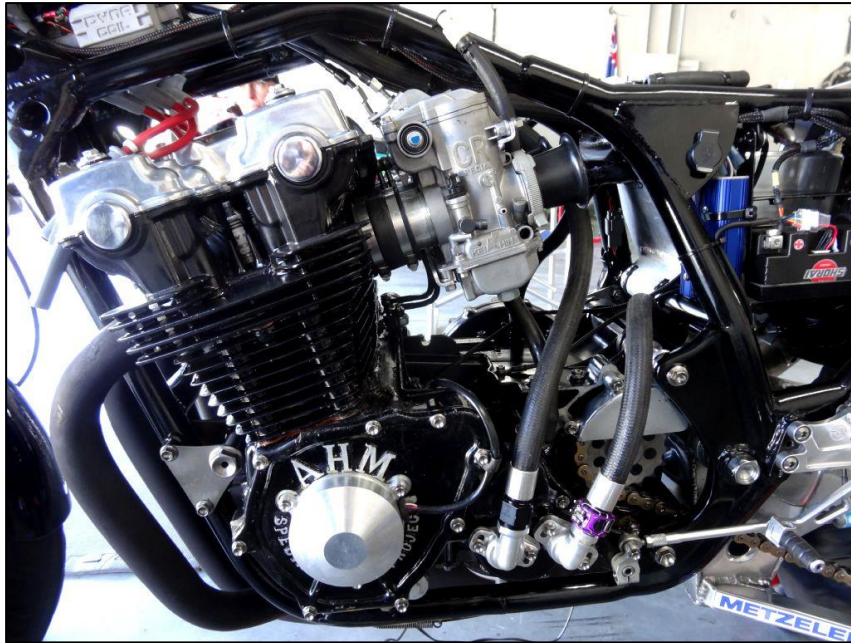


VINCE & HYDE

Racing

HONDA



**AHM Cam Chain Tensioner,
Curved Front Guide
& 'B' Tensioner FAQ**

For

All 1978 – 1983 DOHC Honda 4's

CB750s, CB900s & CB1100s

Models C, F and R

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Why have you developed these products?

In the late '70's and early 80's, the Honda factory and other privateer racing teams in Europe and America were competing with the Honda twin-cam in-line four-cylinder engines in Superbike, F1 and endurance racing. However, all teams soon found the 'A' long cam chain was subject to poor durability and/or outright failure at high engine rpm, with obvious catastrophic results.

This major problem prevented teams from unleashing the full performance and reliability potential from their otherwise highly developed racing engines.

Both Honda and privateers were unable to solve this major problem during the fairly short period of time these engines were raced. Once the new V4 engines were released in 1983, the Honda factory race team immediately abandoned any further development of the earlier twin-cam in-line four-cylinder engines. Race teams also dramatically reduced their development effort. The world simply moved on to different engine architecture.

However, as privateers, abandonment was not an option as we continued to develop and race these engines over several decades. Like many other privateers, we too experienced dozens of broken A cam chains, and always with catastrophic results. Despite this, we continued our efforts to identify the reason for the failure and to engineer a robust and practical solution.

Understanding why this was happening was a real puzzle. Chronic breakage of cam chains cost us enormous amounts of time, money, engineering effort and many unfinished races.

A far more reliable, robust and better engineered solution was needed that completely solved all the inherent design flaws and performance limitations of the OEM products.

Who are Vince & Hyde Racing (V&H Racing)?

V&H Racing are a small private race team from New Zealand who have been successfully developing and racing the double overhead cam in-line Honda fours and CBX sixes manufactured between 1978 – 1983. We have been regular competitors in classic motorcycle racing events in New Zealand, Australia and Europe since 1980.

What is wrong with the OEM design of the 'A' Cam Chain system?

- a) the harmonics and resonance occurring in the largely unsupported free-lengths of the front run of the 'A' cam chain are a direct result of the distance between the crankshaft and camshaft centre lines in the Honda twin-cam four-cylinder engines. The distance on these engines is greater when compared to engines with shorter stroke architecture.
- b) the straight OEM design of the A front guide actually enables and promotes oscillation of the front of the chain along almost the full length of its travel.

You may not think the extra distance between the crankshaft and camshaft centre lines would have that much effect, but it does. At higher rpm, the harmonic range of the chain puts it into an oscillation danger zone. Lower the rpm and the problem is substantially reduced.

However, some have also had the 'A' cam chain break even when idling the engine. This is because the damage was already done and, contrary to popular opinion, idling is actually not the low load many think it is.

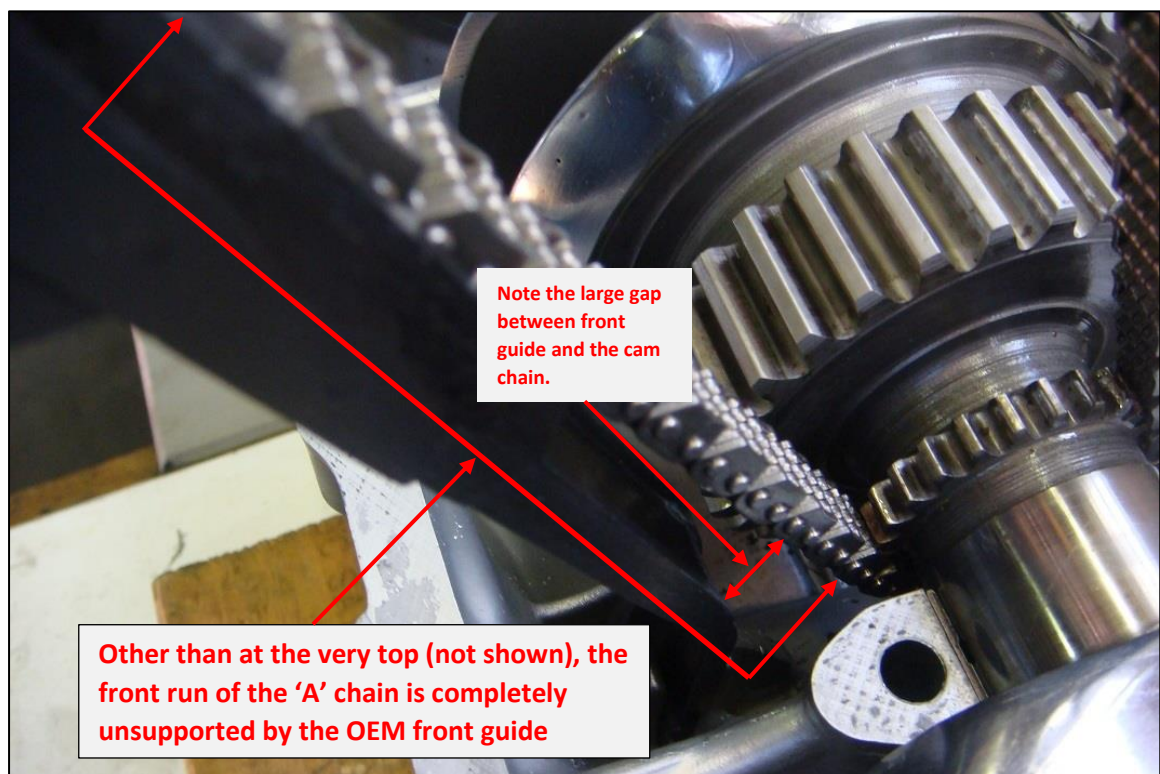
What makes the long 'A' cam chain break when OEM components are used?

The short answer is chain frequency and harmonics.

As the chain rotates, the back side of the chain travels down the front guide and onto the cam chain sprocket on the crankshaft.

In OEM installations, the reality is the chain touches the top of the guide only. During its journey down and onto the crankshaft sprocket, it progressively moves further and further away from the surface of the guide, leaving the chain completely unsupported as it approaches the crankshaft sprocket.

The image below shows the OEM guide in place. You can clearly see the back surface of the bottom part of the 'A' chain is not touching the guide at the base as the chain approaches the crankshaft sprocket (ie; the area between the red arrows). This is the fundamental flaw in the OEM design.

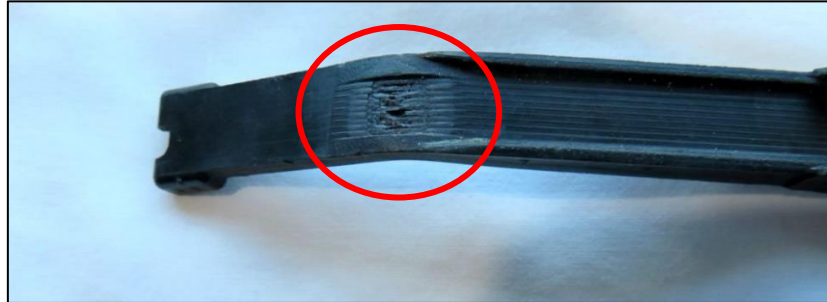


As engine speed approaches the higher end of the rpm range, the unsupported free-length of chain between the exhaust camshaft sprocket and the crankshaft sprocket develops a harmonic wave / resonance. This wave then starts to oscillate the chain violently against the OEM front guide, in addition to any load being applied by the turning crankshaft. There is also minimal material in the OEM guide to prevent the chain from excessive lateral (side to side) movement. This lateral movement introduces even more destructive harmonics into the chain.

If you have ever seen a broken / damaged cross bar mounting point on the OEM guide, or it's receiver groove in the cylinder barrels, the root cause of that damage is the violent oscillation of the cam chain beating hard against the guide.

Further evidence of the effects of damaging harmonics occurring in the cam chain is shown in the image below.

It shows an OEM front guide with damage inflicted to the surface of the guide at the point of greatest clearance. The damage is caused by the resonant wave of the cam chain making the back of the chain repeatedly and violently strike the guide surface. You can see the groove worn into the guide created by the excess pressure applied by these resonant harmonic waves occurring in the chain as it repeatedly and violently beats onto the guide surface.



Finally, a combination of centrifugal force and the harmonic events occurring in the cam chain places additional stress and load on both the multiple toothed plates making up each link in the toothed cam chain and the pins at each end of the cam chain links. This exceeds the ultimate load capacity of the chain.

On many occasions, we found individual link plates in a chain would separate from the pin at one end, rotate outwards. It would then become a high-speed knife blade, slicing through both the front guide and the tensioner itself. This would inevitably result in total cam chain failure.

How did you solve the problem?

We solved the problem by developing solutions for four basic areas of cam chain operation and control:

- a) using improved materials 100% machined from billet, thereby providing longer life and durability over OEM;
- b) developed and introduced a curve to the front guide with the correct radius to suppress/eliminate the harmonic events occurring in the chain;
- c) developed a matching rear cam chain tensioner with the same design advantages and features as the curved front guide;
- d) improved cam chain quality and specifications.

After much trial and error, and with thousands of hours of development and testing under racing conditions, combined with careful engineering analysis of the mounting evidence seen in our many failures, we were finally able to correctly identify the root cause of the failures.

New components were designed and produced to eliminate all the inherent problems of the OEM design. These components are:

- a) the V&H Racing Front Curved Guide for the 'A' cam chain; and
- b) a matching V&H Racing AHM 'A' Cam Chain Tensioner, and
- c) the V&H Racing 'B' Cam Chain Tensioner.

These three components all share the same engineering features and technology (detailed explanation on the following pages.)

The Materials used

The proprietary material used in V&H Racing products provide more durability and longer life than the OEM materials and testing in the most extreme conditions possible has confirmed this.

The V&H Racing Curved Front Guide, AHM 'A' Cam Chain Tensioner and 'B' Cam Chain Tensioner are stronger in all aspects than OEM because they are 100% machined from billet materials.

V&H Racing AHM 'A' Cam Chain Tensioner.

In the image below, on the left is the V&H Racing AHM 'A' cam chain tensioner. In the centre is the Honda OEM item for the 1100's and on the right is the Honda OEM item for the 900's.

You can clearly see Honda attempted to improve the cam chain tensioner in the 1100 engine when compared to the 900, but even the improved 1100 version was still unable to solve the inherent design issues. It simply does not perform as effectively to control the 'A' cam chain movement as the V&H Racing product.



Above image provided courtesy of Ian Fox (aka 'bikeboy') on www.dotheton.com

We developed a solid type rear cam chain tensioner (AHM Tensioner) that is unique in using a single adjuster bolt to position the tensioner against the unloaded rear run of the cam chain.

The V&H Racing AHM 'A' Cam Chain Tensioner, incorporating its specific curvature, is far more robust and durable than the OEM tensioner it replaces. This makes it effective at eliminating any harmonics on the unloaded chain path. Like the curved front guide, this results in better control of any chain movement because the cam chain is required to smoothly follow the curvature of the tensioner.

V&H Racing Curved Front Guide, 'A' cam chain.

In the image below, on the right is the V&H Racing Curved Front Guide for the 'A' cam chain. On the left is the Honda OEM item.

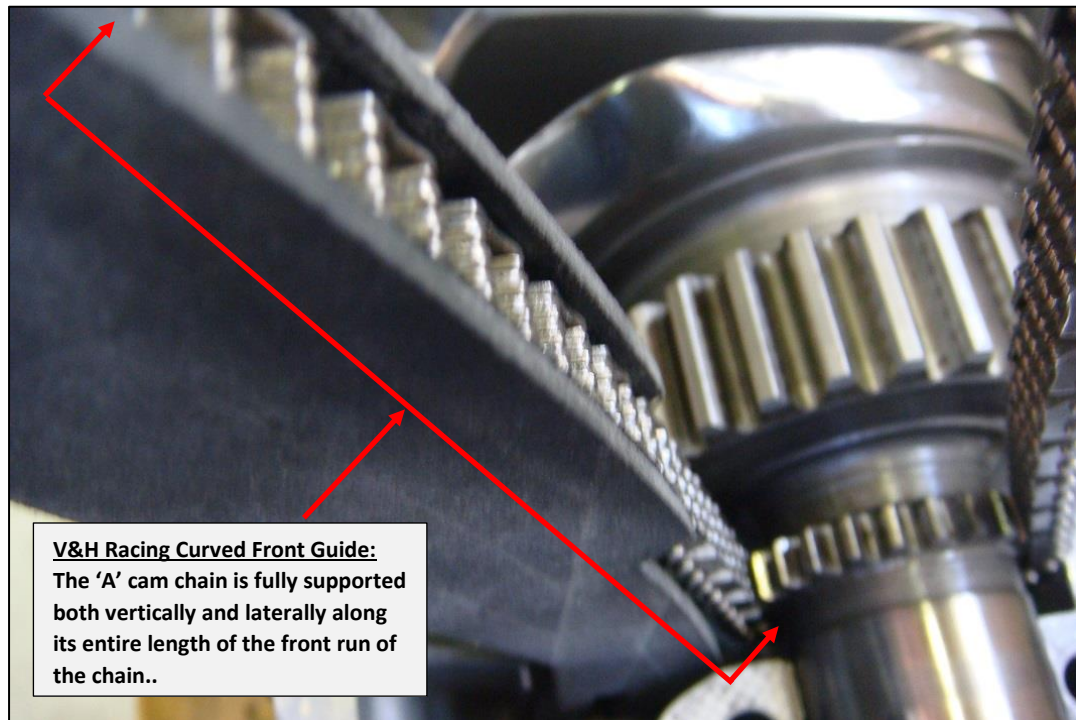
Note the following points of difference between the V&H Racing Curved Front Guide and the Honda OEM item it replaces:

- a) the long, gentle curve along the full length of the guide. This provides much more surface area that is constantly in contact with the back of the chain. This provides greatly improved support and control along the full length of the cam chain run;
- b) the sides of the V&H Racing guide are much taller than OEM. These taller sides fully encapsulate the cam chain on 3 sides, thereby providing total control of any lateral movement of the chain
- c) physically larger dimensions makes it much stronger and more durable than OEM.

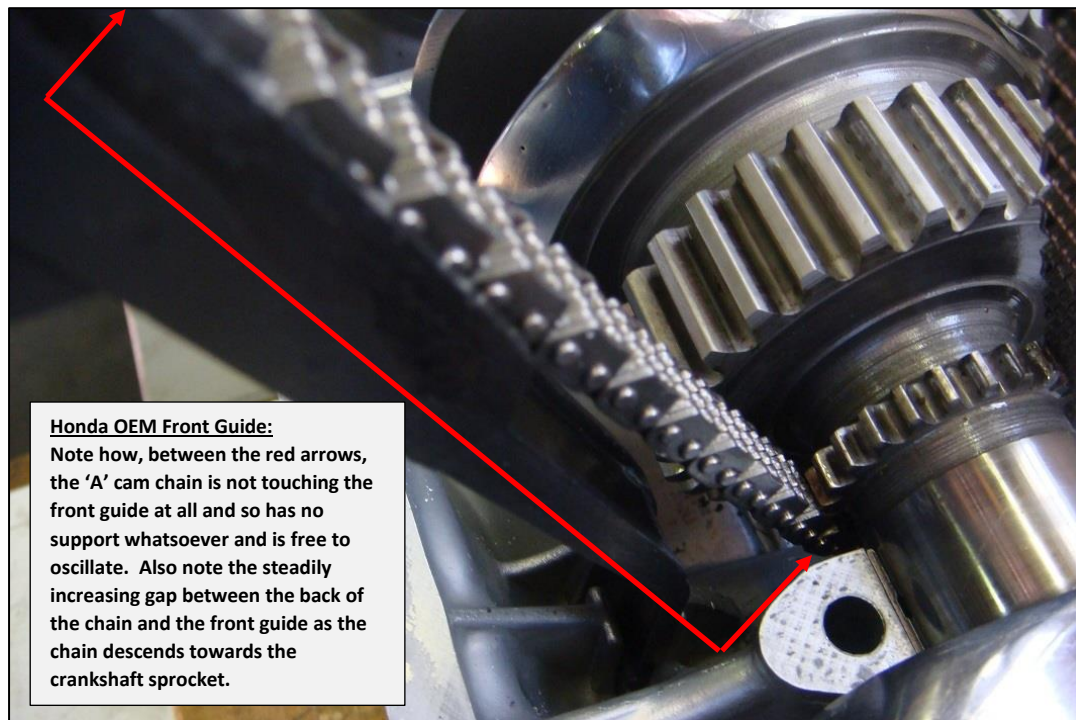


The images below compares installation of the V&H Racing Curved Front Guide with the OEM Honda equivalent parts.

V&H Racing Curved Front Guide



Honda OEM Front Guide



Compared to the image of the OEM straight guide, you can clearly see how the V&H Racing Curved Front Guide is always in full contact with the back of the cam chain for the full length of its travel down to the crankshaft sprocket. As it moves, the chain is held 100% in contact around a curved path. It is then fed onto the crankshaft sprocket in a much more controlled manner. It is also prevented from any lateral movement by the height of the raised sides of the guide, which fully contain and capture the chain.

This perpetual contact between the back of the cam chain and the guide eliminates the harmonics from occurring in the chain, and so reduces loads and stresses to a level **below** the chain's maximum design parameters.

V&H Racing 'B' Cam-chain Tensioner

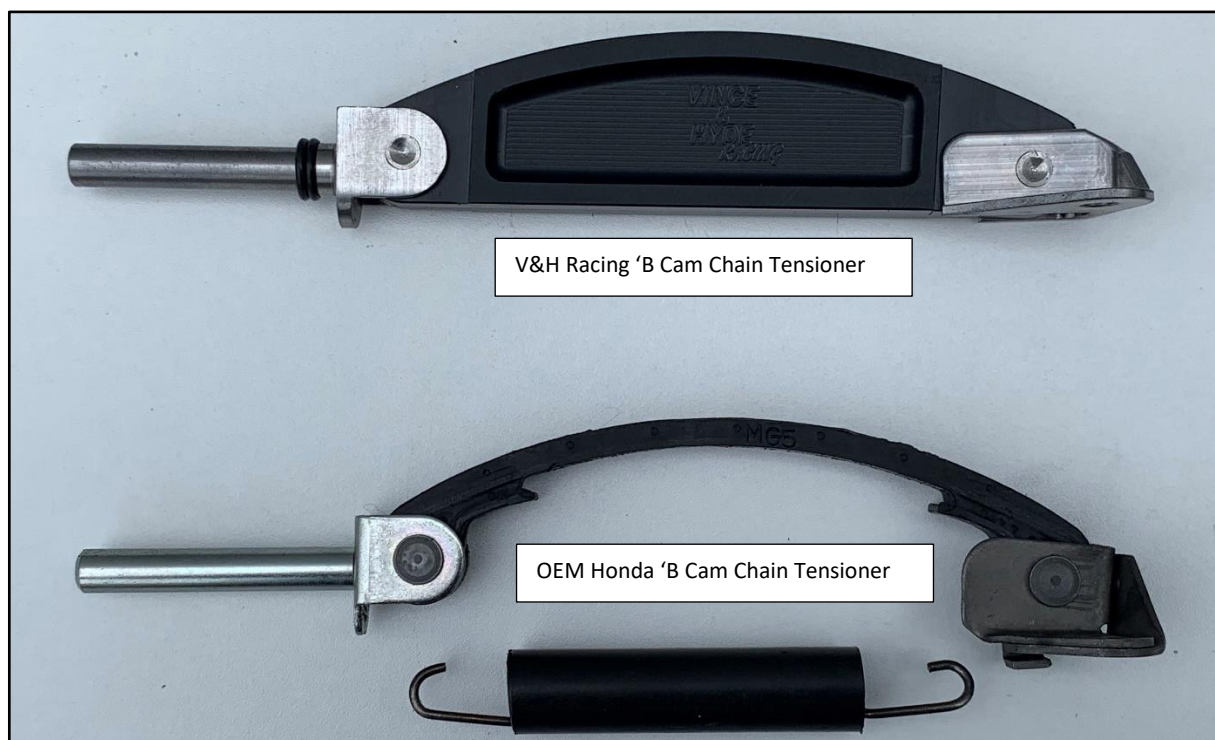
We created the B cam chain tensioner for different reasons. While there are no harmonics / resonance problems in the much shorter 'B' cam chain to overcome, there are OEM durability issues that invited a better engineered solution. We used the same curved guide design and engineering principles as used in our A cam chain components.

This resulted in development and production of a mechanical 'B' chain tensioner also manufactured completely from billet materials.

In the image below, top is the V&H Racing 'B' Chain Tensioner and OEM part on the bottom.

You can see in that image the V&H Racing 'B' cam chain tensioner at the top is far more robust than the OEM part shown on the bottom. This is because it has a solid slipper blade which means there are no moving parts.

The V&H Racing 'B' cam chain tensioner is made from materials with a superior specification than the OEM part it replaces. In addition, all metal mountings are machined from solid billet material and are unbreakable.



V&H Racing Competition Usage Summary

Since using all these components in combination with superior-quality cam chains in our racing engines, we have not suffered one single cam chain failure in several seasons of racing, even running the engines up to 12,000 rpm.

Furthermore, when we strip and inspect the engine at the end of each racing season, our cam chains, tensioners and guides still look as new as the day they were fitted and are completely unmarked. We also found we now rarely need to adjust the cam chain tension during a complete season of racing.

Are they easy to fit?

Yes. We have prepared comprehensive, easy to follow installation instructions, complete with detailed pictures and descriptions of each step.

Here is the [link](#) to the V&H Racing Curved Front Guide and AHM 'A' Cam Chain Tensioner installation instructions.

To ensure the very best component service life, and to simplify installation and overcome the changes in the way the cam chain free length is consumed, both the Curved Guide and AHM Tensioner **must** be used together as a set.

Fitting the V&H Racing Curved Front Guide

There are no changes needed whatsoever and the front VHR Curved Guide is a drop-in replacement for the OEM straight guide.

Fitting the V&H Racing AHM 'A' Cam Chain Tensioner

Fitting the rear AHM Tensioner requires minor changes to the two existing OEM 6mm holes in the rear of the cylinders / barrels.

The TOP hole in the cylinder is drilled and tapped ALL THE WAY THROUGH for an 8mm x 1.25 mm pitch bolt. Further details are provided in the installation instructions.

The BOTTOM hole in the cylinder is tapped to a small amount, details are provided in the installation instructions.

V&H Racing recommend tapping the threads in the two holes with the cylinders removed from the engine.

A word about Cam chain Specifications

We have identified there are many cam chains available in the market for these engines that are of a lesser quality and specification than was originally used.

We only use and supply our customers with genuine Morse heavy duty / race specification cam chains which have proven to be the very best available.

We recommend fitting these cam chains to your engine, in combination with the V&H Racing components. Then, regardless of whether you use your engine for street, track or all out competition, you will be assured of getting the very best durability, performance and service life of your cam chains and components.

Pricing for the genuine Morse heavy duty / race specification cam chains are available upon request.

OK, but I have a street bike, so why should I use these racing parts in my engine?

The engine in your street bike spends far less time at high rpm and peak loads than engines used in competition. Therefore, if components are very robust when used for racing, it stands to reason they will be even more durable, give longer service life and will be even more effective when used on the street.

The focus for street bike engines shifts to:

- a) availability of replacement parts;
- b) durability; and
- c) the time between service intervals.

Availability of Replacement Parts

New replacement OEM parts are becoming increasingly harder to find and many owners are unaware our products even exist. So, unfortunately, those owners believe they have no option but to put second-hand parts back into their engines that are well used – parts that were manufactured decades ago and have only limited service life remaining.

V&H Racing parts are now readily available to you for purchase. Delivery typically takes 1-2 weeks from the time you place your order and your payment received.

Durability

The OEM parts are a poor design because they do not control the harmonics in, or provide support of, the cam chain, even at lower rpms. The V&H Racing products have been specifically designed to eliminate all these events, providing further durability of the cam chain and components.

The carefully developed and well-executed design of VHR components, combined with use of modern materials and metal components, all 100% machined from billet stock, means the V&H Racing products are better in every respect than the OEM parts they replace.

Time between Service Intervals

The cam chain adjustment must be set correctly during installation as per the instructions provided. Using the V&H Racing AHM Tensioner and Front Curved Guide means the cam chain and the components that control it are no longer subject to the high stresses and loads induced by the poor design of the OEM Honda parts. This means the time between cam chain adjustments is greatly extended.

Many customers tell us that when they do a second cam chain tension check at around 1,000 miles after installation, they only need to make a very minor adjustment. Others have reported no adjustment at all is needed and have run the engines for tens of thousands of miles with no further adjustment required and the cam chains remain quiet in operation.

The V&H Racing components have now effectively become the 'Gold Standard' for any twin cam in-line four-cylinder Honda engine ('78 - '83), so you are assured of greatly improved durability and service life, regardless of how you use your bike – street only, a mix of street and track days, or all out competition.

V&H Racing 'B' Cam Chain Tensioner Oiling Kit – (available separately.)

For street use, the V&H Racing 'B' cam chain tensioner can be simply installed using these procedures and will give years of trouble-free service.

But for competition use, or to give your street bike engine the very best cam chain lubrication system possible, we recommend installation of our additional oiling kit. The easily installed kit delivers a jet of oil sprayed directly onto the V&H Racing 'B' cam chain and tensioner. This enhances service life of both the 'B' cam chain and the tensioner.

The kit consists of a modified stock oil filter housing; an oil line, two banjo bolts and four sealing washers. The oil line runs from the oil filter housing up to the front of the cylinder head on the spigot where the 'B' cam chain tensioner shaft is located.



For pricing and availability of the optional Oiling Kit, contact Vince & Hyde Racing at brentmopar@xtra.co.nz.

How do I order and pay for them?

Send an email to brentmopar@xtra.co.nz stating which of the following VHR components you require.

- a) V & H Racing Curved Guide cam chain tensioner
- b) V & H Racing AHM Tensioner.
- c) 'A' Cam chain.

Payment is via Paypal to the above email address.

IMPORTANT: Please do NOT send money without first receiving an invoice from V & H Racing.

When will I get them?

As soon as your Paypal payment is received, your order will be promptly shipped from New Zealand.

Once your items are shipped, we will immediately send you a picture of the package.

What is the Warranty?

The VHR components come with an unconditional 12-month warranty from date of purchase, subject to the items first being returned at the buyer's cost. In the unlikely event of failure, simply contact us to advise us of the problem, then ship us your failed parts (at the buyers cost) and we will happily replace them.

If any goods arrive damaged in transit, they are to be returned at the buyer's cost. Once received VHR will replace and ship your parts free of charge. We are yet to have any returned for a warranty claim.

Other DOHC Honda Performance Parts available:



Contact Brent at brentmopar@xtra.co.nz for price and availability.

Honda CB750F and CB750C

V&H Racing Curved Front Guide, Cam Chain 'A'	V&H Racing AHM Tensioner, Cam Chain 'A'
V&H Racing 'B' Cam Chain Tensioner	V&H Racing Morse 124 link Race Cam Chain 'A'
V&H Racing Morse 82 link Race Cam Chain 'B'	V&H Racing Oiling Kit, 'B' Cam Chain Tensioner
V&H Racing Oil Filter to Pan Air Purge Kit	V&H Racing Cam Degree Tool – suitable for all 1978 – 1983 Honda Twin Cam 4 and 6 cyl. engines.

Honda CB900F, CB900C & Honda CB1100F

V&H Racing Curved Front Guide, Cam Chain 'A'	V&H Racing AHM Tensioner, Cam Chain 'A'
V&H Racing 'B' Cam Chain Tensioner	V&H Racing Morse 126 link Race Cam Chain 'A'
V&H Racing Morse 82 link Race Cam Chain 'B'	V&H Racing Oiling Kit, 'B' Cam Chain Tensioner
V&H Racing Oil Filter to Pan Air Purge Kit	V&H Racing Primary Chain Tensioner
V&H Racing Lightweight Crankshaft	V&H Racing Cam Degree Tool – suitable for all 1978 – 1983 Honda Twin Cam 4 and 6 cyl. engines.
V&H Racing Straight Port High Performance Super Head	V&H Racing Billet 72 mm Hard Anodized Race Pistons (1123 cc)

Honda CBX Six Cylinder

V&H Racing Curved Front Guide, Cam Chain 'A'	V&H Racing AHM Tensioner, Cam Chain 'A'
V&H Racing 'B' Cam Chain Tensioner	V&H Racing Morse 120 link Race Cam Chain 'A'
V&H Racing Morse 82 link Race Cam Chain 'B'	V&H Racing Oil Filter to Pan Air Purge Kit
V&H Racing Cam Degree Tool, all '78 – '83 Honda Twin Cam 4 & 6 cylinder engines	