

1A. "BIAS" ADJUSTMENT PROCEDURE

For best results operate and adjust the D70 at 120VAC line voltage, or at the line voltage that is typical in the final installation. Adjustments should be made under zero-signal conditions after at least 15-20 minutes of uninterrupted stabilization time. There may be a very slight interaction between the 4 output tube bias adjustments, so recheck the first tube current after adjusting the other three, etc., until you are certain that all are correct and stabilized.

A digital voltmeter capable of accurate measurement of .05 to .1 Volt DC is required to accomplish this adjustment. Use the plastic alignment tool provided to make the adjustments.

There is a 1 ohm 5% wirewound resistor in the cathode circuit of each output tube, and test connections (test points referred to schematically and on the circuit board as TPs) are provided at either end of these resistors so that a voltage measurement can be conveniently made across each resistor. These test points are identified and accessible from the top side of the circuit board.

Because the resistor is 1 ohm, you can conveniently "direct" read the total cathode current in each tube. A .065 Volt reading indicates 65mA.

	<u>TUBE</u>	<u>TEST POINTS</u>	<u>ADJUSTMENT</u>
Channel 1	V8 V10	TP1, TP3 TP5, TP7	RV"7" ("RV" is not indicated RV"9" on the circuit board.)
Channel 2	V9 V11	TP2, TP4 TP6, TP8	RV"8" RV"10"

It is important that all 4 output tubes be reasonably matched (within 5%) for highest performance operation. (Matched sets are available from Audio Research.) It is also important, both for long life free from arcing effects as well as sonically, that these tubes be of a low "gas" nature. Tubes provided by Audio Research will meet these parameters.

2. DC BALANCE

The D70 uses an improved version of our patented cross-coupled input/driver circuit that automatically tracks normal minor tube drift. Therefore, the accuracy of DC balance required for best performance is not super-critical. However, it is necessary to check and reset DC balance if input tubes V2 or V3 are changed.

A battery-operated digital voltmeter having a 10 megohm or higher input impedance and 3½ digit resolution or better is needed for this adjustment.

Set each adjustment for +90V DC within 0.1V of equal voltages for the two test points of each channel. Allow at least 20-30 minutes warmup stabilization for best results, plus 10-20 hours "burn-in" for the new tubes.

The sonic or measured degradation is minimal with up to 2 volts of DC unbalance, but it is best to set the balance within 0.1V to allow for tube aging.

	<u>TUBE</u>	<u>TEST POINT</u>	<u>ADJUSTMENT</u>	<u>SET TO</u>
Channel 1	V2	TP9 TP11	RV1 RV3	+90V DC) +90V DC) 0.1V Matched
Channel 2	V3	TP10 TP12	RV2 RV4	+90V DC) +90V DC) 0.1V Matched

If proper voltages cannot be achieved, replace the tube indicated above.

3. AC BALANCE

Normally the AC balance does not require readjustment. If any tubes are changed, you may want to recheck its setting. However, this adjustment should not be attempted unless low distortion measuring equipment is available.

First, make sure the output tubes are properly biased and that the DC balance is correct.

Using the plastic alignment tool provided, set RV5 and RV6 for minimum second harmonic distortion at 4 watts (8 volts) of 1kHz output into a 16 ohm load, typically less than .02%. As an approximation, the adjustments can be made for minimum 1kHz total harmonic distortion and noise, typically less than .02%.

A properly adjusted unit will achieve AC balance at about midrotation $\pm 30^\circ$ of RV5 and RV6. If lowest distortion requires adjusting beyond this range, it may indicate a weak or unbalanced tube at V6 or V7, or possibly other tubes.