The Thermo-Bob Review

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...not a farkle...a necessity.

Introduction & Cooling System Background

Engine temperature is more important than most of us understand. And consistently keeping your engine in a certain temperature range is even more important still.

There are a couple of reasons for this, so let me take a second and tell ya about it.

Modern performance engines are to a large degree reliant upon clearances. Clearance between the cams and the valve stems, clearances between the crank and its bearings, and of course clearances between the piston and the cylinder walls. Too much clearance and the parts rattle and beat themselves to death quickly. Too little clearance and an engine seizure is the result. Certainly we've all heard our engines make a little more noise and rattle when cold, and we've seen the result of high temperatures causing a crank or piston to "lock up" or "seize". Both cases are bad, very bad. This is why we always let the engine warm up to temperature before we ride, and try to control the high temperature as we ride.

Now we all know that metal expands with heat and contracts with cold. Knowing all about this, the design engineers that built your engine allowed for the engine to operate at an optimum temperature where the metal parts have expanded to a specific size, resulting in the perfect clearances for best power, and longest life. Anything to either side of this optimum temperature and obviously the opposite is true... diminished power and shortened engine life.

Surely I don't need to tell you about the importance of engine oil in the longevity of an internal combustion engine. But what you may not know is that the oil also has an optimum temperature at which it works best. And once again, allowing the temperature to move outside of this optimum range even for a short period of time is detrimental to the life of the oil…and thus the engine itself. The oil needs to be hot enough to freely flow into all the tiny spaces that require it, and also hot enough to boil off the water and combustion contaminates that naturally accumulates in the oil as a byproduct of engine operation. Yet if the oil gets too hot, it quickly (almost instantly) breaks down, looses it's lubricity, and is ruined.

So hopefully now you can understand that temperature control in your KLR650 engine is not just about controlling the upper end, and the boil over point, but also controlling the lower end as well, to keep the internal components and the oil hot enough to work best and last the longest. Hot enough to work properly, not so hot as to ruin the engine or oil.

KLR650 Cooling System

The engine temperature control system in the KLR650 is fairly simple. The engine generates heat. The liquid coolant is there to take that heat to the radiator via a pump. Air takes the heat from the coolant in the radiator and the process starts over. The upper end of the temperature range is controlled by airflow through the radiator. This is accomplished either by forward speed through the air (and maybe airflow enhancements like the Patman Radiator Mod), or by way of an electrically controlled fan to assist with airflow if the engine temps get too high.

The lower end of the temperature range is controlled by the thermostat in the cylinder head. This device blocks the flow of coolant to the radiator when the engine isn't hot enough to operate properly, and allows coolant to flow to the radiator when the engine starts to get too hot, thereby stabilizing the engine temperature at that optimum range we spoke of a minute ago.

Liquid cooling in internal combustion engines has almost become perfected. Take a look at the temperature indicator in your family car. Chances are, if it's a well-designed system, it comes up to running temperature fast, and stays there all day, with the needle barely moving at all.

It is here, in the stabilization area, that the KLR liquid cooling system falls short. You must have noticed that there are days when the needle moves through 30-50% of it's arc several times during the course of a single ride. You've probably seen it dangerously hot at a stoplight, then a few minutes later it's well below proper operating temperature as you get on the highway in the cool morning air. Sometimes in the winter, it never warms up at all, not allowing the oil to cleanse itself of contaminants or lubricate properly, and not allowing the internal engine components to heat up to proper operating temperature. This may look like the engine is running cool, but actually it's very bad.

The KLR is unable to control and stabilize the temperature of its engine. Like I said, this is bad. For all the reasons we spoke of above.

Part of the reason it can't control and stabilize the temperature of the engine is in the poor airflow through the radiator, causing it to run too hot. But we've found ways to fix this as was mentioned above.

It's the lower end of the temperature range that we've not been able to control. And as I've tried to explain, being too cold is just as dangerous to an engine as being too hot.

The fault here lies in the poorly designed KLR thermostat system.

Ya see, the KLR thermostat has at least two major problems. One is that it opens too soon at about 160 degrees, and the second is that there is no bypass around the thermostat to keep the coolant circulating through the engine as it heats up. The thermostat opening too soon causes the engine to run too cold (especially in winter), and the lack of water circulation causes the water in the top of the engine to get very hot, while the water in the lower part remains stuck there (and cold) until the thermostat opens at about 160 degrees. Then… the hot water rushes out, and the cold water rushes in …and closes the thermostat… until the cycle starts over. I don't need to tell you how bad this is for the parts in the engine.

What is needed is a method for the water in the engine to keep moving around so it heats up quickly and evenly, and also circulates around the thermostat, so it doesn't open and then slam closed with each inrush of cool water.

Thermo-Bob Kit Information

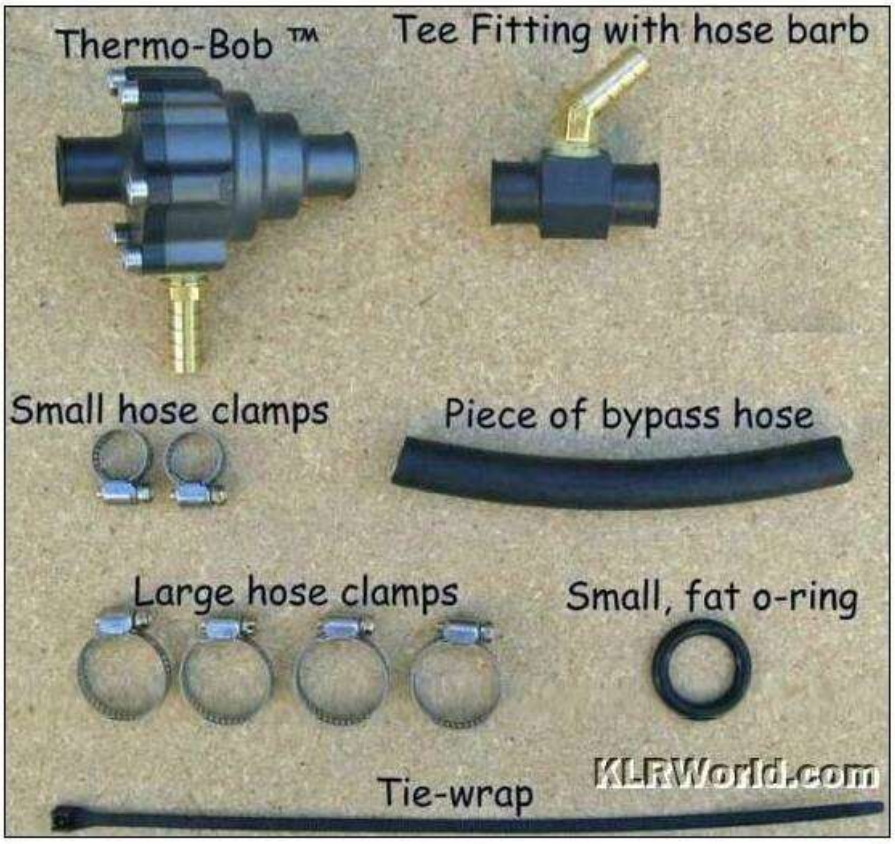
Watt-man's Thermo-Bob is a replacement thermostat in it's own housing that has a built in bypass circuit. It cleverly solves both of the problems with the stock Kawasaki thermostat. It's higher temp thermostat keeps the temperature at the proper and stable 195 degrees, while the recirculation bypass system allows for faster warm up to operating temperature, a much more even temperature within the cylinder and head, and prevents an inrush of cold water by constantly circulating warm water back into the engine's water inlet. Bill's done his homework on this venture and his website has a wealth of info about it.

The device comes in a kit with everything you need other than hand tools (little more than a sharp knife, screwdriver and a basic socket set) and fresh coolant.

All the parts you'll need come in a neatly boxed kit.

The kit includes-

- The Thermo-Bob
- Tee fitting with hose barb
- 2 small hose clamps
- Piece of bypass hose
- 4 large hose clamps
- a small, fat O-ring
- 1 tie wrap



From the beautifully machined device itself, to a single zip-tie to secure it, all is included in the box. The instructions that are e-mailed when you order the kit are among the best I've ever seen. There are several pages, with color photographs (in fact, the photos in the instructions are so good that I've decided to use many of them here) Where necessary, the separate components in the photographs are color coded, and the parts breakdown and any possible future maintenance is all covered therein. The supplied hardware is of outstanding quality (though I would've preferred phillips to slotted fastener heads on the hose clamps) and the machining of the main thermostat housing is outstanding. By the way, you'll recognize Bill's machinist for this device as none other than Eagle Mike of Eagle Manufacturing.

Installation

In it's most basic form, the install goes like this. Pull the tank and shrouds. Drain your coolant (when cold of course). Ya pull your old low temp thermostat, and put the cover back on with the new o-ring. Then cut the hose that connects the old thermostat housing to the radiator right where it crosses the valve cover to head junction. Insert the Thermo-Bob device there using the supplied clamps. Measure and cut the return line from the radiator to the pump. Install the recirculation "Tee" fitting there (again with supplied clamps), and connect the "tee" fitting to the bottom of the Thermo-Bob device with the supplied bypass hose and clamps. Use the supplied Zip-Tie to hold it in place. Replenish your coolant. Reinstall the tank and shrouds. Enjoy the peace of mind that you've added years to the life of your engine. It took me 45 minutes with notes and picture taking and the installation of a digital temp probe.

During the install, I saw little need for departure from the well written instructions. One thing I did do however was (instead of removing it) to simply hang the coolant tank from my turn signal stalk with safety wire, just to save a minute or two.

You'll notice in the picture above that I've got an extra electrical panel that rests behind the coolant tank. Even with all these extra "space sinks", the Thermo-Bob installation was well thought out and there still remains plenty of room.

As I said, there is little I can add to the excellent instructions, but I'll throw in a picture or two to give ya an idea of what it looks like in the real world.

Below is the (in my case) installation of the temperature probe for the Vapor Digital instrument panel. This was a great aid in testing, since the manufacturer claims a 195 degree thermostat opening (that is by the way, EXACTLY what I saw).

The device is actually a little wider than the 1/4" inch I left for it, but the extra hose helps to hold it away from the cylinder head. You can alter yours as needed, but start small, you can't add hose once you've cut it.

Below is a shot of the thermostat housing installed. Notice the hose clamps aren't tight yet. This is to allow you to "aim" the bypass fitting on the thermostat housing at the bypass "t" fitting later in the install.

Now, specific measurements are given in the instructions as to where to cut the radiator return hose for the bypass "t" fitting. Simply measure and cut, install the bypass "T" and the clamps, and before tightening the clamps, you'll want to "aim" the thermostat housing bypass fitting and the bypass "t" fitting at each other. It makes for a cleaner install. Then you can tighten the clamps.

There is a supplied bypass hose and clamps of course. I installed mine to the Thermo-Bob thermostat housing first with it's clamp, and then routed it down to the bypass "T" fitting. You'll see in the picture below that the supplied hose is a bit too long. The reason for this is so you can add some upward support to the thermostat housing by cutting the hose a bit long so that the Thermo-Bob will "rest" on the bypass hose. I cut off about half of the extra (shown in the picture) hose leaving it about 1/4" longer than the bottom of the barbed fitting on the bypass "T".

Not much to it after that. Check all the hose clamps, use the supplied Zip-tie to adjust the position of the thermostat housing as needed (I didn't need it), fill with coolant per the instructions, reassemble, and ride.

Here's how it fits in after final install. (remember, the wire to the inline temp probe for the Vapor, is not part of this kit)

Testing and Final Findings

In order for you to understand the testing, you need to understand the bike and the environment in which it's operated.

The test bike was of course the Patman Racing KLR705, fitted with massive performance enhancements from Schnitz Racing, and the Rekluse automatic clutch. This is a high performance bike and it requires a high performance cooling system to go with it. The front fender is vented for increased airflow, the Patman Radiator mod has been accomplished, (of course) there is a manual switch for the electric fan, and certainly the finest liquid coolant is in effect.

Immediately after this install the bike was taken to the desert of Moab Utah and ridden hard for a couple of days as though it were a desert racer in the 95 degree heat. After that trip, I came back to Texas, and ran many early morning trips in the cool rain, and many late afternoon trips in the 100 degree heat.

The short of it is this. In all cases, the Thermo-Bob performed *exactly* as the manufacturer claimed. Having the digital engine temperature readout on my Vapor Instrument panel, combined with input and ambient temperature readings from a stand alone MAC Tools digital temp probe confirmed all of this.

Warm-up times are easily cut in half depending on ambient temperature. And as advertised, the temperature stays consistant all day long, day after day, test after test. I saw at the lowest (after a quick warm-up) 189 degrees F. And a Max of 215 degrees F. well below the boil over point here in Texas with the coolant I run. (210 degrees is where the fan turns on automatically during intentional "overheat" tests...it never boiled over).

Generally in 8 weeks of testing, I would say that 90% of the times that I've looked at the cylinder head output temperature, it has been at exactly 195 degrees F and rarely moves away from that.

I'm Satisfied. This thing works. In addition to all of this, and as a side note, Bill also sells a kit (not reviewed here) that will add a template to your existing KLR650 temperature gauge to allow for a bit more accuracy in determining your coolant temperature.

So here's the official KLRWorld Rating.

The product is (unlike many gimmicks we see) exactly as the manufacturer says it is. The theory and technology are sound. The hardware is (though a little bulky) unobtrusive in application, and the supplied kit and instructions are excellent. Installation, though detailed, is straightforward, and not outside the realm of the average do-it-yourselfer. Measured temperatures, deltas, and times to temperature, were in every case within just a few points of manufacturer's claims. The price is fair, and the manufacturer's web support page is complete.

Fact is, I can't find anything wrong with it, and knowing that it's installation has potentially added years of service life to my expensive high performance engine, awards it a rating I've never given to any product, a 10 out of 10 !