

Thermo-Bob™ Installation Manual: KLR650A (1987-2007)



Thank you for purchasing the Thermo-Bob™ radiator bypass system for the KLR650. Since the KLR already has a *doohickey*, it seemed that this *thingamabob* for the KLR needed a name too.

Proper installation is critical: if you are not familiar with or feel uncomfortable with heated, pressurized liquid cooling systems, you should have a professional install the kit. Improper installation can cause engine overheating and possible engine damage.

Read through these instructions completely to familiarize yourself with the hardware names and installation procedure. This will also allow the bike to cool off if ridden recently.

Other than basic tools (small wrenches / slotted screwdriver), gather the following items that you will need but are not included in the kit:

- Box cutter or sharp knife
- ~52 oz. of 50/50 coolant
- Depending on the age / mileage of your bike, you might want to have new radiator hoses ready for the installation.

The Thermo-Bob is already assembled, but if you ever plan to disassemble it, you will need a 4mm (or 5/32 inch) allen wrench.

Familiarize yourself with the parts in the kit per **Figure 1**:

(1) Thermo-Bob, assembled from:

Housing
Cap
Six screws
Thermostat
Large skinny o-ring
Straight brass hose barb

- (1) Tee Fitting with 45° 'bypass' hose barb
- (2) Small hose clamps
- (1) piece of bypass hose
- (4) Large hose clamps
- (1) Small, fat o-ring
- (1) Tie-wrap

PREPARE THE AREA

- 1) Remove the right radiator shroud that is an extension of the fuel tank by removing the two bolts that retain the shroud through the coolant overflow tank, and the upper screw that attaches the shroud to the fuel tank. Release the plastic nipple where the shroud ‘pops in’ to the rubber grommet at the lower front of the tank, and remove the shroud.
- 2) Remove the front fender (four bolts). It’s very easy to remove and will make your work easier. Then remove the engine skid plate and the black cover from the coolant overflow tank.
- 3) You now need to remove the overflow tank. First, slide the upper vent hose off of the nipple on the top of the overflow tank as shown in **Figure 2**. Be careful not to break the nipple off of the plastic overflow tank – it usually helps to twist the hose first to break it loose. On the bottom of the overflow tank, you’ll see a second hose – but don’t remove it from the tank here or coolant will pour out. Instead, remove the black screw-on “fill” cap. Then remove the final two bolts that hold the overflow tank to the frame, and invert the tank over a drain pan to empty out the contents. Loosely reinstall the overflow tank cap, remove the lower hose from the overflow tank nipple (again, be careful, it’s plastic and has lived near the exhaust pipe since the bike was new!) and set the overflow tank aside. It is recommended that you inspect to verify that the lower nipple is truly open, there have been instances where KLR’s are assembled and shipped with that nipple plugged! This is also a good time to flush the inside of the overflow tank, as it has probably never been cleaned since the bike was new.
- 4) Carefully remove the radiator cap after the engine is cool and pressure has been relieved from the cooling system. **If you do this while the coolant is still hot, you will burn yourself.**
- 5) Drain the coolant into a suitable container, remembering to keep it away from children and pets due to the toxicity. The drain plug (8mm head) is in bottom of the water pump housing as shown in **Figures 3a and 3b**. Approximately 35-40 oz of coolant will drain. Reinstall the drain plug in the bottom of the water pump with its sealing washer, and torque to 70 inch-pounds (that’s only 5.75 foot-pounds).
- 6) Your next task is to remove the exhaust headpipe. I have found this to provide more room, and be easier than the old method, which was to remove the side covers, seat, fuel tank and left radiator shroud. There are a few things in the way of removing the headpipe so first remove the two screws that retain the rear master cylinder cover as shown in **Figure 4**, then remove the one 10mm head bolt that holds on the rear master cylinder reservoir as shown in **Figure 5a**. Now loosen the rear exhaust clamp (**Figure 5b**) about 6 turns and open the clamp slightly to release any clamping load, then remove the one 12mm-head bolt that holds the headpipe to the frame (**Figure 5c**). We’re getting close. Remove the two 12 mm-head acorn nuts that hold the headpipe to the cylinder as shown in **Figure 5d**, then slowly remove the headpipe from the bike by pulling it forward as shown in **Figure 6**. NOTE: pay attention to the copper crush washer (Red arrow in **Figure 6**). Unless you have a new one ready to go, it is recommended to keep track of the washer’s orientation so that upon reassembly, you can put it back in the same way that it was before.
- 7) OK. Now you have a good view of where you’re going to work. **Figure 7** shows the three main hoses involved in the KLR cooling system (the exhaust pipe was still installed when this photo was taken). All hoses have been colored to help in identification. Two of the three hoses will be modified to install this kit. The upper hose (red/purple) will have the Thermo-Bob installed in it. The lower blue hose will have the tee fitting installed in it. **Note that the blue hose attaches to the REAR nipple on the water pump housing.** The lower gold hose will stay as-is, do not cut it up. **Did you catch that? If you mistakenly install the tee fitting in the GOLD hose instead of the BLUE hose, there will be no coolant flow, the engine will overheat and engine damage could result.**

ASSEMBLE THE THERMO-BOB

(Steps 8 through 11 have already been completed for you but are spelled out below if you ever take the Thermo-Bob apart in the future.)

8) Locate the thermostat from the kit and verify that the retention tabs have been cut off as shown in **Figures 8 and 9**. The thermostat will not fit in the housing until the tabs are removed.

9) Lubricate the outside diameter of the thermostat's rubber seal and the inside of the Thermo-Bob housing with a thin film of coolant as shown in **Figure 10**. Then push the thermostat into the housing as shown in **Figure 11**. Before pushing it in, orient the thermostat in the housing as shown in **Figure 12**. It is important to push it in firmly until it bottoms squarely in the housing and does not protrude more than 0.005" above the edge as shown in **Figure 13**.

10) Lubricate the large, skinny o-ring with coolant and install it in the housing cap as shown in **Figures 14 and 15**. Be sure it is down in the groove all the way around. Then install the cap onto the housing - **Figure 16** reminds you that the o-ring will slightly separate the housing and cap. Install the six housing screws. They should spin in easily: if one does not, back the screw out a turn and try again. Install them finger tight, *then* tighten them in a cross-pattern, ½ turn at a time to seat the cap against the housing as shown in **Figure 17**. Finally, torque the screws to 45 to 50 in-lb.

11) Place a thin layer of pipe dope (not provided) around the threaded end of the straight brass hose barb and thread it into the bypass port on the Thermo-Bob. The hose barb and housing use tapered pipe thread, so the effort required to continue turning the fitting will increase as you continue - snug it up good.

Your finished product should look like **Figure 18**. Note how water moves through the part so that you can install it properly.

UPPER HOSE MODIFICATION AND OLD THERMOSTAT REMOVAL

12) Measure along the outside bend of the upper radiator hose as shown in **Figure 19** and mark the hose at a distance of 7.0 inches and 8.5 inches from the engine end. Cut the upper radiator hose at those two points, being cautious to make a straight cut that is perpendicular to the axis of the hose. Depending on how your upper hose was originally connected to your original thermostat housing nipple, you might find it helpful (see **Figure 20**) to loosen the radiator clamp at the original thermostat housing, slide the hose out 0.25 inches further on the nipple, and then retighten the clamp, being certain that the clamp is still to the 'left' of the barb on the nipple. This might help you in step 14.

13) Loosen and then remove the three bolts (8mm head) on the factory thermostat housing – the bolts are circled in red in **Figure 21**. In the side of the cylinder head you'll see the original thermostat and gasket as shown in **Figure 22**. Remove them as shown in **Figure 23**. This is where the small, fat o-ring is going to be installed as shown in **Figure 24**. Inspect the sealing surfaces - a few gentle swipes with fine sandpaper will clean this surface up if necessary, then wipe clean with a damp cloth to remove any grit that may be left behind. Lubricate the o-ring with coolant and place the factory thermostat housing over the o-ring. **IMPORTANT: Be careful installing this – run the bolts down finger tight, then turn each bolt ½ turn at a time in succession to slowly seat the housing against the cylinder head, then torque to 70 inch-**

pounds (that's only 5.75 ft-lb). If you don't do this 'shared' method of tightening the housing bolts and crank only one bolt all the way down first, you will damage or break an ear off the factory housing.

14) Install the Thermo-Bob in the gap of the upper radiator hose for a trial fit without clamps. During this trial fit, your goal is to place the Thermo-Bob in its final location that doesn't touch the frame downtube, overflow tank or cam cover / cylinder head. Note in **Figure 25** how the Thermo-Bob is clocked about 30 degrees counter-clockwise to improve clearance between the housing's lugs and the cylinder head. Without using any bolts, place the overflow tank back in its normal location by hand to verify that you will not have contact between the Thermo-Bob and overflow tank as shown in **Figure 26**. If you find that they touch, you should cut another bit off the upper hose on the 'radiator' side, which will pull the Thermo-Bob to the left side of the bike a bit further. It is possible to have light contact between the Thermo-Bob and the cylinder head at this stage. The tie-wrap (coming up in step 18) will allow you to pull the Thermo-Bob slightly away from the cylinder head. As shown in **Figure 27**, place alignment markings on the hose on each side of the Thermo-Bob. Remove the Thermo-Bob from the bike and locate the piece of bypass hose from the kit. Dip one end of the bypass hose into coolant, wipe off the outside and slide the wetted hose end onto the brass hose barb on the bottom of the Thermo-Bob. Install and tighten a small clamp from the kit in the orientation shown in **Figure 28**. Locate two large clamps from the kit, then using your alignment markings, install the Thermo-Bob in the upper radiator hose as shown in **Figure 29**. Tighten both new clamps properly to hold the Thermo-Bob in place.

LOWER HOSE MODIFICATION

15) Please note back in **Figure 7** that I've also colored the two lower coolant hoses; one goes from the radiator to the water pump (colored blue) and the other goes from the water pump to the bottom of the cylinder (colored gold). The blue hose will have the tee fitting installed in it. Remove the two clamps that hold the lower ("blue") hose to the KLR and remove the hose. On the radiator tank end, mark and cut out a $\frac{3}{4}$ inch long section of hose that occupies the 2 $\frac{1}{4}$ " to 3" placement from the end as shown in **Figure 30**.

16) As shown in **Figure 31**, reinstall the lower hose on the bike with the tee fitting oriented as shown in the lower hose, plus two new large clamps from the kit. When you're happy with the brass barb orientation, tighten all four large clamps that hold the lower hose to the KLR as well as the Tee Fitting.

17) It is now time to determine the proper length for the bypass hose. It is provided a little too long on purpose to accommodate variations in each installation. If you leave the bypass hose too long, it might kink and restrict bypass flow, resulting in the thermal cycling that the original cooling system is known for. As shown in **Figure 31**, push the bypass hose over against the side of the bypass barb and mark the hose where it should be cut (yellow line in **Figure 31**). After cutting the bypass hose at that point, slide the remaining small radiator clamp from the kit up the hose, dip the free end of the bypass hose in coolant (I lift a small cup of coolant up to the hose), wipe off the outside and slide it onto the bypass barb. Slide the loose small clamp down the bypass hose and tighten it appropriately.

18) Inspect for interference between hoses and metal parts that could rub a hole in them. If you are concerned about clearances anywhere, the tie wrap provided in the kit can be used to apply tension in the direction you wish, but the most common use is to pull the Thermo-Bob slightly forward towards the frame downtube to improve clearance between the Thermo-Bob and the cylinder head. Installation is now

complete, it should look like **Figure 32**. Make one final check of all radiator hose clamps to be sure they're all tightened properly.

19) Reinstall the exhaust pipe and crush washer (**Figure 6 then 5d**), placing the copper crush washer in the same orientation in which you found it. Install the two acorn nuts in a shared method to place the exhaust collar parallel to the cylinder head – then torque both to 15 ft-lb. **I'll remind you here that you will need to retorque these two fasteners to 15 ft-lb a second time after the engine has been through a thermal cycle, as the crush washer might relax.** Reinstall and torque the headpipe-to-frame clamp (**Figure 5c**) and rear exhaust clamp (**Figure 5b**), torquing both to 15 ft-lb as well. Reinstall the rear master cylinder reservoir (**Figure 5a**, 40 inch-lb), and rear master cylinder cover (**Figure 4**, two phillips screws).

20) Reinstall the overflow tank with two bolts in the holes closest to the frame downtube (40 inch-lb). Reconnect the two small hoses to the overflow tank nipples. Remove the fill cap, and pour 14 oz. of 50/50 coolant into the overflow tank. Tighten the cap.

REFILL THE COOLING SYSTEM

21) The cooling system typically holds about 38 oz of 50/50 coolant, but without a bleed hole in the thermostat, filling the cooling system is a little more complex. Fill the radiator nearly to the top by pouring in 50/50 coolant – this should take around 28 fluid oz. Start the engine and let the bike run between 1000 and 2000 rpm with the radiator cap off. By running the engine for less than 30 seconds, the air should be purged in the system and the coolant level will drop in the radiator. Shut off the engine and you should be able to add the final 10 oz. of coolant. Then replace the radiator cap, being sure it is on correctly.

22) Replace the black coolant overflow tank cover, skid plate, front fender and right radiator shroud. Torque all bolts to Kawasaki specification. It's time for a test ride!

23) Ride the bike a short distance to allow the cooling system to heat and pressurize itself so you can conduct leak checks. Once home, let the bike completely cool. Then you can remove the radiator cap again to be sure the system is truly topped off. Check all hose clamps one more time, and **retorque the two 12 mm-head acorn nuts that hold the exhaust headpipe to the cylinder one final time at 15 ft-lb.**

Installation is complete. If you have any comments or questions, contact me at watt-man@cox.net.

REPLACEMENT PARTS

(Recommended replacement frequency: every 5 years or 40,000 miles, whichever comes first)

The replacement thermostat is produced by STANT, and four different thermostats will fit. Due to the fact that Stant has two different ways to reference a particular part (the catalog usually uses the “box” number) these four thermostats can be referenced with eight different part numbers. The photos below clarify the Stant numbering scheme.

Unless special ordered, your Thermo-Bob was shipped with a STANT 29829 which is a 195°F thermostat. Do not try to cross-reference the part number to a different brand, they typically will not fit properly. If you are unable to find parts locally, replacement thermostats are available below and include shipping fees to the US or Canada:

Thermostat: \$12
O-ring kit: \$5 (includes both o-rings from the kit – one ‘large/skinny’ and one ‘small/fat’).



There are two methods to provide payment:

1) A personal check or money order to:
Watt-man LLC
6501 E. Greenway Pkwy
#103-296
Scottsdale, AZ 85254

and at the same time, send an e-mail to watt-man@cox.net so I'll be able to box up your order and wait for your check.

2) PayPal to watt-man@cox.net

If you need other parts (brass fittings, aluminum housing pieces etc.) contact me as well. Same e-mail address as above.

IM07 V9c

Thermo-Bob™



Tee Fitting with hose barb



Small hose clamps



Piece of bypass hose



Large hose clamps



Small, fat o-ring



Tie-wrap

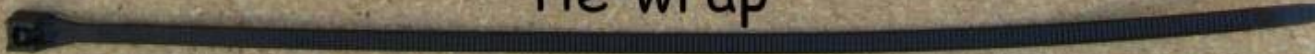


Figure 1 – Thermo-Bob™ kit contents.



Figure 2

Remove upper vent hose
from overflow tank as shown

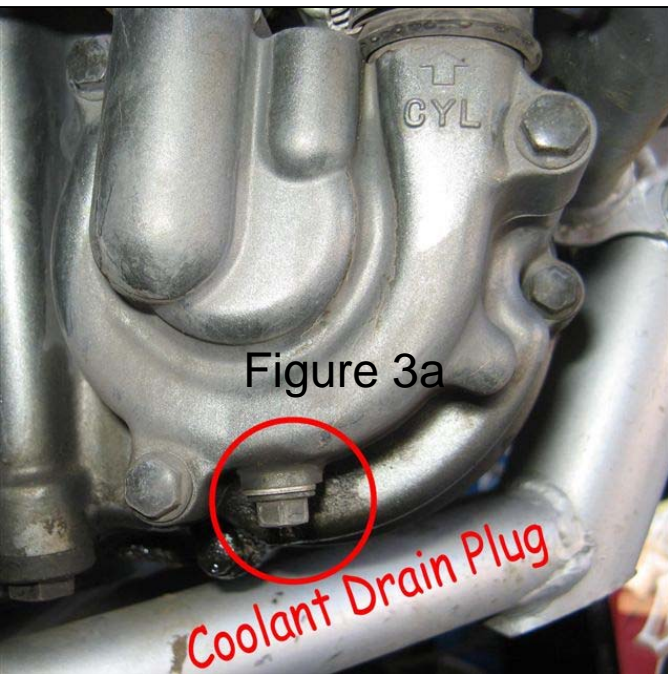


Figure 3a

Coolant Drain Plug



Figure 3b



Figure 4



Figure 5a

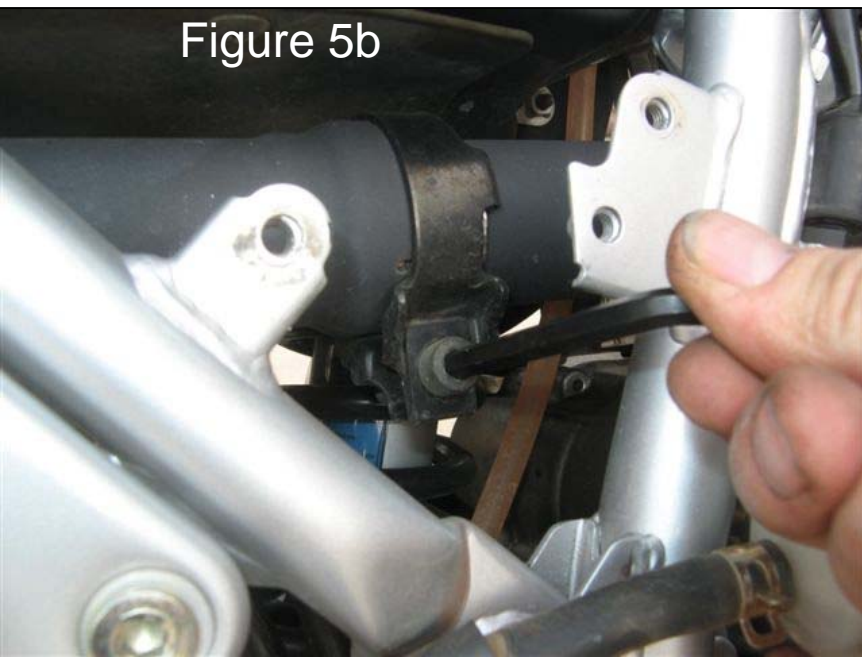


Figure 5b



Figure 5c



Figure 5d



Figure 6
(Red Arrow points to
copper crush washer)

Upper Hose
(Head to Radiator)
T-stat assembly
will go in this hose.

Hose: Radiator
to water pump.
Tee fitting will
go in this hose.

Hose: Water Pump
to cylinder. This
hose will NOT
be modified.

Figure 7

T-stat with full
tabs still in place



Figure 8

T-stat with
tabs cut off



Figure 9

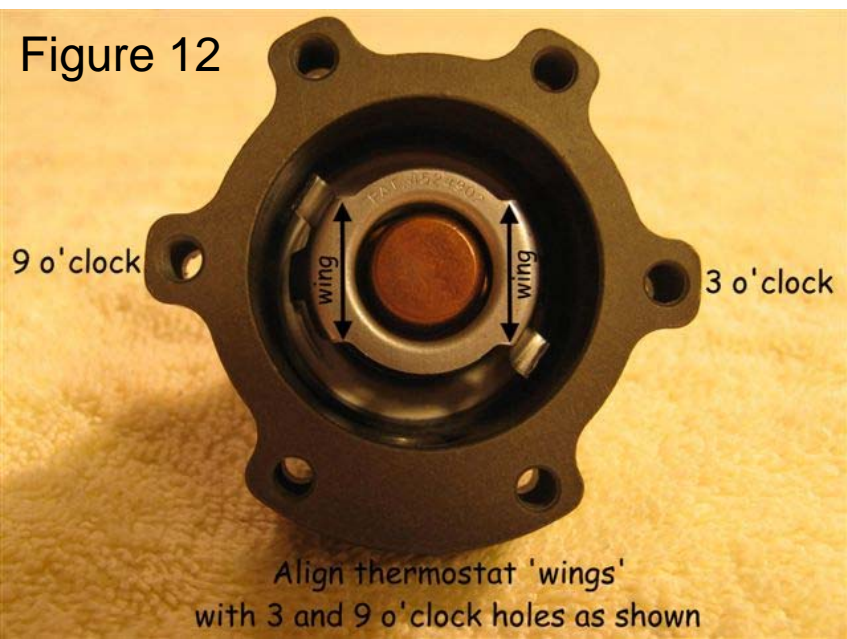
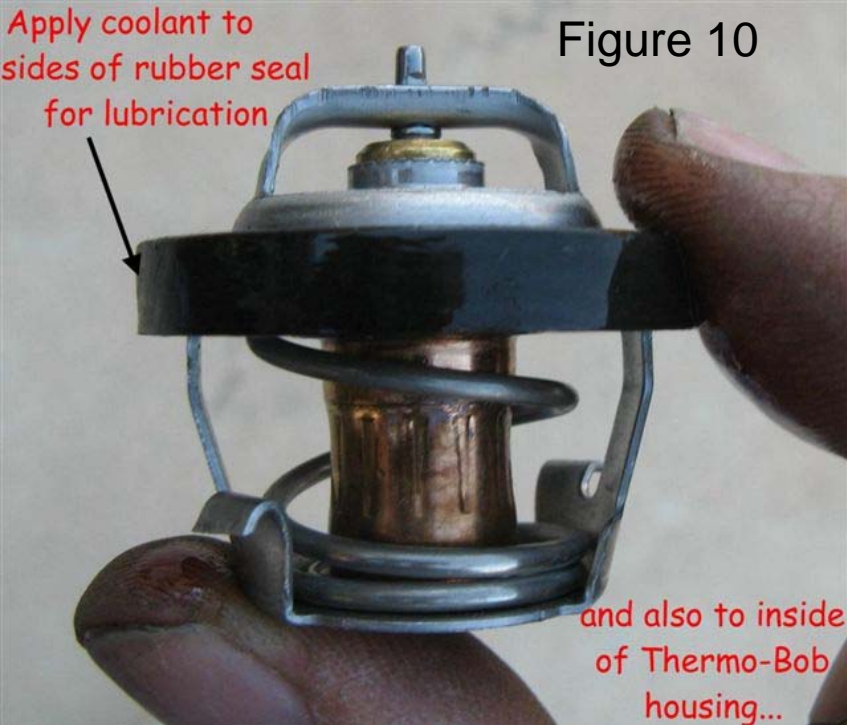
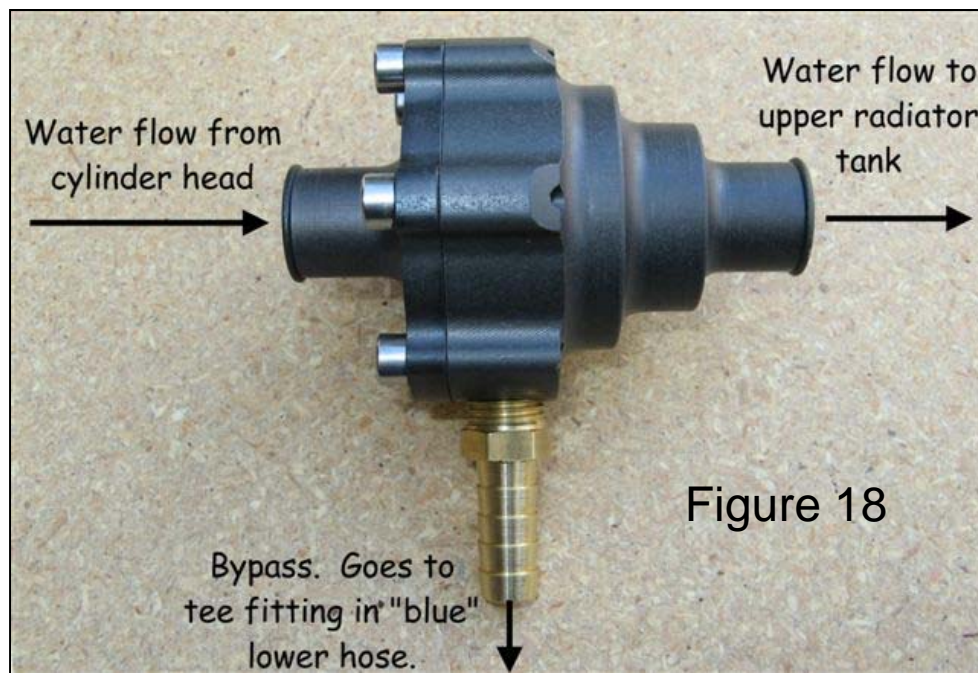




Figure 14



Figure 15



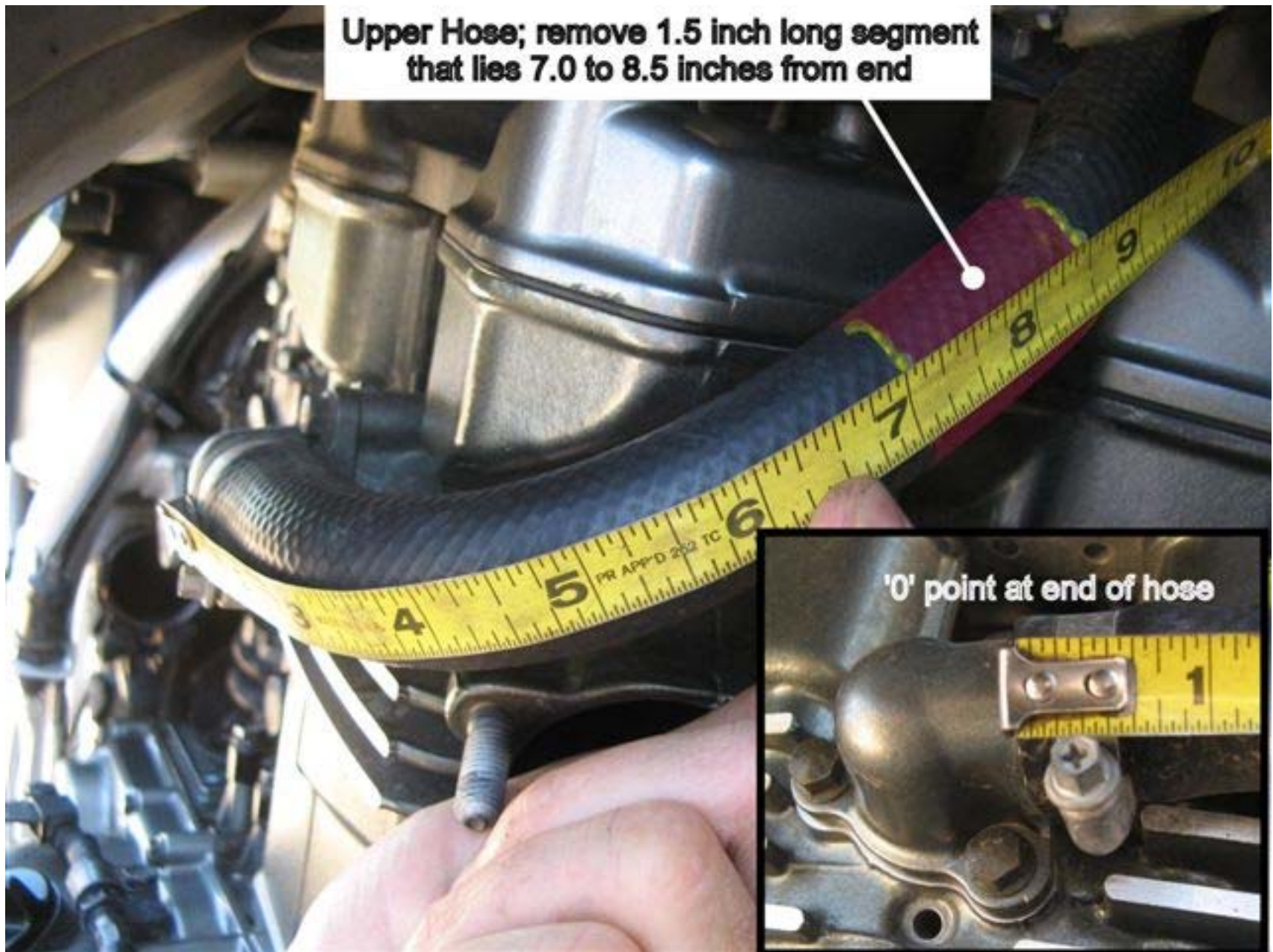


Figure 19

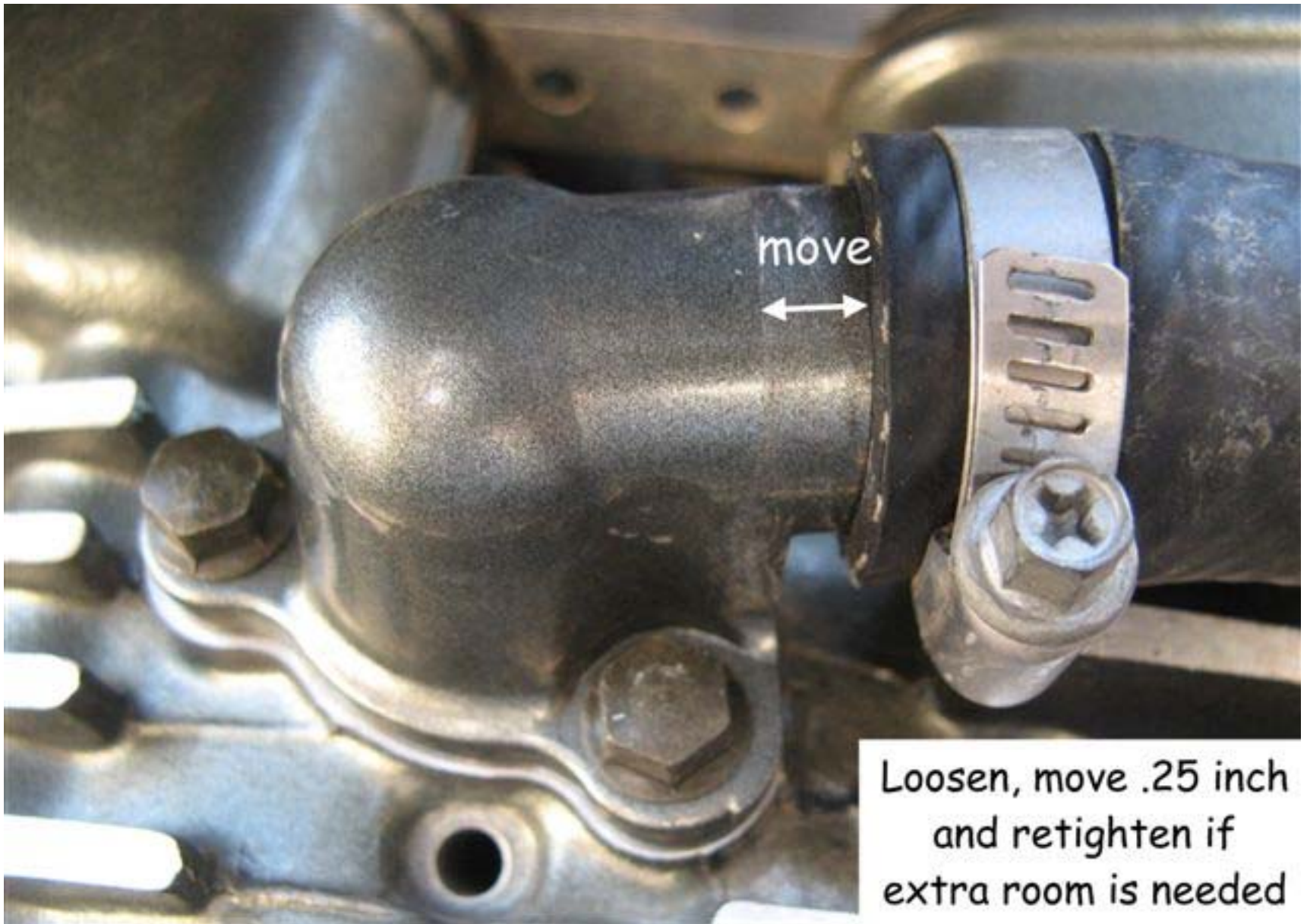


Figure 20



Figure 21



Figure 22

Figure 23

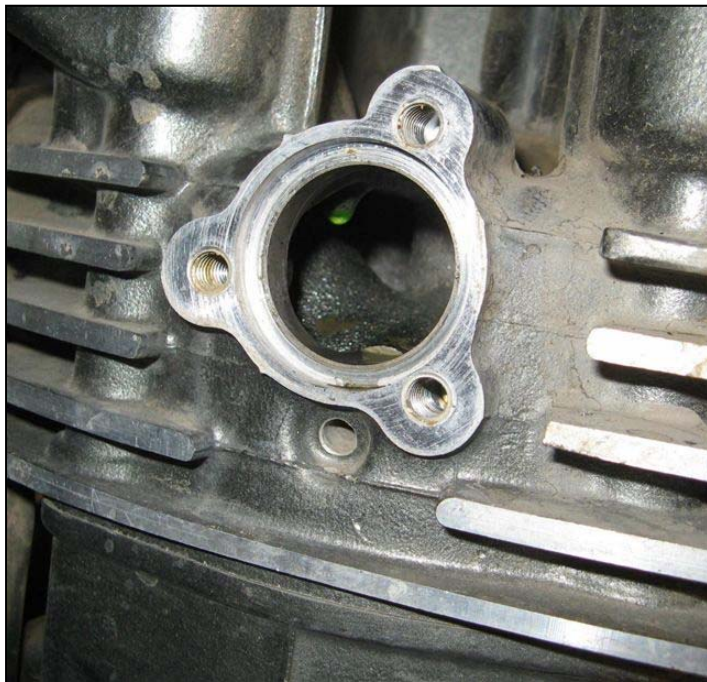


Figure 24





Figure 25

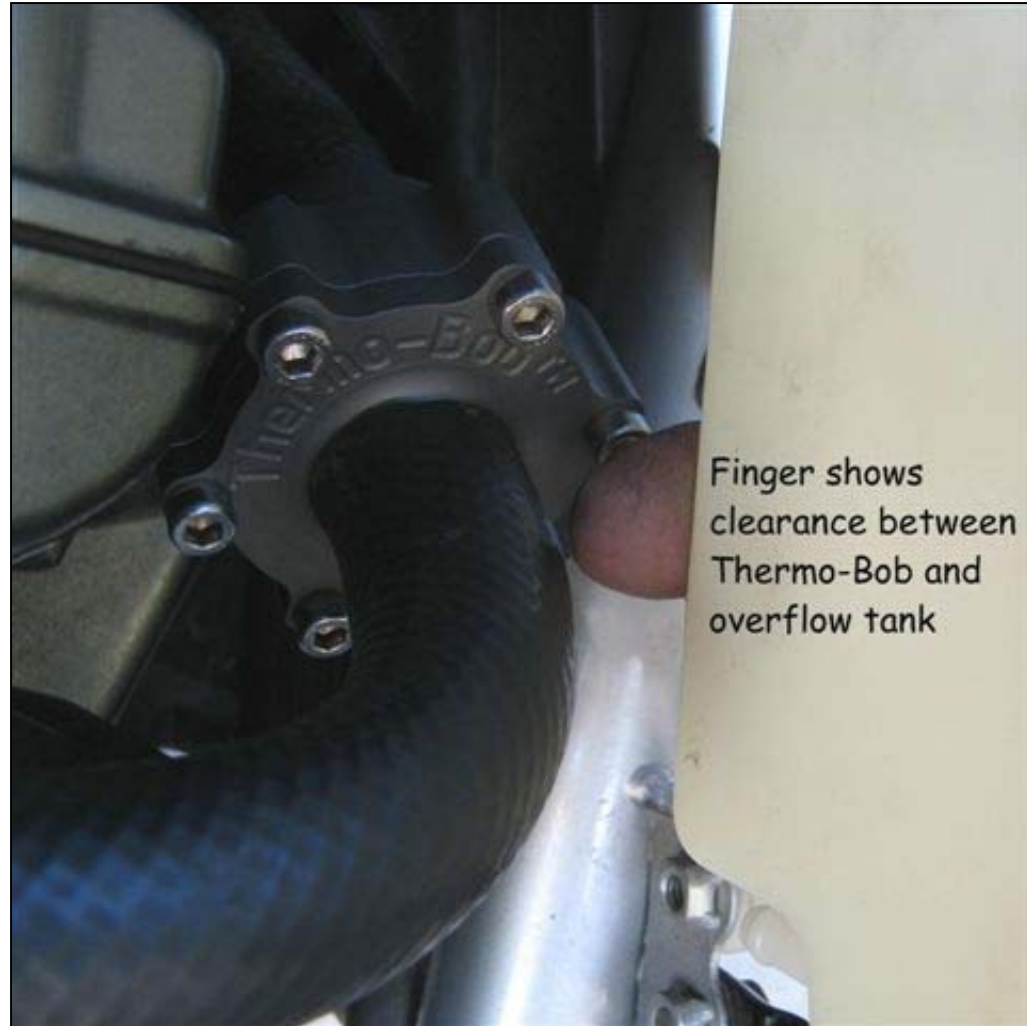


Figure 26



Figure 27



Figure 28

Figure 29



"Blue" hose - this end goes to the lower radiator tank

Remove 3/4" section from hose - Tee fitting will slide in here

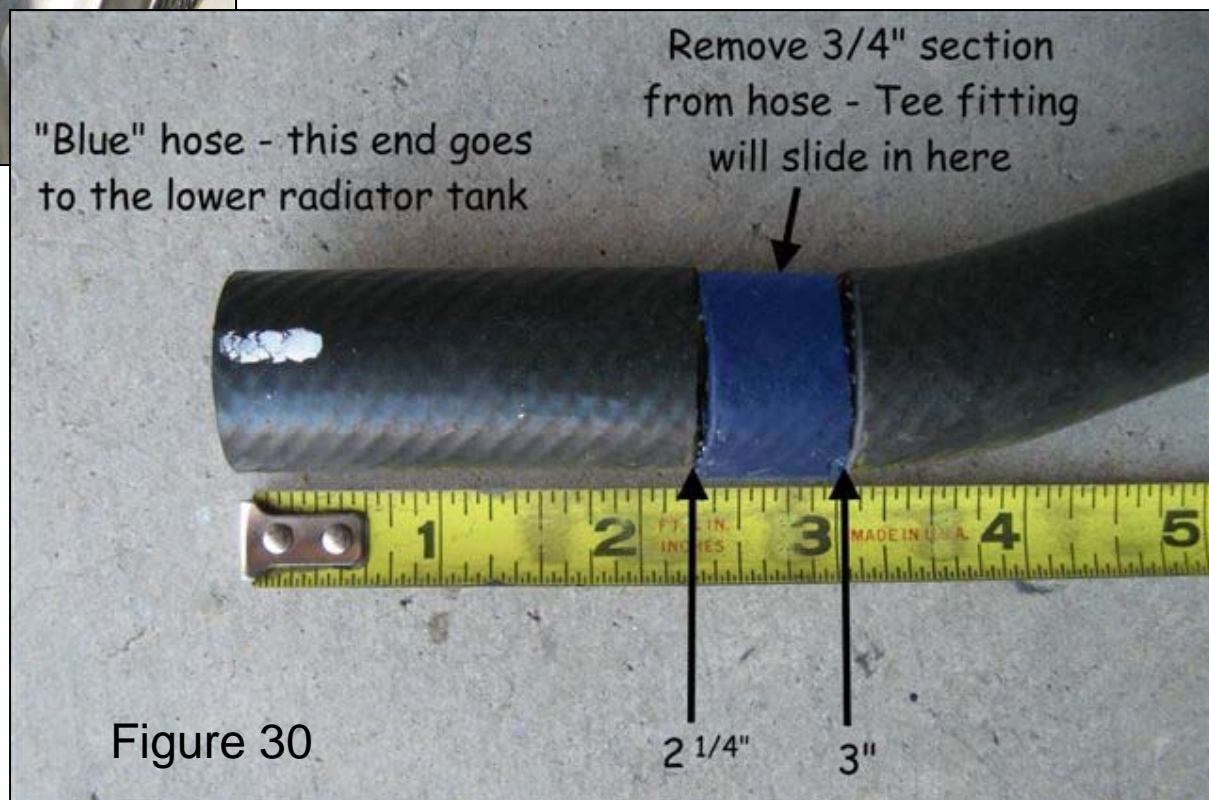


Figure 30



Figure 31



Figure 32