



## **OWNER'S MANUAL**

# **THE "STINGRAY" INTEGRATED AMPLIFIER**



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# CONTENTS

<i>SECTION</i>	<i>PAGE</i>
INTRODUCTION	3
MAINS CONNECTIONS	4
OPERATIONAL NOTES	5
CONNECTING YOUR STINGRAY	6&7
SIMPLE TROUBLESHOOTING	8
FRONT PANEL, LAMP, BACK PANEL	9
TUBE LOCATIONS	10
SIDE PANELS	11
OPTIMIZING YOUR SOUND SYSTEM	12&13
REPLACING TUBES & SETTING BIAS	14&15
CREDITS	16
SPECIFICATIONS	17
WARRANTY	18
WARRANTY REGISTRATION	19

# INTRODUCTION

## **THANK YOU!...**

for choosing the Manley Laboratories the "**STINGRAY**" **INTEGRATED AMPLIFIER**, You have possibly chosen this product because you auditioned it in a store or heard it at a hi-fi show and were impressed with the sound. It may have been the right combination of price, power, features and styling for you. It may have been because you know the Manley Labs reputation for quality, reliability and integrity. If any or all of these were the reasons, you made the right choice.

The basis of the STINGRAY is the Manley 50 Watt Monoblocks combined with what is generally referred to as a passive preamp. We have always felt that the 50 Watt Monoblocks are among our best amplifiers for sweet highs and three dimensional staging and imaging. We went a step further and refined all performance aspects of the output transformers. The advantages of a passive preamp are well known - near absolute transparency, no added noise and extreme signal path simplicity.

This product shares the same philosophies and standards of component quality and build technique as all of the recent Manley products. It uses the best available parts with the shortest, cleanest, signal path possible. Visually, this product is unique, elegant and practical. Visual beauty may be a prime factor for some but the size, shape and component locations were first chosen first for performance reasons.

Please take a few moments to read through this manual, there may be features and information about this unit which you should familiarize yourself with.

Thank you again, and please enjoy!

## **GENERAL NOTES**

### **LOCATION & VENTILATION**

The STINGRAY should be installed on a stable location with ample ventilation to allow some cooling. A table top or cabinet top is a good choice. A speaker top is not the best location because the vibration can transfer to the Stingray and degrade the sound and possibly cause the tubes to become microphonic. If your household has small children, we suggest that the STINGRAY be in a location where it may be out of reach. Similar considerations should apply if you have pets. You do not want the cat or dog jumping up on it or across it or possibly exposing them to hot tubes accidently. This unit is meant for indoor use and should be kept clean and dry. You will probably need access to the sides and back so locating this unit inside a 3 sided cabinet may be not practical. If the Stingray is placed on top of other equipment, we suggest that rubber feet or pads be placed under the Stingray's 3 feet to prevent scratching the surface of the other gear.

### **WATER & MOISTURE**

As with any electrical equipment, this unit should not be used near water or moisture.

### **SERVICING**

The user should not attempt to service the amplifier beyond that described in the owner's manual. Refer all servicing other than tube or fuse replacement to Manley Laboratories.

## MAINS CONNECTIONS

Your STINGRAY has been factory set to the correct mains voltage for your country. The voltage setting is marked on the serial badge, located on the rear panel. Check that this complies with your local supply.

Export units for certain markets have a moulded mains plug fitted to comply with local requirements. If your unit does not have a plug fitted the coloured wires should be connected to the appropriate plug terminals in accordance with the following code.

GREEN/YELLOW	EARTH	terminal
BLUE	NEUTRAL	terminal
BROWN	LIVE	terminal

As the colours of the wires in the mains lead may not correspond with the coloured marking identifying the terminals in your plug proceed as follows;

The wire which is coloured GREEN/YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol or coloured GREEN or GREEN and YELLOW.

The wire which is coloured BLUE must be connected to the terminal in the plug which is marked by the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal in the plug which is marked by the letter L or coloured RED.

**DO NOT CONNECT/SWITCH ON THE MAINS SUPPLY UNTIL ALL OTHER CONNECTIONS HAVE BEEN MADE.**

## OPERATIONAL NOTES

### SWITCHING ON

The power switch is located on the back panel. You shouldn't need to turn the Stingray around or get yourself behind it. You should be able to "feel" the rocker switch located next to the AC power cord. Flip the switch away from the power cord to turn on the Stingray or towards the power cord to turn off the unit.

### RUNNING

It is not recommended that you leave your Stingray stay permanently switched on. This only wastes electricity and tube life. The Stingray reaches peak operating condition in approximately 30 minutes.

### TUBE LIFE

As with all tubes, their quality degrades with age. This is due to decreasing cathode emission, a natural process found in all tubes. We recommend that you have your amplifier checked every 4-5 years, depending on usage. An excessive increase in noise level or very unstable output tube bias can indicate the need to replace a tube.

**REPLACING A TUBE, INDICATOR LAMP or FUSE.** You should read page 14 and 15 for more details if you need more specific info. You may need a small Phillips screwdriver and the correct replacement fuse, tube or lamp. First be sure the unit is off and remove the IEC mains cable. Let it sit for 20 minutes to be sure all power supply capacitors are discharged otherwise one could still get a shock even though the unit is unplugged. Gently wiggle the tube around while pulling it out of the socket. Avoid bending the printed circuit board. Before putting a new tube in, look at it. Check to see that the pins are straight and that they line up to the socket. You should be able to gently push the tube into the socket without excessive force. If it is the indicator lamp that needs replacing, remove the bottom cover. Six screws near the sides hold it in place - when these are removed, the cover should slide off. You will see what looks like a fuse directly behind the black name panel. Gently pry the lamp out and replace it with another lamp and not a fuse. Replace the cover before powering up the unit. The mains fuse is in the IEC power connector sub-assembly. The fuse cover is a grey rectangle with a large slot and a small slot. The small slot is to help remove the cover. A fingernail or small screwdriver in the small slot is used to gently push or pry the tab towards the bulk of the grey cover. It should pop open. The two B+ fuses are located under the bottom cover; see pg 8 under "ONE CHANNEL DEAD" for details on replacing these. Refer to pg 17 for proper fuse types.

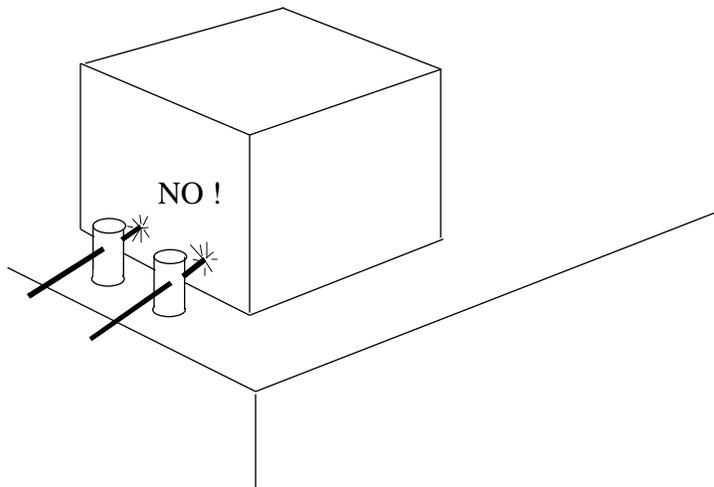
## CONNECTING YOUR STINGRAY

Setting up this integrated amplifier is rather easy. Please refer to page 8 for a diagram of the back of the Stingray.

1. You will be connecting power last and turning the system on after all other connections are made to prevent ugly noises as wires are connected and to prevent possible damage to the amps and speakers. In general, it is best to make any connections with the power off or the volume control turned all the way down. With all tube amps, you **MUST** have speakers (or a load box) properly connected to the speaker terminals before power is turned on. Without a speaker, the voltage swings can be large enough to possibly cause an electrical arc inside a tube, tube socket or transformer and this may damage the amp. Solid state amps operate with no speaker connected but generally don't tolerate a short circuit. Most tube amps will tolerate a short, but we try to avoid this.
2. Before plugging in your interconnects, take a quick visual inspection of the tubes. Sometimes either through shipping or unpacking things get jostled. Make sure all tubes are firmly in their sockets and standing straight up. You might also verify that none have turned white inside. That indicates that air has leaked inside the tube (or the vacuum leaked out!). Though it is rare, a tube is sometimes cracked or broken in shipping. It would need to be replaced before powering the amp.
3. On rectangular chassis it is easy to specify front, back, sides etc - but on the 6 sided Stingray we should adopt a convention and call the sides that have the RCA inputs and input switching as Left-Back and Right-Back. We provide 4 left inputs on the Left-Back and 4 right inputs on the Right-Back. We realize splitting left and right this way with individual input select switches may be a problem for some - sorry. We did it this way because a good percentage of people rely on only one source 95% of the time and because it provides you with the maximum stereo separation at the lowest cost. Yes, it could have been more convenient but it would have cost more if more we had to use 10 "runs" of good shielded wire and it wouldn't have sounded quite as good.
4. Plug in your interconnects, one at a time, from each source, ie CD, Tuner, AUX, then connect each input to the appropriate RCA jack on the Stingray. All RCA jacks are clearly labeled as to a typical function. Each input is for all intents functionally and electronically the same - only the labels are different. You may have to separate or split interconnects an extra 12 inches if they are the "paired" type or slide the loop that holds the pair together. If you need to connect a turntable (vinyl!) you will need a separate phono preamp to raise the level from the tiny signal from the cartridge to regular line levels. Manley builds these, as do some other manufacturers.

5. Connect the speaker leads to the terminals on the top far left and far right of the Stingray. Be sure that the RED (+) terminal is connected to the RED(+) wire and BLACK is to BLACK. Connect the opposite ends to the speakers also RED to RED and BLACK to BLACK. This insures that your speakers will be "in-phase". All too often people accidentally connect their speakers out-of-phase and lose most of the lows. We have even seen this happen in hi-fi trade shows and record company executive offices. There is always some indication on the wire to help get "polarity" right but it may be as subtle as a "ridge" on the insulation or different colored conductors. Most high quality speaker interconnects are clearly labeled and/or color coded. Be sure that these connections are firm and solid. We do not recommend using pliers or a wrench to tighten the terminals because one can easily overtighten or mar the finish of the bolts. Good finger tightening is usually the best.

**IMPORTANT: DO NOT LET THE BANANA PLUGS OR SPEAKER CABLE CONNECTORS COME INTO CONTACT (TOUCH) THE TRANSFORMERS DIRECTLY BEHIND THEM.** This can short the output of the amplifier and possibly cause damage to the Stingray, besides losing the signal.



6. Before proceeding to the next step (power!) check that the On/Off switch is Off and the volume is turned all the way down (anti-clockwise). Now connect the IEC power cable to the back of the Stingray and then the other end to your mains wall socket.
7. Turn on the On/Off switch and let the Stingray "warm-up" for a few minutes. You should be seeing the tubes begin to glow a bit. None should turn bright red - that would indicate a problem. Let us start off checking with a favorite CD. Be sure that both input select switches (Back-Left & Back-Right) are set to CD. Put the CD in PLAY and slowly turn up the Volume - You should be getting sound from both speakers. If not, turn the power off and check your connections from CD to Stingray and Stingray to Speakers. Sometimes we don't get an interconnect pushed in enough for good contact. Power up and try again. If you have sound, sit back and enjoy. Try your other inputs by turning the input selectors to each source.

## **Troubleshooting:**

It is rare that any of these problems occur but if they do here is some things to try.

**HUM** - Try a mains ground adapter if they are legal in your country. They are also called 3 pin to 2 pin adapters or "cheaters" and are available in hardware stores. There should be one ground in your system and only one. If two or more pieces of gear have 3 pin AC cables a ground loop can occur which will usually cause hum. The Stingray is probably the best grounded single piece as it is the center of your system.

**HISS** - Usually one of the sources. This source may have a volume control that is turned down and forcing you to turn up the volume of the Stingray. Adjust the source so that it is a similar volume as your other sources. If it seems to be the one channel of the Stingray, then it is probably an input tube (12AT7WA). Most tubes should last many years but sometimes they get noisy prematurely. To verify, you can swap the two 12AT7s (with the power off) then test again. Be careful - tubes can be hot, don't bend any pins and gently wiggle the tube to remove it or insert it. Force should not be needed.

**BALANCE** - The two speakers sound different - It may be the CD or source and the way it was recorded. First try a different source. Next try swapping the inputs. Power down and swap left and right inputs. If it is the source, then the problem will "follow" the swap. Return them to normal (L=L). Power down again and next try swapping the speaker connections by putting the left speaker wire in the right terminals and right wires into the left terminals. If the problem switched sides then the Stingray is suspect, if the problem stayed on the same side it is probably a damaged or fatigued speaker.

**ONE CHANNEL DEAD** - Usually just a bad connection or an interconnect is plugged in wrong. Check your wiring. You can try any of the other 4 inputs and verify that both channels work on other inputs or not. The Balance Control is centered ? You might try swapping the speaker interconnects at the Stingray end. If the problem swaps sides then it may be the Stingray. The two most likely problems is a bad tube (12AT7 or 6414) or a blown 250 mA (MDL 1/4) B+ fuse located in the Stingray. Wait at least 20 minutes after turning off the amp and unplugging the power. There is about 400 volts on these fuses when power is on and it takes a while before the power supply capacitors discharge so there could still be volts there even when unplugged - so be patient and let the power supply discharge before taking off the bottom cover and poking around. There is a **SHOCK HAZARD** unless you follow these directions. The current is low and it is DC which means we are not talking "lethal" but it can hurt, arc and burn, not to mention make one jump and yell nasty four letter words. Also, use one hand - not two. Wearing a cotton glove insures that there won't be any surprises.

**TUBE GLOWS CHERRY RED.** This is where you can see the plate area of the tube glowing red hot (they are normally gray or black and are the most visible part inside the tube). This indicates a bias problem or a bad tube; immediately attempt to re-bias the tube in question (see page 15). If the bias cannot be adjusted on that tube, immediately turn off the power; the tube will have to be replaced. It is normal to see a slight blue glow that seems to coat the inside of the glass.

## FRONT PANEL



**A**

**C**

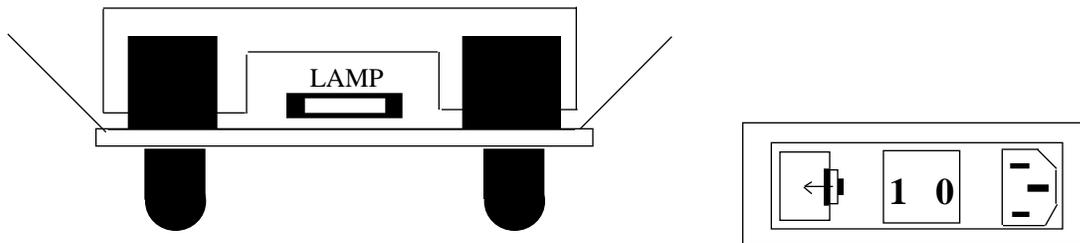
**B**

**A - BALANCE** - This is a special Nobles balance control. Unlike most balance controls, this one has no loss at center (detented) and can be considered to be a straight wire if it is in the 12:00 position. It only reduces the volume of one channel at a time

**B - VOLUME** - This is also a high quality Nobles conductive plastic precision attenuator.

**C - BACKLIT PANEL** - This is the power indicator. If the IEC mains is properly connected and the On/Off Switch is "ON" and this panel does not glow then you probably have a blown fuse. It is located as part of the IEC socket assembly. If it does not glow but the tubes do and you have music then the little bulb is dead. It can be replaced easily. See the drawing below. The lamp looks just like a fuse. Do NOT put a fuse here. Replace it with a 12 volt, 0.15 amp, 1/4 X 1 1/4 lamp. It pulls straight up if the Stingray is upside down but you may need a hook or needle-nose pliers to get it started. Don't crush & break the glass.

## LAMP ACCESS

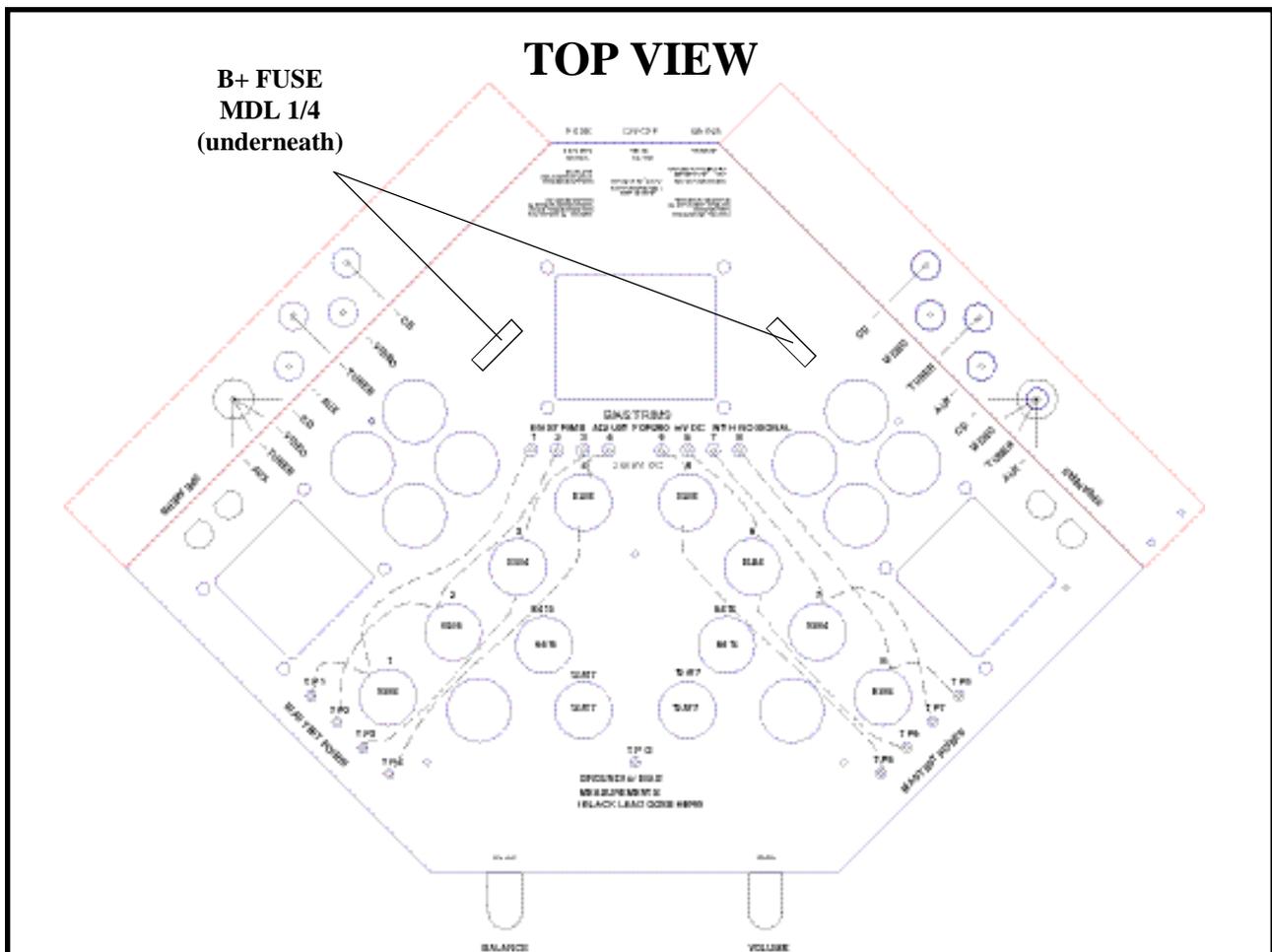


## BACK PANEL

**D- FUSE COVER**- Pry in the small slot to move the locking tab towards the fuse cover and it should pop open. Only use an MDL 3 fuse if it needs replacing (MDL 2 for 220V units).

**E - POWER SWITCH** -Towards the fuse or away from the IEC power cable is ON (1), towards the power cable is OFF (0). Because tubes require some time to warm up there is about 10 or 20 seconds of silence followed by "not good sound" before "wow". The best way to power up the system is sources (CD, turntable, etc) first, then after about 10 seconds - turn on the Stingray. Wait a minute or so - then you can turn up the volume and play tunes. This sequence prevents pops and thumps and may protect your speakers. Some people hear a difference after an hour or two but it will be a small improvement and nothing to worry about - this is normal, just warming up. Powering down is the opposite order - Stingray first.

**F - IEC MAINS SOCKET.** This is where the power cable goes. Note that your amp should be wired correctly for your country. You may want to check the packing box to be sure. Also notice that this is a grounded 3 pin cable. If you get a hum problem, see the previous page for some simple troubleshooting hints.



**TUBE LOCATIONS** - See the diagram above for the proper tube locations. Power should be unplugged and the tubes cool before handling them. We label the tube sockets, test points and trimmers to help. It is possible to put tubes in wrong if you bend the pins - not good. On this diagram we added dashed lines to further clarify which test points are associated with which tube and which trimmer but they are numbered right on the chassis.

Refer to pages page 14 & 15 if you are unsure about replacing tubes and setting the bias. A full description is given.

Once that you've learned a bit about setting bias, we provide a bias trim pot and test point for each tube that should be referred to ground or TPG (The butt of the Stingray). Aim for .25 DC volts or 250 mV DC. All of the important info is silk-screened on the chassis.

Notice that there are two fuses for the B+. These are 250 mA Slo-blo ( MDL 1/4) types. They are supposed to blow with some types of tube shorts and prevent damage to the amps. ALWAYS let the amps sit unpowered for at least 20 minutes before attempting to check them out - SHOCK HAZARD - there can be very high volts here until the power supply capacitors discharge. See page 8 for details.

## SIDE PANELS

Any of the input jacks can be used with any hi-fi RCA outputs and they are electrically identical and only differ in how we labeled them.

**CD** - Plug in your audio outputs from your CD player or "D to A Converter" here. Kind of obvious. A good spot for the main L & R signals from a DVD deck. Do not patch lines marked "digital output, SPDIF or AC-3 here though. These are un-decoded digital signals and not audio (yet).

**VIDEO** - Audio actually, from a VCR or Laser Disc player's audio outputs. Again, watch out for AC-3, video output and S-video.

**TUNER INPUT** - Connect your FM/AM tuner outputs here. Another good input for a second VCR too.

**AUX** - Plug your Aux in here -What is an Aux?. It stands for Auxilliary and basically means "extra", so this is just an extra input for any other source that we didn't label or you have two of. Most people use it for tape deck playback and some use it for computer audio.

**SPEAKER POSTS** - The speaker connection posts are on the top panel and labeled on the side panel. The RED is positive and black is negative (ground). Be sure you have speakers (or a 4 to 8 ohm load resistor) connected to these terminals before powering the Stingray. Tube amps (unlike solid state) require a speaker if there is any chance there will be a signal applied.

Watch out for reversing the positive and negative wires either at the amp or speakers (unless you want to simulate record company executive's office hi-fi). The lows get lost, and the image is very weird. If in doubt, try reversing one channel, the way with the most lows is correct.

These terminals will accomodate most thicknesses of bare speaker wire and most U shaped terminals or banana plugs. The only thing that they don't like is thin wire. You should avoid thin wire for speaker cables in general. Use at least 18 guage (18AWG) or heavier. Bigger wire has smaller AWG numbers. Be sure that the top bolts are tight, but avoid over-tightening that might be difficult to undo or may damage the posts. In other words, firm as "strong finger tight" but less than "big wrench tight".

These outputs are appropriate for speakers rated between 3 and 10 ohms which includes all those 4 and 8 ohm speakers. For reference, the amp design was optimized for 5 ohms. The damping factor is about 10 - good for a tube design. The only thing to consider is your speaker sensitivity. With 50 watts per channel max, the best combinations are with sensitive and very sensitive speakers, ie 90 dB/1watt/1 meter or higher. Of course, if you can accept "quiet only" then this is not much of an issue.

## Optimising Your Sound System

This section is full of little hints that may help you get the most out of your stereo - and it may not cost anything or cost very little. Probably, you know most of this, but hopefully some of it may be new or refresh your memory or just be refreshing reading in a manual.

A very important factor is your speakers. Hopefully you have good speakers and they are appropriate for this integrated amplifier. What is appropriate? Well, with 50 watt of tube power per side and probably a limited budget we would hope for reasonably efficient speakers so that the system will get loud enough for the music you listen to. The "spec" to look for is "sensitivity" or "efficiency". A speaker that is 95 dB efficient will easily get as loud with these 50 watts as 85 db speakers with 150 watts. "85" will do if you only listen to folk or chamber music. Usually you pay about the same for high sensitivity speakers but in amplifiers more watts is more \$. By the way, many reviewers confirm that 50 tube watts is similar to 100 solid state watts. If you are buying speakers, it is wisest to carefully listen to them before buying. You will most likely like them longer if they tend to sound natural and real rather than over-emphasized in some area. In other words, think "accurate reproduction" not "numbers" and "hype".

The price of speakers is often directly related to the low frequency response. Great lows generally require deep pockets and plenty of power. Thanks to "home theatre" there are a lot of powered subwoofers available that won't drain your resources. Get one that connects to speaker outputs so that it follows your input selection and volume control. This makes connecting them pretty easy.

There are some very interesting speaker tricks. Most people just place them wherever it is convenient. Spouse approval is a real factor. We suggest that you experiment with speaker placement, then when they sound 100% better you bring in the spouse and demonstrate the difference. They should be able to hear the improvement and may totally agree with your choice. You should aim for equal distances between your listening position to each speaker and from speaker to speaker. The ideal is an "equilateral triangle". Try to get the speakers off the floor, and away from the walls (both side and back). The angle of the tweeter or speaker front panel to your face is also critical and experiment with that too. You should be getting a smooth frequency response so that highs and lows are balanced and mids not too prominent or distant. It should simply sound "natural". When we buy color TVs the first thing most of us relate to is flesh tones because it is something we all relate to and know when they are right. The equivalent thing in audio is vocal tone. We have evolved amazing discrimination for the varieties of human voice and much less for other instruments. Use a few well recorded CDs with vocals and adjust the speakers to get the most natural voices. If you are lucky, you will end up with a system that creates a 3D picture of the music that not only has left/right width but a solid distinct center. It should also make some sounds seem in front of the speakers and some behind. We have heard some systems with the Stingray even give an illusion of the height of the individual musicians. Most rooms are longer in one dimension. Some systems sound best with the speakers across the short dimension and the listening position part way back but not right at the back wall. Some systems are better across the long dimension. The only way to find out is to try.

If you are getting this amazing imaging and soundstage, you may be interested why you suddenly have it now that you have the Stingray. These are very audible effects that seem to be beyond normal measurement technique or textbook electronic theory. This effect is directly related to the amount of negative feedback used in a design. The less feedback the greater the imaging. In transistor amplifiers it has been common practice to use more than 80 dB of negative feedback. Conventional designs need it because transistors are not particularly linear devices and it forces the circuit to get low distortion figures as well as very high damping factors. Tubes are much more linear and inherently low distortion. Tube amplifier designs use far less negative feedback (less than 20 dB) as a result. We speculate that the negative feedback may have a negative effect on transient accuracy. It is reasonably documented that the feedback does reduce the lower order harmonics in distortion but can raise higher order harmonics that are more audible. Feedback also makes the transition from clean to clipping very abrupt and abundant with high order harmonics. The best audio devices always seem to be simple & aesthetically balanced, with form following function.

You may have bought a great system but there is a good chance that you are only getting a fraction of it's potential. Very frequently we have experienced top quality electronics sounding unimpressive simply because acoustics were ignored. Even amongst studio engineers, few can really tell the difference between good speakers in a bad room and bad speakers in a good room - but they all know good speakers in a good room and very likely so do you. Acoustic techniques are better explained in books on recording studio construction. You can buy good ready-made acoustical materials and/or build them yourself for a fraction of the cost. Dollar for dollar, you can expect far greater improvement with acoustic treatment than expensive interconnects.

Most people think acoustics is about sound-proofing but there is a lot of info available for improving the reproduction of music. Sound-proofing is usually expensive. Luckily just improving the acoustics in a room can be pretty painless. You may be able to change or move what is on the floors and walls (without getting expensive or ugly). The improvements may be dramatic.

Number One on the bad list is parallel surfaces. That pretty much includes most rooms. Parallel surfaces can support a very short echo that is known as a standing wave. It boosts some frequencies and cuts others. This effect is often called comb filtering because of the multitude of peaks and dips. One cure is breaking up the big surfaces with a variety of smaller ones. The good news is that book shelves, curtains, wall hangings or macrame, plants, furniture and lamps all help. Not only does this balance live surfaces with dead ones but "checker-boarded" areas also act as a sort of diffuser. You can probably build low cost effective and attractive diffusers or have them made if you want something better (and more efficient).

Number Two is very unbalanced room treatment. Both too "live" and too "dead" is generally bad. One might think that wall to wall carpets & curtains is going to be fine but watch out. All that stuff only eats highs and a little mids, but doesn't do anything to the lows. The lows end up very live in contrast to very dead highs. One way to balance this is get some thick absorption into the corners. Thick absorption in the corners is most effective to lows. The idea is to balance high and low absorption. Even normal speech sounds wierd in near empty rooms with plain painted gypsum walls and hardwood floors. The simpler the decor the more intense the acoustic problems. The only hints we can offer is that the wall behind the speakers and behind you are often the most important. You can build some simple absorbers. Simply cut two 4'X8' pieces of 2" rigid fiberglass or open cell foam rubber into 16"X8' strips and wrap some white cloth around them. Easy, clean looking and cheap. Experiment, lean them against the wall at various places. Even very experienced acoustic designers experiment, listen then decide rather than attempting to predict every result. A variation is to use "perf-board" as a backing if you intend to stretch the fabric reasonably tight. It may also help with hanging the strips to the walls. Perfboard with a one or two inch space behind it is an alternative front surface to increase diffusion or can do double duty as a simple helmholtz absorber (for the low mids) and can be effective on the ceiling. You can hang a few up there either flush or dropped a few feet if you have the height to absorb lower frequencies. The wall behind the listening position is usually responsible for too much or too little lows compared with the rest of the room. Read up on slat and membrane absorbers for problems there - the panels described above won't help much for that.

Number Three is lack of left/right symmetry. In order to get the left and right similar sounding and getting a rock-solid center you should have identical left and right walls and distances. The ideal is a perfectly symmetrical room but this may not be practical. Again, try to achieve this with positioning.

Some of the "test" CDs have a variety of low frequency tones or sweeps. Use them to find rattles and buzzes in the room. Lamps and fixtures, some cabinets and components can do this. A little tape or glue can often fix these types of things. If you are getting serious about this kind of thing you can get a variety of test gear from measurement mics to real time analysers or computer software. These are useful tools but do not depend on the readings unless you are very experienced using them. Best to use your ears and use the test gear to verify what you hear and to document the changes. Remember that test gear neither makes records nor listens to music. Frequency measurement often ignores "time" and exaggerates some factors and glosses over others. Steady tones are virtually useless in real rooms. The more comprehensive tests give complex data that needs to be correctly interpreted to be useful. Use 'em but don't jump to confusions. Always use ears too.

## Replacing the Tubes & Setting The Bias

Setting bias is one of lifes little neccessities when you own tube amps. The other is replacing tubes. Considering how these are related we will treat both as one subject.

**How long will these tubes last?** We can't say for sure. Some die prematurely and some tubes last more than 30 years. The average for the tubes in the Stingray should be 4 to 5 years depending on useage. As with all tubes, their quality degrades with age. This is due to gradually decreasing cathode emission, a natural process found in all tubes.

**How can I tell when I need to replace them?** The output tubes (EL-84) should have their bias voltage checked on a regular basis (see page 15). Any tube thats bias reads very different from the rest should be re-adjusted, and closely monitored in the future for further large variations which would indicate it's time for replacement. The input tube and occasionally the others can have other symtoms as well. An excessive increase in noise level or distortion can indicate the need to replace a tube. Some tubes loosen up in their internal supports and become microphonic. If you tap the tube lightly it may ring through the speakers. A little is normal - a lot means "time for a new tube". A tube that has turned white inside means that air has leaked in - or (as we joke) the vacuum has leaked out. Obviously, any tube that does not light up at all is bad, too. Replace it. These tubes are not expensive, esoteric or hard to find. We always suggest that you own at least a few spare tubes.

**Do I need to replace them all at once?** No, at least not with these amps. Some tube amps do require that if one tube has to be replaced that a complete matched set put in. All Manley amps use individual bias trims for each output tube which allows a single tube to be replaced. Absolute best performance is achieved when the tubes are most similar. We batch them and label each tube so that in the event of a replacement you can get one from Manley of similar characteristics as the others in your amp. We need that hand drawn number on the top of the output tubes so we can supply you the optimum one.

**Does the "sound" of the amp change as the tube ages?** Yes, but not very much. It is just the tubes and they can be replaced. It is not like big guitar amps where tubes are replaced every 6 months for reasons of "tone". We run the tubes quite conservatively which allows a very long life and less change between old and new tubes. This is where that 4 to 5 years of use comes from. You may notice an improvement between tubes this old and new tubes depending on how critical you are. Keep in mind the sound of new tubes changes most in the first weeks of use before they can be considered "broken in". At first the sound may be a little "tight" and "direct".

**Is it difficult to replace a tube?** Yes, if you have trouble replacing light bulbs. It is super easy. Turn off the power. Just let the amp cool a few minutes so that you don't burn your pinkies. It helps to wiggle the tube gently rather than pulling it out straight. Even if you don't consider yourself "technical" you probably have more technical ability than your parents and they used to fix the family TV set by taking out the tubes and putting them on the tube tester at the local pharmacy. It is almost as easy to re-insert a tube. Just make sure it is correctly lined up with the socket and you dont bend a pin. You can wiggle it in too. If you had a solid state amp, it would be an unlikely repair. You would have to open it up, diagnose the bad transistors and burnt resistors, de-solder, find replacements (good luck) re-solder, and hold your breath as you turn it on. Or you could send it back, be without music for a few weeks, pay for service by the hour and get real upset when it fries again. If one transistor goes the system is dead, not so with power tubes, just limping. If you need a tube or set of tubes Manley will be happy to sell you some (matched) at a good price and if you prefer to send the Stingray back for repair or adjustment, our warranty covers about everything except tubes (6 mo. only) and abuse and we handle ground shipping back to you - usually the same week

**What should I know about BIAS?** Bias is a simple DC (negative) voltage that sets, what is called, the "operating point" of the tube. For our purposes it "fine tunes" the current going through the tube. We want each of the 4 tubes per channel to be equally sharing the load. This gives the amplifier's lowest distortion and the tube's optimum life. When we set "bias" we are adjusting that voltage and measuring the current at a pin called the cathode. The cathode is connected with a 10 ohm 3 watt resistor that allows the more convenient voltage measurements from terminals right on the top panel. These 10 ohm resistors also have a second job. They are fuses in case of a really nasty tube failure. Sometimes a tube will die in a way that burns up this resistor (with a little puff of smoke) and then with a new tube you will only measure zero at the terminal for that tube. The resistor should be replaced by a technician, but it should only take ten minutes. Can you solder?

**How often should I check these BIAS points?** Some people never do. It really should be done when you change a tube and it is very likely that a little adjustment will be needed. We suggest that you check every 3 months - that way you are assured that the amp is running optimally and will spot a tube on its way out. Some check every month, once a week is getting a little obsessive.

**What tools do I need?** Just two. A small flat screwdriver (insulated handle) to adjust the trimmers. You also need a voltmeter or multi-meter. You don't need a good one. Analog or digital (preferred) will do and you can get one that is perfectly adequate for about \$25 to \$50 as long as it measures DC volts between 0.1 (100mV) and 1 volt. In the USA, RadioShack sells acceptable inexpensive meters.

**What do I do?** The amp should be well warmed up (30 min.) and no music playing. Set the meter to read DC volts. The meter has two test leads, red and black. Put the black lead in the black terminal on the top marked TPG (ground) or touch the metal point to the steel chassis (but not a painted or anodized part). Put the red lead in the first red terminal marked TP1. The meter should read either .25 V or 250 mV (same thing). If it doesn't you need to adjust BIAS 1 trimmer until it does. It doesn't need to be exact - .23 to .27 will do. Now move the red lead to the red test point labelled TP2. Same thing, if it is not .25 adjust BIAS 2 so that its close. Continue till all 8 points have been done. If you trimmed a few, you should re-check because there is a little interaction and you may want to fine tune a bit.

**What if the reading is drifting up and down?** Some drift is normal. It is caused by the AC mains changing and by a little very low frequency noise in the tube. If one drifts above .3 or below .2 then you may be seeing a tube begin to go bad. Watch it for a while or check it every few weeks noting changes. This tube should be replaced probably. With mains changes all the tubes drift together and you may see more long term drift. Another cause is that you forgot to stop the music.

**What if I can't trim a tube into range?** If all you get is zero or near zero on one terminal it means either the tube or 10 ohm resistor is dead and needs replacing. If it is too high then it probably is the tube. If you look at the tubes, that one will probably be cherry red. Get a new tube. If all the terminals read zero on one channel, then the B+ fuse is likely blown on that side. If all the terminals read zero on both channels but the amp still plays, then you have a problem with the meter.

**Is there any advantages to biasing higher or lower than .250?** This is the optimum trade-off between tube life and cross-over distortion. If you bias a little higher you may lower distortion a bit but shorten tube life a lot. If you bias lower the distortion climbs fast and the tube life will lengthen - partially because you won't want to listen as often or as long.

## CREDITS



### **An EveAnna Manley Production**

Featuring concept, layout and industrial design by EveAnna Manley,

Starring: Paul Fargo for Input Innovations  
Hutch for Output Outovations

Inspired by : David Manley  
Mastered by: Baltazar Hernandez  
Titled by: J. Gordon Holt

#### Contributing Players:

Michael Hunter	transformer specialist
Marcelino Tornez	assembly supervisor
Elias Guzman	silk screens and PCBs
Miguel Tovar	knobs and feet

It all began at last year's HI-FI show, at the bar of course -J. Gordon Holt with his traditional martini, and EveAnna Manley with her stimulant of choice, a cup of coffee. She was describing this new integrated amplifier she wanted to build and drew a one of those legendary "bar napkin drawings". Gordon remarked "It looks like a stingray" (the fish, not the car) - and so, in honor of Gordon, we call this little jobbie "The Stingray".

The Power Amps are from David's 50 watt Monoblocks with newly developed transformers from Michael and Hutch (for exceptionally clean highs and more power in the lows). The passive PreAmp came from EveAnna and her talent of finding just the right parts. The Input stage was developed by Paul to further extend the HF response. Balta did all the circuit board and metal work drawings and assembled the prototypes - no small feat. Speaking of small feet, Miguel machines each foot and knob in-house. Marcelino oversees the entire assembly process and designed one of the PCBs. Paul strenuously tested every prototype and Hutch, as usual, just listened.

You can blame this silly manual on Hutch

## SPECIFICATIONS

Vacuum Tubes:	8 x EL84, 2 x 6414 2 x 12AT7WA
Lamp type	1/4 X 1 1/4, 12 volt, .15 amp
Fuse type	120VAC operation: MDL 3 AMP / 250 Volt SLO-BLO 240VAC operation: MDL 2 AMP/ 250 Volt SLO-BLO B+ FUSES (2): MDL 1/4 AMP/250 Volt SLO-BLO
Gain	37 dB max 185mv input=50w output
Signal to noise	Typically 87 dB A WGT 20-20K (69 dB unweighted)
Frequency Response	15 Hz to 40 kHz @ - 1 dB
Distortion @ 5 watts	.25 % @ 5W, 1 kHz (-55 dB)
Volume control "Left / right tracking"	.25 dB
Input Impedance	100 Kohm
Output Power	50 Watts each channel (1.5% THD @ 1kHz, both channels driven)
Output Impedance	Optimized for 4-8 ohm speakers (5 ohm design)
Damping Factor	10
Power Consumption (idle)	170 Watts (1.4A @120VAC)

# WARRANTY

All Manley Laboratories equipment is covered by a limited warranty against defects in materials and workmanship for a period of 90 days from date of purchase to the original purchaser only. A further optional limited 5 year warranty is available to the original purchaser upon proper registration of ownership within 30 days of date of first purchase.

Proper registration is made by filling out and returning to the factory the warranty card attached to this general warranty statement, along with a copy of the original sales receipt as proof of the original date of purchase. Only 1 card is issued with each unit, and the serial number is already recorded on it.

If the warranty registration card has already been removed then this is not a new unit, and is therefore not warranted by the factory. If you believe this to be a new unit then please contact the factory with the details of purchase.

This warranty is provided by the dealer where the unit was purchased, and by Manley Laboratories, Inc. Under the terms of the warranty defective parts will be repaired or replaced without charge, excepting the cost of tubes. Tubes are warranted for six months provided the warranty registration is completed as outlined in paragraph 1.

If a Manley Laboratories product fails to meet the above warranty, then the purchaser's sole remedy shall be to return the product to Manley Laboratories, where the defect will be repaired without charge for parts and labour. The product will then be returned via prepaid, insured freight, method and carrier to be determined solely by Manley Laboratories. All returns to the factory must be in the original packing, (new packing will be supplied for no charge if needed), accompanied by a written description of the defect, and must be shipped to Manley Laboratories via insured freight at the customer's own expense. Charges for unauthorized service and transportation costs are not reimbursable under this warranty, and all warranties, express or implied, become null and void where the product has been damaged by misuse, accident, neglect, modification, tampering or unauthorized alteration by anyone other than Manley Laboratories.

The warrantor assumes no liability for property damage or any other incidental or consequential damage whatsoever which may result from failure of this product. Any and all warranties of merchantability and fitness implied by law are limited to the duration of the expressed warranty. All warranties apply only to Manley Laboratories products purchased and used in the USA.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

**WARRANTY REGISTRATION**

We ask that you please fill out this registration form and send the bottom half to:

MANLEY LABORATORIES  
REGISTRATION DEPARTMENT  
13880 MAGNOLIA AVE.  
CHINO CA, 91710

Or you may FAX this form in to: 909-628-2482

Registration entitles you to product support, full warranty benefits, and notice of product enhancements and upgrades. You **MUST** complete and return the following to validate your warranty and registration. Thank you again for choosing Manley Laboratories.

MODEL **STINGRAY** SERIAL No. \_\_\_\_\_

PURCHASE DATE \_\_\_\_\_ SUPPLIER \_\_\_\_\_

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*PLEASE DETACH THIS PORTION AND SEND IT TO MANLEY LABORATORIES*

MODEL **STINGRAY** SERIAL No. \_\_\_\_\_

PURCHASE DATE \_\_\_\_\_ SUPPLIER \_\_\_\_\_

NAME OF OWNER \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY, STATE, ZIP \_\_\_\_\_

TELEPHONE NUMBER \_\_\_\_\_

COMMENTS OR SUGGESTIONS? \_\_\_\_\_

\_\_\_\_\_