

## **An Improved Throttle Linkage for Jenvey Throttle Bodies on a Caterham 7.**

In about 1999 I converted my Vauxhall engined 7 from Weber carbs to Jenvey throttle bodies. The throttle linkage was never ideal in several respects and so, some years later, I set out to improve it.

### **Pedal Box Cable Entry Boss.**

The initial problem was that I'd never been happy with the way that the ITG 'sausage' air filter pushed the throttle cable down as it came horizontally out of the pedal box. This severely tightened the bend radius of the already rather stiff outer cable and added severely to the friction of the throttle mechanism. Scouring the Blatchat archives and posting on the subject yielded a couple of solutions that allowed the cable outer to exit at a sufficiently downward angle to almost eliminate the bend in the outer.

The more elegant of the two ideas came from Bob Simon who had designed a replacement exit boss containing a roller. The cable outer enters the boss at about 30 degrees below the horizontal and the inner passes over the roller, becoming horizontal and attaching to the pedal rod in the usual way although I used a clevis to reduce the risk of wear to the cable, although probably not strictly necessary. The boss is made to replace the thimble-like cup that is an interference fit into the sleeve welded into the front of the pedal box. The old one has to be removed which is best accomplished by pressing it out using a combination of nuts, bolts and a large socket. If its not too tight it might be possible to knock it out with a hammer but it has to be driven out from the inside of the box so its hard to get a good swing at it without hitting something else. You might also distort it so it would be difficult to get the knackered end through the welded sleeve.

### **Throttle Body Lever**

The second area that needed some serious attention was the throttle body end of the cable. Jenvey offer a range of throttle control levers but they seem mostly to come with a two-arm lever fitted as standard. Jenvey also offer some expensive spring-loaded linkages that allow the throttle cable to come from different directions and maintain a reasonably linear throttle opening. Many people opt for a simple outer cable attachment, fixed somewhere to the engine or manifold, which tends to be highly non linear and can make the throttle very abrupt at small openings and uncomfortable on the road.

The solution here was to design a snail cam arrangement that could be made to a profile that suits both road and competition use and can be adapted to the drivers preferences. In addition, although the standard Caterham cable can be used after shortening the outer, I replaced mine with a high quality lined cable from Venhill Engineering in Dorking, available as a Kit Car throttle cable kit.

### **Modifications**

These two modifications have transformed throttle control to the extent that, even with 250bhp and 194lbft of torque on-tap, is tractable and incredibly docile on the road, where you can rarely open the throttle more than about 25% and above which all hell breaks loose. Different cam profiles can be tried to suit the driver's preference.

The following sections provide pictures, sketches and notes to help you make your own versions.

### **Making the Pedal Box Cable Entry Boss.**

The boss is made from 28.5mm (1 1/8" dia) aluminium stock and turned up on a lathe to the dimensions shown below. The 30deg facing angle, roller slot and cheeks were done using a milling cutter on a lathe with a vertical slide but could be done sufficiently well using hand tools with a bit of care, as can drilling the 8mm cable entry hole and roller spindle bolt hole.

The roller was turned up on a lathe from the same ali stock as the boss.

The boss has to be fitted without the roller otherwise it won't go through the hole. It can be tapped in with a hammer as its an interference fit but make sure its correctly aligned, with the roller slot vertical, as you won't be able to twist it once its home. Also make sure that the dimension on your car for the roller boss is the same as mine or it won't fit. Check before machining.

### **Making the Throttle Body Lever Cam and Cable Bracket**

The snail cam is made from three layers of 2mm ali sheet. The outer two are the same shape and size and the inner approximately 4mm smaller so that, when sandwiched together, there is a slot for the cable along the curved edge of the cam. The sandwich is held together by a series of pop rivets and secured to the levers by a pair of suitable nuts, washers and bolts. A further hole is drilled where the cable cotter clamp sits. You should make sure that the rivets holding the sandwich together are inserted so that they don't foul the casting as the throttle opens.

The profile of the cam is an involute with maximum (closed throttle) and minimum (fully open throttle) radii of 60mm and 35mm respectively. The advantage of the involute curve is that the tangent that the cable comes off at remains constant as the cam rotates, which helps improve control. In actual fact in practice it probably doesn't matter a tinkers what the form of the curve is but it sounds good! If the light throttle operation is a bit tame then the large radius can be reduced a bit to sharpen it up and, similarly, the minimum radius for full-throttle feel. After the cam was originally photographed, I replaced one of the rivets with a long bolt and nyloc nuts to facilitate fitting an extra throttle return spring, the other end of which is attached to another bolt through the filter back plate.

The remaining component is the fixing of the outer cable for which I fabricated a rather elaborate swivel arrangement. Frankly this is probably overkill and a simple bracket would do just as well. An 'L' shaped bracket can be fixed with a couple of screws to the outside of the air filter back-plate such that the cable passes through a hole of the perpendicular bit with the outer ferrule securing into the hole. Make sure that any nuts and bolts inside the air filter are securely lock-washed and/or loctited as you don't want them floating around and risk having them ingested into the engine.

The other thing to bear in mind here is to secure the outer in some way so that it doesn't drop out of the bracket and snag if the throttle is operated by hand. Scrutineers have a habit of checking the throttle return spring tension by pushing the TB lever down and, on more than one occasion, I've subsequently started to car, only to have it rev flat-out because the misplaced outer is pulling the cable tight.

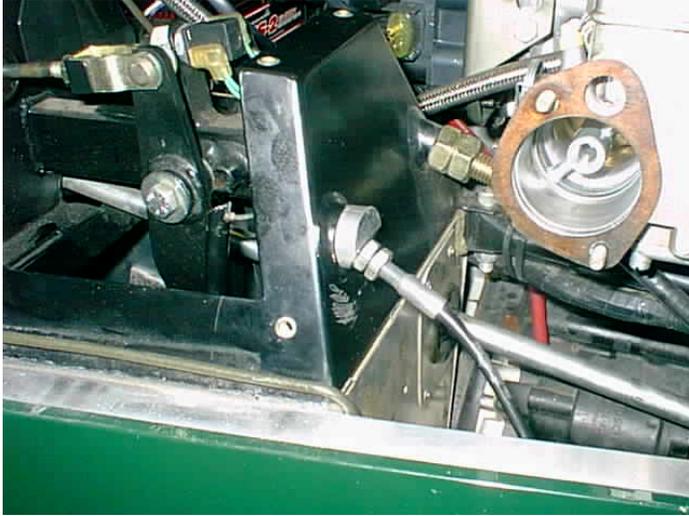
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Original design and photographs of roller bush by Bob Simon and gratefully acknowledged.

Throttle cable and components available from:

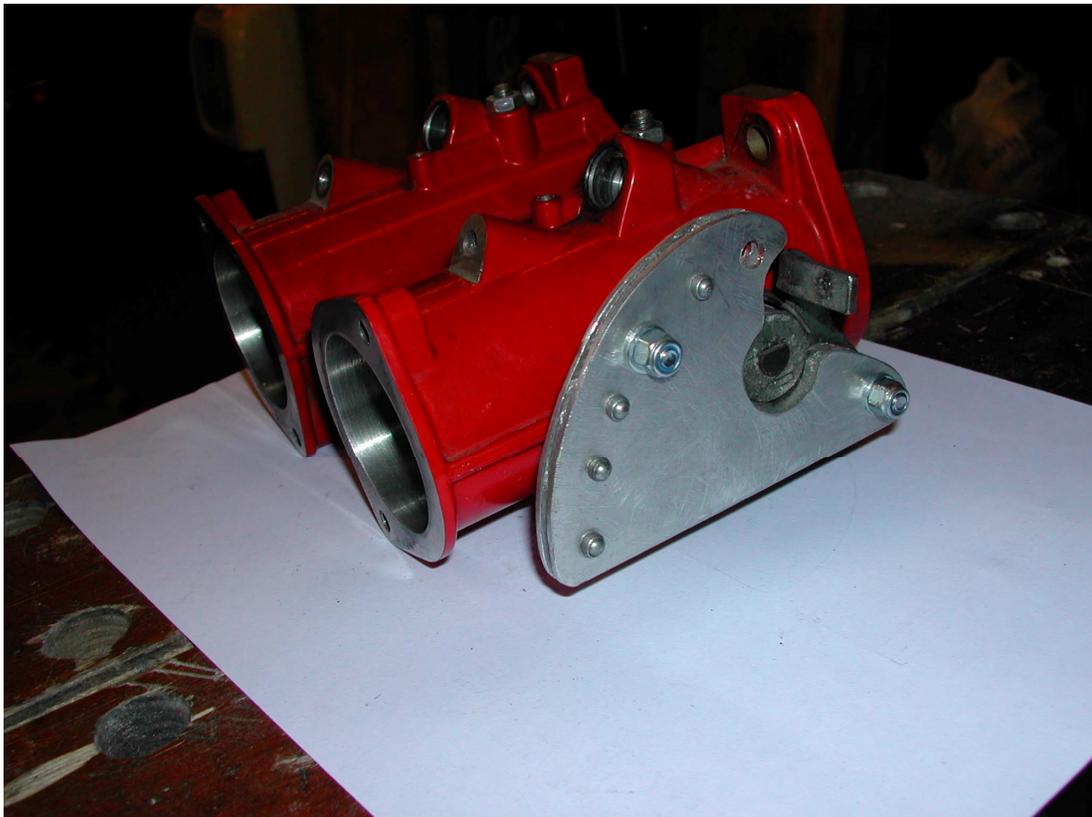
Venhill Engineering Limited  
21 Ranmore Rd  
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Tel: +44 (0) 1306  
Fax: +44 (0) 1306 740535  
www.venhill.co.uk

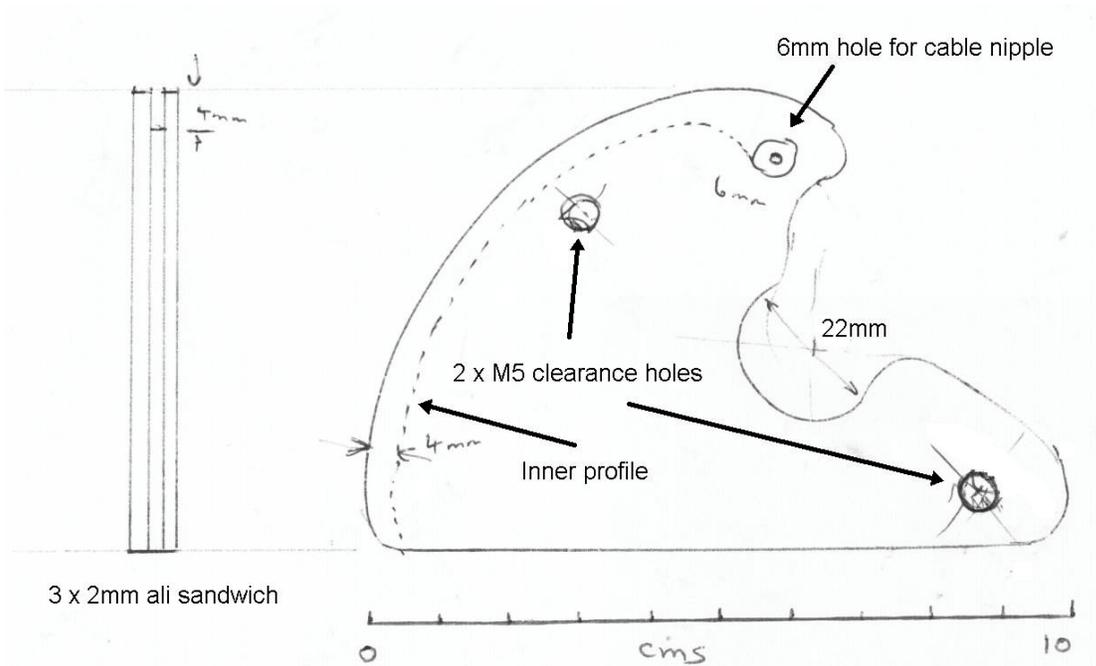




Bare Jenvey throttle lever

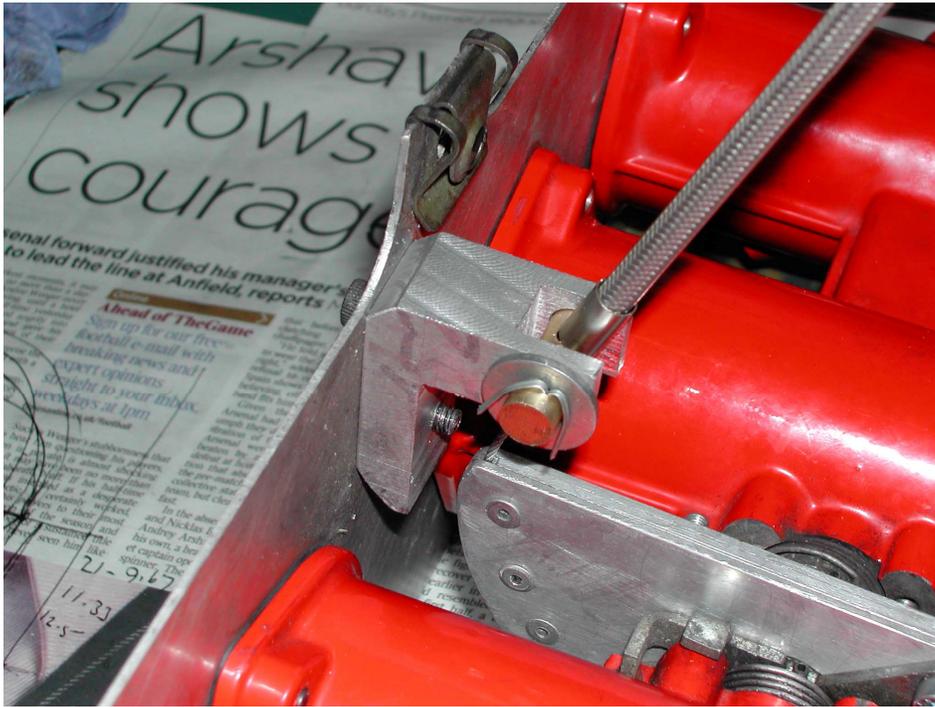


Snail Cam fitted – note clearance required to fit over spindle end plate  
Base of cam should be roughly parallel to the throttle axis at closed position.

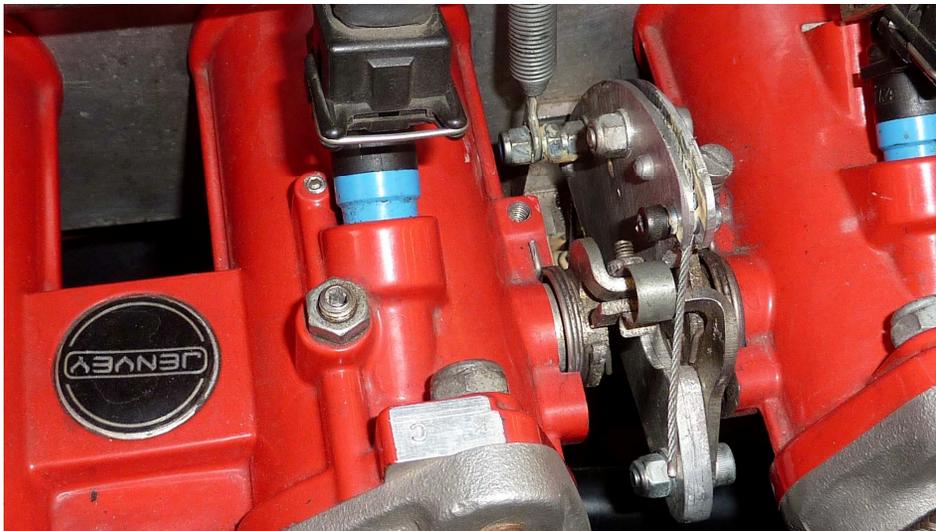


Throttle Cam Profile

**Be sure to check the hole positions before drilling in case they are different to mine**



Upside down view showing outer cable bracket. A more simple fixed arrangement would almost certainly suffice. Also note how inner cable slots into cam.



Cam installed, showing the extra bolt for the throttle return spring

