

****Important****

Bellhousing Alignment Instructions

Before installing your new TKO transmission, it is important to make sure that your bellhousing or scattershield is properly aligned with the centerline of the crankshaft. The alignment process is called “dial indicating”. If using a stock GM bellhousing or a scattershield (blow proof bell housing), dial indicating is necessary before installing your transmission. The *Classic Motorsports Group* bell housings and the Quicktime scattershields are built and checked to be within the manufacturer’s specifications (.005” tolerance). If you are using one of these bell housings **and your motor has not been align bored**, in theory, dial indicating is not necessary as these units have been built and checked to be within the required Tremec tolerance***. However, checking any bellhousing for proper alignment is a good idea. Installing a bellhousing that is not centered with the crank can result in poor shifting, clutch engagement problems, worn pilot bearing, as well as accelerated wear on the transmission itself.

Unfortunately checking the alignment can be a tedious task, especially if the engine is still in the car. To check for proper alignment, you will need a dial indicator, some basic tools, and a bit of patience.

Checking bellhousing alignment

1. Make sure that dowel pins and the mating surface of the engine block are clean and free from dirt and/or paint. Next, mount the bellhousing securely to the engine block. If using a scattershield be sure to mount the block saver plate as well. Torque all bellhousing-to-engine bolts to specification.

Note: If using a scattershield, make sure that the dowel pins protrude out far enough to let the scattershield and block plate fit on the flat part of the dowel (not on the tapered part of the dowel). If the scattershield is resting on the tapered part this will cause inaccurate measurements. It may be necessary to tap the stock dowels out far enough to allow this. Alternatively, you can purchase longer dowel pins if required.

2. Install magnetic dial indicator base on the flywheel/end of crankshaft and adjust the dial plunger so that it contacts the inside edge of the register bore of the bellhousing (**Fig. 1**). If you need to create space for the dial indicator base to sit flat on the flywheel, remove two of the flywheel bolts that are directly across from one another. Please note that the dial indicator base does not need to be dead-centered on the crank during this process but it must be solidly mounted. If you do not have a dial indicator, Summit Racing has an inexpensive one with a magnetic base for about \$30 (Summit part #SUM-900016-1).

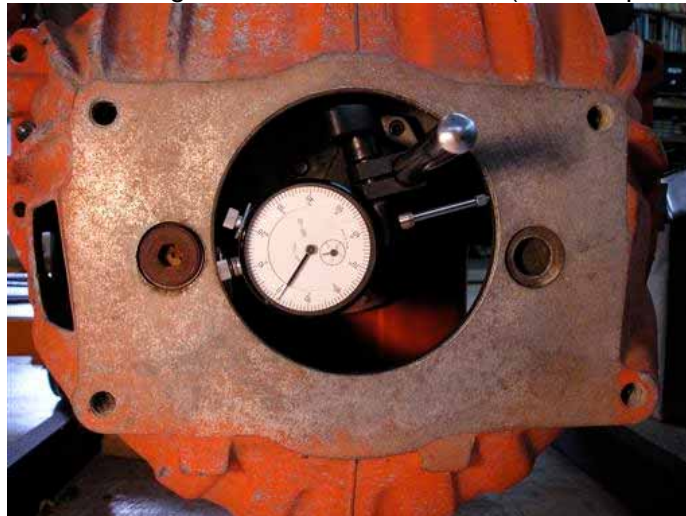


Fig. 1

3. Once you are ready to measure, there are **two** steps in aligning your bell housing.

The first step is to see what direction the bell housing is out of spec. Remember zero is the spec and .005" is the out of spec tolerance. **The second step is to see how far out of spec the bell housing is and how far you need to move it to be within the .000"- .005" spec.**

Step One:

Determine if bellhousing is in, or out, of allowable alignment tolerance

First start out with the dial indicator anywhere in the circle - it is not necessary to start at any given point. Rotate the engine (crank) until the needle on the indicator moves to the right. The needle moving to the right indicates that the bellhousing is getting closer to the centerline of the crank shaft. Continue rotating the engine until the indicator stops moving to the right and starts to move backward. Stop at this spot and put a mark on the bellhousing at this point. This is the point of the housing that is closest to the centerline of the crank shaft. For example: If the indicator finds the closest point to be at 2:00 o'clock you would need to move the housing in that direction to correct the mis-alignment (i.e. towards 2:00 o'clock and away from 8:00 o'clock). After completing this step, you will know which direction to move the housing to correct an out-of-tolerance mis-alignment.

Step Two:

Determining how far the bellhousing needs to be moved if the bellhousing is out of allowable alignment limits (greater than .005").

After finding the closest point to the centerline of the crankshaft from step 1, set the dial indicator to "zero". From this point forward as you rotate the crank, the needle on the indicator should move only to one side of zero. If it moves to the positive side of zero, you must re-zero the indicator as described in step 1. After rotating the crank (and therefore the dial indicator) 360* and watching the read out on the indicator, if your maximum measurement (needle movement) is .010" or less, your bellhousing is within allowable tolerance. *If this is the case you are finished with this process and can proceed with your installation.* If your indicator readings show more than .010", your bellhousing is NOT within allowable tolerance and you will need to correct it with offset dowel pins as described below. To understand how far out of tolerance your bellhousing is, take the highest reading on the indicator and divide this number by two. For example: If your maximum read out is .016", .016 divided by 2 is .008". In this case a set of .007" offset dowel pins will be able to correct the alignment to within .001". Offset dowel pins are available in the following sizes: ".007, .014" and .021".

Tremec, GM, Ford, Chrysler and most other manufacturers specify a maximum misalignment, or "runout" of .005". If you have more than .005" runout you will need to correct this by using offset dowel pins. If your reading is .005" or less, your bellhousing is within tolerance and you are finished with this process. If you have between .005" – .040" misalignment, you can correct the misalignment by using the correct size offset dowel pins. If this is the case with your bellhousing proceed to step #4. If your misalignment is greater than .040" you have either measured incorrectly or there is a problem with your bellhousing and it will likely need to be replaced.

4. To correct misalignment, you will need to use offset dowel pins. These dowel pins come in various sizes. Select the offset dowel pin set that is closest to $\frac{1}{2}$ of the runout reading (i.e. if runout is .016" then $\frac{1}{2}$ of .016" = .008"; in this instance you would select .007" dowels). If your runout is .014" you would use the, .007" dowels. If you are at .010", you also use the .007" dowels as they are closest. *We recommend RobbMC Performance Products (www.robbmcperformance.com) for a good set of adjustable dowel pins.*
5. Before installing your dowel pins It is important to mark each dowel at it's highest point which will help you to install them correctly. You can use a permanent marker and your dial indicator to do this. Doing this will assist you when you install the dowels to keep them clocked the same as each other. When you install and position your dowels they should be set with your marked high points clocked at the same position as your closest to center of the crankshaft mark that you made on the bellhousing in step 1. For example: If your closest to the center line mark is at 3 o'clock then your markings on the dowels should be at 3 o'clock.
6. To remove the stock dowel pins drive them through from the front of the car towards the rear using a brass drift or by using gripper pliers or vice grips and pulling them out. Properly clean engine block dowel pin holes and lightly coat with lubricant.
7. Lubricate new offset dowel pins and install them into engine block. Remember, you must find the high spot on the dowel with the dial indicator and mark it so the dowels can be installed equal to one another. Refer to the adjustable dowel pin installation instructions supplement included with this manual.
8. Install bellhousing and torque bolts to specification. Re-mount the dial indicator and recheck runout by repeating step #2. Small corrections can be made by loosening the bellhousing bolts and turning the dowels with a wrench to bring the bellhousing within limits.

Congratulations – you have completed an important step.

**** If you are using a McLeod scattershield and you choose to check alignment, do so without the silver register ring installed in the register hole – checking alignment with this ring in place will give you a false reading.*

These installation notes are provided to help you with the installation process. To the best of our knowledge, this information is accurate; however it is in no way guaranteed. Every car is unique and will represent unique challenges. There is no guarantee of proper fitment in your particular vehicle and you need to take responsibility for your own installation. When installing your transmission, be sure to follow proper torque & alignment specifications. Also, it is important to follow proper break-in procedures. Classic Motorsports Group is not responsible, in any way, for any damage, financial or otherwise, to you or your vehicle.



RobbMc Offset Dowel Pins Installation Instructions

To correct a misaligned bellhousing, RobbMc offset dowel pins are designed for easy installation into your engine block and provide for a much simpler bellhousing alignment process.

1. After determining the direction the bellhousing needs to move, remove the bellhousing and existing dowel pins from your engine block. In most cases, it is possible to drive the existing dowels out of the block from the front side using a blunt punch and a hammer. If the front of the dowels cannot be accessed for whatever reason, the dowels can often be removed by twisting and pulling with vice grips. If this fails, the pins can sometimes be removed by drilling and tapping the ends of the dowels and using a slide hammer. If the pin is in a blind hole, it may also be possible to drill and tap all the way through the pin and then drive a screw through the pin. As the screw comes in contact with the back wall of the blind hole it will push the pin out as the screw is turned.
2. Before inserting the pins into the block, make sure the allen screws in the pins are not tight or the pins will not slip into the block. Insert the dowels into the block with the slit end of the dowel facing towards the block. The dowels should be a slip fit (or perhaps a very light press fit) into the block. If the pins do not slip in check for burrs on the pins and/or in the holes in the block. Insert the pins into the block until the offset prevents the pins from going any further.
3. Rotate the pins so that the offsets of the pins are pointing in the desired direction. Note that the two flats machined into the pins are parallel with the pin's offset. If necessary, an open end wrench can be used to turn the pins. The flats on the two pins must be parallel to one another (i.e. the pins must be rotated to the same angle) or the bellhousing will not fit over the pins. Tighten the allen head screws in the pins lightly (just enough so that the pins won't move accidentally while installing the bellhousing).
4. Re-install the bellhousing and check for alignment using your dial indicator. If the bellhousing is still not within specification (.005"), loosen the bellhousing bolts and rotate the dowels slightly using an open end wrench. Re-tighten the bellhousing bolts and recheck the alignment.
5. Once the bellhousing is aligned within .005", hold the dowels in place with an open end wrench and tighten the allen head screws to secure the dowels and lock them in place. Do not over tighten the allen head screws (8 lbs. of torque maximum). If the dowel pin needs to be turned again, the screw can be loosened and the pin can be turned to a new angle. It is not necessary to remove the pin from the block to reposition it.
6. If it is not possible to achieve proper alignment, pins with a different amount of offset may be required. Call us if you need a different set of dowels.

For questions, please call Classic Motorsports Group at 760.438.2244