DATA SET 604B-TYPE

DESCRIPTION AND OPERATION

CONTENTS PAGE

1. GENERAL

1.01 This section contains the physical and functional description and operation of Data Set 604B-type. Information concerning the business machine associated with the data set is not included.

1.02 This section is reissued for the following reasons:

(a) To indicate the change to the reverse-channel output and answer-back level option.

(b) To provide information on changes to various apparatus.

(c) To change the rating of the section from Special to Standard. The Special rating is no longer used to limit the distribution of Bell System Practices. This does not affect the rating of the apparatus, which remains Special.

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

1.03 The Data Set 604B-type is designed for DATA-PHONE® service over local switched network or private line facilities. It is the receiving data terminal at the customer location.

1.04 Data Set 604B-type is designed to receive three frequency-multiplexed frequency-modulated signals simultaneously over a switched telephone network from the associated transmitter.

1.05 The data set provides three individual outputs to the associated business machine. Each output ranges in voltage between +2.5 and −2.5 volts and in frequency between dc and 105 Hz. Each output channel of the data set has an output impedance of approximately 1000 ohms. Each output channel should be terminated into approximately 100,000 ohms.

1.06 The data set also provides the following features if required and so arranged:

(a) It can signal the transmitter in the data mode manually or automatically.

(b) It provides a means for normal voice communications when not receiving data.

(c) It provides a means of testing each of the data channels.

(d) It answers and receives data automatically without an operator being present.

2. PHYSICAL DESCRIPTION

2.01 Data Set 604B1 is shown in Fig. 1. The data set is comprised of four circuit pack cards, a 48B power unit, a 3A2 data unit, a filter FL1, a 6-button key unit, and a rotary or TOUCH-TONE® dial assembly. The components are housed in a 2-tone gray plastic case as shown in Fig. 2. Refer to Table A for the circuit card nomenclature.

2.02 The data set weighs approximately 18 pounds and is designed to operate properly within the temperature range of +40° to +120°F and a relative humidity range of 0 to 95 percent.

2.03 The business machine connection to the data set is made via the interface connector J1. The interface connection cord and plug must be supplied by the customer. The plug attached to the interface connection cord must be a Cinch or Cannon type DB-19604-432, or equivalent, to mate

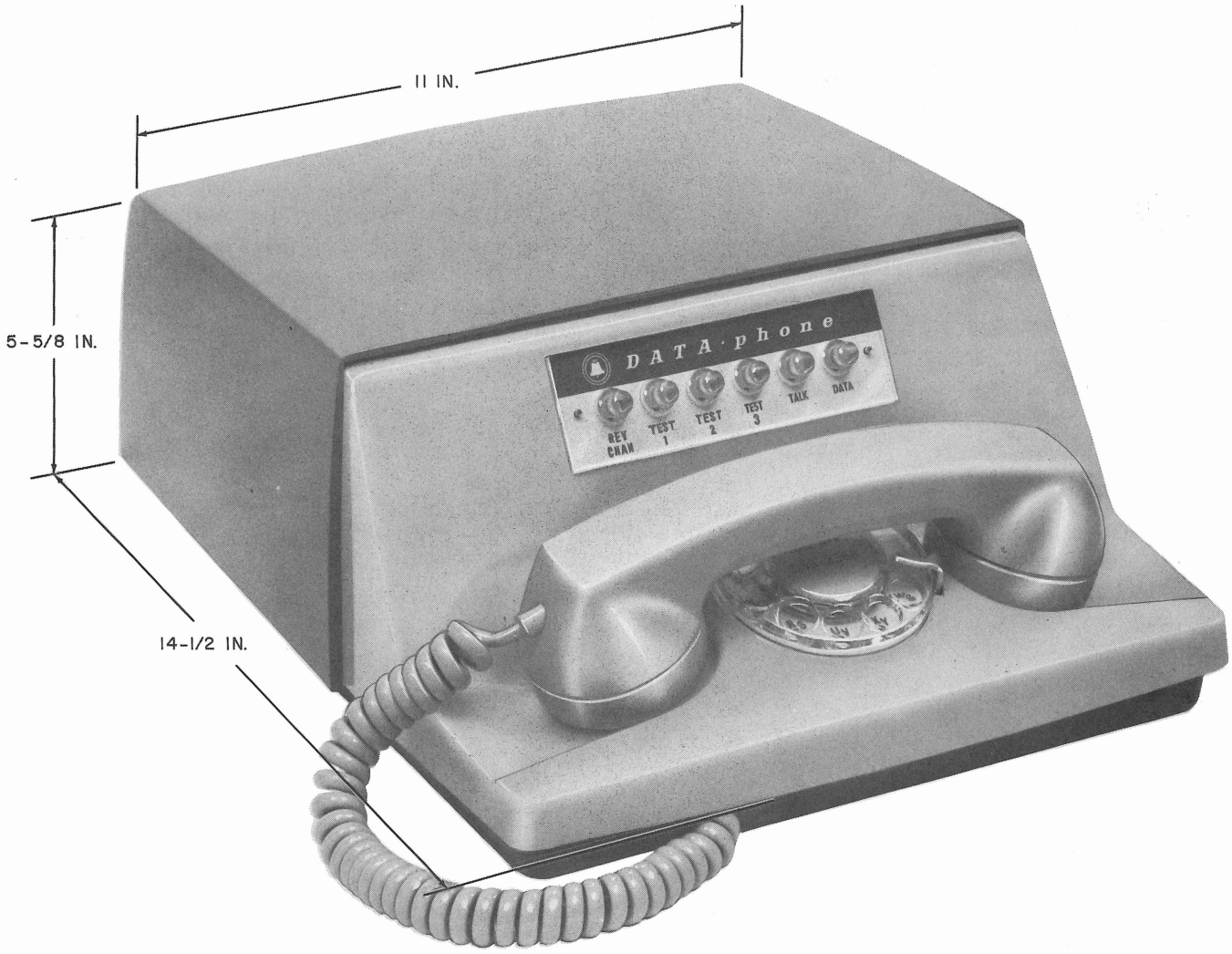

Fig. 1—Data Set 604B1, Front View

with the interface connector J1. The interface cord should not exceed 50 feet in length.

Note: The interface connection cable (provided by the customer) should provide a separate ground lead for the following:

- One for each received data lead: receive data channel A (RDA), receive data channel B (RDB), and receive data channel C (RDC). These grounds should be connected to the signal ground (SG) at interface connector J1.

- One which is connected to the signal ground (SG) at interface connector J1 for grounding the leads data terminal ready (DTR) and automatic answer (AA). This ground lead may also be used for a ground return for the lead data set ready (DSR) and reverse channel send (RCS).

2.04 The interface leads that connect to the associated business machine are shown in Table B. Those pins not shown in Table B are not used.

2.05 The data set operates on 105 to 125 volts 60 $\pm$0.5 Hz supplied at the customer location via the ac power cord.

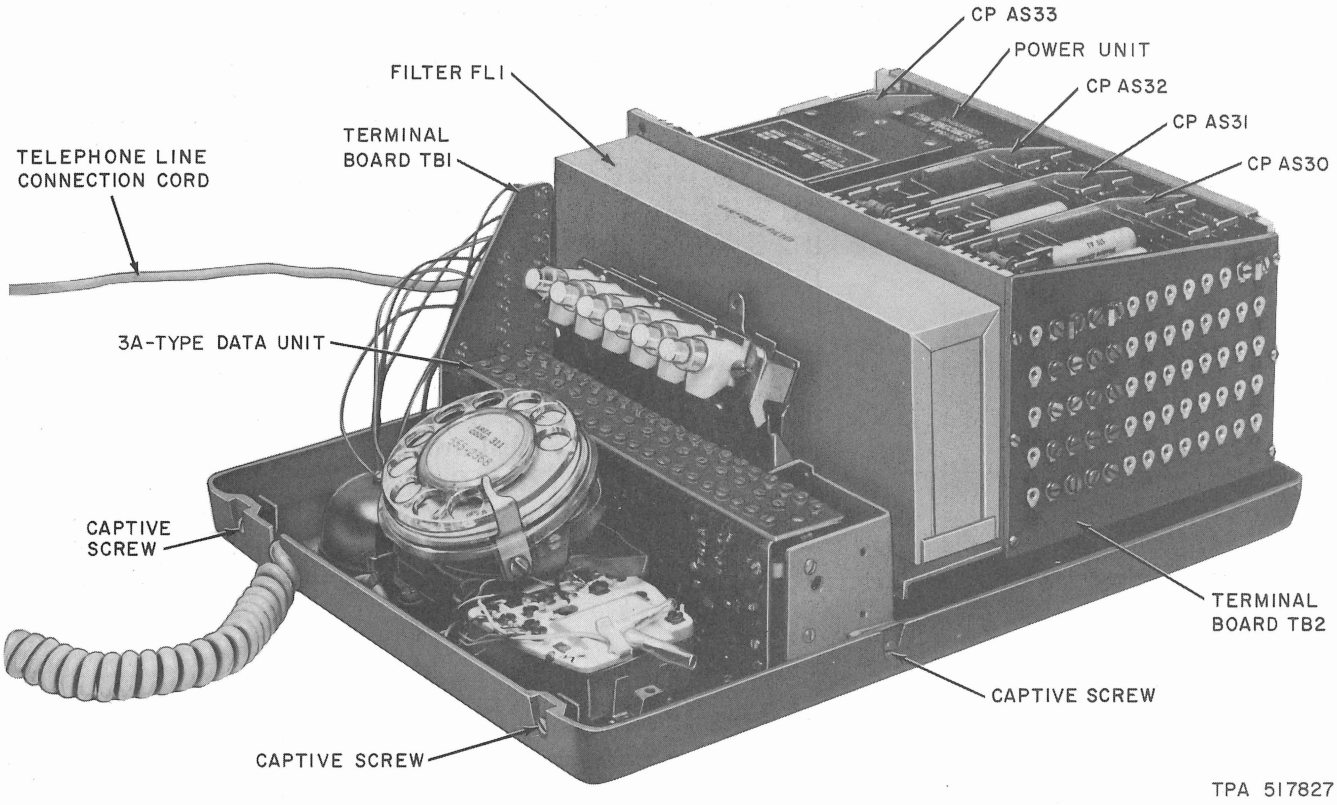

Fig. 2—Data Set 604B1, Covers Removed

TABLE A

CIRCUIT PACK (CP) NOMENCLATURE

CP NUMBER	NOMENCLATURE
CP AS30	Channel A Demodulator Circuitry
CP AS31	Channel B Demodulator Circuitry
CP AS32	Channel C Demodulator Circuitry
CP AS33	Reverse-Channel Transmitter and Miscellaneous Circuitry

2.06 The models of the data set are the same except for the type dial used in each:

- Data Set 604B1 is equipped to be used with dial pulse telephone equipment.
- Data Set 604B2 is equipped to be used with TOUCH-TONE telephone equipment.

2.07 Each model of the data set can be arranged for the options of operation shown in Table C and outlined in Section 596-018-200.

2.08 Each data set is also shipped with a telephone line connection cord as shown in Fig. 3.

2.09 Data Sets 604B1 and 604B2 series 2 identify the later models of this data set. The series 2 sets are identical to series 1 except that the later models contain the newer 48B power unit and the 3A2 data unit.

2.10 The 48B power unit replaces the 17B power unit to reduce power input frequency sensitivity and cost. the 3A2 data unit is used for line control and provides compatibility for the Data Set 604B-type with ESS offices and Unigauge lines.

2.11 The series 2 models of Data Set 604B-type also have a reduced output level for reverse channel operation, as indicated in Table C.

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
11	RCS	Reverse Channel Send
25	RDC	Receive Data (Channel C)
24	RDB	Receive Data (Channel B)
3	RDA	Receive Data (Channel A)
7	SG	Signal Ground
1	FG	Frame Ground
9	+18	Positive Supply Voltage (test)
10	−18	Negative Supply Voltage (test)

TABLE C

OPTIONS AVAILABLE

FEATURE	OPTION	DESIG	AVAIL ON		QUANTITY
			604B1	604B2	
Termination	600 ohms	N	†	†	One Per Circuit
	900 ohms	Q	*	*	
Reverse Channel Output and Receiver Input Level	−12 dBm	R‡	†	†	One Per Circuit
	−3 dBm	S	†	†	
	−6 dBm	T	*	*	
	−9 dBm	V	†	†	
Common Signal and Frame Ground	SG & FG Connected	Z	*	*	One Per Circuit

* Identifies options supplied and installed by the factory.

† Identifies options which may be installed at the time of data set installation by removing the non-compatible factory-supplied option and wiring as shown.

‡ Data sets identified as Series 1 models have an option level of 0 dBm when option R is designated.

3. FUNCTIONAL DESCRIPTION

3.01 The function of the data set depends on whether it is in the talk mode or the data mode of operation, selected by depressing the TALK pushbutton or DATA pushbutton. The pushbuttons of models 604B1 and 604B2 are shown in Fig. 1 and Fig. 4, respectively.

3.02 When the data set is in the talk mode, it functions as any normal voice communication telephone. In the talk mode, the data set can only handle voice communications.

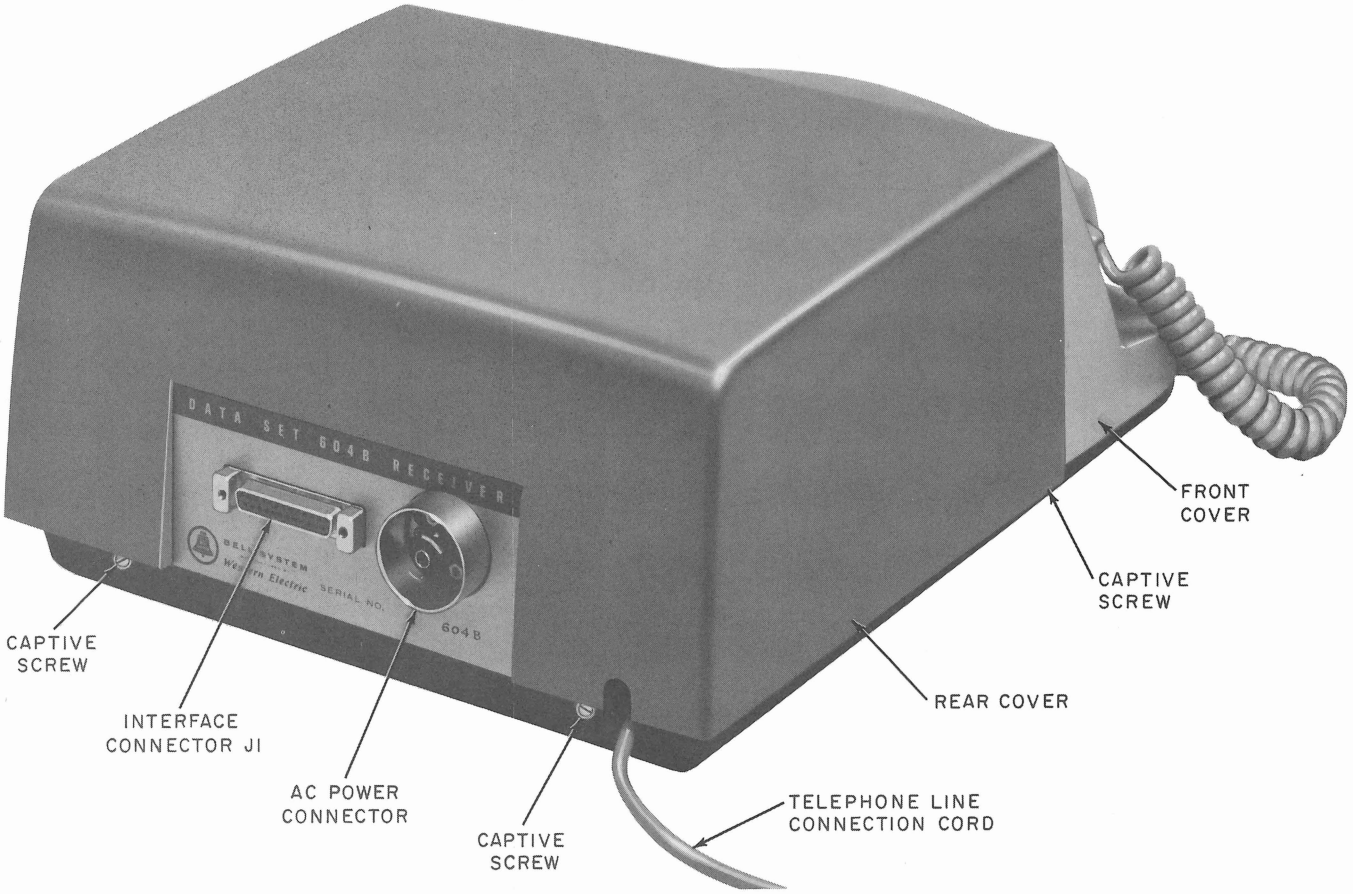

Fig. 3—Data Set 604B-Type Rear View

3.03 A functional block diagram of the data set is shown in Fig. 5.

3.04 In the data mode of operation, the basic function is to receive a frequency-multiplexed frequency-modulated (FM) signal from the associated transmitter, and pass three individual output signals to the associated business machine. The multiplexed signal consists of three FM channels. The data of each channel is contained in the modulation of the center frequency of each channel. Each channel has a maximum 100-Hz peak deviation of the center frequency as follows:

(a) Channel A—1075 $\pm$100 Hz

(b) Channel B—1935 $\pm$100 Hz

(c) Channel C—2365 $\pm$100 Hz

3.05 The three FM signals are simultaneously received, separated, demodulated, and passed to the associated business machine in the following manner:

(a) The three FM signals are received simultaneously in the 3A2 data unit via the telephone line. From the data unit, they are passed to filter FL1.

(b) The function of filter FL1 is to separate the three FM signals and pass the signals to their respective demodulator circuits as shown in Fig. 5. Filter FL1 is comprised of three separate bandpass filter circuits. The three circuits operate as follows:

(1) The first is tuned to pass signals in the range of 1075 Hz; its output is passed to the channel A demodulator circuit.

Fig. 4—Data Set 604B2, Front View

(2) The second is tuned to pass signals in the range of 1935 Hz; its output is passed to the channel B demodulator circuit.

(3) The third is tuned to pass signals in the range of 2365 Hz; its output is passed to the channel C demodulator circuit.

(c) Each channel demodulator circuit operates in the same manner. The demodulator circuit demodulates its respective FM signal and passes the data to the miscellaneous circuits.

(d) The miscellaneous circuits do not perform a function in the data mode.

3.06 The data set can communicate with the transmitter while in the data mode by using the reverse-channel transmitter function. This is done in the following manner:

(a) The reverse-channel transmitter must be operated either manually or by the associated business machine. This can be done in the following manner:

- To manually operate the reverse-channel transmitter, depress the REV CHAN pushbutton on the front of the data set.

- The associated business machine can operate the reverse-channel transmitter by grounding the RCS interface lead.

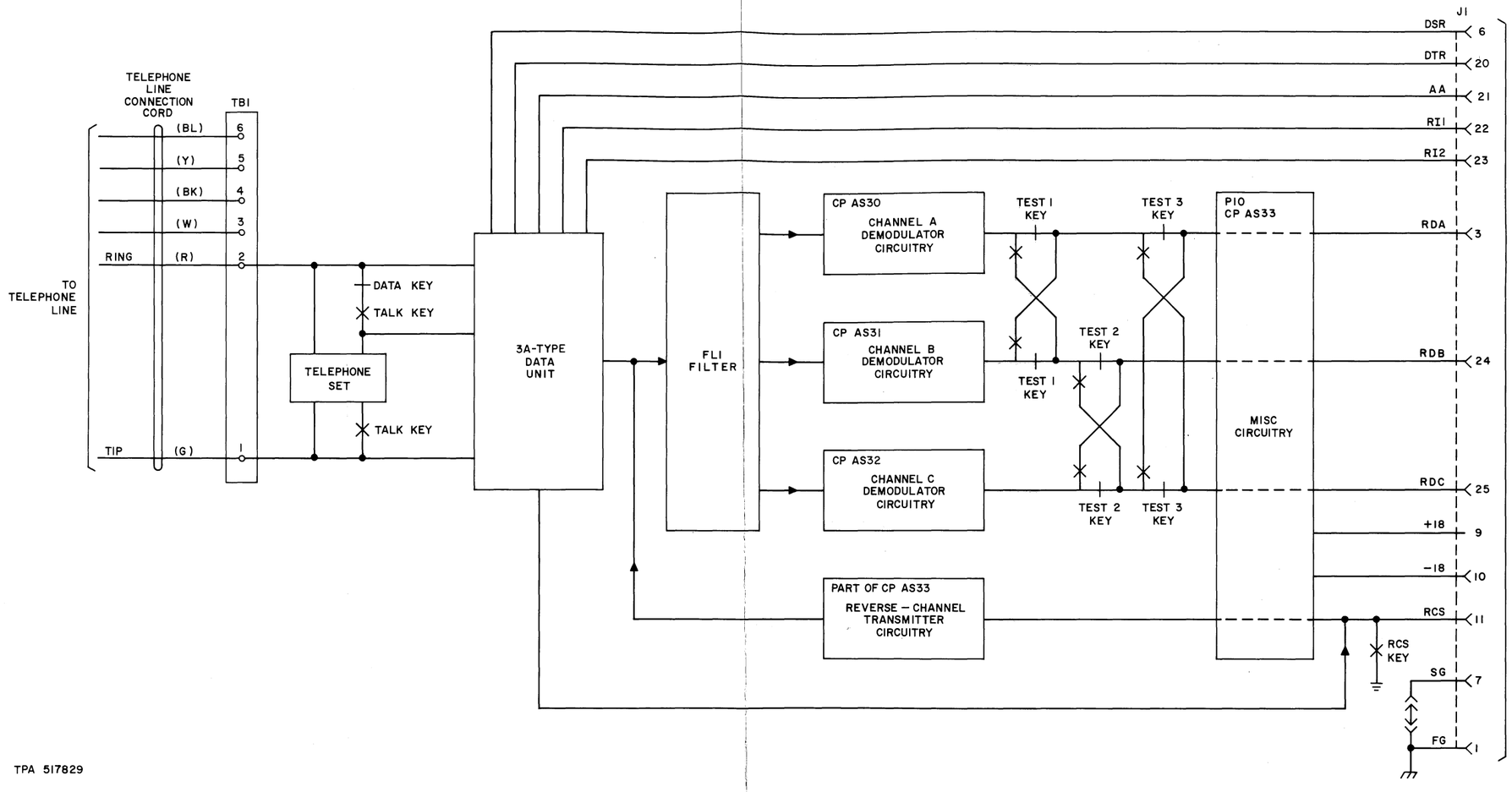

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Fig. 5—Data Set 604B-Type, Block Diagram

(b) When the reverse-channel transmitter is operated (either manually or by the associated business machine), the miscellaneous circuits are conditioned to ground the interface leads RDA, RDB, and RDC to the associated business machine.

(c) The reverse-channel transmitter will produce a 387-Hz signal for the the length of time that the transmitter is operated. This signal is passed through the 3A-type data unit over the telephone lines to the associated transmitter of the system.

3.07 The data set is capable of disabling the echo suppressors. This is necessary to ensure that the 387-Hz signal transmitted by the receive data set will reach the transmitter. The echo suppressors can be disabled by the following operation.

(a) When the data set is switched from the talk mode to the data mode (either automatically or manually), the answer-back oscillator and timing circuit (part of the 3A-type data unit) are conditioned to operate.

(b) The timing circuit will cause a silent period for about one second and then allow about 3.5 seconds of the 2025-Hz signal (produced by the answer-back oscillator) to be transmitted to the transmitter.

(c) The 2025-Hz signal will disable the echo suppressors if the transmitter end is quiet.

3.08 Data can be received automatically if the interface leads AA and DTR are grounded in the associated business machine. This is the automatic answering function and is completed as follows:

(a) When the operator at the transmitting end calls the data set, the ring detector circuitry of the 3A-type data unit detects the 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 are conditioned to operate.

(b) The timing circuit will now perform the function as outlined in 3.07.

(c) After the 2025-Hz tone has been produced, the data set will start receiving data from the associated transmitter. The data information is received and passed to the business machine as outlined in 3.04 and 3.05.

4. OPERATION

4.01 The operation and test features of the data set are controlled by the pushbutton keys on the front of the data set. The designation and function of the six pushbuttons are shown in Fig. 6. The complete functional description and operation of the TEST 1, TEST 2, and TEST 3 pushbuttons are outlined in Section 596-018-500.

REV CHAN	TEST 1	TEST 2	TEST 3	TALK	DATA
PRESSING WILL INITIATE 387 HZ REVERSE CHANNEL SIGNAL. SIGNAL IS STOPPED WHEN BUTTON IS RELEASED. USED TO SIGNAL DISTANT END EQUIPMENT.	REVERSES OUTPUT SIGNALS OF CHANNEL A WITH CHANNEL B. USED FOR OPERATIONAL TESTING.	REVERSES OUTPUT SIGNALS OF CHANNEL B WITH CHANNEL C. USED FOR OPERATIONAL TESTING.	REVERSES OUTPUT SIGNALS OF CHANNEL A WITH CHANNEL C. USED FOR OPERATIONAL TESTING.	PLACES THE DATA SET IN THE TALK MODE THEREBY PROVIDING FOR NORMAL VOICE COMMUNICATIONS	CLOSES THE REQUIRED CONTACTS TO PLACE THE DATA SET IN THE DATA MODE

Fig. 6—Data Set 604B-Type, Control Buttons, Designations, and Functions

4.02 An operator is required to operate the data set manually. To initiate a call to the transmitter end, the operator of the data set must use the following procedure:

(a) Lift the handset from the cradle and depress the TALK pushbutton if not already locked in the depressed position.

(1) Ensure that the TALK pushbutton locks down when depressed.

(2) With the TALK pushbutton locked in the depressed position, the data set is in the talk mode.

(b) Dial the telephone number of the transmitting end location.

(c) Depress the DATA pushbutton.

(1) This is done only after the operators of both the transmitter and receive ends have agreed to transmit data.

(2) Upon release of the DATA pushbutton, the DATA lamp will light dimly and the TALK pushbutton will release from the locked depressed position.

Note: The DATA pushbutton does not lock in the depressed position.

(d) When the DATA lamp is lighted brightly, the data set is ready to receive data from the transmitting end.

4.03 If the transmitter is arranged for automatic answering, the operator at the receive end can initiate a call to an unattended transmitter. The operator must use the following procedure to initiate this type of call:

Note: If the receive location is operated over a line known to be equipped with echo suppressors, it is suggested that this operation procedure not be used.

(a) Call the transmitting location in the same manner as outlined in 4.02(a) and (b).

(b) Depress the DATA pushbutton on the front of the data set.

(1) This should be done only after the operator at the receive end has heard the transmitter telephone set ring and a short period of silence immediately followed by a 2025-Hz tone for about 3.5 seconds. The 2025-Hz tone signifies the transmitting end is ready to transmit data.

(2) Upon release of the DATA pushbutton, the DATA lamp will light dimly and the TALK pushbutton will release from the locked depressed position.

Note: The DATA pushbutton does not lock in the depressed position.

(c) When the DATA lamp is lighted brightly, the data set is ready to receive data from the transmitter.

4.04 The data set can also begin receiving data from the transmitter automatically if it is arranged for automatic answering. This feature is completed as outlined in 3.08 without an operator present to perform the operations as outlined in either 4.02 or 4.03.

4.05 Coordination between the transmitting end and the receive end is required to ensure that the transmitter and receive data set are returned at the same time to the on-hook (idle) condition. The coordination must be made on a local level. This is to ensure that the units of the system are not on the line (in the data mode) for any more time than necessary to complete the data transmission. The receive data set can be placed in the idle condition as follows:

(a) To manually return to the on-hook (idle) condition, the operator must use the following procedure:

(1) Lift the telephone handset from the cradle on the receiver.

(2) Depress the TALK pushbutton.

- The DATA lamp will extinguish.
- The TALK pushbutton will lock in the depressed position.

(3) Replace the handset into the cradle of the data set. The receive data set is

now in the idle condition to await the next data transmission.

(b) The receive data set will automatically return to the on-hook (idle) condition if either the central office battery over the telephone lines is lost or the business machine opens the grounded contact closure through the interface lead DSR. Automatic return to the idle condition is verified only when the DATA lamp extinguishes.

4.06 The operator at the receive data set can signal the operator at the transmitter at any time while the receive data set is in the data mode. This is done by depressing the REV CHAN pushbutton which functions as outlined in 3.06. The reverse-channel signal will be produced as long as the REV CHAN pushbutton is depressed or the RCS interface lead is grounded by the associated business machine.

5. REFERENCES

5.01 For more detailed information on Data Set 604B-type refer to the following list:

- CD-1D101-01 (Data Set 604B-Type, Circuit Description)
- SD-1D101-01 (Data Set 604B-Type, Schematic Description)
- Section 590-006-105 (Data Set 604B-Type—Reference Guide)