

EXPLANATION  
OF  
400/40 ~ TRANSISTOR  
TONE GENERATOR  
H-850061

DESCRIPTION

This circuit is a 5 watt Transistor Tone Generator designed to provide alternating current for use as ringback tone. The unit consists basically of 2 oscillators, a power supply filter, a modulator and output filter. Ringback tone is obtained by modulating 400 cycle with 40 cycle.

OPERATION

1. Power Supply

Exchange battery of 48V ("H" wiring) or 24V ("L" wiring) is used to power this circuit. Inductor L1 is used to remove any ac. components. The voltage divider R-10 and R-11 permits use on either 24V or 48V d.c.  $\pm 10\%$ . Electrolytic capacitors C-4 and C-5 across the voltage dividers maintain full voltage during the load changes of oscillation. Diodes D-4 and D-5 across the input protect transistors from polarity reversal, and provide feedback circuit to maintain potential across both halves of the oscillator at equal values.

2. Oscillator

The 400~ oscillator is controlled by the square hysteresis loop characteristic of transformer T1: When power is connected to this circuit, starting resistor R9 insures that transistor Q1 conducts first. Transistor Q1 conducts until the field in T1 builds up enough to bias the base at the cut off potential. At this point, Q2 conducts until the field in T1 drops to the point where Q1 will again conduct. This flip-flop produces a square wave, the frequency of which is controlled by the characteristics of T1, and TRL. This arrangement minimizes transistor heating.



The 40~ oscillator operates in the same manner and is kept in synchronism with the 400~ oscillator by windings of T1 and T4 with biasing resistor R3 and R4 in series.

3. Amplifier

Transistor Q6 is used as an amplifier to amplify the signal from the 40 cycle oscillator to the modulator.

4. Modulator

Transistor Q3 and diodes D1, D2, D3, and D6 modulate the 400 cycles with 40 cycles. Transistor Q3 is biased by T4 from the 40 cycle oscillator, thus giving the pattern shown.

E-850061	SHEET 1	TOTAL 2
	AUTOMATIC ELECTRIC COMPANY NORTHLAKE, ILL., U.S.A.	
SIZE	A	
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5. Output

The square wave is integrated into a sine wave by the output filters; transformer T3, and capacitor C1 which are resonant at the third harmonic (1200 cycles); and transformer T2, and capacitor C2 which are resonant at 400 cycles. The taps on output transformer T2 may be selected for all commonly used voltage levels.

6. General

The maintenance of this circuit will be chiefly due to transistors and diodes that burn out or short. If one of the oscillators has a frequency ten to twenty times what it should be, most likely one of the transistors has shorted out. If the output is not modulated check the 40 cycle oscillator, then transistors Q6 and Q3 and the diodes. This circuit is designed to permit stable operation at elevated temperature.

$$\begin{array}{r} 2 \\ 4 \overline{) 8} \\ \underline{8} \\ 0 \end{array}$$

$$\begin{array}{r} 333 \\ 003 \overline{) 1000} \\ \underline{999} \\ 1 \end{array}$$

$$\begin{array}{r} .025 \\ 40 \overline{) 1000} \\ \underline{800} \\ 200 \end{array}$$

- (1) HS:jt
- (2) PLG:jp