

**4800-BIT PER SECOND (BPS)
SERVICE USING DATA SET 208-TYPE
REFERENCE GUIDE**



Data Set 208B-L1 and 2565HK-Type Telephone Set

CONTENTS	PAGE	1. GENERAL
1. GENERAL	1	<p>1.01 Data set (DS) 208-type is a synchronous, binary, serial, 4800-bps transmitter-receiver. There currently exist six kinds of DS 208-type; three DS 208A-type and three DS 208B-type. The two earlier models of each are rated Manufacture Discontinued (MD). The three DS 208A-type [DS 208A-L1 (MD), DS 208A-L1A (MD), and DS 208A-L1B] are for use on 3002-type 4-wire private line telephone channels. The three DS 208B-type [DS 208B-L1 (MD), DS 208B-L1A (MD), and DS 208B-L1B] are for use on the switched network.</p> <p>1.02 This section is reissued to:</p> <ul style="list-style-type: none"> • Show DS 208A-L1A rated MD • Show DS 208B-L1 and DS 208B-L1A rated MD • Add coverage on DS 208A-L1B • Add coverage on DS 208B-L1B.
2. PHYSICAL AND ELECTRICAL CHARACTERISTICS	2	
3. SERVICE ORDER INFORMATION	2	
DS 208A-Type	3	
DS 208B-Type	6	
4. CONVERSION AND DISPOSITION INFORMATION	8	
DS 208A-Type	8	
DS 208B-Type	8	
5. MAINTENANCE SPARE GUIDELINES	9	
6. REFERENCES	9	

NOTICE

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SECTION 590-002-110

Since this reissue constitutes a general revision, arrows ordinarily used to denote changes have been omitted.

1.03 DS 208A-type is recommended for use with data auxiliary set (DAS) 828A or 829-type. These data auxiliary sets provide standard, prewired, tested station arrangements for terminating 4-wire private line voiceband channels. The following models are available:

- DAS 829-type provides a standard termination with switched network backup for data only or alternate data/voice.
- DAS 828A-L1 (rack mount) or -L1A (wall mount) provides data-only service.
- DAS 828A-L1/2 (rack mount) or -L1A/2 (wall mount) provides data service with alternate voice.

1.04 DS 208A-L1A (MD) is compatible with and provides the same service as DS 208A-L1 (MD), but includes additional test features and a customer option relating to the data set ready lead (CC) in the analog loop-back test mode. DS 208A-L1B is compatible with DS 208A-L1 and DS 208A-L1A.

1.05 DS 208B-type is recommended for use with a 565HK-type or equivalent key telephone set which must be ordered separately. Up to five data sets may be controlled with a single telephone set, which allows manual call origination and voice/data transfer. A Bell System 801-type automatic calling unit (ACU) may be ordered separately and used in addition to the telephone set to provide automatic call origination.

1.06 DS 208B-type is provided with a pushbutton option switch labeled "50." The switch is accessible to the customer and is used to select either a 50-ms (switch depressed) or 150-ms (switch released) request-to-send (CA)/clear-to-send (CB) interval. The 50-ms interval should normally be used unless actual experience shows that in working with extremely long calling distances and short message lengths, echo messages are received which can cause the data terminal to time out or cause improper data transfer. Transmission between two DS 208B-type on a connection with one optioned for 50 ms and the other optioned for 150 ms is

possible should the customer choose to operate this way.

1.07 DS 208B-L1A provides a ring memory feature. DS 208B-L1B provides all the features of DS 208B-L1A, plus an error inject feature and a remote test timing feature.

2. PHYSICAL AND ELECTRICAL CHARACTERISTICS

2.01 DS 208-type consists of a transmitter, receiver, and control circuits mounted on plug-in circuit packs (CPs). The data set cover has front and back panels of molded black plastic. The rest of the exterior has a brushed aluminum finish. The overall dimensions of the data set are approximately 16 inches across the front, 4-1/4 inches high, and 11-1/2 inches deep; the set weighs approximately 20 pounds.

2.02 DS 208-type is provided with two interface connectors at the rear of the set: the KS-19087-L2 (CUST INT) connector provides the digital interface leads for the customer-provided terminal equipment, and the KS-19088-L2 (TELE INT) connector provides the interface for connection to the telephone network. The customer's data equipment must be equipped with a cable terminated in a Cinch or Cannon DB-19604-432 plug.

2.03 DS 208-type operates in a temperature range of +40 to +120°F and a relative humidity range of 20 to 95 percent.

2.04 DS 208-type requires approximately 26 watts of 105- to 129-Vac 60-Hz power supplied by the customer through a common 3-wire grounding-type receptacle. The receptacle should not be under control of a switch to ensure uninterrupted service.

3. SERVICE ORDER INFORMATION

3.01 Service orders for data services should describe the desired service by USOC (Uniform Service Order Code). Service orders **should not** specify data set codes. The **encoding** procedure to determine the appropriate USOC is described in Section 590-000-100. Customer option decisions which must be made to determine the USOC suffixes are listed in 3.03 for DS 208A-type and 3.09 for DS 208B-type. An explanation of features and options common to most data sets is given in Section 590-000-101. A rapid cross reference between USOC data sets and reference guides is presented

in Section 590-000-102. Intercity Service Manual (ISM) section 87 gives customer billing nomenclature, shows tariff listings for data services, and provides general reference information.

3.02 The USOC *decoding* procedures are described in Section 590-000-100. Engineering or Plant Department personnel responsible for selecting data sets are not compelled to use any particular data set codes specified or suggested on the service order. To achieve maximum reuse of data set apparatus, the use of telephone company (telco) stocks (field and class C) is preferred over the purchase of a new set. Refer to Table A for a list of service offerings provided by DS 208-type.

DS 208A-Type

3.03 Refer to Table B for the options which require a customer decision for DS 208A-type. The following subparagraphs provide detailed information on customer options. To provide the features desired by the customer, one of the two options under each of the following decisions must be selected.

(a) *Decision A—Transmitter Timing*

1. Transmitter Internally Timed: With this option the set provides a transmit

clock signal to allow the terminal to properly time signals on the transmitted data lead at the 4800-bps rate.

2. Transmitter Externally Timed: With this option the internal transmitter timing of the data set is phase-locked to the external clock signal provided by the terminal. This external clock signal must conform to the distortion and frequency accuracy of Electronic Industries Association (EIA) Standard RS-334.

(b) *Decision B—Carrier Control*

3. Continuous Carrier: With the continuous-carrier option, the data set transmitter remains ON continuously to maintain receiver synchronization. This option is normally used on master stations of multipoint networks and both stations of point-to-point networks.

4. Switched Carrier: If the switched-carrier option is selected, the switched request-to-send (CA) option must also be selected. With these options, the data set will transmit only when the CA lead is ON. This option is used on remote stations of multipoint networks and may be

TABLE A

SERVICE OFFERINGS

USOC	FEATURE	USABLE DATA SET	NOTE
G48++	4800 bps on Private Line	208A-L1	1
		208A-L1A	1 & 2
		208A-L1B	1 & 2
S48++	4800 bps on Switched Network	208B-L1	
		208B-L1A	3
		208B-L1B	3 & 4

Note 1: If alternate voice or switched network backup is required, specify in REMARKS column of service order.

Note 2: Includes additional test features and CC ON or OFF in analog loop-back mode option.

Note 3: Includes ring memory feature.

Note 4: Includes error inject and 3-second time to disconnect from remote test mode.

TABLE B

CUSTOMER OPTION DECISIONS FOR DATA SET 208A-TYPE

DECISION	OPTION	SWITCH SETTING	DESIGNATION
A	1. Transmitter Internally Timed	S3A Down	YC
	2. Transmitter Externally Timed	S3A Up	YD
B (Note 1)	3. Continuous Carrier (Note 2)	S4B Up	XB
	4. Switched Carrier (Note 3)	S4B Down	XA
C	5. Switched Request-to-Send	S1C Down	YT
	6. Continuous Request-to-Send	S1C Up	YS
D	7. 1-Sec Holdover Used (Note 4)	S4A Down	YX
	8. 1-Sec Holdover Not Used (Note 5)	S4A Up	YW
E	9. New Sync Used (Note 6)	S4C Up	YB
	10. New Sync Not Used	S4C Down	YA
F	11. Data Set Ready Lead (CC) ON in Analog Loop-Back Test Mode (Note 7)	S1A Up	YM
	12. Data Set Ready Lead (CC) OFF in Analog Loop-Back Test Mode	S1A Down	YN

Note 1: If decision B4 is made, decision C5 must be selected.

Note 2: Continuous carrier should be used for multipoint master stations and all point-to-point stations.

Note 3: Switched carrier must be used for outlying stations on multipoint networks.

Note 4: It is recommended that the 1-second holdover option be employed when the distant data set is optioned for continuous carrier.

Note 5: Master stations on multipoint networks must have the 1-second holdover disabled (decision D8).

Note 6: The new sync option should be installed if the interval between messages from different transmitters is less than 100 ms and the terminal is equipped to provide the required new sync signal.

Note 7: DS 208A-L1A and DS 208A-L1B only.

used in point-to-point operations when the customer requires it. This option should not be used on master stations of multipoint networks.

(c) **Decision C—Control of Request-to-Send (CA)**

5. Switched Request-to-Send (CA): This option can be used with the continuous-carrier option as described in decision B3. If the switched-carrier option is selected, this option must also be selected and is used as described in decision B4. If the continuous-carrier option is used, the request-to-send (CA)/ clear-to-send (CB)

time is nominally 8 ms. With the switched-carrier option, the time is nominally 48.5 ms.

6. Continuous Request-to-Send (CA): This option is used when it is desired to keep both the transmitter and clear-to-send (CB) ON continuously. The customer CA lead has no control. When this option is selected decision B has no effect.

(d) **Decision D—1-Second Holdover**

7. 1-Second Holdover Used: With this option, the data set receiver maintains synchronization with the remote transmitter for up to 1 second in the absence of a received line signal. It is recommended that this option be used when the distant data set is optioned for continuous carrier. Remote stations on multipoint networks would use this option.

8. 1-Second Holdover Not Used: With this option, the loss of received line signal results in the turning OFF of the received line signal detector in about 2 ms. Master stations on multipoint networks must use this option.

(e) **Decision E—New Sync**

9. New Sync Used: This option is normally used in the master station for multipoint polling arrangements. With this option, the business machine can use the new sync lead to quench the data set receiver clock to prepare the data set receiver for a new message from an outlying station.

10. New Sync Not Used: With this option, the new sync interface lead connection is broken and the circuit is not affected by the customer. Remote stations on multipoint networks and both stations on point-to-point networks use this option.

(f) **Decision F—Data Set Ready Lead (CC) ON or OFF in Analog Loop-Back Test Mode**

11. CC ON: This option provides an ON indication on the CC lead when the set is in the analog loop-back test mode. It

should be chosen if the terminal has the capability to perform an analog loop-back test with the data set and requires the CC lead to be ON. The terminal should be capable of full-duplex operation and should be able to verify transmission through the data set. This option can only be provided by DS 208A-L1A or DS 208A-L1B.

12. CC OFF: This option provides an OFF indication on the CC lead when the set is in the analog loop-back test mode. Without specific knowledge of the test capability and requirements of the data terminal, this option should be installed. This option does not prohibit the use of external test equipment to make an analog loop-back test through the data set interface.

3.04 The data set may be mounted on a desk or in a Bell System provided equipment cabinet or 19- or 23-inch rack. If the data set is to be mounted in a rack, a D-180556 mounting bracket kit should be ordered separately. Mounting information should appear in the REMARKS column of the service order.

3.05 Telco engineering options for DS 208A-type are outlined in Table C and are as follows:

- CC interface lead control
- Compromise equalizer setting
- Automatic equalizer retrain

Note: The automatic retraining option (S3B up) should always be installed.

- Compromise equalizer test (DS 208A-L1A and DS 208A-L1B only)
- Ground strap.

3.06 The private line termination (DAS 828A or 829-type) controls the data set ready (CC) indication through the data set to the customer interface. The DAS will turn off CC when the channel is not available (ie, talk or loop-back mode). The CC lead can be held on by placing option switch S3C in the down position. If DAS 828A or 829-type is used, switch S3C must be in the up position.

TABLE C

TELCO ENGINEERING OPTIONS FOR DATA SET 208A-TYPE

OPTION		DESIGNATION
Automatic Equalizer Retrain *		YU
Retrain Not Used		YV
Data Auxiliary Set Used		YI
Data Auxiliary Set Not Used		YJ
Compromise Equalizer Setting	None	ZT
	Amp. & Delay (SYM)	ZS
	Amp. & Delay (HI END)	ZU
	Amp. & Delay (SYM & HI END)	ZV
Compromise Equalizer Test Enabled		YR YQ
Compromise Equalizer Test Disabled } †		
Signal-to-Frame Ground Strap IN		—
Signal-to-Frame Ground Strap OUT		

* Automatic Equalizer Retrain option should always be in

† DS 208A-L1A and DS 208A-L1B only

3.07 The setting of the compromise equalizer will be determined at the time of installation and is only determined for switched carrier sets. Four settings are available. The first setting disconnects the equalizer completely. This position is for testing only and no set should be installed with the compromise equalizer disconnected. The second setting provides amplitude and symmetrical delay equalization and is used for continuous carrier sets. The third setting provides amplitude and delay equalization on the high end of the spectrum. The fourth setting provides amplitude and delay equalization on the lower portion of the spectrum but also provides increased equalization on the upper portion of the spectrum.

3.08 The compromise equalizer test option in DS 208A-L1A and -L1B facilitates testing the compromise equalizer by telco employees. When the option is installed, the CC indication to the customer terminal is held OFF. At the completion of the test, the option should be removed in order for the terminal to operate with the data set. The option should be installed only while testing the compromise equalizer settings.

DS 208B-Type

3.09 Refer to Table D for the options which require customer decisions for DS 208B-type. The following subparagraphs provide detailed information on customer options. To provide the features desired by the customer, one of the two options under each of the following decisions must be selected.

(a) Decision A—Transmitter Timing**1. Transmitter Internally Timed:**

With this option the set provides a transmit clock signal to allow the data terminal to properly time signals on the transmitted data lead at the 4800-bps rate.

2. Transmitter Externally Timed:

With this option the internal transmitter timing of the data set is phase-locked to the external clock signal provided by the data terminal. This external clock signal must conform to the distortion and frequency accuracy of EIA Standard RS-334.

TABLE D

CUSTOMER OPTION DECISIONS FOR DATA SET 208B-TYPE

DECISION	OPTION	DESIGNATION
A	1. Transmitter Internally Timed	YC
	2. Transmitter Externally Timed	YD
B	3. Without Telco 801-Type ACU	—
	4. With Telco 801-Type ACU	
C	5. Data Set Ready Lead (CC) OFF in Analog Loop-Back Test Mode	YN
	6. Data Set Ready Lead (CC) ON in Analog Loop-Back Test Mode	YM
D	7. Without Automatic Answer	YO
	8. With Automatic Answer	YP
E	9. Desk Mounting	—
	10. Rack or Cabinet Mounting	

(b) **Decision B—Without or With Telco 801-Type ACU**

3. Without ACU: For applications not requiring automatic call origination.

4. With ACU: Used with unattended automatic originating data terminals and other applications requiring automatic call origination. The ACU must be optioned to detect the end of answer tone.

(c) **Decision C—Data Set Ready Lead (CC) ON or OFF in Analog Loop-Back Test Mode**

5. OFF: This option provides an OFF indication on the CC lead when the set is in analog loop-back test mode. Without specific knowledge of the test capability and requirements of the data terminal, this option should be installed. This option does not prohibit the use of external test equipment to make an analog loop-back test through the data set interface.

6. ON: This option provides an ON indication on the CC lead when the set is in analog loop-back test mode. This option

should be chosen if the data terminal has the capability to perform an analog loop-back test with the data set and requires the CC lead to be ON. The data terminal should be capable of full duplex operation and should be able to verify transmission through the data set.

(d) **Decision D—Without or With Automatic Answer**

7. Without Automatic Answer: Incoming calls must be answered manually.

8. With Automatic Answer: When this option is selected, calls are answered automatically by the terminal, by either turning ON the CD lead in response to a ringing indication on the ring indicator lead, or holding CD ON continuously when idle but ready to receive calls.

(e) **Decision E—Mounting**

9. Desk Mounting: The data set may be mounted on a desk but should be located near the business machine, because the interface cord supplied by the customer should not exceed 50 feet in length.

10. Rack or Cabinet Mounting: The data set may be installed in either 19- or 23-inch racks when equipped with a D-180467 mounting bracket kit which must be ordered separately. The data set may also be mounted in a Bell System provided equipment cabinet.

3.10 Telco options for DS 208B-type are listed in Table E.

4. CONVERSION AND DISPOSITION INFORMATION

DS 208A-Type

4.01 DS 208A-L1 can be converted to DS 208A-L1A by replacing CP HG9 with a CP HG23 and replacing the front cover with a new front cover (Section 840-807-655). The new cover is required to accommodate the lamps and switches on CP HG23. No wiring changes are necessary. DS 208A-L1A cannot be converted to a DS 208A-L1B because of differences in backplane wiring. The same USOC will be used and no extra tariff charges will be applied for the self test features. To reduce inventory and plant problems and to maintain service commitments, it is recommended that all existing DS 208A-L1 be converted to DS 208A-L1A over a reasonable time period. Converted data sets should be stamped DS 208A-L1A. Refer to Table F for conversion and disposition information.

4.02 In-service DS 208A-L1 should not be converted on customer premises unless CP HG9 fails and a replacement is available. Since the new maintenance kit is not factory-equipped with new front covers, it is recommended that new front covers be ordered and included in the new maintenance kit as long as the kits continue to support DS 208A-L1.

4.03 In addition to the changes described above, CP HG1 is replaced by CP HG21. The CPs are completely interchangeable and substitution of one for the other may be made. The manufacture of CP HG1 was discontinued with the introduction of CP HG21.

DS 208B-Type

4.04 DS 208B-L1 can be converted to a DS 208B-L1A by replacing CP HG19 with a CP HG24 and CP HG18 with a CP HG18B.

Note: CP HG18 must always be replaced with a CP HG18B when CP HG19 is replaced with a CP HG24.

DS 208B-L1A cannot be converted to a DS 208B-L1B because of differences in backplane wiring. All existing DS 208B-L1 should be converted to DS 208B-L1A while -L1A parts remain available.

4.05 During the warranty period, defective CPs should be returned to Western Electric for

TABLE E

TELCO ENGINEERING OPTIONS FOR DATA SET 208B-TYPE

OPTION	DESIGNATION	NOTE
Compromise Equalizer IN (4-dB Slope)	WU	1 & 2
Compromise Equalizer IN (8-dB Slope)	ZS	2
Compromise Equalizer OUT	ZT	2
Signal-to-Frame Ground Strap IN	—	
Signal-to-Frame Ground Strap OUT	—	
Transmit Level (0 to -15 dBm)	ZA through ZP	

Note 1: Applies to DS 208B-L1A and DS 208B-L1B only.

Note 2: Compromise equalizer should always be IN, except during test.

TABLE F

CONVERSION AND DISPOSITION INFORMATION

DATA SET	STATUS	REPLACED BY	CONVERTIBLE TO	RECOMMENDATION
208A-L1	MD	208A-L1A	208A-L1A	Convert
208A-L1A	MD	208A-L1B	—	Update & Repair
208A-L1B	Standard	—	—	Update & Repair
208B-L1	MD	208B-L1A	208B-L1A	Convert*
208B-L1A	MD	208B-L1B	—	Update & Repair
208B-L1B	Standard	—	—	Update & Repair

* To reduce inventory and to maintain service commitments, only update when it is necessary to correct specific operational problems or when CPs HG18 and HG19 fail.

full credit in accordance with General Engineering Complaint (GEC) 9400 (Section 010-700-020). After the warranty period, defective CPs rated MD should be junked. Other CPs should be returned to Western Electric for repair.

5. MAINTENANCE SPARE GUIDELINES

5.01 DS 208-type should not be stocked for maintenance purposes. Maintenance of DS 208-type service is accomplished on a circuit pack replacement basis, using spare circuit packs contained in the D-180718 maintenance kit. The maintenance kits should be stocked in quantities shown in Table G.

TABLE G

MAINTENANCE SPARE GUIDELINES

NUMBER OF DS 208-TYPE IN SERVICE IN MAINTENANCE TERRITORY	RECOMMENDED NUMBER OF MAINTENANCE KITS
1 to 9	1
10 to 35	2
36 to 55	3
56 to 80	4
Over 80	Not more than 5% of number of sets in service

5.02 The initial version of the maintenance kit (D-180468), was designed to support DS 208A-L1. Later production versions of the D-180468 kit included a larger carrying case and compress-o-cartons to facilitate eventual upgrading. With the introduction of DS 208A-L1A, manufacture of the D-180468 maintenance kit was suspended and the D-180497-L1 kit was introduced. With the introduction of DS 208A-L1B and DS 208B-L1B, new kits are provided for maintaining all DS 208-type. The new kit is designated D-180718.

6. REFERENCES

6.01 The following Bell System Practices contain information pertaining to DS 208-type.

SECTION	TITLE
590-000-100	Implementation of Data Services—Interdepartmental Coordination
590-000-101	Reference Guide—Description of Data Set Features and Options
590-000-102	Data Service—Reference Guides—Cross Reference Information
592-027-100	Data Set 208A-Type Transmitter-Receiver—Description and Operation
592-027-150	Data Set 208A-Type Transmitter-Receiver—Supplementary Information

SECTION 590-002-110

SECTION	TITLE	SECTION	TITLE
592-027-180	Data Set 208A-Type Transmitter-Receiver—Summarizing Specification	592-030-300	Data Set 208B-Type Transmitter-Receiver—Maintenance
592-027-200	Data Set 208A-Type Transmitter-Receiver—Installation and Connections	592-030-500	Data Set 208B-Type Transmitter-Receiver—Test Procedures
592-027-300	Data Set 208A-Type Transmitter-Receiver—Maintenance	666-511-503	Test of Data Services Provided by Data Set 208A-Type From a Private Line Data Testroom
592-027-400	Data Set 208A-L1 Transmitter-Receiver—Wiring Information	668-102-551	904A/B and 904C/D Data Test Centers—Test Procedures—Data Set 208B-Type
592-027-500	Data Set 208A-Type Transmitter-Receiver—Test Procedures	6.02 The following documents also contain information pertaining to DS 208-type.	
592-030-100	Data Set 208B-Type Transmitter-Receiver—Description and Operation	NUMBER	TITLE
592-030-150	Data Set 208B-Type Transmitter-Receiver—Supplementary Information	CD- &SD-1D232-01	Data Set 208A-Type
592-030-180	Data Set 208B-Type Transmitter-Receiver—Summarizing Specification	CD- &SD-1D242-01	Data Set 208B-Type
592-030-200	Data Set 208B-Type Transmitter-Receiver—Installation and Connections	CD- &SD-82134-01	83A Power Unit
			Data Set 208A-L1—Technical Reference
			Data Set 208B-L1—Technical Reference.