

PACIFIC COMPANY STANDARD

SUBJECT: Data Sets 203-Type

APPLY WHEN TARIFF IS EFFECTIVE—
YOU WILL BE NOTIFIED

DATE April 17, 1969

FILE NO. E.L. 286
Topical Index Code 1D8



American Telephone
& Telegraph Company

195 BROADWAY, NEW YORK, N.Y. 10007

212 393-9800

FILE No. 215-020

Pls Route To 2ND LINE
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TO: Chief Engineers (copies to General Plant Managers, and
Engineering, Plant and Marketing Data Specialists)

FROM: Assistant Vice President - Engineering B

SYNOPSIS: Describes high speed voice band Data Sets 203-type which will
be available from Western Electric on a normal production basis
in the near future. Also, describes those versions still in
the development stage. Price and ordering information is in-
cluded.

Data Sets 203-type use 2, 4 or 8 level amplitude modulation and
vestigial sideband (VSB) spectrum shaping to provide high speed binary
serial data transmission over the DDD Network and 2- or 4-wire private
lines. The data sets are designed on a modular plug-in basis to provide
various configurations and data speeds. The initial offering will include
3600 bps operation on the DDD Network and 4800 bps operation on C2 con-
ditioned private lines. Additional speed capabilities are being developed
to provide 4800 bps operation on the DDD Network and 7200, 9600 and 10,800
bps operation on private lines. Tests of these higher data rates are pro-
ceeding and if they prove feasible, they will be available on a plug-in
basis sometime after the initial offering.

There are three basic types of Data Sets 203 available. Data
Set 203A-type is a transmitter/receiver, Data Set 203B-type is a transmitter
only and Data Set 203C-type is a receiver only. Each of these data sets
can be equipped with the speed options mentioned above. They can either
be frame mounted or mounted in a KS-20018, L3 cabinet that is the same used
for housing the 303 Wideband Data Station. Line control functions, includ-
ing automatic answer and ACU compatibility, is provided by an associated
Data Auxiliary Set 804A. In 4-wire applications, Data Auxiliary Set 804M
can be used. A non-synchronous auxiliary channel feature (arranged for
backward or reverse operation) capable of data speeds up to 150 bps is
always provided on 2-wire configuration of Data Sets 203A and all configura-
tions of Data Sets 203B and 203C. The auxiliary channel is only available
on an optional basis with Data Sets 203A-type provided on 4-wire private
lines. Optional error control circuits (encoder and decoder) will be avail-
able at a later date and provision is made to allow the addition of these
units.

Ordering and availability information for the initial Data Set 203-type offerings is included in the attached table. More detail information, including data set coding, is contained in the accompanying memorandum.

C. H. Edmunds

Assistant Vice President

FOY: CMCK
Attachments
Table
Memorandum

The Western Electric Company advises that the Data Sets 203-type indicated below are tentatively expected to be available from factory stock in May 1969. Price and ordering information is as follows:

	<u>Order Wording</u>	<u>Approximate Price</u>	<u>Account Code</u>
(Quantity)	Set, Data, 203A-L1/2 *	\$ 4,570.00	234 (Large Private Branch Exchange)
"	" " 203A-L1/3 *	4,590.00	"
"	" " 203A-L1/2/7 *	4,760.00	"
"	" " 203A-L1/3/7 *	4,780.00	"
"	" " 203A-L1A/2 *	4,510.00	"
"	" " 203A-L1A/3 *	4,530.00	"
"	" " 203A-L1A/2/7 *	4,700.00	"
"	" " 203A-L1A/3/7 *	4,720.00	"
"	" " 203B-L1/2 #	1,920.00	"
"	" " 203B-L1/3 #	1,925.00	"
"	" " 203B-L1A/2 #	1,860.00	"
"	" " 203B-L1A/3 #	1,865.00	"
"	" " 203C-L1/2 ϕ	4,145.00	"
"	" " 203C-L1/3 ϕ	4,165.00	"
"	" " 203C-L1A/2 ϕ	4,065.00	"
"	" " 203C-L1A/3 ϕ	4,085.00	"
"	" " 203C-L1B/2 ϕ	4,065.00	"
"	" " 203C-L1B/3 ϕ	4,085.00	"

* See Table 1 of memorandum accompanying E.L. 286 for data set description.

See Table 2 of memorandum accompanying E.L. 286 for data set description.

ϕ See Table 3 of memorandum accompanying E.L. 286 for data set description.

Note: The above equipment configurations do not include the Data Auxiliary Set 804A- or M-type. The appropriate Data Auxiliary Set 804A- or M-type should be ordered separately when required.

This memorandum describes general aspects, transmission considerations, wiring options, power requirements, maintenance considerations and supplementary information for Data Set 203-type.

General

Data Sets 203-type (Figure 1) are designed to provide synchronous transmission and reception of high speed digital data over the DDD Network and 2- or 4-wire C2 conditioned private lines. They use 2, 4 or 8 level amplitude modulation, vestigial sideband (VSB) spectrum shaping, synchronous detection and automatic, adaptive equalization of linear transmission impairments. They have been designed on a modular plug-in basis to provide various configurations and data speeds. The initial offerings will be an 1800 baud service (1800 and 3600 bps on DDD and 1800, 3600 and 5400 bps on C2 conditioned private lines) and a private line-only 2400 baud service (2400, 4800 and 7200 bps on C2 conditioned private lines). The expected error performance of the 2 and 4 level data speeds (1800-3600 or 2400-4800 bps) is somewhat comparable to existing data sets (see following section on performance). The initial 8 level data rates (5400 and 7200 bps) available for use on private lines will provide a much poorer error rate in a large proportion of cases. Additional speed capabilities are being developed to provide 4800 bps (4 level) operation on the DDD Network and 7200 (4 level), 9600 and 10,800 bps (8 level) operation on private lines; however, the error performance of these higher speed versions is expected to be progressively poorer than that observed with the lower data rates. If these higher data rates prove feasible, they will be available on a plug-in option basis sometime after the initial offering. An auxiliary channel feature capable of data speeds up to 150 bps is available which will allow either simultaneous or alternate transmission of non-synchronous binary data. Table 4, attached, lists all the Data Set 203-type speed options available and being proposed along with normal auxiliary channel usage.

Data Sets 203-type have been designed on a modular basis to facilitate implementation of optional configurations and speeds. The three basic parts of the data set are the 22A Data Unit containing the basic transmitter circuitry; the 23A Data Unit containing the basic receiver circuitry including the automatic, adaptive equalizer; and the 24A Data Unit containing the customer and telephone line interface circuits, data set control circuits, remote test circuits, power supply, and provision for adding the low-speed auxiliary channel (reverse channel feature). Provision has also been made for the future inclusion of error control encoder and decoder units as separate data units. The data sets are available for mounting on a 23-inch frame or in a KS-20018, L3 cabinet (2' high x 2' wide x 1' deep). Frame mounted Data Sets 203A and C are 20 inches high and Data Set 203B is 14 inches high. Data Set 203C without error control is 14 inches high.

Three basic types of Data Set 203 are available. Data Set 203A (Figure 2) is a transmitter/receiver consisting of 22A, 23A and 24A Data Units plus the associated plug-in cards and networks to provide a particular baud (symbol) rate. The auxiliary channel feature is always provided with Data Set 203A when 2-wire line facilities are used; however, when Data Set 203A is used on 4-wire circuits, the provision of the auxiliary channel is optional. Data Set 203B (Figure 3) is a transmitter only consisting of 22A and 24A Data Units plus the associated plug-in cards and networks to provide a particular baud rate. Data Set 203C (Figure 4) is a receiver only consisting of 23A and 24A Data Units plus the associated plug-in cards and networks necessary to provide a particular baud rate. Data Sets 203B and 203C have, as standard equipment, the auxiliary channel feature. The coding of the sets is in accordance with the current coding practice that identifies the basic and functional options as list numbers. These are given in the attached Tables 1, 2 and 3. Note that List L1 contains common apparatus, assembly, wiring and hardware. Variations in the basic set are identified by an additional letter such as L1A and L1B. The functional options are identified by separate list numbers such as L2, L3, L4, etc. Attached Tables 1A, 2A and 3A contain the authorized codes for Data Sets 203-type. The speed options listed in Tables 1, 2 and 3 are intended for use on specific applications. Details of these are listed in the attached Table 4. Three speeds are shown for some of the same applications. The data set is equipped with a switch on the front control panel to permit the installer to select the desired speed. The switch can be turned to a customer control (CC) position that will then allow the customer to select between the two highest speeds through a control lead in the customer interface.

The Data Set 203-type interface conforms with EIA Standards RS-232B and RS-334. The data sets provide optional automatic answer and automatic calling unit (Data Auxiliary Sets 801-type) compatibility features when associated with Data Auxiliary Sets 804A or 804M and has, depending on configuration, the auxiliary channel feature. An optional forward acting error control feature will be made available at a future date. Two Data Sets 203-type can be used as a regenerative repeater. The data sets are intended to operate in environments where the ambient temperature is between 40° and 120° F with relative humidity a maximum of 95 percent.

Data Auxiliary Sets 804A and 804M are used with Data Sets 203-type to provide the telephone set, automatic answering, ACU compatibility and line control functions (Figure 1). Data Auxiliary Set 804A-type is intended for use on DDD facilities and, with the addition of key telephone units, on various private line facilities. Data Auxiliary Set 804M-type is intended for use on a 4-wire switched network application. Data Sets 203-type come equipped for connection of Data Auxiliary Set 804A. In order to use Data Auxiliary Set 804M, a M25A cord must be ordered separately. See B.S.P. Sections 598-030-100 and 598-057-100 for detailed information on Data Auxiliary Sets 804A and 804M, respectively.

Performance

The expected performance of Data Sets 203-type is based upon the results of nationwide field trials using early experimental Data Sets 203-type. The results of these trials are listed in an article titled "Nationwide Field Trial Performance of a Multilevel Vestigial-Sideband Data Terminal for Switched Network Voice Channels" by C. W. Farrow and L. N. Holzman of the Bell Telephone Laboratories which is published in the IEEE International Conference on Communications, Conference Record, June 1968, pp. 782-787. The results show that the error rate performance at 1800 bps on the DDD Network was approximately 10^{-5} or better for about 95 percent of all calls. At 3600 bps, a 10^{-4} or better error rate was obtained on 84 percent of all calls and an error rate of better than 10^{-5} on 62 percent of all calls. At 5400 bps the raw error rate was excessive on most dialed connections. Using these results and the fact that the automatic equalizer causes the effect of transmission parameters such as slope and delay to be minimized, it is concluded that the performance at 1800 or 2400 bps and at 3600 or 4800 bps on C2 conditioned private line facilities will be comparable to those performance results indicated above for 1800 and 3600 bps on the DDD Network, respectively. It should be noted that the projected expected error rate is assumed on a long term average basis and excludes catastrophic failures.

The performance of Data Sets 203-type operating over T1 carrier facilities can be seriously impaired if the facilities are not adequately maintained to meet voice objectives as specified in the appropriate Bell System Practices. In order to more satisfactorily meet normal voice objectives, the present 3-month maintenance routines for T1 carrier are being both improved as well as lengthened to 6-month intervals. An E.M. will be issued about June 1969 to describe these new maintenance procedures.

Transmission Considerations

Data Sets 203-type are designed to provide synchronous transmission and reception of high speed digital data over the Direct Distance Dialing Network (initially 3600 bps) and 2- or 4-wire C2 conditioned private lines (initially 4800 bps). The data set transmitter accepts serial binary data at the selected data rate synchronous with a bit rate timing signal which may be obtained externally from the customer or internally from the data set. The selection of these modes is made by a strapping option. External timing will be accepted by the transmitter in accordance with EIA Standards. However, to guarantee maximum performance of the data set the customer supplied timing must be accurate to at least 0.001 percent. The data set transmitter output level can be set by strapping option to between 0 and -15 dBm in 1 dB increments and with 1 dB accuracy. Line impedances of 600 and 900 ohms can be selected by strapping. On DDD and 2-wire private line, the transmit/receive line termination is strap selected to 600 or 900 ohms. On 4-wire private line, the receiver line termination is wired permanently for 600 ohms and only the transmitter is strapped for 600 ohms. Strapping options are also provided to adjust data set receiver sensitivity to be compatible with expected input signal variations for all DDD and private line applications. A constant average output power level is provided by scrambling of the customer's serial data. Scrambling provides the further advantage of making the data set code-insensitive.

Upon the initial reception of high speed carrier, the local data set receiver is automatically synchronized to the far-end transmitter prior to actual data transmission. This initial synchronization interval (sometimes referred to as the training or start-up period) will require up to 10 seconds, depending on the baud rate of the data set and allows the receiver to complete the following operations:

- a) Carrier recovery
- b) Initial automatic equalizer adjustment
- c) Timing recovery
- d) Scrambler-descrambler synchronization
- e) Error control synchronization (if used).

The auxiliary channel (reverse channel feature) is designed for the transmission and reception of non-synchronous binary data at rates up to 150 bits per second. The possible ways in which the auxiliary channel can be used in conjunction with the main data channel is indicated in attached Table 4. The output level adjustments and impedance selection of the main data channel also applies to the auxiliary channel which has a transmit level nominally 6 dB below the main channel transmit level. On DDD and 2-wire private lines, the maximum receive sensitivity of the auxiliary channel is -48 dBm to -33 dBm, depending on the line signal level adjustment (options ZA through ZP). On 4-wire private line, the maximum receive sensitivity of the auxiliary channel is -48 dBm.

Subscriber loops assigned to Data Set 203-type should be designed to meet Type 2 conditioning in conformance to standard DATA-PHONE® Data Set loop design criteria.

Wiring Options

Data Sets 203-type are equipped with an installer's option board which contains all of the data set strapping options. These options, briefly mentioned here, are:

- Options Z, Y, X: mode of operation (4-wire with or without auxiliary channel or 2-wire with auxiliary channel, respectively)
- Options W, V, T: control of auxiliary channel (by Request to Send, by Auxiliary Request to Send, or by both Request to Send and Auxiliary Request to Send, respectively)
- Options S, R: 600 ohm or 900 ohm line impedance

Option Q: installed only when transmitter timing is supplied externally by the customer

Options ZR, N: installed when Data Set 203 is used with or without Data Auxiliary Set 804-type, respectively

Option M: installed for Receiver Only (203C) data set

Option ZS: start-up under customer control (normal operation)

Option K: start-up option (see below)

Option J: start-up option (see below)

Option F: received data never clamped (intended for regenerator operation)

Option E: received serial clock never clamped (intended for regenerator operation)

Options B, A: receiver input attenuation pad (10 dB or 0 dB)

Options ZA-ZP:* transmit line signal level (-15 dBm to 0 dBm)

Option ZQ: installed for Transmitter Only (203B) data set

* This is a 2-wire pad inserted between the line and the transmitter or receiver circuits. As a result, the pad is reflected when either transmitting or receiving in 2-wire applications. On 4-wire facilities, this pad is between the line and the transmitter circuit.

The start-up procedure for the Data Set 203-type can be modified by providing installer's strap option K or J. Option K is intended to be used in 2-wire half-duplex configurations with an auxiliary channel included. Option J is intended for use in 4-wire full-duplex configuration with data set type 203A (transmitter/receiver).

Option K is used to hold the transmitter start-up sequence in the Operator Tone mode until approximately 1 second after auxiliary channel carrier is detected. This option is primarily intended for DDD applications where the called station is conditioned as a high-speed transmitter and the

calling station conditioned as a high-speed receiver. Without option K, the operator at the calling station would have to wait for the 2025 Hz answer-back tone to end and the 900 Hz or 1200 Hz operator tone to begin, and then enter the DATA mode before the operator tone ends. Since the time allowed for this operation is only 2.3 seconds or 1.7 seconds for the 900 Hz or 1200 Hz operator tone, respectively, there is a possibility that the operator would not react in time to insure proper training. To circumvent this problem, option K can be provided for use at the called station. Under this option, the operator tone will continue until the calling station is placed in the DATA mode. The low-speed auxiliary carrier will then be transmitted to the called station, thereby continuing the start-up sequence. It should be mentioned here that a momentary removal of auxiliary carrier from the line will not cause a restart. The operator tone can be held up again only by a recycling of Request to Send at the called station.

Option J is used to automatically restart the transmitter when either:

- a) its associated receiver detects carrier from a distant station providing the local transmitter is not already in a start-up sequence, or
- b) if Receiver Signal Quality has not been achieved or is lost after the end of the receiver start-up period.

When both the local and distant data set are strapped for option J and with their respective Request to Send signals "ON", the initial start-up procedures at both stations will be continually repeated until both modems are trained and successful data transmission in both directions can take place. If received carrier is lost by a trouble condition or a recycling of Request to Send at either location, both local and distant transmitters will restart until, again, successful data transmission in both directions is assured. Option J can be installed at unattended stations to allow remote start-up or restarts.

When using Data Sets 203-type in conjunction with Data Auxiliary Sets 804A or 804M, a variety of configurations is possible. Some of the typical configurations with associated Data Auxiliary Set 804A or 804M options are shown in Table A.

Table A

SD-1D 151-01 Drawing	Data Service	*Applicable Data Set Speed Options	Applicable Data Auxiliary Set 804A or 804M Options
BD1	2-wire without Telephone Set	L3, L4	NA
BD2	4-wire without Telephone Set	ALL	NA
BD3	2-wire DDD with Data Aux. Set 804A and Optional 801A	L3, L4	G, B, or E, H, J, Q, W, X or Y or Z, ZA. If DAS 801 used - option T.
BD4	2-wire Private Line with Data Aux. Set 804A	L3, L4	G, B or E, H, J, N, W, X or Y or Z, and ZA.
BD5	2-wire Private Line with DDD Back-up Using Data Aux. Set 804A	L3, L4	G, B or E, H, J, N, W, X or Y or Z, and ZA.
BD6	4-wire Private Line with Data Aux. Set 804A	ALL	G, B or E, H, M, N, W, X or Y or Z, and ZA.
BD7	4-wire Common Battery with Data Aux. Set 804M	ALL	M or K, N, G, or F, W, Z, R, T or V.
BD8	4-wire E&M Signaling with Data Aux. Set 804A	ALL	G, B or E, H, M, N, W, X or Y or Z and ZA.
BD9	4-wire Private Line with 2 DDD Back-up Lines Using Data Aux. Set 804A	L3, L4	B, H, U, N, W, X or Y or Z, and ZA.
BD10	4-wire Operation Using 2 DDD Lines with Data Aux. Set 804A	L3, L4	B, H, U, N, W, X or Y or Z and ZA.

* See attached Table 4 for detail information on speed options.

In addition to the options specified for the Data Auxiliary Set 804A-type in Table A above, the following wiring changes must be performed in the Data Auxiliary Sets 804A 1, 2, 3 or 4 to make them compatible with the Data Set 203-type.

- 1) Remove the blue-red wire from terminal 55 and connect it to terminal 54 on the 3A1 Data Unit.
- 2) Remove the orange wire from terminal 34 on the 3A1 Data Unit; tape and store.
- 3) Remove the red-blue wire from terminal 16 on the 3A1 Data Unit; tape and store.
- 4) Remove the yellow-slate wire from terminal 18 on the 3A1 Data Unit; tape and store.
- 5) Remove the black-slate wire from terminal 41 on the 3A1 Data Unit; tape and store.
- 6) Remove the green-yellow wire from terminal 27 on the 3A1 Data Unit; tape and store.
- 7) Remove the violet-slate wire from terminal 45 on the 3A1 Data Unit; tape and store.
- 8) On the 3A1 Data Unit, connect the cathode of a KS-15724, 1L (or equivalent) diode to terminal 44 and the anode to terminal 46.

The Data Auxiliary Set 804M requires the following additional wiring changes to be compatible with Data Set 203-type.

- 1) On TBL, connect a wire from 24 to 43.
- 2) On TBL, remove the wire on 63 which connects to the TEST key and connect it to 23.

Effort is under way to make the above wiring changes standard options in Data Auxiliary Sets 804A- and M-type which will be included in the appropriate Bell System Practices covering the auxiliary sets.

Power Requirements

Data Sets 203-type are powered by a 41A Power Unit that operates on 120 volts ± 10 , -20 percent AC power at a frequency range of 47.5 to 63 Hz. A 2 amp fuse, in series with the AC input, is provided at the rear of the 41A Power Unit. Power consumption varies between 17 and 55 watts, depending on the list options used. The power cord supplied with Data Set 203-type requires a standard 3-wire grounding type AC receptacle which should be on a circuit not under control of a switch.

Maintenance Considerations

The Data Set 203-type can be remotely tested from a Telephone Company Data Test Center. The remote test is used to perform "on-line" operational tests which individually check out the following circuits:

- a) High-speed channel performance
- b) Data Set timing accuracy
- c) Auxiliary channel performance
- d) Data Set control logic

The remote test is intended to be performed when the data set is initially installed and when the data set is suspected of providing abnormal performance. These tests are capable of localizing a data set trouble so that field repair involving replacement of printed circuit plug-in cards or subassemblies is possible. Only conventional data test sets (types 901, 902, 903 or 914) will be needed for local tests. The data test center will have to be equipped with a complete data set for remote testing. The data test center can remotely release the data set under test. Initially it is planned to equip only the Chicago Data Test Center to test Data Sets 203-type. As usage increases, more test centers will be equipped.

Supplementary Information

. Identification and Operation, Supplementary Information, Summarizing Specifications, Installation and Connections, Maintenance and Testing of Data Sets 203-type will be covered in Bell System Practices 592-019-100, 150, 180, 200, 300 and 500 respectively. The expected availability is as follows:

<u>Section</u>	<u>Expected Availability</u>
592-019-100	June 1969
592-019-150	August 1969
592-019-180	May 1969
592-019-200	June 1969
592-019-300	June 1969
592-019-500	June 1969

Schematics for the Data Set 203 are as follows:

Data Set 203-type	SD-1D151-01
22A Data Unit	SD-1D152-01
23A Data Unit	SD-1D153-01
24A Data Unit	SD-1D154-01
Circuit packs	SD-1D060-01

The Technical Reference covering Data Sets 203-type is expected to be available in April 1969.

TABLE 1 - DATA SET 203A TYPE TRANSMITTER/RECEIVER

BASIC UNIT LISTS

- L1 COMMON APPARATUS, ASSEMBLY, WIRING AND HARDWARE FOR ONE DATA SET 203A TYPE TRANSMITTER/RECEIVER WITH PROVISION FOR BIT RATE, AUXILIARY CHANNEL AND ERROR CONTROL OPTIONS, IN A KS-20018, L3 CABINET.
- L1A COMMON APPARATUS, ASSEMBLY, WIRING AND HARDWARE FOR ONE DATA SET 203A TYPE TRANSMITTER/RECEIVER WITH PROVISION FOR BIT RATE, AUXILIARY CHANNEL AND ERROR CONTROL OPTIONS, FOR MOUNTING ON A 23 INCH FRAME.

FUNCTIONAL OPTION LISTS IN ADDITION TO L1 AND L1A

- L2 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 4.8 AND/OR 7.2 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.
- L3 DDD, 2 OR 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.6 AND/OR 5.4 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS POSSIBLE ON ANY WIRE PAIR (AUXILIARY CHANNEL REQUIRED ON DDD AND 2-WIRE).
- L4 * DDD, 2 OR 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 4.8 AND/OR 7.2 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS POSSIBLE ON ANY WIRE PAIR. (AUXILIARY CHANNEL REQUIRED ON DDD AND 2-WIRE).
- L5 * 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.2 AND/OR 6.4 AND/OR 9.6 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.
- L6 * 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.6 AND/OR 7.2 AND/OR 10.8 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.
- L7 A 0-150 B/S AUXILIARY CHANNEL

* UNDER DEVELOPMENT, NOT INITIALLY AVAILABLE.

TABLE 1A - LIST OF AUTHORIZED CODES FOR 203A TYPE

203A-L1/2			203A-L1A/2		
L1/2/7			L1A/2/7		
L1/3	*		L1A/3	*	
L1/3/7			L1A/3/7		
L1/4	#		L1A/4	#	
L1/4/7	#		L1A/4/7	#	
L1/5	#		L1A/5	#	
L1/5/7	#		L1A/5/7	#	
L1/6	#		L1A/6	#	
L1/6/7	#		L1A/6/7	#	

EXAMPLE: 203A-L1/ 3/7

THIS IS A DATA SET 203 TYPE TRANSMITTER-RECEIVER WITH A 150 B/S AUXILIARY CHANNEL FOR OPERATION ON DDD, 2 OR 4-WIRE PRIVATE LINE AT A BIT RATE OF 3.6 AND/OR 5.4 KB/S, IN A KS-20018, L3 CABINET.

* 4-WIRE LINE OPERATION ONLY

UNDER DEVELOPMENT, NOT INITIALLY AVAILABLE

TABLE 2 - DATA SET 203B TYPE TRANSMITTER WITH AN AUXILIARY CHANNEL

BASIC UNIT LISTS

- L1 COMMON APPARATUS, ASSEMBLY, WIRING AND HARDWARE FOR ONE DATA SET 203B TYPE TRANSMITTER WITH A 0-150 B/S AUXILIARY CHANNEL AND PROVISION FOR BIT RATE AND ERROR CONTROL OPTIONS, IN A KS-20018, L3 CABINET.
- L1A COMMON APPARATUS, ASSEMBLY, WIRING AND HARDWARE FOR ONE DATA SET 203B TYPE TRANSMITTER WITH A 0-150 B/S AUXILIARY CHANNEL AND PROVISION FOR BIT RATE AND ERROR CONTROL OPTIONS, FOR MOUNTING ON A 23-INCH FRAME.

FUNCTION OPTION LISTS IN ADDITION TO L1 AND L1A

- L2 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 4.8 AND/OR 7.2 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.
- L3 DDD, 2 OR 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.6 AND/OR 5.4 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS POSSIBLE ON ANY WIRE PAIR.
- L4 * DDD, 2 OR 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 4.8 AND/OR 7.2 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS POSSIBLE ON ANY WIRE PAIR.
- L5 * 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.2 AND/OR 6.4 AND/OR 9.6 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.
- L6 * 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.6 AND/OR 7.2 AND/OR 10.8 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.

* UNDER DEVELOPMENT, NOT INITIALLY AVAILABLE.

TABLE 2A - LIST OF AUTHORIZED CODES FOR DATA SET 203B TYPE

203B-L1/2	203B-L1A/2
L1/3	L1A/3
L1/4 *	L1A/4 *
L1/5 *	L1A/5 *
L1/6 *	L1A/6 *

EXAMPLE: 203B-L1/2

THIS IS A DATA SET 203 TYPE TRANSMITTER WITH A 150 B/S
AUXILIARY CHANNEL FOR OPERATION ON 4-WIRE PRIVATE LINE
AT A BIT RATE OF 4.8 AND/OR 7.2 KB/S, IN A KS-20018, L3
CABINET.

* UNDER DEVELOPMENT, NOT INITIALLY AVAILABLE

TABLE 3 - DATA SET 203C TYPE RECEIVER WITH AN AUXILIARY CHANNEL

BASIC UNIT LISTS

- L1 COMMON APPARATUS, ASSEMBLY, WIRING AND HARDWARE FOR ONE DATA SET 203C TYPE RECEIVER WITH A 0-150 B/S AUXILIARY CHANNEL AND PROVISION FOR BIT RATE AND ERROR CONTROL OPTIONS, IN A KS-20018, L3 CABINET.
- L1A COMMON APPARATUS, ASSEMBLY, WIRING AND HARDWARE FOR ONE DATA SET 203C TYPE RECEIVER WITH A 0-150 B/S AUXILIARY CHANNEL AND PROVISION FOR BIT RATE AND ERROR CONTROL OPTIONS, FOR MOUNTING ON A 23-INCH FRAME.
- L1B COMMON APPARATUS, ASSEMBLY, WIRING AND HARDWARE FOR ONE DATA SET 203C TYPE RECEIVER WITH A 0-150 B/S AUXILIARY CHANNEL AND PROVISION FOR BIT RATE OPTIONS BUT WITHOUT PROVISION FOR ERROR CONTROL, FOR MOUNTING ON A 23-INCH FRAME.

FUNCTIONAL OPTION LISTS IN ADDITION TO L1, L1A AND L1B

- L2 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 4.8 AND/OR 7.2 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.
- L3 DDD, 2 OR 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.6 AND/OR 5.4 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS POSSIBLE ON ANY WIRE PAIR.
- L4 * DDD, 2 OR 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 4.8 AND/OR 7.2 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS POSSIBLE ON ANY WIRE PAIR.
- L5 * 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.2 AND/OR 6.4 AND/OR 9.6 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.
- L6 * 4-WIRE PRIVATE LINE OPERATION AT A BIT RATE OF 3.6 AND/OR 7.2 AND/OR 10.8 KB/S. SIMULTANEOUS OPERATION OF MAIN AND AUXILIARY CHANNEL IS ONLY POSSIBLE USING OPPOSITE WIRE PAIRS.

* UNDER DEVELOPMENT, NOT INITIALLY AVAILABLE

TABLE 3A - AUTHORIZED CODES FOR DATA SET 203C TYPE

203C-L1/2	203C-L1A/2	203C-L1B/2
L1/3	L1A/3	L1B/3
L1/4 *	L1A/4 *	L1B/4 *
L1/5 *	L1A/5 *	L1B/5 *
L1/6 *	L1A/6 *	L1B/6 *

EXAMPLE: 203C-L1B/2

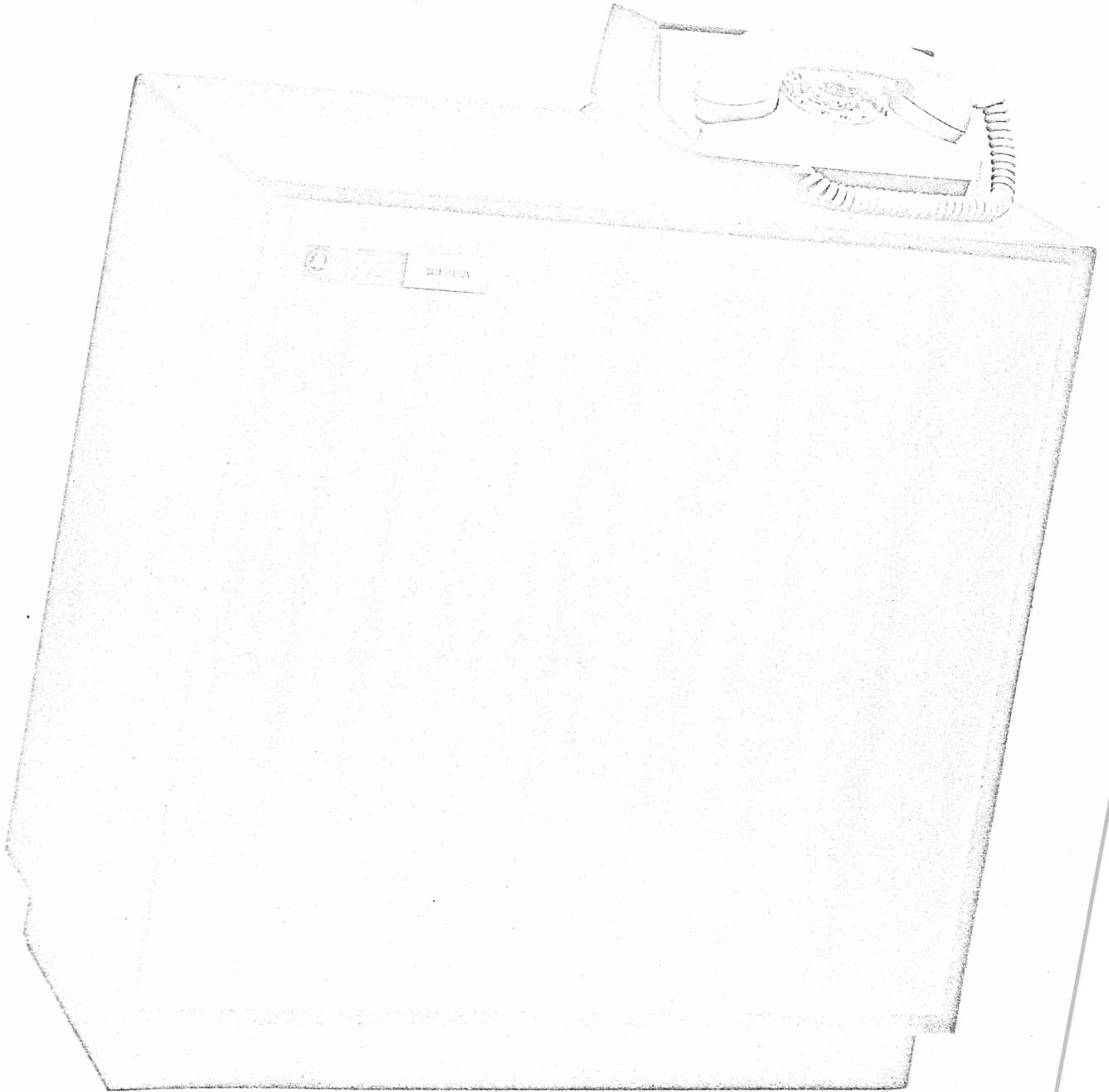
THIS IS A DATA SET 203 TYPE RECEIVER WITH A 150 B/S AUXILIARY CHANNEL AND WITHOUT PROVISION FOR ERROR CONTROL FOR OPERATION ON 4-WIRE PRIVATE LINE AT A BIT RATE OF 4.8 AND/OR 7.2 KB/S, FOR MOUNTING ON A 23-INCH FRAME.

* UNDER DEVELOPMENT, NOT INITIALLY AVAILABLE

TABLE 4

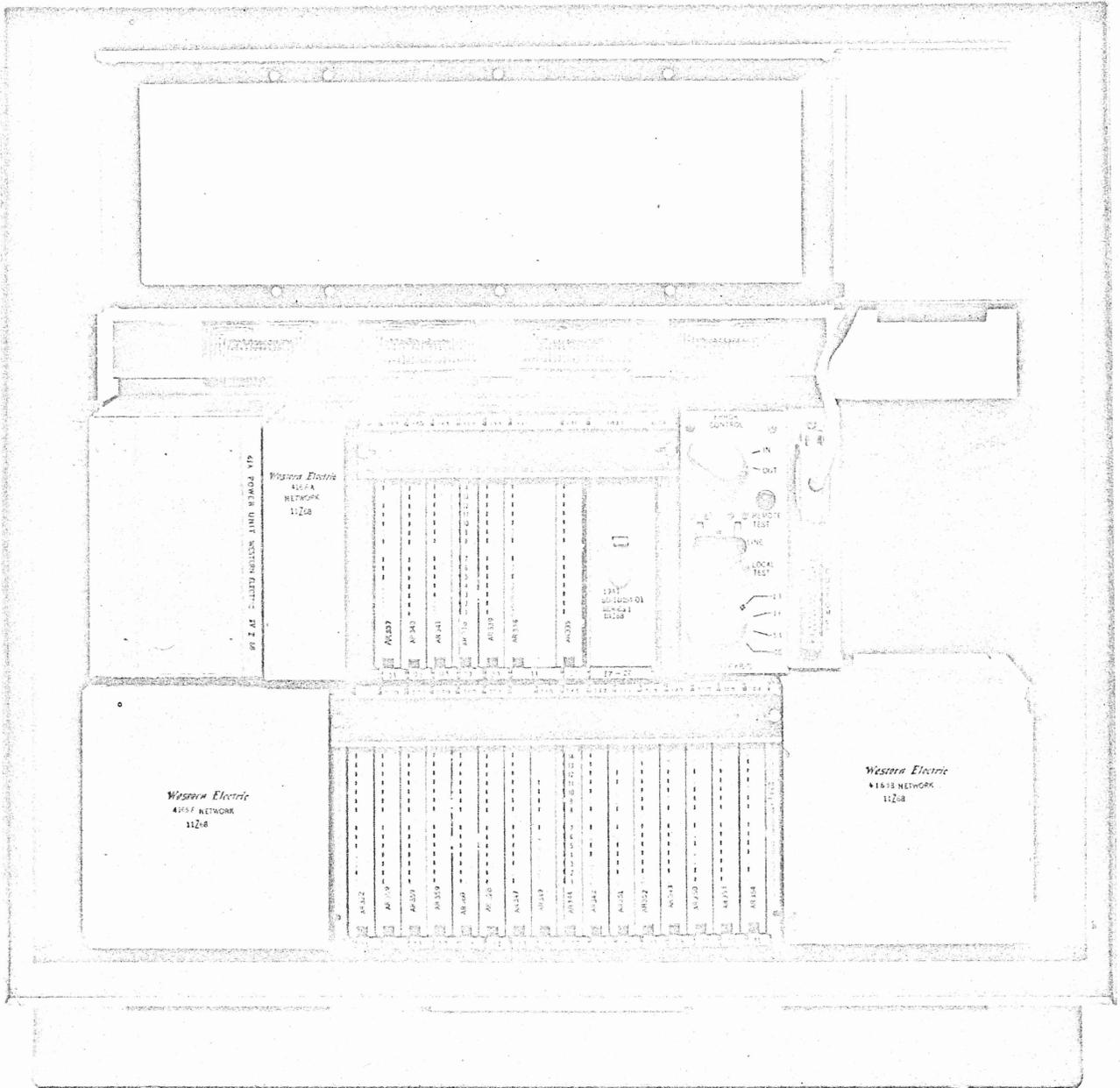
SPEED OPTION LIST	BAUD RATE	BIT RATE (KB/SEC.) 2/4/8 LEVEL	HIGH-SPEED (VSB) CHANNEL BANDWIDTH ¹	CARRIER FREQ.	INTENDED APPLICATION	TRANSMISSION OF LOW-SPEED AUXILIARY DATA BETWEEN TWO STATIONS ²
L2	2400	2.4/4.8/7.2	500-2900 HZ	2300 HZ	4-Wire Private Line at a Bit Rate of 4.8 or 7.2 KB/Sec.	Alternately in Same Direction on Same Wire Pairs. Simultaneously or Alternately in Opposite Direction on Separate Wire Pairs.
L3	1800	1.8/3.6/5.4	700-2700 HZ	2200 HZ	DDD Lines at a Bit Rate of 3.6 KB/Sec. 2 or 4-Wire Private Lines at a Bit Rate of 5.4 KB/Sec.	DDD Lines: Simultaneous in Opposite Direction. Private Lines: Simultaneously or Alternately in Same Direction on Same Wire Pairs. Simultaneously or Alternately in Opposite Direction on Separate Wire Pairs.
L4 ³	2400	2.4/4.8/7.2	700-2700 HZ	2300 HZ	DDD Lines at a Bit Rate of 4.8 KB/Sec. 2 or 4-Wire Private Lines at a Bit Rate of 7.2 KB/Sec.	Same as Speed Option L3
L5 ³	3200	3.2/6.4/9.6	400-2900 HZ	2400 HZ	4-Wire Private Lines at a Bit Rate of 6.4 or 9.6 KB/Sec.	Same as Speed Option L2
L6 ³	3600	3.6/7.2/10.8	401-2900 HZ	2543 HZ	4-Wire Private Lines at a Bit Rate of 7.2 KB/Sec.	Same as Speed Option L2

1. Frequencies Given are the Lower and Upper Pilot Tones
2. Operation is Explained with Reference to the Transmission of High-Speed (VSB) Data.
3. Under Development - Not Initially Available



DATA SET 203 - TYPE WITH DATA
AUXILIARY SET 804A OR M-TYPE

Figure 1



DATA SET 203C – FRONT COVER REMOVED

Figure 4