

**DATA AUXILIARY SET 809B-TYPE**  
**DESCRIPTION AND OPERATION**

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**1. GENERAL**

**1.01** This section provides a physical description and functional operation of Data Auxiliary Set (DAS) 809B-type as used in conjunction with Data Set (DS) 303-type and the WRR-1 wideband regenerative repeater.

**1.02** This section is reissued to correct technical information and to add a reference section.

**1.03** The 809B1 was designed primarily to provide, in conjunction with DS 303B-type, 19.2-kilobit per second (kbps) data service over half-group wideband transmission facilities. The DAS 809B-type may also be used in conjunction with DS 303H-type. The DAS 809B1 transmitting circuit accepts a baseband signal output from DS 303-type and amplitude-modulates and vestigial sideband (VSB) shapes it into a frequency spectrum suitable for half-group transmission. The receiver circuit in the 809B1 accepts the VSB signal and demodulates it to the original baseband spectrum. Data Set 303-type then reproduces the original digital data signal and delivers it to the business machine.

**1.04** The DAS 809B2 is a DAS 809B1 that has been modified for central office use in the WRR-1 wideband regenerative repeater by removing the power unit and providing a power cable and a

new interface cable. A WRR-1 equipped with one DAS 809B2 is a full-duplex VSB modem which is coded J70174D, and it is used to connect a half-group T1 carrier wideband terminal with a passband half-group (28 through 44 kHz) wideband transmission facility. A WRR-1 equipped with two DASs 809B2 is a full-duplex half-group regenerator which is coded J70174E.

**2. PHYSICAL DESCRIPTION**

**2.01** The DAS 809B1 consists of two 7-inch nests and a 26A power unit mounted on a chassis (Fig. 1 and 2). The overall dimensions of the data auxiliary set are 17 inches wide, 6 inches high, and 10 inches deep. The set weighs 25 pounds.

**2.02** The overall dimensions of DAS 809B2 are the same as DAS 809B1 (Fig. 3 and 4). The weight of DAS 809B2 is 20 pounds. Information for rack mounting DAS 809B2 in the WRR-1 is given in Section 314-644-200.

**2.03** The DAS 809B1 is normally mounted in a KS-20018-type cabinet (Fig. 5). It may also be mounted on a 19, 23, or 25 equipment bay using the appropriate 87-type brackets. Refer to Section 593-800-200.

**2.04** The DAS 809B-type is comprised of seven plug-in type circuit packs. These circuit packs are placed in the appropriate slots within the two nests. Refer to Fig. 1 for locations.

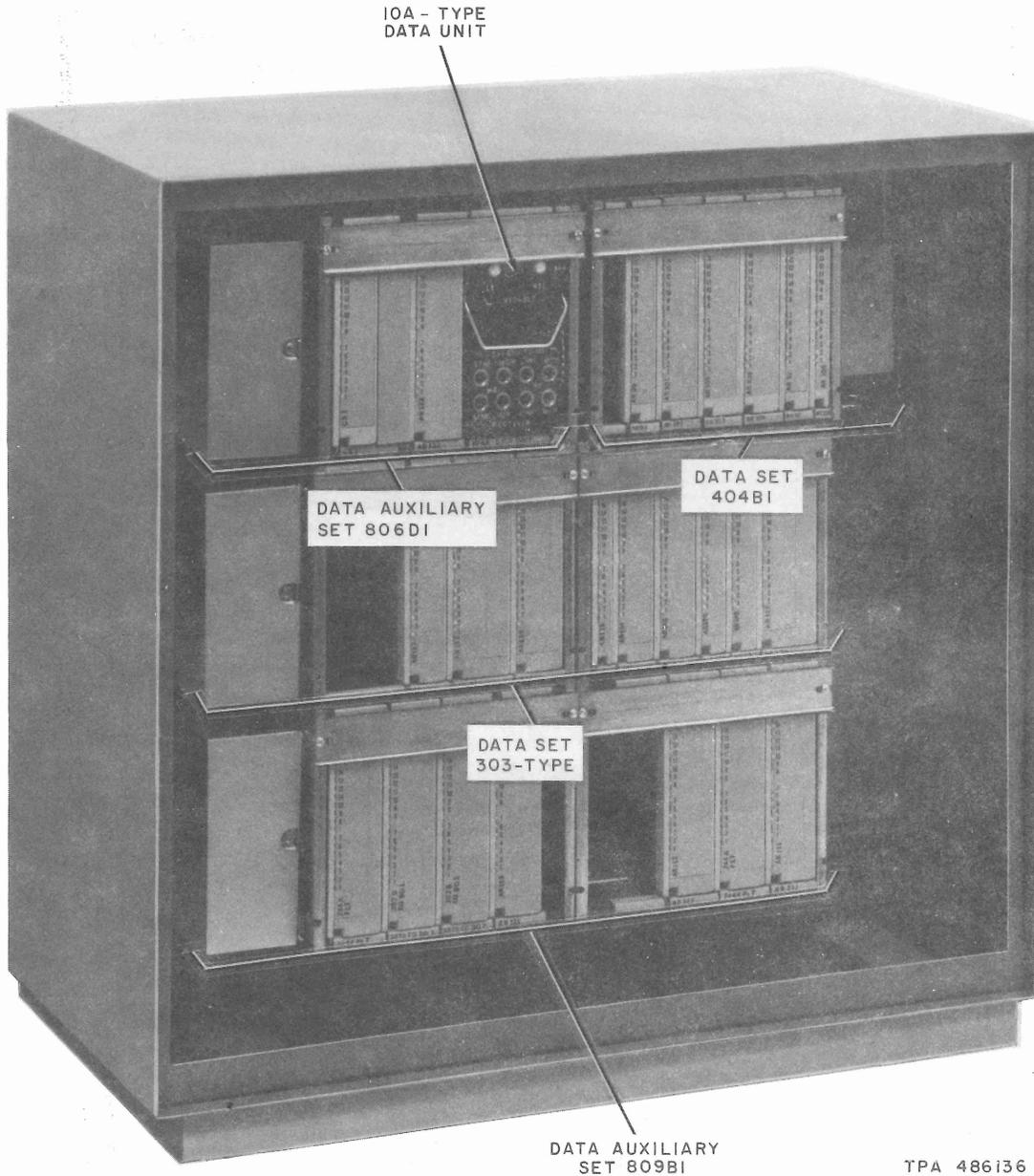
**2.05** The 26A power unit in DAS 809B1 accepts its power from a 105- to 125-volt 60-Hz supply. The P-10H098 power cord, approximately 30 inches long, is a 3-conductor cord with plug attached at one end and a Twist-lock\* connector on the other end. The plug has two blades and a U-ground pin (110-volt type).

\*Trade mark of Harvey Hubbell, Inc.

**2.06** In DAS 809B1, the connection is made from the power unit to the data auxiliary set by a 4-conductor cable ended by a 4-pin Jones plug







**Fig. 5—Data Auxiliary Set 809B1—Location in Cabinet**

KS-8585-L51. The cable is terminated on TB1 of the data auxiliary set. Refer to Table A.

**2.07** The DAS 809B2 is powered by the 46A power unit in the WRR-1 which is connected to the 48-volt office battery. The 46A power unit can power a maximum of two 809B2s in the WRR-1. Power cable P-95P028, which is included with DAS 809B2, is approximately 19 inches long with three leads for +18 volts, -18 volts, and ground. A

4-pin Jones jack on one end of the cable connects to the 4-pin Jones plug on the end of the power cable on DAS 809B2, and spade-tip leads on the other end connect to screw terminals on TB2 of the WRR-1.

**2.08** Connection to Data Set 303-type is made by the interface cable P-95M023. The wires in the cable, which are spade-tipped and attached to a fan-out strip, are connected to TB1 of DAS 809B1.

◆ TABLE A ◆

**POWER CABLE CONNECTIONS  
FOR DATA AUXILIARY SET 809B-TYPE**

DESIGNATION	DAS 809B TYPE	COLOR	JONES PLUG		WRR-1	
			P1	J1 26A POWER UNIT OR P-95P028 POWER CABLE	SIDE A ZC OPTION	SIDE B ZD OPTION
—	TB1	—	Pin	Pin	TB2	TB2
+18V DC	8	R	2	2	19	19
-18V DC	5	O	3	3	20	20
SG	27	BK	4*	4	26	13
FG			1*	1	26	13

\*Pins 1 and 4 are strapped inside the plug.

**2.09** The operation of DAS 809B1 is controlled by auxiliary equipment in the station.

**2.10** Interface cable P-95P026 interconnects DAS 809B2 and the rest of the WRR-1. The cable, approximately 18 inches long, has four signal leads and a circuit ground lead with spade tips on both ends of the cable. Lead designations and terminals for the signal interface cables for DAS 809B1 and DAS 809B2 are shown in Table B.

### 3. FUNCTIONAL DESCRIPTION

#### A. Transmitter

**Note:** All references to DS 303-type apply also to the WRR-1 wideband regenerative repeater unless an exception is specifically stated.

**3.01** The function of the transmitter circuit (Fig. 6) is to accept the restored polar baseband data signal from the transmitter in DS 303-type. It amplitude-modulates and VSB-shapes the signal to a 28- to 44-kHz frequency spectrum suitable for transmission over half-group facilities.

**3.02** The data signal from DS 303-type on lead VT1 is fed into a low-pass filter which attenuates the higher frequencies to prevent foldover in the modulation process. The signal is then sent to an amplifier. After amplification, the signal is applied to the modulator.

**3.03** The output of the modulator has an energy spectrum consisting of a double sideband AM signal plus unwanted higher-order modulation products. The carrier itself is suppressed.

TABLE B

INTERFACE CABLE CONNECTIONS  
FOR DATA AUXILIARY SET 809B-TYPE

DESIGNATION	FUNCTION	CABLE P 9 5 P 0 2 6	CABLE P 9 5 P 0 2 3	COLOR	DAS 809B TYPE	DS 303 TYPE	WRR-1	
							SIDE A ZC OPTION	SIDE B ZD OPTION
—	—	—	—	—	TB1	TB1	TB2	TB2
BLTL	Baseband Local Test Lock	—	*	W-BL	23	23	—	—
VSR	VSB Send Request	—	*	W-BR	24	24	—	—
VT1	VSB Transmitter IN	*	*	O	25	25	33	32
VT2	VSB Transmitter OUT	*	*	BL	26	26	38	27
CKT GRD	Circuit Ground	*	*	BK	27	27	26	13
VR1	VSB Receiver IN	*	*	BR	28	28	36	29
VR2	VSB Receiver OUT	*	*	G	29	29	37	28
BLTK	Baseband Local Test Key	—	*	W-O	30	30	—	—
AGC Lock	Automatic Gain Control lock	—	*	W-G	31	31	—	—

\* Required interface cable conductors

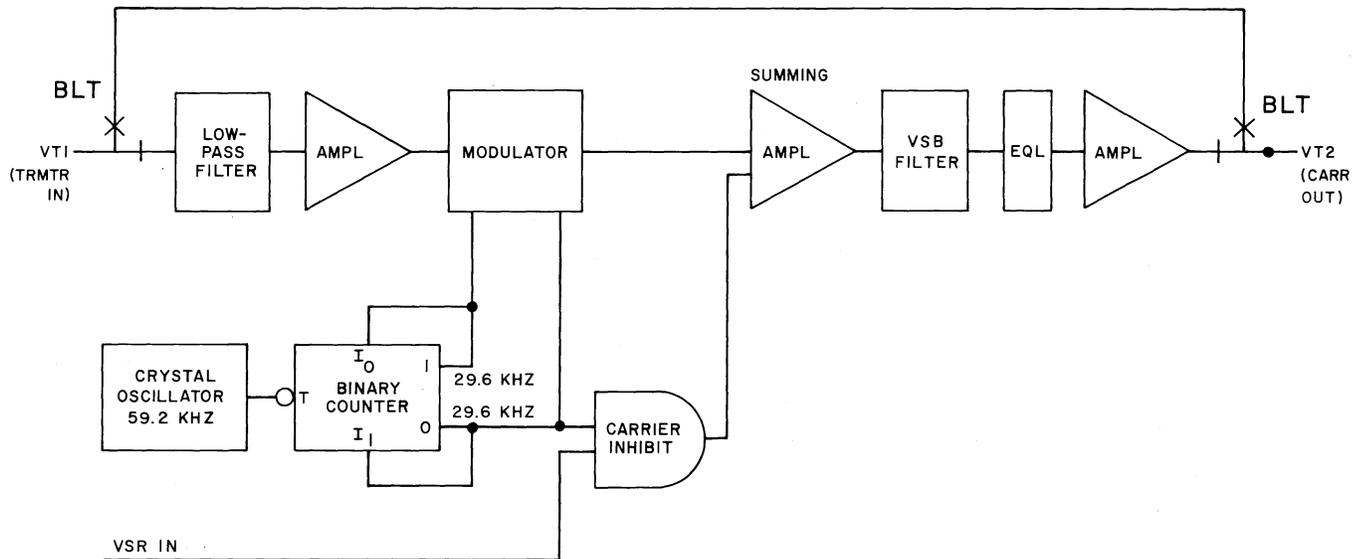


Fig. 6—Data Auxiliary Set 809B1—Block Diagram Transmitter Circuit

**3.04** A 59.2-kHz signal generated by the crystal oscillator is sent to the toggle lead of the binary counter. The counter output consists of two 29.6-kHz signals on the 0 and 1 leads which are 180° out of phase. The signals on the 0 and 1 leads are passed to the modulator. The 29.6-kHz signal from the 0 lead is fed into the carrier inhibit AND gate.

**3.05** In some applications, DS 303-type can be strapped with option R to provide a carrier inhibit signal on lead VSR which will cut off the carrier pilot signal when the SR signal on the customer interface is OFF. The carrier inhibit option is not included in the WRR-1. There are no options provided in DAS 809B-type.

**3.06** The reduced-level carrier signal and the output of the modulator are added by the summing amplifier. The summed signal is then fed through a VSB filter which passes only a small part of the lower fundamental sideband, the carrier, and all of the upper fundamental sideband. The signal also passes through a delay distortion equalizer that equalizes the transmit and receive VSB filters.

**3.07** This signal is then applied to the line amplifier and passed to the line interface circuit in DS 303-type on lead VT2. This signal, which is known as a VSB signal, is composed of a VSB

data signal and a carrier pilot with a power level 6 dB below the data signal.

## B. Receiver

**3.08** The receiver circuits in DAS 809B-type (Fig. 7) accept the VSB signal and demodulate it to the original baseband spectrum. The DS 303-type then reproduces the original digital data signal and delivers it to the business machine. The WRR-1 regenerates the baseband signal or connects to a T1 carrier wideband terminal.

**3.09** The signal from the line interface circuit in DS 303-type is received on lead VR1 and passed through the 12.5-dB pad. This pad provides a good termination for the baseband line.

**3.10** The signal goes from the pad through a VSB filter which shapes the VSB spectrum.

**3.11** The signal is then passed through a buffer amplifier and fed to the AGC circuit which consists of a variolossor, an amplifier, and a dc control circuit. This circuit operates on the dc output of the demodulated carrier pilot which appears at the output of the data demodulator. The signal level is maintained within  $\pm 0.5$  dB for an input signal variation of +6 dB to -12 dB by this AGC circuit. When a carrier pilot signal is

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received, a positive signal is applied to the AGC lock lead as a carrier pilot indicator.

**3.12** After passing through the AGC circuit, the signal is amplified and sent to the data demodulator and the phase-locked loop.

**3.13** The phase-locked loop, which recovers a carrier signal from the received carrier pilot, consists of a carrier demodulator, a low-pass filter, a difference amplifier, a voltage-controlled oscillator, a trigger amplifier, and two binary counters.

**3.14** The carrier demodulator compares the input carrier pilot phase with the phase of the binary counter output signal. An error signal is generated, if there is a phase difference between the two signals, and is filtered by the low-pass filter (LPF) and applied to the difference amplifier.

**3.15** The difference amplifier generates a signal which has a pulse duration dependent upon the amplitude and polarity of the error signal from the data demodulator. This signal is applied to the voltage-controlled oscillator (VCO) control which switches a capacitor across the VCO tank circuits.

**3.16** The VCO operates at two distinct frequencies. The average frequency is proportional to the amount of time during which the capacitor has been switched across the VCO tank. Thus, the VCO frequency is proportional to the error signal from the carrier demodulator.

**3.17** The signal from the VCO is passed to a trigger amplifier. The output of the amplifier is used to drive the binary counters, which in turn divide the frequency of the trigger amplifier signal by four. The outputs from one of the counters are fed back to the carrier demodulators. The outputs from the other counter are passed to the data demodulator.

**3.18** The data demodulator takes the incoming data signal and demodulates it to its original baseband frequency spectrum. This signal is then amplified by a buffer amplifier and fed out on the interface cable lead VR2 to the baseband receiver circuits in DS 303-type.

### C. Test Circuitry

**3.19** A baseband local test (BLT) circuit is included in DAS 809B1 to switch the data auxiliary

set transmit and receive circuits out of the data paths during a local test of the station. This BLT circuit provides a means of determining whether a trouble condition is caused by a malfunction in DAS 809B1 or in DS 303-type.

**3.20** The BLT circuit is activated by placing the wideband station in the local test (LT) mode and momentarily depressing the BLT pushbutton. The LT key and the BLT pushbutton are located on the front panel of DAS 806D1. The BLT circuit is released when the wideband station is removed from the LT mode. Lamps on DAS 806D1 indicate when the wideband station is in the LT or BLT test mode. The BLTK and BLTL leads provide operate and holding-current paths, respectively, for the BLT relay in the relay board CK1 of the DAS 809B1. Refer to Fig. 6. The BLT test feature is not included in the WRR-1. The BLT circuitry remains in the DAS 809B2.

## 4. REFERENCES

**4.01** The CDs and SDs for the apparatus associated with Data Auxiliary Set 809B-type are as follows:

CD- and SD-1D067-01—Data Auxiliary Set 809B-Type

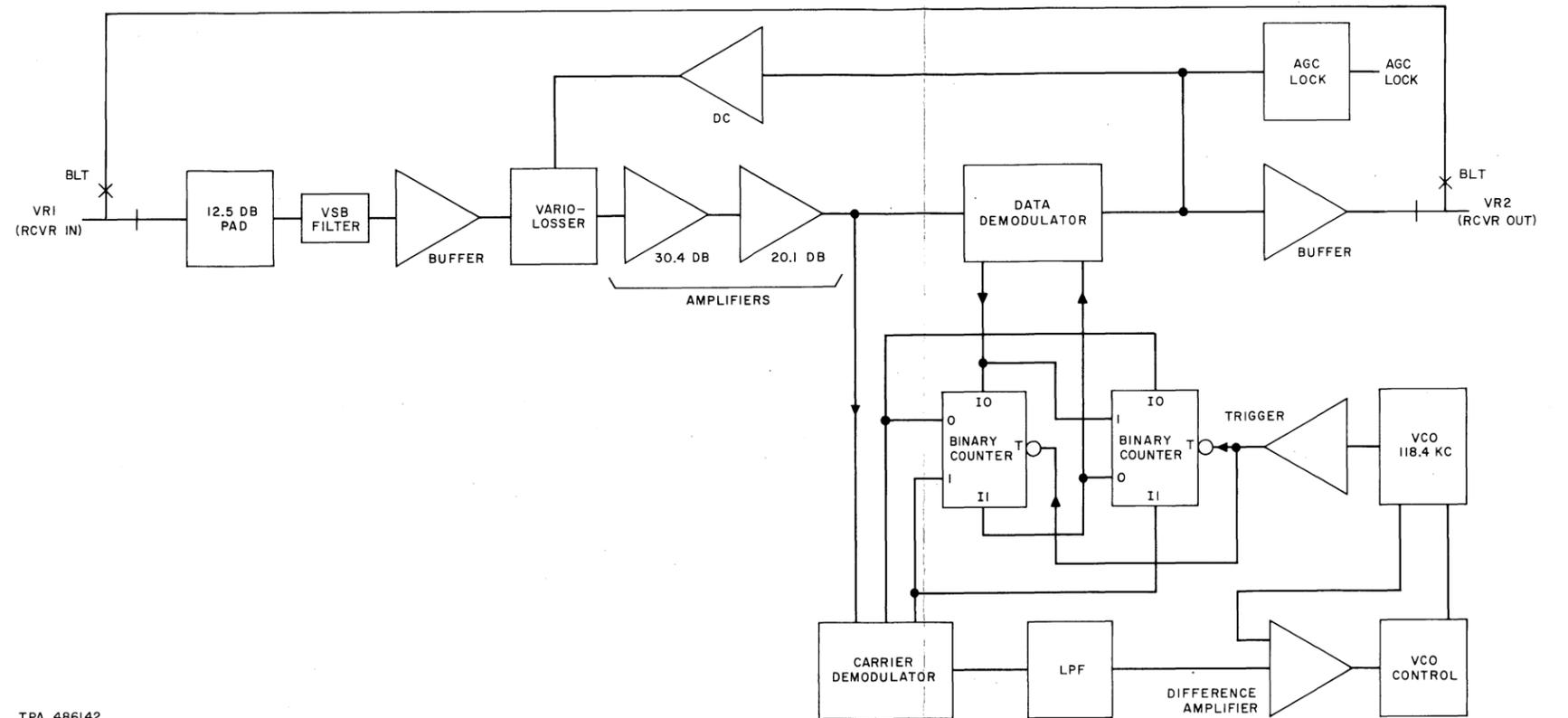
CD- and SD-1D099-01—Wideband Data Station Using Data Set 303-Type

CD- and SD-1D217-01—Data Auxiliary Set 806D-Type

CD- and SD-73062—Wideband Regenerative Repeater (WRR-1) J70174.

**4.02** Bell System Practices covering the various equipment associated with Data Auxiliary Set 809B-type are as follows:

SECTION	TITLE
314-644-ZZZ	Data Systems—Central Office, Wideband Regenerative Repeater (WRR-1) J70174
593-800-100	Wideband Data Station Using Data Set 303, Four-Wire Point-to-Point Private Line (Commercial Service).◆



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Fig. 7—Data Auxiliary Set 809B1—Block Diagram Receiver Circuit