

IMPROVING THE HONDA 400/4 CAMCHAIN

The incredibly popular little multi has always been afflicted with an inferior tensioner and adjuster for the camchain. Guy de la Bedoyere explains how to modify it for the better.

LIKE many Hondas the 400/4 is a basically reliable machine afflicted with an unsatisfactory camchain tensioner and adjuster mechanism.

Most owners will be familiar with the theoretical method of adjusting the camchain and will be equally familiar with how it frequently results in an even noisier engine.

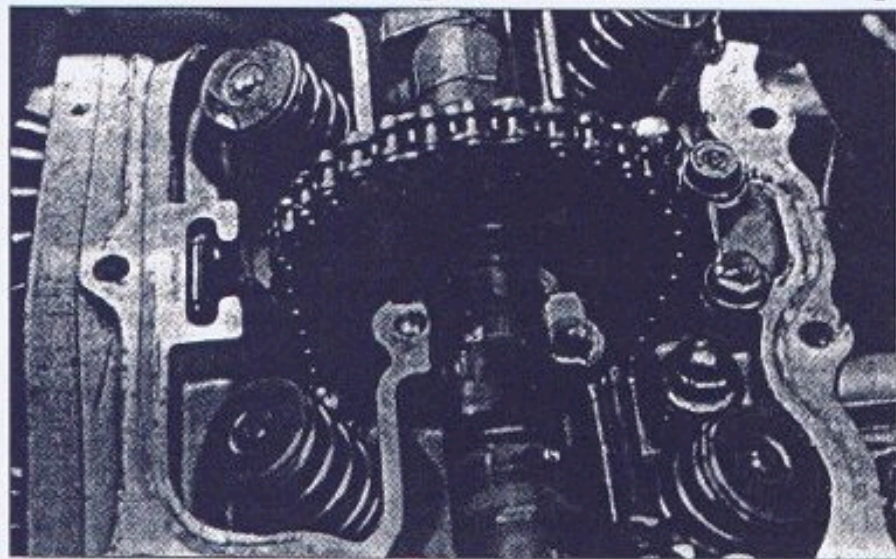
A noisy camchain can be identified by the lack of a distinctive whine when the engine is revved. This non-appearance of the whine is accompanied by a light erratic tinkling from the top end — unlike loose tappets which make a regular noise.

The 400/4's camchain is tensioned by a blade which sits at the back of the barrels. It works like an archer's bow. Imagine taking a bow and placing one end on the ground while leaning on the top. The bow will bend and be forced outwards. In the same way the tensioner blade is made to bend into the camchain.

Some camchain tensioner adjusters work like the imaginary hand, for example on the Yamaha XS twins, and push down from the top onto the blade.

The 400/4's is much more complicated and this is the root of the problem. The top of the tensioner blade is fixed and the adjuster force actually comes via a spring loaded adjuster (A) inserted into a drilling in the front of the upper crankcase just above the oil filter housing.

The force is transmitted (B) via an arm which curves under the crankshaft from the front of the engine. The arm hangs on a pivot (C) at the front of the engine. This has the effect of forcing the blade (D) into the camchain.



The cam sprocket and camchain from the left hand side. To the left can be seen the chain guide and on the right the two bolts which secure the tensioner blade holder (H on diagram).

As most 400/4 owners will know, the official method of adjusting the camchain involves running the engine at tickover, releasing the lock-nut and loosening the adjuster bolt. The two springs are then free to push the plunger harder onto the arm. The bolt is tightened and the job is done.

That's the idea. But often it simply doesn't work. The springs are probably 15 years old or more by now and remember, they are having to transmit the force a long way against the back tension of the camchain. What usually happens is that the camchain's back tension actually pushes the plunger back — thereby making the chain looser — and the noise gets worse! If a new camchain has been fitted, the effect can be even more pronounced.

There are two solutions. One is simple and one is more complicated. The former was devised some time ago but having met several 400/4 owners with very noisy camchains it seems worth describing. The latter is more dramatic and is really more suited for when a new chain is being fitted.

Method One

THIS is suitable for routine maintenance and requires no special skills.

Above the camchain tensioner bolt at the front of the engine is a small bolt (10mm head) which faces upwards and sits between the two front engine mounting plates (E). Remove this bolt completely and put it somewhere safe. It may be seized, in which case it may be necessary to remove the mounting plates in order to improve access.

This bolt caps off the drilling into which the tensioner plunger is sited. By removing it a thin screwdriver can be pushed down to apply pressure to the plunger while performing the conventional tensioning technique. In other words you do the work of the springs. Maintain the pressure while you tighten (carefully) the bolt and lock-nut. Replace the capping bolt.

While you push the screwdriver the tinkling should disappear to be replaced by the characteristic whine of

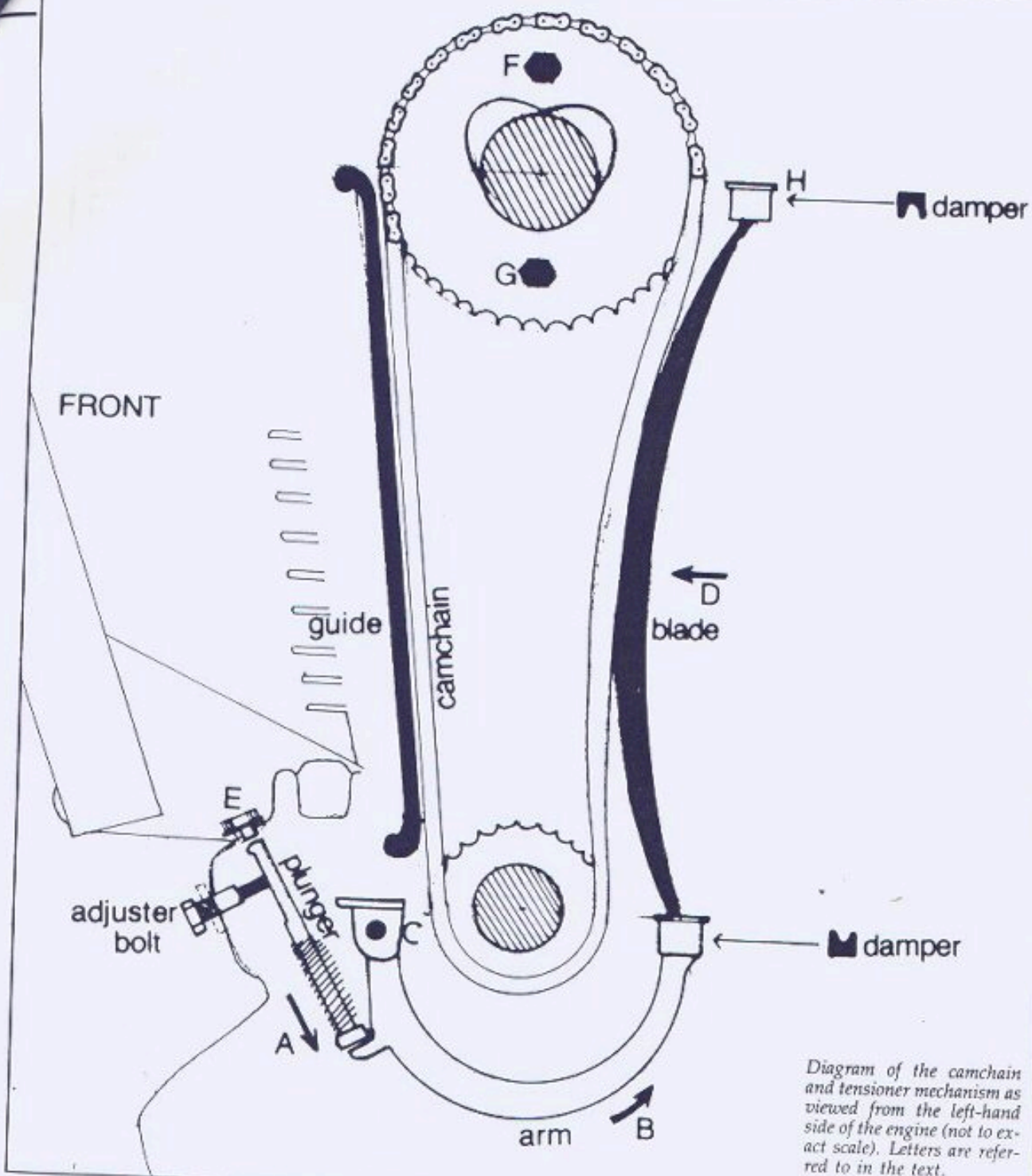


Diagram of the camchain and tensioner mechanism as viewed from the left-hand side of the engine (not to exact scale). Letters are referred to in the text.

a new-sounding 400/4. If it doesn't go completely then the camchain probably needs replacing. If there is no change at all then either the chain is completely worn or the whole tensioner mechanism is seized. The latter will probably require a complete strip of the engine but Method Two may rectify the problem.

Method Two

ANYONE who has worked on an engine should find this method straightforward. It is

best combined when replacing the camchain with a split/soft rivet type and tensioner blade.

If only seeking to adjust the camchain, this method is most suitable for when the camchain is extremely noisy and Method One has failed. However, if the noise is that bad the camchain probably needs replacing. Proceed as follows:

- Remove tank, plugs and ignition coils. Remove tappet covers and slacken all tappets (this is vital). Remove the rocker cover and expose the camshaft and valves.
- Turn the engine to the T1.4

mark on the advance-retard mechanism behind the chrome cover on the bottom right hand side of the engine. Loosen and remove the visible bolt (F) securing the cam sprocket to the camshaft.

- Turn the engine 360 degrees and remove the other bolt (G). These bolts are special shear-resistant ones and should not be substituted other than with identical replacements.

- Push the sprocket off the camshaft and free the chain. If you are not replacing the chain move on to * below.

IMPROVING THE HONDA 400/4 CAM CHAIN

● Split the chain after tying string to either side of the split. A chain splitter is ideal but the chain can be sawn (with extreme care). Remove the camshaft noting that the worm gear to drive the tachometer is on the right hand side. Use the string to pull both ends of the chain over the front of the cylinder head where they will be out of the way. Tie the string ends to the front down-tube of the frame.

● Undo the two 10mm bolts which secure the top blade holder (H) and pull off the blade holder. Note that the blade holder contains a metal damper into which the curved top of the blade fits.

● You can now withdraw the blade (also called a slipper). The bottom of the blade fits into another damper which is itself fitted into a socket on the tensioner arm down inside the crankcases. This damper may come out with the blade. Equally it may drop out and fall into the sump so a judicious use of rags is recommended to prevent this. If it does, the sump can always be removed. The blade will bear grooves worn in by the camchain. The service limit is 3mm thick at the centre.

● Install the new blade with the bottom damper in place. Install but do not tighten down the top holder yet.

● The camchain guide which sits at the front of the barrels can also be replaced though this is less critical. Service limit is 5mm at the centre. It is simply pulled out and a new one placed in.

● Attach one end of the new chain to the old one at the front of the engine either with a piece of wire or use a split link from a CD175 camchain. Tie string to the other end of the new chain and secure the string to the frame. Now pull the old chain out and it will pull the new camchain in behind it.

● Now you need to separate the two camchains but you will have to add a third piece of string to the end of the new camchain where it joins the old before you separate them. Remove the old camchain. If you drop the new one into the crankcases don't worry; a piece of wire and a little patience will recover it easily enough (he said, speaking from experience).

● You should now be looking at a new camchain emerging from either side of the camchain tunnel secured by string at either end. Fine. Now make sure that the engine is at the T1.4 mark and that either one of the camshaft bolt holes is in line with the centre of the crankshaft (marked by

the bolt securing the advance-retard unit. It doesn't matter which).

● On the right hand side of the cam sprocket two horizontal lines at 90 degrees to the bolts should be in line with the top of the cylinder head. This positioning will make sure that the valve timing is correct. It must be done accurately.

● Install the camshaft with the tach drive on the right and restore the sprocket to the camshaft. Replace one of the special bolts which secure the sprocket to the camshaft (F or G), with a dab of Loctite, but do not tighten.

● Place the camchain on to the sprocket. You may now need to remove the string, in which case it is a good idea to stuff a rag around the chain to prevent it dropping into the engine. It saves fishing around with wire to retrieve it.

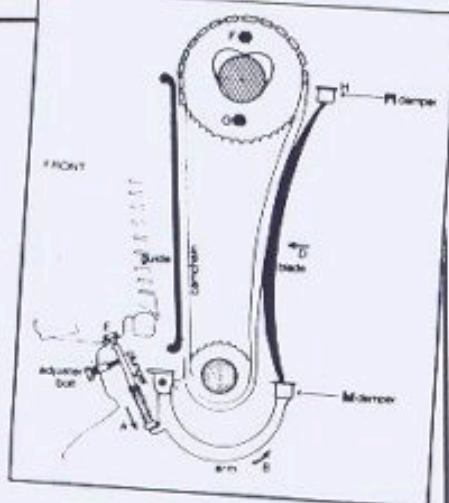
● If you are uncertain about the valve timing, use a CD175 split link to connect the two ends of the chain for the meantime.

● When you are happy that the valve timing is correct you can replace the split link with a soft rivet link. Push the link in and place the open plate on the other side. You will need an assistant to hold the link together while you hammer a punch into the ends of the rivet link. Turn the engine over and install the other special bolt (with a dab of Loctite) on the cam sprocket and tighten up. Turn the engine over and tighten up the corresponding bolts.

● *Those not replacing the chain rejoin us here. You can now tension the camchain. Only screw down the two bolts which secure the top blade holder (H) until they are sitting about 5mm proud of the cylinder head. Those who are not replacing the camchain should unscrew these nuts until they are about 5mm proud of the head.

● Release the tensioner bolt at the front of the engine and watch the blade rise up as the spring pushes it. Freed of having to work against the camchain's back tension, the plunger spring can work properly.

● Tighten carefully the tensioner bolt. Now tighten down the two bolts which secure the holder and watch as the blade is pushed against the chain. It is theoretically possible to over-tighten the camchain so watch very carefully as you tighten down. If in doubt slacken the tensioner bolt off and try again, this time starting with the holder bolts screwed in further to begin with. If, on the other hand, the chain is still loose repeat the whole procedure.



● Turn the engine over on the starter and check that it moves smoothly. Pour oil over the camshaft. Replace the rocker cover (you may need a new O-ring gasket) and adjust the tappets to the correct clearance of two thou on the T1.4 mark. (At this position half the tappets are adjustable. Turn the engine over to this point again to do the other half. See table below.)

● Restore the coils, plugs and tach cable. Replace the tank and turn the engine over a few times before starting.

IF everything has gone smoothly you should now be listening to a sound which will take you back to the Golden Age when the sohc fours ruled the world.

I have performed this procedure several times quite satisfactorily. It only requires patience and care, there is nothing particularly complicated about the job. Remember that if the camchain is noisy and is left untended it will undoubtedly wear away the tensioner arm introducing metal particles into the oil.

If the blade is worn down the same applies. Quite apart from this a loose camchain has the effect of putting out the valve timing slightly and diminishing performance.

PART NUMBERS

- Split camchains (219-821) are manufactured by Tsubaki (available from Titan Trading, 0362-698147) amongst others.
- Tensioner blade. Honda part number 14545-333-000.
- Camchain guide. Honda part number 14620-333-000.
- Rocker gasket. Honda part number 12391-333-000.
- CD175 split link. Honda part number 14411-235-003.

TAPPET ADJUSTMENT

- With the engine at alternate T1.4 points the valves are adjustable as follows (two thou/0.05mm each):

Cylinder 1 2 3 4
Intake x o x o
Exhaust x x o o