

Owner's Manual for the BE85-636-0450-01A Time Delay Relay Module

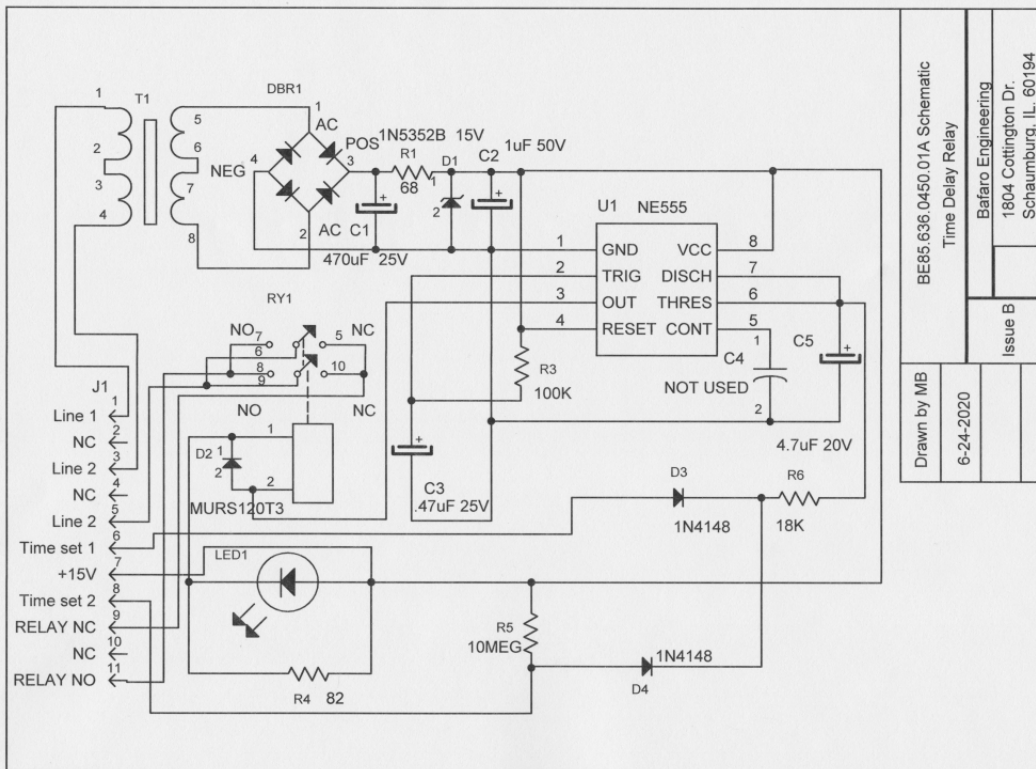
December 26, 2023

by Michael Bafaro

Purpose: The purpose of this manual is to inform the user of the features, installation, and theory of operation of the BE85-636-0450-01A time delay relay. The time delay relay was designed to be a direct replacement for the time delay relay used in the MULTVAC AG6 vacuum sealing machine. The Multivac part number is 85-636-0450-01. The BE85-636-0450-01A uses a power transformer to eliminate the original unit's sensitivity to line transients.

Installation: The BE85-636-0450-01A uses the same card edge connector as the original time delay relay and may be used as a drop-in replacement. The BE85-636-0450-01A relay may be used along with the original time delay relays as made by Multivac. The timing of the functions may require little or no adjustments on the AG6 front panel controls.

Theory of Operation: The schematic of the BE85-636-0450-01A relay is shown in Figure 1.



BE85.636.0450.01A Schematic	
Time Delay Relay	
Bafaro Engineering	
1804 Cottingham Dr.	
Schaumburg, IL, 60194	
Drawn by MB	Issue B
6-24-2020	

Figure 1.

The 220V AC power is supplied through pins 1 and 3 of the edge connector. This power is then reduced to approximately 16VAC by the power transformer. Unlike the conventional R-C dropping circuit, this design employs an AC power transformer instead of a film capacitor and a resistor to lower the AC input to the voltage used by the timing circuit. The R-C dropping circuit is prone to passing line spikes due to the capacitive reactance of the dropping capacitor decreasing with increasing frequency. These spikes are known to cause damage to the bridge rectifier and Zener regulator.

Upon the application of power (220VAC) to the transformer, the bridge rectifier (C1, C2, R1, and D1) supplies 15VDC to both the relay coil and the NE555 timer chip. At the start of the timing cycle, the output of the 555 timer is high, preventing current flow through the relay coil and keeping the relay from being activated. The timing cycle advances as C5 is charged through R6, D3 and an external resistor connected to +15V (supplied to pin

7 of the edge connector), or through an external resistor and D4. R5 ensures a charging path even if external resistors are absent. C3 and R3 keep the trigger pin (2) of the 555 timer low to initiate the timing cycle. When C5 reaches the threshold voltage, the timing cycle concludes, causing the output of the 555 timer to go low. Now, current has a path to ground, and the relay is activated. The Normally Closed (NC) and Normally Open (NO) outputs from the relay can be used to drive an external load.

LED1 illuminates when the relay is energized. R2 diverts some of the relay coil current around the LED to maintain the LED current within proper limits. D2 serves as a protection diode, ensuring that the inductive spike from the relay's turn-off does not harm the rest of the circuits.

Figure 2 top view:

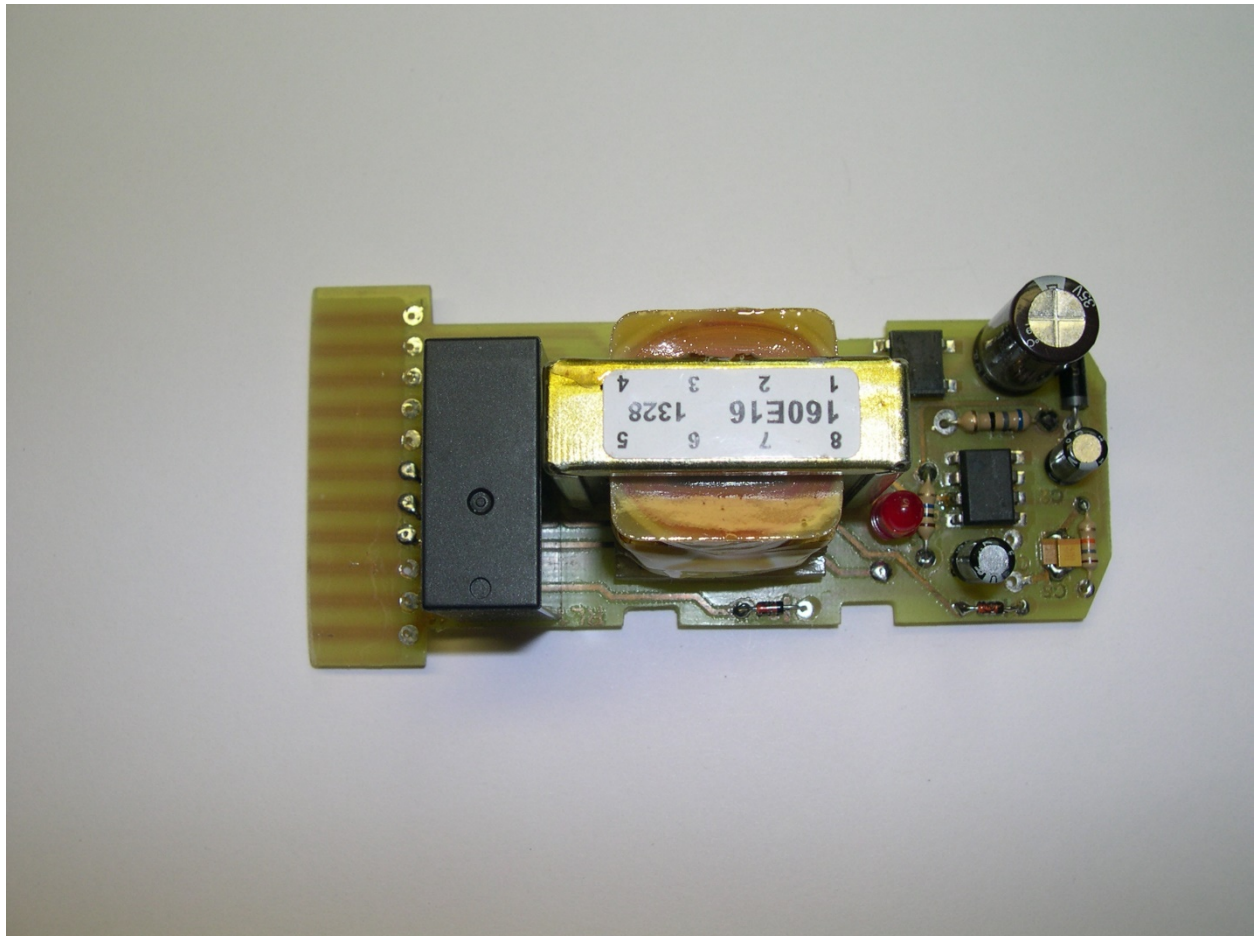


Figure 3 parts list:

Ref Number	Quantity	Digikey P/N	Description
R1	1	CF12JT68R0CT-ND	CF12JT68R0 68 Ohm 1/2W Resistor
R2	0		Not used
R3	1	RMCF0805JT100KCT-ND	RMCF0805JT100K RES 100K OHM 5% 1/8W 0805
R4	1	RMCF0805JT82R0CT-ND	RMCF0805JT82R0 RES 82 OHM 5% 1/8W 0805
R5	1	CF12JT10M0CT-ND	CF12JT10M0 RES 10M OHM 1/2W 5% AXIAL
R6	1	CF12JT18K0CT-ND	CF12JT18K0 RES 18K OHM 1/2W 5% AXIAL
ZD1	1	1N5352B-TP	1N5352BTPMSCT-ND DIODE ZENER 15V 5W DO15
DB1	1	DF08MDI-ND	1A 800V diode bridge DIP Diodes inc
C1	1	493-10748-1-ND	UKW1E471MPD1TD 470UF 25V Lytic
C2	1	493-11321-1-ND	UPS1H010MDD1TD CAP ALUM 1UF 20% 50V RADIAL
C3	1	493-15553-ND	UMP1HR47MDD CAP ALUM 0.47UF 20% 50V RADIAL
C4	0		Not used
C5	1	478-3887-1-ND	TAJB475K020RNJ CAP TANT 4.7UF 10% 20V 1411
C5A	1	399-3695-1-ND	T491A474K025AT CAP TANT 0.47UF 10% 25V 1206
D1	1	1N5352BTPMSCT-ND	1N5352B-TP DIODE ZENER 15V 5W DO15
D2	1	1N4148FS-ND	1N4148 DIODE GEN PURP 100V 200MA DO35
D3	1	1N4148FS-ND	1N4148 DIODE GEN PURP 100V 200MA DO35
D4	1	1N4148FS-ND	1N4148 DIODE GEN PURP 100V 200MA DO35
IC1	1	296-1411-5-ND	NE555 timer IC by TI
RY1	1	Fred R	Relay AZ755-1C-12DE
LED1	1	67-1648-ND	SSL-LX5093SRD/D LED RED DIFFUSED T-1 3/4 T/H
T1	1	HM4127-ND	160E16 Hammond PWR XFMR LAMINATED 1.2VA TH
PCB	1	Far Circuits	PC board BE85-636-0450-01A

If you have any questions, please contact me at m.bafaro@comcast.net.