

## WILCAP ADJUSTABLE ALIGNMENT PIN

For correct installation of the Alignment pins the following tools will be needed;

1. Dial indicator and magnetic stand.
2. 1/4" or smaller drift and hammer.
3. Dial calipers.
4. 1/4" Allen wrench
5. 9/16" open ended wrench

You may also need the following;

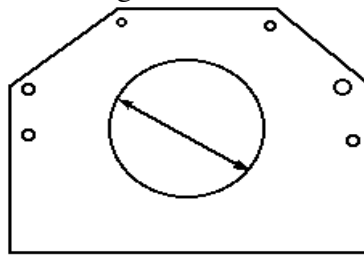
1. Drill motor and 5/16" drill bit
2. 3/8" -16 tap
3. Slide hammer with 3/8 -16 male thread or a pin dowel removal tool

Before beginning you should;

1. Clean the crankshaft flange and flywheel mating surface and install the flywheel.
2. Clean and de-burr the block to bellhousing and bellhousing to transmission surfaces.
3. Make several photocopies of the enclosed recording sheet.
4. Note an approximate location on the block and bellhousing-mating surface where a 5/16" hole will be drilled for the spring pins.

Before proceeding, check the following;

Check the diameter of the transmission register bore of the bellhousing for roundness by measuring it with dial calipers in at least 6 places. If the readings vary by more than .005" then location and amount of the largest and smallest should be readings recorded.



### Installation

1. Remove the existing dowel pins from the engine. There are special slide hammers offered by top line tool companies for this purpose, the following procedure assumes you do not have one of these; On some engine blocks the dowel pin hole is a through hole and the pin can be removed with a drift and a hammer from the engine side of the hole. Note; Most holes are not reamed to size all of the way through. Do not attempt to drive the pin through the hole from the transmission side. If you cannot drive the pin out, try a pair of locking pliers on the pin and try pulling them out of the block. If that does not work then you will

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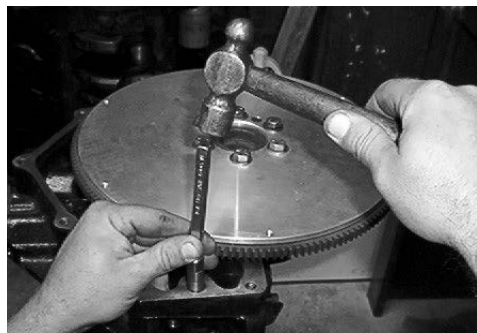
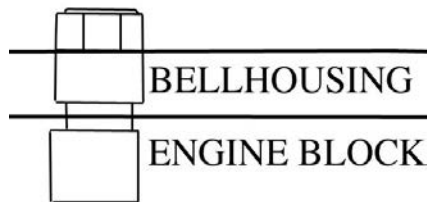
need to drill and tap the pin to accept the male thread of the slide hammer or thread the pin with a die and use a female adapter on the slide hammer. For a 5/8" diameter pin and using a 3/8-16 slide hammer adapter proceed as follows; carefully center punch the pin. Drill the 5/16" hole about 3/4" deep. Tap the hole and place the thread the slide hammer adapter into the



Alternatively, using a die it is possible to thread the pin and using nut or a slide hammer with a female thread adapter, pry the pin out. Take care not to ding or damage the bellhousing mounting face.



2. With the original locating pins removed, clean the pin holes and apply a light film of oil in the hole. Using care not to damage the hex in the head of the pin, carefully drive the pin into the block to the depth of the relief between the upper and lower portion of the pin.



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3. Once the pin is driven into the block to the correct depth, check to see that the bottom and top portions of the pin can be rotated independently of each other. If there is a problem, contact Wilcap for further instructions.
4. Place the bellhousing on the over the locating pins and by rotating the upper sleeve with the 9/16" wrench and the lower pin with the 1/4" Allen wrench, work the bellhousing onto the pins and flush with the block. If too much force is applied to the bellhousing, the locating pins could be forced into the block to the point that the relief is below the surface of the block. This will prevent the upper sleeve of the pin from rotating.
5. Install the bellhousing to block bolts and torque them in the proper pattern (starting with the bolts closest to the dowel pins and proceeding in a criss-cross pattern) to 75% of the final torque value. This will "seat" the bellhousing and should remove any "spring" in the bellhousing.
6. Install the dial indicator and make certain plunger is contacting the center of the bore. Note the reading and rotate the engine one revolution to be certain the indicator plunger is contacting the bore fully during the entire rotation and that the reading is the same when you return to your starting point.



7. Loosen the bellhousing bolts in the same pattern as they were tightened only to the point where the bellhousing can be moved using the Allen wrench and open end wrench on the locating pins.
8. Starting at 12 O'clock, zero the indicator and record the reading of the indicator with a + or - sign. Settle on a convention for plus and minus. Typically plus is "loose" or further away from center and minus is "tight" or closer to center. To check the movement of the indicator, push on the plunger and note which direction the needle moves. This is the tight or minus direction.
9. Once the maximum deflection is found, rotate the crankshaft to that position. Also note the reading directly across from the maximum reading. Refer to the measurement you made earlier of the bore diameter and take those measurements

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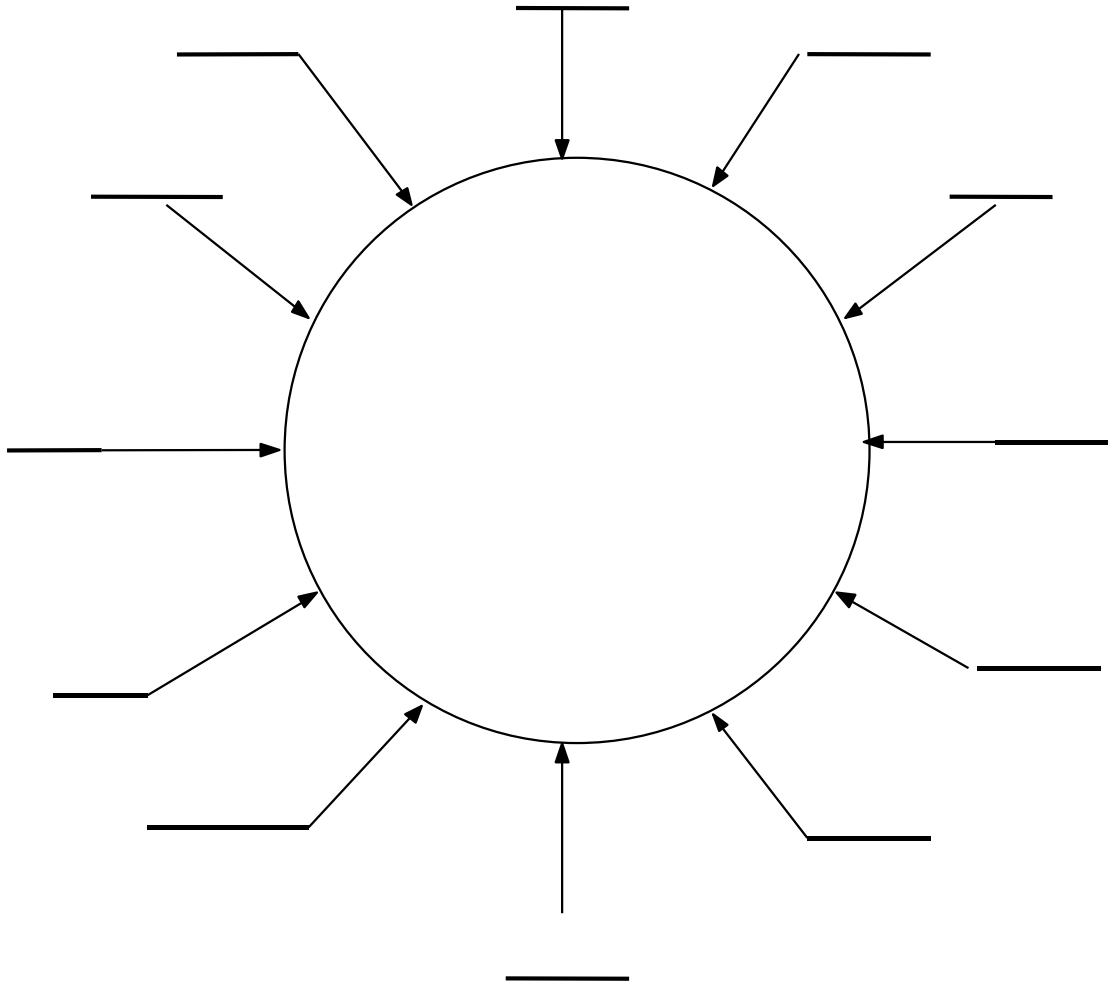
- into account. For example, if the indicator reads  $+0.020''$  but the bore was  $.006''$  larger at that spot then the real reading should be  $.017''$  ( $.020'' - (.006''/2)$ ).
10. Rotating both pins in small increments and moving the bottom and the top pin together or individually, you should be able to get the indicator needle to move. Move the bellhousing  $1/2$  of the difference between the maximum reading and the reading directly across from the maximum. For example; Maximum reading is  $-.020''$ . 180 deg. Across from the maximum was  $+0.005''$ . The difference is  $.015''$  move the bellhousing until the reading is  $-.007''$
  11. Continue this process until the maximum difference in readings between the highest and lowest reading (or Total Indicator Reading T.I.R.) is less than  $.010''$ . Remember to take into account the raga of the bore diameter. This process may take several tries. Patience is the key. If a point is reached where the bellhousing will not move any closer to centerline, you may be to a point where the bolts are hitting the sides of the bellhousing holes. To correct this the bolt holes in the bellhousing may have to be enlarged. Be aware that the manufacturer of you bellhousing may not accept the bellhousing back if you do this.
  12. Once you are satisfied with the readings, torque the bellhousing into place as before but to the final torque value and check again. If the reading change and are out of the  $.010''$  tolerance, the process will have to be repeated.
  13. If the reading repeats, you are ready to secure the bellhousing to the block using the spring pins. While this step is not absolutely necessary in all cases, with sufficient amounts of torque applied, the adjustable dowel pins may not maintain the relationship between the bellhousing and the engine block and an out of concentricity condition could be created. In addition, if the engine and transmission are to be disassembled in the future, without the spring pins in place, the entire alignment procedure will have to be re-done. Also, be aware that there is the possibility that if drilled incorrectly, the holes into the block could cause an oil or water leak and could weaken the block. To drill for the spring pins; find the location you noted earlier for the  $5/16''$  hole. Drill through the bellhousing and into the block. The portion of the hole into the block should be a minimum of  $.375''$  deep. Drive the spring pin into place.

Contact Wilcap if you have any questions. Thanks again for you business.

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