

two twin triodes form the "cross-coupled phase inverter"—see Chapter 12 Sect. 6(viii)—which is here used to amplify the difference between the input voltages to the 6SN7 grids. The frequency response curves are shown in Fig. 15.43B for different values of  $R_1$ . The maximum output and the point of zero phase shift occur at  $f/f_0 = 1$ , where  $f_0 = 1/2\pi RC$ . The frequency of the peak in the curve may be determined by choice of  $R$  and  $C$ ; in the circuit shown, this frequency is adjustable from 360 to 4000 c/s by means of a dual 1 M $\Omega$  potentiometer. A choice of  $f_0 = 600$  to 800 c/s is pleasing in many cases.

### (ix) Ganged continuously-variable tone controls

Two or more controls may be ganged and operated by a single knob. One control may be the tone control and the other a control of gain so that the apparent output level is held approximately constant at all settings.

### (x) Dual control continuously-variable tone controls

#### (A) Simple duo-control circuit, Fig. 15.44A (Ref. 22)

This filter incorporates resistors and condensers only, and  $R_3$  controls the bass and  $R_4$  the treble. A filter having a similar function is also described in Ref. 31.

A slight modification of this circuit is Fig. 15.44B which gives either bass or treble boosting (Ref. 41).

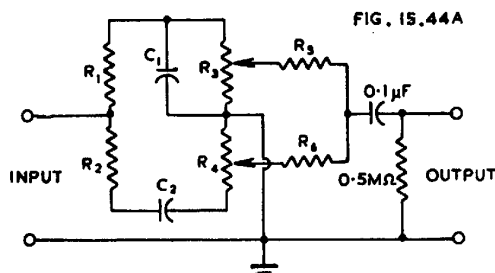


FIG. 15.44A

Fig. 15.44A. Simple duo-control circuit giving individual control of bass and treble. Typical values are:  $R_1 = 0.25$  M $\Omega$ ;  $R_2 = R_3 = 0.5$  M $\Omega$ ;  $R_4 = 0.25$  M $\Omega$ ;  $R_5 = R_6 = 0.5$  M $\Omega$ ;  $C_1 = 0.01$   $\mu$ F;  $C_2 = 0.001$   $\mu$ F (Ref. 22).

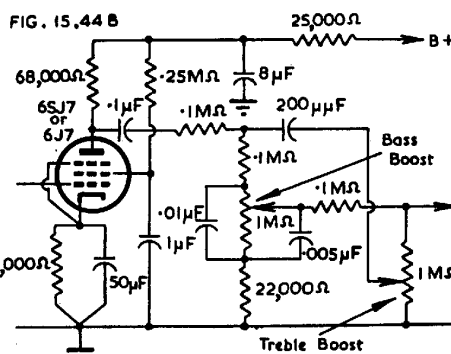


FIG. 15.44B

Fig. 15.44B. Simple tone control giving bass and treble boosting (Ref. 41).

#### (B) Duo-control circuit incorporating $L$ and $C$ (Fig. 15.45, Ref. 26)

In this filter,  $R_1$  controls the bass and  $R_3$  the treble. Hum may be troublesome on account of  $L$ .

#### (C) Cutler duo-control circuit (Fig. 15.46, Ref. 26)

This filter may only be used to feed into the grid of an amplifier valve;  $R_4$  controls the bass boost and  $R_3$  the treble boost. The maximum boost is 17 db at 40 c/s and 15 db at 10 000 c/s, relative to 1000 c/s, with the values shown.

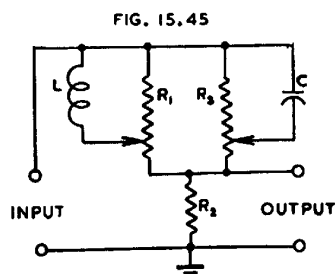


FIG. 15.45

Fig. 15.45. Duo-control circuit incorporating  $L$  and  $C$  (Ref. 26).

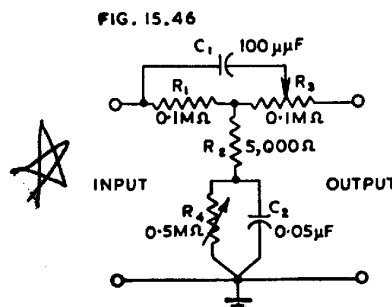


FIG. 15.46

Fig. 15.46. Cutler duo-control circuit (Ref. 26).