

# KIM Vari-Stepper

*Set your own pace with an automatic single-stepper.*

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I have been using with my KIM-1 a simple and convenient circuit that complements the add-on described by Dr. Marvin L. De Jong in the September 1979 *Kilobaud Microcomputing* ("Catching Bugs with Lights," p. 96). His device automatically displays the contents of a selected register while in the single-step mode, without having

to use the KIM keyboard. My contribution is a variable speed, automatic single-stepper. With both of these units installed, the KIM will step through a program at a rate you select, and you can watch a register value change without even touching that temperamental, built-in keypad.

The simple circuit is shown in the figure. I used a 555 timer to set the time interval between steps. The 1 meg potentiometer provides a good range of step rates: approximately 45 ms to 3 seconds. Three seconds is use-

ful if you want to carefully check the program as it progresses and stop it at a specific address. The faster rates are useful for moving quickly through part of a program, such as a loop, when you don't need to see the actual progression.

The step rate can be changed at any time by turning the potentiometer. If you would like a different range, experiment! A 2 meg potentiometer will give you about 6 seconds maximum between steps. If you want faster single-step execution, try smaller timing resistors (R1,R2) or a smaller capacitor.

There is a limit to how fast you can go. You must allow enough time between steps for the KIM to perform its single-step software and fully scan the keyboard; otherwise, erratic operation may result. I don't have a scope to check this out, and I didn't feel like tracing through the software to determine the amount of time KIM needs, so I can't tell you what it is.

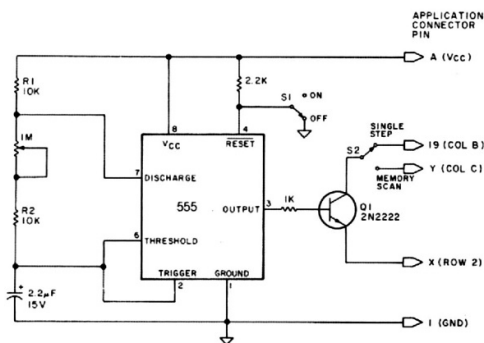
Q1 can be any NPN switching transistor. I used a 2N2222. It is connected to the output of the timer and acts like a switch. When the 555's output goes

high, the transistor shorts the "GO" key, fooling KIM into thinking that you pressed it. When the timer's output is low, the transistor is an open circuit, and KIM thinks you have released the key.

In order to use the stepper, you must set up the computer exactly as if you were manually single-stepping: The single-step switch must be on, and 1C00 must be stored in locations 17FB, 17FA. The auto-stepper is turned on and off by S1. When off, the "GO" key works as usual.

There is an extra bonus if you install switch S2. Connecting the collector of Q1 to application connector pin Y instead of 19 causes "+" key closures to be simulated. Now you can check a portion of memory, using a slow step rate, without pushing the "+" key a hundred or more times. This saves wear on my fingers and a lot of aggravation from bouncy keys.

The circuit can be built on any board that's convenient. Parts placement is not at all critical. The usefulness of this little gadget shows that good things do come in small packages! ■



Single-stepper circuit.