

**DATA SET 202D-TYPE
TRANSMITTER-RECEIVER
DESCRIPTION AND OPERATION**

CONTENTS	PAGE
1. GENERAL	1
2. PHYSICAL DESCRIPTION	2
3. FUNCTIONAL DESCRIPTION	3
A. General	3
B. Service Applications	4
C. Options	6
4. OPERATION	14
A. General	14
B. Two- or Four-Wire Switched Network With DAS 804A-Type	14
C. Two- and Four-Wire Private Line With DAS 804A1 Without Alternate Switched Network Line	15
D. Private Line Without DAS 804A-Type (No Talk Feature)	15
E. Two- and Four-Wire Private Line With DAS 804A-Type With Alternate Switched Network Line	16
F. Four-Wire Private Line With DAS 804A2 With Two Alternate Switched Network Lines	18
5. REFERENCES	19

1. GENERAL

1.01 This section covers in general terms the physical and functional descriptions as well as the operating procedures for data set 202D-type.

Information concerning customer-provided data terminals is not included in this section.

1.02 This section is reissued to include information pertaining to data sets 202D5 and 202D6, the 1A2 data unit, and the 17A series 2 and 48A power units. Due to extensive changes, arrows denoting changes have been omitted.

1.03 Data set 202D-type (Fig. 1) is a medium speed, serial transmitter-receiver intended for operation in private line (PL) service over 2-wire and 4-wire lines. On 3002 private lines, the recommended maximum bit rate is 1200 bits per second (bps): with C1 conditioning, the recommended maximum bit rate is 1400 bps and with C2 conditioning the recommended maximum bit rate is 1800 bps. It is a transmitting-receiving data terminal to be installed on customer premises.

1.04 With the addition of data auxiliary set (DAS) 804A (Fig. 2), data set 202D-type is suitable for DATA-PHONE® service at speeds up to 1200 bps. DAS 804A may also be used to provide control and talk features on certain PL applications.

1.05 The data set TEST button (Fig. 2) can be made nonfunctional by an installer option when DAS 804A-type is used. This option provides for test mode operation via the TEST key on the DAS 804A-type.

1.06 Data set 202D-type is compatible for use with data set 202B over 2-wire and 4-wire private lines. When DATA-PHONE service is provided, data set 202D-type is compatible for use with data set 202C. The 202D5 is compatible with data set 202R over 2-wire and 4-wire private lines. When DATA-PHONE service is provided, data set 202D5 is compatible for use with data set 202R only if manual call origination and answering is used.

1.07 Data set 202D is compatible for use with DAS 828A. DAS 828A provides standard,

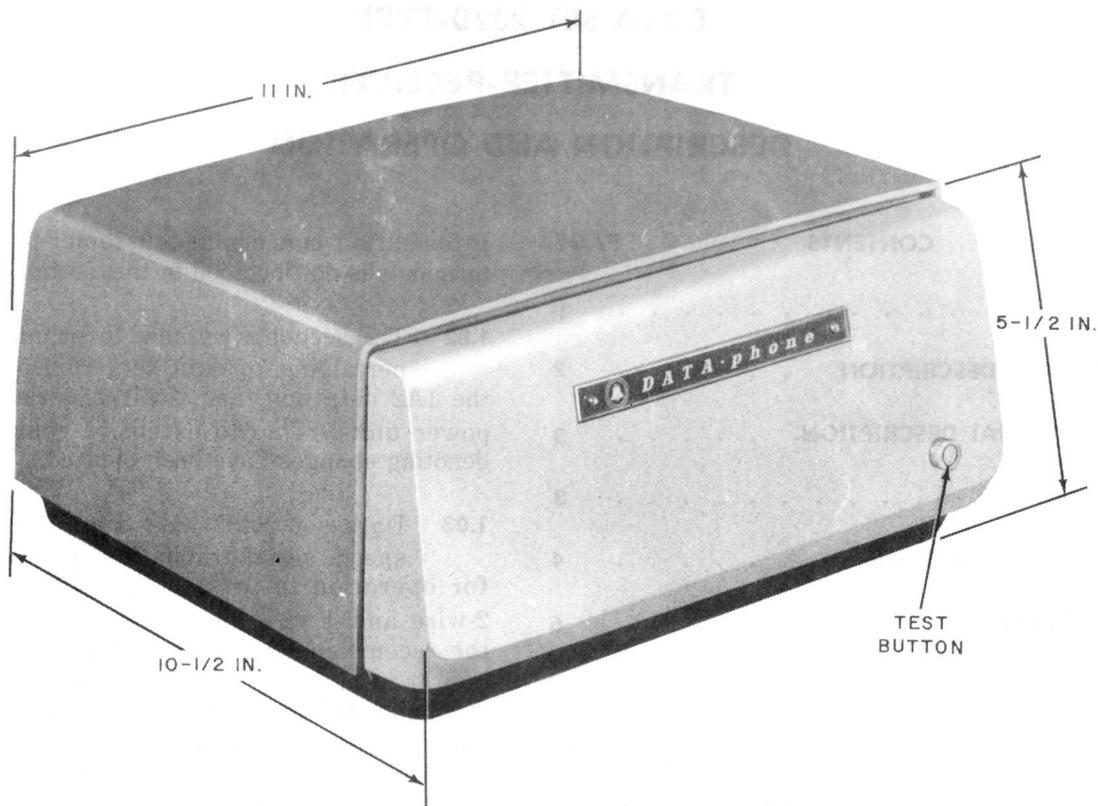


Fig. 1—Data Set 202D-Type

prewired, tested station arrangements for terminating 4-wire private line voiceband data channels. DAS 828A is available with or without alternate voice. For more information concerning DAS 828A, refer to Sections 598-080-100 and 598-080-200.

1.08 Data sets 202D3 and 202D4 replace data sets 202D1 and 202D2, respectively. In data sets 202D3 and 202D4, the soft carrier turnoff can be disabled on an installer option basis.

1.09 Data sets 202D5 and 202D6 replace data sets 202D3 and 202D4, respectively. Data sets 202D5 and 202D6 are provided with timing options that allow fast turnaround of a data message on four-wire PL multipoint applications.

2. PHYSICAL DESCRIPTION

2.01 This part contains the physical description of data set 202D-type.

2.02 Data set 202D-type is a nonintegrated unit combining a data transmitter-receiver in a two-tone gray plastic case. The unit weighs approximately 16 pounds.

2.03 A 25-pin connector, KS-19087-L6, is provided at the rear of the data set (Fig. 3) for connecting to the business machine of the customer. This connection is made with a customer-furnished cable (not to exceed 50 feet) equipped with a Cinch or Cannon DB-19604-432 type plug. Interface leads present at this connector are numbered and designated as indicated in Table A.

2.04 Data sets 202D-type are delivered with a D6AA-61 mounting cord. If the data set is to operate with a DAS 804A-type, the D6AA-61 cord must be replaced with a D34B-61 mounting cord which can be ordered locally. In addition, a 3-conductor, 10-foot power cord (KS-14532-L16) is supplied with the data set.

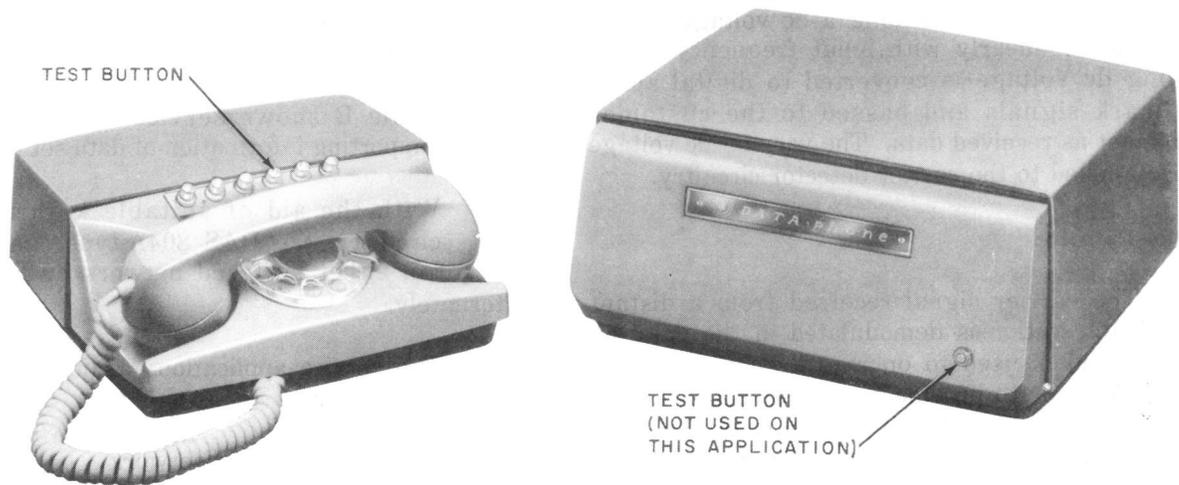


Fig. 2—Data Set 202D-Type With Data Auxiliary Set 804A-Type

2.05 A ringer mounted in the DAS 804A-type (Fig. 2) provides audible signals on incoming calls.

Note: When a louder ring is required, substitute an external high impedance ringer for the DAS ringer. Refer to the section entitled Data Set 202D-Type Transmitter-Receiver—Installation and Connections (592-016-200).

2.06 The 17A series 1 power units used in data sets 202D1 and 202D2 (series 6), and in data sets 202D3 and 202D4 are being replaced with a 17A series 2 or 48A power unit due to the high harmonic content of the 17A series 1 power unit which causes data distortion. The 48A power unit is less susceptible to input power frequency variations than either the 17A series 1 or 17A series 2 power units. Replacement of the 17A with the 48A power unit raises the series number of the data set but replacement with the 17A series 2 does not raise the series number of the data set. Data sets 202D5 and 202D6 are equipped with a 48A power unit.

2.07 The 17A series 1, 17A series 2, and 48A power units provide two semiregulated dc outputs of $+18 \pm 0.45$ volts and -18 ± 0.45 volts at a normal load current of 200 to 250 mA from both outputs.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 This part contains the functional description of data set 202D-type. Application information is given in Table B and Part B.

3.02 Data set 202D-type is a frequency-modulated (FM) transmitting-receiving set. Data set 202D-type contains a transmitter, receiver, carrier detector, and control and test circuitry (Fig. 4). Data sets 202D2, D4, and D6 also contain a reverse channel transceiver.

3.03 In preparation for the data mode, the interface signals are conditioned in accordance with the function explained in Table A.

Transmitter

3.04 The data set transmitter contains a voltage-controlled oscillator which converts data signals from the customer equipment into FM signals (1200 ± 12 Hz for a mark and 2200 ± 22 Hz for a space) which are suitable for transmission over the transmitting line.

Receiver

3.05 The FM signals from a distant station are applied to the receive circuitry by way of the control circuitry. The receiver output demodulates

this signal, therefore yielding a dc voltage output which varies linearly with input frequency. This varying dc voltage is converted to digital space and mark signals and passed to the customer equipment as received data. The varying dc voltage is also applied to the carrier detector circuitry.

Carrier Detector

3.06 The carrier signal received from a distant data station is demodulated in the data set receiver and is used to operate its corresponding carrier detector to provide a receiver clamp action. A noise guard feature in the carrier detector provides protection against out-of-band frequency components which might falsely operate the receiver.

Reverse-Channel

3.07 A 1A-type data unit is provided in data sets 202D2, D4, and D6 (on 2-wire application) to furnish circuit assurance and low-speed coordinating signals between customer business machines. The 1A1 data unit is a reverse channel transceiver that has discrete power level options of -3, -6, and -9 dBm to meet the central office requirements. The 1A2 data unit is a reverse channel transceiver that has a continuously adjustable power level (0 to -12 dBm) to meet the central office requirements. Input and output signals of the 1A-type data unit are EIA-type (positive voltage for an on condition and a negative voltage for an off condition) which appear on the interface of the data set.

Control and Test Circuitry

3.08 The FM signals from the transmitter circuit are applied to the transmission line through the control and test circuitry. The circuit consists of gates, relays, and associated components. Through suitable strapping arrangements, modes of terminal operation or provisions for four-wire configuration can be used with the transmit and receive signal path(s). The test circuit permits a check of the data set operation from a remote data test center (DTC).

B. Service Applications

3.09 Data set 202D-type can be used in a range of service applications. The selected service application dictates the type and amount of apparatus required for each installation. Certain features of

the data set remain uniform regardless of the service application selected.

3.10 Table B shows service applications and supporting information of data set 202D-type.

3.11 With the aid of suitable key telephone circuitry, the DAS 804A-type can be used to control either switched network or PL service alternately.

3.12 The service applications available are listed as follows:

- (a) Two-wire switched network
- (b) Two 2-wire switched network lines
- (c) Four-wire switched network
 - Common battery signaling
 - E and M signaling
- (d) Two-wire PL without talk and reverse-channel features
- (e) Two-wire PL without talk feature but with reverse-channel feature
- (f) Two-wire PL with talk feature but without alternate switched network feature
- (g) Two-wire PL with talk and alternate switched network features
- (h) Four-wire PL without talk and reverse-channel features
- (i) Four-wire PL with talk and reverse-channel features
- (j) Four-wire PL with talk feature but without alternate switched network feature
- (k) Four-wire PL with talk and alternate switched network features (one switched network line)
- (l) Four-wire PL with talk and alternate switched network features (two switched network lines).

TABLE A

INTERFACE LEAD IDENTIFICATION

INTERFACE CONNECTOR PIN NUMBER (See Fig. 4)	EIA STANDARD DESIGNATIONS	LEAD DESIGNATIONS	FUNCTION
1	AA	Protective Ground	Common to signal and ac power service ground.
2	BA	Transmitted Data	Customer data presented to data set.
3	BB	Received Data	Data output presented to business machine.
4	CA	Request to Send	When business machine places this lead in ON condition, data set is placed in transmit condition. When placed in OFF condition, data set is placed in receive condition.
5	CB	Clear to Send	Signals business machine that data may be transmitted.
6	CC	Data Set Ready	Signals business machine when data set is in the data mode.
7	AB	Signal Ground	Common to frame ground and ac power service ground.
8	CF	Data Carrier Detector	Signals business machine that data carrier is being received.
9	+P	+ Voltage	Power supply (+18 volts under no load condition).
10	-P	- Voltage	Power supply (- 18 volts under no load condition).
11	SA	Supervisory Transmitted Data	Provides means of transmitting low speed coordinating signals to data transmitting end of connection.
12	SB	Supervisory Received Data	Provides means of receiving low speed coordinating signals and circuit assurance signal.
13	Not used		
14	Not used		
15	Not used		
16	Not used		
17	Not used		
18	Not used		
19*	RR	Remote Release	When opened by business machine, terminates call. Must be connected to CD lead for data set to go to data mode.

TABLE A (Cont)

INTERFACE CONNECTOR PIN NUMBER (See Fig. 4)	EIA STANDARD DESIGNATIONS	LEAD DESIGNATIONS	FUNCTION
20	CD	Data Terminal Ready	Business machine applies an ON condition for auto answer and to allow data set to go to data mode. An OFF condition disconnects data set from line.
21*	RY	Ready	Closed to CD lead by business machine when automatic answering of incoming calls is desired.
22	CE	Ring Indicator 1	Signals business machine that an incoming call is being received.
23*	R12	Ring Indicator 2	Signals business machine that an incoming call is being received.
24	Not used		
25	Not used		

* For 202A- or 202B-type interface.

3.13 A DAS 828A (or 6017AP key) is used on four-wire PL installations to provide a PL termination toward the central office and to permit the customer to perform loop-around tests through the data set.

3.14 Data set 202D can be obtained with reverse-channel (data set 202D6 replaces 202D4 and 202D2), or without reverse-channel (data set 202D5 replaces 202D3 and 202D1). The 1A-type data unit (reverse-channel) can be added later or removed as required. Refer to the section entitled Data Set 202D-Type Transmitter-Receiver—Maintenance (592-016-300).

Note: The data set should be redesignated when an addition or a removal is made.

C. Options

3.15 Two-Wire—Four-Wire Operation: The 2-wire operation is used in PL facilities and DATA-PHONE service where half-duplex operation is acceptable. The 4-wire operation is used in point-to-point and multipoint PL where full-duplex service is required.

3.16 600-Ohm—900-Ohm Termination: The 600-ohm termination is used in 4-wire

point-to-point and multipoint PL facilities and the 900-ohm termination is used in 2-wire DDD facilities.

3.17 Clamp-On Demodulator Output: The clamp circuit is a means of protecting the demodulator against excessive line noise. This circuit requires a signal in the data band for a timed period before the demodulator is allowed to deliver a signal to the received data lead. If there is no such signal, noise will not operate the carrier detector and the receiver will be clamped off.

3.18 Reverse Channel In—Reverse Channel Out: Reverse channel in provides a means of simultaneous communication from the receiver to the transmitter of two-wire data transmission systems. This feature is intended as a means of circuit assurance, for a break signal, and to facilitate certain forms of error control. Reverse channel out does not provide this feature.

3.19 Squelch In—Squelch Out: When a transmitting 2-wire station has its request-to-send lead turned *off*, the line may reflect signals (echoes) back to that station for a period equal to the round-trip delay of the circuit. It is possible that these echoes might be recovered as valid data. To prevent this, the demodulator is squelched against all signals for a period of 120 milliseconds. If the business machine is able to

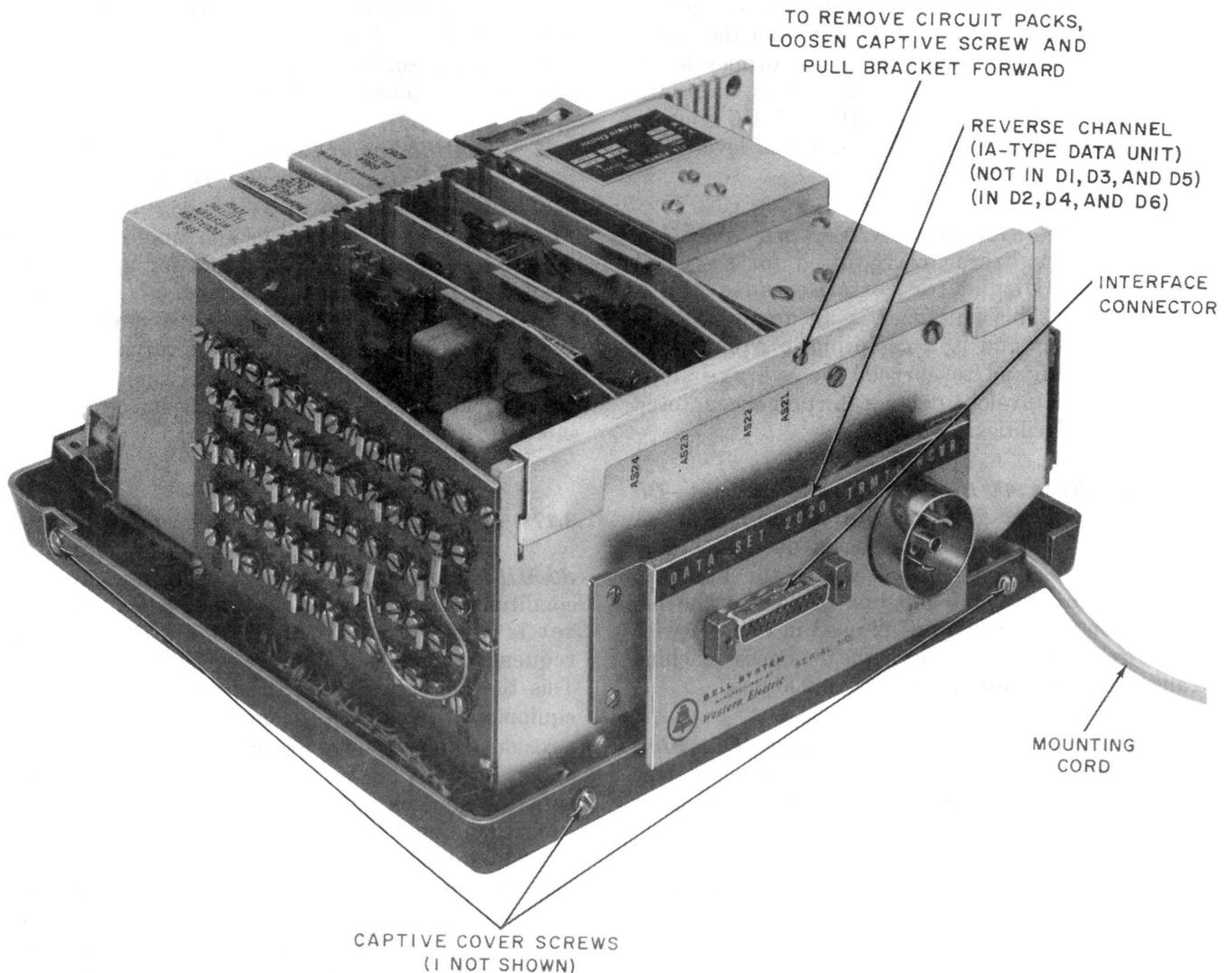


Fig. 3—Data Set 202D-Type—Rear View

ignore the echoes, then the squelch out option may be used. In 4-wire operation, echoes are not encountered and, therefore, the squelch out option should be used.

3.20 Automatic Answering—No Automatic Answering: When a DAS 804A is used and it is provided with the automatic answering option, the data set will automatically answer incoming data calls and go into the data mode. Without automatic answer, all incoming calls must be handled in the normal manner.

3.21 EIA Voltage Interface—Contact Interface: The EIA voltage interface is used with all

business machines using the standard EIA voltage interface where an *on* (or space) condition on an interface lead is a voltage more positive than three volts with respect to signal ground and an *off* (or mark) condition on an interface lead is more negative than minus three volts. The contact interface is used in those data sets working with business machines requiring a contact closure on a specific lead to signify an on condition and an open placed on a specific lead to signify an off condition.

3.22 Data Transmit Power Levels: Data sets prior to 202D1, D2 Series 10, and 202D3, D4 Series 5 contain discrete level options as shown

in Table B of Section 592-016-200. These options lower the transmission level in order that the signal will reach the central office at the proper level. Data sets starting with these series numbers mentioned and data sets 202D5 and D6 contain potentiometers to vary the transmission level from 0 to -12 dBm.

3.23 *Equalizers for Switched Network Operation:*

The equalizers are required for switched network (DDD) and for certain grades of PL applications. This equalizer is an amplitude and delay equalizer and is a compromise equalizer in that it is designed to correct the average slope distortion and envelope delay distortion encountered on switched facilities.

3.24 *Bit Rate 900 Bits Per Second or Less—Bit Rate Over 900 Bits Per Second:*

The bit rate option of 900 bps or less is used in either 2-wire or 4-wire applications where the business machine transmits at 900 bps or less. The bit rate option of over 900 bps is used in either 2-wire or 4-wire applications where the business machine transmits at bit rates greater than 900 bps.

3.25 *Enabled Data Set Test Key—Disabled Data Set Test Key:*

Enabled data set test key is used when a DAS 804A-type is *not* used with the data set. Disabled data set test key is provided to disable the test key in the data set when a DAS 804A-type is used with the data set. In this case the TEST key on the DAS 804A-type is used instead of the data set test key.

3.26 *When Data Set is Not Used With DAS 804A-Type or 6017AP Key—When Data Set is Used with DAS 804A-Type or 6017AP Key:*

When the data set is not used with the DAS 804A-type, 6017AP key, or DAS 828A, this option is installed to permit an *on* condition to be presented on the data-set-ready lead as soon as power is supplied to the data set. When a data set is used with a DAS 804A-type, 6017AP key, or DAS 828A, this option is not used and the data-set-ready lead is then under the control of the DAS 804A-type, 6017AP key, or DAS 828A.

3.27 *Reverse Channel Transmit Power Level:*

Data sets prior to 202D1, D2 series 10, and 202D3, D4 series 5 contain discrete level options for the reverse channel as shown in Table B of Section 592-016-200. These options lower the transmission level in order that the signal will

reach the central office at the proper level. Data sets starting with the series numbers mentioned and data sets 202D5 and D6 contain potentiometers to vary the transmission level from 0 to -12 dBm.

3.28 *40-Millisecond Carrier Detector Timing—20-Millisecond Carrier Detector Timing:*

This option is provided in data sets 202D5 and D6 to set the carrier detector clamp timing to either 40 milliseconds or 20 milliseconds for applications requiring fast startup of the receiver. With the 20-millisecond option, the carrier detector is more susceptible to noise unclamping the carrier detector and receive data leads. Other data sets 202D-type only provide a 40-millisecond carrier detector timing interval.

3.29 *200-Millisecond Clear-to-Send Timing—60-Millisecond Clear-to-Send Timing—30-Millisecond Clear-to-Send Timing:*

The *on* condition of the clear-to-send lead from the data set is a response to an *on* condition on the request-to-send lead delayed by a time interval. This time interval allows the data communications equipment to establish a communication channel to a remote data processing terminal. The 200-millisecond option is used when the remote data set is equipped with the squelch option (DATA-PHONE or 2-wire PL). Data Sets 202D1, D2, D3, and D4 only provide the 200-millisecond clear-to-send timing interval. The 60- and 30-millisecond options (available on data sets 202D5 and 202D6) are used when the remote data set is strapped for the 40-millisecond or 20-millisecond carrier detector options, respectively, without the receiver squelch. These shorter clear-to-send and carrier detector intervals are for use of fast turnaround 2-wire and 4-wire PL applications.

3.30 *Carrier Soft Turnoff:* When a business machine turns the request-to-send lead *off* at the conclusion of a transmitted message, transients are likely to occur which may cause spurious spacing signals to be received at the distant station. With the carrier soft turnoff option, the data set transmits a 900-Hz carrier (which is outside the data band) for 27 to 45 milliseconds after the request-to-send lead is turned *off*. This allows the remote data carrier-detector circuit to turn off and does not cause nonvalid data to appear on the remote receive-data lead. This feature may be disabled for fast turnaround applications.

TABLE B
SERVICE APPLICATION AND SUPPORTING INFORMATION

SERVICE APPLICATIONS	DATA SET TYPE (202D-TYPE) SEE NOTE 1	TRANSMISSION SPEED BITS/SEC	MOUNTING CORD REQUIRED (5/8 FOOT)	PROVISION FOR AUTOMATIC ANSWERING	PROVISION FOR AUTOMATIC CALLING UNIT	TYPE OF CONTROL DATA AUXILIARY SET REQUIRED	OTHER ASSOCIATED CONTROL APPARATUS REQUIRED				POWER SUPPLY REQUIREMENTS FOR ASSOCIATED CONTROL APPARATUS	OTHER SUPPORTING INFORMATION AND REFERENCE MATERIAL							
							KEY TELEPHONE UNITS						MISC						
							AMT	TYPE	AMT	TYPE									
SWITCHED NETWORK	2-WIRE (HALF-DUPLEX)	D1, D2, D3, D4, D5, D6	UP TO 1200	REPLACE WITH D34B-61	YES	YES	804A5 ¶ OR 804A1 (MD)	NOT APPLICABLE		NOT APPLICABLE	NOT APPLICABLE	REFERENCE: CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 7 AND 8							
	TWO 2-WIRE LINES (FULL-DUPLEX)	D1, D3, and D5	UP TO 1200	REPLACE WITH D34B-61	YES	NOT APPLICABLE	804A6 ** OR 804A2 (MD)	1	219A	—	—	NOT APPLICABLE	20-26V DC 20-26V DC 75-110V AC, 20 HZ	SIGNAL TALK RING	REFERENCE: CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 19				
							1	220A	—	—									
							6	229B	—	—									
						1	248A	—	—										
							2	251A	—	—									
PRIVATE LINE	4-WIRE (FULL-DUPLEX)	D1, D3, and D5	UP TO 1600	REPLACE WITH D34B-61	NO	NO	804A5 ¶ OR 804A1 (MD)	COMMON BAT SIG (Note 2)		E AND M SIG (Note 2)		NOT APPLICABLE	COMMON BAT SIG 20-26V DC TALK	E AND M SIG 20-26V DC TALK 40-50V DC SIGNAL 75-110V AC, 20 HZ RING	REFERENCE: CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 13 AND 14				
							1	219A	1	219A									
							2	229B	2	229B									
							1	243A	1	255A									
							—	—	—	—									
	2-WIRE WITHOUT TALK AND WITHOUT REVERSE-CHANNEL FEATURES (HALF-DUPLEX)	D1, D3, and D5	UP TO 1800	D6AA-61 (FURNISHED)	NO	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE		NOT APPLICABLE	NOT APPLICABLE		REFERENCE: CD- AND SD-1D049—DATA SET 202D-TYPE SECTION 592-016-200, FIG. 4				
	2-WIRE WITHOUT TALK FEATURE BUT WITH REVERSE-CHANNEL FEATURE (HALF-DUPLEX)	D2, D4, and D6	UP TO 1800	D6AA-61 (FURNISHED)	NO	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE		NOT APPLICABLE	NOT APPLICABLE		REFERENCE: CD- AND SD-1D049—DATA SET 202D-TYPE SECTION 592-016-200, FIG. 5				
	2-WIRE WITH TALK FEATURE BUT WITHOUT ALTERNATE SWITCHED NETWORK FEATURE (HALF-DUPLEX)	D1, D2, D3, D4, D5, and D6	UP TO 1800	REPLACE WITH D34B-61	YES	NOT APPLICABLE	804A5 ¶ OR 804A1 (MD)	OLD KTU MODEL	REPLACEABLE WITH 200-TYPE KTU MODEL	OLD KTU MODEL	REPLACEABLE WITH 200-TYPE KTU MODEL	KS-15900-L1 INTERRUPTER†	20-26V DC 20-26V DC +10V AC, 60 HZ 75-110V AC, 20 HZ	SIGNAL TALK AC MOTOR SUPPLY RING	REFERENCE: CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 9				
1								15D	1	219A	1					232B†	—	—	
1								17B	2	220A	—					—	—	—	
1								30 ‡	1	232B	—					—	—	—	
1								219A	1	251A	—					—	—	—	
3	220A	—	—	—	—	—	—												
	2-WIRE WITH TALK AND ALTERNATE SWITCHED NETWORK FEATURES (HALF-DUPLEX)	D1, D2, D3, D4, D5, and D6	UP TO 1800 LIMITED TO 1200 WHEN SWITCHED NETWORK LINE IS USED	REPLACE WITH D34B-61	YES	NOT APPLICABLE	804A5 ¶ OR 804A1 (MD)	2	15D	1	219A	1	232B†	—	—	KS-15900-L1 INTERRUPTER†	20-26V DC 20-26V DC 10V AC, 60 HZ† 75-110V AC, 20 HZ	SIGNAL TALK AC MOTOR SUPPLY RING	DO NOT USE SWITCHED NETWORK LINE FOR REGULAR TELEPHONE SERVICE. USE FOR DATA CALLS ONLY. REFERENCE: CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 10
1								17B	4	220A	—	—	—	—					
1								30A‡	1	232B	—	—	—	—					
1								219A	2	251A	—	—	—	—					
5								220A	—	—	—	—	—	—					

TABLE B (Cont)

SERVICE APPLICATIONS	DATA SET TYPE (202D-TYPE) SEE NOTE 1	TRANSMISSION SPEED BITS/SEC	MOUNTING CORD REQUIRED (5½ FOOT)	PROVISION FOR AUTOMATIC ANSWERING	PROVISION FOR AUTOMATIC CALLING	TYPE OF CONTROL DATA AUXILIARY SET REQUIRED	OTHER ASSOCIATED CONTROL APPARATUS REQUIRED				POWER SUPPLY REQUIREMENTS FOR ASSOCIATED CONTROL APPARATUS	OTHER SUPPORTING INFORMATION AND REFERENCE MATERIAL				
							KEY TELEPHONE UNITS									
							AMT	TYPE	AMT	TYPE			MISC			
P R I V A T E L I N E	4-WIRE WITHOUT TALK AND WITHOUT REVERSE-CHANNEL FEATURES (FULL-DUPLEX)	D1, D3, and D5	UP TO 1800	D6AA-61 (FURNISHED)	NO	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	6017AP KEY	NOT APPLICABLE	REFERENCE: CD- AND SD-1D020—LINE AND TEST CIRCUIT CD- AND SD-1D049—DATA SET 202D-TYPE SECTION 592-016-200, FIG. 6				
	4-WIRE WITH TALK AND REVERSE-CHANNEL FEATURES (FULL-DUPLEX)	D2, D4, and D6	UP TO 1800	REPLACE WITH D34B-61	YES	NOT APPLICABLE	804A5 † OR 804A1 (MD)	1 1 1 4	15D* 30A‡ 220A* 229B	1 1 — —	232B† 248A* 248B§ —	6017AP KEY KS-15900-L1 INTERRUPTER†	20-26V DC 20-26V DC 10V AC, 60 HZ† 75-110V AC, 20 HZ	SIGNAL TALK AC MOTOR SUPPLY RING	REFERENCE: CD- AND SD-1D020—LINE AND TEST CIRCUIT CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 17	
	4-WIRE WITH TALK FEATURE BUT WITHOUT ALTERNATE SWITCHED NETWORK FEATURE (FULL-DUPLEX)	D1, D3, and D5	UP TO 1800	REPLACE WITH D34B-61	YES	NOT APPLICABLE	804A5 † OR 804A1 (MD)	1 1 1 2	15D* 30A‡ 220A* 229B	1 1 — —	232B† 248A* 248B§ —	6017AP KEY KS-15900-L1 INTERRUPTER†	20-26V DC 20-26V DC*§ 10V AC, 60 HZ† 75-110V AC, 20 HZ	SIGNAL TALK AC MOTOR SUPPLY RING	REFERENCE: CD- AND SD-1D020—LINE AND TEST CIRCUIT CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 11	
	4-WIRE WITH TALK AND ALTERNATE SWITCHED NETWORK FEATURES (ONE SWITCHED NETWORK LINE) HALF-DUPLEX ON SWITCHED NETWORK LINE	D1, D3, and D5	UP TO 1800 LIMITED TO 1200 WHEN SWITCHED NETWORK LINE IS USED	REPLACE WITH D34B-61	YES	NOT APPLICABLE	804A6 ** OR 804A2 (MD)	1 1 2 1 4	15D* 30A‡ 220A 220A* 229B	1 1 1 1 —	232B† 248A* 248B§ 251A —	6017AP KEY KS-15900-L1 INTERRUPTER†	20-26V DC 20-26V DC 10V AC, 60 HZ† 75-110V AC, 20 HZ	SIGNAL TALK AC MOTOR SUPPLY RING	DO NOT USE SWITCHED NETWORK LINE FOR REGULAR TELEPHONE SERVICE. USE FOR DATA CALLS ONLY. REFERENCE: CD- AND SD-1D020—LINE AND TEST CIRCUIT CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 12	
	4-WIRE WITH TALK AND ALTERNATE SWITCHED NETWORK FEATURES (TWO SWITCHED NETWORK LINES) FULL-DUPLEX	D1, D3, and D5	UP TO 1800 LIMITED TO 1200 WHEN SWITCHED NETWORK LINE IS USED	REPLACE WITH D34B-61	YES NOT AVAILABLE ON ALTERNATE SWITCHED NETWORK LINES	NOT APPLICABLE	804A6 ** OR 804A2 (MD)	1 1 1 1	15D* 30A‡ 219A 220A	8 1 1 1	229B 232B† 248A* 248B§	251A	6017AP KEY KS-15900-L1 INTERRUPTER†	20-26V DC 20-26V DC 10V AC, 60 HZ† 75-110V AC, 20 HZ	SIGNAL TALK AC MOTOR SUPPLY RING	DO NOT USE SWITCHED NETWORK LINE FOR REGULAR TELEPHONE SERVICE. USE FOR DATA CALLS ONLY. REFERENCE: CD- AND SD-1D020—LINE AND TEST CIRCUIT CD- AND SD-1D049—DATA SET 202D-TYPE CD- AND SD-1D041—DATA AUX SET 804A-TYPE CD- AND SD-1D061—DATA SET APPLICATIONS SECTION 592-016-200, FIG. 15

NOTE 1: THE FOLLOWING DATA SET FEATURES REMAIN UNIFORM REGARDLESS OF THE SERVICE APPLICATION:

- (A) MODULATION TECHNIQUE, FM SERIAL (VOICEBAND).
 (B) MARK FREQUENCY:
 (C) SPACE FREQUENCY:
 (D) INTERFACE SIGNAL:
 (E) POWER REQUIREMENT:
 (F) POWER CORD:
 (G) ROOM TEMPERATURE-HUMIDITY LIMITS:

1200 ±12 HZ.
 2200 ±22 HZ.
 EIA VOLTAGE OR 202A- OR 202B-TYPE (OPTIONAL AS REQUIRED).
 3-WIRE, 60 ±0.5 HZ, 117 VOLT AC.
 KS-14532-L16 3-CONDUCTOR (10 FEET LONG).
 +50 TO 120°F AT 20 TO 95%.

- NOTE 2:** COMMON BAT SIG AND E AND M SIG ARE USED ONLY WITH 4-WIRE SWITCHED NETWORK.
 * REQUIRED ONLY WHEN NONSELECTIVE INCOMING AND MANUAL OUTGOING SIGNALING IS USED.
 † REQUIRED ONLY WHEN INTERRUPTED VISUAL AND AUDIBLE SIGNALING IS DESIRED.
 ‡ REQUIRED ONLY WHEN LOCKED-IN SIGNALING IS DESIRED.
 § REQUIRED ONLY WHEN SELECTIVE INCOMING AND OUTGOING SIGNALING IS DESIRED.
 ¶ DASs 804A1 AND A5 PROVIDE ROTARY DIALS. WHEN A TOUCH-TONE DIAL IS REQUIRED, USE DAS 804A3 OR A7.
 ** DASs 804A2 AND A6 PROVIDE ROTARY DIALS. WHEN A TOUCH-TONE DIAL IS REQUIRED, USE DAS 804A4 OR A8.

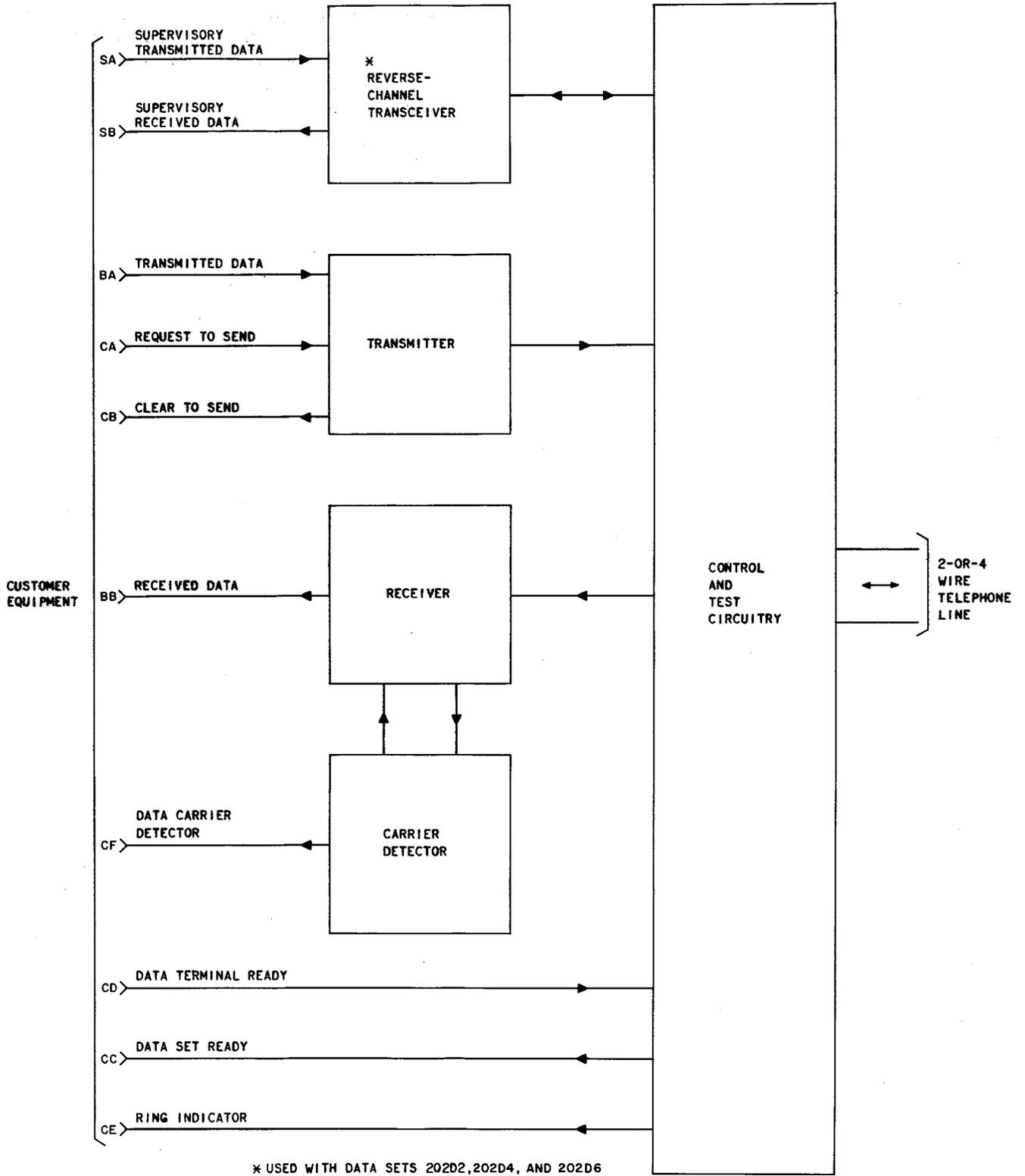


Fig. 4—Data Set 202D-Type—Block Diagram

4. OPERATION

A. General

4.01 Data set 202D-type can be used to transmit and receive data alternately on two-wire operation or simultaneously on four-wire operation. The business machine determines whether the set is used to transmit and/or receive.

Note: On two-wire applications when the data set is used as a transmitter, the receive side of the set monitors the transmitted data.

4.02 Operating procedures of the data set and associated control equipment vary with the service applications.

4.03 The following operating procedures are described by service application.

Note: It is assumed that correct option wiring of the data set and associated control equipment has been made for each service application.

B. Two- or Four-Wire Switched Network With DAS 804A-Type

4.04 Originating and Answering a Data Call

(1) The calling customer depresses the TALK key, takes the handset off-hook (TALK lamp *does not* come on), and establishes connection to the distant terminal (called station) in the normal telephone manner.

(2) At the called station, ringing current will ring the bell and operate circuitry in the data set. The business machine is signaled that an incoming call is present. After one complete ringing cycle, the attendant at the called station should depress the TALK key and take the handset off-hook (TALK lamp comes on and ringing trips).

(3) Calling and called attendants reach voice agreement concerning the nature of the data call (which station will transmit, which station will receive, etc).

(4) Both attendants agree to go to the data mode by one of the following methods.

Note: If the called data station is arranged for automatic answer, the called station performs answer and data mode functions automatically. The calling attendant performs data mode functions manually.

(a) If the called station is a data set 202A, 202B, or digital subset Model 3A, both stations may go into the data mode simultaneously by operating and releasing the DATA keys (DATA lamps come on) and hanging up.

(b) If the called station is a data set 202C or 202D, the called station must operate and release the DATA key first (DATA lamp comes on and TALK lamp remains on) and hang up. At this time, the calling station will hear a 2025-Hz tone for about two to three seconds. When the tone ceases or changes pitch, the calling attendant operates and releases the DATA key (DATA lamp comes on and TALK lamp *remains* off) and hangs up.

Note: If it becomes necessary to return to the talk mode and then return to the data mode, both stations should take the handsets off-hook, depress the TALK keys, and proceed as previously described in (3) and (4).

4.05 Test Operation

(1) The DTC calls the customer and instructs him to momentarily depress the data auxiliary set TEST key (TEST lamp comes on) and then hang up.

Note: If at any other time the TEST button is accidentally operated while the handset is off-hook and the TALK key is operated, the data set will lock in the test mode. Release by restoring handset on-hook and reoperating the TEST key.

(2) Test center terminates the call (data set remains in test mode) and initiates a second call to the data set. (In test mode, data set will answer automatically.)

Note: Customer should disregard momentary ringing when the test center calls data set.

(3) Test center performs required test.

- (4) At conclusion of test, test center releases data set from test mode and terminates call.

C. Two- and Four-Wire Private Line With DAS 804A1 Without Alternate Switched Network Line

4.06 Originating and Answering a Data Call

Note: The transmit and/or receive condition of the data set is controlled by the business machine.

- (1) The calling customer depresses the TALK key, takes the handset off-hook (TALK lamp **does not** come on), and signals called station by momentarily depressing the RING key (RING lamp **does not** come on). Audible and visual signals at the called station are provided by one of the following optional methods.

Note: On four-wire applications with selective signaling systems, the calling customer can signal the called customer by dialing the code number of the called station.

- (a) Bell and RING lamp operate at interrupted rate until call is answered.
- (b) Bell and RING lamp operate steadily until call is answered.
- (2) Attendant at the called station depresses the TALK key and takes the handset off-hook (TALK lamp comes on, ringing trips, and RING lamp goes out).
- (3) Calling and called attendants reach voice agreement concerning the nature of the data call.
- (4) Both attendants agree to go to the data mode by one of the following methods.

Note: If the called data station is arranged for automatic answer, the called station performs answer and data mode functions automatically. Calling attendant performs data mode functions manually.

- (a) If the called station is a data set 202A, 202B, or digital subset Model 3A, both stations may go into the data mode simultaneously by operating and releasing the DATA keys (DATA lamps come on) and hanging up.

- (b) If the called station is a data set 202C or 202D, the called station must operate and release the DATA key first (DATA lamp comes on and TALK lamp **remains** on) and hang up. At this time the calling station will hear 2025-Hz tone for about two to three seconds. When tone ceases or changes pitch, calling attendant operates and releases the DATA key (DATA lamp comes on and TALK lamp **remains** off) and hangs up.

Note: If it becomes necessary to return to the talk mode and **then** return to the data mode, both stations should take handsets off-hook, depress the TALK keys, and proceed as previously described in (3) and (4).

4.07 Test Operation

Note: It is assumed that arrangements have been made to provide access to the DTC for PL testing.

- (1) The DTC calls the customer and instructs him to momentarily depress the data auxiliary set TEST key (TEST lamp comes on) and then hang up.

Note: If at any other time the TEST button is accidentally operated while handset is off-hook and the TALK key is operated, the data set will lock in the test mode. Release by restoring the handset to on-hook and reoperating the TEST key.

- (2) Test center terminates call (data set remains in test mode) and initiates a second call to the data set. (In test mode, data set will answer automatically.)

Note: Customer should disregard momentary ring when test center calls data set.

- (3) Test center performs required test.
- (4) At conclusion of the test, the test center releases data set from the test mode and reinstates original 4-wire connection.

D. Private Line Without DAS 804-Type (No Talk Feature)

4.08 Originating and Answering a Data Call

SECTION 592-016-100

Note: All data set functions are controlled by the business machine and do not require manual operation by an attendant.

4.09 Test Operation

- (1) The DTC calls the customer at an adjacent telephone set and instructs him to momentarily depress the data set TEST button (TEST lamp comes on).

Note: To place the data set in the test mode, the recessed TEST button must be activated with a pencil or similarly shaped object.

- (2) DTC has control of the data set and can make the required test.
- (3) At conclusion of test, DTC releases data set from test mode and reinstates original 4-wire connection.

E. Two- and Four-Wire Private Line With DAS 804A-Type With Alternate Switched Network Line

4.10 Originating and Answering a Data Call on Private Line

Note 1: Any two stations using the private line will appear idle on the switched network line to any other station.

Note 2: The transmit and/or receive condition of the data set is controlled by the business machine.

Note 3: On four-wire applications and when switched network feature is used, data set will be required to operate on a half-duplex basis.

- (1) The calling customer depresses TALK key, takes handset off-hook (TALK lamp *does not* come on), and signals called station by momentarily depressing the RING key (RING lamp *does not* come on). Audible and visual signals at called station are provided by one of the following optional methods.

Note: On four-wire applications with selective signaling systems, the calling customer can signal the called customer by dialing the code number of the called station.

- (a) Bell and RING lamp operate at interrupted rate until call is answered.

- (b) Bell and RING lamp operate steadily until call is answered.

- (2) Attendant at called station depresses the TALK key and takes the handset off-hook (TALK lamp comes on, ringing trips, and RING lamp goes out).

- (3) Calling and called attendants reach voice agreement concerning the nature of the data call.

- (4) Both attendants agree to go to data mode by one of the following methods.

Note: If called data station is arranged for automatic answer, called station performs answer and data mode functions automatically. Calling attendant performs the data mode functions manually.

- (a) If the called station is a data set 202A, 202B, or digital subset Model 3A, both stations may go into the data mode simultaneously by operating and releasing DATA keys (DATA lamps come on) and hanging up.

- (b) If the called station is a data set 202C or 202D, the called station must operate and release the DATA key first (DATA lamp comes on and TALK lamp *remains* on) and hang up. At this time, the calling station will hear 2025-Hz tone for about two to three seconds. When tone ceases or changes pitch, calling attendant operates and releases the DATA key (DATA lamp comes on, TALK lamp *remains* off) and hangs up.

Note: If it becomes necessary to return to the talk mode and then return to the data mode, both stations should take the handsets off-hook, depress the TALK keys, and proceed as previously described in (3) and (4).

4.11 Originating and Answering a Data Call on Switched Network Line

Note: Any two stations using the switched network line will appear idle on the private line to any other station.



Alternate switched network feature can be used to communicate with any data set 202-type in switched network service.

Note: The transmit or receive condition of the data set is controlled by the business machine.

(1) When desired, the customer can establish a data call by using alternate switched network line.

(2) Calling customer depresses the TALK key, takes the handset off-hook (TALK lamp **does not** come on), and momentarily depresses key of switched network line (line lamp comes on).

Note: Switched network line will be designated by telephone number. Refer to the section entitled Data Set 202D-Type Transmitter-Receiver—Installation (592-016-200).

(3) The calling customer waits for dial tone and then proceeds to establish connection to the switched network line number of the called station in the normal telephone manner.

(4) Bell and line lamp will operate until call is answered (rate of interruption is subject to ringing cycle interruption rate).

(5) Attendant at called station answers by one of the following methods:

(a) If called station is a data set 202A, 202B, 202C, or digital subset Model 3A, attendant at called station depresses the TALK key and takes the handset off-hook (ringing trips).

(b) If called station is a data set 202D, attendant at called station depresses the TALK key, takes the handset off-hook (TALK lamp comes on), and momentarily depresses the line key associated with the incoming call. (Ringing trips and line lamp changes to steady rate.)

(6) Calling and called attendants reach voice agreement concerning the nature of the data call (which station will transmit, which station will receive, etc).

(7) Both attendants agree to go to the data mode by one of the following methods.

Note: If called data station and associated key telephone circuitry are arranged for automatic answer, called station performs answer and data mode functions automatically. Calling attendant performs data mode functions manually.

(a) If the called station is a data set 202A, 202B, or digital subset Model 3A, both stations may go into data mode simultaneously by operating and releasing the DATA keys (DATA lamps come on) and hanging up.

(b) If the called station is a data set 202C or 202D, the called station must operate and release DATA key first (DATA lamp comes on and the TALK lamp **remains on**) and hang up. At this time, the calling station will hear a 2025-Hz tone for about two to three seconds. When tone ceases or changes pitch, calling attendant operates and releases the DATA key (DATA lamp comes on, TALK lamp **remains** off) and hangs up.

Note: If it becomes necessary to return to the talk mode and then return to the data mode, both stations should take the handsets off-hook, depress the TALK keys, and proceed as previously described in (6) and (7).

4.12 Test operation

Note: It is assumed that arrangements have been made to provide access to the DTC for PL testing.

(1) The DTC calls the customer and instructs him to depress the data auxiliary set TEST key (TEST lamp comes on) and hang up.

Note: If at any other time the TEST key is accidentally operated while handset is off-hook and the TALK key is operated, the data set will lock in the test mode. Release by restoring the handset to on-hook and reoperating the TEST key.

(2) Test center terminates call (data set remains in test mode) and initiates a second call to the data set. (In the test mode, the data set will answer automatically.)

SECTION 592-016-100

Note: Customer should disregard momentary ring when the test center calls data set.

- (3) The test center performs required test.
- (4) At conclusion of the test, the test center releases the data set from the test mode and reinstates original 4-wire connection.

F. Four-Wire Private Line With DAS 804A2 With Two Alternate Switched Network Lines

4.13 Originating and answering a Data Call on Private Line

Note: Any two stations using the private line will appear idle on the switched network lines to any other station.

- (1) The calling customer depresses the TALK key, takes the handset off-hook (TALK lamp **does not** come on), and signals the called station by one of the following optional methods:
 - (a) Dials digit 1.
 - (b) Dials code number (selective signal system) of called station.
- (2) Audible and visual signals at called station are provided by one of the following optional methods:
 - (a) Bell and RING lamp operate at interrupted rate until call is answered.
 - (b) Bell and RING lamp operate steadily until call is answered.
- (3) Attendant at called station depresses the TALK key and takes the handset off-hook (TALK lamp comes on, ringing trips, and RING lamp goes out).
- (4) Calling and called attendants reach voice agreement concerning the nature of the data call.
- (5) Both attendants agree to go to the data mode by one of the following methods:

Note: If the called data station is arranged for automatic answer, the called station performs answer and data mode functions automatically.

Calling attendant performs data mode functions manually.

(a) If the called station is a data set 202A, 202B, or digital subset Model 3A, both stations may go into the data mode simultaneously by operating and releasing the DATA key (DATA lamps come on) and hanging up.

(b) If the called station is a data set 202C or 202D, the called station must operate and release the DATA key first (DATA lamp comes on and TALK lamp **remains** on) and hang up. At this time, the calling station will hear a 2025-Hz tone for about two to three seconds. When the tone ceases or changes pitch, the calling attendant operates and releases the DATA key (DATA lamp comes on, TALK lamp **remains** off) and hangs up.

Note: If it becomes necessary to return to the talk mode and then return to the data mode, both stations should take handsets off-hook, depress the TALK keys, and proceed as previously described in (4) and (5).

4.14 Originating and Answering a Data Call on Alternate Switched Network Lines

Note 1: Any two stations using the switched network lines will appear idle on the private line to any other station.

Note 2: The transmit or receive condition of the data set is controlled by the business machine.

- (1) When desired, the customer can establish data call by using the switched network lines.
- (2) Calling customer depresses the TALK key, takes the handset off-hook (TALK lamp **does not** come on), and momentarily depresses the key of first (1) line (first line lamp comes on).

Note: Switched network lines will be designated (1) and (2) followed by telephone numbers. Refer to the section entitled Data Set 202D-type Transmitter-Receiver—Installation (592-016-200).

- (3) The calling customer waits for dial tone and then proceeds to establish connection to the second (2) switched network line number of the called station in the normal telephone manner.
- (4) Bell and (2) lamp will operate until call is answered. (Rate of interruption is subject to ringing cycle interruption rate.)
- (5) Attendant at called station depresses the TALK key, takes the handset off-hook (TALK lamp comes on), and momentarily depresses (2) key. Ringing trips and (2) lamp changes to steady rate.
- (6) Calling and called attendants reach voice agreement on establishing next phase of call.

Note: Calling and called attendants should not restore handsets on-hook until entire procedure is completed.

- (7) Called attendant momentarily depresses the HOLD key [HOLD lamp *does not* come on, (2) lamp *remains* on at steady rate].
- (8) Calling attendant momentarily depresses the HOLD key [HOLD lamp *does not* come on, (1) lamp *remains* on at steady rate].
- (9) Calling attendant momentarily depresses (2) key, waits for dial tone, and proceeds to establish connection to the first (1) line number of the called station in the normal telephone manner.
- (10) Bell and (1) lamp will operate until call is answered. (Rate of interruption is subject to ringing cycle interruption rate.)
- (11) Attendant at called station momentarily depresses (1) key, ringing trips, and (1) lamp changes to steady rate.
- (12) Both attendants agree to go to data mode by the following method:
 - (a) The called station must operate and release the DATA key first [DATA lamp comes on and TALK, (1), and (2) lamps *remain* on] and hang up. At this time the calling station will hear a 2025-Hz tone for about two to three seconds. When tone ceases or changes

pitch, calling attendant operates and releases the DATA key [DATA lamp comes on, TALK lamp *remains* off, and (1) and (2) lamps *remain* on] and hangs up.

Note: If it becomes necessary to return to the talk mode and then return to the data mode, both stations should take the handsets off-hook, depress the TALK keys, and proceed as previously described in this step.

4.15 Test operation

Note: It is assumed that arrangements have been made to provide access to the DTC for PL testing.

- (1) The DTC calls the customer and instructs him to depress the data auxiliary set TEST key (TEST lamp comes on) and hang up.

Note: If at any other time the TEST key is accidentally operated while the handset is off-hook and the TALK key is operated, the data set will lock in the test mode. Release by restoring the handset to on-hook and reoperating the TEST key.

- (2) Test center terminates call (data set remains in test mode) and initiates a second call to the data set. (In the test mode, the data set will answer automatically.)

Note: Customer should disregard momentary ring when test center calls the data set.

- (3) Test center performs required test.
- (4) At conclusion of test, test center releases the data set from the test mode, releases line, and reinstates original 4-wire connection.

5. REFERENCES

The following schematic drawings, circuit descriptions, and BSPs pertain to data set 202D-type.

NUMBER	TITLE
SD- & CD-1D049-01	Data Set 202D-Type—Transmitter Receiver Circuit

SECTION 592-016-100

SECTION	TITLE
592-016-200	Data Set 202D-Type—Transmitter Receiver—Installation and Connections
592-016-300	Data Set 202D-Type—Transmitter Receiver—Maintenance
592-016-500	Data Set 202D-Type—Test Procedures
598-010-Series	Data Auxiliary Set 801A-Type
598-012-Series	Data Auxiliary Set 801C-Type
598-030-100	Data Auxiliary Set 804A-Type
598-080-100	Data Auxiliary Set 828A—Data Service Unit—Description and Operation
598-080-200	Data Auxiliary Set 828A—Data Service Unit—Installation and Connections