DATA SET 208B-TYPE
TRANSMITTER-RECEIVER
DESCRIPTION AND OPERATION

CONTENTS PAGE

1. GENERAL

1.01 This section contains a physical and functional description and operating procedures for data set (DS) 208B-type. Other than a description of interface signals and customer options, information pertaining to the customer-provided terminal is not provided. For a more detailed description of DS 208B-type, refer to Section 592-030-150.

1.02 This section is reissued to include information pertaining to DS 208B-L1B which replaces DS 208B-L1A. Concurrent with the introduction of DS 208B-L1B, DS 208B-L1A has been rated Manufacture Discontinued/Not Orderable (MD/NO).

1.03 DS 208B-type is a synchronous, binary, serial 4800-bit per second (bps) data set for use on the 2-wire switched telecommunications network. The data set requires a type III DATA-PHONE® loop. This data set is compatible for use ***only*** with another DS 208B-type.

1.04 DS 208B-L1A ▶and -L1B◀ have ring memory and other features which make them less susceptible to data errors during call setup procedures or talk/data transfers. DS 208B-L1 can be converted to a 208B-L1A by replacing circuit pack (CP) HG19 with a CP HG24 and CP HG18 with a CP HG18B. ▶DS 208B-L1A cannot be converted to a DS 208B-L1B because of differences in backplane wiring.◀

1.05 ▶DS 208B-L1B provides all the features contained in DS 208B-L1A, plus the following additional features:

- Self-test error inject
- Start-up test in remote test.

Five CPs in DS 208B-L1A have been replaced by two CPs in DS 208B-L1B. The two new CPs use large scale integration (LSI) thus requiring only two instead of five CPs.◀

1.06 DS 208B-type is recommended for use with a 565HK-type or equivalent key telephone set which allows manual call origination and voice/data transfer. The HOLD button on the telephone set should be relabeled DATA. Up to five data sets may be connected to one telephone set by the use of a KS-21253, L3 adapter.

1.07 A Bell System 801-type automatic calling unit (ACU) may be used in addition to the telephone set to provide automatic call origination.

2. PHYSICAL DESCRIPTION

2.01 DS 208B-type (Fig. 1) consists of a transmitter, receiver, and control circuits mounted on 18 plug-in CPs in DS 208B-L1 and -L1A, ▶and 15 CPs in the -L1B.◀ The exterior of the data set consists of front and rear molded black plastic covers mounted on an extruded aluminum housing. The extrusion has a brushed finish. Overall dimensions of the data set are approximately 16 inches wide, 4-1/4 inches high, and 11-1/2 inches deep. The set weighs approximately 20 pounds.

2.02 The data set can also be equipped for rack mounting in either 19- or 23-inch type racks or a KS-20018-type cabinet. The data set with a D-180467 mounting bracket kit (ordered separately) attached is shown in Fig. 2.

2.03 The data set is provided with two interface connectors and a power cord connector at the rear of the set (Fig. 3). The customer interface (CUST INT) connector is a KS-19087-L2 type and provides the digital interface leads for interfacing with customer-provided terminal equipment. The telephone interface (TELE INT) connector is a KS-19088-L2 type and provides the interface for connection to the telephone network through an M13F (5-foot 6-inch) cord supplied with the data set. The M13F cord may be extended up to 200 feet by use of a B25A cable, which must be ordered separately. Customer data equipment must be equipped with a cable not exceeding 50 feet in length, and terminated in a Cinch or Cannon DB-19604-432 plug. The power connector is a Twist-lock connector which will accept the KS-14532, L24 cord provided with the data set.

2.04 A front view of DS 208B-L1 and -L1A with plastic cover removed is shown in Fig. 4. ▶A front view of DS 208B-L1B with plastic cover removed is shown in Fig. 5.◀ Option switches, data set status lamps, and test switches are shown. ▶A summary of the CPs used in each of the DS 208B-type is presented in Table A.◀ Methods used for installing and removing options are explained in detail in Section 592-030-200.

2.05 Seven light emitting diode (LED) status lamps are provided on the data set to monitor the power supply and certain interface leads. These lamps illuminate a portion of the front cover which depict the control lead or condition being monitored. Lamp names and functions are as follows:

(a) The ON (power) lamp is illuminated when the power cord is plugged into a 105- to 129-Vac 60-Hz ±5% source.

If for any reason the output voltages of the power unit rise excessively, the power unit will protect the data set from the overvoltage by automatically reducing the output voltage. When the cause of the overvoltage has been corrected, normal output voltages will be obtained only after the data set power cord has been unplugged and plugged in again.

(b) On DS 208B-L1B, power unit overvoltage is indicated by the ON lamp extinguishing. This is not true on -L1 and -L1A sets.

Fig. 1—Data Set 208B-Type and 2565HK-Type Telephone Set—Front View

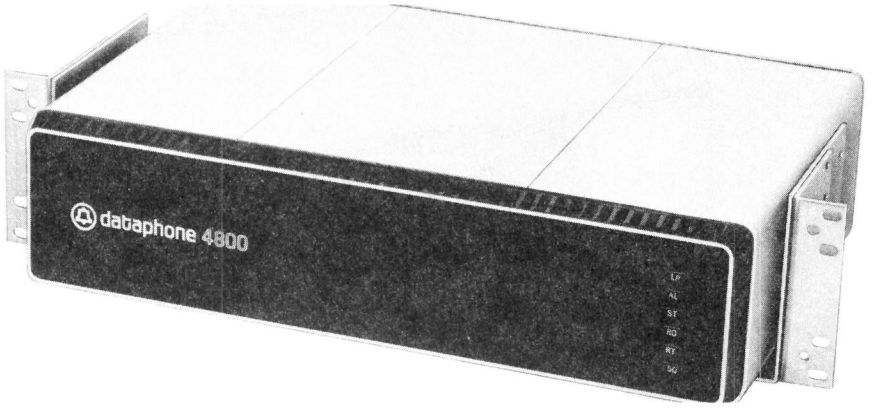

Fig. 2—Data Set 208B-Type With D-180467 Mounting Bracket Kit Installed—Front View

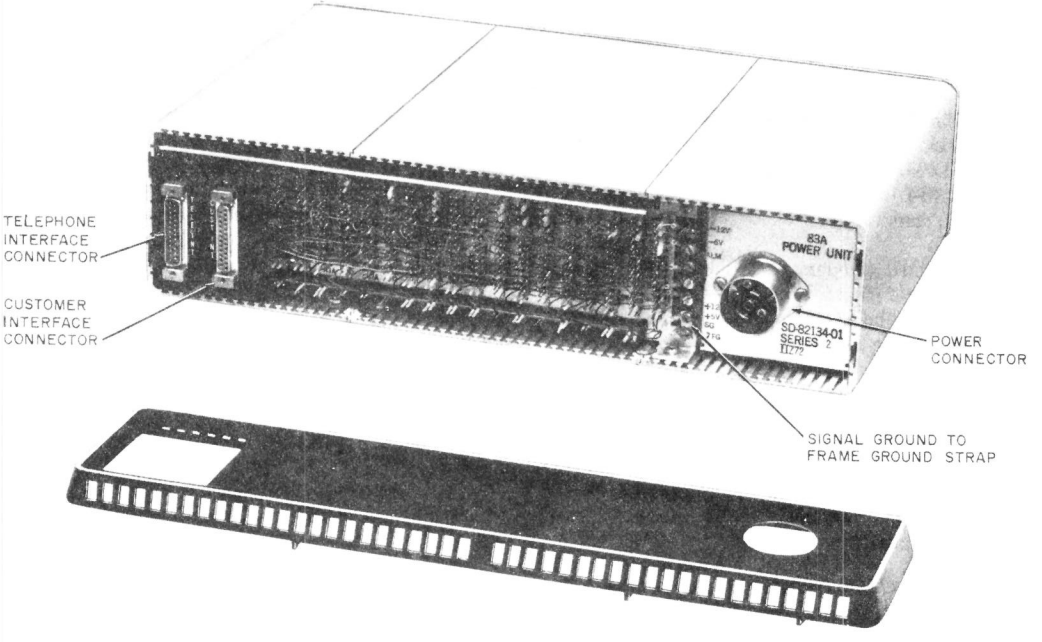

Fig. 3—Data Set 208B-Type—Rear View With Cover Removed

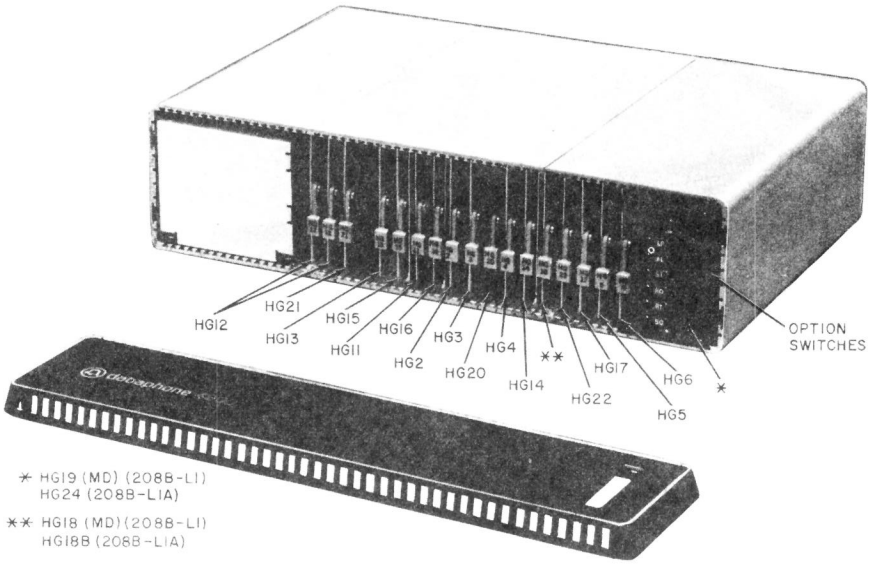

Fig. 4—Data Set 208B-L1 or -L1A—Front View With Cover Removed

(c) The TR (terminal ready) lamp monitors the state of the CD lead and is illuminated when the CD signal from the customer is ON. On DS 208B-L1B, the TR lamp is also ON in ST and RT modes.

(d) The MR (modem ready) lamp monitors the state of the CC (data set ready) lead and is on when the CC lead is ON. On DS 208B-L1B, the MR lamp is also ON in AL mode.

(e) The RS (request-to-send) lamp monitors the condition of the CA (request-to-send) lead internal to the data set. This lamp is illuminated only when the data set is in data mode and the voltage on the CA lead is more positive than +3 volts (ON condition), or when the data set is in certain test modes.

(f) The CS (clear-to-send) lamp monitors the condition of the clear-to-send (CB) lead and is illuminated whenever the CB lead is in the ON condition. This indicates that the data set is ready and will transmit data present on the BA (send data) lead.

(g) The CO (carrier on) lamp monitors the condition of the carrier on (CF) interface lead and is illuminated whenever the CF lead is in the ON condition. This indicates that the receiver has detected a signal on the line which is within the data band. The signal must be received for approximately 45 ms before the CO lamp will illuminate.

(h) The ER (equalizer retrain) lamp monitors the condition of the automatic retrain mode. If the CO lamp is on and the ER lamp is flashing, it indicates that the automatic equalizer is retraining and data on the receive data (BB) interface lead may not be valid. Continuous flashing is an indication of marginal performance. When the data set is in self-test or remote test mode, the ER lamp will flash when an error is detected in the received data.

2.06 The data set is equipped with six pushbutton switches which are accessible at the front panel. All of the switches are locking-type switches

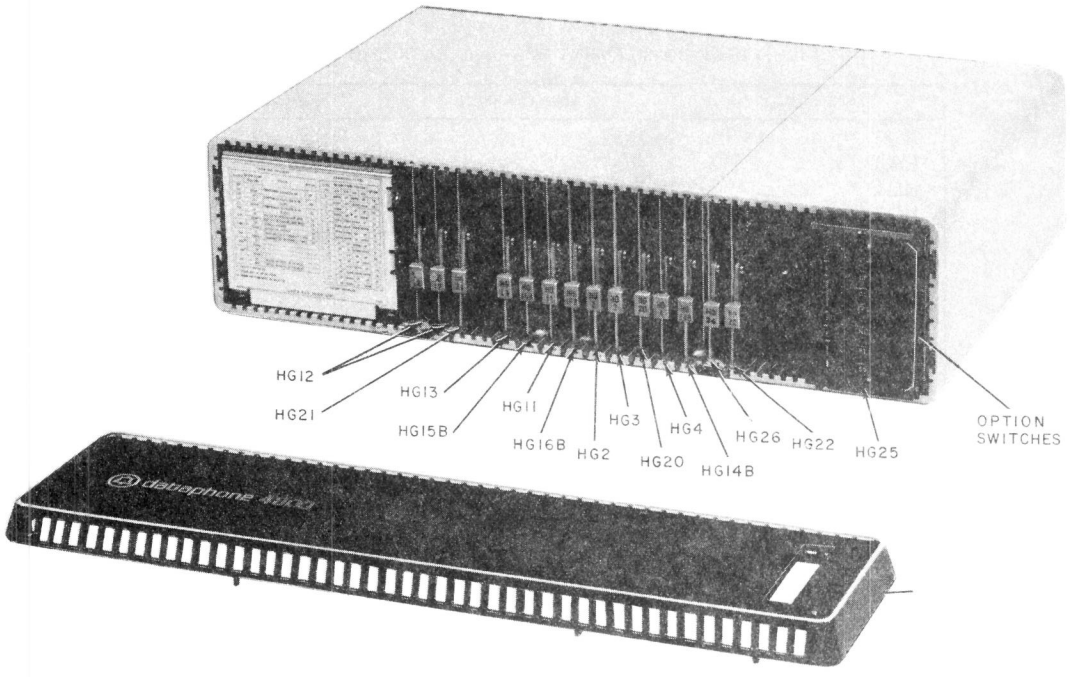

Fig. 5—Data Set 208B-L1B—Front View With Cover Removed

except for the lamp test (LP) switch. Functions of the switches are as follows:

(a) Depressing the LP (lamp test) switch causes all of the lamps except the ON lamp to light. The ON lamp should be on normally if power is applied. The switch does not affect normal data set operation. When the AL and/or ST test switches are depressed, the lamp test circuit is reconfigured to become an error inject circuit (DS 208B-L1B only). The LP switch may then be used to inject errors (spaces) in the analog loop-back and end-to-end self-test modes in the -L1B.

(b) Depressing the AL (analog loop) switch loops the output of the transmitter to the receiver through an internal pad. If the data set is connected to the line when the AL switch is depressed, the line will be dropped. If the data set is not connected to the line and is optioned for automatic answer, the set will not automatically answer an incoming call when the AL switch is depressed. Also, the data set cannot be transferred from talk to data mode with the AL switch depressed.

(c) Depressing the ST (self test) switch causes the transmitter to turn on and transmit steady marks. When both the AL and ST switches are depressed, the ER lamp will flash when the receiver detects a space signal.

(d) When depressed, the RO (receive only) switch internally conditions the request-to-send lead to OFF, regardless of the state of CA from the customer interface, or other test switches.

(e) When both the ST and RO switches are depressed, the ER lamp will flash when the receiver detects a space signal from a distant station.

→TABLE A←

CIRCUIT PACK COMPLEMENT FOR DATA SETS 208B-TYPE

208B-L1 (MD)	208B-L1A (MD)	208B-L1B
HG2	HG2	HG2
HG3	HG3	HG3
HG4	HG4	HG4
HG5 (A&M)	HG5 (A&M) (Note 1)	—
HG6 (A&M)	HG6 (A&M) (Note 1)	—
HG11	HG11	HG11
HG12 (Note 2)	HG12 (Note 2)	HG12 (Note 2)
HG13	HG13	HG13
HG14 (MD) (Note 3)	HG14 (MD) (Note 3)	HG14B
HG15 (MD) (Note 3)	HG15 (MD) (Note 3)	HG15B
HG16 (MD) (Note 3)	HG16 (MD) (Note 3)	HG16B
HG17 (A&M)	HG17 (A&M) (Note 1)	—
HG18 (MD) (Note 4)	HG18B (A&M) (Note 6)	—
HG19 (MD) (Note 5)	—	—
HG20	HG20	HG20
HG21	HG21	HG21
HG22	HG22	HG22
—	HG24 (A&M) (Note 6)	—
—	—	HG25
—	—	HG26

Note 1: The functions of CP HG5, HG6, and HG17 in DS 208B-L1A are performed by CP HG26 in DS 208B-L1B.

Note 2: Two CP HG12 required in each data set.

Note 3: CP HG14B, HG15B, and HG16B are direct replacements for CP HG14, HG15, and HG16, respectively.

Note 4: CP HG18 in DS 208B-L1 is replaced by CP HG18B in DS 208B-L1A.

Note 5: CP HG19 in DS 208B-L1 is replaced by CP HG24 in DS 208B-L1A. When a CP HG24 is installed in a DS 208B-L1, CP HG18 *must also* be replaced with a CP HG18B.

Note 6: The functions of CP HG18B and HG24 in DS 208B-L1A are performed by CP HG25 in DS 208B-L1B.

(f) Depressing the RT (remote test) switch conditions the data set for testing from a telephone company (telco) data test center (DTC).

(g) The "50" switch is an option switch. When it is depressed, the request-to-send/clear-to-send (CA-CB) interval is 50 ms. When the switch is not operated, the CA-CB interval is 150 ms.

2.07 Data set power is provided by an 83A power unit in the data set, which provides +12, -12, +5, and -6 volts. The power unit requires 105- to 129-volt ac power at 60 Hz. Power consumption is approximately 26 watts. The power unit is provided with a self-resetting thermal overload switch which shuts off the power unit if internal temperature rises excessively.

3. FUNCTIONAL DESCRIPTION

3.01 This part contains information pertaining to the data set transmitter, receiver, interface

leads, and options. Refer to Fig. 6 for a block diagram of the data set.

3.02 Like DS 201-type and 208A-type, DS 208B-type uses phase-shift keying to transmit binary data signals over the analog telephone channel. In contrast to DS 201-type, which uses 4-phase modulation, DS 208B-type uses 8-phase modulation.

A. Transmitter

3.03 The transmitter converts serial binary data into groups of three bits called tribits, which modulate the 1800-Hz carrier. Each tribit is encoded into one of eight possible carrier phase shifts. The line signal consists of a serial train of phase shifted signaling elements at one-third the bit rate. A step attenuator is provided in the transmitter to adjust the transmitter output level in 1-dB increments from 0 to -15 dBm. Refer to Section 592-030-200 for procedures for setting the data set output level.

B. Receiver

3.04 At the receiver, DS 208B-type recovers timing in a manner equivalent to DS 201-type. The line signal is demodulated using differential detection. This requires that the phase of each signaling element relative to the previous signaling element be determined for decoding the received baseband signal.

3.05 The receiver sensitivity threshold is -43 dBm with the transmit attenuator set at 0 dB. Receiver sensitivity is dependent on the transmit attenuator setting. For example, if the transmit attenuator were set at 12 dB, the receiver threshold level would be -31 dBm.

3.06 The maximum level that the receiver can handle is 19 dB above the threshold. For example, at a -43 dBm threshold, the maximum level is -24 dBm.

3.07 The higher speed of the data set results in increased sensitivity to delay and amplitude distortion of the telephone channel and requires that greater attention be paid to equalization to assure proper demodulation. This is accomplished with an automatic equalizer, which is included in the data set and which automatically corrects for the delay and amplitude variation introduced by the telephone channel. In addition, there is a fixed compromise equalizer in the transmitter which provides amplitude and delay equalization and must always be installed for normal operation. In DS 208B-L1, the compromise equalizer option provides for 8 dB of slope equalization. In the case of the 208B-L1A and -L1B there are two optional choices of slope equalization (4-dB and 8-dB) one of which must be installed by telco personnel. The 4-dB slope option is preferred for initial installation. Installation information is contained in Section 592-030-200. Absolute delay through the set (transmitter and receiver) is approximately 7 ms.

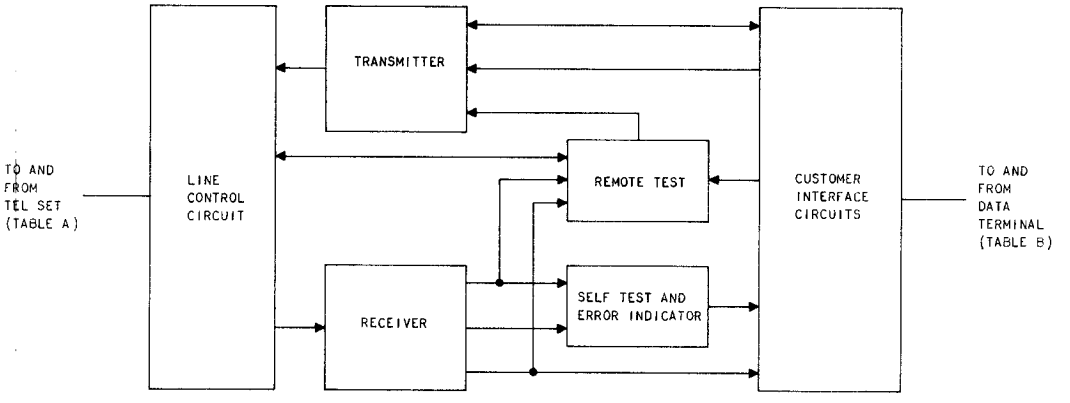

Fig. 6—Block Diagram—Data Set 208B-Type

C. Line Control Circuit

3.08 The line control circuit controls events associated with originating and answering a call and transferring the data set into data mode. The line control circuit provides the following for DS 208B-L1, -L1A, ▶and -L1B:◀

- Ring detection
- Line impedance matching
- Lightning protection
- 2-second quiet interval timing (1 second for -L1B)
- 2021-Hz answer tone to disable echo suppressors
- 600-Hz tone to keep echo suppressors disabled
- Answer sequence timing and control circuitry
- Talk-to-data transfer circuitry
- ACU-to-data control circuitry
- Call termination circuitry.

In addition, ring memory is provided for DS 208B-L1A ▶and -L1B. With ring memory only, the called set will send answer tone and 600 Hz tone. With DS 208B-L1, the tones are sent whether the set is called or calling. Also, with ring memory the called set lights the line lamp even in the TALK mode.◀

D. Test Modes

3.09 DS 208B-type is equipped with various test features which enable the customer or telco employee to test the data set in local loop-back, end-to-end, and switched network test modes.

3.10 The ***analog loop-back test*** allows the customer to perform a local test of terminal equipment by connecting the data set transmitter to the receiver at the line control circuit. This test requires that the terminal equipment be capable of operating in full duplex mode.

3.11 The ***analog loop-back self test*** allows operation of the data set to be checked without depending on connections to the telephone line interface or customer interface. In this test mode, terminal equipment is disconnected from the data set, the self test and error indicator circuits are connected to the transmitter and receiver, and the data set is looped back as for the analog loop-back test (3.08). This test can be performed regardless of data set options or connections to external equipment. ▶On DS 208B-L1B, errors (spaces) may be injected by depressing the LP switch. The ER lamp will light; TR and MR lamps will remain ***off*** when the LP switch is depressed.◀

3.12 The ***end-to-end self test*** allows testing the data set and telephone facilities. In this test mode, the terminal equipment is disconnected from the data set and the self test circuit is connected to the transmitter and the data set will send steady mark. This test requires that a connection be made to a remote data set and that the remote data set be conditioned for self test and receive-only mode of operation. ▶On DS 208B-L1B, errors (spaces) may be injected by depressing the LP switch at the transmitting end. The ER lamp will light at the receiving end.◀

3.13 The ***remote test*** feature of DS 208B-type allows the data set to be tested by a DTC. In this test mode, the data set automatically answers the next incoming call and transfers to data mode. If the DTC transmits a steady mark for 1 second ▶(1.25 second for -L1B)◀ and no errors are detected by the data set, the data set responds by transmitting a steady mark for 1 second ▶(2.0 second for -L1B).◀ If errors are received, the data set responds with a steady space for 1 second ▶(2.0 second for -L1B).◀ Upon receipt of a 1-second space signal from the DTC, the data set disconnects from the line (DS 208B-L1 and DS 208B-L1A). ▶A minimum of 3 seconds of steady space signals from the DTC is required for DS 208B-L1B to cause automatic disconnect.◀ After disconnecting from the line, the data set does not answer further calls automatically until the RT switch is released.

E. Telephone Interface

3.14 The telephone interface is accessible through the telephone connector at the rear of the data set. The connector pin numbers and corresponding lead designations and functions are shown in Table B.

TABLE B

TELEPHONE INTERFACE

PIN	DESIGNATION	FUNCTION
1	L (Lamp)	Used to light lamp on associated telephone set when ringing is received or data set is in data mode or ring memory is set in the -L1A or -L1B.
2	—12V	Provides voltage for test purposes.
3	+5V	Provides voltage for test purposes.
4	LG (Lamp Ground)	Provides ground path for lamp on associated telephone set.
5	TD (Talk-Data)	A ground on this lead indicates to the data set that the associated telephone is in the talk mode.
7	T (Tip)	Tip of telephone line (from CO).
8	R (Ring)	Ring of telephone line (from CO).
12	RNG (Ringing)	Provides ground indication during ringing.
14	C	Provides ground to ACU when data set is in data mode.
16	D1	ACU places ground on this lead when answer tone has been received.
21	T1	Tip of telephone line (internal).
22	R1	Ring of telephone line (internal).
23	A	A lead control.
24	A1	A lead control.
25	TDG	Talk-Data-Ground lead.

F. Customer Interface

3.15 The customer interface is accessible through the connector at the rear of the data set. The connector pin numbers and corresponding lead designations are shown in Table C.

3.16 Customer interface lead functions are as follows:

(a) ***Frame Ground (AA) (Pin 1):*** This lead is connected to the data set housing and local power ground through the third conductor in the power cord. It is normally connected to signal ground, as explained in (g) below.

(b) ***Send Data (BA) (Pin 2):*** The business machine transmits positive and negative voltages to the data set on this lead. These voltage levels must conform to requirements of Electronic Industries Association (EIA) Standard RS-232-C.

(c) ***Receive Data (BB) (Pin 3):*** Data received from the telephone line is converted to positive and negative EIA voltages which are

TABLE C

CUSTOMER INTERFACE CONNECTOR PIN ASSIGNMENTS

PIN NO.	NOTE 1	FUNCTION	DATA SET MNEMONIC	EIA DESIGNATION (RS-232-C)
1	—	Frame Ground	FG	AA
2	T	Send Data	SD	BA
3	D	Receive Data	RD	BB
4	T	Request to Send	RS	CA
5	D	Clear to Send	CS	CB
6	D	Data Set Ready	DSR	CC
7	—	Signal Ground	SG	AB
8	D	Carrier On	COD	CF
9	—	+12V	CI9 (+12V)	Reserved for Data Set Testing
10	—	—12V	CI10 (—12V)	Reserved for Data Set Testing
15	D	Serial Clock Transmitter	SCT	DB
16	D	Divided Clock Transmitter (Note 2)	DCT	SBB (Note 3)
17	D	Serial Clock Receiver	SCR	DD
18	D	Divided Clock Receiver (Note 2)	DCR	Unassigned
20	T	Data Terminal Ready	DTR	CD
22	D	Ring Indicator	RI	CE
24	T	Serial Clock Transmitter External	SCTE	DA
25	—	+5V (Note 2)	CI25 (+5V)	Unassigned

Note 1: T = terminator; D = driver.

Note 2: Functions not defined by EIA Standard RS-232-C.

Note 3: DS 208B uses pin 16 for a different function than that specified by EIA Standard RS-232-C.

presented to the business machine on positive transitions of the serial clock receiver. Polarities on this lead agree with those on the send data lead of the distant transmitter. The BB lead is clamped negative (mark-hold) when the carrier on signal is OFF.

(d) ***Request-to-Send (CA) (Pin 4):*** Signals on this lead are EIA voltages generated by the business machine to turn the local data transmitter on. CA must be held high as long as data needs to be transmitted.

(e) ***Clear-to-Send (CB) (Pin 5):*** Signals present on this lead are EIA voltages generated by the local data set to indicate to the business machine that it is ready to transmit data. The ON condition of CB is in response to an ON condition of CA. The CA-CB interval may be 50 or 150 ms, depending on the option selected. CB goes OFF with essentially no delay when CA is turned OFF.

(f) ***Data Set Ready (CC) (Pin 6):*** This lead provides an EIA voltage ON indication to the business machine when the data set is in data mode and is capable of transmitting or receiving data.

Note: An ON indication should not be interpreted as an indication that a communication channel has been established to a remote station.

(g) ***Signal Ground (AB) (Pin 7):*** This lead establishes a common ground reference for all interface leads. Signal ground is strapped to frame ground at the power supply. This strap can be disconnected by the installer if desired by the customer.

(h) ***Carrier ON (CF) (Pin 8):*** This lead provides an EIA voltage ON indication to the business machine when data signals are being received by the data set.

(i) ***+12V (Pin 9):*** +12 volts for telco test purposes.

(j) ***-12V (Pin 10):*** -12 volts for telco test purposes.

(k) ***Serial Clock Transmitter (DB) (Pin 15):*** A square wave of 4800 Hz appears on this lead. This is the transmitter bit rate clock and conforms to EIA Standard RS-232-C.

(l) ***Divided Clock Transmitter (Pin 16):*** A 1600-Hz clock non-EIA signal used internally by the data set appears on this lead.

(m) ***Serial Clock Receiver (DD) (Pin 17):*** This lead provides an EIA square wave timing signal which is used for clocking received data. This timing signal is at the bit rate (4800 Hz). The BB lead should be sampled on the negative transition of the DD lead.

(n) ***Divided Clock Receiver (Pin 18):*** A non-EIA 1600-Hz clock signal used internally by the data set appears on this lead.

(o) ***Data Terminal Ready (CD) (Pin 20):*** This EIA signal is used by the data set line control. CD must be ON before entering data mode, and OFF for at least 6 to 10 ms for -L1 and -L1A, and 16 to 20 ms for -L1B or until DTR goes off in order to ensure termination of the call while in data mode.

(p) ***Ring Indicator (CE) (Pin 22):*** EIA signals on this lead indicate to the customer that a ringing signal is being received on the telephone channel.

(q) ***Serial Clock Transmitter External (DA) (Pin 24):*** On externally timed data sets, this lead is used by the business machine to furnish bit rate timing to the transmitter. External timing should be 4800 bps ±0.01 percent and meet EIA signal requirements.

(r) ***+5V (Pin 25):*** +5 volts for telco test purposes.

G. Options

3.17 Data set 208B-type is provided with a number of options. Some of these are available as customer options; others are available as telco engineering options. These options are listed in Tables D ◗and E◖ and described in Section 592-030-200. All options are added and removed by switches.

TABLE D

OPTIONS FOR DATA SETS 208B-L1 AND -L1A

DS 208B-L1 (HG19)			
SWITCH		OPTION	
DESIG.	POSITION	DESCRIPTION	DESIGNATION
S2C [1]	UP [2] DOWN	Compromise equalizer IN Compromise equalizer OUT	ZS ZT
S3A [3]	UP DOWN [2]	CC ON in AL mode CC OFF in AL mode	YM YN
S3B [3]	UP DOWN [2]	Manual answer Automatic answer	YO YP
S3C [3]	UP DOWN [2]	Transmitter externally timed Transmitter internally timed	YD YC
"50" [3,4]	IN OUT	50 ms CA-CB interval 150 ms CA-CB interval	— —

DS 208B-L1A			
SWITCH		COMPROMISE EQUALIZER SLOPE	OPTION DESIGNATION
S2B	S2C		
UP OR DOWN	DOWN	None (0 dB)	ZT
UP	UP	4-dB slope & symmetric delay	WU [2]
DOWN	UP	8-dB slope & symmetric delay	ZS

TRANSMIT LEVEL (dBm)	SWITCH				OPTION DESIGNATION
	S1A	S1B	S1C	S2A	
0 [2]	DOWN	UP	DOWN	UP	ZA
−1	DOWN	UP	DOWN	DOWN	ZB
−2	DOWN	UP	UP	UP	ZC
−3	DOWN	UP	UP	DOWN	ZD
−4	DOWN	DOWN	DOWN	UP	ZE
−5	DOWN	DOWN	DOWN	DOWN	ZF
−6	DOWN	DOWN	UP	UP	ZG
−7	DOWN	DOWN	UP	DOWN	ZH
−8	UP	UP	DOWN	UP	ZI
−9	UP	UP	DOWN	DOWN	ZJ
−10	UP	UP	UP	UP	ZK
−11	UP	UP	UP	DOWN	ZL
−12	UP	DOWN	DOWN	UP	ZM
−13	UP	DOWN	DOWN	DOWN	ZN
−14	UP	DOWN	UP	UP	ZO
−15	UP	DOWN	UP	DOWN	ZP

Note 1: Compromise equalizer should always be in.

Note 2: Factory installed.

Note 3: Options for S3 and "50" switches are the same for DS 208B-L1 and -L1A.

Note 4: If not specified on service order, install 50-ms interval.

→TABLE E←

DS 208B-L1B OPTIONS (CP HG25)

SWITCH	OPTION STRAP POSITION	OPTION FEATURE	OPTION DESIGNATION
S2B	†	Compromise Equalizer Out	ZT
S2C	Down		
S2B	Up	Compromise Equalizer (4-dB Slope)	WU*
S2C	Up		
S2B	Down	Compromise Equalizer (8-dB Slope)	ZS
S2C	Up		
S3A	Up	DSR *on* in Analog Loop Mode	YM
	Down	DSR *off* in Analog Loop Mode	YN*
S3B	Up	Manual Answer	YO
	Down	Automatic Answer	YP*
S3C	Up	Transmitter Externally Timed	YD
	Down	Transmitter Internally Timed	YC*
S4A‡	Up		
	Down*		
S4B‡	Up		
	Down*		
"50"	In	RS-CS Interval of 50 ms	(Customer Switch)
	Out	RS-CS Interval of 150 ms	

* Factory installed.

† Strap may be up or down.

‡ Down position must be selected.

4. OPERATION

4.01 DS 208B-type provides the capability for the following:

- Manual call handling
- Automatic answering and disconnect
- Use of telephone line for both talk and data transmission.

4.02 ***Answering:*** DS 208B-type allows both manual and automatic answering.

(a) To manually answer a call:

(1) When ringing is heard, operate the appropriate telephone set LINE button (lamp under button flashes in response to ringing).

(2) Remove telephone handset from cradle.

(3) ***On DS 208B-L1,*** when both data terminals are ready (TR lamp on both data sets lighted), operate the DATA button ***at about the same time*** as the far-end attendant does (lamp under LINE button

lights, LINE button releases, the data set transmits answer tone, and MR lamp on data set lights).

(4) ***On DS 208B-L1A or L1B,*** when both data terminals are ready (TR lamp on both data sets lighted), operate the DATA button ***before*** the far-end attendant does (lamp under LINE button remains lighted, LINE button releases, the data set transmits answer tone, and MR lamp on data set lights).

(5) Replace telephone handset on cradle.

The data set will answer the incoming call automatically if the automatic answer option is installed and the data terminal ready (DTR) lead is on.

4.03 The answering sequence consists initially of a 2-second quiet interval (1 second for -L1B) during which no signal is transmitted from the data set, followed by a 2-second period of 2021-Hz answer tone which disables any echo suppressors on the line. This is followed by another quiet period lasting 63 ms. The data set then enters the data mode. DTR must be high at the customer interface for the answer sequence to occur. If DTR is not on, the call will not be answered automatically and an attempt to transfer to data mode manually will result in the call being dropped.

4.04 ***Originating:*** Calling may be done manually or by an automatic calling unit. Automatic calling is controlled by customer-provided equipment (CPE), and is not discussed here. Manual steps involved in each case are as follows, and are understood to be performed in each subparagraph (b) through (e) below:

(a) To manually originate a call to any station, perform the following common operations.

(1) Verify that data set is ready (TR lamp lighted).

(2) Operate appropriate telephone set LINE button.

(3) Remove telephone handset from cradle, listen for dial tone, then dial the call in the usual manner.

(4) In all cases, replace handset on cradle when both data sets have entered data mode.

(b) ***To Originate a Call From a DS 208B-L1 to a Station That Is Not Arranged for Automatic Answer:***

(1) After the called station answers, verify with attendant that TR lamp is lighted.

(2) Operate DATA button ***at about the same time*** as the called station attendant does (lamp under LINE button lights, LINE button releases, data set transmits answer tone, and MR lamp lights).

(c) ***To Originate a Call From a DS 208B-L1 to a Station That Is Arranged for Automatic Answer:***

(1) At the ***start*** of answer tone, operate DATA button (lamp under LINE button lights, LINE button releases, data set transmits answer tone, and MR lamp lights).

(d) ***To Originate a Call From a DS 208B-L1A or -L1B to a Station That Is Not Arranged for Automatic Answer:***

(1) After the called station answers, verify with attendant that TR lamp is lighted.

(2) Have called station attendant operate DATA button (called station transmits answer tone).

(3) At the ***end*** of answer tone, operate DATA button (lamp under LINE button lights, LINE button releases, and MR lamp on data set lights).

Note: When the DATA button is operated at the originate end, ***DS 208B-L1A or -L1B immediately*** transfers to data mode without transmitting the answer tone.

(e) ***To Originate a Call From a DS 208B-L1A or -L1B to a Station That Is Arranged for Automatic Answer:***

(1) At the ***end*** of answer tone, operate DATA button (lamp under LINE button

lights, LINE button releases, and MR lamp on data set lights).

Note: When the DATA button is operated at the originate end, ***DS 208B-L1A or -L1B immediately*** transfers to data mode without transmitting answer tone.

4.05 Data Mode-to-Talk Mode Transfer: An attendant may return the station to the talk mode at any time by removing the telephone handset and operating the appropriate LINE button.

Caution: At multiple data set installations where more than one data set is controlled by the telephone set, be sure to operate the correct LINE button. If the wrong LINE button is operated, the data exchange on the wrong channel may be interrupted. Upon transferring to talk mode, the MR lamp on the data set will extinguish and the lamp under the LINE button will react as follows:

(a) At originate end on ***all DS 208B-type,*** the LINE button will extinguish.

(b) At answering end on ***DS 208B-L1,*** the LINE button will extinguish.

(c) At answering end on ***DS 208B-L1A or -L1B,*** the LINE button will remain lighted as a reminder that the called station must always be the first to operate the DATA button on a talk-to-data mode transfer. In this case, the depressed LINE button and extinguished MR lamp on the data set are the indications that identify the talk mode. Procedures for returning to data mode are as previously described in 4.04.

4.06 When calling is performed automatically by an ACU, the automatic calling unit responds to the end of 2021-Hz answer tone from the called end, and then puts the data set into data mode, bypassing the quiet and answer-tone periods of the answer sequence.

4.07 ***Hang up:*** The call is terminated and the terminal is disconnected from the telephone line if DTR at the customer interface goes low, or depending upon the central office involved, if the distant terminal hangs up, and causes the loop current to drop for more than 6 to 10 ms for -L1 and -L1A, and 16 to 20 ms for -L1B to ensure termination.◀

5. REFERENCES

5.01 The following documents provide additional information on data sets 208B-type.

NUMBER	TITLE
CD & SD-1D242-01	Data Set 208B-Type
SECTION	**TITLE**
502-543-405	2565HK Telephone Set
592-030-150	Data Set 208B-Type Transmitter-Receiver — Supplementary Information
592-030-180	Data Set 208B-Type Transmitter-Receiver—Summarizing Specification
592-030-200	Data Set 208B-Type Transmitter-Receiver—Installation
592-030-300	Data Set 208B-Type Transmitter-Receiver—Maintenance
592-030-500	Data Set 208B-Type Transmitter-Receiver—TestProcedures
598-010-Series	801A-Type Automatic Calling Units
598-012-Series	801C-Type Automatic Calling Units.