

# Magneto Synchronizer

(Dual magneto timer)

## Features:

- \* Computer controlled
- \* LEDs and audio
- \* Auto turnoff
- \* Low battery indication
- \* Indicates three states.

Open points: Lights and tone on (detects inductance)

Closed points: Lights and tone off (detects short)

Unknown state: Lights blinking and tone pulsing (detects neither inductance or short)

The unknown state, normally means magneto synchronizer is disconnected from magneto.

Can also mean coil of magneto is missing or failure of magneto or synchronizer.

Synchronizer must detect inductance of coil before indicating points open.

Synchronizer turns off after about 10 minutes of inactivity.

When battery is low synchronizer plays "taps" then shuts off.

Directions for timing magnetos:

Warning- Disable engine by disconnecting ignition wires from spark plugs or removing spark plugs.

1. Disconnect the negative terminal of the battery.
2. (Warning) Disconnect ignition wires from spark plugs or remove spark plugs to disable engine.
3. Locate timing marks or install protractor.
4. Position piston at TDC on cylinder #1 on the compression stroke.
5. Turn propeller backwards past the timing position for running.
6. Turn the magneto switch to the "both" position.
7. Connect the ground lead(black wire) of the magneto synchronizer to the case of a magneto or the engine.
8. Connect the other leads(red or green) of the magneto synchronizer to the primary leads (the ones going to the mag switch). In order to connect magneto synchronizer lead to magneto it may be necessary to disconnect the primary leads from the magnetos. Some magnetos have a safety grounding spring inside the mag which grounds the mag if the primary leads are disconnected. This must be defeated while timing mag.
9. Turn the prop in the direction of running. The lights should go from off to on(but not blinking) when the timing marks are reached. If not, adjust magnetos, repeat step #5 and check again.
10. Be sure that primary leads are connected to the mag switch and the mag switch is in the off position before returning aircraft to service.

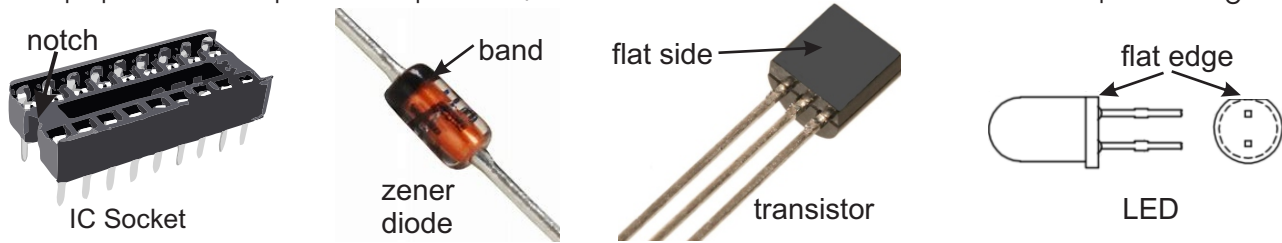
## Warning:

Disable engine by removing spark plugs or wires from engine before using magneto synchronizer.

## Steps for Assembly:

1: Read how to solder below.

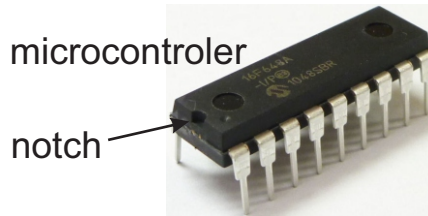
2: Find paper with components taped to it, and IC socket and circuit board that is in zip lock bag.



3: First solder IC socket on to circuit board observing notch position. While observing flat side of LEDs, flat side of transistors and band on zener diodes, solder all components on paper.

4. Wire up circuit as shown on page 2.

5. While observing the notch on the Pic16HV540 microcontroller with the notch printed on the circuit board, Insert microcontroller into the IC socket.



6: Connect battery and switch on. If circuit does not work, disconnect battery and see troubleshooting below.

### Troubleshooting:

The most common problem is bad solder joints. Cleaning circuit board with flux remover or carburetor cleaner makes spotting bad solder joints easier. Use magnifier if necessary. Look closely, they can be hard to spot.

Touching circuit connections can cause erratic behavior or the circuit to stop working completely.

*If fuse gets hot:*

*The IC or the battery leads may be backwards.*

*If device plays "taps" (indicating low battery):*

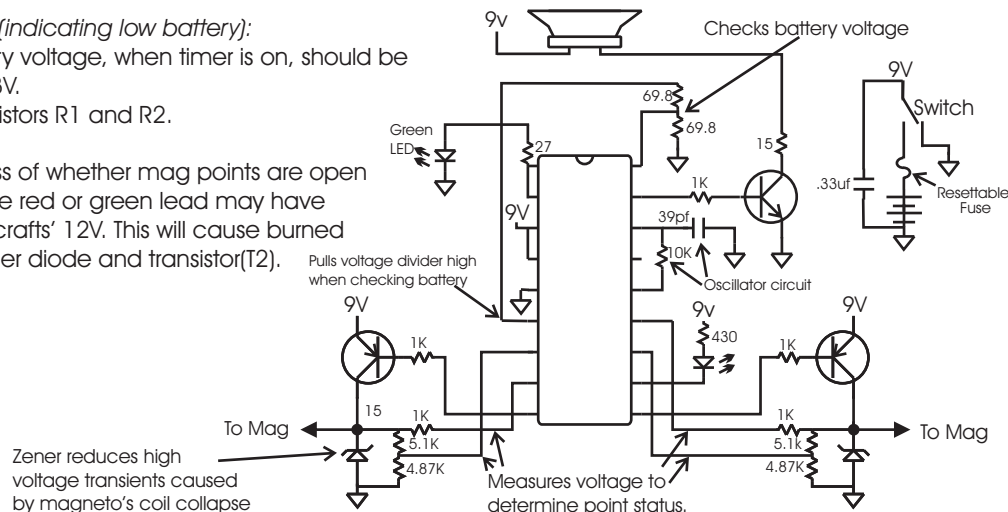
A: The battery voltage, when timer is on, should be above 5.3V.

B: Check resistors R1 and R2.

If light blinks regardless of whether mag points are open or closed, then the red or green lead may have contacted the aircraft's 12V. This will cause burned traces, ruined zener diode and transistor(T2).

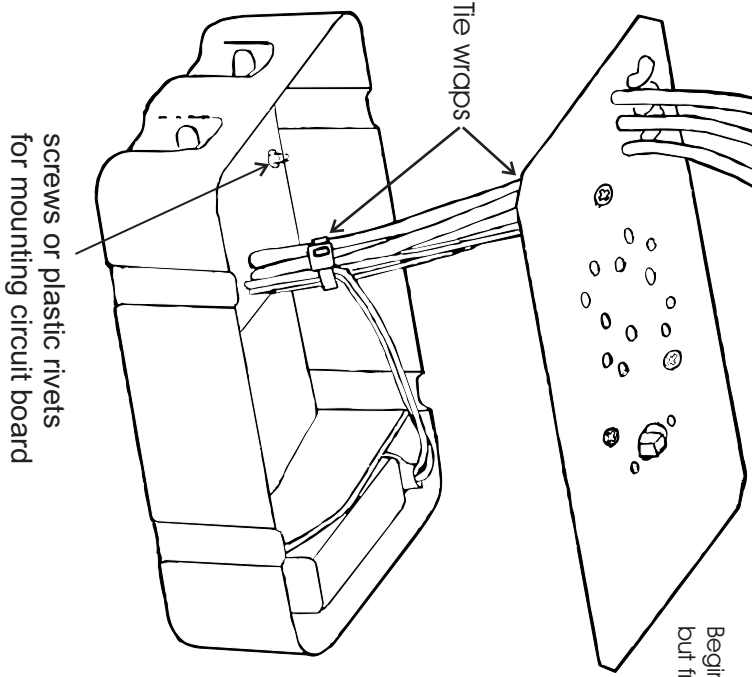
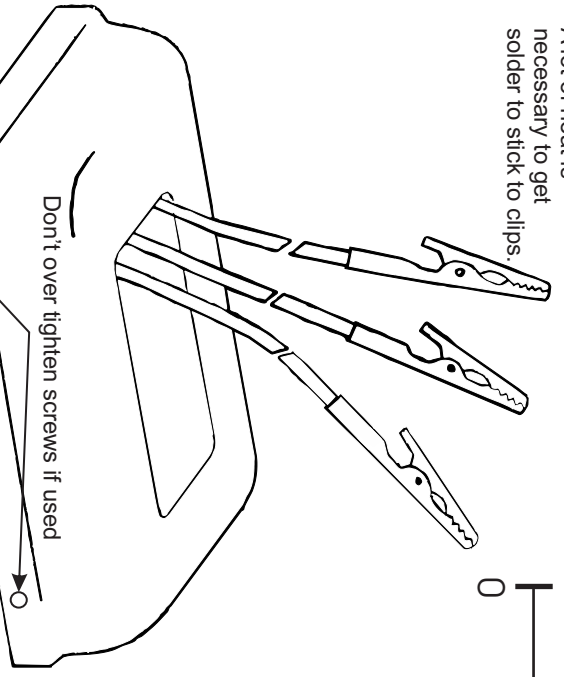
### How to solder:

Use only rosin core solder. Keep soldering tip clean. Soldering iron and solder should be applied to connection at the same time, reducing the time heat is applied to the solder. Apply heat just long enough for the solder to flow well over the pad and component lead. Unless you are fast, solder should not be applied to soldering iron first. If the solder is heated too long the resin burns out leaving a poor solder joint. Sometimes adding new solder to old solder can fix the solder, but if you have too much then remove most of the solder and try again. Solder can be removed with solder wic. Overheating causes copper separation and may damage components.



**Warning:** Disable engine by removing spark plugs or wires from engine before using magneto synchronizer.

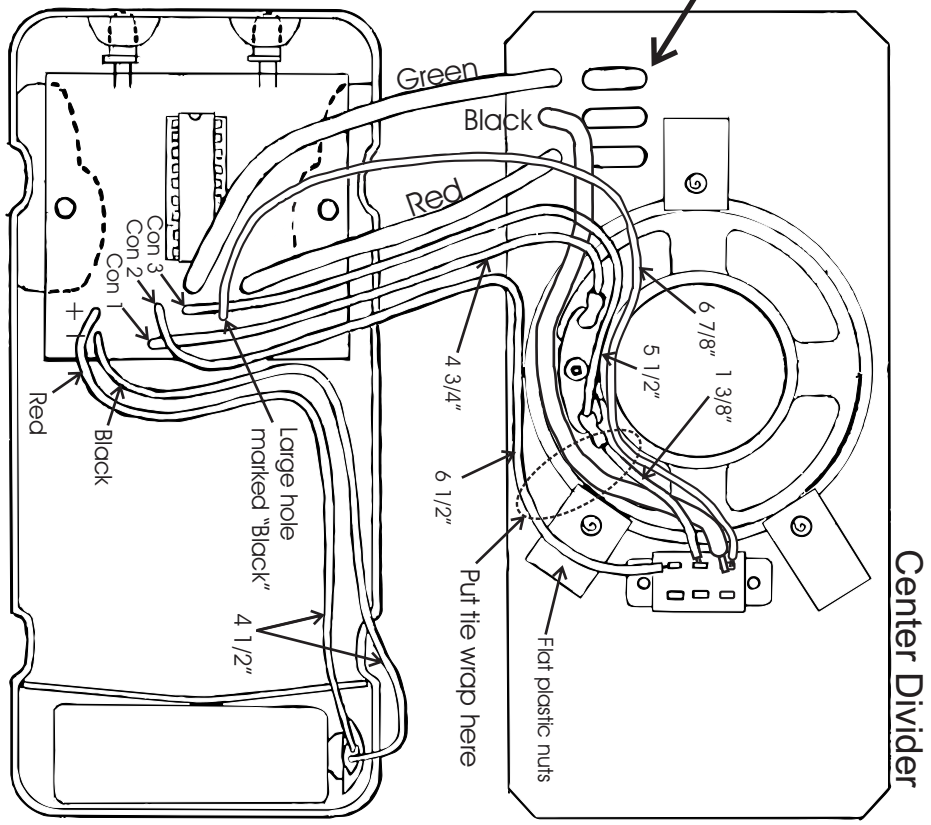
Solder wires to clips.  
A lot of heat is  
necessary to get  
solder to stick to clips.



**Steps:**

- 1: Cut the small wire into these lengths 1 3/8", 4 3/4", 5 1/2", 6 1/2" and 6 7/8". Cut battery leads to 4.5".
- 2: Insert the test lead wires (larger wires), by holding wires (4 3/8" for red and green, and 4 5/8" for black) from the end and insert into the center divider from the top. Then weave the wire through the other two holes. See drawing below.
- 3: Mount the speaker and switch on the center divider.
- 4: Solder wires as shown in drawing.

Begin weaving wire here,  
but from other side.



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I

R4 15

Red LED

R3 430

R2 69.8

R1 69.8

Green LED

R9 24

C1 39pf

T1 mps2222a

R10 10k

R6 4.87K

R7 5.1K

R7 5.1K

R11 1K

R11 1K

R11 1K

R11 1k

R11 1k

T2 2907A

T2 2907A

R6 4.87k

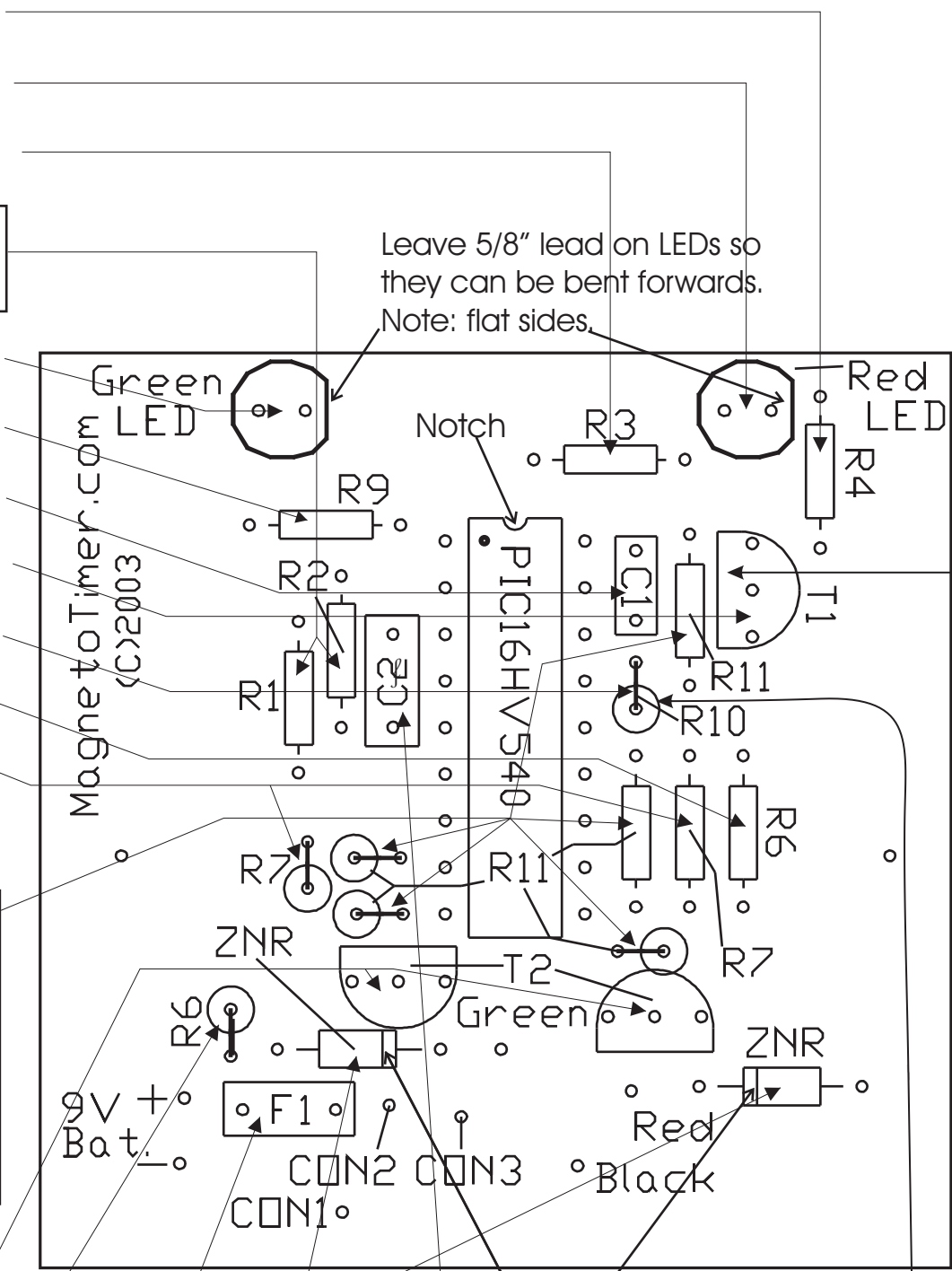
ZNR 1N4738A

ZNR 1N4738A

F1 R020 Resettable fuse

C2 .33uf

T



Leave 5/8" lead on LEDs so they can be bent forwards.  
 Note: flat sides.

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Not  
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This symbol indicates resistor is mounted vertically

Note: bands on zener diodes

## **PARTS LIST for magneto synchronizer kit**

### ***Items on other side of this paper:***

Blue resistor are 1%. Use ohm meter to identify resistors if necessary.

- 1- R1 69.8 ohm resistor 1% (blue,white,grey,gold,brown)
- 1- R2 69.8 ohm resistor 1% (blue,white,grey,gold,brown)
- 1- R3 430 ohm resistor (yellow,orange,brown,gold)
- 1- R4, 15 ohm resistor (broun,green,black,gold)
- 2- R6 4.87k ohm resistor 1% (yellow,grey,violet,brown,brown)
- 2- R7 5.1k ohm resistor 1% (green,brown,black,brown,brown)
- 1- R9 24 ohm resistor (red,yellow,black,gold)
- 1- R10 10k ohm resistor 1% (brown,black,black,red,brown)
- 5- R11 1k ohm resistor (brown,black,red,gold)
- 1- T1 NPN transistor (mps2222a)
- 2- T2 PNP transistor (2907A)
- 1- C1 39pf capacitor (39)
- 2- ZNR 8.2V zener diode (1N4738A)
- 1- green LED
- 1- red LED
- 1- F1 .4amp PTC resettable fuse (R020, very small writing)
- 1- C2 .33uf capacitor (334)

### ***KITS with case:***

#### Items in Zip Lock Bag:

- 1- switch
- 2- small switch screws
- 1- circuit board
- 1- PIC16HV540 microcontroler
- 1- IC socket 18 pin
- 1- battery clip
- 3- tie wraps
- 5- screws for speaker and circuit board
- 3- plastic speaker nuts

#### Other items:

- 3- alligator clips
- 1- speaker
- 1- green test lead wire
- 1- red test lead wire
- 1- black test lead wire
- 1- small hookup wire 30"
- 1- set of instructions
- 1- plastic battery retainer
- 1- plastic case (3 pieces)

### ***KITS without case:***

#### Items in Zip Lock Bag/s:

- 1- switch
- 2- small switch screws
- 1- circuit board
- 1- PIC16HV540 microcontroler
- 1- IC socket 18 pin
- 1- battery clip
- 3- tie wraps
- 3- alligator clips
- 2- LED holders(2 or 4 parts)

#### Other items:

- 1- speaker
- 1- green test lead wire
- 1- red test lead wire
- 1- black test lead wire
- 1- small hookup wire 30"
- 1- set of instructions

