Studebaker HEI electronic ignition

This article is intended to give the reader sufficient information to convert a Prestolite distributor to High Energy electronic ignition. It is based on an article from Bob Johnston’s Studebaker website, however they use the original Chrysler capacitor discharge to fire the coil. There are aftermarket modules (Pertronix, etc) but not specifically for the single point Prestolite. I used a HEI module which is easier and better and this is another way of achieving a reliable ignition with easily obtainable parts. The pickup coils in these distributors are bullet proof as well as the e12-80 Hitachi module. The pickup ex US AU$30, Reluctor $5 Etc.

First you need to obtain an electronic distributor from a Chrysler big block. (440, 460, etc) I picked up the complete distributor for $50. Remember it must be the US Mopar CCW rotation unit, not Bosch. These units were used from the early 70’s and were on heaps of US cars including Dodge and Plymouth just to name two. From this distributor the parts below are removed and cleaned.

Set your Stude to TDC No1 on the compression stroke before removing your existing distributor.

Note the spade terminals on the end of the leads have been added. The original bullet connectors removed.

I spent some time looking for HEI modules and was about to buy a GM HEI module when I came across a US website about converting Nissan 280zx Distributors to run in early 240z’s. Here they used the GM module but found it not good above 4500RPM (v8).

Stupid me!! It does not matter if the module is from a V8 or 6 cylinder, it’s irrelevant; it just triggers the coil as required by the pickup. The pickup produces a signal to trigger module to fire the coil. The signal from all these pickups is somewhat sinusoidal and it should not matter what sort of pickup is used on a particular module. Some newer pickups use a coil with eight spikes on a ferrite surround to produce the signal. All that is needed is a four pin module. Here they used the GM module but found it was not good above 7500RPM on a 6cyl and it requires up to 10, 0000RPM. So the GM module is OK on a V8 up to 5,500 RPM.

The module they raved about was the Hitachi E12-80 but it was very rare. This module was used on early Bosch L-jetronic fuel injected cars and has a built in dwell control to increase dwell at high revs to allow the coil to charge properly. This unit is ideal for carbureted engines.
So I thought it worthwhile checking my pile of L24 Nissan distributors. Well they may be rare in the US but I had a few of them. So I had all that was required right under my nose. The Website said they had tested this module against aftermarket HEI and MSD ignitions and them to have advantages over the Hitachi module, and it was good up to 10000RPM. (On a six cylinder engine) So it will handle up to 75000 on a V8. After installing my distributor it fired up straight away so I took it for a test run. It was not right and I could not understand it. It appeared to have some sort of timing issue, like insufficient advance. I put the timing light on and watched as I revved it. To my horror the centrifugal advance went backwards for about 15 degrees and then back to TDC. After pondering it for some time I suspected it had to be the module. It was mechanically impossible. In desperation I swapped over the green and black wires into the module and bingo was then OK. It appears that these modules have some built in spark advance and if the polarity of the trigger is wrong you get retard instead. I tweaked the weight springs a little bit. Be aware of this and check the module you use. It may be necessary to limit the mechanical advance by modifying the slots in the reluctor shaft or spring mods to delay advance. This needs to be determined on test driving the car. So your next trip is to the wreckers to get one of these modules. (1980-1984 Nissan) Get the coil also as I will explain later. Don’t forget to get the plug and the two small spade terminals that plug into the back. In the photo above (Fig 2) you can see the module mounted on an aluminium plate.

The modifications
1. Make a bracket as shown in Fig 2

![Figure 3](image)

Make the bracket and drill and tap two holes to suit in the bottom of the distributor housing as shown.

Drill and tap 3/16 UNC

2. With the empty distributor insert and mount the pickup plate using the hole which lines up opposite to the one in the photo below

![Figure 4](image)

The pickup plate is almost identical to the original prestolite. You need position and mark this hole then drill to suit.
3. Make the cap locator and clip tab as shown below.

Here are the two parts I made to locate the cap and clamp it down. Use the cap to fabricate the locator and position it over the vacuum advance mounting hole, mark and drill it to suit. Note that it is slotted to allow a bit of fine tuning. The other bracket is for the cap clamp. Keep one original clamp as is and remove one from its mounting lug to use on this new lug.

Figure 5

The positioning or phasing of the rotor button and the cap took a bit of mucking about. I found when I modified the distributor according to the original info the phasing was incorrect and the distributor misfired on the bench. Without going into too much detail I had to cut a big hole in the top of an old distributor cap just next to one of the spark plug sockets. Running it on the bench with a timing light pointed into the hole made it easy to rotate the cap to get the spark jumping at the right spot. Note that this position varies with vacuum advance so it needs to be accurate. Some rotor button heads are hammer shaped to allow greater flexibility but V8’s have less room for this. When it was all done I recon I could have got it near enough by ear by just listening to the spark jumping. So the lugs in Fig 5 were a result of this process.

4. Cut the locating lug off the vacuum advance mechanism.
5. Modify the cable entry by cutting a slot down into the existing hole. See Fig 7

Here you can see the pickup plate in position. You need to cut a slot down into the existing cable hole to accept the Mopar grommet from the coil. Solder the small spade terminals onto the lead ends.

Here is the cap locator and the clamp in place. The cap locator was cut off the vacuum advance.

The Reluctor is used on many distributors and has two roll pins to locate it.

On the other side of this Reluctor is an arrow marking CW Rotation. This is a CCW rotating distributor so the long roll pin must be installed.

Install long roll pin this side

Drill and tap for cap clip

Figure 7

Figure 8
Assembly

After you have finished all the mods Pull it all apart and clean the components. To start assembly install the Mopar (Chrysler advance weights onto the existing shaft. These weights have bushes in them and are a perfect fit on the existing shaft. Bend the spring retainer tab for the light spring out a little with a pair is needle nose pliers to ensure the weight is fully retracted. On the heavy spring bend the tab out the same amount but note that spring has an elongated eye on one end. This will leave the weight loose when installed but when the rotor shaft is installed you will notice that the light spring handles the advance up to a point and then as the shaft is rotated the heavy spring is added to the mechanism producing a two stage advance curve. After discovering the module has some inbuilt advance I tweaked the heavy spring tab to make the spring activate when the pin is halfway out in the slot. This delays the final advance well beyond the point being a worry, (about 4000 RPM) You can play about with this setting and put marks on the harmonic balancer to achieve the desired result but I found this ideal. The best result is to have as much advance as possible without detonation (pinging). The vacuum advance curve is close enough to the Stude one. Next put the Reluctor shaft over the top spreading the weights to engage the weight pins in the slots. Don't forget the nylon spacer below the Reluctor shaft. Assemble the rest as per the photos above.

Use the Chrysler rotor and the Stude cap. On the coil run a wire from the ignition switch to the positive and from the coil positive to “B” on the module, and from the negative on the coil to “C” on the module. The Tacho wire goes to the coil negative also. Something that has always bugged me was the gasket that goes under the distributor so I fixed that while I was at it and machined an “o” ring groove.
Now just a few notes on coils and other matters.

A points system usually runs a ballast resistor. This is used to lower the voltage across the points to increase their life. IE, to prevent wear or erosion at higher voltages. The HEI module requires 12v to operate correctly so it is better to run 12v to the coil from the ignition switch without the ballast resistor.

On a points system the dwell angle is very important. It is the dwell time or the time the points are closed which charges the coil. As the RPM increases the amount of time the points are closed reduces and the spark can suffer. All coils are different. The primary and secondary resistance, inductance, and ratio all vary from coil to coil. So the modules built in dwell is matched to coil to give maximum spark. These solid state devices can be likened to an amplifier and the coil to a set of speakers. If you use speakers with too low impedance they will destroy the output stage of the amplifier. Likewise a coil of with low impedance will most likely destroy the driving module, or at least cause it to overheat and malfunction.

So to cut it short don't use any old coil or a special Bosch GT40 or similar. Use the coil designed to run with the module. Whichever module you use be it GM or other get the coil as well.

Allan Tyler.