DATA SET 201C
TRANSMITTER-RECEIVER
INSTALLATION AND CONNECTIONS

CONTENTS PAGE

1. GENERAL

1.01 This section contains the installation and connection information for data set (DS) 201C. The data set should be installed in conformance with the general instructions in Section 590-010-200.

1.02 This section is reissued to add information on the following:

(a) Data auxiliary set (DAS) 829-type

(b) Customer and telephone interfaces

(c) Customer and telephone company (telco) options.

Since this reissue is a general revision, arrows normally used to indicate changes have been omitted.

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 operates in an ambient temperature range of 40 to 120°F and a relative humidity range of 20 to 95 percent.

1.04 The data set 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]. In order to minimize inductive interference with data signals, the telephone line should not be carried in the same cable run as cable between the data set and CPE or lines connected to teletypewriter services. If this condition cannot be met, the telephone line must be run in type SK (shielded) station wire between the data set and the cable distribution terminal or building entrance. The shield should be grounded at one end only, preferably at the distribution terminal end.

1.05 The data set requires a power source that provides 105 to 129 volts, 27 watts, at 57 to 63 Hz. The customer must supply an outlet that will accept the 3-prong plug on the P3BJ or KS-14532-L24 power cord provided with the data set. To prevent the data set from being turned off accidently, this outlet should not be under the control of a switch. To avoid the possibility of data errors due to a potential difference between data set ground and CPE ground, the outlet for the data set power cord should be served from the same ac distribution panel as the CPE. If this condition cannot be met, a test using the 6H impulse counter should be made to detect the presence of noise potential. This test is described in Section 592-029-500. If test requirements are not met, data set ground and CPE ground must be bonded together in accordance with local instructions.

1.06 Connections to the CPE (Table A) are made through the 25-pin CUST INT connector at the rear of the data set. This connector mates

with a customer supplied Cinch or Cannon DB-19604-432 plug wired in accordance with Table A.

1.07 Connections to the telephone line (Table B) are made through a second 25-pin connector at the rear of the data set. For switched network service, an M13F cord is provided with the data set. For private line service with a channel interface unit (CIU), an M8K cord is provided with the data set. For private line service without a CIU, a D25D cord (ordered separately) is required.

1.08 To gain access to the circuit boards and options in the data set, the data set must be removed from its housing as follows (Fig. 1):

(1) Disconnect the three cords from the rear of the data set.

(2) Remove the front cover by gently squeezing it on the top and bottom and pulling forward.

(3) Loosen the two retaining screws at the rear bottom of the housing.

TABLE A

CUSTOMER INTERFACE

PIN NO.	FUNCTION	DATA SET MNEMONIC	EIA DESIGNATION (RS-232-C)
1	Protective Ground	FG	AA
2	Transmitted Data	SD	BA
3	Received 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	Received Line Signal Detector	CO	CF
9	Test Voltage	+12V	—
10	Test Voltage	−12V	—
14	New Sync	NS (Non-EIA)	—
15	Transmitter Signal Element Timing	SCT	DB
16	Dibit Clock Transmitter	DCT (Non-EIA)	—
17	Receiver Signal Element Timing	SCR	DD
18	Dibit Clock Receiver	DCR (Non-EIA)	—
19	Remote Release (+5V)	RR (Non-EIA)	—
20	Data Terminal Ready	DTR	CD
21	Ready	RDY (Non-EIA)	—
22	Ring Indicator	RI	CE
23	Ring Indicator 2	RG2 (Non-EIA)	—
24	Transmitter Signal Element Timing (External)	SCTE	DA

TABLE B

TELEPHONE LINE INTERFACE

PIN NO.	DESIGNATION	FUNCTION
1	L	Line status lamp control from data set to telephone set
2	—12V	Test voltage
3	+5V	Test voltage
4	LG	Line status lamp control ground
5	TD	Talk/data control from telephone set to data set
7	T	Telephone line tip } Transmit/Receive, 2-Wire — Transmit Only, 4-Wire
8	R	Telephone line ring }
9	DT	Telephone line tip } Receive Only, 4-Wire
10	DR	Telephone line ring }
11	TEK6	Data set ready control ground
12	RNG	Common ringer control for multiple data sets
13	TEK5	Data set ready control from CIU* to data set
14	C	Data mode status from data set to ACU
16	D1	Data mode control from ACU to data set
20	+12V	Test voltage
21	T1	Telephone set tip
22	R1	Telephone set ring
23	A	Telephone line status from data set to ACU
25	TDG	Talk/data control ground

* Channel interface unit (DAS 828-type, DAS 829-type, or equivalent)

(4) Slide the data set out the front of the housing.

Caution: When the data set is removed from its housing, the data set should be placed on a clean, dry, nonconductive surface.

1.09 To gain further access to the circuit boards and options, disassemble the data set as follows:

(1) Remove the slotted head screw (Fig. 2) on top of the analog circuit.

(2) Slide the analog circuit to the left until the rivets in the rear (visible) and in the front (not visible) are disengaged from their keyhole slots.

(3) Fold the analog circuit over to the right and place it on a flat surface (Fig. 3).

(4) If the line control circuit is present, loosen the captive screw (Fig. 2) in each corner of the line control circuit and fold the line control circuit over to the left (Fig. 3).

(5) Remove the two slotted head screws on the underside of the digital circuit directly

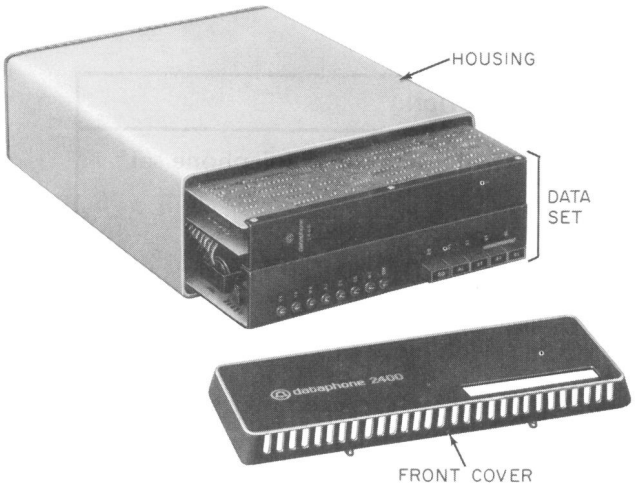


Fig. 1—Data Set 201C—Front Cover Removed

underneath the rear edge of the power unit (Fig. 2).

(6) Lift the power unit and place it behind the digital circuit (Fig. 3).

1.10 The data set must be reassembled to the configuration shown in Fig. 2 before remounting in the housing. To reassemble the data set, perform the procedure described in 1.09 in reverse order. To remount the data set, perform the procedure described in 1.08 in reverse order.

Note: Make sure that both edges of the data set are engaged in the slot in the housing.

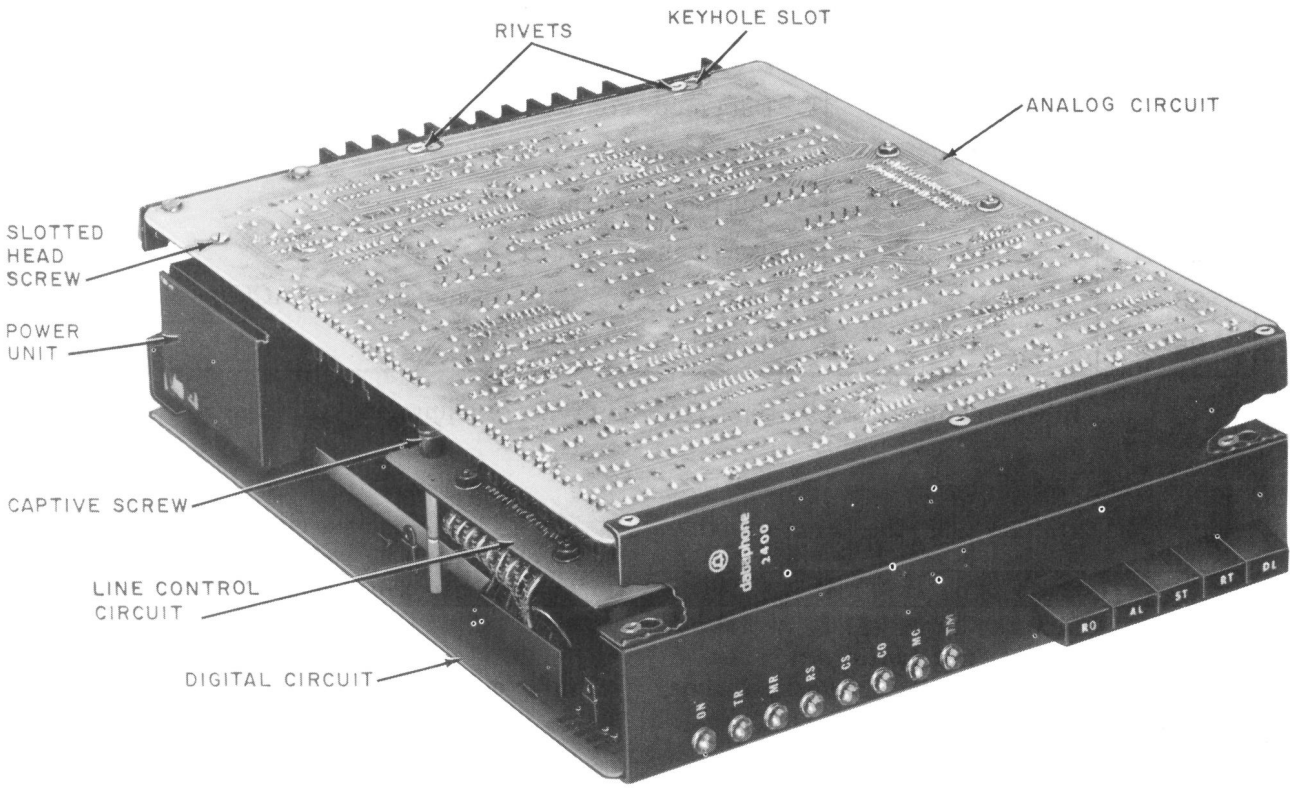


Fig. 2—Data Set 201C Removed From Housing

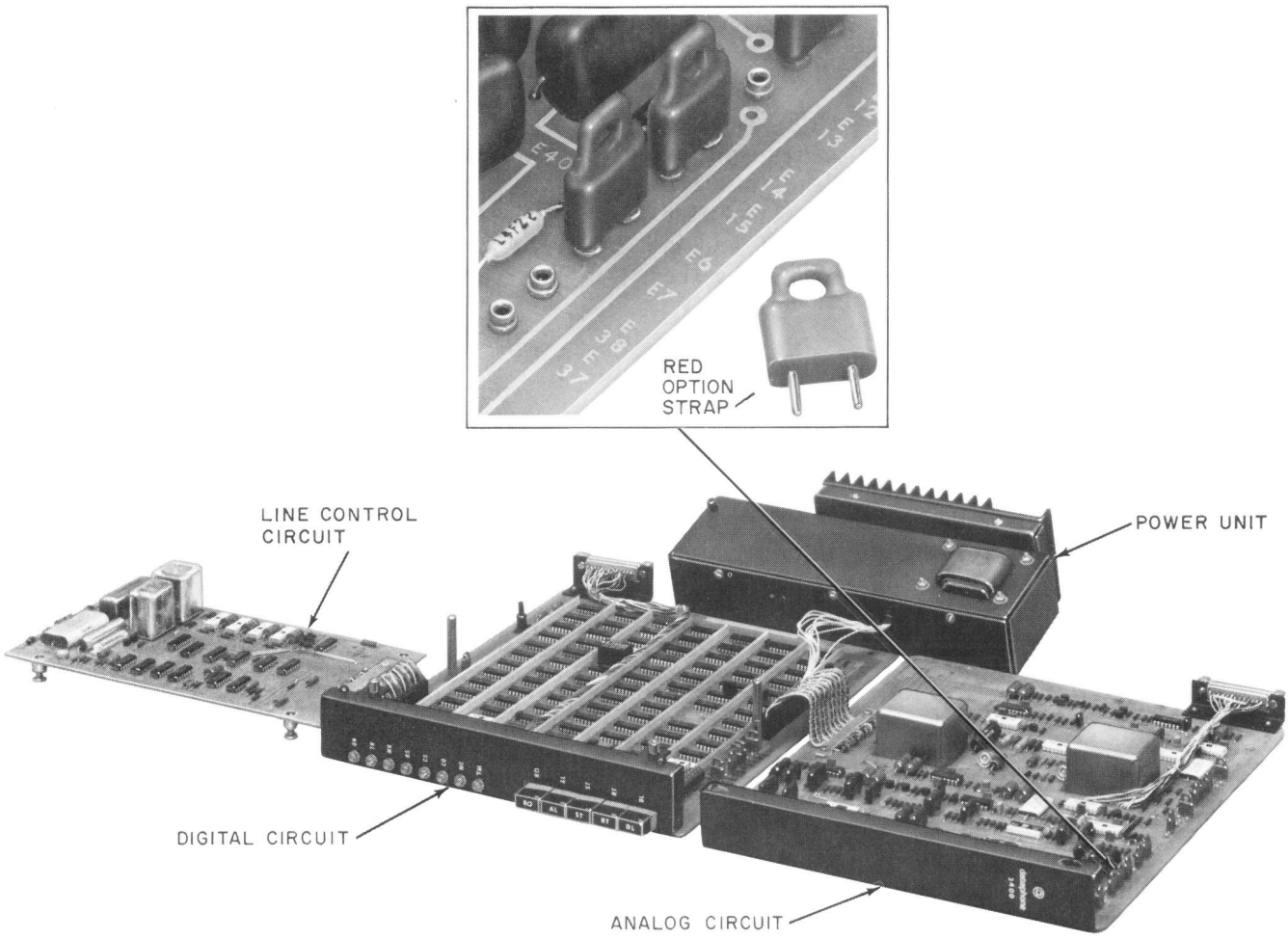


Fig. 3—Data Set 201C—Circuit Board Access

2. OPTIONS

2.01 DS 201C has features or options that must be installed prior to placing the data set in service. The options to be installed should be specified on the service order. Refer to Table C for a summary of the options.

2.02 The options are installed by installing and removing red plug-in straps on the edge of the analog and digital circuit boards (Fig. 3). The red straps to be installed and removed for each option are shown in Table C. The black plug-in straps on the analog, digital, and line control circuit boards are for factory testing and must ***not*** be removed. The correct locations for the black test straps are shown in Table D.

2.03 A gummed option label designated E-6391 can be ordered for the data set. This label can be attached to the bottom of the data set housing.

A. Customer Options

2.04 ***New Sync:*** In multipoint arrangements with the new sync option installed, the master terminal can use the new sync lead (pin 14) to quench the data set receiver between messages from different remote terminals. If new sync is not required, the new sync lead can be inhibited by installing the new sync not used option.

2.05 ***Transmitter Timing:*** Internal or external timing can be provided.

(a) With internal timing, the data set provides serial clock to the CPE on the transmitter signal element timing lead (pin 15).

(b) With external timing, the CPE provides serial clock to the data set on the transmitter signal element timing (external) lead (pin 24). On data sets with external timing, the transmitter signal element timing signal is present and is phase-locked to the serial clock provided by the CPE.

2.06 ***Automatic Answer:*** Two options provide three types of operation.

(a) With option YE, automatic answer is either not provided or provided on a selective basis. If provided, it is controlled by the CPE through the ready lead (pin 21) and the data terminal ready lead (pin 20). Both leads must be ***on*** for automatic answer to occur. This can be accomplished by an EIA voltage, by a contact closure to the remote release lead (pin 19), or by a combination of these methods.

(b) With option YF, permanent automatic answer is provided. It is controlled by the CPE through the data terminal ready lead (pin 20) only. The required ***on*** condition can be accomplished by an EIA voltage or by a contact closure to the remote release lead (pin 19).

2.07 ***Ring Indication:*** EIA or contact interface can be provided.

(a) With EIA interface, the ring indicator lead (pin 22) indicates to the CPE that a ringing signal is present on the telephone line.

(b) With contact interface, a contact closure between the ring indicator lead (pin 22) and the ring indicator 2 lead (pin 23) occurs during ringing.

2.08 ***Grounding:*** Signal ground (pin 7) is normally connected to protective (frame) ground (pin 1) to minimize the introduction of power line noise into the data circuits. However, local conditions may require that signal ground ***not*** be connected to protective ground.

2.09 ***Type of Operation:*** 4-wire private line, 2-wire switched network, or 2-wire private line service can be provided. With 4-wire service, duplex operation is possible. With 2-wire service, half-duplex operation is required.

(a) With 4-wire private line service, switched carrier or continuous carrier options are available.

- With the switched carrier, 7-ms clear-to-send delay option (XA), the data set can transmit (carrier is on) when request-to-send is ***on.*** The data set transmitter is off when request-to-send is ***off.***
- With the continuous carrier, 7-ms clear-to-send delay option (XB), the data set transmitter remains on continuously to maintain synchronization; however, when request-to-send is ***off,*** the data set transmitter sends an idle code of steady marks.
- With the continuous carrier, 0-ms clear-to-send delay option (XC), data set operation is identical to option XB except that there is no delay between request-to-send and clear-to-send.

(b) With 2-wire switched network service, the only option available is switched carrier with 150 ms of delay between request-to-send and clear-to-send (option XD). This delay allows time for echo suppressors in the telephone line to turn around and for the distant receiver to establish synchronization. In addition, the receiver is clamped for 100 ms after the transmitter is turned off to permit line echoes to decay.

(c) With 2-wire private line service, the only option available is switched carrier with 150 ms of delay between request-to-send and clear-to-send (option XE). Data set operation is identical to option XD.

B. Telco Options

2.10 ***Transmit Line Signal Level:*** This option allows selection of the transmitted signal level. Signal levels of 0 to -15 dBm can be provided in steps of 1 dB. For private line service, the signal level is set for 0 dBm. For switched network service, the signal level is set so that the level of the signal reaching the central office does not exceed -12 dBm.

TABLE C

DATA SET 201C OPTIONS (Note 1)

FEATURE	OPTION			STRAPPING ON ANALOG BOARD (CP JB1)		STRAPPING ON DIGITAL BOARD (CP JB2)		PROVIDE
				INSTALL RED STRAPS	REMOVE RED STRAPS	INSTALL RED STRAPS	REMOVE RED STRAPS	
Transmit Line Signal Level	0 dBm	For Private Line	ZA	27-28, 29-30, 31-32, 33-34	19-20, 21-22, 23-24, 25-26			One Per Set
	−1 dBm	For Switched Network	ZB	19-20, 29-30, 31-32, 33-34	27-28, 21-22, 23-24, 25-26			
	−2 dBm		ZC	27-28, 21-22, 31-32, 33-34	19-20, 29-30, 23-24, 25-26			
	−3 dBm		ZD	19-20, 21-22, 31-32, 33-34	27-28, 29-30, 23-24, 25-26			
	−4 dBm		ZE	27-28, 29-30, 23-24, 33-34	19-20, 21-22, 31-32, 25-26			
	−5 dBm		ZF	19-20, 29-30, 23-24, 33-34	27-28, 21-22, 31-32, 25-26			
	−6 dBm		ZG	27-28, 21-22, 23-24, 33-34	19-20, 29-30, 31-32, 25-26			
	−7 dBm		ZH	19-20, 21-22, 23-24, 33-34	27-28, 29-30, 31-32, 25-26			
	−8 dBm		ZI	27-28, 29-30, 31-32, 25-26	19-20, 21-22, 23-24, 33-34			
	−9 dBm		ZJ	19-20, 29-30, 31-32, 25-26	27-28, 21-22, 23-24, 33-34			
	−10 dBm		ZK	27-28, 21-22, 31-32, 25-26	19-20, 29-30, 23-24, 33-34			
	−11 dBm		ZL	19-20, 21-22, 31-32, 25-26	27-28, 29-30, 23-24, 33-34			
	−12 dBm		ZM	27-28, 29-30, 23-24, 25-26	19-20, 21-22, 31-32, 33-34			
	−13 dBm		ZN	19-20, 29-30, 23-24, 25-26	27-28, 21-22, 31-32, 33-34			
	−14 dBm		ZO	27-28, 21-22, 23-24, 25-26	19-20, 29-30, 31-32, 33-34			
	−15 dBm		ZP	19-20, 21-22, 23-24, 25-26	27-28, 29-30, 31-32, 33-34			
Line Impedance	600 ohms		ZQ	16-17	17-18			One Per Set
	900 ohms		ZR	17-18	16-17			
Compromise Equalizer (Note 2)	In		ZS	8-9, 11-12	9-10, 12-13			One Per Set
	Out		ZT	9-10, 12-13	8-9, 11-12			
Carrier On Sensitivity	−24 dBm for Private Line		ZU		1-2			One Per Set
	−44 dBm for Switched Network		ZV	1-2				
New Sync	Not Used		YA			20-21	19-20	One Per Set
	Under Customer Control		YB			19-20	20-21	
Transmitter Timing	Internal		YC				13-14	One Per Set
	External		YD			13-14		
Automatic Answer	Not Provided or Provided Under Control of Customer Interface Circuits RDY and DTR		YE				17-18	One Per Set
	Provided Under Control of DTR Only		YF			17-18		
Ring Indication on Customer Interface	EIA Interface on Terminal 22		YG			22-24	22-23	One Per Set
	Contact Interface Between Terminals 22 and 23		YH			22-23	22-24	

TABLE C (Cont)

DATA SET 201C OPTIONS (Note 1)

FEATURE	OPTION			STRAPPING ON ANALOG BOARD (CP JB1)		STRAPPING ON DIGITAL BOARD (CP JB2)		PROVIDE
				INSTALL RED STRAPS	REMOVE RED STRAPS	INSTALL RED STRAPS	REMOVE RED STRAPS	
External Control of DSR	Yes		YI				15-16	One Per Set
	No		YJ			15-16		
Grounding	Signal Ground Connected to Frame Ground		YK			25-26		One Per Set
	Signal Ground Not Connected to Frame Ground		YL				25-26	
Type of Operation and Clear-to-Send Delay	4-Wire Private Line	Switched Carrier, 7-ms CS Delay	XA	35-36	4-5	1-3, 4-6, 28-29, 11-12	2-3, 5-6, 27-28, 133-134	One Per Set
		Continuous Carrier, 7-ms CS Delay	XB	35-36	4-5	1-3, 5-6, 28-29, 11-12	2-3, 4-6, 27-28, 133-134	
		Continuous Carrier, 0-ms CS Delay	XC	35-36	4-5	2-3, 5-6, 28-29, 11-12	1-3, 4-6, 27-28, 133-134	
	2-Wire Switched Network	Switched Carrier, 150-ms CS Delay	XD	4-5	35-36	1-3, 4-6, 27-28	2-3, 5-6, 11-12, 28-29, 133-134	
	2-Wire Private Line	Switched Carrier, 150-ms CS Delay	XE	4-5, 35-36		1-3, 4-6, 11-12, 133-134	2-3, 5-6, 27-28, 28-29	

Note 1: DO NOT REMOVE ANY BLACK TEST STRAPS.

Note 2: Use option ZS for all installations.

TABLE D

FACTORY BLACK TEST STRAPS

ANALOG BOARD	DIGITAL BOARD	DIGITAL BOARD (SERIES 7 AND ABOVE)		LINE CONTROL BOARD	LINE CONTROL BOARD (SERIES 5 AND ABOVE)
E6—E7	E7—E8	E7—E8	E149—E150	E1—E2	E2—E3
E14—E15	E9—E10	E9—E10	E151—E152		
E37—E38		E127—E166	E153—E154		
		E128—E167	E155—E156		
		E135—E136	E157—E158		
		E137—E138	E159—E160		
		E139—E140	E161—E162		
		E141—E142	E163—E164		
		E143—E144	E165—E170		
		E145—E146	E168—E169		
		E147—E148			

2.11 ***Line Impedance:*** The data set can be equipped with a 600-ohm or a 900-ohm line impedance. The 600-ohm impedance is for use on private lines. The 900-ohm impedance is for use on the switched network.

2.12 ***Compromise Equalizer:*** This option provides a fixed 4-dB slope and symmetrical delay equalizer to compensate for distortion on the telephone line. The option should be provided for all installations.

2.13 ***Carrier on Sensitivity:*** This option determines the minimum line signal level at which the data set reliably detects the carrier signal. For private line service, the carrier on sensitivity is set for -24 dBm. For switched network service, -44 dBm is used.

2.14 ***External Control of DSR (Use With DAS 828-Type):*** This option allows the data set ready lead (pin 20) to be controlled through the telephone line interface by a channel interface unit (DAS 828-type, DAS 829-type, or equivalent). An open circuit on pin 13 of the telephone line interface holds data set ready ***off.*** A contact closure between pin 13 and pin 11 (ground) enables data set ready to go ***on.***

3. CONNECTIONS

3.01 Connections for the various types of service using DS 201C are shown in Fig. 4 through 15. The figure numbers and titles of these connection drawings are listed as follows:

Fig. 4—2-Wire Switched Network

Fig. 5—2-Wire Switched Network Using DAS 801-Type ACU

Fig. 6—2-Wire Private Line Using 66E3 Connecting Block Only

Fig. 7—4-Wire Private Line Using 66E3 Connecting Block Only

Fig. 8—4-Wire Private Line (Data Only) Using DAS 828A

Fig. 9—4-Wire Private Line (Data/Voice) Using DAS 828A

Fig. 10—4-Wire Private Line (Data Only) With Switched Network Backup Using DAS 828A and DAS 828C

Fig. 11—4-Wire Private Line (Data/Voice) With Switched Network Backup Using DAS 828A and DAS 828C

Fig. 12—4-Wire Switched Network Using Two 2-Wire Switched Network Lines and DAS 828C

Fig. 13—4-Wire Private Line (Data Only) Using DAS 829-Type

Fig. 14—4-Wire Private Line (Data/Voice) Using DAS 829-Type

Fig. 15—4-Wire Private Line (Data Only or Data/Voice) With Switched Network Backup Using DAS 829-Type

4. INSTALLATION

4.01 Switched network data circuits used with DS 201C must meet the requirements specified in Section 314-205-501. Private line data circuits used with DS 201C must meet the requirements specified in Section 314-410-500.

4.02 The data set output level (transmit line signal level) is controlled by strapping on the analog board (Table C). The output level must be set to the value specified on the service order. If the output level is not specified on the service order, proceed as follows:

(1) For private line service, set the output level for 0 dBm.

(2) For switched network service, set the output level so that the level of the signal reaching the central office does not exceed -12 dBm. The output level required is determined by the following formula: Output level is equal to the sum of the desired power level at the central office (-12 dBm) and the loop loss. For example, if the loop loss is 5 dB:

Output level = -12 dBm + 5 dB = -7 dBm.

4.03 If the loop loss is not known, it can be determined as follows:

(1) Dial the central office milliwatt supply or request the local testboard to send a 1000-Hz tone at 0 dBm on the loop.

(2) Use a transmission test set, such as the TTS-4, with a 900-ohm termination to measure the level of the incoming signal. The numerical reading is equal to the loop loss in dB. For example, -6 dBm on the meter is equal to 6 dB loop loss.

4.04 After the data set is installed, it must be tested to determine if it is operating properly. The required installation tests are described in Section 592-029-500.

Verify that the options specified on the service order are installed before performing the installation tests.

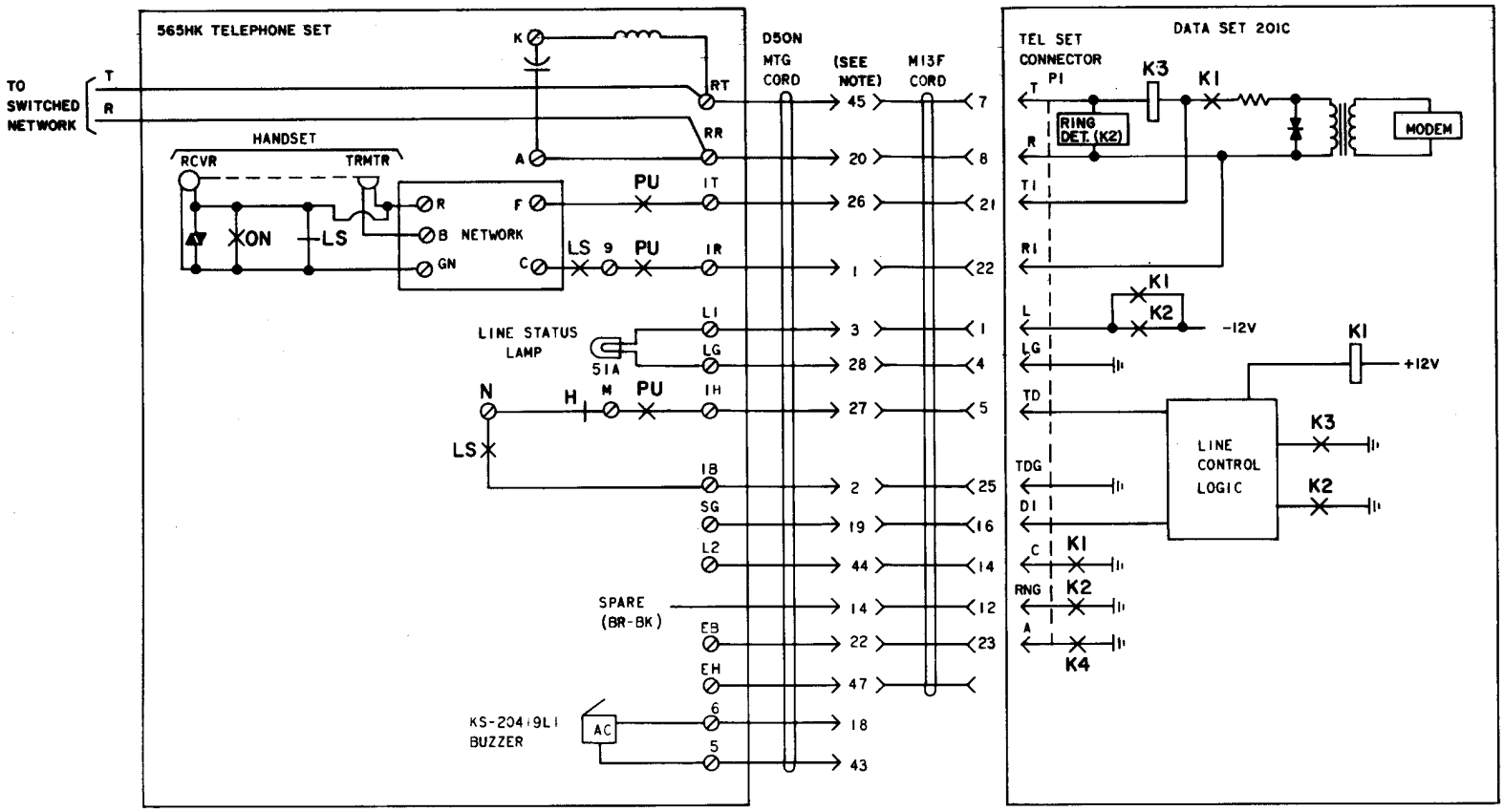
5. REFERENCES

5.01 Additional information concerning DS 201C and auxiliary apparatus is contained in the following publications:

SECTION	TITLE
314-205-501	Data Systems—DATA-PHONE® Service and Data Access Arrangements on Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines
314-410-500	Voice Bandwidth Private Line Data Circuits—Tests and Requirements
314-919-100	Digital Data System—Subrate Off-Net Extension Arrangement—Installation and Connections
502-500-120	Telephone Sets—540, 560, 1560, and 2560 Series—Common Installation and Maintenance Information
590-002-100	Data Services—2000 and 2400 BPS Provided by Data Set 201-Type—Reference Guide
590-008-100	Data Auxiliary Set 801A-Type—Reference Guide
590-008-101	Data Auxiliary Set 801C-Type—Reference Guide
590-010-200	Data Sets and Data Access Arrangements—General Installation and Connection Information

SECTION	TITLE
598-082-501	Data Auxiliary Set 829-Type—Supplementary Functions for Voiceband Private Line Channels—(Alternate Voice and Dial Backup)—Test Procedures
666-511-501	Test of Data Services Provided by Data Set 201C From a Private Line Testroom
999-100-138	Data Set 201C—How to Operate Manual.

5.02 Detailed information concerning DS 201C is contained in CD- and SD-1D239-01.



NOTE:
MAY BE EXTENDED WITH B25A CABLE. MAXIMUM DISTANCE BETWEEN TELEPHONE SET AND DATA SET IS 100 FEET.

Fig. 4—2-Wire Switched Network

NOTES:

1. DAS 801-TYPE OPTIONS REQUIRED ARE SHOWN IN THE FOLLOWING TABLE:

801C-L1/2	801C4	801A6
V OR Y	V OR Y	
W	W	W
S	S	S
ZG	ZG	ZG
B	B	B
ZN		
G OR Z	G OR Z	G OR Z
R OR H	R OR H	R OR H
ZQ, ZR, ZS, OR ZT		
ZU OR ZV		
	ZH	
	ZM	
		ZE OR ZF
	M	M

2. M13G CORD PROVIDED WITH 801C-L1/2. DIOP CORD PROVIDED WITH 801C4 AND 801A6
3. DIOP CORD DOES NOT CONTAIN THESE LEADS.
4. INSTALLER STRAP.
5. MAY BE EXTENDED WITH B25A CABLE. MAXIMUM DISTANCE BETWEEN TEL SET AND DATA SET IS 100 FEET.

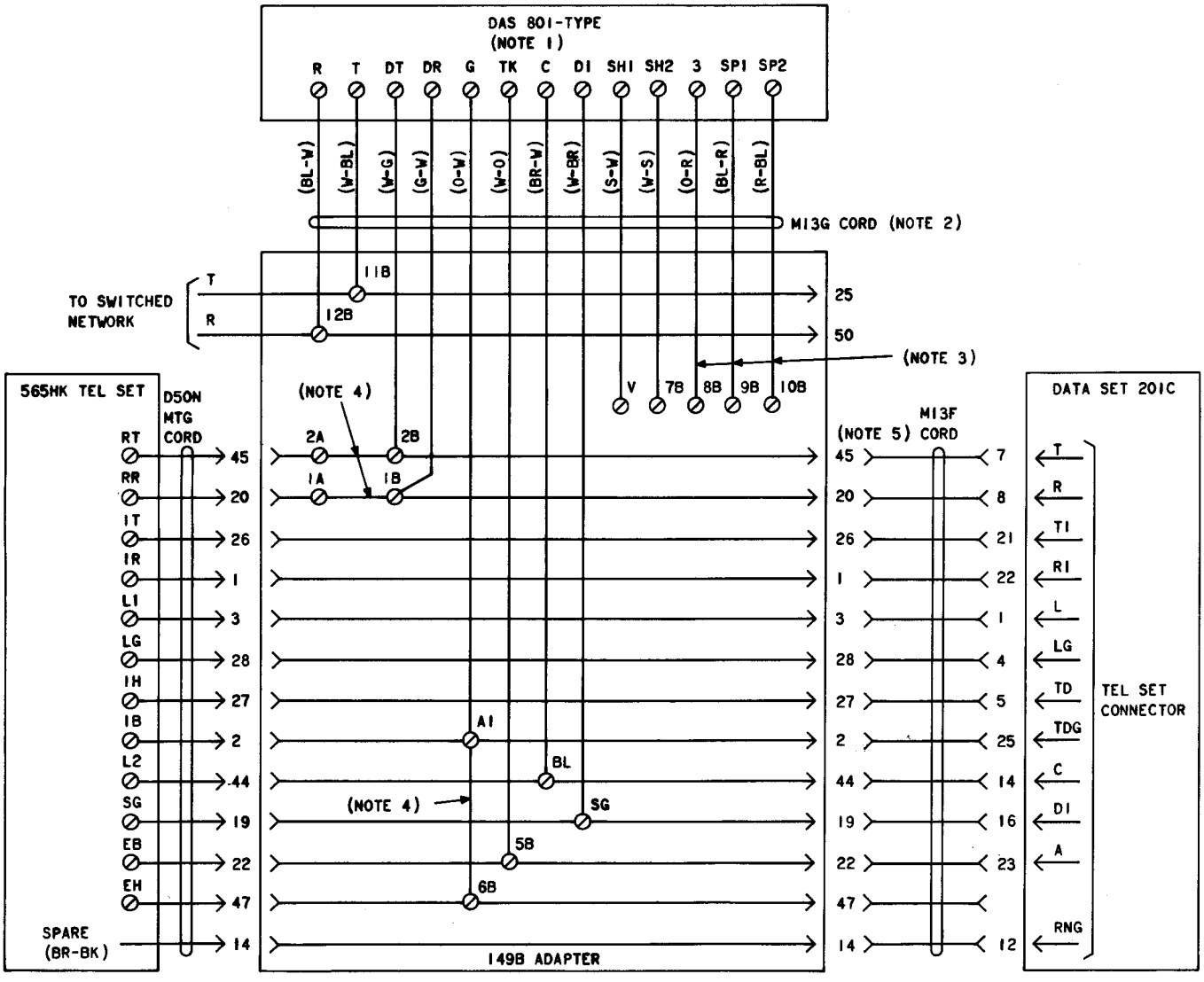


Fig. 5—2-Wire Switched Network Using DAS 801-Type ACU

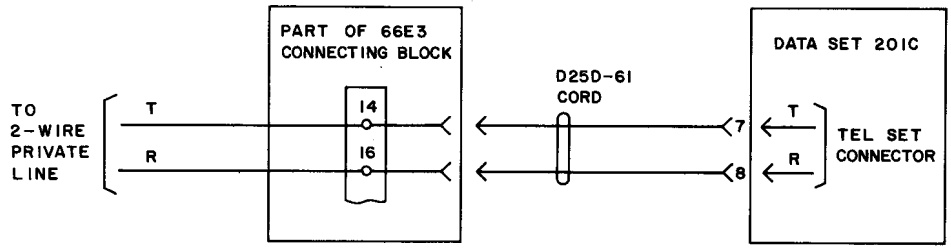
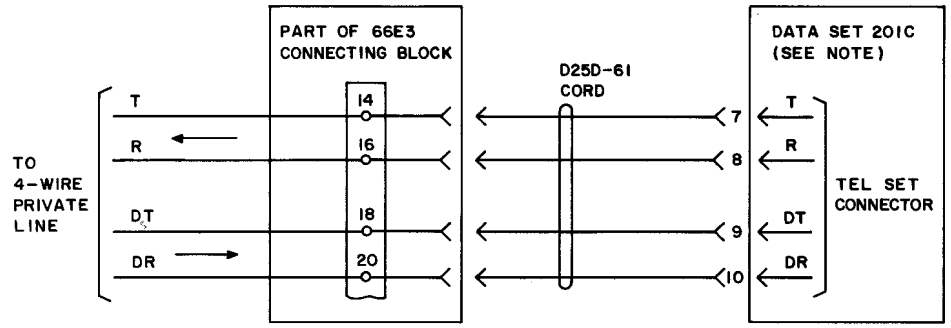
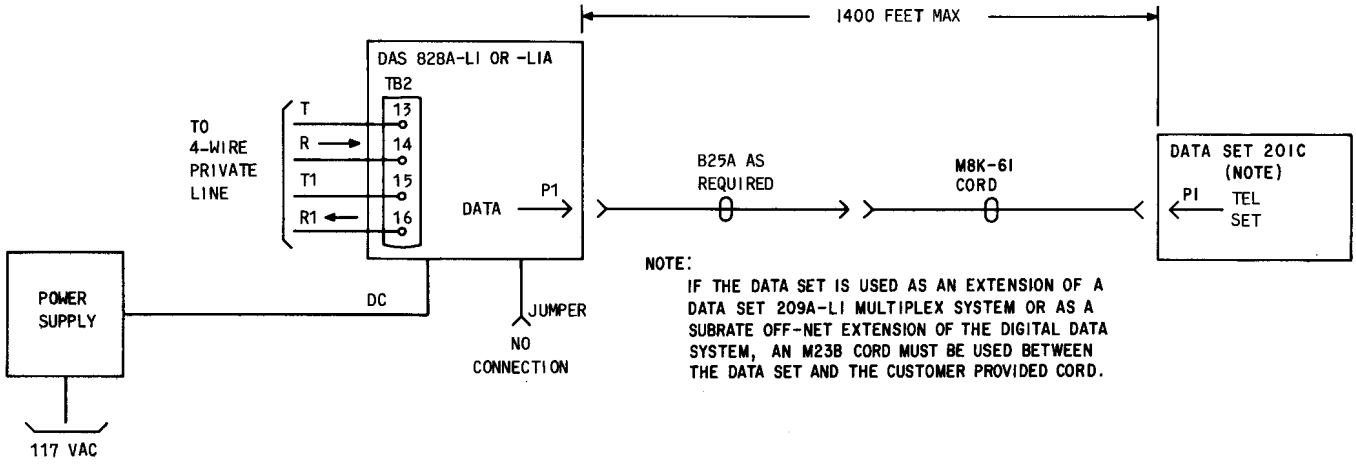


Fig. 6—2-Wire Private Line Using 66E3 Connecting Block Only



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. 7—4-Wire Private Line Using 66E3 Connecting Block Only



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. 8—4-Wire Private Line (Data Only) Using DAS 828A

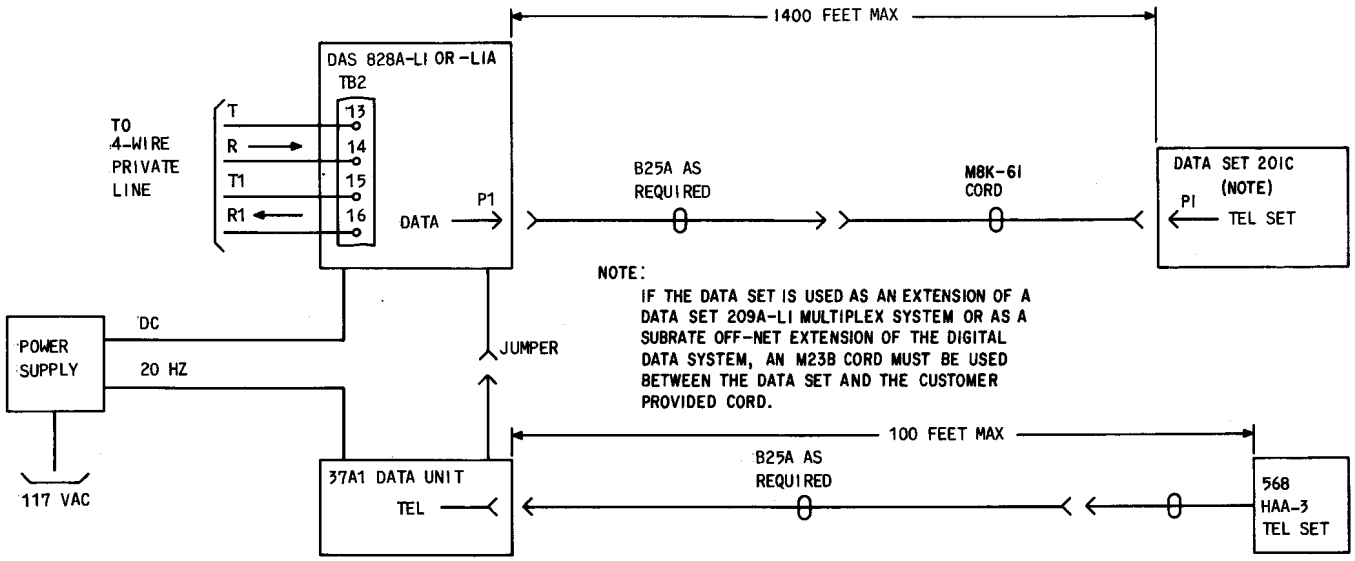
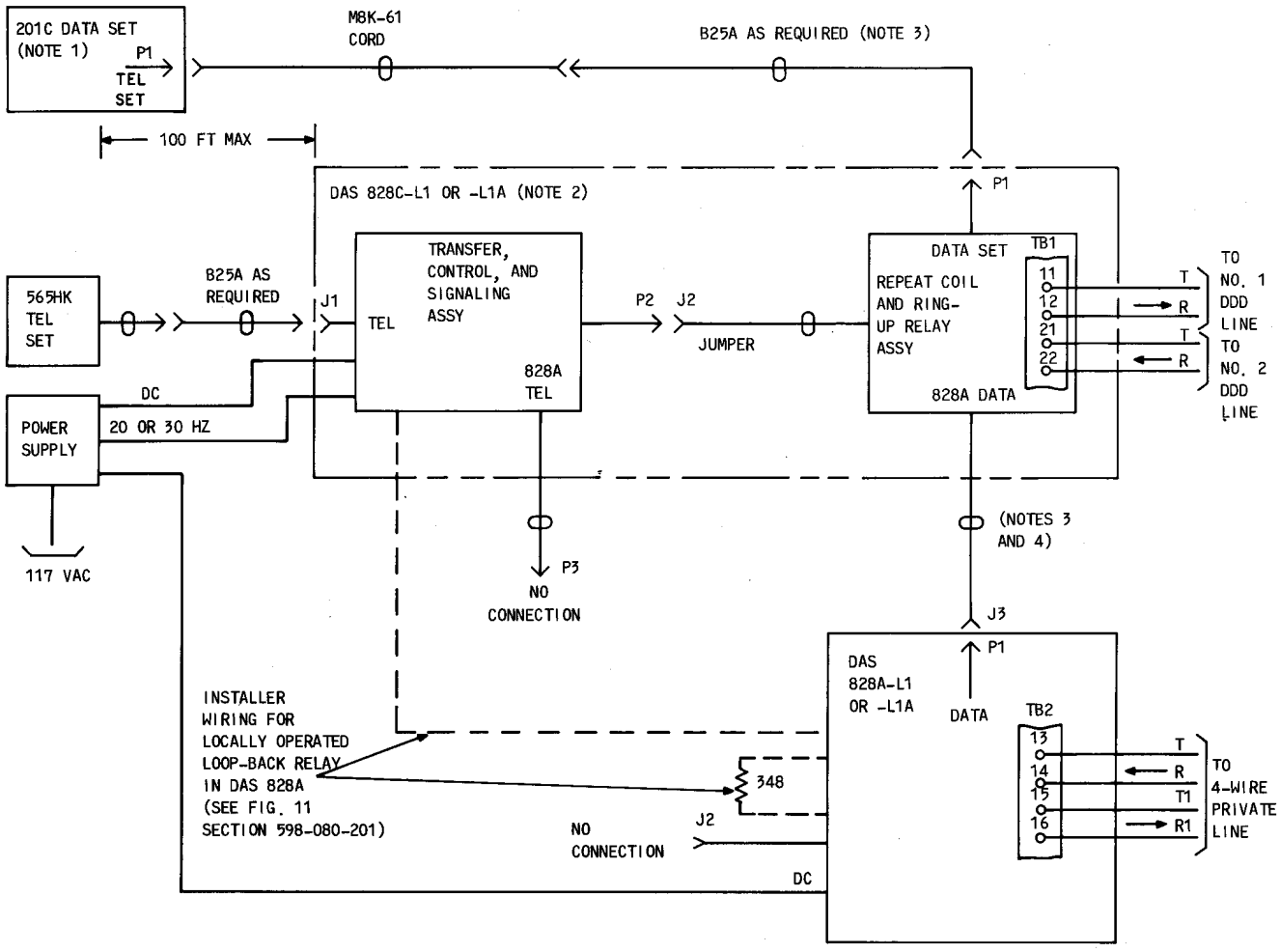
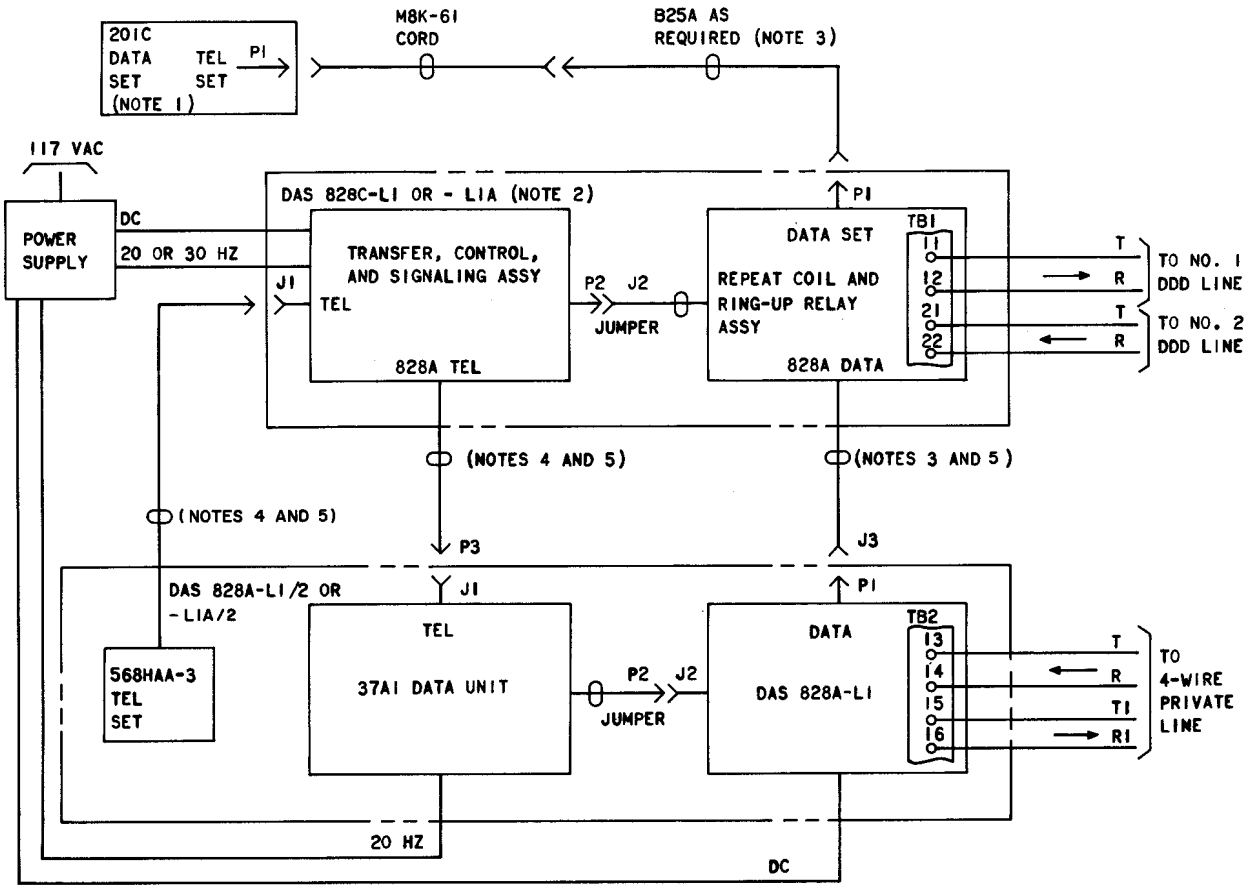


Fig. 9—4-Wire Private Line (Data/Voice) Using DAS 828A



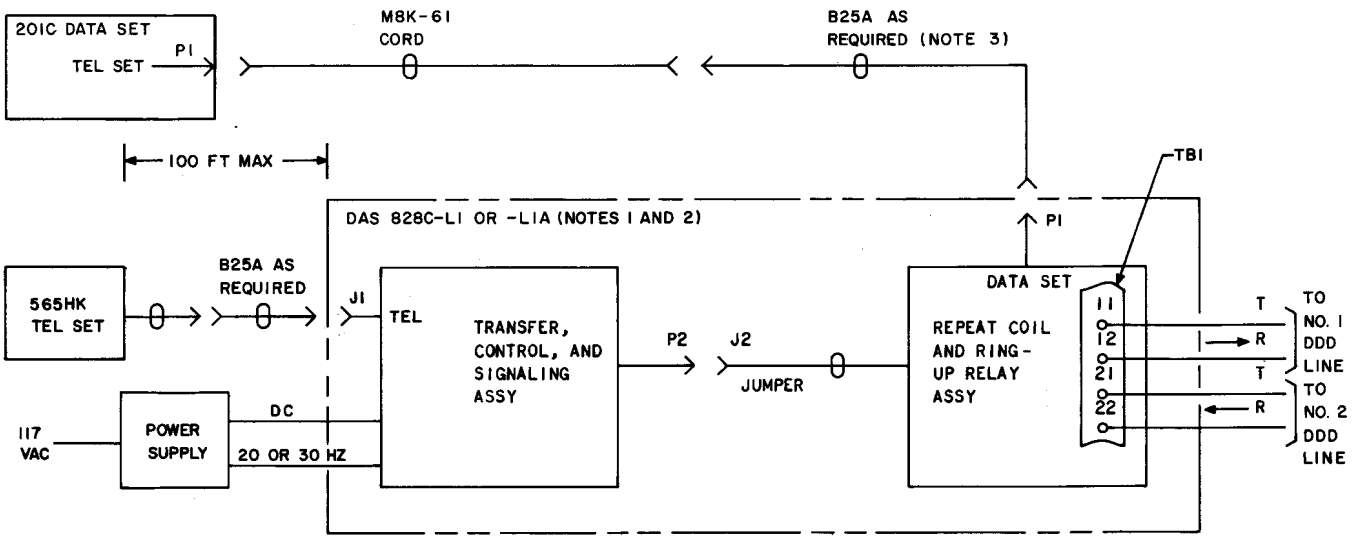
NOTES:
1. IF THE DATA SET IS USED AS AN EXTENSION OF A DATA SET 209A-L1 MULTIPLEX SYSTEM OR AS A SUBRATE OFF-NET EXTENSION OF THE DIGITAL DATA SYSTEM, AN M23B CORD MUST BE USED BETWEEN THE DATA SET AND THE CUSTOMER PROVIDED CORD.
2. ADD 227A AMPLIFIER IN RECEIVE PATH AS DIRECTED IN SECTION 598-080-201.
3. MAXIMUM DISTANCE BETWEEN DATA SET AND DAS 828A IS 1400 FEET.
4. MAY BE EXTENDED WITH B25A CABLE.

Fig. 10—4-Wire Private Line (Data Only) With Switched Network Backup Using DAS 828A and DAS 828C



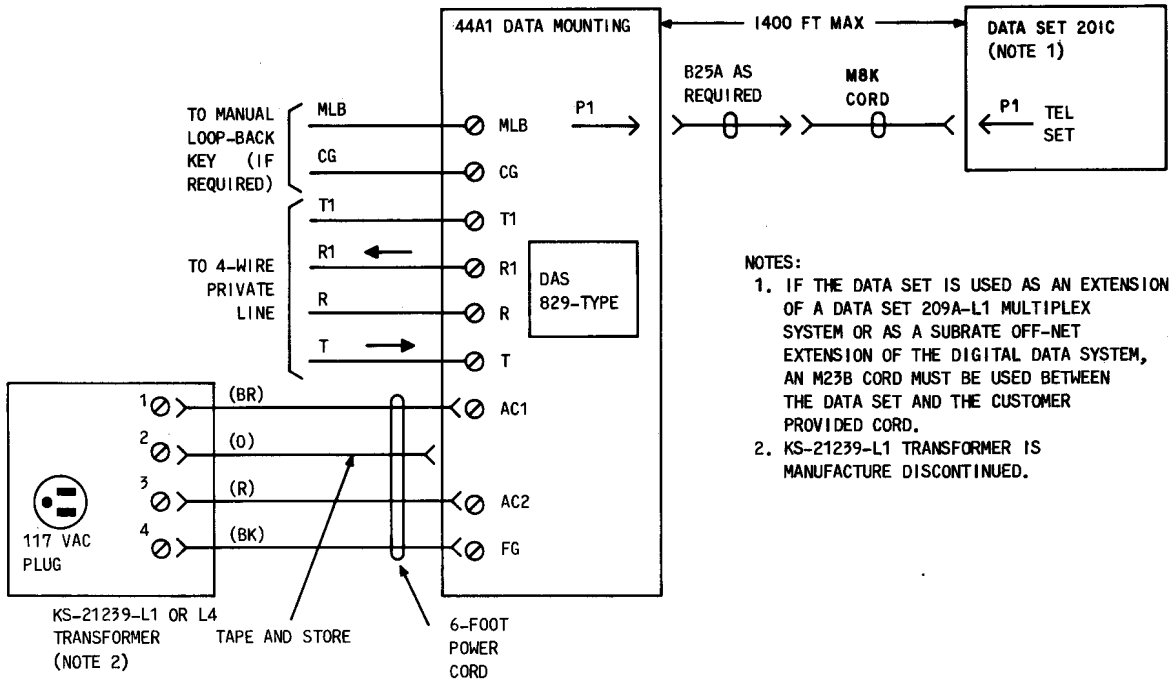
NOTES:
1. IF THE DATA SET IS USED AS AN EXTENSION OF A DATA SET 209A-L1 MULTIPLEX SYSTEM OR AS A SUBRATE OFF-NET EXTENSION OF THE DIGITAL DATA SYSTEM, AN M23B CORD MUST BE USED BETWEEN THE DATA SET AND THE CUSTOMER PROVIDED CORD.
2. ADD 227D AMPLIFIER IN RECEIVE PATH AS DIRECTED IN SECTION 598-080-201.
3. MAXIMUM DISTANCE BETWEEN DATA SET AND DAS 828A IS 1400 FEET.
4. MAXIMUM DISTANCE BETWEEN TEL SET AND 37A1 DATA UNIT IS 100 FEET.
5. MAY BE EXTENDED WITH B25A CABLE.

Fig. 11—4-Wire Private Line (Data/Voice) With Switched Network Backup Using DAS 828A and DAS 828C



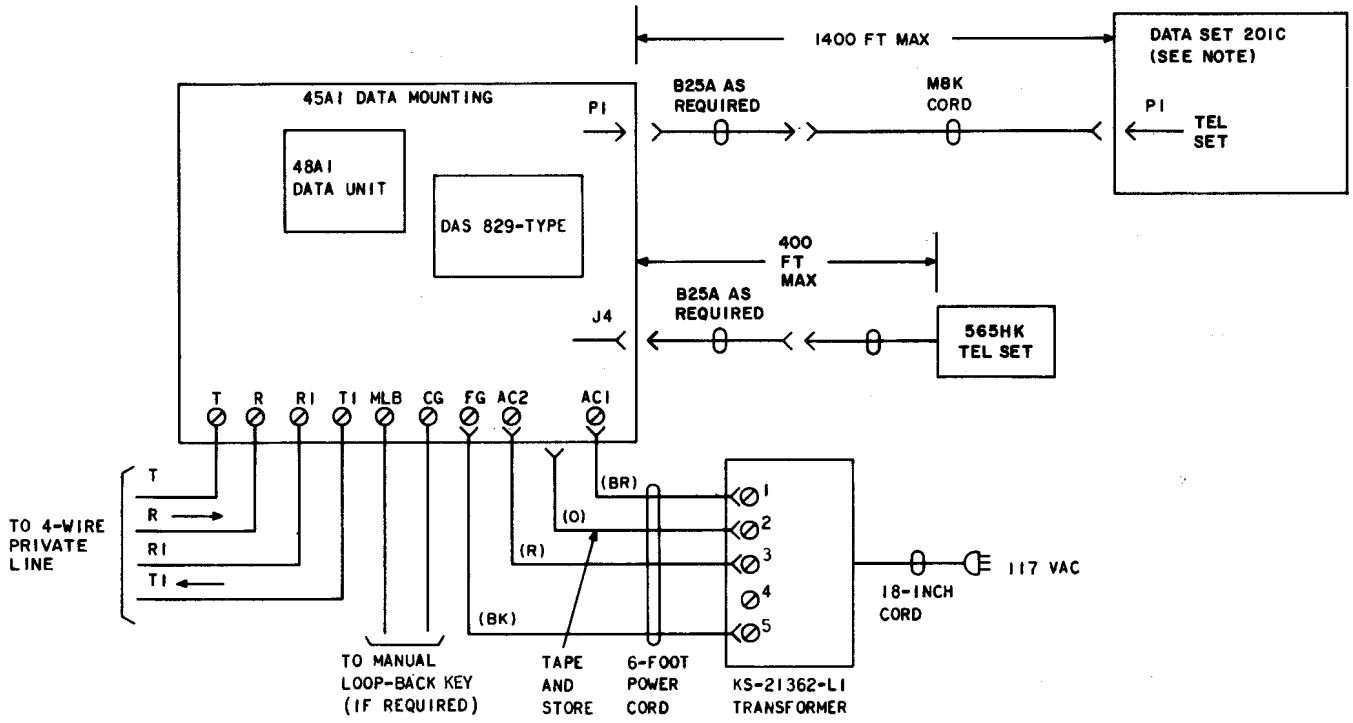
NOTES:
1. DAS 828C OPTIONS REQUIRED ARE X AND Z.
2. ADD 227D AMPLIFIER IN RECEIVE PATH AS DIRECTED IN SECTION 598-080-201.
3. MAXIMUM DISTANCE BETWEEN DATA SET AND DAS 828C IS 1400 FEET.

Fig. 12—4-Wire Switched Network Using Two 2-Wire Switched Network Lines and DAS 828C



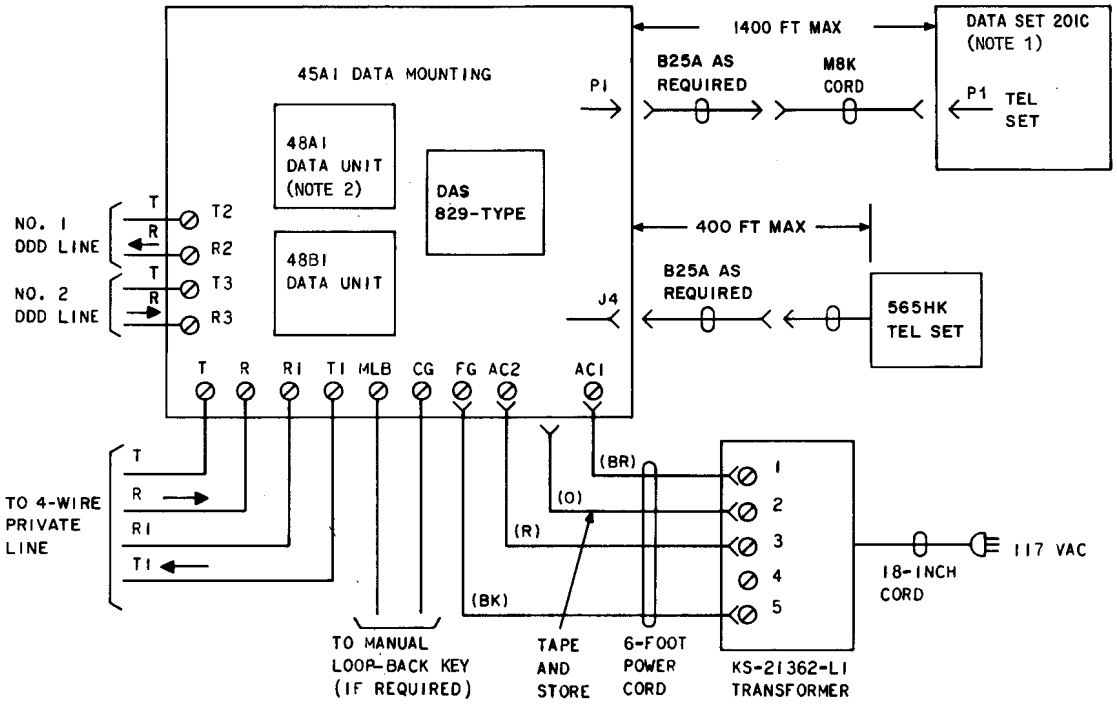
NOTES:
1. IF THE DATA SET IS USED AS AN EXTENSION OF A DATA SET 209A-L1 MULTIPLEX SYSTEM OR AS A SUBRATE OFF-NET EXTENSION OF THE DIGITAL DATA SYSTEM, AN M23B CORD MUST BE USED BETWEEN THE DATA SET AND THE CUSTOMER PROVIDED CORD.
2. KS-21239-L1 TRANSFORMER IS MANUFACTURE DISCONTINUED.

Fig. 13—4-Wire Private Line (Data Only) Using DAS 829-Type



NOTE:
IF THE DATA SET IS USED AS AN EXTENSION OF 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 THE CUSTOMER PROVIDED CORD.

Fig. 14—4-Wire Private Line (Data/Voice) Using DAS 829-Type



NOTES:
1. IF THE DATA SET IS USED AS AN EXTENSION OF 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 THE CUSTOMER PROVIDED CORD.
2. FOR DATA ONLY SERVICE, THE 48A1 DATA UNIT IS NOT REQUIRED.

Fig. 15—4-Wire Private Line (Data Only or Data/Voice) With Switched Network Backup Using DAS 829-Type