Magnet ----->
(South pole is up)

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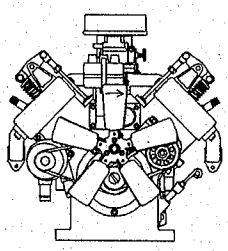
Hollansburg, OH 45332



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Quality Model Project Plans

Model Engine TIM-6 Transistor Ignition System

Some years ago, Floyd Carter of Los Altos, California designed a Transistor Ignition Module for 3.6 volt operation, the TIM-4. I modified it to operate on 6 volts and call it TIM-6. It is a very effective and inexpensive ignition system for model engines. If you use the TIM-6 on an engine with conventional points, remove the condenser as it is not needed. If your engine is a slow running hit-and-miss type and a smaller and less conspicuous point system is desired, use any quality micro switch. For the ultimate in reliability and concealment on any type engine, the magnetic Hall Effect sensor can't be beat as there are no mechanical moving parts. This parts kit includes: (1) TIP42C transistor, (1) 2N2907A transistor, (3) 100 ohm 1/4 watt resistors, (1) 7.5 ohm 1/2 watt resistor, (1) 270 ohm 1/4 watt resistor, (1) Timing LED, (1) 3 Amp. 40 volt diode, (1) Hall Effect sensor, (1) Vinyl tubing to insulate Hall leads, (1) Nickel Plated Rare Earth Magnet 1/8" diameter by 1/16" thick and (1) drilled and trimmed TIM-6 printed circuit board.

Do not allow the magnet to come within close proximity to the transistors as they could be damaged by strong magnetic fields - even from a magnet this small. All parts are manufactured by quality name brand suppliers to the electronics industry and they WILL be good when you receive them. Since there are lots of ways to destroy electronic devices - over heating during soldering, wrong connections, short circuits, static electricity, etc., take care, but if you do damage a component I can supply another one at low cost.

Nothing is difficult about assembling this kit. The drawings on sheet 2 show the component placement. Bend the leads of the TIP42C and the 2N2907A transistors down at a 90 degree angle before inserting them into the board. The tab on the 2N2907A transistor will be pointing up as shown. Install the resistors so they are also against the circuit board. I grip each transistor lead on the top side of the board with heavy tweezers as the soldering is done. This acts as a heat sink to help prevent damage to the transistors. The resisters don't need this treatment as they are not normally damaged by soldering heat. Use a hot soldering pencil iron and small diameter rosin core solder. Make the connections quick before the heat has time to conduct through the lead and into the components. Solder the battery leads to the board last. Use stranded wire as large as will go in the circuit board holes. You can solder the Exciter coil leads directly to the board. You should use very small wire for the Hall Sensor. Trim the component leads on the bottom of the board as close as possible with diagonal cutters. Carefully check the circuit traces with magnification to be sure there are no solder bridges across them. Clean all the solder flux off the board with alcohol and an old toothbrush.

When the proper pole (south) of a magnet passes close by the front side (printed side) of the Hall Effect device, the device will turn "ON" just like any other switch. The only difference is that the Hall Effect device can only control a very small current - not nearly enough to operate an ignition coil. Transistors are also On/Off switches that can be activated by small currents and are used here to amplify the controlled current. The Hall Device can turn "ON" the 2N2907A transistor which can carry enough current to turn "ON" the TIP42C transistor which can carry enough current to energize a model engine coil. When the magnet moves away, the Hall Effect sensor turns "OFF" and so the transistors turn "OFF" too. That is when the coil produces a spark - equivalent to conventional points opening.

The Hall Effect device can be mounted up to 12 inches or more from the circuit board. The wires should be tightly twisted to resist spark interference. I drill a shallow pocket in the cam gear for the magnet so it will be flush with the surface and "south pole" side up. If the cam gear is iron or steel (magnetic) you will need to separate the magnet from the iron by about 1/8" or so with a non magnetic spacer material such as aluminum, brass or plastic. Another way is to flush mount the magnet in a plug of one of the above materials which is imbedded in the cam gear. The Hall Effect device should be mounted so that it will be within about 1/32" of the magnet when it passes by. If you mount the sensor on a pivoting arm, you can have adjustable spark advance and retard. On a two cycle engine mount the magnet on the flywheel back face. The farther the magnet is away from the crankshaft/camshaft, the shorter the time the coil will be energized (dwell). Too short a dwell time may cause a weak spark or no spark at all, too long a dwell is a waste of battery and over heats the coil and the TIP42C. More dwell angle information is on my TIM-6 web page.

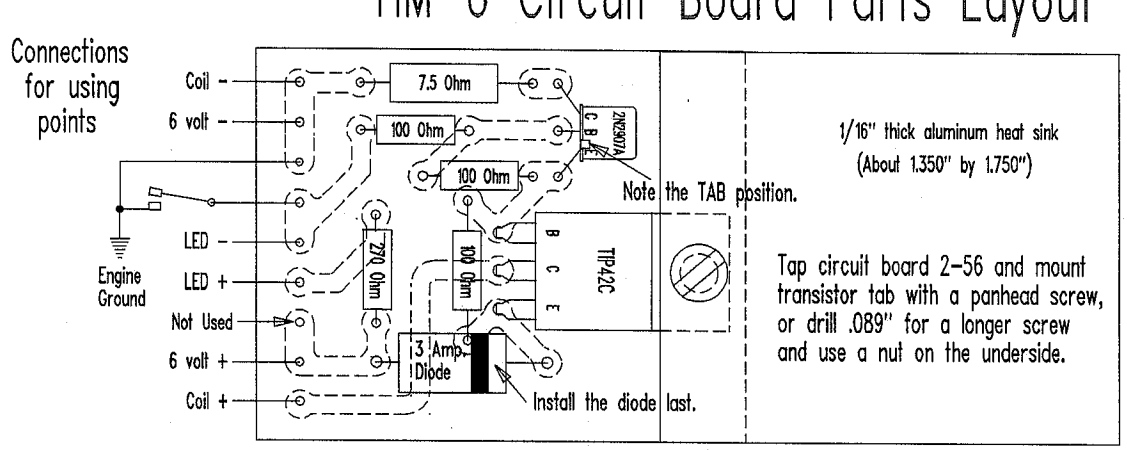
Do NOT attempt to use automotive or other such coils unless you are able to determine their primary winding resistance and then determine the value of an appropriate ballast resistor. Miniature coils especially made for model engines are a much better choice and these should be used with TIM-6. They are small, easy to hide and they don't draw a lot of amperage from your battery.

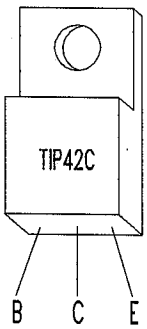
If the TIP42c heat sink gets too warm during operation - which normally shouldn't happen - check the dwell time, provide air movement to the heat sink, select another coil that draws less current (higher primary winding resistance) or use a higher ohm rated ballast resistor, etc.. Remember, heat kills electronics! Mount the TIM-6 where it can get cooling air, not in a confined space. Don't mount the heat sink to the engine frame because the transistor tab is NOT engine ground and also because the engine will get hot!

VERY IMPORTANT - ALWAYS provide a ground wire from the engine frame to the circuit board as shown on the diagram or to the negative battery terminal. Without a ground wire, the circuit board components will be destroyed and if you are using the Hall sensor, it will also be destroyed by the coil high voltage. Bends in the Hall leads must be 1/16" away from the Hall body to prevent stress damage inside the device. Tightly twist the wire leads form the Hall Sensor to the circuit board to help protect from electrical interference. Route the Hall wire leads as far away from the coil and the spark plug wire as possible. Check proper installation of all components before applying battery power.

Thank you, *JEH*

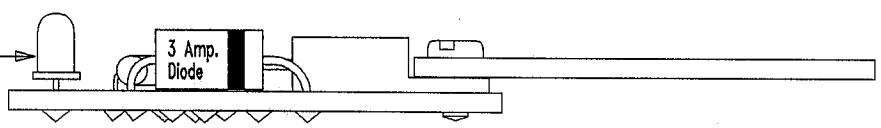
TIM-6 Circuit Board Parts Layout

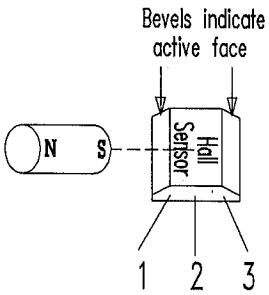




Components on top of board showing traces on bottom and heat sink.

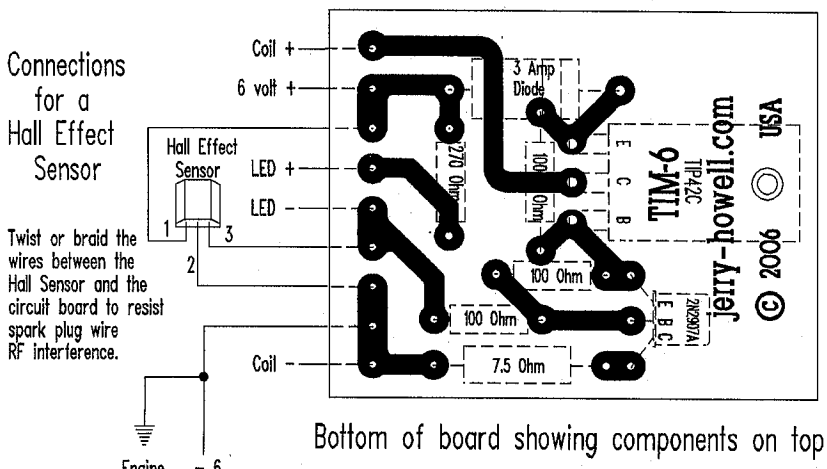
The timing LED is best remote mounted for easy monitoring, but may be mounted directly on the circuit board as shown.



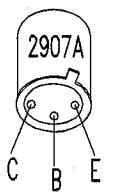


Edge view of module

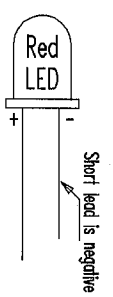
The heat sink may not be absolutely necessary, but I consider it a safety to protect the TIP42C in the event that unusual circumstances cause it to heat up. That is what the mounting tab is for!



Bottom of board showing components on top



Resistor Color Codes
7.5 Ohm = Voilet-Green-Gold
100 Ohm = Brown-Black-Brown
270 Ohm = Red-Violet-Brown



TIM-6