pensation for the internal resistance of the motor: when the current drawn by the motor rises, the supply voltage is increased automatically to counter the fall in RPM.

The circuit is based on an enhanced voltage regulator consisting of IC1 and T1, which provides a reasonably large output current (even small drills draw 2–5 A). The 'onset' supply voltage, and thus the RPM, is set by P2. Because of emitter resistor R1, the currents through IC1 and T1 will be related to one another in the ratio determined by R1 and R2. Owing to this arrangement, the internal short-circuit protection of IC1 will also, indirectly, provide some protection to T1.

As soon as the current drawn exceeds a certain value, T2 will be switched on. This results in a base current for T3 so that R5 is in parallel (well, more or less) with R6. This arrangement automatically raises the output voltage to counter a threatened drop in RPM. The moment at which this action occurs is set by P1, so that the present circuit can be adapted pretty precisely to the motor used.

If only very small motors are likely to be used, the power supply (transformer and bridge rectifier) may be rated rather more conservatively. As a guide, the current in the transformer secondary should be about one and a half times the maximum DC output current.

(G J Lammertink)

062 RADIO & TV

CALL TONE GENERATOR

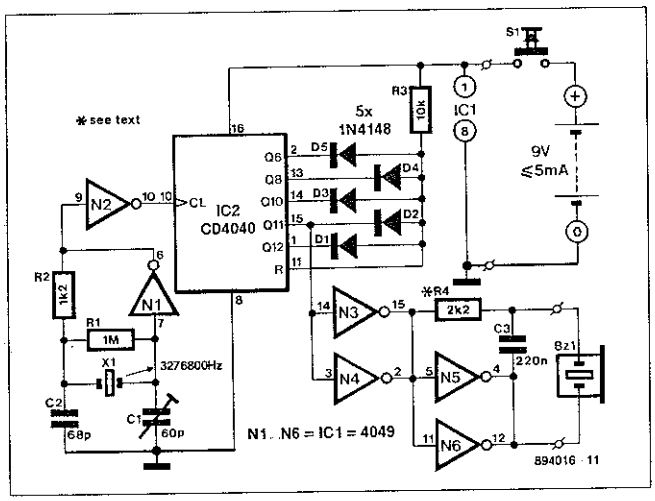
Amateur VHF relay stations are normally actuated by a 1750 Hz call tone. This may give problems when the relevant sending equipment has no internal call tone generator, or it has one whose frequency is not sufficiently accurate, or whose tone duration is not long enough to securely energize the relevant relay.

These problems can be overcome by the stand-alone generator described here. Simply placed in front of the microphone, it makes absolutely certain that the relay station is actuated.

The generator consists of a quartz oscillator, a frequency counter and a buffer-amplifier, all contained in just two CMOS ICs. It is powered by a 9 V PP3 battery, from which it draws a current of around 5 mA.

Gates N1 and N2 form an oscillator that is controlled by a 3.27680 MHz crystal and provides clock pulses to IC2 which is connected as a programmable scaler. Diodes D1–D5 determine the divide factor of 1872. Counter output Q1 thus provides the wanted 1750 Hz signal, which is buffered by N3–N6 before being applied to a piezo electric buzzer. Capacitor C3 suppresses any harmonics, while R4 determines the volume of the output signal.

(N Körber)



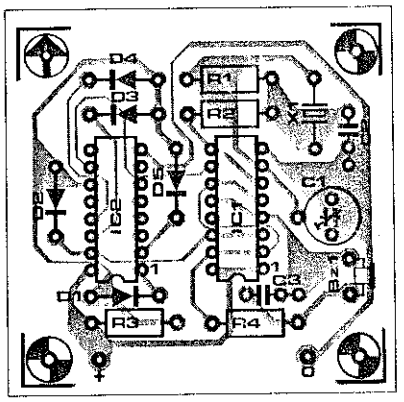
Parts list

Resistors:
R1 = 1 M
R2 = 1k2
R3 = 10 k
R4 = 2k2

Capacitors:
C1 = 60 pF trimmer
C2 = 68 p
C3 = 220 n

Semiconductors:
D1–D5 = 1N4148
IC1 = 4049
IC2 = 4040

Miscellaneous:
X1 = 3.2768 MHz, 30 p parallel
Bz1 = piezo electric buzzer



063 GENERAL INTEREST

MAINS FAILURE INDICATOR

When the mains voltage is present at the input terminals, the transistor in the optocoupler is on, T1 is off and silicon-controlled rectifier Th1 is in the conducting state. Since both terminals of the piezo electric buzzer are then at the same potential, the buzzer is inactive. If the mains voltage drops out, transistor T1 conducts and causes one of the terminals of the buzzer to be connected to earth; the thyristor remains in the conducting state. In this situation there is a large enough potential difference across both the buzzer and D5 to cause these elements indicating the mains failure both audibly and visibly.

When the mains is restored, the circuit returns to its original state. A touch on the reset button then interrupts the current through the SCR so that the thyristor goes into the blocking state, and the other terminal of the buzzer is connected to ground.