

1.4L MULTIAIR TURBO CAMSHAFT

The purpose of this article is to assist our customers with installation of a performance camshaft in the FPT Multiair 1.4 Turbo. This operation requires a person with a reasonable amount of mechanical skill and knowledge. **We recommend you read these instructions thoroughly before proceeding with any installation. THESE INSTRUCTIONS ARE TO BE USED AS A SUPPLEMENT TO THE FACTORY REPAIR MANUAL.**

Changing camshafts in this engine is basically the same as a timing belt change, but with a few added steps. Like a timing belt change, it's not terribly difficult, but it is time consuming and it requires some special tools and procedures. **CAUTION: If you are having someone else do the work, be sure to actually SEE that they have the correct specific tools for a timing belt change on this engine. If they don't, they will never get the cam timed correctly and you should not let them attempt this work.**

The new generations of Italian engines use a totally different system for aligning the camshaft compared to older engines. There are no more keyways, and no timing marks. That means no markings on the crankshaft for top dead center, and no markings on the camshaft to align it. All alignment is done by attaching specific tools to the engine which must be positioned a certain way. Without these tools it would be impossible to correctly time the camshaft. There is no keyway on the camshaft pulley, again correct tools for alignment are the key.

If you do require advanced technical support or installation help, please contact us:

--- **Advanced Technical:** Greg@Eurocompulsion.net

--- **General Technical Assistance:** Tech@Eurocompulsion.net

PROCEDURE:

On a Fiat 500T or Abarth, remove the battery. On a Dart, 500L, or 500X disconnect the battery cables. **If the starter motor is engaged accidentally during this procedure, massive damage will result.**

NOTE: *Locations for all of the below mentioned items, along with photos are included with your required tool kit. Please reference those materials if you have trouble finding them.*

- Jack the front of the car up and remove the passenger side front wheel. You will be working in this area quite a bit, so make sure the car is safely supported. Remove the splash shield and inner fender liner to get access to the areas where we will be working.
- Remove the ribbed accessory drive belt. The drive belt's tensioner is above the crank pulley and towards the rear of the car. Use a 15mm wrench and loosen the tension. It's spring loaded so you have to hold the tensioner in position with one hand while removing the belt from the crank pulley with the other.
- Next, remove the crankshaft pulley. Remove the three bolts attaching it to the timing belt drive pulley (which you DO NOT remove), and remove the crankshaft pulley.
- Remove the plastic timing belt covers, upper and lower from the engine. Some of the bolts holding these on are accessed from below, and some from above.
- Locate the **crankshaft alignment tool** and bolt it to the crankshaft's TIMING belt pulley, not the pulley on the camshaft. There are three bolt holes and AN ALIGNMENT PIN. That pin on the pulley must fit into the corresponding hole in the tool. If the tool is bolted on without the alignment pin and hole lined up with each other, you will destroy the engine upon start up. It is possible to bolt the tool onto the pulley in the wrong position and simply crush the pin so that it's flush with the pulley, so pay attention here.

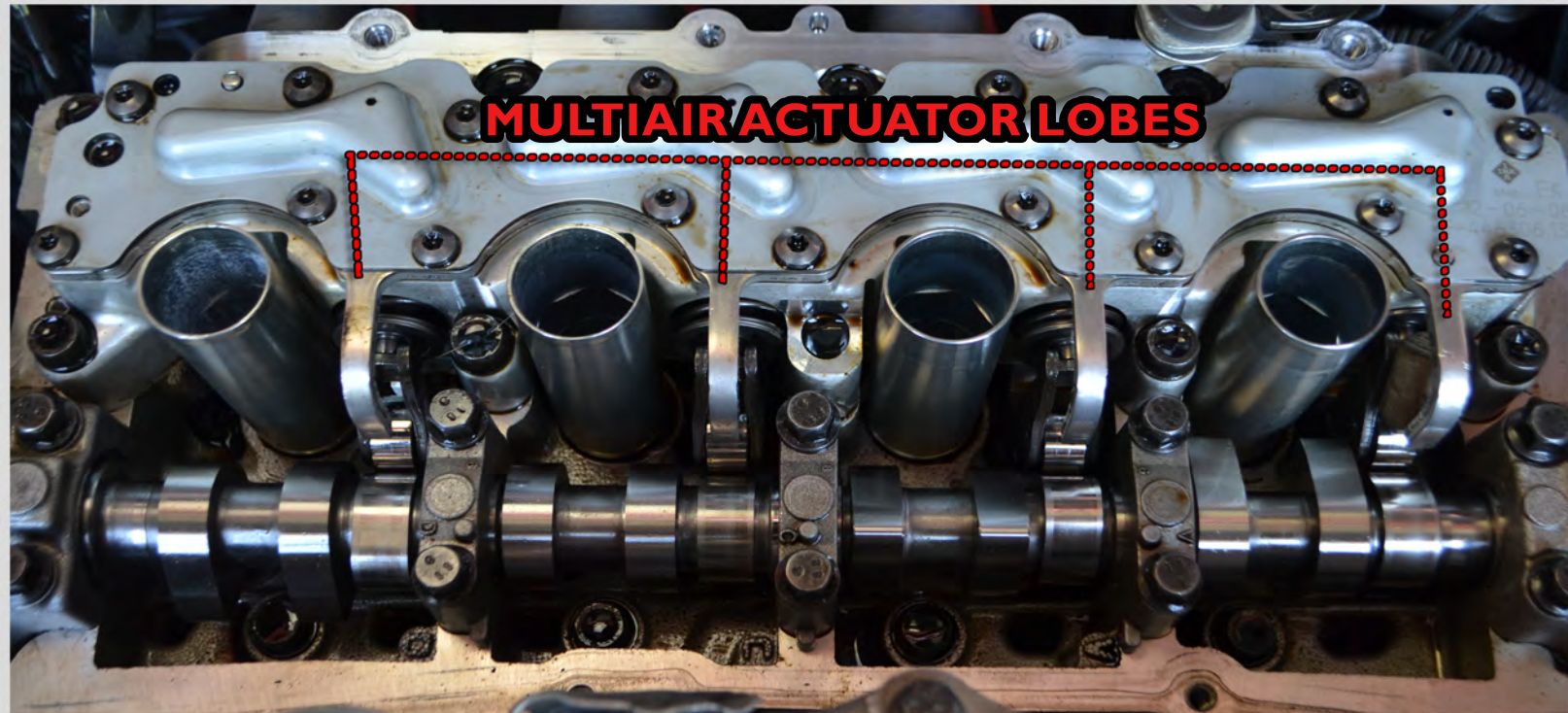
Here is the Crankshaft alignment tool bolted into position:



- Due to space constraints, removal of the factory motor/engine mount **may** be necessary. (This is will require you to support the engine from below temporarily)
- Now, loosen the timing belt tensioner and remove the timing belt. The tensioner is located just below and aft of the crank pulley. It has one bolt, when you loosen it, the belt tension will release and you can remove the belt.
- Now it's time to go to the top of the engine. Remove the engine cover/factory airbox if present. Then remove the air/oil separator and valve cover. The valve cover has a lot of bolts, some are a little harder to find and access than others. If the cover doesn't come off easily, you have missed a bolt or two. Typically the bolts at the front are forgotten since some are in recessed locations.
- Remove the vacuum pump which is located on the driver's side of the engine.
- **USING** the universal camshaft sprocket holding tool, remove the camshaft's pulley.



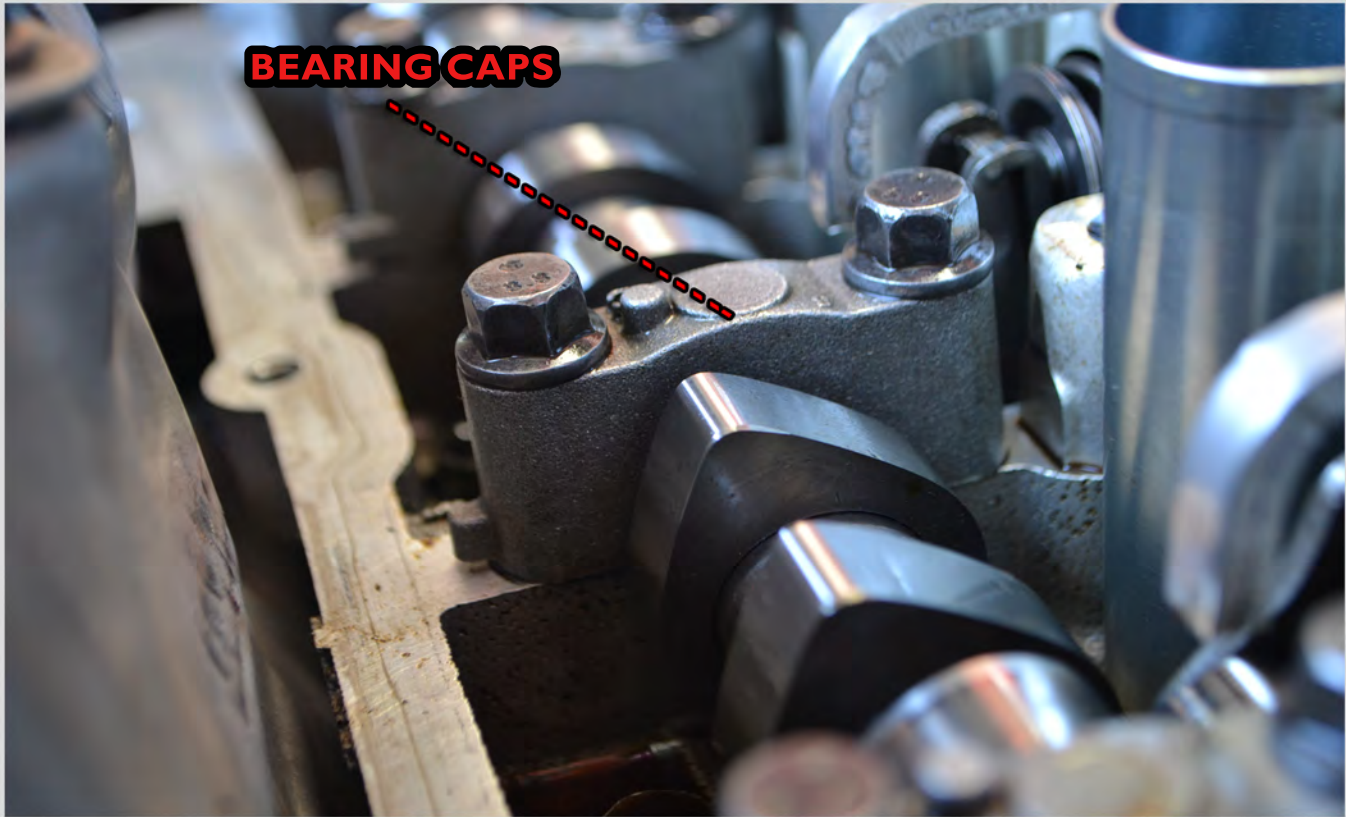
- Now we need to lock the multiair actuators into place. To find them, look at the camshaft. There are 4 lobes that push on rollers. These rollers are part of a rocker mechanism that pushes on the multiair mechanism.



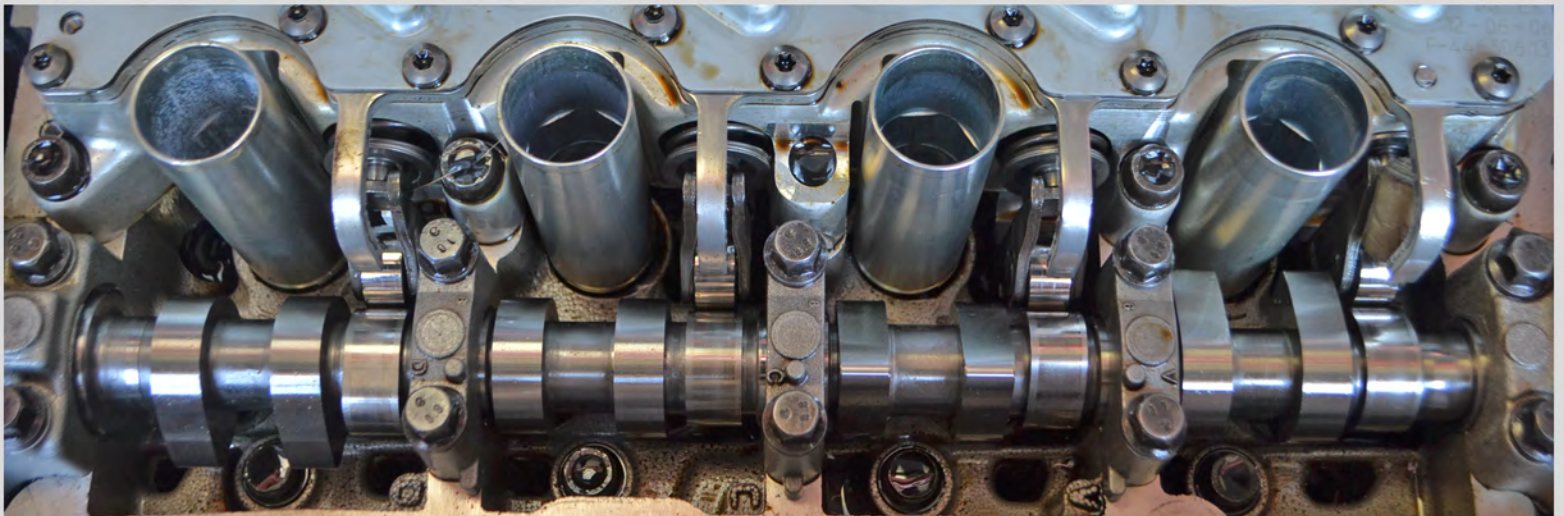
- We lock these in place by positioning simple dowels between the rollers and the hooks. Depending on the position of the cam lobes, there may or may not be enough room to fit the dowel. If there isn't enough room, simply push the rocker towards the rear of the car. Just don't push on the roller itself with anything that could damage the finished surface. Use a screwdriver to push on the steel rocker itself. Notice when you push it, oil will bleed out of the top of the multiair unit, that's normal.



- Remove the camshaft bearing caps and **KEEP THEM IN ORDER**. Remove the camshaft.

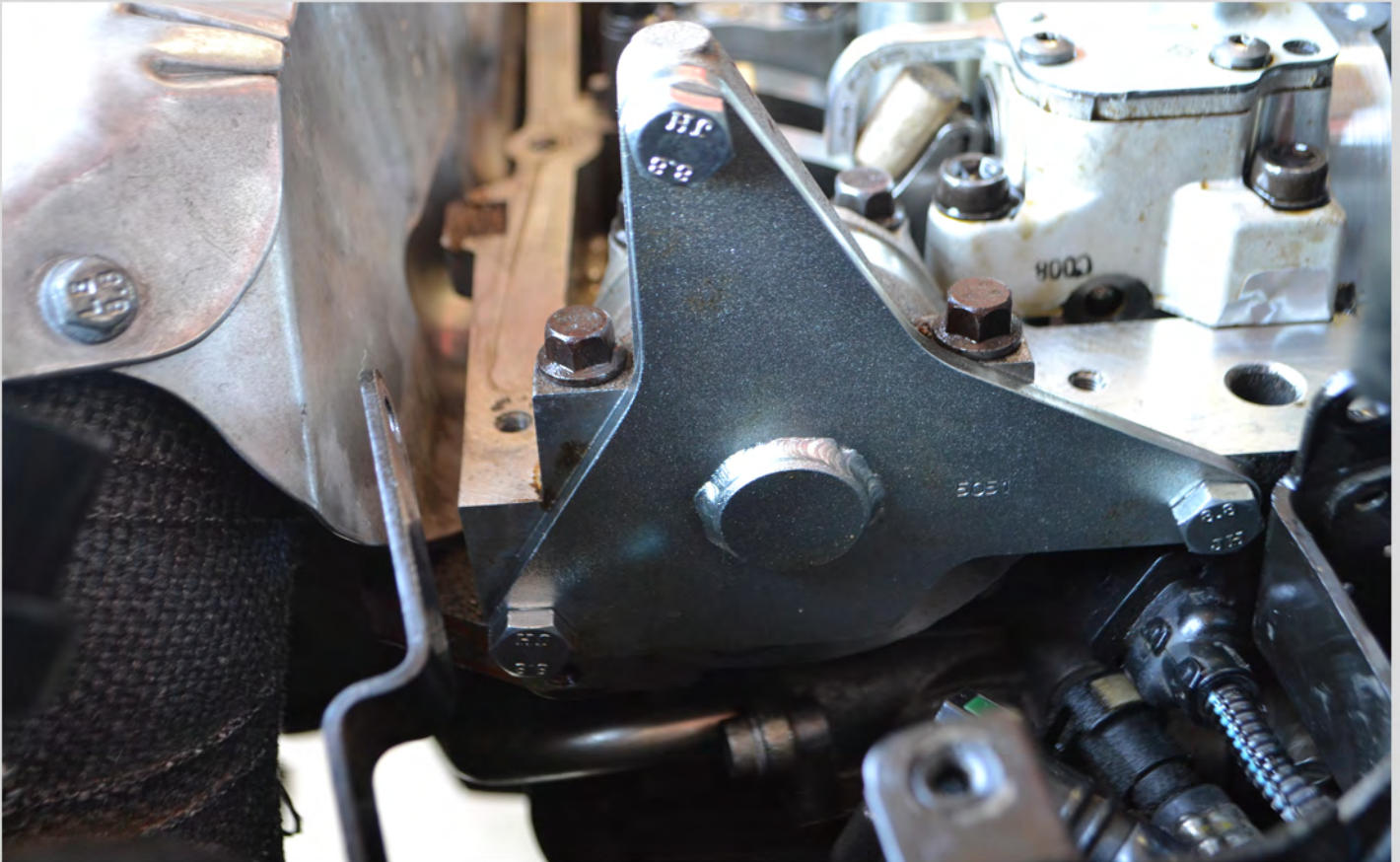


- Install the new camshaft and replace the bearing caps in the same order. Torque the caps to the factory spec. **(NOTE: the factory spec is in INCH pounds. NOT foot pounds. Someone can confuse these terms and snap off a bolt head or worse)**. Once the new cam is in, remove the multi-air holding tools (dowels).



- Locate the camshaft alignment tool. Notice that it has an alignment pin and is designed to fit into the slot on the back of the camshaft.

Camshaft alignment tool bolted to the engine:



- If the camshaft is not aligned properly so that you can install the tool (meaning that the pin is 180 degrees off) simply use the tool to rotate the cam into the correct position and bolt the tool in place. Now the camshaft is in time with the crankshaft. There is a 50/50 chance it will already be in time, if not it will be 180 degrees off. This has to do with where the cam is when you locked the crankshaft tool into position.

- Bolt the camshaft pulley sprocket to the new camshaft (we removed this earlier using the universal camshaft sprocket tool) and **ONLY TIGHTEN THE BOLT FINGER TIGHT**. It needs to be a little loose for now.

- Install the timing belt. Using the tension adjuster that came with the tool kit (shown below) rotate the tensioner until the visible tab aligns with the stock and tighten it in that position. Feel the belt for tension, it should be tight.

In the picture below we can see the tensioning tool, tensioner and locking nut. Adjust tension until the tab and slot are aligned. In this picture the slot is slightly past the tab so tension is just a hair too tight.





- Now it's time to torque the camshaft pulley sprocket bolt. This is a critical step. If done incorrectly, the engine will be destroyed. In fact, there are two ways cause damage here, so pay close attention.

The cam pulley bolt needs to be torqued to 88 FOOT pounds. However, if you torque the bolt relying on the camshaft alignment tool to hold things in place, you will break the camshaft, or worse, the head. Even in the best possible case here which would be that you break the tool, you would still be in trouble. **To avoid this you must use the camshaft pulley holding tool.**

Additionally, you can NOT use an air wrench for this. The bolt must be tightened by a good hand operated torque wrench, while holding the pulley in position with the cam pulley holding tool. We recommend a drop of blue liquid thread lock on this bolt. If this comes loose, the engine will be destroyed.

- Once this is done, you can now begin to put the car back together. Because the camshaft pulley bolt is now torqued to spec, it is impossible for the cam to fall out of alignment. All holding tools can be removed once this is complete.

The order in which you proceed afterward isn't that important. We start with the valve cover and vacuum pump. Then the timing belt covers, crank pulley and accessory drive belt. From there is just a case of re-installing the splash shield, fender liner, battery, etc.

CONGRATULATIONS ON COMPLETING YOUR INSTALLATION