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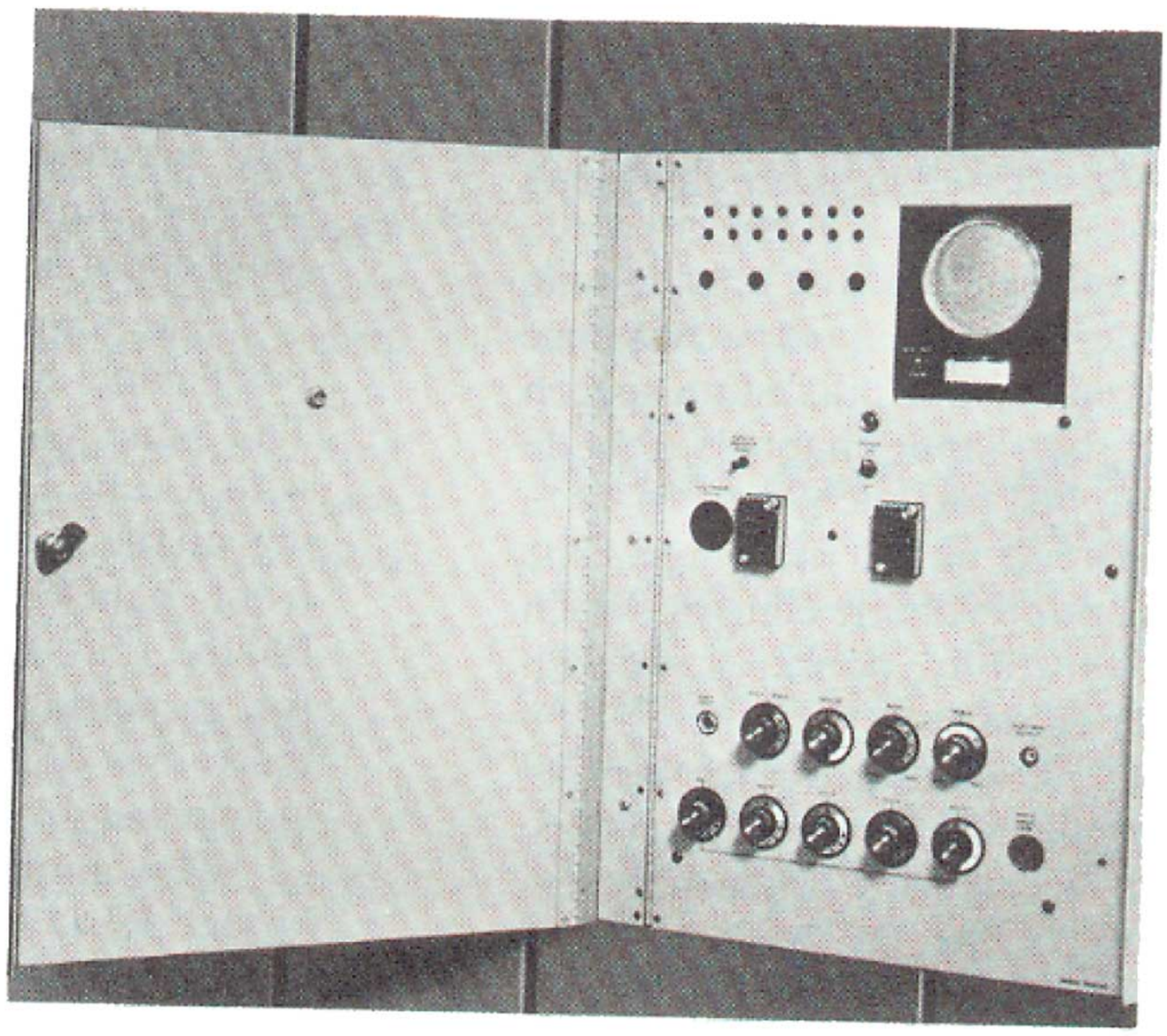


MODEL DWA 60
WALL MOUNTED
PROFESSIONAL
AMPLIFIER

LEAR SIEGLER, INC. / LSi® *BOGEN DIVISION*
P.O. BOX 500
PARAMUS, N. J. 07652

INSTALLATION AND OPERATING MANUAL

READ THOROUGHLY BEFORE OPERATING EQUIPMENT

DESCRIPTION

The Bogen Model DWA60 is a 60-watt all-silicon transistor preamplifier-mixer-amplifier. The unit is designed specifically for use in schools, theaters, radio stations, auditoriums and other locations requiring professional broadcast quality sound systems. The DWA60 provides extended area coverage and ample reserve power which readily overcomes high-noise conditions and provides exceptional power-handling capability over the entire audio-frequency range.

The DWA60 will accommodate up to seven separate inputs. Five of these consist of low-impedance, unbalanced microphone inputs, four of which may be converted for use with balanced (50-600 ohm) microphones by means of Bogen plug-in accessories. Each microphone input may be converted to an input for a magnetic phono cartridge or tape playback head by means of a plug-in module accessory. For convenience, one low-impedance microphone input channel is accessible from the front panel.

Speech input filters in each of the five microphone channels provide either wide-range frequency response for music or limited-range response for maximum speech intelligibility. The remaining two input channels provide high-impedance auxiliary inputs for such devices as a tuner, tape recorder, or ceramic phono cartridge. The auxiliary channels have a common volume control, which may be used as a fader control to permit a smooth transition from one auxiliary channel to the other.

All input channels may be equipped with remote volume control and/or remote microphone precedence control by means of Bogen accessories. Plug-in accessories which limit the output of the DWA60 to a predetermined maximum output level are also available. If desired, one auxiliary input may be fed from a balanced 500/600 ohm telephone line, such as a Muzak transmission cable. This application requires the use of a Model WMT-1 accessory transformer. A Model WMT-1 may also be used as an output matching transformer for transmitting the amplifier output over a 500/600 ohm telephone line to a local broadcast studio.

Individual volume controls are provided for each input channel, permitting individual channels to be mixed or faded. A master volume control is used to set the overall output level of the mixed program. Separate bass and treble controls adjust the overall amplifier frequency response.

The volume controls are equipped with adjustable reset markers to permit any control to be quickly returned to a previous setting. A logging chart inside the front panel provides a convenient means of recording the optimum control settings under various operating conditions in the areas served by the loudspeakers.

The Model DWA60 provides balanced speaker output impedances of 8 and 16 ohms, as well as balanced 25-volt center-tapped, and balanced 70-volt output lines. This arrangement eliminates matching problems when unequal amounts of power are required for different speakers of a distribution system.

The amplifier output level may be monitored at the front panel by use of an optional Model MMS-1 panel. This panel contains an output meter and a local speaker with a volume control for both visual and aural monitoring of the output. A push-button circuit breaker on the front panel provides protection against overload or failure. Circular cutouts are provided on the front panel for mounting area control switches. These switches (customer supplied) may be used to turn off loudspeakers in selected areas.

The amplifier may be flush-mounted in a Bogen Model RBDW-F Back Box or surface mounted in a Model RBDW-S. The control panel has a hinged access door which is equipped with a lock to prevent tampering by unauthorized personnel. The control panel, with amplifier chassis, is also hinged for ease in servicing or for gaining access to internal controls and accessories.

TECHNICAL SPECIFICATIONS

POWER OUTPUT: 60 watts RMS.

HARMONIC DISTORTION: Less than 3% at 60 watts.

PEAK POWER: 110 watts.

FREQUENCY RESPONSE: ±1 db from 20 Hz (cps) to 20 kHz (kc).

POWER RESPONSE: 60 watts ±2 db at less than 5% distortion from 40 Hz (cps) to 10 Khz (kc).

GAIN: Mic 133 db, Aux 85 db.

HUM AND NOISE (Below rated output): Mic 55 db, Aux 72 db.

REGULATION: Better than 3 db from no load to full load.

SENSITIVITY: Mic inputs, 0.125 mv. Aux inputs, 0.15 volt.

INPUTS: 5 Mic 50-600 ohm (200-ohm nominal) unbalanced (4 convert to 200-ohm balanced with T525U transformer); 2 Aux.

OUTPUTS: 8 and 16 ohm speakers (balanced); 25 volt (10.4 ohm) balanced, 25 volt CT (2.6 ohm) balanced; 70 volt (82 ohm) balanced. Tape output, 0.19 volts. 500/600 ohm line output with WMT-1 accessory.

TONE CONTROL ACTION: Treble, +9 to −11 db at 10 kHz (kc); Bass, +12 to −10 db at 50 Hz (cps).

CONTROLS: 5 Mic Volume (with speech filter switches), Aux Volume (Fader), Master Volume, Bass, Treble. Limiter Sensitivity control used with LVP-1 and PVP-1 accessories. Power switch.

POWER REQUIREMENTS: 105-125 volts ac, 50-60 cycles; 115 watts.

SEMI-CONDUCTORS: 14 silicon transistors, 8 diodes.

POWER PROTECTION: Front panel circuit breaker.

DIMENSIONS: Front pane 15⅞″ w x 21⅝″ h. Wall box 14¼″ w × 20⅛″ h × 3¾″ deep.

NET WEIGHT: 23¾ lbs.

ACCESSORIES

T525U MIC INPUT TRANSFORMER

The Model T525U is a 1:1 ratio transformer designed to convert an amplifier microphone input from an unbalanced to a balanced configuration. Any balanced microphone having an impedance from 50 to 600 ohms may be accommodated by use of this accessory. From one to four of the microphone channels may be equipped with Model T525U transformers.

WMT-1 LINE MATCHING TRANSFORMER

The Bogen WMT-1 line input/line output matching transformer is an accessory which has been designed especially for matching either inputs from or outputs to a 500/600 ohm line. It may be used with the Bogen DWA60 amplifier for distributing background music which has been transmitted over leased telephone lines. The accessory also functions as an output matching transformer in feeding special program material over a 500/600 ohm telephone line for transmission to a local broadcast studio.

LVP-1 REMOTE PRECEDENCE CONTROL

The Bogen Model LVP-1 is a plug-in accessory which, when used with a customer-supplied switch, serves as a remote precedence control. When the switch is closed, it disables the channel to which it is connected, permitting paging calls or other priority signals to be heard over another channel.

RVC-2 REMOTE VOLUME CONTROL

This control may be placed at any convenient location and used to control the volume of an amplifier channel. Any one or all of the amplifier channels may be remotely controlled in this manner. Each Model RVC-2 used requires the installation of one Model LVP-1 accessory in the same channel.

MODEL PVP-1 LIMITER

The Model PVP-1 is a transistorized printed-circuit plug-in accessory which permits the Model DWA60 output to be held to a predetermined level. One PVP-1 unit, with one Model LVP-1, is required to provide the limiting for the entire amplifier. A limiter sensitivity control, on the right side of Model DWA60 chassis, is used to adjust the output level.

MODEL PMC-1 TAPE/PHONO BOARD

Tape head or magnetic phonograph inputs may be fed to the amplifier by utilizing the Bogen PMC-1 Tape/Phono Input Board. These boards are plugged into the underside of the chassis after first removing the MIC input boards. Connections are made through the microphone input terminals as described in the Model PMC-1 instruction sheet.

MODEL MMS-1 MONITOR PANEL

The Bogen Model MMS-1 Monitor Panel consists of an output level meter, loudspeaker, and a volume control. The unit is used to provide both aural and visual indication of the amplifier output level. The Model DWA60 panel is designed to accept the Model MMS-1, which connects to the output via a pre-wired socket on the amplifier chassis.

MODEL RBDW-F BACK BOX

The Model RBDW-F Back Box is designed for flush mounting the DWA60. The box has conduit entry knockouts and a 3-prong ac power receptacle on the inside for connecting the amplifier power cord.

MODEL RBDW-S BACK BOX

The Model RBDW-S Back Box is designed for surface mounting the Model DWA60. The box has entry holes on the bottom for connecting a BX cable or conduit line and a 3-prong ac power receptacle on the inside for connecting the amplifier power cord.

INSTALLATION

UNPACKING

The amplifier was carefully checked and packed at the factory. Inspect the shipping carton and unit for indication of improper handling during transit. *If the amplifier is damaged, make an immediate claim.* Notify the shipping carrier if the unit was shipped to you from the factory. Otherwise, notify the dealer or distributor from whom the unit was purchased.

MOUNTING AMPLIFIER IN BACK BOX

The amplifier will mount into either a Bogen Model RBDW-F (flush-mounting) or Model RBDW-S (surface-mounting) Back Box. A small envelope containing eight No. 10 self-tapping screws and nylon flatwashers is shipped with the amplifier. Unlock the front panel and

open the panel to expose the hinge. Align the holes in the hinge with the holes on the left side of the back box and secure with five screws and washers. When all input and output connections have been completed, secure the right side of the panel to the back box with the three remaining screws and washers.

NOTE

Instructions for mounting the box are included in the carton containing the back box.

POWER

When the Model DWA-60 is installed in either the RBDW-F Flush Mounting Back Box or the RBDW-S Surface Mounting Back Box, the amplifier line cord is plugged into a 120 vac power receptacle in the back box. Power is brought into the back box via conduit or BX cable. The power cord is accessible only to personnel having a key to the panel lock.

The amplifier will draw up to 115 watts. The chassis is grounded to the electrical system earth ground via the grounding pin in the 120 vac power receptacle.

AUXILIARY POWER RECEPTACLES

The Model DWA60 has two auxiliary 120 vac power receptacles. One receptacle is located on the front panel and one is on top of the amplifier chassis. The two receptacles may be used for supplying a combined maximum of 500 watts to associated equipment. The auxiliary receptacles receive power whenever the control panel POWER switch is in the ON position. The receptacles are not affected by the amplifier circuit breaker.

NOTE

The auxiliary power receptacles are three-wire grounded outlets. Hence any associated equipment connected to these receptacles with a three-prong line cord will be grounded.

REMOTE PILOT LIGHT

A pilot lamp may be connected to the Model DWA60 to indicate, at a remote location, that the amplifier is operating. The lamp receives 5.8 vdc from the amplifier power supply and is connected at a terminal strip on the top of amplifier chassis (see figure 1). Any 6.3 vac, low-current miniature bulb, such as No. 12, No. 40, or No. 47, may be used. Use No. 18 AWG twisted pair from the amplifier to the remote lamp.

REMOTE AREA SWITCHES

The upper left corner of the control panel has four holes for installing toggle switches. These are supplied by the customer and are used to cut speakers in selected areas out of the sound system. Wire each switch in series with one side of the speaker line going to a selected area. The switch may then be used to disconnect the speakers served by the line from the output of the amplifier.

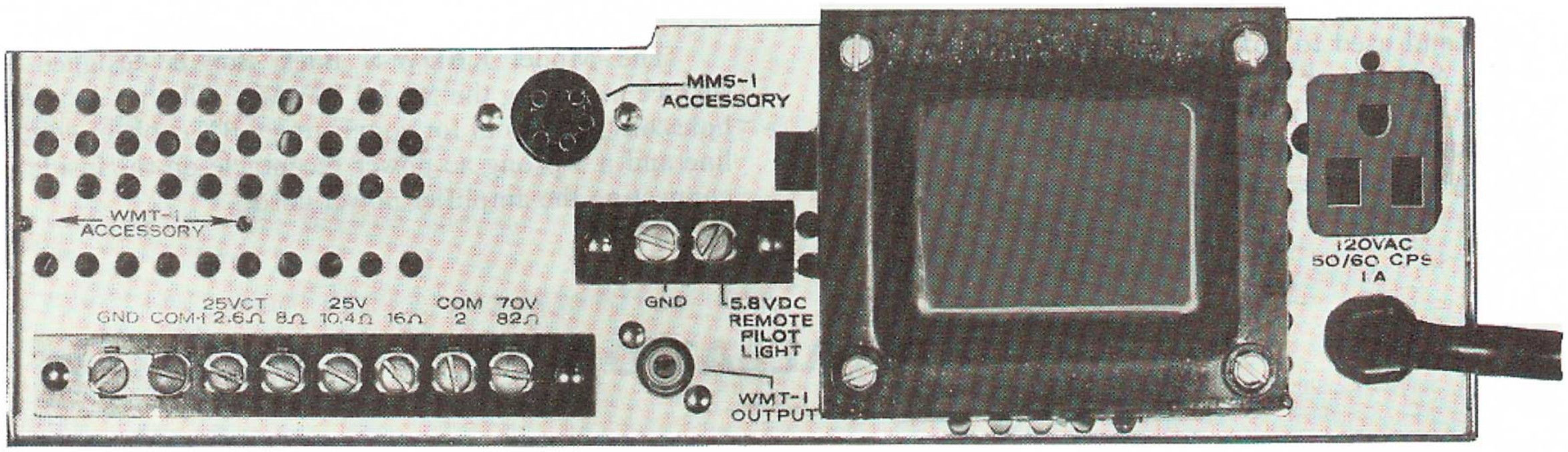


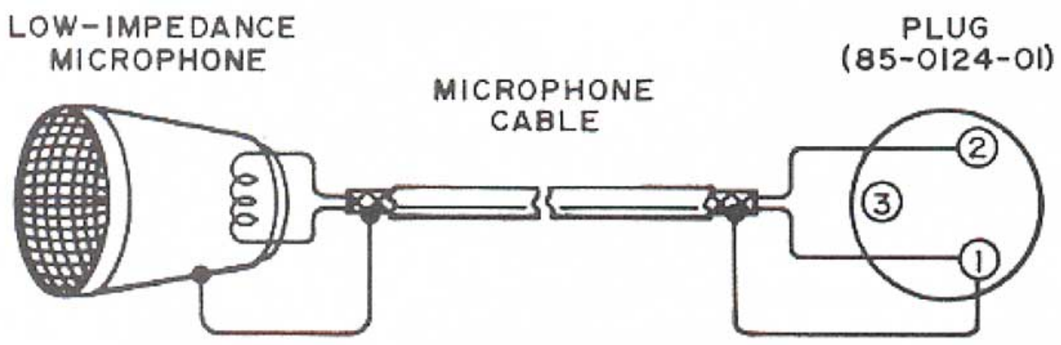
Figure 1 — Model DWA60 Chassis, Top View

INPUT CONNECTIONS

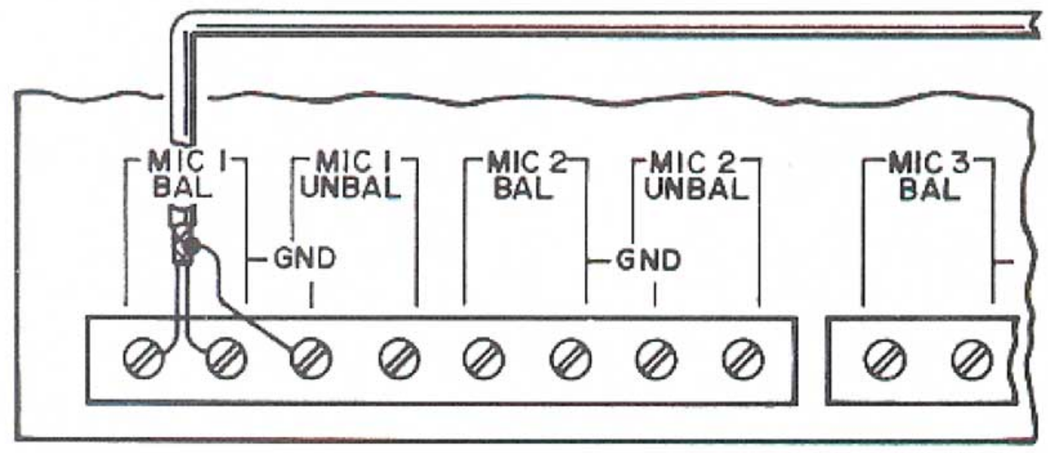
MICROPHONES

Five separate microphone inputs may be connected to the Model DWA60. A low-impedance unbalanced microphone may be connected to the MIC 5 INPUT jack on the front panel. Wire the microphone cable to a three-prong plug (Bogen 85-0124-01, Amphenol 91-854, Cannon XLR-311C) as shown in figure 2a.

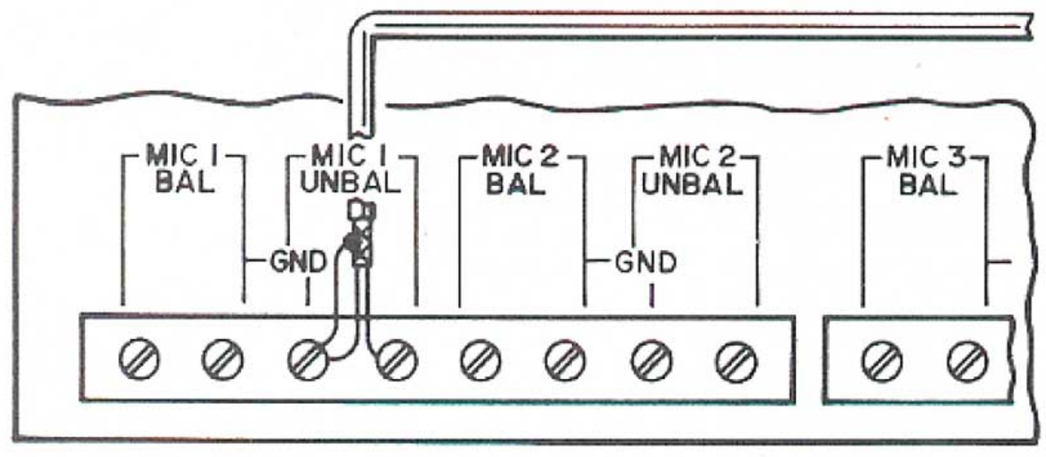
Four low-impedance microphone input connections may be made at the terminal strip on the rear of the amplifier chassis (see figure 3). Notice each microphone input has two pairs of terminal connections, marked BAL and UNBAL. Connect balanced microphones as shown in figure 2b, and unbalanced microphones as shown in figure 2c. When using balanced inputs, a Bogen Model T525U plug-in transformer must be inserted in the corresponding 9-pin socket on the chassis. These sockets are labeled X1 through X4 and correspond to the inputs labeled MIC 1 through MIC 4.



A) UNBALANCED INPUT, FRONT PANEL



B) BALANCED INPUT, REAR TERMINAL STRIP



C) UNBALANCED INPUT, REAR TERMINAL STRIP

Figure 2 — Model DWA60, Microphone Connections

MICROPHONE PRECEDENCE

Any input channel can be muted from a remote location by installing accessory equipment. This accessory equipment consists of one Bogen Model LVP-1 plug-in unit and one SPST toggle switch (supplied by the user) for each channel to be muted.

Install the Bogen Model LVP-1 units in the appropriate four-pin sockets provided on the rear of the amplifier chassis (see figure 3). Solder the SPST switch leads to the octal plug which is installed in the REMOTE CONTROL PRECEDENCE socket. The socket diagram on the rear of the chassis shows which pins to use for each channel. Connect each switch across the appropriate pin and GND (pin 8). Wire the switches for a normally open condition; closing the switches (shorting the contacts) will mute the channel connected to that switch. Use two-conductor cable No. 18 AWG or larger from the amplifier to each switch. For further information and operating instructions, refer to the instruction sheet furnished with the Model LVP-1.

REMOTE VOLUME CONTROL

The volume level of any input channel may be controlled from a remote location by installation of Bogen accessories. The accessories required are one Model LVP-1 and one Model RVC-2 for each channel to be remotely controlled.

NOTE

One remote control is used for the two auxiliary input channels.

Install the Bogen Model LVP-1 units in the appropriate four-pin sockets provided on the rear of the amplifier chassis (see figure 3). Wire the Model RVC-1 volume controls to the octal plug which is installed in the REMOTE CONTROL PRECEDENCE socket. The socket diagram on the rear of the chassis shows which pins to use for each channel. Use a two-conductor wire (No. 18 AWG minumum) from each RVC-1 control to the octal socket. Solder one lead to the proper pin for the channel to be controlled and solder the other lead to the common GND (pin 8). For further information and for operating instruction, refer to the instruction sheet provided with the RVC-1 accessory.

AUXILIARY INPUTS

The Model DWA60 has two auxiliary input channels for connecting signal sources having high-level, high-

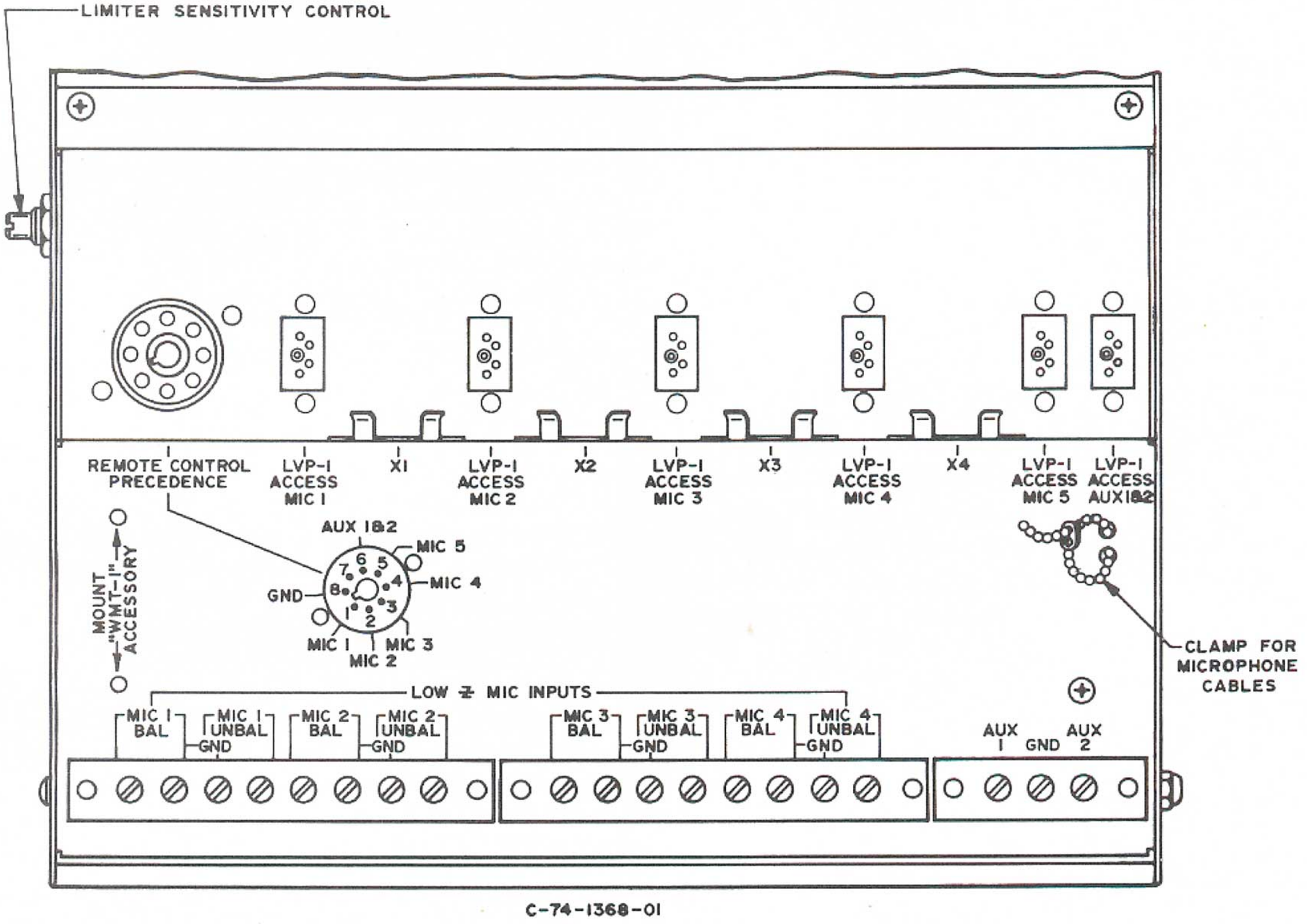


Figure 3 — Model DWA60 Chassis, Rear View

impedance outputs such as a tuner, a ceramic phono cartridge, or the output of a tape-recorder preamplifier.

The audio cables from the devices may be connected to the AUX 1 and AUX 2 terminals on the rear of the amplifier (see figure 3). The GND terminal is a common ground connection for both auxiliary inputs. For convenience, AUX 1 INPUT on the front panel provides the same input as the AUX 1 terminal strip on the rear of the chassis. The AUX 1 INPUT is a phone jack which requires a mating two-conductor phone plug, such as Switchcraft No. 250 or No. 350.

TAPE RECORDER OR MAGNETIC PHONO

If the amplifier is to be fed directly from a magnetic phono cartridge or tape recording head, a Bogen PMC-1 plug-in accessory must be used.

Each channel to be used must have its preamplifier board replaced with a Model PMC-1. To do this, remove the two screws securing the hinged rear panel and open the panel to expose the preamplifier boards (see figure 5).

With the Model PMC-1 installed, the input may be connected to the appropriate amplifier terminals as described under the paragraph titled MICROPHONES.

TELEPHONE LINE INPUT

Background music and other program inputs from a 500/600-ohm telephone line may be fed to the Model DWA60 by use of a Model WMT-1 accessory transformer. Figure 5 shows the location holes for securing the transformer to the *inside* of the rear panel. Remove the two screws securing the top of the panel to the chassis and allow it to swing down, as shown in figure 5. Mount the Model WMT-1 with the terminal strip facing to the right, or opposite, side of the panel. Connect the male phono plug on the transformer cable into the WMT-1 INPUT jack mounted on the angle bracket near the center of the chassis. Bring the telephone transmission line in through the LVP-1 ACCESSORY LIMITER opening on the side of the chassis and connect the wires to the terminal strip on the Model WMT-1. For further information concerning this accessory, consult the instruction sheet packed with the Model WMT-1.

OUTPUT CONNECTIONS

SPEAKERS

The Model DWA60 may be used with speaker systems rated at 8 and 16 ohms and with 25-volt (10.4-ohm) balanced, 25-volt CT (2.6-ohm) balanced, and 70-volt (82-ohm) balanced systems. For detailed information on installation of multiplespeaker systems, refer to the Speaker Installation Instructions (Bogen Publication No. 54-5001-02) included with the amplifier.

Make all speaker connections to the terminal strip on top of the amplifier chassis. Figure 1 illustrates the arrangement of the output terminals, which should be wired in accordance with Table II for balanced outputs. If unbalanced outputs are required, do not remove the shorting link between COM 1 and GND. ***If balanced outputs are required, remove the shorting link between COM 1 and GND.***

TABLE II. SPEAKER CONNECTION CHART FOR BALANCED OUTPUTS

Type of Output	*Connect Speakers Lines Between
8-ohm	8Ω, COM 1
16-ohm	16Ω, COM 1
25-volt (10.4-ohm)	25V, COM 1
25-volt CT (2.6-ohm)	**25V, COM 1, 25 VCT
70-volt	70V, COM 2

**Connect all speaker line shields to GND*
***Connect 25 VCT to GND.*

TAPE RECORDER

The program material being amplified by the Model DWA60 may be recorded on a tape recorder. Connect the tape recorder input the the AUX/TAPE OUTPUT jack on the front panel. Use a standard two-conductor phono plug (Switchcraft No. 3501M or Bogen 85-1005-01) to make the connection at the panel.

TELEPHONE LINE OUTPUT

A zero-level output at 500/600 ohms for transmission over telephone lines may be obtained by using a Bogen Model WMT-1 transformer accessory. Figure 1 shows the location holes for mounting the transformer on the top of the amplifier chassis. Mount the transformer with the terminal strip facing toward the rear. Insert the male phono plug on the transformer cable into the WMT-1 OUTPUT jack on the chassis. Connect the telephone transmission line to the terminal strip on the Model WMT-1. For further information concerning the WMT-1, consult the instruction sheet packed with the unit.

MONITOR PANEL

The Model DWA60 is designed to accommodate a Bogen MMS-1 Monitor Panel. To install the Model MMS-1, first remove the dummy panel grille assembly by removing the two nuts and lockwashers on the rear of the assembly and taking the grille assembly out from the front of the control panel. Install the MMS-1 panel in place of the removed dummy assembly, and secure with two nuts and lockwashers. Put the five-pin plug of the MMS-1 cable into the MMS-1 ACCESSORY socket on top of the amplifier chassis.

OUTPUT LIMITING

The output level of the Model DWA60 may be limited to a desired maximum by means of Model PVP-1 and LVP-1 limiter accessories. The Model PVP-1 is a solid state, printed-circuit board which is installed inside the amplifier chassis. Remove the two screws securing the rear panel and allow it to swing down, as shown in figure 5. Insert the Model PVP-1 printed board into the limiter socket. This is located at the top right side of the chassis, just under the output transformer and is stamped with the number 9559. Close the rear panel and secure with two screws.

There is a four-pin LPV-1 ACCESSORY LIMITER socket located on the right side of the amplifier chassis. Using a pair of needle-nose pliers or tweezers, pull out the bare wire jumper shorting the two socket pins. Install a Model LPV-1 limiter accessory into the socket.

The limiter circuit is adjusted under operating conditions with the amplifier panel open to permit access to the LIMITER SENSITIVITY CONTROL, located on the right side of the chassis. Set this control as follows:

1. Turn the MASTER volume control fully clockwise to maximum and the LIMITER SENSITIVITY CONTROL counterclockwise to minimum.
2. Rotate the channel input volume control to the point where the volume is sufficient to cover the desired area with the lowest anticipated input signal. In the case of a microphone input this would be the speaker with the weakest voice.
3. Next, feed a signal at the highest anticipated level into the same channel. For mike inputs this could be the person with the loudest voice who is likely to use the amplifier.
4. Rotate the LIMITER SENSITIVITY CONTROL clockwise until the average volume of the loud signal input is reduced to a satisfactory level. This will determine the maximum output level for the channel.

OPERATING CONTROLS

MICROPHONE VOLUME CONTROLS

Each of the five volume controls (MIC 1 through MIC 5) adjusts the volume level for its corresponding microphone channel. Rotate the control clockwise (to higher numbers) to increase volume. Set the control to the zero position (fully counterclockwise) when not using the microphone input.

Each microphone volume control has a push-pull speech filter switch to improve speech response. When the volume control knob is pulled out, the filter is switched into the channel, giving the voice frequencies a crisp quality that helps cut through conditions of high room noise and reverberation. When the volume control pushed in toward the panel (speech filter off), the microphone channel has its normal wide-range frequency response.

AUXILIARY VOLUME CONTROL

The AUX 1-AUX 2 control selects either of the two high-level auxiliary channels and sets the output level of the selected channel. Both channels are off when the control is at the zero (large black triangle) position. Turning the control counterclockwise selects the AUX 1 input, the volume increasing with rotation. Turning the control clockwise from zero selects the AUX 2 input, the volume increasing with rotation.

When there is program input on both auxiliary channels, the auxiliary volume control may be used as a fader control. Slowly turning the control through the zero position smoothly reduces the level of one auxiliary output to zero and gradually increases the other auxiliary output. This produces the effect of fading from one auxiliary channel to the other.

MASTER VOLUME CONTROL

The MASTER volume control adjusts the overall output level of the amplifier. Turning this control changes the volume of all channels, simultaneously. The proper way to operate this control is as follows:

1. Set all volume controls to the zero position.
2. Set the MASTER control to the maximum (fully clockwise) position.
3. Turn the input volume control (MIC or AUX) to obtain the maximum desired output level. Reduce the output level to the desired listening level by turning down (counterclockwise) the MASTER volume control. If two or more inputs are being used simultaneously, adjust each input volume control to the maximum desired level and then reduce the mixed program to the desired listening level with the master volume control.

TONE CONTROLS

These are separate tone controls, operating without interaction. For a flat frequency response, set each control at its midposition.

BASS — This control is used to adjust the tonal balance of the amplifier output. Rotation of the control in the counterclockwise (MIN) direction reduces or cuts the bass response of the amplifier. Clockwise rotation of the control to MAX increases bass response.

TREBLE — This control adjusts the tonal balance of the amplifier output. Rotation in the counterclockwise (MIN) direction reduces the high frequency response of the amplifier. Turning the control clockwise to MAX increases the response to high frequencies.

RESET MARKERS

The skirt of each volume control knob has a red reset marker, used to log a particular control setting. This is done by adjusting the control to the desired setting and sliding the reset marker to coincide with the index line on the panel. The control now can be turned to zero or to any other position and later returned to the original setting as indicated by the marker.

POWER SWITCH

The POWER switch is used to turn the amplifier on and off. When 120 vac power is applied to the amplifier, the jeweled lamp above the switch will light.

MAINTENANCE

CIRCUIT BREAKER

There are no replaceable fuses in the Model DWA60 amplifier. A 1.75 ampere circuit breaker is located on the front panel. Should a momentary overload trip the breaker, 120 vac power will be removed from the amplifier, but not from the 500-watt AUX POWER receptacles on the amplifier chassis. Turn amplifier POWER switch to OFF and reset the circuit breaker by pressing the red button. Restore power by turning the POWER switch to the ON position. If the circuit breaker trips continually or frequently, investigate the source of the trouble.

CAUTION

Do not hold down circuit breaker button when POWER switch is in ON position.

OUTPUT TRANSISTORS

Transistors show little, if any, deterioration with age and, at the present time, are considerably more reliable than the best vacuum tubes. The output transistors should be tested and replaced only by a qualified service technician. Power output transistors Q13 and Q14 (see schematic diagram, figure 4) are located on the front panel below the POWER switch. These are selected transistors which must be replaced with Bogen factory replacement transistors.

To remove an output transistor, remove the two screws securing the transistor cover and remove the cover. Next, remove the two screws securing the transistor and pull the transistor out of its socket. Note that there is metal insulating disc between the transistor and the panel. *Do not discard this disc.*

To install a new output transistor, first inspect all contact surfaces of the panel, insulating disc and transistor to make sure they are free of foreign matter. Rub a thin coat of silicone grease (Dow Corning No. 340 or equivalent) on both sides of the insulating disc. Place the insulating disc on the panel over the socket and install the transistor. Tightly secure the transistor with the two screws and replace the transistor cover.

CAUTION

Make certain to install insulating disc and transistor cover when replacing output transistor.

PRINTED CIRCUIT BOARDS

The Model DWA60 contains several solid-state amplifiers built on printed circuit (PC) boards. When replacing parts on a PC board, take care not to damage the board with excessive heat or pressure. A small soldering iron (25-40 watts) normally is sufficient to solder component parts.

If component leads are cut, always pull them through from the top of the board — never pull from printed side. Do not insert the leads of replacement components into the board without first clearing the holes. This is done by heating the solder and inserting a pick from the underside of the board.

TRANSISTORS AND DIODES

Transistors and diodes mounted on printed circuit boards should be handled as described in the previous paragraph. In addition, keep excessive heat away from all such devices. When soldering transistor or diode leads, use a heat sink such as a pair of long-nose pliers held between the component body and the source of heat.

BOGEN SERVICE

We are interested in your Bogen unit for as long as you have it. If trouble ever develops with your unit, please do not hesitate to ask our advice or assistance. Information can be obtained by writing to Service Department, Bogen Division, P.O. Box 500, Paramus, New Jersey 07652.

When communicating with us, state "Model DWA60" and the series letter, which is screened on the lower right side of the chassis. Describe the difficulty encountered and explain the effects each operating control has upon the symptoms of trouble. Include details on electrical connections to associated equipment and list such equipment.

When we receive this information, we will send you service information if the trouble appears to be simple, such as a bad component or incorrect connections. If the trouble requires servicing, we will send you the name and address of the nearest Bogen authorized service agency to which you can send your unit for repair.

If you ship your unit to our factory for repair, pack the equipment well, using the equivalent of the original shipping carton and filler material to prevent damage in transit. Send unit, fully insured and prepaid, via railway express. Do not ship via parcel post unless so instructed. The unit will be promptly repaired and returned to you.

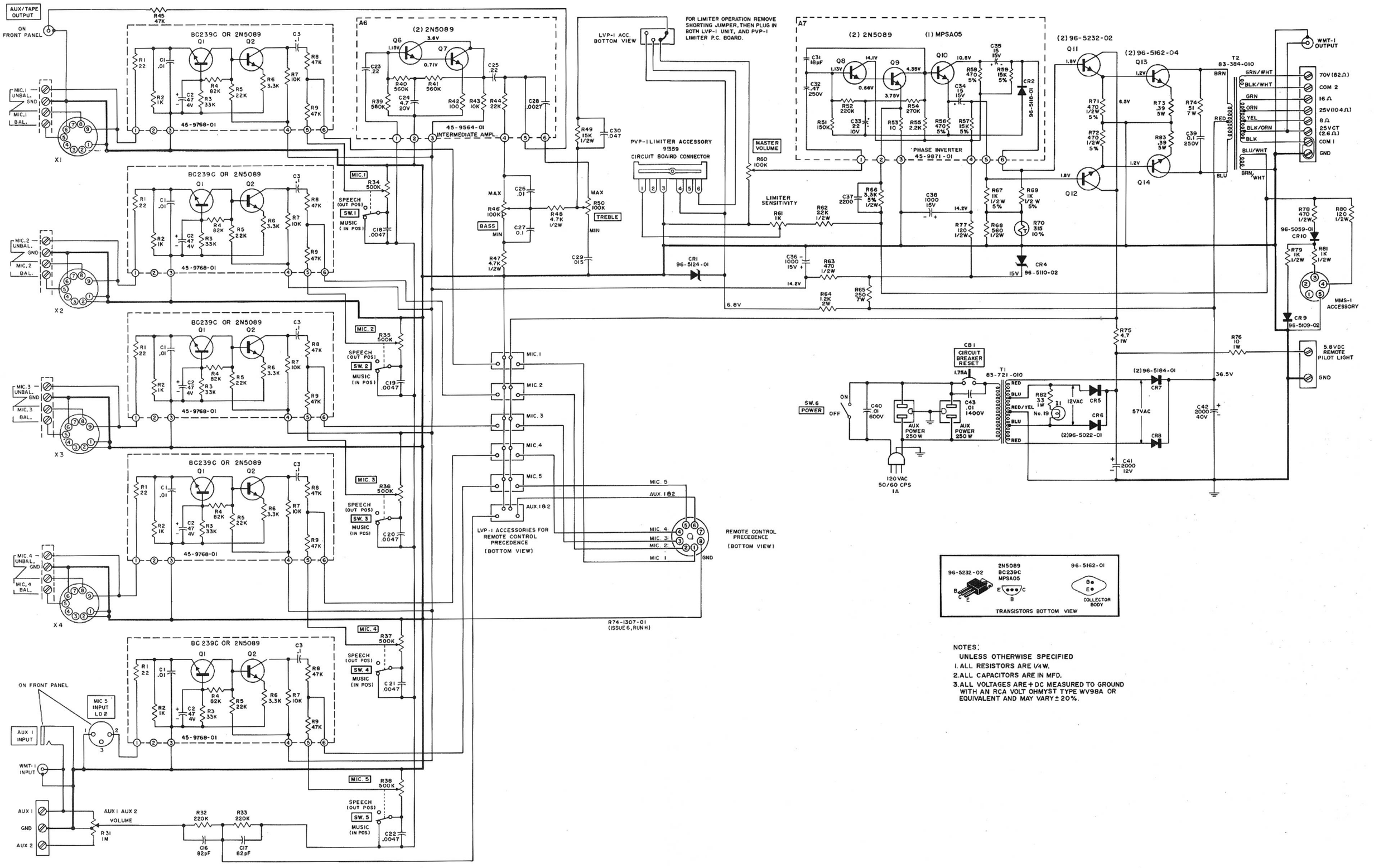
REPLACEMENT PARTS

Most components used in Bogen equipment are standard parts available through all reputable parts jobbers. However, some parts should be replaced only with genuine Bogen parts. These parts are listed here and located in figure 5. The parts are available through Bogen distributors, service agencies or direct from the factory.

When ordering a part, specify part number and description of the part as listed below. Specify the Model DWA-60 and give the Series designation, which is a run letter followed by numbers, stamped or screened on the left side of the chassis. Also, give the component board assembly number (45-) for all parts mounted on PC boards.

Ref. No.	*Part No.*	*Description*
C2,5,8, 11,14	79-504-064	Capacitor, Tantalytic, 47 MFD, 4V
C24	79-504-040	Capacitor, Tantalytic,4.7 MFD, 20V
C33	79-504-056	Capacitor, Tantalytic,22 MFD, 10V
C34,C35	79-504-052	Capacitor, Tantalytic, 15 MFD, 15V
C36,38	79-005-039	Capacitor, Electrolytic, 1000 MFD, 15V
C41	79-009-037	Capacitor, Electrolytic, 2000 MFD, 12V

Ref. No.	*Part No.*	*Description*
C42	79-009-053	Capacitor, Electrolytic, 2000 MFD, 40V
CB1	94-0008-16	Circuit Breaker, 1.75A
CR1	96-5124-01	Diode, Zener, 6.8V
CR2,	96-5118-01	Diode, 15 PIV, 30ma
CR4	96-5110-02	Diode, Zener, 15V
CR5, 6	96-5022-01	Diode, Silicon, 50 PIV, 750ma
CR7, 8	96-5184-01	Diode, Silicon, 200 PIV, 3 A
CR9	96-5109-02	Diode, 150 PIV, 100 ma
CR10	96-5059-01	Diode, IN66
I1	94-0197-01	Pilot Lamp, No. 19
Q1—Q9	96-5228-01	Transistor, BC239C (Telefunken)
Q10	96-5290-01	Transistor, MPSAO5 (Motorola)
Q11,12	96-5232-02	Transistor
Q13,14	96-5162-04	Transistor, Selected
R31	77-001-653	Control, AUX VOLUME, 1 Meg w/center tap
R34—R38	77-001-656	Control, MIC VOLUME, 500K, w/filter switch
R46	77-001-655	Control, BASS, 100K
R50, 60	77-001-654	Control, TREBLE, MASTER volume 100K
R51	75-163-154	Resistor, 150K ±5%, ¼W
R52	75-163-224	Resistor, 220K ±5%, ¼W
R54	75-163-274	Resistor, 270K ±5%, ¼W
R56	75-163-471	Resistor, 470Ω ±5%, ¼W
R58	75-163-101	Resistor, 100Ω ±5%, ¼W
R57, 59	75-163-153	Resistor, 15K ±5%, ¼W
R61	77-001-401	Control, Limiter Sensitivity, 1K
R65	75-742-251	Resistor, 250Ω, 7W
R66	75-213-332	Resistor, 3.3K±5%, ½W
R67, 69	75-213-102	Resistor, 1K ±5%, ½W
R70	96-5156-01	Thermistor, 315Ω ±10%
R71, 72	75-162-471	Resistor, 470Ω±5%, ½W
R73, 83	76-113-100	Resistor, 0.39Ω, 5W
R74	75-742-510	Resistor, 51Ω, 7W
R75	76-104-109	Resistor, 4.7Ω, 1W
SW-1—SW-5		Switch, Filter (See R34—R38)
SW-6	81-002-098	Switch, POWER, SPST
T1	83-721-010	Transformer, Power
T2	83-384-010	Transformer, Output
A1—A5	45-9768-01	Printed Circuit Assy, MIC input
A6	45-9564-01	Printed Circuit Assy, Intermediate Amp
A7	45-9871-01	Printed Circuit Assy, Phase Inverter
	16-9208-01	Insulating Disc, Output Transistor
	03-0592-01	Knob, MIC, MASTER, volume controls
	03-0593-01	Knob, BASS, TREBLE, controls
	94-1045-01	Lock Assy, Panel
	02-9029-01	Marker, Control Reset



NOTES:
UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE 1/4W.
2. ALL CAPACITORS ARE IN MFD.
3. ALL VOLTAGES ARE + DC MEASURED TO GROUND WITH AN RCA VOLT OHMYST TYPE WV98A OR EQUIVALENT AND MAY VARY ± 20%.

Figure 4. Model DWA60, Schematic Diagram

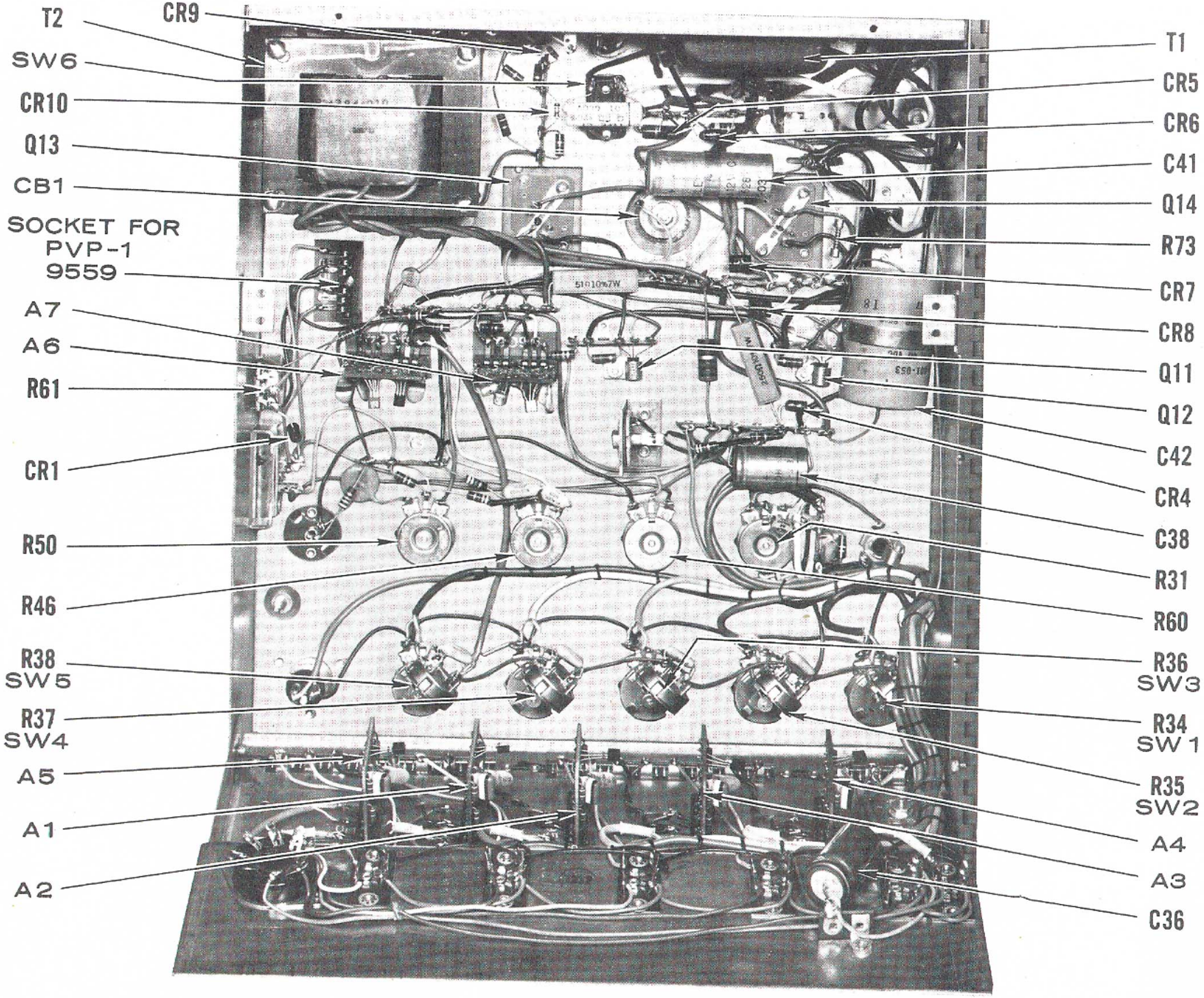


Figure 5. DWA60 Amplifier Parts Location

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