DATA SET 209A-L1
TRANSMITTER-RECEIVER
INSTALLATION AND CONNECTIONS

CONTENTS PAGE

1. GENERAL

1.01 This section contains information concerning the installation and connection of data set (DS) 209A-L1 for point-to-point, point-to-point multiplexing, and digital data system off-net service. Information is included pertaining to the installation and connection of DS 209A-L1 for the following multiplex systems:

- Point-to-point multiplexing
- Many-point multiplexing
- One-to-many multiplexing.

A description of the various systems using DS 209A-L1 is provided in Section 592-032-100. Additional information required when installing DS 201C, 208A-L1A, or 209A-L1 (at 7200 bps) for extended service is included in this section.

1.02 This section is reissued to incorporate information previously contained in Section 592-032-101. Data set option descriptions have been removed from Section 592-032-100 and included in this section. This issue contains connections to provide alternate switched network backup using data auxiliary sets (DAS) 829- or 828A-type and 828C. Since this issue constitutes a general revision, arrows which are ordinarily used to denote changes have been omitted.

1.03 DS 209A-L1 should be installed in conformance with existing installation practices. Refer to the section entitled Data Sets—General Installation and Connection Information (590-020-200). DAS 828- or 829-types are recommended for use with DS 209A-L1.

1.04 The data set operates in an environment of 20 to 95 percent relative humidity from 40 to 75°F, or 20 to 40 percent relative humidity from 75 to 120°F.

1.05 It is preferred that the data set be installed apart from the customer-provided equipment (CPE) on a nearby desk, table, stand, or in a Bell System-provided equipment cabinet. DS 209A-L1 must be located near the CPE, for the interface cord supplied by the customer must not exceed 50 feet in length [to limit stray capacitance and to conform to Electronic Industries Association (EIA) standards]. To minimize inductive interference to data signals on the telephone (data) line, the line should ***not*** be carried in the same run as cable between the data set and CPE or lines connected to teletypewriter services. If this condition cannot be met, it will be necessary to run the telephone (data) line in type-SK (shielded) station wire between the data set and the cable distribution terminal or building entrance. Ground the shield at one end only, preferably at the distribution panel.

1.06 DS 209A-L1 requires an ac outlet to accept the 3-prong plug on the KS-14532-L24 power cord. To prevent the data set from being turned off accidentally, the outlet should not be under control of a switch.

1.07 Four 25-pin KS-19087-L2 connectors are provided at the rear of the data set for connection to customer interfaces which conform to the electrical characteristics of EIA Standard RS-232-C. These connectors are designed to mate with a customer-provided Cinch or Cannon DB-19604-432 plug equipped with a DB-51226-1 hood and wired in accordance with Table A. Connection between the data set and DAS 829- or 828-type is made with an M8K cord which comes with the data set.

1.08 Removal of the front faceplate is required for access to the option switch panel and to the circuit packs (CPs). This faceplate can be removed by gently squeezing it at top and bottom and pulling forward. To replace the faceplate, position it properly, gently squeeze at top and bottom, and push into place.

1.09 In order to gain access to the CPs, remove the front faceplate and CP locking bar. Each CP can be removed by pulling forward on the plastic tab. To replace the CP, align it in the proper slot and push gently into place. The locking bar should be reinstalled before replacing the faceplate.

1.10 Current factory models of DS 209A-L1 are equipped with a guard to prevent inadvertant operation of the multiplex selector switch. Earlier production models can be equipped with a guard at telco expense by ordering:

___ Guard(s) Com. Code 841-571-706.

The guard can be installed on the data set housing using Dow-Corning 732 RTV adhesive, or equivalent. Clean both surfaces with alcohol before applying adhesive, and locate the guard approximately 5/16-inch from the front edge of the data set housing.

TABLE A

CUSTOMER INTERFACE

PIN NO.	FUNCTION	DS 209A-L1 MNEMONIC	EIA DESIGNATION (RS-232-C)	NOTES
1	Frame Ground	FG	AA	
2	Send Data	SD	BA	
3	Receive Data	RD	BB	
4	Request to Send	RS	CA	
5	Clear to Send	CS	CB	
6	Data Set Ready	DSR	CC	
7	Signal Ground	SG	AB	
8	Carrier on Delayed	COD	CF	
9	+12V	CI9 (+12V)	Reserved for Data Set Testing	1
10	—12V	CI10 (—12V)	Reserved for Data Set Testing	1
11	Equalizer Mode	QM	Unassigned	1, 2
15	Serial Clock Transmit	SCT	DB	
16	Divided Clock Transmit	DCT	SBB	3
17	Serial Clock Receive	SCR	DD	
18	Divided Clock Receive	DCR	Unassigned	1, 2
21	Signal Quality Detector	COV	CG	
24	Serial Clock Transmitter External	SCTE	DA	
25	+5V	CI25 (+5V)	Unassigned	1, 2

Note 1: Available only at customer interface 1.

Note 2: These pins are unassigned by RS-232-C. DS 209A-L1 provides these functions to the leads of connector 1 only.

Note 3: DS 209A-L1 provides a DCT signal on this pin of connector 1 only. RS-232-C assigns SBB to this pin.

2. OPTIONS

2.01 DS 209A-L1 is provided with a number of features by options which can be installed prior to placing the data set in service. The options to be installed in the data set should be specified on the service order. All options, with the exception of the ground option, are installed and removed with the switches shown in Fig. 1. Factory-installed options are indicated in Fig. 1 by an asterisk (*). Options installed in the data set should be identified on the option label attached to the front of the power unit. Recommended data set options for system applications are shown in Figs. 2, 3, and 4.

A. Customer Options

2.02 ***Internal or External Timing:***

- With internal timing, the data set provides serial clock to the customer on the DB lead.
- With external timing, the customer provides serial clock to the data set on the DA lead of connector 1 only. This clock must be 2400, 4800, 7200, or 9600 Hz, depending upon the multiplexing arrangement, and must be stable to $\pm 2.5 \times 10^{-7}$ (± 25 ppm). On data sets with external timing, the DB signal is present and is phase-locked to the clock from the customer on the DA lead. If the elastic store enable 1 in option is used, external timing by the customer cannot be used.

2.03 ***Data Set Ready (CC) ON in AL Mode:*** When the data set is in the analog loop-back test mode, the CC interface lead is normally ***off.*** Enabling this option permits the CC lead to remain ***off*** when the AL switch is depressed. This enables some duplex CPE to perform a loop-back test through the data set.

2.04 ***Slave:*** When the slave option is installed in DS 209A-L1, the recovered symbol clock of the receiver is internally connected to DA and the transmitter is timed from the receiver. This option is recommended for use in many-point and one-to-many multiplexing systems.

2.05 ***Elastic Store Enable:*** There are four elastic stores, one associated with each of the four interface connectors. The elastic store options compensate for timing phase differences between the BA and DB leads of DS 209A-L1 and the BB and DD leads of the extension data sets (201C/208A/209A). This option is recommended when DS 209A-L1 is installed in one-to-many or many-point multiplexing systems.

2.06 ***Carrier Control:***

- With the switched carrier and switched request-to-send option, the data set transmitter is under control of the CA lead. The data set transmitter turns off within 3.5 ms after CA turns ***off.*** The CA-CB delay for switched carrier can vary between 8 and 200 ms, depending on CPE control of the CA lead and the 150-ms retraining sequence induced by option XF.
- With the continuous carrier and switched request-to-send option, the transmitter remains on continually and transmits MARK signals when CA is ***off.*** Each customer interface has a CA-CB delay of 8 ms. Continuous carrier operation (either XG or XI) is recommended for all system applications.
- With the continuous carrier and continuous request-to-send option (XI), request-to-send is held ***on*** internally, and the transmitter remains on continuously and transmits MARK signals to maintain synchronization. The CB lead is ***on*** continuously except during an auto retrain sequence.

Only one of the four carrier control options (XF, XG, XH, XI) should be installed per data set.

2.07 ***Ground Option:*** When this option is installed, frame ground (AA) is strapped to signal ground (AB). This option is normally installed but can be disconnected by the installer if the customer specifies a different grounding arrangement.

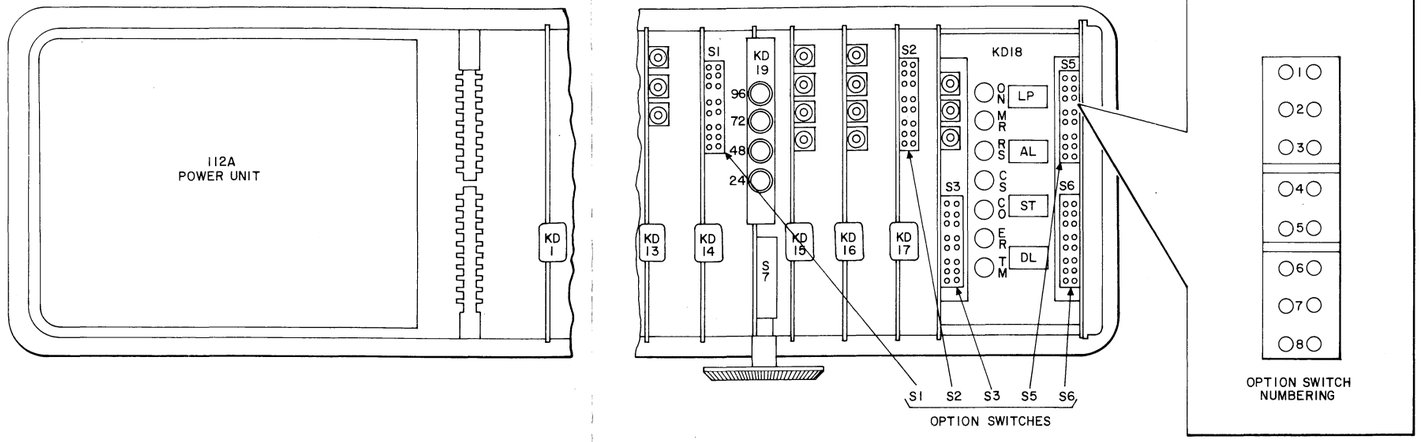
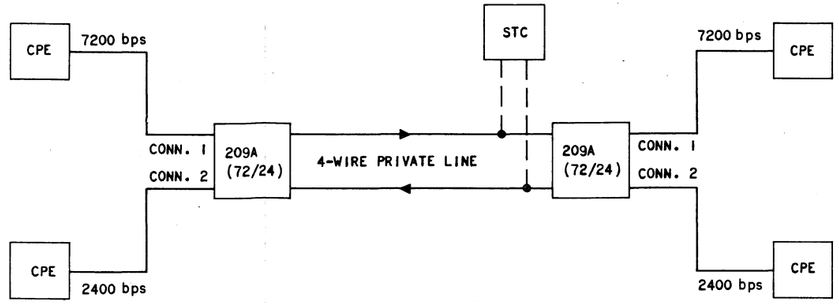


Fig. 1—Location of Option Switches

OPTION	FEATURE	REMOVE JACK		INSTALL JACK		PROVIDE
		SWITCH	POSITION	SWITCH	POSITION	
WA	ELASTIC STORE ENABLE 1 IN	S3	4	S2	1	ONE PER STATION
WB *	ELASTIC STORE ENABLE 1 OUT	S2	1	S3	4	
WC	ELASTIC STORE ENABLE 2 IN	S3	6	S2	3	ONE PER STATION
WD *	ELASTIC STORE ENABLE 2 OUT	S2	3	S3	6	
WE	ELASTIC STORE ENABLE 3 IN	S2	4	S2	5	ONE PER STATION
WF *	ELASTIC STORE ENABLE 3 OUT	S2	5	S2	4	
WG	ELASTIC STORE ENABLE 4 IN	S2	8	S2	7	ONE PER STATION
WH	ELASTIC STORE ENABLE 4 OUT	S2	7	S2	8	
WI	SLAVE IN	S6	4	S6	5	ONE PER STATION
WJ *	SLAVE OUT	S6	5	S6	4	
WK *	COMPROMISE EQUALIZER RECEIVE SLOPE IN	S1	5	S1	4	ONE PER STATION
WL	COMPROMISE EQUALIZER RECEIVE SLOPE OUT	S1	4	S1	5	
WM	COMPROMISE EQUALIZER RECEIVE PHASE HI	S1	2 OR 3	S1	1	ONE PER STATION
WN *	COMPROMISE EQUALIZER RECEIVE PHASE OUT	S1	1 OR 3	S1	2	
WO	COMPROMISE EQUALIZER RECEIVE PHASE LO	S1	1 OR 2	S1	3	
WP *	COMPROMISE EQUALIZER TRMTR SLOPE IN	S3	3	S3	1	ONE PER STATION
WQ	COMPROMISE EQUALIZER TRMTR SLOPE OUT	S3	1	S3	3	
WR	COMPROMISE EQUALIZER TRMTR PHASE HI	S1	7 OR 8	S1	6	ONE PER STATION
WS *	COMPROMISE EQUALIZER TRMTR PHASE OUT	S1	6 OR 8	S1	7	
WT	COMPROMISE EQUALIZER TRMTR PHASE LO	S1	6 OR 7	S1	8	
XF	4W SWITCHED CARRIER (SWITCHED RS) AND AUTO RETRAIN	S5	6 OR 7 OR 8	S5	3	ONE PER STATION
XG *	4W CONTINUOUS CARRIER (SWITCHED RS) AND AUTO RETRAIN	S5	3 OR 7 OR 8	S5	6	
XH	4W SWITCHED CARRIER (SWITCHED RS) AND NO AUTO RETRAIN	S5	3 OR 6 OR 8	S5	7	
XI	4W CONTINUOUS CARRIER (CONTINUOUS RS) AND AUTO RETRAIN	S5	3 OR 6 OR 7	S5	8	

OPTION	FEATURE	REMOVE JACK		INSTALL JACK		PROVIDE
		SWITCH	POSITION	SWITCH	POSITION	
YC *	INTERNAL TIMING	S6	3	S6	2	ONE PER STATION
YD	EXTERNAL TIMING	S6	2	S6	3	
YI *	DAS 828- OR 829-TYPE USED	S3	8	S6	6	ONE PER STATION
YJ	DAS 828- OR 829-TYPE NOT USED	S6	6	S3	8	
YM	DSR ON IN ANALOG LOOP MODE	S6	8	S5	1	ONE PER STATION
YN *	DSR OFF IN ANALOG LOOP MODE	S5	1	S6	8	
YW	1-SECOND HOLDOVER OUT	S5	5	S5	4	ONE PER STATION
YX *	1-SECOND HOLDOVER IN	S5	4	S5	5	

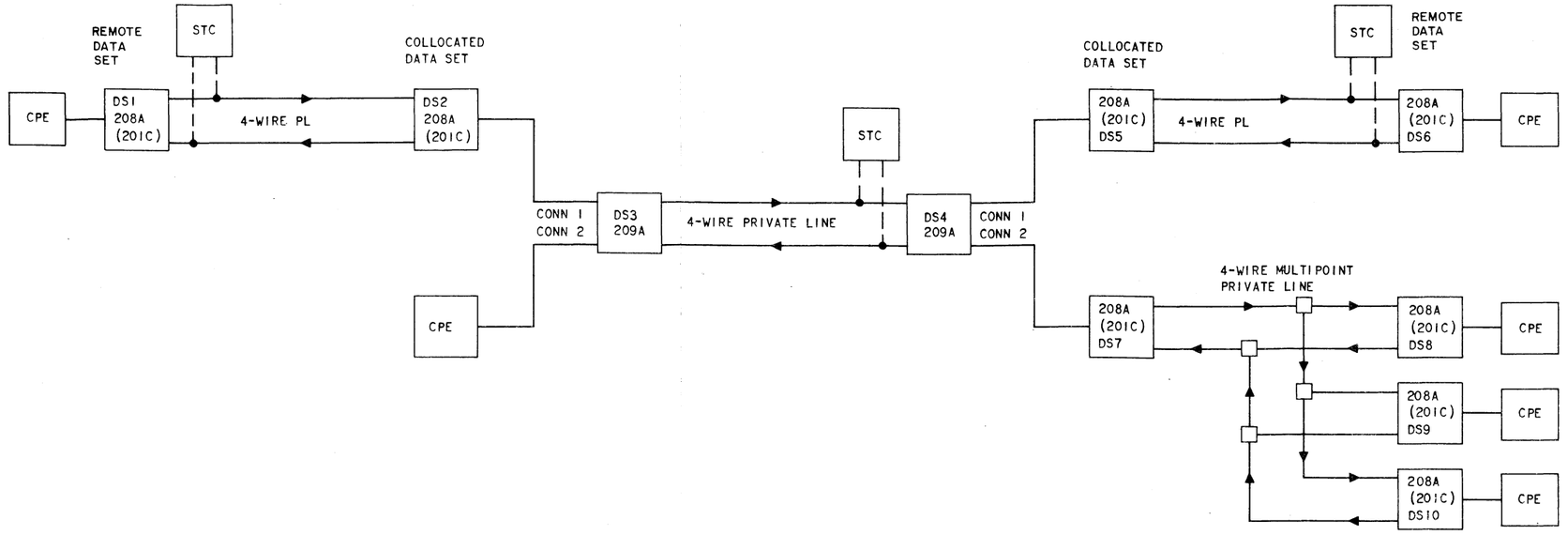
* FACTORY INSTALLED.



SELECT	DATA SET 209A OPTIONS	SELECT
* 72/24, 48/48, 48/24/24, OR 4-24	MULTIPLEX OPTION	* 72/24, 48/48, 48/24/24, OR 4-24
INTERNAL	TRANSMITTER TIMING	INTERNAL
CONTINUOUS	CARRIER CONTROL	CONTINUOUS
PER CPEs	REQUEST-TO-SEND CONTROL	PER CPEs
ALL DISABLED †	ELASTIC STORES	ALL DISABLED †
NOT PROVIDED †	SLAVED TIMING	NOT PROVIDED †
PER CPEs	DATA SET READY CONDITION IN AL MODE	PER CPEs
PER CPEs OR LOCAL PRACTICE	GROUNDING	PER CPEs OR LOCAL PRACTICE
IN	1-SECOND HOLDOVER	IN

* THE MULTIPLEX OPTION MUST BE THE SAME FOR BOTH DATA SETS.
† REQUIRED OPTION.

Fig. 2—Typical Options for Point-to-Point or Point-to-Point Multiplex Systems



(REMOTE) SELECT	DATA SET 208A OPTIONS ON PT-TO-PT EXTENSION CHANNEL	(COLLOCATED) SELECT
EXTERNAL *	TRANSMITTER TIMING	EXTERNAL *
CONTINUOUS	CARRIER CONTROL	SWITCHED *
0 OR 8 MS PER CPE	REQUEST TO SEND OPERATION	SWITCHED *
IN	1-SECOND HOLDOVER	IN
NOT USED *	NEW SYNC	NOT USED *
CC ON OR CC OFF PER CPE	DATA SET READY CONDITION IN AL TEST MODE	CC OFF IN AL TEST MODE *
PER CPE OR LOCAL PRACTICE	GROUNDING	AA CONNECTED TO AB *

(REMOTE) SELECT	DATA SET 201C OPTIONS ON PT-TO-PT EXTENSION CHANNEL	(COLLOCATED) SELECT
EXTERNAL *	TRANSMITTER TIMING	EXTERNAL *
CONTINUOUS	CARRIER CONTROL	SWITCHED *
0 OR 7 MS PER CPE	REQUEST-TO-SEND/CLEAR-TO-SEND DELAY	7 MS *
NOT USED *	NEW SYNC	NOT USED *
PER CPE OR LOCAL PRACTICE	GROUNDING	AA CONNECTED TO AB *

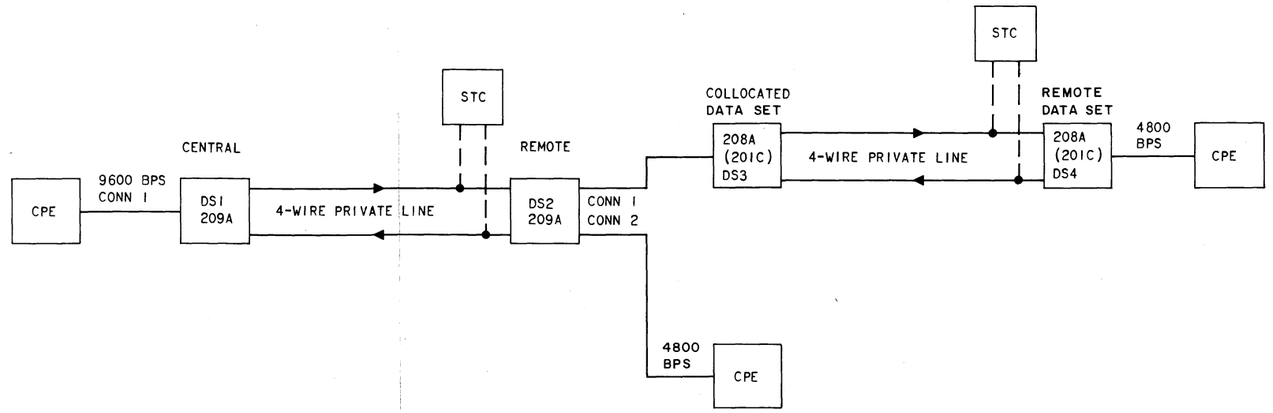
SELECT	DATA SET 209A OPTIONS	SELECT
ANY BUT 96 (48/48 FOR EXAMPLE SHOWN)	MULTIPLEX OPTION	ANY BUT 96 (48/48 FOR EXAMPLE SHOWN)
INTERNAL *	TRANSMITTER TIMING	INTERNAL *
CONTINUOUS *	CARRIER CONTROL	CONTINUOUS *
CONTINUOUS †	REQUEST-TO-SEND CONTROL	CONTINUOUS †
1 IN 2-4 OUT (FOR EXAMPLE SHOWN)	ELASTIC STORES *	1 & 2 IN 3 & 4 OUT (FOR EXAMPLE SHOWN)
OUT IN	SLAVED TIMING ‡ *	IN OUT
PER CPE AT POLLING CENTRAL (FOR EXAMPLE SHOWN)	DATA SET READY CONDITION IN AL TEST MODE	CC OFF IN AL TEST MODE *
AA CONNECTED TO AB *	GROUNDING	AA CONNECTED TO AB *
IN	1-SECOND HOLDOVER	IN

† NOT REQUIRED EXCEPT FOR MULTIPOINT
‡ SLAVE TIMING IS USED IN ONE 209A OR THE OTHER, BUT NOT BOTH.
* REQUIRED

(COLLOCATED) SELECT	DATA SET 208A OPTIONS ON MULTIPOINT EXTENSION CHANNEL	(REMOTE) SELECT
EXTERNAL *	TRANSMITTER TIMING	EXTERNAL *
SWITCHED *	CARRIER CONTROL	SWITCHED *
SWITCHED *	REQUEST TO SEND OPERATION	SWITCHED *
OUT *	1-SECOND HOLDOVER	IN *
NOT USED *	NEW SYNC	NOT USED *
CC OFF IN AL TEST MODE *	DATA SET READY (CC) CONDITION IN AL TEST MODE	CC ON OR CC OFF PER CPE
AA CONNECTED TO AB *	GROUNDING	PER CPE OR LOCAL PRACTICE

(COLLOCATED) SELECT	DATA SET 201C OPTIONS ON MULTIPOINT EXTENSION CHANNEL	(REMOTE) SELECT
EXTERNAL *	TRANSMITTER TIMING	EXTERNAL *
SWITCHED *	CARRIER CONTROL	SWITCHED *
7 MS *	REQUEST-TO-SEND/CLEAR-TO-SEND DELAY	7 MS *
NOT USED *	NEW SYNC	NOT USED *
AA CONNECTED TO AB *	GROUNDING	PER CPE OR LOCAL PRACTICE

Fig. 3—Typical Options for Many-Point Multiplex System



(CENTRAL) SELECT	DATA SET 209A OPTIONS	(REMOTE) SELECT
96*	MULTIPLEX OPTION	ANY MULTIPLEX OPTION
INTERNAL *	TRANSMITTER TIMING	INTERNAL *
CONTINUOUS	CARRIER CONTROL	CONTINUOUS *
PER CPE	REQUEST TO SEND CONTROL	CONTINUOUS WITH EXTEN CHANNEL (CONT OR SWITCHED W/O EXTEN CHANNEL)
ALL OUT *	ELASTIC STORES	1 IN * 2-4 OUT * (FOR EXAMPLE SHOWN)
OUT	SLAVED TIMING † ‡	IN (WITH EXTENSION CHANNEL) OUT (WITHOUT EXTENSION CHANNEL)
PER CPE	DATA SET READY CONDITION IN AL TEST MODE	CC OFF IN AL TEST MODE
PER CPE OR LOCAL PRACTICE	GROUNDING	AA CONNECTED TO AB * (ONLY IF USED WITH EXTENSION)
IN	1-SECOND HOLDOVER	IN

* REQUIRED
† REQUIRED WHEN AT LEAST ONE EXTENSION IS USED
‡ SLAVE TIMING IS USED IN ONE 209A OR THE OTHER, BUT NOT BOTH

WHEN AN EXTENSION CHANNEL IS USED, OPTIONS MUST BE SELECTED IN THE COLLOCATED AND REMOTE DATA SETS (EITHER 208A OR 201C).

(COLLOCATED) SELECT	DATA SET 208A OPTIONS ON PT-TO-PT EXTENSION CHANNEL	(REMOTE) SELECT
EXTERNAL *	TRANSMITTER TIMING	EXTERNAL *
SWITCHED *	CARRIER CONTROL	CONTINUOUS
SWITCHED*	REQUEST-TO-SEND OPERATION	0 OR 8 MS PER CPE
IN	1-SECOND HOLDOVER	IN
NOT USED *	NEW SYNC	NOT USED *
CC OFF IN AL TEST MODE *	DATA SET READY (CC) CONDITION IN AL TEST MODE	CC ON OR CC OFF PER CPE
AA CONNECTED TO AB *	GROUNDING	PER CPE OR LOCAL PRACTICE
(COLLOCATED) SELECT	DATA SET 201C OPTIONS ON PT-TO-PT EXTENSION CHANNEL	(REMOTE) SELECT
EXTERNAL *	TRANSMITTER TIMING	EXTERNAL *
SWITCHED *	CARRIER CONTROL	CONTINUOUS
7 MS *	REQUEST-TO-SEND/CLEAR-TO-SEND DELAY	0 OR 7 MS PER CPE
NOT USED *	NEW SYNC	NOT USED *
AA CONNECTED TO AB *	GROUNDING	PER CPE OR LOCAL PRACTICE

Fig. 4—Typical Options for One-to-Many Multiplex System

B. Telco Options

2.08 In addition to the customer options, DS 209A-L1 provides the following options for selection by the telco employee.

2.09 ***DAS 828- or 829-Type Used:*** This option is installed when these DASs are used as terminations for the data channel. In normal operation, the DAS provides a contact closure between pins 11 and 13 of the telephone interface. Facility loop-back or alternate voice operation of the DAS opens this circuit and causes CC to turn ***off*** when this option is installed in DS 209A-L1. When this option is not installed, the CC lead indicates only the status of DS 209A-L1.

2.10 ***1-Second Holdover:*** With this option installed, the CF lead remains ***on*** for 1 second after loss of line signal. This allows the receiver to maintain synchronization and equalization with the distant-end transmitter for up to 1 second in the absence of a received line signal. This option is recommended when the distant-end DS 209A-L1 is optioned for continuous carrier.

2.11 ***Automatic Equalizer Retraining:*** With this option, the data set automatically resynchronizes and restarts the automatic equalizer when the received signal quality degrades to approximately 1 bit error in 100 bits of data. Duplex operation of the data channel is required to achieve automatic retraining. The retrain sequence causes CB and CF to turn ***off*** on the data set which requires reequalization, while only CB turns ***off*** on the distant-end data set. During retrain the ***off*** state on any one of these leads is maintained for not more than 200 ms. The total time for auto retrain is less than 240 ms, excluding channel propagation delay time. This option is required in either continuous carrier or continuous request-to-send operation. It is recommended in switched carrier operation, but not required.

2.12 ***Compromise Equalizer:*** There are five transmitter equalizer settings and five receiver equalizer settings available. Fixed amplitude and delay equalization are selected by these settings. The proper equalizer setting depends on the characteristics of the transmission facility and is determined for each installation by minimizing a voltage magnitude at two signal quality test points during installation. Final equalizer setting must result in a test voltage of less than −2 volts. Option WP ***or*** WQ must be installed to permit the data set transmitter to function properly. Likewise, option WK ***or*** WL must be installed to allow the data set receiver to function.

2.13 When the data set is installed, it should be checked to verify that the correct options (per the service order) are connected before requesting a loop-back test from the serving test center (STC).

2.14 Option strapping switches S1 and S2 are located on KD14 and KD17 CPs, respectively. Option strapping switches S3, S5, and S6 are located on KD18 CP. Each switch is divided into eight sections, numbered 1 through 8 from top to bottom. Options are installed or removed by inserting or removing shorting jacks on the option switches in accordance with Fig. 1. The data set is shipped with spare shorting jacks attached to the front of the data set heat sink.

2.15 The data set is supplied from the factory with a strap at the bottom of the power supply terminal strip, which is located at the rear of the data set. This strap connects frame ground to signal ground and can be disconnected during installation if the customer specifically requests a different grounding arrangement. To disconnect the strap, loosen the screws, pull back on the strap until the connection is broken, and tighten the strap under the frame ground (FG) screw.

3. CONNECTIONS

3.01 This part contains the information for connecting DS 209A-L1 to DAS 829-type or to DAS 828A-L1 and 828C. For further information pertaining to these data auxiliary sets, refer to Part 6.

3.02 Refer to Fig. 5 and 6 for connections between DS 209A-L1 and DAS 829-type. The data-only connection is shown in Fig. 5 and the data/voice connection is shown in Fig. 6. Additional information pertaining to DAS 829-type is contained in Sections 598-082-100 and 598-082-101.

3.03 Refer to Fig. 7 and 8 for connections between DS 209A-L1 and DAS 828A-type. The data-only connection is shown in Fig. 7 and the data/voice connection is shown in Fig. 8. For further information pertaining to DAS 828A-type, refer to Sections 598-080-100 and 598-080-101.

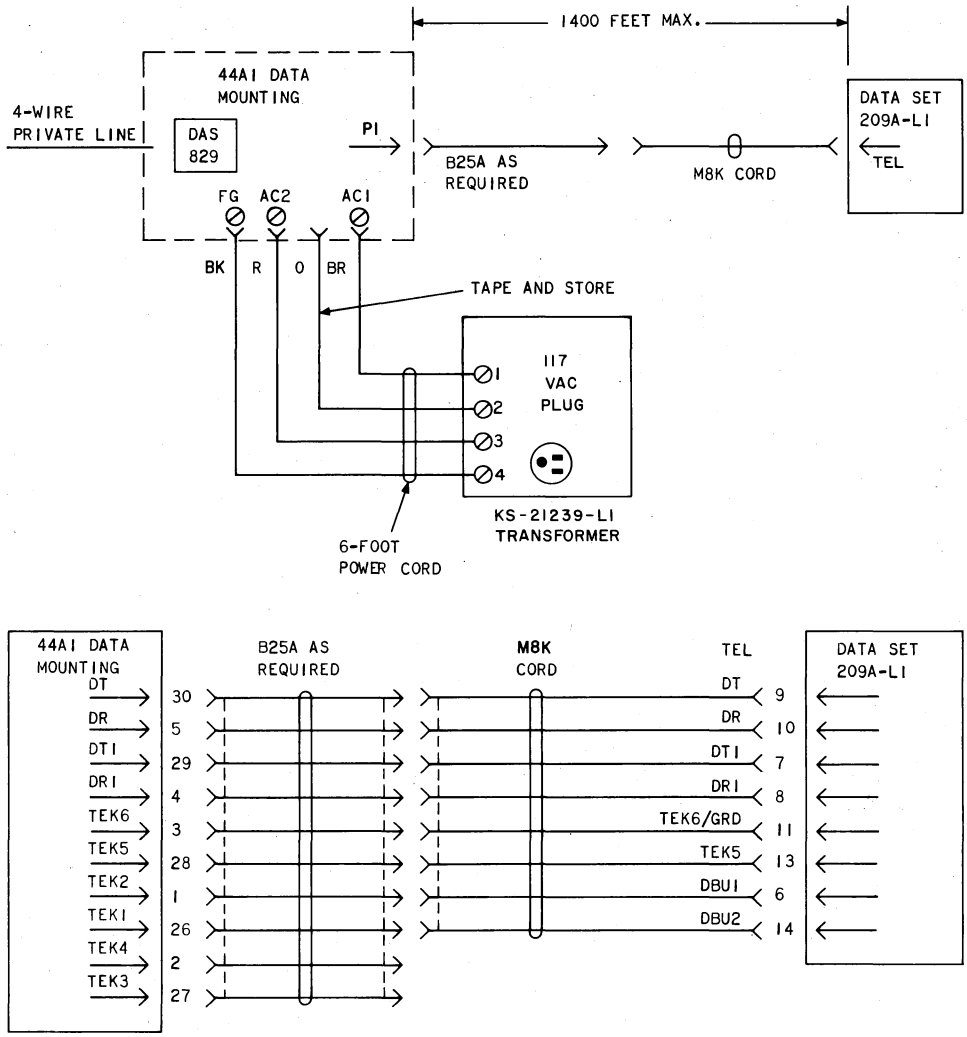


Fig. 5—Block and Connection Diagram for Data Set 209A-L1 Using DAS 829-Type—Data Only

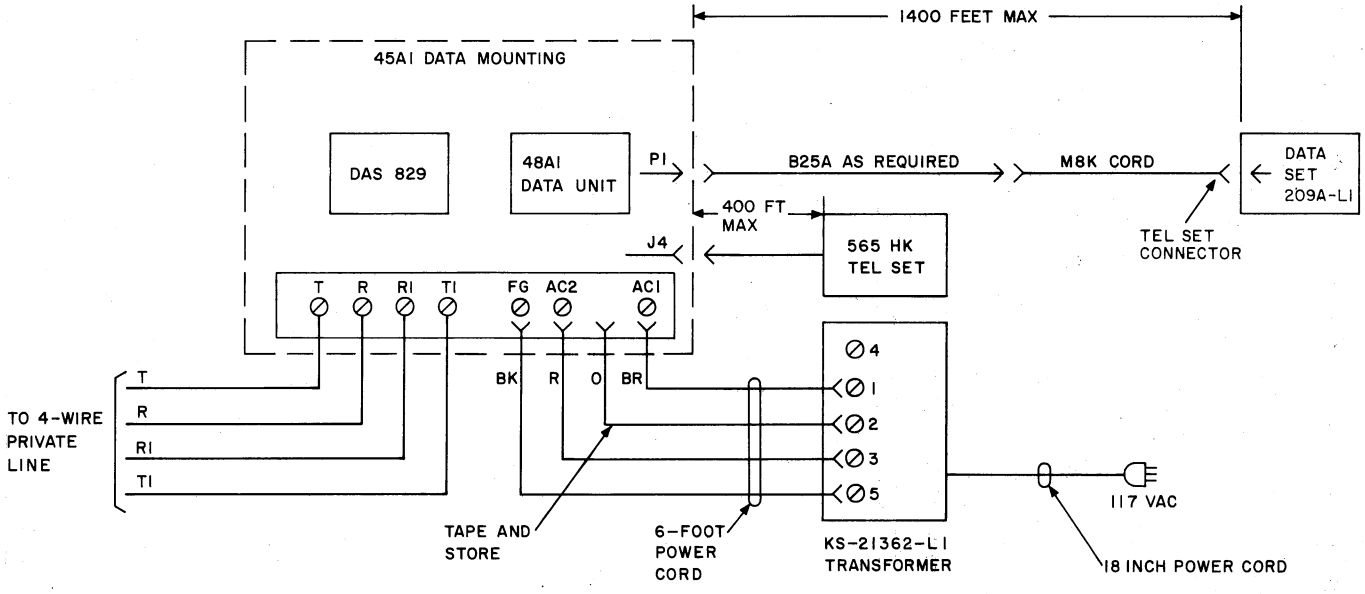


Fig. 6—Block Diagram for Data Set 209A-L1 Using DAS 829-Type—Data/Voice

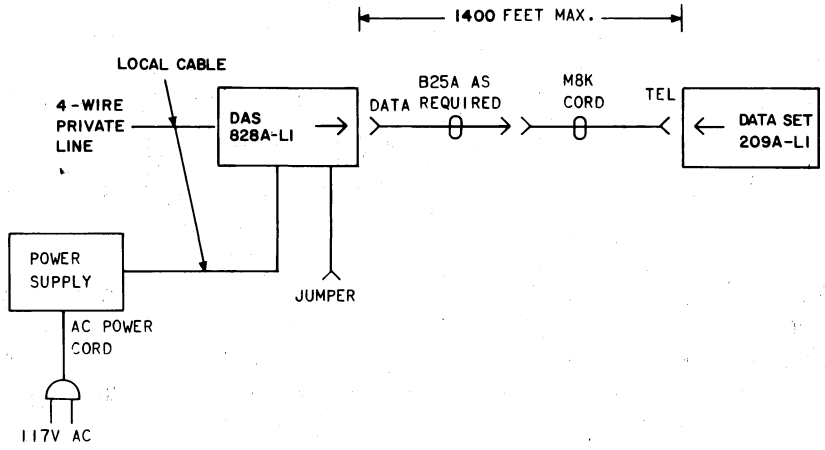
3.04 Connection for DAS 829-type to provide alternate switched network backup is shown in Fig. 9. The 48A1 data unit is required only when alternate voice is to be provided.

3.05 Connections for DAS 828C to provide alternate switched network backup are shown in Fig. 10 and 11. The connection for data-only is shown in Fig. 10, while the connection for data/voice is shown in Fig. 11. Additional installer wiring as shown is required to provide a dial backup indication to the DS 209A-L1.

3.06 DS 209A-L1 should always be installed at 9600-bps dial backup capability. If external control of the data set transmission rate is desired by the customer, the 6017AL key must be installed as shown in Fig. 12. When in the dial backup mode, the data set operates at 9600 bps if the switch is open and at 4800 bps if the switch is closed.

3.07 When DS 209A-L1 is installed in a multiplex system using extension data sets (201C/208A/209A), one-half speed dial backup operation may inhibit some extension data sets from operating correctly.

3.08 If DS 209A-L1 is to be installed without a DAS, connection to the locally engineered termination equipment may be accomplished by using a D-25D-61 cord and a 66E3 connector block. Refer to Fig. 13.



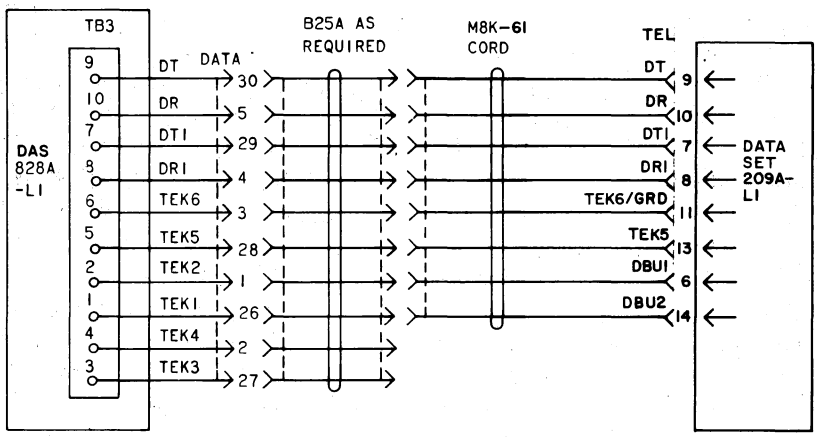


Fig. 7—Block and Connection Diagram for Data Set 209A-L1 Using DAS 828A-L1—Data Only

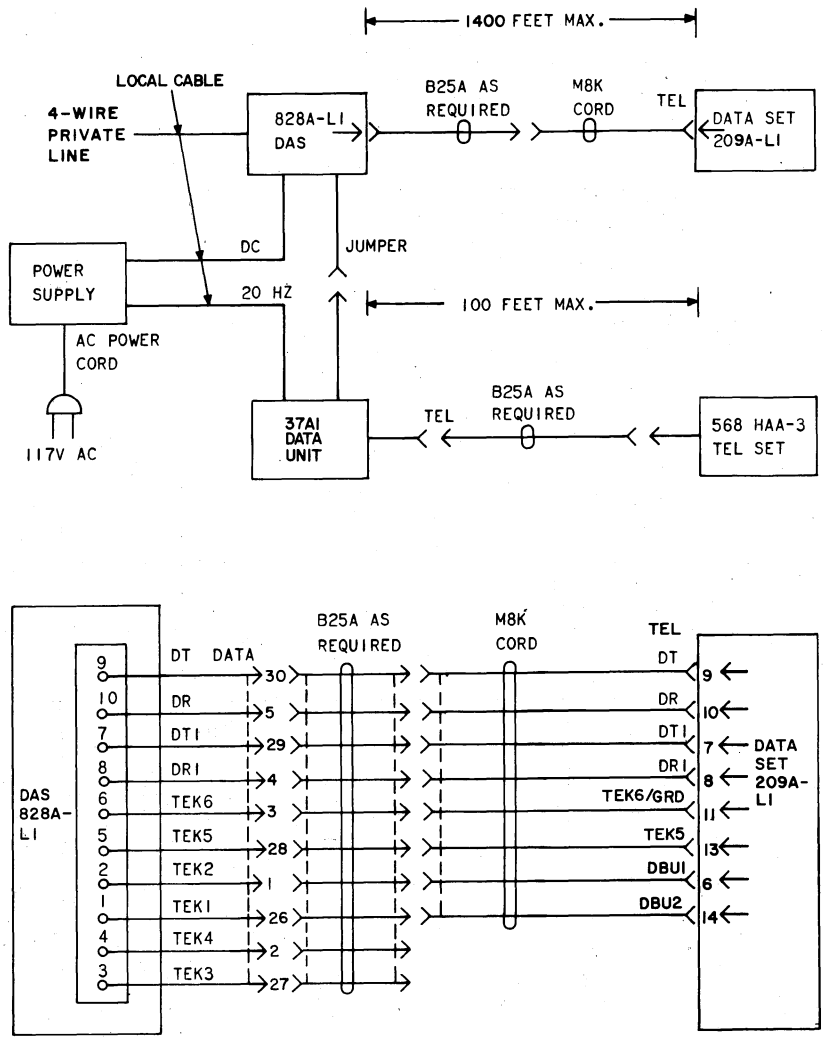


Fig. 8—Block and Connection Diagram for Data Set 209A-I1 Using DAS 828A-I1—Data/Voice

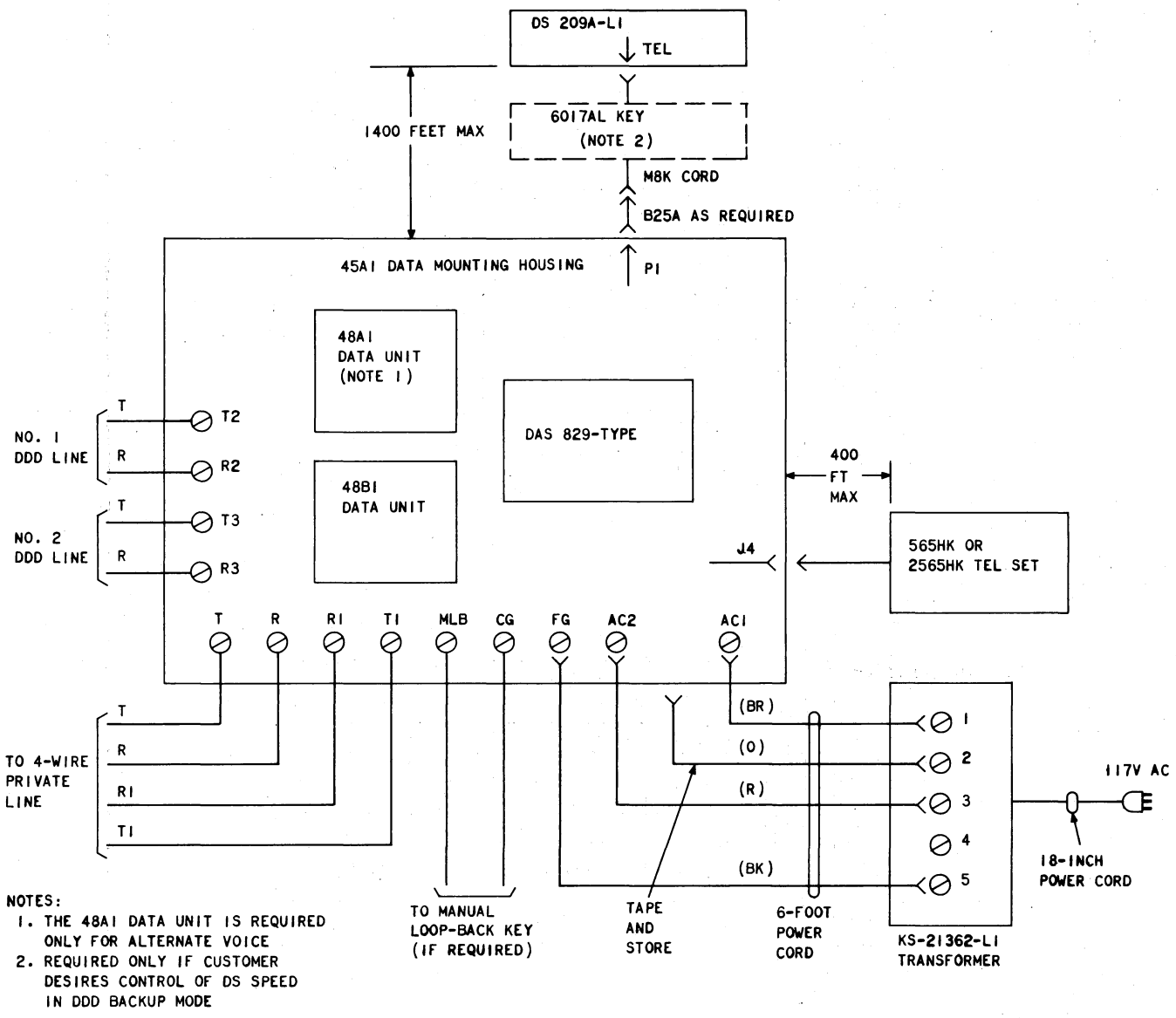


Fig. 9—Data Set 209A-L1 Used on 4-Wire Private Line With Alternate DDD Backup Using DAS 829-Type

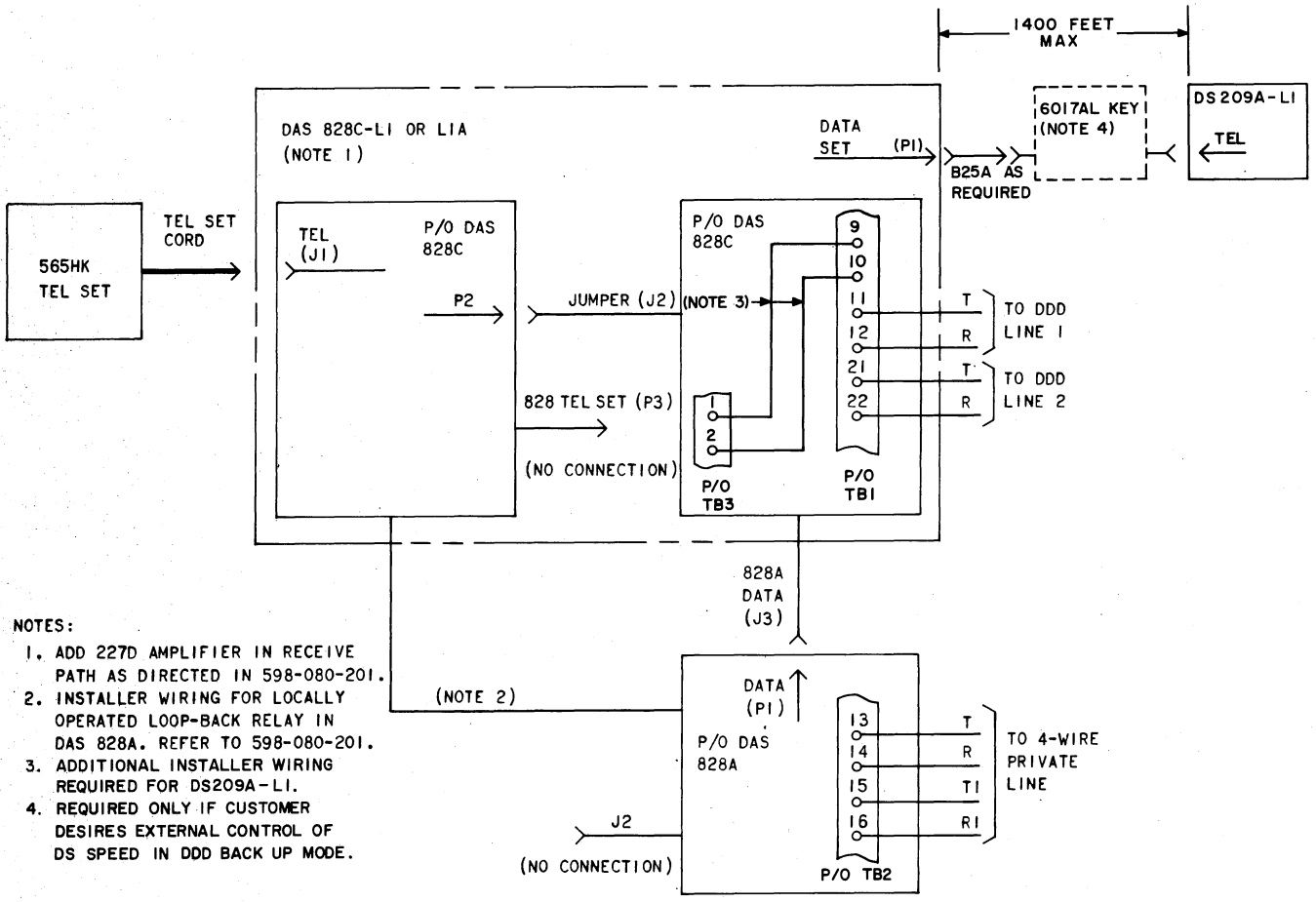


Fig. 10—Data Set 209A-L1 Used on 4-Wire Private Line With Alternate DDD Backup Using DAS 828A-Type and 828C—Data Only

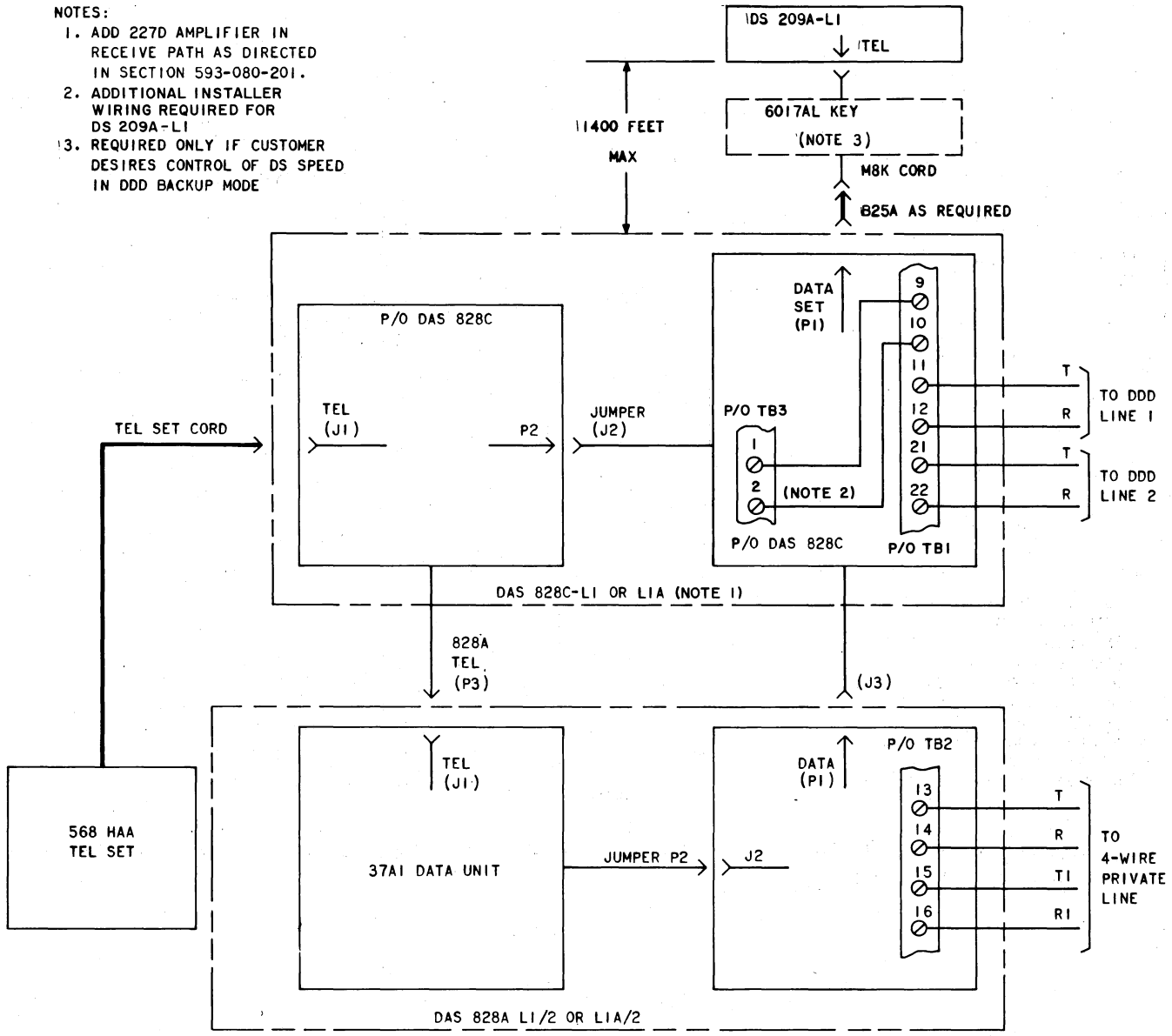
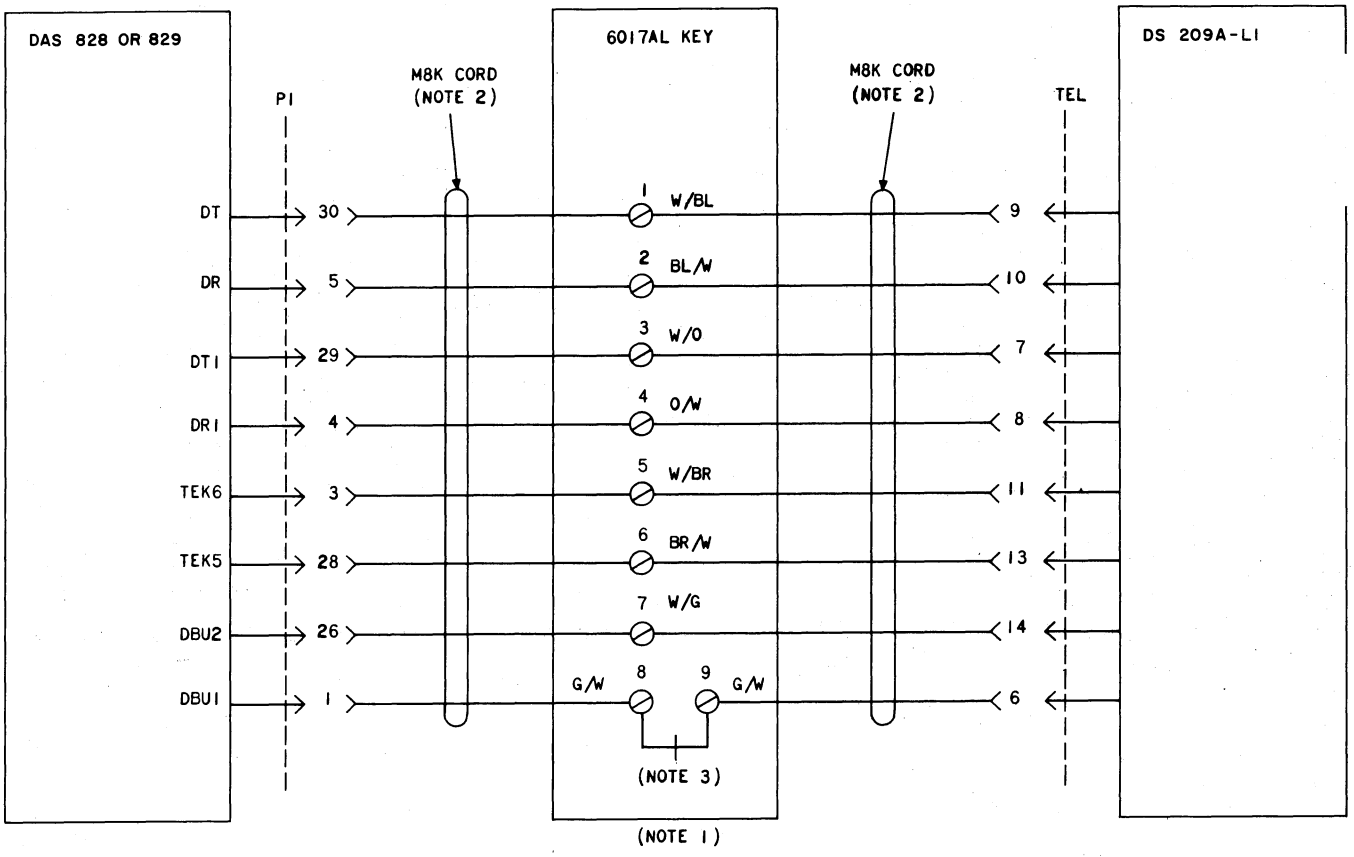


Fig. 11—Data Set 209A-L1 Used on 4-Wire Private Line With Alternate DDD Backup Using DAS 828A-Type and 828C—Data/Voice



NOTES:
1. LOCATE FOR CUSTOMER CONVENIENCE.
2. CUT THE M8K CORD AND CONNECT TO THE 6017AL KEY AS SHOWN.
3. BREAK CONTACT MUST BE WIRED TO TERMINALS 8 AND 9.

Fig. 12—Data Set 209A-L1 Bit Rate Control Wiring Using a 6017AL Key

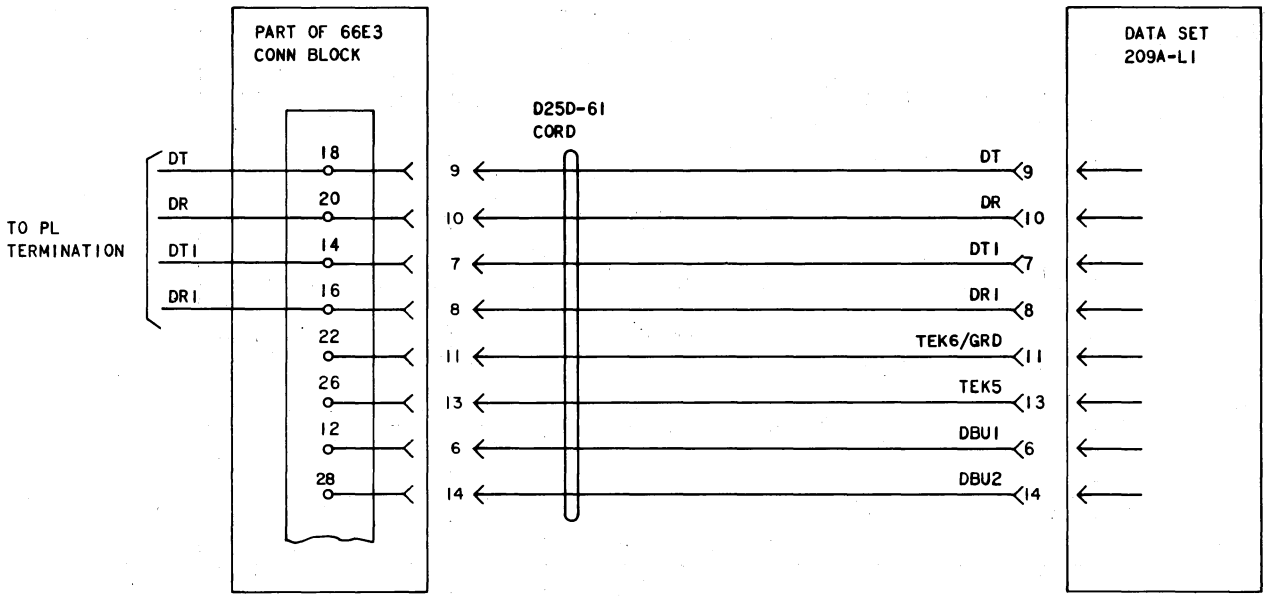


Fig. 13—Data Set 209A-L1 Connections to Locally Engineered Private Line Terminations Without DAS 828- or 829-Type

4. MULTIPLE INSTALLATIONS

4.01 There are two ways in which DS 209A-L1 can be installed in multiple installations.

(a) Three data sets can be stacked vertically.

(b) With suitable mounting brackets (D-180556), the data sets (including faceplates) can be mounted in a 23-inch rack mounting. The small right angle mounting flange can be assembled to the mounting bracket as shown in Fig. 14. If an adjustment to the depth at which the data set is positioned in the rack mounting is required, the small right angle mounting flange can be assembled to the mounting bracket by using the additional holes.

4.02 When DS 209A-L1 are used with the mounting brackets, it is possible to mount the data sets in KS-20018 Bell System-provided equipment cabinets. Cabinets in which DS 209A-L1 are to be mounted must have a perforated rear cover and a translucent front cover. Two Bell System cabinets meet these requirements. The KS-20018-L11A cabinet provides mounting for three DS 209A-L1 and one 46A1 data mounting for DAS 829-type. The KS-20018-L15A cabinet provides mounting for eight DS 209A-L1 and one 46A1 data mounting. Both cabinets must be positioned at least 6 inches from the nearest obstacle to allow free air flow.

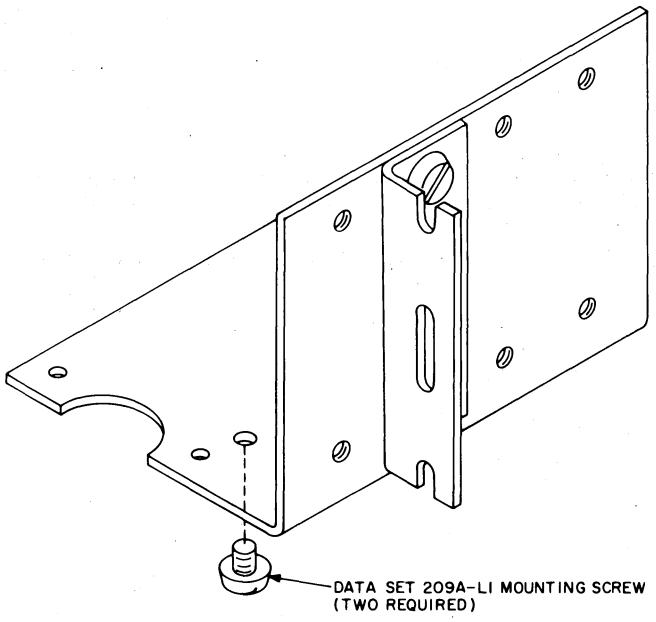


Fig. 14—Data Set 209A-L1 Mounting Bracket (D-180556)

4.03 If the data sets are to be mounted on nonperforated shelves within a cabinet, the front cover of the cabinet must be removed. If the D-180556 mounting brackets are used, the front cover of the cabinet can be retained.

4.04 When installing a multiple installation consisting of a maximum of eight data sets 209A-L1, it may be desirable to concentrate the 8-lead telephone interfaces into a single 50-pin connector. The KS-21253-L1 adapter provides this concentration. The adapter contains eight male 50-pin plugs and one female 50-pin connector. The M8K cord is used to interconnect the data sets and the adapter.

4.05 The DAS 828- and 829-types may also be concentrated in much the same manner by using the KS-21253-L2 adapter. This adapter contains eight female 50-pin connectors and one male 50-pin plug.

4.06 The two line interface adapters (KS-21253-L1 and -L2) can be interconnected by the appropriate length of B25A cable as required. This method of interconnection makes use of the unassigned conductors in a B25A cable. This permits the use of one B25A cable to interconnect a maximum of eight data sets 209A-L1 with a maximum of eight DAS 828- or 829-type.

4.07 When installing a multiple installation consisting of a maximum of 23 DS 209A-L1 equipped with dial backup capability, the 8-lead telephone interface can be concentrated by using two KS-21233-L4 adapters. Refer to Section 598-082-202 for additional information.

5. INSTALLATION PROCEDURES

5.01 After local equipment has been installed, do not turn the system over for customer use until the complete system has been installed and tested end-to-end. Some multiplex systems involve equipment installation at remote locations and require coordination by the STC before the system becomes operational.

A. Point-to-Point, Point-to-Point Multiplexing, and Digital Data System Off-Net

5.02 Call the STC and verify that the 4-wire private line (PL) channel [equipped with high-performance data conditioning (D1)] to be used with DS 209A-L1 meets the requirements given in Sections 314-410-105 and 314-410-500. Requirements specified for the high-performance data conditioning (D1) must be met to ensure that the tests recommended below will adequately test the data channel. Connections for the basic data station configurations are shown in Fig. 5 through 11. Install the DAS 828A-L1 or 829-type in accordance with Section 598-080-200 or 598-082-200, respectively.

5.03 Refer to Fig. 1 for the locations and positions of the data set option switches which provide the options specified on the service order. The first data set installed must have the compromise equalizer slope option IN and the compromise equalizer phase option OUT for both the transmitter and receiver.

Caution: Remove and discard the foam packing material located inside the data set front faceplate. Also remove and discard the protective covering from the data set housing. If the protective packing materials are not removed before operation, excessive heating will result.

5.04 After the data set has been installed, it must be tested to determine if it is operating properly. Perform the appropriate installation tests specified in the test section (592-032-500). Test equipment required to perform the installation tests consists of 914-type data test set or a KS-14510-L1 VOM (or equivalent).

5.05 Record the options that are installed in the data set in the appropriate blocks of the option label located on the power unit.

5.06 Leave the copy of the DS 209A-L1 How to Operate Manual (999-100-143) with the customer.

B. Many-Point and One-to-Many Multiplex Systems

5.07 The telco engineer responsible for system layout must designate the control STC before either of these systems is installed. If possible, the control STC should have access to the 4-wire channel interconnecting the DSs 209A-L1. The control STC specifies which data set is installed first and also coordinates testing of the multiplex system.

5.08 Typical connection diagrams for many-point and one-to-many multiplex systems are shown in Fig. 15 and 16, respectively. Recommended options to be installed in the data sets are given in Fig. 3 and 4. In multiple installations of DS 209A-L1, the data sets at the same location should be equipped with identical options when possible. This facilitates change-out problems where data sets are patched from one channel to another for maintenance purposes. In these installations, the compromise equalizer adjustment should be determined at the remote data set.

5.09 The M23B cord to CPE is 6 inches long and terminated in a 25-pin connector. This connector is designed to mate with a customer-provided Cinch or Cannon DB-19604-432 plug equipped with a DB-51226-01 hood.

5.10 The M8M cord to the collocated data set is available in 4-foot and 10-foot lengths which are terminated in 25-pin plugs at each end. This cord interchanges the serial clock transmit external (DA) and the serial clock receive (DD) leads, which synchronizes the collocated data set clock to the DS 209A-L1 clock. It also interchanges the send data (BA) and receive data (BB) leads, and the request-to-send (CA) and carrier-on (CF) leads.

5.11 A many-point or one-to-many multiplex system can be divided into three possible categories:

- DS 209A with collocated 201C/208A/209A
- DS 209A without collocated 201C/208A/209A
- Remote extension 201C/208A/209A.

Note: The collocated data sets are the 201C, 208A, or 209A (at 7200 bps) which are at the same location as the 209A.

5.12 ***Data Set 209A With Collocated 201C/208A/209A:*** The installation procedure is as follows:

(1) Install DS 209A-L1 as directed in this section and test as directed in 592-032-500.

(2) Position the multiplex selector switch to the proper multiplex option.

(3) After completing installation tests, connect M8M cord(s) to the appropriate data set 209A-L1 interface connectors.

(4) If collocated 201C/208A/209A sets have already been installed, also connect the M8M cord to these data sets.

(5) If collocated 201C/208A/209A sets have not been installed, they should be installed next. Refer to Part 6 for the appropriate BSP numbers.

Note: The collocated data sets must have the external timing option installed.

(6) After installing the collocated data sets, connect the M8M cord between the 209A and the collocated data sets.

Note: If the collocated 201C/208A data sets are a master (central) for an external multipoint polling system, the new sync not used option must be installed.

5.13 ***DS 209A Without Collocated 201C/208A/209A:*** The installation procedure is as follows:

(1) Install DS 209A-L1 as directed in this section and test as directed in 592-032-500.

(2) Position the multiplex selector switch to the proper multiplex option.

(3) If this is the final data set being installed in the system (including extensions), end-to-end tests must be conducted as specified in Section 592-032-500. Conduct tests through each active port (interface connector).

5.14 ***Remote Extension 201C/208A/209A:*** The installation procedure is as follows:

(1) Install remote extension DS 201C/208A/209A. Refer to Part 6 for the appropriate BSP numbers covering installation procedures for these data sets.

(2) Verify that the remote extension DSs 201C/208A/209A have the external timing option installed.

(3) After completing installation tests, install the M23B cord.

(4) Call the STC to determine if additional end-to-end testing is required. If so, refer to Section 592-032-500.

5.15 Record the options installed in the data set in the appropriate blocks of the option label located on the power unit.

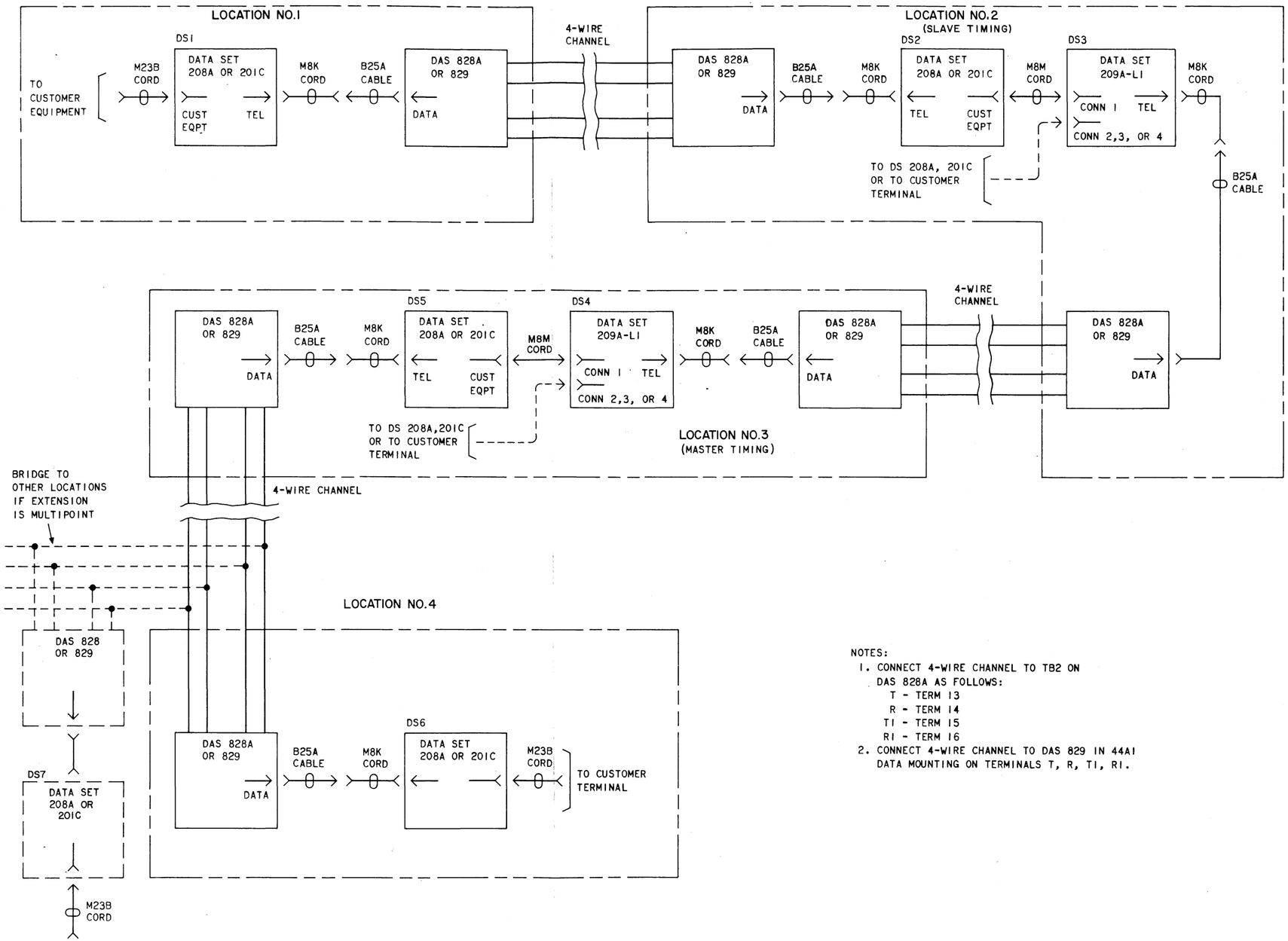
5.16 Leave a copy of the DS 209A-L1 How to Operate Manual (999-100-143) with the customer.

6. REFERENCES

6.01 Refer to the following Bell System Practices which provide information on equipment associated with DS 209A-L1 systems.

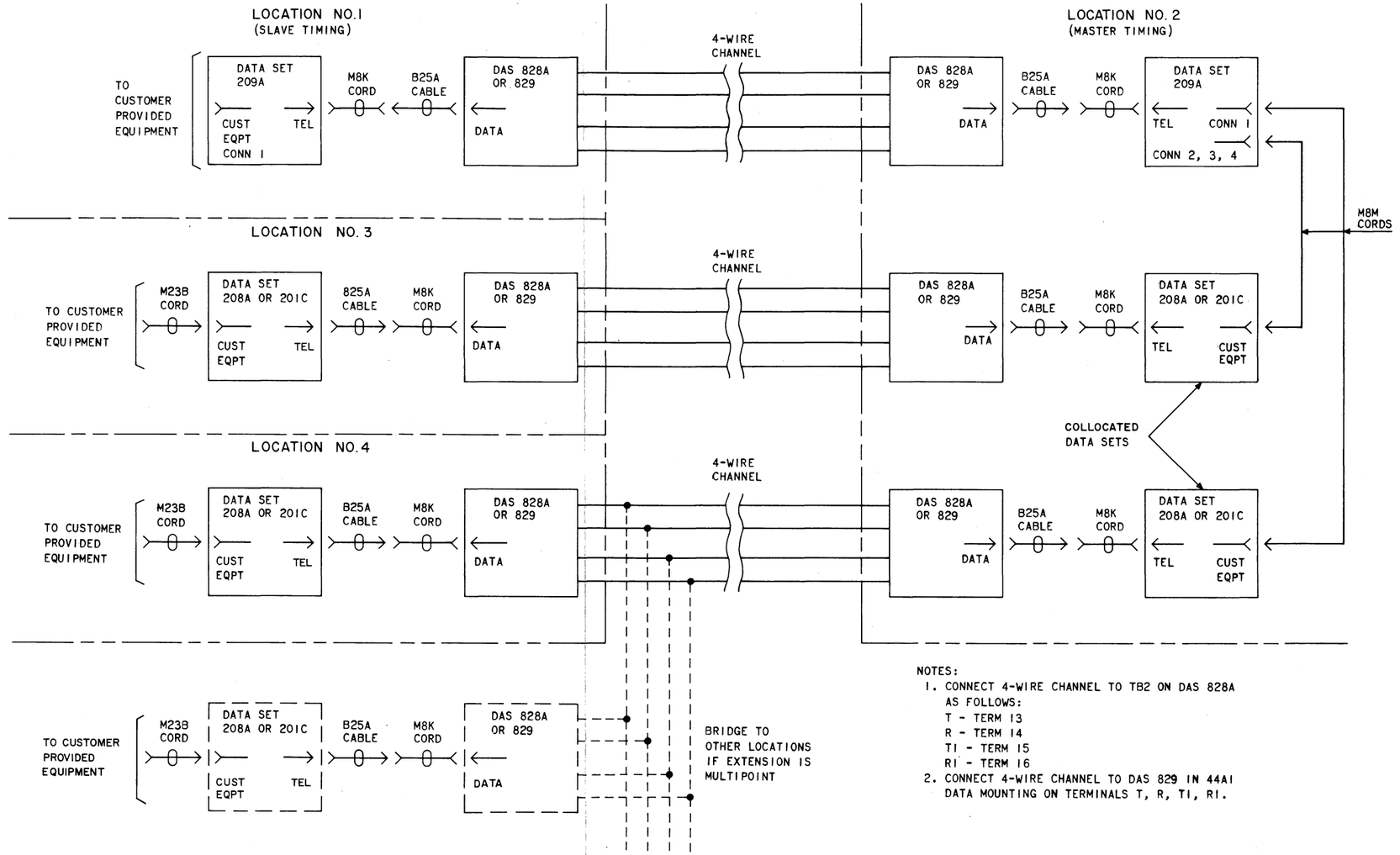
SECTION	TITLE
314-410-105	Voice Bandwidth Private Line Data Circuits—High Performance Data Conditioning—Description and Test Requirements
590-020-200	Data Sets—General Installation and Connection Information

SECTION	TITLE
Data Set 208A-Type	
592-027-100	Description and Operation
592-027-200	Installation
592-027-300	Maintenance
592-027-500	Test Procedures
666-511-503	Test of Services Provided By Data Set 208A-Type From a Private Line Test Room
Data Set 201C-Type	
592-029-100	Description and Operation
592-029-200	Installation
592-029-300	Maintenance
592-029-500	Test Procedures
666-511-501	Test of Services Provided By Data Set 201C From a Private Line Test Room
Data Set 209A-L1	
592-032-100	Description and Operation
592-032-150	Supplementary Information
592-032-300	Maintenance
592-032-500	Test Procedures
666-511-504	Test of Data Services Provided By Data Set 209A-L1 From a Private Line Test Room



NOTES:
1. CONNECT 4-WIRE CHANNEL TO TB2 ON DAS 828A AS FOLLOWS:
   T - TERM 13
   R - TERM 14
   TI - TERM 15
   RI - TERM 16
2. CONNECT 4-WIRE CHANNEL TO DAS 829 IN 44A1 DATA MOUNTING ON TERMINALS T, R, TI, RI.

Fig. 15—Typical Many-Point Multiplex System—Connection Diagram



NOTES:
1. CONNECT 4-WIRE CHANNEL TO TB2 ON DAS 828A AS FOLLOWS:
   T - TERM 13
   R - TERM 14
   TI - TERM 15
   RI - TERM 16
2. CONNECT 4-WIRE CHANNEL TO DAS 829 IN 44A1 DATA MOUNTING ON TERMINALS T, R, TI, RI.

Fig. 16—Typical One-to-Many Multiplex System—Connection Diagram