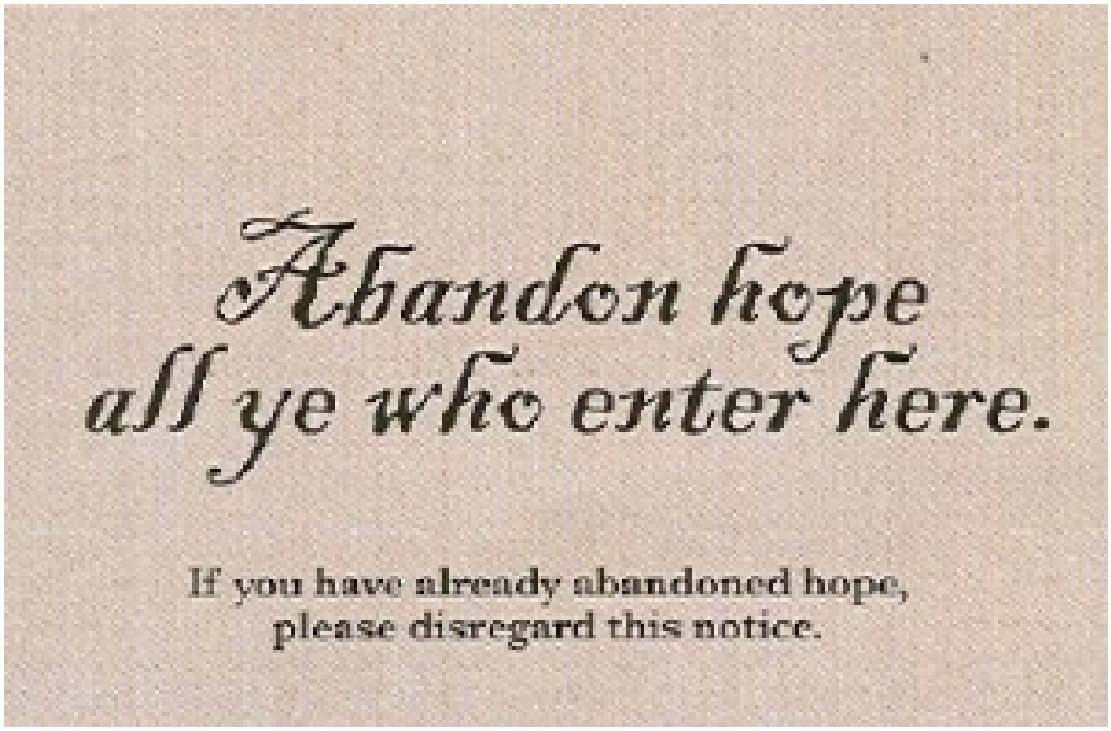
FUEL LEVELS
(and how to set them)



Before we begin, it should be known that this writeup is not intended to provide detailed instructions on breaking down and cleaning the carbs; by this point, your carbs should already be “zestfully clean”, as we like to put it, and already reassembled.

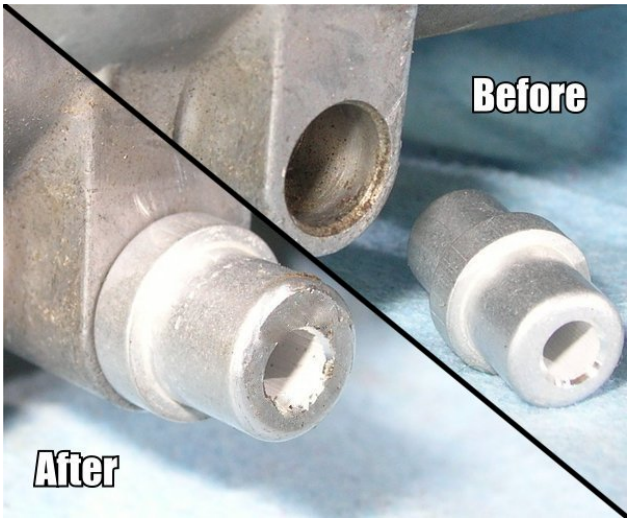
For the purposes of illustration, we will be using a set of Hitachi HSC32 carbs from a 750 Maxim.

Here is a list of some items you might want to have handy. Some of them may not be absolutely, positively required, but they might help.

A carb stand of some sort, to hold the carb rack level and upright. This wonder of PVC was inspired by a user from the Kawasaki Concours forum.

A float height gauge (**HCP4**, above) or float height ruler (**HCP9798**, right).

A clear tube with graduated markings (**HCP1592**) for measuring fuel levels.

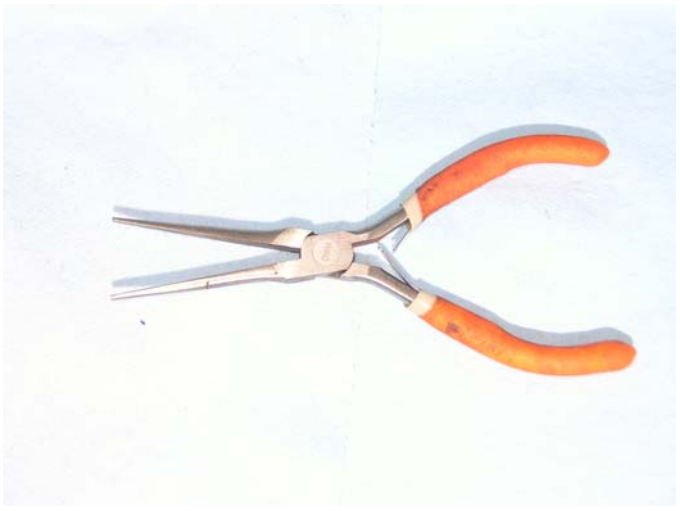


Hitachi float bowls already have a “nipple” to press the tube onto; Mikuni owners can purchase aftermarket fittings (**HCP8494**) to serve the same purpose.

Replacement float needles – these should already be installed. Aftermarket parts, like the one on the right, can be 1mm longer than stock or OEM, seen on the left, so you want to be absolutely sure you use the same ones on all four carbs.

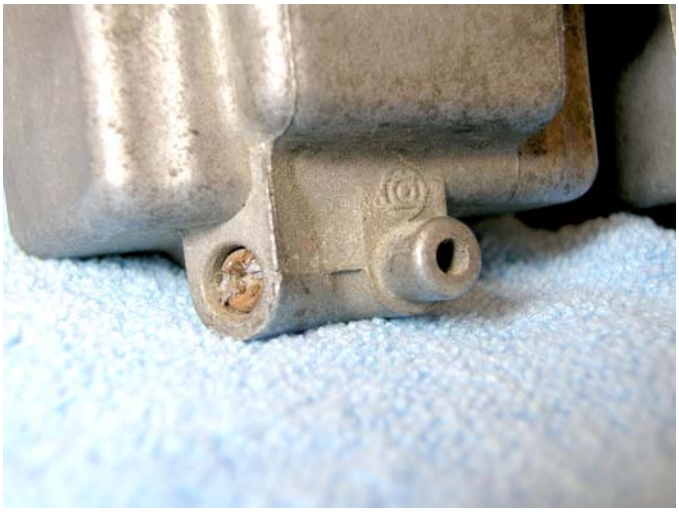
Replacement bowl gaskets (part number varies by model).

Auxiliary fuel tank (**HCP159**).



A small pair of needlenose pliers

Here's an optional item – aftermarket stainless drain bowl screws (**HCP8878** for Hitachi, **HCP8879** for Mikuni) might come in handy. Original phillips head style is also available; check with us to see which part number you need.



This picture shows why they might be needed. On this Hitachi float bowl (note the drain nipple on the right, below the logo), the head of the drain screw on the left is cammed out, and removing it will be difficult.

Go from this…

…to this. The head of the drain screw extends beyond the bowl; you could remove it with a pair of pliers if you had to.

BIGGER IS NOT ALWAYS BETTER

We're going to take a quick pit stop to define a couple of things.

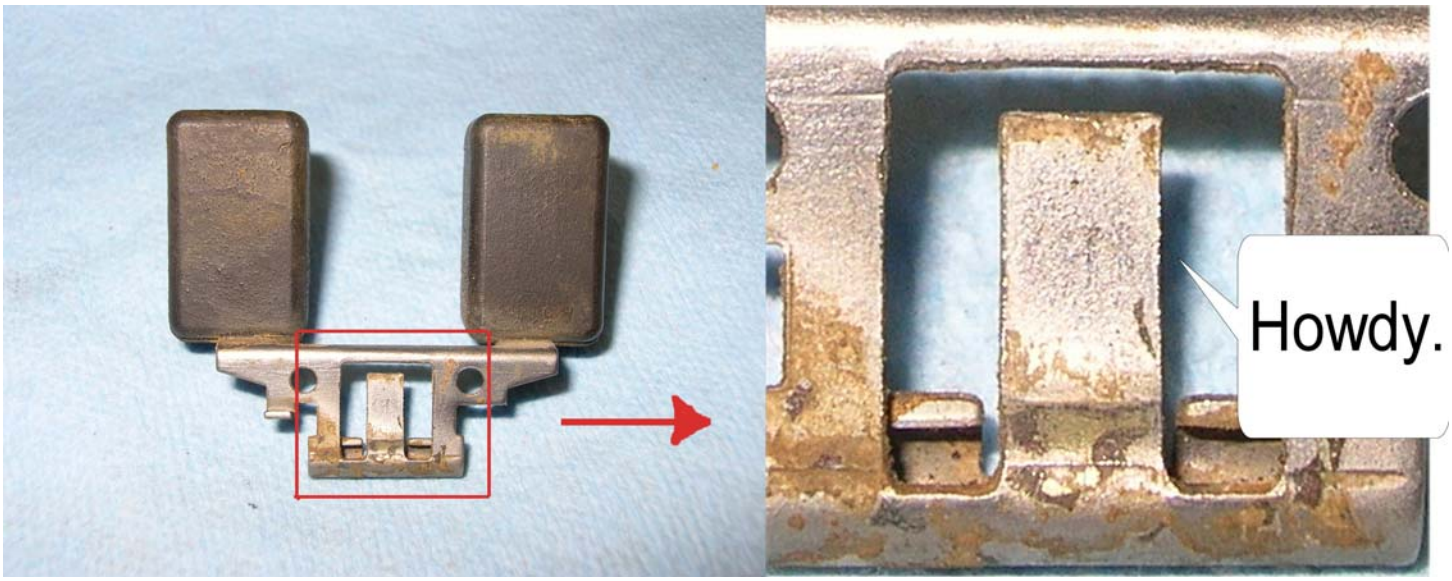
One is the **Fuel Level**, or the amount of fuel that's actually in the bowl at a given time. You find this out by taking a…

…**Fuel Level Measurement**. The manual for your model lists a specification that the carbs should be set to. This value is not measured from the bottom of the bowl, but from the **TOP** – as in 3mm +/- 1mm from the edge of the carb body. Which means, oddly enough, that the ***greater*** the distance between the top of the bowl and the fuel, the ***less*** fuel there is in the bowl. It may seem counterintuitive, but it makes sense once you think about it.

Third is the **Float Height**. With the carbs inclined so that the float tang is just resting on the float needle, which is shown later, a measurement can be taken from the gasket edge (minus the gasket) of the carb body to any given point on the floats.

Quote from a forum entry, showing how people misunderstand the relationship between floats, fuel levels and how to measure them:

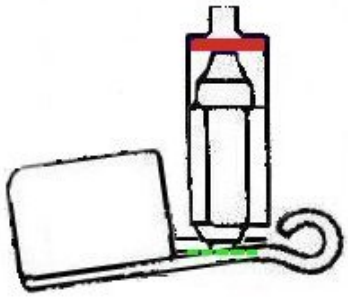
"Bending the float away from the carb body lowers the float level. Bending the float toward the carb body raises the float level."



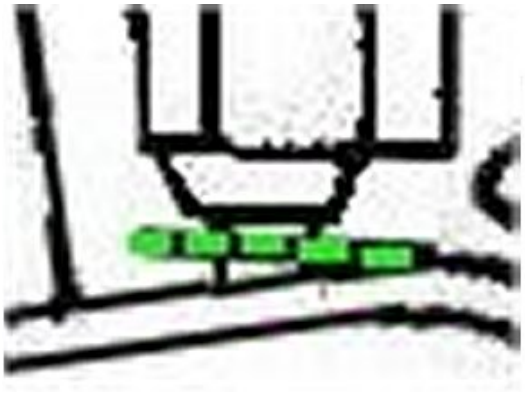
Yes and no. This reference to a "float level" (bad terminology, that – there is no such thing) can lead to confusion. We're not bending the float itself; that would be a Bad Thing[tm]. We're bending a part of the float called a "tang arm".

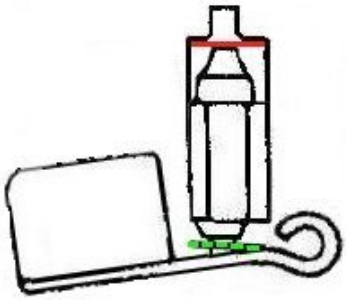
Before we go any further, a quick rundown on how these things work. If you've replaced the valve seats (you **DID** replace them, right?), or even just removed the old ones, you no doubt noticed the hole in the middle. Fuel flows into the bowl through that hole.

The float needle sits on that tang arm and is lifted by the floats. When enough fuel enters the float bowl, the floats lift the needle, which plugs the hole and stops the flow of fuel. As air passes through the carb bore, fuel from the bowl is drawn up through various passages and mixes with the air, where it's fed to the engine.



With the carbs sitting upright; if you bend the tang arm (in green) **down**, away from the carb body, that will increase the gap (shown in **red**, above right). More fuel will enter the bowl, the floats will have to rise farther in order to lift the needle and plug the hole in the valve seat, and the fuel level sits closer to the top of the bowl. Thus, the fuel level measurement ***decreases***.





Conversely, if you bend the tang arm (in green) **up,** toward the carb body, that will decrease the gap (shown in **red**, above right). The floats won't have to rise as far to lift the needle and plug the hole in the valve seat. Since less fuel enters the bowl, the fuel level sits further away from the top of the bowl, and thus the fuel level measurement ***increases***.

If the fuel level isn't right, bad things can happen.

- A fuel level that is too low results in a lean mixture. Less fuel is drawn into the air stream.
- A fuel level that is too high results in a rich mixture. More fuel is drawn into the air stream.
- A fuel level that is higher still can flood your crankcase and/or hydrolock the engine because the float needle doesn't close.

TANG IS GOOD FOR YOU

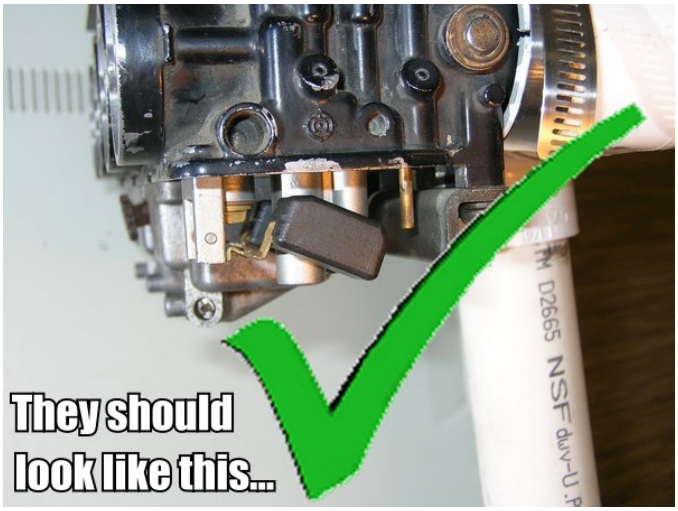
So, how do we get the tang arm – and by extension, the fuel level – where we want it?

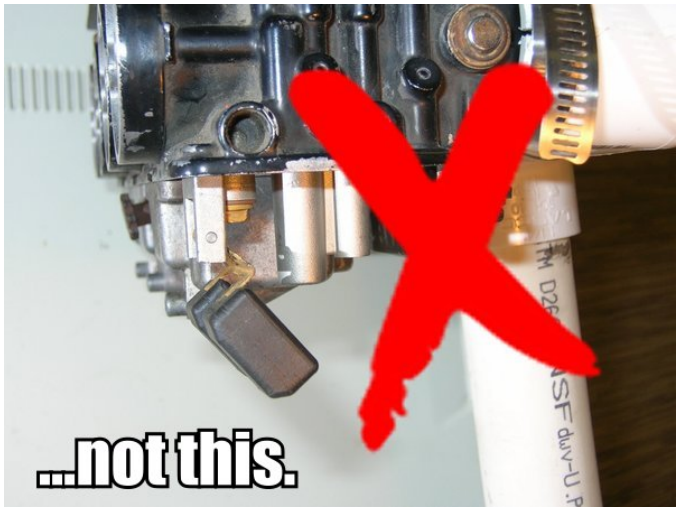
While some say all that's necessary is to set the float height, most manuals don't even tell you how high or low to set them. Even if it does, it might not give you the proper fuel level that you're looking for. Trying to do it this way can be time-consuming and frustrating, to say the least.

We propose a different way:

- Make sure you are using the same float needle valve assemblies in all four carbs.
- Set any one carb up properly by leveling the carb and bringing the fuel level to within spec.
- Once that's done, measure the float height using any two reference points of your choosing.
- Set the other three carb floats to match.
- Measure the fuel level on all four carbs, and tweak to suit.

Oh, and before we go any further, let's clear up any possible confusion about how the floats should be installed in the carb body.





FLOAT HEIGHT SETS THE FUEL LEVEL

If you've never done this dance before, our advice is to get all the proper tools, parts and fixtures ready, and then bribe someone who knows how to come over and do it for you! It's not rocket science, but it can be a messy, pain-in-the-butt, trial-and-error procedure.

If that's not possible, or if you want to learn how to do this yourself (so people can bribe YOU instead), then read on and proceed accordingly.

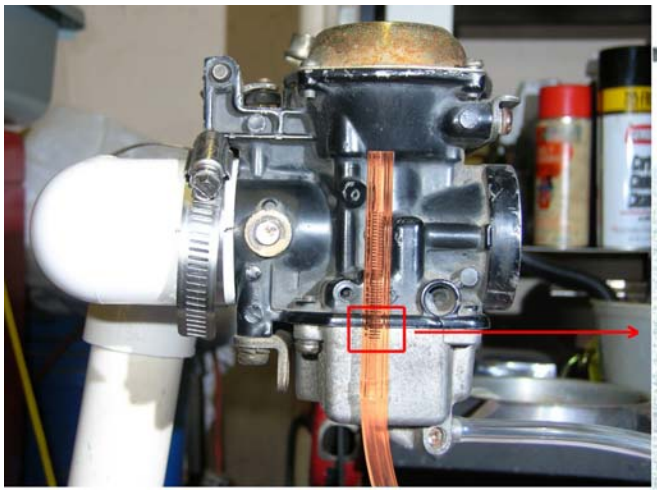
Step One: Determine your fuel level specification

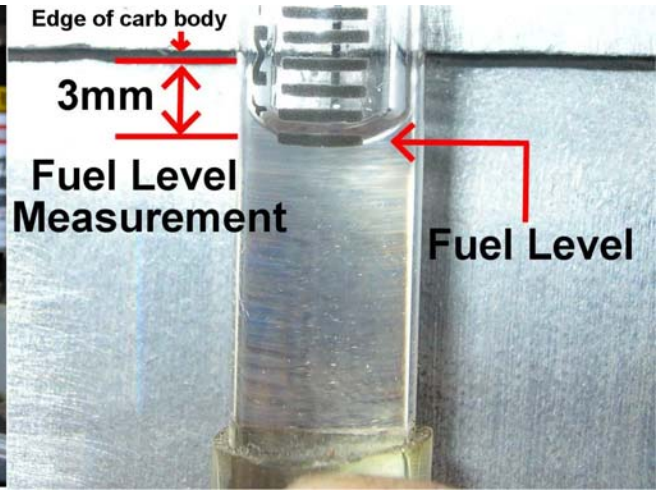
Where the fuel level should be is determined by bike model and carb model. See the included cheat sheet (on the very last page) to find the one that's right for you. You don't even need to ask your doctor.

You'll note there's a bit of wiggle room in the spec. For the HSC32 type that we're using here, it's 3mm +/- 1mm, or anywhere between 2 and 4mm below the edge of the carb body. While that would work, it's best to get your fuel level right on the nose for all four across the board – in this case, right at 3mm.

Step Two: Take a base reading of your reference carb

Make sure all your carbs are fully assembled. If you have a carb stand, so much the better. In any event, the carbs should be fully upright and level from side to side. Yes, when they're on the bike they sit tilted forward, but since the manual says to have them level and upright, that's how we'll do it here.





(If you're not using our **HCP1592** tube, but are using a plain tube without graduated markings on it, what you can also do is mark the float bowl to show where the fuel level should be before starting your measurements.)

Connect your fuel source to the tee on the fuel rail and open the valve. Give the bowls a few seconds to fill up with fuel; then connect your sight tube to the nipple on the float bowl. Hold the other end along the side of the carb body, centered front to back as shown above (colorized so you can see it better). Carefully open the drain screw on the float bowl.

As fluids like to do, the top of the fluid level in the tube will not form a perfectly straight line in the tube... instead, it will be somewhat "u-shaped". (It's called a "meniscus" if you're curious.) The proper measuring point is the lowest level of the fluid in the tube. Make a note of where this is compared to the edge of the carb body. Close the drain screw, close the valve on your fuel source, then drain the float bowls.

While we're on this topic, let's go over just exactly what we're filling the bowls with to take readings. You might be tempted to use something other than gasoline, say water or windshield wiper fluid – it's cheaper, after all. **DON'T**. There's a good reason for this.

These fluids have a different "specific gravity" or "relative density". An object that might float in one liquid would sink in another. In other words, the floats will sit differently in wiper fluid than they will in gasoline, the level of fluid in the bowl will vary, and this will throw off your readings. Then you'll have to do it all over again the right way. Save yourself the aggravation and do it the right way the first time.

Obviously, you want to be careful around gasoline, so take adequate precautions.

Step Three: Adjust your reference carb

If your carb is within spec, skip to Step Four.

If your reference carb is not within spec, you'll need to CAREFULLY bend the tang arm.

Fractions of a millimeter count; a very, **VERY** small adjustment can cause the fuel level to vary greatly. Repeat Steps Two and Three until you have the desired fuel level spec.

At this stage in the process, with one carb set up correctly, you have two options as to how to proceed.

Method A involves following the same steps (#2 and #3 above) for each of the remaining carbs. Measure one carb, tweak it, measure again, repeat ad nauseam until each carb is set properly.

Method B takes a slightly different approach. Measure the **float height** of the first carb that you just finished setting up, and transfer that measurement to the other three. The upside of doing it this way is that you likely won't have to make any subsequent adjustments. The downside is that you might still have to tweak the other carbs anyway. Plus, this method is based on the premise that you have something to measure the float height settings with… which you may not have. If you do, continue below with Step Four.

Step Four: Measuring the float height

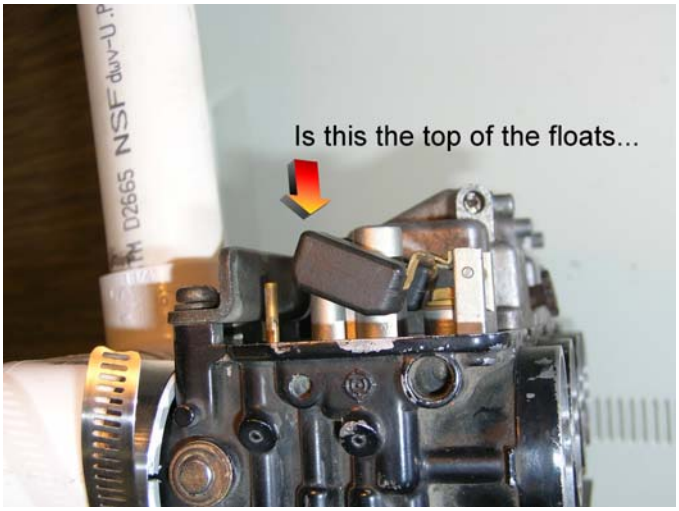
Now that we have one carb where we want it, we need to see how the floats are set in order to get the other three to match up. Here are some useful hints, culled from the factory service manual, on how to check the float height measurement.

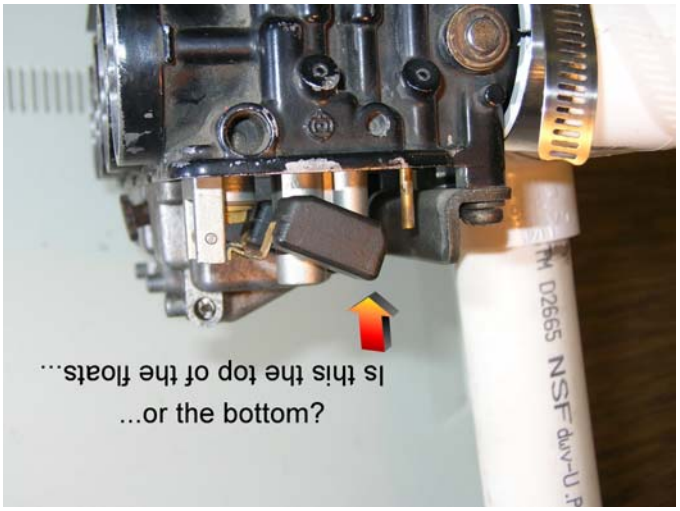
- Hold the carb in an upside-down position.
- Incline the carb at a 60-75 degree angle so that the end of the float valve does not hang down as a result of the float weight.
- Measure the distance from the mating surface of the chamber without the gasket in place, to the top of the float.
- Note: the float should be just resting on, but not depressing, the spring loaded inlet needle.

Well, okay then! Now we… wait. Did you catch that one confusing bit? Here it is again:

"Measure the distance from the mating surface of the chamber without the gasket in place, to the **top of the float**."

Ummm… could someone define "top of the float", please?

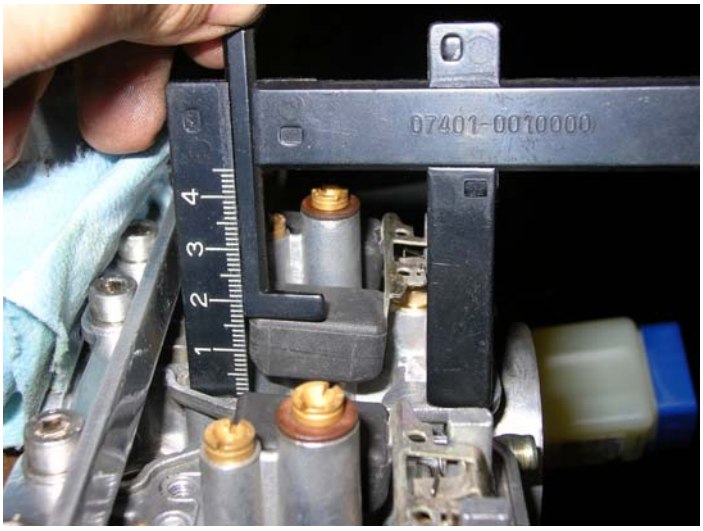




Well, by and large, this isn't really defined. In those service manuals that **DO** show it, the pictures are so small and grainy that they're pretty much useless. It's almost like Yamaha **wanted** us to concentrate on setting the fuel levels… which, amazingly enough, is exactly what we're trying to accomplish here.

Like the pictures above illustrate, since we've got the carbs upside-down while we're doing this, what we're thinking of as the "top" of the floats is actually the **bottom**.

The easiest way to deal with that is this: we measure from the edge of the carb body to whatever point on the floats that you deem appropriate – whatever is easier for you to see and most consistent to measure. When you set the other three floats, make sure you measure at that same point. As the pictures below illustrate, you can use the crosspiece on either device to just brush the upper edge (alright, alright, the **bottom**) of the float.



Once you've got the other three floats set, bolt everything back together and measure the fuel levels on all four carbs. If they're not spot on, they should at least be very close. Do this several times to make sure they're right. Tweak any individual carb to bring it into line.

Once you're done, you can proudly proclaim to the world:

"I am Ozymandias, King of Kings! Look on my works, ye Mighty, and despair!"

FLOAT LEVEL CHEAT SHEET

Hitachi all HSC32 series models:

NOTE: all of the following models used HSC32 carbs:

XJ650 Maxim, Midnight Maxim, XJ650RJ Seca (non-turbo), XJ650 Euro all use HSC32 carbs (various versions)

XJ750 all USA 1981-83 models use HSC32 version 5G200 (Seca) and 15R00 (Maxim and Midnight Maxim)

XJ750 all Canadian 1981-83 models use HSC32 version 5H200 (Seca) and 15T00 (Maxim and Midnight Maxim)

XJ750 UK/Europe 11M models, XJ750 Police models 24L and 37H use HSC32 version 5N100

-Fuel level measured via the clear-tube gauge: 3mm +/- 1mm (.12 +/- .04 inches)

-Float height: 17.5 +/- 0.5mm

Hitachi HSC33 series (XJ700 air-cooled models):

-Fuel level measured via the clear-tube gauge: 1.0mm +/- 1mm (.039" +/- .039")

-Float height: 16.0 +/- 1.0mm

Hitachi HSC33 series (XJ750E-II model):

-Fuel level measured via the clear-tube gauge: 5.0mm +/- 1mm (.197" +/- .039")

-Float height: unknown

Hitachi HSC33 series (XJ750RL models):

-Fuel level measured via the clear-tube gauge: 1.0mm +/- 1mm (.039" +/- .039")

-Float height: unknown, but possibly the same as XJ700 air-cooled models (16.0 +/- 1.0mm)

Mikuni BS28 (all XJ550 except 1984 XJ550L):

-Fuel level measured via the clear-tube gauge: 2mm +/- 1mm (.08 +/- .039 inches)

-Float height: 21.5 +/- 1.0mm

Mikuni BDS26 (USA all 1992-98 XJ600 Seca II):

-Fuel level measured via the clear-tube gauge:

USA: 4 - 6mm (.016 - 0.24") below float chamber line

-Float height: 6.2 - 8.2mm (0.24 - 0.32")

Mikuni BDST28 (non-USA all 1992-98 XJ600 Seca II):

-Fuel level measured via the clear-tube gauge:

1992-96 Canada and Australia: 3 - 5mm (0.12 - .0.20") above float chamber line

1992-95 UK: 3 - 5mm (0.12 - .0.20") above float chamber line

1996-98 UK: 8.5 - 9.5mm (0.34 - .0.37") above float chamber line

-Float height:

1992-96 Canada and Australia: 11 - 13mm (0.43 - 0.512")

1992-95 UK: 11 - 13mm (0.43 - 0.51")

1996-98 UK: 8.8 - 10.8mm (0.35 - 0.42")

Mikuni BS32 (all XJ550L, 1984-85 FJ600, and 1984-87 / 1989-91 XJ600):

-Fuel level measured via the clear-tube gauge: 3mm +/- 1mm (.12 +/- .04 inches)

-Float height: unknown

Mikuni BS30 (all XJ650 Turbo):

-Fuel level measured via the clear-tube gauge: 2mm +/- 1mm (.08 +/- .04 inches)

-Float height: 17.5 +/- 0.5mm

Mikuni BS33 (all XJ700-X and XJ750-X):

-Fuel level measured via the clear-tube gauge: 3mm +/- 1mm (.12 +/- .04 inches)

-Float height: 17.5 +/- 1.0mm

Mikuni BS35 (all XJ900RK/RL):

-Fuel level measured via the clear-tube gauge: 5mm +/- 1mm (.20 +/- .04 inches)

-Float height: 22.3 +/- 0.5mm

Mikuni BS36 (all XJ900F, FN, N, etc):

-Fuel level measured via the clear-tube gauge: 5mm +/- 1mm (.20 +/- .04 inches)

-Float height: 22.3 +/- 0.5mm

Mikuni BS34 (all XJ1100 and XS1100):

-Fuel level measured via the clear-tube gauge: 3mm +/- 1mm (.12 +/- .04 inches)

-Float height:

25.7 +/- 1.0mm (1978-79 all models)

23.0 +/- 0.5mm (1980 all models)

not specified (1981-82 all models)