

DATA SET 109E-TYPE
MULTIPLE DATA SET ARRANGEMENT
USING 28A1 DATA MOUNTING AND 27-TYPE DATA UNIT
INSTALLATION AND CONNECTIONS

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1.04 Power supplies for the multiple data set arrangement may be external sources or a KS-20575 rectifier, which can be mounted on the 28A1 data mounting. The KS-20575 rectifier and other external power sources are not furnished with the data sets and must be ordered separately.



Do not connect power to the equipment until instructed to do so in this section.

1. GENERAL

1.01 This section covers the installation and connection procedures to be followed when installing data set 109E-type in the multiple data set arrangement. This information is limited to use of data set 109E-type with the 28A1 data mounting and 27-type data unit(s).

1.02 This section is reissued to include information on the 27B1 data unit. Since this reissue constitutes a general revision, arrows ordinarily used to denote changes have been omitted.

1.03 A multiple arrangement allows the installation of a large number of data sets in a relatively small area. There are two basic arrangements; one consists of up to sixteen data sets 109E-type, a 28A1 data mounting, *two 27A1 data units*, and an appropriate power supply. The second arrangement consists of up to eight data sets, a 28A1 data mounting, *one 27B1 data unit*, and an appropriate power supply. This arrangement provides loop-back testing capabilities. Either arrangement is capable of full-duplex (FDX) or half-duplex (HDX) operation at speeds up to 150 bauds. Connectors and cables for connecting customer-provided terminals (CPTs) to the data unit(s) are provided by the customer and should not exceed 50 feet in length. The 28A1 data mounting, 27-type data unit, power supply, and A25B connector cable (for connecting data mounting to transmission facilities) are not supplied with the data sets and are ordered individually.

1.05 The data sets and associated mounting apparatus may be installed in any location that is convenient for the customer within 50 feet of the CPT.

1.06 Ensure that the location selected by the customer for this installation has adequate space for maintenance and is within reach of a 120-Vac 60-Hz receptacle. This receptacle must *not* be under the control of a switch.

1.07 Verify that the transmission facilities to be used meet the transmission requirements specified in the section entitled Private Line Data Circuits—Voice Bandwidth Circuits for Miscellaneous Data—Overall Tests and Requirements (314-410-500).

1.08 Reference directions (left, right, front, or rear) used in this section are applicable when the installer is facing the front of the 28A1 data mounting.

1.09 No special tools are required to install the data set 109E-type multiple data set arrangement.

2. OPTIONS

2.01 Options for the data set 109E-type multiple data set arrangement vary depending on the application of the arrangement. These optional

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adjustments are made on the 27-type data unit and data set 109E-type. No adjustments are made on the 28A1 data mounting.

Data Set 109E-Type

2.02 Optional adjustments on data set 109E-type are made by means of screw switches. The five screw switches used for these adjustments are S1A, S1B, S2, S3-1, and S3-2 (Table A). Installation of options on data set 109E-type is made in accordance with specifications on the service order or circuit layout record. Options on the data set can be defined as follows.

Option Z (Current Squelch)—This option causes no voltage to be applied to the loop, independent of the signal on the BA lead, when the CSQ lead is left open or receives a negative voltage. A negative voltage on the CSQ lead will cause the data set to appear out of service.

Option Y (No Current Squelch)—The signals on the CSQ lead have no effect on the data set. Signals that appear on the BA lead are translated to the proper voltages which are applied to the loop.

Option U (BB Lead—Mark Hold)—This option enables the BB lead to go marking when a trouble condition exists if the loop current falls below minimum requirements (Section 591-036-100) for 15 ms. After 15 ms the BB lead will be held marking, independent of the received signal and the crossover shift.

Option V (BB Lead—Space Hold)—This option operates the same as option U, except that the BB lead is held spacing after 15 ms.

Option R (Space Crossover Shift)—This option sets the receiver slicing level either above or below zero, such that zero loop current causes a space to appear on the BB lead.

Option Q (Mark Crossover Shift)—This option operates the same as option R except that zero loop current causes a mark to appear on the BB lead.

Option P (No Crossover Shift)—This option sets the receiver slicing level at zero, allowing zero loop current to randomly cause a mark or space on the BB lead.

TABLE A

DATA SET 109E-TYPE SCREW SWITCH SETTINGS FOR OPTIONS

OPTION		FACTORY EQUIPPED	SCREW SWITCH SETTINGS	
			CLOSE	OPEN
CURRENT SQUELCH (Z)		✓	S2	
NO CURRENT SQUELCH (Y) *			S2	
BB LEAD	SPACE HOLD (V)		S1A†	S1B†
	MARK HOLD (U)	✓	S1B†	S1A†
CROSSOVER SHIFT	SPACE (R)		S3-2	S3-1
	MARK (Q)	✓	S3-1 & 2	
	NONE (P)		S3-1	S3-2

* This option should be installed if a 27B1 data unit is used at the installation.

† Screw should not be inserted in the center position of screw switch S1.

27A1 Data Unit

2.03 Optional connections on the 27A1 data unit are in the form of strapping arrangements. The CB, CC, CD, and CF leads appear as spade-tipped leads in the 27A1 data unit. These leads can be optionally strapped to screw terminals on the 27A1 data unit labeled RS, ON, and CA as required on the service order or circuit layout record (see Table B). Options on the 27A1 data unit can be defined as follows.

Option Z (CC to RS and CF to ON)—This option is used in the Data Line Concentrator System. When used on the trunk side of the concentrator, the signals applied by the data set to the CC lead indicate whether or not the data set is connected through the concentrator to one of the line-side data sets. These signals represent a request for service to the terminal equipment. The CC lead is positive when a connection is established.

Option Y (CC to ON and CF to RS)—This option is used for private line arrangements.

Signals applied by the data set to the CC lead indicate loss of loop current. The RS lead is held positive.

Option X (CB not terminated)—This option provides a CB lead that is not terminated. It is used for CPTs that do not require a clear-to-send indication on the CB lead.

Option W (CB to CA)—This option allows the information on the CA lead to be looped to the CB lead. This option allows data to be sent any time a request-to-send indication is received.

Option V (CB to CC)—This option couples the information on the CC lead to the CB lead.

Option T (CD to ON)—This option is used in the Data Line Concentrator System when the CPT does not provide a data-terminal-ready indication. In this case, the data terminal is ready to send data at all times. A NORMAL-OFF switch in the CD lead circuit

TABLE B
OPTION CONNECTIONS ON THE 27-TYPE DATA UNIT

DATA UNIT	OPTION	WIRING		FACTORY EQUIPPED	CONNECT SPADE-ENDED LEADS TO SCREWS AS INDICATED				
					CC	CF	CB	CD	CSQ
27A1	Z	CC and CF terminations	DLCS	√	RS	ON			
	Y		Private Line		ON	RS			
	X	CB termination	Open				*		
	W		Looped to CA	√			CA		
	V		Common to CC				†		
	T	CD termination	DLCS, no signal from CPT	√				ON	
	S		DLCS, signal from CPT; Private line, all applications					*	
27B1	R		Carrier squelch on carrier fail						RS
	Q		No carrier squelch on carrier fail	√					Spare

* Insulate and store.

† Connect to same screw as spade CC.

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allows the data set to appear out of service when the switch is in the OFF position.

Option S—This option is used when the CPT provides a data-terminal-ready indication. A positive signal on the data-terminal-ready lead conditions the data set to send or receive data. A negative signal on the data-terminal-ready lead causes the data set to appear out-of-service.

27B1 Data Unit

3.04 Optional connections on the 27B1 data unit are also in the form of strapping arrangements, but are not applicable to data set 109E-type.



Data set 109E-type should have option Y (no current squelch) installed if a 27B1 data unit is used.

3. INSTALLATION

3.01 A data set 109E-type multiple arrangement will typically be in one of two basic configurations. One configuration consists of one 28A1 data mounting, one A25B connector cable, a maximum of two 27A1 data units, and up to sixteen data sets 109E-type. The other configuration consists of one 28A1 data mounting, one A25B connector cable, one 27B1 data unit, and a maximum of eight data sets 109E-type.

28A1 Data Mounting

3.02 The 28A1 data mounting may be arranged to mount in either 23-inch (ie, KS-20018 type cabinet) or 25-inch (ie, KS-20093 type cabinet) racks by adjusting the mounting brackets on each end of the data mounting.

3.03 If the 28A1 data mounting is to be installed in a 23-inch rack, arrange the brackets so that the long sides are against the data mounting. When the data mounting is to be installed in the 25-inch rack, arrange the brackets so the short side of the bracket is against the data mounting.

3.04 When the KS-20575 rectifier is to be used as a single power source for the data sets, perform the following:

- (1) Mount the rectifier in the space provided on the left-hand side of the data mounting.
- (2) Secure the 28A1 data mounting in place.
- (3) Route the ac power cord for the rectifier.

KS-20018 Type Cabinet

3.05 If the 28A1 data mounting is to be mounted in a KS-20018 type cabinet, install it using the eight screws provided.

KS-20093 Type Cabinet

3.06 If the 28A1 data mounting is to be mounted in the KS-20093 type cabinet, the 27-type data unit must first be mounted [see 3.07(5)]. Install data mounting using the eight screws provided.



It may be necessary to route the 27-type data unit connector cable over the top or under the bottom of the data mounting. If this is the case, the data mountings should be spaced far enough apart to allow the connector plug and cable to pass between them.

27A1 Data Unit

3.07 Install and interconnect the 27A1 data unit(s) as follows.

- (1) Connect the CB, CC, CD, and CF spade-tipped leads in the 27A1 data unit(s) in accordance with options specified on the service order sheet or circuit layout record (see Table B).

Note: The screws for the 27A1 data unit(s) are supplied with the 28A1 data mounting.



Ensure that all options are properly connected on 27A1 data unit before installing it on the 28A1 data mounting.

KS-20018 Type Cabinet

- (2) Mount one 27A1 data unit in the space provided at the rear right-hand side of the 28A1 data mounting.
- (3) Connect P1 of the 27A1 data unit to connector J1 of the 28A1 data mounting.
- (4) Mount the second 27A1 data unit (if required) in the space provided at the rear left-hand side of the 28A1 data mounting.
- (5) Connect P1 of the 27A1 data unit to connector J2 of the 28A1 data mounting.

KS-20093 Type Cabinet

- (6) Mount the data units behind the customer access door on the front left-hand side of the cabinet.
- (7) Mount the 28A1 data mounting using the eight screws provided.
- (8) Route the two 27A1 data unit connector cables across the rear of the data mounting and through the hole behind connectors J1, J2, and P3 of the data mounting.
- (9) Connect P1 of the top data unit to connector J1 of the data mounting.
- (10) Connect P1 of the second (lower) data unit to connector J2 of the data mounting.

27B1 Data Unit

3.08 Install and interconnect the 27B1 data unit as follows.

- (1) Connect the CSQ spade-tipped lead to either the RS or SPARE terminal, depending on which option is specified on the service order sheet or circuit layout record. Refer to Table B for the option listing.



Ensure that all options are properly connected on the 27B1 data unit before installing it on the 28A1 data mounting.

KS-20018 Type Cabinet

- (2) Mount the 27B1 data unit in the space provided on either side at the rear of the 28A1 data mounting.
- (3) Connect P1 and P2 of the data unit to J1 and J2 of the data mounting.

KS-20093 Type Cabinet

- (4) Mount the data unit behind the customer access door on the front left-hand side of the cabinet.
- (5) Install the 28A1 data mounting using the eight screws provided.
- (6) Route the 27B1 data unit connector cable either around the end, over the top, or under the bottom of the 28A1 data mounting.
- (7) Connect P1 and P2 of the data unit to J1 and J2 of the data mounting.

4. CONNECTIONS

4.01 The interconnection arrangement for the typical data set 109E-type multiple data set arrangement using a 27A1 data unit is shown in Fig. 1. The interconnection arrangement using a 27B1 data unit is shown as Fig. 2. Installation and connection procedures for these arrangements are explained in 4.02.

Note: The procedures given in 4.02 are specifically for installations using the 27A1 data unit, but may be applied to installations using the 27B1 data unit where only the odd-numbered slots in the data mounting are used.

4.02 Connect the 28A1 data mounting to the transmission facilities as follows.

- (1) Plug the 50-pin (A25B-type) connector cable into P3 of the 28A1 data mounting.
- (2) Route the cable through the slot (behind J1, J2, and P3) in the data mounting to the intermediate distribution frame (IDF) or connector block.

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- (3) Connect leads 1 through 16 (L2 of data sets in slots 1 through 16, respectively) of the A25B-type connector cable to the IDF (or connector block).
- (4) Connect leads 26 through 41 (L1 of data sets in slots 1 through 16, respectively) of the A25B-type connector cable to the IDF (or connector block).
- (5) Cross-connect on the IDF (or connector block) L1 of loop facility 1 through 16 to leads 26 through 41, respectively, of the A25B-type cable.
- (6) Cross-connect on the IDF (or connector block) L2 of loop facility 1 through 16 to leads 1 through 16, respectively, of the A25B-type cable.

4.03 Install the data sets 109E-type as follows.



Data sets to be used for private line loops must be equipped with the option that disables the data set carrier squelch feature (option Y—screw switch S2 open). In this case, the 27A1 data unit NORMAL-OFF switch or the 27B1 data unit TEST-NORMAL switch associated with a data set so equipped will be ineffective.

- (1) Install the options as designated on the service order sheet or circuit card pack for loop 1 in a data set 109E-type (Table A).
- (2) Adjust screw switches on data set 109E-type for proper line pad resistance in loop 1 as required on the service order sheet or circuit layout record (Table C).

Note: In all data sets 109E-type associated with the trunk side of the Data Line Concentrator System, line pad resistance settings must be the same.

- (3) Repeat Steps 1 and 2 for each data set for loops 2 through 16.



Ensure that proper options and proper line pad resistance settings are installed in the data set before inserting it into its respective position.

- (4) Install the data sets in their respective positions on the 28A1 data mounting.

4.04 Connect the CPTs to the 27-type data unit(s) as follows.

- (1) Connect the plugs of the customer-provided cables from the CPTs to be associated with data sets 1 through 8 to connectors J1 through J8, respectively, of the 27A1 data unit connected to J1 of the 28A1 data mounting.
- (2) Connect the plugs of the customer-provided cables from the CPTs to be associated with data sets 9 through 16 to connectors J1 through J8, respectively, of the 27A1 data unit connected to J2 of the 28A1 data mounting.

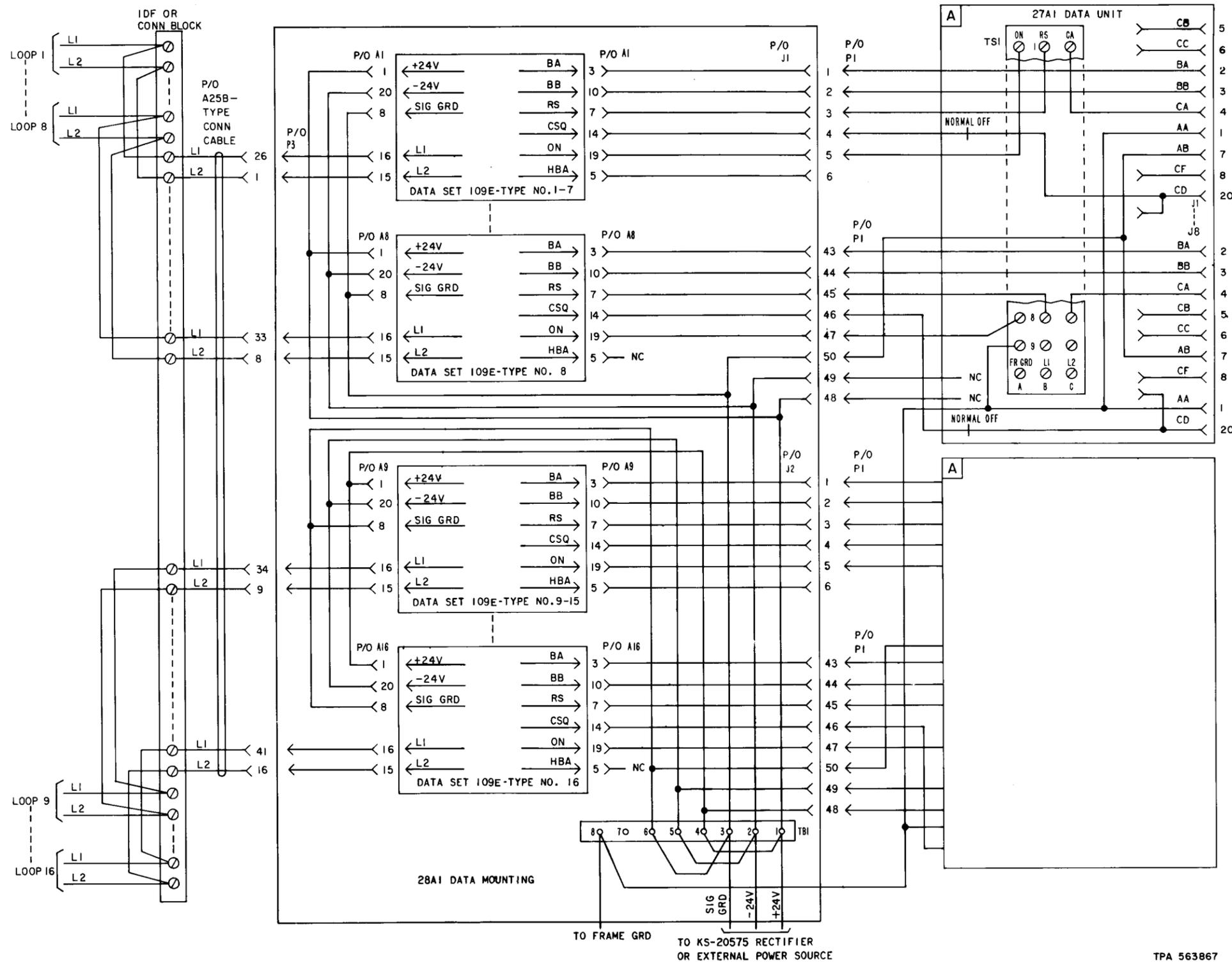
4.05 Connect power to the multiple data set arrangement using 22-gauge, or larger, solid wire for all power leads, signal ground, and frame ground.

4.06 If a separate power source is to be used for each half of the 28A1 data mounting, connect power as follows.

- (1) Connect terminals 1 and 4 of TB 1, respectively, to +24 volts dc of each source.
- (2) Connect terminals 2 and 5 of TB 1, respectively, to -24 volts dc of each source.
- (3) Connect terminals 3 and 6 of TB 1, respectively, to signal ground of each source.
- (4) Connect the FR GRD terminal of the 27-type data unit(s) and terminal 8 of TB 1 of the 28A1 data mounting to frame ground.

4.07 If only one power source is to be used for both halves of the 28A1 data mounting, connect power as follows.

- (1) Strap terminals 1, 2, and 3 of TB 1 on the 28A1 data mounting to terminals 4, 5, and 6, respectively.
- (2) Connect the +24 volts dc lead of the power source to terminal 1 of TB 1.
- (3) Connect the -24 volts dc lead of the power source to terminal 2 of TB 1.
- (4) Connect SIG GRD lead of the power source to terminal 3 of TB 1.



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Fig. 1—Data Set 109E-Type Multiple Data Set Arrangement Using a 27A1 Data Unit, Interconnection Diagram

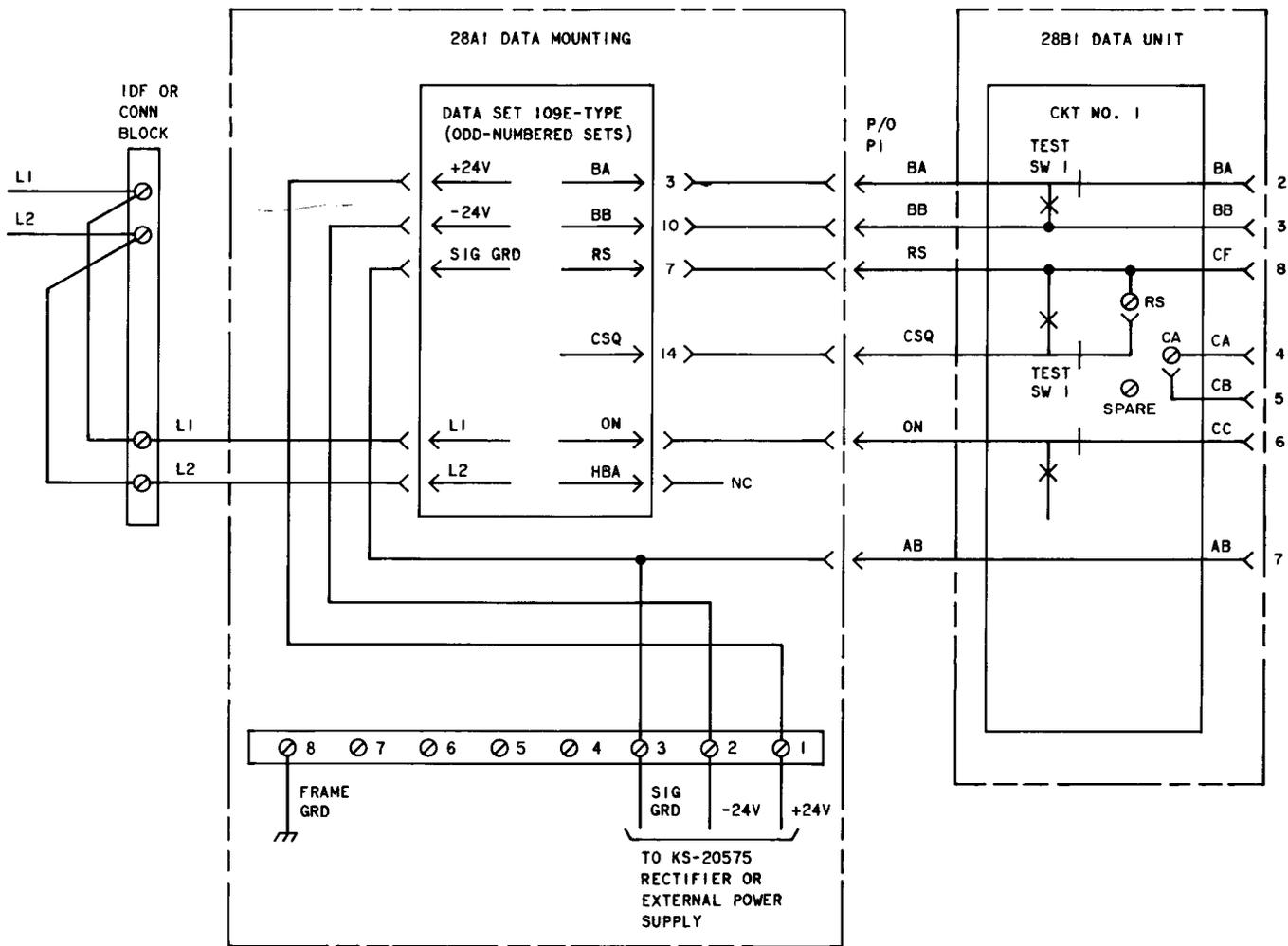


Fig. 2—Data Set 109E-Type Multiple Data Set Arrangement Using a 27B1 Data Unit, Interconnection Diagram

- (5) Connect the FR GRD terminal of the 27-type data unit(s) and terminal 8 of TB 1 on 28A1 data mounting to frame ground.
- (6) If the KS-20575 rectifier is used as the power source, connect the FR GRD terminal of this rectifier to terminal 8 of TB 1 on the 28A1 data mounting.
- (7) Connect the ac power cord to a 115-volt 60-Hz ac outlet.

Note: Do not connect frame ground to signal ground unless requested by the customer.

4.08 Perform the installation tests as described in the section entitled Data Set 109E-Type Multiple Data Set Arrangements—Test Procedures (591-036-501).

TABLE C
LINE PAD ADJUSTMENTS

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