Ideas for experimenters

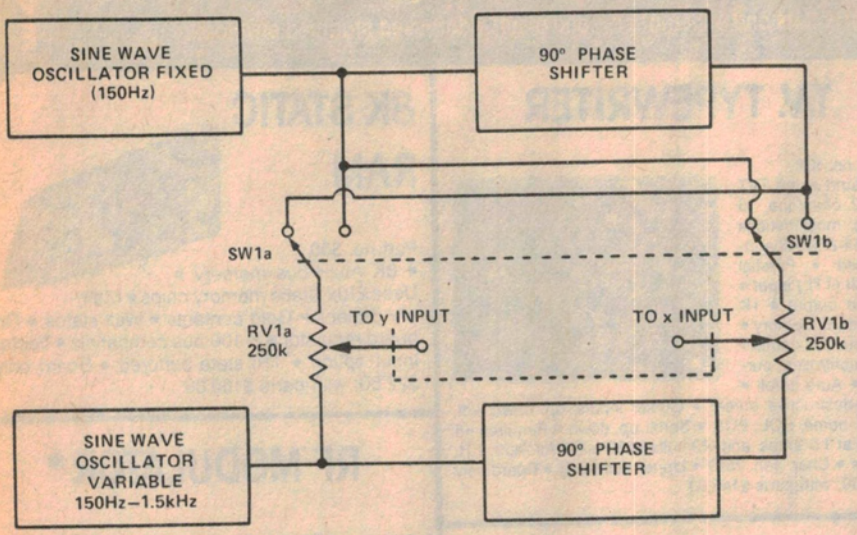


Fig. 1. Block diagram of the 'Spirograph'.

Electronic 'Spirograph'

The circuit will generate 'Spirograph' patterns on a conventional oscilloscope. The circuit consists of two sinewave generators followed by allpass filters which we use to phase shift the input signals by 90°. Applying a sinewave to the y input gives a circular trace. If a second set of sin and cos signals are mixed in, a 'Spirograph' pattern is obtained. A block diagram of the system is shown in Fig. 1.

RV1 is a balance control which varies the contribution of each oscillator to the pattern without affecting the size, so that once set up there is no need to re-adjust the gain controls on the oscilliscope. This type of control can only be used if the oscillators have a low impedance output.

SW1 is a reversing switch which has the effect of turning the pattern inside out.

An existing sinewave oscillator can of course be used and the 50 Hz mains could be employed (attenuated to about 2 V RMS from a low voltage transformer secondary) as the fixed oscillator. However flickering is a problem with lower frequencies (complex patterns requiring four or more cycles to complete will flicker at about 10 Hz using the mains frequency as an oscillator. I found 150 Hz to be a good compromise (higher frequencies require more critical tuning).

The allpass filter is recommended for phase splitting as it has a unity gain for all frequencies and settings of RV5.

First connect the y input of the scope to the output of an oscillator and adjust RV2 until a two volt RMS sine-wave is obtained, repeat for second

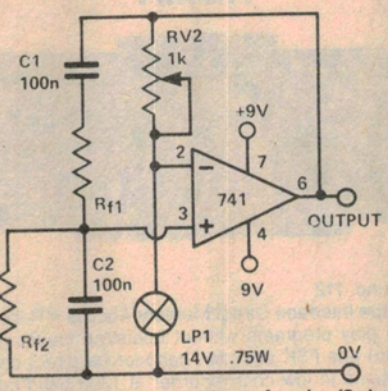


Fig. 2(a). Suitable oscillator for the 'Spirograph'.

oscillator. Then connect up the x and y inputs as shown in Fig. 1, turn the balance control to one end so as to look at the output of the fixed oscillator then adjust the 100 k pot until a circle

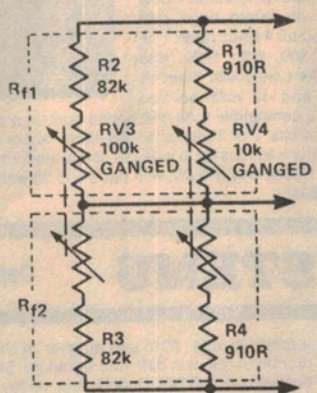


Fig. 2(b). Arrangement to give fine control of the frequency of the oscillator shown in Fig. 2(a). For 150 Hz fixed frequency use Rf1 = Rf2 = 10 k.

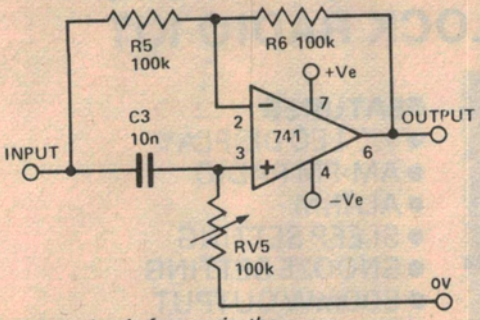


Fig. 3. Phase shifter circuit for use in the 'Spirograph' circuit.

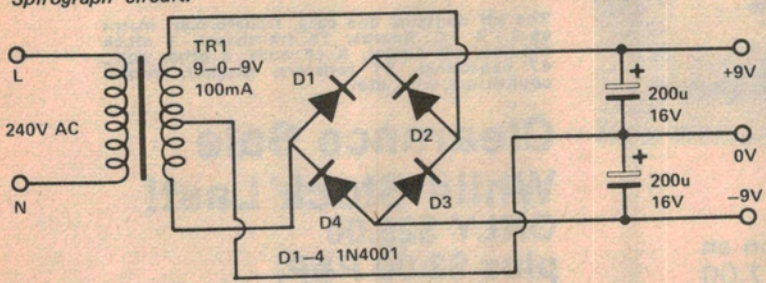
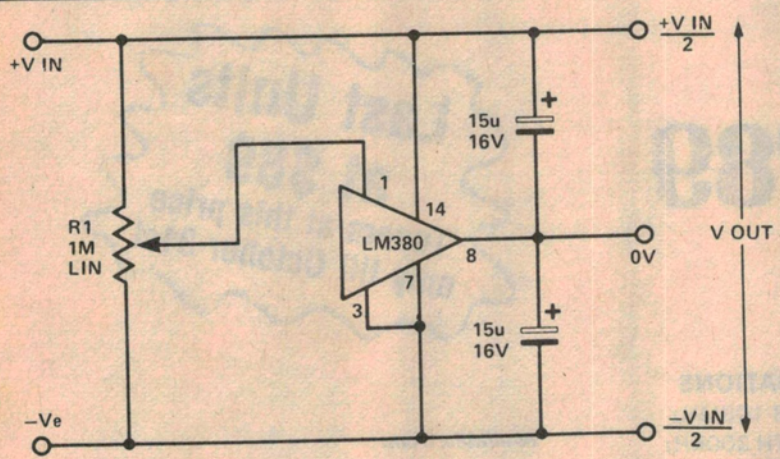


Fig. 4. PSU for 'Spirograph'.

is obtained (with suitable x and y gains). Now put the balance control in the middle and adjust the frequency controls until a stable pattern is produced. SW1 and RV1 the balance control can be used to alter the nature of the pattern without affecting its overall size, stability or symmetry. Adjust RV5, the phase control (following the variable oscillator) for symmetry. – Have fun!



Simple Dual Power Supply

This circuit offers a cheap and simple way of obtaining a split power supply (for Op-amps etc.), utilising the quasi-complementary output stage of the popular LM380 audio power IC.

The device is internally biased so that with no input the output is held mid-way between the supply rails.

R1, which should be initially set to mid-travel, is used to nullify any inbalance in the output. Regulation of V_{OUT} depends upon the circuit feeding the LM380, but the positive and negative outputs will track accurately irrespective of input regulation and unbalanced loads.

The free-air dissipation is a little over 1 watt, and so extra cooling may be required. The device is fully protected and will go into thermal shutdown if its rated dissipation is exceeded, current limiting occurs if the output current exceeds 1A3.

The input voltage should not exceed 20 V.