

DATA SET 208BR-L1C
TRANSMITTER-RECEIVER
DESCRIPTION AND OPERATION

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1. GENERAL

1.01 This section contains a physical and functional description and operating procedures for data set (DS) 208BR-L1C. The "R" in the data set designation indicates that the data set is for use in data set arrangements registered with the FCC. Other than a description of interface signals and customer options, information pertaining to the customer-provided terminal is not provided. The registration number for DS 208BR-L1C is AS593M-62936-MD-E.

1.02 When this section is reissued the reason for reissue will be presented in this paragraph.

1.03 DS 208BR-L1C is a synchronous, binary, serial 4800-bit per second (bps) data set for use on the 2-wire switched telecommunications network. A 565HKM or 2565HKM telephone set is recommended for use with the data set to provide manual call origination and voice/data transfer. The telephone set must be ordered separately. If automatic call origination is required, a Bell System data auxiliary set (DAS) 801CR-L1/2 automatic calling unit (ACU) is required and must be ordered separately. The data set requires a type III DATAPHONE® loop. This data set is compatible for use *only* with another DS 208B-type (DS 208B or DS 208BR).

1.04 DS 208BR-L1C has ring memory and other features which make it less susceptible to data errors during call setup procedures or talk/data transfers.

1.05 Some of the features provided by DS 208BR-L1C are as follows:

- Analog loopback test
- Analog loopback self test
- End-to-end self test
- Remote test by data test center (DTC)
- Ring memory
- Self test error inject
- Start-up test in remote test
- Automatic equalizer retrain.

1.06 The HOLD button on the telephone set should be relabeled DATA. Up to five data

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sets may be connected to one telephone set by the use of a KS-21253-L3 adapter.

1.07 Rules governing the use of DS 208B-type are as follows:

- Data sets designed for use in registered arrangements have an "R" in the data set code.
- Bell System switched network data sets not having an "R" in the data set code are "grandfathered."
- "Grandfathered" DS 208B-type may be connected in registered arrangements provided the transmit line signal level is set to -4 dBm and the interface with the switched network is made with the proper jack and cord as shown in the connection diagrams in Section 592-038-200.
- DS 208BR-L1C may be connected in "grandfathered" arrangements provided the transmit line signal level is adjusted so that the level of the signal reaching the serving central office does not exceed -12 dBm.
- Connection to the telephone line in registered arrangements must be made via the proper cord to the proper data jack as shown in the connection diagrams in Section 592-038-200.
- In arrangements of one to five data sets, a mixture of "new-family" data sets may be used. "New-family" data sets are defined as 103JR, 113CR, 113DR, 201CR, 202SR, 208BR, and 212AR.

2. PHYSICAL DESCRIPTION

2.01 DS 208BR-L1C (Fig. 1) consists of a transmitter, receiver, and control circuits mounted on 15 plug-in circuit packs (CPs). 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 19 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 (1-foot) cord supplied with the data set. The M13F cord may be extended up to the length shown in the connection diagrams in Section 592-038-200 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.



Fig. 1—Data Set 208BR-L1C and 2565HKM Telephone Set—Front View

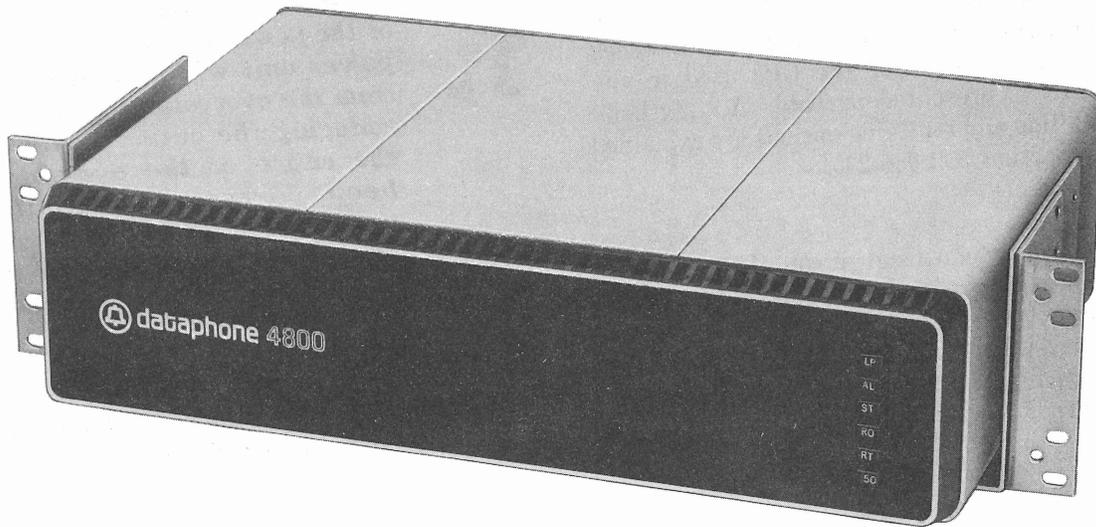


Fig. 2—Data Set 208BR-L1C With D-180467 Mounting Bracket Kit Installed—Front View

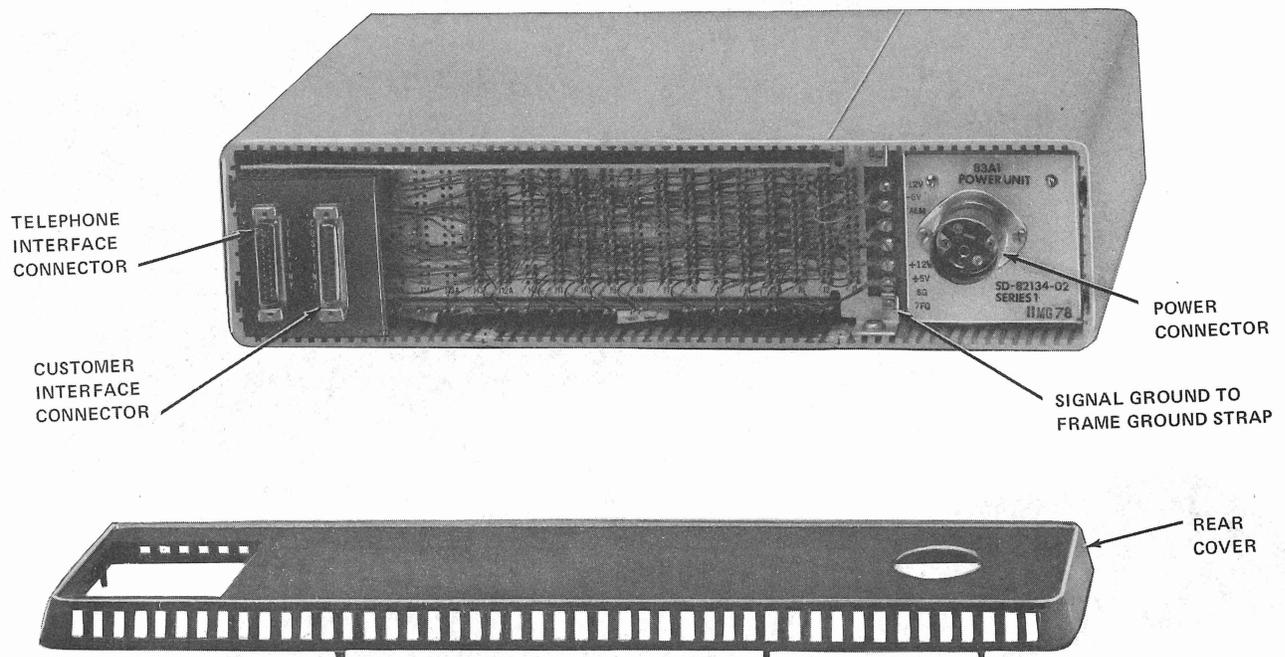


Fig. 3—Data Set 208BR-L1C—Rear View With Cover Removed

2.04 A front view of DS 208BR-L1C with plastic cover removed is shown in Fig. 4. Option switches, data set status lamps, and test switches are shown. A summary of the CPs used in the DS 208BR-L1C is presented in Table A. Methods used for installing and removing options are explained in detail in Section 592-038-200.

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 $\pm 5\%$ 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) Power unit overvoltage is indicated by the ON lamp extinguishing.

(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**. The TR lamp is also **on** in ST and RT Modes.

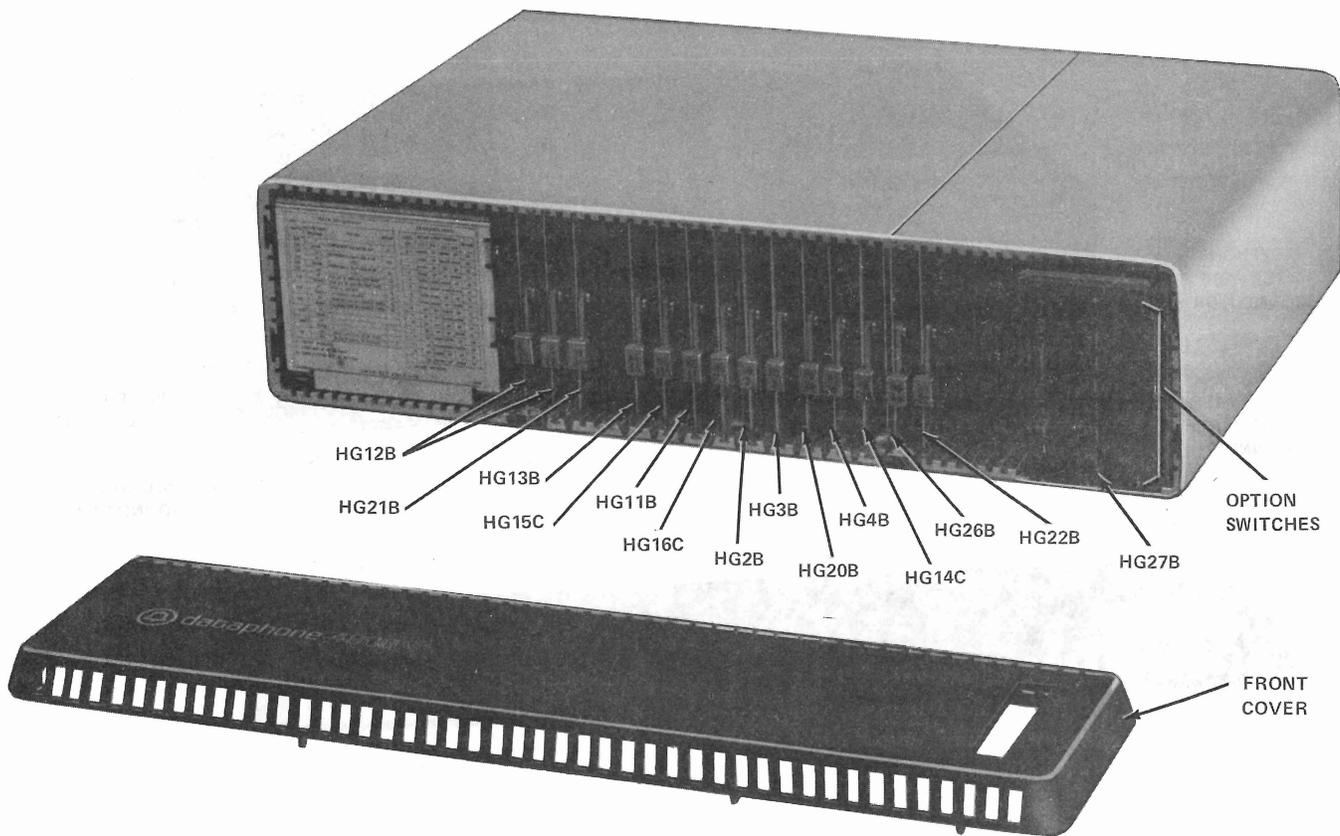


Fig. 4—Data Set 208BR-L1C—Front View With Cover Removed

TABLE A
CIRCUIT PACK COMPLEMENT
FOR DS 208BR-L1C

CIRCUIT PACK CODE	QUANTITY PER DATA SET
HG2B	1
HG3B	1
HG4B	1
HG11B	1
HG12B	2
HG13B	1
HG14C	1
HG15C	1
HG16C	1
HG20B	1
HG21B	1
HG22B	1
HG26B	1
HG27B	1

(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**. 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 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. The LP switch may then be used to inject errors (spaces) in the analog loopback and end-to-end self-test modes.

(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

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receiver detects a space signal from a distant station.

(f) Depressing the RT (remote test) switch conditions the data set for testing from a telephone company (telco) DTC or from a local DS 208B-L1B or DS 208BR-L1C controlled by a data test set.

(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 83A1 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. 5 for a block diagram of the data set.

3.02 Like DS 201-type and 208A- and B-type, DS 208BR-L1C 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 208BR-L1C 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 -4 to -15 dBm. Refer to Section 592-038-200 for procedures for setting the data set output level.

B. Receiver

3.04 At the receiver, DS 208BR-L1C recovers timing. 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 -4 dB. Receiver sensitivity is dependent on the transmit attenuator setting. For example, if the transmit attenuator were set at -8 dB, the receiver threshold level would be -39 dBm.

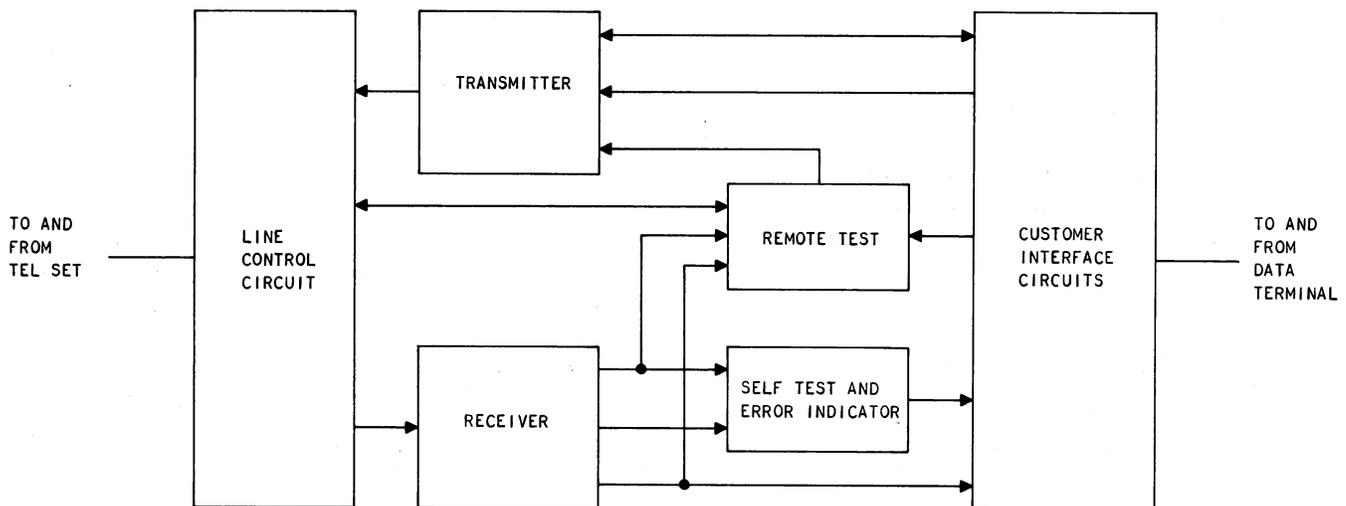


Fig. 5—Block Diagram—Data Set 208BR-L1C

3.06 The maximum level that the receiver can handle is 19 dB above the threshold. For example, at a -39 dBm threshold, the maximum level is -20 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 the 208BR-L1C, 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 592-038-200. Absolute delay through the set (transmitter and receiver) is approximately 7 ms.

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:

- Ring detection
- Line impedance matching
- Lightning protection
- 1-second quiet interval timing
- 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
- Ring memory.

With ring memory, the called set will send answer tone and 600-Hz tone. Also, with ring memory the called set lights the line lamp even in the TALK mode.

D. Test Modes

3.09 DS 208BR-L1C is equipped with various test features which enable the customer or telco employee to test the data set in local loopback, end-to-end, and switched network test modes.

3.10 The *analog loopback 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 loopback 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 loopback test (3.10). This test can be performed regardless of data set options or connections to external equipment. 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. 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 allows the data set to be tested by a DTC or by a local DS 208B-L1B or DS 208BR-L1C controlled by a data test set. In this test mode, the data set automatically answers the next incoming call and transfers to data mode. If the DTC (or local set) transmits a steady mark for 1.25 seconds and no

errors are detected by the remote data set, the data set responds by transmitting a steady mark for 2.0 seconds. If errors are received, the data set responds with a steady space for 2.0 seconds. Upon receipt of a 3-second space signal from the DTC (or local set), the remote data set disconnects from the line. 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.

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

(e) **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.

(f) **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.

(g) **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.

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

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

(j) **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.

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

(l) **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.

TABLE B
TELEPHONE INTERFACE CONNECTOR PIN ASSIGNMENTS

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.
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.

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

(n) **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 20 to 25 ms or until DTR goes **off** in order to ensure termination of the call while in data mode.

(o) **Ring Indicator (CF) (Pin 22):** EIA signals on this lead indicate to the customer

that a ringing signal is being received on the telephone channel.

(p) **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 \pm 0.01 percent and meet EIA signal requirements.

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

TABLE C

CUSTOMER INTERFACE CONNECTOR PIN ASSIGNMENTS

PIN NO.	NOTE 1	FUNCTION	DATA SET MNEMONIC	EIA DESIGNATION (RS-232-C)
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 208BR-L1C uses pin 16 for a different function than that specified by EIA Standard RS-232-C.

G. Options

3.17 DS 208BR-L1C 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 592-038-200. All options are added and removed by switches.

4. OPERATION

4.01 DS 208BR-L1C 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 208BR-L1C 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) 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).
- (4) 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 1-second quiet interval during which no signal is transmitted from the data set, followed by a 2-second period of 2021-Hz answer tone which

TABLE D

TRANSMIT LEVEL (TELCO) OPTIONS FOR DS 208BR-L1C

TRANSMIT LEVEL (dBm)	OPTION DESIGNATION	SWITCH			
		S1A	S1B	S1C	S2A
-4*	ZE	DOWN	UP	DOWN	UP
-5	ZF	DOWN	UP	DOWN	DOWN
-6	ZG	DOWN	UP	UP	UP
-7	ZH	DOWN	UP	UP	DOWN
-8	ZI	DOWN	DOWN	DOWN	UP
-9	ZJ	DOWN	DOWN	DOWN	DOWN
-10	ZK	DOWN	DOWN	UP	UP
-11	ZL	DOWN	DOWN	UP	DOWN
-12	ZM	UP	UP	DOWN	UP
-13	ZN	UP	UP	DOWN	DOWN
-14	ZO	UP	UP	UP	UP
-15	ZP	UP	UP	UP	DOWN

* Use option ZE for all data sets in registered installations. For "grandfathered" installations, select the appropriate level so that the signal reaching the serving central office does not exceed -12 dBm.

TABLE E

DS 208BR-L1C OPTIONS (CP HG27B)

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 <i>on</i> in Analog Loop Mode	YM
	Down	DSR <i>off</i> 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.

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 as in subparagraph (b) and (c) 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 each case, replace handset on cradle when both data sets have entered data mode.

(b) To Originate a Call From a DS 208BR-L1C 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 208BR-L1C** immediately transfers to data mode without transmitting the answer tone.

(c) To Originate a Call From a DS 208BR-L1C 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 208BR-L1C** 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 the LINE button will extinguish.

(b) At answering end, 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 paragraph 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 20 to 25 ms to ensure termination.

5. REFERENCES

5.01 The following documents provide additional information on data sets 208BR-type and related apparatus.

NUMBER	TITLE
CD & SD-1D242-02	Data Set 208BR-Type
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

SECTION 592-038-100

SECTION	TITLE	SECTION	TITLE
502-541-415	Service—565HK and 565HKM Telephone Sets	592-038-500	Data Set 208BR-L1C Transmitter-Receiver—TestProcedures
502-543-405	2565HK and 2565HKM Telephone Sets	598-088-Series	801CR Automatic Calling Units.
592-038-200	Data Set 208BR-L1C Transmitter-Receiver—Installation		