APPENDIX I

Effective Arm Length (mm)	Optimum overhang (mm)
212—216	19½
217—222	19
223—227	18½
228—233	18
234—239	17½
240—246	17
247—253	16½
254—261	16

Effective arm length is the distance from arm pivot to stylus tip. Overhang is the distance the stylus goes beyond the center of the turntable spindle, measured on a radius from the arm pivot.

The distance the tone arm pivot should be mounted from the center of the platter is the difference between the above numbers. For example, an effective arm length of 229 mm (9") requires the mounting hole for the arm pivot to be about 211 mm from the center of the turntable spindle.

APPENDIX II

How to use the Vernier Scale

In addition to the curved scale on the white piece, graduated in units of one degree per division, there is a vernier scale on the clear piece marked in degree increments of 0.25°. Noting which line on the vernier is closest to a line on the curved scale, add the vernier and curved scale readings. Use the plus side of the vernier for readings from 0 to + 15 and the minus side for those 0 to − 15.

This reads 7 + .25 = 7.25°

TECHNICAL NOTES - This alignment gives minimum tracking distortion for inside and outside recorded radii of 2.375" and 5.75". When the cartridge is tangent at 2.6" and 4.76" (called null points), the above alignment is correctly achieved. Offset angle, effective length and overhang are automatically correct since there is only one solution to the equation.

If the recorded grooves go further in than 2.375" then with this alignment the distortion due to tracking error will rise sharply. Good quality recordings do not go in this far; however the alignment for radii of 2.25" and 5.75" can be calculated and has 2.47" and 4.68" for null points.

For 45 RPM singles the inner and outer radii may be taken as 2.14" and 3.255" which yield null points of 2.253" and 3.02".

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DBP-10 PHONO ALIGNMENT PROTRACTOR INSTRUCTIONS

The objective of the alignment procedure is to achieve lateral tracking error of zero degrees at two points which are 2.60" (6.6 cm) and 4.76" (12.1 cm) from the center of the record. When the cartridge is parallel to the grooves at these points then the distortion is optimally low across the recorded area of a modern LP record.

If your tone arm is mounted on the turntable, proceed to the the next paragraph. If not, you may use the manufacturer's directions, bearing in mind that minor adjustments may be needed if they are not exactly right. Refer to *Appendix I* for recommended arm mounting dimensions.

Check that the arm is free to move across the platter. In some automatic changers you may need to pull the power cord while playing a (disposable) record to free the arm. The anti-skating mechanism on the arm should be disabled if possible to keep the arm from pulling to the outside while measuring.

Using masking tape or other means, immobilize the platter so it doesn't rotate while you are making measurements. The protractor is safe to use as long as the stylus can move freely along its surface, but if the stylus should slip off the edge—disaster!

Alignment procedure:

1. Place the white plate on the turntable spindle with the –15 to + 15 scale up.
2. Place the clear plate on the spindle over the white plate.
3. Move the white plate and the arm until the stylus rests on top of point A.
4. Move the clear plate until the cross lines are parallel to the sides of the cartridge.
5. Measure the angle at point A by finding the mark on the –15 to + 15 scale closest to the zero line on the clear plate. This scale is one degree per small division. For the initial measurements disregard the additional lines (the vernier) on the clear plate. Directions for using the vernier are given in *Appendix II*.
6. Repeat steps 3—5 at point B.
7. If the angle noted at point B falls to the right (toward + 15) of the angle at point A, move the cartridge forward or arm back about 1/16" (1.6mm) per degree of difference between the angles at A and B.

8. If the angle noted at point B falls to the left (towards –15) of the angle at point A, move the cartridge back or the arm forward about 1/16" (1.6mm) per degree of difference between the angles at A and B.
9. Repeat steps 3—8. When the angles at A and B are within a few degrees of each other, twist the cartridge to bring the angle close to zero. The direction of twist is clockwise (as viewed from the top) if the midpoint between A and B is to the + side of zero and counterclockwise if the midpoint between A and B is to the – side of zero.

Again go through 3—8 and continue adjustments to bring the error to the zero at A and B.

For the final adjustments you will probably find the grid on the back of the white plate a great convenience. Put the clear plate aside and alternately check the orientation of the cartridge relative to the grid at A and B.

Suppose the readings were as follows:
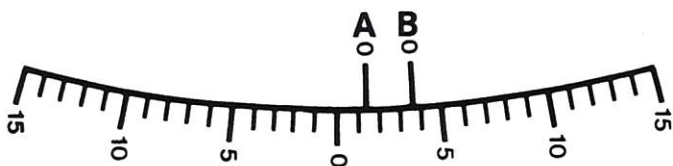
The cartridge needs to be moved forward about 1/8" (3 mm) and in addition needs to be twisted clockwise as viewed from the top.
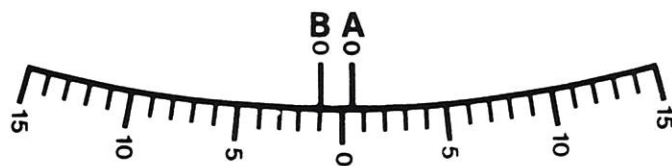
The cartridge needs to be moved back about 1/16" (1.6mm) and then may be in correct alignment. Otherwise a slight counterclockwise twist may bring it in.

note: If you are unable to move the cartridge or arm sufficiently to achieve alignment, then it is necessary to modify the arm. If there are slots in the headshell to allow the cartridge to be moved forward and back, you may be at the limit of travel and will need to file the slots longer. If the cartridge needs to be twisted in the horizontal plane, the screw slots may need to be widened to allow more "play" for adjustment. It may even be necessary to remove the arm and bore out its mounting hole to allow the arm to be re-positioned. *(Sorry, it's not **our** fault.)*