Robertshaw-design Balanced Thermostat Installation

The supplied thermostat may carry trade name identification as "Robertshaw", "Stant", "Purolator", "Prestone", or "Atlas". No matter which "brand name" may be associated with this part, it was originally produced by Robertshaw Controls and is now manufactured for Cooper Standard, a major supplier to the automotive industry.

The Robertshaw part number is 370-XXX (where XXX represents the set-point of the thermostat, i.e. 160f, 170f, 180f, 195f, etc.).

This "balanced" thermostat design is an integral component of the OEM International Harvester four-cylinder (152/196c.i.) and SV (266,304,345,392c.i.) engine cooling system. This thermostat must be installed correctly to insure proper engine cooling.

It is recommended that this thermostat be installed only after the entire vehicle engine cooling system has been cleaned and flushed using an approved chemical treatment system. If the cooling system has been long neglected and not maintained according to a standard maintenance schedule, additional work may need to be performed such as removing engine block/cylinder head core plugs to allow access to the engine water jacket for interior cleaning.

WARNING:
Cooling system "flushing" may also "induce" coolant leakage at casting core plug locations, the water pump shaft seal or "vent" location, heater temperature control valve, heater core, radiator, or any coolant hose connection point. Be prepared with any additional parts or supplies needed to correct these conditions. This is also the appropriate time to replace all cooling system plumbing/hose components, most especially the "bypass" hose.

Suggested Procedure:

- Incorporating local waste engine coolant handling practices and regulations, drain the engine coolant into a suitable container and set aside for disposal in an environmentally-responsible manner.

- Remove the upper radiator hose from the "water neck" and radiator inlet connection point and set aside for cleaning and/or replacement.

There are several different water neck designs used on IH engine applications. IH/OEM-supplied and installed fasteners for the water neck are "grade 8" quality and appropriate replacement fasteners are supplied in this kit. It is highly recommended that the old fasteners which were removed, not be re-used due to excessive corrosion which will be present. These two fasteners are used to "sandwich" the thermostat housing between the water neck and the intake manifold mounting boss. Upon removal of the water neck, the existing thermostat will be visible. Note it's "design-type", condition, and verify if it was previously installed in the correct manner.

Note:

It is possible to install either an RS 370-XXX thermostat or a "conventional" thermostat (non-RS design) "upside down"! If installed incorrectly, the thermostat CANNOT perform correctly! For diagnostic purposes, identify the installation "direction" of the old thermostat before removal from the housing.
The "copper pellet" or sensing element goes TOWARD the intake manifold or in the "DOWN" position!

Figure 1: Water Neck For Some SV Applications

Figure 2: Water Neck for Some SV Applications

Figure 3: Early SV Water Neck, Thermostat Housing, Thermostat, and Gaskets/Fasteners

- Remove the short 90 degree molded bypass hose from the thermostat housing and the water pump and set aside for cleaning/replacement.

Various engine variations may have a heater hose nipple, temperature sensor, or thermo-vacuum switch installed into the side of the thermostat housing. Carefully identify and label any wiring or vacuum hose connections before disconnecting or removing any of these items to avoid any confusion when re-installing. Other variations may have only a "pipe plug" installed in the thermostat housing.

- Remove the water neck and the thermostat housing from the intake manifold and set aside for cleaning.

- Use a gasket scraper and appropriate solvent to clean the intake manifold mounting flange where it mates to the thermostat housing. Be careful to avoid allowing any debris to enter the opening in the manifold. Also clean the threaded holes for the fasteners, it may be necessary to "chase" the threaded holes with an appropriate tap.

- Next, carefully clean the previously-removed water neck and thermostat housing machined surfaces. Pay special attention to the counter-bore on the thermostat housing in which the thermostat is seated. This area must be clean and have absolutely no residual corrosion or gasket material or adhesive present.

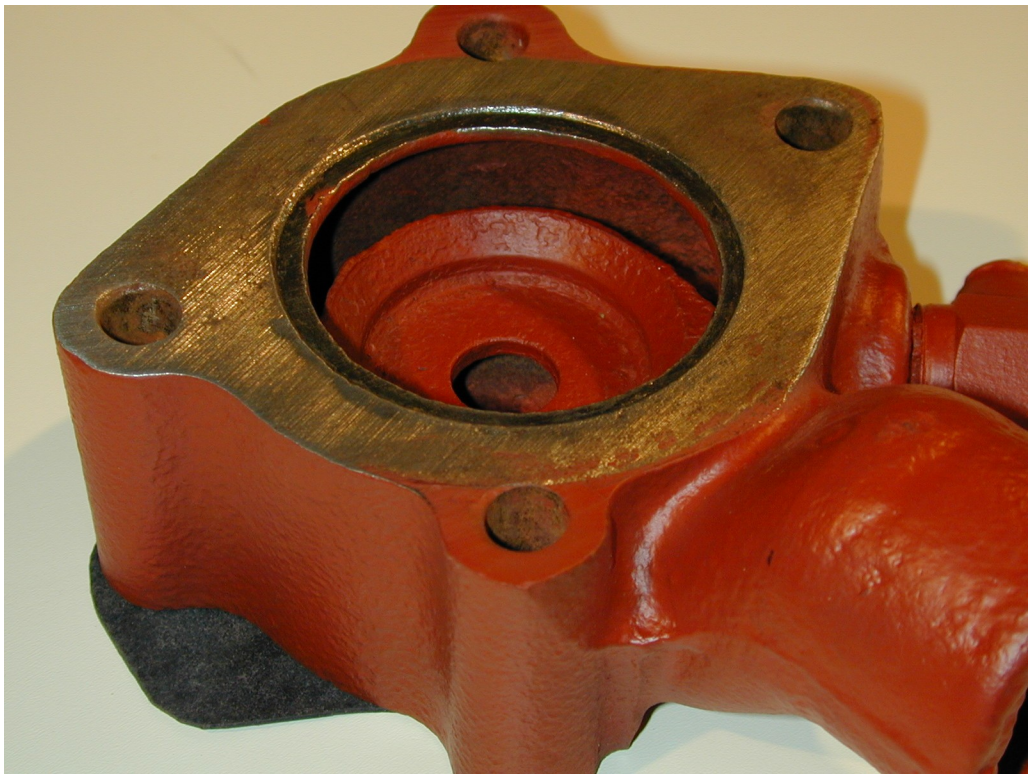

Figure 4: Thermostat Housing Counter-bore

- Also, clean any corrosion from the area inside the thermostat where the thermostat movable "can" seats and seals the bypass when the thermostat opens.

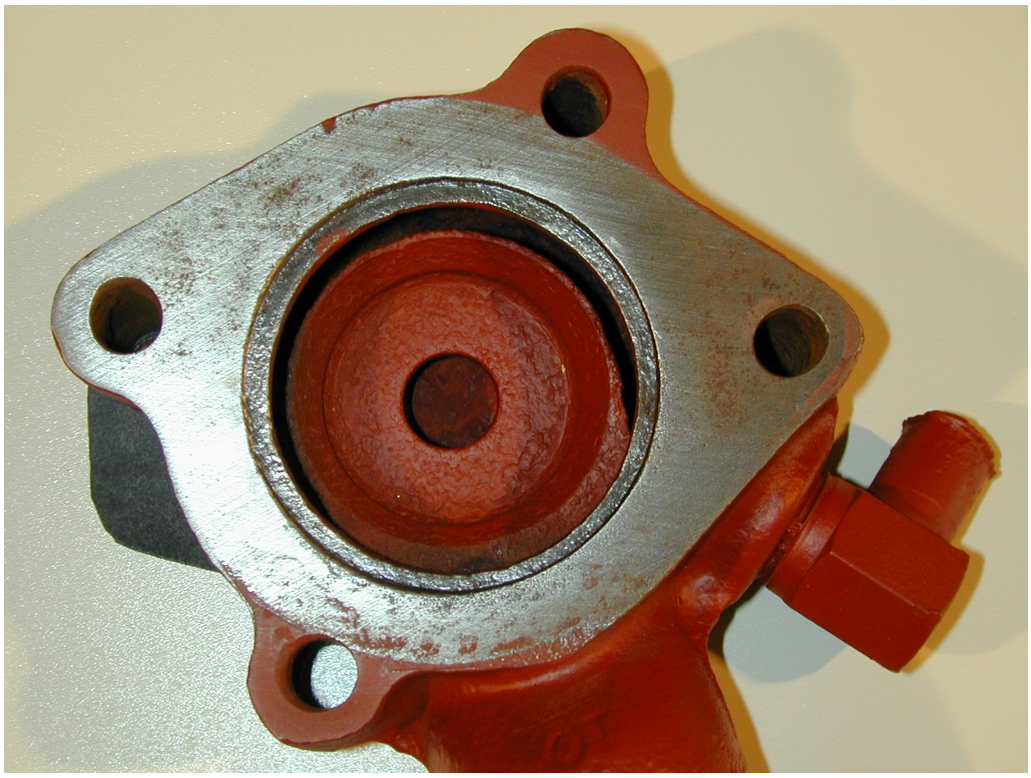

Figure 5: Thermostat Housing Bypass Seat

- Turn the thermostat housing upside down and verify that the "air bleed" hole which is present underneath the bypass "seat" is clear of any corrosion or obstruction.

While it may appear that this "hole" was formed due to corrosion, it was actually formed during the casting process when the thermostat housing was manufactured and in some cases, this hole may have been "cleaned up" with an appropriate (1/8") size drill bit at that point.

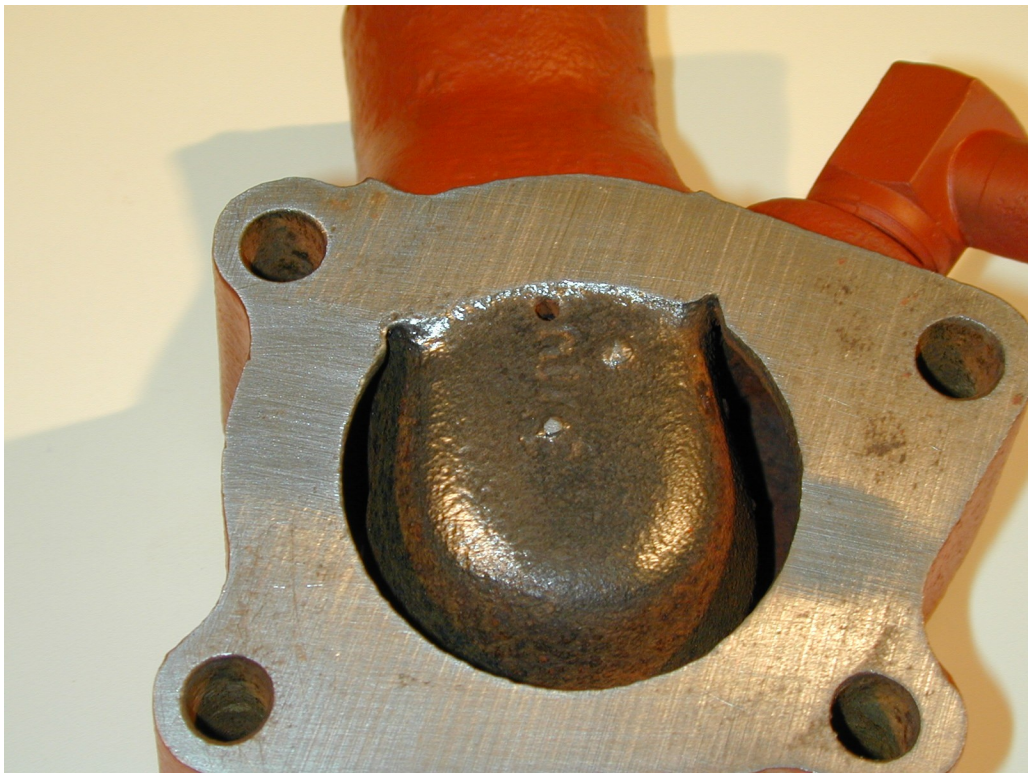

Figure 6: 1/8" Air Bleed Port Formed in Bypass Seat in Thermostat Housing

- Place the new thermostat in it's counter-bore on the thermostat housing, verifying that the sealing flange fits snugly in the machined space and is flat. This step is important as the sealing flange **must not** allow engine coolant to bleed/migrate around the thermostat when in operation.

Notice the CORRECT orientation of the thermostat in its seat, DO NOT install the thermostat upside down!!!

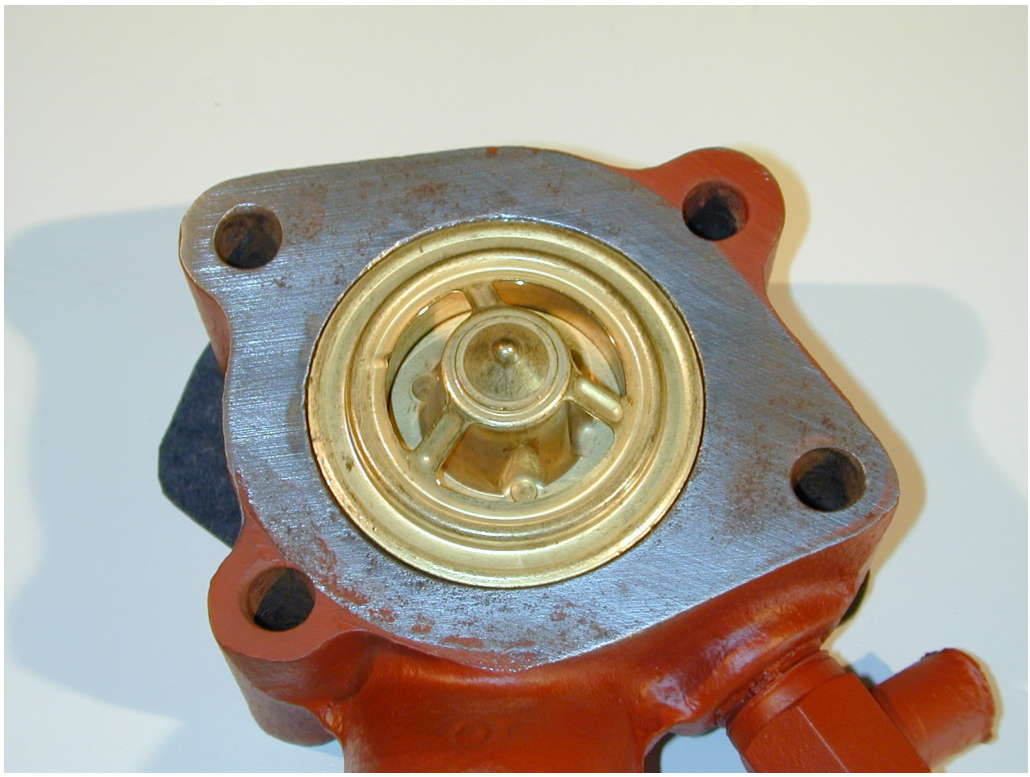

Figure 7: Correct Seating of Thermostat in Thermostat Housing

Note that the thermostat supplied in this kit may have either of two different forms of "air bleed" incorporated into its design. Either design is appropriate and has no effect on thermostat operation or overall engine cooling performance.

One type uses a small "channel" formed into the brass stamping adjacent to the sealing flange.

The other type uses a simple "hole" formed into the movable "valve" element of the thermostat can.

DO NOT drill any additional holes anywhere on this thermostat! There is no reason to add any additional air bleed to this thermostat and in fact, any additional hole or enlarging of the bleed passage will impede correct thermostat performance.

Figure 8: Air Bleed Formed in Thermostat Body at 5 o'clock Position, Top View

Figure 9: Air Bleed Formed in Thermostat Body at 4 0'clock Position, Bottom View

Enclosed with these instructions are full-size templates for the upper and lower thermostat housing gaskets. The only difference in these two templates is the diameter of the large center hole in the gasket.

The OEM/Aftermarket-style gaskets (such as Conteco p/n: 11261, or Felpro p/n: 12485) for the upper/lower application are the same p/n. Two are required.

I prefer to make my own gaskets using a 1/32" thickness rubber/fiber composite gasket material such as NI-2085 made by Interface Solutions, Inc. and marketed by ROL Gaskets as p/n: RK 1016, available through most local auto parts jobbers.

I feel that it is important to fab the top gasket so that it aids in completely sealing the thermostat mounting flange in the counter-bore in the thermostat housing. The OEM-style gasket DOES NOT accomplish this! Accordingly, I make the center hole slightly smaller than the OEM-style gasket.

I have also found that the OEM-style gasket when used between the thermostat housing and the intake manifold, substantially "overhangs" the engine coolant passage, resulting in coolant restriction and turbulence induced by this overhang.

If one elects to fab their own gaskets as I have recommended, simply "adjust" the center hole in each gasket to match your INDIVIDUAL water neck/thermostat housing/intake manifold assembly. I have found considerable variance in the parts as supplied to/by IH, due to time of manufacture, casting mold "shift", machining variation, etc.

Figure 10: Top and Bottom Gasket Configuration

If you are using the thermostat "kit" which I supply, it will have new, hand-cut upper and lower gaskets included. These gaskets are essentially the same, the only difference is the diameter of the large center hole and it's location on the gasket. These hand-cut gaskets have been verified for fit on three different IH thermostat housing/water neck assemblies and should allow for discrepancies in casting/machining "drift" for your application. If the supplied gaskets do not perfectly align in their intended positions for your application, slight trimming with a razor knife may be done.

The supplied gaskets should be installed with the printing on the gasket material itself facing toward the intake manifold boss. That will orient the custom-cut gaskets correctly for the benefits they may provide to proper engine cooling performance.

- Install the lower thermostat housing gasket to the intake manifold by simply setting it into place. This type gasket does not require any adhesive as part of it's "system". If one desires to "stick" the gasket in place to aid in assembly, I recommend the use of ONLY "Gascacinch" adhesive.

DO NOT UNDER ANY CIRCUMSTANCES, use any type of "RTV" or "silicone sealant" anywhere on this water neck/thermostat housing assembly! It WILL migrate into the WRONG PLACES and **will impede** correct engine cooling and thermostatic-control of the engine cooling system!

- Next install the thermostat housing in proper position, using the mounting bolts to align the housing with the manifold/gasket if needed.

- Correctly position the new thermostat into the counter-bore on the top of the thermostat housing. Place the upper gasket over the body of the thermostat and verify that it completely seals the flange of the thermostat body.

Figure 11: Top Gasket to Thermostat Installation

- Install the water neck onto the thermostat housing using the new hardware provided and alternately snug the bolts. Verify the complete water neck/thermostat housing alignment and then perform final tightening of the fasteners. Torque specification for these grade 8 fasteners is 25>30ft. lbs. with a lubricated thread.

- Complete the installation by replacing the upper radiator hose and bypass hose. If a heater hose was present on your application, replace it in proper position also. Also replace any vacuum hoses or electrical devices previously removed.

When preparing to fill the vehicle cooling system, use appropriate protective gear to avoid any personal injury due to coolant "splash" or overflow.

After filling the cooling system with the appropriate engine coolant mixture it may be helpful to elevate the front of the vehicle to aid in "burping" or bleeding air from the system which was introduced during this service process. This is especially true if the radiator on the subject vehicle is a "cross-flow" design. The heater temperature control should also be placed in the full "Hot" position during the air purging process.

I leave the radiator cap off while warming up the engine so that I can observe the opening and closing of the thermostat once the coolant reaches the "open" set point.

If your cooling system employs a "coolant recovery system", be sure to monitor coolant level in the recovery tank and add coolant mix as needed.

I normally perform this "bleeding" process for about one hour, continuously monitoring the system for any signs of coolant leakage from ANY location (remember the "flushing" process done earlier!).

Once you are certain that all air has been expelled from the system, install the radiator pressure cap and take the rig out for a test drive while monitoring engine temperature and fan clutch "lockup" (if equipped with a thermostatic-control fan clutch).

Over a period of time, any entrained air in the coolant will continue to be expelled into the overflow/coolant recovery system, so continue to monitor the coolant level in the tank until it's level "stabilizes (may be two to three days of operation).

If any additional assistance is needed regarding the thermostat replacement work, I may be contacted as:

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