ROTAX 504 500cc Engine

Fit a softer camshaft

By Ushbert

Over the years, there have been several references to the starting difficulties with the Rotax engine resulting from its high compression coupled with the lumpy 800 cam, perhaps more suited to a scrambler.
On the Archives website, Roy Candler tells of the improvements he found after changing the cam for an ex-military camshaft. I was a bit daunted for a while with talk of special tools etc, and hesitated to delve into an unfamiliar engine, but actually it's not difficult.

NOTE : It is not necessary to remove the rockers

Good reasons to do it.

The military Armstrong MT500 is rated to have a top speed of over 90 mph, so no worries about loss of performance.
Good second-hand camshafts are readily available from the military Rotax dealers,
(Force Motorcycles) for reasonable money.
The result will be easier starting and less lumpy running at low revs with better tickover.
Squaddies aren't going to want to struggle with difficult starting.

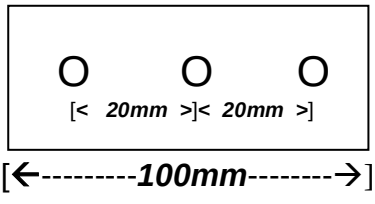
This account gives the process in simple steps. If necessary, supplement it with photo-copied engine diagrams, etc.
Normal workshop skills are assumed.

Once you've got the listed parts and tools, you should complete the job in less than 2 hours, and even that would be taking your time!

What you need before you start

A used Rotax 660 camshaft ex Armstrong military MT500 bike **}** Order all 3 to be
Cam oilseal (part no 850055) Cam O-ring (part no 230405) **}** supplied together

Circlip pliers, for a large size internal clip
Loctite nutlock -- either 221 violet-low strength (recommended) or 242 blue-medium
Crank locking bolt – made by grinding a cone point on the end of a 8mm x 30mm bolt.
Two 8mm bolts to extract the camshaft
Puller for the camshaft pulley if you have one
(or make one using flat steel, drilled 9mm dia. as below, and use it with the two 8mm bolts)



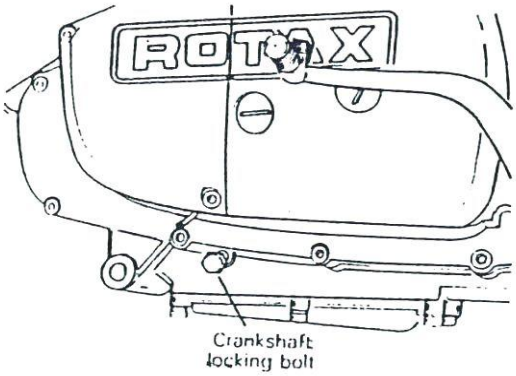
Preliminary dismantling

- Remove tank
- Remove spark plug
- Set engine to TDC on compression stroke (white dot in cambelt window)
- Remove timing belt cover (4 Allen screws)
  (It may be necessary to give this cover a tap with a rubber mallet to crack the

bond of the seal to the rear housing.)

Lock crankshaft at TDC

- Look below the engine for the Allen socket bolt rather larger than the rest.



- Remove this but be ready to catch a small amount of oil
- Look into the hole where you can see a small notch in the crank. This shows the locking point. Screw in the locking bolt part way. (stems the oil drip too !)
- Nudge engine in top gear as you screw in the bolt until you feel it engage in the notch. No need to do more than just nip it up.
- Crank centre and the witness marks on both crank pulley and cam pulley should now all line up.
- Slacken cam pulley centre bolt.
- Loosen cambelt tensioner and remove along with its spacer.
- Remove belt. Chalk an arrow on belt showing direction of travel and put it safe. It will later need to be refitted and should be put on the same way round.

Accessing camshaft

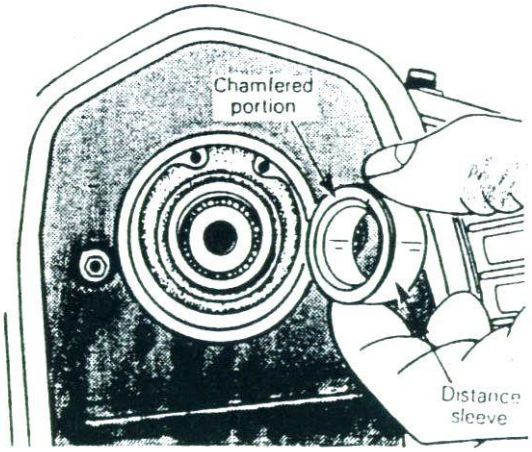
- Remove cam belt pulley
- Remove the two Allen bolts either side of camshaft. (Will clear the way for you to draw out the camshaft—see next section)
- Clean exposed face behind and extract circlip.
- Withdraw distance spacer from shaft
- Winkle out oil seal-- Be prepared to catch an eggcupful of oil
- Remove shim behind it to expose camshaft.

Removal of camshaft

- Replace camshaft pulley loosely on camshaft splines with centre bolt finger tight.
- Screw one of the two 8mm bolts in the threaded holes in the pulley.
- Slide a flat bar or spanner behind the pulley and nip it in position with the bolt
- Repeat with the other bolt to nip up another bar behind the opposite side
- Evenly screw in the two 8mm bolts to extract the camshaft.

Fit the new camshaft

- Slide O-ring off old camshaft
- Remove bearing from camshaft and, with a smear of oil slide it on to new one.
- Take new camshaft and slide into head, **checking that timing mark is uppermost.**
- Tap shaft home, using a large size socket as a drift on the **outer race** to drive it home until you hear it's snug. **On no account hit the inner race.**
- Refit the O-ring and shim.
- Smear a little oil on the lip of the oilseal and tap it gently in with the socket drift as before.
- Refit the circlip.
- Slide the distance sleeve on to the shaft **with the chamfered face toward the o-ring** (see illustration below)



Finishing off

- Clean threads of Allen screws for rear cover and replace them, giving each one a drop of the Loctite**.**
- Examine the camshaft pulley and dress off any sharp edges
- Refit thrust washer, then the pulley in correct alignment.
  (Don't fit the centre bolt yet)
- Refit the belt (right way round !) and belt tensioner roller and tension up.
- **Double check** that all witness marks (on camshaft, camshaft pulley and crank) line up as before.
- Clean the thread of the pulley centre bolt and apply a smear of Loctite.
- Tighten bolt (with its washer) securely (13-16ft.lbs recommended)
- Adjust belt tension to give a 6mm gap between idler roller and belt as per handbook.
- Remove crank locking bolt and replace original bolt in crankcase.
- Turn engine over to check belt tension before refitting cover.
- Top up oil to replace any lost.

That's it---job done! **Go and enjoy the improvement!**