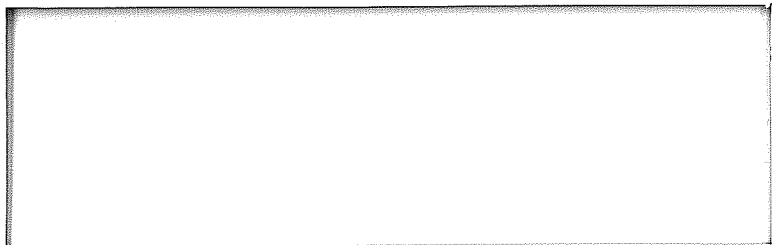


EQ^L™
EQUALIZER / PRE-AMPLIFIER
OWNER'S INSTALLATION MANUAL

AudioControl™



EQL™
EQUALIZER / PRE-AMPLIFIER
OWNER'S INSTALLATION MANUAL

AudioControl™

22313 70th Ave. West • Mountlake Terrace, WA 98043
Phone (206) 775-8461

Congratulations on buying a truly unique enhancement to any quality car stereo system. If you don't want to hike through this whole booklet, we have begun with "express" instructions. For the rest of you, we'll proceed by familiarizing you with each portion of the EQL.

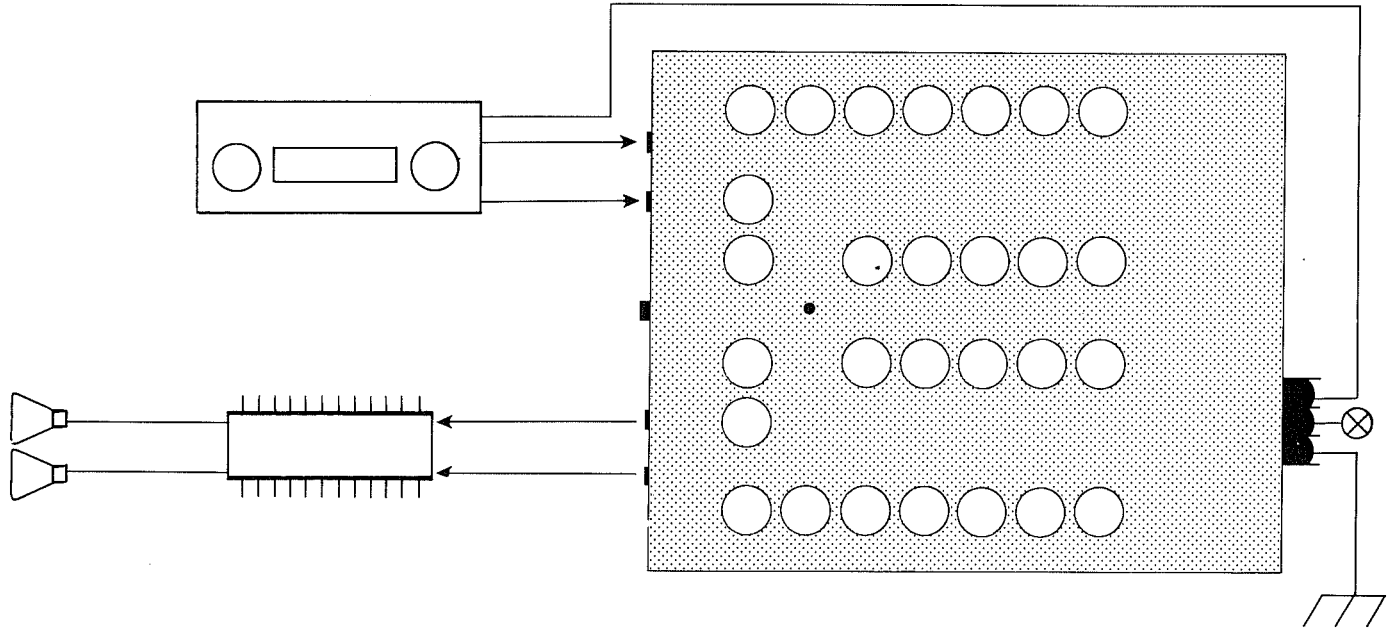
What you can expect from your EQL:

- **Car acoustic problems solved.** Car interiors are inherently different and varying size doors and trunks create different sized speaker enclosures. All of which affects the sound, usually adversely. With the EQL, you will have a way to compensate.
- **Component line level incompatibilities eliminated.** Unlike home stereo, there are no exact standards for auto input / output levels. Now you have the control to provide a perfect level and signal-to-noise ratio.

- **Tremendous sound control.** 12 bands of equalization, 5 bands half octave bass, 7 bands octave. Input and output level controls.
- **Highest quality,** USA built by an award winning manufacturer.

ULTRA-FAST, CAN'T WAIT HOOK-UP DIAGRAM

For you anti-manual types or professional installers, here is the express approach: Hook the EQL between the deck and the power amplifier. Period.



GETTING TO KNOW YOUR EQL

The Audio Control EQL is a compact, audiophile grade, line level sound processor. It contains a 5-band half-octave bass equalizer, 7-band upper octave equalizer, and input/output level matching circuits. In short, a solution to several previously unsolved problems that have been encountered in most car installations.

INPUTS AND POWER. Lurking on the left side of the EQL, you'll see two RCA-type audio inputs like the ones you're familiar with on home hi-fi and VCR's. These are the inputs which run between your tape deck and the EQL's input level circuitry.

You'll also notice a terminal strip with screws set in it on the right side. These are where you hook the +12 volt and ground connections which power the EQL. The third terminal is for remote turn on of the EQL. It connects to your radio or tape player power antenna lead to allow you to activate the EQL simply by firing up your tape deck.

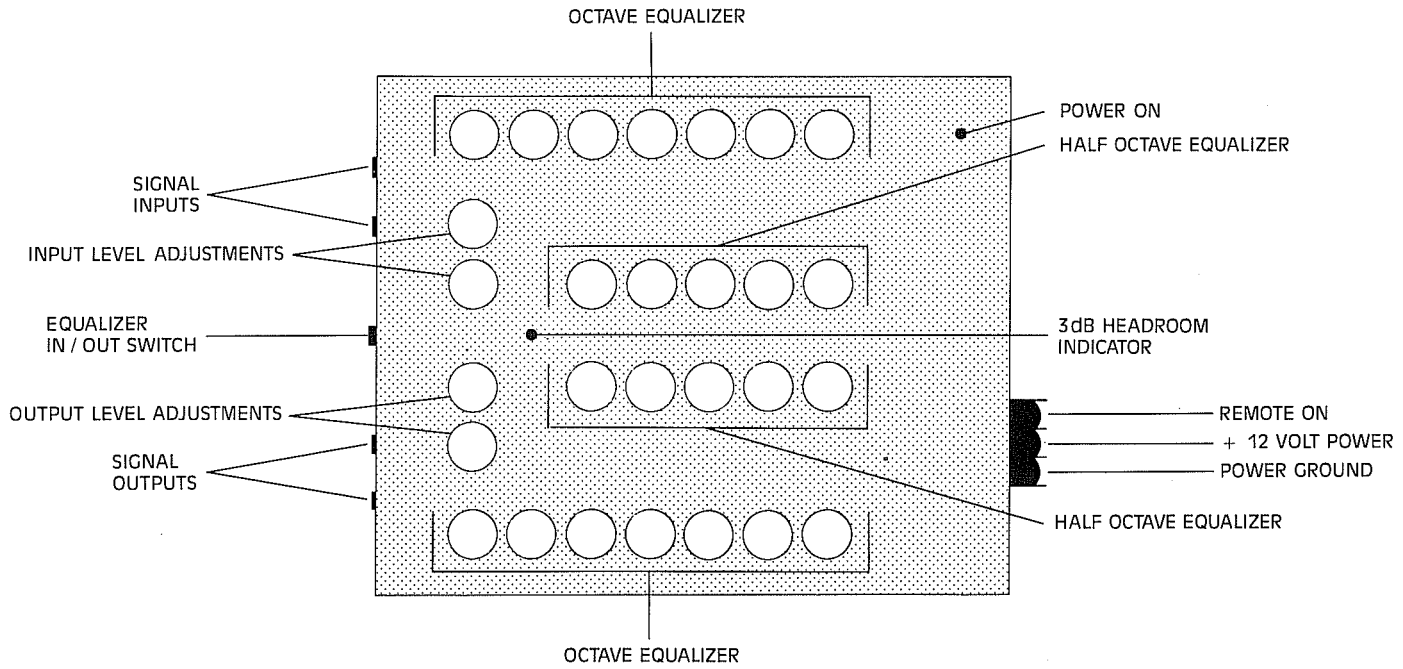
INPUT LEVEL CONTROLS. On the face of the EQL, on the left, you will notice two knobs and a small red LED. These control the "loudness" of the signal coming from your deck. The EQL accepts any output level from any head unit and converts it to just the right input for any power-amp / speaker combination. A special variable gain amplifier allows astonishing variation in drive signal without ANY overload distortion.

Even more important, the EQL's variable gain circuitry handles drive signal variations with maximum signal-to-noise ratio, instead of just "boosting" or "turning down" a signal in relation to the output. The cassette/tuner head "sees" the perfect input.

The LED will be used to set the input level during installation.

LEFT AND RIGHT EQUALIZER SECTIONS.

Most of those bewildering knobs on the top of the EQL are a precision half-octave and octave equalization system. Just as Audio Control's home equalizers can be found in some of the most expensive Hi-Fi systems,



the EQL's finesse and accuracy are ready to go to work on your car system.

You're probably familiar with equalizers that have sliders on them. All equalizers are basically tone controls. They split the sound spectrum into specific bands which can be adjusted more accurately for better control of acoustics and speakers.

Both left and right EQL channels have seven octave bands and five special half-octave bands for more exacting adjustment of bass frequencies. It does not take a golden ear or a lot of test gear to adjust all these knobs. Just common sense and your own judgment.

LEFT AND RIGHT OUTPUT ADJUSTMENTS.

These adjustments are used to control the EQL's output to your power amplifier. The circuitry provides output level along with the maximum signal-to-noise ratio to drive virtually any power amplifier made. Gain can be set so that mid setting on the volume control is truly mid volume in relation to power amplifier output. (Instead of being in the first three clicks of the volume control).

EQUALIZER IN/OUT BUTTON. This button is used during installation to let you compare the effect with and without equalization. The button is left in once you have arrived at the best setting.

OUTPUT JACKS. On the right end of the EQL are the RCA-type jacks which connect the EQL to the power amplifier.

QUICK REFERENCE GUIDE TO INSTALLING THE EQL

If you can install a power amplifier or speakers, you won't have any trouble with the EQL. Two wires in, two wires out, and the power connections. After that, we've gone ahead and talked each individual facet of the EQL to death. You don't have to read it, but it will help understand some of the more sophisticated functions of the EQL.

A. The most important instruction of all

**** FILL OUT THE WARRANTY CARD!** It is critical that you keep your invoice or sales slip, since it is your proof of purchase should anything happen to the EQL. It's also good insurance proof if the local hot car ring takes a fancy to your fine workmanship and makes off with the whole system. Insurance companies are notably reluctant to believe something like the EQL was part of a system, since it doesn't fall in any of their little predefined niches the way decks, amps and speakers do.

B. Initial adjustment

Since the EQL is used to improve sound within a car, it should be adjusted inside the car even though it's going to live under the dash, in the trunk, etc. So we first have you do a temporary connection.

1. INSTALL THE DECK, POWER AMPLIFIER AND SPEAKERS.
2. OBTAIN CABLES LONG ENOUGH TO ALLOW YOU TO SIT IN THE DRIVER'S SEAT AND ADJUST THE EQL. After the following instructions you can install the EQL in a permanent, out of the way place.
3. HOOK THE EQL TO THE **TAPE DECK ONLY**. Use the long patch cords from deck output to EQL input.
4. TEMPORARILY CONNECT +12 V., GROUND WIRES, and REMOTE ON TO THE EQL. Since Remote On is +12 volts also, you can use a jumper from the +12 v. terminal for this temporary hook up.
5. SET ALL EQL EQUALIZER CONTROLS AND THE DECK TONE CONTROLS FLAT. That is, to 0dB

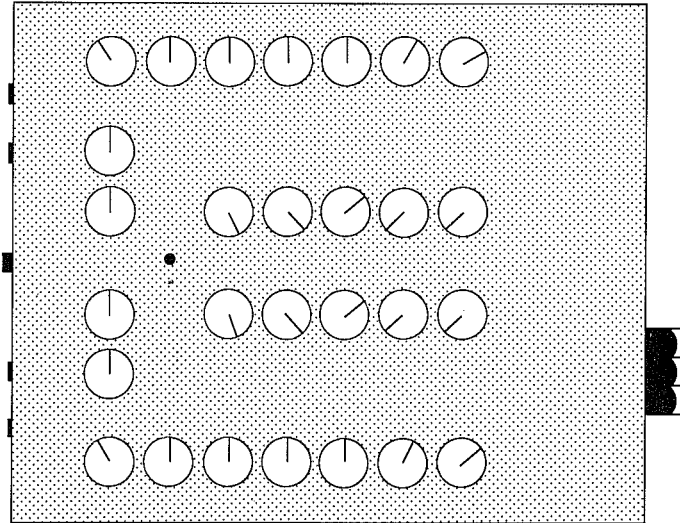
without boost or cut. Make sure that the deck's balance control is set in the middle.

6. SET THE EQL OUTPUT CONTROLS TO ZERO ALSO.
7. PLAY A TAPE WITH THE DECK VOLUME CONTROLS ALL THE WAY UP.
8. ADJUST THE EQL'S INPUT LEVEL CONTROLS UNTIL THE OVERLOAD LED BARELY BEGINS TO FLICKER. The left and right EQL input controls should be pretty much at the same setting when you through. That is, if the left control is at 6, the right control should be at 6, too.
9. TURN THE SYSTEM OFF.
10. CONNECT THE EQL TO THE POWER AMP USING **LONG** PATCH CORDS.
NOTE: At this point you should consult the power amplifiers manual to determine amp sensitivity. If it is adjustable, set for between .8 volts (800mV) and 1 volt (1000mV) sensitivity.
11. TURN DECK ON BUT LEAVE THE VOLUME CONTROL TOTALLY OFF.

12. AFTER SHUTTING THE CAR DOORS, LISTEN FOR HISS FROM THE SPEAKERS. IF ANY IS PRESENT, ADJUST THE EQL OUTPUT CONTROL UNTIL IT IS NEARLY INAUDIBLE.
13. NOW PLAY A TAPE WITH THE VOLUME CONTROL AT 3 O'CLOCK. IF IT'S A GOOD SYSTEM WITH A BEEFY AMP, THAT SHOULD BE REALLY LOUD. If it is too loud, or overdriving the system, use the EQL output controls to reduce the volume. Conversely, crank up the EQL output control if the sound is not loud enough.
14. USING A TAPE YOU ARE FAMILIAR WITH, LISTEN FOR FREQUENCY RANGES THAT ARE AUDIBLY TOO LOUD. REDUCE THEM WITH THE EQL. Typical rises that are noticeable will be in the mid bass (90-250Hz) and in the midrange areas.
15. LISTEN FOR AND BOOST FREQUENCY RANGES THAT ARE DEFICIENT USING THE SAME SELECTION. Almost always 45 and 63Hz need lots of increase just due to the design limitations of cassettes and smaller woofers. We've included some starting points which you can use for

your settings. Start with them, switching the EQL's EQUALIZER IN/OUT button to make comparisons.

16. INSTALL THE EQL IN ITS PERMANENT LOCATION using the instructions in the next section.



C. PERMANENT EQL INSTALLATION

MOUNTING. The EQL can be mounted in many parts of the car, depending on the vehicle's configuration. However, we recommend it be placed as close as possible to the tape deck, since the longer the low level signals wires to the EQL, the greater the chance of interference and other hassles. Inside the dash, under a seat and in the trunk are possibilities in descending order of distance from the head end. Use 100% shielded cables for the best results.

Wherever you mount the EQL, take the following into consideration.

- Don't mount it near heaters or other places where it will get really hot.
- The mounting location must be safe from water seepage.
- The EQL must be firmly mounted to the car. This protects connections from breakage and stress as well as the possibility of it becoming UN-attached when you blast over a speedbump sometimes.
- Analyze the potential location care-

fully to make sure that mounting holes won't pierce a gas tank, gas/brake/or electrical lines.

- Make sure that you have clearance for a small screwdriver so you can make adjustments on the EQL later.

The EQL has been designed with very high quality parts and in a manner which reduces mass-related circuit board stress (a typical failing of a lot of car gear). Still, all electronics have a limit to environmental stress. So no fair putting it on the front bumper or under the oil pan.

AUDIO WIRING. The idea is to minimize potential interference and noise. That means good quality audio-type cables. Since the EQL has a very low output impedance (150 ohms), cable noise pick-up OUT of the EQL should not be a problem.

However, the deck that feeds the EQL most likely has a medium output impedance (2K to 10K ohms) and long cable lengths can be a problem. That's why we suggest mounting the EQL as close as possible to the head unit. The cables going from the deck to the EQL

must be the best you can get. Not cheapo stranded shield with 80% shielding. Try to hold out for trusty 100% shielding to cut noise in this critical run.

POWER WIRING. The EQL's +12 volt and ground (-) connections should be made with 15 gauge wire or better. Use spade lugs and a crimper.

NOTE: As always, you should disconnect the negative terminal of the car's battery before working on electrical connections. Unless you want an extra tingle in your day.

USE A SINGLE GROUND POINT THAT YOU KNOW IS COMMON WITH OTHER GROUNDED PARTS OF THE STEREO SYSTEM. MAKE THE CONNECTION WITH NO LESS THAN 16 GAUGE MULTI-STRANDED WIRE.

TOOLS. For permanent installation, you'll need a drill and bits, wire cutters and strippers, pliers, screwdrivers, crimpers and spade lugs. Clear the area of small children, maiden aunts and other impressionable types who might react to colorful language.

MOUNTING. Nothing very complicated. The EQL mounts just like a power amplifier. If you're mounting the EQL on a carpeted surface, cut away small sections of the carpet and pad before drilling any holes. Drilling a smaller pilot hole first will insure accuracy and guard against stripping the hole.

Congratulations! That is all there is to installing the EQL. The rest of this manual will expand on several topics including mounting tips and good old cracker-barrel opinions.

LONG FORM IN DEPTH INSTALLATION INSTRUCTIONS

Here is a further more detailed explanation of how to use the EQL to eliminate many of the problems systems have always had no matter how good the electronics.

Adjusting input levels

1. As we said before, don't mount the EQL in its final position and try to do things by remote control.
2. Get long cables. Connect up the system. Sit in the driver's seat, shut the windows, control heavy breathing and go for it. In most cases, maximum volume overload (when the EQL LED lights) should be at $\frac{3}{4}$ volume with an average tape. This leaves some room for gain on quiet tapes and weird radio stations which may be few decibels louder. If system gain is too high, the volume control of the deck will be frustratingly hard to use with all adjustments made in the first part of rotation. This is one way the EQL can make a deluxe, custom system truly nice to use.
3. Make sure to leave the EQL equalizer controls flat. Watch the LED closely when the deck volume is at $\frac{3}{4}$. You want to bring up the EQL input level controls until the

light is obviously blinking to the music (which you can't hear). NOW BACK OFF THE INPUT GAIN JUST SLIGHTLY. Slightly MORE if you have a dbx tape deck or CD player.

Be gentle about backing it off since it is this flickering of the LED which indicates the EQL is getting the most headroom with the least amount of hiss.

Adjusting output levels

4. Now you're ready to work on output levels. Make sure the deck and EQL equalizer controls are set to 0dB.
5. Connect the power amp(s).
6. Put in the same tape you used for the input adjustments and turn it to $\frac{3}{4}$ volume. What you are trying to do is get the amp just BELOW clipping (assuming the speakers can handle it). Clipping you will hear as distortion; your speakers will be flogging themselves to an early grave.

Adjusting equalization

1. Adjust with your ears, your tastes, and a well-recorded tape you know in your sleep.
2. First, get rid of obvious bumps and resonances. Then concentrate on deficient areas. We know that you'd like to think that you have a "flat" system that theoretically doesn't need EQ. But there are areas that even the best system cannot control, just as there is in even the best home system. Factors of environment, woofer performance and even a person's individual taste. Switch the EQ IN/OUT button to compare. If you take the time, you can really boost a system's performance.

NOTE: It is not uncommon for the 90, 120 or 180 Hz bands to be cut quite a bit due to resonances. Nor is it odd for the 45 and 63Hz bands to be boosted a lot. Aside from that, the optimal setting for all cars we've installed it in is fairly gentle, often

around plus or minus 3-5dB. In all cases the overall "curve" should be centered around 0dB, the way it would with a home hi-fi graphic equalizer. Otherwise the overall curve will affect the level of the system and create ripples in the total response pattern of the system.

3. When the system sounds as good as you think it can, go out for a drive to add engine and road noise factors.

POWER SUPPLY CONNECTION

Cars are rotten environments for anything approaching a "high fidelity" stereo system and it takes a lot of design and installation consideration to get the most from it. The EQL is protected from reverse polarity (+ to - or - to +) with an internal diode, spike protector, Zener diode, custom choke, and fuse. If it gets damaged from improper installation after all that, we want to know about it!

Noise isolation is provided by a choke, capacitor input filter, electronic power supply with built-in R-C filter, internal electronic power supply and multi-stage R.C. isolation.

Grounding considerations

Even though the positive side of the EQL has no less than five stages of isolation, how you ground the unit is VERY important.

USE A SINGLE GROUND POINT THAT YOU KNOW IS COMMON WITH OTHER GROUNDED PARTS OF THE STEREO SYSTEM. MAKE THE CONNECTION WITH NO LESS THAN 16 GAUGE MULTI-STRANDED WIRE.

Keep in mind that the entire car is NOT one perfect ground. Even slight resistance can cause problems. If problems persist, consult an electronic engineer or your local Guru of The Gods of Ground.

LEVEL MATCHING AND WHY

One of the biggest and (up to now) least controllable factors that leads to car system noise problems is level matching. The same sort of level matching as is found in large commercial sound reinforcement systems. Audio Control engineers have a background in pro sound as well as hi-fi and it is this experience which has led to the concept and design of the EQL's level matching system.

Hiss, static and hum are caused by:

1. Poor grounding.
2. Incorrect operating level — incorrect gain structure which causes either noise or overload distortion.
3. Medium to high operating impedance. Caused by poor tape deck and pre-amp design.

SECURITY COVER

A steel "security" cover is available for the EQL which completely covers all of the controls on the top of the unit. This was requested by installers to keep folks from undoing careful adjustments they'd made. But if you do your own adjustments, does it have any use? Yes. Although Audio Control car products are very grunge-resistant, the cover further helps protect the EQL from dust and moisture. And keeps other prying fingers from it. It also looks nifty. Ask your dealer about getting one. They are worth the bucks.

THE AUDIO CONTROL EQL LIMITED WARRANTY

People are scared of warranties. Lots of fine print. Lots of noncooperation. Months of waiting around.

Well, don't be scared of this warranty. It's designed to make you rave about us to your friends. It's a warranty that looks out for you and helps you resist the temptation to have your friend "Who's good with electronics" try to repair your Audio Control EQL. So go ahead and read through this warranty, then enjoy your new component for a few days before sending in the warranty card and comments.

"Conditional" doesn't mean anything ominous. The Federal Trade Commission tells all manufacturers to use the term to indicate certain conditions have to be met before they'll honor the warranty. If you honor these conditions, we will warrant all material and workmanship on your EQL for ONE YEAR from the date you bought it, and will fix or replace it, at our option, during that time.

Here are the conditions that make this warranty conditional:

1. You have to fill out the warranty card and send it to us within 15 days after you purchased your EQL.
2. You must keep your sales slip or receipt so you have proof when and from whom you bought your EQL. We're not the only company to require this, so it's a good habit to get into with any stereo purchase.
3. Your EQL has to have been originally purchased from an authorized Audio Control dealer. You do not have to be the original owner to take advantage of the one year warranty, but the date of purchase is still important so be sure to get a copy of the sales slip from the original owner.
4. You cannot let anybody who isn't: (a) The Audio Control Factory; (b) An authorized service center; or (c) Someone authorized

in writing by Audio Control to service your EQL. If anyone other than (a), (b), or (c) messes with your EQL, that voids the warranty.

5. The warranty is also void if the serial number has been altered or removed, or if the Audio Control EQL is used improperly. Now, that sounds like a big loophole, but here is all we mean by it. Unwarranted abuse is: (a) Physical damage (our mobile products are not meant to use as jack stands for your car); (b) Improper connection. We have done the best we can to protect the inputs; however, 120 volts into the jacks can fry the innards of the poor beastly. (c) Sadistic things. This is the best mobile product we know how to manufacture, but if you use it for the front bumper of your Baja bug and get it full of water and dirt, things will go wrong.

Assuming you conform to numbers 1-5, and it isn't all that hard to do, we get the option of deciding whether to fix your old unit or replace it with a new one.

Legalese section

This is the only warranty given by Audio Control. This warranty gives you specific legal rights which vary from state to state. Promises of how well your EQL will work are not implied by this warranty. Other than what we've covered in this warranty, we have no obligation, express or implied. Also, we will not be obligated for direct or indirect consequential damage to your system caused by hooking up the Audio Control EQL.

Failure to send in a properly completed warranty card negates any service claim.

Copyright ©1985 **Audio Control**

Printed in U.S.A.

Specification subject to change without notice.

EQL SPECIFICATIONS

All specifications are at 14.4 VDC (Standard automotive voltage)

INPUT IMPEDANCE 33k ohms

OUTPUT IMPEDANCE 150 ohms

SIGNAL TO NOISE RATIO (rated full output) . . .
-105dB

TOTAL HARMONIC DISTORTION

(20Hz-20kHz) 0.005%

MAXIMUM OUTPUT LEVEL 9.5 Vrms

INPUT GAIN ± 18 dB

OUTPUT GAIN ± 15 dB

EQUALIZER GAIN ± 12 dB

FREQUENCY RESPONSE . . . 20Hz-20kHz; ± 0.5 dB

POWER SUPPLY PROTECTION

Input fuse, Reverse Polarity diode,

Over-voltage zener diode,

Spike and noise protection choke

SIZE 1.6"H x 9.5"L x 6.8"W

AudioControlTM

22313 70th Avenue West

P.O. Box 3199

Mountlake Terrace, WA 98043

Phone (206) 775-8461

THE AUDIO CONTROL STORY

We could be making electric toothbrushes, but we're not.

Audio Control's president made that observation while explaining why we design and handcraft stereo equalizers and other sound products. Of all the things a group of employees could legally produce in a Lynnwood, Washington factory, we think a device that lets you hear music better is just about the best thing we could be making.

We incubate and hatch our products in a modern plant complete with solder baths, non-stop FM over half dozen big speakers, a ping pong table in the breakroom, a Lab with a matched set of frisbees, more test equipment than a Japanese sci-fi flick, and employees so friendly that the UPS man regularly stops in to have lunch with us.

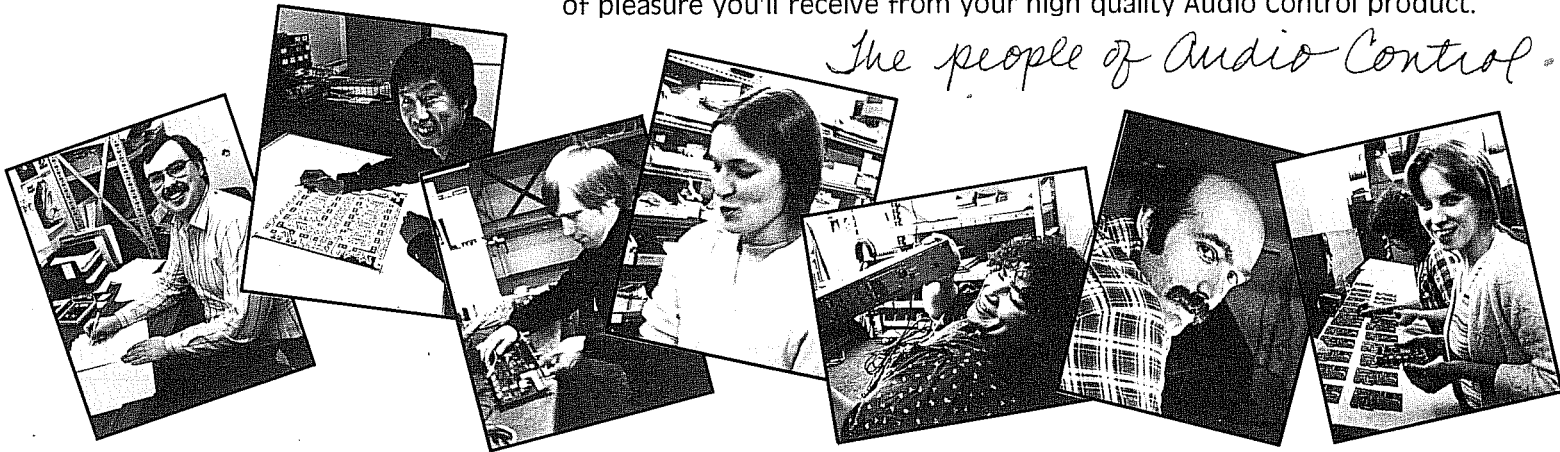
Maybe it's that we're located out here in the misty rain forest of the Northwest where moss grows on the windshields, the sun rarely makes it through the overcast, and Boston ferns grow so well they've formed a union. This fertile soil has grown Carver, Phase Linear, Speakerlab, and Tapco.

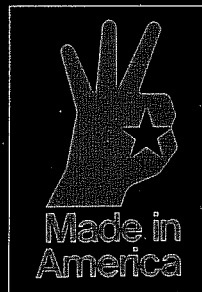
Whatever it is here in the Northwest, we're perfectly content to stay here and keep producing high quality, well-engineered, affordable hi-fi equipment without so much as a glimmer of the sort of greed and me-too-manship that so often pervades the stereo market. We like producing a high quality product that is useful and gives people pleasure without wasting energy or resources. Something nobody else thought of, though should have.

Thus, we're not only interested in what goes out of Audio Control, we're interested in the comments which come back. Our fearless leader and production staff still read every warranty card, suggestions from which have led to customer-based product changes instead of marketing department speculation.

We're really glad you bought something from us. Our appreciation will come back to you in the thousands of hours of pleasure you'll receive from your high quality Audio Control product.

The people of Audio Control.





AudioControlTM

22313 — 70th Ave. W. Mountlake Terrace, WA 98043
Phone (206) 775-8461