Table 1 Continued

B	V	F	B	V	F
YA	1	96	YR	8	23
YB	0	6	YS	10	56
YC	4	12	YT	3	17
YD	2	19	YV	0	1
YE	5	105	YW	1	19
YG	2	8	YX	0	4
YH	0	2	ZA	3	10
YI	3	64	ZE	14	88
YL	2	84	ZI	1	10
YM	3	33	ZL	1	4
YN	2	10	ZO	3	8
YO	6	251	ZY	2	7
YP	5	34	ZZ	2	9

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An on-off switch for solid state programming systems*

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One difficulty with some solid state programming systems is that modules (e.g., counters, lamp drivers, etc.) requiring both 28- and 12-V power must always have the 12 V applied before the 28 V. If 28 V is on without the 12, serious damage can occur to logic drivers and driven equipment, such as counters, since no bias exists to control the 28 V.

Figure 1 describes an inexpensive (approximately \$22) circuit which handles the problem and allows enough current to control large programming systems. Two buttons are employed. One button provides power (both 12 and 28 V) to the programming modules, the other turns the power off. Pushing the "on" button supplies 12 V first, then the 28 V. The "off" button turns 28 V off, and a few milliseconds later the 12 V disengages.

ON CYCLE: When the "on" pushbutton (S1) is depressed, Silicon-Controlled Rectifier SCR1 is gated to an "on" state. Consequently, Relay RY1 is energized, thus connecting the bias supply to the equipment. Also, the timing cycle on the unijunction transistor (Q1) is initiated. After a predetermined interval (R4, C2), the unijunction (Q1) gates Silicon-Controlled Rectifier

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Fig. 1. Circuit diagram for on-off switch to be used with solid state programming systems.

Table 1
Parts List

C ₁	.47 μ F
C ₂ , C ₃	10 μ F (see text)
D ₁ , D ₂	200 PIV, 1A
Q ₁ , Q ₃	2N2646 (unijunction)
Q ₂	2N1302 (bipolar)
R ₁	620 Ω
R ₂	1 K
R ₃	2 Ω
R ₄ , R ₈	39 k (see text)
R ₅ , R ₉	330 Ω
R ₆	200 Ω
R ₇	6.8 k
R ₁₀	10 Ω
RY ₁	24-V coil SPST 10A contacts
RY ₂	24-V coil DPDT 2A contacts
S ₁	SPST momentary action switch 24 V, 2A
S ₂	SPDT momentary action switch 24 V, 2A
SCR ₁	RCA C106B
SCR ₂	RCA C122D
T ₁	Pulse transformer 1:1 ratio

SCR2, which supplies power to the 28-V circuits.

OFF CYCLE: Depressing the "off" pushbutton (S2) initiates two simultaneous functions. First, the 28-V supply is disengaged. Second, the dropout relay timer is energized, which (1) maintains bias to the dropout circuit, (2) short circuits Silicon-Controlled Rectifier SCR1, and (3) disconnects the "on" timing circuit. All above functions are controlled by Relay RY2. The dropout timer, consisting of Transistor Q2 and Unijunction Q3, interval is determined by Resistor R3 and Capacitor C3. At the end of the predetermined timing interval, Transistor Q2 is switched to an "off" state, which in turn releases Relay RY2. This, in turn, releases Relay RY1, turning "off" the 12-V bias.

Diodes D1 and D2 suppress transient voltages (i.e., $L di/dt$). Also, Resistor R3 and Capacitor C1 insure voltage turn off on Silicon-Controlled Rectifier SCR1 (i.e., dv/dt).

Three circuits have been in use for 2 months without a failure.

Parts are listed in Table 1.

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