History of N754

Preface

N754 is a one-of-a-kind, deHavilland beaver airframe, specially modified with a Garrett turbine engine by the Alaska Aircraft Division of the U.S. Fish and Wildlife Service (USFWS), for use in conducting aerial wildlife surveys.

Jerry Lawhorn (head of maintenance) and Theron Smith (Aircraft Division Supervisor) worked with Volpar, Inc. to build N754 using the Volpar engine nacelle previously used in the conversion of a USFWS Grumman Goose, N780.

This document tells the story, first by Jerry and then continued by Jim King and Bruce Conant, of how N754 came into being and then was further modified for conducting aerial Migratory Bird Surveys.

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Introduction

History of N754, a transcribed tape narration by Jerry Lawhorn relaying the time, place and how it all evolved. At the time of the evolution of N754, Jerry was employed with the U.S. Fish and Wildlife Service, Alaska Aircraft Division. His employment began in the mid-50's and continued through the life of the Aircraft Division and into the beginning of The Office of Aircraft Services, a combined aircraft management division of the U.S. Department of the Interior.

This airplane, N754, was a highly prized survey tool based primarily in Juneau, Alaska. It was flown far and wide annually in Alaska, down the west coast of Mexico, into adjacent Canada and over into Eastern Russia in the early 90's. It was flown mostly by just a few U.S. Fish and Wildlife Service pilots. The following narration explains how the conversion of a standard airplane into a modern-day tool, specifically designed for migratory bird surveys, took place. It was retired from service in 2011 and donated to the Alaska Aviation Museum at Lake Hood in Anchorage, Alaska.

Transcribed Interview with Jerry Lawhorn

The Early Years

In July, 1964, Refuges came up with enough dollars to go direct to deHavilland and buy a brand-new Beaver and Theron Smith (Aircraft Supervisor) and I went down to Toronto, I guess it was, and picked up N715 right from the factory. The deHavilland factory had stopped the production line, but they would still make them on a "special order" basis so the assembly line was a five-man thing. These five old guys would start off in one bay of the building and just truck right along and assemble a whole Beaver and when it came out the other end of the building, it was all done, kinda handmade -–kept those guys busy. It was a brand new one. Later on that year, in 1964, the military decided it was going to surplus a bunch of Beavers, down in Davis Monthan Air Force Base in Tucson, so the Fish and Wildlife decided that sounded pretty neat – we could get some of those big round motored jobs and we had a lot of engines for them. We could get parts surplus so that sounded like a pretty cheap operation.

We proceeded to cabbage on to nine of those dudes down there – all they had at that time. Five of them would come to Alaska and four would stay in the States somewhere. A couple would remain on the East Coast, one in Louisiana, and one in Portland. The rest would come to Anchorage and we would convert the things and get the show on the road.

There were very few Beavers up here at the time. They were pretty nice and roomy airplanes. In October, we went down to Tucson and commissioned all those aircraft. We took them out of storage and unpickled them and checked all the pilots out in their airplane and sent them on their way. Some of the troops from up here that went down with us to fly some of the airplanes back and that was good.

We were in the middle – well just completed the conversion of N780, turbine powered Goose – and the thinking was, at the time, that it worked so well and the engines were so reliable, we figured we would probably convert two more Goose's, which would make a total of three up here. Five of the Beavers that were up here – we would convert those to turbine power as well as possibly three of them down in the States – the flyway Beavers. We decided to use the Volpar nacelle and retain all of the turbine Goose accessories, i.e., the propeller, nacelle, exhaust, everything so that the Service would only have to have one spare power package to be able to outfit all of these airplanes.

The nacelle is made in such a way that it will allow the exhaust to go out either side. It would be either a right-hand or a left-hand engine for any of the Goose's or it would fit any of the Beaver's. This made sense because at the time we were able to get those turbine engines for a brother-in-law price out of Garrett Air Research at about $42,000 each. If we had one spare engine, we could outfit all these airplanes, no matter where they were. It would be easy to send this 400-pound package to whoever needed it and it would be cheaper for the Government and it would bring Fish and Wildlife up to almost industry standards.

As you well know, Fish and Wildlife has always been really reserved – just downright cheap and we have always had to make do with all the discards and the military airplanes, and confiscated airplanes. It was a rare occasion when we could buy an airplane new from any of the factories! This left us 8-10 years behind industry and all the violators. They had Super Cubs and we had J-3's and J-5's and J-4's and whatever we could put our hands on. This was a chance to modernize the whole fleet, we struggled with this thought for quite a while. We went to back to deHavilland to see if they had kits to convert the standard Beaver to the PT-6, the Pratt and Whitney engines. They didn't have any more kits. They made some for just a little bit and then they quit that and got into the Twin Otter business.

Our next approach then, was, we heard the Australians were making a duster conversion – duster and sprayer – quite a nice-looking airplane in Australia. We got a hold of those folks and they sent us a lot of data and some movies and pictures and this looked like it could be a useable thing although they were using a 665-horsepower engine, Garrett, with the air scoop down and this didn't work out too well with our plans. We wanted to still have the air scoop up so there would be less foreign object ingestion and less water intake.

We went through the FAA and they concluded that a Third Nation conversion, in other words the airplane was built in Canada, converted in Australia, but couldn't be licensed in the United States. There were just too many nations involved and that kinda threw their paper mill into a cocked hat. The U.S. had direct licensing capabilities with deHavilland or with Australia but not with the third party in the picture.

So, our next step then was to go to Volpar and see if they were interested in building more Goose nacelles for us and attaching the things to a Beaver. At that time, they were considerably interested, because they were in the conversion work. It was their livelihood. They knew the military had 300+ of these Beavers still in their inventory and they wanted to either surplus the Beavers or convert them to turbine power. The military wanted no more resips in their fleet. They wanted everything turbine so this would be a cheap way for the military to obtain turbine powered aircraft. About that time, Pilatus Porter had a bunch of those and they got into this conversion business and converted a bunch of Pilatus Porters for the military, to turbine power. Of course, all the military pilots promptly went out and broke those things because they were a little fragile. Then when they were flown on the bottom end of their flight envelope and arrived at an airport, instead of landing, they managed to bend them all. This soured the military on conversions from then on.

While this was going on, Volpar decided this would be a good opportunity to get into the business and see if they couldn't get some dollars from the military. They went on into the paper mill and

made all the drawings and all the stuff and they decided they could STC this conversion (supplemental type certificate). They went ahead and stressed all the parts and pieces as they built them; made all the drawings, and put the thing on the FAA shaker and went through the "whole schmear," flight tests, and all. The thing would have an STC and be named "Volpar 4000." It would be an STC to the original airplane design which would retain the original airspeed envelope. There would be a minimum of flight tests and it would bring the gross weight of the airplane up to 5,370 pounds, which is the turbine Beaver's gross weight specification. That way, they would not have to run through all the stress analysis on the original airframe to prove this thing – kinda quick and dirty. Volpar was really willing to go on with this thing and, of course, the bottom fell out of the airplane industry and there were no more military conversions, or very few.

It seemed like no one had money for these conversions, including us. We went ahead and footed the bill for this one. We drew up the primary specs of the thing, laid out drawings and sent these drawings to Volpar. Some of the specifications we wanted was to keep the Volpar nacelle, add an interface to the nacelle that would attach to a tubular structure which would go from station zero on the airframe out and get a hold of the Volpar nacelle. It would also retain the float fittings in their original position so there would no problem putting the aircraft on floats or skis. It ended up with a funny bulbous protrusion in front, there right behind the nacelle but we could live with that. We wanted the instrument panel to be kept as low as possible for maximum visibility. We wanted all the forward window frames to be kept quite narrow so that when you looked out the airplane and saw an object, no matter how small it was, you could follow the object clear around to 120 degrees behind you without losing sight of the thing behind a stupid wide door frame or a window frame.

This tubular structure meant that we would lose the front doors and we thought about that a long time. We decided we would make the front side windows wide enough and long enough to serve as emergency exits and not use them except in an emergency and just use the cabin doors. The front windows had to have quick releases on them so they could be gotten rid of in case the windows were needed to get out of. That is why they have a quick release on them and they are just big enough to meet the requirement of an emergency exit. We also wanted, in that tubular structure, two lower windows up there in the cockpit so that if you were on floats and you were trying to dock on the far side and you were in the left front seat, you could see down through that lower window and see the dock. You could tell where it was in relation to your floats and it also made things a little lighter inside so that when you looked down into the bilge of the airplane, then all was not dark. This could be a grim thing on a bright day if you lost a map or a pencil or something down there and you looked down into this dark bilge. It's difficult to see and find what you were looking for and this just provided more light. We really didn't need the space for anything else so we decided to incorporate the windows.

By putting all the switches in the airplane - all in one spot - this would be quite an improvement over airplanes of any kind. Yet today, seldom do you find an airplane with all the electrical switches in one spot. They are normally scattered everywhere. The switches are all in one row and are sequenced in the proper order for starting and running the aircraft. If you know your right hand from your left, you have it made. You start on the left-hand end of the switches. You operate the first switch and wait 'till its function is complete, then go to the next in line, etc., etc. After you have completed actuating all the switches, the engine has been started and the aircraft systems are

all on and ready. The reverse is true when shutting the aircraft down. You start at the right-hand end of the switches and proceed to the left.

As a survey airplane, one of the requirements that we wanted, was to keep all the switches in one location and all the circuit breakers in one location. We figured that most of the people that flew this airplane were pilots incidental to their job. This would be a big plus if everything was in one spot. That way when you had a problem or needed a light or needed something else turned on or off, you knew there was one place to go for those switches. We wanted all the flight controls located in the center console. It turned out that it made quite a nice control quadrant up there. Your right hand could rest on the quadrant, be able to get at the tabs, flaps, landing gear, power levers, condition levers, fuel shutoff – everything was right there under your hand. It made a real nice arrangement as far as simplicity goes.

Another requirement was that we have the idiot lights located in a very slim, flat location just above the glare shield on the instrument panel. They wouldn't be obtrusive and they would have a hood over them so that direct sunlight wouldn't get at them. They would be quite visible for any of the systems that might be going array such as oil pressure, fuel pressure, etc. They would be right there visible in your line of sight. There again, all in one spot. These indicator lights would not have a lot of the normal stuff on them. The writing would tell you what to do or what was happening or what you needed to do if one of them came on. There again, it made the flying of the thing simpler; knowing full well that the turbine Beaver would be new for most of our pilots, but if we could make life easier for them, so much the better.

Another thing that we wanted was a long-range fuel system and as simple a system that could be designed – that took the minimum amount of time and very little housekeeping to keep the system going. Initially, when we first got the airplane, this wasn't the case, so we modified the system to where it was pretty simple, really. We turned the wing selector valves off, filled up all the airplane tanks full of fuel. Once you got in the airplane, there were two wing fuel tank valves to turn on. We turned those on, turned on the fuel transfer pump switch and then didn't have to worry about the fuel system anymore. At about 3-1/2 hours into the flight, one of the idiot lights would come on up on the panel that would say "turn off the fuel transfer pump." At which time, the pilot just reaches over and turns the switch off. No more fiddling with the fuel system at all until another light came on the panel which said, "you have 45 minutes of fuel." This system turned out to be so simple that the FAA could not fathom how an airplane with that many fuel tanks could have such a simple system.

This is how the fuel system worked. The fuel would drain out of the wing tanks and go to the front main. The only way to shut it off from the engine was through the fire wall shutoff. All fuel from the entire airplane goes into that tank before it is used by the engine. The front tank, the main, has an auto fill valve and if it is kept dry with no moisture, which is really hard to do – kinda like a toilet valve – with a small float, only allowing so much fuel to come in and keeps the fuel level almost full but not quite. Once the wing tanks are burned down to about half-full on each tank; there is a switch in each liquidometer that turns on the fuel transfer pump. The wing tanks have to be half-full or less. These two liquidometer switches in series will lock a solenoid on and it turns the fuel transfer pump on. The pump is located back in the camera hatch area. It transfers the fuel from the two rear tanks up into both wing tanks. In the plumbing, there is a flow switch and once

the fuel flow stops, the two rear tanks are empty, and the pump is pumping air. This flow switch turns on the idiot light that says, “turn off the fuel transfer pump.” That’s how that system works. The fuel that was in those two rear and fuselage tanks is now up in the wing tanks, which feed down into the main tank by gravity. As long as gravity doesn’t fail us, the system is pretty fool proof.

Another requirement was that the exhaust not interfere with the camera hatch or the side views. When counting waterfowl, one of the drawbacks of the PT-6 engine that we were considering was the fact that they have two exhausts, one on each side of the engine. The exhaust is just in the wrong place for viewing through to count ducks. That was a major factor in not pursuing the PT-6 conversion. We also wanted the exhaust stack to be long enough and far enough to one side to where it didn’t interfere with the camera hatch, knowing that someone would want a camera back there in the hole and we didn’t want the exhaust impinging upon the camera or person.

We also wanted the floor of the cabin to remain as clean as possible, no garbage on the floor like the old flap selector and stuff that was always on the floor. Knowing that people would have to be checked out in the aircraft that had never flown turbines before, we wanted the dual flight controls so those are in place. There are no brakes on the right side. We would have to put sequence valves in the system to be able to put brakes on the right side, priority valves, shuttle valves, and all this foolishness, which gets quite complicated. Two more fluid reservoirs and two more things to go to pot. We figured the person on the right side would have a handle on enough stuff without necessarily bothering with brakes. The steering wheel was hooked up on the right side and all the engine instruments were quite visible from the right side.

We tried to get by with only one big main battery and one small battery for the ignition but we found that wasn’t enough power, especially in cooler weather for a decent start. So, we put a second big battery in the back with the series parallel solenoid. Knowing that the airplane would be off out in the “bush” a lot and there would be no APU available, we depended upon those batteries to work good for the airplane to get from point to point. When you go to series on your starts, the little battery is no longer in the start circuit at all. It supplies power to the ignition, to the strobe lights and nav lights and that’s all. Once you come out of series and go back to parallel, then that battery could be used for starting. All the batteries are then on line for all the needs.

We wanted the thing to be capable of IFR flying if we had to, so we retained all the IFR flight instruments. We wanted quite a good radio system in it so we had at that time, at least, the finest that we could put in. Collins ADF was the top of the line, airline quality, ADF – one of the best HF’s that we could put in and the VOR’s, good VHF comm. We wanted it reliable, more than anything. We put the power outlets in for the four-place intercom, tracking recorders; tracking antennas, audios, tape recorder power plugs, and mounting brackets.

We had an overabundance of power so we decided to use the bleed-air for cabin heat and windshield defrost. This was a little noisy but with the David-Clark headsets and intercom system, it turned out not to be too bad. It took a lot of tinkering to be able to get the volume of air and to be able to temper the air by using outside air along with the bleed-air heat to keep it to where it wasn’t too hot.

The plane was equipped with Tannis electric heaters on the engine. These little electric units were glued right to the case and power section of the engine and the oil tank. This allowed the system to be plugged into a 110 volt. Otherwise, the engine exhaust plug could be used and one of the 3,000 BTU catalytic heaters that uses white gas. A person could light one of these up and stick it in the exhaust pipe and put the plug in behind it. There is enough heat where it runs through the whole engine and it keeps it plenty warm for starting.

We wanted a simple hydraulic system. This is a demand system. It retains X-number of pounds – about 1,000 pounds. It has a self-contained pump and an accumulator. Whenever the pressure gets down to X-number of pounds (about 800) it kicks back on and pumps the system back up to 1,000 pounds. You can then use the float landing gear or the flaps; put the skis down or up with it. The motor only works when there is a need for that pressure.

We got the wing fuel tanks made - Volpar did - through Tank Services in Burbank, California. They made a form block off the leading edge of the deHavilland wing. They proceeded to build the tank that retained the same airfoil as the original wing. It runs from the wing butt out beyond the lift- strut fitting and it is a separate, structural, fuel tank in that it is strong enough to hold its own fuel. It attaches right to the spar which transmits all its load to the spar through quite a span of the wing which is actually stress-relieving for the wing in turbulence. Rather than concentrating heavier loads in the fuselage which a standard turbine Beaver does, by adding another fuel tank or two in the belly, this makes the flight loads on the wing considerably higher. If you put some of the added weight out into the wing leading edge, this relieves a lot of the bending moment and is stress relieving. This is one of the neat features.

The Beaver is a bugger to fuel because you have to get out there on the wings, pretty high up on amphib-floats and it is inconvenient that way. That gave us about 260 gallons of fuel and on wheels, running at 26 gallons an hour at 140 miles per hour, gives about 10 hours of fuel. The airplane with the propeller that far away, goes quite cleanly through the air. On wheels, indicating 140 miles per hour, full of fuel, and one person aboard, I flew the plane and pulled 290 hp out of the engine and set the air speed right at the bottom of the caution line, maximum level flight, miles per hour at 290 hp. The plane apparently runs through the air quite clean. At cruise power, on wheels, trimmed for level flight, to go beneath a cloud, duck down a little and push the nose over, that plane would go right up to the red line – quite clean, at least on wheels.

We elected not to put the wing tip tanks on. We really didn't need two more hours of fuel. In operating a standard Beaver with the wing tip tanks full and operating on a river or trying to make step turns on a lake, the centrifugal force of that fuel clear out at those wing tips, sometimes, made it feel awful bad. The wings are the strong ones; they have had the service bulletin complied with. The rivets are 5/8 of an inch apart on the bottom side. That is one of the requirements for the tip tanks that the rivets on the spar be 5/8 of an inch maximum spacing for compression loads landing. The top is all right; that is tension, and no problem there.

I flew the first 170+ hours of its life, got most of the bugs out of it at Van Nuys, California. Before I left down there, I even took some of the Chilean Government officials up for a ride – still zinc chromate on the outside – some military paint; pretty rag-tag inside with the old green upholstery. One of the flight test guys from Garrett Air Research in Los Angeles (a test pilot on the SR-71)

went up with me and drove around awhile. He wrote up quite a thing about the stability.

It has a standard turbine Beaver tail on it, except that a standard turbine rudder has got all the counter balance, static balance weight in the overhang up at the top and Volpar found that when they put the thing on the shaker, vibration resonance, etc. – that the standard turbine Beaver tail is pretty borderline. There are frequencies that can be induced into the airframe in certain parts of the flight regime on a standard turbine Beaver that might make the rudder go away so I took half the weight out of the overhang up on top and distributed it then to the two lower dynamic balances – one on each side, down below. That's why those little static balances are where they are. They put this thing back on the shaker and found out that cured any problems that might arise during flight tests due to a vibration frequency.

We put on the strobe system - made it as visible as possible. It originally had 102-inch diameter propeller for the first "umpteen" hours of its life and it was quite long. It made the power lever real sensitive because of all this disc area out in front. The pilot had to be quite careful on how the power lever was moved. It would flat get with the program, going uphill or coming down, there was enough disc area at flight idle, coming downhill that it made the tail feathers vibrate somewhat. It was quite satisfactory, I thought, but if I owned the thing, it would still have the long propeller on it.

Somewhere along the line, "Brother" Herman, (Herman Ruess – Pilot Engineer) got in the airplane, filled it completely full of fuel, and a bunch of people and stuff, taxied off the ramp, got into Lake Hood with about a 25-mph south wind blowing. There were white caps on the lake. Herman taxied downwind to the far end of the lake and in turning around, he put it in flight idle, ground idle, and let the thing weather cock and of course, the propeller got into the float bow wave and sprayed a lot of water around. During the turnaround, with small floats, naturally, with approximately 5,600 pounds gross, Herman scared himself. Instead of making the airplane do what he wanted it to do, like honking the thing in reverse and getting the nose with the floats up and making it turn around and keeping the nose up, he let it dip in the creek and scared himself to death.

Herman then proceeded to tell anyone that would listen that the thing was dangerous – it was just going to flat sink and kill people. Theron Smith got tired of hearing this noise and had the propeller cut down to 96 inches which is still ample steam but it was so much better before.

On wheels with just myself in it and not too much fuel, I made a stop and go landing on the north/south runway at International. I stopped in the middle of the runway, took off and before I got to the north shore of Cook Inlet, I was going through 5-6,000 feet – with a rate of climb of about 4,200 feet a minute. It would flat go uphill, Agnes! At 80 mph, it was shaking, but it was really getting it on!!

We had a lot of capability before with the long prop. It would clear these big nose wheels on the amphib floats with a couple inches to spare even if you came off the beach at 90-degree angle and left the nose wheels cocked as they retracted. Their closest proximity to the propeller, still had a 2–3-inch space, it wasn't all that close and the wheels go right on by. It was plenty safe. It needs a bigger set of floats. It needs a set of about 6,000's on it. If handled correctly, it works all right.

During part of its flight test when it was put on floats the first time, I flew the thing in a descending left-hand turn at 80 mph air speed. In making my approach, I ended up with quite a lot of right aileron and a little bit of right rudder to keep it from increasing into the left-hand turn. From that, we decided that we had better put the ventral fin on and that's why and how the ventral fin got put on. The standard turbine Beaver has a little different arrangement back there but it still has one or two smaller ventral fins on it. The airplane is lacking a little in directional stability when making a slow left hand turn on approach, and that tells you why the ventral fin is on. Otherwise, we would have left it off, as it is sort of a hazard back there.

A little more about the fuel system: Initially, we had two electric fuel pumps underneath the pilot's feet to supply fuel pressure to the fuel control. One is the primary and the second is the back up. The engine actually does not need any fuel pump. It will draw fuel 90 inches below the engine with the fuel pump that's in the fuel control but it is a little hard on that fuel pump.

We used the two electric pumps initially but they were not long-lived things. About every 400 hours, they would die. We kept one of them in the system as a backup and used an engine-driven pump, (a PT-6 engine pump) that is mounted on the accessory section of the engine as a primary. If it died, then the electric backup was available, and if it died, you could still get from "A to B." The fuel pressure warning light would be on but it would still play. All in all, it was pretty redundant.

N754 was not one of the original nine Beavers that we picked up in Tucson. This was the one that Ray Wolford (Assistant Regional Director stationed in Portland, Oregon) got from the Army, surplus, in Portland and he flew the plane up to Anchorage and it sat for quite a while. It had a little less total time on it than the rest of the Beavers but they had good engines on them. Rather than decommission one of the other Beavers, the flyable ones that we were using, we elected to take N754 down to Volpar and have the conversion done down there.

The last time I was down at Volpar, I think they had put all the drawings that they had on the airframe in a trunk and had planned on keeping them. I don't know if they still have the plans or not. They still had the jig to make the tubular forward section of the fuselage. The last I heard they still have that stuff. The requirement is such that if you need another, someone may have to contact Volpar and see what they have.

The Beaver was operated a couple of years in the wintertime on skis and it worked quite well. It had the fairly light tail wheel assembly on it, initially. Herman managed to pull the tail wheel unit off it once and Don Ross (Division of Refuges) tore it off once in the Arctic NWR. We have since put the stronger bulkhead on the thing. If it is ever put back on wheels or wheel/skis, it does have the stronger fittings in the back. I only flew it once on skis – had very little experience that way; however, it did work quite well.

The thing is torque sensitive on skis and on wheels. The propeller was still long then. You had to feed the power to it slow and easy until it got headed down the runway in the right direction then you could get into it. I found one thing that was surprising and that was its torque in reverse. It wants to go to the left also in reverse. I found this out at Mekoryuk. I landed over there one winter on wheels on the runway. The wind always blows from the north and they put the runway in east-

west. A bunch of snowdrifts were across the runway and I tried to land and stop between these drifts. When I cleared a drift and went to plop it in and jammed it in reverse and get stopped before I ran into the next drift, well, I did, but it also wanted to make a 90-degree left turn and ended up cross ways of the runway.

This upset me somewhat and I thought about this for a long time. After flying it a bit later, I found that if you are really into it in reverse with at least the long propeller, it wants to make a left-hand turn. The slower you get and the more reverse you have, the more it wants to go to the left. If you ever have the occasion to get it into reverse and it starts to go to the left, then pull it back out part way so you still have directional control over the thing. The slower you go, the less reverse you can use to keep it straight.

Another thing we had a problem with was the brake master cylinders. There are apparently two different diameters of brake master cylinders for the Beaver. In order to have the best braking that you can obtain you need the smaller diameter brake master cylinders that go alongside the brake pedals on the rudder. It gives you a little more PSI on the wheel cylinders. It is also quite borderline in brake fluid capacity with the smaller cylinders. You have to keep the flexible lines in the system to a minimum in length and make sure that all the air is out of the system. Otherwise, there is not quite enough capacity for the small diameter cylinders to handle the whole thing as well as you would like. You know about the front landing gears and shimming and how to adjust those.

When Herman made his rough landing in the wintertime on the snow, he buggered up the left-hand landing gear. We had to replace that. He bent it because he hit the snow so hard. Part of the landing gear fittings on the fuselage were not replaced so now it takes a specific left-hand landing gear for that airplane for alignment. If you ever have the occasion to put the landing gear back on or to change landing gears, the left one takes some special care. I can't remember what the difference is, but there is a difference between the standard and that one that is on there.

In the design, we requested that the front seats be moved forward – forward from the originals, either 7 or 9 inches so that when you turned your head, you weren't looking right into the wing butt. You're out ahead of it always and it made for a better visibility. So, they are a little further forward than the standard Beaver.

It would be far better if it had bigger floats. They made some big floats and I looked at a set they used to run on the twin Cessna - T-50's - Bamboo Bombers. Northern Consolidated used to run them. We had a set of those available to us. The spreader bars were about 18 inches wider than those on the Beaver and it would have taken a lot of input stress analysis to get them approved. They were 6400 floats – which would have made a floatplane out of that hummer! It would have just sat right up there on step and made a safer thing in big water.

The windshields are Beech 18's. We tried to have the thing made so that they were ambidextrous but that didn't take place. If the windshields need replacing, they are Beech 18's.

This is about all I can remember. I hope this gives you a good idea of the background of the plane, the evolution, the thinking at the time, what we did, why we did it, and how come some things are the way they are. It is an airplane that I would personally just love to have. If you want to duplicate

my version of the history of N754, please be my guest.

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333-0092

History of N754 – Addition

This document is written as a continued history of N754 as originally detailed in a tape recording by Jarrett (Jerry) Lawhorn and transcribed by Mary E. Smith in the 1980s. Jerry did a wonderful job of describing the early life of N754, the why and how it came into being. James (Jim) G. King served as Project Leader of the Waterfowl Investigations Project of the U.S. Fish and Wildlife Service (USFWS), based in Juneau, Alaska, from 1964-1984. Jim described his early history with N754 in his book *Attending Alaska's Birds – A Wildlife Pilot's Story*, pages 95-100. As Jim described, N754 was a USFWS aircraft. When all U.S. Department of the Interior aircraft operations in Alaska were combined into the newly created Office of Aircraft Services (OAS) in 1973, N754 (being uncertificated) was not transferred. It was neglected and was almost reassigned by USFWS to the 'lower 48' before being resurrected by OAS and has remained in Alaska.

1970s to 1998

Jim (with Jim Bartonek) first used N754 in 1972 to help delineate the boundaries of the then proposed (now enacted) new additions to the National Wildlife Refuge System in Alaska. Jerry Lawhorn went along, in the back seat, on that about an 80-hour trip around Alaska noting how he could improve the operation of N754, especially the fuel system for pilots busy with other duties not involved with flying the aircraft. After Jerry improved and finished some changes, Jim first used N754 to fly the Alaska/Yukon portion of the annual continental Waterfowl Population and Habitat Survey in 1977. This annual survey has been flown in Alaska using various aircraft types since 1957 (1955 in other parts of Canada and the central United States). Bruce Conant joined the Waterfowl Project in early 1978 and flew with Jim on the 1978 survey. Because N754 was starting to show some wear-and-tear from use in other projects and because Bruce had just transferred from the 'lower 48' continental survey program, where aircraft were assigned to individual projects, we had N754 officially assigned to the Waterfowl Project in Juneau in early 1979, with 1300+ hours on it since turbine conversion. John (Jack) I. Hodges joined the Waterfowl Project in 1984, after Jim's retirement in 1983. This document describes most of the changes, (mostly in chronological order) that were made to N754 after Jerry's retirement in 1984.

As Jerry describes on page 11, N754 was acquired from Army surplus in Portland, Oregon. If one 'Googles' N754, you will learn that the N754 airframe was an original, piston powered deHavilland beaver, serial number 1207, delivered June 19, 1958, as FAEC-29, to the Cuban Air Force. When converted to turbine power, it had 5500+ hours on the airframe. The only turbine engine N754 has ever had is an Air Research (Garrett) TPE-331-2ua-203D, serial number P97003, rated at 715 HP (Takeoff and Max Continuous).

N754 was originally painted with the then orange and white design of USFWS. This presented the optical illusion of a drooping long nose nacelle (App. III). So, when N754 was due for a new paint job, Jim and Bruce came up with a series of stripes design that blended the nose in with the rest of the airframe (App. IV). Since N754 was now cared for by the Office of Aircraft Services (OAS), it was painted with their brown and white colors.

N754 was flown on amphibious floats during the 1977 waterfowl survey and kept permanently on amphibs since 1979. The EDO Bristol Aircraft (Western) Limited, 4580 amphib floats, built in Winnipeg Canada were designed for a standard, piston powered, deHavilland beaver, but modified with large front (Piper super cub) tires with custom forks designed and welded by Jerry for use on FWS beavers in Alaska. These floats were designed for the lower weights of standard beavers and thus, as Jerry described, they made N754 quite under floated at the higher weights that we flew N754. Pilots needed to be very careful on the water, at high weights, especially when backing up with the reverse setting on the propeller. The sterns of the floats could dive under water, endangering the stability of the aircraft. In Juneau, we learned

from a local air service of an extension (about 11 inches) on the sterns of the floats. We had that modification installed by Seaflight Industries Inc. in Richmond, British Columbia in 1992 and had a plug inserted in the middle of the floats to make that part equal to a standard ED 4930 float, the ones used on deHavilland Turbo beavers (App. V). It helped some, but not enough because of our higher gross weights and pilots had to be careful on takeoffs where the extended sterns of the floats could dig into the water (later we had that extension removed).

We really liked the rugged EDO floats, especially with the large front tires when operating on soft ground. They did require special care by pilots and mechanics. The front wheels were sensitive to shimming on paved runways and required careful adjustment. The front gear was retracted with a pulley/braided cable system, which sustained extra stress moving the larger tires against the slip stream after takeoff. We tried to keep the airspeed below 80 mph until the front wheels were on top of the float. The front cable broke once, so we carried extra cables in the front float compartment. Also, the main gear brakes are sensitive. Having to have one replaced in Fort Nelson, Canada once (with all the paperwork to get the parts through Canadian Customs), since then we carried an extra set in the airplane. This came in handy when Bruce had to have a brake replaced in remote Cambridge Bay, Nunavut, Canada.

Jerry describes the addition of Tannis electric heaters that were glued to the engine case, power section of the engine and the oil tank. We used 110-volt shore power to preheat the aircraft. Because of concern in using the BTU catalytic heaters, described by Jerry, when away from shore power, we had a system installed that we could hook up to a small, portable electric generator that we carried in the aircraft. We always tried to preheat the aircraft in temperatures below 40 degrees F to ease the strain on the batteries and to aid in getting a good, positive start.

We learned about a modification (Baron) that was installed on some standard beaver wings in Anchorage. It reduced the stall speed with a leading wing edge modification and increased aileron response with flow energizers. We had that evaluated and, because N754 has fuel tanks that extend into the leading wing edge, we elected to only have the flow energizers installed, which worked well.

Refurbishment at Viking Air, 1998-1999

In the late 1990's, because of the total hours on the airframe and some major panel/avionics changes we wanted to make, Bruce made a case to have N754 completely refurbished. Fortunately, because of the way OAS tracked aircraft maintenance funds and specifically replacement funds (by aircraft type, and N754 being a one-of-a-kind), Bruce was able to make a strong case that there were sufficient funds available to have a complete refurbishment of N754 accomplished.

In order to find a good company to bid on this substantial work, in 1997 Bruce took N754 to the 50th deHavilland beaver celebration in Victoria, B.C. Canada. It was well attended by many companies involved with modifying, maintaining and operating beavers from across Canada and the United States. Eventually and fortunately for us, Viking, Ltd., the official deHavilland beaver representative company based in Victoria, made a good bid to accomplish this substantial work, thanks to Dave Curtis (president) and Ted Gerow (head of maintenance) who both took a great interest in our project. An additional benefit was the opportunity Bruce had to go for a ride in a standard, piston powered beaver there on a set EDO 4580 straight floats, specially widened by Sealand Aviation, Ltd. In Campbell River, B.C. Bruce was impressed with how much the widened floats increased the performance of a standard beaver on the water. A nice feature is that, once on the step, the floats perform just like a regular set of EDO 4580 floats.

Of great benefit in securing a reasonable, quality bid for this work was the fact that N754 was never certificated by the Federal Aviation Administration (FAA) of the United States. It was always operated as a U.S. Government Public Use Aircraft with only a U.S. Registration Certificate (App. XV). Therefore, the

paperwork and documentation for the work and modifications accomplished during refurbishment was simplified tremendously.

Bruce delivered N754 to Viking in August 1998 to start the work. The complete refurbishment of N754 was completed at the end of May 1999. During this major project, managed by Alf Aanensen in contracting at OAS in Anchorage, many trips were made to Viking by John Pribbenow, head of maintenance at OAS in Anchorage, as well as Bruce and Jack. The following major work as well as modifications were accomplished by Viking and Sealand Aviation, as well as many smaller items, in close cooperation with OAS and FWS Juneau.

N754 was stripped down to bare metal and completely disassembled for inspection (App. X). All electrical wiring and hydraulic hoses were replaced with new. Jack and Bruce used *Panel Planner* software (App. VI) to redesign N754's panel to most importantly incorporate the 2 Aero/PC minicomputers, tied to individual Garman GNS 250XL GPS units, for biological data capture with GPS locations and for precise navigation with moving U.S. Geological Survey 1:250,000 scale maps (computer software custom designed and programed by Jack). The panel was not designed with a formal IFR layout, since all our operations were VFR. The final panel, in action, is depicted in Appendix VII.

Because N754 was operated at substantially higher gross weights, when on amphib floats, the 20,000-hour lift struts were installed on it before refurbishment. Viking has their own higher gross weight (6,000 pound) DHC -2 MK III Turbo Beaver certificated aircraft. So, during refurbishment of N754, we had most of their modifications added to N754, notably the bigger/stronger lower strut attachment fittings to the fuselage ('pork chops') and the under-belly strut strap (Apps. XXI and XXII).

Because of the need for better directional control (as described by Jerry), the ventral tail fin was replaced with finlets outboard on the horizontal stabilizer. It worked out quite well during the weight and balance exercise since, on amphib's, N754 originally was a little nose heavy. Also, Viking's horizontal stabilizer end plates were installed on N754. The original beaver belly tank caps were replaced with standard turbine fuel caps. Because the top of the wing can be very slippery when wet or frosty during wing tank refueling, we had non-skid tread installed on top of the wing from fuselage to wing tank caps.

We had Viking install 4-point shoulder harnesses to all 4 seats, softer (NASA) foam seat cushions in the front 2 seats, two attachment positions for the 2 back seats, one further aft to better provide forward visibility through the new rear door bubble windows and noise cancelling Bose headsets for all 4 seat positions.

Bruce remembered a challenging incident when one of the big Nicad batteries overheated (as noted on cockpit temperature gages) when Jim and Bruce were flying. At that time, one of the 2 bigger batteries was installed inside in the rear of the aircraft (along with the one smaller one) and the other big one in the standard beaver battery compartment accessed from the outside back fuselage door. We landed in the Yukon River and (luckily because of easy access) removed the outside big battery and cooled it down in the river. Jerry had warned us that, when Nicad's overheat, they can sometimes 'volcano' and melt out the bottom of the aircraft. It turned out that the batteries installed in N754 at the time were past expiration for inspection. The result was during refurbishment, Bruce had another outside accessed battery compartment installed, aft of the original, for the second large battery.

Remembering my flight in the standard beaver on the widened (fat) floats at the 50th beaver celebration, Bruce approached Bill Alder (president of Sealand) to see if they might be interested in widening our amphib floats. He was not too interested since they would need to certificate them and there would not be much of a market for them. When I said they would not need to be certificated, since they would be installed on a Public Use aircraft, he became quite interested. So, we had them widen our already

modified amphib's to EDO/Bristol 5470 ('fat') amphibious floats (Apps. XXIII and XXIV). This much improved the operation of N754 on the water. Upon completion of all the work, Bruce test flew N754 at Viking and flew it back to Alaska where he joined and finished the Alaska annual waterfowl survey.

We had N754 repainted with the same new stripe design, but with the original FWS colors of orange, black and white (App. VIII). The Alaska Aviation Museum in Anchorage has a Grumman Goose, obtained from OAS, painted in the original FWS colors, which is where we obtained the details on the same paint. We also checked FAA regulations and found that we could have the registration number, N754 painted on the tail. Non-glare flat black paint was applied to the top of the nose/engine nacelle and non-skid paint was put on the float decks.

1999-2011

Jack worked out a nice, simple easy to use weight and balance computer program for N754 (App. XVIII). Because we sometimes flew N754, starting out, up to the gross weight of 6850 pounds, and a long-standing concern about N754 being uncertificated, Bruce eventually located Tom Nixon (formally with Volpar) at his home in California. I told him that we were trying to find some original drawings of N754 and specifically for the wing tanks (Volpar had gone out of business and the person who bought up all their paperwork told me he might eventually look for them, but it didn't look too promising). There was a pause on the phone and he then said that he just might have them in his garage. He did find them and sent them to us. So, OAS arranged to have a duplicate wing built by Viking and tested for structural integrity. Jack and Bruce went down for the test as well as Rudy Berus, Alaska Regional Director, and John Pribbenow of OAS. I knew the metal smith who built the duplicate wing and he told me before the test that it would not break. Viking built a jig to anchor the wing and Ted Gerow supervised the test. They used a crane to lift the tip of the wing by about a foot with the equivalent of 28,000 pounds. The top of the wing only showed a wrinkle and never did break. Viking's structural engineer, who also watched the test, told Jack and I that we would never have to worry about the wing breaking at the weights we flew N754.

Tom Nixon drove up to meet me at Santa Paula, CA on one of my trips back from Mexico. Looking at N754, he remarked about how wonderful the metal work was back when N754 was created. He also related the interesting story of the vertical stabilizer on N754. During construction of N754, Volpar asked deHavilland for plans for their Turbo Beaver tail. They declined to provide them. So Volpar found a wrecked Turbo Beaver somewhere and just copied the tail, which is what is on N754.

Since 1985, N754 was operated with an over gross waiver for only pilots Bruce Conant and Jack Hodges. An added benefit of having Rudy watch the wing test came when the new head of OAS in Boise in 2005 would no longer sign the waiver. I think that, because Rudy had personally watched the test, he convinced his boss to let him sign the over gross waiver for our continued operation.

The N754 fuel system was described well by Jerry (pgs. 6,7 and 11 and App. XIX). It had generally worked well over the years, but we occasionally had trouble with the autofill valve in the front main belly tank. Therefore, we had David Nelson and team at International Aeroproducts, Ltd. In Courtenay, B.C. build a strong front belly tank replacement which could withstand the added pressure of an unmetered, direct flow from the wing tanks. To accommodate this modification, Jack figured out how to have one way flow valves installed at the outboard end of the wing tanks, thus eliminating the need to vent the front main belly tank under the wing where the two rear belly tanks are vented (App. XX).

Over the years, we have worked with Mickey Selhay, long time Garrett engine representative for Alaska (App. XI). He was originally involved with the FWS Alaska Aircraft Division conversions of both the Garrett powered Grumman Goose and N754. Shortly after the refurbishment of N754, he found us a Hartzell 102-

inch diameter ag propeller which we had installed on N754. It restored the higher performance that Jerry mentioned in his history.

On one of Bruce's many stops at Viking in Victoria, on the way back from flying waterfowl surveys in Mexico, he had the chance to fly the Viking Turbo beaver on amphib's with Arnold Parlee, their test pilot. It is a nice flying airplane, but I noticed the little bit slower response to the application of power compared to the Garrett in N754. I also took him up in N754 and showed him how we flew waterfowl surveys. He remarked how he could see how we had an airplane that was well designed for our work. He also mentioned, on the ground, that they felt that Viking's Turbo beaver was significantly superior to the standard, piston powered deHavilland beaver and that our Garrett powered beaver exhibited the same difference from their Turbo beaver, a great compliment coming from him.

N754 is a great wildlife survey aircraft (App. XIV), with great forward/side visibility (App. XII) unmatched, to this day, for overall operations in remote (bush) northern areas from Alaska, across Canada and into nearby Siberia. In his book *Above and Beyond – Life of an Alaskan Aviator and Voyager*, Jack Hodges describes his historic survey flights into Russia in the early 1990's as well as his development of custom computer software for use in conducting bird surveys. N754's only debatable shortcoming has been its lack of official FAA certification. When retired from service in 2011 it had over 19,000 hours of total airframe time and over 13,500 hours since conversion to turbine power. Since assignment to FWS in Juneau, mainly only 4 well trained Migratory Bird Management pilots (Jim King, Bruce Conant, Jack Hodges and Ed Mallek) have flown it (almost all of N754's turbine time, Bruce over half, App. XIII). Their accumulated hours of accident/incident Pilot in Command time are a testimony to the vision of the FWS Alaska Aircraft Division and especially Jerry Lawhorn. Other FWS pilots (Don Ross, Ray Tremblay, Paul Anderson) and OAS pilots have flown it a little over the years.

N754 was flown far and wide for many years, over some very challenging country, for the benefit of better management of continental waterfowl resources. It was given tender loving care by the pilots who flew it and the mechanics who maintained it. When it was prematurely retired from service in 2011, it was a fine-tuned, excellent, versatile, specialized, unmatched bird survey aircraft. My only regret was not succeeding in having more of them built.

Bruce Conant

6/15/2018

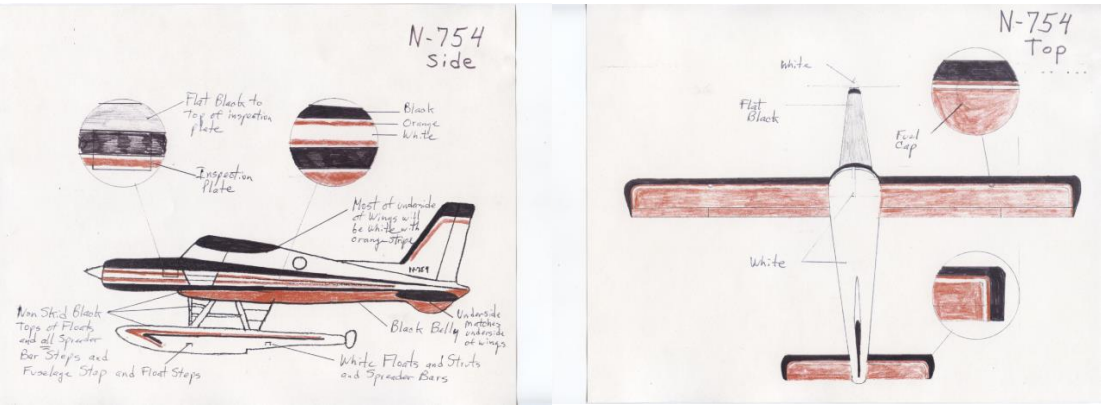
Appendices:

Appendix I. Jerry Lawhorn – Designer/First Test Pilot:

Appendix II. Frank Nixon – President of Volpar:

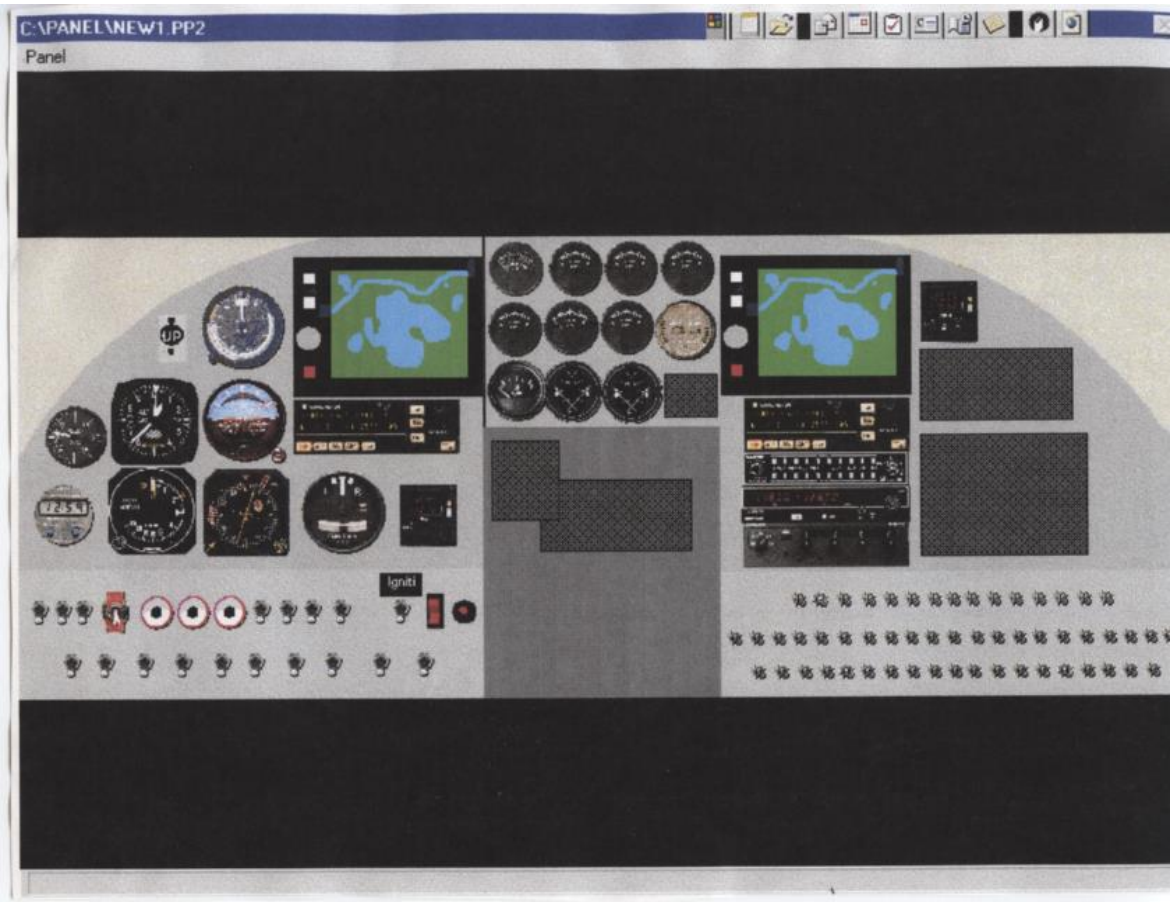
Appendix III. Original Paint Scheme:

Appendix IV. New Paint Scheme:



Appendix V. Float Plates:

Appendix VI. Panel Planner:

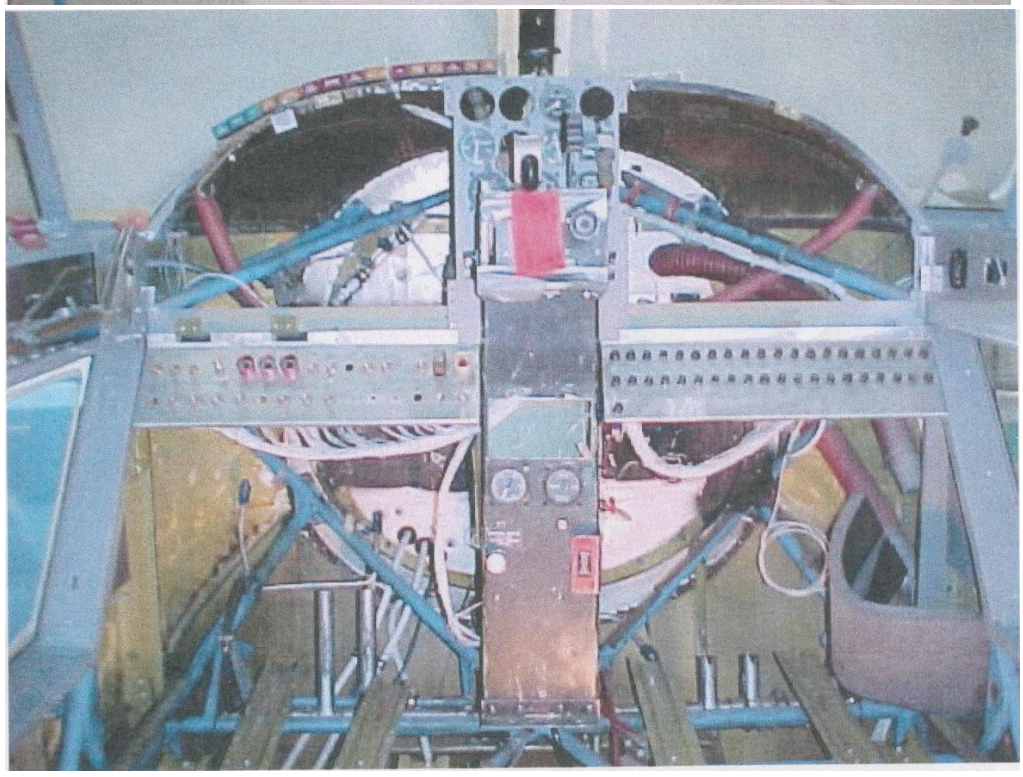


Appendix VII. New Panel in Action:

Appendix VIII. New Paint with Viking Refurbishment Crew:

Appendix IX. Volpar Name Plate:

Appendix X. Refurbishment Photos:



Appendix XI. Mickey Selhay – Alaska Garrett Representative:

Appendix XII. Superb Visibility:

Appendix XIII. Main Migratory Bird Management Pilots of N754:

Jim King

Bruce Conant

Jack Hodges

Ed Mallek

Appendix XIV.

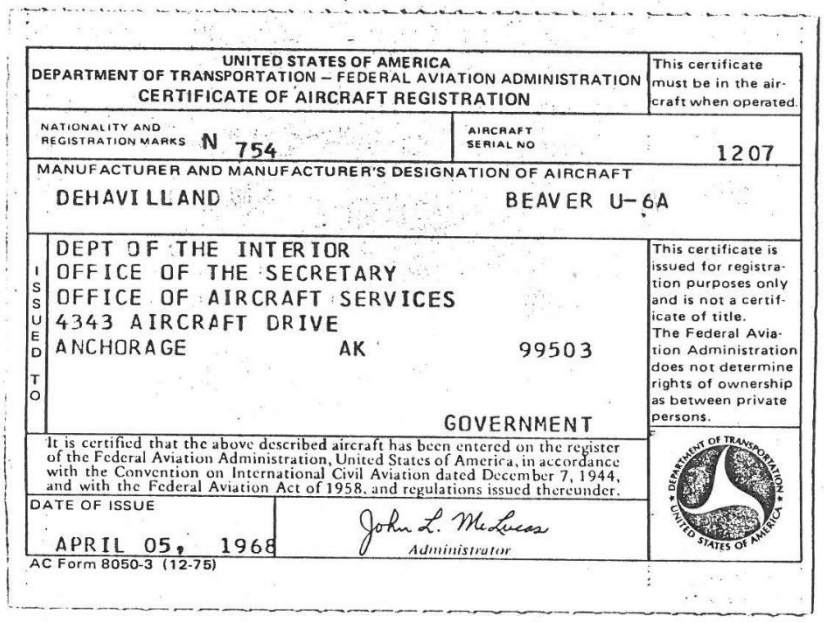
N-754 ATTRIBUTES

Rugged, time tested, high wing, deHavilland Beaver airframe
Highly modified, strengthened for high gross weight operations
Turbine powered with Garrett TPE-331-2
Rapid response to application of power (direct drive propeller)
Good climb performance
Reversible, agricultural style propeller
(very useful for catching geese and swans for banding)
Four place, side by side seating
Long range, wing fuel tanks which reduces stress on airframe in turbulence
Simple to operate and very safe fuel system
Accurate, simple fuel consumed enumerator
7 hours endurance at low level at survey power settings on amphibious floats
Edo/Bristol 5470 (fat)amphibious floats with 4 internal storage compartments
Rugged landing gear (large single main tires and big front tires)
Good soft field capability
Superior visibility forward and to the side (not blurred by exhaust fumes)
Front seats forward of the wings for unrestricted, better view in turns
Simple to operate
Controls for flaps, gear, power, RPM and trim tabs within hand span
Easy to maintain in field operations
Relatively low cost of operation
Relatively low stall speed
Relatively high cruise for a float plane
Stable in flight
Light and easy on the controls, very responsive
Outboard mounted wing flow energizers (for rapid aileron response)
Relatively low noise level (inside and from the ground when in the air)
Hauls two canoes easily
Intercom equipped at all four seats
Installed, acoustic noise canceling headsets at all four seats
Annunciator panel with all warning lights in easy view, on top of panel
All circuit breakers within easy reach on copilot lower panel
Simple, well organized, easy to read instrumentation
4 seats have *NASA* style foam for comfort on long range surveys
5 point shoulder harness restraints at all 4 seat positions
Camera hatch with internal power supply for large format aerial camera

Avionics
- RMI with dual GPS needles
- 2 GPS/VHF Comm's
- 1 GPS (pilot)capable of down loading to laptop computer (rear seat)
- 1 GPS (copilot)capable of down loading to laptop computer (rear seat)
- 1 HF Comm
- 1 ADF
- Radar altimeter
- 2 Panel mounted, windows based computers
  - With custom data recording capability by GPS position
  - With multi scale moving, seamless maps
- Panel mounted Telonics scanner/receiver with reception through headsets
- Satellite tracking system which downloads to central location
- Satellite phone through headsets and portable

Independent power supplies for
- Charging Telonics scanner/receiver
- Charging for laptop computers
- 12 volt source for 120 volt, low amperage portable accessories

Appendix XV.



UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION – FEDERAL AVIATION ADMINISTRATION
CERTIFICATE OF AIRCRAFT REGISTRATION

This certificate must be in the aircraft when operated.

NATIONALITY AND REGISTRATION MARKS: N 754

AIRCRAFT SERIAL NO: 1207

MANUFACTURER AND MANUFACTURER'S DESIGNATION OF AIRCRAFT
DEHAVILLAND BEAVER U-6A

ISSUED TO:
DEPT OF THE INTERIOR
OFFICE OF THE SECRETARY
OFFICE OF AIRCRAFT SERVICES
4343 AIRCRAFT DRIVE
ANCHORAGE AK 99503

GOVERNMENT

This certificate is issued for registration purposes only and is not a certificate of title. The Federal Aviation Administration does not determine rights of ownership as between private persons.

It is certified that the above described aircraft has been entered on the register of the Federal Aviation Administration, United States of America, in accordance with the Convention on International Civil Aviation dated December 7, 1944, and with the Federal Aviation Act of 1958, and regulations issued thereunder.

DATE OF ISSUE
APRIL 05, 1968

John L. McLucas
Administrator

AC Form 8050-3 (12-75)

Appendix XVI. Start/Shutdown Procedures:

N-754 START/SHUTDOWN PROCEDURES

NORMAL BATTERY START (Note: Instructions for APU start in Flight Manual)

Preheat the engine if engine temperature is below 40 degrees F

Ensure the intake plug is removed and prop is in the **non** feathered (on the start locks) position

Ensure sufficient oil in tank (Note: it may be down some if it has not been started recently)

Prop should spin free (Note: **only** rotate in the direction of the arrows on the prop or damage can occur to the starter/generator brushes)

Doors closed and parking brake set and/or chocks on main wheels

Ensure all switches (except strobe) on the pilot knee panel are in the down or off position

Check circuit breaker panel and ensure at least one of the electric boost pump switches is in (CB #3 or #31) (Note: alternate use of the electric boost pumps to periodically exercise them)

Check the power lever is in the ground start position and the prop condition lever is full aft

Check each battery individually for sufficient voltage (25+ volts for #1 and #2, 24+ volts for #3)

Turn on all 3 batteries and check all warning lights on the annunciator panel on top of the instrument panel and battery temp warning lights on the pedestal

Starting from left to right:

Run/Stop switch to run
(Note: it has to be pulled out over notch/you should hear the electric boost pump activate)

Push start button

When green ignition light at left end of annunciator panel lights (or 10% RPM) push series button
(Note**:** do **not** push series for an APU or a parallel battery start)

Hold manual prime down and watch EGT rise to 400 degrees (300 when hot)

Release prime button momentarily to ensure you have control of the EGT

Push prime button down again and bring EGT up to 550-600 degrees
(Note: usually not needed when hot)

Milk prime button on and off to hold EGT there till start complete

Watch for any unusual rate of EGT increase
If there is an unusual rate of increase then shut down
(Note: maximum start EGT allowed is 788 degrees - stay below 700 degrees)

After secondary nozzles kick in (at 50% on speed switch) the series light on annunciator panel goes out and you can release the prime button

Engine should stabilize at 65% RPM with stable EGT and oil pressure **(if not, shut down)**

Increase the condition lever to 70% RPM and turn on the generator switch
(Note: watch for slight rise in EGT and amp gage pegged to top)

After amp gage drops below 80 amps - hydraulic pump, avionics master and radio master switches can be turned on
(Note: engine can be shut down after amp gage stabilizes at or below 20 amps)

TAXI/TAKE OFF/FLIGHT/LANDING/TAXI (if desired)

SHUTDOWN

If you have **not** executed a takeoff, advance condition lever to 100% RPM momentarily (sets the EPA kit) then down to 65% (all the way aft)

Turn switches off from right to left

Radio and avionics master - off

Hydraulic pump - off

Generator - off

Run/Stop switch to off (Note: it has to be pulled out over notch)

Watch engine spool down

at 50% RPM pull power lever all the way aft into reverse to put the prop on the start locks

Batteries #3 and #2 - off

Watch engine spool down to 10% RPM

Battery #1 - turn off

Appendix XVII. Cockpit Checklists:

START
- **F** - Fueled/Caps - On/Fuel Counter - Set/Electric Boost Pump - On
- **L** - Quadrant Levers - Correct Position
- **O** - Oil Level - Checked
- **P** - Intake Plug - Behind Seat

TAKE OFF / CRUISE / LANDING
- **G** - Wing Fuel Levers - Forward
- **U** - Gear - Proper Position/Up on Water/Down on Land
- **M** - Mixture - Rich (Reciprocating Engines)
- **P** - Propeller/Condition Lever - Check Position
- **C** - Carb Heat - On (Reciprocating Engines)
- **F** - Flap Position - Correct
- **W** - Wing Lights - Flashing for Traffic/Poor Visibility

AFTER TAKE OFF
- Boost Pump - Off
- Wing Lights - Off
- Satellite Phone - On
- Computers - On

BEFORE LANDING
- Boost Pump - On
- Wing Lights - On
- Satellite Phone - Off
- Computers - Off

AFTER SHUT DOWN
- Switches - Off
- Satellite Phone - Off
- Telonics - Off
- Parking Brake - Set
- Controls - Locked
- Windows - Locked
- Doors - Locked
- Aircraft - Secured

N-754 Emergency Procedures

Identify Landing Point
Gear Up on Water or Rough Terrain
Trim for 90 mph

Engine Out:
- Wing Tank Selectors - Forward
- Fuel Transfer Switch - On
- Electric Aux Fuel Pumps - On
- Ignition Override - On
- Primer button - Depress
- Quadrant Levers - Check Position
- Propeller - Feather if Needed

Fire in Engine Nacelle
- Feather handle - Pull
- Run/Stop Switch - Down to Stop
- Fire Wall Shut Off - Pull to Off
- Fire Extinguisher - Actuate

ELT - Turn On
Emergency Tracking Switch - Turn On
Mayday Call on Current Radio Frequency
Mayday Call on 121.5

Prepare for Rough Landing - All Crew and Passengers
- Seat Belt - Tight
- Helmet Visor - Pull Down
- Unlock Front Windows
- Passengers - Brace and Use Available Padding

Just Before Touchdown
- Flaps - as Desired
- Engine Switch - Down to Off
- Electric - Off
- Use Rudders with Minimum Flight Speed

CIRCUIT BREAKER CHART FOR N754 JUNE 1, 1999

CB	DESCRIPTION	CB	DESCRIPTION	CB	DESCRIPTION	CB	DESCRIPTION
1	Aux Power	16	Buss Tie-Main to Gen	31	#2 Fuel Boost Pump	46	Avionics Master
2	Gen.Field	17	Fuel Transfer System	32	Oil Pressure Guage	47	Spare
3	#1 Fuel Pump	18	Inlet Anti-ice	33	Fuel Pressure Gauge	48	GPS 1
4	Inverter (a/c pwr)	19	Pitot Heater	34	Torque Pressure Gauge	49	GPS 2
5	Gen. Reset	20	Oil Temp.Chip Detector	35	Fuel Valve	50	Audio Phone AMP
6	A/C Failure light	21	Fire Warning & Extinguisher	36	Ignition	51	Audio Spkr AMP
7	Voltmeter 1 & 2	22	Beta & N.T.S. Light	37	Start control	52	ADF
8	Prime	23	Prop Unfeather	38	Speed Switch & Start Hold	53	Bose Headsets
9	Fuel flow & Totalizer	24	Landing Gear Position	39	Nav. Lights	54	R.M.I.
10	Fuel Filter	25	Battery Temp. Monitor	40	Cabin Heat	55	Rad Alt
11	Feul Qty-Main Tank	26	Fuel & Oil Pressure Lights	41	Instrument Lights	56	Xpdr
12	45 min. Fuel Warning	27	Left Landing Light	42	Turn & Bank	57	Encoder
13	Fuel Qty 1	28	Right Landing Light	43	Attitude Horizon Gyro	58	H.F.
14	Fuel Qty-Wing Tanks	29	Dome Light	44	Pulse Light Power	59	Telonics
15	Hydraulic Pump	30	Strobe Lights	45	Pulse Light Control	60	12 Volt Converter

Appendix XVIII. Sample Weight/Balance Calculation:

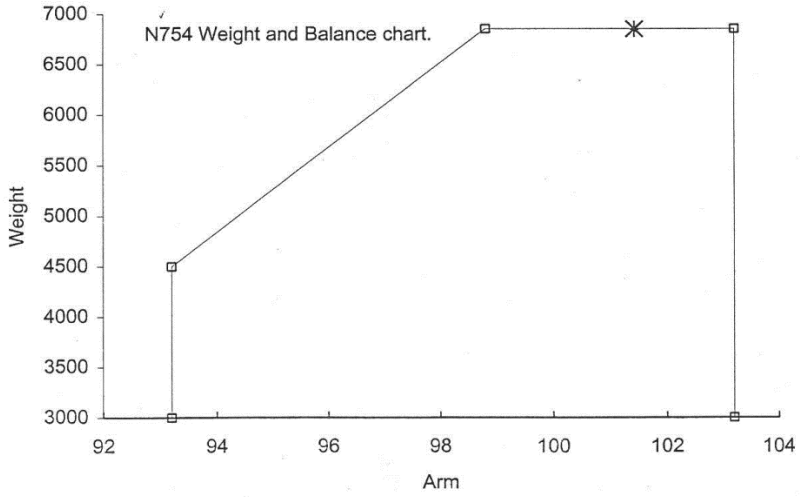
Weight and Balance for N754
(All weights in lbs and arms in inches)

Situation:
Long Range/Three Person Survey
at Take Off

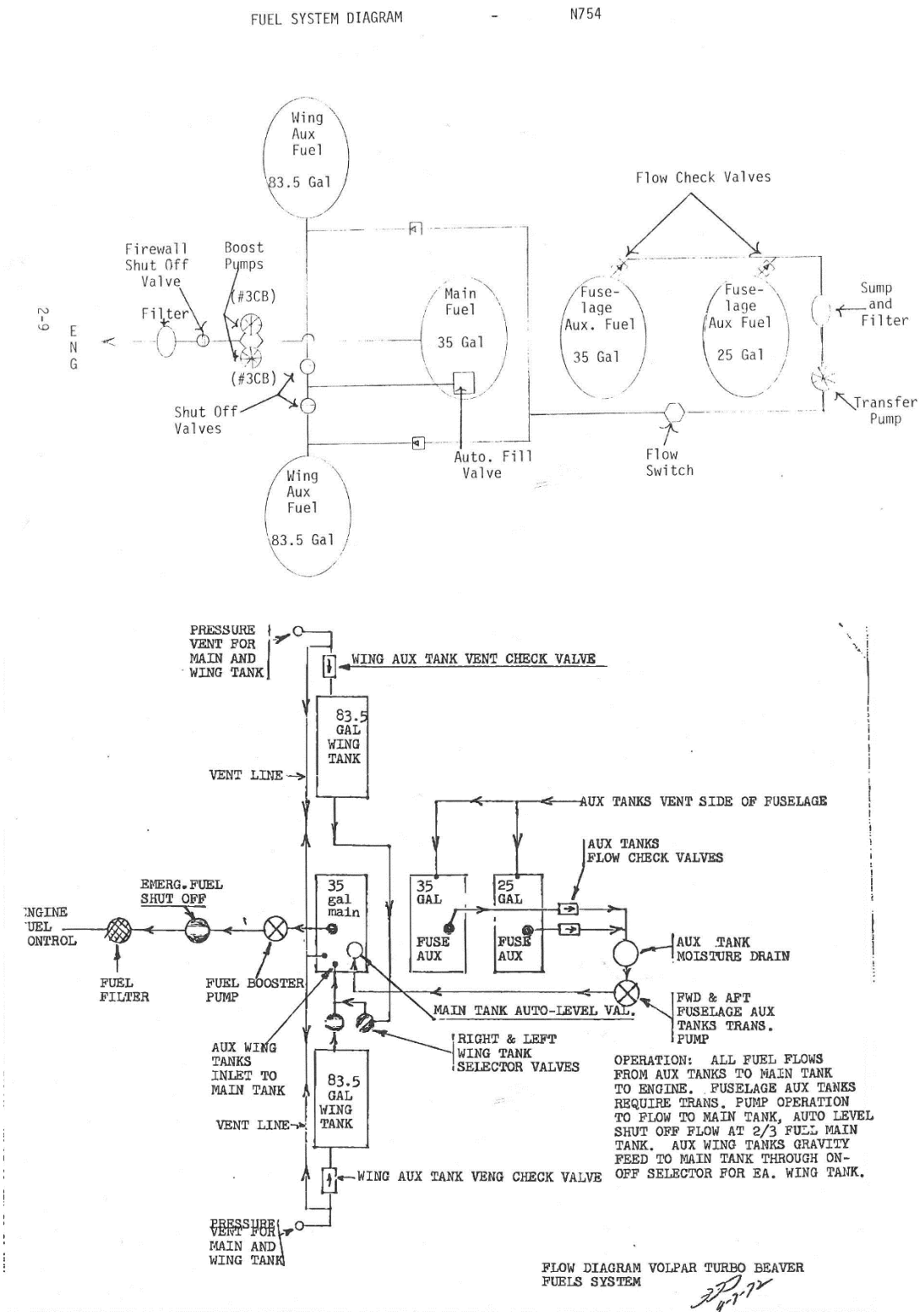
	Gal	Weight	Arm	Moment
Empty Weight		4308	99.2	427354
Fuel (Main 35gal)	35	235	95.5	22395
Fuel (Wings 167gal)	167	1119	91.5	102379
Fuel (Center 35gal)	35	235	119.6	28046
Fuel (Aft 25gal)	25	168	140.0	23450
Pilot/Copilot		340	85.8	29172
Rear seats (Fwd)		170	129.0	21930
Rear seats (Aft)		50	143.4	7170
Baggage (Fwd)		130	157.0	20410
Baggage (Aft)		50	192.0	9600
Float Comp. (Fwd)		40	50.0	2000
Float Comp. (Aft)		4	160.0	640
Total		6847	101.4	694546

Weight except wing fuel 5729
(All weight above 5730 to be wing fuel)

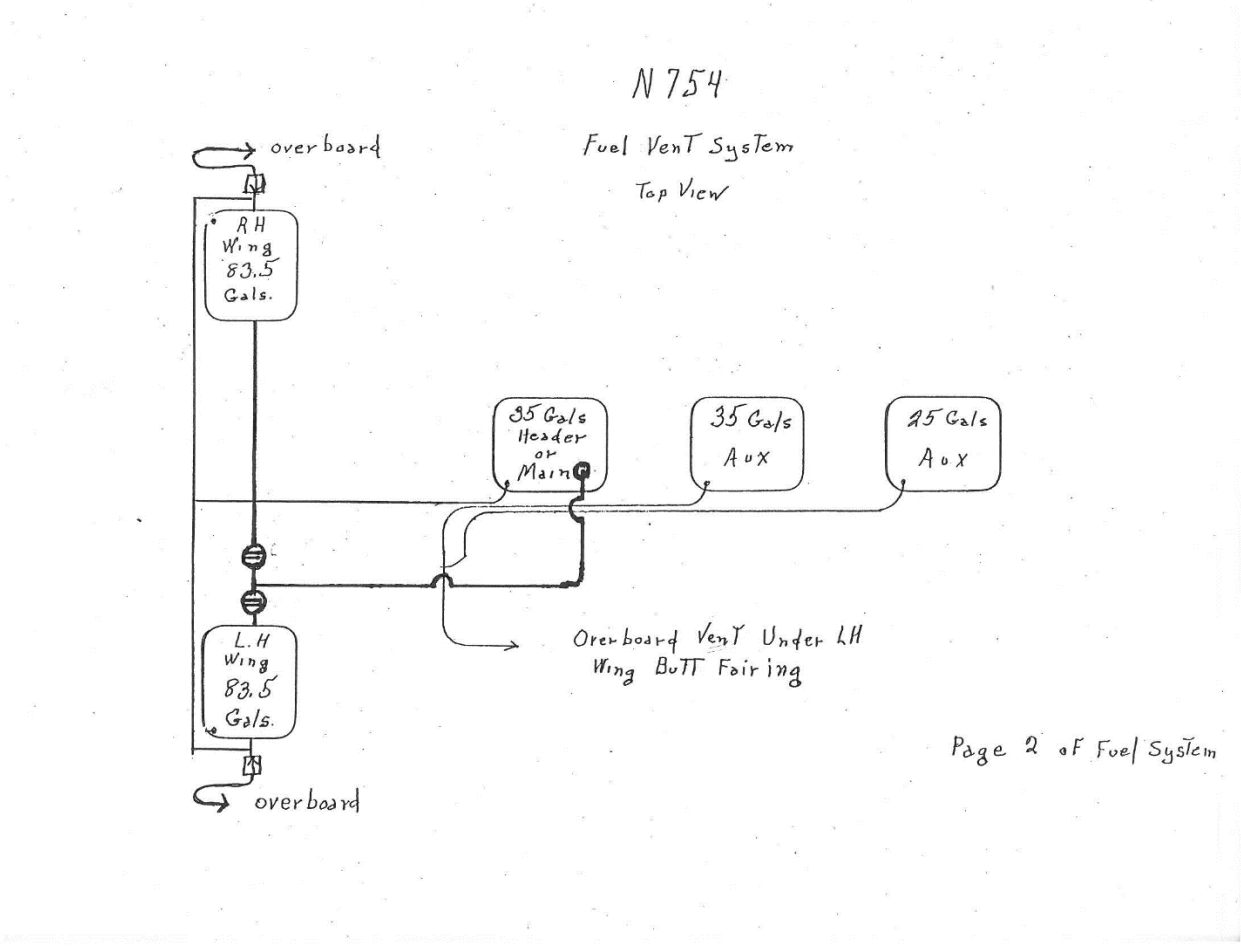
Fuel to burn for 6000 lbs 126 Gallons
(Fuel weight is 6.7lbs/gal)



Appendix XIX. Original Fuel System Diagrams:



Appendix XX. Main Sealed Fuel Tank – New Vent System:



Appendix XXI. Certificate of Origin – Viking

APR. 06 '99 (TUE) 08:51 REV CAN CBS SIDNEY 250 363 6764 PAGE. 2

Revenue Canada
Customs, Excise and Taxation

Revenu Canada
Accise, Douanes et Impôt

PROTECTED (when completed)

North American Free Trade Agreement
CERTIFICATE OF ORIGIN
(Instructions Attached)

Please Print or Type

1 Exporter's Name and Address:
Viking Air Ltd
9574 Hampden Rd.
Sidney, B.C.
V8L 5V5
CANADA
Tax Identification Number: ▶ 105534861

2 Blanket Period:
From: DD MM YY 01 01 99 To: DD MM YY 31 12 99

3 Producer's Name and Address:
United States Dept. of the Interior
Office of Aircraft Services
4837 Aircraft Dr.
Anchorage, Alaska. 99502-1052
U.S.A.
Tax Identification Number: ▶ 84-0643076

4 Importer's Name and Address:
Tax Identification Number: ▶

5 Description of Good(s)	6 HS Tariff Classification Number	7 Preference Criterion	8 Producer	9 Net Cost	10 Country of Origin
See attach sheets.	8802.30 (5950165)	"B" ("A" 100%)	No (1)	NO	CA

11 I certify that:
— the information on this document is true and accurate and I assume the responsibility for proving such representations. I understand that I am liable for any false statements or material omissions made on or in connection with this document;
— I agree to maintain, and present upon request, documentation necessary to support this Certificate, and to inform, in writing, all persons to whom the Certificate was given of any changes that would affect the accuracy or validity of this Certificate;
— the goods originated in the territory of one or more of the Parties, and comply with the origin requirements specified for those goods in the North American Free Trade Agreement, and unless specifically exempted in Article 411 or Annex 401, there has been no further production or any other operation outside the territories of the Parties; and
— this Certificate consists of _____ pages, including all attachments.

Authorized Signature: Ted Geron
Company: Viking Air Ltd
Name: Ted Geron
Title: Director of Maintenance
Date (DD / MM / YY): 18 05 99
Telephone: 250-656-7227
FAX: 250-656-0673

B 232E (93/12) Printed in Canada

Canada

Appendix XXII. Viking Work Report:

Garrett Beaver Work Report

The following work was carried out on A/C Reg.N754 S/N 1207 at Viking Air Ltd. under w/o #18446 & 19704.

- 800 hrs. Inspection in accordance with deHavilland DHC-2 Manual
- Removal of all Hyd components and overhauled or repaired then reinstalled and system checked.
- Aft floor was fabricated from Honeycomb.
- Removal of all fuel boost pumps and selector valves and O/H, reinstall and system checked
- Fuel tanks removed, inspected, primed and reinstalled.
- Fuel transfer indicators were removed, sent out for overhaul then reinstalled and calibrated.
- Installed Viking Air flush fuel cap system in the fuselage location.
- Replaced cockpit windscreens with new units.
- New side windows and tracks installed.
- Doors were refurbished with new latches and door locks and new seals.
- Replaced old interior with new fabric and insulation, which pass FAR 23,853 flame tests.
- Add extra step below pilots & copilots window
- The complete A/C wiring was removed and replaced with MIC M22759/16-16-9 Aircraft wire and system checked.
- Wing fuel tanks removed for inspection then resealed pressure tested and reinstalled.
- Replaced all bearings and inspected all flight control rods
- Install decktread on top of the wing,
- Replaced all flight control cables with new stainless steel units.
- Replaced all flap hangar bearings
- Installed Viking Air Ltd gross wt increase to 6000 lbs.
- Overhauled copilots and passenger seats and replaced pilot's. Corroded seat base with a new unit.
- Repairs to Horizontal Attach bracket pickup.
- Replaced all flight control pulleys.
- Replace all Rubber fuel and Hyd lines with new units.
- Made up new rigged pitot static lines
- Replaced all "SCAT" tubing.
- The prop model HC-B3JN-SE S/N BU667 was removed inspected and reinstalled
- New Eng Rubber mounts installed.
- Engine and Prop was static rigged and function tested in accordance with Garret Maintenance Manual
- The floats S/N R/H BA2492 & S/N l/H BA2491 were removed and sent to Sealand Aviation for modification to turn them from model 4930 to 5475 floats then reinstalled.

- 100 hr inspection was completed in accordance with deHaviland inspection sheet.
- Repaired L/H main gear Assy.
- Reworked R/H main landing gear trunion.
- Replaced R/H main landing gear bushing.
- Replace L/H fork fitting bolt and bushing.
- Replaced rubber hoses.
- O/H main gear Actuation Jacks.
- Replaced both Main Gear Boots
- Installed new paddle brackets and paddles.
- Landing gear was function tested and all system checked.
- Fabricated all new stainless steel float control cables and Rig.
- Decktread added to the top of the floats.
- Repair or o/H all instruments as required.
- Installed new wing strobe light system.
- Install a Landing Light pulse system.
- New A/C Dash was fabricated to incorporate new flight instruments and Avionics package.
- Fabricate new switch panel.
- All Nicad Batteries deep cycled. One P/N 6ML193E16960 S/N 27061 found unserviceable. Replaced with a new unit P/N MA5-20, 9706344.
- Installed Viking Air Ltd. finlets to the Horizontal stabilizer.
- Wing & tail section & flight controls were removed for paint and inspection and repairs as required. Flight controls balanced after painted and reinstalled.
- An extra Battery Compartment Assy P/N C2FS4843A was installed aft of the original Battery box. All work was done in accordance with AC43-13A sec. 4 Pg. 4-40.
- Engine model #TPE331-24A-203D, S/N P-97003 was removed and sent to the factory for a complete overhaul. The work was performed at Allied Signal under w/o #H606U5-001001 then reinstalled.

The following ADS and MODS were complied with

- Mod 2/1511, reinforcement of I/B Flap Root Rib.
- Incorporate TNS#3 reinforcement at the front pick up fitting on the fuselage
- Incorporate Mod #2/1475 wing strut pickup strap replacement to install larger units.
- Incorporate Mod 2/1497, which incorporates E/B 2/33, & E.O. 35, which reinforces the inboard wiring ribs # 2,3 & 4.
- S/B 2/50 incorporation of the inspection panel on the Elevator Tip.
- AWD's
- 81-13-01 - Elevator butt inspection
- 84-09-06 – Control column tube inspection
- 92-2402 – Horizontal Stabilizer Front spar inspection.
- S/B 2/49 – fuselage tube frame inspection.
- S/B 2/37 mass balance inspection and 2/1536 replace balance arm bracket

- Installed Sealand Redesign EC trim push rods SA1015NE
- 80-24-02 – Aileron differential mount S/B 2/29
- 84-07-05 – Aileron center hinge
- S/B 2/6 – Throttle Rivets
- S/B 2/11 Rear fin bolts
- S/B 2/39 Seat attachment to the floor
- S/B 2/48 wing strut inspection
- New 4 point shoulder installed for pilot and copilot.
- A/C painted as per specs. The paint codes are:

Orange	EMBRON	51464
Black	EMBRON	994
White	Deltron	8631

The following inspection were completed in accordance with deHaviland DHC-2 Maintenance Manual.

Appendix XXIII. Certificate of Origin – Sealand:

Revenue Canada
Customs, Excise and Taxation

Revenu Canada
Accise, Douanes et Impôt

PROTECTED (when completed)

North American Free Trade Agreement
CERTIFICATE OF ORIGIN
(Instructions Attached)

Please Print or Type

1 Exporter's Name and Address:
UNITED STATES DEPT. OF INTERIOR
OFFICE OF AIRCRAFT SERVICES
4837 AIRCRAFT DRIVE
ANCHORAGE, ALASKA 99502-1052
Tax Identification Number: ▶ 140001849

2 Blanket Period:
From D D M M Y Y To D D M M Y Y

3 Producer's Name and Address:
SEALAND AVIATION LTD.
BOX 729
CAMPBELL RIVER, B.C. V9W 6J3
Tax Identification Number: ▶ 104763354

4 Importer's Name and Address:
Tax Identification Number: ▶

5 Description of Good(s)	6 HS Tariff Classification Number	7 Preference Criterion	8 Producer	9 Net Cost	10 Country of Origin
AIRCRAFT REGISTRATION -N754 S/N - 1207 MODEL - DHC2T	8802.30	A	No (1)	No	CA
INV. ATTACHED					
AIRCRAFT FLOATS	8803.30	A	No (1)	No	US

11 **I certify that:**

— **the information on this document is true and accurate and I assume the responsibility for proving such representations. I understand that I am liable for any false statements or material omissions made on or in connection with this document;**

— **I agree to maintain, and present upon request, documentation necessary to support this Certificate, and to inform, in writing, all persons to whom the Certificate was given of any changes that would affect the accuracy or validity of this Certificate;**

— **the goods originated in the territory of one or more of the Parties, and comply with the origin requirements specified for those goods in the North American Free Trade Agreement, and unless specifically exempted in Article 411 or Annex 401, there has been no further production or any other operation outside the territories of the Parties; and**

— **this Certificate consists of _____ pages, including all attachments.**

Authorized Signature: Colleen F. Jansen
Company: Sealand Aviation Ltd.
Name: COLLEEN F. JANSEN
Title: Bookkeeper
Date (DD / MM / YY): 29/04/99
Telephone: 250-287-9464
FAX: 250-287-8659

B 232E (93/12) Printed in Canada

Canada

Appendix XXIV. Sealand Work Report:

Sealand Aviation, Ltd. Page 1
P.O. BOX 729
CAMPBELL RIVER, BRITISH COLUMBIA
V9W-6J3
(250) 287-9464 FAX (250) 287-8659

Invoice #: 95598 Date Printed: 4/29/1999

Account : UNITED STATES DEPARTMENT OF THE INTERIOR Account # :
4837 AIRCRAFT DRIVE Date Opened: 7/22/1998
ANCHORAGE, AK 99502-1052 Date Closed: 1/20/1999

PO #: 81P98-088

Aircraft Information:
Number: N754 A/C Type: Total Time: 0.0
Serial #: Hobbs Time: 0.0
Eng Type: Tach Time : 0.0

Itemized Discrepancies and Repairs:

Item 1: INCREASE DISPLACEMENT ON EDO 4930 FLOATS TO PERMIT 6000 LB. DISPLACEMENT
A/T -> WORK COMPLETED AS DESCRIBED ABOVE
ALL WORK QUOTED IN U.S. DOLLARS AS PER AWARD CONTRACT DATED JULY 22/98
RE: ALF AANENSEN
CONTRACT NO. 81P98-088
Charges this item: Flat fee :$ 23453.50

Item 2: PICK UP AND DELIVER FLOATS FROM AND TO VIKING AIR
A/T -> FLOATS PICKED UP AND DELIVERED AS REQUESTED
Charges this item: Flat fee :$ 250.00

Item 3: WORK OVER & ABOVE QUOTE
A/T -> SPREADER BAR REPLACEMENT
KEEL & SISTER KEEL
MISC. WHEEL PARTS
PAINT FLOATS
REPAIR BRAKES & LINES
Charges this item: 194.00 hrs @ 40.21: 7800.74

Quan	Part Number	Description	List Price	Dsc%	Unit Price	Extended
1.0	SAL-2T-47C	PUSH ROD KIT	0.00		194.69	194.69
4.0	067-00701	SPACER	0.00		40.56	162.24
1.0	R1	ZINC	0.00		3.14	3.14
1.0	MFG. LOOM FOR FLOAT		0.00		200.90	200.90
1.0	HYDRAULIC CYLINDERS	HYDRAULIC CYLI	0.00		174.63	174.63
1.0	SPREADER BAR	(BLANK SPREADE	0.00		2294.12	2294.12
2.5	NAFP-0220	BULB ANGLE, CU	0.00		8.92	22.30
48.0	5052-0 TUBING	TUBING, ALUM.1	0.00		2.10	100.80
1.0	471737	SEAL	0.00		2.73	2.73
2.0	58K201	KEELSON	0.00		197.25	394.50
4.0	92 625 46000 8000 E	W/R SPRING	0.00		6.84	27.36

Sealand Aviation, Ltd. Page 2
P.O. BOX 729
CAMPBELL RIVER, BRITISH COLUMBIA
V9W-6J3
(250) 287-9464 FAX (250) 287-8659

Invoice #: 95598 Date Printed: 4/29/1999

2.0 AN4-30	BOLT	0.00	1.59	3.18
2.0 19150	BEARING - TAPE	0.00	15.56	31.12
2.0 067-00701	SPACER	0.00	41.37	82.74
2.0 158 47628	SEAL - METRIC	0.00	4.01	8.02
1.0 20000	PAINT & SUPPLI	0.00	230.00	230.00

SUMMARY

Flat-Rated Charges	:$		23703.50
Labor - 194.00 Hrs	:		7800.74
Parts	:		4010.11
Freight	:		0.00
Subtotal	:$	35514.35	
Sales Tax:		0.00	
GST Taxa Taxable?:	:	0.00	
Total Due	:$		35514.35
Amount Paid	:		0.00
Balance added to account	:		35514.35

BUSINESS NUMBER HST/GST REG. #10476 3354 RT
A SERVICE CHARGE OF 2.00% MONTHLY, 24.00% ANNUALLY,
IS ADDED ON UNPAID BALANCES AFTER 30 DAYS E.& O.E.
INVOICE DUE UPON RECEIPT
PLEASE NOTE THERE WILL BE A 20% RESTOCKING FEE CHARGED FOR GOOD RETURNED
ALL PARTS ARE SOLD AS EXCHANGE UNLESS OTHERWISE NOTED.
PLEASE NOTE ----- EFFECTIVE IMMEDIATELY - SEALAND AVIATION WILL NOT DO A
COMPLETE INSPECTION ON SATURDAY. ALL AIRCRAFT MUST BE AT SEALAND ON FRIDAY
MORNING FOR COMPLETION ON SATURDAY - WM. J. ALDER - PRESIDENT
HOURS OF OPERATION: 7:30 A.M. to 4:00 P.M. - $75.00/HR AFTER 4 P.M.

Appendix XXV. Mechanic Award for Jerry Lawhorn - Support Letters:

James G King
1700 Branta Road
Juneau, Alaska 99801

Tom Lawhorn
3850 Westminster Way
Anchorage, Alaska 99508

10/24/94

Dear Tom,

Your dad, Jerry Lawhorn, is certainly among the most proficient and innovative aircraft mechanics ever to have worked in Alaska. His experimental "Keybird" which flew well at 20 mph, with sufficient pay load for moose hunting, has never been equalled by the STOL fraternity. His long years with the US Fish & Wildlife Service produced regular innovations that made the wildlife pilots more effective and safe. His design and perfection of the Garrett powered turbine Beaver (N-754) improved quality and efficiency of air surveys even more.

I flew nearly 7 thousand hours for FWS in Alaska doing wildlife surveys and for 20 years doing the duck counts for Alaska/Yukon that went into setting annual hunting regulations across the continent. The single engine bird surveyors have never had a serious accident, as far as I know, related to the thousands of hours they spend at low altitude, even though we all learn in flight school that there is safety in altitude. That record speaks well for the equipment maintained by the shop supervised by Jerry Lawhorn. We had to worry about weather, navigation, landing conditions and so forth but unlike the pioneer aviators we did not have to worry about sudden engine failures.

An example of the things Lawhorn could do for us occurred when I reported that, because I was busy recording bird sightings out the side window, I often missed the red, panel light that warned of the need to switch the fuel tank selector in the De Havilland Beaver. The engine would then die and I would have to scurry to switch tanks and use the hand pump to build fuel pressure all the time hoping that 100 feet was enough elevation until the power revived. Sometimes the tape recorder I used for my bird observations would crash. The plane never did. The next time I picked up the plane after a 100 hour there was a light bulb on the door post that produced enough heat that I could feel it on my forehead even if I failed to see the lightning like flash. Problem solved.

I started using standard Beavers for waterfowl surveys in 1966 and a few years later I was asked to evaluate them for our work. The Beaver is a wonderful airplane but I wrote up all the little problems I had been having: wing tip tanks often difficult to fill, too much door post and not enough side window visibility, too many controls to adjust when flying contact at low level while recording birds and so forth. When I finally flew the finished product of Lawhorn's modification, with the Garrett engine (N-754), all my

complaints were taken care of and there were lots of other improvements. Engine start up came from a remarkable set of switches to be activated from left to right and shutdown by the reverse, thus eliminating the need for a separate engine check list. An equally remarkable set of pumps and check valves assured delivery of fuel to the engine, from 5 separate tanks, with a minimum of pilot attention. The flight controls, throttle, trim, flaps, wheels and condition lever were all placed on a small, centrally located console, available for flying from either side. Because of the reduced cowling, lowered panel, narrow posts and enlarged windows visibility approached that of a Supercub.

Flying N-754 proved much less tiring than in any of the other single engine planes used for wildlife flying. Review of data from before and after the modifications revealed that the pilot and observer were getting about 25% more observations per given time unit than before.

Jerry liked to say he had "biologist proofed" 754. I guess he had, for no biologist has had any serious problem using it in more than 17 years now. He provided everything I had asked for. One time while talking to a group of biologists the biologist proof remark almost slipped out but he caught it just in time and after a pause went on in another direction. I was able to tell him not to worry. The biologist/pilots who have lots to do besides tending the airplane when they are working in the air wouldn't mind. "Just don't tell us you fool proofed it," I told him.

All this is not to say there never were any problems with planes coming from Jerry's shop. We would regularly take a plane for a full hundred hour trip away from maintenance sources. Little things would happen. The most valuable thing any of us carried in those days was Jerry's home phone number. I called him numerous times at night or on weekends to ask about anything from strange noises to inability to proceed. Jerry could always discuss the problem without benefit of his books and manuals and advise if it was okey to tweek something and go or if we should wait until he could get a mechanic out to where we were.

None of us ever worried about bothering Jerry on his own time. We just knew he would rather have us call than for us to do something we were not sure of without calling. He loved those airplanes like they were his own. Perhaps the pilots too.

Sincerely,

Jim King Jim King

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Migratory Bird Management-Raptors
3000 Vintage Blvd., Suite 240
Juneau, Alaska 99801-7100

IN REPLY REFER TO:

Tom Lawhorn
3850 Westminster Way
Anchorage, Alaska 99508

10/20/94

Dear Tom,

I think it is wonderful that you are submitting your dad's name for recognition by award as an aviation mechanic with a long, successful career in Alaska. Jerry Lawhorn is certainly one of the very best and I highly value his counsel and advice on the mechanical end of aviation in general and especially in regards to our specific operation.

I first met Jerry when I started to fly for the U.S. Fish and Wildlife Service in 1972. Jerry was in charge of aircraft maintenance then and had been for some time. I flew a standard deHavilland Beaver in Southeast Alaska for three years. I always appreciated the special maintenance treatment he and his Anchorage shop provided to this far flung end of their Alaska operation.

In 1975 I moved to the "lower 48" for a couple of years and flew bird surveys for the U.S. Fish Wildlife Service mostly in Canada, the Mississippi Valley and eastern Mexico. When I returned to Alaska, I joined the waterfowl survey project of the USFWS for Alaska here in Juneau.

I succeeded as project leader in 1984 and have worked in this position ever since. Our mission is primarily to conduct aerial bird surveys at low level, mainly in Alaska, but also throughout the Pacific Flyway from western Mexico to eastern Russia. For this very specialized flying we have been blessed, since 1977, with having the best airplane in the world to do it with, thanks to Jerry Lawhorn.

Based on his vast experience and technical ability, Jerry was able to use the comments of many USFWS survey pilots over the years to create an exceptional, one of a kind airplane. It is a highly modified deHavilland Beaver airframe powered by a Garrett turbine engine. It has successfully met, and far exceeded, the demanding needs of our specialized kind of flying for over eighteen years now. I, the former project leader/pilot, Jim King and my partner, Jack Hodges have completely field tested the airplane on the Pacific coast from Mexico to Russia and throughout most of Alaska. For our kind of work, it is the

safest aerial platform available and has allowed us to gather the highest quality data for the continental management of migratory birds. It enables us to easily fly in places and under conditions we would not even attempt in other aircraft. It is a joy to fly and has the enviable reputation of being the most maintenance free aircraft in our Alaska fleet. In the attached memo I tried to outline the major attributes of this superlative aircraft in hopes that more could be built.

It is the kind of airplane that from the very first take off, you know you are in love with it. It is very forgiving and easily compensates for a pilot's mistakes and shortcomings. It makes our very demanding flying work easy. It's the kind of airplane that when the going gets tough (as it can in Alaska), there is none other that I would rather be in. A lot of the "right stuff" went into this aircraft and Jerry put it there.

Even though Jerry has been officially retired for a number of years now, I rely on him for counsel and advice on our operation of this airplane. I carry a little notebook of vital numbers in my shirt pocket wherever I go. The first number is Jerry's home telephone number. I've used it now more than I should be entitled to and I can always rely on him. There is nothing more comforting to a low level survey pilot than this "ace in the hole".

I consider it a rare privilege to know Jerry and fly his and my favorite airplane. It only takes me five minutes at the controls of an "off the shelf airplane" to remember and appreciate what a truly wonderful aircraft Jerry had the foresight to create.

Sincerely,

Bruce Conant

Bruce Conant
Project Leader/Pilot

Attachment

Appendix XXVI. Mechanics Appreciation Letter:

Bob "Zark" Zarkovich and Ron Watson
Office of Aircraft Services
4837 Aircraft Drive
Anchorage, AK 99502

11/28/95

Dear Zark and Ron,

This letter is written to express our deep and sincere appreciation for all the years of dedication and commitment that both of you have devoted to the high quality maintenance of our favorite airplane.

Pilots, more than anyone else, realize that the most important people in aviation are the mechanics. To properly aviate, you start with a well maintained airplane. With good training, some skill and a little luck, pilots can deliver their flying machines back to the hands of their trusted mechanics without too much wear and tear that a good mechanic can't fix. Occasionally, we challenge your abilities and ingenuity.

Of even higher value to the long term health of an airplane and its occupants is the special attention given to preventative maintenance. Finding and fixing the little items before they can become big headaches or worse. Like an oil leak, an electrical arc on a fuel line or a worn out wheel. Things that the experienced eye with a special concern notice.

Pilots are inherently impatient and are usually poised in an "anxious to go" mode. It takes good, conscientious, careful, won't be hurried mechanics to ensure healthy airplanes take safely to the air, hour after hour, month after month, year after year. Although we don't often express it, rest assured that we much prefer to be delayed in our journeys knowing that we have an airship in tip-top shape than to leap into the air and wonder.

The sterling record of dependability and performance of N-754 and its long history of flying in places far and wide under some very demanding conditions to further the cause of wildlife conservation is primarily due to the tender touch you both have consistently given it since it was young.

On behalf of the airplane and ourselves, to both of you and your fellow mechanics, many thanks for your steadfast dedication and professionalism.

Good luck in your future endeavors.

Sincerely,

Bruce Conant	Jack Hodges	Jim King
Wildlife Pilot	Wildlife Pilot	Wildlife Pilot
23 years	11 years	30 years

cc: OAS Hangar, Anchorage
Bart Stone, Training and Standardization Manager, OAS
John Sarvis, Regional Aviation Manager, USFWS
Rudy Berus, Regional Director, OAS
Dave Allen, Regional Director, USFWS
Elmer Hurd, Director OAS
Mollie Beattie, Director USFWS

Appendix XXVII. Tribute to the Forgotten Mechanic:

Tribute to the Forgotten Mechanic

Through the history of world aviation many names have come to the fore.

Great deeds of the past in our memory will last, as they're joined by more and more.

When man first started his labor in his quest to conquer the sky he was designer, mechanic, and pilot, and he built a machine that would fly but somehow the order got twisted, and then in the public's eye the only man that could be seen was the man who knew how to fly.

The pilot was everyone's hero, he was brave, he was bold, he was grand, as he stood by his battered old biplane with his goggles and helmet in hand.

To be sure these pilots all earned it, to fly you have to have guts.

And they blazed their names in the hall of fame on wings with bailing wire struts.

But for each of these flying heroes there were thousands of little renown, and these were the men who worked on the planes but kept their feet on the ground.

We all know the name of Lindbergh, and we've read of his flight to fame.

But think, if you can, of his maintenance man, can you remember his name?

And think of our wartime heroes, Gabreski, Jabara, and Scott.

Can you tell me the names of their crew chiefs?

A thousand to one you cannot.

Now pilots are highly trained people, and wings are not easily won.

But without the work of the maintenance man our pilots would march with a gun.

So when you see mighty aircraft as they mark their way through the air, the "grease-stained man" with the wrench in his hand is the man who put them there.