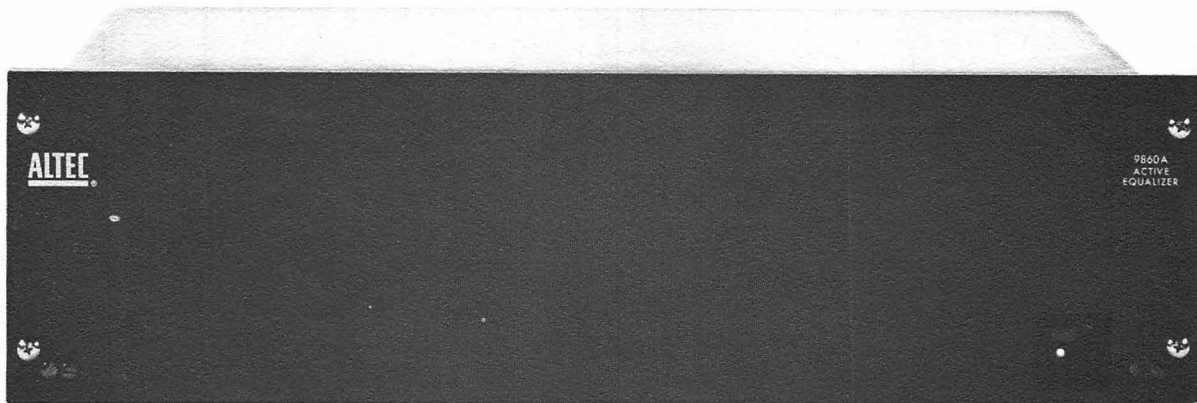




**9860A
ACTIVE EQUALIZER**

**OPERATING
INSTRUCTIONS**



FEATURES

- 26 Band-Rejection Filters — 1/3 Octave (40 to 12500 Hz)
- High-Pass and Low-Pass Filters with Controls
- Front Panel Gain Control
- Transformer-Coupled Inputs and Outputs
- Hinged Front Cover Prevents Tampering with Controls
- Bypass Switch
- AC or Battery Operation
- Modular PCB Construction

NOTICE

Read this manual before operating the ALTEC 9860A Active Equalizer.

Specifications and components subject to change without notice. Overall performance will be maintained or improved.



ALTEC DIVISION OF LANSING ALTEC, INC.

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42-02-042624-01 Price \$0.35

Litho in USA CP-1071-1K

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SPECIFICATIONS

Type:	Active 1/3 -octave equalizer with 26 band-rejection filters
Operating Gain:	-3 dB
Available Gain:	20 dB (to restore equalization loss)
Input Level:	+18 dBm maximum
Power Output:	+15 dBm
Frequency Response:	±1 dB from 20 Hz to 20 kHz
Distortion:	Less than 0.5% total harmonic distortion (THD) at rated output and re-stored gain
Input Impedance:	150 Ω or 600 Ω, balanced input
Load Impedance:	150 Ω or 600 Ω, balanced output
Noise Level:	82 dB below rated output
Controls:	26 detented linear slide filter controls on 1/3-octave ISO centers 40 Hz through 12.5 kHz. 15 dB depth each center frequency, combining with adjacent filters at -7 dB 1 detented linear slide reinsertion GAIN control 2 four-position interlocked pushbutton switches HI PASS; OFF/40 Hz/80 Hz/160 Hz; 18 dB/octave rolloff LO PASS; OFF/6 kHz/12.5 kHz/16 kHz; 18 dB/octave rolloff 1 push/push BYPASS switch
Pilot Indicator:	Light-emitting diode
Power Requirements:	120/240V, 50/60 Hz, 35W 24/28V dc at 1A
Operating Temperature Range:	Up to 50° C (122° F)
Dimensions:	5-1/4" H x 19" W x 8" D
Weight:	17 pounds
Color:	ALTEC Green on panel cover, black matte finish on inner panel

DESCRIPTION

The ALTEC 9860A Active Equalizer is an Acousta-Voicing® filter set equipped with 26 band-rejection filters and additional high/low pass filter selection to accurately equalize the entire audio spectrum of one sound-system channel. The 9860A enables adjustment of the sound system so that the loudspeaker and

enclosed-room environment provide a flat acoustical response for the listener's ear. Internal gain correction restores the equalized output to the original input level.

INSTALLATION

MECHANICAL

The 9860A may be mounted in a standard 19-inch equipment rack. Vertical rack space required is 5-1/4 inches. Use the following procedure.

1. Remove four screws securing front cover, open and lower cover.
2. Install 9860A in equipment rack with appropriate four screws supplied with unit.
3. Close front cover and secure with four screws previously removed.

VENTILATION

The 9860A generates minimal heat during normal use. Although the amount of heat is relatively low, the unit must be ventilated to prevent excessive temperature rise. Because transistors are heat sensitive, the 9860A should not be placed adjacent to heat-generating equipment or in areas where ambient temperature exceeds 50° C (122° F).

If the 9860A is mounted in an equipment rack or cabinet with other heat-producing equipment mounted above and/or below (two or more 9860As or one 9860A with real time analyzer, oscilloscope, etc.), space must be provided between the units or the 9860A may become too warm. The 1-3/4" perforated panel (ALTEC Part No. 10399) is recommended for this purpose.

When several 9860As or other heat-producing units are mounted in a single rack or cabinet, acceptable air temperature may be in doubt. To determine temperature conditions, operate the system until temperatures stabilize, then measure air temperature with a bulb-type thermometer held at the bottom of the uppermost 9860A. Do not let the thermometer bulb touch metal because the metal will probably be hotter than the ambient air. If air temperature exceeds 50° C (or if it will on a hot day), the equipment should be spaced further apart or a blower should be installed to ventilate the cabinet.

ELECTRICAL

120 Volt, 50/60 Hz Power Connections

Equipment supplied for domestic use is provided with the power transformer strapped for 120 volts (terminals 2 to 3 and 4 to 5 on TB4). The power input nameplate on the chassis adjacent to the power cord is mounted to show the appropriate side specifying the connections (see Figure 1). Verify that line voltage is in accordance with the voltage rating before connecting the 9860A to line power.

240 Volt, 50/60 Hz Power Connections

Export equipment, specified, is provided with the power transformer strapped for 240 volts (terminals 3 to 4 on TB4). The power input nameplate on the chassis adjacent to the power cord is mounted to show the appropriate side specifying the con-

nections. Use the following procedure to change a unit strapped for 120V operation to 240V operation.

1. Remove seven screws securing bottom cover; lift off cover.
2. Locate terminal board TB4 beneath power transformer T3.
3. Remove strap "A" connecting terminals 2 and 3, and remove strap "B" connecting terminals 4 and 5; then solder strap "C" to terminals 3 and 4 (see Figures 2 and 3).
4. Remove voltage rating nameplate from chassis, reverse and reinstall to show 240V rating.
5. Replace bottom cover and secure with seven screws previously removed.
6. Change ac line fuse (F1) from the existing 1A fuse to a 1/2A fuse (see Figure 1). Place a 1/2A ac line rating tag on tag on the back of the 9860A, above the AC LINE fuse.

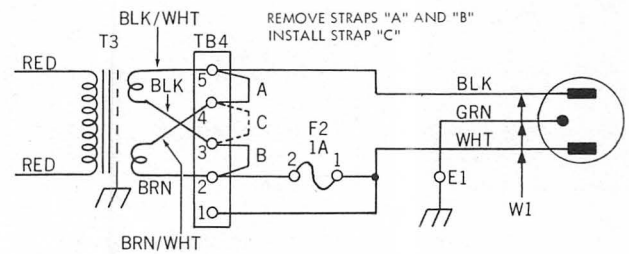


Figure 3. Converting to 240V, 50/60 Hz Power

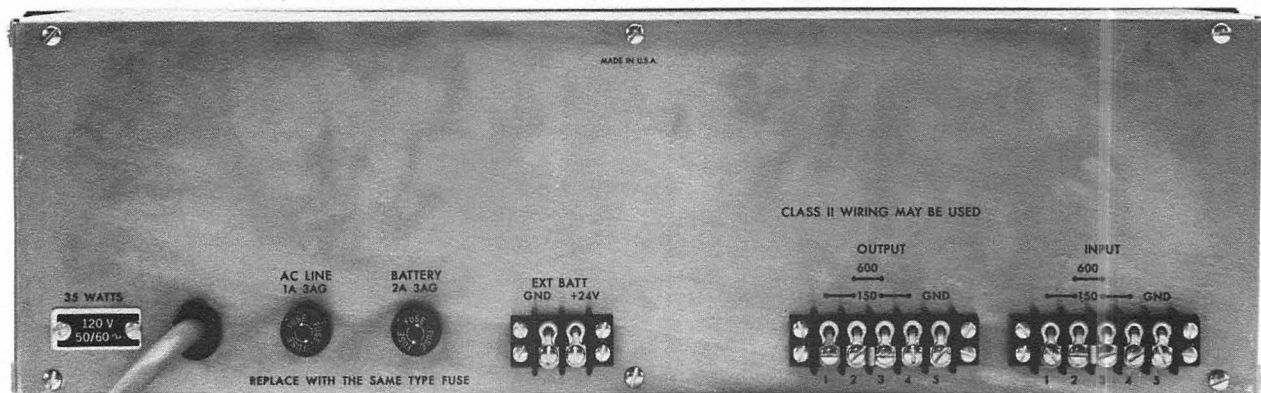


Figure 1. Electrical Connections

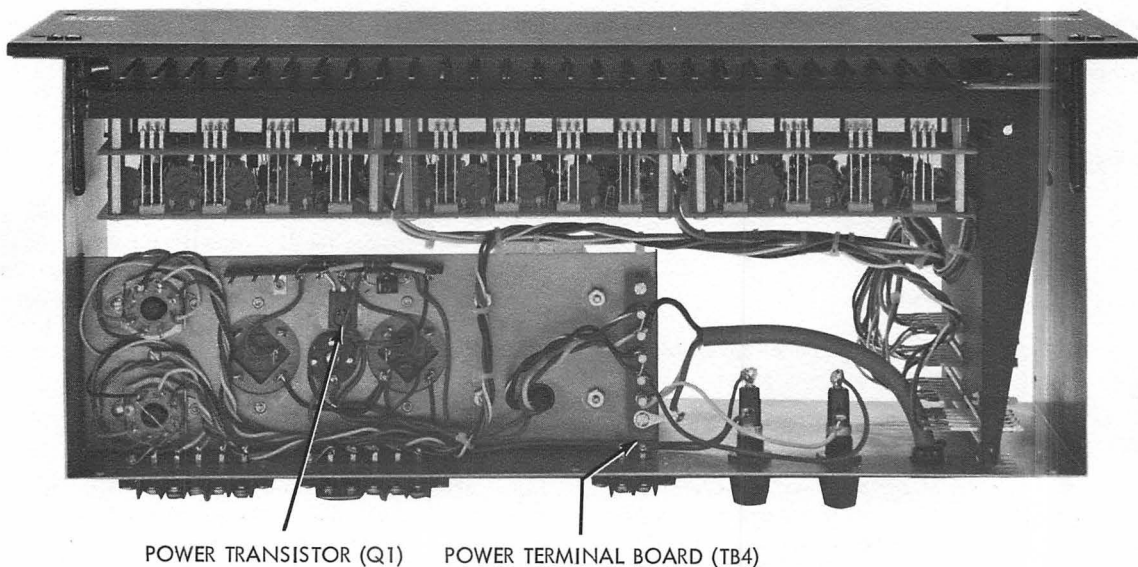


Figure 2. Bottom View 9860A, Cover Removed

Battery Connections

If desired, the 9860A may be connected to an external 24/28V battery with minus (-) as ground. Terminals for the dc power connections are on TB3 (see Figures 1 and 8). If ac power fails, transfer to dc power is instantaneous, automatic and silent.

Input Connections

Input to the 9860A is connected to the INPUT terminal board (TB1) on the rear panel of the chassis (see Figures 1, 4 and 8). Connections to ALTEC power amplifiers must be made with two-conductor, twisted and shielded cable, such as Belden 8450 or 8451 cable.

NOTE

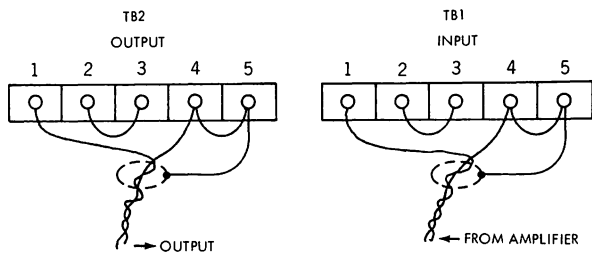
For amplifier connections, refer to operating instructions for associated ALTEC amplifier.

For 600-ohm balanced input applications with 9860A, connect amplifier to terminals 1 and 4 of TB1 and strap terminals 2 and 3 (see Figure 4). Terminals 4 (common) and 5 (ground) may also be strapped to prevent interference from stray electrostatic radiation.

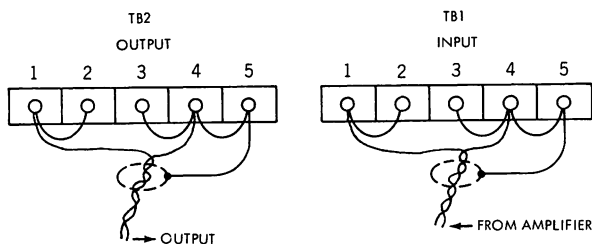
For 150-ohm balanced input applications with the 9860A, connect amplifier to terminals 1 and 4 of TB1 and strap terminal 1 to 2 and 3 to 4 (see Figure 4). Terminals 4 and 5 may also be strapped to prevent interference from stray electrostatic radiation.

Output Connections

Output from the 9860A is connected to the OUTPUT terminal board (TB2) on the rear panel of the chassis (see Figures 1, 4 and 8). Terminal connections and cable requirements are the same as described for input connections.



CONNECTIONS FOR 600 OHMS BALANCED INPUT AND OUTPUT



CONNECTIONS FOR 150 OHMS BALANCED INPUT AND OUTPUT

Figure 4. Input and Output Connections

OPERATION

CONTROLS AND INDICATORS

The pilot indicator and all operating controls are on the front panel (see Figure 5). Their functions are described in Table 1. A hinged cover prevents inadvertent control changes. When the hinged cover is secured, only the BYPASS switch and pilot indicator are exposed.

Use of Equalizer Controls

Although the filter controls are continuously-variable slide potentiometers, they are detented in increments of 1-1/2 dB. ALTEC strongly recommends that only the detented positions be used to guarantee precision resetting of the controls. A convenient method of recording filter control settings for future resetting of controls for different installations or applications is shown in Figure 6.

Only one pushbutton at a time should be pressed on the HIGH PASS selector or LOW PASS selector. Two pushbuttons will lock in for either selector but an error in filter frequency insertion will result.

The first attempt to smooth the house curve should be limited to one or two of the greatest peaks or valleys. After this initial smoothing, run a new house curve to check results. Continue adjusting one or two sections at a time, replottting the frequency response each time, until the desired uniformity of response is achieved or until the correction capability of the 9860A is exceeded.

After the best obtainable house curve is achieved with the 9860A filter controls, adjust the GAIN control to provide an equalized output level as high as the unequalized input level. The GAIN control is detented in increments of 2 dB and has a reinsertion range of +20 dB.

SERVICE

If a malfunction occurs, service should be performed by an ALTEC Qualified Service Representative. For factory service, ship the 9860A prepaid to Customer Service, ALTEC Lansing, 1515 South Manchester Avenue, Anaheim, California 92803. For additional information or technical assistance, call (714) 774-2900, or TWX 910-591-1142.

ACCESS

Obtain access to the chassis interior by removing the top and bottom covers and/or the control panel assembly.

Cover Removal

Remove seven screws securing each cover and lift off cover. Figure 2 shows interior with bottom cover removed and Figure 7 shows interior with top cover removed.

Control Panel Assembly Removal

Use the following procedure to remove the control panel assembly.

1. Remove four screws securing hinged control panel cover and lower cover.

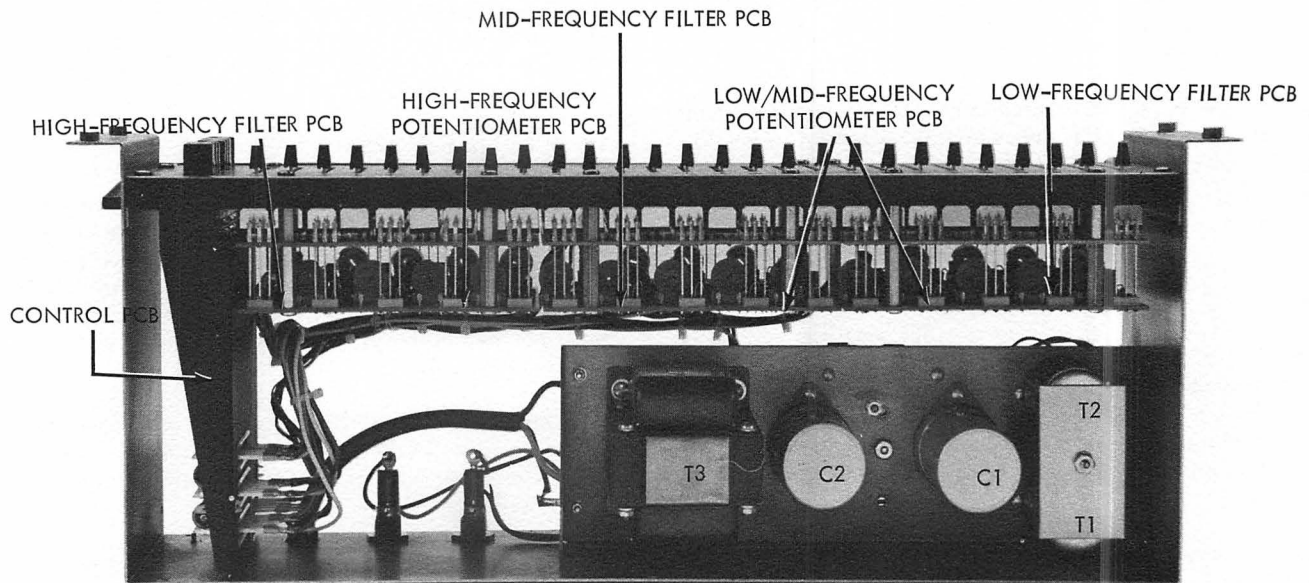


Figure 7. Top View 9860A, Cover Removed

3. Replace T1 or T2, as applicable, with identical module (see parts list).
4. Install clamp plate and attaching hardware previously removed.
5. Replace top cover and secure with seven screws previously removed.

Pilot Indicator Replacement

Use the following procedure to replace the pilot indicator.

1. Remove control panel assembly.
2. Remove pilot indicator from clip-ring mounting by pressing it through from the front side of panel.
3. Press replacement pilot indicator (see parts list) into the clip-ring mounting.
4. Unsolder old pilot indicator and solder leads to replacement pilot indicator, observing proper polarity.
5. Replace control panel assembly by reversing steps of removal procedure.

Power Transistor Replacement

The power transistor (Q1) is located on the bottom chassis sub-assembly (see Figures 2 and 8). Use the following procedure to replace it.

1. Remove seven screws securing bottom cover and lift off cover.
2. Unsolder transistor leads from terminals 4, 5 and 6 of terminal board TB5.

3. Remove mounting screw and lift Q1 from chassis.
4. Be sure the following conditions exist when replacing Q1:
 - a. Mica insulator is not damaged; if damaged, replace with new insulator.
 - b. No grit or metal particles are lodged between Q1 and chassis.
 - c. Both sides of mica insulator are covered with silicone grease or fluid.
 - d. Mounting screw is tight.
5. Solder Q1 leads to terminals 4, 5 and 6 of TB5 in accordance with lead configuration shown in Figures 2 and 8.
6. Replace bottom cover and secure with hardware previously removed.

Printed Circuit Board (PCB) Replacement

Three potentiometer PCBs, three filter PCBs and one control PCB are located within the chassis (see Figures 7 and 8). Repair or component replacement for any PCB should be made only at the factory.

CAUTION

Filter PCBs have several factory-adjusted potentiometers. Their adjustments must not be disturbed because any changes result in misalignment of the corresponding band-rejection filters. Adjustment of these potentiometers should be done only at the factory.

A new or repaired PCB may replace a failed PCB to restore operation. Remove the control panel assembly, then use the applicable replacement procedure for the failed PCB.

CAUTION

When removing and replacing any PCB, do not warp, bend or twist the board or conductor may fracture.

1. Control PCB Replacement

- a. Remove two screws at front end of PCB which secure it to spacers on chassis.
- b. Carefully lift rear of PCB to free connector pins. Take care that control buttons do not bind in control panel while removing board.
- c. Insert control buttons of replacement PCB through appropriate holes in control panel and position connector pins of replacement PCB over receptacle. Verify that all PCB connector pins mate properly with receptacle, then press PCB firmly into receptacle. Be careful not to warp, bend or twist the board.
- d. Align PCB mounting holes with spacers on chassis and secure PCB with two screws previously removed.
- e. Replace control panel assembly by reversing steps of removal procedure.

2. Filter PCB Replacement

- a. Remove four screws from rear of board which secure it to spacers on potentiometer PCB.
- b. Carefully lift PCB to free connector pins; if necessary, remove plastic cable clamps from cable harness.
- c. Carefully remove all wire connections from PCB; tagging each connector as removed, with wire color/relationship.
- d. Attach wire connectors to replacement PCB in accordance with tagging (see Step c).

- e. Position connector pins of replacement PCB over receptacle, then press PCB firmly into receptacle. Be careful not to warp, bend or twist the board.
- f. Align PCB mounting holes with spacers on potentiometer PCB and secure it with four screws previously removed.
- g. Replace any cable clamps removed in Step b.
- h. Replace control panel assembly by reversing steps of removal procedure.

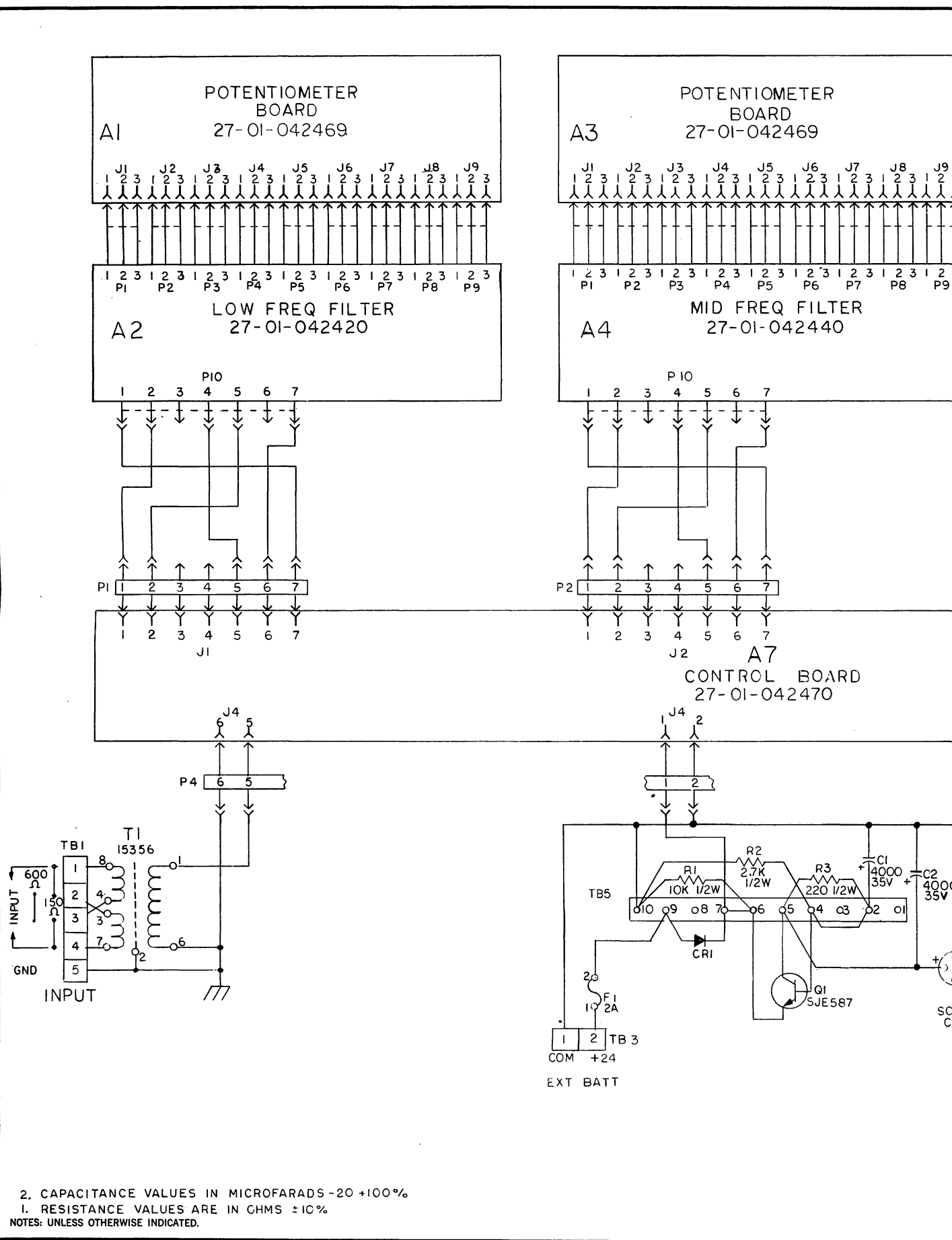
3. Potentiometer PCB Replacement

- a. Remove nine plastic slider tips from filter controls of PCB being replaced; the tips are press-fitted and may be pulled free.
- b. Remove four screws securing PCB assembly to front panel.
- c. Remove four threaded spacers securing potentiometer PCB to filter PCB.
- d. Carefully lift PCB to free connector pins.
- e. Position connector pins of replacement PCB over receptacle. Verify that all PCB connector pins mate properly with receptacle, then press PCB firmly into receptacle. Be careful not to warp, bend or twist the board.
- f. Secure potentiometer PCB to filter PCB with four threaded spacers previously removed.
- g. Align spacer mounting holes with holes in front panel and secure PCB with four screws previously removed.
- h. Press nine plastic slider tips, previously removed, onto filter controls.
- i. Replace control panel assembly by reversing steps of removal procedure.

PARTS LIST

Reference Designator	Ordering Number	Name and Description
A1,3	27-01-042469-01	PCB assembly, low/mid frequency, potentiometer
A2	27-01-042420-01	PCB assembly, low frequency, filter
A4	27-01-042440-01	PCB assembly, mid frequency, filter
A5	27-01-042480-01	PCB assembly, high frequency, potentiometer
A6	27-01-042450-01	PCB assembly, high frequency, filter
A7	27-01-042470-01	PCB assembly, control
C1,2	15-01-107430-01	Cap., 4000 μ F, 35V
CR1	48-02-100835-01	Diode, rectifier, 3A, 100 PIV
CR2	48-02-108577-01	Rectifier, bridge, 1.5A, 100 PIV

Reference Designator	Ordering Number	Name and Description
CR3	39-01-112201-01	Lamp, solid-state, 1.8V, 20 mA
F1	51-04-100464-01	Fuse, 1A, 3AG
F1 (optional 240V)	51-04-100463-01	Fuse, 0.5A, 3AG
F2	21-04-100465-01	Fuse, 2A, 3AG, 250V
P1,2,3	21-01-110991-01	Plug, 7-pin slot, snap-in
P4	21-01-107445-01	Plug, 6-pin slot, snap-in
Q1	48-03-109408-01	Transistor, power
R1	47-01-102367-01	Res., 10K Ω \pm 10%, 1/2W
R2	47-01-102360-01	Res., 2.7K Ω \pm 10%, 1/2W
R3	47-01-102346-01	Res., 220 Ω \pm 10%, 1/2W
T1,2	10-05-01-042	Transformer, 15356
T3	56-08-007437-01	Transformer, power



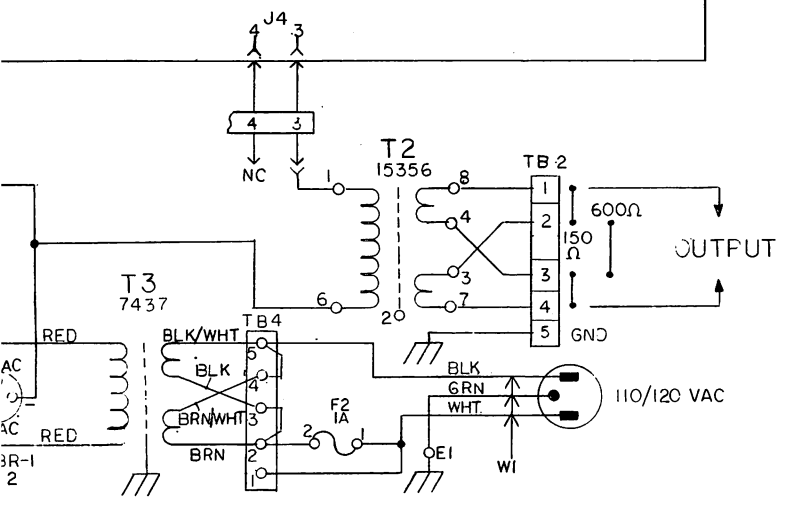
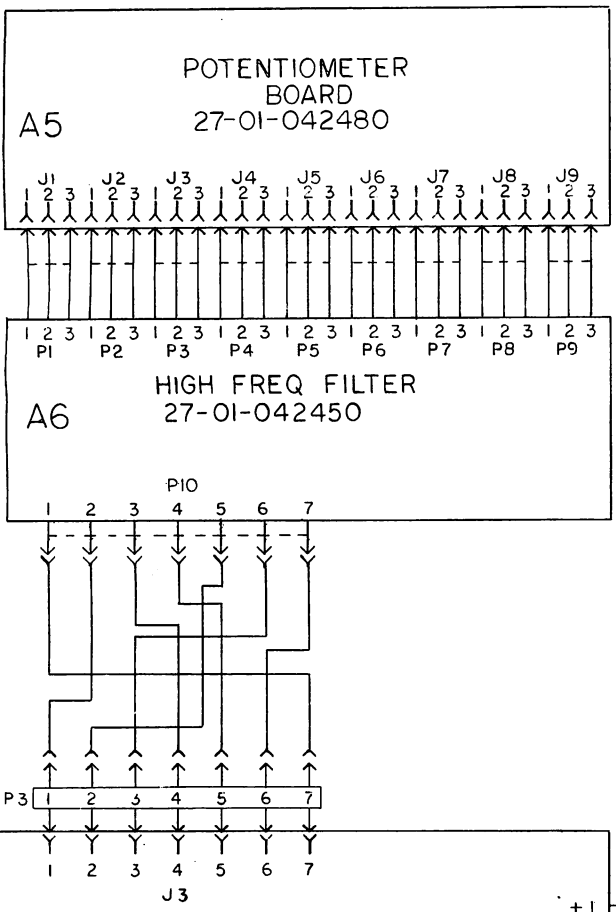
2. CAPACITANCE VALUES IN MICROFARADS -20 +100%

1. RESISTANCE VALUES ARE IN OHMS ±10%

NOTES: UNLESS OTHERWISE INDICATED.

Figure 8. Schematic

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	ENGR
1	REL FOR PROD		<i>[Signature]</i>	<i>[Signature]</i>



ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION	MATERIAL	NOTE
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACT. 2 PLACE DEC. 3 PLACE DEC.					
ORIGINAL DATE OF DRAWING 1-5-71			SCHEMATIC - ACTIVE EQUALIZER		
DR. BY <i>[Signature]</i>					
CHKD. <i>[Signature]</i>			ALTEC A Division of <i>[Logo]</i> Ling Alltec, Inc. ANAHEIM, CALIFORNIA		
ENGR. <i>[Signature]</i>					
NEXT ASSY USED ON 9860A			D 2D7C0-1		
APPLICATION			SCALE ~	CODE	SHEET 1 OF 1