

Stromberg Carbs by the Numbers

STROMBERG NA-S3 CARB UPDATE

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The "STROMBERG SPECIALIST"

The little Stromberg NA-S3 carburetor has been around since 1935 and there are thousands of them out there installed on small Continental engines. Many aircraft owners, mechanics and IAs out there are of the opinion that "all Strombergs are the same" and can be installed on any engine. This is far from true.

When an aircraft "type certificate data sheet" is issued, it specifies which parts are installed on that plane and engine. The parts specified go by model and part number and must be adhered to. To change a part (without an STC) involves a lot of testing and a "field" approval by the FAA. It is best to leave well enough alone and stick with the right parts and their associated numbers on certificated aircraft.

With regard to carburetors, the "other" brand (Marvel-Schebler) is easy to identify because it has a neat little aluminum tag riveted to the casting body giving the carb type, model & serial number on the tag. One would never install a Marvel carburetor from a Cherokee on a Cessna 172. That would not be legal, right...?

The Stromberg does NOT have an identifying aluminum plate on it (except for a few of the very early models). There are two numbers mechanically stamped on the lower casting square flange (the flange that attaches to the air intake box). The 6 digit number is the part number and the 4 or 5 digit number stamped on the flange's left side is the engine manufacturers setting number. Some carburetors may have a -2, -3, or -4 suffix number after the part number but, the important number is the main 6 digit

number.

The Stromberg carburetor comes in two different variations. There is a "NA-S3A1" and a "NA-S3B". The letters are cast into the upper casting and are easy to see and identify. Also, there are Strombergs designed to be used with either gravity flow fuel delivery systems or fuel pump pressure fed fuel delivery systems. All in all, there are 19 different part numbers and variations.



The NA-S3A1 carb was designed to be used with a "mixture control" device attached to the upper casting. The mixture control in a Stromberg is really not a "mixture control" as we know it. It does not control fuel flow like the "other brand" carb. It controls the air pressure in the upper part of the float bowl. It is called a "back suction" device and does not have an "idle cut-

off" position (like the "other" carburetor). It starts working when you get above 5 or 6 thousand feet MSL. Quite primitive, at best, but it does work...

The NA-S3B carburetor does NOT have the mixture control device. It uses a "blanking plate" instead. There are a very few model engines that the "B" carburetor is used on (more on that later).

All Stromberg carbs require a 13/32" +/- 1/64" fuel float level which has to be set "wet" on a flow bench. They are all the same. Fuel level is set using 100LL fuel which has a specific gravity of .710 to .720 at 68 degrees temp. This is a critical step.

Gravity flow carburetors require a 19" pressure head - 1/2PSI fuel delivery to flow the proper amount of fuel the engine needs to develop full power. The brass needle seat has a .187" opening bored into the lower seat opening to

Continued on the Next Page

Continued from Previous Page

permit sufficient fuel flow. Gravity flow carbs also must have a minimum of .048" vertical needle travel to assure that the proper amount of fuel is being delivered under high power requirements. This is called "float drop" and sadly, many Strombergs fall short of this critical dimension

Fuel pump pressure fed carburetors require a 2 to 4 PSI fuel flow to attain proper engine power. The brass needle seat opening is only .113" diameter, more than sufficient with 2 to 4 pounds fuel pressure. The "float drop" in this series carb is only .021" but is more than sufficient considering the higher pressure a fuel pump delivers versus a gravity flow system.

There are several different main jet and air bleed sizes along with different venturi diameters to provide proper fuel flow and air/fuel ratios to obtain proper engine power.

With regard to the needles and seats, there are several variations that were used in a Stromberg. Many times they are mismatched during overhaul and cause problems. The first version was a stainless steel needle (p/n P14222) and "sharp edged" brass seat (p/n P17247) installed in the earliest Stromberg deliveries. The "early" needles were crudely machined and did not "lap in" very well. As a result, they dripped and leaked.

The second version was made with a "neoprene" tip needle, which was supposed to stop the leak. It worked (up until now). It came out in 1943, after the war and was to be the "cure-all" for the leak problem. Three or four other suppliers came out with a "clone" needle that looked like an OEM Stromberg but they used a very poor grade neoprene. Some of the "bad guys" even made the needles out of "mild steel" (much cheaper). The Neoprene needle had a different design brass seat which used a rounded edge needle seat. This was so the sharp edged seat used with the stainless needle would not cut into the neoprene. That seat's part number is p/n 383911 and the neoprene needle part number is p/n 390077 (the needle/seat assembly was available in kit form, the part number being p/n 383943). Two problems exist with the neoprene needles. The first is that if you use auto gas containing

"ethanol" (illegal in your bird), using the needles made by the "bad guys", they can swell up and stop fuel from flowing. These were the needle tips made of a poor grade neoprene. The OEM needles made by Stromberg did not swell up, but it is impossible to tell them apart. Second is that these "old" neoprene needles have become age hardened and brittle, they can crumble and fall apart. Take an old needle and squeeze the tip with a pair of pliers. Most needles will crumble before your very eyes. None of these old neoprene needle kits are available any longer.

The next needle came out and was made of a white plastic material called "Delrin". It was designed to replace the neoprene needle. The factory part number of the Delrin needle was p/n 2523047 and replaced the p/n 390077 neoprene unit. The Delrin needle was several grams lighter in weight than the stainless needle and required a modification adding a brass weight soldered to the back of the brass float arm to properly balance the float mechanism. The Delrin needle also had to use the rounded edge brass seat like the neoprene needle. The change-over was covered by Stromberg Service Bulletin # ACBS-84 issued 6/1/1964 & revised on 7/15/1972. (revision 1). The only AD that came out on a Stromberg was AD 46-04-02 which specifies that the rounded edge brass seat **MUST** be used with the Delrin needle. The Delrin needle is also very hard to lap in because it is so soft. Someone on the "internet" suggested using mayonnaise as a lapping compound (wow). You might want to add a little pickle juice to give it a better flavor...

The latest needle/seat combination is a much better machined version of the original stainless/brass p/n P14222 & P17247. It laps in quite well and stops the needle "drip/leak" problem.

With all the variables, it is easy to see why there are so many "messed up" Strombergs out there...on wrong engines. An installed A-65 carburetor would starve a C-85 or C-90 engine for fuel (also running too lean and causing a lack of power) which could ultimately cause engine damage. Conversely, a large C-85 or C-90 carburetor would flood out a little A-65, washing

Continued on Next Page

Continued from Previous Page

lubrication off the cylinder walls, diluting the oil and possibly causing TBO headaches.

I am shocked at the number of Strombergs I get in for overhaul that leak and have numerous mismatched components.

NOW, it begins to make sense why the Stromberg's part number is so important to be

CARB MODEL ENGINE MFGR ENGINE MFGR ENGINE MODEL HORSEPOWER FUEL FEED
SETTING NUMBER

NA-S3A1 series carburetors with mixture control

A18033A -or- B	CONT	3628	A-65	65	GRAVITY
			A-75	75	GRAVITY
			A-80	80	GRAVITY
A30177	CONT	4631	A-75 (Stinson)	75	GRAVITY 50" HEAD
380162	CONT	40059	C-75	75	GRAVITY
380167	CONT	40590	C-85	85	GRAVITY
380171	CONT	36019	C-75	75	PRESSURE
380172	CONT	40636	C-85	85	PRESSURE
380174	CONT	24716	C-75-12	75	GRAVITY
380231-3	CONT	-----	C-9012F	90	GRAVITY
380231	CONT	-----	C-90	90	PRESSURE
391090	CONT	-----	C-90	90	GRAVITY
391156	CONT	-----	C-90	90	GRAVITY
391229-1-2	CONT	531126	C-90-14F	90	GRAVITY
391257	CONT	531157	C-90-14F	90	GRAVITY
391716-1	CONT	-----	A-50	50	PRESSURE
"	"	"	A-65	65	3 PSI /
"	"	"	A-75	75	.048" FLOAT
"	"	"	A-80	80	DROP
392458	CONT	4805	A-80	80	GRAVITY

NA-SO3A1 (rarely seen)

380168	CONT	50335	A-100	100	GRAVITY
380175	CONT	36020	A-100	100	PRESSURE

NA-S3B (no mixture control)

380155	CONT	35885	A-50	50	GRAVITY
"	"	"	A-65	65	"
380205	CONT	36109	A-65	65	PRESSURE
"	"	"	A-75	75	"
380206	CONT	36109	A-65-8	65	PRESSURE

Take the time to note the number stamped on your Stromberg and compare it to the numbers on this list. If you do not have the proper carburetor number on your engine, you are illegal and "technically" not in annual and also, "un-insured"... The insurance companies only insure planes that are legal and "in annual". Check it out.....

used for the right engine application.

The following list has been compiled using Bendix/Stromberg Factory Service and Parts manuals ad records and is considered to be accurate and complete

Hopefully, the enclosed information will make it easy for the aircraft owner, A&P Mechanic and IA Inspector to determine which carburetor fits which engine and application plus stay LEGAL.....

If you have any questions, I can be reached at 708-267-7111 or email me at uni-tech@earthlink.net