DATA AUXILIARY SET 829-TYPE
MULTIPLE CHANNEL ARRANGEMENTS
(SWITCHED DIAL BACKUP)
TEST PROCEDURES

CONTENTS PAGE

1. GENERAL

1.01 This section contains installation and maintenance test procedures for multiple channel arrangements with switched dial backup. The information in this section can be used to test channel arrangements which were installed as directed in Section 598-082-202. The multiple channel arrangements tested here utilize an 18- or 30-button Call Director® telephone connected through a 48D1 data unit to a maximum of 23 channel interface units (CIUs) equipped with (or without) alternate voice and with (or without) switchable dial backup.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 DAS 829-type is a CIU which provides standard, prewired, tested station arrangements for terminating 4-wire private line (PL) voiceband data channels. For more descriptive information on DAS 829-type, refer to Section 598-082-100.

1.04 The supplementary functions of alternate voice and dial backup are furnished by the 48A1 and 48B1 data units, respectively. Descriptive information on the 48A1 and 48B1 data units is given in Section 598-082-101. As noted in that section, dial backup service provided by use of the 48B1 data unit is intended for use with telco-provided data sets only.

1.05 The function of switched dial backup is provided for by the 48B1, 48C1, and 48D1 data units. Descriptive information on the 48C1 and 48D1 data units is given in Section 598-082-102. These data units, along with the 46C1 data mounting, are used to add a switchable dial backup arrangement to full data (FD) and/or full data/alternate voice (FDA) multiple arrangements provided by DAS 829-type. In addition, the 48A1 data unit is required for FDA arrangements.

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

2. TEST EQUIPMENT

2.01 The test equipment required at the station and used in testing a multiple arrangement with switchable dial backup is as follows:

1—Portable volt-ohm-milliammeter (VOM), KS-14510-L1 or equivalent

1—Voiceband transmission test set, TTS-4B, or equivalent set with bridging measurement capability

2—2W6A patch cords (310 plug on one end and clip leads on the other end)

3—66E3-25 connecting blocks

3—B25A cable (length as required)

2—A25D cable (length as required)

2—284-1 Amphenol test apparatus connectors (may be used as access to the 66E3-25 connector blocks).

3. INSTALLATION TESTS

3.01 These procedures are to be performed at the time of installation to verify that the equipment is operating properly. Each position to be tested (from 1 to 23) is checked in the following manner:

(1) The CIU is looped back and tested locally.

(2) If alternate voice is provided, the 48A1 and 48D1 data units are tested.

(3) If switched dial backup is provided, the 48B1, 48C1, and 48D1 data units are tested.

3.02 Refer to Fig. 1 to determine the overall sequence in which the tests are to be performed. All positions equipped with a DAS 829-type must be tested at time of installation as directed in Fig. 1. These tests may also be used during a maintenance visit subject only to the following: If only one DAS 829-type is to be tested while the rest of the DAS 829-types (in the same 46A1 data mounting) remain operational, then the CIU (N) referred to in Fig. 1 applies only to the DAS 829-type to be tested. The access points to J9 of the 46A1, J10 of the 46B1, or P2, P3, P4 of the 46C1 data mountings would be made on the corresponding connecting block or the appropriate connector of the KS-21253-L1 or -L4 adapter. If a connecting block or adapter is not available, these tests cannot be done on a single channel without taking other channels out of service.

3.03 The 48D1 data unit concentrates control of the 48A1, 48B1, and 48C1 data units in an 18- or 30-button Call Director telephone. Depending on what services are provided, the Call Director set will provide for control of the backup channels, for control of switching the modems to backup channels, and for control of alternate voice circuits. The 48D1 data unit provides that the Call Director set may control up to 23 full data (FD) and/or full data/alternate voice (FDA) circuits provided with or without switchable dial backup. In addition, the 48D1 data unit provides both the dc supplies for the 48B1 and 48C1 data units, the 46C1 data mounting, the Call Director telephone lamps, and the ac supply for the Call Director telephone buzzer.

3.04 The pickup keys of the Call Director telephone are designated as assigned in Section 598-082-202. The Nth alternate voice circuit is controlled by the TALK (N) or TALK-DBU (N) pickup key. The Nth modem is switched to a dial backup channel through the use of the DBU (N) or TALK-DBU (N) pickup key. The 18-button Call Director telephone provides for a maximum N of 11. The 30-button Call Director set provides for a maximum N of 23. Pickup keys not used to control alternate voice circuits or not used to switch modems to backup channels are left blank. Although the Nth pickup key is blank, the arrangement may still be providing an FD circuit without switched dial backup for the Nth modem.

3.05 The DAS 829-types are installed in the 46A1 data mounting in positions 1 through 8, or 9 through 16, or 17 through 23, as viewed from left to right across the front of the 46A1 data mounting. The DAS 829-type installed in the Nth position (1-23) provides a channel interface for the Nth (1-23) 4-wire metallic facility.

3.06 The 48A1 data units are installed in the 46B1 data mounting in positions 1 through 8, or 9 through 16, or 17 through 23, as viewed from left to right across the front of the data mounting. The 48A1 data unit installed in the Nth position (1-23) of the 46B1 data mounting interfaces with the DAS 829-type installed in the Nth position

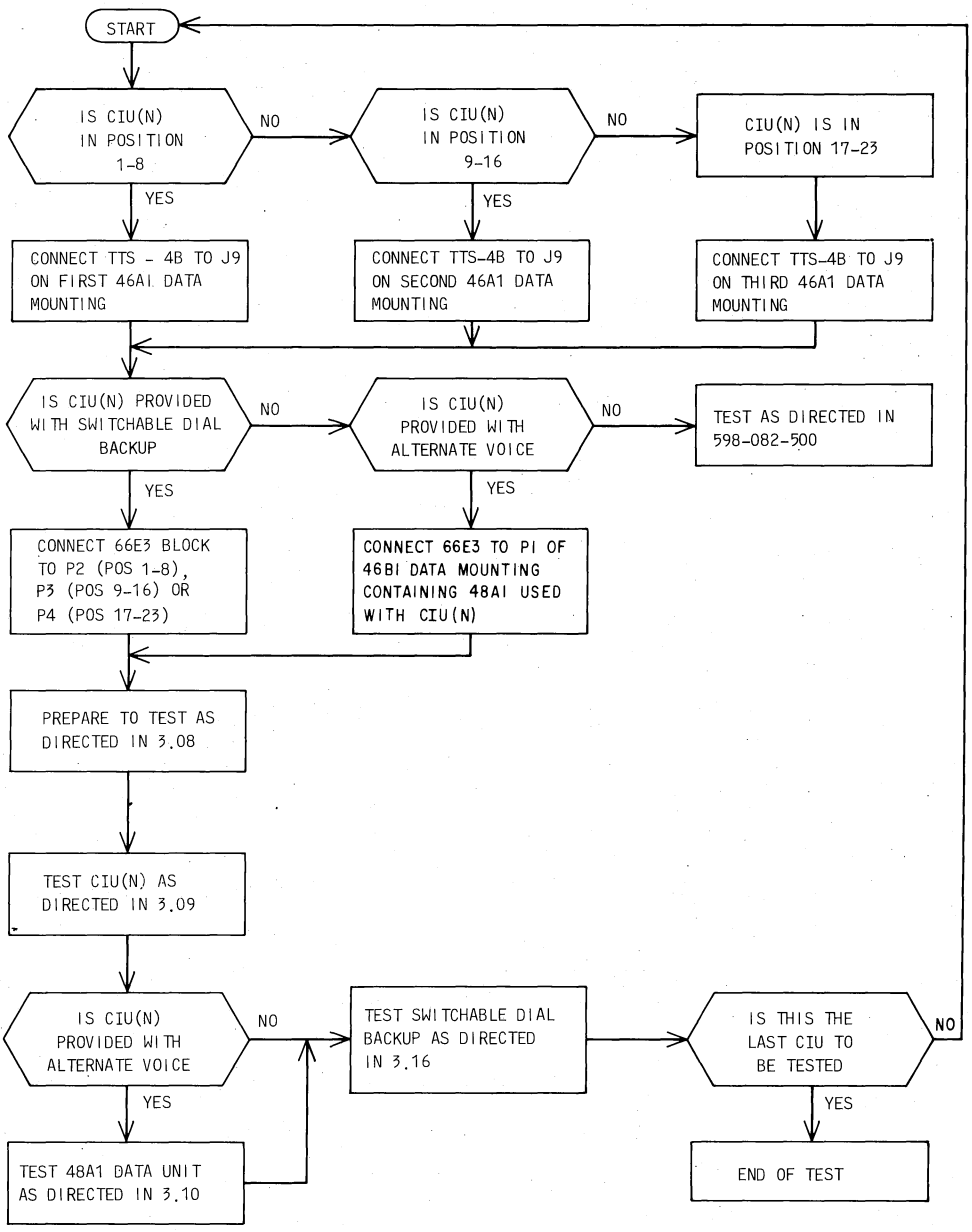

Fig. 1—Installation Test Procedure

(1-23) of the 46A1 data mounting to provide alternate voice service for the Nth (1-23) 4-wire metallic facility.

3.07 To determine if the CIU to be tested is provided with alternate voice and/or switchable dial backup, proceed as follows.

(1) Determine the position number (N) of the DAS 829-type in the 46A1 data mounting.

(2) If the CIU in that position is equipped with alternate voice, its corresponding position in the 46B1 data mounting will be equipped with a 48A1 data unit. The corresponding pickup key will be labeled TALK (N) (alternate voice only) or TALK-DBU (N) (alternate voice and switchable dial backup).

(3) If the CIU in that position is equipped with switchable dial backup, its corresponding

position in the 46C1 data mounting will be equipped with a 48C1 data unit. In addition, the corresponding pickup key on the Call Director telephone will be labeled TALK-DBU (N) (alternate voice and switchable dial backup) or DBU (N) (dial backup only).

Note: If any position N1-N8 is provided with switchable dial backup, all other positions in that same group must be provided with switchable dial backup and must be equipped with a 48C1 data unit. The same applies for group N9-N16 and group N17-N23.

(4) If the CIU in that position is not provided with a 48A1 data unit and its corresponding pickup key is blank, it is an FD only circuit.

A. Test Setup

3.08 Prepare the equipment for test as follows.

STEP	PROCEDURE
	Note: Refer to Fig. 2 for the test circuit arrangement.
1	Verify that all 46-type data mountings and the 48D1 data unit are connected as required to provide the desired service.
2	Verify that the required DAS 829-type and 48-type data units are installed.
3	Verify that the Call Director telephone is connected to the 48D1 data unit.
4	Verify that the corresponding modem is not connected and that the transmit and receive pairs are strapped back-to-back [DR (N) to DR1 (N); DT (N) to DT1 (N)]. See Table A for the required terminals.
5	Verify that the 4-wire metallic facilities are not connected at J9 or the 46A1 data mounting containing the CIU under test (refer to 3.02).
6	If the 46A1 data mounting containing CIU (N) is not equipped with a loop-back key for CIU (N), connect a 66E3 block to J10 of the 46A1 data mounting using a B25A cable.

TABLE A

CONNECTIONS AT 66E3 BLOCK USED IN PLACE OF MODEM

DAS 829-TYPE INSERTED IN POSITION DESIGNATED (N)	TERMINAL CONNECTIONS ON 66E3 BLOCK			
	DT (N)	DR (N)	DT1 (N)	DR1 (N)
1 or 9 or 17	1	2	3	4
2 or 10 or 18	7	8	9	10
3 or 11 or 19	13	14	15	16
4 or 12 or 20	19	20	21	22
5 or 13 or 21	25	26	27	28
6 or 14 or 22	31	32	33	34
7 or 15 or 23	37	38	39	40
8 or 16	43	44	45	46

STEP	PROCEDURE
7	Verify that the 46A1 and 46B1 data mountings and 48D1 data unit are connected to 117 Vac power.
8	Apply power to the TTS-4B.
9	Allow the TTS-4B to warm up and stabilize, then calibrate according to instructions printed on the instrument case.

B. CIU Local Test

3.09 Test as follows.

STEP	PROCEDURE
1	Set the TTS-4B controls as follows: SEND FREQ to 1000 Hz SEND LEVEL to −40 dBm SEND IMP to 600 ohms FUNCTION to SEND + TALK + REC REC IMP to 600 ohms.
2	Verify that the DAS 829-type options are installed as called for on the service order or circuit layout record card.
3	Using the 2W6A cord, connect the TTS-4B SEND 310 jack to terminals T (N) and R (N) on the connector block connected to J9 on the 46A1 data mounting. Refer to Table B for the terminal connections.
4	Using the 2W6A cord, connect the TTS-4B REC 310 plug to terminals T1 (N) and R1 (N) on the connector block connected to J9 on the 46A1 data mounting. Refer to Table B for the terminal connections.
5	Adjust the SEND LEVEL on the TTS-4B to obtain a REC LEVEL reading of between −16 dBm and −25 dBm.
6	Observe and record the new SEND LEVEL.

STEP	PROCEDURE

7 Use the following formula to verify the SEND LEVEL.

SEND LEVEL = [(+REC) or (−GAIN)] + TRANS + INSERTION LOSS + REC LEVEL

REC = The loss of REC attenuator (DAS 829A-L1).

GAIN = The * gain of the amplifier in the receiver path (DAS 829B-L1 or DAS 829C-L1) measured between the REC IN and REC TST jacks.

*The amplifier gain may be a positive or a negative value (provide gain or loss).

TRANS = The loss of TRANS attenuator on any DAS 829-type.

INSERTION LOSS = The losses due to slope equalization circuitry and hazardous protection circuitry. These values are shown in Table C and correspond to the loss through DAS 829-type illustrated in Fig. 2.

REC LEVEL = Reading between −16 dBm and −25 dBm on TTS-4B.

Requirement: SEND LEVEL calculated = send level recorded in Step 6.

Example: A DAS 829B-L1 with a 600-ohm option is tested. Gain control R28 is adjusted to −5 dB between the REC IN and REC TST jacks in the receive path. In this example, the amplifier is providing a 5-dB loss in the receive path.

Note: This adjustment was made previously during the installation and is given in Section 598-082-200.

The TRANS pad is adjusted for a loss of 8 dB (viewed number 8 appears on the TRANS pad).

GAIN = −5.0 dB (gain as adjusted by R28 and receive level gain strap)

TRANS = 8.0 dB (setting of TRANS pad)

INSERTION LOSS = 1.0 dB (from Table C)

REC LEVEL = −24.0 dBm (reading on TTS)

SEND LEVEL = −(−5.0 dB) + 8.0 dB + 1.0 dB + (−24.0 dBm) = −10.0 dBm

−10.0 dB would be the expected value for the SEND LEVEL reading on the TTS-4B.

8 If CIU (N) is provided with a loop-back key, operate the key to the loop-back position. If a loop-back key is not provided, connect a strap between CG (N) and MLB (N) on the connector block connected to J10 of the 46A1 data mounting. This operates the loop-back relay. See Table D for the terminal connections. Readjust SEND LEVEL of TTS-4B for REC LEVEL of −16 dBm to −25 dBm. Recalculate SEND LEVEL (with 16 dB added to the receive level) using the formula from Step 7. This completes the test of the DAS 829-type transmission and receive circuits.

TABLE B

4-WIRE INPUT CONNECTIONS AT J9 CONNECTOR OF 46A1 DATA MOUNTING

DAS 829-TYPE INSERTED IN POSITION DESIGNATED (N)	TERMINAL CONNECTIONS ON 66E3 BLOCK			
	T (N)	R (N)	T1 (N)	R1 (N)
1 or 9 or 17	1	2	3	4
2 or 10 or 18	7	8	9	10
3 or 11 or 19	13	14	15	16
4 or 12 or 20	19	20	21	22
5 or 13 or 21	25	26	27	28
6 or 14 or 22	31	32	33	34
7 or 15 or 23	37	38	39	40
8 or 16	43	44	45	46

TABLE C

LOOP-BACK INSERTION LOSS 600-OHM TERMINATIONS

DAS 829-TYPE	OPTION	INSERTION LOSS
829A-L1	600	1.8
829A-L1	1200	2.6
829B-L1	150	4.8
829B-L1	600	1.0
829B-L1	1200	2.2
829C-L1	359A	9.0 to 12.0*
829C-L1	359K	7.7 to 10.7*

* Loss is dependent on equalizer strap options.

TABLE D

LOCATION OF LOOP-BACK PAIR FOR LOCAL KEY OPERATION

DAS 829-TYPE INSERTED IN POSITION DESIGNATED (N)	J10 TERMINAL	
	CG (N)	MLB (N)
1 or 9 or 17	5	6
2 or 10 or 18	11	12
3 or 11 or 19	17	18
4 or 12 or 20	23	24
5 or 13 or 21	29	30
6 or 14 or 22	35	36
7 or 15 or 23	41	42
8 or 16	47	48

STEP	PROCEDURE

Note: The resistance checks in Steps 9 and 11 verify the not-in-data indication provided by the Nth DAS 829-type.

9 Perform a resistance check between terminals TEK5 (N) and TEK6 (N) at the connector block used in place of the modem. Refer to Table E for the terminal connections.

Requirement: Meter indicates infinite resistance.

10 Release the loop-back key (if used) or remove the strap between CG (N) and MLB (N) that was installed in Step 8.

11 Perform a resistance check between terminals TEK5 (N) and TEK6 (N).

Requirement: Meter indicates 0 ohms.

12 If the CIU is provided with alternate voice, proceed to 3.10.

13 If the CIU is provided with switched dial backup, proceed to 3.16; if not, refer back to Fig. 1 to test the next CIU.

TABLE E

LOCATION OF NOT-IN-DATA PAIRS AT 66E3 BLOCK USED IN PLACE OF MODEM

DAS 829-TYPE INSERTED IN POSITION DESIGNATED (N)	TERMINAL	
	TEK5 (N)	TEK6 (N)
1 or 9 or 17	5	6
2 or 10 or 18	11	12
3 or 11 or 19	17	18
4 or 12 or 20	23	24
5 or 13 or 21	29	30
6 or 14 or 22	35	36
7 or 15 or 23	41	42
8 or 16	47	48

C. Alternate Voice Test

3.10 Test as follows:

STEP	PROCEDURE
1	Adjust the SEND LEVEL on the TTS-4B to obtain a REC LEVEL reading of between −16 dBm and −25 dBm.
2	Set the SEND FREQ control on the TTS-4B to 2600 Hz. ***Requirement:*** Within a period of 10 seconds after switching to 2600 Hz, the telephone set buzzer will sound and either the TALK-DBU (N) or the TALK (N) key lamp flashes, indicating that the 2600-Hz signal has been detected.
3	When the telephone buzzer sounds, set the TTS-4B FUNCTION switch to REC + TALK. Read and record the peak value of the meter reading. ***Note:*** The telephone buzzer, either the TALK-DBU (N) or TALK (N) key lamp, and the 1300-Hz ringback tone cycles on and off for approximately 30 seconds. The level of the 1300-Hz ringback tone can be measured by reading the test receive level on the TTS-4B meter. Each time the telephone buzzer sounds, the meter indicates a level of signal.
4	Verify the REC LEVEL of the 1300-Hz oscillator in the 48A1 data unit using the following formula. REC LEVEL = −0.5 dBm − TRANS − TRANSMIT INSERTION LOSS Where: −0.5 dBm = the transmit level of the 48A1 data unit 1300- or 2600-Hz oscillator at the DAS 829-type interface (600-ohm termination) TRANS = The loss of the TRANS attenuator on the DAS 829-type (mounted in the 46A1 data mounting) TRANSMIT INSERTION LOSS = The loss due to slope equalization circuitry and hazardous protection circuitry in the transmit pair. These values are given in Table F and correspond to the loss through the transmit pair of DAS 829-type. ***Requirement:*** REC LEVEL calculated approximately equals the peak REC LEVEL recorded in Step 3. (This level will be measured more accurately in Step 6.) ***Example*** of REC LEVEL measurement: A DAS 829B-L1 with a 600-ohm option is used. The TRANS pad is adjusted for a loss of 8 dB (viewed number 8 appears on the TRANS pad). TRANS = 8.0 dB TRANSMIT INSERTION LOSS = 0.5 dB (Table F) REC LEVEL = −0.5 dBm − 8.0 dB − 0.5 dB = −9.0 dBm The peak reading on the TTS-4B meter should equal −9.0 dBm.

TABLE F

TRANSMIT PATH INSERTION LOSS
600-OHM TERMINATIONS

DAS 829-TYPE	OPTION	INSERTION LOSS (dB)
829A-L1	600	0.8
829A-L1	1200	1.2
829B-L1	150	2.2
829B-L1	600	0.5
829B-L1	1200	1.1
829C-L1	359A	1.2
829C-L1	359K	0.8

STEP	PROCEDURE

5 Set the TTS-4B FUNCTION switch to SEND + REC + TALK position. When the telephone buzzer sounds, take telephone off-hook and depress the TALK-DBU (N) or TALK (N) key.

Requirement: The 2600-Hz tone is heard in the telephone receiver. The buzzer is silenced and the TALK-DBU (N) or TALK (N) key lamp is lighted.

6 Set the TTS-4B FUNCTION switch to REC + TALK position. Depress and hold the RING key to generate a 2600-Hz ringdown signal.

Requirement: The level reading on the TTS-4B meter is the same as that calculated in Step 4.

7 Release the RING key.

Requirement: The REC LEVEL reading on the TTS-4B meter decreases to a low reading indicating the removal of the ringdown signal.

Note: Some signal from the telephone handset may cause a slight reading on the meter.

8 Whistle or blow in the telephone transmitter.

Requirement: The TTS-4B meter indicates some level as sound is made. A loud sound should produce a peak meter reading in the range of −10 to +10 dB. The level reading is limited by the TRANS pad adjustment.

STEP	PROCEDURE
9	Using a KS-14510-L1 VOM, perform a resistance check by measuring between terminals TEK5 (N) and TEK6 (N) on the connecting block used in place of the modem. See Table E for terminal connections. ***Requirement:*** The meter indicates infinite resistance. ***Note:*** This completes the test of the not-in-data indication of the Nth 48A1 data unit.
10	Depress and release the HOLD key. ***Requirement:*** The TALK-DBU (N) or TALK (N) key button releases and the lamp goes off.
11	Place the telephone handset on-hook. Depress the TALK-DBU (N) or TALK (N) key. ***Requirement:*** The TALK-DBU (N) or TALK (N) lamp remains off. ***Note:*** If all requirements are met, the alternate voice test of the Nth position is complete.
12	If the switchable dial backup is to be tested, proceed to 3.16. If not, refer back to Fig. 1 to test the next CIU.

D. Switchable Dial Backup Test

3.11 The calling sequence used in a switchable dial backup arrangement varies in only one respect from the calling sequence required when either the 48B1 data unit installed in a 45A1 data mounting or the DAS 828C is used. The dial backup service previously provided was for use with a single modem as described in Section 598-082-101. After the 4-wire backup channel was established, the DDD1 and DDD2 key lamps on the telephone set were lighted and the modem was automatically switched to the backup chnnel.

3.12 With switchable dial backup, the 4-wire dial backup channel must first be established; then, using the Call Director telephone, a modem is selected to be switched to the backup channel. The 46C1 data mounting provides for up to two 4-wire dial backup channels, designated A and B. The 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.

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.

3.13 For these tests, the switched network lines must be connected to the 46C1 data mounting using screw terminals T2A, R2A, T3A, R3A, T2B, R2B, T3B, and R3B or connector jack J1. The modem should not be connected during these tests.

3.14 The switched network lines used for data transmission should meet Dataphone® service requirements as given in Section 314-205-501. These requirements should be checked with the 48B1 data unit in the circuit.

3.15 The test procedures are given in two parts. The first part provides the test of the control circuit functions while the second part provides the test of the transmission line circuit. For maintenance purposes, the tests can be performed separately or in sequence as required. For installation tests, perform the procedures given in both parts.

3.16 *Control Circuit Test*

STEP	PROCEDURE
1	Allow the TTS-4B to warm up and stabilize, then calibrate using the instructions on the instrument case.
	Backup Channel A
	Note: If backup channel A is not provided, proceed to Step 10 for channel B.
2	Take the telephone handset off-hook and depress the DDD1A line key button.
	Requirement: The DDD1A line key lamp does not light. Dial tone is heard in the telephone receiver.
3	Dial the directory number of the DDD2A line.
	Requirement: The telephone buzzes and the DDD2A line key lamp flashes in response to ringing signal.
4	After the telephone starts to buzz, depress the HOLD key and release it.
	Requirement: The DDD1A line key lamp lights and the DDD1A key releases on the up-stroke of the HOLD key. The telephone continues to buzz in response to the ringing signal.
5	Depress the DDD2A line key button.
	Requirement: Ringing is tripped and the DDD2A line lamp does not flash.
6	Depress the HOLD key and then release it.
	Requirement: The DDD2A line key lamp lights and the DDD2A key releases on the up-stroke of the HOLD key. The station arrangement now has a dial backup channel.
7	Depress the REL key button, then release it.
	Requirement: Both DDD1A and DDD2A line key lamps go off.
8	Repeat Steps 2 through 7 by making a call from DDD2A line to DDD1A line.
	Note: If a second backup channel is furnished to the multiple arrangement, proceed to Step 9. If not, proceed to Step 10.
	Backup Channel B
9	Repeat Steps 2 through 8 by making calls from DDD1B line to DDD2B line and from DDD2B line to DDD1B line.

STEP	PROCEDURE

Dial Backup Operation

10 Using a B25A cable, connect a 66E3 block to P11 of 48D1 data unit (if testing positions 1 through 16) or P12 of 48D1 data unit (if testing positions 17 through 23).

11 If CIU (N) is provided with a loop-back key, operate the key to the loop-back position.

12 If CIU (N) is not provided with a loop-back key, connect a strap between CG (N) and MLB (N) on the block connected to J10 on the 46A1 data mounting. Refer to Table D for terminal connections. This operates the loop-back relay.

13 Using a KS-14510 VOM (or equivalent), perform a resistance check between TEK5 (N) and TEK6 (N) at the 66E connector block connected in place of the modem. Refer to Table E for terminal connections.

Requirement: Meter indicates infinite resistance.

Backup Channel A

Note: If backup channel A is not provided, proceed to Step 24 for channel B.

14 Repeat Steps 2 through 6.

Note: The resistance checks in Steps 15 and 18 verify the not-in-data indication provided by the 48C1 data unit which is providing switchable dial backup for the Nth modem.

15 Depress the DBU (N) or TALK-DBU (N) key on the Call Director telephone.

Requirement: The DDD1A, the DDD2A, and the DBU (N) or TALK-DBU (N) key lamps are lighted.

16 Perform a resistance check between TEK5 (N) and TEK6 (N) at the 66E3 block connected in place of the modem.

Requirement: Meter indicates zero resistance.

17 Release the loop-back key or remove the strap between CG (N) and MLB (N) that was placed in Step 12.

18 Depress and release the HOLD button.

Requirement: The DBU (N) or TALK-DBU (N) button releases. The DDD1A, DDD2A, and the DBU (N) or TALK-DBU (N) lamps remain lighted.

Note: The resistance checks in Steps 19 and 23 verify the dial backup status indication provided by the 48C1 data unit providing switchable dial backup for the Nth modem.

19 Perform a resistance check between terminals DBU1 (N) and DBU2 (N) on the connector block installed in Step 10. Refer to Table G for terminal connections.

Requirement: The meter indicates 0 ohms.

TABLE G

LOCATION OF DIAL BACKUP STATUS INDICATION PAIRS AT P-DBU BLOCK*

DAS 829-TYPE INSERTED IN POSITION DESIGNATED (N)	DBU1 (N)	DBU2 (N)
1	1	2
2	3	4
3	5	6
4	7	8
5	9	10
6	11	12
7	13	14
8	15	16
9	17	18
10	19	20
11	21	22
12	23	24
13	25	26
14	27	28
15	29	30
16	31	32
17	1	2
18	3	4
19	5	6
20	7	8
21	9	10
22	11	12
23	13	14

* 1 through 16 are provided when the P-DBU block is connected to P11 of the 48D1 data unit. 17 through 23 are provided when the P-DBU block is connected to P12 of the 48D1 data unit.

STEP	PROCEDURE
20	Depress the REL key. ***Requirement:*** The DDD1A, DDD2A, and the DBU (N) or TALK-DBU (N) lamps remain lighted.
21	Depress the DBU (N) or the TALK-DBU (N) button and then the REL key. ***Requirement:*** The backup channel releases and the DDD1A and DDD2A lamps go off. If the DBU (N) button is depressed, the key lamp is off. If the TALK-DBU (N) button is depressed, the lamp remains lighted.

STEP	PROCEDURE
22	Depress and release the HOLD button. ***Requirement:*** The DBU (N) or TALK-DBU (N) button is released. The TALK-DBU (N) lamp goes off.
23	Perform a resistance check between terminals DBU1 (N) and DBU2 (N) at the connector block installed in Step 10. ***Requirement:*** The meter indicates infinite resitance.
24	If the multiple arrangement is furnished with a second backup channel, proceed to Step 25. If not, proceed to Step 26. **Channel B**
25	If the station is equipped with a backup channel B, repeat Steps 15 through 24 using DDD1B and DDD2B. When channel A is also provided, Steps 16, 17, 19, and 28 need not be performed.
26	The test of the control circuits is now complete. If all requirements have been met, proceed to 3.18.

3.17 The test procedures given in this second part of the dial backup test provide the test of the transmission line circuit. The circuitry of DDD1A line (or DDD1B) is used as the receive backup pair and provides an overall gain of 3.7 dB from the local central office (CO) to the modem interface. The circuitry of DDD2A line (or DDD2B) is used as the transmit backup pair and provides attenuation to ensure that the modem signal will not exceed a signal level of −12 dBm at the local CO.

3.18 ***Transmission Line Circuit Test***

STEP	PROCEDURE
	Note: If backup channel A is not provided, proceed to Step 19.
1	Connect the TTS-4B REC 310 jack to terminals DR (N) and DT (N) on the 66E3-25 connecting block installed in place of the modem. See Table A for the required terminals. ***Note:*** The TTS-4B should be warmed up and calibrated.
2	Set the TTS-4B controls as follows: FUNCTION to REC + TALK REC IMP to 600Ω.

STEP	PROCEDURE
3	Take the telephone handset off-hook and depress the DDD1A line key button. ***Requirement:*** The DDD1A line key lamp does not light. Dial tone should be heard in the telephone receiver.
4	Dial the directory number of the milliwatt supply in the local CO. After call is connected, depress and then release the HOLD key. ***Requirement:*** The DDD1A line key lamp lights and the DDD1A line key releases on the up-stroke of the HOLD key.
5	Depress the DDD2A line key button. ***Requirement:*** The DDD2A line key lamp does not light. Dial tone should again be heard in the telephone receiver.
6	Dial the directory number of the 900-ohm quiet termination in the local CO. After call is connected, depress and then release the HOLD key. ***Requirement:*** The DDD2A line key lamp lights and the DDD2A line key releases on the up-stroke of the HOLD key.
7	Depress the DBU (N) or TALK-DBU (N) key and place the telephone handset on-hook. ***Requirement:*** The DDD1A and DDD2A line key lamps remain lighted.
8	Read and record the receive signal level from the milliwatt supply on the TTS-4B meter. ***Requirement:*** The measured receive level should be between −12 and −13 dBm. If this requirement is not met, proceed to Step 9 and adjust as directed in Step 10. If the requirement is met, proceed to Step 9 and then Step 13. ***Note:*** The receive level (or transmit level) adjustment is only made once for either backup channel A or B. Succeeding measurements are made to ensure the continuity of all channels through the switching matrix provided by the 48C1 data units.
9	Take the telephone handset off-hook and depress the REL key and then release it. ***Requirement:*** DDD1A, DDD2A, and DBU (N) or TALK-DBU (N) line key lamps go off.
10	If the requirement of Step 8 is not met, remove the channel A 48B1 data unit from the 46C1 data mounting and set the transmit attenuator to provide the required attenuation. For example, if the measured receive level is 2 dB low, the 48B1 attenuator is set to provide 2 dB less attenuation. If the requirement of Step 8 is now met, proceed to Step 11. ***Note:*** The receive level (or transmit level) adjustment is only made once for either backup channel A or B. Succeeding measurements are made to ensure the continuity of all channels through the switching matrix provided by the 48C1 data units.

STEP	PROCEDURE
11	Reinstall the channel A 48B1 data unit in the 46C1 data mounting.
12	Repeat Steps 2 through 10.
13	Disconnect the TTS-4B meter leads from terminals DR1 (N) and DT1 (N) and connect to terminals DR (N) and DT (N) on the 66E3-25 connecting block installed in place of the modem. This changes the TTS-4B meter from the transmit pair to the receive pair. See Table A for terminal connections.
14	With the telephone handset off-hook, depress the DDD2A line key button. ***Requirement:*** The DDD2A line key lamp does not light. Dial tone should be heard in the telephone receiver.
15	Dial the directory number of the milliwatt supply in the local CO. After a call is connected, depress and then release the HOLD key. ***Requirement:*** The DDD2A line key lamp lights and the DDD2A line key releases on the up-stroke of the HOLD key.
16	Repeat Steps 5, 6, and 7 using DDD1A line key.
17	Read the receive signal level on the TTS-4B meter. ***Requirement:*** Adjust R9 on the front of the channel B 48B1 data unit (if required) to provide a receive signal level of +3.7 dBm. ***Note:*** The adjustment of R9 is made during installation using procedures given in Section 598-082-202, and should not require resetting.
18	Repeat Step 9.
19	If the station is equipped with backup channel B, repeat Steps 1 through 18 using DDD1B and DDD2B.
20	The test of the transmission line circuits is now complete. If all requirements have been met, refer back to Fig. 1 to continue the test.

4. TROUBLE ISOLATION TESTS

A. General

4.01 The tone detector loop-back circuit and monitor jacks of the DAS 829-types provide access for maintenance and should be used for isolating troubles at the station end.

4.02 The first test to be performed is the loop-back test by the STC. The STC personnel may compare actual measurements against benchmark tests recorded at time of installation. Local policy should dictate policy of test performance before dispatching personnel to the station.

4.03 When station trouble is traced to DAS 829-type or the 48A1 and/or 48B1 data unit, the data signal levels or test signals should be monitored and compared to signals that have been previously recorded.

B. Isolation Tests for Multiple Installation Using 46-Type Data Mountings

4.04 If installation test requirements are not met, the cause of trouble may be due to the failure of the low voltage ac power supply. The telco employee should verify that the DAS 829-type or the 48A1 data units have the required voltage by performing the following steps.

Note: The data units must be installed in the data mounting for this measurement.

(a) If a 46A1 data mounting is used, measure for a nominal 24 Vac between terminals AC1(1) and AC2(1) located on the backplane using a KS-14510 VOM, or equivalent.

(b) If a 46B1 data mounting is used, measure for a nominal 24 Vac between terminals AC1 and AC2 located on the backplane using a KS-14510 VOM, or equivalent.

(c) If a 46B1 data mounting is used, measure for a voltage reading of $+35 \pm 5$ Vdc across terminals RG (GRD) and RV (N) (+35V) located on the backplane using a KS-14510-L1 VOM, or equivalent.

4.05 One trouble symptom may be that the 18- or 30-button key telephone buzzer does not sound, regardless of which TALK or TALK-DBU lamp is flashing (indicating ringing). This problem may be caused by one of the following.

(a) The INT option is not installed on the 46B1 data mounting.

(b) The key telephone buzzer is defective.

(c) The 46B1 data mounting is defective.

4.06 Loss of signal through a channel provided by the interconnection of the 46A1 and 46B1 data mountings can be traced as follows.

(1) Ensure the DAS 829-type line impedance option or slope equalizer option is properly installed as specified.

(2) Check for signal continuity with only the DAS 829-type installed. By using the test and monitor jacks, the signal continuity can be verified for both the 46A1 and 46B1 data mountings.

(3) Install the 48A1 data units and repeat the signal continuity tests. If the tests fail, the 48A1 data unit is defective and should be replaced.

4.07 Troubles involving internal wiring of the 46-type data mountings should be cleared by replacing the data mounting.

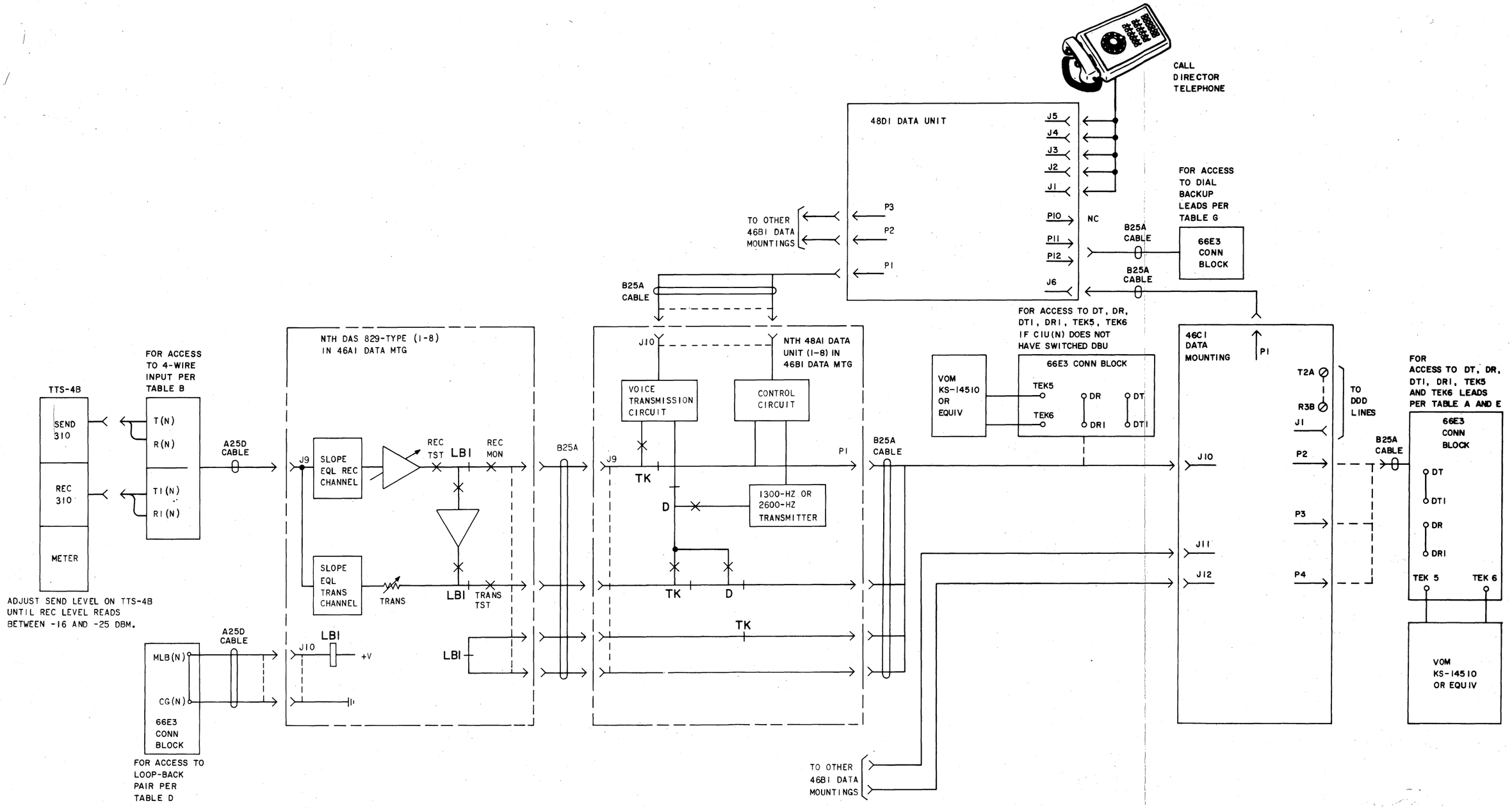

Fig. 2—Circuit Arrangement for Testing a DAS 829-Type in a 46A1 Data Mounting and a 48A1 Data Unit in a 46B1 Data Mounting