Model A Ford Zenith Carburetor

Restoration Tips

2007-2010

by Tom Endy

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Acquisition:

Zenith cores are easily found at swap meets. Most are usually in a cruddy rusty condition. However, if they are not damaged they can easily be restored. It is prudent to look them over carefully to make certain the top and bottom housings are not cracked or broken. Pay particular attention to the fuel inlet in the top casting. If this area is broken away it is beyond repair. Another area to check carefully is the mounting flange where the top casting attaches to the intake manifold. If any part is broken away it is also beyond repair. If either of the two threaded holes in the mounting flange is stripped out this is not a problem as they can be repaired with a 5\16-18 heli-coil.

Disassembly:

The disassembly of a Zenith carburetor should be approached very carefully because this is where many are destroyed beyond repair. The first thing I usually do with a newly acquired Zenith is to separate the upper and lower castings and place them in a one pound coffee can full of lacquer thinner and let it sit over night.

Begin the disassembly by removing the bolt on the bottom that holds the two housings together. The early Zeniths will have a half-inch hex; the later ones will have a nine-sixteenth-inch hex. If the two housing halves do not come apart after the bolt has been removed reinstall the bolt and screw it in about half way and "gently" tap on the bottom of the bolt with a hammer, it will usually come apart if it is only being held by the gasket. If it still does not come apart remove the bolt and replace it with a length of 3\8-24 threaded stock and screw it all the way in. Now tap on the end of the threaded stock more aggressively. What is probably holding the two housing halves together is the venturi that is frozen in both the top and the bottom housings. The aggressive hammering should shear the ventri in half and allow the two housings to come apart. The two broken halves of the venturi can be removed with a special venturi removal tool or burned out with a torch. The venturi is made of pot metal and will easily melt. Even if the two housing halves come apart easily you may find that the venturi is frozen into either the top or the bottom housing and will have to be removed with the venturi removal tool or melted out with a torch. The venturi is about a $5 item and can easily be replaced.

Venturi Removal Tool **Venturi**

Continue disassembling the carburetor. Remove everything that comes apart easily. Do not force anything. Any bolt, nut, screw, or jet that does not back out easily will be destroyed if you try to force it. Parts that appear to be frozen will have to be heated and quenched in cold water to free them up. It is essential that the float be removed before any heat is applied to the carburetor as the solder that holds the two float halves together will melt and the float will be destroyed. Floats are usually easy to remove as they are seldom ever found frozen in place.

Place the housings on a suitable surface and using a welding torch or propane torch heat the components that were found frozen. Apply heat directly to the two small screws that secure the throttle butterfly and to the two small screws that secure the choke butterfly. Apply heat to the side of the casting where the secondary well is located. Secondary wells are notorious for being found frozen in place. Apply heat to the GAV valve assembly, they are also notorious for being found frozen. Heat the casting surface of all areas near components that were found frozen until it glows a dull red.

Quickly dunk the housings in a container of cold water. The expansion and contraction caused by the heat and the cold water will cause the components to un-freeze themselves. Most all the parts that are found frozen are usually brass parts that are screwed into cast iron. The coefficient of expansion is different for each of the two metals and they readily loosen up with the heat and cold water dunking process. You will be surprised at how easily every thing comes apart once you remove the housings from the cold water.

After the GAV assembly has been removed shine a pen light down into the hole and determine if the carburetor has a brass GAV valve seat screwed into place at the bottom of the hole, or if the GAV valve seat is cast as an integral part of the casting. The early carburetors had the brass seat; the later carburetors had the cast seat. If a brass seat is found you may have to re-heat this area and quench it in cold water to get the seat out. Make a note if a brass seat was found and make certain you install one when doing the final assembly.

Inspection of removed parts:

Many of the removed parts can be cleaned up and reused. The throttle plate, GAV assembly, float valve, float, secondary well, and the four jets are made of brass and can be cleaned with a fine wire wheel to be made to look like new. The same is true of other parts that may be found made of brass. Parts that will more than likely have to be replaced are the throttle shaft (as they are generally worn), the filter screen, the choke butterfly, the four small screws that secure the throttle and choke butterflies, and possibly the GAV driver. The fiber washers used with the filter screen, float valve, drain plug, three of the jets, and the housing gasket should also be replaced.

Drain plug repair:

Often the drain plug boss threads are found stripped out from someone over tightening the plug. A repair can be made by drilling out the boss with a 29/64 size drill bit. Be careful not to drill into the seat for the main jet. Rethread the boss with a 1\2-20-size tap. Use a bottoming tap to finish up. Salvage the plug end off of a discarded fuel filter screen by unsoldering the screen from it. The original hex was a 1\2" and the replacement hex will be a 5\8", which will not be correct according to judging standards, however it will functionally work.

Secret passageways:

Internal to both the top and bottom housings are a number of passageways that port fuel to various areas of the carburetor. It is important that these passageways be free and clear of debris. When the carburetor was manufactured the passageways were made by drilling holes from the outside of the housing and then plugging the entrance holes with small brass plugs. Many of the Zenith how-to restoration manuals recommend that the brass plugs should be drilled out, the passageways cleaned out with drill bits, and then new brass plugs reinstalled. **Don't do it!** Many carburetors have been destroyed by this practice. There is a very simple way to clean out the passageways and ascertain they are open and free of debris. It can be done with a simple garden-variety paper clip and a little patience. There are **five major passageways** involved. The paper clip is straightened out and then bent into several gentle curves and inserted through the various passageways. This process should be done twice, once before the housings are subjected to bead blasting and then again after the bead blasting. The following is the sequence and method for cleaning out the passageways.

#1. The main jet passageway.

This passageway is located in the bottom housing and runs from the right side of the fuel reservoir to the drain plug where the main jet is located. Bend the paper clip into a gentle curve and insert it from the reservoir to the drain plug. Check that the end of the paper clip has exited at the drain plug. You may have to grip the paper clip with a pair of long nose pliers and apply some pressure. If any debris was pushed out ahead of it, wiggle the paper clip around and push it back and forth a number of times.

#2. The comp jet passageway.

This passageway is located in the bottom housing in the center of the fuel reservoir and is where the comp jet screws in. The passageway runs from the comp jet into the secondary well and then on into where the cap jet is screwed in. Straighten out the paper clip and insert it into the comp jet opening and pass it through the secondary well and into the cap jet hole. Shine a penlight into the secondary well and into the cap jet hole to see that the paper clip has passed through the secondary well and exited into the cap jet hole. Some early castings have a step between the secondary well and the cap jet hole. This makes it somewhat difficult to get the paper clip completely through to the cap jet. However, with patience and a little ingenious bending of the paper clip the task can be done.

#3. The GAV-reservoir passageway.

This passageway is located in the bottom housing and runs from the bottom of the GAV assembly hole where the GAV valve seat is located to the left side of the fuel reservoir. Straighten out the paper clip and insert it into the GAV valve hole. Shine a penlight into the hole on the left side of the fuel reservoir and you should be able to see the end of the paper clip sticking down from the GAV valve seat.

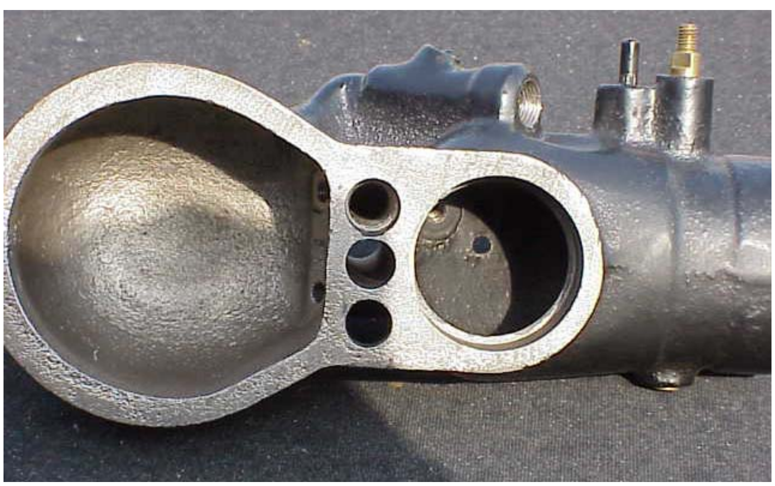
Reference the three holes at the bottom of the fuel reservoir.
The hole on the right goes to the main jet (#1). The hole in the center is the comp jet boss and goes to the secondary well, then on to the cap jet (#2). The hole on the left goes to the bottom of the GAV valve (#3).

#4. The GAV-secondary well passageway:

This passageway is located in the bottom housing and runs from the GAV assembly hole just above the GAV valve seat to the secondary well. There is a variation in housings and sometimes the passageway is found to run to the cap jet hole instead of the secondary well. This is also a more difficult passageway to get the paper clip through, but it can be done. Shine a pen light down into the GAV assembly hole and determine exactly where the passageway hole is located. The passageway hole will be on the left side of the GAV assembly hole above the valve seat at one of two positions. If the passageway runs to the secondary well if will be located at about the eight-o'clock position. If the passageway runs to the cap jet it will be located at about the ten-o'clock position. Bend the paper clip into a gentle curve shape with a little hook on the end. Insert it down into the GAV assembly hole and fish it around until it enters the passageway hole. Grip it with a pair of long nose pliers and push it through the passageway. Shine a pen light down into both the secondary well and the cap jet hole. The end of the paper clip should be found exiting into one of the two locations.

Reference the hole for the GAV assembly at the right (This carburetor has a brass GAV seat installed)

The passage hole to the fuel reservoir is straight down through the brass GAV seat (#3). The passage hole to the secondary well is just above the brass GAV valve on the left side of the GAV assembly hole (#4).

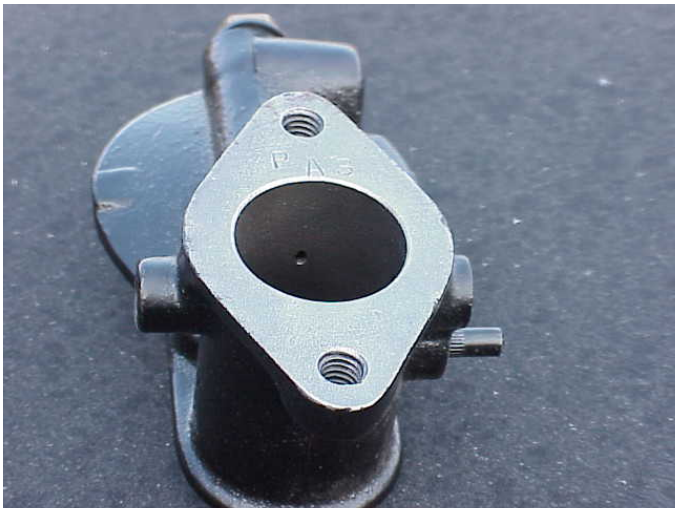


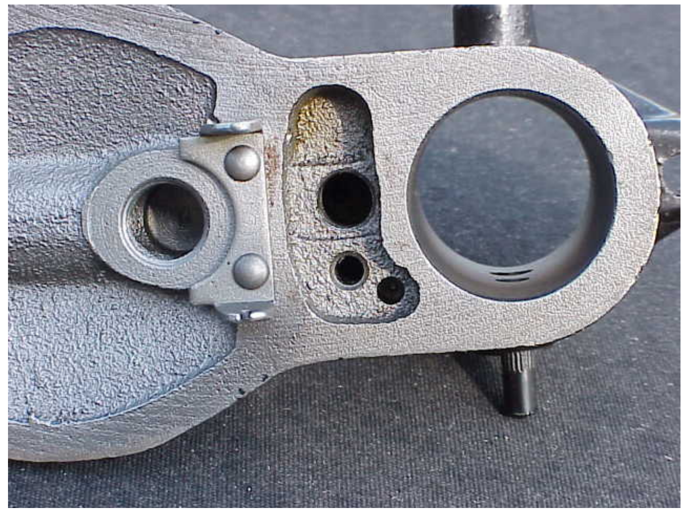
**The secondary well is the hole at the top of the three vertical holes seen in the photo.
The boss for the cap jet can be seen in the upper left of the venturi opening.**

<u>#5. The Idle passageway.</u>

This passageway is located in the top housing and runs from the hole where the idle jet screws in to a very small hole in the throat of the carburetor just below the intake manifold mounting flange. This the most difficult passageway to get the paper clip through as the passageway makes two turns. However, with patience, ingenuity, and dexterity it can be done. Bend the paper clip to a proper angle and insert it into the small hole in the throat. The end of the paper clip should exit into the hole where the idle jet screws in. Shine a pen light down into the idle jet hole to see if the end of the paperclip is there.

If the paper clip method is not successful there is an alternative method to check this passageway. The use of a narrow tipped air pressure nozzle can be inserted into the idle jet hole. Wet your finger and place it over the small hole in the throat. While applying air pressure move your finger around and you should be able to feel the rush of air and play an "armpit tune" as the air pressure exits the small hole.





The small hole in the throat can be seen in the photo at left (#5). The passage leads to the second hole from the bottom of the casting in the photo at right where the idle jet screws in (#5).

Bead blasting the housings:

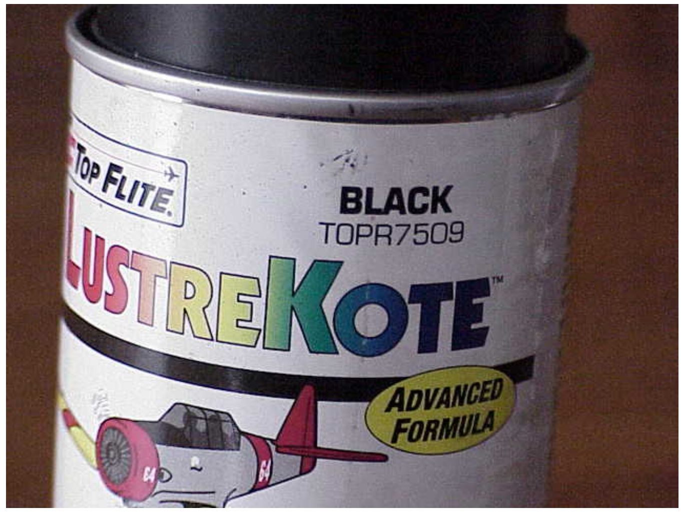
Once both housings have been completely disassembled and it has been determined that all the passageways are open it is time for bead blasting. This is the most essential part of the restoration process. If you do not have a bead blaster, you need to find someone who does. Bead blasting with a medium glass bead will remove all crud, old paint, and rust. It will make the housing look like new with bright shiny metal. During the bead blasting process the tip of the blaster wand should be pointed into each of the five secret passageways that were previously determined to be open. This process will clean out any remaining debris that resides in the passageways. It is important that once the bead blasting is complete the passageways should be blown out with air pressure and once again be checked with the paper clip or the "armpit tune" to make certain they are still open.

Painting the housings:

The housings should be painted as soon as possible after the bead blasting process as rust will begin to settle onto the bare metal surfaces. Mask off all the machined areas of the housing that should not be painted. Insert small pieces of paper towel into any holes paint should not get into. The use of a length of 3\8-24 threaded stock attached to each housing will act as a wand to hold the housing by hand while being spray pained. The inside of the air intake tunnel in the bottom housing should also be painted to prevent rusting. Mask off the boss for the cap jet and insert a small piece of paper towel into the hole for the main jet to prevent paint from getting into these areas. Do not paint the inside of the bottom housing where the fuel reservoir is located or the inside of the top housing where the venturi and the manifold mounting flange are located. Do not paint the two housings where they meet together. After painting, check that the weep hole in the base of the bottom housing is open by pushing the garden variety paper clip through it. After the paint has dried spray WD-40 on the bare metal areas that were previously masked off to prevent rusting.

The paint used should be impervious to fuel. My recommendation is to use a product called LustreKote, marketed by TF Top Flite (www.top-flite.com). There is a FLAT BLACK, part number TORP7510 that has a nice dull sheen to it and goes on very nicely. You can apply as many coats as you desire. It dries very quickly and is impervious to fuel. If you want the finish to be glossier use BLACK, part number TORP7509.

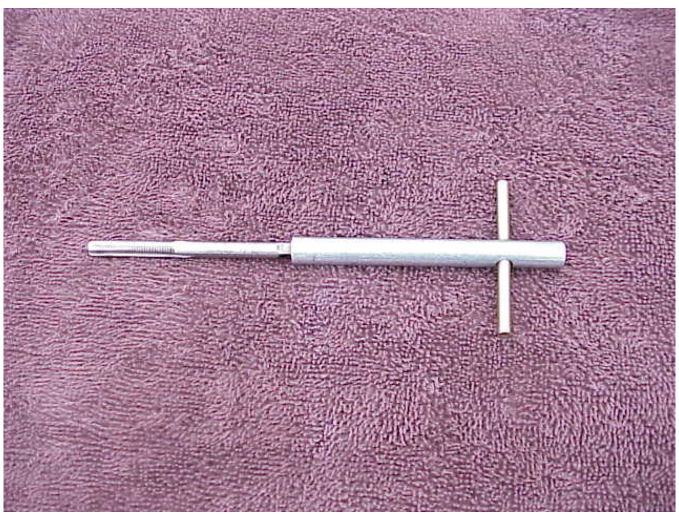
FLAT BLACK TORP7510



BLACK TORP7509

Chasing the jet threads:

The threaded bosses for the **main**, **cap**, and **comp** jets along with the threads for the **air-fuel mixture needle** are a special thread size. This also includes the **brass GAV valve seat threads** if one is installed. The thread size is a 5mm 75 pitch. It is prudent to clean these threads out with a proper size tap. **<u>Do not</u>** run the tap through the threads for the **idle** jet, as these threads are a tapered pipe thread. The 5mm 75 pitch tap shown in the photo has an extension handle attached; this is to allow access to the cap jet and the comp jet that are situated at a difficult angle that preclude the use of a standard tap holder tool.

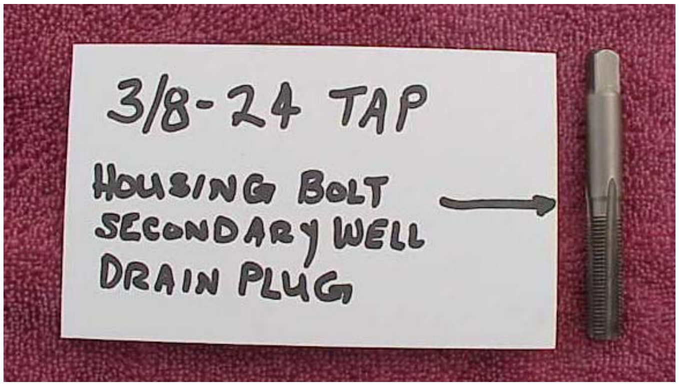


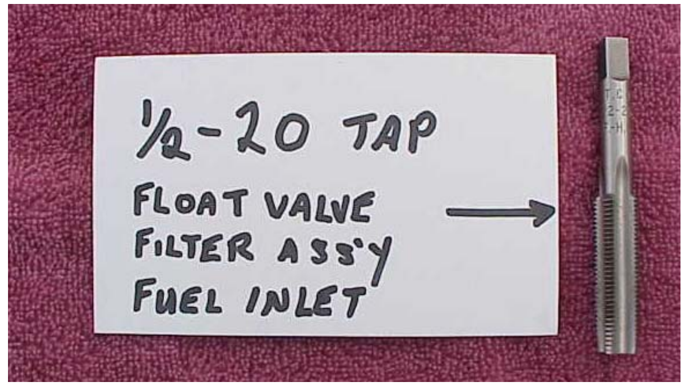
Tap for jet threads with extension handle

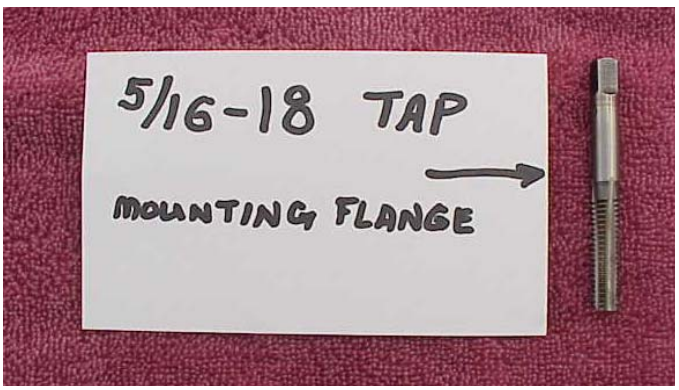
5mm 75 pitch special tap

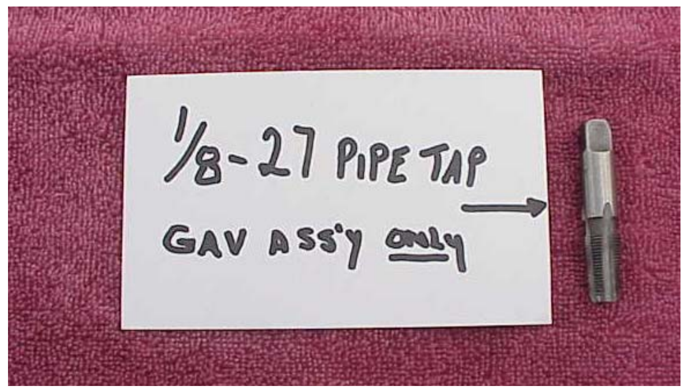
Chasing the other threads:

The bolt that holds the two housings together, the secondary well, and the drain plug are a **3/8-24** thread size and may be chased with a standard **3\8-24** tap. **<u>Do not</u>** run this tap through the threads for the GAV assembly. The thread size may appear to be the same, but it is not. The threads in the GAV assembly are a tapered pipe thread and require a **1/8-27** pipe thread tap to chase them. The threads for the filter screen, the float valve, and the fuel inlet are a **1\2-20** size thread and these may be chased with a standard **1\2-20** tap. The threads for the mounting flange bolts are a standard **5\16-18** size thread and may be chased with a standard **5\16-18** tap.









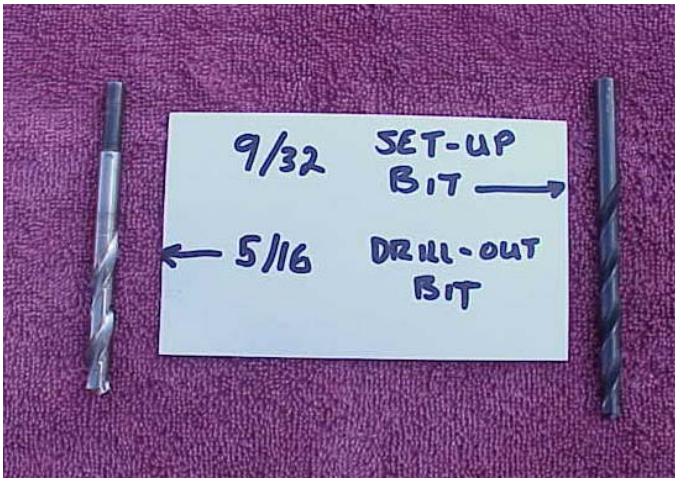
The throttle shaft:

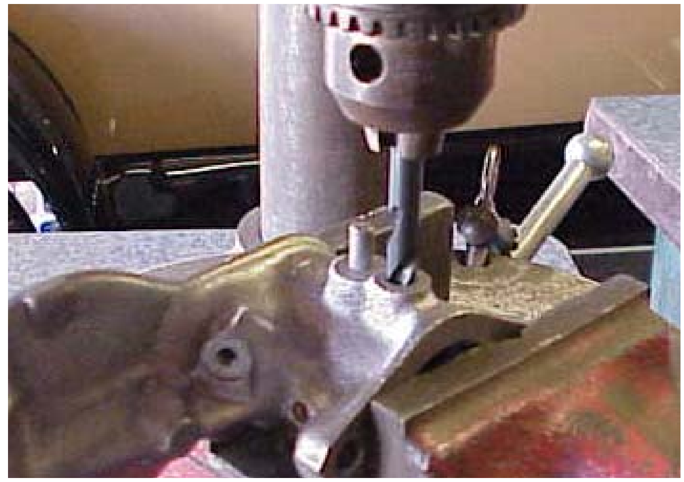
Inspect the throttle shaft to see how much slop there is between the throttle shaft and the housing bosses. If it is excessive the throttle shaft should be replaced and the housing should have bushings installed in the bosses. Many of the how-to restoration manuals suggest that no slop at all should be tolerated. However, I have seen any number of well restored carburetors that idled and ran very well with a noticeable amount of slop present. The individual must decide how much slop is tolerable. The first effort should be to only replace the worn throttle shaft. Many times this will decrease the amount of slop to a point where it is not excessive. Installation of bushings in the housing requires that the two bosses be accurately drilled out to accommodate the bushings. Once the bushings are installed they will have to be reamed to fit whatever throttle shaft will be installed. Throttle shaft bushings are available from most Model A suppliers (Bratton's).

Drilling out the housing:

To accurately drill out the throttle bosses mount the housing in a drill vice and clamp it to a drill press platform. Place a **9\32”** drill bit in the chuck of the drill press and lower it through both throttle bosses. Maneuver the drill vice and housing around until the drill bit is perfectly aligned through the center of both bosses and then clamp everything down firmly. Replace the 9\32” drill bit with a **5\16”** drill bit without disturbing the set up of the housing. Drill through both bosses. Make sure the hole in the second boss is drilled deep enough to accommodate the end of the throttle shaft. Be careful drilling the second boss so as not to drill clear through to the outside of the housing. If this should happen however, it is easy enough to fix it. A small round piece of cardboard can be cut and placed just inside the exit hole of the boss. The end of a shaft is slid into place to provide a backing and the outer edge of the hole is filled with JB weld. After it is painted it will look as before.

Some carburetors have a brass cup pressed into the outside of the second boss. If this is the case the cup will be pushed out and it can easily be pressed back in. Replacement cups are available from Bratton's.



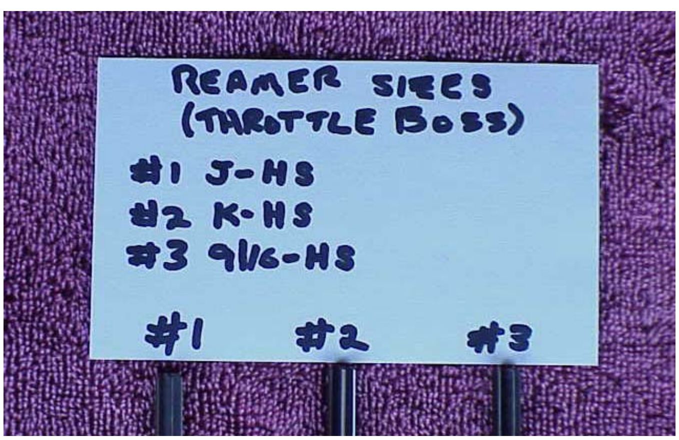


Installing the bushings:

The new bushings are easily tapped into place. It is best to coat the outside knurled circumference of both bushings with JB weld. Before installing a bushing in what has been referred to as the "second boss", determine the depth of the boss because it will not accommodate the full length of the bushing. The depth can be measured by sliding the end of a pencil into the boss and marking it. Grind the bushing down on a grinding wheel until it is short enough to fit all the way into the boss without sticking out into the throat of the carburetor. It is very important that neither bushing protrude the slightest into the carburetor throat, as it will restrict the throttle plate (butterfly) when it is installed. Allow the JB weld to sit overnight before attempting to ream the bushings.

Reaming the bushings:

There are three reamer sizes that are generally used for reaming a Zenith carburetor throttle bushings. The smallest is a **J-HS**, the next is a **K-HS**, which is slightly larger, and the last is a **9\16-HS** that is the largest. If you are planning to install a used throttle shaft it is best to start with the smallest size and work toward the largest so as not to ream the bushings out past what the used throttle shaft requires. If you plan to install a new throttle shaft you will more than likely need to ream to the largest size.



The three reamer sizes

Throttle shaft bushing reamer

Fitting a new throttle shaft:

It has been my experience that new reproduction throttle shafts do not fit properly. This is because when the throttle arm was swaged onto the shaft there was a tendency for the brass shaft to swell in an area just under the arm. You will notice as you slide the shaft into place the opposite end of the shaft will slide easily through both bushings. However, just as the shaft reaches its final install position it binds up. The remedy for this is to place the throttle shaft in a drill press and using some emery paper sand down the area of the shaft about a quarter of an inch from the arm. This is a trial and error fit. It is necessary that the shaft rotate freely within both bosses. The slightest bit of binding cannot be tolerated, as it will increase when the engine is warmed up. A binding throttle shaft will not allow the carburetor to return to the idle position.

Installing the new throttle shaft:

Prior to installing the new reproduction throttle shaft it will be necessary to bend the curvature of the arm further out. This is done so that the throttle rod will not bind on the choke rod when the carburetor is installed in the car. This should be done very carefully so as not to tear the swaging loose from the end of the shaft where the arm is held on. It is best to grip a small area of the arm with a pair of vice grips and with another pair of vice grips grip an area up around the ball on the end of the arm and bend it slightly. This method will not apply any pressure on the swage.

The area of the throttle stop screw should also be checked and corrected before installation. The throttle stop screw should be difficult to turn, as it is desirable that it does not move once it has been set. There are two metal tabs the stop screw is screwed into. If the screw feels loose grip the tabs in a vice and clamp them down tighter.

Install the throttle shaft into the housing bosses and slide the throttle plate (butterfly) into place. Back the stop screw clear off the stop so that the butterfly can be fully closed inside the throat of the carburetor. Open and close it smartly several times to properly center the butterfly. Install the two small plate screws and tighten them down while holding pressure against the throttle arm. This will center the plate in the throat and compensate for any non-alignment in the screw holes. Once the plate screws are locked down turn the throttle stop screw in until the butterfly dissects the center of the small (armpit song) hole in the throat of the carburetor. This will provide a high idle when the car is initially started up, a more refined adjustments can be made after the car has warmed up.

Sand reproduction shafts about 1\4” above the arm

Arm curvature needs to be "carefully" bent more

Choke shaft:

It should be noted that there is no concern about any appreciable wear to the choke shaft or the choke shaft bosses in the housing. The choke is wide open during normal operation and is only closed to start the engine in cold weather. Any air leakage around the choke shaft is of no consequence. Therefore it is not necessary that bushings be installed in the choke shaft bosses.

Adjustment of the fuel level in the reservoir:

The adjustment of the "fuel level" is one of the most critical adjustments required to make a Zenith carburetor perform properly. The requirement is that when the float valve shuts off the flow of fuel into the reservoir the fuel level will be **5\8"** down from the mating surfaces of the top and bottom housings. A second requirement is that once the level has been set to the 5\8", it must **"hold"** there. Many worn float valves and new reproduction float valves do not "hold". Fuel seeps past them and the fuel level climbs in the reservoir until it spills out over the tops of the main jet and cap jet and floods the carburetor.

The float valve leak phenomenon:

It should be understood that in a properly restored Zenith carburetor the 5\8" fuel level in the reservoir is also at the same level in both the main jet and cap jets. The tops of both jets are just 1\4" above the set fuel level. This is part of the design of the Zenith. During operation the air rushing past the top of the two jets pulls the fuel out to mix with the air stream. If fuel is allowed to seep past the float valve while the carburetor is sitting static the fuel level will rise in the reservoir and in the two jets as well until it will spill over the top of the jets and run down into the air intake base. The fuel will then drain out through the small weep hole in the base and flow back to where the hex bolt for the drain plug is located and drip off of it. Many Model A owners will be misled to think that the leak is coming from the drain boss itself and will concentrate their efforts there. Many times the result is a stripped out drain boss from over tightening. In order to properly set the float level and to determine if the level will hold it is prudent to set it up on some type of test apparatus.

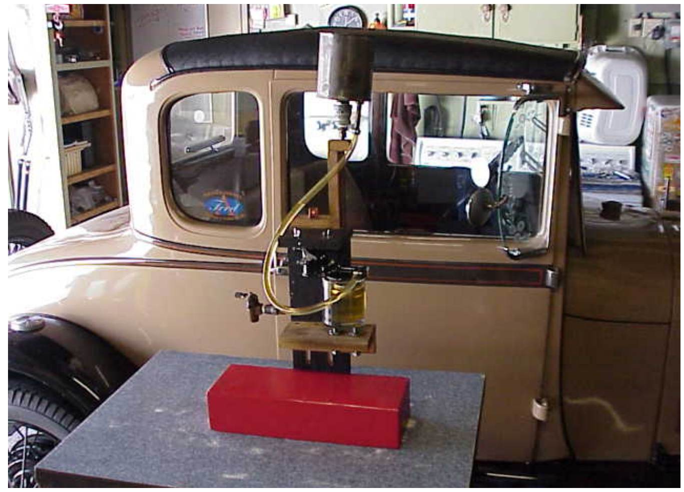
Setting the float level:

A test jig can be constructed that the top housing is attached to. A fuel supply is added above it and a supply line connected to the fuel inlet. A glass container is attached beneath to allow the fuel level to be observed. When fuel is allowed to flow into the glass it will rise until the float valve shuts it off. The level can then be measured to determine if it is 5\8" down from the bottom of the housing. A mark is placed on the glass at the fuel level and the carburetor is allowed to sit static for a period of time to determine if the float valve is holding or allowing fuel to creep up in the glass.

The level should be adjusted by adding or subtracting to the fiber washer that fits under the float valve. This will raise or lower the fuel level. It is not a good idea to adjust the level by bending any portion of the float structure as it will likely distort it and prevent it from operating properly. If the float does not come up straight it can push the float valve at an angle causing it to not seat properly. Finding a float valve that will hold is sometimes a difficult task. Some of the reproductions are poorly made. The type with the round balls in them should be avoided, as they tend to stick shut with modern fuels. The Viton tipped float valves seem to work very well. This type of float valve has a neoprene tip on the end and forms a good seal when closed. Most Model A suppliers carry them. It is however prudent to take them apart and clean out any brass machining debris found inside or imbedded in the neoprene tip. Quite often the float itself is the reason the valve will not shut off properly. Many floats have been molested in an attempt to set the float level. The distortion of the float itself may not allow the float valve to close correctly.

Float

Float Valve (Viton Tip)

The four photos above show a Zenith carburetor top casting attached to a test jig for setting and observing the float level. Note the reference mark on the side of the glass in the close up photo.

Jet sizes:

Most reproduction jets are not sized correctly. They are too large and flow too much fuel. This is also the case with many original jets found in old carburetor cores. Soldering the ends shut and re-drilling can resize both originals and reproduction jets.

After the jet ends have been soldered closed they should be drilled out using a set of miniature drills that come in a set ranging from the largest #61 to the smallest #80. The set can be obtained at tool supply or hobby stores.

According to most Zenith carburetor literature the jets should be drilled out to the following sizes.

Main -	**63 go, 62 no go**
Cap -	**63 go, 62 no go**
Comp -	**65 go, 64 no go**
Idle -	**75 go, 74 no go**

Note that the drill sizes recommended for the main and cap jets are the same. This is very confusing as the same literature calls out different flow rates for the two jets.

Re-sizing and flow testing the jets:

The four jets associated with the carburetor should be soldered closed, re-drilled, and then flow checked on a flow tester to produce a quality restoration that will perform well on the car. The flow tester can be made of a number of different materials and styles, as long as the water column is 36" high. This means that from the center of the jet to the point at the top of the column where the water spills over should be a length of 36". The water flow can be accomplished with the use of a small electrical fishpond pump obtainable at most home supply stores.

Flow test values (jets):

Main – 140-150 cc per min.

Cap – 150 – 180 cc per min.

Comp – 138 – 142 cc per min

Idle – 38 – 42 cc per min.

Flow testing jets

Further leak checking:

Once it has been determined that the float valve will hold. The bottom housing should be tested separately for leaks before it is attached to the top housing. One area that is prone to leaking is around the base of both the main jet and the cap jet. There should be a gasket installed at the base of each. The best choice of a gasket is the black plastic type (Bratton's Antique Auto). They are impervious to modern fuels and will not allow fuel to soak through. The jets themselves are also prone to leak, especially if they are reproduction. Some are made with the sleeve of the jet pressed into the base of the jet poorly. Fuel will often leak where it is joined. Often a repair can be made by applying solder around the joint. (This is especially true with idle jets. Check them by holding your finger over one end and sucking on the other end).

Another area prone to leak is around the GAV assembly. The assembly screws into the housing with a 1\8-27-pipe fitting. This is a tapered fitting and is supposed to seal off any leak. However it does not always work. It is therefore prudent to wrap white Teflon tape around the threads of the GAV assembly prior to installation.

To test the lower housing the main jet, cap jet, comp jet, drain plug, and GAV assembly must be installed. Place the housing on a suitable support to hold it level. Fill the reservoir with fuel up to about 5\8" from the top and allow it to sit for a period of time. Periodically examine the areas around the main jet, cap jet, and GAV assembly. There should be no fuel leaking.

Testing for leaks at the GAV and main & cap jets

There should be no fuel leaks around either jet

Lower housing assembly – GAV installation:

Begin by making certain a brass GAV valve seat is installed if one is required. Install a small black plastic gasket under the brass GAV seat.

Before installing the GAV assembly make certain that it turns in and out smoothly. Most of the reproductions are difficult to turn. You can try to make it better by removing the small circular clip at the bottom and then spread the legs at each split slightly. Make the clip larger before re-installing it. The roughness of the internal threads is more than likely the cause and the only alternative is to find one that operates smoothly.

Wrap several turns of white Teflon tape around the pipe threads of the GAV assembly before installing it. It is important that it does not leak fuel as the GAV sits below the fuel level in the reservoir. Back the GAV needle out several turns before installing it. After installation run it all the way in, then back it out one-half turn.

After the choke butterfly and actuation arm have been installed check the actuation of the choke. Make sure the actuation arm fully engages the slot in the GAV driver. You may have to remove the arm and bend it in slightly to fully engage the slot.

Many reproduction GAV drivers are poorly built with little heed to the proper overall length of the internal portion. Make sure that as you turn the GAV valve open that it does not start closing the choke butterfly. To test it, close the GAV fully and hold the choke full open with a slight pressure. Begin turning the GAV open. If the choke starts to close before you have it about three turns open you will have to modify the GAV needle valve. To do this grind about 1\16", or slightly more, off two locations on the GAV needle valve. See photo for locations. Re-test the GAV-choke action.

Grind about 1\16" off each end of the flat at the black marker

Lower housing assembly - continued:

Continue with the lower housing assembly by installing the secondary well, the comp jet, cap jet, and main jet (if they have not been previously installed for leak checking). Do not over-tighten the jets. Make sure there is a small black gasket under each. Install the drain plug with a black gasket. Check that the venturi fits easily into both the lower housing and the upper housing. Place the venturi in the lower housing.

Upper housing assembly:

The float valve and float should have already been installed during the float level setting. To prevent the axle for the float from falling out flatten one end in a vice for about 1\8" at one end. Install it in the float and gently tap it into place.

Install the filter screen with a black gasket. Make sure the ferrule from the old screen is not still lodged in the end of the housing near the float valve. This should have been done during the initial disassembly.

Install the air-idle screw and spring. Screw it all the way in and then back it out one and one-half turns.

Install the throttle shaft and butterfly (if it has not already been done). Back the idle adjust screw before inserting the butterfly into the shaft. Close the butterfly and "slam" it several times in the throat of the carburetor to center it before tightening the two butterfly screws. Reset the idle stop screw so that the butterfly is in the center of the "armpit song" hole in the throat of the carburetor.

Install the idle jet. **Do not** place a gasket under it. This is a tapered pipe fitting type thread and does not require a gasket.

This completes the final assembly of both the upper and lower housings. The two halves are then joined together with the single bolt through the bottom of the lower housing into the top housing with a gasket in between. The gasket goes between the two housings, with the **gasket on top** of the venturi flange**.**

Installation on the car:

Before installing on the car make three preliminary adjustments to the carburetor.

1. Set the throttle stop so that the butterfly is centered in the "armpit song" hole in the throat.

2. Run the air-idle screw all the way in and then back it out one and one-half turns.

3. Run the GAV control all the way in and then back it out one-half turns.

The fuel line:

It is prudent to wrap both ferrule ends of the fuel lines with white Teflon tape. **Do not** wrap the tape around the threads, as this is not where it seals. The seal is at the ferrules. The ferrules after much use will become deformed and wont seal off inside the fittings at the carburetor and at the firewall fitting. The tape will ensure a proper seal. **Do not** allow the tape to get over the ends of the fuel line. See photo below.

White Teflon tape is wrapped around the ferrules at each end of the fuel line

<u>The three most important factors to consider if you want a good performing carburetor:</u>

1**. The five passageways must be open.**

2. The fuel level in the reservoir has to be properly set at 5\8" and it must hold.

3. The four jets must be flow tested (and re-sized if necessary) to ensure they perform within specifications.

Road testing:

The car should start right up if the proper preliminary settings to the carburetor were made. However, the idle will be slightly high. Take the car for a short drive to warm up the engine. When the engine is sufficiently warm adjust the idle stop screw to lower the idle RPM until the engine is just ticking over. Have the spark handle all the way up. Rotate the idle air adjust screw from the position it was originally set at. Turn it in both directions to locate the "sweet" spot, where the engine operates at its highest RPM. You should be able to stall the engine by turning it too far either way. You may have to lower the RPM with the idle stop screw some more. You will only find the sweet spot when the engine is at a very low RPM. If you are not able to locate the sweet spot there are two possibilities, one: there is an air leak somewhere on the intake manifold, two: the ignition timing is not set correctly. When everything is set correctly you should be able to pull the spark handle down and the RPM will increase.

Take the car for another road test and experiment where the GAV valve should be set. All cars will be slightly different. The nominal adjustment should be from slightly cracked open to about 3\4 of a turn. Anything more than a full turn and the valve is fully open and opening it further will not make any changes if fuel flow. Some cars will stall when the GAV valve is fully closed, others will not. It is dependent on the actual sizing combination of the main, cap, and comp jets.

Find a road where you can run the car at 45-50 mph. There should be ample power without the engine coughing or sputtering. This is an indication that both the main jet and the cap jet are providing ample fuel.

Drive the car at about 15 mph in high gear. There should be no bucking or hesitation. If there is a problem it is in the secondary fuel circuit, which is comprised of the comp jet, secondary well, the cap jet, and the GAV valve. Try opening the GAV valve slightly more to alleviate the problem. If the problem persists it may be because of the style and shape of the secondary well that is installed. The secondary well itself could be blocking off the entrance ports from the comp jet and the GAV valve. Check that the comp jet is not sticking into the secondary well casting too far and that there is a relief cut into the brass secondary well where the comp jet enters. An extra gasket can be installed on the comp jet if it is sticking into the casting too far.

As indicated earlier in this dissertation the fuel path from the GAV valve to the secondary fuel circuit can, depending on individual castings, travel from the GAV valve either to the secondary well, or direct to the cap jet. When the path is to the secondary well it can enter at different vertical heights depending on how the casting was drilled. It is possible that the entrance is being blocked by the brass secondary well. To correct the problem the brass secondary well should have a relief machined into it. Apparently the Zenith people were aware of this problem and for that reason produced a number of different style brass secondary wells with different relief's machined into them to accommodate different situations. Unfortunately modern day reproduction parts dealers only stock one variety which does not accommodate all situations. The photo below shows four different styles of secondary well. I am told there are additional others.

Four different style secondary wells (photo by Chris Pelikan)

Take the time to properly restore a Zenith carburetor if you expect it to perform properly. A good running Zenith should give you years of service provided you don't let the car sit around for a few years and allow the fuel in the tank to go sour and plug up the carburetor. ☺