

QST

PODUNK HOWLOW
RADIO CLUB

100 Years of
QST
1915-2015
June 2015

devoted entirely to

amateur radio

FIELD DAY ORGANIZATION

Equipment	Avail- able	Not available	Promised by
Transmitters 100 Watt Phone 100 Watt CW	✓ ✓		W3ZR W4LA
Receivers Super-Exalted 22 XYZ-105	✓ ✓		W3PC W3ZR W3BB
Antennas + Masts Rotary Beam, Rhombic	✓		W3KE
5 Power One K.W. generator	✓		W3LA
Food: Steak, Turkey, Ham + Eggs	✓		

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0006043885 KC70 F2 12/2099
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Harold Kramer, WJ1B
Publisher

Steve Ford, WB8IMY
Editor

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Assistant Editor

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Happenings

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Product Review Lab Testing

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Asst Production Supervisor

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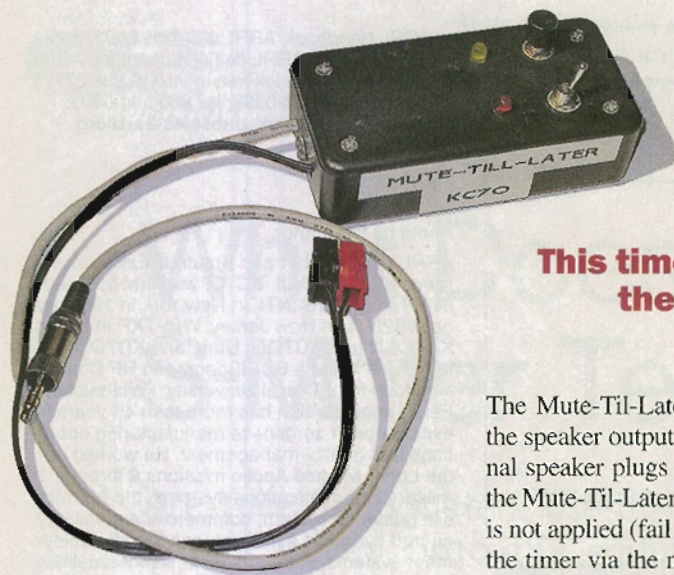
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The Mute-Til-Later

This timer accessory mutes your radio speaker then restores audio after a brief time.

Allen Wolff, KC7O

It's happened to just about everyone — we turn the radio's volume down to answer a phone call and forget to turn the volume back up. When that happens during a training exercise, a public service event, an emergency, or while piloting a boat into a harbor, the lack of communications might become dangerous, rather than just embarrassing.

John Minger, Jr, AC6VV, ham radio coordinator for the Angeles Crest 100 Mile Endurance Run event, mentioned to me that one of his net control operators "disappeared" during an event after answering a phone call. John wished there was a way to mute a radio, then have it return to normal operation within a reasonable amount of time. The challenge was on, and I had a prototype for him within a few days, because the next Endurance Run event was coming up in just two weeks.

The Timer Circuit

The Mute-Til-Later circuit, based on the venerable NE555 integrated circuit, is similar to the monostable timer circuit of H. Ward Silver, NØAX.¹ My circuit needed to have (1) a variable mute time, (2) a method for disabling the timer, (3) the ability to start another mute cycle, and (4) speaker lines independent of the timer power supply lines. It also needed to (5) allow a low-level audio through to the speaker with the external speaker muted if desired, (6) be fail safe — the speaker unmutes if the mute device loses power, and (7) operate from 12 V.

The Mute-Til-Later AUDIO_IN plugs into the speaker output of a radio, and an external speaker plugs into the AUDIO_OUT of the Mute-Til-Later (Figure 1). When power is not applied (fail safe) the audio bypasses the timer via the normally closed contacts of relay K1. When power is applied (S2 ON) the red LED lights up and the first timing cycle starts, the speaker is muted, and the yellow LED mute indicator lights up. I chose about 40 seconds for a mute cycle — a reasonable time for a quick question and answer on a telephone call. After 40 seconds, the relay opens, the yellow LED extinguishes and the speaker is un-muted. Depressing pushbutton S1 causes the timer cycle to re-start and the relay to actuate,

muting the speaker for another cycle. The cycle can always be cancelled by turning switch S2 OFF. I used a 100 Ω resistor across the relay contacts. Any value that gives the appropriate muted audio level can be used, based on the radio volume and the type of external speaker used. If full muting is desired, omit the 100 Ω resistor and the speaker line will be open circuited during the mute cycle.

I used a double-pole double-throw relay (K1) so that two speakers could be muted simultaneously by duplicating the resistor and audio in/out circuit. Keep the shields of the two speakers separated to prevent possible ground loops.

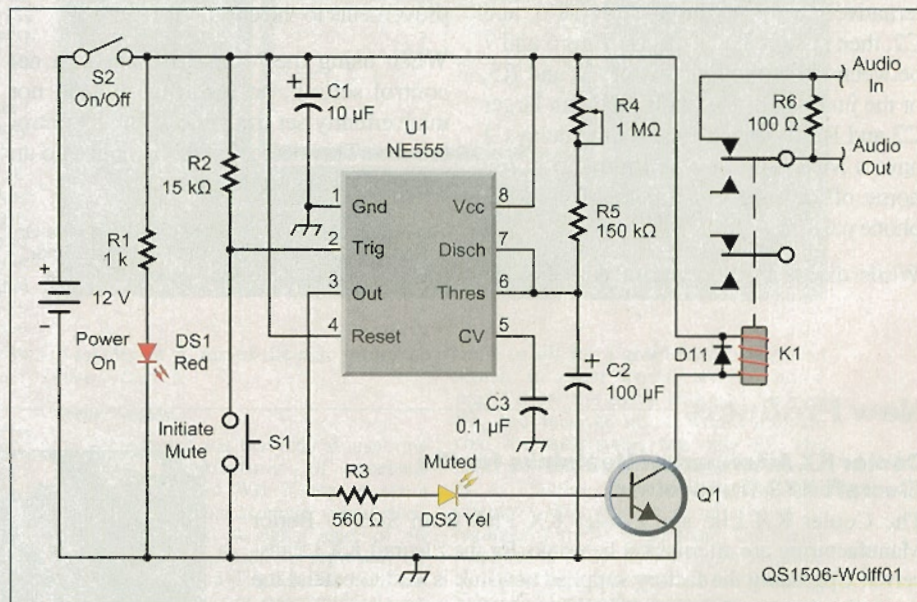


Figure 1 — An NE555 based Mute-Til-Later circuit. Set the mute duration to 40 seconds with C2, R5, and with potentiometer R4 set to 270 kΩ.

- C1 — 10 µF capacitor
- C2 — 100 µF capacitor
- C3 — 100 nF capacitor
- D1 — 1N4007 diode
- DS1 — red LED
- DS2 — yellow LED
- K1 — 12 V dc relay, DPDT
- Q1 — 2N2222 NPN transistor
- R1 — 1 kΩ resistor

- R2 — 15 kΩ resistor
- R3 — 560 Ω resistor
- R4 — 1 MΩ potentiometer
- R5 — 150 kΩ resistor
- R6 — 100 Ω resistor
- S1 — SPST momentary contact switch
- S2 — SPST toggle switch
- U1 — NE555 timer integrated circuit

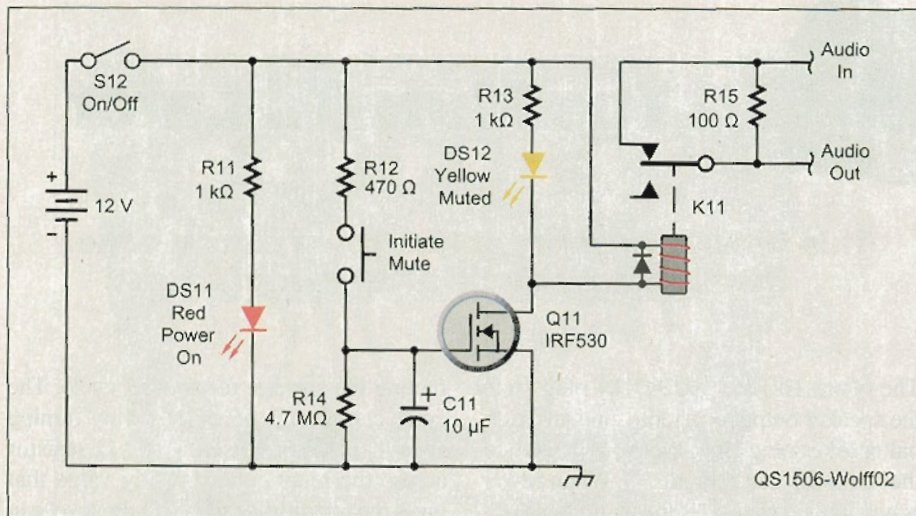


Figure 2 — An NFET based Mute-Til-Later circuit. Q11 can be nearly any NFET, R12 limits the peak switch current, R15 sets the muted audio level, and the product $R14 \times C11$ sets the mute duration.

C11 — 10 μ F capacitor
 D11 — 1N4007 diode
 DS11 — red LED
 DS12 — yellow LED
 K11 — 12 V dc relay, SPST
 Q11 — IRF530 or equivalent NFET

R11, R13 — 1 k Ω resistor
 R12 — 470 Ω resistor
 R14 — 4.7 M Ω resistor
 R15 — 100 Ω resistor
 S11 — SPST momentary contact switch
 S12 — SPST toggle switch

Refinements

As designed, the time delay ranges from about 16 to 240 seconds. For more flexibility, two potentiometers could be used and switched for different time delays. Alternatively, you can duplicate R4, R5, and C2, then switch the line to U1 Pins 6 and 7 between either the junction of C2 and R5, or the junction of the duplicated, but larger C2 and R5 for much longer time delays. I have a Mute-Til-Later on my radio in my home office set for 4 minutes for taking phone calls.

While discussing the circuit with friends

on the air, Hall Blankenship, KC7RAF, suggested using an NFET based circuit instead of the 555 timer. Mike Mladejovsky, WA7ARK, designed the much simpler circuit (Figure 2), and also suggested improvements to the circuit of Figure 1.

When using the Mute-Til-Later in a net control setting, be sure that you do not inadvertently set the radio volume control too low. This device could be built into an external speaker if desired.

¹See Figure 2 in H. Ward Silver, N0AX, "Hands-On Radio: Experiment #5 — The Integrated Timer," *QST*, Jun 2003 p 59; also Figure 3.89 in *The*

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Photo by the author.

ARRL Life Member and Amateur Extra class licensee Allen Wolff, KC7O, was first licensed as WN2NTL/WB2NTL in New York in 1964, then as WB2NTL in New Jersey, WB9TXP in Indiana, KA7CGN and KC7O in Utah, and KC7O in California. He holds a BSEE degree in RF Communications from Drexel University, Philadelphia, Pennsylvania. Allen has more than 45 years experience in aerospace manufacturing operations and quality management. He worked on the Lunar Module Apollo missions 9 through 14, military communications systems, the MX missile guidance system, commercial and military aircraft hydraulic actuators, spacecraft deployment systems, titanium fuel tanks for satellites and launch vehicles, and RFID systems. He is now semi-retired, and a management, engineering, and quality consultant.

Allen supports the local police by leading the Sierra Madre Emergency Communications Team and is a member of the Pasadena Radio Club. He enjoys travel, photography, and camping, and has operated a 1B Field Day station for the past 8 years.

In 1999, the ARRL awarded Allen the Herb S. Brier Instructor of the Year Award for 17 years of teaching Novice and Technician classes, and accounting for at least 450 new Ham Radio licenses. You can reach Allen at ajwolff@earthlink.net.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.



New Products

Cooler KX Aftermarket Heatsinks for the Elecraft KX3 Transceiver

The Cooler KX Lite and Cooler KX Plus from Simply Better Manufacturing are aftermarket heatsinks for the Elecraft KX3 transceiver. Upgrading the factory-supplied heatsink is said to extend the transceiver's expected operating life and increase the transmitter's high duty-cycle maximum output power capability. Cooler KX heatsinks are offered in several grades of finish and include mounting hardware. The Simply Better Manufacturing website offers guidance on which model to choose. Illustrated step-by-step instructions are provided to make installation quick and easy; no messy thermal grease application or tedious paint removal are necessary. Price: \$79.50 to \$118. For more information, visit www.ve7nm.ca.

