Speech timer

At public meetings, conferences, debates and in speech classes and the like, each speaker is limited to a predetermined amount of time. This timer (Fig. 2), described in *Break-In*, a New Zealand amateur radio magazine, can be set for time periods of either 3 or 5 minutes. A green indicator lamp comes on at the beginning of the timed period, an amber light warns the speaker that he has only one-half minute left and a red light indicates the end of the period. A HOLD position on switch S2 interrupts the timing cycle to allow for such interruptions as when points of order are decided. Switching S2 to OPERATE allows the timing cycle to continue so the speaker does not lose time due to the interruption.

The device uses two timers; one for either 2½ or 4½ minutes and the other for ½ minute. The 30-second timer turns on when the first timer has completed its preselected interval to give a total countdown of either 3 or 5 minutes.

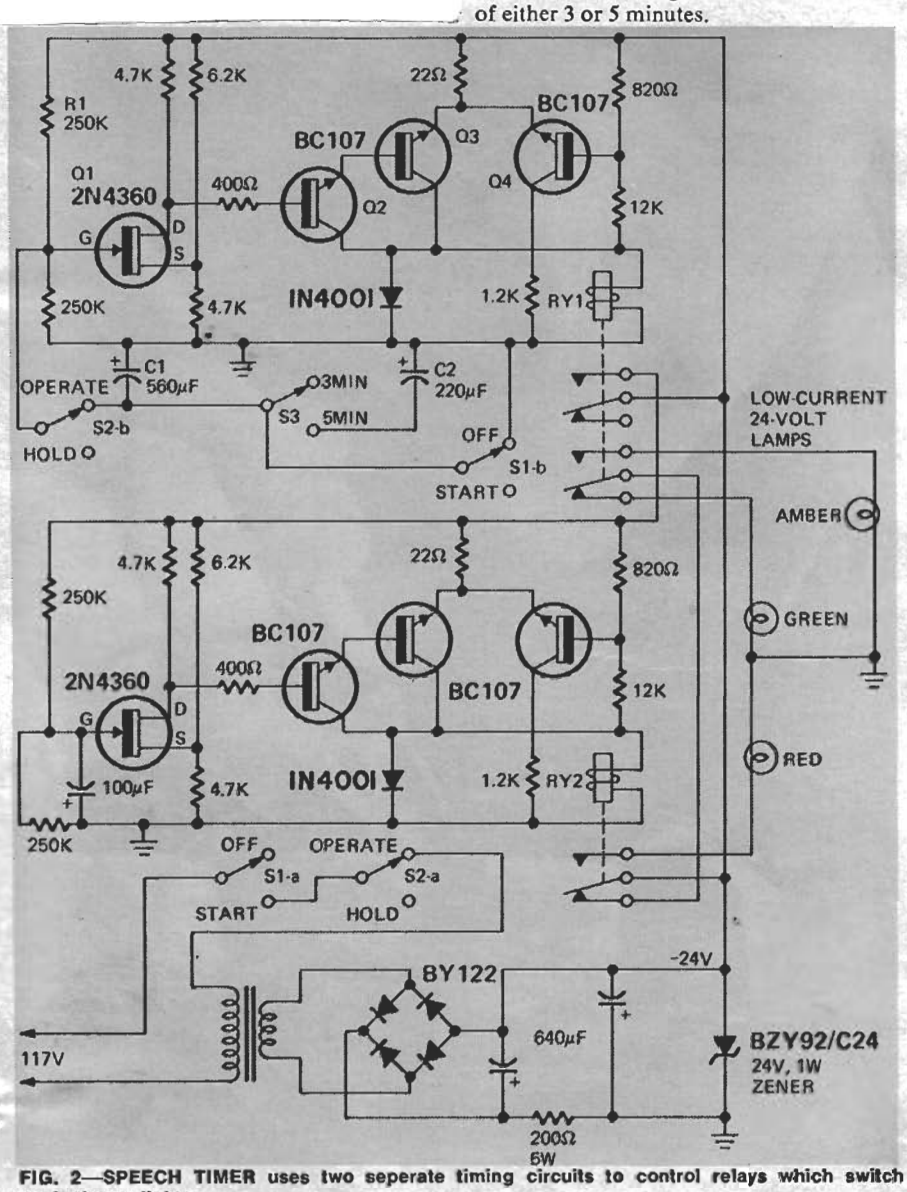


FIG. 2—SPEECH TIMER uses two seperate timing circuits to control relays which switch the indicator lights.

Throwing S1 to START applies power to the first timer (Q1-Q4) and turns on the GREEN indicator through the normally closed contacts on relays RY1 and RY2. Q1, a p-channel FET, is initially cut off with its gate at 0 volts and −24 and −10 volts on its drain and source, respectively. With power applied, the FET's gate gradually rises to half the supply voltage level (−12 volts) in a period determined by the time constant of R1 × C1 (or R1 × C1 + C2). When the timing capacitance's charge reaches −12 volts, Q1 saturates and its drain goes to about −9 volts. Q3 and Q4 form a Schmitt trigger with Q3 cut off and Q4 conducting. Q2 amplifies the trigger pulse from Q1. When Q1's drain drops from −24 to −9 volts, the regenerative action of the Schmitt trigger quickly drives Q3 to saturation.

Relay RY1 is energized, switching the indicator from green to amber and applying power to the 30-second timer. In 30 seconds, the 100-μF timing capacitor charges to −12 volts so RY2 operates, removing power from the amber lamp and turning on the red one.

When the timer is turned off, S1-b shorts the timing capacitor(s) in the first timer to insure that the next timed interval starts with Q1's gate at 0 volts. When S2 is thrown to HOLD, S2-b disconnects the timing capacitance in the first timer so it will hold its remaining charge so the timed interval can continue when S2 is again thrown to OPERATE.

The power supply delivers −24 volts regulated. You can use a 28—32-volt filament transformer and four general-purpose silicon rectifier diodes rated at 1 ampere or so. The transistors are general-purpose npn silicon types similar to the Workman WEP 735 and Zenith ZEN 103.

Conference TALK TIMER

BY WALTER W. SCHOPP

Compact, versatile project has selectable time intervals.

IT IS a well-known fact that public speakers frequently run over their allotted time. This "Talk Timer" is an ideal device for keeping speakers within their time limits and getting a conference moving on schedule. Its use need not be confined to conferences, however. It can be used in any timing application in the kitchen, in the radio shack, near the telephone, etc.

When the unit is turned on and the RESET button is pressed, a green light glows for the TALK period (adjustable from 5 to 60 minutes). At the end of that time, a yellow light comes on, and the SUMMARIZE period (adjustable from 5 to 15 minutes) begins. When the total time is up, a red light comes on.

The project can be built easily at a total parts cost of about $30.

About the Circuit. The Talk Timer has a fairly low parts count due to the fact that two Exar XR-2400 IC's are used. Each chip contains a 555 timer and eight flip-flops (divide-by-two counters) in a 16-pin DIP. Each open-collector flip-flop output is accessible at a specific pin, and any number of them can be connected together. The result is a summed output signal with a period from RC to 255RC, where RC is the time constant of the timing resistor and capacitor.

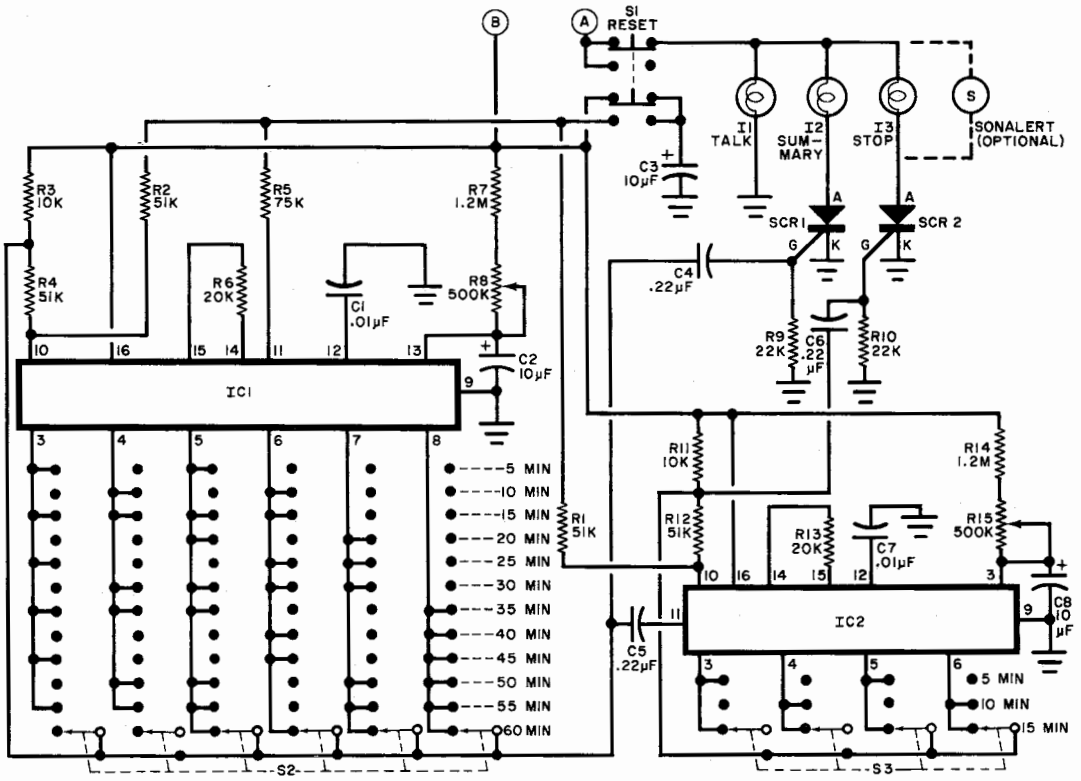
The schematic diagram of the Talk Timer is shown in Fig. 1. Duration of the "talk" period is controlled by *IC1*, and that of the "summarize" period by *IC2*. A 15-second time constant is used in each timer, determined by *R7, R8,* and *C2* for *IC1* and *R14, R15,* and *C8* for *IC2*. Because this time constant is fairly short, reasonably sized capacitors can be used. Also, adjustment of *R8* and *R15* is much easier for this interval than for one considerably longer. (The overall accuracy of each timer depends on that of its reference time constant.) For the "talk" period, the 4RC through 128RC outputs of *IC1* are selectively summed to give an output signal with a duration of 5 to 60 minutes in 5-minute increments. For the "summarize" period, the 4*RC* through 32*RC* outputs of *IC2* are combined to give an output signal of 5, 10, or 15 minutes.

When power is initially turned on, both timers are reset. All three lamps (*I1-I3*) glow, and the unit is ready for operation. When RESET switch *S1* is depressed, one pole momentarily disconnects *SCR1* and *SCR2* from the unregulated +7.5-volt supply (point A). This turns off the SCR's and lamps *I2* (SUMMARIZE) and *I3* (STOP). Lamp *I1* (TALK) will glow again when *S1* is released. The other pole of *S1* applies a pulse from capacitor *C3* to the reset terminal of *IC2* (pin 10) and to the reset and trigger (pin 16) terminals of *IC1*. Thus, *IC1* starts timing and its output goes low.

At the end of the selected "talk" period, the output of *IC1* goes high and causes *SCR1* and *I2* to conduct. Simultaneously, a pulse is applied to the trigger input of *IC2*. This IC then times out the SUMMARIZE period. At the end of that interval, *IC2*'s output goes high and turns on *SCR2*. This activates *I3* and the Sonalert (if used). The Talk Timer can then be reset for the next speaker by depressing *S1*. Also, the unit can be reset at any time during the TALK and SUMMARIZE intervals by pressing RESET.

A suitable power supply providing regulated and unregulated outputs is shown schematically in Fig. 2. For stability, the two timing chips are connected to the 6.8-volt regulated output (point B). The rest of the circuit (the SCR's and indicator lamps) is connected to the unregulated output.

Construction. Assembly techniques and parts placement are not critical. Printed circuit or perforated board can be used, with hard wire or wrapped wire



PARTS LIST

C1, C7—0.01-µF disc ceramic capacitor
C2, C3, C8—10-µF, 25-volt tantalum capacitor
C4 through C6—0.22-µF Mylar capacitor
I1 through I3—No. 44 or 47 pilot light
IC1, IC2—XR-2240CP programmable timer (Exar)
The following fixed resistors are ¼-watt, 10% tolerance components.
R1, R2, R4, R12—51,000 ohms
R3, R11—10,000 ohms
R5—75,000 ohms
R6, R13—20,000 ohms
R7, R14—1.2 megohms
R9, R10—22,000 ohms
R8, R15—500,000-ohm trimmer potentiometer
S1—Dpdt momentary pushbutton switch
S2—6-pole, 12-position nonshorting rotary switch (Centralab 2025 or equivalent)
S3—4-pole, 3-position nonshorting rotary switch (Centralab 2011 or equivalent)
SCR1, SCR2—1-ampere, 100-volt silicon controlled rectifier (Radio Shack 276-1059 or equivalent)
Misc.—Lensed lamp holders, printed circuit or perforated board, IC sockets or Molex Soldercons, suitable enclosure, switch knobs, Sonalert (optional), hookup wire, solder, etc.

Fig. 1. Two timer-counter IC's reduce parts count for the project.

connections. The use of sockets or Molex Soldercons is recommended for the IC's. Care should be taken when wiring *S2* and *S3*. The many contacts on these rotary switches make it easy to wire them incorrectly, and make it difficult to find the error after assembly. Lampholders with colored lenses should be used with *I1* (green), *I2* (yellow), and *I3* (red).

Adjustment. The only adjustments that need to be made are the settings of *R8* and *R15*. Using a dc-coupled oscilloscope or high-threshold logic probe, observe the signals at pin 1 of each IC. During the "talk" period, the waveform at pin 1 of *IC1* should change state every 15 seconds when *R8* is properly adjusted. During the "summarize" period, pin 1 of *IC2* will change state every 15 seconds when *R15* is set correctly. Try to adjust these *RC* time constants as precisely as possible, because the overall accuracy of the Talk Timer depends entirely on them.

No matter what your application may be, the Talk Timer is set up and operated in this manner—connect the project to the ac line, close power switch *S4*, select the desired talk and summary times with rotary switches *S2* and *S3*, respectively, and activate and reset the system using RESET switch *S1*. ◇

PARTS LIST

C9—2500-µF, 15-volt electrolytic capacitor
C10—0.001-µF disc ceramic capacitor
D1 through D4—1N4001 rectifier diode
D5—6.8-volt, 1-watt zener diode (1N3016B or equivalent)
R16—33-ohm, ½-watt resistor
S4—Spst toggle switch
T1—117V/6.3-volt, 1.2-ampere transformer
Misc.—Line cord, terminal strips, hookup wire, solder, machine hardware, etc.

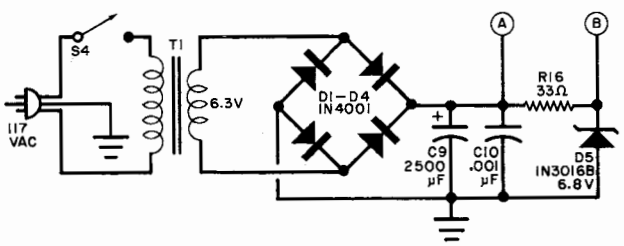


Fig. 2. Schematic of suitable power supply.

Out of Tune

In the "Conference Talk Timer," February 1977, P.63, the following connections to *S2* in the schematic should be deleted: Pin 5 of *IC1* at the 35-minute position; Pin 5 of *IC1* at the 50-minute position. The following connection to *S2* should be added: Pin 5 of *IC1* at the 45-minute position.

POPULAR ELECTRONICS