Aeromomentum Aircraft Engines
First Engine Run and Break-in Procedure

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Ver 1.1 – check website for updates

Aeromomentum aircraft engines are a product of a long history of development and real-world field experience. The AM13 and AM15 engines have evolved and been tested in various applications for over ten years. A typical application is the commercial airboat, a severe, often eight-hours-a-day duty cycle. They often operate at full throttle and with little to no maintenance, but typically exceeding the 2000 hour recommended TBO. Some of these have seen 4000 hours and are still in service.
As has been the experience in the off-road and racing community, the basic Suzuki engine, which is the heart of the AM13 and AM15, appears to be near "bulletproof", according to many users.

Only recently have these highly developed products been offered to the experimental aircraft market. Currently (August 2019) more than 40 Aeromomentum engines are successfully flying in a variety of aircraft. Excellent results are being reported.
Important to the success of your own installation is the first run and subsequent break-in procedure. This document is an attempt to help the owner / installer of a new AM13 or AM15 engine succeed.

First engine run(s)
This is the most critical phase of a successful installation. Your engine was custom-tuned by Aeromomentum and run-in for a minimum of two hours on a dynomometer – an initial break-in, but not sufficient for full-power runs in your application. Additional run-ins and break-in steps will be required...but before we do that, an important step is to ensure the engine is filled completely with coolant and no air remains in the system!....and don't forget the recommended break-in oil for the gearbox and engine! (yes, it's been done)

Adding the coolant
The engine cooling system is designed to run with regular 50:50 automotive anti-freeze. Do not use waterless coolant, such as EVANS brand or others. Those are meant for non-pressurized systems; they have a higher boiling point, but are 30% less efficient for removing heat.
We do recommend using a coolant additive in hotter climates. A good one is *RedLine Water Wetter,* a surfactant additive that improves heat transfer from the engine. Mix about 4 ounces of RedLine 80204 in a gallon of anti-freeze.
As a guideline, the AM15 (slant version) will require approximately a gallon of coolant mix – more or less, depending on radiator size, hose lengths, and whether you use a heater core.
Add the coolant mix into the expansion tank (radiator cap). Pour as much as can fit, or until the engine won't accept any more – but this does not mean the engine is actually full; there will be quite a bit of air trapped in the radiator, the heater core, and the engine head itself – up to a quart of air.
Obviously, you don't want to overheat things in this condition, but repeated short runs will purge the air eventually.

Purging the air
We recommend the first runs be done without the cowling or propeller installed. Easier and safer, too. You'll be pleased to see how smoothly the engine runs.....and again, make sure you've got oil in the engine and gearbox!

Fill the overflow bottle to 50 percent and use a piece of tape as a marker at that level.
For the first run, start the engine at idle and let it run at about 1700 RPM for 30 seconds or so, then vary the RPM between 1700 and 2500 over about a minute. Watch the coolant temp gauge closely, and don't let it get over 150 deg F on this first run. Now shut it down and visually check everything over.

After a few minutes rest run it again, varying the RPM as before, but this time keep going until the thermostat opens. This will occur around 175 deg F. You might see a momentary fluctuation in coolant temp as the cold air/coolant from the radiator begins to flow. Shut it down when you've reached 185 deg F.

Now install the propeller and prepare for more extensive and higher temp runs. The prop provides cooling air to the radiator, which will be necessary as we progress here.

Note: Do not fly the aircraft at this time! *The prop is installed here only to aid in cooling as we take the engine to higher temps and continue the air-purging process on the ground. Do not fly until all air is purged!*

For the next several runs, we will take the engine up to higher temperatures, but nowhere near redline. Caution is needed here, because much of the air is still trapped in the engine and local hot spots can occur in the cooling jacket – especially in the head. Don't exceed 210 deg F.

With the engine fully cooled off (to ambient temperature) refill the overflow bottle to the marked level. With each successive run, the engine will purge air from the system, then it will suck in coolant from the overflow bottle during cool-down. Refill to the marker after each cool-down.
Eventually, you'll see the overflow level rise when the engine is hot, then drop back down to the marker when the engine cools. When this pattern is repeatable, and no more fluid is needed at ambient temperature, the air has been purged and you're good to go. This may require four to five run sessions – or more.

Break-in
Your AM13 / AM15 engine is at its core, a highly developed automotive engine. As such, you would not expect much caution during break-in. However, the automotive application assumes relatively low power duty cycle, while this application is more demanding. Your first takeoff will require full power in relatively low airspeed / low cooling conditions (climb-out). Care must be taken to limit the extremes of this on your first flights.

Critical to this is sufficient airflow through the radiator. This is entirely dependent on airflow characteristics in the cowling. Sufficient pressure differential between the front and rear face of the radiator is a must. See the document *Installation notes* in the Technical Tips section of my webpage *www.aerosaleseab.com* for guidelines on this. Don't ignore this.

Your first few takeoffs should be restricted to a shallower climb and higher airspeed profile than you might use later. Pushing over to level flight and reducing power to a cruise setting (say, 20 - 22 inches MAP) will see the coolant and oil temps come down in the first few flights.

Initial break-in will occur over about 5 hours in cruise. An interesting indication of this will be the engine breather output. If you route the breather line into a catch-bottle (instead of overboard), you'll collect about an ounce of oil in the first couple hours. As break-in progresses, this will subside. After the first five or so hours, it will virtually stop, indicating a successful break-in is under way – though not yet complete. Typically we like to see about 20 hours before declaring victory. At that point, we recommend changing the oil to synthetic or synthetic blend.

Routine operation
You will find the Aeromomentum engines to be smooth and powerful. The claimed horsepower and torque curve performance is backed up by real dynomometer data, custom-tuned for each engine. The reliability claims are backed up by ten years of sometimes punishing commercial duty in the field. These engines are proven, well-engineered alternatives to the conventional, legacy solutions commonly available.

So: Fly safely...and, as always, *Enjoy the Journey!*