

## DESCRIPTION

Prop builders have long used three-stage timers for simple props and effects. The problem with traditional products is the inability to modify behavior beyond the original design. The EZ-3 Timer Control Board solves this problem by converting the [re]programmable Prop-1, Prop-2, and Prop-SX controllers into simple or advanced 3-stage timing control devices.

## PRODUCT APPLICATIONS

- Props and holiday displays
- Special FX

## FEATURES & BENEFITS

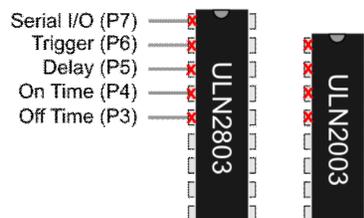
- Built-in potentiometer circuits to allow for trigger delay, on time, and off (reset) time
- Colored LEDs indicate timing stages
- Built-in manual switch for testing
- Terminal block provides for connection of external (N.O.) trigger device
- Pre-configured for Prop-1; may optionally be configured for the Prop-2 and Prop-SX
- Compact size: 1.5" x 2" (38.1mm x 50.8mm)

## Mounting the EZ-3

Mount the EZ-3 by mating the 3x8 female socket with the 3x8 TTL header on the Prop-1, Prop-2, or Prop-SX. Secure the EZ-3 to the controller using a stand-off and screws (provided).

## ULN2x03 Modification

The EZ-3 includes three potentiometer circuits that must be freed from the inputs of the ULN2x03 output driver used for valves and solenoids connected to the OUTx terminals. Modification of the ULN2x03 is best handled with a small diagonal cutter. Remove the pins as shown below.



ULN2803: Remove pins 1 through 5

ULN2003: Remove pins 1 through 4

## Reconfiguring for the Prop-2/Prop-SX

The potentiometer circuits on the EZ-3 are pre-configured for the POT instruction used by the Prop-1 controller. To reconfigure for the RCTIME instruction used by the Prop-2 and Prop-SX you must bridge the “solder jumpers” with solder. Using a low-wattage (25W) soldering iron and rosin-core solder bridge each of the solder jumpers; all six jumpers must be bridged for proper operation.



**CAUTION:** Use caution when adding solder to the solder bridges on the EZ-3 as excessive heat can damage the PCB. Use a low-wattage iron and just enough solder to make a connection between the inner pad and outer ring. Using acid-core solder will damage the PCB.

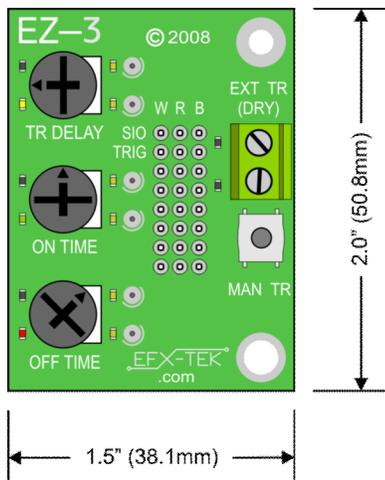
## Triggering

The EZ-3 – with the correct firmware in the prop controller – can be triggered thusly:

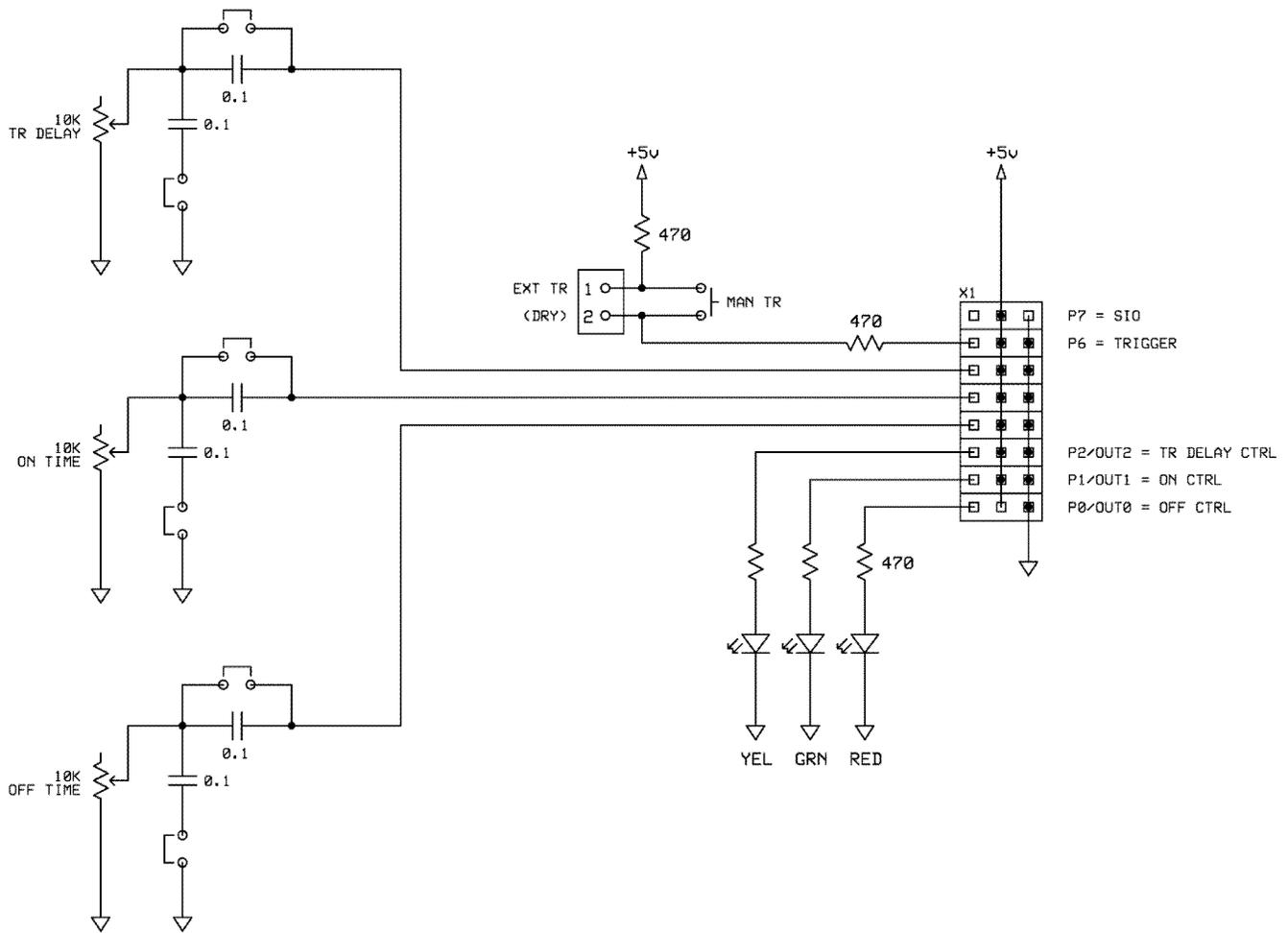
1. Press the MAN TR (manual trigger) button
2. Connect a N.O. button or switch (e.g., mat switch) to the EXT TR (external trigger) terminal block
3. Connect a N.O. or active-high device (e.g., PIR sensor) to the TRIG header (P6)

EFX-TEK recommends that the input on P6 be debounced to prevent false triggering on a spurious input. See the demonstration program at the end of this document for an example of input debouncing.

## MECHANICAL SPECIFICATIONS



## EZ-3 Schematic



## Accessories

805-00035 14" Extension Cable  
 805-00175 68" Extension Cable

## Additional Applications

For additional ideas and application notes for the EZ-3 Timer Control Board be sure to visit us on the Internet at the following links:

[www.efx-tek.com](http://www.efx-tek.com)  
[forums.efx-tek.com](http://forums.efx-tek.com)

## Errata

## Demonstration Program

The following Prop-1 program allows the EZ-3 to control a standard, 3-stage timer application. The trigger delay time may be set from zero to 10 seconds, the on time from 1 to 60 seconds, and the off time from 1 to 20 seconds.



**NOTE:** If you'd like custom timing for a 3-stage application using the EZ-3 simply post a programming request with details in our Tech Support forums.

```
' =====
'
' File..... EZ-3_Standard.BS1
' Purpose...
' Author.... EFX-TEK
'           Copyright (c) 2009 EFX-TEK
'           Some Rights Reserved
'           -- see http://creativecommons.org/licenses/by/3.0/
' E-mail.... teamefx@efx-tek.com
' Started...
' Updated... 01 MAR 2009
'
' {$STAMP BS1}
' {$PBASIC 1.0}
' =====

' -----[ Program Description ]-----
'
' Standard 3-stage timer application.
'
' Trigger Delay... 0 TO 10 seconds
' On Time..... 1 TO 60 seconds
' Off Timer..... 1 TO 20 seconds
'
' For best accuracy of each stage you should run the POT Scaling program
' from the Run menu for each stage. Set the scale value into the POT
' instruction for each stage.
'
' Trigger Delay... Pin 5
' On Time..... Pin 4
' Off Timer..... Pin 3
'
' Turn each pot fully clockwise and use the scale value provided. The
' scale value will be around 100 but will vary from pot-to-pot based on
' minor component differences.

' -----[ Revision History ]-----

' -----[ I/O Definitions ]-----

SYMBOL Sio           = 7           ' SETUP = out; no ULN
SYMBOL Trigger       = PIN6        ' SETUP = DN
SYMBOL AdjTrDelay    = 5           ' on delay (no ULN)
SYMBOL AdjOnTime     = 4           ' run time (no ULN)
SYMBOL AdjOffTime    = 3           ' off delay (no ULN)
SYMBOL TrDelay       = PIN2        ' trigger delay output
SYMBOL OnTime        = PIN1        ' on time output
SYMBOL OffTime       = PIN0        ' off time output
```

```

' -----[ Constants ]-----
SYMBOL  IsOn          = 1          ' for active-high in/out
SYMBOL  IsOff         = 0

SYMBOL  Yes           = 1
SYMBOL  No            = 0

' -----[ Variables ]-----
SYMBOL  timer         = W0
SYMBOL  negFlag       = BIT15

SYMBOL  tix           = W1

' -----[ Initialization ]-----
Reset:
  PINS = %00000000    ' clear all
  DIRS = %00000111    ' set outputs

' -----[ Program Code ]-----
Main:
  timer = 0           ' reset timer

Check_Trigger:
  PAUSE 5             ' debounce input
  timer = timer + 5 * Trigger    ' loop pad
  IF timer < 100 THEN Check_Trigger    ' update timer
  IF timer < 100 THEN Check_Trigger    ' wait for 0.1 sec input

' Trigger delay is 0 to 10 seconds
' -- convert pot span (0 to 250) to 0 to 100 "tix"
' -- tix = timer x 0.4

Trigger_Delay:
  POT AdjTrDelay, 100, timer    ' raw input, 5 to 255
  timer = timer - 5             ' correct low end offset
  IF negFlag = No THEN Run_TD
  timer = 0                     ' fix roll-under

Run_TD:
  IF timer = 0 THEN On_Time     ' skip if zero
  tix = timer ** $6666         ' tix = timer x 0.4
  TrDelay = IsOn
  GOSUB Delay_Tix
  TrDelay = IsOff

' On time is 1 to 60 seconds
' -- convert pot span (0 to 250) to 10 to 600 "tix"
' -- tix = (timer x 2.36) + 10

On_Time:
  timer = 0
  POT AdjOnTime, 100, timer
  timer = timer - 5
  IF negFlag = No THEN Run_OT
  timer = 0

Run_OT:
  tix = timer * 2              ' tix = timer x 2

```

```

timer = timer ** $5C28          ' x 0.36
tix = tix + timer              ' tix = timer x 2.36
tix = tix + 10                 ' set low end
OnTime = IsOn
GOSUB Delay_Tix
OnTime = IsOff

' Off time is 1 to 20 seconds
' -- convert pot span (0 to 250) to 10 to 200 "tix"
' -- tix = (timer x 0.76) + 10

Off Time:
timer = 0
POT AdjOffTime, 100, timer
timer = timer - 5
IF negFlag = No THEN Run_XT
timer = 0

Run_XT:
tix = timer ** $C28F          ' tix = timer x 0.75
tix = tix + 10                ' set low end
OffTime = IsOn
GOSUB Delay_Tix
OffTime = IsOff

GOTO Main

' -----[ Subroutines ]-----

' Delay in 0.1-second units
' -- put delay in "tix" before calling

Delay_Tix:
IF tix = 0 THEN DT_Exit
PAUSE 100
tix = tix - 1
GOTO Delay_Tix

DT_Exit:
RETURN

```