DATA SET 404B1

DESCRIPTION

1. GENERAL

1.01 This section contains a physical and functional description of Data Set (DS) 404B1. This set is a nonintegrated 4-wire voiceband data transceiver capable of transmitting and receiving signals of a multifrequency 2-out-of-10 code format. The 404B1 operates full-duplex and is continuously on line, unless switched by associated station equipment.

1.02 This section is reissued to update information given in Issue 1. Because of extensive revision, change arrows have been omitted.

1.03 The transmitter accepts voltage signals from the business machine at the interface and converts them into voice-frequency signals for transmission over telephone lines.

1.04 The receiver accepts the voice-frequency signal from the line, detects the frequencies present, and converts them into voltage signals which are passed through the interface to the business machine. The transceiver is capable of handling a maximum of 20 data characters per second.

1.05 DS 404B1 is used primarily for the transmission of coordination signals over the voice frequency channel for business machines such as facsimile scanners and printers at DS 303-type wideband data stations.

1.06 A loop-back test feature is incorporated within the data set. The remote loop-back feature is controlled from Data Auxiliary Set (DAS) 806B.

2. PHYSICAL DESCRIPTION

2.01 Data Set 404B1 (Fig. 1 and 2) consists of a single nest with slots to accept six circuit packs. Two wire-spring relays, a 637B filter, and a 2552B transformer are mounted on the same chassis to the right of the nest.

2.02 The data set is 11 inches wide, 6 inches high, and 10 inches deep. It weighs approximately 17-1/2 pounds.

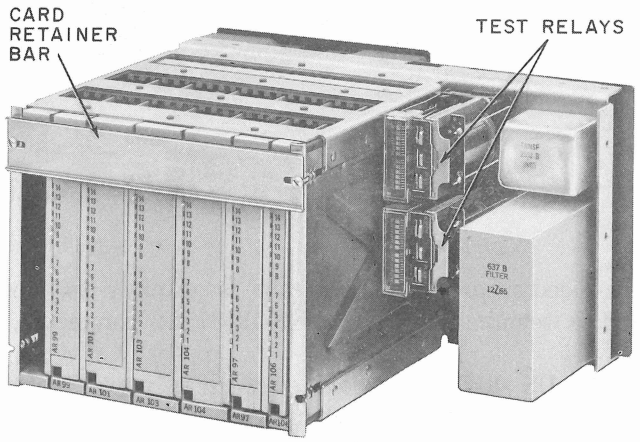

Fig. 1—Data Set 404B1—Front View

2.03 DS 404B1 can be mounted individually on a 19-inch relay rack, or adjacent to a DAS 806B on 23-inch or 25-inch relay racks using coded 87-type mounting brackets. For proper code of bracket, refer to section 593-800-200.

2.04 The front of the chassis is equipped with a card-retainer bar. The back of the chassis has two removable coverplates for access to and protection of the exposed chassis wiring.

2.05 DS 404B1 is connected to the adjacent DAS 806B by means of the data cable (M14C cord) provided with the DS 404B1.

2.06 Customer interface connections are made via the KS-19087 L2 connector on the left side of the chassis extension at the rear of the set. The

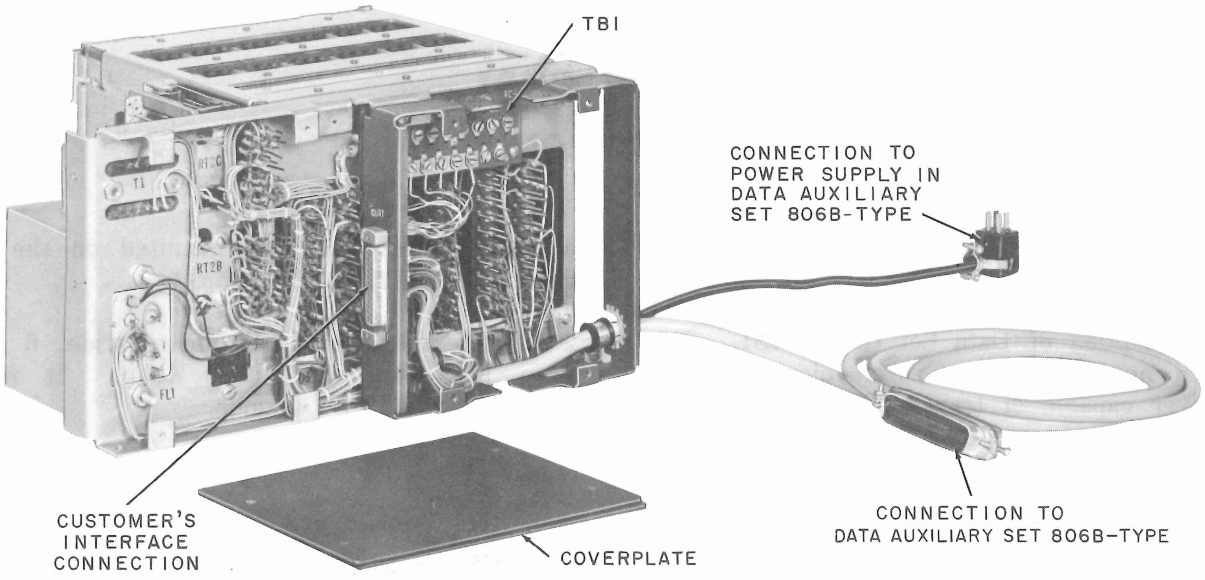

Fig. 2—Data Set 404B1—Rear View

low-speed customer interface cable is customer-provided and is terminated with a KS-19087 L2 connector.

2.07 DS 404B1 is provided with a power cable (P95M062) with which it obtains power from the adjacent DAS 806B. A KS-8586 L5 socket is provided on the DS 404B1 to receive a return power cable from the DAS 806B.

3. FUNCTIONAL DESCRIPTION

A. Transmitter

3.01 The transmitter section of DS 404B1 has two channel oscillators with associated drivers and transmitter line pad. Figure 3 is a block diagram of the transmitter section of DS 404B.

3.02 The oscillators provide five separate frequencies in each of the two channels. The output of one oscillator in each channel provides the 2-out-of-10 multifrequency format.

3.03 Table A lists the two rest tones and the four keyed tones for each channel, and the frequency assignment for each input lead.

3.04 A transmitted single symbol consists of one frequency from each group. The 2-out-of-10 code produces a total of 25 frequency combinations or symbols.

3.05 The rest tones (600 Hz, channel A; 1098 Hz, channel B) are produced by a negative potential (at least -3 volts below ground potential) on each of the four input leads of each channel, eg, A1-A4 and B1-B4. When a positive potential (+3 volts or greater above ground potential) is placed on one of the four input leads of each channel, the corresponding frequency is produced from the oscillator in each channel.

3.06 These output frequencies, one from each group, are combined in parallel and are coupled by the transformer to the line through a pad at a nominal power level of -10 dBm on the A channel frequency, and -9 dBm on the B channel frequency.

B. Receiver

3.07 The receiver section of DS 404B1 converts the multifrequency line signal into voltage signals which are usable at the customer interface. The receiver consists of 5 parts: an AGC amplifier, a band-separation filter, a limiter, detector circuits, and the A and B channel EIA interface adapter and test gate (Fig. 3).

3.08 There are two sets of installer options required in DS 404B1. These options are located at the receiver input and are completed by

TABLE A

KEYED OSCILLATOR ASSIGNMENTS

LOW GROUP	MIDDLE GROUP
A0 — 600 Hz	B0 — 1098 Hz
A1 — 697 Hz	B1 — 1209 Hz
A2 — 770 Hz	B2 — 1336 Hz
A3 — 852 Hz	B3 — 1477 Hz
A4 — 941 Hz	B4 — 1633 Hz

terminal straps located on CP AR99. Option Y or Z provides either 600-ohm or 900-ohm line termination, respectively, at the receiver input. Option X provides a 6-dB pad to reduce the gain of the receiver. Option W bypasses the pad. Refer to Table B for DS 404B1 options.

3.09 The receiver accepts the line signal at the input of the AGC amplifier on the DT1 and DR1 leads. A series of varistors provides lightning protection at the receiver input.

3.10 The AGC amplifier provides linear amplification of the data signal over the entire data band. It reduces the range in amplitude levels of the line signals fed to the limiters.

3.11 The band-separation filter divides the line signals into two frequency bands. The filter consists of a low-pass section and a bandpass section which make up the A and B channels of the receiver. to both the A and B channel detectors.

3.12 The outputs of the low-pass and bandpass filters are fed through the A and B limiters to ensure that signals of equal amplitude are fed

3.13 Specific signals are detected from the frequencies presented to the A and B detector section of the receiver. The rectified dc output of the detector operates a relay. The relay then connects +18 volts to a resistance-diode network which provides EIA potentials to be used by the business machine at the customer interface. EIA signals are defined as follows: OFF (less than -3 volts with respect to ground); ON (more than +3 volts with respect to signal ground). The terminating impedance of the receiving end of the interface circuits should have a dc resistance of not less than 3000 ohms.

C. Testing Circuitry

3.14 Testing circuitry is incorporated in DS 404B1 to provide a remotely controlled loop-back test of the receiver and transmitter circuitry. Under control of the associated data station, the relay RT2B operates to the ground on the RT2B lead and places DS 404B1 in the remote test mode. The customer circuits are disconnected from the interface circuitry of the data set and are terminated. The output of each receiver circuit is connected to the input of the corresponding transmitter circuit, thereby utilizing the detected signal to key the data transmitter.

TABLE B

OPTIONS FOR DATA SET 404B

FEATURES		OPTIONS	TERMINALS ON CP AR99	
			FROM	TO
Receiver Input Impedance	600Ω	Y	6	7
	900Ω	Z	5	6
			1	3
Receiver Input Attenuator	6dB	X	2	4
			1	2
	0dB	W	3	4

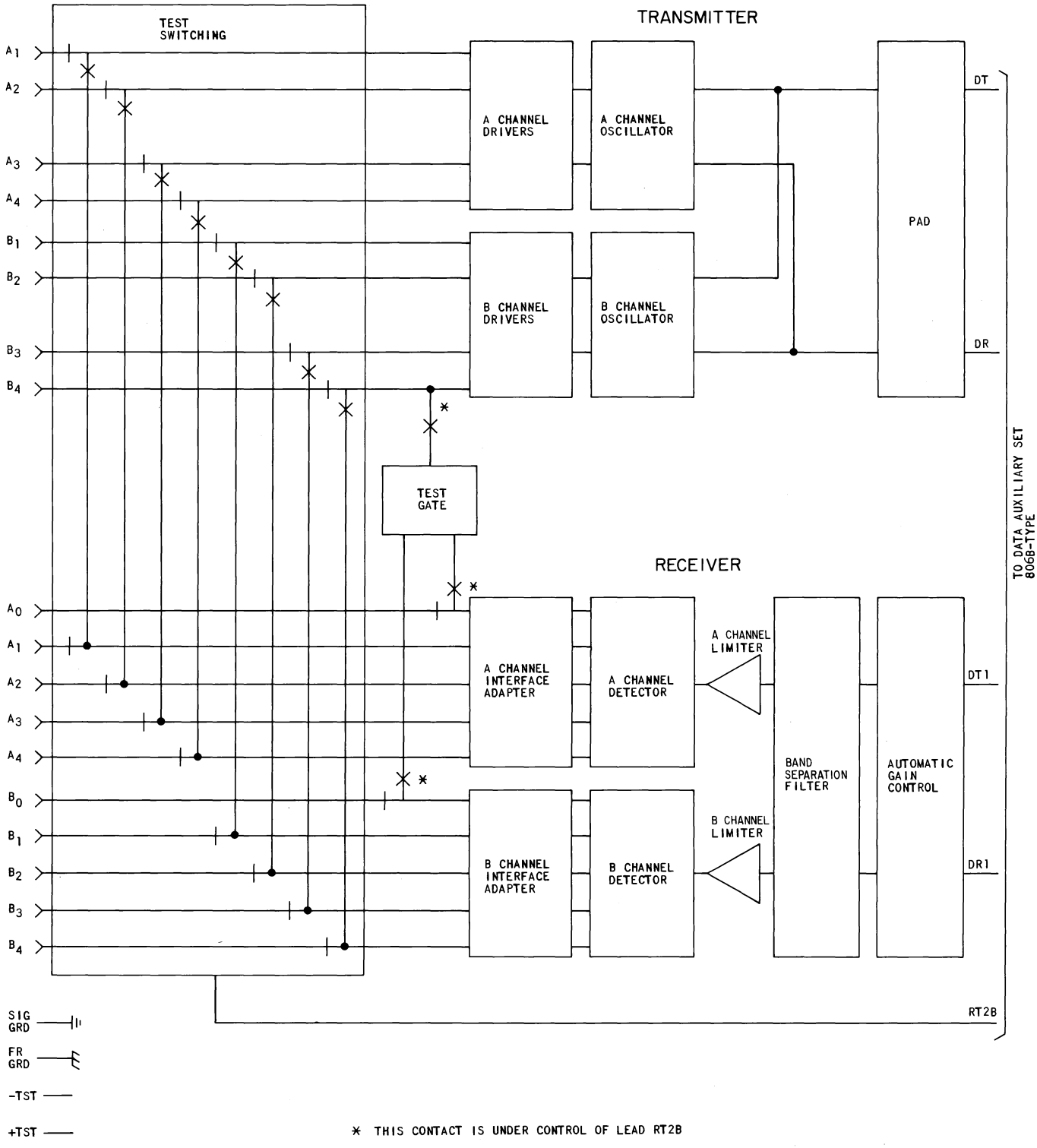

Fig. 3—Data Set 404B—Block Diagram

3.15 Each test frequency sent to the receiver keys the corresponding oscillator output at the transmitter. Operation of the idle-state (rest tone) detectors (A0 and B0) is verified by sending the A0 and B0 frequencies to the receiver. In the test condition only, the receiver outputs of A0 and B0 are presented to an AND gate. When both A0 and B0 are present at the gate input, the B channel oscillator is keyed to transmit a single-frequency output B4 (1633 Hz).

3.16 A ±voltage power source is supplied as part of CP AR97 for testing the data set.

D. Power

3.17 Power for DS 404B1 is obtained from the 26A Power Supply (part of DAS 806B). DS 404B is provided with a power cable which is terminated at one end and equipped with a plug on the opposite end. Refer to 2.05.

3.18 Receptacle J2 extends power to other units. Table C gives the pin numbers and appropriate voltage sources.

TABLE C

26A POWER UNIT CONNECTIONS

P1	SOURCE	J2
1	Grd (Frame)	1
2	+18 Volts	2
3	−18 Volts	3
4	Grd (Pwr)	4

4. CONNECTIONS—INTERFACE BETWEEN CUSTOMER AND DATA SET 404B1

4.01 The KS-19087 L2 connector provides the necessary interface connections between DS 404B1 and the customer. These connections are listed in Table D. The Data Terminal Ready (DTR) and Ring Indicator (RI) leads appear, but are not used in DS 404B1 interface when the DS 404B1 is combined with DS 303 in the Wideband Data Station. The DTR and RI functions are made through the high-speed interface connections of the DS 303, and terminate on TB2 of the DS 303.

4.02 Connections are made from DS 404B1 to DAS 806B via the M14C mounting cord. One end of the mounting cord is connected on terminal block TB1 of DS 404B1. Refer to Table E.

TABLE D

PIN	FUNCTION
1	Frame Ground
2	A1 Transmitting
3	A2 Transmitting
4	A3 Transmitting
5	A4 Transmitting
6	
7	Signal Ground
8	B1 Transmitting
9	+ Test Voltage (+TST)
10	− Test Voltage (−TST)
11	B2 Transmitting
12	B3 Transmitting
13	B4 Transmitting
14	A0 Receiving
15	A1 Receiving
16	A2 Receiving
17	A3 Receiving
18	A4 Receiving
19	B0 Receiving
20	*Data Terminal Ready (DTR)
21	B1 Receiving
22	*Ring Indicator (RI)
23	B2 Receiving
24	B3 Receiving
25	B4 Receiving

* Not functional at the 404B1 customer interface when the 404B1 is used as part of 303-type wideband data station.

5. REFERENCES

5.01 Information on the apparatus included in the Wideband Data Station using Data Set 303-type is found in the following:

SD- and CD-1D099 Data Station For Wideband Service

SD- and CD-1D097 Data Auxiliary Set 806B-Type

SD- and CD-1D069 Data Set 404B

BSP 593-800-200 Wideband Data Station Using Data Set 303, Four-Wire Point-to-Point Private Line (Commercial Service), Installation and Connections

TABLE E

DATA CABLE CONNECTIONS

TERMINAL ON TB1	DESIGNATION	FUNCTION	WIRE COLOR	CONNECTOR PIN NUMBER
1	DT	Data Tip *	O-R	6
2	DR	Data Ring *	W-O	3
3	DT1	Data Tip †	W-S	39
4	DR1	Data Ring †	S-W	5
5	RT2B	Remote Test	BL-R	8
6	DTR	Data Terminal Ready ‡	BR-W	11
7	RI	Ring Indicator ‡	W-BR	30

* Transmitting

† Receiving

‡ Not functional at the 404B1 customer interface when the 404B1 is used as part of 303-type wideband Data Station.