

ZC1 Mk2 vibrator substitute.

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Description

The two MosFets Q1 and Q2 switch the primary of the ZC1 HT inverter transformer (Phase1 and Phase2). These devices are driven in perfect anti phase by the microcontroller IC1.

The secondary winding (Rect1 and Rect2) is rectified by the diodes D1 D2.

The low voltage devices are supplied with 5V from IC2. This is a low current device, but provides sufficient power for this circuit. Polarity protection diode D3 can be substituted for a lower current device if required.

The Mosfets can be substituted for other types, but select others with low gate thresholds and fast switching times. The stated devices are logic level types, with a gate threshold of 2V, and a high speed transition time, and a max drain voltage of >50V. This results in very cool running, and these devices need no heat sink. The existing capacitor across the primary is still required, to limit the drain peak voltage, C4 can still be fitted as a little extra capacitance will not be a problem.

Note the circuit has two ground wires (Phase1 GND and Phase2 GND) from the board to the vibrator base, to ensure a low impedance return path.

The microcontroller IC1 is an entry level device that can be programmed directly from a comm. Port on a PC, the PC software is free and the code is shown below. Pre-programmed devices may be available from the author. Other features could be included, like soft start and HT voltage regulation by feedback into the microprocessor, but these were found unnecessary in practice.

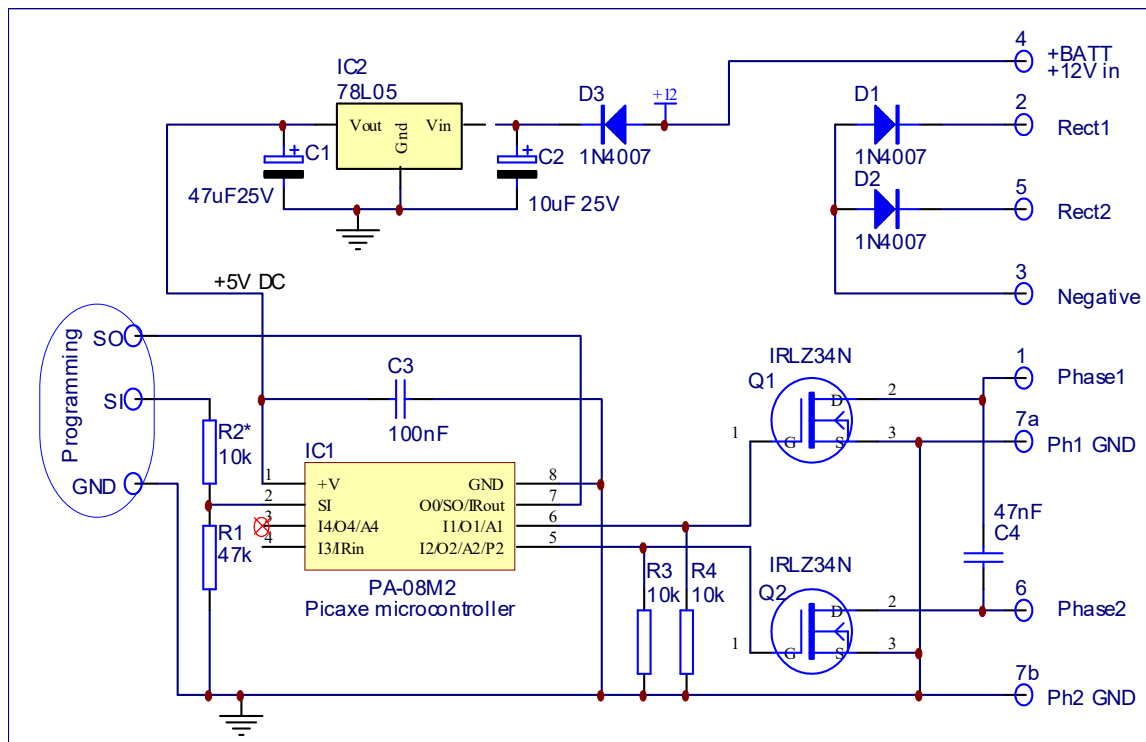


Figure 1 Circuit diagram

Notes:

1. Pad numbers refer to the corresponding vibrator pin numbers.
2. R2 10k not needed if a pre programmed Picaxe is used.
3. Ph1& Ph2 grounds are separate wires to the supply ground pin 7.
4. If using Veroboard, keep all leads very short.

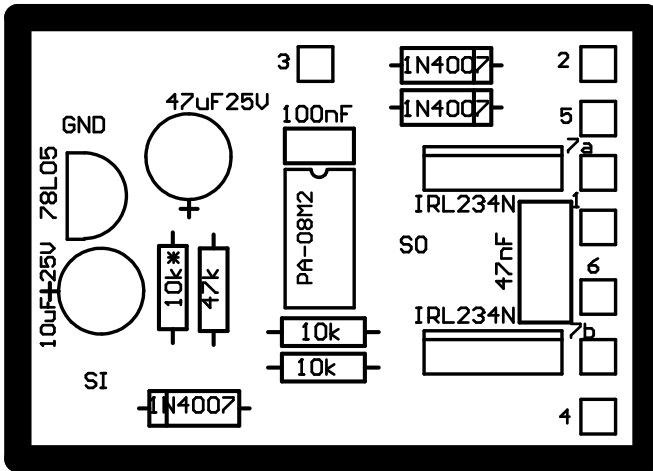


Figure 2 PCB component overlay, pad numbers refer to vibrator pin numbers

| Used | Part Type | Designator |
|------|----------------------------|------------|
| 1 | 47k Axial leaded | R1 |
| 2 | 10k Axial leaded | R3 R4 |
| 1 | 100nF Ceramic | C3 |
| 1 | 10uF 25V Electrolytic | C2 |
| 1 | 47nF Polyester Film 50V | C4 |
| 1 | 47uF 25V Electrolytic | C1 |
| 3 | 1N4007 | D1 D2 D3 |
| 1 | 78L05 | IC2 |
| 2 | IRL234N Logic level MOSFET | Q1 Q2 |
| 1 | PicAxe-08M2 | IC1 |

Figure 3 Bill of Material for ZC1 Vibrator

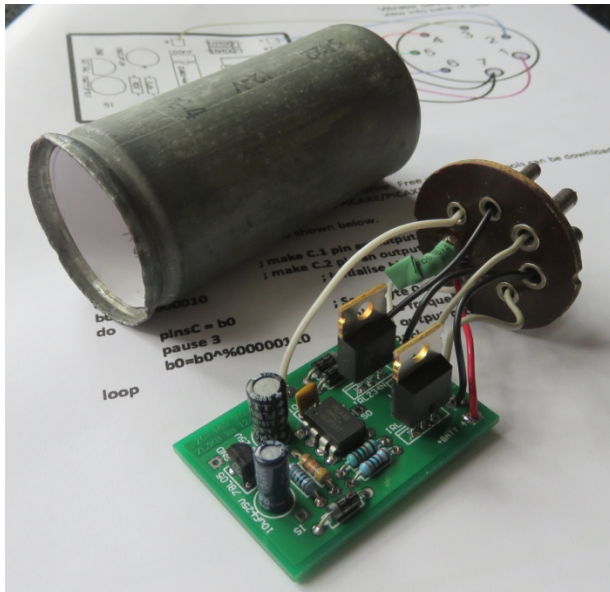


Figure 4 Completed project. Note insulation inside vibrator can.

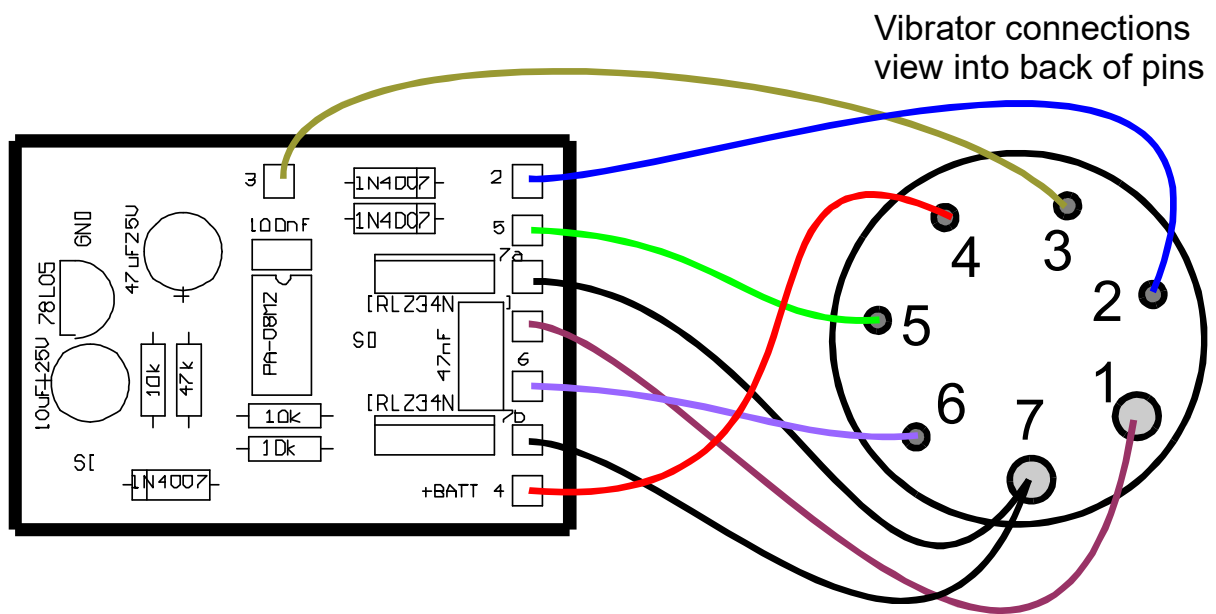


Figure 5 Wiring of board to vibrator base

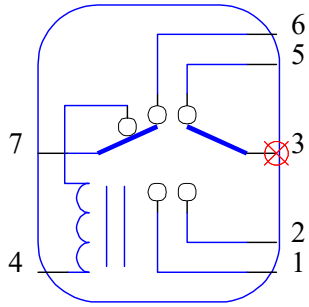
Software code for Picaxe 08M2 chip

Although the Picaxe chip is supplied with the kit, it can also be programmed by the constructor. Free programming tools can be downloaded from <http://www.picaxe.com/Software/PICAXE/PICAXE-Editor-6/>

The software for this project is shown below.

```

output c.1           ; make C.1 pin an output
output c.2           ; make C.2 pin an output
b0=%00000010        ; Initialise bits
do
    pinsC = b0       ; Send byte 0 to outputs
    pause 3          ; this sets frequency
    b0=b0^%00000110 ; Invert output bits in byte 0
loop                 ;loop back
  
```



ZC1 MK2 VIBRATOR

Figure 6 Original vibrator internal functions