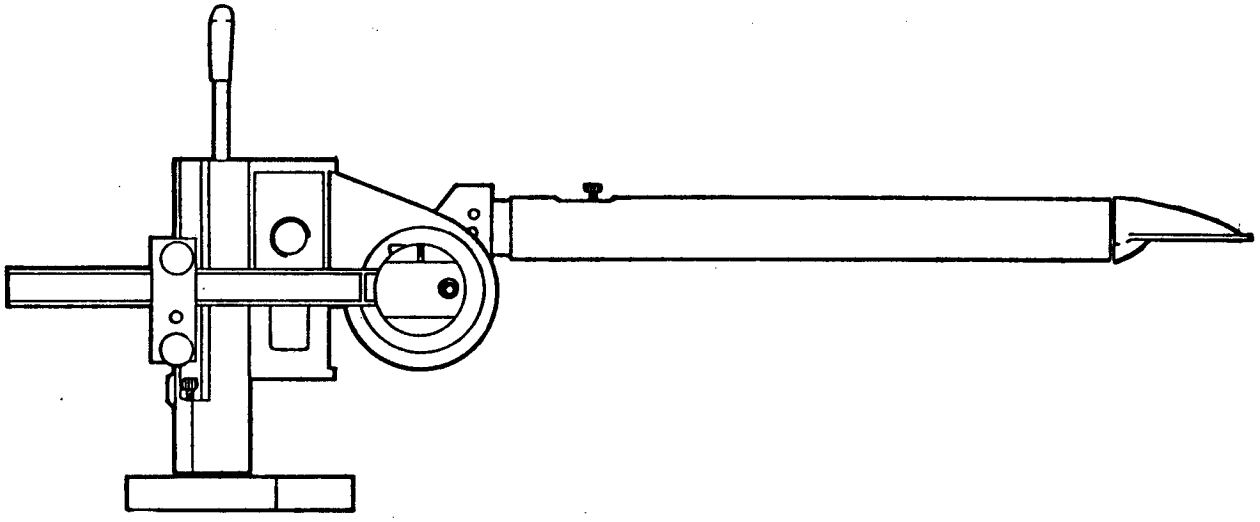
OWNERS MANUAL

THE EMINENT TECHNOLOGY MODEL TWO

AIR BEARING STRAIGHT LINE TRACKING TONEARM



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THE EMINENT TECHNOLOGY MODEL TWO AIR BEARING TONEARM IS A DELICATE AND PRECISE INSTRUMENT WHICH REQUIRES MAINTENANCE TO RETAIN ITS HIGH PERFORMANCE CAPABILITIES. IT IS IMPORTANT FOR THE USER TO UNDERSTAND THE REQUIREMENTS OF THIS TONEARM. THIS PRODUCT IS DESIGNED AND MANUFACTURED BY PEOPLE WHO APPRECIATE AND ENJOY MUSIC. IT IS UNIQUE IN ITS APPROACH, DESIGN, AND OPERATION. THIS MANUAL SHOULD BE THOROUGHLY REVIEWED BEFORE USING THIS PRODUCT.

THE COUNTERWEIGHTS OF THIS TONEARM ARE MANUFACTURED FROM LEAD. NORMAL INFREQUENT HANDLING DOES NOT POSE A HEALTH HAZARD. KEEP THE COUNTERWEIGHTS OUT OF THE REACH OF CHILDREN. PLEASE CONSULT THE BACK OF THIS MANUAL FOR MORE DETAILS.

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INTRODUCTION

The Model Two is an air bearing, straight line tracking tonearm for precise reproduction of analog records.

It is a uniquely conceived tonearm, designed to be installed on turntables with universal mounts. It can be adapted to both solid mount (direct drive) turntables and spring suspended mount turntables. Its flexibility in many cases allows it to be mounted on many turntables without the need for special hardware.

The large surface area of the air bearing uses some of the tightest tolerances in tonearm manufacturing today, and is much more rigid at audio frequencies than metal bearings. A unique choice of materials was determined through extensive listening tests, measurements, and work in stress and resonant analysis of materials.

The tonearm's lead wire is important, it must be flexible and interface with very low impedance transducers. A multi-stranded, oxygen free litz wire was chosen, with gold plated connectors in the audio chain.

Resonances within the arm were carefully measured during the prototype stage. These results led to the use of a large diameter, thin wall aluminum tubing with foam filled damping. Interface connections are made with heavy wall carbon fiber and socket head cap screws. The tonearm tube incorporates a taper machined from aluminum. Its interface incorporates a unique expanding collet design

which grips over one square inch of inside surface area of the tonearm tube when locked into place.

Counterweights are provided for cartridges weighing up to fifteen grams. Additional counterweights can be used for heavier cartridges (to twenty grams). These weights are isolated from the spindle by a vertical flat spring. The air bearing spindle is machined to within (+/- .0003") tolerances and is hard coat anodized to prevent wear when the arm is moved without air.

This arm does not pivot at low frequencies. The air bearing is a rigid system which provides support vertically and horizontally and allows no motion outside of these two planes of operation. (The mechanical servo, and small surface area air bearing type arms behave like a pivoted arm at close to their resonant frequencies.) This is a true medium mass arm which works well with most cartridges.

The arm has high horizontal inertia and medium vertical inertia, which splits the resonant frequencies and lowers their peak aplitudes (See Technical Section) at those frequencies. Resonance in one plane will not start resonance in another plane (or rotational motion) which helps improve imaging and phase response.

SPECIFICATIONS:

TONEARM:

Type:	Straight line tracking air bearing
Length:	7 3/8" pivot to stylus distance
Tracking Error:	0 degrees
Effective Mass:	25-35 grams horizontal, 7 grams verticle
Height Adjustment At Pivot:	.50" equal to +/- 2 degrees of vertical angle adjustment
Overhang Adjustment At Tonearm:	Slot with 1/2" range
Resonance Damping:	Tonearm tube and spindle are filled with closed cell foam
Maximum Cartridge Weight:	Counterweights supplied for use up to 15 grams
Maximum Tracking Force Available:	Cartridge weight plus 7 grams, infinitely variable.
Tracking Force Calibration:	None. User must supply scales.
Sidethrust Correction:	Not required with tangentially tracking arm. (See technical section)
Pivot Damping:	None for vertical. Horizontal motion damping at counterweight.
Azimuth Adjustment:	+/- 2 degrees
Spindle Weight:	14 grams
Tonearm Tube Weight:	11 grams
Counterweight:	5 grams "small" (2) 15 grams "large" (2)
Air Bearing Surface Area:	6.8 sq. in.
Air Filter:	.01 micron rating, moisture trap
Air Bearing Pressure Requirements:	3 psi at 50 cu. in./min.

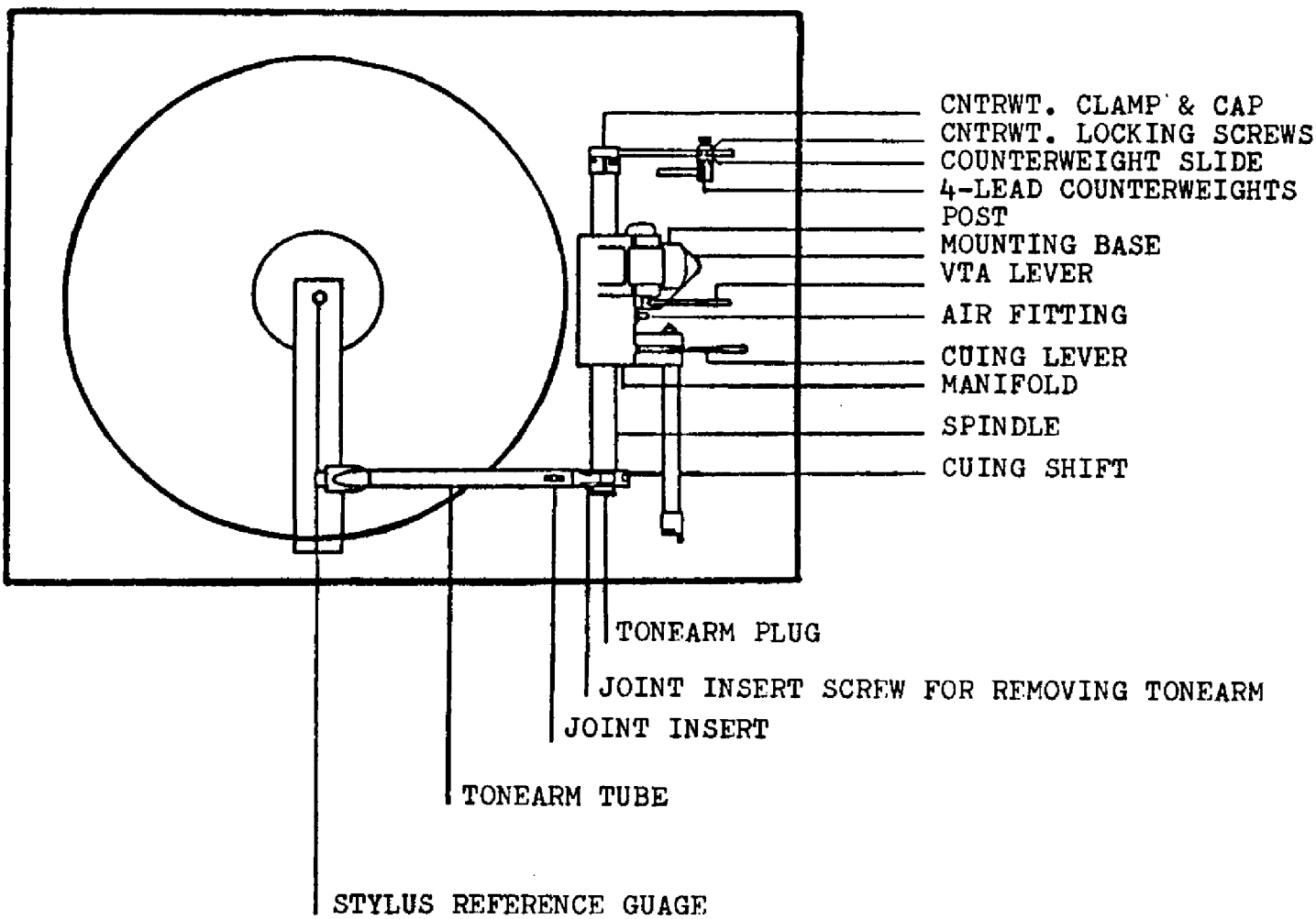
MATERIALS

Tonearm:	5052-T5 hard anodized .5" O.D. .035 wall aluminum tubing
Spindle Tube:	6061-T6 hard anodized aluminum .6110 O.D. .014" wall
Headshell:	Same as tonearm tube-teflon damping material
Manifold Housing & Post Assembly:	Carbon fiber composite
Counterbalance Weights:	4-Lead, 3-Brass
Counterbalance Weight Damping:	2 Hz - 6 HZ spring isolated with damping material
Overall Tonearm Weight:	405 grams, .9 lbs.

AIR PUMP - OPTIONAL

Power Requirement:	120 vac. 50-60 Hz. 8.5 watts
Cuing:	Mechanical eccentric bar adjustable height range.
Cartridge Leadwires:	7/42 stranding color coded litz in vinyl jacket. Tonearm tube 20/32 stranding color coded.
Capacitance:	40 p.f.
Resistance:	.9 ohm

DESCRIPTION OF COMPONENTS



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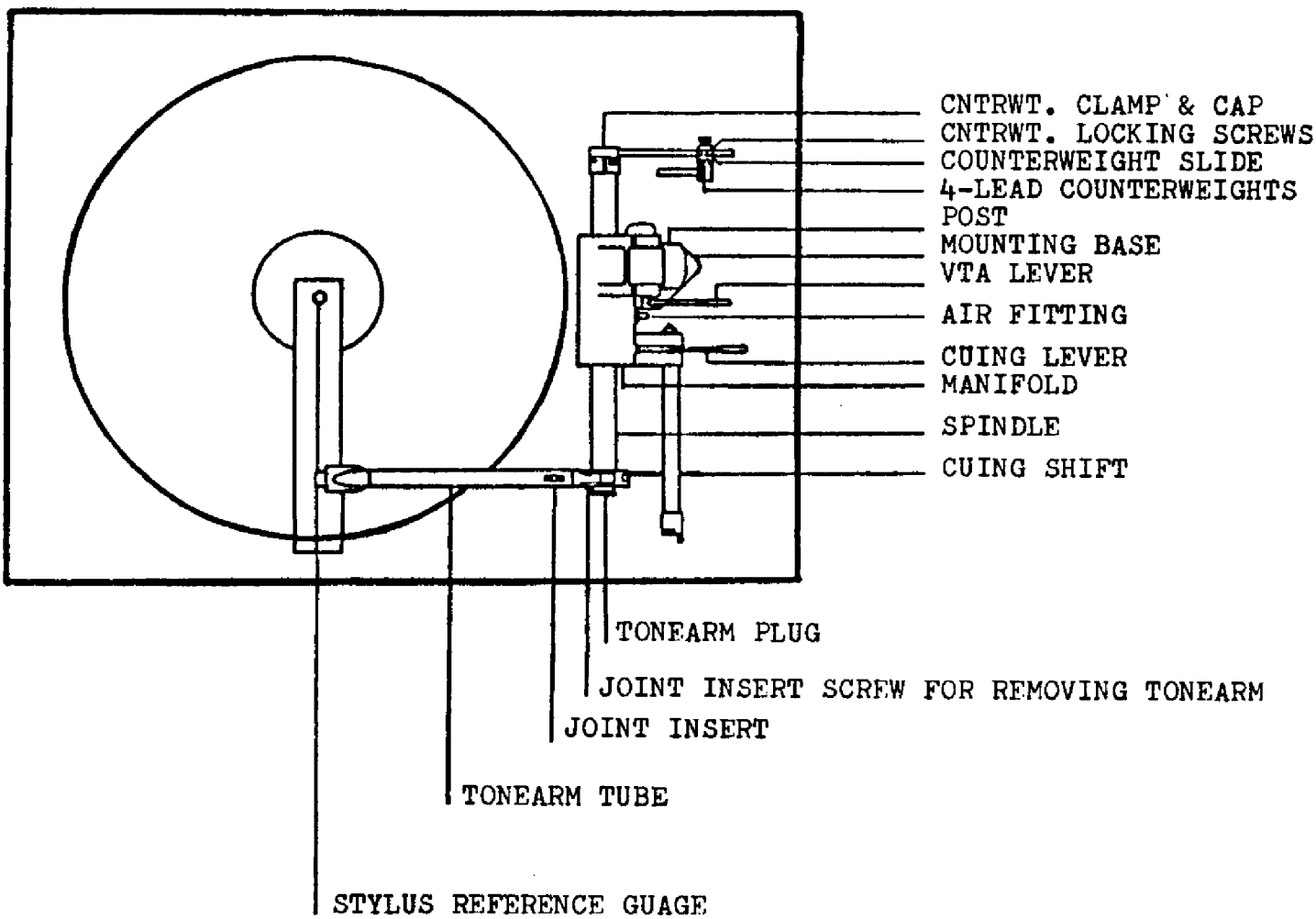


Special features of the Eminent Technology Model Two Tonearm.

UNIVERSAL MOUNTING

The post assembly of the Model Two has adjustable height and level features. These adjustments allow the tonearm to be fitted to any turntable with a large enough mounting platform. Other pedestal type mounting turntables will require mounting plates. These plates will be provided on request to users and dealers.

UNIVERSAL MOUNTING FIXTURE AND DRILL JIG

A mounting jig can be used to find the precise location that the post assembly should be attached to the mounting board of the turntable. This jig allows the user to find the correct location for the mounting hole and drill it to the correct size. These mounting jigs are available from the dealer.

INTERCHANGEABLE TONEARM TUBES

The tonearm tubes are interchangeable by means of an electrical disconnect located at the end of the spindle. The interface mechanically uncouples from a rigid carbon fiber clamp. A joint connected to the arm tube sets azimuth and overhang for a given cartridge. Therefore, when a cartridge is installed on a tube, azimuth and

overhang are set once at the joint. If the arm tube is removed and replaced later, these parameters will still be maintained.

ADJUSTABLE EFFECTIVE MASS

The effective mass of the tonearm is adjustable, both vertically and horizontally. The arm has low-medium mass vertically and medium to high mass horizontally.

Four counterweights allow the vertical/horizontal mass to be changed. For example; if the user decreases the amount of counterweights used, and moved this position back, (higher scale number) the horizontal inertia of the tonearm would go down and the vertical inertia would go up.

DECOUPLED COUNTERWEIGHTS

The effective mass of the arm horizontally is equal to the sum of its component parts. (It does not pivot) It needs to be as light as possible for low mass, however, making the arm too light sacrifices rigidity. By decoupling the counterweight system horizontally, but not vertically, the mass of the counterweight is not seen by the cartridge above a certain frequency and is lowered. This allows the use of heavier (more rigid) components in the tonearm design without increasing the effective mass.

The decoupling mechanism is damped at its natural frequency (2Hz-5Hz). This decreases the rise in frequency

response at resonance improving low frequency performance.

PROPER GEOMETRY

The Eminent Technology Model Two Tonearm is one of the few tonearms made with nearly perfect geometry. Horizontally, there is no pivot point, and therefore no tracking error. (Servo type and mechanical straight line tracking tonearms have small amounts of error.)

Vertically, the pivot point is positioned just above the surface of the record (0-3/8"). This minimizes warp wow when the stylus traces warps or groove modulation levels change.

VERTICAL TRACKING ANGLE ADJUSTMENT

The Eminent Technology tonearm VTA/SRA adjustment maintains the position of the stylus tip along the true centerline by raising and lowering the spindle over an arcuate path. When this adjustment is made only the angle of the stylus tip with repect to the groove changes, not its position.

COUNTERWEIGHTS

The counterweight system on the Model Two allows good flexibility. The tracking force, effective mass, and center of mass are adjustable. The counterweights are

interchangeable as assemblies, allowing counterweight sets to be matched and changed with cartridges.

SET UP INSTRUCTIONS FOR THE MODEL TWO INSTALLATION JIG.

Place hole number one over the center spindle of the turntable platter. Using the clamp nut and stabilizing bracket, adjust the bracket so that it firmly rests against the right hand side of the turntable. Tighten the clamp nut.

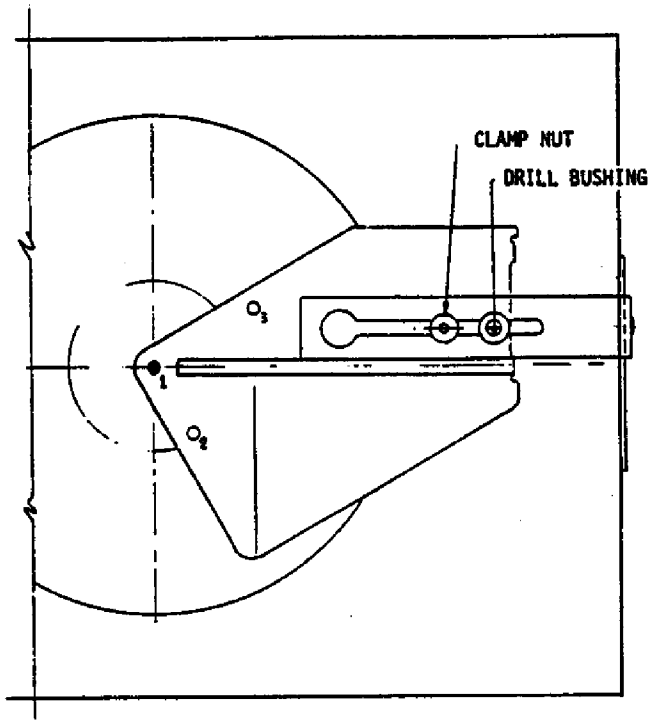
If the turntable has a spring suspension system and it can be tied down easily, do so! otherwise it is not necessary.

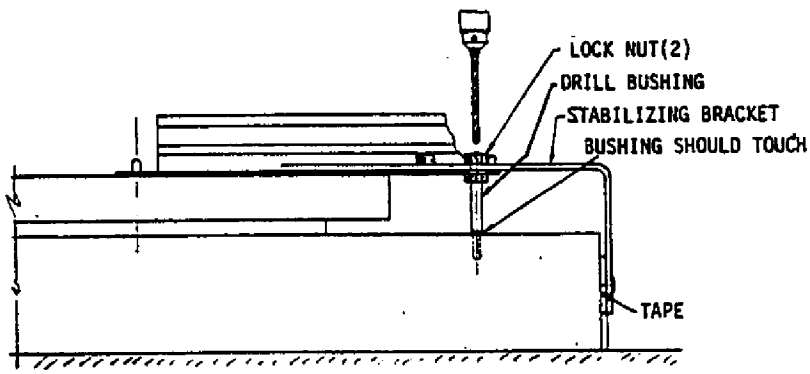
The brass drill bushing should be positioned in the correct location above the mounting board. Using the two lock nuts which hold the drill bushing in the jig, adjust the bushing such that it rests against the surface of the mounting board.

The drill bit size depends on the type of mounting board material used, and the size and type of mounting screw. For example: if you are going to use a wood or sheet metal screw (#8 or #10) choose a drill bit size which is just smaller than the major diameter of the threads. If you are going to use a number 10 screw for mounting the post, choose a drill bit which is slightly larger then the machine screw (#10=.187 in., so use a 7/32 drill bit).

If your drill bit is not long enough to reach through the drill bushing use a nail to mark the hole to be drilled in the mounting board without the jig in place.

After the mounting hole is drilled you will have to drill two more holes, one for the airline (1/4 inch or larger) and one for the lead wire (1/16 in.). These holes





TO DRILL MOUNTING HOLE

ADJUST BRACKET AGAINST RIGHT HAND END OF TURNTABLE ENCLOSURE, TWISTING LEG SO ONE CORNER RESTS ON TABLE. ADJUST LOCK NUTS SO BRASS BUSHING RESTS ON ARM MOUNTING SURFACE. TIGHTEN LOCK NUTS AND CLAMP NUT. TAPE BRACKET LEG AGAINST END OF ENCLOSURE TO STABILIZE WHILE DRILLING.

MATERIAL	DRILL	SCREW	SUPPLIED
WOOD COMPOSITION	#25	#10 TYPE B SPECIAL SOCKET HEAD	✓
METAL OR ACRYLIC	#25, OPEN HOLE TO .182" DIA. WITH #14 DRILL	" " " " " " " "	✓
METAL OR ACRYLIC	#25 TAP #10-24	#10-24 SHALLOW SOCKET HEAD (FITS) 3/32" HEX KEY; OR #10-24 ROUND HEAD MACHINE SCREW.	✓ NO

should be drilled after installing the mounting post because their correct location depends on the choice of turntable used.

To mount and square the post on the turntable, first insert the post squaring bracket (white squaring bracket) in the jig, and then place the jig over the turntable platter in hole position number two.

A decision needs to be made regarding the use of the aluminum base plate. If your mounting board is made of a soft wood or composite fiber material, you should use the aluminum base plate; otherwise, the pointed set screws will sink into the mounting board over a period of time. If the mounting board is made of a harder acrylic or aluminum, then it is not necessary to use the aluminum base plate. In any case, when setting up the tonearm, use the base plate to facilitate alignment of the post so that the pointed set screws do not sink into the mounting board.

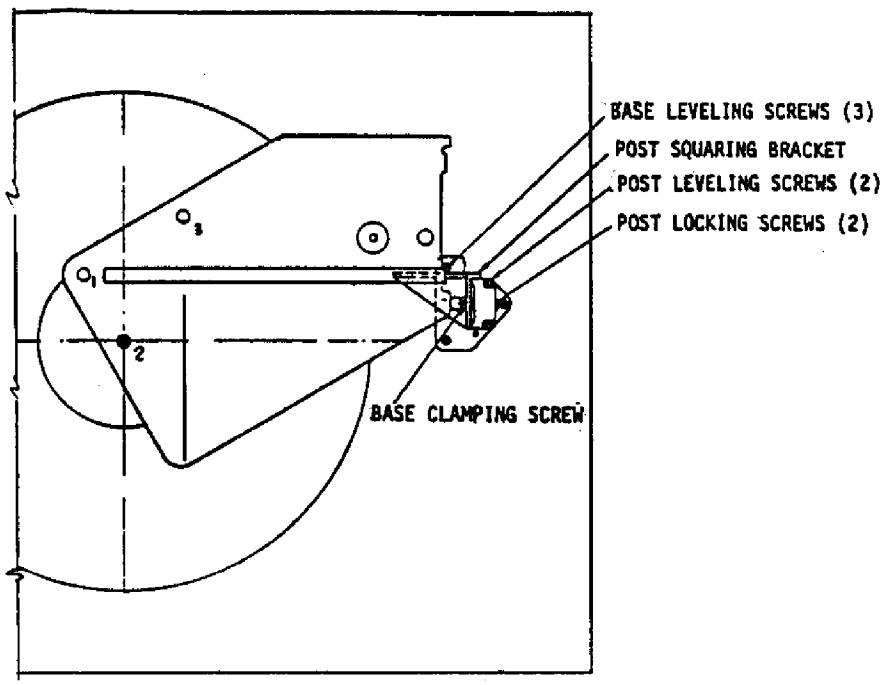
After choosing the correct mounting screw for attaching the post to the mounting board, loosely mount the post onto the board using the chosen screw. Then with the post in position and the mounting jig in position (hole #2), slide the post squaring bracket out against the post. Level the post by first loosening the two post locking screws. These two screws are located at the bottom of the vertical post. The top screw is the pivot point, the bottom screw locks it into place. Two smaller vertical screws perform the levelling when the locking screws are loosened. Tighten one levelling screw while loosening the other. This will rock the post back and forth.

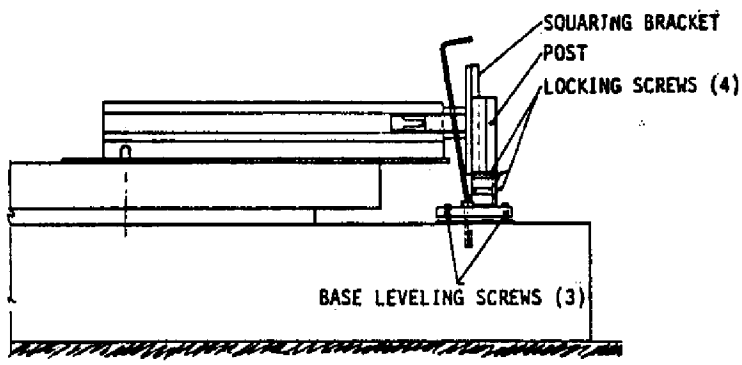
The post is correctly aligned (perpendicular to the surface of the platter) when the back edge of the post is parallel (flush) with the post squaring bracket.

The three pointed set screws in the base also perform a levelling function in all directions. Before mounting the post these three set screws should be adjusted so that they protrude equally from the bottom of the post. These three set screws can be used to rock the post toward or away from the post squaring bracket.

Adjust the set screws and the post levelling screws so that the post is flush with the squaring bracket in all axes.

Mount the tonearm assembly to the post. The VTA arc block fits into the post tightly. This is done intentionally for a good interface between the two assemblies. One 8-32 locking screw joins these two parts.

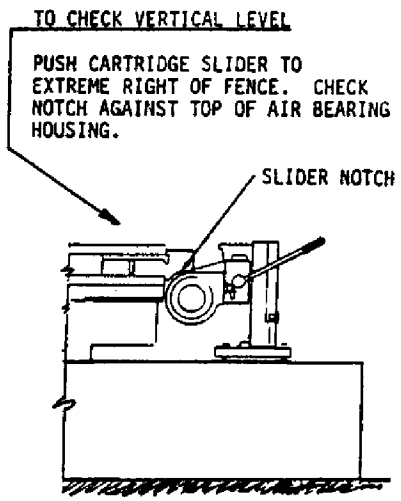




TO SQUARE POST

LOOSEN LEVELING AND LOCKING SCREWS, SLIDE SQUARING BRACKET AGAINST POST, AND HOLD POST FIRMLY AGAINST BRACKET, THEN TIGHTEN POST LOCKING SCREWS. IF NECESSARY USE BASE LEVELING SCREWS TO COMPLETE SQUARING OPERATION.

Use the VTA lever to center the VTA in the middle of its range. The vertical height of the tonearm will be correct when the center of the air bearing spindle is at the surface of a record. This height should be adjusted using the post locking screw. The overall height of the tonearm can also be set by using the jig in position number three. Move the cartridge slider over the air bearing housing, as shown in the drawing. Raise or lower the housing until the two surfaces meet. This will also put the center of the spindle (middle of the tonearm tube electrical plug) at the surface of the record.



VERTICAL LEVEL

LOCATING & DRILLING HOLES FOR THE AIRLINE AND CARTRIDGE LEADWIRES

The airline hole should be drilled with a 1/4" drill bit. Its location is not critical, but the airline should not get in the way of the travel of the counterweights or tonearm.

The best location for the airline hole is directly under the airfittings on the tonearm. This cannot be done on some turntables (SOTA). In this case, the airline should be routed underneath the manifold housing, about 1" beyond the mounting base between the spindle and the platter. The hole can be drilled anywhere within that area as long as there is access underneath the turntable.

The leadwire hole location is more critical because you want to minimize the force required to bend the wire. The best location is about 1/2" in front of the spindle towards the platter. The tonearm should be placed in the middle of its travel, and then as viewed directly from above the spindle, the hole should be located below where it exits the spindle at the counterweight cap.

ROUTING OF WIRE THROUGH THE MOUNTING BOARD

The wire will come properly routed through the tonearm tube and spindle. The wire should be routed down through the middle of the spacer and mounting board to the RCA phono jack plate as shown.

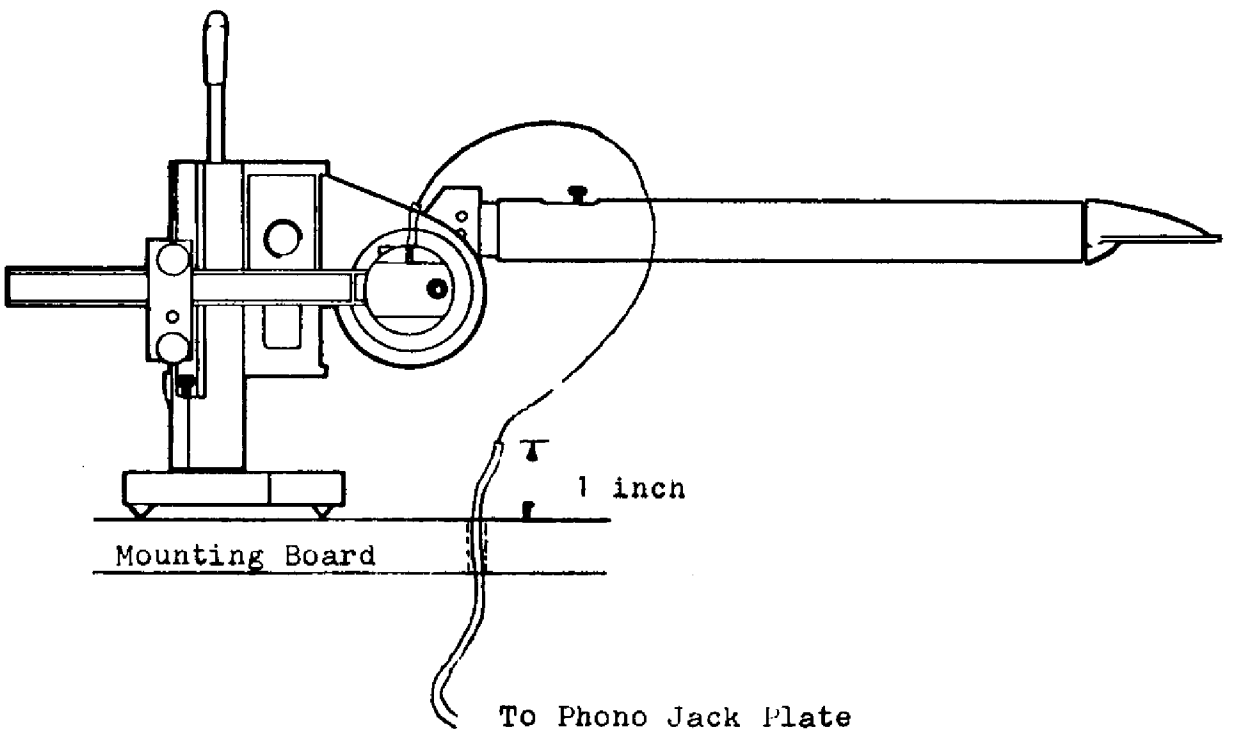
The loop will be set at the proper length when the

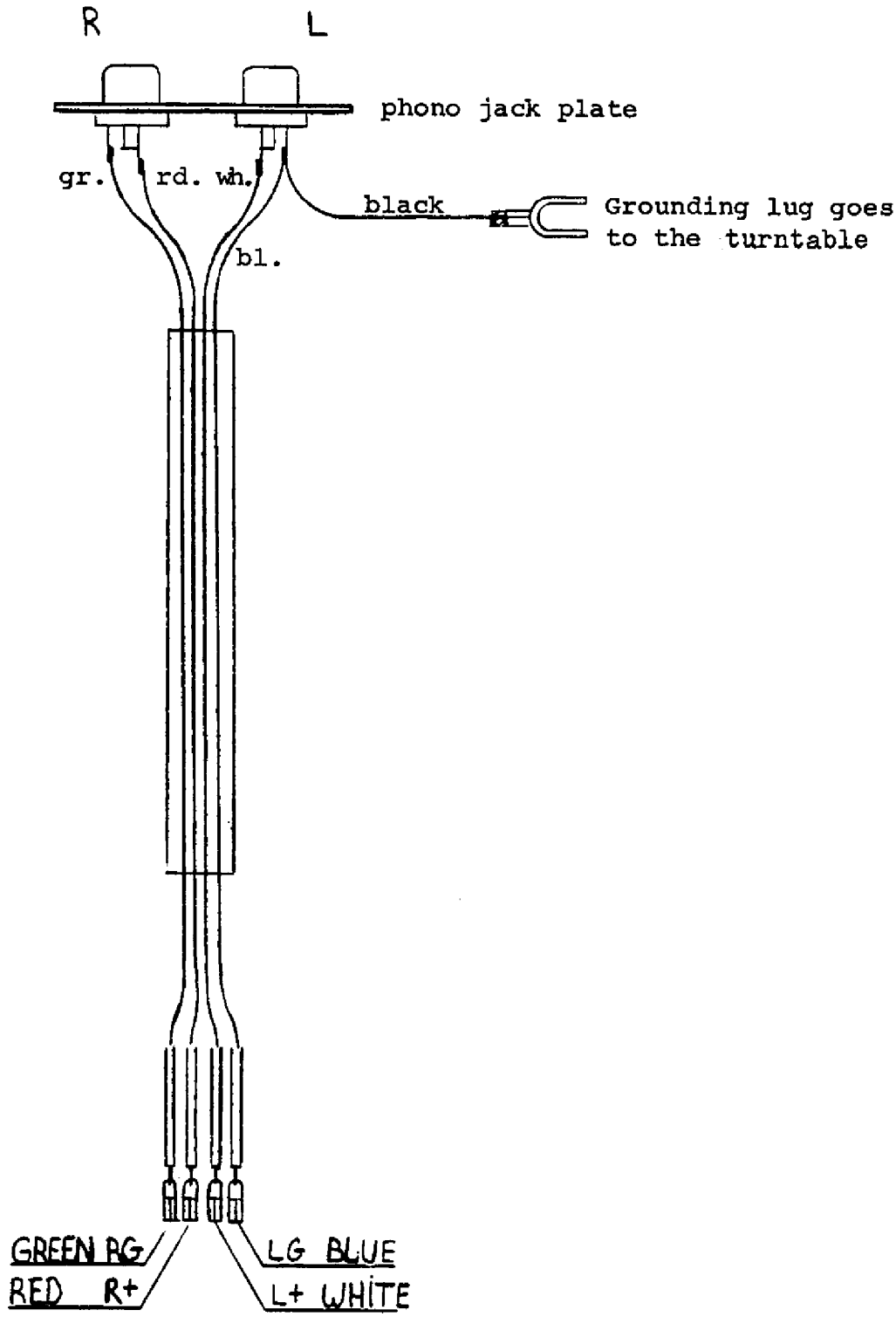
vinyl jacket of the litz wire extends out of the top of the mounting board about 1/2".

NOTE: Do not cut any of the litz wire that comes with the arm. This additional length allows the spindle to be removed from the manifold for maintenance and cleaning without cutting or unsoldering.

IMPORTANT:

The loop should be configured as shown in the drawing. It is the area of the litz wire where the vinyl jacket is removed from the wire that is important. The vinyl jacket should extend about 1/2" from the end of the spindle (counterweight end) and about 1/2" - 1" above the mounting board. If the loop is not arranged properly or is pulled into the mounting board, the free motion of the spindle will be restricted and arm performance will suffer.


1 inch
Mounting Board
To Phono Jack Plate



WIRING DIAGRAM FOR THE TONEARM

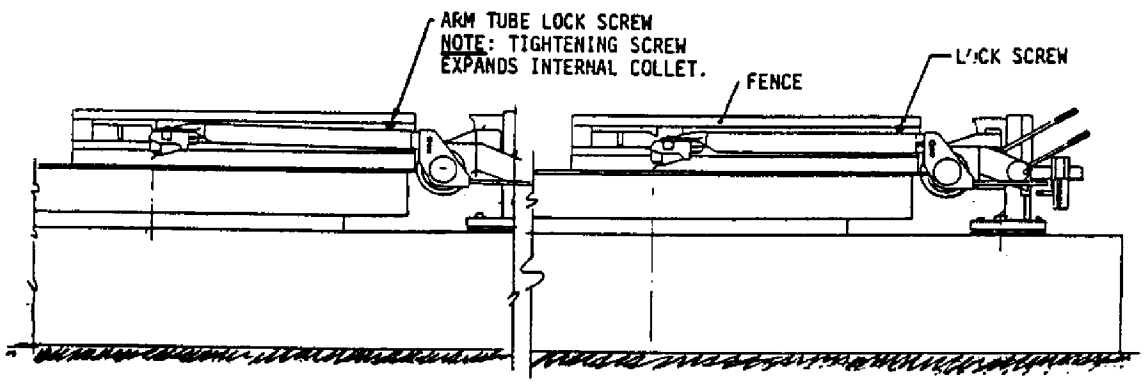
Solder the leads to the phono jack plate per the color code given in the drawing. The right channel is identified by a red dot on the plate.

CARTRIDGE ALIGNMENT

Use hole number three of the mounting jig to square the cartridge in the tonearm tube by moving the cartridge slider up against the front face of the cartridge body. When the two surfaces are flush, tighten the headshell screws.

To adjust the cartridge azimuth, depending on the type of cartridge you have, place the cartridge slider over the front top portion of the cartridge body, or place the cartridge slider headshell over the top of the headshell. Loosen the tonearm tube locking screw, and push the cartridge firmly up against the underside slider. Then tighten the arm tube locking screw.

To adjust the overhang, the tonearm jig should be used in hole number three. Loosen the tonearm tube locking screw, and slide the tonearm tube until the stylus tip lands directly over the scribed line in the jig. Recheck the azimuth position to insure that it has not moved.

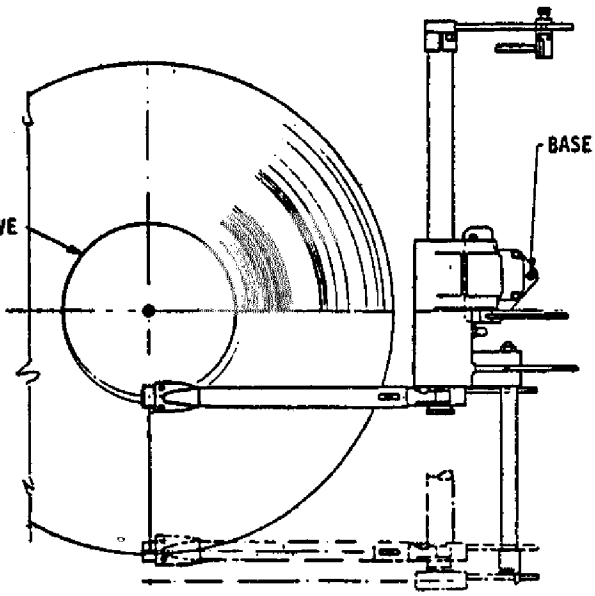


TO SET AZIMUTH

LOOSEN ARM TUBE LOCK SCREW, ADJUST CARTRIDGE SLIDER OVER FRONT END OF CARTRIDGE, LEVEL CARTRIDGE AGAINST UNDERSIDE OF SLIDER & TIGHTEN LOCK SCREW.

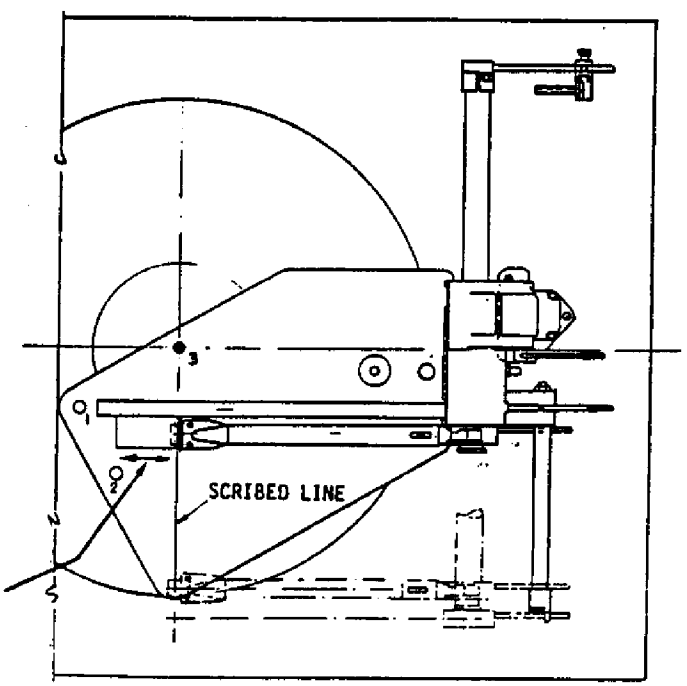
TO SET OVERHANG

LOOSEN ARM TUBE LOCK SCREW AND SET STYLUS POINT TO SCRIBED LINE, TIGHTEN LOCK SCREW. LEVELNESS OF ARM CAN BE SIGHTED AGAINST FENCE.



TO CORRECT ARM TUBE PLAYING MOVEMENT RANGE

STYLUS SHOULB REACH JUST PAST END OF LEAD OUT GROOVE IN INNERMOST PLAYING POSITION. IF NECESSARY LOOSEN RIGHT SIDE BASE SET SCREW AND ROTATE ENTIRE ARM ASSEMBLY VERY SLIGHTLY TO ADJUST MOVEMENT RANGE. THEN RETIGHTEN SET SCREW.



TO SQUARE CARTRIDGE

SHIFT CARTRIDGE SLIDER TO LEFT THEN TO RIGHT AGAINST END OF CARTRIDGE; LOOSEN CARTRIDGE MOUNTING SCREWS AND ROTATE CARTRIDGE TO SQUARE POSITION, THEN TIGHTEN SCREWS.

USING THE STYLUS REFERENCE GAUGE

The stylus gauge is used to align the cartridge over the centerline of the record, as well as to insure that the cartridge is mounted exactly in line with the tonearm tube, perpendicular to the centerline.

Use the stylus guard during these alignment procedures. Do not lower the stylus directly onto the referece gauge. The stylus reference gauge can be used to check cartridge alignment in place of the jig.

The center hole of the gauge is purposely made small. Use a pair of scissors to enlarge the hole by rotating one of the blades in the hole. Gradually enlarge the hole until it slips tightly over the turntable record spindle.

Place the stylus reference gauge on the spindle. Rotate the gauge until the stylus (air pump on) tracks straight down the centerline. You may have to rotate the post slightly by loosening its mounting screw, or adjust the overhang to get this exact. Use the slot in the tonearm tube to set the overhang. If the stylus tip will travel down the centerline you have established correct alignment.

ADJUSTING THE CUING LEVER

At the factory, the cuing mechanism is set so that when the lever is down, the cartridge will be lowered onto the surface of a record. When the lever is up, the cartridge will be raised. This can be reversed by loosening the set screw (.Ø5) on the cuing eccentric and rotating it 18Ø degrees.

The overall height or range of the cuing mechanism can be adjusted using the 3/32 ball end of an allen wrench. Loosen the 4-4Ø socket head screw located in the slot that the cuing lever moves against in the manifold housing. When this screw is loose the cuing housing can be moved up or down, shifting the starting and stopping positions of its operation.

The smoothness of operation is controlled by tightening or loosening the nut located behind the cuing housing. You may want to place a drop of oil in either end of the cuing housing where the shaft goes through.

ADJUSTING THE COUNTERWEIGHTS

The rectangular aluminum rod locks the four lead weights into place. The cartridge mass will determine the number of lead weights to use. The aluminum rod can point in either direction.

The lead weights are positioned in the cartridge

slider and locked into place using the bottom thumb screw. The ideal position for the weight is about 1/8" to 1/4" below the bottom of the slider. The top thumb screw adjusts the cartridge slider along the I-Beam. This changes the tracking force. The scale numbers on the I-Beam are relative, but can be applied directly to a tracking force. Determining the tracking force at two different locations along the I-Beam will allow you, by scale numbers, to find the tracking force at any other point.

ADJUSTING THE VTA/SRA MECHANISM

The stiffness of operation of the VTA mechanism is set at the factory. The stiffness can be adjusted, either increased or decreased by four screws located behind the gear shaft. (The cuing lever rotates the gear shaft). To change the stiffness of operation generally only a very small fraction of a turn (1/16) is required, using the bottom two of the four screws. Turning the bottom two screws clockwise (as viewed from the back of the tonearm) increases the stiffness, and turning them counterclockwise decreases the stiffness.

Friction in the mechanism is required for correct operation and coupling of the manifold housing to the post.

A small amount of grease can be placed on the arched surface of the mechanism if the VTA Lever is used frequently.

SOME SUGGESTIONS FOR SOLVING HUM PROBLEMS

The phono jack plate of the tonearm comes with a single black ground wire attached to one of the ground lugs on an RCA jack. In general, it is best to connect this wire to a ground lug on the turntable, if available, or to the metal chassis of the turntable. Sometimes an additional ground wire can be connected from the chassis of the turntable to the chassis of the pre-amp. These two steps should handle most hum problems. Tying the two RCA jack grounds together may also help.

The AC power cord of some amplifiers and pre-amps have two prong plugs. One or both of these should be reversed at the AC wall outlet. This can decrease hum in some instances.

Do not attempt to reverse any three prong AC power cord. Do not ground the chassis of any power amplifier to the chassis of any component which does not have a three prong AC plug.

USE OF THE COUNTERWEIGHTS

Four counterweights come with the Model II, two (2) fifteen gram weights and two (2) five gram weights, giving five incremental settings up to 40 grams.

The tracking force range available depends on the mass of the counterweights chosen, and the mass of the cartridge. If you have a cartridge that is light (7 grams), two, three or four counterweights can be used (30, 35, and 40 grams) to support this cartridge. As you reduce the amount (4,3,2 weights) that the counterweight weighs, it must move further out along the I-Beam (higher number on the scale). By changing the weights used and the effective mass of the arm, you can change the low frequency performance of the tonearm.

We believe that for a light cartridge, the smallest number of counterweights should be used. This raises the vertical inertia of the tonearm (because it is low) and decreases the horizontal inertia (because it is high), bringing the mass of the tonearm to a more desirable figure. It will always be lower vertically than horizontally, which is desirable.

For heavier cartridges (greater than eight grams) more counterweights must be used (three or four). Because these cartridges are heavier, the counterweights must be used further back on the I-Beam (higher number on the scale) and will end up in the ideal location.

SETTING THE TRACKING FORCE

The owner must provide his/her own scale to set tracking force. Determine the number of counterweights necessary to balance the cartridge. (Note: the three brass weights are not intended to be used as counterweights. See tonearm levelling section.) The two large counterweights will support cartridges weighing up to ten grams. If two small additional counterweights are added, a cartridge of almost 15 grams can be supported. It is desirable in most cases (low to medium compliance cartridges 5X10 dynes/cm - 20X10 dynes/cm) to use the minimum number of counterweights, far out on the counterweight stem (#3-6). This decreases the horizontal inertia of the tonearm while increasing its vertical inertia.

Set the scale on the platter of the turntable at the desired force and move the weight(s) back (to reduce tracking force) along the I-Beam until the desired tracking force is reached. The weight(s) should end up close to the end of the I-Beam (#3-6).

ADJUSTING THE TURNTABLE SUSPENSION SYSTEM

If the turntable used does not have a suspended sub-base, then the only adjustment necessary is levelling the turntable. This can be done with shims, or if the turntable has adjustable feet which can raise and lower the turntable, these can be used. We highly recommend the use of accessory levelling feet (or a base which can be leveled) if the turntable does not have that capability. The tonearm must be level to perform its best.

If the turntable has a spring suspended sub-base, then this should be leveled (adjusted) first after installing the tonearm. We recommend levelling the suspension and platter of the turntable with the tonearm installed and then using the turntable feet to level the entire system, using the tonearm as a gauge of true level (unless the suspension system of the turntable is very easy to adjust).

When the arm is installed on a spring suspended turntable, the suspension will usually need to be adjusted to re-level the platter and arm combination. This is because the arm is lighter than most conventional pivoted arms and its center of gravity is closer to the front of the turntable. In some cases weight (such as from a fishing tackle supplier or mag wheel adhesive lead weight) will have to be added to the back of the turntable. (Use double sided adhesive foam tape to attach the weight to the suspension system.) If the suspension system is easy to

adjust, this can be used to find the true level of the turntable when it is installed in the system and ready for use. If not, use the adjustable feet.

LEVELLING THE TURNTABLE

The most accurate level available is the tonearm itself (much more accurate than a bubble level). The horizontal plane (the direction of travel the arm moves from the inside to the outside of the record) is the plane that must be level. If the arm is level for horizontal movement, everything else will be set. Do not use a bubble level to try and balance the arm.

FIRST METHOD-USING THE TONEARM

To use the arm as a balance level, start by trying to establish neutral balance. This can be done by using one of the three brass counterweights. These accessory weights will thread onto the rectangular aluminum rod holding the four lead weights together. These brass weights should not be used as counterweights. They should only be used as weight to achieve neutral balance, thus not disturbing a pre-set tracking force. Choose the size which allows the tonearm to come as close as possible to a floating condition. You will see the arm's tendency to move in one direction or the other as it is pushed back and forth. Adjust the suspension system, or feet, until the arm has no tendency to move toward the inner or outer portion of the record. It is now level. You can see the effect of the lead wire stiffness at the extreme ends of travel. This is normal.

SECOND METHOD

When the cartridge is installed and the tracking force correctly set, you can perform a quick check of tonearm level by lowering the stylus in between the grooves of the lead out section on any record while the platter is turning. The vinyl surface of the record where there are no cut grooves provides a low friction surface, and you can see the tendency of the arm to move in one direction or the other if it is not level in this small space between grooves.

Some test records are made with blank spaces where no grooves are cut to check anti-skating on pivoted arms. These can also be used for the same purpose.

A small mirror or piece of glass also works very well for a level check. Place the mirror on the platter and lower the stylus (correct tracking force) on to the surface of the glass. If the arm is not level you will see it slide in one direction or the other. Adjust the suspension as required.

A mirror has the additional advantage of providing a visual check of stylus azimuth. The stylus tip should be absolutely perpendicular to the record groove.

AIR PUMP

RECOMMENDATIONS FOR AN AIR SOURCE

NOTE: ANY PUMP USED WITH THIS PRODUCT MUST BE TURNED-OFF WHEN THE ARM OR SYSTEM IS NOT IN USE. THE FILTER SUPPLIED WITH THE ARM MUST BE USED WITH THIS PRODUCT AT ALL TIMES.

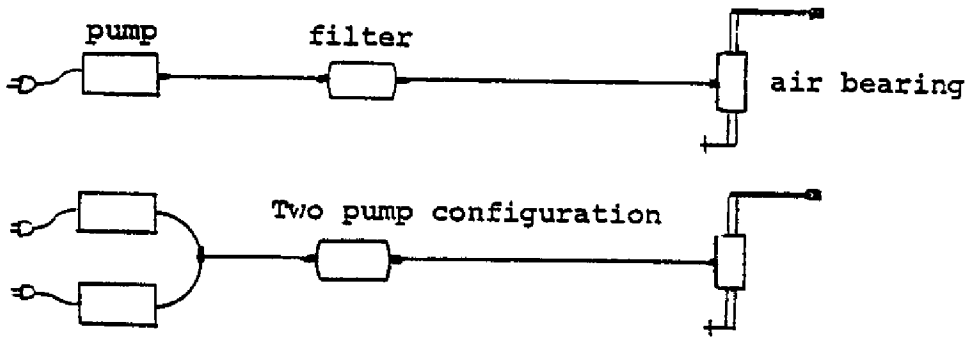
If the owner chooses to supply his/her own air source, we offer the following suggestions:

We have experimented with many aquarium air pumps and have found that very few actually work. We have NOT found a standard aquarium pump that is quiet. These pumps must be placed a distance from the listening room in order to maintain low noise levels.

Smooth air flow is important in the operation of the air bearing. A long length of airline (10') smooths the flow of air. The pressure drop is not significant with 1/8" I.D. airline because the flow rates are low (150 cubic in./min., 2.5 l/min). Therefore, long airline runs are favorable. If the user wants an "ideal" air source, a surge tank can also be used. A quart bottle stuffed with cotton with air input and output fittings in series with the airline in this order: pump - surge tank - filter - tonearm, works very well.

Standard aquarium air pumps produce 60 Hz pulses. These can be smoothed by the above methods. If aquarium pumps are chosen and the recommendations show that two are required, these should be run out of phase. This can be done by running them in parallel with a "T" air fitting,

when the pumps are out of phase, the output of air at the fitting will be much smoother.



RECOMMENDED AIR PUMPS

1. Silent Giant.....(2 required), (quiet)
2. Hagen "Optima".....(2 required), (noisy)
3. WISA Model 120.....(1 required), (very quiet)
4. Hartz Mountain, Vibra Power..(2 required), (noisy)

The user can also attach the air bearing arm to a shop air compressor with excellent results. The compressor would need to turn on only once, for hours of listening, because the arm can operate from the storage tank. The regulator should be set on 3 to 5 psi. Higher pressure will not damage the bearing, but it is not necessary. Remember, the included filter must be used in any pump application.

EMINENT TECHNOLOGY AIR PUMP

THIS PUMP MUST BE TURNED-OFF WHEN THE TONEARM OR SYSTEM IS NOT IN USE. WE RECOMMEND USING A SWITCHED OUTLET ON A PREAMP OR A SWITCHED TRACK LINE IN THE SYSTEM TO TURN IT OFF.

This air pump supplied by Eminent Technology for use with the tonearm is manufactured in Japan by the Takatsuki MFG., CO., (Model SPP6GA). It provides the optimum air pressure and flow requirements necessary for the tonearm and is extremely quiet.

Internally, it uses two diaphragms driven out of phase by matched transformer/magnet assemblies. Out of phase operation produces 120 Hz pressure pulsation which smooths the air flow. A surge tank cast into the bottom ofthe pump further smooths the air flow. The pump should be used in the upright position because the motor assembly is mounted on rubber bushings.

This air pump will produce about 3.6 psi into a stopped load. Operating the air bearing it will produce about 2.5 psi at about 150 cu/in. per minute air flow.

We have found that the best location for any air pump is a closet, or another room, if possible. In the listening room, placement under a chair or behind the speakers will also work well.

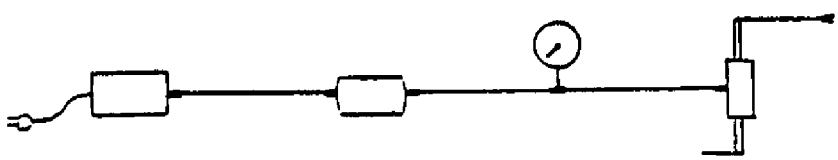
The user should experiment to find the optimum (quietest) location for the air pump. Additional airline is available from an acquarium supply store, (1/8" I.D.).

USE OF A PRESSURE GAUGE

A pressure gauge is not necessary for use with this product. If the user wishes to use one, several options are available.

Most heating and air conditioning suppliers offer a pressure gauge which has a scale range from 0-5, 0-15, or 0-30 psi. Any of these are acceptalbe. These are usually used for checking gas pressures in propane or natural gas heaters and stoves. Ask them for the necessary fittings to adapt the gauge to 1/8" I.D. airline.

Another possibility is an automotive manifold vacuum/pressure gauge, available from most hardware stores. These gauges will have scales which range from 0-30" Hg. (vacuum) and 0-10 psi (pressure) on one scale. The airline used in the tonearm will directly interface with these gauges.



A pressure gauge can indicate the long-term performance of the pump. It can also tell you if the filter is clogging when the pressure drops, and if the capillaries within the tonearm manifold are clogging (see maintenance section) if the pressure increases. Both problems are easy to solve. Proper pressures should be between 2.5 and 3.5 psi when used with any of the recommended air pumps.

MAINTENANCE SECTION

Your dealer is skilled in maintaining this product and it is best to consult them concerning problems. We hope you will use your dealer for service. The factory is available for technical advice and help concerning problems. We will always be glad to offer our assistance.

CLEANING THE AIR BEARING

We recommend cleaning the bearing every three months using the following procedure: Dip a cotton ball in rubbing alcohol. With the air pump on, wipe down the air bearing spindle all along its length, top and bottom. This will greatly extend the life of the bearing before more intense cleaning procedures must be used.

If the bearing sticks while traveling across the record and causes skipping, it is most likely due to one of the following:

1. Not enough air supplied to the bearing. This can be the air pump (see air pump maintance) or the filter.

CHECKING THE FILTER

The filter can be checked by removing it from the line and hooking the air pump directly to the air bearing. If the bearing then works, the filter is clogged and needs to be replaced. Contact your dealer or Eminent Technology for a replacement. Do not operate the bearing for long periods of time (hours) without the filter.

2. If the air supply to the bearing is good (over 2 psi at the manifold), then the other possible causes of failure are dirt buildup on the spindle, manifold, or clogged capillaries within the manifold.

CLEANING DIRT FROM THE SPINDLE

For this operation the air pump should be on. Take a toothbrush, dip it in rubbing alcohol, and vigorously brush the spindle on both ends. Then wipe off the alcohol with a soft cloth. If this restores operation, then nothing else

needs to be done. If this does not work, you must clean the inside walls of the manifold. Sometimes the dirt buiIup on the spindle can be removed by scrapping the surface with a knife or scrapping tool. If residue comes off when this is done, the spindle is not clean. Clean it again with a toothbrush.

NOTE: In normal use the following two procedures should never need to be done. Proper cleaning and use should make the bearing last a lifetime.

CLEANING THE MANIFOLD

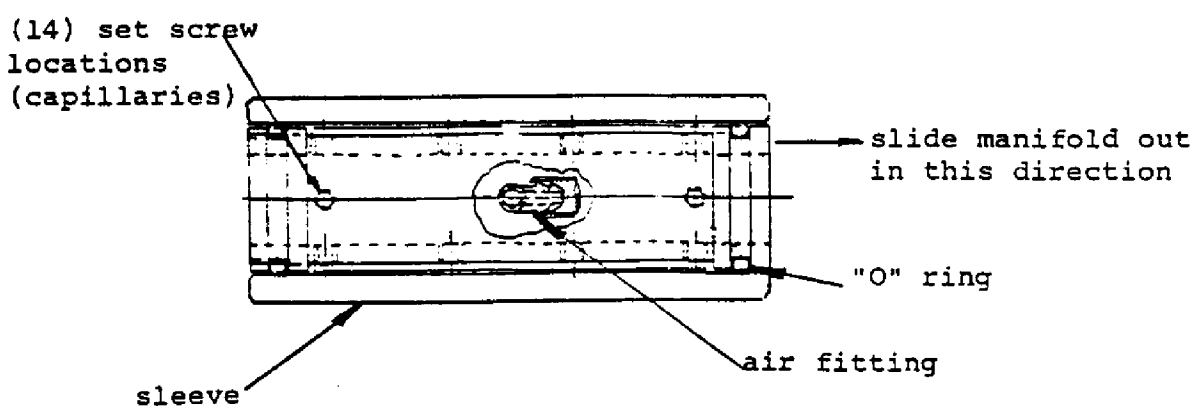
First you must remove the spindle from the manifold. The best method is to remove the tonearm tube joint and interface assemble from the spindle. This is done by loosening its clamping screw and sliding it off of the spindle. The fit between these parts is very tight, but rotation of the spindle, while pulling on the interface, makes removal easy. These parts are rugged. It is difficult to damage them when the interface is removed from the spindle. The spindle can be pushed completely through the manifold (in the direction towards the inner groove of a record). With the inside of the manifold exposed, take a toothbrush dipped in alcohol and vigorously brush the inside walls of the manifold. You cannot damage the surfaces of the air bearings by too much cleaning. Then push a soft cloth into the manifold and gently dry it. This almost always restores normal operation.

3. If the tonearm still does not work, and the pump is delivering over 3.0 psi, then the capillaries are clogged within the manifold.

CLEANING THE CAPILLARIES

Remove the spindle as described above. With the spindle removed from the manifold, the manifold is removed by pushing very hard with your thumb against the manifold while holding the manifold housing. It is held in by two o-rings which need to be lubricated with grease before re-installation. Mark its position, both front to back, and up and down, with a magic marker. This insures that during re-assembly the manifold is returned to its original position.

When the manifold is out of the sleeve, (14) 6-32 x 1/8 set screws will be exposed. The threaded portion of the manifold is designed to allow air to spiral around the outside of the set screws and maintain the precise length and size of air passage required for an efficient air bearing. Remove the set screws. These holes and the set screws should be cleaned with a pipe cleaner and alcohol. Re-assemble the air bearing assembly (the manifold should be oriented as it was when removed) and normal operation should be restored.



AIR PUMP MAINTENANCE

Inside the enclosure of the pump there are two diaphragms. These diaphragms can tear or puncture. This could be a cause of low air pressure at the tonearm (2 psi). There are also four valves (two in each diaphragm). If torn or defective, this can cause reduced flow or pressure. If you can identify either of these faults, we will supply replacement parts for your pump. It can also be replaced by your dealer or returned to the factory for replacement.

NO OUTPUT

If the pump fails completely, it is probably a bad line cord or open coil in the transformer. Return the complete assembly to the factory for replacement.

MOTOR GUARD MODEL D-13 FILTERS
USED WITH THE EMINENT TECHNOLOGY MODEL II

GENERAL INFORMATION

These disposable filters have been designed to remove oil aerosols, smoke, and condensed moisture from compressed air lines. The Model D-13, with 1/4"NPT(F) ports, is designed for general industrial and laboratory applications.

The filters should be installed as close as possible to the air pump.

INSTALLATION

Push the airlines over the black fittings at the ends of the filter. Needle nose pliers can be used to spread the air line if it will not slip over the fittings. It is not directional.

OPERATION AND MAINTENANCE

The operating pressure of the tonearm is 3 psi, and the maximum recommended operating pressure of the filter is 100 psi. The plastic housing is adversely affected by aromatic hydrocarbons, including solvents, ketones, etc. DO NOT ATTEMPT TO CLEAN THE FILTER, INSIDE OR OUT, OTHER THAN A QUICK WIPE OFF WITH SOLVENT. When used with the air bearing, this filter should last approximately one to two years with average use.

TECHNICAL SECTION

ANTISKATING AND FREQUENCY MODULATION DISTORTION OF DIFFERENT TONEARM GEOMETRIC

Pivoted tonearms are designed so that the headshell holds the cartridge at an "offset angle" with respect to an imaginary line drawn through the tonearm pivot to the stylus tip. The arc traced by the stylus tip extends past the record center and is defined as "overhang".

This design approach minimizes tracking error. There have been many articles written about the geometry of this design approach.

Pivoted arms create several side effects which reduce phono cartridge performance. The first is a skating force which results from two different parts of pivoted arm design.

There is a force component (vector) that is directed toward the center of a record. It results from the stylus drag force vector not falling in line with the pivot point of the arm. (See Figure) This force pulls the tonearm inward and the stylus can be observed as bending outward. This force and the resulting bending can be demonstrated by connecting a rubberband to a pivoted arm around the cartridge body and pulling it straight ahead (away) from the tonearm. Note: the motion of the tonearm is inward and results in bending of the rubberband (cantiveler).

If you corrected these forces with an anti-skating mechanism such that the stylus did not bend (you can not really do this because the frictional force and resultant

bending varies with groove modulation, stylus shape, tracking force, etc.) there still exists another component of skating.

This second skating force results because of overhang. There are frictional force vectors that result which are not directly ahead of the stylus. The surface of the record is not really moving straight ahead with respect to the stylus tip. As a result, there are force components directed ahead and toward the center of the record. The magnitude of the inward force depends upon the degree of overhang.

This means that any given cartridge works against lower horizontal forces in the Model Two tonearm (.1 gram or less) compared to a conventional arm (.2 grams/gram VTF). These figures apply if you use records that are not severely out of round. If you like to play severely eccentric records, ones with runout of greater than 1/8", then we suggest you use a low mass pivoted arm.

For vertical forces while tracking warps, the cartridge suspension system must work against the tonearms moment of inertia about its vertical axis of rotation. For the Model Two, these forces will be similar to those of a conventional tonearm which has low to medium effective mass (10 grams).