DATA-PHONE® INTERCONNECTION ARRANGEMENT FOR LINE SIDE OF 10-TYPE DATA LINE CONCENTRATOR (DATREX*) DESCRIPTION

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1. GENERAL

1.01 This section covers the physical and functional description of the DATA-PHONE interconnection arrangements for the line side of the 10-type Data Line Concentrator (DATREX).

*Service mark of the Bell System

1.02 The DATA-PHONE interconnection arrangement (Fig. 1) provides DATA-PHONE stations [half-duplex (HDX) or full-duplex (FDX)] with access to a DATREX concentrator via the Direct Distance Dialing (DDD) network. One such arrangement consists of a Data Set 103G-type, a Data Set 109D-type (HDX only) or 109E-type (FDX or HDX), an AR270 circuit pack, a 208B adapter plug, and a 28A1 Data Mounting. At installations of more than six DATA-PHONE interconnection arrangements, the 113-type Data Station equipped with Data Set 113B-L1 may be used in place of the Data Set 103G-type.

1.03 Data Set 103G-type provides the means to answer incoming calls automatically and to convert the frequency-shift-keyed (FSK) tones received from the DDD lines into voltage signals conforming to the Electronics Industries Association (EIA) standard RS-232B. It also converts the EIA voltage signals received from the Data Set 109D- or E-type into FSK tones for transmission over the DDD line.

1.04 Data Set 103G-type may be mounted any place that is convenient for the customer and within 50 feet of the AR270 circuit pack. A 6-foot cable is provided on the AR270 circuit pack, and when the Data Set 103G-type (or 113-type Data Station) is to be located outside the reach of the AR270 circuit pack cable, an extension cable (eg, M25A-61) must be used. Data Set 103G-type must be equipped with long space disconnect, carrier fail disconnect, send disconnect, no common grounds, automatic answer, and answer control combined options.

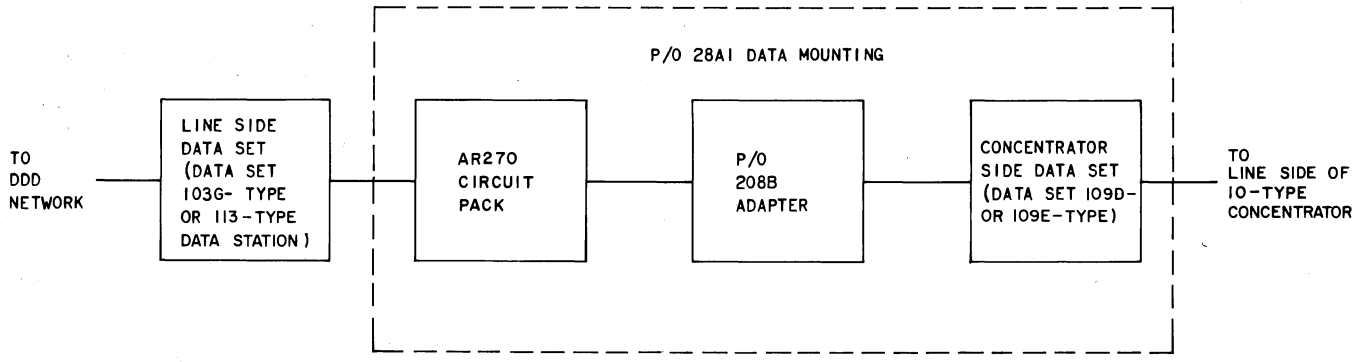

Fig. 1—DATA-PHONE Interconnection Arrangement

1.05 The AR270 circuit pack (Fig. 2) provides the logic and timing circuits necessary to the arrangement for the receive supervision feature. It mounts in the 28A1 Data Mounting (see Fig. 3) and may be arranged for either HDX or FDX operation.

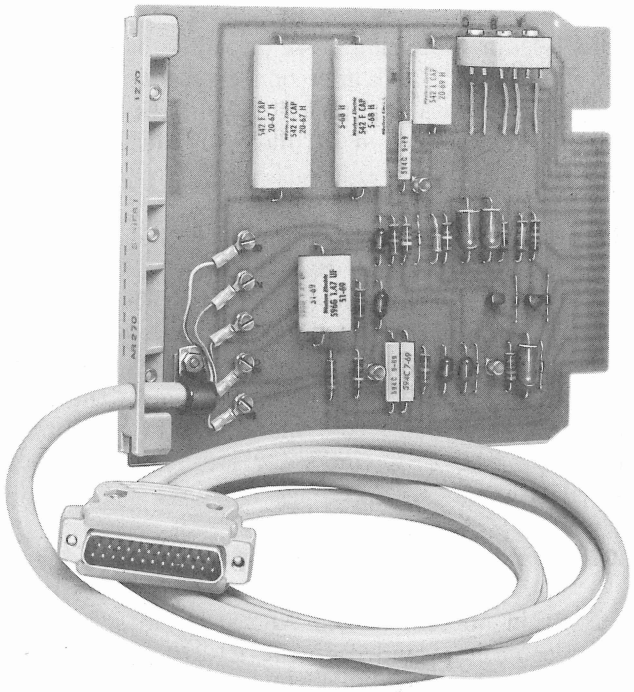

Fig. 2—AR270 Circuit Pack

1.06 Data Set 109D- or E-type provides the means for converting the EIA voltage signals received from the Data Set 103-type into baseband (bi-polar loop) currents for delivery to the concentrator line, and vice versa. It also provides a request-for-service indication to the concentrator by unsquelching its output when the connection between Data Set 103-type and the station is complete.

1.07 Data Set 109D- or E-type also mounts in the 28A1 Data Mounting (see Fig. 3). It must be equipped with mark-hold, current squelch, and space-hold crossover shift options.

1.08 The 28A1 Data Mounting is electrically divided into halves. The left half (slots 1 through 8) is associated with connector J1 and terminals 1, 2, and 3 of TB1. The right half (slots 9 through 16) is associated with connector J2 and terminals 4, 5, and 6 of TB1. The 28A1 Data Mounting is capable of housing the AR270 circuit packs and Data Sets 109D- or E-type for up to eight DATA-PHONE interconnection arrangements.

1.09 The 28A1 Data Mounting can be mounted in either 23- or 25-inch racks by adjusting the brackets on each end of the mounting. The power (+24 and −24 volts dc) required for the 28A1 Data Mounting is supplied by a KS-20575-L1 rectifier mounted in the space provided for it on the mounting, or by some other suitable external power source.

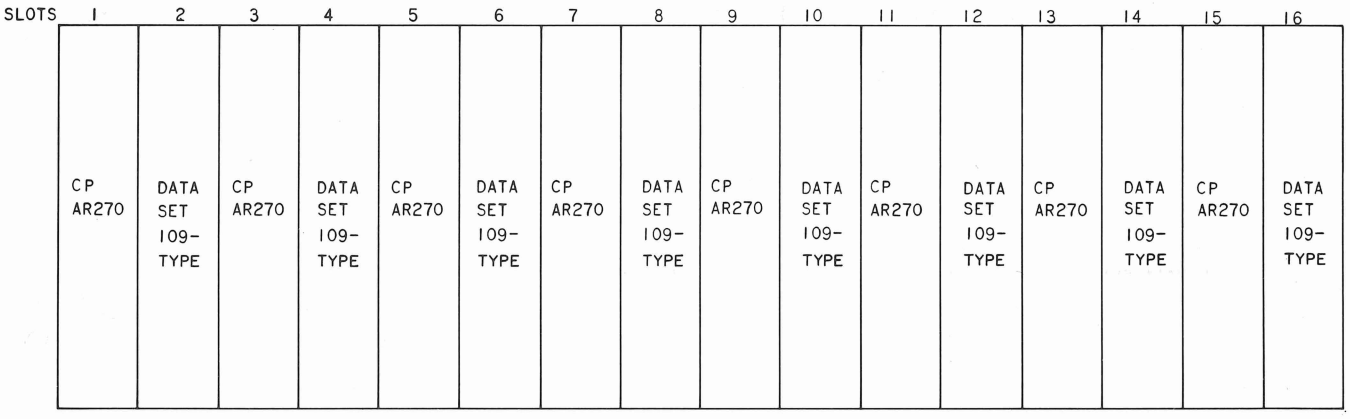

Fig. 3—28A1 Data Mounting Slot Assignments for AR270 Circuit Pack and Data Set 109E-Type

1.10 The 208B adapter provides the means for interconnecting the AR270 circuit packs and Data Set(s) 109D- or E-type through the 28A1 Data Mounting. It plugs into J1 of the data mounting

for the circuit packs and data sets in slots 1 through 8, or into J2 for those in slots 9 through 16.

2. PHYSICAL DESCRIPTION

2.01 This part covers the physical description of the AR270 circuit pack and 208B adapter. For a physical description of Data Set 103G-type or 113-type Data Station, refer to the following Bell System Practices (BSPs).

SECTION	TITLE
591-814-100	113-Type Data Station—Description and Operation
591-026-100	Data Set 103G-Type—Description and Operation

For a physical description of the 28A1 Data Mounting or Data Set 109D- or E-type, refer to the following BSPs.

SECTION	TITLE
590-102-124	28A1 Data Mounting—Identification
591-029-100	Data Set 109D-Type—Description
591-036-100	Data Set 109E-Type—Description

2.02 The AR270 circuit pack (Fig. 2) is a single printed circuit card approximately 5-1/2 inches high, 1/2 inch wide, and 7-1/3 inches deep. It weighs approximately 2 pounds. A 6-foot long cable is fed through the faceplate of the circuit pack and terminated in a KS-19088-L2 (EIA) connector. This provides the means to connect the circuit pack to the Data Set 103G-type or 113-type Data Station. The power requirements of the AR270 circuit pack are +24 volts dc and −24 volts dc, both of which are supplied via the 28A1 Data Mounting.

2.03 The 208B adapter is a KS-16785-L4 50-pin plug, strapped to provide the interconnection wiring for the AR270 circuit pack and the Data Set 109D- or E-type.

3. FUNCTIONAL DESCRIPTION

3.01 A functional block diagram of one DATA-PHONE interconnection arrangement for the line side of the 10-type Data LIne Concentrator (DATREX) when mounted in slots 1 and 2 of the 28A1 Data Mounting is given in Fig. 4. The heavy lines depict the data signal paths and the light lines depict the control leads. The plug P3 pin assignments for L1 and L2 of the Data Set 109D- or E-type in slots 4, 6, 8, 10, 12, 14, and 16 are given in Table A. The 208B adapter pin assignments are shown on Fig. 5.

3.02 The interface leads between the Data Set 103G- (or 113B-type) and the AR270 circuit pack are as follows.

(a) The ***transmitted data (BA)*** lead delivers data signals received from the AR270 circuit pack to the Data Set 103G- (or 113B-) type for transmission to the outlying station.

(b) The ***received data (BB)*** lead delivers data signals received from the outlying station to the AR270 circuit pack.

(c) The ***carrier detector (CF)*** lead delivers an indication to the AR270 circuit pack when the Data Set 103G- (or 113B-) type detects a loss of carrier.

(d) The ***signal ground (AB)*** lead interconnects the signal ground circuits of the Data Set 103G- (or 113B-) type and AR270 circuit pack.

(e) The ***data terminal ready (CD)*** lead delivers an indication to the Data Set 103G- (or 113B-) type when the concentrator fails to connect on a request for service or originates a disconnect.

3.03 The interface leads between the Data Set 109D- or E-type and AR270 circuit pack are as follows.

(a) The ***BA*** lead delivers data signals from the AR270 circuit pack to the Data Set 109D- or E-type for transmission to the concentrator.

(b) The ***BB*** lead delivers data signals received by the Data Set 109D- or E-type to the AR270 circuit pack.

(c) The ***current squelch*** (***CS*** on AR270; ***CSQ*** on 109D or E) lead delivers an indication to the Data Set 109D- or E-type when the Data Set 103G- (or 113B-) type is connected to the outlying station.

(d) The ***carrier detector*** (***CF*** on AR270; ***RS*** on 109D or E) lead delivers an indication to AR270 circuit pack when a loss of concentrator line loop current is detected by Data Set 109D- or E-type.

3.04 When the arrangement is in the idle state, the BA and BB leads of both data sets are marking. The CF, CS, CSQ, and RS leads are in the off condition and CD is on. With the CSQ lead off, the output of Data Set 109D- or E-type is squelched, thereby causing the concentrator line loop current to be zero. The concentrator recognizes this no-current state as the idle conditon.

3.05 When an outlying station places a call to the concentrator DATA-PHONE line, Data Set 103G- (or 113B-) type answers automatically. Upon completion of the connection between Data Set 103G- (or 113B-) type and the outlying station, Data Set 103G- or (113B-) type turns on its CF lead which turns on the CS lead and enables the AR270 circuit pack timing circuit.

3.06 The on condition of the CS lead unsquelches the output of Data Set 109D- or E-type, causing marking current to flow in the concentrator line loop. The concentrator recognizes this as a request for service, and provided one is available, connects the concentrator line through to a trunk. If all the trunks in the concentrator are busy, the line is put in queue until one is available, and a camp-on signal is sent to the station. Connection of the line to a trunk or camp-on causes the Data Set 109D- or E-type RS lead to turn on.

3.07 Turning on the RS lead enables the current detector circuit of AR270 circuit pack, which disables the timing circuit and holds the CD control circuit in the disabled state. As long as the CD control circuit is disabled, the CD lead will be held on.

3.08 If for some reason the RS lead is not turned on within 2.5 seconds after the Data Set 103G- (or 113B-) type CF lead turns on, the timing circuit will time out and enable the CD control circuit. The CD control circuit will then turn off the CD lead, causing Data Set 103G-type to send a long space to the outlying station, disconnect, and turn off its CF lead (3.11). This is considered a trouble condition.

3.09 A normal disconnect can be originated either by the outlying station or by the trunk-side customer-provided terminal (CPT). Typically, a disconnect is originated at the outlying station by operation of the CLEAR key on the attendant set. A disconnect can be originated by the trunk-side CPT in two ways.

(a) If the outlying station is equipped to receive the end-of-transmission (EOT) character, the trunk-side CPT can originate the disconnect by sending EOT. In this case the sequence of events is the same as for a disconnect originated by the outlying station (3.10).

(b) The trunk-side CPT can also originate a disconnect by turning off its CD lead.

3.10 When a disconnect is originated by the outlying station or by the trunk-side CPT sending an EOT, the outlying station data set will send a long space or turn off and remove carrier from the line. Data Set 103G-type will recognize the long space or loss of carrier on the line, disconnect, and turn off its CF lead. Data Set 113B-L1 will disconnect when the loss of carrier is detected and then turn off its CF lead.

3.11 When the Data Set 103G- (or 113B-) type CF lead turns off, it disables the timing circuit and turns off the CS lead. Turning off the CS lead turns off the CSQ lead which squelches the output of Data Set 109D- or E-type. This drops the concentrator line loop current to zero, turning off the RS lead. The concentrator recognizes the no loop current condition as a request for disconnect and breaks the connection to the trunk. Turning off the RS lead disables the current detector circuit, thereby restoring the arrangement to the idle state.

3.12 When the trunk-side CPT originates a disconnect by turning off its CD lead, the output of the CPT data set is squelched, causing the trunk loop current to drop to zero. The concentrator will recognize the no loop current condition on the trunk as a request for disconnect, break the connection between Data Set 109D- or E-type and the trunk-side data set, and then place a termination on the Data Set 109D- or E-type line. During the time the loop current is zero, the RS lead will be turned off which disables the current detector circuit of the AR270 circuit pack. This in turn will enable the CD control circuit, causing the CD lead to turn off for 500 milliseconds.

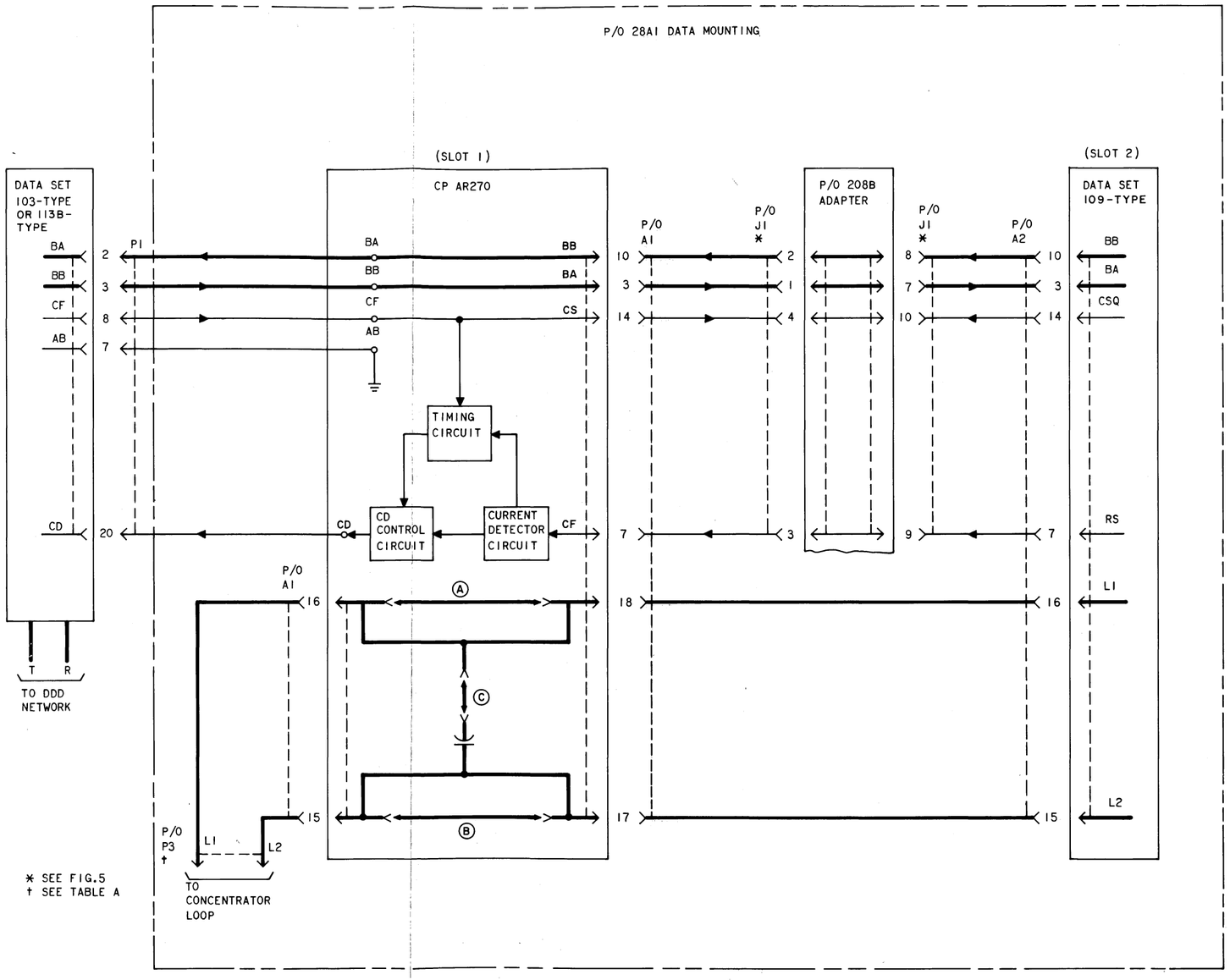

Fig. 4—Functional Block Diagram of DATA-PHONE Interconnection Arrangement Using 28A1 Data Mounting Slots 1 and 2

TABLE A

PLUG P3 PIN ASSIGNMENTS FOR L1 AND L2

DATA SET 109-TYPE IN SLOT	PIN ASSIGNMENT FOR	
	L1	L2
4	P3-28	P3-3
6	P3-30	P3-5
8	P3-32	P3-7
10	P3-34	P3-9
12	P3-36	P3-11
14	P3-38	P3-13
16	P3-40	P3-15

When the CD lead is turned off for as much as 50 milliseconds while Data Set 103G-type is connected to the line, Data Set 103G-type will send a long space to the station and then disconnect. The off condition of the CD lead will cause Data Set 113B-L1 to disconnect, thereby removing carrier from the line. In either case, this turns off the Data Set 103G- (or 113B-) type CF lead, restoring the arrangement to the idle mode.

3.13 Optimum operation of Data Set 109E-type is obtained with a capacitive line (ie, cable pair) when it is used as a FDX data set. Whenever it is used with a purely resistive line (ie, less than 6 miles of cable), a capacitor must be inserted across the line to simulate a capacitive line. This is accomplished in these arrangements by use of the A, B, and C screw switches on AR270 circuit

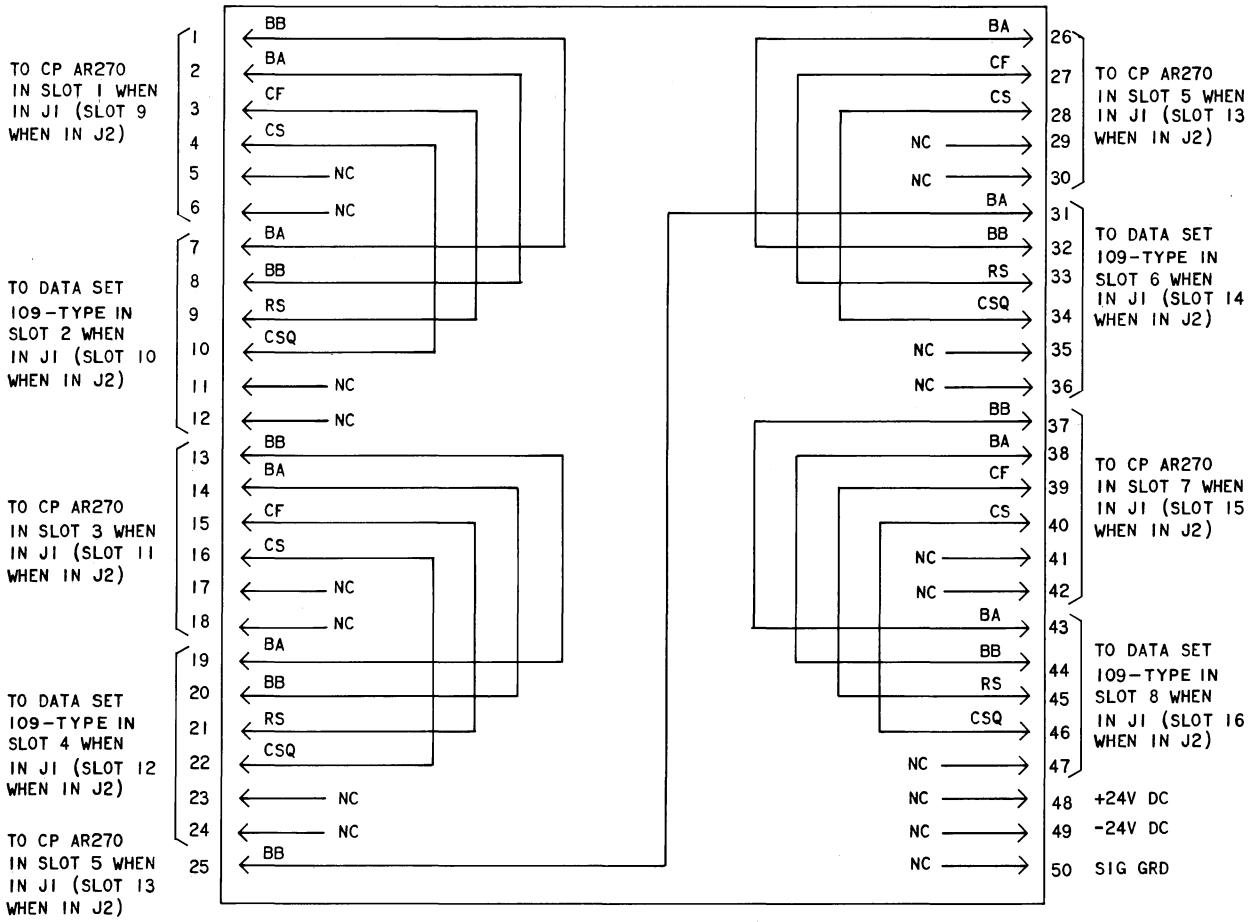

Fig. 5—208B Adapter Plug Pin Assignments

pack. Closing screw switch C and opening screw switches A and B places a capacitor across L1 and L2 of Data Set 109E-type. Opening screw switch C and closing screw switches A and B removes the capacitor from the circuit and connects L1 and L2 straight through to the concentrator line.

4. REFERENCES

4.01 The following schematic drawings, circuit descriptions, and BSPs pertain to the DATA-PHONE interconnection arrangements for the line side of the 10-type Data Line Concentrator (DATREX).

SD-&CD-1D197-01	Data Systems Station—DDD Incoming Circuit—For the DATREX* Concentrator
SD-&CD-1D176-01	Data Systems Station—28A1 Data Mounting
SD-&CD-1D198-01	Data Systems Station—Data Set 109E-Type
SD-&CD-1D096-01	Data Systems Station—Data Set 103G-Type
SD-&CD-1D208-01	Data System Station—Data Set 113B-L1 and 32A1 Data Mounting—Part of 113-Type Data Station
SD-&CD-1D172-01	Data Systems Station—Data Set 109D-Type
BSP 590-102-124	28A1 Data Mounting—Identification
BSP 591-026-Series	Data Set 103G-Type
BSP 591-036-100	Data Set 109E-Type—Description
BSP 591-810-Series	10-Type Data Line Concentrator System
BSP 591-811-Series	10-Type Data Line Concentrator
BSP 591-814-Series	113-Type Data Station