DATA SET 208A-TYPE
TRANSMITTER-RECEIVER
INSTALLATION AND CONNECTIONS

CONTENTS PAGE

1. GENERAL

1.01 This section contains information concerning the installation and connection of data set (DS) 208A-type. The data set should be installed in conformance with existing installation practices. Refer to the section entitled Data Sets And Data Access Arrangements—General Installation and Connection Information (590-010-200). DS 208A-type is recommended for use with data auxiliary set (DAS) 828- or 829-type (ordered separately).

1.02 This section is reissued to add information on:

- DS 208A-L1B
- DS 208A-type used on 4-wire private line with alternate DDD backup using DAS 829-type, data/voice.

1.03 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. The data set will operate in an ambient temperature range of 40 to 120°F and a relative humidity of 20 to 95 percent.

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

1.04 DS 208A-type must be located near the CPE since the interface cord supplied by the customer should not exceed 50 feet in length [to reduce 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 business machine 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 terminal end.

1.05 DS 208A-type requires an outlet that will accept the 3-prong plug on the P3BJ or KS-14532-L23 power cord. To prevent the data set from being turned off accidentally, the outlet should not be under control of a switch.

1.06 A 25-pin KS-19087-L2 connector is provided at the rear of the data set for connection to the CPE. This connector is designed to mate with a customer-provided Cinch or Cannon DB-19604-432 plug wired in accordance with Table A.

Connection between the data set and DAS 828- or 829-type is made with an M8K cord which comes with the data set.

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

1.08 In order to gain access to the CPs, remove the front cover and CP locking bar. With the exception of HG9 and HG23, the CPs can be removed by pulling forward on the plastic tab. To replace the card, align it in the proper slot and push gently into place. The locking bar should be replaced before replacing the front cover.

1.09 ▶A label (E-6650) and holder (841 788 292) are available for use with DS 208A-type to provide identification of the circuit number and trouble call number. The label has a pressure-sensitive

TABLE A

CUSTOMER INTERFACE

PIN NO.	FUNCTION	DATA SET MNEMONIC	EIA DESIGNATION (RS-232-C)
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	COD	CF
9	+12V	CI9 (+12V)	Reserved for Data Set Testing
10	−12V	CI10 (−12V)	Reserved for Data Set Testing
11	Equalizer Mode	QM (Non-EIA)	Unassigned
14	New Sync	NS (Non-EIA)	SBA
15	Serial Clock Transmitter	SCT	DB
16	Divided Clock Transmitter	DCT (Non-EIA)	SBB
17	Serial Clock Receiver	SCR	DD
18	Divided Clock Receiver	DCR (Non-EIA)	Unassigned
21	Signal Quality Detector	COV	CG
24	Serial Clock Transmitter External	SCTE	DA
25	+5V	CI25 (+5V)	Unassigned

adhesive to adhere to the bottom front of the data set housing 1 inch from the left side and flush with the front edge.◀

2. OPTIONS

2.01 DS 208A-type is provided with a number of options which must 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. Refer to Fig. 1 for a cross reference between options and the switches which control the options.

A. Customer Options

2.02 ***Carrier Control:***

- With the switched carrier (XA) and switched request-to-send (YT) options, the data set transmits only when the request-to-send lead is ***on.*** The CA-CB delay for switched carrier is approximately 48.5 ms. The data set transmitter turns off within 2 ms after request-to-send goes ***off.***

- With the continuous carrier (XB) and continuous request-to-send (YS) options, request-to-send is held ***on*** internally and the transmitter remains on continuously to maintain synchronization.

- With the continuous carrier (XB) and switched request-to-send (YT) options, the transmitter remains on continuously to maintain synchronization; however, the customer may continue to control request-to-send with a shortened CA-CB delay of approximately 8 ms.

2.03 ***Internal or External Timing:***

- With the internal timing option (YC), the data set provides serial clock to the customer on the serial clock transmitter lead (pin 15).

- With the external timing option (YD), the customer provides serial clock to the data set on the serial clock transmitter external lead (pin 24). This clock must be stable to $\pm 4.8 \times 10^{-7}$ (± 48 ppm). On data sets with external timing, the serial clock transmitter signal is present and is phase-locked to the clock received from the customer on the serial clock transmitter external lead.

2.04 ***New Sync:*** The new sync option (YB) is recommended for use in the master DS 208A-type of a multipoint arrangement. Use of this option ensures rapid resynchronization on a series of incoming messages from remote transmitters. A pulse of 1 ms duration applied by the CPE on the new sync interface lead (SBA) when option YB is installed squelches the data set receiver for receipt of the next message. This option should not be installed in the local data set if the remote data set is optioned for continuous carrier (XB). It should not be installed in the master DS 208A-type if the DS 208A-type is an extension of a DS 209A-L1 multiple system. The new sync interface lead can be disabled by installing option YA.

2.05 ***1-Second Holdover:*** With the 1-second holdover option (YX), the timing recovery circuits in the data set receiver can maintain synchronization during line dropouts which do not exceed 1 second. This option can be disabled by the use of option YW.

2.06 DS 208A-L1A and ▶DS 208A-L1B◀ provide all the preceding customer options listed for DS 208A-L1, plus one additional option.

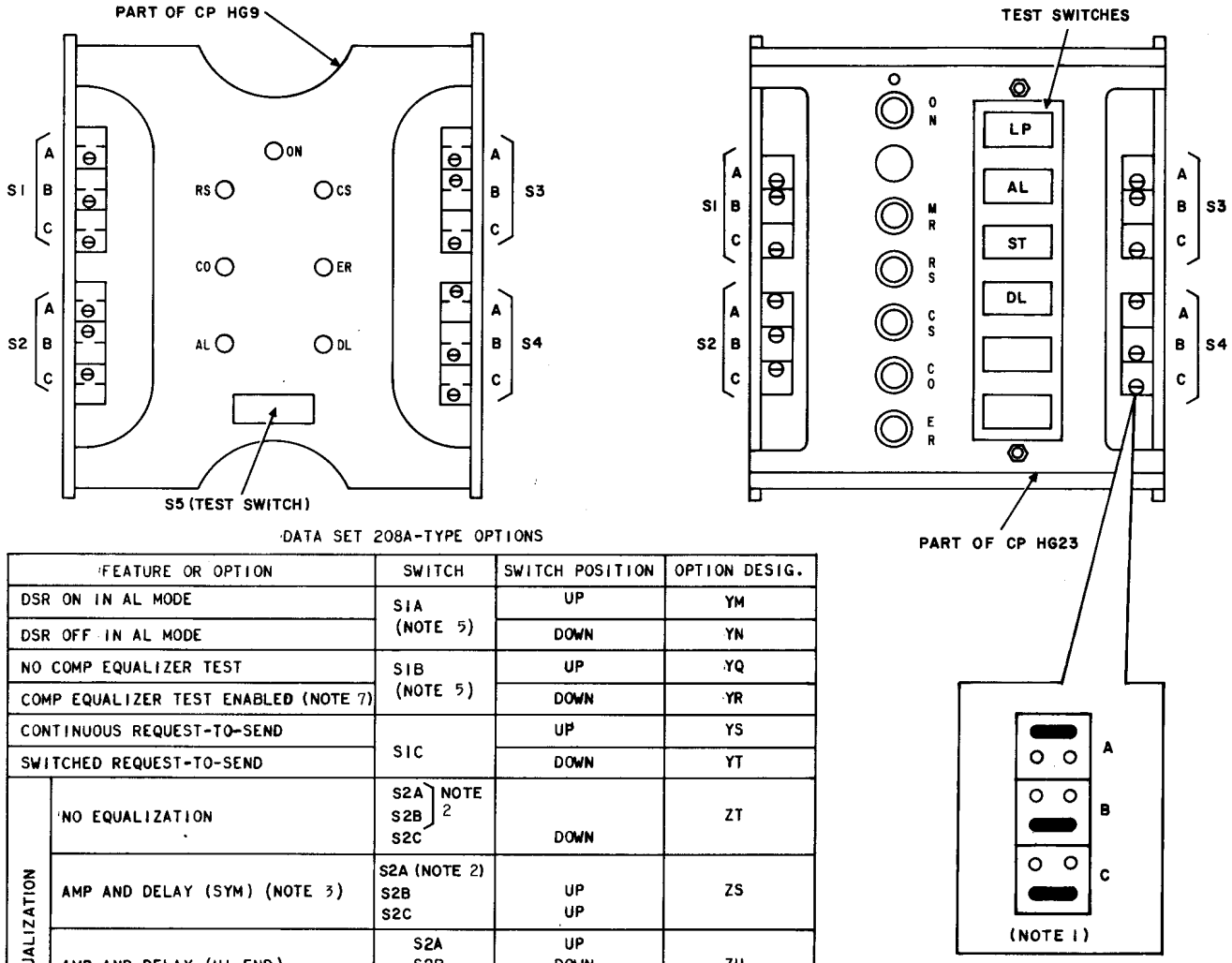
2.07 ***Data Set Ready (DSR) On in AL Mode:*** This option provides an ***on*** indication to the CPE via the data-set-ready lead when the data set is in the analog loop-back mode. This option, provided by DS 208A-L1A or ▶DS 208A-L1B◀ only, allows a customer to loop back signals through the data set for testing of the CPE.

B. Telco Options

2.08 ***Data Auxiliary Set Used or Not Used:***

- When the DAS used option (YI) is installed, the data-set-ready lead is externally controlled by the DAS 828A, 829-type, or equivalent line terminating unit. This indicates when the private line channel is in a maintenance mode, a test condition, or alternate voice mode.

- When the DAS not used option (YJ) is installed, the data-set-ready lead is always ***on*** except when the data set is in the



DATA SET 208A-TYPE OPTIONS

FEATURE OR OPTION		SWITCH	SWITCH POSITION	OPTION DESIG.
DSR ON IN AL MODE		S1A (NOTE 5)	UP	YM
DSR OFF IN AL MODE			DOWN	YN
NO COMP EQUALIZER TEST		S1B (NOTE 5)	UP	YQ
COMP EQUALIZER TEST ENABLED (NOTE 7)			DOWN	YR
CONTINUOUS REQUEST-TO-SEND		S1C	UP	YS
SWITCHED REQUEST-TO-SEND			DOWN	YT
EQUALIZATION	NO EQUALIZATION	S2A, S2B, S2C (NOTE 2)	DOWN	ZT
	AMP AND DELAY (SYM) (NOTE 3)	S2A (NOTE 2) S2B S2C	UP UP	ZS
	AMP AND DELAY (HI END)	S2A S2B S2C	UP DOWN UP	ZU
	AMP AND DELAY (SYM + HI END)	S2A S2B S2C	DOWN DOWN UP	ZV
TRANSMIT EXTERNALLY TIMED		S3A	UP	YD
TRANSMIT INTERNALLY TIMED			DOWN	YC
RETRAIN AUTOMATICALLY (NOTE 4)		S3B	UP	YU
RETRAIN NOT USED			DOWN	YV
DAS IS USED		S3C	UP	YI
DAS NOT USED			DOWN	YJ
1-SEC HOLDOVER DISABLE		S4A	UP	YW
1-SEC HOLDOVER			DOWN	YX
CONTINUOUS CARRIER		S4B	UP	XB
SWITCHED CARRIER			DOWN	XA
NEW SYNC USED BY CUSTOMER (NOTE 6)		S4C	UP	YB
NEW SYNC NOT USED BY CUSTOMER			DOWN	YA

NOTES:
1. CP HG23 MAY HAVE OPTION SWITCHES AS SHOWN IN INSET. EACH SWITCH SECTION (A, B, OR C) CONSISTS OF AN UPPER AND LOWER PAIR OF TERMINALS DESIGNATED UP AND DOWN. INSTALL DESIRED OPTION BY PLACING SHORTING PLUG ACROSS RESPECTIVE TERMINALS AS SHOWN.
2. SWITCH MAY BE IN EITHER POSITION
3. ALWAYS USE WHEN OPTIONED FOR CONTINUOUS CARRIER OPERATION (S4B UP)
4. THIS OPTION MUST ALWAYS BE INSTALLED
5. THIS OPTION AVAILABLE ONLY ON DS 208A-L1A AND DS 208A-L1B
6. NOT USED WHEN FAR-END DATA SET IS OPTIONED FOR CONTINUOUS CARRIER
7. USED ONLY DURING INSTALLATION AND SHOULD NOT BE INSTALLED FOR NORMAL OPERATION.

Fig. 1—Location of Option Switches

analog loop-back mode (option YN installed), digital loop-back mode, or option YR is installed.

2.09 ***Compromise Equalizer Test Control:*** This option, provided by DS 208A-L1A or ▶DS 208A-L1B◀ only, facilitates testing of the compromise equalizer. Option YR should only be installed during the compromise equalizer setup. When this option is installed, the LP switch can be used to short the line signal. This option replaces the necessity to withdraw CP HG5, which must be done when setting the compromise equalizer on DS 208A-L1. ***This option must be removed upon completion of the compromise equalizer adjustment.***

Note: When this option is installed, the CC lead will always be ***off.***

2.10 ***Automatic Equalizer Retraining:*** With this option (YU), the data set receiver is able to determine if the automatic equalizer has been properly adjusted. If the automatic equalizer has not been properly adjusted, the data set receiver initiates local retraining of the equalizer while the remote transmitter continues to transmit data.

The automatic retrain option (YU) should always be installed during normal data set operation.

2.11 Option switches S1, S2, S3, and S4 are located on CP HG9 or HG23. DS 208A-L1 contains CP HG9 while DS 208A-L1A and ▶DS 208A-L1B◀ contain CP HG23. Each switch is divided into three sections: A, B, and C. To access the switch screws, the hinged protective cover must first be opened by pulling it from the end with the dot. Each switch section is individually adjusted to one of two positions using a screwdriver (provided with CP HG23) to gently rotate the adjustable screw to either the up or down position.

Caution: The final position of the screw must be such that it butts up against the spacer and the screwdriver slot is parallel with the spacer. Care must be taken not to turn the screw roughly or too far past the final position, as this could damage the switch.

2.12 ▶If CP HG23 is equipped with option switches which use shorting plugs, a method such as using long-nose pliers facilitates positioning the plugs. The plug is inserted horizontally in either the up or down position to install the respective option.◀

2.13 Switch sections are referred to by adding the letter designation (either A, B, or C) to the switch number. Thus, S2B refers to switch S2, section B.

2.14 The data set is supplied from the factory with a strap at the bottom of the power supply terminal strip to connect frame ground to signal ground. This strap can be disconnected during installation if the customer specifies 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.

2.15 When the data set is installed, verify that the correct options are installed before requesting a loop-back test from the serving test center (STC).

2.16 A gummed option label designated E-6327 should be ordered for the data set. It can be attached to the front of the 83A power unit, and the installed options should be indicated for easy reference on subsequent maintenance visits.

3. CONNECTIONS

3.01 This part contains the information for connecting DS 208A-type to DAS 829-type or to DAS 828A-L1 and DAS 828C. For further information pertaining to these data auxiliary sets, refer to Part 6.

3.02 Refer to Fig. 2 and 3 for connection between DS 208A-type and DAS 829-type. The data-only connection is shown in Fig. 2 and the data/voice connection is shown in Fig. 3.

3.03 ▶Connections for DAS 829-type to provide alternate switched network backup are shown in Fig. 4. The 48A1 data unit is not required for data-only service. Detailed information pertaining to DAS 829-type is contained in Section 598-082-101.◀

3.04 Refer to Fig. 5 and 6 for connection between DS 208A-type and DAS 828A-L1. The

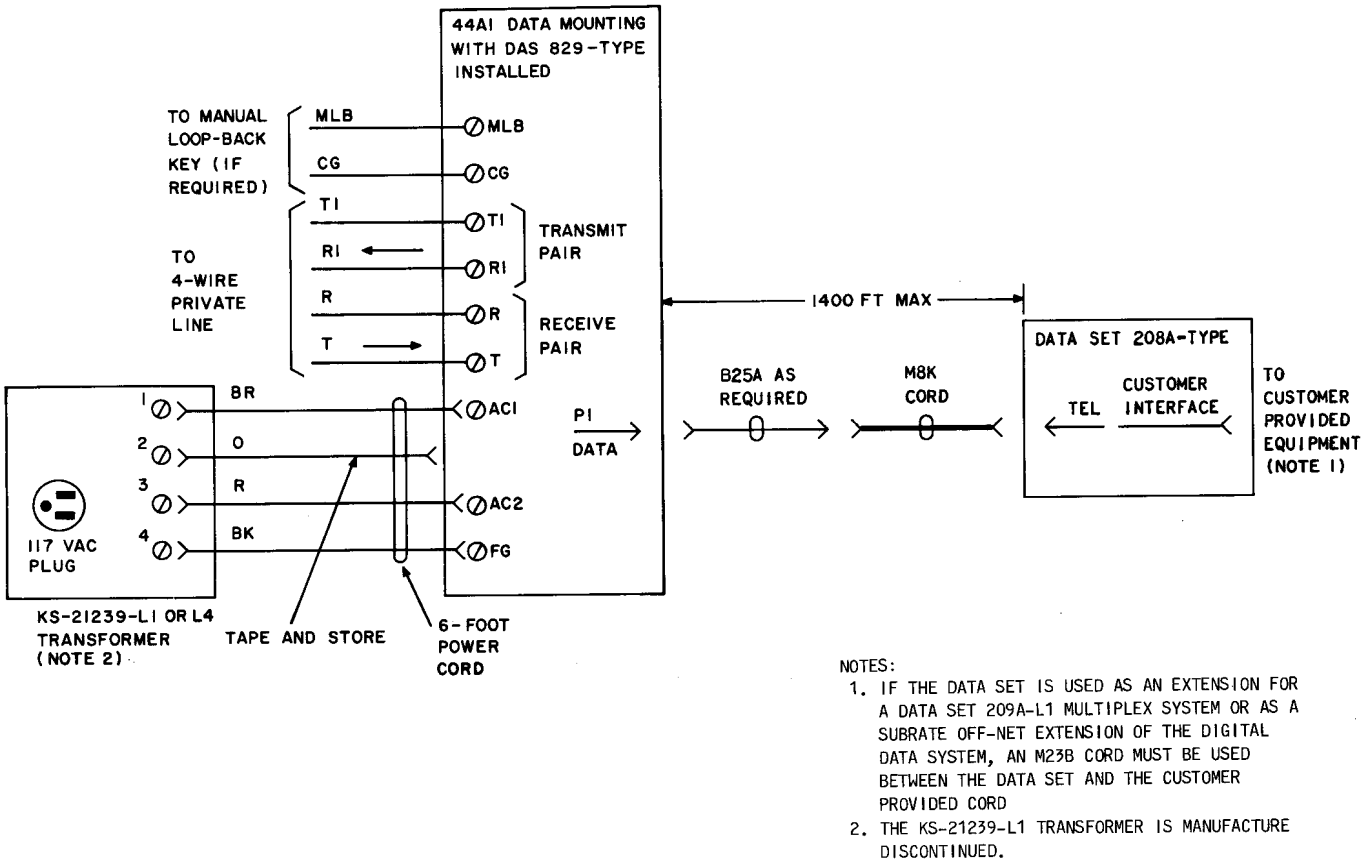


Fig. 2—Data Set 208A-Type Used With DAS 829-Type, Data Only

data-only connection is shown in Fig. 5 and the data/voice connection is shown in Fig. 6.

3.05 Connections for DAS 828C to provide alternate switched network backup are shown in Fig. 7 and 8. The connections for data only are shown in Fig. 7, while the connections for data/voice are shown in Fig. 8. Detailed information pertaining to DAS 828C is contained in Section 598-080-101.

3.06 If DS 208A-type is to be installed without a DAS 829-type, DAS 828A, or DAS 828C, connection to the locally engineered termination equipment may be accomplished by using a D25D-61 cord and a 66E3 connector block. Connections are shown in Fig. 9.

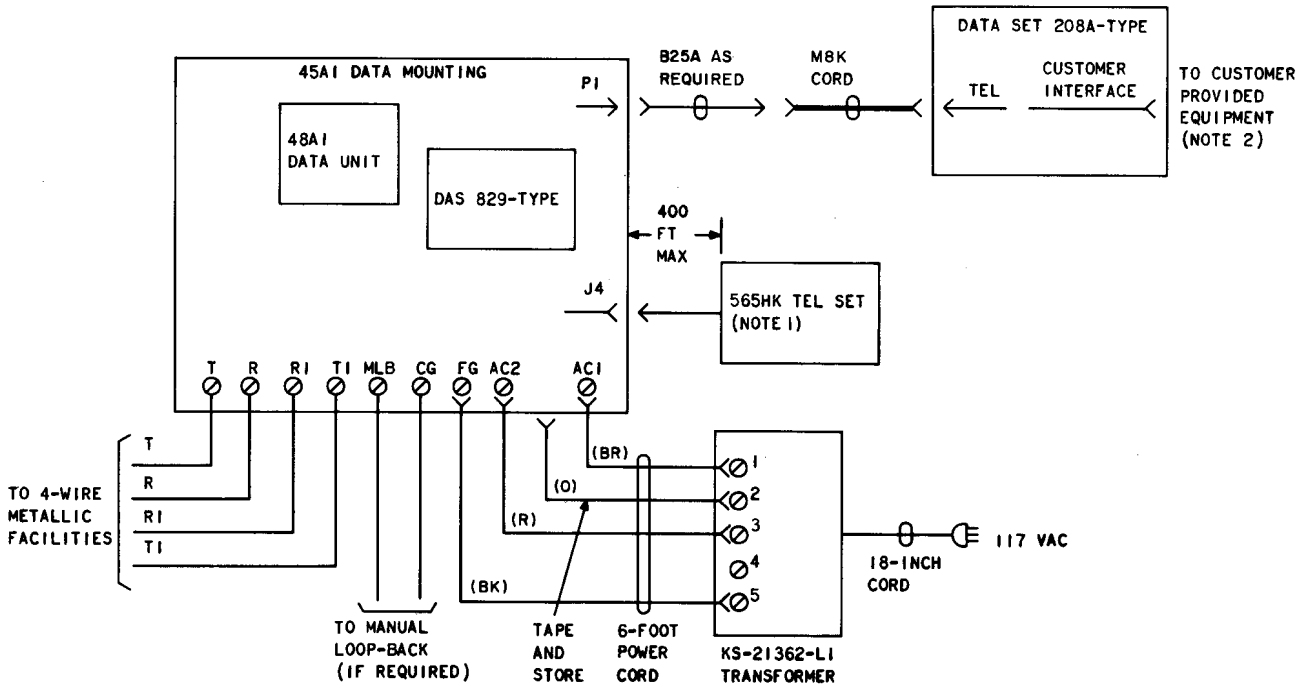
3.07 If DS 208A-type is used as an extension for a DS 209A-L1 multiplex system or as a subrate off-net extension of the digital data system (DDS), an M23B cord must be used. The M23B cord is approximately 6 inches long and connects between the data set and the customer-provided cord. This is shown on Fig. 2 through 9.

4. MUTLIPLE ARRANGEMENTS

4.01 There are two ways in which DSs 208A-type can be installed for multiple arrangements.

(a) The data sets can be stacked on each other as follows:

MAX. ROOM TEMP	NO. OF DATA SETS
85°F	3
110°F	2
120°F	1



NOTES:

1. DESIGNATE KEY STRIP AS SHOWN. CONVERT RING BUTTON TO NONLOCKING.

HOLD	—	—	PL TALK	RING	—

2. IF THE DATA SET IS USED AS AN EXTENSION FOR A DATA SET 209A-L1 MULTIPLEX SYSTEM OR AS A SUBRATE OFF-NET EXTENSION OF THE DIGITAL DATA SYSTEM, AN M23B CORD MUST BE USED BETWEEN THE DATA SET AND CUSTOMER PROVIDED CORD

Fig. 3—Data Set 208A-Type Used With DAS 829-Type, Data/Voice

(b) With suitable mounting brackets [D-180467 (MD) or D-180556], the data sets (including cover) can be mounted on a 19-inch or 23-inch rack mounting (Fig. 10).

(c) In cases where the DS 208A-type is replacing another data set in a cabinet arrangement, replace the data sets with DS 208A-type on a one-for-one basis. If a higher density of data sets is required, remove the cabinet shelves and use mounting brackets. For additional information, refer to Section 590-010-201.

4.02 When DSs 208A-type are used with the mounting brackets, it is possible to mount the data sets in KS-20018 cabinets. However, because of heat limitations, only a limited number of data sets can be mounted in a cabinet. Criteria for calculating the maximum number of data sets for a given cabinet is contained in Section 592-027-150.

5. INSTALLATION PROCEDURES

5.01 The 4-wire private line channel to be used with DS 208A-type must meet the requirements given in Section 314-410-500. Connections for the various data station configurations are shown in Fig. 2 through 9. Install DAS 829 (or equivalent), if required, per Sections 598-082-200 or 598-082-201 as required. Install DAS 828A and DAS 828C (or equivalent), if required, per Sections 598-080-200 and 598-080-201, respectively.

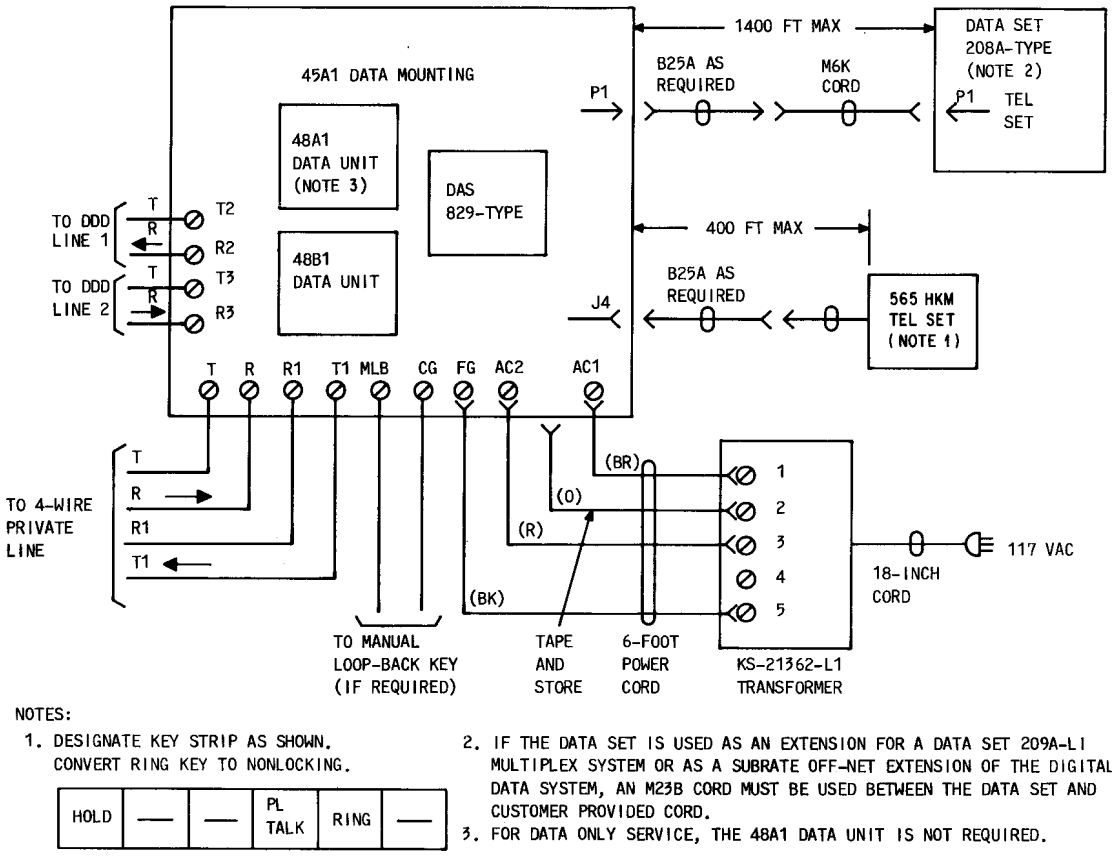


Fig. 4—Data Set 208A-Type Used on 4-Wire Private Line With Alternate DDD Backup Using DAS 829-Type, Data/Voice

5.02 Refer to Fig. 1 for the location and positions of the data set option switches which provide the options specified on the service order.

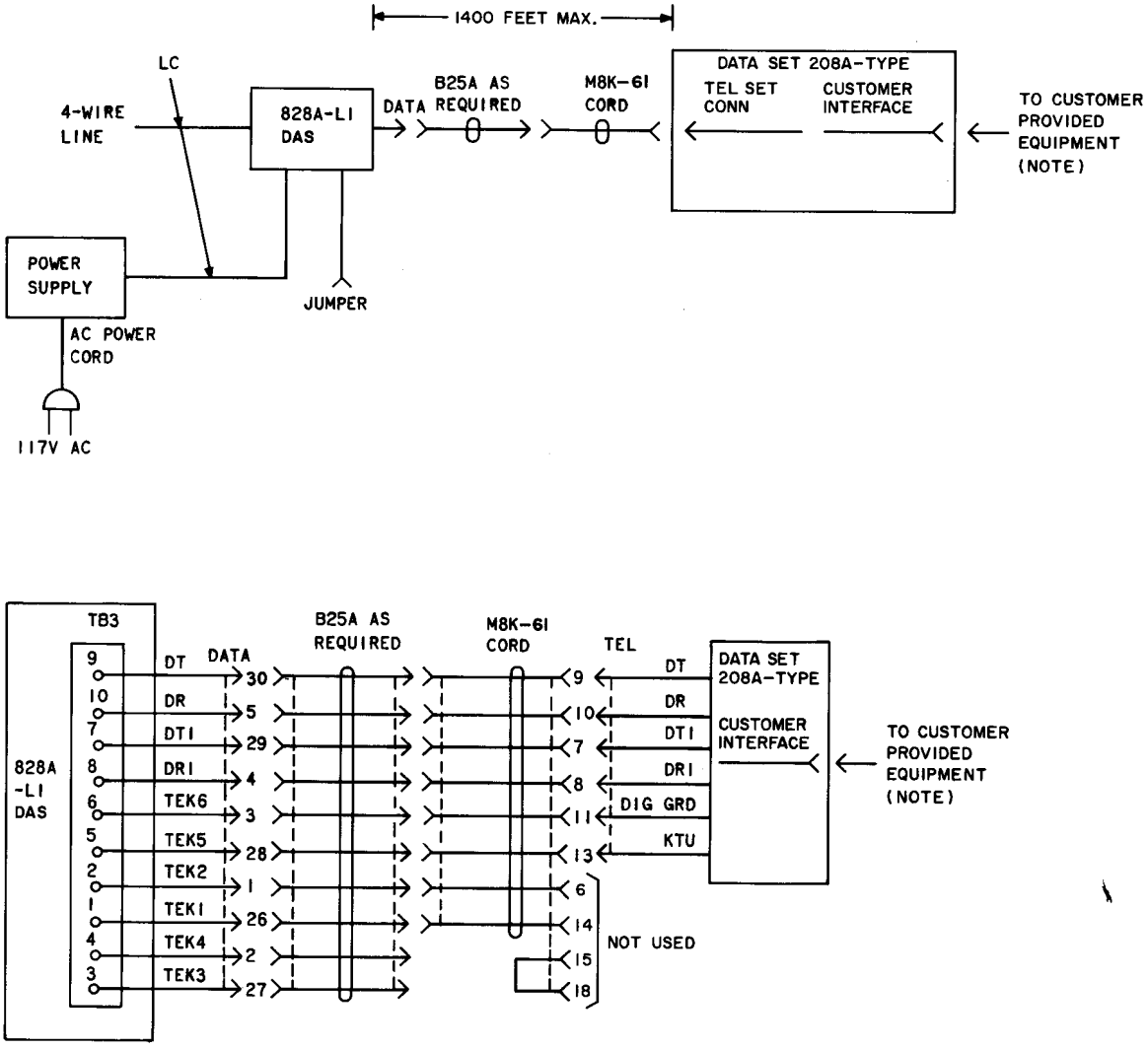
5.03 After the data set has been installed, it should be tested to determine if it is operating properly. Tests to be performed are as follows:

- Analog loop-back self test (DS 208A-L1A and -L1B)
- Digital loop-back test from STC
- Digital loop-back test to distant end
- Analog loop-back test (to be performed if either of the digital loop-back tests fails)
- Compromise equalizer test (if required).

5.04 In addition to the loop-back tests, the correct setting of the compromise equalizer must be determined if the data set being installed is optioned for switched carrier. Testing of the compromise equalizer setting is ***not*** required if the data set is optioned for continuous carrier operation. In this case, the compromise equalizer should be set for symmetric compromise equalization (S2B up; S2C up).

5.05 When the compromise equalizer test is required, the test procedure will be performed after the digital loop-back test to distant end has been performed. The distant-end data set should have been tested previously by the STC and must be in the digital loop-back (DL) test mode.

5.06 The proper test to be performed will be determined by the STC. Test procedures are given in Section 592-027-500.



NOTE:
IF THE DATA SET IS USED AS AN EXTENSION OF A DATA SET 209A-LI MULTIPLEX SYSTEM OR AS A SUBRATE OFF-NET EXTENSION OF THE DIGITAL DATA SYSTEM, AN M23B CORD MUST BE USED BETWEEN THE DATA SET AND THE CUSTOMER PROVIDED CORD.

Fig. 5—Data Set 208A-Type Used With DAS 828A, Data Only

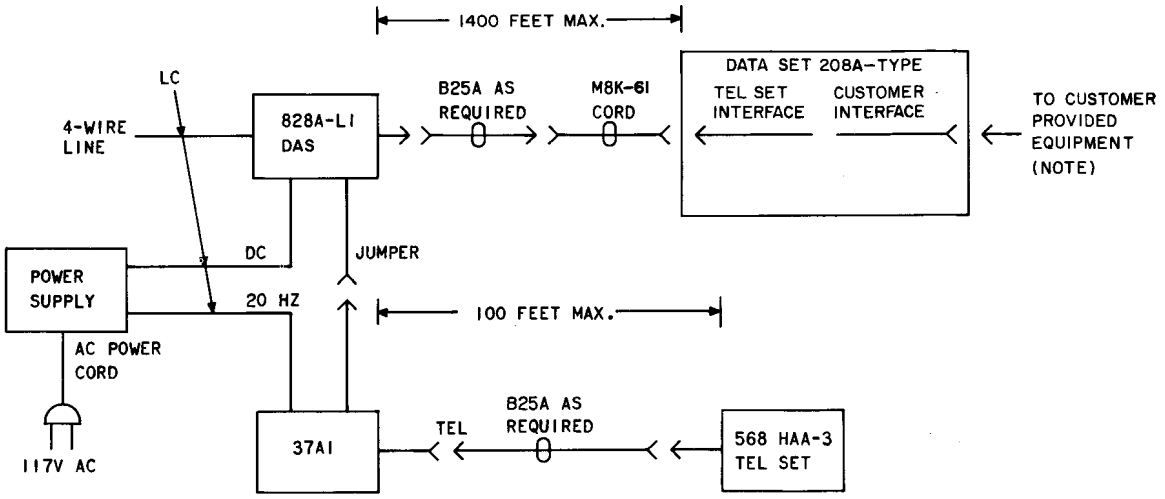
5.07 ▶Affix the label holder (841 788 292) to DS 208A-type and record both the circuit number and trouble call number on the label. ***Do not place identification of any type on the data set housing.***◀

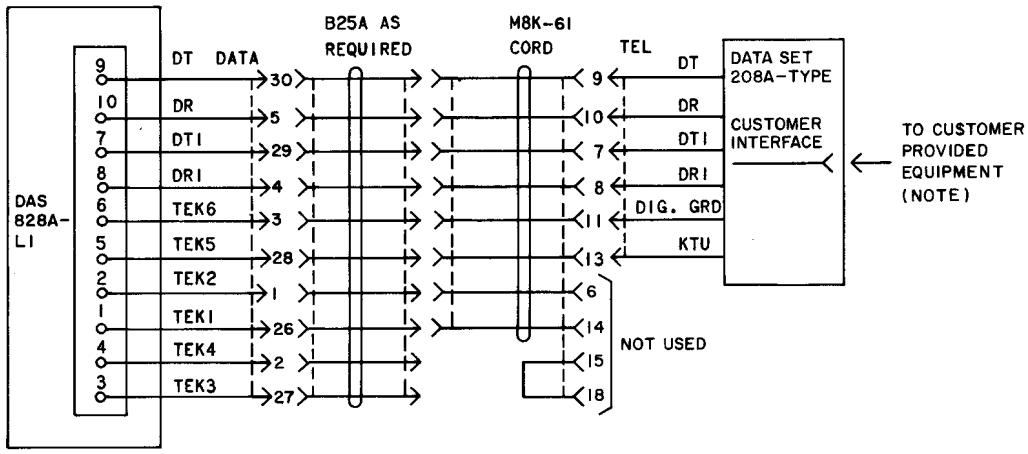
5.08 Ensure that a copy of Data Set 208A-Type, How to Operate Manual (999-100-105) is readily available to the customer.

6. REFERENCES

6.01 Documents listed in this part contain information pertaining to DS 208A-type.

SECTION	TITLE
590-002-110	4800-Bit Per Second (BPS) Service Using Data Set 208-Type—Reference Guide





NOTE:
IF THE DATA SET IS USED AS AN EXTENSION OF A DATA SET 209A-LI MULTIPLEX SYSTEM OR AS A SUBRATE OFF-NET EXTENSION OF THE DIGITAL DATA SYSTEM, AN M23B CORD MUST BE USED BETWEEN THE DATA SET AND THE CUSTOMER PROVIDED CORD.

Fig. 6—Data Set 208A-Type Used With DAS 828A, Data/Voice

592-027-100	Data Set 208A-Type—Transmitter-Receiver—Description and Operation	592-027-400	Data Set 208A-Type—Transmitter-Receiver—Wiring Information
592-027-150	Data Set 208A-Type—Transmitter-Receiver—Supplementary Information	592-027-500	Data Set 208A-Type—Transmitter-Receiver—Test Procedures
		592-027-501	▶Data Set 208A-Type—Transmitter-Receiver—Test Procedures Using 921A Data Test Set◀
592-027-180	Data Set 208A-Type—Transmitter-Receiver—SummarizingSpecification		
592-027-300	Data Set 208A-Type—Transmitter-Receiver—Maintenance	598-080-100	Data Auxiliary Set 828A—Description and Operation

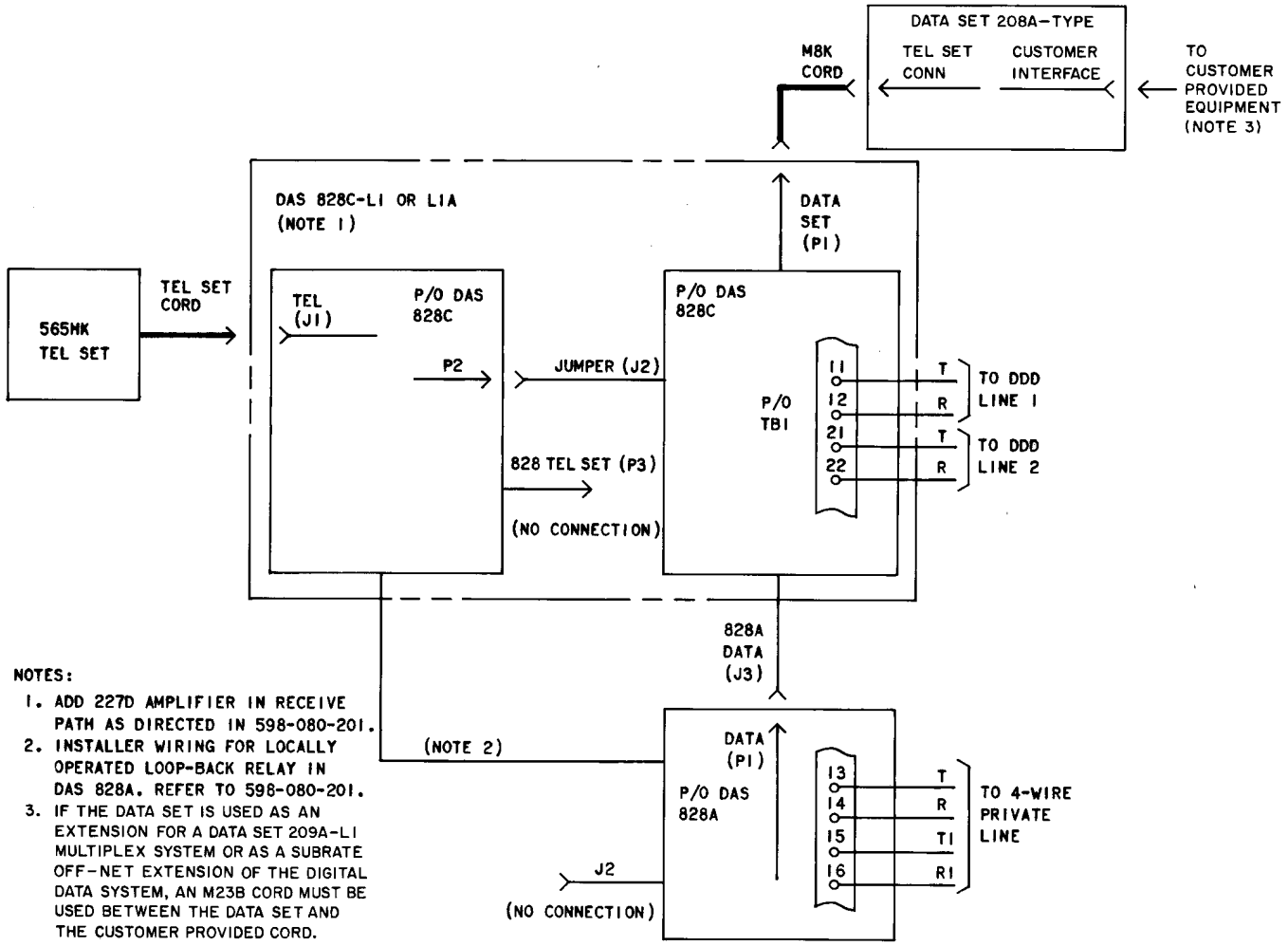


Fig. 7—Data Set 208A-Type Used on 4-Wire Private Line With Alternate DDD Backup Using DAS 828A and 828C, Data Only

598-080-200	Data Auxiliary Set 828A—Installation and Connections	598-082-101	Data Auxiliary Set 829-Type—(Alternate Voice and Dial Backup)—Description
598-080-500	Data Auxiliary Set 828A—Maintenance and Test Procedures	598-082-200	Data Auxiliary Set 829-Type—Installation and Connections
598-080-101	Data Auxiliary Set 828C—Description and Operation	598-082-201	Data Auxiliary Set 829-Type—(Alternate Voice and Dial Backup)—Installation and Connections
598-080-201	Data Auxiliary Set 828C—Installation and Connections		
598-080-501	Data Auxiliary Set 828C—Maintenance and Test Procedures	666-511-503	Test of Data Services Provided by Data Set 208A-Type From a Private Line Test Room
598-082-100	Data Auxiliary Set 829-Type—Description	999-100-105	Data Set 208A-Type—How to Operate Manual

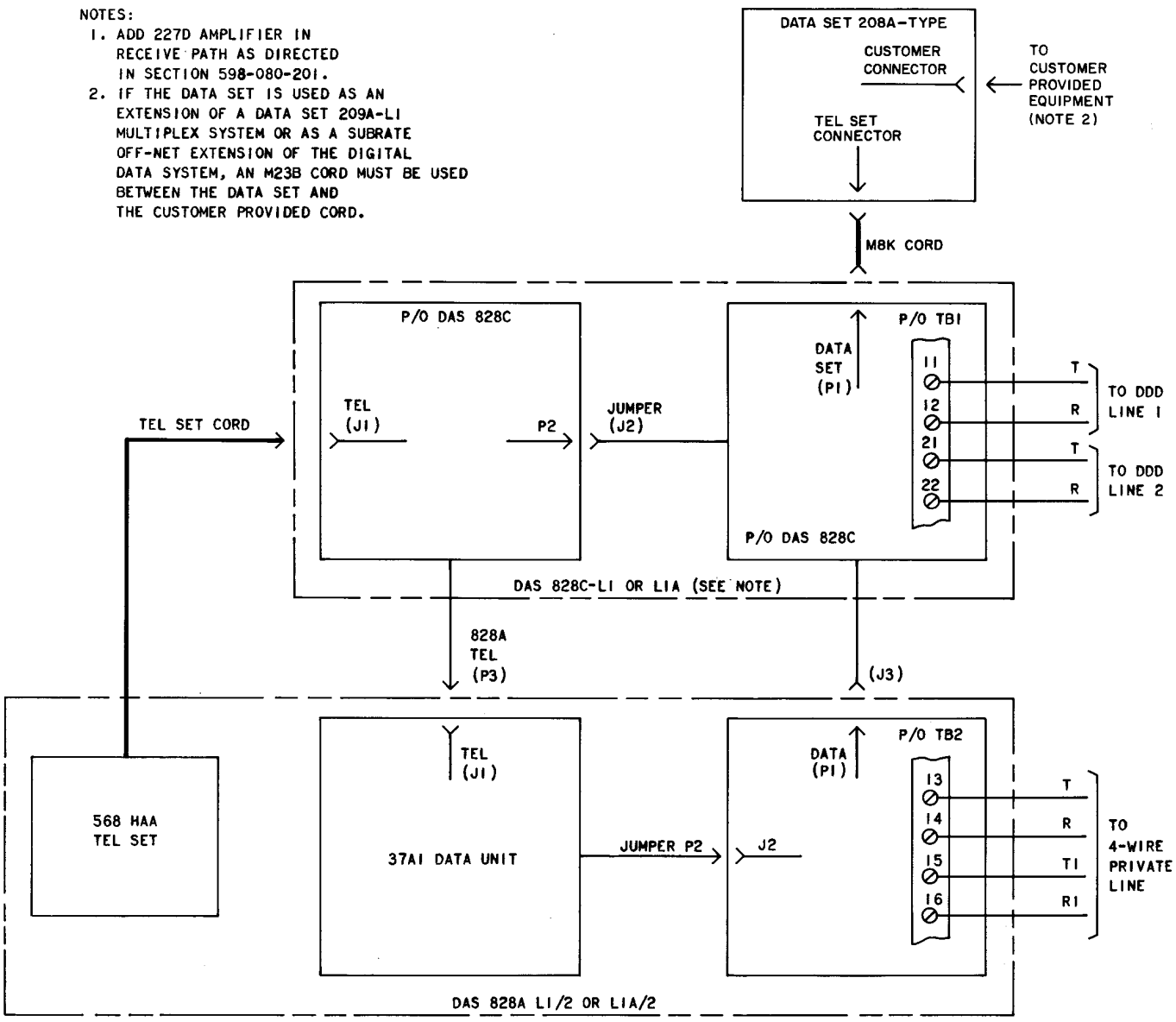
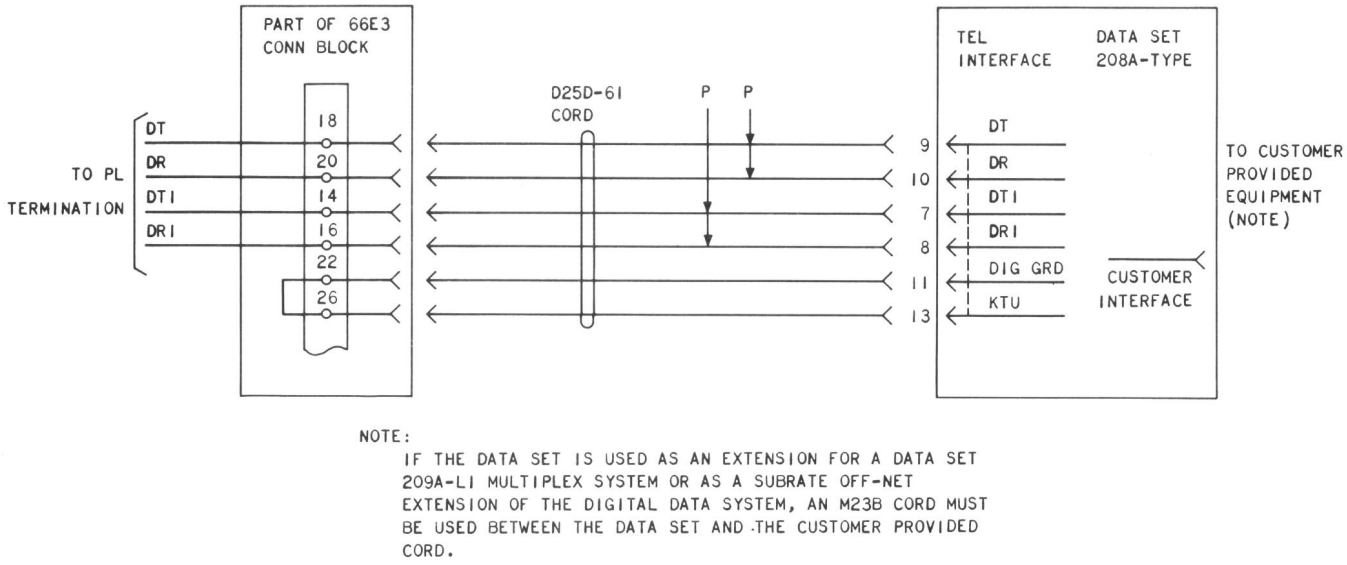


Fig. 8—Data Set 208A-Type Used on 4-Wire Private Line With Alternate DDD Backup Using DAS 828A and 828C, Data/Voice



NOTE:
IF THE DATA SET IS USED AS AN EXTENSION FOR A DATA SET 209A-LI MULTIPLEX SYSTEM OR AS A SUBRATE OFF-NET EXTENSION OF THE DIGITAL DATA SYSTEM, AN M23B CORD MUST BE USED BETWEEN THE DATA SET AND THE CUSTOMER PROVIDED CORD.

Fig. 9—Data Set 208A-Type Connections to Locally Engineered Private Line Termination Without DAS 828- or 829-Type

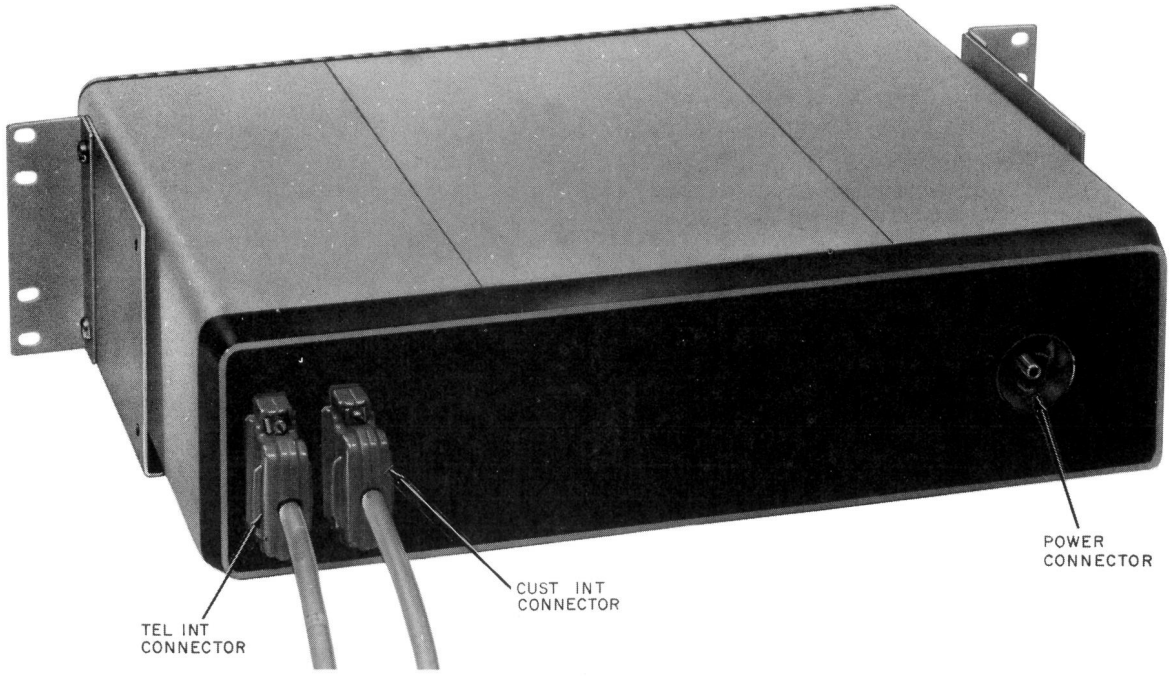


Fig. 10—Data Set 208A-Type With D-180467 (MD) Mounting Bracket Kit Installed, Rear View