The output tubes, for example, are operated with a special electronically regulated and direct coupled "bias" circuit, as well as electronically regulated "screen" voltage. With these voltages regulated, the variation in output tube idle current for varying line voltage becomes normally of little consequence.

The output tubes are set at the factory for an "idle" cathode current of 65mA. (.065 amperes) each at a power line voltage of 120. Reducing the line voltage to 105 causes this current to drop to 62/63mA. Increasing the line voltage to 130 causes this current to increase to 67/68mA. This amount of change is not critical sonically nor will it materially affect tube life, although it may result in reduced brilliance of bias indicators.

A. Bias Adjustment Procedure. The M100 has a unique front panel indicating system that provides visual observation of correct bias adjustment.

With no audio signal present, proper bias setting may be observed or achieved by the following procedure (the M100 should be "warmed up" for at least 15 minutes prior to other than a preliminary adjustment):

Activate the "bias adjust" switch, making certain that no audio signal is present.

Note that each of the four power output tubes (V7, V8, V9, V10) has its own front panel bias adjustment as well as indicator.

Turning the adjustment counter-clocwise reduces the current (and dissipation) in each tube.

Turning the adjustment clockwise increases the current (and dissipation).

The indicator circuitry is designed to cause the lamps to light over a narrow range from approximately 63mA. to approximately 67mA., with maximum brilliance at approximately 65mA. Note that the lamps extinguish with either low or high bias settings.

Proper adjustment procedure is to initially rotate each adjustment counter-clockwise slowly. (This is in the direction of lowered dissipation.) If the indicator doesn't light, then slowly rotate clockwise, until indication occurs. When all four tubes are properly biased, all four indicators will be simultaneously at maximum brilliance. Some interaction is normal during adjustment.

Should an indicator not light throughout the adjustment range, a faulty tube or other circuit malfunction is indicated and appropriate service help should be obtained.

Be certain to return the "bias-adjust" switch to "operate" prior to use.

B. DC Balance. The direct and cross-coupled circuitry of the M100 maintains its DC balance by use of an automatic servo-circuit. This circuitry is normally effective throughout tube life as well as through changes of tubes.

There is an initial factory adjustment, RV3, which should not normally require adjustment throughout the life of the product.

In the unlikely event of accidental misadjustment of RV3, or in the event of a component change, RV3 can be readjusted using a Digital Voltmeter (with input impedance of 10 megohms or more) as follows (turn down the M100 input level control and allow a 15 minute warmup period):

a) Determine that the DC voltage at Test Point 1 is between +70 and +80 volts (reference to circuit common). (If not, replace V2, or other circuit component as necessary.)

b) With DVM connected between TP1 and TP2, adjust RV3 for minimum DC voltage. (Optimum value less than 1mV.)

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

First, make sure the output tubes are properly biased. (You should also verify DC balance prior to AC balance adjustment.)

Using the plastic alignment tool provided, set RV2 for minimum second harmonic distortion at 10 watts of 1kHz output into a 16 ohm load, typically less than .005%. As an approximation, the adjustments can be made for minimum 1kHz total harmonic distortion and noise, typically less than .02%.

If a "null" cannot be obtained, it may indicate a weak or unbalanced tube at V1 or V4, or possibly other tubes.