

Electronic timer circuit improves welder performance

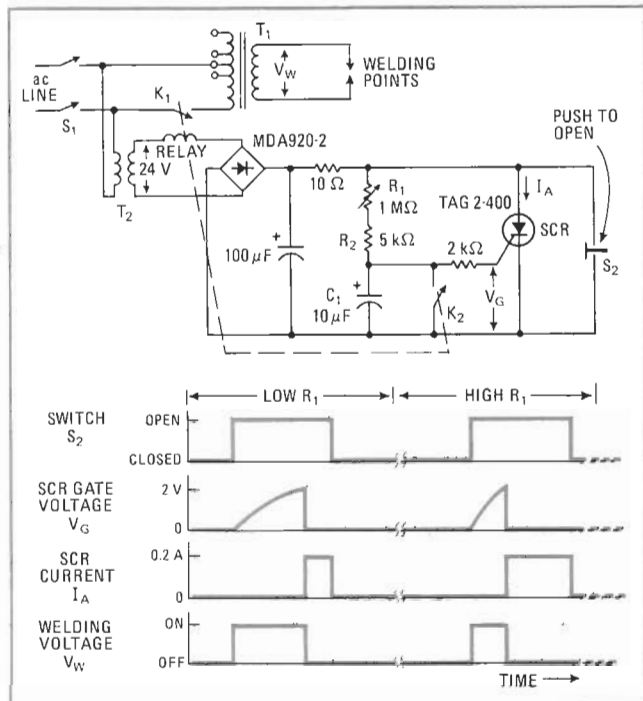
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Point welders are widely used in industry, but many of them have no timers. Without an automatically controlled welding pulse, only skilled operators can weld thin metal parts that require a current-pulse duration of less than a second; if the equipment is automatically timed, however, almost anyone can weld such parts successfully. And even skilled personnel can probably perform repetitive production operations more quickly and efficiently with the aid of a timed current pulse.

A simple timing circuit that can be added to a welder is shown in the figure. When the ac line voltage is turned on and switch S_2 is closed, current through the relay coil holds K_1 open and K_2 closed. When the operator wants to weld, switch S_2 is opened, and the current through the relay coil thereupon decreases so much that K_1 closes and K_2 opens.

With K_1 closed, welding current flows in the secondary of T_1 , and because K_2 is open, C_1 charges through R_1 and R_2 . When the voltage across C_1 reaches the firing voltage of the silicon-controlled rectifier (about 2 volts), the SCR carries enough current to let the relay open K_1 and close K_2 again to stop welding and discharge C_1 . The SCR continues to conduct until the operator lets S_2 close again. The welding current flows for a time returned by $(R_1 + R_2)C_1$ and the line voltage.

One of the most important features of this circuit is that the welding cycle is immune to noise from the relay spikes and transformer surges.



Welding made easy. When S_2 is pushed open, welding current flows and gate voltage starts to rise. Once gate voltage becomes high enough to let SCR conduct, welding current ceases. SCR continues to conduct until operator allows S_2 to close; thus, duration of welding pulse is determined only by charging time for V_G to reach SCR firing voltage, not by how long S_2 is open.

The timing diagrams in the figure illustrate the operation of the circuit and indicate some typical values of current and voltage. □

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