increase the high frequencies at the expense of greater distortion.

Cassette bias at 1-7/8 ips is very critical because of the shorter wavelengths, making it difficult to obtain repeatable results from 1 kHz peak bias adjustments. A superior method is to peak the bias while recording 6.3 kHz, which gives a lower value of bias than the 1 kHz peak. Then increase the bias current until the 6.3 kHz playback signal drops exactly 2.5 dB. This method gives a value of bias current which is very close to peak 1 kHz, and it can be repeated very consistently.

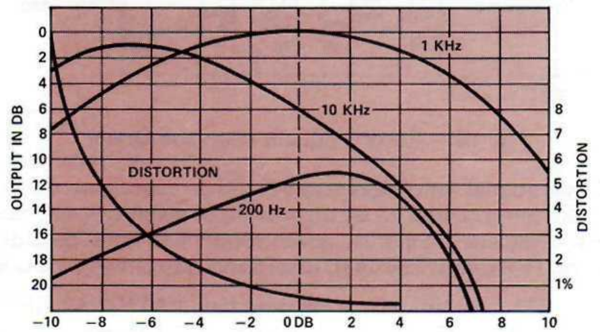

Fig. 19 – Typical 3.75 ips output curves and distortion vs. bias current. (0 dB is 1 kHz peak.)

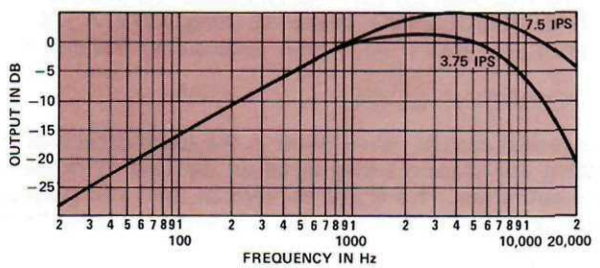

Fig. 20 – Typical constant-current unequalized Record/Play response curves run at peak 1 kHz bias.

The above method of overbiasing at a high frequency for adjusting bias is described for various tape speeds in DIN Standard No. 45512 dated March, 1974, available from USASI, 10 E. 40th St., New York, N.Y. 10016.

Erase/Bias Oscillator. The oscillator to supply erase power and record bias should operate at five or more times the highest audio frequency. Use the NORTRONICS T70-T2 for 50-120 kHz, T70-T5 for 100-250 kHz, and T70-T6 for 250-1000 kHz. The push-pull circuit can deliver more power at minimum distortion. A single-ended (one transistor) oscillator may be adequate for light loads but has more second harmonic distortion in its waveform. A typical circuit is shown on page 89.

D.C. Bias Operation. It is possible to erase and apply bias with D.C. This will reduce cost by eliminating the bias oscillator. Results are inferior to those from A.C. bias and erase, but are often satisfactory for non-critical voice applications such as telephone answering recorders, dictation machines, etc. Background noise and distortion are increased for D.C. bias.

Either Z-Combo or conventional erase and R/P heads can be used with D.C. The erase head is supplied with a D.C. current equal to twice the specified nominal rms A.C. current. This is enough to leave the medium in a saturated condition. Then, D.C. bias is fed to the record coil in a polarity such as to tend to neutralize the residual flux in the medium. This bias is adjusted for peak or optimum 1 kHz recording, or else can be set for minimum hiss or background noise while listening with a monitor play head.

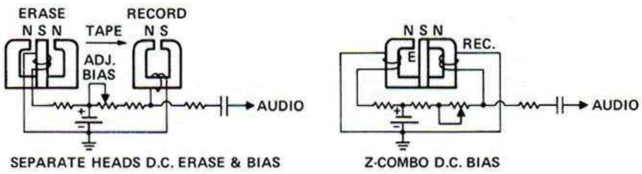

Fig. 21

B. TYPICAL PLAYBACK CIRCUITRY

The playback preamplifier should have low noise components, particularly the input transistor and its collector and emitter resistors. Equalization serves to boost the low frequency response to compensate for the falloff in playback head output as frequency is decreased. Normally the playback equalization is adjusted to give a flat play response from a prerecorded test tape. The circuit below (Fig. 22) is typical for use at 7.5 ips. Other speeds will require changes in the equalization resistance and capacitance to maintain the correct frequency response.

R2 and C2 trap TV and radio interference. C3 and R5 couple high frequency negative feedback from collector of Q2 to emitter of Q1. The impedances of C3 and R5 determine the "break point" or "transition frequency" on the response curve. For example, NAB 7.5 ips specification calls for a time constant of 50 usec. (R x C) or a transition frequency

of 3180 Hz $\left(\frac{1}{2\pi RC}\right)$

Therefore, if C is .015 mfd, the value for R may be calculated as:

$$R = \frac{1}{2\pi FC} = \frac{1}{6.3 \times 3180 \times .015 \times 10^6} = 3300 \text{ ohms}$$

$$\text{Alternately, } R = \frac{T_C}{C} = \frac{50 \times 10^6}{.015 \times 10^6} = 3300 \text{ ohms}$$

For a tape speed of 3.75 ips we have 1800 Hz and 90 usec T_C.

$$R = \frac{90}{.015} = 6000 \text{ ohms, well within the range of R5 adjustment.}$$

The curves of Fig. 23 show the 1800 Hz and 3180 Hz transitions for 3.75 and 7.5 ips. The points are located at the intersections of the straight-line extensions of the sloped and horizontal sections on the curves.

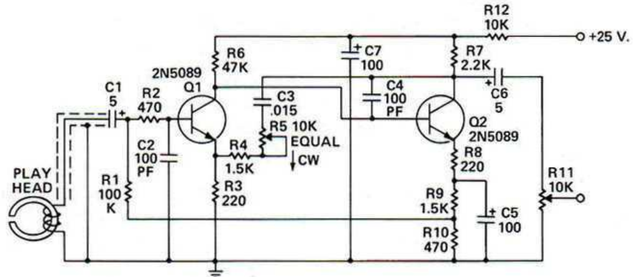

Fig. 22 – Playback Preamplifier