

# QUICKSILVER MX-190 OPERATING INSTRUCTIONS

## INPUT CONNECTIONS

To maintain a short and concise signal path, the input connectors are mounted directly on the plug-in front-end circuit boards. Consequently they are recessed within the 3/4 inch holes in the upper part of the rear panel.

IMPORTANT - Never operate the amplifier with the inputs open or disconnected. Always have shorting jacks or a preamp connected to the input. The MX-190 maintains a high input impedance extending well into the ultrasonic region and may pick up spurious signals if left open at the input.

## OUTPUT CONNECTIONS

The 5-way binding posts at the rear of the amplifier are labeled:

Red terminals	4 ohm	4 $\Omega$
	8 ohm	8 $\Omega$
Black terminals	Common	

These are the nominal impedances that should be connected to the respective outputs. The best connection for your outputs is made by tightening the binding post securely onto a bare wire. Banana plugs may be used for convenience but will degrade sound quality.

CAUTION: Beware of high capacitance speaker wires, or unterminated speaker wires (no speaker attached). They may cause the amplifier to oscillate.

## ON/OFF SWITCH

The Quicksilver MX-190 has a 3 position on/off switch located in the center of the front panel. Before plugging the amplifier in, familiarize yourself with the operating positions of the switch:

<u>OFF:</u>	pushed in at the left
<u>WARM-UP:</u>	center position
<u>OPERATE:</u>	pushed in at the right

The warm-up position charges the power supply and warms the tube filaments as indicated on the front panel display. CHARGING the power supply takes 5 to 10 seconds. The tube filaments remain in WARM-UP mode (no plate current flowing) while the switch is in this position.

When the amplifier is cold, leave the switch in "WARM-UP" position for at least 3 minutes before switching into "OPERATE" mode. This prevents tube arc-over during the initial 50 hour burn-in period.

When amplifier is warm (i.e., off less than 1/2 hour) you may bypass the WARM-UP mode, but if you would like to avoid surging the power supply, leave the switch in "WARM-UP" mode until the charging light goes out.

The last switch position energizes the green "OPERATE" light after about 12 seconds, indicating the tubes have reached their operating voltage and the amplifier is ready for use.

(over)

## FUSES

The front panel indicates the following, if a line fuse is blown:

FUSE OUT  
2 amp

FUSE OUT  
4 amp

IMPORTANT - Always turn the power off before replacing a fuse.

## OUTPUT TUBE OPERATION

Under normal use the EL-34 output tubes should last many years, but listed below are some of the conditions that may damage them:

1. Less than 3 minute warm-up, during the first 50 hours of usage.
2. A short, at the output terminals; this may cause the 4 tubes of the shorted channel to glow RED when driven hard.
3. Driving the amplifier hard into less than the rated 4 or 8 ohm output load impedance.
4. A bias setting of higher than 60ma per tube.
5. A d.c. voltage on the amplifier input.
6. Less than 4 inches cooling space above and on either side of the amplifier.

If a tube flashes, glows RED, or will not hold a stable bias setting, it is probably damaged and should be replaced.

## OUTPUT TUBE REPLACEMENT

IMPORTANT - NEVER operate amplifier with more than 1 output tube removed.

1. Remove bad tube
2. Idle amplifier in OPERATING mode for 5 minutes
3. Connect bias meter to respective bias jack
4. Insert new EL-34
5. As tube warms up, keep bias adjusted below 45ma by turning the bias control with a screwdriver
6. Remove meter
7. Operate amplifier for a least 15 minutes
8. Connect meter and readjust bias to 53ma

NOTE - During the first 50 hrs. of new tube operation the bias will slowly drop and need periodic readjusting.

## PROCEDURE FOR REPLACING ALL 8 OUTPUT TUBES:

1. Purchase 2 sets of 4 matched EL-34 tubes from QUICKSILVER AUDIO
2. Idle amplifier in OPERATE mode for a couple of minutes
3. Remove one tube using a towel to avoid burning your hand
4. Connect bias meter to the corresponding bias jack
5. Insert new EL-34
6. As tube warms up, keep bias adjusted below 45ma by turning the bias control with a screwdriver
7. Remove meter from jack and follow steps 3 thru 6 for the next 7 tubes
8. Operate amplifier for a least 15 minutes
9. Connect bias meter and readjust each tube to 53ma

## SERVICING TIPS

Problems with the MX-190 usually fall into the following categories:

1. Fuse Blowing
2. Amplifier won't go into operate mode
3. Output tube bias is incorrect

Listed below are the probable causes with their solutions

### 1. Fuse Blowing:

- a. 4 amp fuse blows about 30 seconds after operate light appears:  
cause → An output tube is arcing  
solution → With cage removed, watch all 8 output tubes closely. One will flash, right before fuse blows. Keep your hand on power switch and switch off as soon as flash is seen. Remove flashing tube and operate amp again. If O.K., replace tube with new one as per operating instructions.
- b. 4 amp fuse blows immediately after switching to operate mode. Charging light does not go out during warmup:  
cause → Power supply is shorted  
solution → Either diode bridge or large blue capacitor on the left side of chassis is shorted. Check these with ohmmeter after amp has been unplugged 1 hour. Do not leave in warmup mode if charging light stays on.
- c. 2 amp fuse blows:  
cause → Output tube filament is shorted  
solution → Turn amp off and remove all 8 output tubes. Replace amp fuse. Switch to warmup mode, (important - never switch to operate under these conditions. On amps before no 30, remove 4(5) amp fuse) then replace tubes one by one until 2(1.5) amp fuse blows. Replace shorted tube.

2. Amplifier won't go into operate mode:

cause 1 → Relay is bad

solution → Listen for click of relay when operate mode is switched to. If no click is heard, replace relay located behind front panel on left side.

cause 2 → 2 small tubes at center rear of chassis are bad, or large blue capacitor on right side of chassis or 160 uf cap at rear of chassis is shorted.

solution → If the 2 small tubes glow blue or red after operate mode is switched to, check capacitors for shorts. If caps are O.K., try replacing tubes. Always unplug unit for 1 hour before removing bottom.

3. Output tube bias problems:

a. No bias on 1 tube:

cause → tube is bad or 120Ω resistor between pin 4 and 6 on tube socket is open.

solution → replace tube or resistor.

b. Bias on all 4 tubes of one channel or both channels jumps up and down continuously:

cause → D.C. voltage leak to output tubes

solution → Disconnect preamp. If problem stops then preamp is putting out D.C. voltage into amplifier. If problem continues then turn amp off and remove both front end boards. If problem remains then main frame is at fault. If problem disappears then boards are at fault.

c. Bias on one output tube has dropped 10 or 20 ma or drifts up and down.

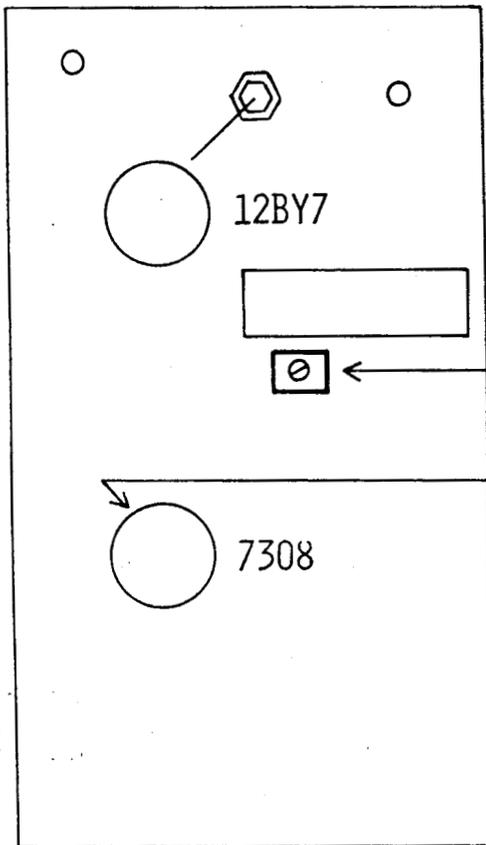
cause → Output tube has been damaged

solution → Replace tube

Other problems such as one channel dead etc. can usually be narrowed down by switching front end boards or tubes between channels. If a problem is in a board, return it to Quicksilver Audio. Our service is very fast, and boards are cheap to ship.

MS-190 amplifiers prior to no. 32 do not have a 3 position on off switch, but instead use a 70 sec. time delay relay. Amps prior to no. 21 have one 6x4 tube and the charging light stays on the duration of the 70 sec. turn on sequence.

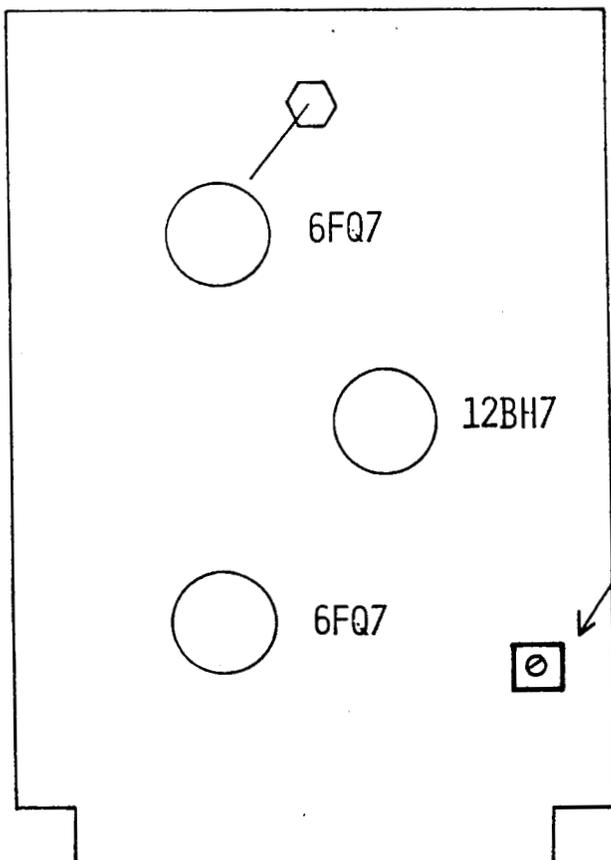
## PENTODE BOARD



Adjust to 123 volts at the point indicated below. Use only a high impedance D.C. voltmeter. Allow 30 minutes warm-up before adjustment.

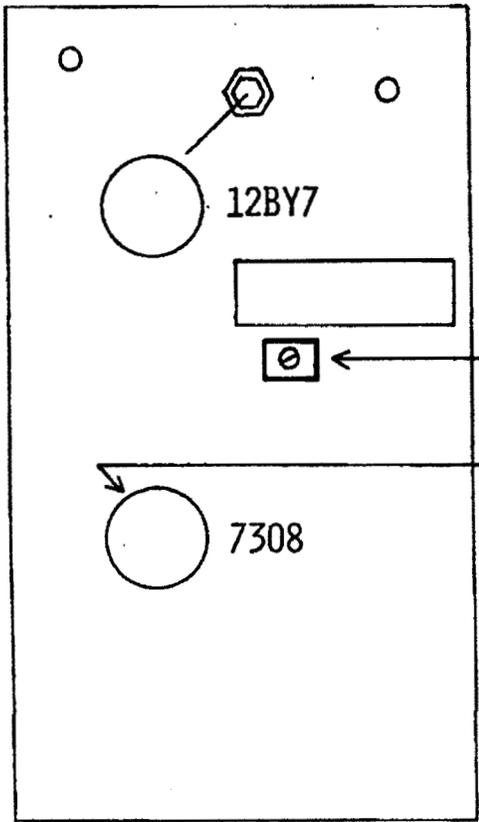
123 volts to ground from exposed part of tube pin at eleven o'clock position.

## TRIODE BOARD



Adjust for lowest I.M. or second harmonic distortion on either 4 or 8 ohm tap at 1 watt, then check at 10 watts. A change in the setting indicates a bad tube or component.

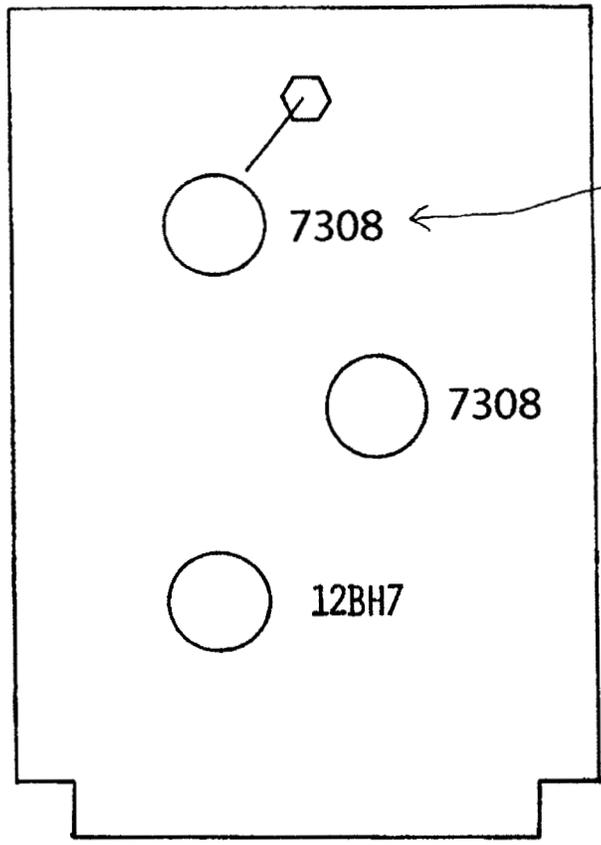
# PENTODE BOARD



Adjust to 123 volts at the point indicated below. Use only a high impedance D.C. voltmeter. Allow 30 minutes warm-up before adjustment.

123 volts to ground from exposed part of tube pin at eleven o'clock position.

# D.C. COUPLED BOARD



This tube needs to be carefully matched between sections to allow proper operation