KCRC Newsletter
March 2008

February Meeting; Tuesday, 11-Mar-2008, 7:00 pm, Fellowship Church, 8000 Middlebrook Pike

KCRC
KNOX COUNTY RADIO CONTROL

Propwash

Phil Spelt KCRC President

Phil and his propwash column are on break for this issue of the newsletter. They'll be back next month.

Minutes: February meeting
Ed Hartley, sec.

• A float fly will be held June 21st at the field.

• The club's AMA charter was discussed. We will have to bring our by-laws to be in compliance with AMA requirements.

• Phil Spelt had the program consisting of the annual AMA safety code review.

• We must immediately start flying per field layout rules. We must also stop buzzing the runway and hovering over the runway. We are going to start enforcing the sound limits.

• Model of the month entries: Jeff Prosise had his beautiful B-25, Phil Cope showed his equally beautiful Cessna 310 and Mike Tennings won with his Heinkle #E100.

• No crash of the month was reported.

Heinkle E100 control line model by Mike Tennings.

B-25 ARF by Jeff Prosise.

Scratch-and-Dent plane lives! Cessna 310 ARF by Phil Cope.

Safety Corner
Bill Walters, KCRC Safety officer

Hello everyone! It's almost a new flying year and we all have those new builds that we've been working on all winter or the airplanes that have been setting around for several months in our hangars. It's very important to ensure that everything is set up properly before that first flight. The following tips will increase that flight's success.

1. Ensure that the batteries in both the transmitter and receiver are fully charged
2. Check all control horns, servo horns and clevises to make sure they are secure and in good condition. Replace any items that would be considered questionable.
3. Check the radio installation and make sure all of the control surfaces are moving in the correct direction and with the recommended throws.
4. Perform a range test by following the instructions in the transmitter manual.

5. Test run the engine and make sure it transitions smoothly from idle to full throttle and back.
6. Ensure the engine is tuned according to the manufacturer's instructions and it will run consistently and constantly at full throttle when adjusted.

These simple tips are often overlooked by veteran pilots because they have done it so many times they sometimes forget to check them.

REMINDER: Please make sure we are following the guidelines about low level flight over the runway. There have been numerous complaints and problems with people not following the rule and everyone should understand that it will be enforced at all times at the field.

Thank you and have a great month and flying season.

Calendar of Events

17-18 May-2008....SPA contest at KCRC

23-24 Aug-2008....KCRC AMA contest (location to be determined

Model Technique

Turbine Basics

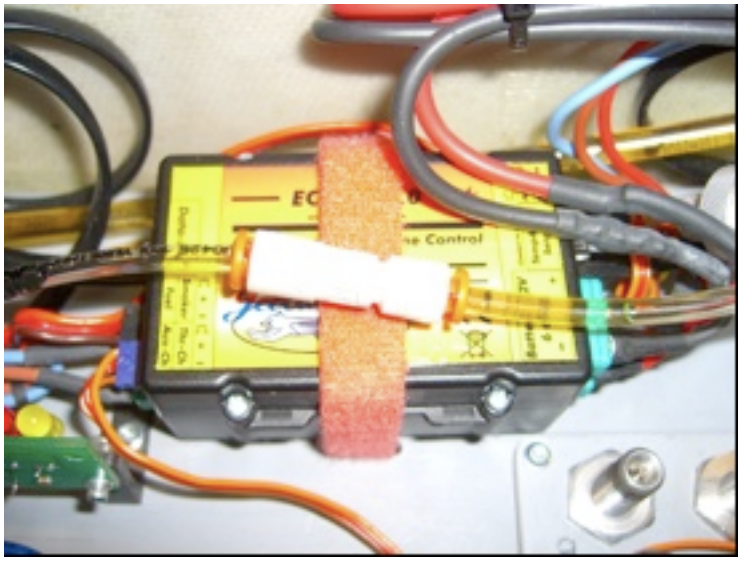
Jeff Prosise

The cutting edge of our hobby today is flying models with gas-turbine engines. Turbine jets have been around for more than a decade, and now airplane and heli pilots are getting in on the act with turboprops. Once the exclusive domain of do-it-yourselfers with access to high-tech machine tools, today turbines are commodity items that can be purchased from a variety of manufacturers.

The principles behind the operation of gas-turbine engines are simple. Air enters the front of the engine and travels through a compressor. Compressed air is mixed with fuel and injected into a combustion chamber to produce high-temperature gases. These gases exit the nozzle of the engine at high velocity and produce thrust. Before they exit, the exhaust gases spin a turbine wheel at the rear of the engine that powers the compressor in the front. A working gas-turbine engine produces enough energy to drive the compressor and produce thrust in a self-sustaining reaction that requires nothing more than a steady flow of jet fuel.

Model turbines are mechanically simpler than their full-scale counterparts. Large jet engines, for example, use multi-stage axial compressors to raise the pressure of the intake air. Model turbines, by contrast, tend to use single-stage radial compressors that are similar to the impellers in vacuum cleaners. But model turbines and full-scale turbines are more alike than different. Both require precision machining and balancing to support rotational speeds in excess of 100,000 RPM and minimize gap losses (energy lost when exhaust gases slip between the edge of the turbine blades and the casing surrounding them). And both use exotic materials such as Inconel—a nickel-based super alloy— to withstand high combustion temperatures.

The brain of a model gas-turbine engine is the ECU, or Electronic Control Unit, pictured below.



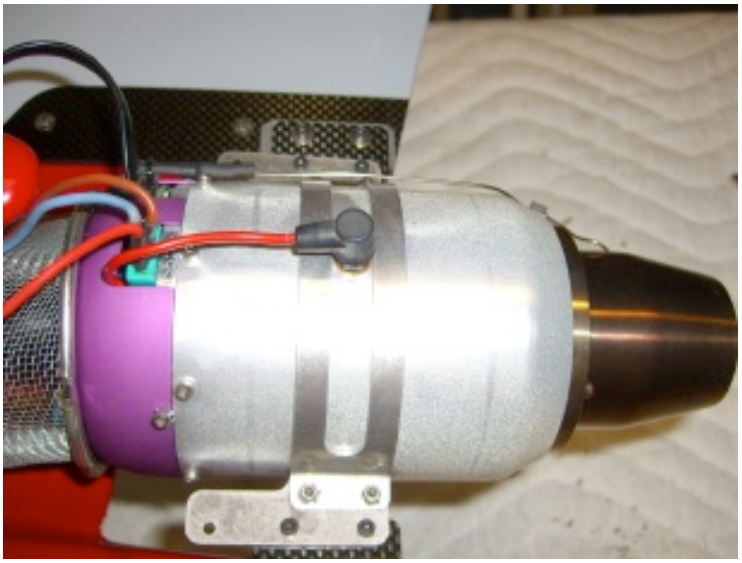
The ECU continuously monitors two key variables: the turbine's rotational speed and exhaust gas temperature. It doesn't let the rotational speed fall below the level required for a self-sustaining reaction, and it prevents the turbine from spinning so fast that it tears itself apart. For a JetCat P-60, which produces up to 13 pounds of thrust, the maximum rotational speed allowed by the ECU is 165,000 RPM, and the minimum speed, or idle speed, is 50,000 RPM.

The ECU also controls turbine startup. When you command the ECU to start the turbine—typically by flipping a switch on your radio or moving the throttle stick to the uppermost position—the ECU starts the turbine spinning by sending current to an electric starter motor attached to the turbine. (Not all model turbines have built-in starter motors, but most these days do.) It then opens a valve and injects a propane/butane mix—what turbine guys refer to as "starter gas"—into the combustion chamber and applies current to a glow plug to ignite the mix.

Once the mix is ignited and the turbine reaches a predetermined rotational speed (typically around 30,000 RPM), the ECU shuts off the starter gas and applies current to a pump to start jet fuel flowing to the turbine. It increases the flow until the turbine reaches idle speed and then hands control back to the pilot so that the throttle stick controls RPMs (and consequently, thrust). If anything goes wrong during startup or operation, the ECU shuts down the turbine. JetCat ECUs come with handheld computers called Ground Support Units (GSUs) that plug into a board connected to the ECU and tell you what happened if the turbine failed to start or had to be shut down.

Some ECUs can also be programmed to limit air speed. AMA rules limit jets to 200 MPH. If you equip your jet with an air speed indicator, plug it into the ECU, and program in a top speed, the ECU will keep you at or under that speed by limiting RPMs.

The picture below shows the electrical connections between an ECU and turbine. Three wires plug into the intake end of the engine. One supplies current to the glow plug; one supplies current to the starter motor; and one is a ground wire. Behind these wires is a black data cable that supplies RPM and exhaust gas temperature readings to the ECU. Look closely and you can see the thermocouple that measures exhaust gas temperature snaking around the top of the engine. The red wire on top powers the glow plug.



Turbines are extremely reliable provided they have a steady supply of fuel. The minutest of bubbles in the fuel line, however, will shut a turbine down. That's why most RC jets are equipped with special header tanks called universal air traps (UATs). The UAT's job is to eliminate bubbles and ensure a steady supply of fuel.

The chief downside to turbines is their cost: about $2,500 for a small one (complete with ECU, fuel pump, and other accessories) rated for 13 to 14 pounds of thrust and more for larger models. But the sound of a turbine is amazing, and as most jet guys will tell you, there's nothing sweeter than the smell of Jet A in the morning!

For Sale / Want to Buy

For Sale: NIB Champion 45L ARF. $95.00, Ed Hartley 865-934-2141.

For Sale: Anniversary Piper Cub, needs a touch of work, covering and finishing up. Needs a window set $40.00. Ed Hartley 865-934-2141.

At the Field

Below are photos taken at KCRC of two of the planes showcased at the February meeting. These big twins are not hanger queens!

Jeff and his ground crew prepare the B25 for flight.

Jeff's B-25 with with extended flight crew

On the way to the runway.

Runup before takeoff. The plane didn't get off the ground on this attempt but the it did eventually fly successfully.

The engines on Phil's 310 get a final tweak before another flight.

Steve Bayliss had his B25 at the field to test run the engines. We're looking forward to the test flight of another heavy metal warbird!

Taxiing out for the take-off run.

Most recent photo of 3 B-25's by (front to back) Jeff Prosise, Steve Bayliss and Doll Thompson. All three flew successfully!

Coming in on final.

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