

Electronic VIBRATO

PRODUCING THE TRUE MUSICAL EFFECT
FOR ELECTRICAL INSTRUMENTS

BY J. HOLDEN

MANY of us who enjoy the fascinating pastime of electronic music have many times wished for a simple device that would produce a true vibrato and not, as is so often found in published circuits, amplitude modulated tremolo which is to say the least disappointing.

It is well known that the most successful vibrato to date is the Hammond Line Vibrato, which, of course, is used on the Hammond organs, and is accepted by most organists to be the most outstanding feature of these instruments. In fact, records made on the old organs which had amplitude modulated tremulants sound "thin" and artificial.

The Line Vibrato consists of a complicated electronic circuit comprising many chokes and a large number of capacitors, also a high-precision scanner which would be practically impossible to duplicate without special tools.

The following circuit effectively does the same job as the above, but only requires the ordinary parts that are found in most junk boxes. It consists of an inter-valve transformer with centre-tapped secondary, ratio approximately 1:3 primary to secondary—Fig. 1(a).

The centre tap of the secondary in conjunction with a 50kΩ resistor is the output to main amplifier, and should be followed with not less than a potentiometer of 1mΩ. One side of the secondary is connected to earth through a 500kΩ resistor.

The other side of the secondary is connected to earth through a variable capacitor of approx. 0.001μF; this is made up of two sections of a tuning gang of 500pF per section, the two sections being connected in parallel.

This variable capacitor is driven by a small electric motor at approximately 5.7 revs. per second; this causes the signal to be effective across firstly one half of secondary, and then as the gang attains its maximum capacitance the signal is effective across the section connected to this capacitor.

Now it will be seen from the above, without going into the matter too technically, that we have obtained a phase change which at its maximum is nearly 180°. A change in phase is heard by the listener as a change in frequency so long as the phase is constantly changing.

The idea of phase change vibrato is not new and various devices have been published, but all have used valve methods of changing the phase which always results in a "thumping" sound being added to the original signal; all the above devices are fitted with filters to remove this "thump", but in doing so the signal has to be very much attenuated at the lower end with the result that the final sound is poor.

The system we are discussing requires no filters

whatsoever and the frequency range is entirely dependent on the quality of the transformer. It must be stated at this point that the same effect of phase change can be obtained by replacing the fixed 500kΩ resistor with one of the new light sensitive variable resistances, such as ORP60 cadmium sulphide cell. In this case the variable capacitor is replaced by a fixed capacitor of 0.001μF—Fig. 1(b).

The change of resistance is brought about by cutting off and on the light from a small dial bulb placed in front of the sensitive portion of the ORP60. This can be done by a piece of suitably shaped card rotated by a small motor.

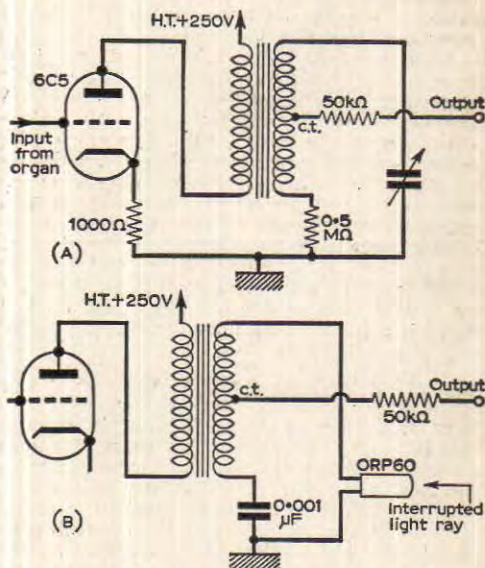


Fig. 1 (a) and (b): The two versions of the circuit required for producing a true vibrato effect.

Both methods have been tried out for long periods with complete success and no fault has been found whatsoever, both on the writer's own home-made organ and a commercial model, viz., Polychord.

The variable capacitor used is the type fitted to most all-dry portables, but must be of construction that will allow the vanes to complete the full circle; the small piece of paxolin which is fitted to the ends of the vanes has to be carefully removed. Do try not to distort either the moving or fixed vanes.