

DHC-2 Beaver



Versatile and dependable, a go-anywhere STOL workhorse, the de Havilland Canada DHC-2 Beaver is one of the world's very special aircraft. Ian Seager flies a perfectly restored example of pure aviation beauty.
Photos Ed Hicks

Someone cursed with a cold heart, no imagination and a lifetime of never experiencing flight may tell you that aeroplanes are not living things, that aeroplanes don't have souls, that they're machines built to serve and nothing more. You and I know they're wrong, you and I know that aeroplanes are special, we know they're there to share the joy and occasional frustration of flight. You and I also know that not all aeroplanes are created equal. The DHC-2 Beaver is one of the world's very special aeroplanes.

In the post-war 1940s, just north of Toronto, Punch Dickens, a renowned bush pilot found himself working as sales director for de Havilland. In an early example of market research, he contacted bush pilots all over the world and asked them what they wanted from a tough STOL aircraft. A small design team got the job of producing something that could sit on wheels, skis or floats and that could haul big loads out of all sorts of improbable places. ▶



The engineers pointed out that with all that drag the Beaver wouldn't be a very fast aeroplane, but Punch told them that as its only competition was a dog sled, that didn't really matter. At the time de Havilland was still British-owned and the original plan had been to equip the aircraft with a development of the company's own Gipsy engine. The relative lack of power would require a big wing to meet the design STOL goals, but when Pratt & Whitney Canada offered the 450hp supercharged Wasp Junior, the company took advantage of the extra power but decided to keep the large wing. That particular bout of having your cake and eating it guaranteed some impressive performance, eventual sales success and a very long life for what was to become Canada's very first all-metal, working bush aircraft.

It was nearly 70 years ago, on 16 August 1947 that the Beaver first took to the air, but while most surviving aircraft from that era can be found in museums or on the airshow circuit if you are lucky, the good old Beaver can still be found working for a living in areas where load hauling



It's a bit of a climb, but worth it...

and operating in and out of unprepared landing sites call for something dependable, versatile and capable. That's a pretty impressive vote of confidence in the original design, and as far as I can see it's something unequalled in the single-engine world. If that's not testament enough, many Beaver owners are spending time and money rebuilding and refurbishing existing Beavers, most of which it's been said have been to the bottom of a river or lake at some stage in their life.

N450DM was delivered on December 31 1953 (didn't they have parties to go to?), it spent some time in corporate service, was rebuilt and refurbished several times, despite sustaining damage that put it 'beyond repair', and eventually ended in the custodianship of the Marco family in Jacksonville, Florida. I think it would be fair to say that for David Marco there's only one kind of aeroplane and that's a perfect aeroplane. After owning the Beaver for the best part of 15 years, in 2013 it went to Wipaire for a full restoration that took the best part of nine months. The Marcos

spent countless hours deciding on modifications that would result in a lightweight, working aeroplane without losing that vintage feel, and given the Beaver's long history there are lots of mods available that will undoubtedly keep the type flying in commercial service for years to come.

Working modifications

The first and most obvious modification comes in the shape of the Wipline 6100 amphibious floats. These give the flexibility to land on err, land, or to land on water with the wheels up, or to make a really short, one time only landing on water with the wheels down; considerable effort and attention is expended on avoiding the latter.

The Wiplines have more internal storage space and thanks to their 6,100lb rating they can easily cope with any increased gross weights. Every operator wants a higher gross weight (more weight usually equals more money) and the Beaver's spoilt for choice with Wipline, Kenmore and design holders Viking Air all having kits available. The Marcos chose the Wipline kit which

gave an increase of about 370lb. If you are operating the Beaver on anything other than amphibious it's possible to go all the way to 5,600lb, a modification that most Alaskan working Beavers enjoy, and one that pretty much means you can carry almost anything you can load. The Wipline kit for the Marco Beaver means that the total fuel load (spread between five tanks, three in the belly and one in each wing) is 137usg. That means an endurance of about five hours with 30 minutes reserve. To save you doing the maths, that means the Beaver will burn about 95lph, so planning for a nice round figure of 100lph should mean no awkward silences.

Next up in the modification stakes are a pair of aileron flow accelerators – think one big VG per wing. The Beaver has ailerons that droop with flap, and without the accelerators, aileron control apparently becomes a bit ponderous when you have a lot of flap combined with not very much airspeed. I'm told that's something that can get your attention when approaching a short gravel strip.

Remember my comment about the extra power that the P&W Wasp engine offered? For some, 450hp is not quite enough; I asked Michael about the engine, and I'll let him explain.

"A stock Beaver uses a Pratt & Whitney 450hp R-985 Wasp Jr. Nearly every Beaver pilot will tell you that this provides adequate power for the aircraft. It's just that – adequate. When you're flying in the cool, dry air of the far north, the engine excels at lower altitudes as the supercharger enables you to maintain 25in of manifold pressure all the way up to 5,000ft, which is plenty high enough for most bush flying. But in warmer environments the engine could use a little extra kick.

"When we restored the airplane the original engine had reached its TBO of 1,650 hours so we decided to have Covington Engines (a Pratt & Whitney specialist) build up a freshly overhauled 985. They were able to incorporate many of the mods used in the larger R-1340s for T-6s at the Reno races. We opted for a polished and ported blower system, which increases efficiency of the



You can see more photos from this feature on the iPad and Android edition of FLYER and on the Editorial Extras section of the FLYER forum at forums.flyer.co.uk



Big doors designed for easy loading of oil drums and other cargo



It's all in the details, and there are many...



Flow accelerators on the leading-edge prevent brown trousers by improving low-speed handling. Ailerons droop with flaps



Fuel tank selector and mag switch. Radials sound great even when they're cranking

“Sat in the hangar on its amphibious floats the Beaver is imposing, and just a little intimidating”



This is what they mean when they say pilots get the best offices in the world



Michael Marco

N450DM IS OWNED by David Marco (who also owns the Lockheed 12 featured in *FLYER'S* June 2014 issue). David was away so asked his son Michael to fly with us – turns out that he's a bit of a total aeroplane person with quite a lot of recent Beaver experience.

Michael grew up with aeroplanes in the same way that most of us grew up with pushbikes. He started flying gliders at 13 and soloed in a Blanik on his 14th birthday. On his 16th birthday he soloed in a Taylorcraft L-2 and started training for his PPL, which he finished on his 17th birthday in the family's Super Decathlon. Commercial, Multi-engine, and Flight Instructor Ratings followed as quickly as possible. During college Michael got into aerobatic competitions and instructed on the Super Decathlon, giving tailwheel endorsements and aerobatic introductory flights. He also began chasing checkouts in as many aeroplanes as he



could and has had, in his words, “The privilege of being able to fly T-6s, P-51s, T-34s, Citations, and Cessna 185s, 170s, and 421s.”

After building some time and getting a Commercial Seaplane rating, Michael's father (and owner of the Beaver) David Marco let him fly the Beaver more often. After graduating, and with 250 Beaver hours in his logbook Michael got a flying job in Alaska. He's done three seasons now, the last two flying ski-equipped Beavers for Talketna Air where he takes climbers and supplies into Mt McKinley Basecamp – all operations are from snow and ice and at altitudes of anything from 5,000 to 8,000ft. When he's got time off you'll usually find him and girlfriend Allison in a Super Cub on a remote lake in Florida somewhere. During the winter he teaches aerobatics and unusual attitude recovery at the Patty Wagstaff Aerobatic School in St Augustine.

supercharger. We also had the cylinders bored out to a slightly larger diameter and the piston has an increased stroke length. These two mods give us about 30-40 more horsepower than a stock 985. This is really noticeable on hot, humid, east coast Florida days. Previously the airplane just didn't perform very well in climbs and cruise.

“On top of the engine mods, we also incorporated Wipair's modified carburetor intake. It redirects the carb air intake to below the engine rather than above it. This provides a more efficient route for intake air and also provides a carb heat system that will actually prevent ice from forming at all. A stock Beaver's original carb intake/heat system was above the engine and notorious for being completely inadequate, and for taking a very long time to provide enough warm air to melt or prevent ice. Not ideal when flying in humid/snowy conditions.”

The rebuild was completed with a new interior made from lighter waterproof vinyls and a lightweight waterproof synthetic carpet that means pretty much anything can just be thrown in the

back. The interior looks great while being tough, light and practical. The result of all this work? On its first showing at Sun 'n Fun, N450DM was judged as the 2014 Seaplane Grand Champion. To be honest I'd have crawled through broken glass for a chance to fly the aeroplane, but happily for my knees, all we needed to do was to fly into Jacksonville Executive on the assigned day.

Waiting for warmth

Sat in the hangar on its amphibious floats the Beaver is imposing, and just a little intimidating. Somehow it makes you want to wander up to it, take a little jump while you turn in one fluid motion so that you can nonchalantly park your backside on one of its floats, dangling your legs as you take in the detail. But those big Wiplines are just a couple of inches too high, and the chance of success runs about equal with the ignominious possibility of failing and looking a bit clumsy as you slide back to the ground. I take the cut-out steps instead and make my way towards the cockpit, which is cleaner, better designed and better built

than a fair few factory new aeroplanes I've flown. There's a small jolt and I look down to see a lineman from the nearby FBO attaching a tow bar which looks like it could double as a bridge support in its spare time. Once outside, the fuel truck appears and we add fuel to the belly tanks – the position of the tanks, and the fillers which sit mid fuselage, are optimised for fuelling in the field. While Beaver pilots stand on the float under the wing, pilots of other aircraft can find themselves balancing on rocking struts while they clamber to reach on top of the wing. As the engine's a radial it's important to pull through the blades to check for any oil that may have collected in the bottom cylinders – starting with pooled oil will lead to hydraulicing, which in turn will lead to a maintenance bill that would probably make a fair dent in Greece's national debt.

The cockpit is spacious, well thought out and, unlike the initial impression of the aeroplane, not at all intimidating. There are some elements that are a bit unfamiliar like a lever for the water rudders, a set of lights next to the gear retraction



Rarely will the Beaver
leave you up a creek
without a paddle



Make sure the water
rudders are up, else you'll
be buying the beers...

whose sole purpose in life is to stop you landing on the water with the wheels down and a bright yellow old cap sitting right by the centre pedestal so that you can top up the engine oil in flight. The other element that's a bit different is a single throw-over yoke, a bit like the early Bonanza.

To get the engine running it needs to be primed, and that means building up a bit of fuel pressure first. Near your feet there's a wobble pump and a fuel pressure gauge – the tough old Beaver has a few weak points and this is one of them – so you have to be careful not to pump so many times that the pressure exceeds 5psi. Once you've done that the primer plunger is operated and you're ready to go. Mixture to rich, push the starter switch and after a few blades the mags can go to both. If you've done it right there'll be some smoke, the sound of five cylinders catching, followed by the remaining four getting their act together. You then have to wait for everything to warm up. You might want to use this time to read a book or grow a beard. There's a lot of metal and about six gallons of oil to warm up so it's going to



The fuselage-mounted
tanks make
refuelling easy

take some time – particularly if you are operating in northern Canada rather than Florida.

Pure beauty

Eventually the time comes to taxi, and with the only brakes being on Michael's side he takes us to the runway while I try to get used to sitting in an aeroplane with my head 20ft above the ground. Just short of the threshold there's a run-up area and we park next to a Piper Seminole about to head off on an instructional flight – I think it's fair to say their departure brief got interrupted when we manoeuvred a couple of tonnes of pure aviation beauty alongside for our checks.

We ran through the power checks (they'd be familiar to any pilot) and set flaps to their take-off position by moving the flap selector to the down position and manually pumping the hydraulics until the indicator ahead of the P1 position showed 'take-off'. Craig Tower cleared us to depart, we lined up and Michael swung the control yoke over to me. This particular piece of great news was accompanied by an equally large ▶

amount of trepidation that I dealt with by going to full power and setting us off down the runway.

The Wasp is smooth but loud and persuasive at full power, which means 36.5 inches and 2,300rpm. Somewhere around 60kt we left the ground and climbed away – flaps are retracted (well, pumped back up) to their climb position and the gear also comes up. Confirmation that the undercarriage is in the right position comes by light in the cockpit and by looking out of the window. I think everyone involved in amphibious operations is rightly paranoid about gear position, and I think I checked gear position about a hundred times before we got to the top of the (short) climb.

We weren't heavy and we weren't trying to out-climb trees at the end of a short strip or lake so there was no need to run high power settings and both the throttle and prop came back to something kinder on the engine, neighbours and fuel burn. We climbed to about 1,500ft and headed south towards the St John's river. For such a big aeroplane the Beaver has surprisingly light and pleasant controls. With wings that measure almost 50ft there's always the potential for some adverse yaw, and the roll rate is never going to be rapid but it's gentle and predictable.

We take some time to play around with various configurations, we climb and descend, roll

right and left, speed up and slow down. With the flap all the way up the Beaver rides a little nose high and Michael suggests that we put down just the tiniest bit of flap, which has the effect of dropping the nose slightly and making the cruise very comfortable indeed.

With the manifold pressure back at about 28in and the prop back at about 1,800rpm we're cruising just under 100kt and burning about 24usg/hr (90lph). The engine's purring, the wings are riding on the silky air and the whole experience is almost hypnotic, but there's work to be done and we need to look at some water work.

Michael gets the controls back, I check the position of the gear another hundred times and Michael demos a couple of water landings with a fast taxi 'on the step' while Ed works his photographic magic. We climb back a couple of hundred feet and it's my turn on the water – this is one gentle STOL aeroplane and one huge and pretty calm (but not glassy) river. I check the position of the gear yet again (you never know I may have missed something), and get set up with the flaps down and the power coming back. A gentle flare, a very much reduced sink rate and the floats gently kiss the water, power off and control column all the way back and we're more or less stationary in short order. I put the water

rudders down into the water and taxi about a little.

Michael mentions a tradition I'd not heard about – if you're seen taking off with your water rudders still deployed then you get to buy the beer! I point the nose into wind, bring the water rudders up and gently go to full power with the column fully back. As we build speed the Beaver rises and goes onto the step, back pressure's relaxed, we accelerate a bit more and climb away. I fly a few more water landings before reluctantly heading back to Craig – a couple of miles out I put the gear down and check another hundred times or so that they are where they should be. There are times when I don't like my job. This isn't one of them.

At the end of the landing roll I swing the yoke back over to the left and Michael takes us back to the hangar. The day's light has faded, the Florida air is pleasantly warm and the only sound I can hear is the gentle burble of the Wasp.

This might 'only' be a single-engine aeroplane, but it is a very special aeroplane. It may have been built to serve, and when it's put away and the lights turned off you may struggle to find a heartbeat, but somewhere in there you'll find a soul and a reliable friend ready to share countless adventures. If I could only ever fly one more aeroplane it would be the Beaver. It should be on every pilot's bucket list. ■



Right aeroplane, right light, right people. A little slice of heaven

TECH SPEC

DHC-2 Beaver



■ DIMENSIONS

Wingspan.....	48ft
Length.....	32ft 9in
Height.....	16ft
Cabin width.....	4ft

■ WEIGHTS & LOADING

mtow.....	5,370lb
Empty weight.....	3,450lb
Useful load.....	2,150lb
Fuel capacity.....	137usg
Oil capacity.....	6g

■ PERFORMANCE

Cruise speed (1800rpm).....	115mph
Stall speed (with flaps).....	45mph
Best rate of climb.....	920fpm
Range (with 30min reserve).....	500nm
Take-Off (over 50ft).....	1,610ft
Landing roll (over 50ft).....	1,510ft

■ FLOATS

Wipaire Wipline 6100 Amphibious

■ ENGINE

Pratt & Whitney R-985 Wasp Jr. 450hp

■ PROPELLER

Hartzell 3-blade constant-speed

■ PRICE

N450DM isn't for sale. Similar amphibious Beavers can be found, starting from \$450,0000