ND DISTRIBUTOR STEP BY STEP CONVERSION INSTRUCTIONS

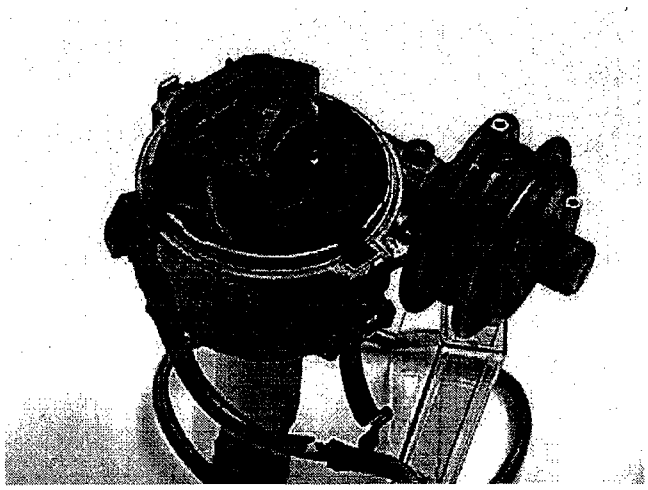
This kit will allow you to replace the stock single pickup with two stock pickups and remote mount the stock control modules or use other control modules with the stock pickups.

These instructions are thought to be sufficient to allow the required modification. Comments and corrections are appreciated and may be sent to the email address on the front page.

The kit contents are listed below:

1. One new distributor plate, 6061 T6511 alodine finish with stainless steel roll pins and tapped holes.
2. One new vacuum advance hole plug, Black Delrin with tapped hole.
3. Six 8-32 x 3/8 screws with captive washer and lock washer.
4. One 10-32 x 3/8 screw with captive lock washer.
5. Six foot (approx.) Mil spec aircraft wire. Shielded twisted pair.(small)
6. One large Cable Tie.
7. Four small Cable Ties.
8. One length of small diameter black heat shrink tubing.
9. One length of medium diameter black heat shrink tubing.
10. One length of large diameter black heat shrink tubing.
11. Four red nylon cable clamps.
12. Six heat shrink solder ring wiring splices.
13. Six foot (approx.) Mil spec aircraft wire. Shielded twisted pair (large)
14. Eight "fast on" wire terminals for the control modules
15. Dist O ring 3 x 22 mm
16. Six feet #16 Mil spec aircraft wire
17. One length of small blue heat shrink tubing
18. One length of small yellow heat shrink tubing

Depending on how you make the conversion you may not use all the above items.



You will need a usable complete EA81 ND distributor and coil and a second set of the electrical modules and coil for your dual installation. The distributor shaft should have no more than 0.005" total side play. More side play will result in poor operation, as the pickup to reluctor gap will vary too much. Remove the rotor before checking for side play, as it may be that only the rotor is worn and loose.

The first step is to look at your distributor and note the location of the pickup module to the distributor case. Mark the case so that when you are ready to reassemble the distributor plate with both pickups, you will be able to set one of the pickup locations to the same place. This mark is only close to the final position, as the removal of the Vacuum advance will result in slight repositioning for the best position. This is covered later in the instructions.

This is important so the rotor will line up properly with the cap to permit the spark to occur with the proper rotor location. Do not proceed until you are sure you understand what is needed here and make a permanent

mark on the distributor housing rim. You will find the end of the pickup module near the screw holding the vacuum advance unit on the distributor. The pickup module is on the right in the picture. The control module, on the left of the picture, is secured in place to the inside of the case with two screws found on the outside of the distributor case.

Now carefully remove the small snap ring on the vacuum advance lever pin inside the distributor (keep a finger on it so it doesn't "fly" away). Then remove the screw holding the vacuum advance unit to the distributor and remove the unit. This may require some work if it has "frozen" in place.

Remove the two control module screws and then remove the two screws located 180 deg apart in rectangular cavities in the side of the distributor housing that hold down the stock pickup mounting plate. The small rectangular washers will be reused to hold down the new plate.

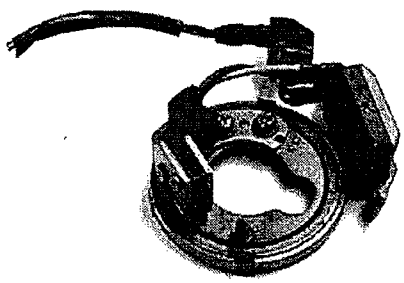
Slip the grommet with the wires from the module to the spark coil out of the side of the distributor and then remove the pickup and plate and wire connected control module from the distributor.

This is a good time to clean your old distributor. The top assembly can be removed by removing the black rubber plug in the top of the shaft and removing the screw that is inside (The plug has a small hole in it that can be used to extract it.). Removing the mechanical advance weight springs allows the top to slide off (take note of the orientation of these springs, they only fit properly "right side" up.). Both sides of this rotor look the same, but the "Book" says to replace it the same way and there is a stamped number under the plate for this purpose. There is a small pin that limits the advance and this pin has a plastic sleeve on it. Usually the plastic is already broken off, but can be removed anyway so parts of it cannot get in the wrong place later. This removal may allow a slight increase in the total mechanical advance if the above springs have no play, but since we are only interested in the spark setting at full advance, there should be no problem. The few I have checked had this plastic partly broken off already.

It would be a good idea to also drill out the pin on the cam gear end of the distributor and clean and lubricate this shaft also. You need to buy the special pin to reattach the gear. PN 391834302. This should only be considered if you have the skills to replace this pin as it is not as easy as it looks. Also replace the "O" ring on the distributor housing (included in this kit).

Now is the time to plug the two screw holes in the side of the case that were used to hold the control module. Countersinking both sides of the holes and using a good epoxy such as J B Weld will work well. Remember the inside must be flush when you are done or the plate will not slide into place.

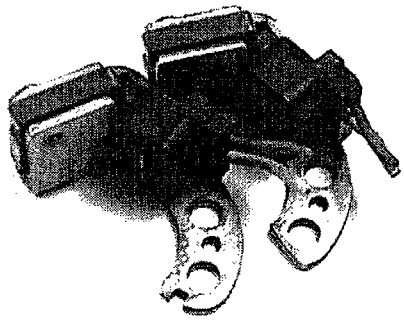
Lubricate the flyweight pivot bearings with engine oil and the shaft of the mechanical advance rotor assembly with CV or other quality grease and reassemble.



Remove the black plastic module and pickup protectors that are marked "DO NOT REMOVE" Cut the module apart from the pickup unit at the mid point of the red and white wires between them.

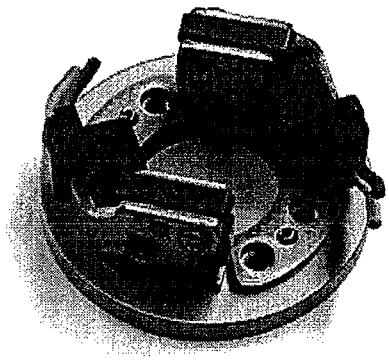
Set the control modules aside (these are the ones with the long external wires on the right that go to the coil.).

Grind, or cut and file the end of the pickups off as shown here. Make both pickups like the one on the right. If grinding, do not allow excessive vibration to damage the unit. Be sure to remove all the metal particles from the magnet areas.



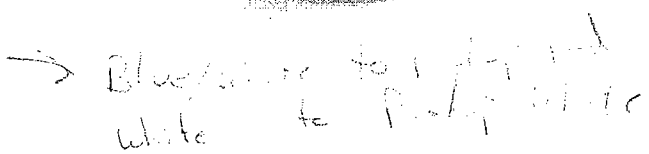
Test fit the pickups on the new plate.

Push the center pickup hole over the roll pin. This may be a tight fit the first few times. This tight fit is intentional to make the gap adjustment easier. Now carefully slip the new plate into the distributor. It is a close tolerance fit and the plate must be very straight or it will jam. Some of the newer distributors are 0.020" larger in diameter inside. If you have one of these you can wrap a thin strip of masking tape around the edge as a spacer. Having the pickups installed makes it much easier to do this. With the plate seated verify that you can rotate both pickups to a direct contact with the reluctor tips (no gap). If you need to grind more off the pickup ends, this is the time to do it.

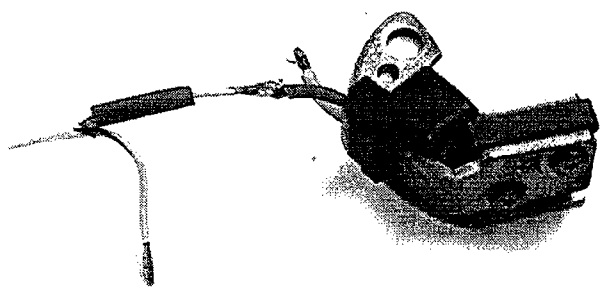


Now it is time to splice the new wire to the old red and white wires extending from the pickup units.

The supplied wire is colored differently and you need to record what you connect to what so the other end can be reconnected properly to the now externally mounted control module. This pickup will also work with some other control modules that use more modern electronics.

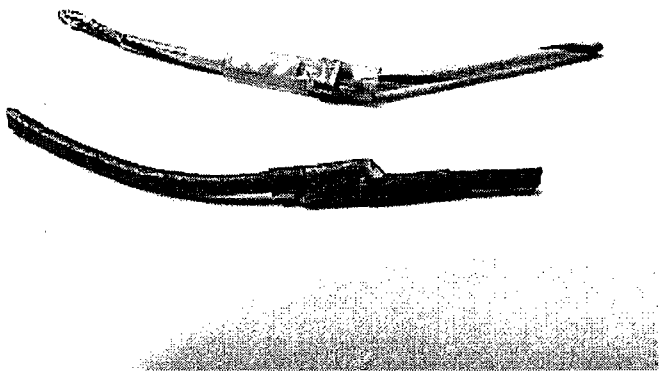


There are two methods of doing this. This kit supports both ways.



One way is the conventional method with the soldered joint covered with heat shrink tubing. Cut the supplied wire (smaller twisted) pair into two unequal lengths so that one piece is about 3 5/8" longer than the other. Strip the outer covering and the braided shield back about 1 1/4 inches. Cut 4, ¾ inch long pieces from the small heat shrink tubing. Note the picture shows red tubing and the kit has black.. Prepare (tin) the wire ends and before soldering them together be sure to slip one of the ¾ inch long tubes over the wire. After soldering, position the tubing over the solder joint and shrink in place. The shielding blade is cut off and not used at this end.

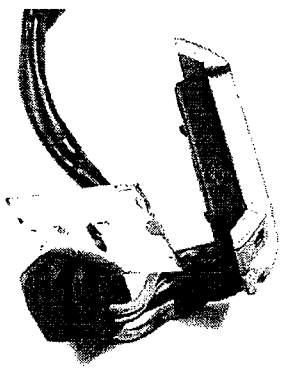
Another way is to use the small solder ring heat shrink splices supplied. These are higher temperature Teflon shrink material because of the need to melt the solder. The insulation on the wire will withstand the extra heat if you are careful. The kit has 6 splices and you only need four for the kit. There are two spare included to experiment with. The way to use these splices is to strip 1/8" to 3/16" of the insulation and push the wire in from each end with the ends overlapping where the solder ring is. Heating the sleeve will shrink the ends first and leave the solder ring unshrunk. Unless you have a concentrated small and hot air stream that is all that you can do with the hot air. The last part of actually soldering the joint can be done with a book match flame if you keep it moving. The final middle part will shrink and by wiping off the soot you can see the results through the sleeve. The solder should be seen as a fillet between the two overlapping side by side wire ends. There is not enough solder to cover and fills the wires except in the area where they touch. Now cut the sleeve off and inspect the solder joint. If you are happy with the results, use this method as it will be a stronger joint. The solder ring is not centered and the soft pickup wire should be inserted into the longer sleeve end for better support. The small heat shrink tubing is not used with this method. This method needs a small concentrated hot air source.

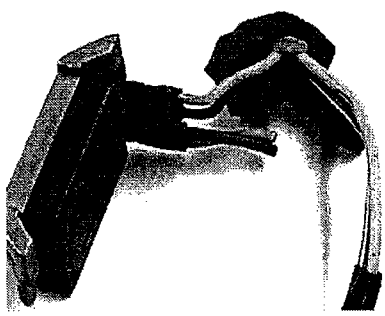


I recommend that you use the Weller Portasol Butane portable soldering tool with the hot air tip. Another tool is the "Ultratorch" 3 way heat tool by Master Appliance Corp. of Racine Wisconsin.

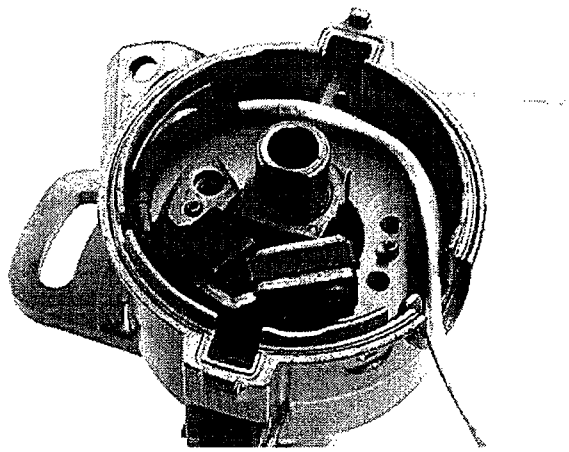
After both wires have been joined, cut the medium size heat shrink tubing in half and shrink it over the combined wire splices.

Now take the control module and using a sharp knife slit the rounded side of the rubber grommet to remove the wiring from the inside as shown below. This requires a bit of careful surgery complicated by an unusual plastic bit that is used to form the right angle bend of the two wires. You can use the old wires or replace the wires going to the module with instructions in the appendix. If you use the old wires be sure to repair any nicks in the insulation with suitable lengths of the blue or yellow shrink tube after cutting the leads to the right length to reach the coils and removing the right angle plastic bit.



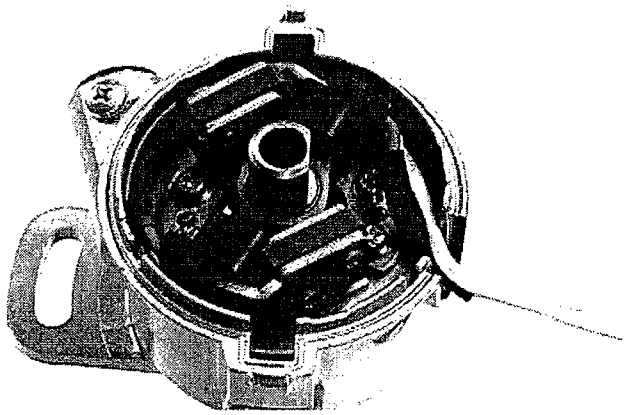


Now it is time to test fit the wired Pickups into the distributor. The first pickup is located approximately as shown with the wire looping around as shown. Use the 8-32 screws supplied with the kit. They will be tight the first time used, as the tolerance on the threaded holes is aircraft standards not automotive. Do not over torque, as the plate is aluminum. The screws are longer and thread the entire thickness of the plate



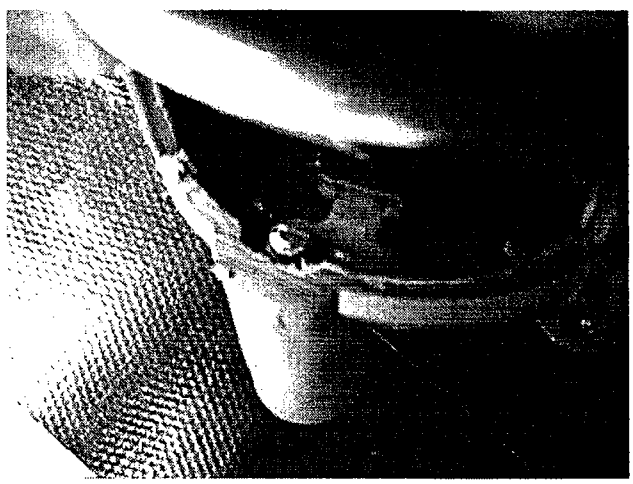
This is also a good time to install the plate hold down screws. The rectangular washers that were removed initially are used with the new 8-32 screws supplied with the kit. Do not tighten, as you will need to adjust the position of the plate and later remove the plate

The second pickup is now positioned with the wiring as shown running alongside that from the first pickup. Use the remaining two new 8-32 screws supplied with the kit.



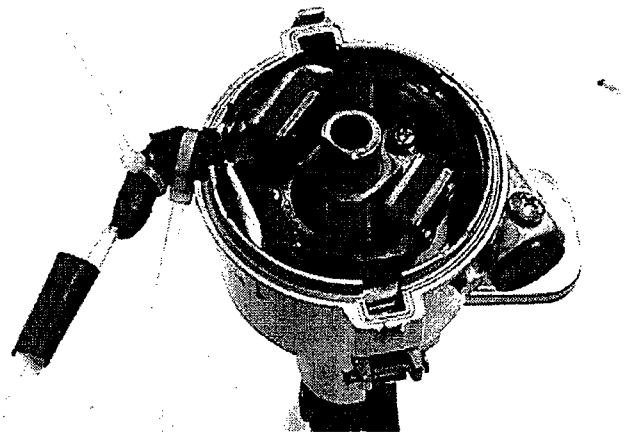
Both wires need to be bent to make the "U turn" inside the re-used grommet and through the slotted opening in the side of the distributor case. The final wiring bending and fitting into the grommet will be done later after the plate alignment is completed.

At this time take one of your old distributor caps and cut away the area around the lead for cylinder No 1 as shown here. A hacksaw was used on the cap shown. Another way of doing this is to drill a ½" or larger hole through the side of the cap just below the stud for cylinder #1 (most distributor caps are marked on top). A small rotary grinder (Dremel tool) can then be used to widen the hole enough to be able to see the position of the rotor inside. The cap and rotor are installed as shown. Line up the reluctor with the pickup metal poles. A zero gap will hold the pickup/plate in position. The picture is with the cap down and the rotor shown in the normal position. The plate must be rotated until the rotor is positioned so the mechanical advance moves the rotor end from one side to the other. The best position has the rotor overlap equal on both extremes of "no" to "full mechanical advance".

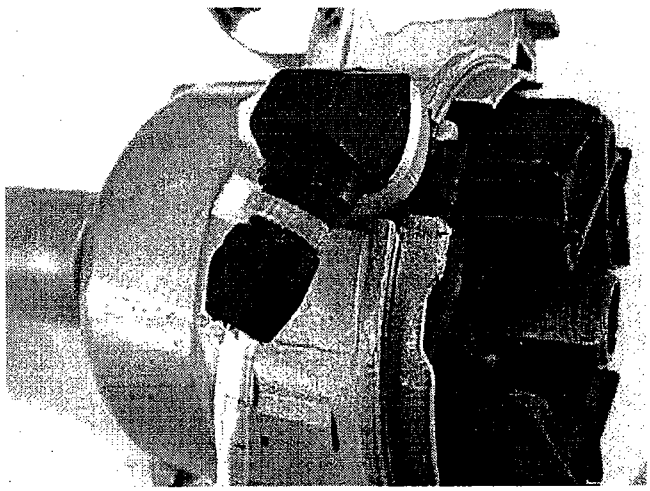


This may take a few tries to get where you want it. This step is very important, as the relationship of the rotor to the plug pickup post MUST be in line under the full range of advance. This is why the rotor tip is so wide. Now mark the plate position and or the pickup position so you can always remove and replace the plate to the exact position. A punch mark on the plate at one of the rectangular plate hold downs works for me.

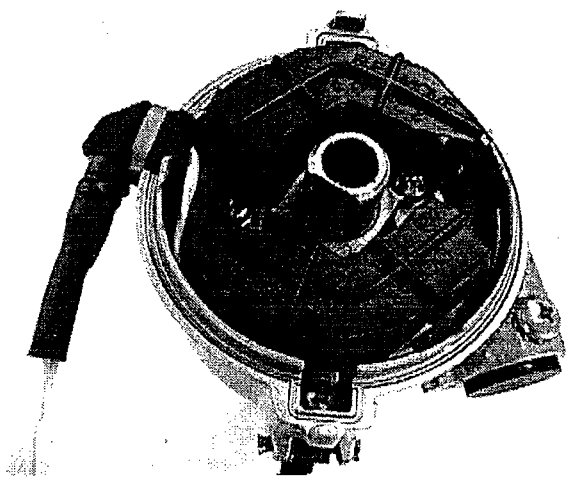
Now that the plate is located, one of the rubber bushing previously cut off the old module wires must be fitted to the new wires.



As the new wires are larger in diameter it is a good idea to carefully remove any molding flash from the inside of the rubber bushing. By use of sharp bends in the new wires they can be "forced" to mostly fit inside the bushing. It may take several tries to make the best fit. There will be a large gap where the bushing was slit, as the new wires are much too big to fit in the original depression. This is OK as there will be the distributor case slot and the large Cable Tie to help. The idea is to be sure that the new wires do not touch the case at the bottom of the slit in the bushing. Push the bushing down into the distributor slot and do not worry about the wiring staying in the long sleeve end of the bushing. Use the large cable Tie and tighten it around the bushing right next to the distributor case. The Cable Tie locking sleeve needs to be on the bottom away from the distributor cap.



Next use one of the Small Cable Ties and use it to keep the wires inside the bushing sleeve. Be sure the end of the cable tie is cut flush so it will not cut the tube in the next step. The sleeve has a depressed band at its midpoint. Slip the large heat shrink tubing over the ends of the wires and hold it as close to the bushing as possible. Shrink this end first and then the end extending over the wires. The wire end will not shrink down tightly around the wires but just be a close fit.



Insert the Delrin plug into the hole left by the vacuum advance hardware. Use the supplied 10-32 screw to hold it in place. Note the threads do not go all the way through so ensure the treaded end of the hole is "up". Also note the hole in the plug is offset slightly. This is intentional to cause a slight binding action to help hold the plug in position. Reinstall the dust covers marked "DO NOT REMOVE". The pickup gap needs to be adjusted and you are done. A smaller gap will result in a spark at a lower RPM than with a larger gap. The factory gap setting is 0.008" - 0.016". Be sure that any play in the shaft is taken into account when setting the gap. The side play should not put the gap out of the tolerance range.

APPENDIX A

Instructions for Making the Heat Sink and mounting and wiring the stock ignition system.

Obtain a piece of aluminum sheet, .040" to .064" thick (B&S 14 -16 gage), 5" x 5 1/2"

1. Anneal this sheet to "soft" condition by heating to 450° F for a half hour, or by heating with a torch until a piece of soft wood (Pine) rubbed across it will leave a dark mark. This may not be required depending on the material you use and your ability to bend it.

2. Lay out the outline and all holes as per the Heat Sink Drawing. Mark the lines for bending with a fine marker, not with an awl or pencil.

3. Drill a 1/8" dia. hole at each inside corner where the two end tabs are located.

4. Cut the sheet metal in to these 4 holes to form the two tabs. Deburr all edges.

5. Drill 3/16 dia. holes for the 4 cable clamps, the 2 ground terminal screws, and the 2 center mounting holes. Do not drill holes for mounting the modules yet. If using flat head machine screws, countersink holes on the back side for the heads.

6. File away the little locating "ears" from each threaded mounting lug of each module. "Paint" the bright parts of each module with black marker pen to improve heat radiation.

7. Bend up sides of the heat sink 45° as shown. If using a vice, use hard fiber or other smooth jaw covers.

8. Test fit each module. The mounting lugs that normally fit inside the round distributor case should make tangential contact with the heat sink sides. Bend sides up or down until you get a good fit. It is not necessary for the flat part of the modules to touch the center part of the heat sink. (They did not touch in the distributor.)

9. Check that the location of the mounting holes is centered with the threaded module holes. Re-position marks as necessary so there will be no binding of the machine screws on the edges of the holes, and that the module mounting lugs will not be stressed when fastened down.

10. Drill these last 4 holes to 3/16 diameter and deburr. Do not chamfer or countersink them.

11. Bend up the outside tabs about 80°. These provide for extra radiation and physical protection.

12. Spray paint the inside of the heat sink a flat black for best heat radiation. Allow to dry.

13. Mount the modules using the 4 metric machine screws with captive flat and lock washers that formerly held the pickup units down on the original, swivel bearing distributor plate. Use approved heat sink compound where the modules contact the heat sink.

14. Connect wires to the modules, and the shields to the two center ground terminal screws using #8-32 x 1/2" long flat head machine screws, nuts, and flat washers as per manual and drawing "Dual Ignition System for EA81 Subaru Conversion". A separate ground wire from the heat sink to engine block or Battery Negative terminal may be required to ensure a good ground.

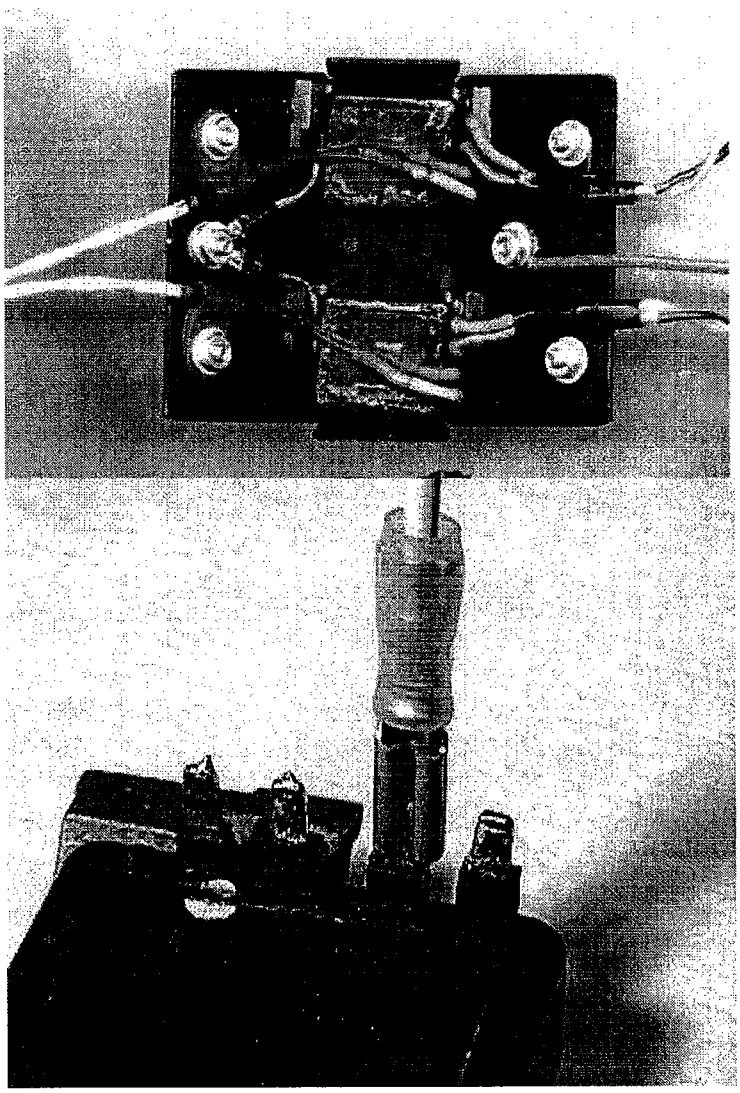
15. Secure the cables to the heat sink using the four cable clamps supplied. An inch of 1/4" shrink tube shrunk over the wires where each clamp holds them will make a stronger, tighter job.

16. Spray Paint the outside of the heat sink, including the screw heads, flat black. Do not do this earlier or you will have to remove the paint under the screw heads to ensure a good ground.

17. Run a bead of sealant around the edge of the module dust covers to keep out crud and moisture.

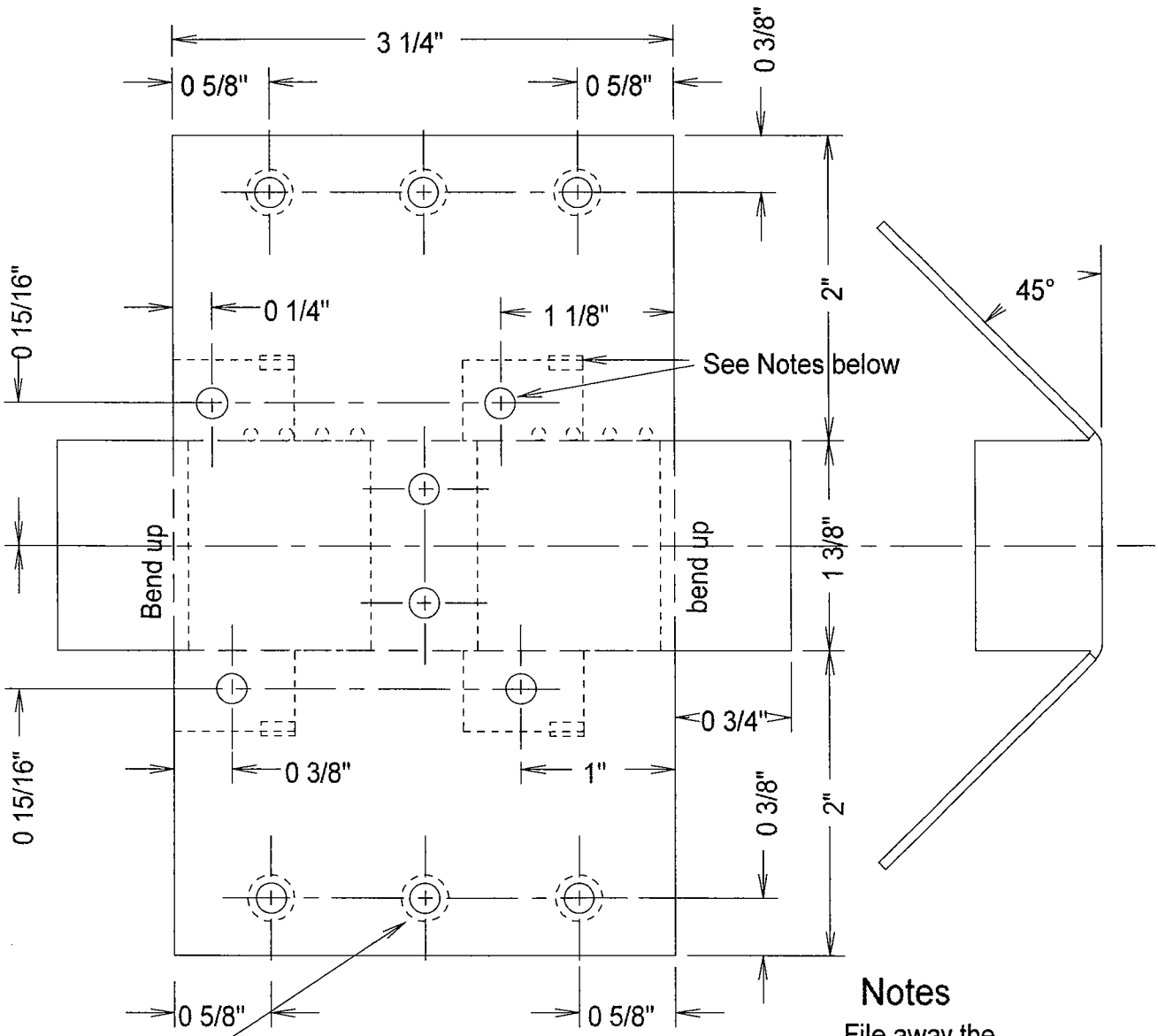
18. There are four wire clamps and some single conductor wire to allow replacement of the automotive type wire by unsoldering the wires from the control module. This can be done by carefully heating the crimp connection and sliding the crimp connector off the tab on the control module. The supplied Fast ON crimp terminals are then attached to the new wire and slipped on the control module tabs and soldered in place. Soldering is required as these Fast on terminals are not an exact fit. This is not shown in the top picture assembly

19. The kit includes a heavy shielded twisted pair wire that can be used as the +12v power to the dual ignition. Each wire can power one of the systems. The shield needs to be grounded at the control module end. The other end can have the shield cut off and not grounded (as the shield was not connected in the distributor). Again this is not shown in the top picture.



Heat Sink for Nippondenso Distributor Modules

1/16" thick soft Alum. sheet, painted flat black



3/16 Drill, 12 holes: 4 for modules, 6 holes are csk for 2 ground terminals & for 4 cable clamps. Ctr 2 holes mount heat sink to firewall.

Remove paint from under ground and module screw heads to ensure electrical grounding.

Notes

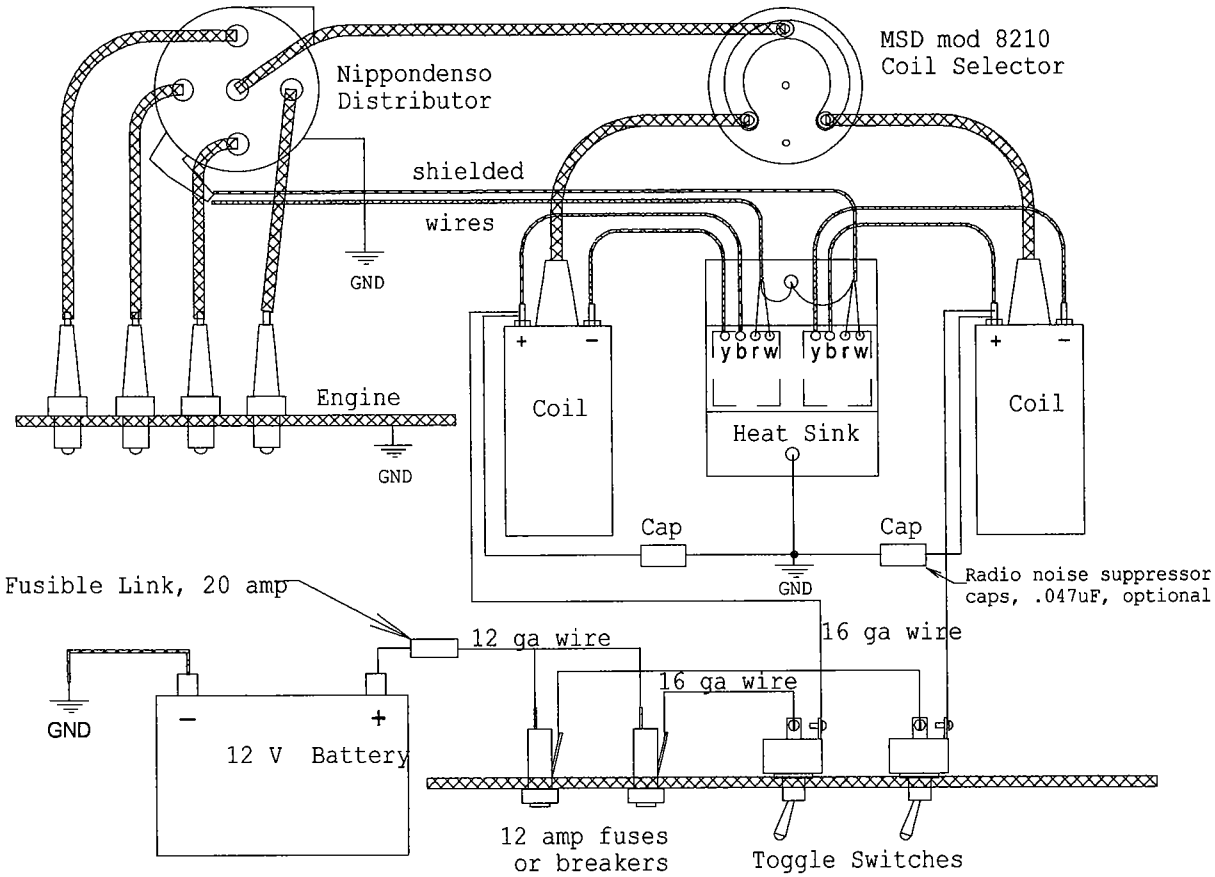
File away the locating ears from modules

Ensure electrical ground of screws to heatsink. Mounting screws must not bind in holes

Use Heatsink compound

T J Foulkes, Dec 31. 1997

DUAL IGNITION SYSTEM FOR EA81 SUBARU CONVERSION



Notes:

The use of the fusible link direct connection is optional to avoid the complexity and possible unreliability of supplying power from a bus bar, master switch, etc.

Ensure that the heatsink is properly grounded, and the modules ar grounded to but not stressed by the heatsink. Mount on firewall

Coils must be mounted horizontally for cooling. Tim Foulkes
Jan 4/98

Additional notes:

1. The large shielded twisted wire can be used for the power wiring and the shield connected at either end to ground. Just use one wire for each system.

2. This wiring diagram is only one approach to wiring and the actual method used by any builder is up to the builder.

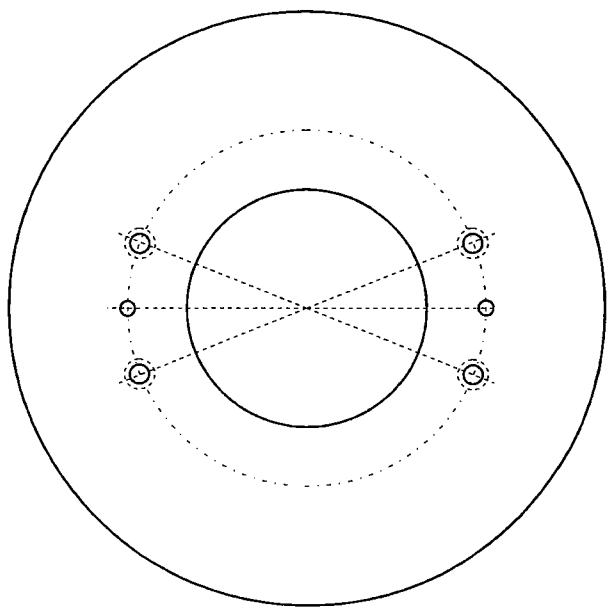
3. The noise cap can be the cap used in points type ignition systems and is easier to find. In any case use a new cap.

APPENDIX B
Making the machined parts and additional tips.

The information required for making the plate and plug are presented here for those who want to do it yourself. Machined plates and kits may be available in 1999 depending on demand and availability. Also included are tips for trouble shooting and a improved ignition system design using more modern electronics.

MAKING THE PLATE AND PLUG

The dual pickup mounting plate is made out of aluminum plate for both ease and design reasons. Aluminum is easy to work and is non-magnetic. The stock plate is made of steel and is magnetic. With only one pickup (with its integral magnet) there is only one magnetic system to consider. Adding a second magnetic system in close proximity to the first has caused interactions, and in some cases these interactions have caused false triggering in the other system and also reduces sensitivity which increases the minimum cranking speed required for a spark. This is much more likely if the pickup-mounting bracket is magnetic.



For these reasons it is important to make the plate out of nonmagnetic material. I recommend the commonly available 6061-T6 aluminum plate. 6061 is more corrosion resistant that other common machineable alloys. The plates in the kit are alodine treated for corrosion protection and looks.

The pickups have a locating hole that is designed for a 3-mm pin. This diameter is hard to find in a roll pin. A roll pin is needed because the more common dowel pin is not a self-locking design and could slip out and into the rotating parts of the advance mechanism below. The kit supplies a preinstalled 3mm stainless steel roll pin. A carbon steel roll pin can be substituted as a magnetic pin is isolated and does not cause any problems. It is not corrosion resistant however. Also a 1/8-in diameter roll pin can be substituted for the 3mm pin if the pickup-locating hole is reamed out to fit. In both cases the roll pin grips the pickup and makes adjustment and assembly a lot easier. A snug fitting locating pin is key to an adjustment that does not move when the screws are tightened.

The plate is made from ¼-in nominal aluminum plate. The outside diameter is 63-mm +/- 0.03-mm (2.48" +/- 0.001"). The inside diameter is 26-28.5-mm (1 1/16" – 1 1/8"). The two 3-mm locating pin holes are 180 degrees apart on a 40-mm +/- 0.1-mm diameter (1.576" +/- 0.005"). There are four 8-32 tapped holes on the same diameter located +/- 20 degrees on each side of the 3-mm holes or 13.75-mm +/- 0.2-mm (0.542" +/- 0.005") apart center to center.

The plate outside diameter and the location of the 3-mm locating pins are critical to the proper operation of the dual pickup plate. Too loose a fit of the plate in the distributor body can result in inability to keep the pickup to reluctor gap constant. Locating pin inaccuracy will cause each pickup to timed differently and while this is not necessarily harmful it is important to check the timing of both systems and time the engine on the most advanced pickup. This pickup should be used for the primary IGN system.

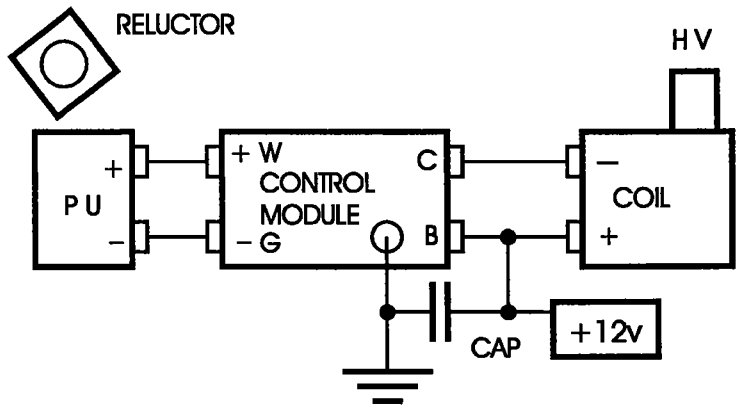
The tapped holes for the pickup mounting screws are best made with a precision tap to produce tight threads. This along with lock washers provides a locking action against vibration. Overkill perhaps, but with only one mechanical distributor supplying the ignition system, any loose parts could fail both systems.

The vacuum advance plug can be made out of aluminum or structural plastic like Delrin. A short cylinder of the material with a tapped hole for a screw is suggested. Use the screw that locked the vacuum advance mechanism in place.

A MORE MODERN DESIGN FOR THE IGNITION SYSTEM

The GM HEI system has several advantages over the stock EA81 electronics. Its lighter, smaller, draws less power and is smarter.

This is discussed in detail in Contact! #43. The recommended control module is NAPA #TP 45 and the coil is NAPA #IC 107. There are less expensive equivalent parts out there that are not as well made and not recommended (in fact there have been reported failures of some less expensive parts). The cap is any common points type distributor capacitor.



One system is shown, the other system is identical and the HV is combined with the MSC Coil selector #8210. Naturally the electrical supply to each system needs to be independent of the other for a fault tolerant design.

TROUBLSHOOTING TIPS

Dan Horton has provided the following comments that will help others get their dual dizzy up and running properly.

"When I fired up my new ignition, I found I had retarded timing, and it retarded even more when I increased the RPM. After a frustrating afternoon checking everything I could think of, including all the electrical connections, I e-mailed Paul Messinger. No question about it, the ND pickup red wire was connected to the TP45 module's terminal "W" and the white wire went to Terminal "G", just like the diagram in the Contact! #43 article, so why the funny timing behavior? Paul tried to duplicate what I was getting, and in the process discovered that not all ND pickups have the same wire color code! Some examples in his shop were "red wire positive" others were "red wire negative". He has no idea why, neither do I, and there's no way to tell what year or application his selection of pickups came from. The same is likely to be true for many of us, as we are commonly working with pickups taken from a selection of junkyard dizzys (distributors), aftermarket sources, etc.

This discovery means that a method of checking every installation is necessary. Dan's comments refer to my article in Contact #43.

"The "technical" way is to use an O-scope. If you have a scope, set it for 2 volts and 2ms, connect the probe ground to airframe (battery) ground, and touch the probe tip to terminal "G". See in the article, and swap the wires if necessary. But what if you don't have an O-scope? That's OK, because you don't need one. As it turns out, all you really need is a timing light. There are three timing clues to reversed pickup polarity. Paul touched on two of them in the Contact! text and the third is found with a little study of the waveforms. Remember, the module turns the coil current on the first time it sees pickup output voltage go positive, then

turns it off (causing magnetic collapse in the coil and thus a spark) the first time it sees pickup voltage return back to zero. As Paul noted, that means timing will be retarded in the case of reversed pickup connections. That's Clue #1. With reversed pickup connections the return to zero happens at the end of a flattening curve, rather than at a sharp drop as is the case with correct polarity. As the shape of this curve varies a bit with each ignition event, the return to zero isn't going to happen with any great consistency. As Paul noted, the spark timing will seem to jump around a bit under the glare of the timing light. That's Clue #2. The sure tip-off is Clue # 3, increasing retard with increasing RPM. Look at the Contact! #43 illustrations and you'll note that the signal decay back to zero, as a proportion of the time between signals, takes longer as the RPM is increased. In the "2000 RPM HEI", "stock soob" and "reversed polarity stock soob" illustrations, the time between ignition events is about 80ms with a decay time of about 25ms. In the "6000 RPM" illustration the time between events is about 26ms with a decay time of 14ms. Although the timing mark will jump around a bit under the light (Clue #2), overall the spark is going to arrive later and later with increasing RPM."

"So, if you have to twist the distributor body against its stop in the advance direction to get it cranked, the timing mark is sort of "fuzzy" and hard to see, and the timing light shows increasing retard when you advance the throttle, chances are the pickup connections are reversed. Swap them around, put the dizzy back where it was, and try again. If the timing is now stable and the mechanical advance marches the timing ahead in the normal manner, the pickup connections are correct."

Thanks, Dan, for the fine description, I wanted to include Dan's comments, as the procedure he describes is universal.

SUBSTITUTE PICKUPS

Here is another update from Dan Horton. Dan has suggested several possible alternate pickups to use in the ND dual pickup design. I looked at two, NAPA #MP1400 and Standard #LX600. Both look like exact replacements at first glance. There are critical differences that make one questionable for the "Dual Distributor" application. The electrical resistance of the MP1400 is essentially the same while the LX600 is higher. The DC resistance is of no interest other than verifying the continuity of the coil. I have run tests with 10,000 ohms in series with the pickup and this had no significant affect on the voltage present at the HEI module used in Contact! #43. Any additional external series resistance will increase the possibility of external electrical noise pickup that can degrade operation.

Closer inspection revealed the MP1400 had a carbon steel (magnetic) mounting bracket while the LX600 had a stainless (non magnetic) mounting bracket. The LX600 had other features making it appear to be made by the same manufacturer as the OEM ND distributor pickup, including being marked "Made in Japan". When there are two pickups in close proximity to each other the magnetic paths are important. It is possible to get cross coupling from one pickup to the other. This is why the mounting plate I supplied for the dual pickup kit was made out of a non-magnetic material. The potential magnetic coupling with the MP1400 is a concern.

Finally I tested the output signals in a distributor on my sun distributor machine. The tests showed the output of the MP1400 was approximately 25% lower based on one sample test. This raises the minimum cranking speed for spark generation.

Based on the electrical and mechanical shortcomings of the MP1400 I find it "not acceptable" for this application and recommend the LX600.

Also the color code for the LX600 is reversed from the Contact! #43 table (page 11) with "W" going to "W" and "R" going to "G" on the HEI module.

This is another example of "after market" parts not being the same for our applications. Substitution of brand may not be applicable even when, in the original application, either part will work fine. Different brands have different quality parts and typically the lower cost part is also lower quality. While they may be suitable for the original application it does not mean that they are suitable for this application.

Additional parts that should be replaced during the distributor overhaul.

I recommend replacement of the advance springs with Factory new springs PN #49172 9002. They are not expensive and do change characteristics with over long use. Another part that is a good idea to replace is the cap gasket (called packing) PN #49178 7202. Finally the "O" ring seal on the distributor housing to crank case should be replaced, PN #39176 4302.

APPENDIX C
Information for modifying the HI distributor
Making the machined parts and additional tips.

This distributor has a larger reluctor and requires a more complex replacement plate. The same pickups used for the ND distributor may be used but it is a very tight fit.

The plate and modifications are considered experimental, as extensive testing has not been done. As with the ND distributor there are at least two versions used. I have found different mechanical advance curves where both the rpm/advance curve and the total allowable advance are different. The version that closely follows the factory manual has the numbers –10 and 11 stamped on the advance plate. The other version I have seen has –5 and 10 stamped on the plate and has a smaller advance range. Either version will work as long as the timing is set at or above 4500 RPM with the recommended advance springs.

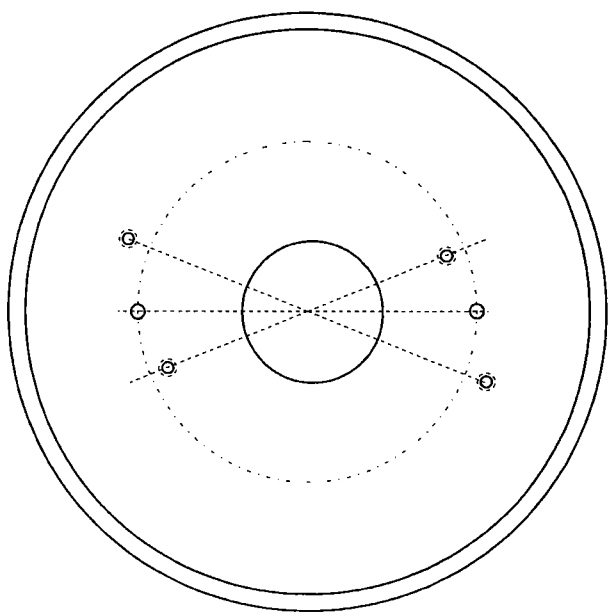
I recommend replacement of the advance springs with Factory new springs PN #49145 8901. They are not expensive and do change characteristics with over long use. Another part that is a good idea to replace is the cap gasket (called packing) PN #49123 7401. Finally the "O" ring seal on the distributor housing to crank case should be replaced, PN #49176 2001.

MAKING THE PLATE AND PLUG

The dual pickup mounting plate is made out of aluminum plate for both ease and design reasons. Aluminum is easy to work and is non-magnetic. The stock plate is made of steel and is magnetic. With only one pickup (with its integral magnet) there is only one magnetic system to consider. Adding a second magnetic system in close proximity to the first has caused interactions, and in some cases these interactions have caused false triggering in the other system and also reduces sensitivity which increases the minimum cranking speed required for a spark. This is much more likely if the pickup-mounting bracket is magnetic.

For these reasons it is important to make the plate out of nonmagnetic material. I recommend the commonly available 6061-T6-aluminum plate. 6061 is more corrosion resistant that other common machineable alloys. The plates in the kit are alodine treated for corrosion protection and looks.

The pickups have a locating hole that is designed for a 3-mm pin. This diameter is hard to find in a roll pin. A roll pin is needed because the more common dowel pin is not a self-locking design and could slip out and into the rotating parts of the advance mechanism below. The kit supplies a preinstalled 3mm stainless steel roll pin. A carbon steel roll pin can be substituted as a magnetic pin is isolated and does not cause any problems. It is not corrosion resistant however. Also a 1/8-in diameter roll pin can be substituted for the 3mm pin if the pickup-locating hole is reamed out to fit. In both cases the roll pin grips the pickup and makes adjustment and assembly a lot easier. A snug fitting locating pin is key to an adjustment that does not move when the screws are tightened.



The plate is 14mm (0.5625") thick nominal aluminum plate. The outside diameter is 62.5-mm +/- 0.03-mm

(2.46" +/- 0.001"). This is a flange that is only 2.25-mm (0.088"– 0.092") high located at the bottom of the plate. The rest of the plate is recessed to a diameter of 58-mm (2.280" +/- 0.005"). This recess is to clear the plate mounting screws. A study of the stock plate will clarify why this is necessary. The plate has a center hole 21-mm (0.825" +/- 0.005") diameter to clear the shaft.

The two 3-mm locating pin holes are 180 degrees apart on a 41-mm +/- 0.1-mm diameter (1.614" +/- 0.005"). There are four 8-32 tapped holes on different diameters. These holes are best located using the pickups as drill guides. Fit the plate with the roll pins installed into the distributor and slip the reluctor in place. Verify the pickups can be adjusted to clear the reluctor with a minimum gap of 0.4-mm (0.016"). Note that this is not the gap for running, just for setting the adjustment range. Use the ND instructions for setting the pole gap.

Note the reluctor must be installed with the engraved letter up and visible. Reversing the reluctor will cause incorrect waveforms to be sent to the control electronics. The IGN will appear to work but it is not working properly. Be sure to use the reluctor locking roll pin during final assembly.

The plate outside diameter and the location of the 3-mm locating pins are critical to the proper operation of the dual pickup plate. Too loose a fit of the plate in the distributor body can result in inability to keep the pickup to reluctor gap constant. Locating pin inaccuracy will cause each pickup to timed differently and while this is not necessarily harmful it is important to check the timing of both systems and time the engine on the most advanced pickup. This pickup should be used for the primary IGN system.

The tapped holes for the pickup mounting screws are best made with a precision tap to produce tight threads. This along with lock washers provides a locking action against vibration. Overkill perhaps, but with only one mechanical distributor supplying the ignition system, any loose parts could fail both systems.

The vacuum advance plug can be made out of aluminum or structural plastic like Delrin. A short cylinder of the material with a tapped hole for a screw is suggested. Use the screw that locked the vacuum advance mechanism in place.