

DATA-PHONE® INTERCONNECTION ARRANGEMENT FOR TRUNK SIDE OF 10B DATA LINE CONCENTRATOR (DLCS*) INSTALLATION AND CONNECTIONS

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1. GENERAL

1.01 This section contains instructions for installing and connecting the DATA-PHONE interconnection arrangement for the trunk side of a 10B Data Line Concentrator.

*Data Line Concentrator Service, formerly known as DATREX

1.02 The interconnection arrangement consists of two separate data sets, one logic circuit, and one interface circuit (each contained on a single

plug-in circuit pack). All four circuit packs for one interconnection arrangement are contained in one-half of a 28A1 Data Mounting. (See Fig. 1.) The data mounting unit has slot provisions to accommodate two separate interconnection arrangements.

1.03 Circuit functions of the four circuit packs are interconnected by the wiring provided in the special 209A adapter cord (see Fig. 2). This adapter cord is capable of serving two separate interconnection arrangements when both are contained in the same 28A1 Data Mounting.

1.04 The 28A1 Data Mounting measures 10 inches high, 25 inches wide, and 6 inches deep. The data mounting can be used in either a 23-inch or a 25-inch rack. The data mounting has provisions for attaching a KS-20575 rectifier to provide operating voltages for the interconnection arrangement. The weight of a data mounting with a KS-20575 rectifier and one interconnection arrangement is 30 pounds or, with two separate interconnection arrangements, 33 pounds. The weight of a data mounting without the KS-20575 rectifier and with one interconnection arrangement is 17-1/2 pounds or, with two interconnection arrangements, 20-1/2 pounds.

1.05 Normally, the interconnection arrangement will be mounted in close proximity to the 10B dual-access concentrator. The physical location is not as important as correct interconnection and proper resistive padding for the DLCS loop. The interconnection must appear to the calling station as a suitable port access.

1.06 The KS-20575 rectifier is a separately ordered item and is provided with a KS-14532-L21 3-conductor cord. The cord length is approximately 9 feet and is terminated by a plug having parallel blades and a U-shaped grounding pin. The KS-20575 rectifier requires an ac source of between 105 and

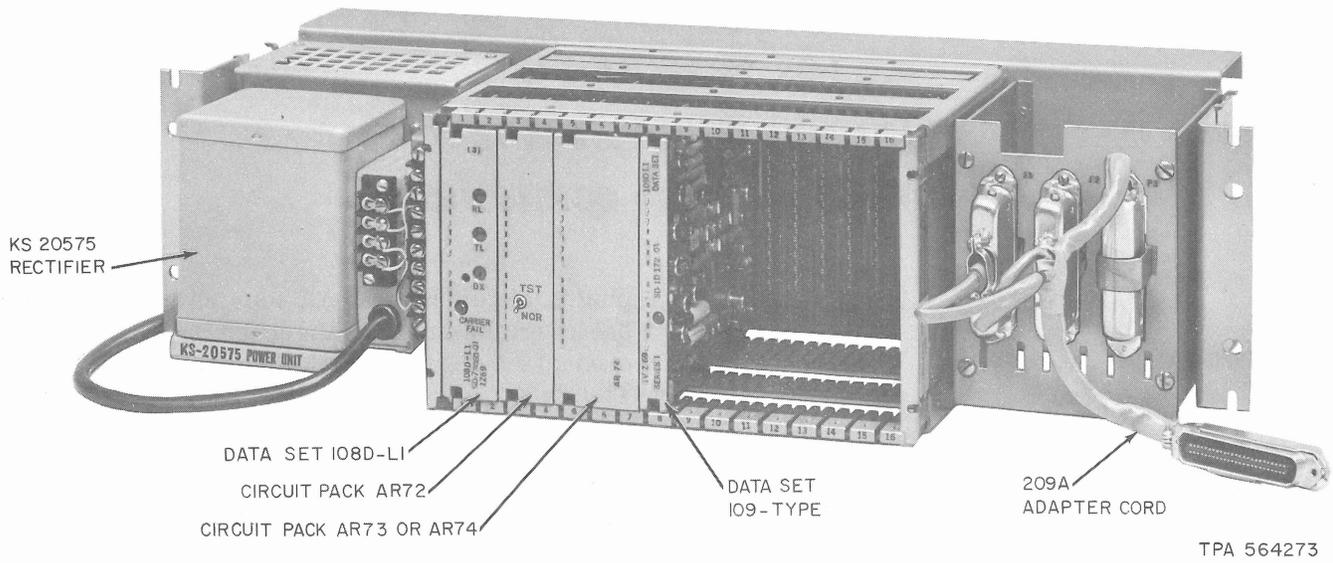


Fig. 1—28A1 Data Mounting With One Interconnection Arrangement

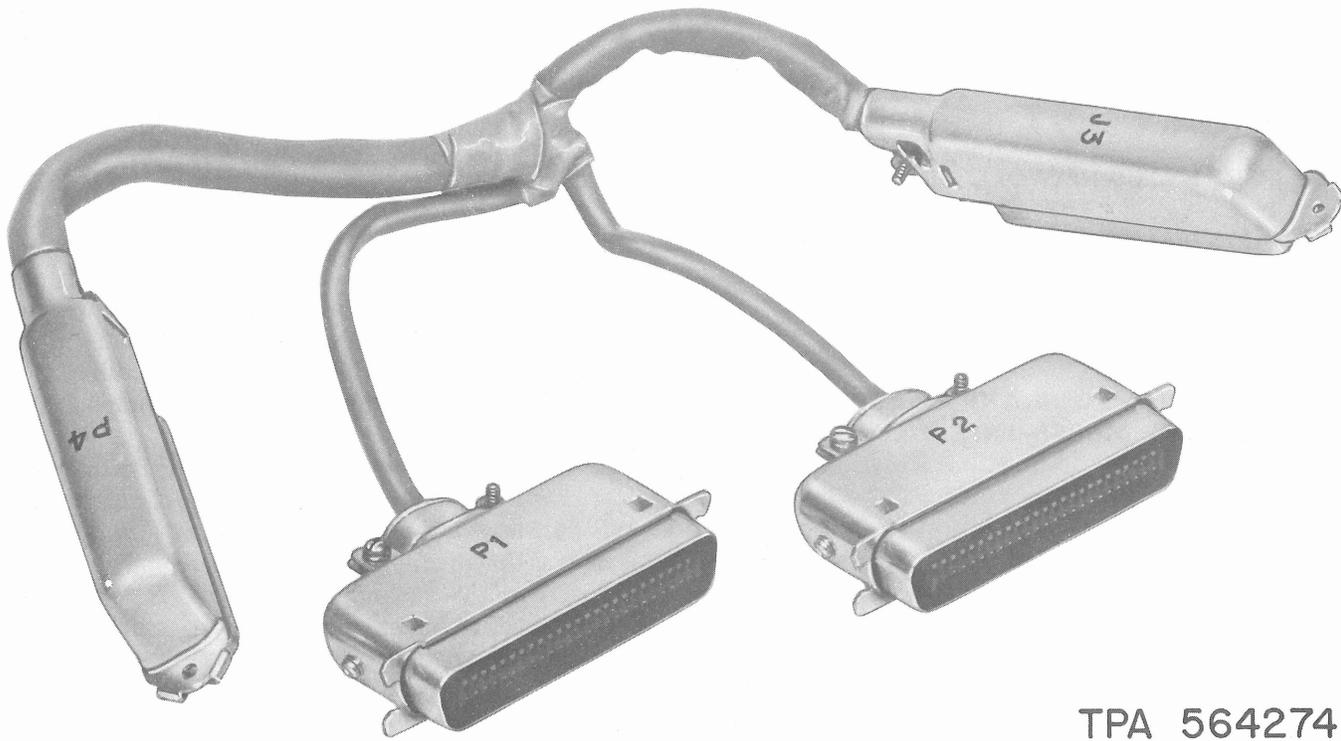


Fig. 2—209A Adapter Cord

129 volts at 60 (± 3) Hz. The ac source must not be under control of a switch.

1.07 An interconnection arrangement always uses a Data Set 108D-L1 and a circuit pack AR72. Station requirements for rotary dial signaling or TOUCH-TONE® signaling are that the arrangement is to be equipped with either circuit pack AR73 (option Z) or AR74 (option Y), respectively. The interconnection arrangement may be operated half-duplex only by using Data Set 109D-type or may employ optional half-duplex or full-duplex operation by using Data Set 109E-type. The four circuit packs and a 209A adapter cord required for each interconnection arrangement and the 28A1 Data Mounting must be ordered separately. The adapter cord will service two independent arrangements.

1.08 General data set installation practices, such as outlined in Data Sets—General Installation and Connection Information (Section 590-010-200), should be followed in addition to the steps outlined in this section.

2. TOOLS AND APPARATUS

2.01 Special equipment required for installation of an interconnection arrangement is a volt-ohm-milliammeter, such as a KS-14510 test meter or equivalent, and a portable station test set, such as a TTS-28 or equivalent.

2.02 The test meter is required to set the resistor pads in the Data Set 109-type to provide the proper line current on the DLCS loop. The portable test set will be required to set the output level for Data Set 108D-L1 on circuit pack AR73 or AR74.

3. OPTIONS

Circuit Pack AR72

3.01 At installations to be optioned for recognizing and repeating rotary dial signal pulses (option Z), the screw switch S1 (see Fig. 3) must be closed to make a metal-to-metal connection with the two contacts. For TOUCH-TONE signaling (option Y), the screw switch S1 must be open so the contacts are not made. A summary of required options for the interconnection arrangement is given in Table A. An explanation of both available and

required options is provided in the following paragraphs.

Circuit Pack AR73 (Option Z)

3.02 An interconnection arrangement which recognizes rotary dial signal pulses must be provided with a circuit pack AR73. This unit provides the line-holding relay which is conditioned to repeat the rotary dial signaling. The logic circuitry for line relay K1 control is provided from circuit pack AR72. Circuit pack AR73 is shown in Fig. 4.

Circuit Pack AR74 (Option Y)

3.03 An interconnection arrangement which recognizes TOUCH-TONE signals must be provided with a circuit pack AR74. This unit provides the line-holding relay and circuitry similar to circuit pack AR73, plus additional circuitry for TOUCH-TONE operation. Circuit pack AR74 is shown in Fig. 5.

Data Sets 109D- and 109E-Type (See Fig. 6 and 7.)

3.04 The same options are provided in both Data Sets 109D- and 109E-type. Identical options have been assigned the same option designations in both data sets. They only differ in the method of installation and switch designations.

3.05 The available options are as follows:

- (a) Current squelch (option Z)*
- (b) No current squelch (option Y)
- (c) Space-hold on BB lead (option V)
- (d) Mark-hold on BB lead (option U)*
- (e) Space crossover shift (option R)
- (f) Mark crossover shift (option Q)*
- (g) No crossover shift (option P).

*The interconnection arrangements for the trunk side of the DLCS system require the installation of options Z, U, and Q in the concentrator-side data set.

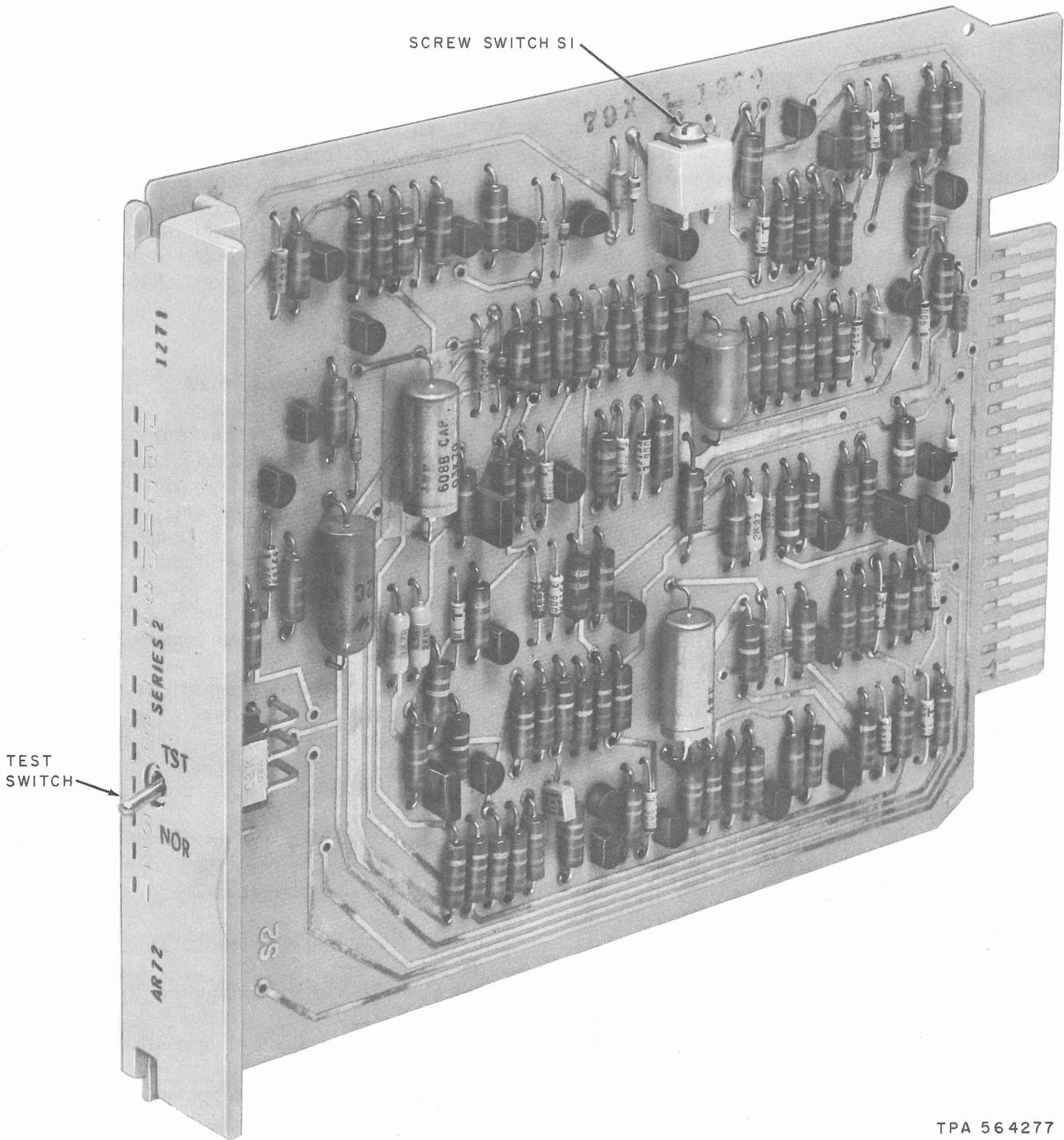
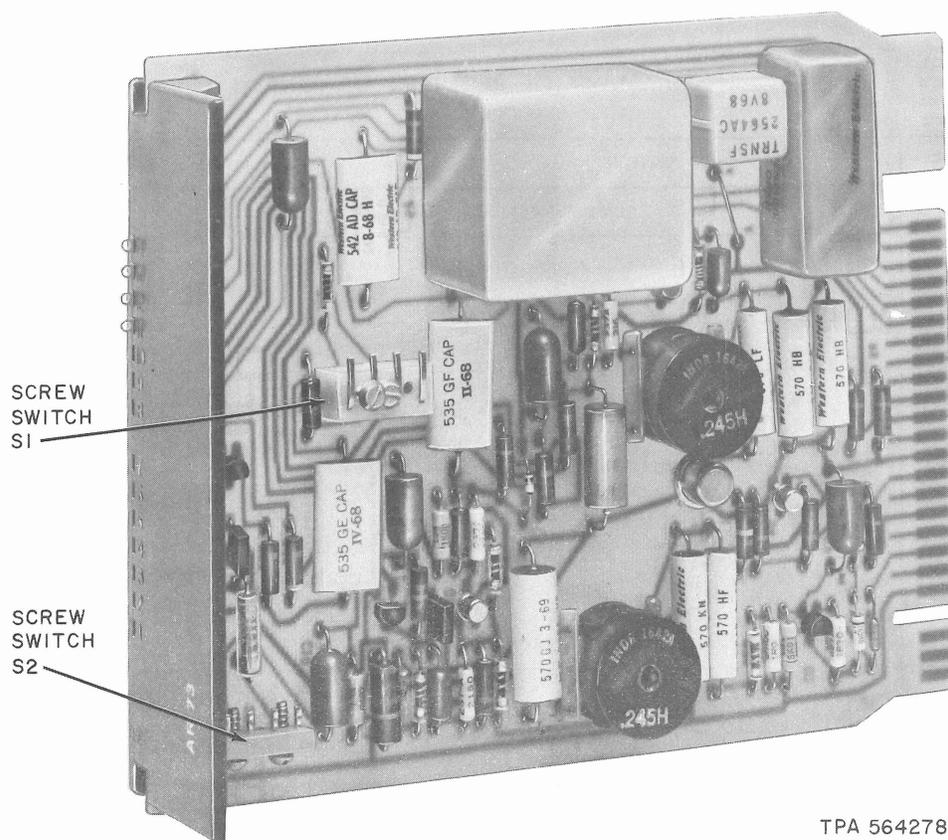


Fig. 3—DATREX/DATA-PHONE Logic CP AR72

TABLE A
SUMMARY OF REQUIRED OPTIONS

OPTION	SWITCH	PURPOSE
<i>CIRCUIT PACK AR72 (SEE FIG. 3)</i>		
Z Y	S1 — Closed S1 — Open	Rotary Dial Signaling TOUCH-TONE Signaling
<i>CIRCUIT PACK AR73 (SEE FIG. 4)</i>		
Required with AR72 for Option Z	Screw Switch S1 1 to 2 — Open 3 to 4 — Closed Screw Switch S2 1 to 2 2 to 3	Hybrid Network Strapping General Optimum Setting Dial Tone Amplifier Settings determined during Preoperative Adjustments (Part 6)
<i>CIRCUIT PACK AR74 (SEE FIG. 5)</i>		
Required with AR72 for Option Y	Screw Switch S1 1 to 2 — Open 3 to 4 — Closed Screw Switch S2 1 to 2 2 to 3	Hybrid Network Strapping General Optimum Setting Dial Tone and TOUCH-TONE Amplifiers Set per Table and Service Order
<i>DATA SET 109D-L1 (SEE FIG. 6)</i>		
Z U Q	S4 — Closed S2 — Open Switch S5 3 to 4 — Closed 4 to 5 — Open	Current Squelch Mark-Hold on BB Lead Mark Crossover Shift
<i>DATA SET 109E-L1 (SEE FIG. 7)</i>		
Z U Q	S2 — Closed S1A — Open S1B — Closed S3-1, 2 — Open	Current Squelch Mark-Hold on BB Lead Mark Crossover Shift
<i>DATA SET 108D-L1 (SEE FIG. 8)</i>		
Z X U S	Screw Switch A 1 to 2 — Closed 3 to 4 — Closed 2 to 3 — Open Slide Switch S1 — Closed Slide Switch S2 — Open Slide Switch S3 — Open	4-Wire Operation Disable Directional Control TL — Mark-Hold RL — Mark-Hold



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Fig. 4—Interface CP AR73

3.06 If Data Set 109D-type is to be used, install options Z, U, and Q as follows:

- (a) Option Z—Close screw switch S4.
- (b) Option U—Open screw switch S2.
- (c) Option Q—Install shorting link between 3 and 4 of S5 and remove shorting link from between 4 and 5 of S5.

3.07 If Data Set 109E is to be used, install options Z, U, and Q as follows:

- (a) Option Z—Close screw switch S2.
- (b) Option U—Open screw switch S1A and close screw switch S1B.
- (c) Option Q—Open screw switch S3-1 and S3-2.

Data Set 108D-L1 (See Fig. 8)

3.08 The options provided are as follows:

- (a) 4-wire operation (option Z)*
- (b) 2-wire operation (option Y)
- (c) Disable directional control (option X)*
- (d) Enable directional control (option W)
- (e) TL—Space-hold (option V)
- (f) TL—Mark-hold (option U)*
- (g) RL—Space-hold (option T)
- (h) RL—Mark-hold (option S)*.

*The interconnection arrangement for the line side of the DATA-PHONE system requires the installation of options Z, X, U, and S in Data Set 108D-L1.

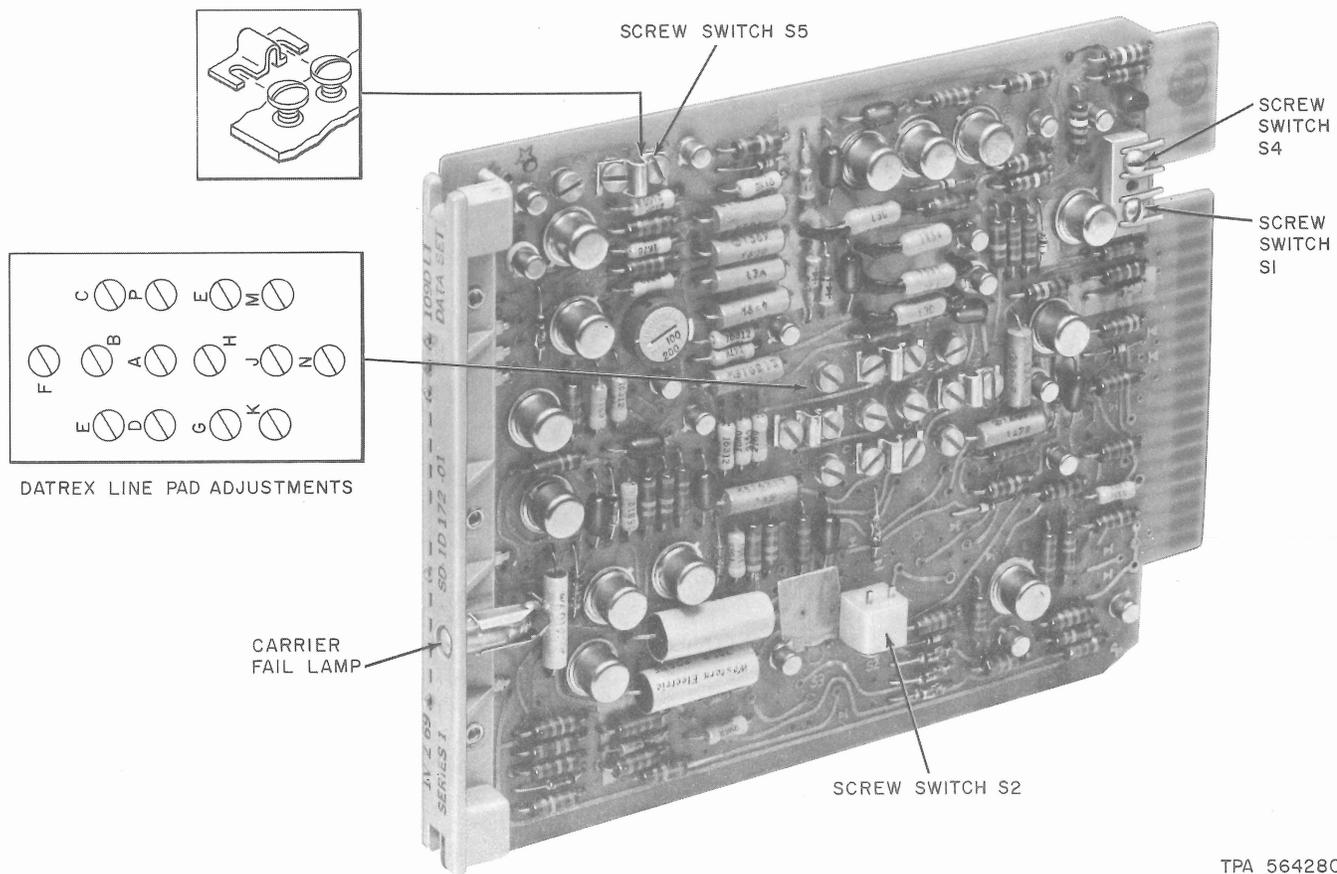


Fig. 6—Data Set 109D-L1

Data Sets, Circuit Packs, and Adapter Cord

4.04 Verify that the proper options are installed in the data sets and circuit packs as required in Part 3 of this section. Verify that the TEST switch on circuit park AR72 is in the NORMAL (pressed down) position. Adjust the line pad of Data Set 109D or 109E as directed in Preoperative Adjustments (Part 6). Install the line-side data set (Data Set 108D-L1), the concentrator-side data set (Data Set 109D-L1 or 109E-type), and circuit packs AR72 and AR73 or AR74 in the 28A1 Data Mounting slots as shown in Fig. 9.

Note: The interconnection arrangement will function *only* as shown in Fig. 9. Do not insert the data sets and circuit packs in any other order. For installations requiring only one arrangement, fill the left slots of the 28A1 Data Mounting. Interconnections will be made through connectors J1 and P3 and the 209A

adapter cord. The P2 connector of the 209A adapter cord may be disconnected from the J2 connector of the data mounting making the right half of the data mounting available for other arrangements.

4.05 Install the 209A adapter cord. Mate the P1 connector to J1, P2 connector to J2, and J3 connector to P3 on the 28A1 Data Mounting. Insert a retainer clip to secure each connector of the 209A adapter cord into the 28A1 Data Mounting.

5. CONNECTIONS

5.01 Connect the 28A1 Data Mounting as follows:

- (1) Plug the 50-pin connector end of the line cable into P4 of the 209A adapter cord. A functional sketch of interconnections through the 209A adapter cord is shown in Fig. 10.

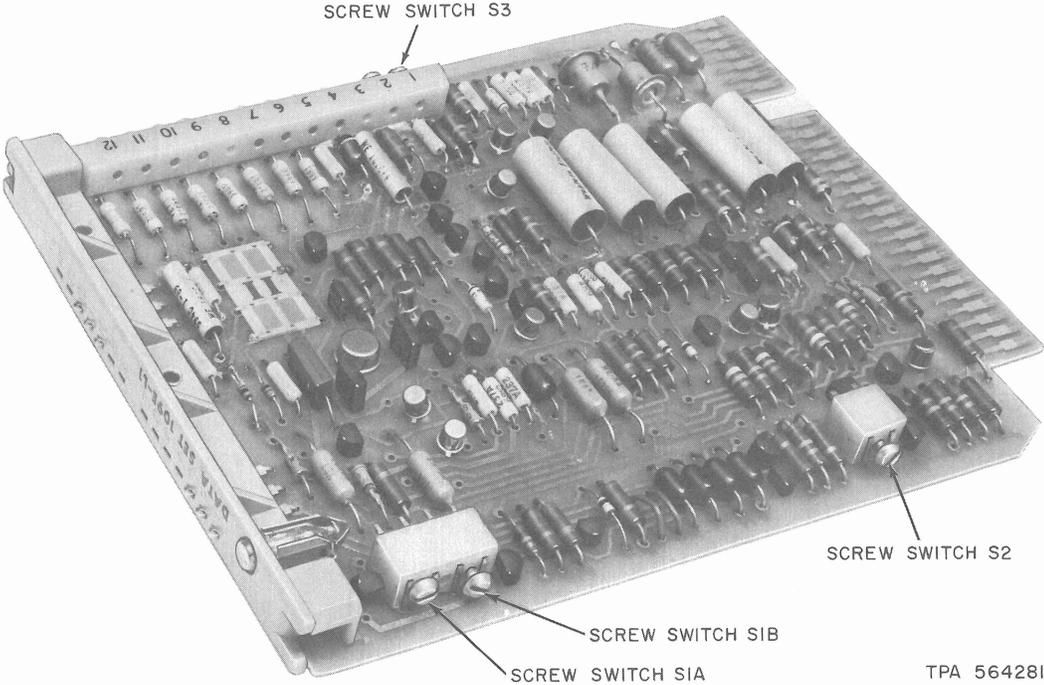


Fig. 7—Data Set 109E-L1

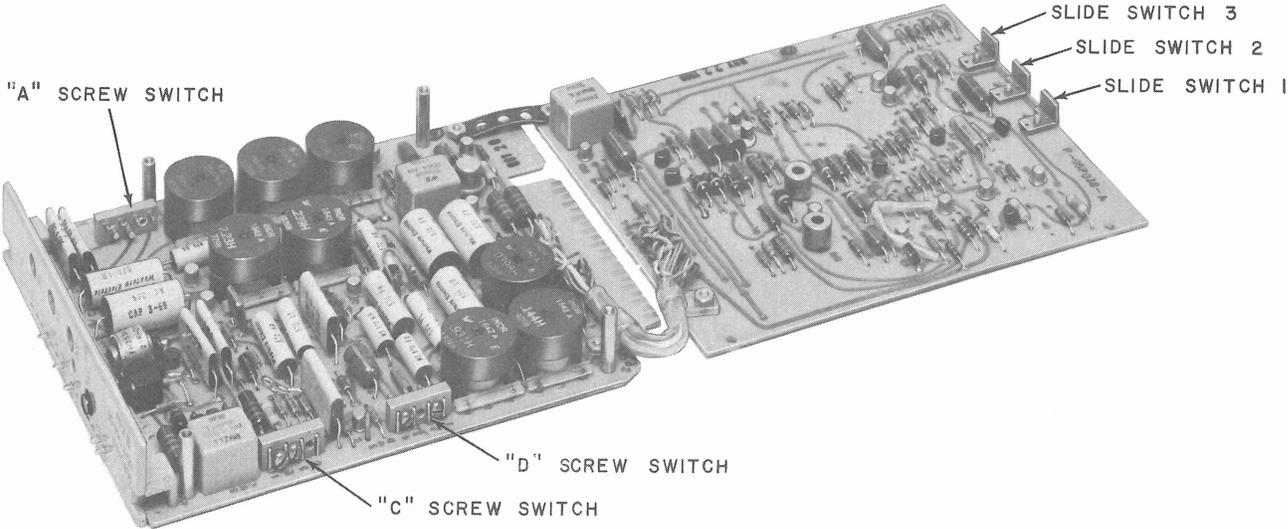


Fig. 8—Data Set 108D-L1

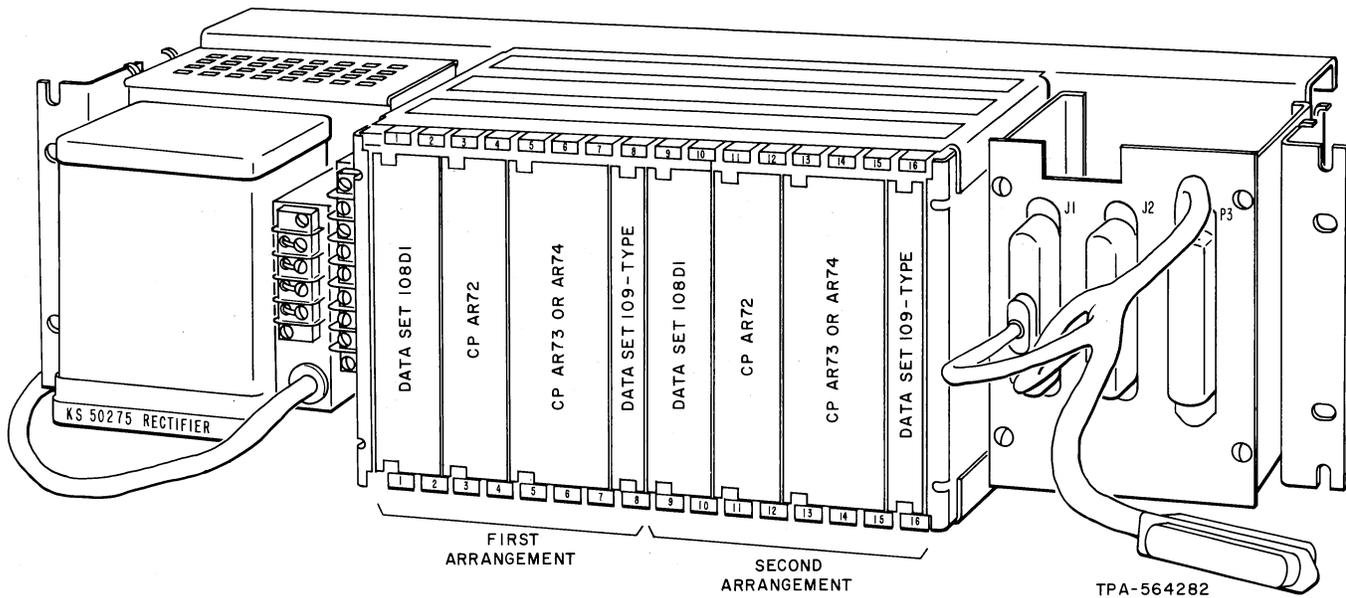


Fig. 9—Interconnection Arrangement Layout

(2) Route the line cable through the hole (behind J1, J2, and P3) in the data mounting to an Intermediate Distribution Frame (IDF) or connector block.

(3) Terminate the leads from the interconnection arrangement, telephone facility, and concentrator trunk lines at the distribution frame as listed in Table B.

(4) Install the optional 565HK telephone arrangement for handling up to two interconnection circuits using Table B and Fig. 11. Modify the telephone set as noted on the illustration.

(5) Install the optional 631D12 telephone arrangement for handling up to four interconnection circuits using Table B and Fig. 12. Modify the telephone set as noted on the illustration.

5.02 Connect power as follows:

(1) If a separate power source is to be used for both halves of the 28A1 Data Mounting, omit (2).

(2) If one power source is to be used to power both halves of the data mounting, strap

terminals 1, 2, and 3 of TB1 on the data mounting to terminals 4, 5, and 6, respectively, and omit (7) through (10).

(3) Connect terminal 8 of TB1 to frame ground.

(4) Connect terminal 3 of TB1 to the SIG GRD lead of the power source.

(5) Connect terminal 1 of TB1 to the +24 volt dc lead of the power source.

(6) Connect terminal 2 of TB1 to the -24 volt dc lead of the power source.

(7) Connect terminal 4 of TB1 to SIG GRD lead of the second power source.

(8) Connect terminal 5 of TB1 to the +24 volt dc lead of the second power source.

(9) Connect terminal 6 of TB1 to the -24 volt dc lead of the second power source.

(10) If the KS-20575 rectifier is used as the power source, connect the rectifier power cord to a 117-volt 60-Hz ac outlet.

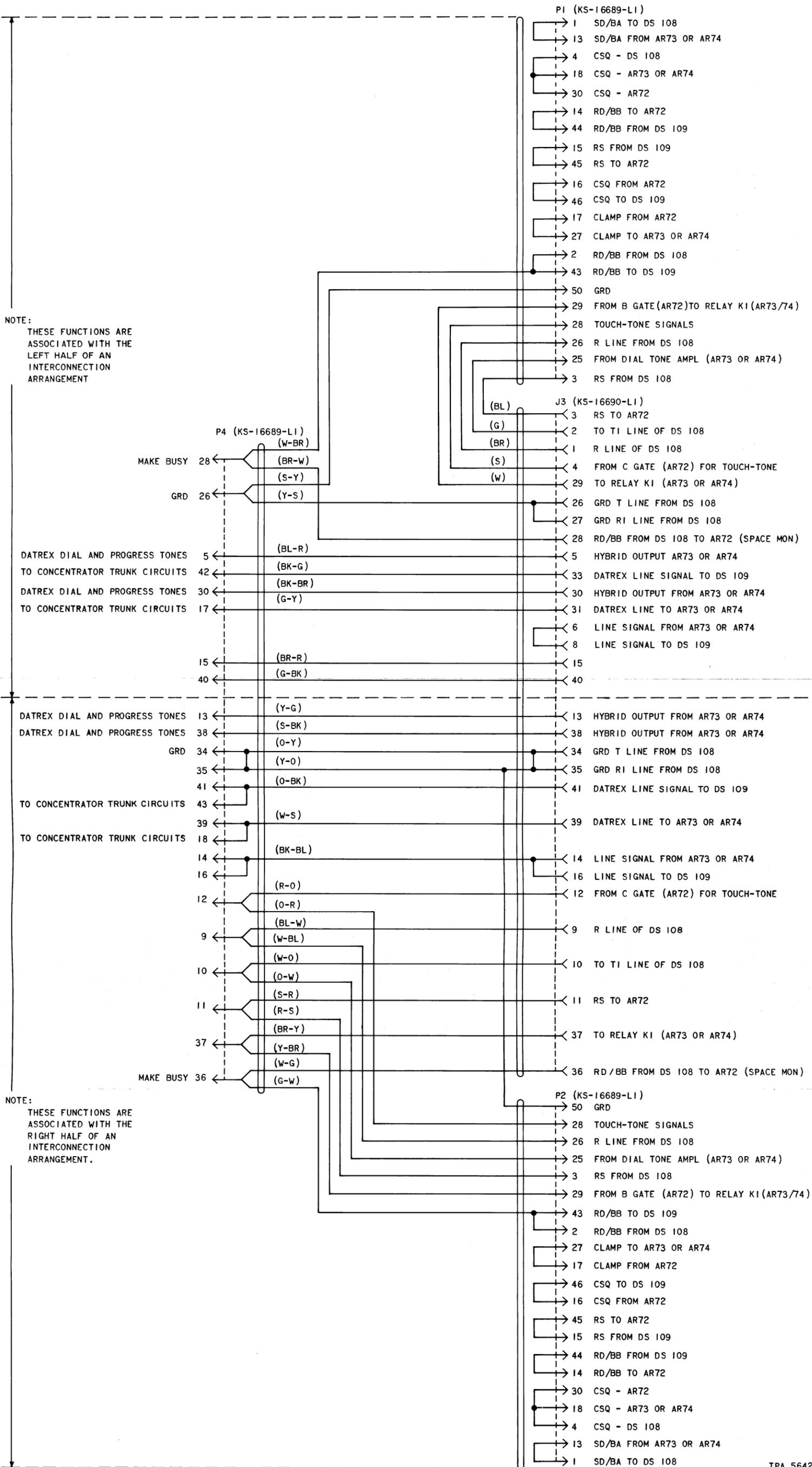


Fig. 10—209A Adapter Cord, Interconnection Sketch

TABLE B
INSTALLATION CONNECTIONS

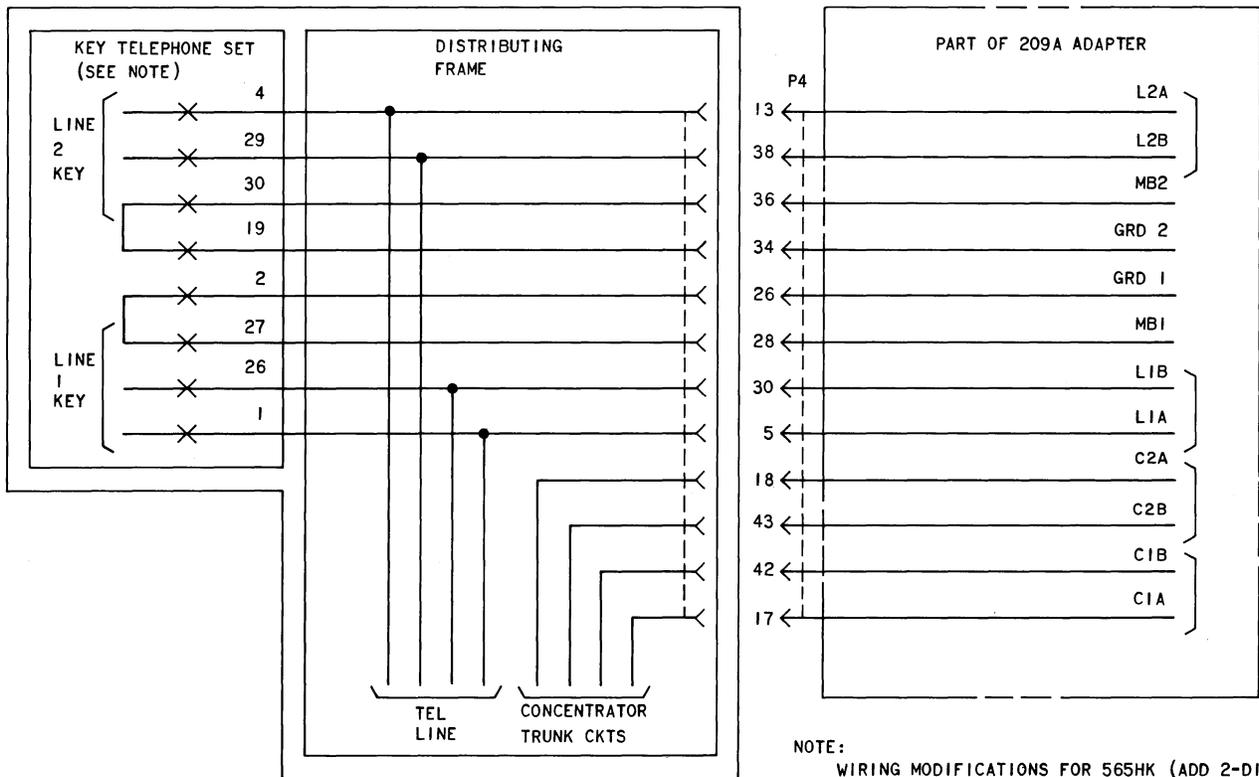
TELEPHONE FACILITY CONNECTIONS		
FOR ARRANGEMENT USING SLOTS	CONNECT TIP TO	CONNECT RING TO
01 through 08 09 through 16	P4-30 P4-38	P4-5 P4-13
CONCENTRATOR TRUNK CIRCUITS		
FOR ARRANGEMENT USING SLOTS	CONNECT L1 TO	CONNECT L2 TO
01 through 08 09 through 16	P4-17 P4-18	P4-42 P4-43

6. PREOPERATIVE ADJUSTMENTS

Data Set 109-Type Line Pad Adjustment

6.01 In order to properly adjust the line pads for Data Set 109D or 109E, it is necessary to know the total resistance of trunk group A lines between the concentrator and the terminal ports (see D1 + E1 in Fig. 13). This information may be found on the service order or circuit layout card. An equivalent amount of resistance should be inserted into the interconnection arrangement Data Set 109D or 109E (shown as D2 + E2 in Fig. 13).

6.02 Data Set 109D is provided with a set of shorting links for a series of resistors which



- NOTE:**
WIRING MODIFICATIONS FOR 565HK (ADD 2-DIGIT CODE FOR DESIRED COLOR) TELEPHONE SET USED WITH INTERCONNECTION CIRCUITS
- A. RINGER
 - 1. CONNECT (R) WIRE TO T/S-9.
 - 2. CONNECT (BK) WIRE TO NETWORK 425E-F.
 - B. MOUNTING CORD
 - 1. DISCONNECT (O-W) WIRE FROM T/S-1B.
 - 2. CONNECT (O-W) WIRE TO T/S-M.
 - C. KEY
 - 1. DISCONNECT (Y-BR) WIRE FROM T/S-M.
 - 2. CONNECT (Y-BR) WIRE TO T/S-SG.

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Fig. 11—Telephone Arrangement Handling Up to Two Interconnection Circuits

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may be inserted in each side of the loop. Data Set 109E is provided with screw switches for the same purpose. After determining the amount of padding to be inserted as described in 6.01, locate the resistance value nearest to but not greater than the padding needed in the PAD RESISTANCE (OHMS) column of Table C for Data Set 109D or Table D for Data Set 109E. Install the shorting link or open and close the screw switches given for this value in the INSTALL LINKS BETWEEN SCREWS column of Table C (Data Set 109D) or SCREW SWITCH SETTINGS column of Table D (Data Set 109E).

DATA SET 108D-L1 LEVEL ADJUSTMENT



Tip and ring from the data set being tested must be disconnected from the transmission facility before the data set level adjustment is performed.

6.03 Connect the positive (+) and negative (–) terminals of the TTS-28 Portable Station Test Set to test points TP11 and TP14 on circuit pack AR73 or AR74, whichever is used. Position the FUNCTION switch of TTS-28 to DBM 900Ω TERM 0. Remove circuit pack AR72. Adjust potentiometer R18 on Data Set 108D-L1 (see Fig. 8) for the output level specified on the service order sheet or circuit layout card. The output level should reach the central office equipment at a level not greater than –12 dBm. Perform this adjustment on each interconnection arrangement being installed. Replace circuit pack AR72.

DATA SET 108D-L1 DESENSITIZING PAD STRAPPING

6.04 Screw switch D contacts 1 to 2 were closed to provide maximum sensitivity (maximum gain of the receive amplifier stage) during manufacturing tests. The gain of the stage may be reduced by 6.0 dB and should be adjusted to meet the requirements of the individual installation. Table E shows the condition of the screw switch for each gain setting. The screw switch should be set according to the service order or circuit layout record card.

AR73 HYBRID NETWORK STRAPPING

6.05 Strapping of the hybrid was set during manufacturing tests by closing contacts 2 to 3 of screw switch S1. This is the best compromise

for most loop facilities. Check that contacts 2 to 3 of screw switch S1 are closed.

AR73 DIAL TONE AMPLIFIER ADJUSTMENT

6.06 Screw switch S2 controls the receive level of dial tone at the local station in 5.0-dB steps. Excessive gain can cause distortion and false operation of the interconnection arrangement. Connect the positive (+) and negative (–) terminals of the TTS-28 Portable Station Test Set to test point TP12 on circuit pack AR73 and terminal 3 (Signal Ground) of the data mounting, respectively. Open contacts 1 to 2 and 3 to 4 of screw switch S2. Position the FUNCTION switch on the TTS-28 to 0 DBM—BRDG. Operate the TEST switch on circuit pack AR72 to obtain dial tone from the central office. Close contacts 1 to 2, and if necessary 3 to 4, of screw switch S2 to obtain a meter indication between +5 and –3. An extreme loop may have a reading as low as –8 with maximum gain installed. This condition is also acceptable, but for optimum performance, adjust for a meter indication of +5 to –3 dBm.

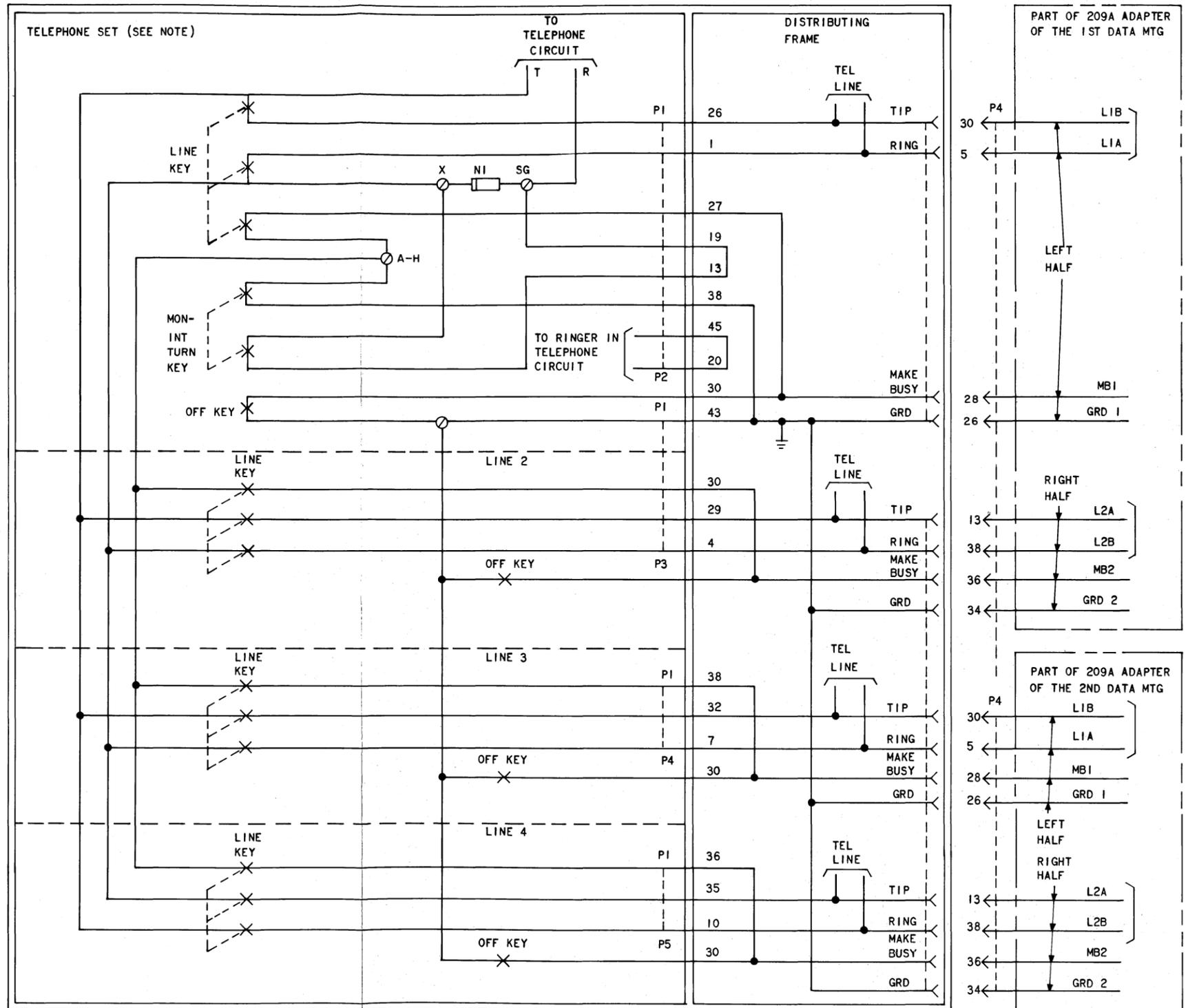
AR74 HYBRID NETWORK STRAPPING

6.07 Strapping of the hybrid was set during manufacturing tests by closing contacts 2 to 3 of screw switch S1. This is the best compromise for most loop facilities. Check that contacts 2 to 3 of screw switch S1 are closed.

AR74 DIAL TONE AND TOUCH-TONE AMPLIFIER ADJUSTMENTS

6.08 Screw switch S2 controls the gain of both the dial tone and the TOUCH-TONE amplifiers by 2.5 dB. The setting of the screw switch S2 depends upon the 1000-Hz loss of the telephone loop. Table F shows the condition of the screw switch for each gain setting. Screw switch S2 should be set according to the service order or the circuit layout record card.

- NOTE:**
 WIRING MODIFICATIONS FOR 631D12 (ADD 2-DIGIT CODE FOR DESIRED COLOR) TELEPHONE SET USED WITH INTERCONNECTION CIRCUITS
- I. ON MODULE:**
- CONNECT Y-G LEAD (SPADE-TIPPED SPARE TERMINATED ON TERMINAL 43-PLUG 1) TO TERMINAL C.
 - CONNECT Y-O (SPADE-TIPPED SPARE TERMINATED ON TERMINAL 12 KEY PLUG 1) TO TERMINAL X.
 - MOVE BL-V LEAD FROM TERMINAL R TO TERMINAL SG.
 - MOVE R LEAD FROM TERMINAL R TO TERMINAL X.
 - CONNECT A 185A NETWORK BETWEEN TERMINALS X AND SG (NETWORK NI-185A).
 - ON TB11 REMOVE AND INSULATE BL-V FROM R
V-BL FROM T
G-V FROM A-H
 - ON TBV11
 - MOVE BK LEAD FROM TERMINAL 3 TO TERMINAL 2.
 - REMOVE Y-S LEAD FROM TERMINAL 3 AND CONNECT IT TO TERMINAL F OF THE 4010B NETWORK.
- II. MECHANICAL CHANGES**
- REMOVE CHAINING BAR AND SPRING.
 - PROVIDE EACH KEY WITH P-10E836 SPRING COIL AND P-13E899 PIN.



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Fig. 12—Telephone Arrangement for Handling Up to Four Interconnection Circuits

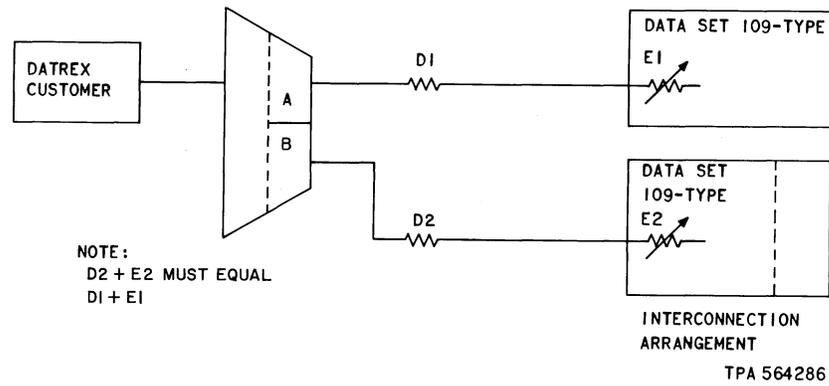


Fig. 13—Line Pad Adjustment

TABLE C

LINE PAD LINKS FOR DATA SET 109D

PAD RESISTANCE (OHMS)	INSTALL LINKS BETWEEN SCREWS
0	L and P, N and J, D and G, F and B
294	L and P, K and J, D and G, C and B
632	L and P, M and J, D and G, E and B
926	L and M, J and K, D and E, B and C
1238	L and P, J and H, D and G, B and A
1532	L and H, J and K, D and A, B and C
1870	L and H, J and M, D and A, B and E

TABLE D
LINE PAD SCREW SWITCH SETTINGS FOR DATA SET 109E

PAD RESISTANCE (OHMS)	SCREW SWITCH SETTINGS	
	OPEN S3	CLOSE S3
0	—	4, 5, 6, 7, 9, 10, 11, 12
136.2	7, 9	4, 5, 6, 10, 11, 12
266.0	6, 10	4, 5, 7, 9, 11, 12
402.2	6, 7, 9, 10	4, 5, 11, 12
522.0	5, 11	4, 6, 7, 9, 10, 12
658.2	5, 7, 9, 11	4, 6, 10, 12
788.0	5, 6, 10, 11	4, 7, 9, 12
924.2	5, 6, 7, 9, 10, 11	4, 12
1022.0	4, 12	5, 6, 7, 9, 10, 11
1158.2	4, 7, 9, 12	5, 6, 10, 11
1288.0	4, 6, 10, 12	5, 7, 9, 11
1424.2	4, 6, 7, 9, 10, 12	5, 3
1544.0	4, 5, 11, 12	6, 7, 9, 10
1680.2	4, 5, 7, 9, 11, 12	6, 10
1810.0	4, 5, 6, 10, 11, 12	7, 9
1946.2	4, 5, 6, 7, 9, 10, 11, 12	—

Note: Screw switch C-3 and C-8 should contain no screws.

TABLE E
DATA SET 108D
SCREW SWITCH D SETTINGS FOR
DESENSITIZING PAD STRAPPING

LOOP FACILITY LOSS (dB) AT 2300 Hz FROM C.O.	DESENSITIZING PAD (dB) TO BE USED	SCREW SWITCH D	
		CLOSED	OPEN
0-4.0	6	—	1-2
4.1 and greater	0	1-2	—

TABLE F
AR74 AMPLIFIER ADJUSTMENTS

LOOP FACILITY LOSS (dB) AT 1000 Hz FROM C.O.	SCREW SWITCH S2			
	DIAL TONE AMPLIFIER		TOUCH-TONE AMPLIFIER	
	OPEN	CLOSE	OPEN	CLOSE
0-2.5	1-2	—	3-4	—
2.6-5.5	—	1-2	—	3-4