

# Fixing your loose throttle shafts

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Is your shaft loose? After you get revved up does your shaft not return to its original position? No, you do not need a medication advertised on TV, but you may need a carburetor rebuild.

If you are like most of us your carburetors have been around for a few miles. Odds are your throttle shafts are now loose. If they are they will allow an air leak to occur. This results in more airflow to the engine with a throttle plates closed than you had expected. Additionally, it will cause your idle mixture to be lean. When you correct your idle mixture by adjusting your jets then you are running mixture is too rich. Additionally, the leak will vary from time to time causing the idle speed to vary in random ways. It may never return to the same idle speed. If you have reached the point where you want to rebuild your carburetors there is one step which is somewhat more difficult and expensive to perform than all the rest.

The master rebuild kits that are available from the large distributors carry nearly all of the parts that you would require to do a rebuild. None of these require cutting away any of your original metal in order to make the replacement. Unfortunately, to repair your throttle bushings you must cut metal away to make an oval hole round again. The simplest technique to get new bushings, and the most expensive but the only technique offering a guarantee, is to send your stripped carburetors out to a professional, such as Joe Curto, to have new bushings installed. Joe does this in a very professional manner. He has a special piloted reamer that will maintain axial alignment of the bores for the throttle shafts. The reamer then enlarges each bore so that it will accept an interference fit brass bushing. The inner diameter of his bushing is smaller than the throttle shaft. Therefore the inner diameter needs to be reamed to the proper diameter also. A less expensive technique would be to enlarge the bore of the original bushings to 0.010" oversize and use an oversize throttle shafts. The reaming process for the oversized shaft is somewhat more simple and therefore less expensive.

For those of us that enjoy more hands-on work, we can ream the bores ourselves using fairly simple tools. I was taught this technique by Brian Schlorff of Power British. With care we can achieve good alignment and good fit with an outcome just as good as what the professionals can achieve. The original throttle shafts have diameter of 0.312" (5/16"). The new bushings have an inner diameter to fit this. The outer diameter of the bushings is about 0.3765 (this is what I measured on the set of bushings in my kit, yours might differ and ought to be measured before reaming). We need to ream the original bushings for the replacement bushing and gave an interference fit.

To do this job you need a reamer of



Figure 1 Alvord-Polk Tool Chucking Reamer, Straight flutes (spiral is good too), and a tap handle. Notice the square cross-section ground near the end of the shaft of the reamer to accommodate the tap handle. A great supplier is MSC Industrial Supply ([www1.mscdirect.com/cgi/nnsrbr](http://www1.mscdirect.com/cgi/nnsrbr))



Figure 2 Close-up of the flutes of the reamer with the back-cutting modification.

approximately 0.002" undersize (this is an approximate number, but start small and move up in diameter if the fit is too tight) for the replacement brass bushing. As it happens, standard hand reamers of this size (Figure 1) have a shaft which is the same diameter as the throttle shaft. Therefore it is possible to insert the shaft of the reamer through both original bushings to maintain alignment, and cut backward with the reamer. These hand reamers are designed to cut forward not backward. It is therefore necessary to create cutting teeth on the backside to allow backward cutting (Figure 2).

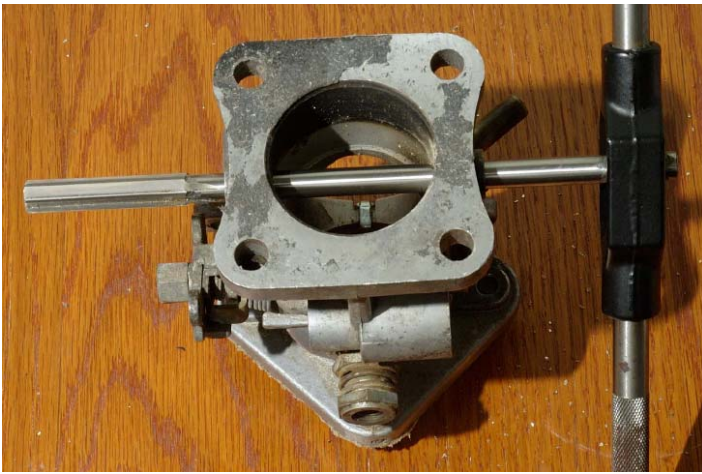


Figure 3 The reamer installed in the carburetor body, with the tap handle attached, ready to ream.



Figure 4 Close up of the reamer in position.



Figure 5 Close up of the initial reaming of the original bushing

A cut off wheel on a Dremel tool performs this job quickly and easily. All that is necessary is to clear any potential burrs that may have formed on the corners so that the reamer does not cut a larger hole than expected. Additionally, it is necessary to use a grinder to create a roughly square area on the back of the shaft so that a tap handle may be attached. The handle will not adequately hold on to the rounded surface of the shaft of the reamer and will not allow cutting otherwise.

Once the reamer is inserted through the carburetor body, and the tap handle is attached (Figure 3,4) then you gently pull directly axially on the reamer, remembering that the wear of the bore has created a slightly oval hole, causing a slightly loose fit of the reamer shaft. Frequently blow out the swarf so that it does not cause binding and enlarge the bore of the reamed hole.

Do not ream away the entire original bushing. Instead, leave behind about 1/16" of the bushing at the bottom. This will prevent migration of the replacement bushing into the carburetor.

It is probably best to start with a reamer that is 0.002" less than the OD of the new bushing, This will allow compression of the bushing, and some slight enlargement of the hole due to wiggle of the reamer shaft on the other side. *[For bushings that were 0.3765" OD, I reamed with a 0.3740" reamer. This gave a very snug fit. A 0.3745" reamer would have worked well too.]* Ream 1/8" to 5/32" of depth then test fit a new bushing (Figure 5,6). Be careful not to get it totally stuck in the hole. If it is too tight or too loose, then select a differently sized reamer. As you can see, it would be best to have a selection of reamers. They are available in 0.0005



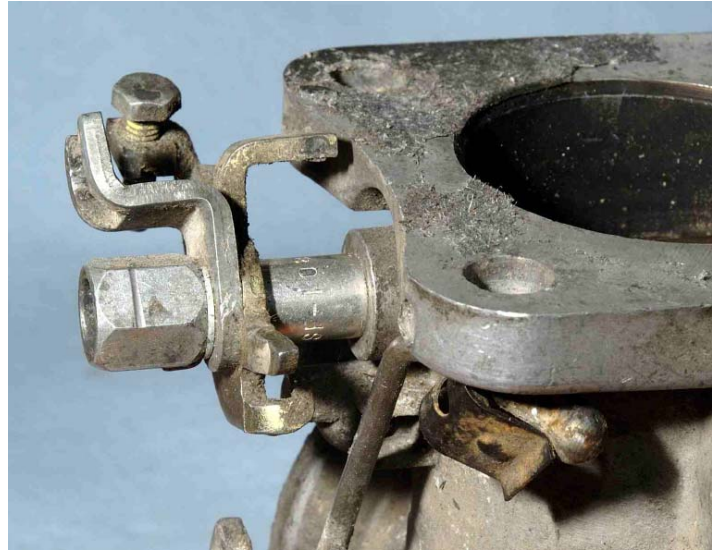
Figure 6 Close up of test fitting of the new bushing

increments (usually) and are not particularly expensive.

When you have reamed fully, then take one of the replacement bushings and gently start it in the reamed hole. It should have a significant friction fit. The easiest way to maintain alignment as the new bushing is driven into place is to place the new throttle shaft through the new bushing on this side and the original bushing on the opposite side. Have the screw-on bracket attached to the end. Push the shaft fully across the carburetor until the bracket bottoms-out on the bushing (Figure 7). Then gently tap the bushing into the carburetor with a small hammer. It should go with friction but not with extreme difficulty. There should be excess bushing standing proud from the reamed hole. This may be removed by a second, larger, reamer that has the back-cutting modification. This second reamer should be of just about exactly the outer diameter of the replacement bushing. Alternately, you can use the undersized reamer but this will leave a thin wall of bushing behind that will need to be gently picked free. The excess bushing should be reamed slightly countersunk into the carburetor body.

Once this is complete turn the carburetor around and ream the second bushing the same as the first.

When this procedure is complete, you will have a set of brand new throttle shaft bushings



**Figure 7** New shaft in position ready to tap the bushing into place.