

## DATA SET 604A-TYPE DESCRIPTION AND OPERATION

### 1. GENERAL

**1.01** This section covers the physical and functional description and the operation of the Data Set 604A-type (herein called the transmitter). The section does not include information concerning the associated business machine but does include information about the operational relationship of the data set transmitter to the associated data set receiver (Data Set 604B-type) of the system as shown in Fig. 1.

**1.02** This section is reissued for the following reasons:

- To further identify data sets which have new output power level options for compliance with FCC tariff requirements
- To change rating from "Special" to "Standard" with limited distribution.

**1.03** For the purpose of this section, any reference to a business machine should be interpreted as any electronic equipment capable of providing analog voltage signals at the acceptable input levels for the data set.

**1.04** Data Sets 604A-type are integrated data sets. Earlier model data sets which contain a 3A1 line control unit are no longer manufactured. Later model data sets are equipped with a 3A2 line

control unit which provides for data set operation with ESS central offices and long Unigauge lines.

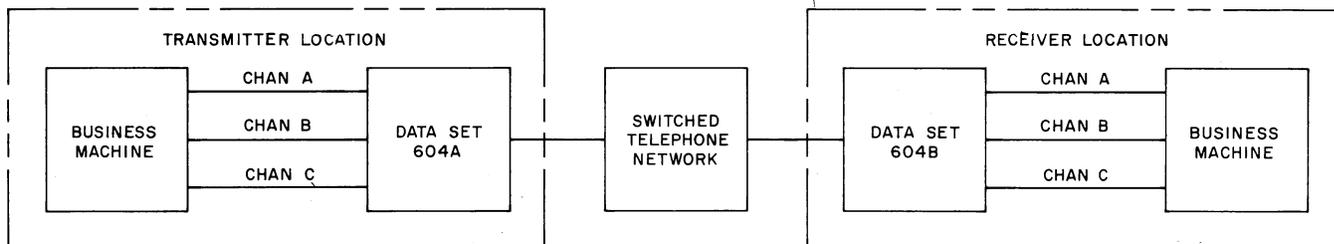
**1.05** Data Set 604A1 is equipped with a rotary dial (Fig. 2) while Data Set 604A2 has a TOUCH-TONE® dial (Fig. 3).

**1.06** The transmitter is designed to transmit three simultaneous analog signals over the switched telephone network to the associated data set receiver.

**1.07** The transmitter will accept three individual inputs from the business machine. Each input must range in voltage between +2.5 and -2.5 volts and in frequency between dc and 105 Hz. Each input channel of the transmitter has a differential input impedance of 100 kohms, but each input lead of a channel has a 50  $\pm$ 2 kohms impedance to ground.

**1.08** The transmitter provides an audible and visual indication and a contact closure to ground to the associated business machine when the receiver signals the transmitter by means of a reverse-channel circuit.

**1.09** Data Set 604A1 (rotary dial) transmitter may be installed in conjunction with a TOUCH-TONE pad if end-to-end signaling is required. Connecting information for this arrangement is shown in the Section 596-017-200.



**Fig. 1—System Block Diagram**

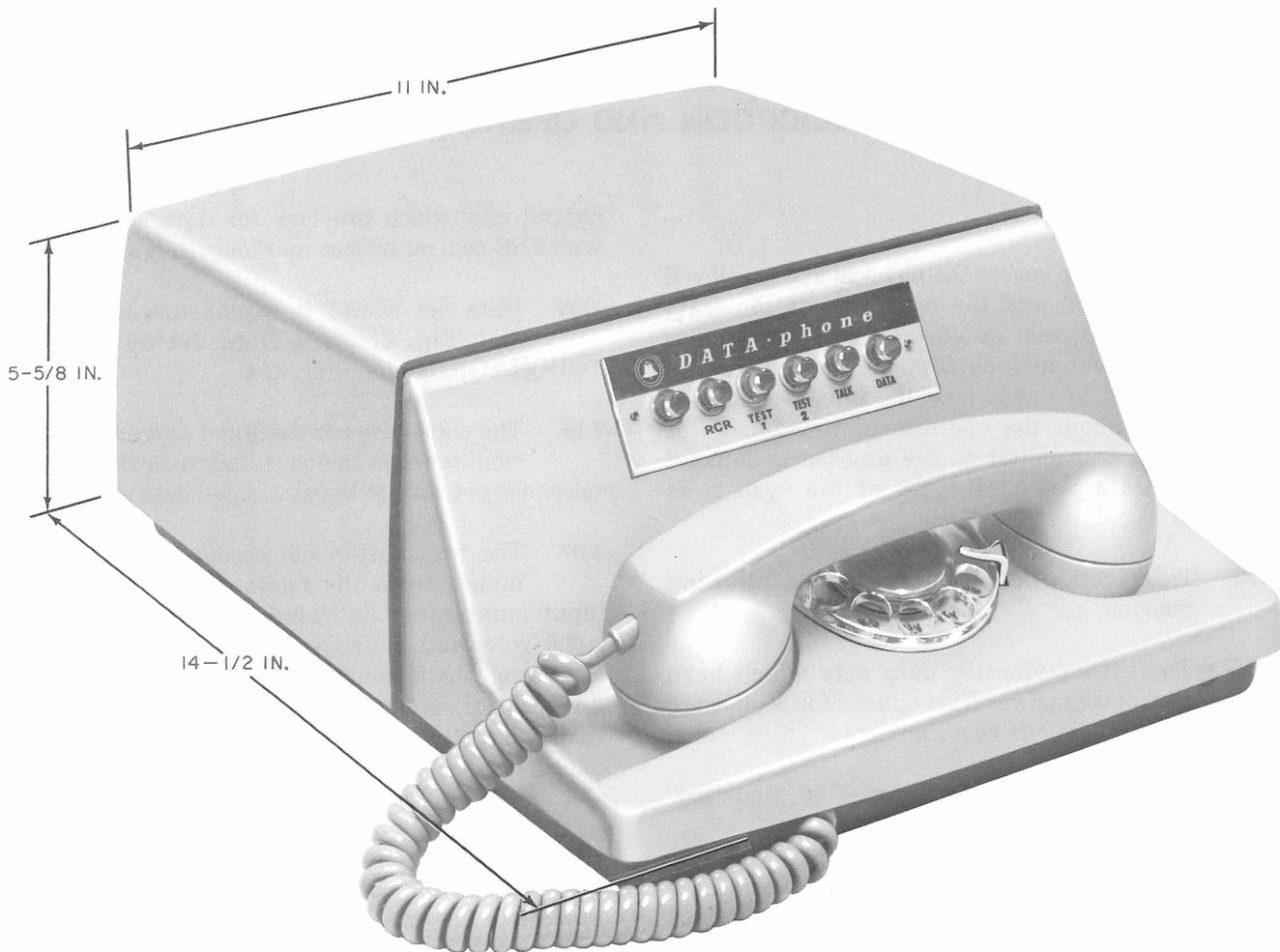


Fig. 2—Data Set 604A1—Front View

**Note:** The 1035B3 TOUCH-TONE pad is now rated MD and is replaced by the 1035C3A TOUCH-TONE pad.◀

**2. PHYSICAL DESCRIPTION**

**2.01** ▶The transmitter consists of five circuit pack cards, a 17A or 48A power unit, a 3A-type line control unit, a 6-button telephone set, a low-pass filter, two selecting networks, and other miscellaneous components (Fig. 4). The circuit pack cards are described in Table A.

**2.02** The transmitter weighs approximately 16.5 pounds and is housed in a 2-tone gray plastic case.

**2.03** The transmitter is designed to operate within a temperature range of +40 to 120°F and a relative humidity range of 0 to 95 percent.◀

**2.04** The business machine connection is made to the transmitter via the interface connector J1 (Fig. 5). The interface cord (which must not exceed 50 feet in length) and plug must be supplied by the customer. The plug attached to the interface cord must be a Cinch or Cannon type DB-19604-432, or equivalent, to mate with the interface connector J1. A Cinch DB-51226-1 hood or equivalent is recommended to hold the plug firmly in place.

**2.05** The interface leads of the transmitter that connect to the business machine are listed in Table B.



Fig. 3—Data Set 604A2—Front View

**2.06** Power for the transmitter must be obtained from a local  $117 \pm 10V$  60-Hz outlet at the customer location. A power cord for connecting the data set to the power receptacle is shipped with the data set.

**2.07** Earlier models of Data Sets 604A1 and 604A2 (Series 1) are factory-equipped with a 17A power unit. Later models of Data Sets 604A1 and 604A2 utilize a 48A power unit.

*Note:* The 17A power unit and the 3A1 line control unit are now rated MD, but information is retained in this section for those units already in the field.

**2.08** The 17A power unit requires  $60 \pm 0.5$  Hz, while the 48A power unit requires  $60 \pm 3.0$  Hz. Therefore, the 48A power unit will work satisfactorily on most emergency power sources furnished by the customer.

**2.09** Options for the data sets are listed in Table C.

### 3. FUNCTIONAL DESCRIPTION

**3.01** A functional block diagram of the transmitter is shown in Fig. 6. The function of the transmitter depends on whether the transmitter is in the talk mode or the data mode. The mode of operation is selected by depressing the TALK pushbutton for the talk mode or the DATA pushbutton for the data mode. Pushbutton functions for both models of the transmitter are shown in Fig. 7.

**3.02** When the transmitter is in the talk mode, it functions as any normal voice communication telephone. In the talk mode, the transmitter can handle voice communications and TOUCH-TONE signaling by the transmitter equipped for TOUCH-TONE operation.

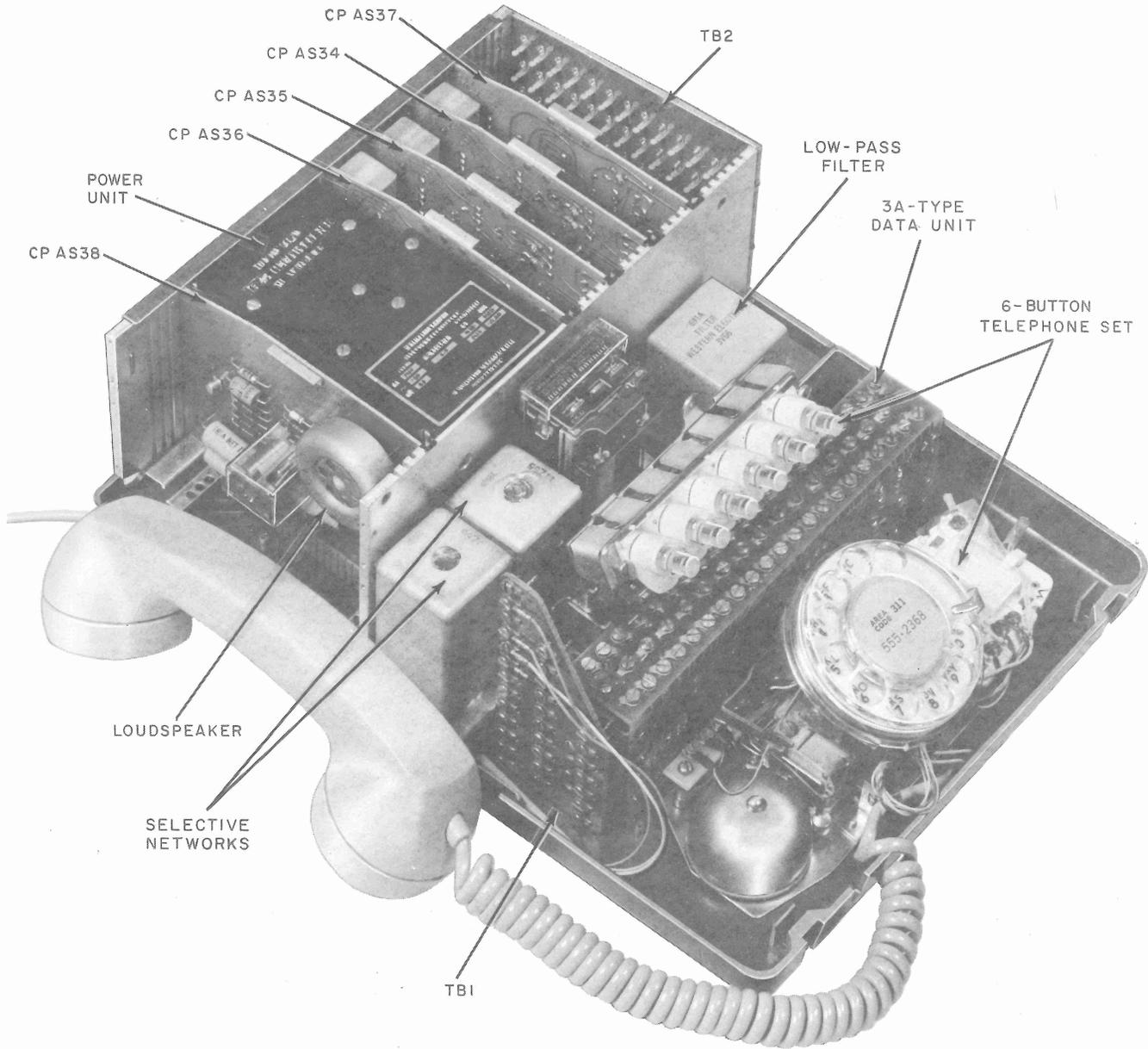


Fig. 4—Data Set 604A1—Covers Removed

**3.03** In the data mode, the transmitter will accept three analog signals from the business machine and transmit this data to the receiver. Transmission is accomplished by frequency modulating each signal and combining these signals (frequency multiplexing) as a data output. The transmitter utilizes an FM channel for each input. Each channel may be modulated for a 100-Hz peak deviation from the

center frequency. The center frequency of each channel is as follows:

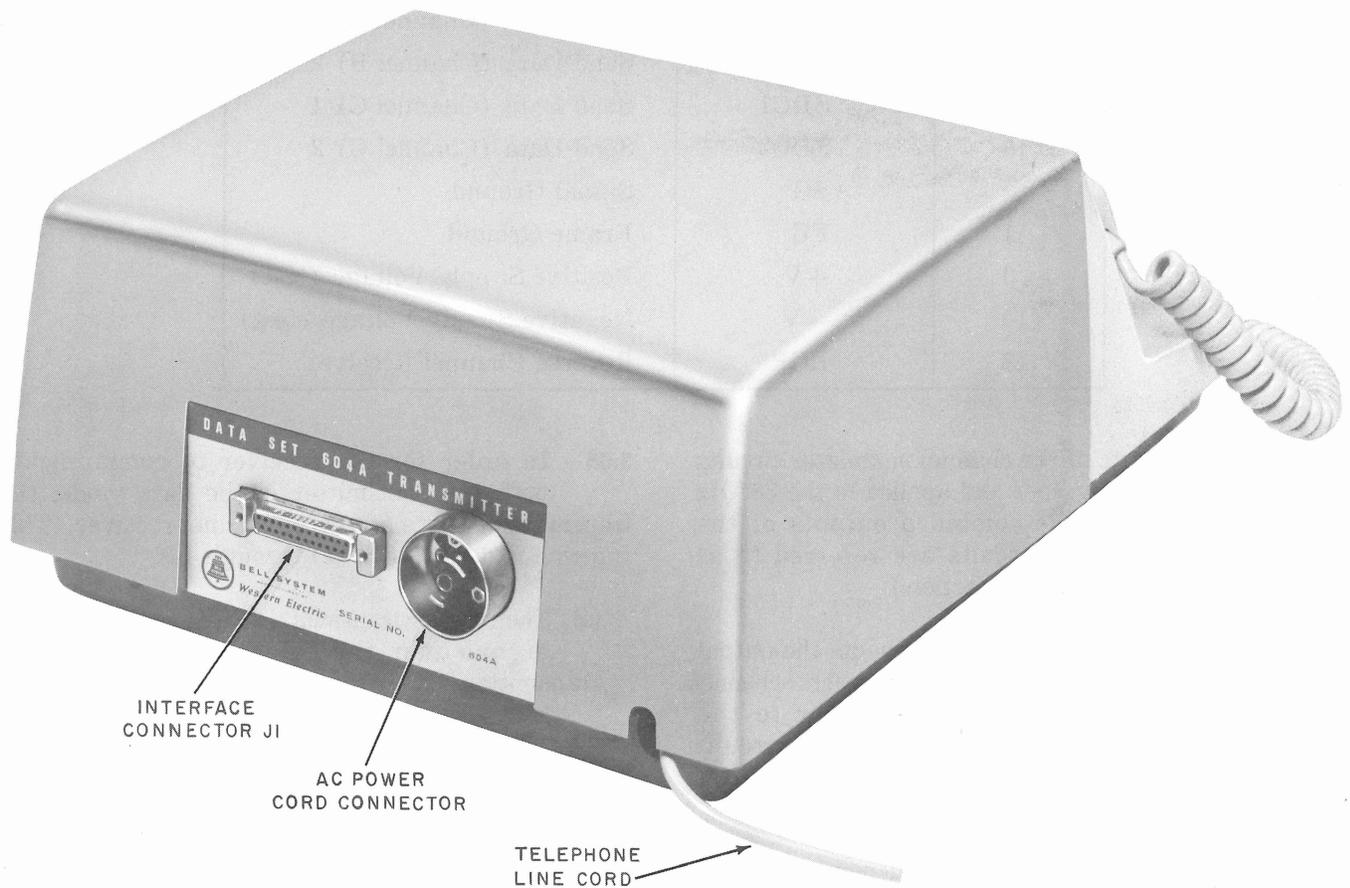
- (a) Channel A—1075 Hz
- (b) Channel B—1935 Hz
- (c) Channel C—2365 Hz.

**TABLE A**  
**CIRCUIT PACK (CP) DESCRIPTION**

CP NUMBER	DESCRIPTION
CP AS34	Channel A Modulator Circuitry
CP AS35	Channel B Modulator Circuitry
CP AS36	Channel C Modulator Circuitry
CP AS37	Reverse-Channel Receiver and Miscellaneous Circuitry
CP AS38	Miscellaneous Circuitry

**3.04** The three individual business machine input signals are transmitted in the following manner.

- (a) Each input signal is applied to a respective channel modulator circuit which causes a shift or modulation of the center frequency.
- (b) Each channel modulator circuit is equipped with an output amplifier which isolates the operation of that circuit from the other modulator circuits.



**Fig. 5—Data Set 604A-Type—Rear View**

**TABLE B**  
**INTERFACE CONNECTOR LEAD ASSIGNMENTS**

PIN NO.	DESIGNATION	LEAD ASSIGNMENT
21	AA	Automatic Answer
20	DTR	Data Terminal Ready
22	RI1	Ring Indicator 1
23	RI2	Ring Indicator 2
6	DSR	Data Set Ready
2	SDA1	Send Data (Channel A) 1
17	SDA2	Send Data (Channel A) 2
13	SDB1	Send Data (Channel B) 1
18	SDB2	Send Data (Channel B) 2
14	SDC1	Send Data (Channel C) 1
16	SDC2	Send Data (Channel C) 2
7	SG	Signal Ground
1	FG	Frame Ground
9	+V	Positive Supply Voltage (test)
10	-V	Negative Supply Voltage (test)
12	RCR	Reverse-Channel Receive

(c) The outputs of the channel modulator circuits are added together and applied to the 387-Hz tuned circuit. (The combined outputs of the channel modulator circuits are referred to as the output signal in this section.)

(d) The 387-Hz tuned circuit prevents the output signal from interfering with the reverse-channel signal transmitted by the receiver to the transmitter. From the 387-Hz tuned circuit, the output signal is passed to low-pass filter FL1.

(e) FL1 attenuates the high-frequency components of the output signal and passes the output signal to the line amplifier circuit.

(f) The amplifier circuit is used to adjust the output signal to a predetermined output level as determined by the option installed.

(g) From the amplifier circuit, the output signal is transmitted to the receiver via the ♦3A-type♦ Data Unit and the telephone line.

**3.05** In order for the receiver to communicate with the transmitter in the data mode, the transmitter utilizes a reverse-channel receiver. This function is described in (a) through (d).

(a) The receiver transmits a 387-Hz reverse-channel signal over the telephone lines to the transmitter.

(b) The transmitter accepts the signal via the ♦3A-type♦ Data Unit.

(c) From the data unit, the signal is passed to the reverse-channel receiver circuit of the transmitter (Fig. 6) through selective networks which reject any signal not at 387 Hz.

(d) Upon receiving a signal, the reverse-channel receiver circuit signals the transmitter operator by producing a 3000-Hz tone and causing the RCR lamp to light. This signal also causes grounded contact closure through the RCR interface lead to the business machine. These

TABLE C  
OPTIONS FOR DATA SET 604A-TYPE

FEATURE	OPTION		DESIG
Grounding	FG to SG		M*
Termination	600 ohms		N
	900 ohms		Q*
Output Level	-9 dBm	-12 dBm†	W
	-6 dBm	-9 dBm†	X*
	-3 dBm	-6 dBm†	Y
	-0 dBm	-3 dBm†	Z
Provides TOUCH-TONE capability for signaling	Add 1035B Station Unit (MD) (See Note)		T
Provides TOUCH-TONE capability for signaling	Add 1035C3A Station Unit (See Note)		U

**Note:** Only used with Data Set 604A1 where receiver is equipped for TOUCH-TONE reception.

\* Factory-supplied.

† Identifies options installed in Data Sets 604A1 and 604A2, series 2 and above.

actions indicate to the operator of the transmitter that the receiver is signaling the transmitter.

**3.06** The transmitter has the capability to disable any echo suppressors that may be on the line between the transmitter and the receiver. This is required because the echo suppressors might prevent the reverse-channel signal from the receiver reaching the transmitter. The echo suppressors are disabled by a 2025-Hz signal transmitted over the line from the transmitter to the receiver. This signal is produced as follows.

- (a) When the transmitter is switched from the talk mode to the data mode, the answer-back oscillator and timing circuit (a part of the 3A-type Data Unit) is conditioned to operate.
- (b) The timing circuit causes the data line to be silent for about 1.5 seconds and then keys the answer-back oscillator for about 3.5 seconds. The 2025-Hz signal, called the answer-back signal, is transmitted to the receiver.



**To ensure that the echo suppressors on a line between the transmitter and receiver will be disabled, the receiver must be in the data mode before the transmitter is switched to the data mode.**

**3.07** The automatic answer feature permits the transmitter to start transmitting automatically when the receiver operator calls the transmitting station, provided interface leads AA and DTR of the transmitter (Fig. 6) are grounded by the business machine. The automatic answering feature of the transmitter is described as follows.

- (a) When the receiver operator calls the transmitter, the ring detector portion of the 3A-type Data Unit recognizes ringing voltage and provides a contact closure to the business machine via interface leads RI1 and RI2. Upon detection of the ringing voltage, the answer-back oscillator and timing circuit of the transmitter operate.



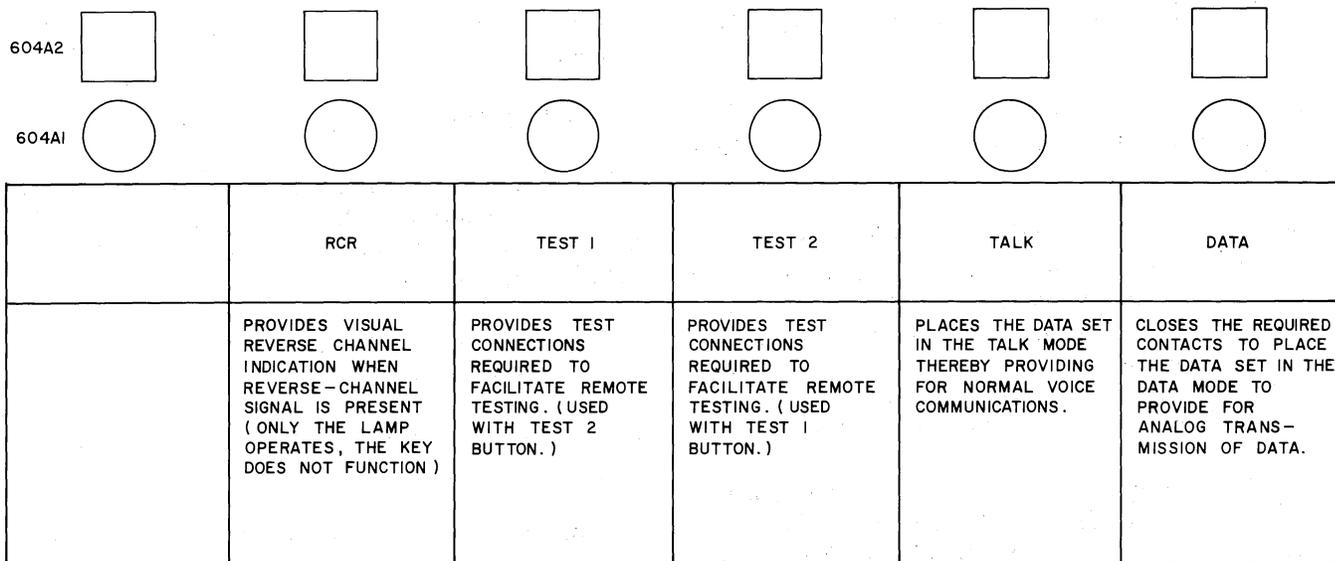


Fig. 7—Data Set 604A-Type—Control Buttons, Designations, and Functions

**Note:** Receiver must be in data mode before switching transmitter to data mode to ensure that echo suppressors will be disabled.

(d) Upon release of the DATA pushbutton, the DATA lamp lights and the TALK pushbutton key releases from the depressed position. (The DATA pushbutton does not lock in the depressed position.)

(e) Approximately 5 seconds after the DATA lamp lights, the transmitter is in the data mode and ready to transmit data to the receiver.

**4.03** If the receiver is arranged for automatic answering, the transmitter operator can initiate a call to the unattended receiver as follows.

(a) Call the receiver location as outlined in 4.02 (a) and (b).

(b) After the transmitter operator hears audible ringback and a short period of silence followed by a 2025-Hz tone for about 3.5 seconds, the receiver is ready to receive data. The transmitter operator then depresses DATA pushbutton.

(c) Upon release of the DATA pushbutton, the DATA lamp lights and the TALK pushbutton releases from the depressed position. About 5

seconds after the DATA lamp lights, the transmitter is ready to transmit data.



*If using a line that is equipped with echo suppressors, do not use the unattended transmitter method of operation because the echo suppressors may not be disabled. (Refer to 3.06.)*

**4.04** The transmitter can begin transmitting data to the receiver automatically if the transmitter is arranged for automatic answering. This feature is completed (as outlined in 3.07) without an operator present to perform the operations as described in either 4.02 or 4.03.

**4.05** Coordination between the transmitter and receiver locations is required to ensure that the transmitter and receiver are returned to the on-hook (idle) condition upon completion of data transmission. The coordination must be made on a local level to ensure that the units of the system are not on the line in the data mode for more time than necessary to complete data transmission. The transmitter is returned to idle condition as follows.

(a) Lift the telephone handset from the cradle on the transmitter. Depress the TALK pushbutton on the front of the transmitter. The DATA lamp on the transmitter will extinguish.

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The TALK pushbutton will lock in the depressed position.

(b) Replace the handset on the cradle of the transmitter. The transmitter is now in the idle condition.

(c) The transmitter will automatically return to idle condition if central office battery on the telephone line is lost or if the business machine opens the grounded contact closure to the transmitter via interface lead DSR. The DATA lamp will extinguish to indicate that the transmitter has returned to idle condition.

(d) When the transmitter automatically returns to idle condition, the receiver will not necessarily return to idle condition. Therefore,

similar procedures must be followed at the receiver.

### 5. REFERENCES

5.01 For more detailed information about the transmitter and the associated receiver, refer to the following circuit description (CD), schematic drawing (SD), and section:

- CD-1D105-01 (Data Set 604A-Type—Circuit Description)
- SD-1D105-01 (Data Set 604A-Type—Schematic Drawing)
- Section 596-018-100 (Data Set 604B-Type—Description).