# 24 Hour Timer

Description:
These two circuits are multi-range timers offering periods of up to 24 hours and beyond. Both are essentially the same. The main difference is that when the time runs out, Version 1 energizes the relay and Version 2 de-energizes it. The first uses less power while the timer is running; and the second uses less power after the timer stops. Pick the one that best suits your application.
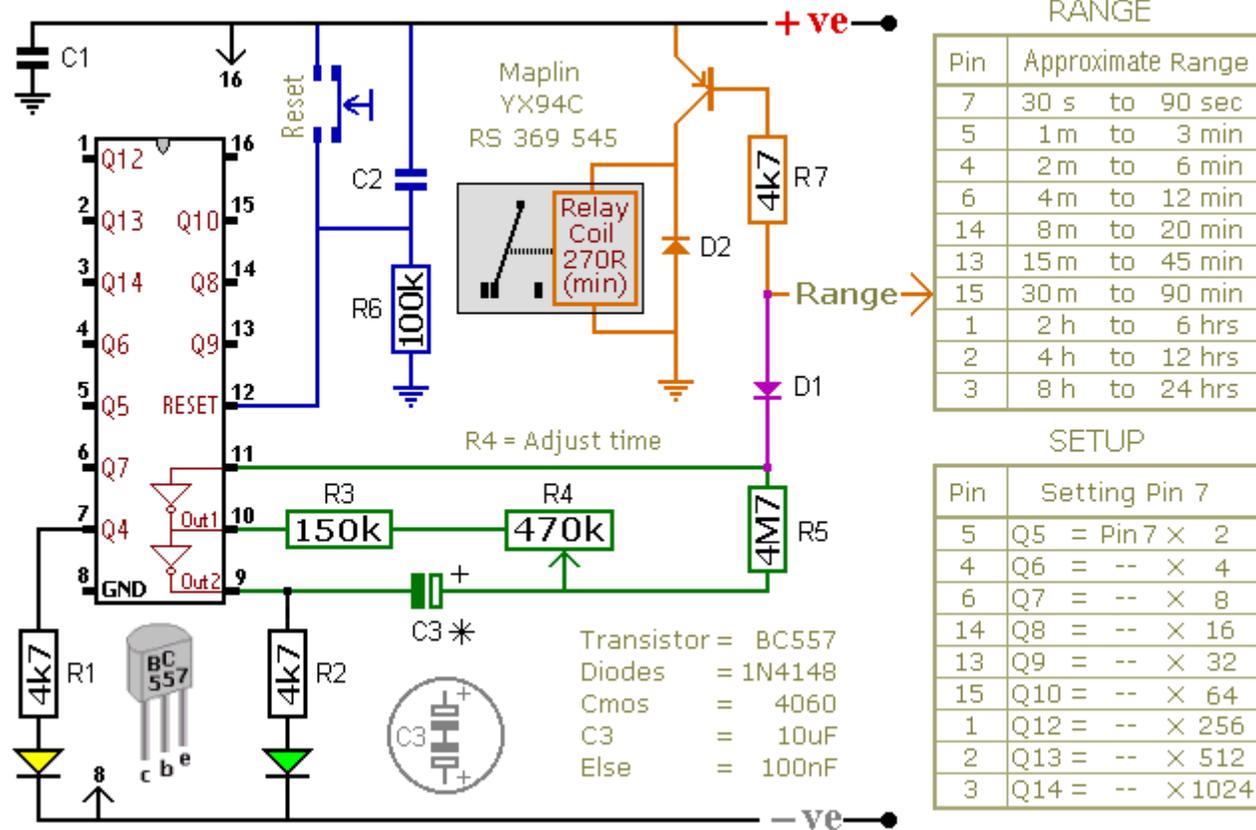
24-Hour Timer {1}
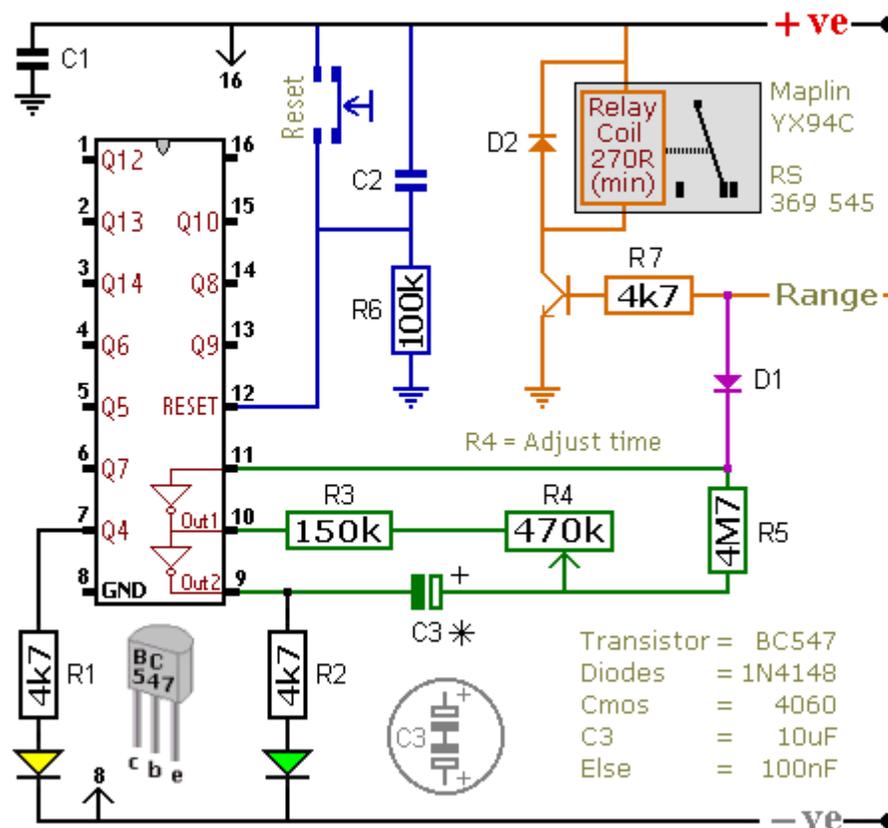
RANGE

Pin	Approximate Range		
7	30 s	to	90 sec
5	1 m	to	3 min
4	2 m	to	6 min
6	4 m	to	12 min
14	8 m	to	20 min
13	15 m	to	45 min
15	30 m	to	90 min
1	2 h	to	6 hrs
2	4 h	to	12 hrs
3	8 h	to	24 hrs

SETUP

Pin	Setting Pin 7			
5	Q5	÷	2	= Pin 7
4	Q6	÷	4	= --
6	Q7	÷	8	= --
14	Q8	÷	16	= --
13	Q9	÷	32	= --
15	Q10	÷	64	= --
1	Q12	÷	256	= --
2	Q13	÷	512	= --
3	Q14	÷	1024	= --

R4 = Adjust time

Transistor = BC547
Diodes   = 1N4148
Cmos   =   4060
C3   =   10uF
Else   = 100nF

Relay Coil 270R (min)

Maplin YX94C
RS 369 545

Transistor = BC547

✳ Ideally C3 should be non-polarized. Maplin JA75S. RS 768 728. See Text

24-Hour Timer {2}

Maplin YX94C
RS 369 545

Relay Coil 270R (min)

R4 = Adjust time

Transistor = BC557
Diodes = 1N4148
Cmos = 4060
C3 = 10uF
Else = 100nF

✳ Ideally C3 should be non-polarized. Maplin JA75S. RS 768 728. See Text

RANGE

Pin	Approximate Range		
7	30 s	to	90 sec
5	1 m	to	3 min
4	2 m	to	6 min
6	4 m	to	12 min
14	8 m	to	20 min
13	15 m	to	45 min
15	30 m	to	90 min
1	2 h	to	6 hrs
2	4 h	to	12 hrs
3	8 h	to	24 hrs

SETUP

Pin	Setting Pin 7			
5	Q5	= Pin 7	×	2
4	Q6	= --	×	4
6	Q7	= --	×	8
14	Q8	= --	×	16
13	Q9	= --	×	32
15	Q10	= --	×	64
1	Q12	= --	×	256
2	Q13	= --	×	512
3	Q14	= --	×	1024

Notes:

The Cmos 4060 is a 14 bit binary counter with a built in oscillator. The oscillator consists of the two inverters connected to Pins 9, 10 & 11; and its frequency is set by R3, R4 & C3. The green Led flashes while the oscillator is running: and the IC counts the number of oscillations. Although it's a 14 bit counter, not all of the bits are accessible. Those that can be reached are shown on the drawing.
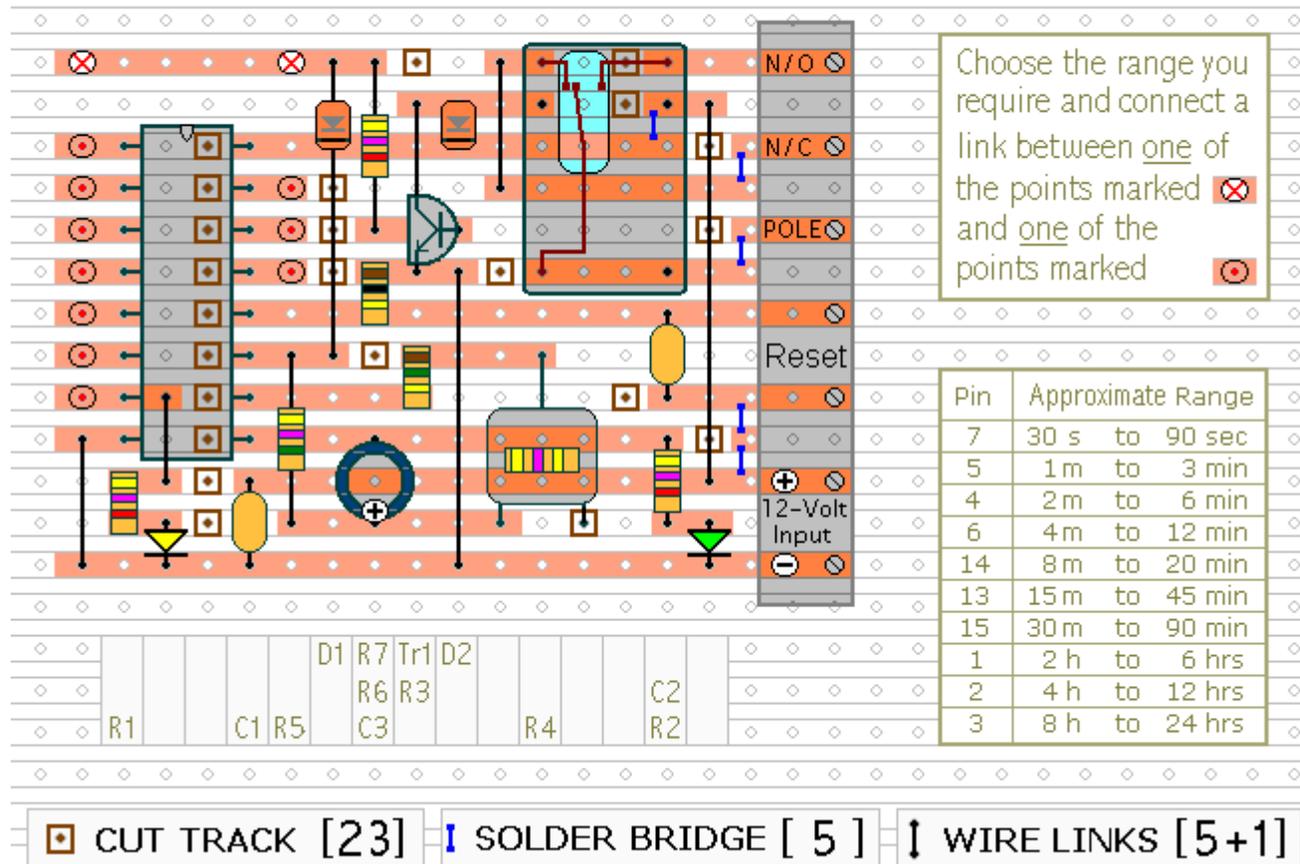
By adjusting the frequency of the oscillator you can set the length of time it takes for any given output to go high. This output then switches the transistor; which in turn operates the relay. At the same time, D1 stops the count by disabling the oscillator. Ideally C3 should be non-polarized; but a regular electrolytic will work, provided it doesn't leak too badly in the reverse direction. Alternatively, you can simulate a non-polarized 10uF capacitor by connecting two 22uF capacitors back to back (as shown).

Using "Trial and Error" to set a long time period would be very tedious. A better solution is to use the Setup tables provided; and calculate the time required for Pin 7 to go high. The Setup tables on both schematics are interchangeable. They're just two different ways of expressing the same equation.

For example, if you want a period of 9 Hours, the Range table shows that you can use the output at Pin 2. You need Pin 2 to go high after 9 x 60 x 60 = 32 400 seconds. The Setup table tells you to divide this by 512; giving about 63 seconds. Adjust R4 so that the Yellow LED lights 63 seconds after power is applied. This will give an output at Pin 2 after about 9 Hours. A suitable Veroboard layout for each version is shown below:
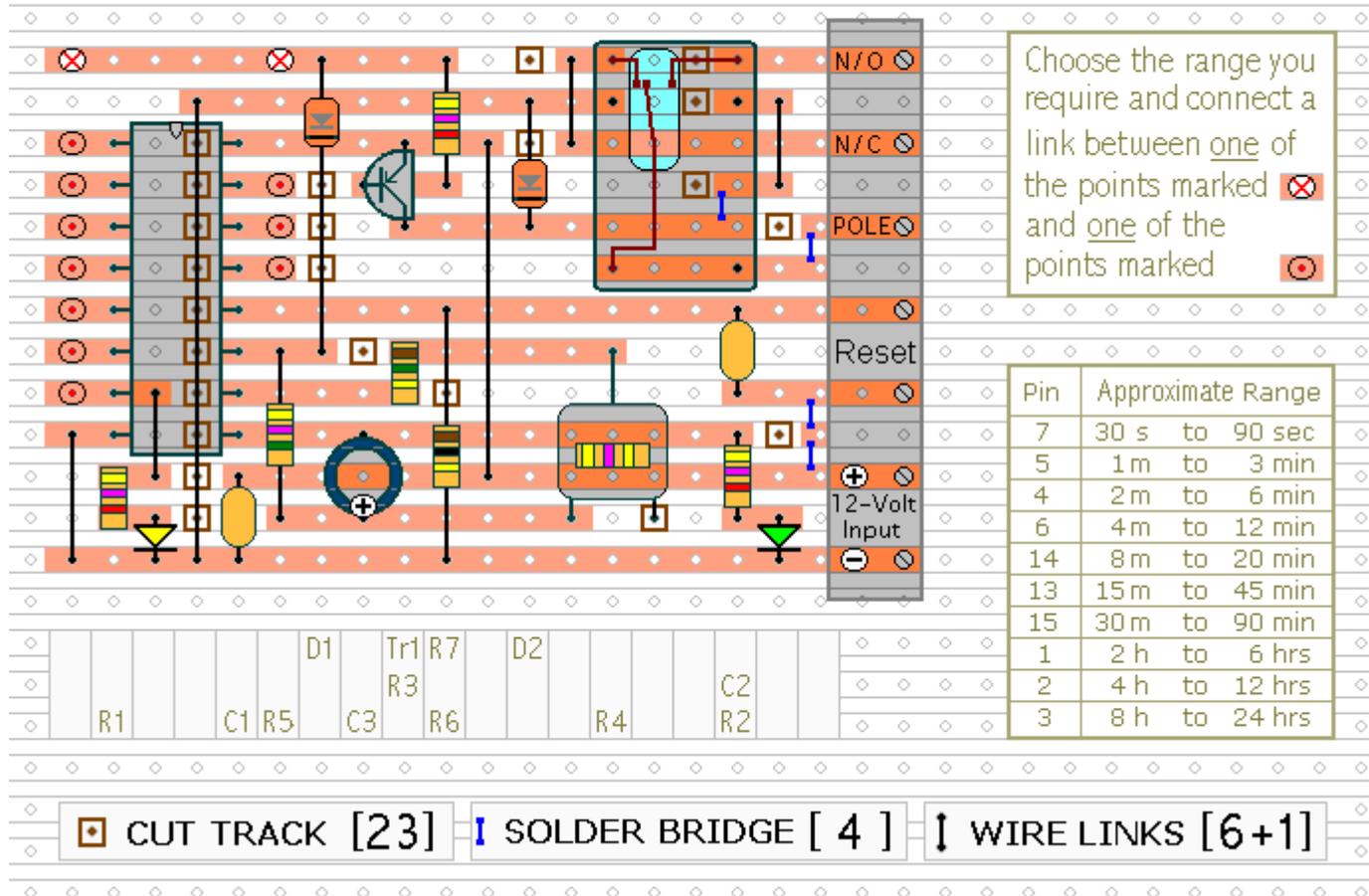
24‑Hour Timer {1}

component side

Choose the range you require and connect a link between *one* of the points marked ⊗ and *one* of the points marked ⊙

| N/O |
| N/C |
| POLE |
| Reset |
| 12‑Volt Input |

Pin	Approximate Range		
7	30 s	to	90 sec
5	1 m	to	3 min
4	2 m	to	6 min
6	4 m	to	12 min
14	8 m	to	20 min
13	15 m	to	45 min
15	30 m	to	90 min
1	2 h	to	6 hrs
2	4 h	to	12 hrs
3	8 h	to	24 hrs

D1 R7 Tr1 D2
R6 R3
R1   C1 R5   C3   R4   C2 R2

⊡ CUT TRACK [23]   I SOLDER BRIDGE [5]   ↕ WIRE LINKS [5+1]

24-Hour Timer {2}

component side

Choose the range you require and connect a link between <u>one</u> of the points marked ⊗ and <u>one</u> of the points marked ⊙

N/O
N/C
POLE
Reset
12-Volt Input

Pin	Approximate Range		
7	30 s	to	90 sec
5	1 m	to	3 min
4	2 m	to	6 min
6	4 m	to	12 min
14	8 m	to	20 min
13	15 m	to	45 min
15	30 m	to	90 min
1	2 h	to	6 hrs
2	4 h	to	12 hrs
3	8 h	to	24 hrs

D1 Tr1 R7 D2
R3
R1   C1 R5 C3 R6   R4   C2 R2

⊡ CUT TRACK [23]   I SOLDER BRIDGE [4]   ↕ WIRE LINKS [6+1]

The timer was designed for a 12-volt supply. However, provided a suitable relay is used, the circuit will work at anything from 5 to 15-volts. Applying power starts the timer. It can be reset at any time by a brief interruption of the power supply. The reset button is optional; but it should NOT be used during setup. The time it takes for the Yellow LED to light MUST be measured from the moment power is applied. Although R1, R2 and the two LEDs help with the setup, they are not necessary to the operation of the timer. If you want to reduce the power consumption, disconnect them once you've completed the setup. If you need a longer period than 24-hours, increase the value of C3.