: DDD1 lamp does not light. Dial tone is heard in handset.</p> <p>Dial directory number of DDD2 line.</p> <p>Requirement: Audible indication is heard. DDD2 lamp flashes in response to audible indication.</p>
11	<p>When audible indication is heard, depress and release HOLD button.</p> <p>Requirement: DDD1 lamp lights and DDD1 button releases on up-stroke of HOLD button. Audible indication continues.</p>
12	<p>Depress DDD2 button.</p> <p>Requirement: Audible indication stops and DDD2 lamp stops flashing.</p>
13	<p>Depress and release HOLD button.</p> <p>Requirement: DDD2 lamp lights and DDD2 button releases on up-stroke of HOLD button. For next 10 seconds, test set meter reads signal level of about -12 dBm. At end of signal, BU lamp on 48ER1 data unit lights. Station is now in dial backup mode.</p>
14	<p>Depress and release REL button.</p> <p>Requirement: BU lamp on 48ER1 data unit goes off. For next 3 seconds, test set meter reads signal level of about -12 dBm. At end of signal, both DDD1 and DDD2 lamps go off. Station is now released from dial backup mode.</p>
15	<p>Take handset off-hook and depress DDD2 button.</p> <p>Requirement: DDD2 lamp does not light. Dial tone is heard in handset.</p>
16	<p>Dial directory number of DDD1 line.</p> <p>Requirement: Audible indication is heard. DDD1 lamp flashes in response to audible indication.</p>
17	<p>When audible indication is heard, depress and release HOLD button.</p> <p>Requirement: DDD2 lamp lights and DDD2 button releases on up-stroke of HOLD button. Audible indication continues.</p>
18	<p>Depress DDD1 button.</p> <p>Requirement: Audible indication stops and DDD1 lamp stops flashing.</p>
19	<p>Depress and release HOLD button.</p>

STEP	PROCEDURE
	<p>Requirement: DDD1 lamp lights and DDD1 button releases on up-stroke of HOLD button. For next 10 seconds, test set meter reads signal level of about -12 dBm. At end of signal, BU lamp on 48ER1 data unit lights. Station is now in dial backup mode.</p>
20	<p>Connect a 2P4B cord between SEND 310 jack on test set and XMT TST jack on 48ER1 data unit.</p> <p>Requirement: Test set meter reads signal level of -12 ± 4 dBm.</p>
21	<p>On test set, set SEND LEVEL to +10.</p> <p>Requirement: After 1 second, test set meter reads signal level not more than 2 dB greater than level in Step 20.</p>
22	<p>Remove 2P4B cord from SEND 310 jack on test set and XMT TST jack on 48ER1 data unit.</p>
23	<p>Depress and release REL button.</p> <p>Requirement: BU lamp on 48ER1 data unit goes off. For next 3 seconds, test set meter reads signal level of about -12 dBm. At end of signal, both DDD1 and DDD2 lamps go off. Station is now released from dial backup mode.</p>
24	<p>Disconnect test set from 48ER1 data unit.</p>
25	<p>Refer to Fig. 1 for any remaining tests.</p>

C. Single Installation (Automatic Dialing With Station Dial)

3.09 This installation consists of a DAS 829-type CIU and a 48ER1 data unit housed in a 59A1 data mounting. A station dial is used to originate a call on DDD2 line. The 48ER1 data

unit automatically answers a call on DDD1 line. When option D is installed, the 48ER1 data unit is controlled by a customer- or modem-provided contact. When option S is installed, the 48ER1 data unit is controlled by the O/R switch on the data unit. Perform the test as follows:

STEP	PROCEDURE
1	<p>Install options in 48ER1 data unit as directed in Section 598-082-200 and as specified on service order and/or circuit layout record card.</p>
2	<p>If option D is installed in 48ER1 data unit, temporarily remove option D and install option S.</p>
3	<p>For nonregistered arrangements, perform Steps 4 through 7. For registered arrangements, verify that transmit (XMT) and receive (REC) switches on 48ER1 data unit are set to 8 dB fixed loss loop as specified in Table A, then proceed to Step 8.</p>

STEP	PROCEDURE
	<p>Note: Steps 4 and 5 are for adjusting transmit (XMT) switch on 48ER1 data unit.</p>
4	Measure loop loss of line 1 (T2, R2) using a 600-ohm loop termination and the milliwatt supply in serving central office.
5	Set 4-pole transmit (XMT) switch on 48ER1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated.
	<p>Note: Steps 6 and 7 are for adjusting receive (REC) switch on 48ER1 data unit.</p>
6	Measure loop loss of line 2 (T3, R3) using a 600-ohm loop termination and the milliwatt supply in serving central office.
7	Set 4-pole receive (REC) switch on 48ER1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated.
	<p>Note: Steps 8 through 15 check station dial, switching functions, and ring detection functions of 48ER1 data unit.</p>
8	Set controls on TTS-4B test set as follows:
	SEND FREQ to 1000
	SEND LEVEL to 0 (CAL)
	SEND IMP to 600Ω
	FUNCTION to SEND + TALK + REC
	REC IMP to 600Ω
9	Connect a 2P4B cord between REC 310 jack on test set and REC TST jack on 48ER1 data unit.
10	Program station dial to dial directory number of DDD1 line of 48ER1 data unit.
11	Depress O/R switch on 48ER1 data unit.
	<p>Requirement: Station dial dials directory number of DDD1 line of 48ER1 data unit. The 48ER1 data unit automatically answers call on DDD1 line. About 5 seconds after call is answered, test set meter reads signal level of about -12 dBm for about 5 seconds. At end of signal, BU lamp on 48ER1 data unit lights. Station is now in dial backup mode.</p>
12	Connect a 2P4B cord between SEND 310 jack on test set and XMT TST jack on 48ER1 data unit.
	<p>Requirement: Test set meter reads signal level of -12 ±4 dBm.</p>

STEP	PROCEDURE
13	On test set, set SEND LEVEL to +10. Requirement: After 1 second, test set meter reads signal level not more than 2 dB greater than level in Step 12.
14	Remove 2P4B cord from SEND 310 jack on test set and XMT TST jack on 48ER1 data unit.
15	Release O/R switch on 48ER1 data unit. Requirement: BU lamp on 48ER1 data unit goes off. For next 3 seconds, test set meter reads signal level of about -12 dBm. At end of signal, station is released from dial backup mode.
16	Disconnect test set from 48ER1 data unit.
17	Program station dial to dial directory number of DDD1 line of customer's remote 48FR1 data unit. Note: If possible, use 48ER1 data unit to establish and release a dial backup channel with customer's remote 48FR1 data unit as described in Steps 18 and 19.
18	Depress O/R switch on 48ER1 data unit. Requirement: Station dial dials directory number of DDD1 line of remote 48FR1 data unit. Within next 2 minutes, remote 48FR1 data unit initiates a return call to DDD1 line of 48ER1 data unit. The 48ER1 data unit automatically answers call on DDD1 line. About 10 seconds after call is answered, BU lamp on 48ER1 data unit lights. The dial backup channel is now established.
19	Release O/R switch on 48ER1 data unit. Requirement: BU lamp on 48ER1 data unit goes off. After about 3 seconds, the 48ER1 data unit places DDD1 and DDD2 lines on-hook. The dial backup channel is now released.
20	If option S was temporarily installed in 48ER1 data unit in Step 2, remove option S and install option D.
21	Refer to Fig. 1 for any remaining tests.

D. Single Installation (Automatic Dialing With Automatic Calling Unit)

3.10 This installation consists of a DAS 829-type CIU and a 48ER1 data unit housed in a 59A1 data mounting. A DAS 801CR-L1/2 automatic

calling unit (ACU) is used to originate a call on DDD2 line. The 48ER1 data unit automatically answers a call on DDD1 line. The 48ER1 data unit (option D installed) is controlled by a customer- or modem-provided contact.

STEP	PROCEDURE
1	Install options in 48ER1 data unit as directed in Section 598-082-200 and as specified on service order and/or circuit layout record card.
2	If option D is installed in 48ER1 data unit, temporarily remove option D and install option S.
3	For nonregistered arrangements, perform Steps 4 through 7. For registered arrangements, verify that transmit (XMT) and receive (REC) switches on 48ER1 data unit are set to 8 dB fixed loss loop as specified in Table A, then proceed to Step 8. <i>Note:</i> Steps 4 and 5 are for adjusting transmit (XMT) switch on 48ER1 data unit.
4	Measure loop loss of line 1 (T2, R2) using a 600-ohm loop termination and the milliwatt supply in serving central office.
5	Set 4-pole transmit (XMT) switch on 48ER1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated. <i>Note:</i> Steps 6 and 7 are for adjusting receive (REC) switch on 48ER1 data unit.
6	Measure loop loss of line 2 (T3, R3) using a 600-ohm loop termination and the milliwatt supply in serving central office.
7	Set 4-pole receive (REC) switch on 48ER1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated. <i>Note:</i> Steps 8 through 19 check switching functions and ring detection functions of 48ER1 data unit.
8	Set controls on TTS-4B test set as follows: SEND FREQ to 1000 SEND LEVEL to 0 (CAL) SEND IMP to 600Ω FUNCTION to SEND + TALK + REC REC IMP to 600Ω
9	Connect a 2P4B cord between REC 310 jack on test set and REC TST jack on 48ER1 data unit.
10	Connect a jumper wire between screw terminals 28 and 30 on KS-21253-L5 adapter (Fig. 2).

STEP	PROCEDURE
------	-----------

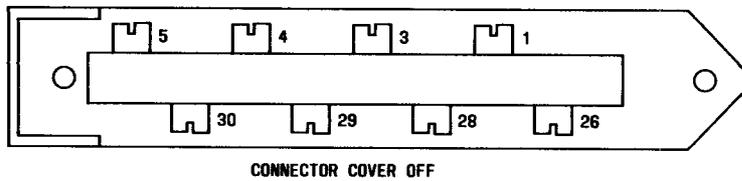
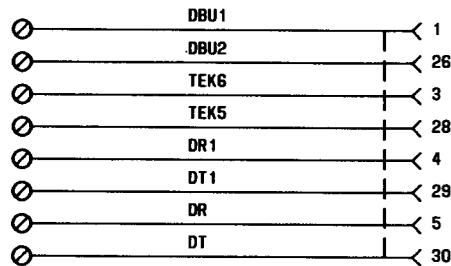


Fig. 2—KS-21253-L5 Adapter

- 11 Disconnect ACU cord from connector J4 on rear of 59A1 data mounting and install KS-21253-L5 adapter in connector J4.
- 12 Connect 1013B handset to screw terminals 4 and 29 on KS-21253-L5 adapter (Fig. 2).
- 13 Depress O/R switch on 48ER1 data unit.
- 14 Take 1013B handset off-hook and dial directory number of DDD1 line of 48ER1 data unit.

Requirement: The 48ER1 data unit automatically answers call on DDD1 line and disconnects 1013B handset from switched network. About 5 seconds after call is answered, test set meter reads signal level of about -12 dBm for about 5 seconds. At end of signal, BU lamp on 48ER1 data unit lights. Station is now in dial backup mode.

- 15 Place 1013B handset on-hook.
- 16 Connect a 2P4B cord between SEND 310 jack on test set and XMT TST jack on 48ER1 data unit.

Requirement: Test set meter reads signal level of -12 ±4 dBm.

STEP	PROCEDURE
17	On test set, set SEND LEVEL to +10. Requirement: After 1 second, test set meter reads signal level not more than 2 dB greater than level in Step 16.
18	Remove 2P4B cord from SEND 310 jack on test set and XMT TST jack on 48ER1 data unit.
19	Release O/R switch on 48ER1 data unit. Requirement: BU lamp on 48ER1 data unit goes off. For next 3 seconds, test set meter reads signal level of about -12 dBm. At end of signal, station is released from dial backup mode.
20	Disconnect test set from 48ER1 data unit. Note: If possible, use 48ER1 data unit to establish and release a dial backup channel with customer's remote 48FR1 data unit as described in Steps 21 through 23.
21	Depress O/R switch on 48ER1 data unit.
22	Take 1013B handset off-hook and dial directory number of DDD1 line of remote 48FR1 data unit. Requirement: Within next 2 minutes, remote 48FR1 data unit initiates a return call to DDD1 line of 48ER1 data unit. The 48ER1 data unit automatically answers call on DDD1 line and disconnects 1013B handset from switched network. About 10 seconds after call is answered, BU lamp on 48ER1 data unit lights. The dial backup channel is now established.
23	Release O/R switch on 48ER1 data unit. Requirement: BU lamp on 48ER1 data unit goes off. After about 3 seconds, the 48ER1 data unit places DDD1 and DDD2 lines on-hook. The dial backup channel is now released.
24	Disconnect 1013B handset from KS-21253-L5 adapter.
25	Remove KS-21253-L5 adapter from connector J4 on rear of 59A1 data mounting and connect ACU cord to connector J4.
26	Remove jumper wire from KS-21253-L5 adapter.
27	If option S was temporarily installed in 48ER1 data unit in Step 2, remove option S and install option D.
28	Refer to Fig. 1 for any remaining tests.

- E. Single Installation (Automatic Answering With Two Calls Answered)**
- 3.11 This installation consists of a DAS 829-type CIU and a 48FR1 data unit housed in a 59A1 data mounting. The 48FR1 data unit automatically answers calls on DDD2 and DDD1 lines when option E is installed in the data unit or when option D is installed in the data unit and a customer- or modem-provided contact is closed.

STEP	PROCEDURE
1	Install options in 48FR1 data unit as directed in Section 598-082-200 and as specified on service order and/or circuit layout record card.
2	If option D is installed in 48FR1 data unit, temporarily remove option D and install option E.
3	For nonregistered arrangements, perform Steps 4 through 7. For registered arrangements, verify that transmit (XMT) and receive (REC) switches on 48FR1 data unit are set to 8 dB fixed loss loop as specified in Table A, then proceed to Step 8. <i>Note:</i> Steps 4 and 5 are for adjusting transmit (XMT) switch on 48FR1 data unit.
4	Measure loop loss for line 1 (T2, R2) using a 600-ohm loop termination and the milliwatt supply in serving central office.
5	Set 4-pole transmit (XMT) switch on 48FR1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated. <i>Note:</i> Steps 6 and 7 are for adjusting receive (REC) switch on 48FR1 data unit.
6	Measure loop loss for line 2 (T3, R3) using a 600-ohm loop termination and the milliwatt supply in serving central office.
7	Set 4-pole receive (REC) switch on 48FR1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated. <i>Note:</i> Steps 8 through 19 check switching and ring detection functions of 48FR1 data unit. This procedure requires the assistance of a serving test center (STC) equipped with a 48ER1 data unit with options M and T installed.
8	Set controls on TTS-4B test set as follows: SEND FREQ to 1000 SEND LEVEL to 0 (CAL) SEND IMP to 600Ω FUNCTION to SEND + TALK + REC REC IMP to 600Ω

STEP	PROCEDURE
9	Connect a 2P4B cord between REC 310 jack on test set and REC TST jack on 48FR1 data unit.
10	Contact STC and agree on test procedure to be performed.
11	STC uses DDD2 line of 48ER1 data unit to call directory number of DDD1 line of 48FR1 data unit. STC Requirement: STC hears 48FR1 data unit automatically answer call (trip ringing).
12	STC depresses and releases HOLD button. STC Requirement: DDD2 lamp lights.
13	STC uses DDD1 line of 48ER1 data unit to call directory number of DDD2 line of 48FR1 data unit. STC Requirement: STC hears 48FR1 data unit automatically answer call (trip ringing).
14	STC depresses and releases HOLD button. STC Requirement: DDD1 lamp lights. After about 10 seconds, BU lamp on 48ER1 data unit lights. Station Requirement: Test set meter reads signal level of -16 ± 7 dBm for about 10 seconds. At end of signal, BU lamp on 48FR1 data unit lights. Station is now in dial backup mode.
15	Connect a 2P4B cord between SEND 310 jack on test set and XMT TST jack on 48FR1 data unit. STC Requirement: STC measures and records signal level of -16 ± 7 dBm at REC TST jack on 48ER1 data unit (600 ohms terminating impedance).
16	STC connects a 1000-Hz 0 dBm signal source (600 ohms terminating impedance) to XMT TST jack on 48ER1 data unit. Station Requirement: Test set meter reads signal level of -16 ± 7 dBm.
17	On test set, set SEND LEVEL to +10. STC Requirement: Signal level at REC TST jack on 48ER1 data unit is not more than 2 dB greater than level recorded in Step 15.
18	After 10 dB signal has been sent to STC for about 10 seconds, set SEND LEVEL on test set to -10.
19	When STC observes a 10 dB drop in signal level for a minimum of 3 seconds, STC takes handset off-hook and depresses and releases REL button.

STEP	PROCEDURE
	Station Requirement: BU lamp on 48FR1 data unit goes off. Station is now released from dial backup mode.
20	Disconnect test set from 48FR1 data unit.
21	If option E was temporarily installed in 48FR1 data unit in Step 2, remove option E and install option D.
22	Refer to Fig. 1 for any remaining tests.
<hr/>	
F. Single Installation (Automatic Answering With Automatic Call Back)	a call on DDD2 line. The 48FR1 data unit automatically answers a call on DDD1 line when option E is installed in the data unit or when option D is installed in the data unit and a customer- or modem-provided contact is closed.
3.12	This installation consists of a DAS 829-type CIU and a 48FR1 data unit housed in a 59A1 data mounting. A station dial is used to originate

STEP	PROCEDURE
1	Install options in 48FR1 data unit as directed in Section 598-082-200 and as specified on service order and/or circuit layout record card.
2	If option D is installed in 48FR1 data unit, temporarily remove option D and install option E.
3	For nonregistered arrangements, perform Steps 4 through 7. For registered arrangements, verify that transmit (XMT) and receive (REC) switches on 48FR1 data unit are set to 8 dB fixed loss loop as specified in Table A, then proceed to Step 8. Note: Steps 4 and 5 are for adjusting transmit (XMT) switch on 48FR1 data unit.
4	Measure loop loss for line 1 (T2, R2) using a 600-ohm loop termination and the milliwatt supply in serving central office.
5	Set 4-pole transmit (XMT) switch on 48FR1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated. Note: Steps 6 and 7 are for adjusting receive (REC) switch on 48FR1 data unit.
6	Measure loop loss for line 2 (T3, R3) using a 600-ohm loop termination and the milliwatt supply in serving central office.

STEP	PROCEDURE
7	Set 4-pole receive (REC) switch on 48FR1 data unit for measured line loss as specified in Table A. For example, if measured line loss is 4.5 dB, switch would be set with poles 1 and 4 released and poles 2 and 3 operated. Note: Steps 8 through 20 check station dial, switching functions, and ring detection functions of 48FR1 data unit. This procedure requires the assistance of a serving test center (STC) equipped with a 48ER1 data unit with options M and T installed.
8	Set controls on TTS-4B test set as follows: SEND FREQ TO 1000 SEND LEVEL to 0 (CAL) SEND IMP to 600Ω FUNCTION to SEND + TALK + REC REC IMP to 600Ω
9	Connect a 2P4B cord between REC 310 jack on test set and REC TST jack on 48FR1 data unit.
10	Contact STC and agree on test procedure to be performed.
11	Program station dial to dial directory number of DDD1 line of 48ER1 data unit at STC.
12	STC uses DDD2 line of 48ER1 data unit to call directory number of DDD1 line of 48FR1 data unit. STC Requirement: STC hears 48FR1 data unit automatically answer call (trip ringing).
13	STC depresses and releases HOLD button. STC Requirement: DDD2 lamp lights.
14	STC waits up to 1 minute for call on DDD1 line of 48ER1 data unit. When ringing is heard on DDD1 line, STC answers call.
15	STC depresses and releases HOLD button. STC Requirement: DDD1 lamp lights. After about 10 seconds, BU lamp on 48ER1 data unit lights. Station Requirement: Test set meter reads signal level of -16 ± 7 dBm for about 10 seconds. At end of signal, BU lamp on 48FR1 data unit lights. Station is now in dial backup mode.

STEP	PROCEDURE
16	Connect a 2P4B cord between SEND 310 jack on test set and XMT TST jack on 48FR1 data unit. STC Requirement: STC measures and records signal level of -16 ± 7 dBm at REC TST jack on 48ER1 data unit (600 ohms terminating impedance).
17	STC connects a 1000-Hz 0 dBm signal source (600 ohms terminating impedance) to XMT TST jack on 48ER1 data unit. Station Requirement: Test set meter reads signal level of -16 ± 7 dBm.
18	On test set, set SEND LEVEL to +10. STC Requirement: Signal level at REC TST jack on 48ER1 data unit is not more than 2 dB greater than level recorded in Step 16.
19	After 10 dB signal has been sent to STC for about 10 seconds, set SEND LEVEL on test set to -10.
20	When STC observes a 10 dB drop in signal level for a minimum of 3 seconds, STC takes handset off-hook and depresses and releases REL button. Station Requirement: BU lamp on 48FR1 data unit goes off. Station is now released from dial backup mode.
21	Disconnect test set from 48FR1 data unit.
22	If option E was temporarily installed in 48FR1 data unit in Step 2, remove option E and install option D.
23	Program station dial to dial number specified by customer. Note: Do not leave station dial programmed to dial STC number.
24	Refer to Fig. 1 for any remaining tests.

G. Multiple Installation (Manual Dialing With 48B1 or 48ER1 Data Unit)

3.13 This installation uses switched 4-wire dial backup and consists of a maximum of twenty-three DAS 829-type CIUs housed in 46A-type data mountings, one or two 48B1 or 48ER1 data units, a maximum of six 48C1 data units, and one 48D1 data unit. The 48B1 or 48ER1 data units and the 48C1 data units are housed in a 46C-type data mounting. A maximum of twenty-three 48A1 data units housed in 46B1 data mountings may also

be provided. The presence of 48A1 data units does not affect this test.

Note: Use of the 48B1 data unit or the 46C1 data mounting is not permitted in registered arrangements.

3.14 With switched 4-wire dial backup, the 4-wire dial backup channel must first be established; then, using an 18- or 30-button CALL DIRECTOR key telephone set, a modem is selected and switched to the dial backup channel. Two 4-wire dial backup

channels, designated A and B, can be provided. The two 2-wire lines required for channel A are controlled by the pickup keys designated DDD1A and DDD2A. For channel B the keys are designated DDD1B and DDD2B. Each channel provided is terminated by a 48B1 or 48ER1 data unit. Perform the test as follows:

Note: Only the indicated channels can be used for dial backup. For example, a dial backup channel cannot be established using pickup keys DDD1A and DDD2B.

STEP	PROCEDURE
1	For channel A and/or channel B, perform installation test for a single installation (manual dialing with 48B1 data unit) as described in paragraph 3.07 or for a single installation (manual dialing with 48ER1 data unit) as described in paragraph 3.08. Note: Steps 2 through 8 check switching matrix and telephone set for each position equipped with switched 4-wire dial backup.
2	Take handset off-hook. Depress DDD1A (channel A) or DDD1B (channel B) button, then depress HOLD button. Requirement: DDD1A (channel A) or DDD1B (channel B) lamp lights.
3	Depress DDD2A (channel A) or DDD2B (channel B) button, then depress HOLD button. Requirement: DDD2A (channel A) or DDD2B (channel B) lamp lights. When station uses a 48ER1 data unit, BU lamp on 48ER1 data unit lights after about 10 seconds.
4	Depress DBU(N) button, that is, DBU button for Nth position. Start with lowest number position equipped with switched 4-wire dial backup. Requirement: DBU(N) lamp lights. Note: If alternate voice is also provided for Nth position, button will be labeled TALK-DBU.
5	Depress HOLD button to release DBU(N) button. Requirement: DBU(N) lamp remains lighted.
6	Depress DBU(N) button, then depress and release REL button. Requirement: DDD1A or DDD1B, DDD2A or DDD2B, and DBU(N) lamps go off immediately when station uses a 48B1 data unit or after about 3 seconds when station uses a 48ER1 data unit. If DBU(N) button is labeled TALK-DBU, it remains lighted.
7	Depress and release HOLD button. Requirement: All lamps go off.

STEP	PROCEDURE
8	Repeat Steps 2 through 7 for each position equipped with switched 4-wire dial backup.
9	Refer to Fig. 1 for any remaining tests.

4. TROUBLE ISOLATION TESTS

4.01 There are four methods of isolating trouble encountered on CIUs and their associated equipment:

- Loopback from STC
- Access channel through test jacks
- Access CIU and channel through 171C test adapter
- Access interface leads through KS-21253-L5 adapter or through 66E-type connecting block.

4.02 Whenever trouble is encountered on the private line channel, the first test to be performed is the loopback test by the STC. The STC personnel may compare actual measurements against benchmark tests recorded at time of installation. Local policy should dictate the conditions under which personnel will be dispatched to the CIU location.

4.03 Test jacks on the DAS 829-type CIU provide access to the transmit and receive circuits of a 4-wire private line channel, or provide access to the transmit and receive circuits of the 4-wire portion of a 2-wire private line channel. Four-wire private line channel transmission tests, either end-to-end or end-to-STC, must be made through these test jacks. Two-wire private line transmission tests, either end-to-end or end-to-STC, must be made through the 2W TST jack on the 48G1 data unit, except tests that require a 4-wire interface.

4.04 The 171C adapter is a card extender that can be used to access the CIU for voltage measurements and to access T, R, T1, and R1 leads of the 4-wire metallic facilities without going through the CIU.

4.05 The KS-21253-L5 adapter is a 50-pin Amphenol-type connector for accessing the DT, DR, DT1, DR1, TEK5, TEK6, DBU1, and DBU2 leads (for a single 4-wire private line modem interface), or for accessing the DT1, DR1, TEK5, and TEK6 leads (for a single 2-wire private line modem interface), at the point where 25-pair cables normally interconnect the various pieces of equipment. This adapter can be used for making continuity checks through the data mountings.

4.06 To clear a trouble report involving a CIU and its associated equipment, the type of trouble must be determined:

- (a) Trouble with transmitting or receiving data on private line
- (b) Trouble with alternate voice equipment
- (c) Trouble with switching from 4-wire private line to 4-wire dial backup channel
- (d) Trouble with transmitting or receiving data on 4-wire dial backup channel.

A. Private Line

4.07 If the loopback test from the STC determines that trouble exists in the private line, the trouble must be cleared by following procedures specified in Section 314-410-300. If the station equipment is suspected of being defective, a dispatch to the station location is required.

4.08 To determine if a CIU (4-wire private line channel) or a CIU and a 48G1 data unit (2-wire private line channel) operate properly, perform tests specified for the type of channel as called for in Section 314-410-500. For 4-wire private line channels, tests to the STC or distant end must be made through the TRANS TST and REC TST jacks on the CIU. For 2-wire private line channels, tests to the STC or distant end

must be made through the 2W TST jack on the 48G1 data unit, except tests that require a 4-wire interface.

4.09 The trouble may be due to failure of the low voltage power supply. Verify that the CIU has the required voltage by using a KS-14510-L1 VOM (or equivalent). Measure for a voltage of approximately 24 Vac on terminals AC1 and AC2 of the 44A-type, 45A1, 59A1, or 62A1 data mounting. If a 46A-type data mounting is used, measure for a voltage of approximately 24 Vac between terminals AC1(1) and AC2(1) located on the backplane.

4.10 Replace any defective CIU or 48G1 data unit. If the private line channel then tests good at the test jacks and the trouble is not cleared, the trouble may be in the station wiring or in the data mounting wiring. This may be determined by checking the continuity of the telco-provided station wiring. It is necessary to access the DT, DR, DT1, DR1, TEK5, and TEK6 leads at a 4-wire modem interface, or to access the DT1, DR1, TEK5, and TEK6 leads at a 2-wire modem interface.

4.11 If the modem is telco-provided, there are two ways of connecting the modem to the CIU.

- Some arrangements provide access to the interface of a single modem, such as single installations using a 44A-type, 45A1, 59A1, or 62A1 data mounting or multiple installations using a KS-21253-L1 or -L4 adapter.

- Some arrangements do not provide access to the interface of a single modem. An example of this is data sets 202T installed in a 40B1 data mounting. To access the interface of a single modem, it is necessary to interrupt service to the other seven modems associated with the same connector.

4.12 If the modem is customer-provided, access to the modem interface can be made at the demarcation point, such as the 42A, 44A, or 66E-type connecting block.

4.13 The general procedure is to disconnect the modem at the private line demarcation point and then test for continuity between the demarcation point and the CIU and/or 48G1 data unit. When the demarcation point is for a single telco-provided modem, convenient access to pairs DT and DR, DT1 and DR1, TEK5 and TEK6, and DBU1 and DBU2 is provided through use of the KS-21235-L5 adapter (Fig. 2). When the demarcation point is for a multiple arrangement of modems, use a 66E-type connecting block to access individual leads per Table B, or use the connector terminals to access individual leads per Table C.

4.14 For 2-wire private line modems, tests for continuity on pair DT1 and DR1 can be made from the demarcation point to the 2W MON jack on the 48G1 data unit as per local company practice. Likewise, tests for continuity on pair TEK5 and TEK6 can be made from the demarcation point to the CIU.

TABLE B

CONNECTIONS AT 66E-TYPE CONNECTING BLOCK USED IN PLACE OF MODEM

DAS 829-TYPE CIU INSERTED IN POSITION DESIGNATED (N)	TERMINAL CONNECTIONS ON 66E-TYPE CONNECTING BLOCK					
	DT(N)	DR(N)	DT1(N)	DR1(N)	TEK5(N)	TEK6(N)
1 or 9 or 17	1	2	3	4	5	6
2 or 10 or 18	7	8	9	10	11	12
3 or 11 or 19	13	14	15	16	17	18
4 or 12 or 20	19	20	21	22	23	24
5 or 13 or 21	25	26	27	28	29	30
6 or 14 or 22	31	32	33	34	35	36
7 or 15 or 23	37	38	39	40	41	42
8 or 16	43	44	45	46	47	48

TABLE C

MULTIPLE CONNECTIONS FOR STANDARD 6-LEAD INTERFACE

DAS 829-TYPE CIU INSERTED IN POSITION DESIGNATED (N)	PIN NUMBERS ON STANDARD 50-PIN CONNECTORS					
	DT(N)	DR(N)	DT1(N)	DR1(N)	TEK5(N)	TEK6(N)
1 or 9 or 17	26	1	27	2	28	3
2 or 10 or 18	29	4	30	5	31	6
3 or 11 or 19	32	7	33	8	34	9
4 or 12 or 20	35	10	36	11	37	12
5 or 13 or 21	38	13	39	14	40	15
6 or 14 or 22	41	16	42	17	43	18
7 or 15 or 23	44	19	45	20	46	21
8 or 16	47	22	48	23	49	24

4.15 For 4-wire private line modems, tests for continuity on pair DT and DR can be made from the demarcation point to the REC MON jack on the CIU as per local company practice. Likewise, tests for continuity on pair DT1 and DR1 can be made from the demarcation point to the TRANS MON jack on the CIU. Finally, tests for continuity on pair TEK5 and TEK6 can be made from the demarcation point to the CIU.

the trouble may be due to failure of the low voltage power supply. Verify that the 48A1 data unit has the required voltage by using a KS-14510-L1 VOM (or equivalent). Measure for a voltage of approximately 24 Vac on terminals AC1 and AC2 of the 45A1 or 59A1 data mountings. If a 46B1 data mounting is used, measure for a voltage of approximately 24 Vac between terminals AC1(1) and AC2(1) located on the backplane.

B. Alternate Voice

4.16 If the trouble report indicates problems associated with the alternate voice service,

4.17 If the power supplied to the 48A1 data unit is proper, then proceed as follows:

STEP	PROCEDURE
1	Check data-to-talk transfer by performing installation tests for an installation equipped with alternate voice.
2	If installation tests pass, proceed to Step 4.
3	If installation tests fail, replace 48A1 data unit and retest. If retest fails, replace telephone set and retest. Note: Steps 4 through 7 check that TEK5, TEK6 connection is broken when station is in talk mode.
4	If 48A1 data unit is installed in a 45A1 or 59A1 data mounting, connect KS-21253-L5 adapter in place of modem. If 48A1 data unit is installed in a 46B1 data mounting, disconnect

STEP	PROCEDURE
	modem and use a 66E-type connecting block to access TEK5 and TEK6 per Table B, or use the connector terminals to access TEK5 and TEK6 per Table C.
5	With CIU in data mode, test for continuity on pair TEK5 and TEK6 as per local company policy. Requirement: Test indicates continuity (short circuit).
6	Transfer to talk mode by taking handset off-hook and depressing TALK button. Requirement: TALK lamp lights.
7	Test for continuity on pair TEK5 and TEK6 as per local company policy. Requirement: Test indicates open circuit.
8	If step 6 or 7 fails, replace 48A1 data unit.
9	Restore station to pretest condition.

C. 4-Wire Dial Backup

4.18 If the trouble report indicates problems associated with the 4-wire dial backup equipment:

(a) For single installations, perform the installation tests. If these tests fail, replace the 48B1, 48ER1, or 48FR1 data unit and retest. If the tests still fail, replace the telephone set.

(b) For multiple installations equipped with switched 4-wire dial backup, perform the tests specified in paragraph 4.19. If when performing these tests, a telephone set lamp fails to light, check the bulb for failure before replacing any equipment. If the telephone set is replaced, ensure wiring is modified as specified in Section 598-082-200.

4.19 Proceed as follows:

STEP	PROCEDURE
1	Perform Steps 2 through 20 for each 4-wire dial backup channel provided. Note: Steps 2 through 8 check the operation of the 48B1 or 48ER1 data unit providing 4-wire dial backup channel A or channel B.
2	Take handset off-hook and depress DDD1A (channel A) or DDD1B (channel B) button. Requirement: DDD1A (channel A) or DDD1B (channel B) lamp does not light. Dial tone is heard in handset.
3	Dial directory number of DDD2A (channel A) or DDD2B (channel B) line.

STEP	PROCEDURE
4	<p>Requirement: Audible indication is heard. DDD2A (channel A) or DDD2B (channel B) lamp flashes in response to audible indication.</p> <p>When audible indication is heard, depress and release HOLD button.</p>
5	<p>Requirement: DDD1A (channel A) or DDD1B (channel B) lamp lights and DDD1A or DDD1B button releases on up-stroke of HOLD button. Audible indication continues.</p> <p>Depress DDD2A (channel A) or DDD2B (channel B) button.</p>
6	<p>Requirement: Audible indication ceases. DDD2A (channel A) or DDD2B (channel B) lamp stops flashing.</p> <p>Depress and release HOLD button.</p>
7	<p>Requirement: DDD2A (channel A) or DDD2B (channel B) lamp lights and DDD2A or DDD2B button releases on up-stroke of HOLD button. When station uses a 48ER1 data unit, BU lamp on 48ER1 data unit lights after about 10 seconds. Station is now in dial backup mode using dial backup channel A or channel B.</p> <p>Depress and release REL button.</p>
8	<p>Requirement: Both DDD1A and DDD2A (channel A) or DDD1B and DDD2B (channel B) lamps go off immediately when station uses a 48B1 data unit or after about 3 seconds when station uses a 48ER1 data unit. Station is now released from dial backup mode.</p> <p>Repeat Steps 2 through 7 using DDD2A line to call DDD1A line (channel A) or DDD2B line to call DDD1B line (channel B).</p>
9	<p>If any of Steps 2 through 8 fails, replace 48B1 or 48ER1 data unit associated with that channel and retest. If test still fails, replace telephone set.</p>
	<p>Note 1: Ensure telephone set wiring is modified as specified in Section 598-082-200.</p>
	<p>Note 2: Steps 10 through 15 check switching matrix and telephone set for each position equipped with switched 4-wire dial backup.</p>
10	<p>Take handset off-hook. Depress DDD1A (channel A) or DDD1B (channel B) button, then depress HOLD button.</p>
	<p>Requirement: DDD1A (channel A) or DDD1B (channel B) lamp lights.</p>
11	<p>Depress DDD2A (channel A) or DDD2B (channel B) button, then depress HOLD button.</p>
	<p>Requirement: DDD2A (channel A) or DDD2B (channel B) lamp lights. When station uses a 48ER1 data unit, BU lamp on 48ER1 data unit lights after about 10 seconds.</p>
12	<p>Depress DBU(N) button, that is, DBU button for Nth position. Start with lowest number position equipped with switched 4-wire dial backup.</p>

STEP	PROCEDURE
	<p>Requirement: DBU(N) lamp lights.</p> <p>Note: If alternate voice is also provided for Nth position, button will be labeled TALK-DBU.</p>
13	<p>Depress HOLD button to release DBU(N) button.</p> <p>Requirement: DBU(N) lamp remains lighted.</p>
14	<p>Depress DBU(N) button, then depress and release REL button.</p> <p>Requirement: DDD1A or DDD1B, DDD2A or DDD2B, and DBU(N) lamps go off immediately when station uses a 48B1 data unit or after about 3 seconds when station uses a 48ER1 data unit. If DBU(N) button is labeled TALK-DBU, it remains lighted.</p>
15	<p>Depress and release HOLD button.</p> <p>Requirement: All lamps go off.</p>
16	<p>Repeat Steps 10 through 15 for each position equipped with switched 4-wire dial backup.</p>
17	<p>If Step 13 fails, replace 48C1 data unit associated with Nth position and retest. If test still fails, replace telephone set.</p> <p>Note: Ensure telephone set wiring is modified as specified in Section 598-082-200.</p>
18	<p>If Steps 10 through 15 pass except that none of DBU(N) or TALK-DBU(N) lamps light, check fuses in 48D1 data unit and replace fuses or 48D1 data unit as required.</p>
19	<p>If step 12 or 13 fails for all positions, check wiring modification in telephone set.</p>
20	<p>If Step 12 passes, but Step 13 fails, replace 48B1 or 48ER1 data unit associated with that channel.</p>
21	<p>Restore station to pretest condition.</p>

4.20 After completing tests specified in paragraph 4.18, perform the following test to determine if the 4-wire dial backup channel meets requirements.

STEP	PROCEDURE
1	<p>Plug KS-21253-L5 adapter in place of modem (N). If it is not possible to access a single modem interface, use a 66E-type connecting block to access individual leads. Refer to Table B for appropriate terminals.</p>

STEP	PROCEDURE
2	Set controls on TTS-4B test set as follows: <ul style="list-style-type: none"> • SEND FREQ to 1000 • SEND LEVEL to 0 • SEND IMP to 600Ω • FUNCTION to SEND + TALK + REC • REC IMP to 600Ω
3	Insert plug of a 2W6A cord into SEND 310 jack on test set. Connect the alligator clips to DR1 and DT1.
4	Insert plug of another 2W6A cord into REC 310 jack on test set. Connect the alligator clips to DR and DT.
5	Use DDD1 line to call DDD2 line. When audible indication is heard, depress and release HOLD button. <p>Requirement: DDD1 lamp lights.</p>
6	Depress DDD2 button, then depress and release HOLD button. If station is a single installation, it is immediately in dial backup mode when station uses a 48B1 data unit or after about 10 seconds when station uses a 48ER1 data unit. <p>Requirement: DDD2 lamp lights. After about 10 seconds, BU lamp on 48ER1 data unit lights.</p>
7	If station is a multiple installation, depress DBU(N) button, then depress and release HOLD button. Station is immediately in dial backup mode when station uses a 48B1 data unit or after about 10 seconds when station uses a 48ER1 data unit. <p>Requirement: DBU(N) lamp lights. After about 10 seconds, BU lamp on 48ER1 data unit lights.</p>
8	Check test set meter for level of received signal. <p>Requirement: -8 to -16 dBm.</p> <p>Note: The test set is transmitting a 0-dBm signal. The transmit side is arranged so that the signal to the serving central office is no greater than -12 dBm. There is a 3- to 4-dB loss through the central office and a +3.7 dB gain in the receive side to the modem. Therefore the received signal should be a nominal -12 dBm.</p>
9	If there is no received signal, or if there is difficulty in placing call, clear trouble in same way as a telephone trouble.

STEP	PROCEDURE
10	If telephone portion of a single station installation functions properly, but trouble is encountered in switching from 4-wire private line to 4-wire dial backup channel, replace 48B1 or 48ER1 data unit.
11	If telephone portion of a multiple station installation functions properly, but trouble is encountered in switching from 4-wire private line to 4-wire dial backup channel, replace 48C1 data unit associated with channel (N) and retest. If retest fails, replace 48B1 or 48ER1 data unit and retest.
12	Restore station to pretest condition.

5. REFERENCES

5.01 Additional information concerning testing of the DAS 829-type CIU and the supplemental data units and data mountings is contained in the following publications:

SECTION	TITLE	SECTION	TITLE
314-410-300	Voice Bandwidth Private Line Data Circuits—Maintenance	598-082-100	Data Auxiliary Set 829-Type—Channel Interface Units—Voiceband Private Line Channels—Description
314-410-500	Voice Bandwidth Private Line Data Circuits—Tests and Requirements	598-082-200	Data Auxiliary Set 829-Type—Channel Interface Units—Voiceband Private Line Channels—Installation and Connections
		598-088-500	Data Auxiliary Set 801CR-L1/2—Test Procedures
		5.02 Detailed information concerning the DAS 829-type CIU and the supplemental data units and data mountings is contained in CD- and SD-1D247-01.	