

Beech on a Budget

SAFE • LEGAL • LOW COST

By Mike Caban

Engine and Cabin Pre-Heat Options

With the cold weather now upon us in most northern areas, many Beechcraft owners recognize the challenges and precautions necessary to properly start a cold-soaked, air-cooled engine. For me, I'm going to call temperatures below 50°F a cold start. I have seen many FBO and Club rules require pre-heat at anything 40°F and below.

Personally, the farther below 50°F the OAT is, the more concerned I become about some form of pre-heat for my Baron's engines, as well as the cabin.

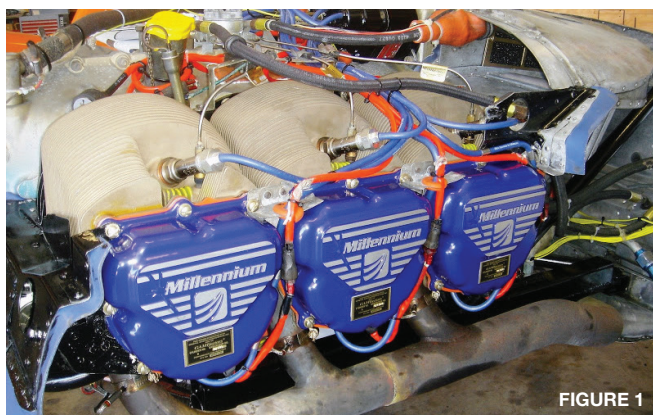
Here's what some of the experts have to say about piston engine pre-heating:

Significant engine wear can occur at startup, because the oil circulation system has not had a chance to pump oil to the engine parts. The thicker the oil, the longer this will take, resulting in less oil on running surfaces during the startup sequence. Preheating during extremely cold temperatures is one of those 'ounces of prevention' that can keep cold starts from damaging your engine. Cold temperatures not only slow the initial movement of the oil but the differential thermal expansion of engine materials (aluminum and steel) decreases engine clearances, creating the potential for more accelerated wear during cold startups.

**—Al Beech, Director of Engineering Service Programs
Teledyne Continental Motors**

WARNING – Failure to properly pre-heat a cold-soaked engine could result in oil congealing within the engine, oil hoses and oil cooler with subsequent loss of oil pressure, possible internal damage to the engine and subsequent engine failure.

—Continental IO-550 Manual



Some may say they understand the need for the engine pre-heat, but why the cabin? Cabin heat is not so much for our own personal comfort but for the startup ease of our gyroscopic instruments, and some electronic screens that could be sensitive to cold temperatures. An instrument shop I have used over the years cautioned me to do whatever I can to bring cabin temps out of the deep freeze of winter to get longer service life out of my gyros.

We're familiar with the classic FBO options of portable pre-heat that are rolled up to your plane, and about an hour later you've got enough engine and cylinder heat to make an engine start. Cost and competing with other pilots for the FBO equipment might make this a less appealing option.

Another option for engine pre-heating, while initially relatively expensive (ranging from \$600 to \$1,100 plus installation), are the Tanis (www.tanisaircraft.com) and Reiff (www.reiffpreheat.com) complete engine systems consisting of

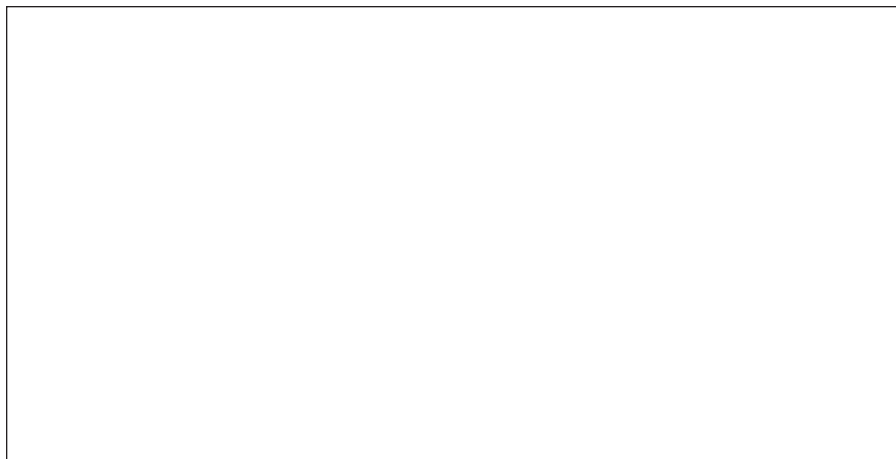
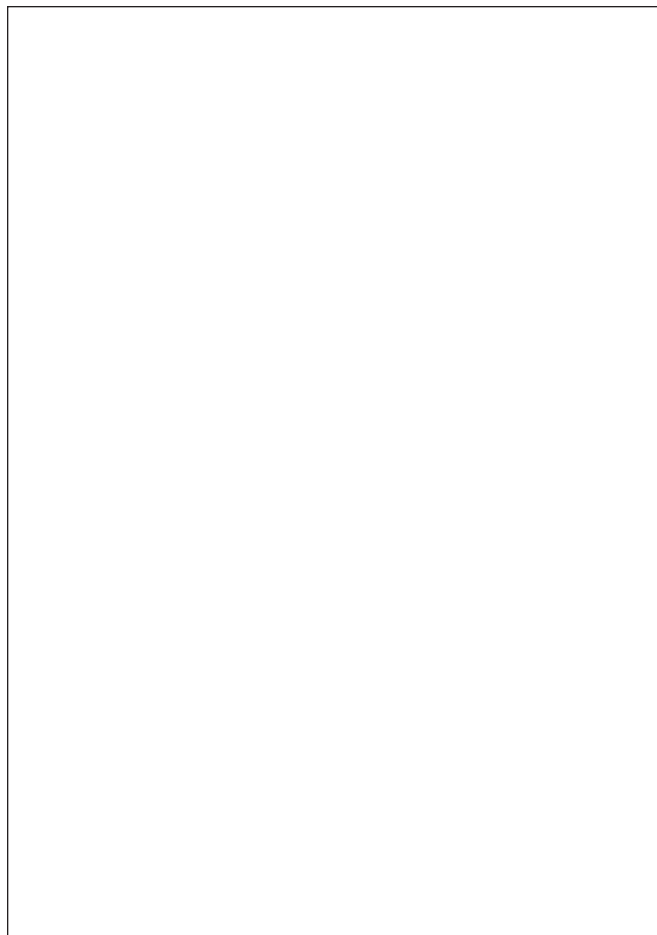




FIGURE 2



FIGURE 3



combinations of sump heater pad, a top block pad, and individual cylinder heating elements. A few years back I came upon a complete Tanis Baron pre-heat system on eBay in serviceable condition for around \$200, needing only a top block pad element replacement (**Figure 1**). This system used the old-style gasket heating elements that fit under the valve covers. Even in below-zero OATs, this system, with about a six-hour on time, will get my cylinders and oil temps to about 70°F in my hangar. If you can find one of these older Tanis systems in serviceable condition at the salvage yards, it can be a very cost-effective find.

Recent breakthroughs in portable ceramic heaters have created a very cost-effective way to get engine *and* cabin pre-heat. **Figure 2** shows my use of a Honeywell Model HZ-315 ceramic heater (**Figure 3**) for cabin pre-heating. It works great sitting on the right side floor, to allow hot air to rise and warm the gyros as well as the rest of the instrument panel avionics and cockpit. Running an extension cord through one of the existing holes in the firewall allows the cabin door to be closed during heating. I like the ceramic units because their cases do not get hot at all, and they have a stable footprint that won't tip easily. If you

are concerned about tipping, setting it on a cookie tray might be a belt-and-suspenders approach to safety. Tip-over shut off switches are incorporated into many of these portable designs; check your specific heater for details.

This HZ-315 heater puts out 1500 watts. In about three hours I got the inside of my B55 a nice toasty 60°F from an OAT of about 25°F! This and other ceramic heaters can be found at Fleet Farm, *Amazon.com*, WalMart, and Home Depot in the range of \$20 - \$30.

Here are other innovative ways that Beech owners are putting the ceramic heaters to use in pre-heating their engines (**Figures 4 & 5**):



FIGURE 4



FIGURE 5



FIGURE 6



FIGURE 7



FIGURE 8

One Bonanza owner reports that his hangar started at 28°F. Using his \$20 ceramic pre-heater placed on a step stool pointed into the cowl flap opening, he got the oil and cylinders to 90° F-100°F overnight with the heater and the engine cowl and air openings covered with a moving quilt. The blanket or moving quilt over the cowl and stuffed into the air intake holes prevents the heat from escaping out the front. Blocking the front cooling holes ensures that the air will flow back out the lower cowl opening. Select an appropriately sized electric timer, **Figure 6**, from any Lowes or Home Depot, and you've got a very simple and effective engine heating system for less than \$50!

Figures 7 and 8 show another Beechcraft owner's variation on the ceramic heater theme, with ductwork to accomplish engine and cabin heating with a single heating unit.

The ductwork and dryer hose added about \$26 to the total materials cost. This Beechcraft owner reports the following measurements:

- OAT 36°F/Hangar temp 40°F
- After three hours of heater operation the oil temp was 65°F, cylinder temps were between 62° F-72°F, and interior cabin temp was 70°F. Bear in mind, these results are without a blanketed cowl.



FIGURE 9

If you're inclined to augment your ceramic heater with an oil sump heater (**Figure 9**), there are several available in the usual aviation sources ranging in price from \$80 to \$150. Automotive versions of the same wattage ratings are around \$20 (check with your specific A&P for his thoughts on the applicability of these units for installation on your aircraft).

Another interesting low-cost winter heating accessory to turn on your heating system is the Thermo Cube (**Figure 10**). The Thermo Cube is a thermostatically controlled electrical outlet that comes on at 35°F and goes off at 45°F. It's available at *Amazon.com* for about \$10.



FIGURE 10

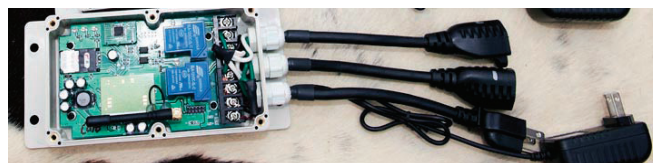
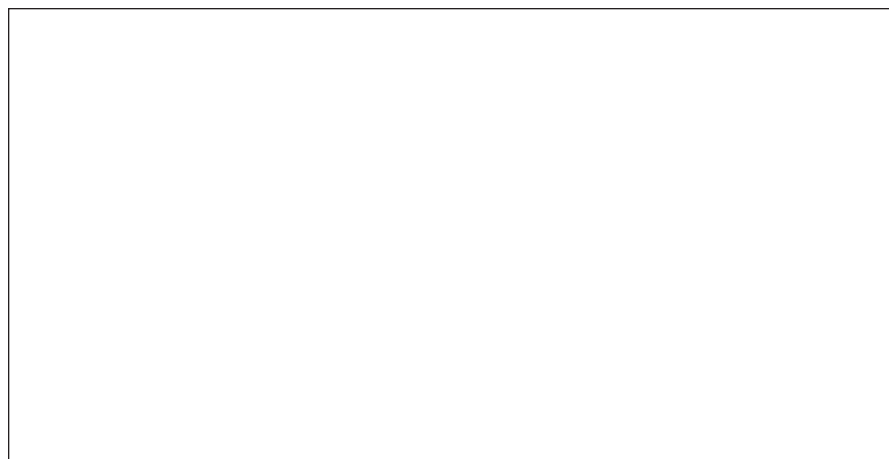


FIGURE 11

By now you might be saying, wow, those ceramic electric heaters and engine pre-heat systems look great, but I don't want to run the heaters 24/7, and making a run to the airport the night before a flight to set the timers is not at all convenient. Technology comes to the rescue in the form of a cellular phone activated switch box (**Figure 11**) with two independently controllable outlets. Simply placing a phone call or sending a text to the switch box



Be kind to your equipment during the deep freeze of winter...

turns on the outlets. Completely configured with a mobile number for your area, the unit was last seen for \$275 at: <http://pilotportraits.com/switchbox.html>.

The operating manual can be found here: <http://pilotportraits.com/switchboxmanual.pdf>. An iPhone app has just been written to control the switch box via

a very intuitive interface (**Figure 12** and **13**). Any phone can activate the switch box, however.

As with any high current draw devices, be sure to check all electrical cords and ensure they are in good condition. Match timers and electrical accessories to the loads they will support. Additionally, ensure that extension cords are sized appropriately for the anticipated electrical loads.

Be kind to your equipment during the deep freeze of winter, and get out as often as you can to exercise your flying skills and give your Beechcraft some running time. Happy holidays, and happy winter flying!

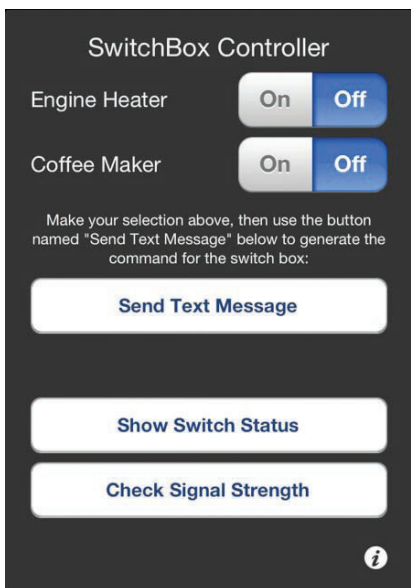


FIGURE 12

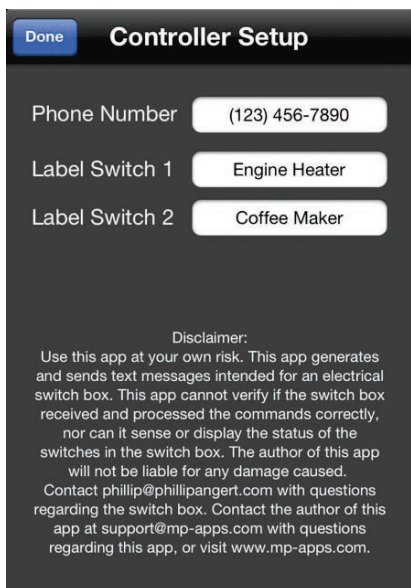


FIGURE 13

