

**DATA SETS 201A- AND 201B-LIST TYPE  
TRANSMITTER-RECEIVER  
DESCRIPTION AND OPERATION**

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**1. GENERAL**

**1.01** This section contains information concerning the description and operation of the following data sets:

- 201A-L1/2A/3/6/7A and 201A-L1/2A/4/6/7A (see note),
- 201B-L1/2A/3/6/7B and 201B-L1/2A/4/6/7B (see note),
- 201A-L1A/2A/3/6A/7A and 201A-L1A/2A/4/6A/7A,
- 201B-L1A/2A/3/6A/7B and 201B-L1A/2A/4/6A/7B.

**Note:** These codes are created by converting older data sets (eg, 201A3) to the new coding and not by manufacture.

**1.02** This section is reissued to provide complete updated list-code information. Due to extensive revision, change arrows have been omitted.



*The list codes covered in this section should not be confused with the J1D201A and J1D201B list codes used with early data sets 201-type. The early list-coded data sets have been Manufacture Discontinued.*

**1.03** Data sets 201A- and 201B-list type (Fig. 1) are medium-speed, 4-phase serial binary transmitter-receivers. Data set 201A is to be used on DATA-PHONE® service or private lines at 2000 bits per second (bps). Data set 201B is for use on private lines at 2400 bps.

**1.04** Data sets 201A and 201B may be used with data auxiliary sets (DAS) 828A, 828C, or 804A. The 801-type automatic calling unit (ACU) is also used as optional equipment. The DAS 804A provides a telephone and an automatic answering system. Under the control of a business machine, DAS 801-type provides automatic calling. The DAS 828A which is used to terminate a 4-wire private line can be used to provide 2- or 4-wire private line service with or without alternate voice. DAS 828C can be used to provide switched network on backup lines or to provide 4-wire transmission capability on two switched network lines.

**1.05** List-coded data sets 201-type provide the following features in addition to the features of earlier models:

- (a) Transmit level options which will comply with FCC Tariff 263.
- (b) Additional polling capability.

List-coded data set 201 can provide any function previously provided by data sets 201A3, 201A4, 201B3, and 201B4.

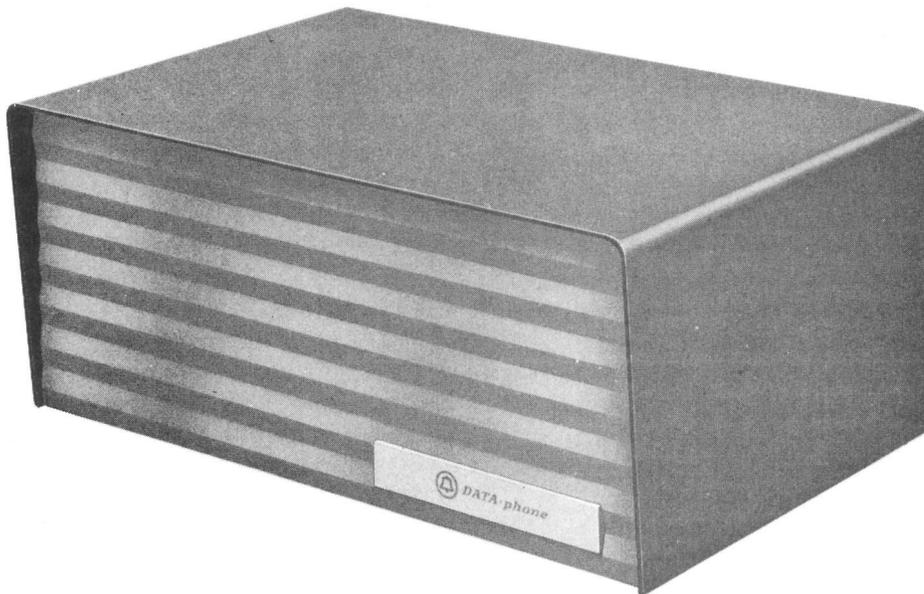


Fig. 1—Data Set 201-Type (List 1 Chassis)—Front View

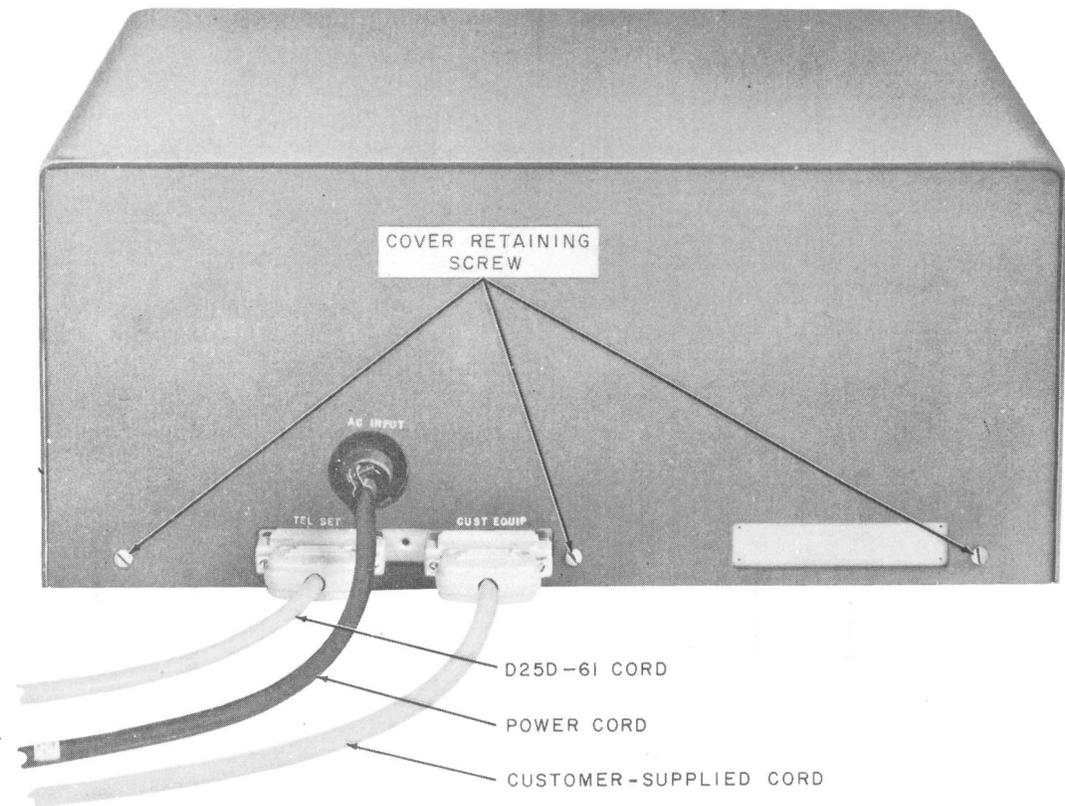


*The individual elements of the list code do not uniquely identify hardware. For example, List 3 can consist of either AN- or GU-type circuit packs, neither of which are interchangeable. The hardware can only be identified by the complete code of the set.*

**1.06** The List 1 metal chassis and the List 1A plastic chassis differ in the location of the power supply and cord connectors and the type circuit pack used (Fig. 2 and 3). The List 1 chassis accepts AN-type circuit packs. The List 1A chassis accepts GU-type circuit packs. The GU-type circuit packs are mechanically different from the AN-type circuit packs; however, the circuit packs which have the same number suffix are electrically identical. For example, GU43 circuit pack is electrically identical to AN43 circuit pack.

**1.07** List 2A indicates that the data set is equipped with a J87212B power supply. This power supply is capable of supplying +12 volts at 0.650 ampere and -12 volts at 0.280 ampere. A 24-volt, 0.132 ampere series connection from the +12 to the -12 volt terminal provides unfiltered power for the DAS 804A. The power supply requires 117 volts at 60 ( $\pm 0.5$ ) Hz to be delivered on a 3-wire grounded cord. The ground is connected to the data set frame and should be common with the ground furnished to the business equipment.

**1.08** List 3 indicates that the data set is internally timed. Internally timed data sets have a crystal-controlled oscillator which provides the transmitter with a clock signal.



**Fig. 2—Data Set 201-Type (List 1 Chassis)—Rear View**

**1.09** List 4 indicates that the data set requires external timing. For the externally timed data sets, the customer must provide the source of clock signal. The clock signals must be 2000 Hz ( $\pm 0.01$  percent) for data sets 201A and 2400 Hz ( $\pm 0.01$  percent) for data sets 201B. The clock signal must be a square wave having a 50 ( $\pm 0.5$ ) percent duty cycle.

**1.10** List 6 indicates that the data set is compatible for use with an 804-type DAS. Data sets equipped with List 6 will use the List 1 chassis. Data sets equipped with List 6 are compatible for use with DAS 801 (automatic calling unit).

**1.11** List 6A is electrically, but not mechanically, equivalent to List 6. The L4 card of List 6A is coded GU74; the L4 card of List 6 is coded AP1. Because of connector differences, List 6A requires the use of the List 1A chassis.

**1.12** List 7A provides automatic gain control, timing recovery, and the polling capability for data set 201A.

**1.13** List 7B provides automatic gain control, timing recovery, and the polling capability for data set 201B.

**1.14** Refer to Table A for a list of circuit boards which are provided by each list code.

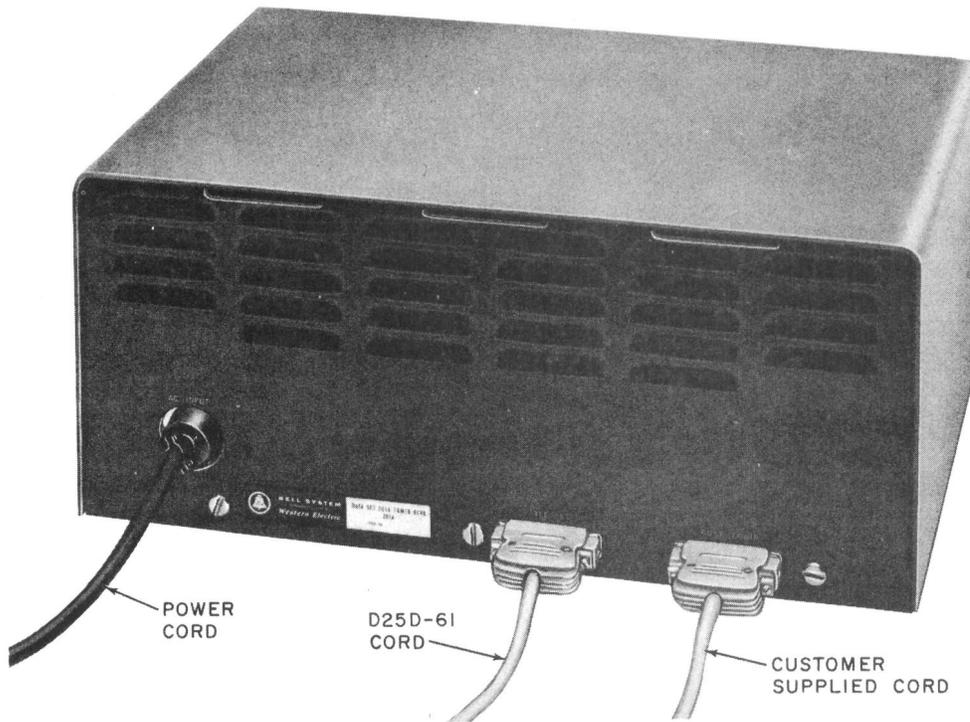


Fig. 3—Data Set 201-Type (List 1A Chassis)—Rear View

1.15 Data sets 201A or 201B can provide the following services:

- 2-wire private line with DAS 804A
- 2-wire private line without a telephone
- 2-wire DDD service with DAS 804A
- 2-wire DDD service with DAS 804A and 801 automatic calling unit
- 4-wire private line with DAS 828A (data only)
- 4-wire private line with DAS 828A (data/voice)
- 4-wire private line with DDD backup using DAS 828A and 828C (data only)
- 4-wire private line with DDD backup using DAS 828A and 828C (data/voice).

**2. PHYSICAL DESCRIPTION**

2.01 Each data set 201A- and 201B-list type (Fig. 1) contains equipment per Table A and each is mounted in a dark gray housing with a light gray front panel. The data set cover is held in place by three captive retaining screws (Fig. 2). The set measures 7-3/4 inches high by 17-1/2 inches wide by 11-5/8 inches deep and weighs approximately 35 pounds.

2.02 Data sets 201A and 201B are designed to operate at an ambient temperature of 40° to 120°F and at a relative humidity of 20 to 95 percent.

TABLE A  
CIRCUIT PACKS USED IN DATA SET 201-TYPE

CIRCUIT PACK DESCRIPTION	CARD LOCATION	AN CODE (NOTE 1)	GU CODE (NOTE 2)	DATA SET 201 LIST NUMBER	
				201A	201B
Transmitter Data Logic	T4	AN43	GU43	1,1A	1,1A
Envelope Binary Count	T6	AN46	GU46	1,1A	1,1A
Phase Logic	T7	AN47	GU47	1,1A	1,1A
Timing Control	T9	AN3	GU3	1,1A	1,1A
Line Circuits II	L1	AN6	GU6	1,1A	1,1A
360A Equalizer	L3	—	—	1,1A	1,1A
Demodulator	R6	AN54	GU54	1,1A	1,1A
Data Sample	R7	AN55	GU55	1,1A	1,1A
Demodulator	R8	AN54	GU54	1,1A	1,1A
Data Sample	R9	AN56	GU56	1,1A	1,1A
Receiver Data Logic	R10	AN57	GU57	1,1A	1,1A
Carrier On-Off	R12	AN59	GU59	1,1A	1,1A
Line Amplifier	T10	AN72	GU72	1,1A	1,1A
Modulators and Filters	T12	AN52	GU52	1,1A	—
Modulators and Filters	T12	AN64	GU64	—	1,1A
Line Circuits I	L2	AN73	GU73	1,1A	1,1A
844A Network	R4,R5	—	—	1,1A	—
844B Network	R4,R5	—	—	—	1,1A
Output Buffer	R11	AN58	GU58	1,1A	—
Output Buffer	R11	AN65	GU65	—	1,1A
OSC for INT Timing	T1	AN38	GU38	3	—
OSC for INT Timing	T1	AN60	GU60	—	3
Timing I for INT Timing	T2	AN40	GU40	3	—
Timing I for INT Timing	T2	AN62	GU62	—	3
Timing II for INT Timing	T3	AN41	GU41	3	—
Timing II for INT Timing	T3	AN63	GU63	—	3
Channel Binary Counter	T8	AN48	GU48	1,1A	3
Input Buffer — INT Timing	T5	AN44	GU44	3	3
OSC for EXT Timing	T1	AN39	GU39	4	—
OSC for EXT Timing	T1	AN61	GU61	—	4
604C Filter	T2	—	—	4	—

TABLE A  
CIRCUIT PACKS USED IN DATA SET 201-TYPE (Cont)

CIRCUIT PACK DESCRIPTION	CARD LOCATION	AN CODE (NOTE 1)	GU CODE (NOTE 2)	DATA SET 201 LIST NUMBER	
				201A	201B
604D Filter	T2	—	—	—	4
Input Buffer — EXT Timing	T5	AN45	GU45	4	4
Channel Binary Counter	T8	AN49	GU49	—	4
Timing for EXT Timing	T3	AN42	GU42	4	4
Interface Circuit	L4	—	GU74	6A	6A
Interface Circuit	L4	AP1	—	6	6
Line Transformer	T11	AN5	GU5	6,6A	6,6A
AUTO VOL Control II	R2	AN67	GU67	7A	7B
AUTO VOL Control I	R1	AN8	GU8	7A	7B
Preamplifier	R3	AN1	GU1	7A	7B
BIT SYNC AMP	R16	AN69	GU69	7A	—
604A Filter	R13	—	—	7A	—
BIT SYNC MOD	R14	AN10	GU10	7A	7B
BIT SYNC Filter	R15	AN68	GU68	7A	—
604B Filter	R13	—	—	—	7B
BIT SYNC MOD	R14	AN10	GU10	7A	7B
BIT SYNC Filter	R15	AN70	GU70	—	7B
BIT SYNC AMP	R16	AN71	GU71	—	7B
J87212B Rectifier	POWER SUPPLIES USED ON 201-TYPE SETS			2A	2A

Notes:

1. Circuit boards coded AN are rated A&M. Data Sets with the List 1 chassis (metal) use the AN circuit boards.
2. Only data sets with the List 1A chassis (plastic) use the GU circuit boards.
3. Groups designated BT7, BT8, BT9, BT10, BT11 or BT12 contain matched cards. When replacement of any card in the group is required, the entire group must be replaced. Group codes BT7, BT8, and BT9 are used in the List 1 chassis. Group codes BT10, BT11, and BT12 are used in the List 1A chassis.

**2.03** Three cords are provided with the data sets.

The 25-conductor cord (D25D-61) connects the data set to a connecting block or a bridging adapter. Another cord (M50J-61) is furnished to connect the DAS 804A connecting cord to the bridging adapter. The 3-conductor power cord (KS-14532-L15) connects 117-volt 60-Hz power to the data set.

**2.04** The customer must furnish an interface cord to connect the business machine to the data set. The connector on the data set is a KS-19087-L2 25-pin receptacle. The customer interface cord should be equipped with a mating DB-19604-432 Cinch or Cannon plug and a DB-51226-1 Cinch hood (or equivalent). The length of the cord should not exceed 50 feet.

### 3. FUNCTIONAL DESCRIPTION

**3.01** In 2-wire operation, data sets 201A and 201B can transmit or receive, but they cannot perform both functions at the same time. When a set transmits, its receive portion monitors the transmitted data to provide local copy for the transmitting station. In 4-wire operation, these sets can transmit and receive simultaneously or independently; however, the transmitted data will not be monitored.

**3.02** The data set transmitter accepts serial binary data from the customer business machine. Two consecutive bits are combined to form a dibit which is used to phase-modulate the carrier (1750 Hz for 201A, 1800 Hz for 201B). The principal line signal spectrum ranges from 750 Hz to 2750 Hz for the 201A and from 600 Hz to 3000 Hz for the 201B. The modulated carrier is transmitted to the line circuits which match impedance, provide a means for adjusting the transmitter level, and provide a strapping for 2-wire or 4-wire operation.

**3.03** The data set receiver accepts the phase-modulated carrier from the line circuits. Control signals from the receiver alert the business machine that data is being received. The receiver converts the phase-modulated carrier into serial binary form and delivers the received data to the business machine.

**3.04** The line circuits contain the electronic transmit-receive switch, transmit and receive input pads, a compromise equalizer for the received signal, and repeat coils for connecting the transmitter

and receiver to the line. Optional modes of operation may be selected from strapping points provided on the line circuit boards.

**3.05** Transmission and control leads and the associated J1 pin numbers from the data set to the line or to data auxiliary sets are given in Table B. Control functions may be strapped for the contact closure option or the EIA voltage option as specified by the customer. Interface signals between the customer equipment and the data set are specified in Table C. Customer interface signals conform to EIA Standard RS232-B.

### 4. OPTIONS

**4.01** Options in the data set will permit the following.

- Data set terminal impedance can be varied to match 600- or 900-ohm lines.
- Echo delay is available on either 2-wire or 4-wire lines. If echo delay is not used, a short or long clear-to-send interval is optional.
- New sync is available at the hub station in the multistation arrangements to assure rapid synchronization between messages in the polling operation. Rapid synchronization is necessary because of receiver clock holdover after the end of a message which can interfere with the start of synchronization on receipt of the next message. Use of this option is recommended when the time between messages is less than 100 ms.
- Compromise equalizer and adjustment of receiver signal level can be coordinated with maximum line noise level.
- Adjustment of transmitter line signal level can be made in 1 dBm steps from +2 dBm to -12 dBm.
- Half-duplex operation (2-wire) or full-duplex operation (4-wire) can be chosen.
- Continuous carrier or carrier controlled by request to send is available with 4-wire operation.

**TABLE B**  
**DATA SET CONNECTIONS TO**  
**LINE OR AUXILIARY EQUIPMENT**

J1 PIN NO.	DATA SET INTERFACE LEAD DESIGNATION
1	RG2
2	-12V
3	Not used
4	RG1
5	TK LAMP
6	TEK 1
7	DT1
8	DR1
9	DT
10	DR
11	AR
12	ADT
13	Not used
14	TEK 2
15	LSM1
16	GRD
17	RDY
18	LSM2
19	RC
20	+12V
21	RM2
22	RM3
23	A GRD
24	RM4
25	IT0

- Choice of interface control signals (EIA or contact closure) as required by the customer's business machine.

## 5. OPERATION

**5.01** Data sets without a telephone or data auxiliary set are controlled by the business machine and do not require manual operation. The 569NB telephone set has a 6-button key with functions shown in Table D. The DAS 804A has a 6-button key with functions shown in Table E.

### A. Procedure For Data Sets Equipped With DAS 804A in a Private Line Arrangement

**5.02** When using DAS 804A, the manual operation procedure of the calling station is as follows:

- Depress the TALK button and dial the distant station in the usual manner. The dialed station may answer either manually or automatically.

- If Answered Manually:** Verbally agree to begin data transmission. Momentarily depress the DATA button. Release of the DATA button restores the TALK button to normal and lights the DATA lamp. The data set is now in the data mode and data transmission can begin. Place the telephone handset on-hook.

- If Answered Automatically:** A 2025-Hz tone should be heard. This tone indicates that the distant data set is ready to receive data. When the tone ceases, momentarily depress and release the DATA button. Verify that the DATA lamp lights.

**5.03** The called data station which is equipped with DAS 804A responds in the following manner:

- To Answer Manually:** Depress the TALK button and answer in the usual manner. After agreeing to begin data transmission, depress and release the DATA button. Verify that the DATA lamp is lighted, which is an indication that the data set is in the data mode.

- To Answer Automatically:** Operation by the data set attendant is not required.

**TABLE C  
CUSTOMER INTERFACE CONNECTIONS**

<b>J2 PIN NO.</b>	<b>EIA STANDARD NOMENCLATURE</b>	<b>DATA SET 201A AND 201B DESIGNATIONS</b>
1	Protective Ground (AA)	Frame Ground (FG)
2	Transmitted Data (BA)	Send Data (SD)
3	Received Data (BB)	Received Data (RD)
4	Request to Send (CA)	Request to Send (RS)
5	Clear to Send (CB)	Clear to Send (CS)
6	Data Set Ready (CC)	Interlock (IT)
7	Signal Ground (AB)	Signal Ground (SG)
8	Data Carrier Detector (CF)	Carrier On (CO)
9	Reserved For Data Set Testing	Positive Battery (+12V)
10	Reserved For Data Set Testing	Negative Battery (-12V)
11	Unassigned	Not used
12	Unassigned	Not used
13	Unassigned	Not used
14	Unassigned	New Sync (NS)
15	Transmitter Signal Element Timing (DB)	Serial Clock Transmitter (SCT)
16	Unassigned	Dibit Clock Transmitter (DCT)
17	Receiver Signal Element Timing (DD)	Serial Clock Receiver (SCR)
18	Unassigned	Dibit Clock Receiver (DCR)
19	Unassigned	Remote Release (RR)*
20	Data Terminal Ready (CD)	Remote Control (RC)*
21	Unassigned	Ready (RDY)*
22	Ring Indicator (CE)	Ring Indicator 1 (RG1)†
23	Unassigned	Ring Indicator 2 (RG2)†
24	Transmitter Signal Element Timing (DA)	Serial Clock-Transmitter-External (SCTE)

\* When contact interface is used, these leads are for unattended answering and are used for terminating dialed calls. When voltage interface is used, the Remote Control (RC) lead performs this function, and leads 19 and 21 are not used.

† When contact interface is used, these leads indicate to the customer when a ringing signal is present on the line. When voltage interface is used, the Ring Indicator 1 (RG1) lead performs this function, and lead 23 is not used.

**TABLE D**  
**KEY FUNCTIONS OF 569NB TELEPHONE SET**

KEY NUMBER	DESIGNATION	FUNCTION
1	DATA HOLD	A nonlocking key used to shift from talk to data mode of operation on data line and as a hold key for central office or PBX lines if connected to keys 4, 5, and 6
2	TALK	Connects the telephone set to the data line
3	TEST	Nonlocking key used to test the data set under direction of the Data Test Center
4	1ST PICKUP KEY	Used for pickup of an additional central office or PBX line; can be used in 1A1, 1A, or 6A key telephone systems
5	2ND PICKUP KEY	Same as first pickup key; may also be converted to a single key if desired
6	AUTO ANS OR 3RD PICKUP KEY	Used either as automatic answer key ( <i>W</i> option) or same as pickup key 2 when <i>X</i> option is used

**TABLE E**  
**KEY FUNCTIONS OF DAS 804**

KEY NUMBER (LEFT TO RIGHT)	KEY DESIGNATION		FUNCTION
	804A1, A3 A5, A7	804A2, A4 A6, A8	
	Dial Tone	—	Nonlocking key used to manually start a ground-start line used with automatic calling unit
1	—	AUX*	Nonlocking key used to operate relays in external equipment when provided
2	DD1	DD1*	Additional nonlocking keys used to operate relays in external equipment when provided
3	DD2	DD2*	
		AUTO	AUTO
4	TEST	TEST	Not used with data set 201A or 201B
5	TALK	TALK	Locking key used to connect telephone set to data line for talking
6	DATA	DATA	Nonlocking key used to shift from talk to data mode

\* When both DD1 and DD2 keys are used for full-duplex operation over two 2-wire DDD lines, the AUX key is used to hold the first DDD line until the second line is picked up.

**Note:** If DAS 804A is connected for selective automatic answering, the AUTO ANS button must be operated in order to automatically answer the call. If DAS 804A is connected for permanent automatic answering without the AUTO ANS button, the business machine must be programmed to answer data calls automatically.

**B. Procedure for Data Sets Equipped With DAS 804A Used in DDD Service**

**5.04** When using two 2-wire DDD lines and DAS 804A, data set 201A can be arranged for full-duplex service. This system requires manual calling and answering.

(a) **Calling Procedure:** Depress the TALK button and select the desired line by depressing either the DD1 or DD2 button. This connects the dial and handset to the desired line and lights the appropriate DD lamp to indicate which line is in use. Dial the distant station in the usual manner. The calls must be made from the DD1 or DD2 line of a station to the DD2 or DD1 line of the other station, respectively, for proper connection of the data set transmitter to receiver. When the contact is established, depress the AUX button to hold the line. Depress the other DD button and dial the distant station as before. Again depress the AUX button to hold the second line. After verbal agreement to begin data transmission, momentarily depress and release the DATA button. The DD1 and DD2 lamps will extinguish and the DATA lamp will light, which indicates that the data set is in the data mode and transmission can begin. The telephone handset should be placed on-hook.

(b) **Answering Procedure:** At the called station, one of the DD buttons will flash to indicate which line is being called. Depress the TALK button, lift the handset, and momentarily depress the flashing DD button. This will connect the handset to that line and light that DD lamp. When one line has been established, momentarily depress the AUX button to hold that line while waiting for a call on the other line. Do not place the station handset on-hook. When the second line is called, its associated DD button will flash. Momentarily depress the flashing DD button to answer the call, and again depress the AUX button to hold the second call. After

verbally agreeing to begin data transmission, depress and release the DATA button. The DATA lamp will light and the DD lamps will extinguish. The data set is now in the data mode.

**6. REFERENCES**

**6.01** For further information concerning list-coded data sets 201-type, refer to the following sections:

592-011-202	Data Sets 201A- and 201B-List Type Transmitter-Receiver—Installation and Connections
592-011-302	Data Sets 201A- and 201B-List Type Transmitter-Receiver—Maintenance
592-011-502	Data Sets 201A- and 201B-List Type Transmitter-Receiver—Test Procedures
598-010-100	Data Auxiliary Sets 801A1, 801A2, and 801A4 for Automatic Calling—Description and Operation
598-010-101	Data Auxiliary Sets 801A5 and 801A6 for Automatic Calling—Description and Operation
598-012-100	Data Auxiliary Sets 801C1 and 801C2 for Automatic Calling—Identification and Operation
598-012-101	Data Auxiliary Sets 801C3 and 801C4—Description and Operation
598-030-100	Data Auxiliary Set 804A-Type—Description and Operation
598-080-100	Data Auxiliary Set 828A—Data Service Unit—Description and Operation
598-080-101	Data Auxiliary Set 828C—Description and Operation
668-102-500	Data Test Center 904B- and 904D-Types—Test Procedures—Data Set 201-Type Dynamic Test