

# marine diesel

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Apart from ship sirens and fog horns, builders of ship models are also interested in imitating marine engine noises. With only a few components the 'marine diesel' circuit lends realism to a model.

The noise produced by a diesel-driven ship is made by the thump of the engine and the regular puffing of gases escaping through the exhaust. The noise of these escaping gases is imitated by a small noise generator in the circuit. The thump effect is achieved by using an IC in a trapezium generator circuit, with the noise added on the leading and trailing edges. The figure shows the circuit. The base-emitter junction of  $T_1$  is reverse biased to breakdown and the resulting noise signal is fed to the non-inverting input of the operational amplifier. The feedback network, formed by  $R_4$ ,  $R_5$ ,  $R_6$  and  $C_3$  then determines the form of the trapezium voltage. As long as the IC has not reached saturation, the output produces a voltage ramp with superimposed noise. The noise is suppressed as soon as the IC reaches saturation. An oscilloscope connected to the output of the circuit should show one of the waveforms drawn in the diagram, depending on whether the DC-connected or the AC-connected oscilloscope input is used.

If after completion of the circuit it is found that the sound produced by the model is too slow, certain modifications may be made.  $C_1$  affects the noise;  $C_2$ ,  $R_5$  and  $R_7$  determine the repetition rate. The output of the circuit can be connected to the input of an amplifier. A resistor (value to be found by experiment, depending on amplifier sensitivity and input impedance) connected between the circuit and the amplifier prevents overdrive of the amplifier. ■

