FlightLine

A Monthly Publication of Collins Model Aviators **August 1996**

☞**Reminder:** August's CMA meeting is Thursday the 1st at the main plant cafeteria

August's Featured Model — Sopwith Pup in flight from Allan Wright's W.W.I modeling Web page

August's featured model

Sopwith Pup

August's featured model isn't a model at all, its a photo of a Sopwith Pup in flight. I found this on Allan Wright's W.W.I modeling web page (http://peasel.unh.edu). From full scale to 1/72 scale plastic model, I also downloaded a picture of Allan's Albatros DI. The Web page has several photos of models as well as links to various sites of interest to modelers who enjoy Word War I military aircraft.

Another interesting page is:
http://www.csd.uwo.ca/~pettypi/elevon/gustin_military
This page has an index of military aircraft with short summaries of each aircraft

The two aircraft shown have a number of similarities: Both were single seat fighters that entered service in 1916, and both were forerunners to even more successful aircraft.

The Sopwith Pup (also known as the Scout Tractor) was the precursor to the famous Sopwith Camel. The Camel was the most successful fighter of World War I, shooting down more enemy aircraft than any other plane of the war. But the Pup was memorable in it own right. The Pup had excellent maneuverability speed and rate of climb, and in August of 1917 it became the first plane to land on a moving ship, the HMS Furious.

Allan Wright's W.W.I Albatros model

The Albatros was a very successful fighter that lead quickly to a slightly improved version the Albatros DII. The DII had better forward visibility but was basically the same design as the DI. The DI was an innovative fighter that won back the air from the D.H.2 and Newport 17. Its twin machine guns gave it more firepower than the single gunned British and French aircraft of the time, and its powerful liquid cooled engine and streamlined fuselage shape gave it good performance even though it was nearly twice the weight of the Pup.

see W.W.I Aircraft on page 2

In This Issue:

W.W.I Aircraft (continued from page 1)

The Pup had a slight edge in speed and was considerably more nimble, but with its single machine gun it was at a distinct disadvantage to the firepower of the DI and DII's

The following table shows a comparison of the two aircraft.

Designation:	Pup	Albatros DI
Type:	fighter	fighter
Length:	19' 3" (5.87m)	24' 3" (7.4 m)
Height:	9' 5" (2.74m)	9' 8" (2.95 m)
Wingspan:	26' 6" (8.08m)	27' 11" (8.5m)
Wing Area:	253.9 ft^2 (23.59 m^2)	246.5 ft^2 (22.90 m^2)
Empty Weight	787 lbs (356 kg)	1425 lbs (645 kg)
Engine	Le Rhone 9C	Mercedes DIII
Engine Cooling	air cooled	liquid cooled
Horse power	80	160
Max Speed	111 mph (178 km/hr)	108 mhp (175 km/hr)
Ceiling	17,500 ft	17,000 ft
Armament	1 × 7.7mm mg	2 × 7.92mm mg
Number Built	1770	50

Comparison of Sopwith Pup and Albatros DI

Both of these planes are excellent candidates for scale models. A Pup should be considerably easier to fly than a Sopwith Camel (if both are true to scale). The Camel was very tricky to fly and more Camel pilots were killed in training than in combat. The DI version of the Albatros will probably be more rare than the DII, DII, or even DV (which was flown by Richthofen before he switched to Fokkers).

Allan Wright's Albatros model shown in the picture is actually a DIII kit modified to look like a DI by adding scratch built wings, wing struts, Windorf radiators, radiator overflow tank, and modifying the tail position and fuselage shape.

J. H. Doty, FlightLine Editor ✈

Fuel Leak

by Rich Dean

Well the club trainer PT-40 is out of action right now because of a leaky fuel tank. All of the electronics have been removed and are being cleaned up. The leak was found after the plane acted like it was taking RF interference hits, in flight of course. The plane was landed and the wing taken off. Mark Woytassek noticed fuel in the servo area. The foam around the receiver was removed and fuel was wrung out of it indicating quite a leak. The front hatch was taken off and the tank removed showing there was as much fuel in the tank compartment as there was in the tank. Fuel is conductive enough to cause receiver glitches so we were done flying for the day.

A leak was found at a fitting going into the tank so a new tank has been purchased and is in the process of being retrofitted. If you haven't had something like this happen to you yet you are lucky. The most common tank leaks are a split on the mold line of a blow molded tank or a leak around the rubber stopper which has shrunk and become a loose fit after several years. Also fuel lines can be pulled off the copper tubing feeding through the tank stopper when the fuel lines are pulled off the engine for refueling. When this happens in the tank compartment it can cause a big mess in a hurry!

What can be done to help a plane survive a fuel leak? Fuel proof the inside of the plane's tank compartment when the plane is being built. Epoxy thinned with rubbing alcohol brushed on the balsa or lite ply interior is the best fuel proofer going. Some builders even fuel proof the servo compartment just in case. Other modelers will even drill a small hole in the bottom of the tank compartment to let fuel out in case of an internal runaway fuel spill. It is a good early indicator that something could be wrong.

WHAT IF YOU DIDN'T FUEL PROOF THE TANK COMPARTMENT BEFORE A LEAK HAS HAPPENED?! All is not lost. Remove all of the equipment out of the affected area. Spray the fuel soaked area with an aerosol can version of K2-R spot remover. It has a solvent that penetrates into the wood and also has a powder in it that stays on the surface. As the solvent loosens the fuel from the wood the fuel is absorbed by the powder which you brush off or vacuum off after things dry. It may take a couple of applications of K2-R but is will save the airframe. Now fuel proof with epoxy.

As for the electronics, the battery was flooded so the heat shrink wrap was carefully cut off and the battery and heat shrink wrap was washed in soapy water. After drying the heat shrink wrap was put back over the battery and held on with electrical tape. The protective foam for the battery and receiver was washed in soapy water also. The servo tray with the throttle, elevator and rudder servos were up out of the fuel so they were squirted with a Windex type glass cleaner and dried with a paper towel.

The receiver case was taken off and was washed in soapy water. The receiver printed circuit board was washed in a rubbing alcohol bath and allowed to air dry. The switch harness was taken out and the wires were cleaned off with Windex. The switch had a plastic case around it and was wiped off.

DO NOT CLEAN THE INSIDE OF A SWITCH!

All slide switches have a grease put on the contacts when they are manufactured. This cuts down on arcing during switching which keeps the contacts from pitting and the grease cuts down on oxidation corrosion. If this grease is

removed from the switch it will quickly go bad from pitting and corrosion and be a cause of intermittent problems that you don't need.

All of the switch connectors and servo lead connectors got rinsed in alcohol and the plane was restuffed. The plane is going to be carefully range checked and should be ready for flight in a couple of days. I was able to find a 10 ounce tank to replace the original 8 ounce tank so flight times for the students should go up. See you at the flying field.

Rich Dean, CMA Flight Instructor ✈

National Newsletter

May 1996

Cryogenics:

Make Your Speed Engine Stronger

You Guessed It Take Your Engine and Freeze It!

by John Tate

History: I was watching a TV program called *Next Step* on the **Discovery Channel.** They were reporting on a company called **300 Below Inc.** The company was freezing metal items from golf clubs to automobile engine blocks. I started paying attention when they pulled out the go-cart racing engine case from the freezer. The company claims that by freezing certain types of metal, they can make it up to 100% to 500% stronger with less friction between the metals. This process sounded unbelievable to me. Have our metal stress problems been answered?

Theory: The *Next Step* program explained that molecules in metals are not equally spaced from each other. This is the problem with all metals after they have been processed by melting, then poured, molded or forged. The old method of stress relieving was to heat the metal evenly for a long period of time and bring it back to room temperature very slowly. This only relieves the internal stresses in the metal and makes it the same strength overall. The cryogenic process (freezing) brings the molecules as close together as possible and then allows them to redistribute equally by slowly thawing the metal. This will relieve the metal of internal stresses, plus the metal will also become stronger (tempering). There would be less friction between metals with the molecules distributed equally. The secret to this method is to do it very slow and controlled accurately.

The Company: 300 Below Inc. has freezers cooled with liquid nitrogen. The temperatures in the freezers are controlled by a computer. The computer takes the temperature of the metal down to the coldest it can go and then brings the temperature back up slowly to room temperature. The process takes around 24 hours to complete. They don't just drop the metal into liquid nitrogen. The metal would go into thermal shock and shatter when it hits the liquid nitrogen. The engine for the quarter mile record holder gasoline burning Harley Davidson motor was treated by **300 Below Inc.**

Plan of Attack: I found their number and gave them a call and asked if they could freeze treat a model airplane engine. Well, guess what? A model airplane engine has not been treated as to date. They told me to dismantle the

engine and send all of the components except items made of rubber, plastic or glass. They did not know how much to charge me because nothing this small had been done before. The minimum charge was about $49.50 so the model engine should not exceed this. They only charge $89 to do a Harley Davidson block. I have two Super Tigre 29X engines that are still new in the box. The engines were taken apart, cleaned, fitted and reassembled. Both engines were fitted as close together as possible to each other. The piston and cylinder fits were a little loose. The pistons could be pushed all the way through the cylinders with a little pressure. Both the engines were test run one time. The (open exhaust) max rpm was close to 22,000 for each. One was disassembled and packaged for shipment to 300 Below Inc. Everything but the glow plug, head gasket and crankcase gasket was sent. The ball bearings have brass retainer cages so they went also. The other engine was not sent so comparison testing between them could be done. All I had to do was to sit back and wait for the engine to come back from 300 Below Inc. Second thoughts started to come to my mind. Were the brass bushings in the aluminum connecting rod going to crack due to the aluminum shrinking more than the brass? Was the chrome in the cylinder going to flake off? Will the piston and cylinder still be round? What else could go wrong?

Results: The engine came back 1-1/2 weeks later. All items looked the same as when they were mailed out. 300 Below Inc. stated that "the only thing that would look different when the engine came back was the bill added to the box it came in. The metal items would not change color. The only thing that would be different is that the metal items would be stronger."

Cylinder: The first thing I noticed was that the piston would barely go back into the bottom of the cylinder. The piston stopped at the middle of the exhaust port. Comparing the stock cylinder to the treated one, it was noticed that the treated cylinder shrank just a little. The before and after dimensional check of the cylinder was almost the same. I could not measure the difference (not within a 10 thousandth

of an inch) with the crude equipment I have. No doubt a large bore gauge could have shown the difference, but I don't have one. The cylinder slid back into the case just a tad bit easier (almost not enough that one could tell). The cylinder had to be honed out for the piston to fit. Usually it takes me about fifteen minutes to hone a cylinder to fit a piston properly. The chrome in the cylinder was harder than ever (if that is possible) The honing process took over one hour to make the piston fit as it did before. I had to hone through the chrome into the brass of the cylinder only at the exhaust and intake ports area. Usually the chrome will start to chip off when I hone through the chrome and go to the brass liner. The treated cylinder did not do this. The cylinder was the hardest I have ever honed. I could not tell when the hone ground through the chrome to the brass as I normally could. An examination of the cylinder determined that the area around the ports constricted during the freezing process and did not return to the original diameter.

Piston: No noticeable changes could be measured.

Connecting rod: The inside diameters of the wrist pin and crank bushing had been reduced in size. The difference was so minute that no corrective action was taken (lapping or reaming to fit). The bushings did not look as if they had cracked because of cryogenics.

Crankshaft and bearings: No dimensional changes could be measured, except the bearings hand spun over with less friction.

Crankcase, head and internals: No noticeable changes could be measured. The case had to be heated to install the bearings, as it took to remove them. The bearings and crankshaft fit seemed better. The head fit the cylinder the same. The back plate and disk set up were the same.

Spinner nut: The brass spinner nut would not screw back onto the crankshaft. It had shrunk just enough not to be able to screw back on the crankshaft threads. All that was needed was to clean out the threads in the spinner nut (maybe a thousandth at the most). This was the hardest thing I ever had to tap. A 1/4" x 28 plug tap was used. I bent several pieces of piano wire that were inserted through the spinner nut so it could be held to be tapped. The chunk on the lathe was locked in position and the tap was tightened as much as possible. The only other material that I have tapped this tough was titanium sheet for landing gear.

Reassembly: The engine was reassembled and it felt close to the same as before the freeze treatment. Usually I over tighten the head and back plate screws to where the screwdriver leaves marks in the screw head slots. This time you could not see any screwdriver marks in the screw head slots. Yes, the screws were made harder also.

Testing: The decision was made to test run the engine with the brass exposed in the cylinder. This area is below where the piston starts to get a close fit. I know the treated brass is not as hard as chrome, but the piston should not hit this area very much anyway.

Both engines were test run with open exhaust only (no tuned pipes). The engines had 30 minutes (10 runs at 3 minutes each) before the max rpm was recorded. A fast rich setting of 20,000 rpm was easily set for the full 30 minutes of break-in time for each engine. The engines have stock and timing parts.

MAX RPM: Cryogenic Treated: 24,300 Untreated: 23,100

The engines were taken apart after test running. There was no wear and tear on any of the internal parts that I noticed. The treated piston did not show any wear by running in the liner with the brass exposed around the intake and exhaust ports. Where the piston seated to the cylinder (polished ring around the top of the piston) was the same for both. The crankshaft bearings were checked by turning the crankshaft over by hand. The crankshaft in the treated engine spun over effortlessly compared to the non-treated engine. This was the first time I ever had bearings that felt as good as these. The crankshaft seemed like it would turn over forever when spun over by hand. The engines will be retimed for B speed.

Conclusion: The cryogenic treated engine did run faster than the non-treated engine as hoped. The crankshaft bearing had less resistance for the treated engine verses the non-treated engine. The 10% fuel doesn't wear on the engines like the high nitro fuel used to. The wear patterns will be checked throughout the engine's lifetime. I felt like the cryogenic process was worth the trouble.

Afterthoughts: Hopefully this article will start some NAAS members to think of ways to improve the engines we use. Maybe they can figure out which parts in a speed engine need to be freeze treated and which ones do not. It would be nice to have a speed engine that would not break or wear out. The glow plug should have been sent out and treated also, even with the danger of cracking the seal. A glow plug element that is 100% to 500% stronger would be nice to have. Maybe someone can get a glow plug manufacturer to send in a spool of the element wire and have it freeze treated. The cost of $50 for a few thousand feet of wire sounds inexpensive to me. The glow plug is usually the first thing we need to change in speed engines. The future can only tell how long we make these speed engines last. If you want to try this process, the address and telephone number are listed below:

300 Below Inc.
1160 South Monroe
Decatur, IL
(217) 423-3070

by John Tate, North American Speed Society 129
from Speed Times
North American Speed Society
Box 82294
North Burnaby, British Columbia, Canada VSC SP 7

Heads Up, CMA Activities

Thursday, August 1, 4:45 pm—Club Meeting

Friday, August 23, 5 pm—FlightLine Deadline

Thursday, September 5, 4:45 pm—Club Meeting

Friday, September 20, 5 pm—FlightLine Deadline

Note: All meetings and build sessions are held in the 35th street N.E. Facility (main plant) Cafeteria building 140, unless otherwise noted.

FlightLine deadlines are flexible if you can let me know ahead of time what to expect

✪1996 CMA Staff

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- **Irv Anderson**
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Test Pilots for first flights of new airplanes:
- **Rich Dean**
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✍ Send your input for FlightLine to:

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Local Activities

✈ Flight Training

Flight Training is available every Tuesday and Thursday weather permitting.

Tuesdays — Beginner training

Thursdays — Advanced training

Check the CMA Hotline 395-8888 for the latest updates on the training sessions.

In case of bad weather on Tuesdays Thursday will be used for both sessions.

On Saturday mornings with good weather there will usually be someone available to provide additional training.

Send your input for the CMA Web Page to:

Tom DeWulf
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1996 CMA Membership

M/S	NAME
108-103	Irvin Anderson
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124-114	Ross Beins
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124-115	Raleigh Dean
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153-120	Timothy DeWit
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153-163	David Gillespie (for Amy Gillespie)
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108-166	John Michael
108-166	John Michael (for Kevin Michael)

M/S	NAME
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108-136	Gary Prior
124-123	Wayne Savold
139-125	Gerald Showman
108-136	Duane Smith
108-136	Brian Smith
105-152	Basil Tilley
124-111	Robert Tribuno
124-111	Robert Tribuno (for Peter Tribuno)
124-111	Robert Tribuno (for Michael Tribuno)
120-131	Ron Menti (for Tony Veit)
139-142	Charles Ward
153-264	Bryan Wesner
107-110	Victor Wolfe
124-115	Mark Woytassek

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R/C Adventures
PO Box 284
Marion, IA 52302

Is someone you know missing from this list?
Give them a call and ask them to *Come Fly with us in CMA!*