CTIS Leak Repair
Gilbert Herman

Isolating The Problem

You have an air leak somewhere in the CTIS system that is causing excessive tire pressure loss. But, how much air loss is normal for the CTIS in the Hummer? AMG indicates that 6-PSI loss in 3 days is considered normal. Values exceeding the AMG standards should be investigated. My experience with several vehicles was that I had around 1-2 PSI lost in 3 days. This article will focus on the CTIS valves and geared hub spindle seal primarily.

Both the front and rear tires are connected to each side as a unit. So a leak in the right rear will deflate the right rear and left rear leaving both front tires unaffected or vice versa. Your investigation starts here. Are you really loosing too much pressure in the front or rear tires?

To start your investigation, inflate the tires having the suspected abnormal pressure loss to a known pressure; let us say 40 PSI on your CTIS gauge on the dashboard. Now, disconnect both tires from the system by pressing the CTIS valve tab and pulling the brass assembly outward. Using a tire gauge, measure and record each tire pressure using CTIS valve outlet. Also record the CTIS gauge reading for this tire set. Over the next day observe your tires. Is one tire notably deflating as compared to the other? Depending upon the extent of the leak you may have to adjust your observation time. After your observation period, measure the individual tires and again note the pressure reading of the CTIS gauge. Compare this to your baseline readings.

	Tire # 1	Tire # 2	CTIS Gauge	Interpretation	Causes
1	No loss	Loss	No loss	Tire Leak	Nail hole, laceration, rim leak, valve stem leak
2	Loss	No Loss	No loss	Tire Leak	Nail hole, laceration, rim leak, valve stem leak
3	No loss	No Loss	Loss	CTIS System leak	Spindle or hose leak in either wheel, leak in manifold or pump
4	Loss	No Loss	Loss	Tire and CTIS leak	Both of the above
5	No loss	Loss	Loss	Tire and CTIS leak	Both of the above
6	No loss	No Loss	No loss	CTIS Valve leak	Internal CTIS valve leak only when engaged

If you observe #3, now check for a spindle seal leak. With both tires disengaged but filled to 40 PSI, disconnect the vent line to one of the geared hubs. Place a test hose on the vent connection and run it into a bowl of water. Now connect this or the opposite wheel to pressurize the system. Observe for bubbling. If this hub does not bubble, reconnect the vent line and repeat the procedure on the opposite side. If neither hub leaks, you now have to investigate all airlines from the wheels to the manifold. Spraying the lines with Windex or soapy water will show bubbling in a pressurized system.

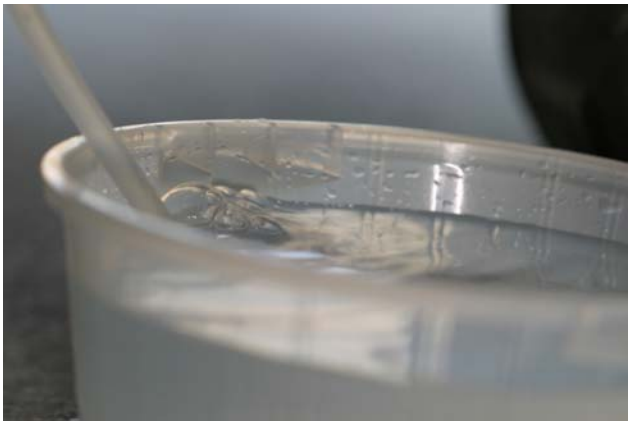

Figure 1 (Left) shows the test hose attached to the vent on the geared hub. (Right) the end of the hose is placed under water. You can see active bubbling due to a spindle seal leak.

If you find #6, then perform the following: inflate the tires to a known pressure; let us say 40 PSI on your CTIS gauge. Now connect only one wheel's CTIS valve, observe over time. If no pressure is lost, disconnect this wheel and connect the other to the system. Observe over time. If you loose pressure in this test it is leaking at the valve only when engaged. Using a spray bottle with soapy water or Windex, spray solution over the various joints of the CTIS valve and its connections to the rim. If you do not confirm the leak, bench test it.

Bench Testing The CTIS Valve

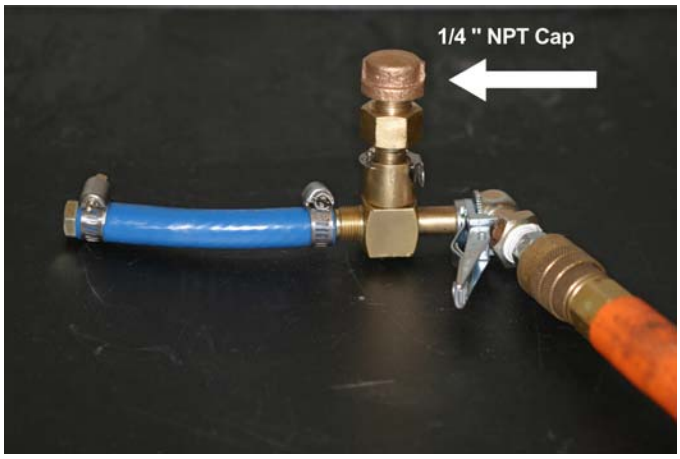

Figure 1 (Left) This is the system that I use for valve testing.

Due to the awkward position of the CTIS valve when attached to the rim, it is difficult to fully test for leaks. I recommend removing the valve and bench testing it if the leak is not obvious. When you remove the valve, insert a standard ¼ inch NPT tank valve into the rim to prevent the tire from fully deflating. Separate the CTIS valve from the small plastic hose. Attach a ¼ inch NPT end cap on the threaded portion that attaches to the rim, sealed tubing to the valve portion that attaches to the plastic tube. Attach an

airline going to a compressor set for 40 PSI. Immerse this CTIS unit into a bowl of water observing for leaks. Test the valve in the engaged and disengaged positions.

Repair Of The CTIS Valve

I am now aware of two major versions of this item. It was through articles by Chuck Kopelson that I learned that the valve could even be disassembled. Unfortunately, I had the earlier model valve and nearly destroyed it following his procedure. So to end confusion, I will discuss and compare both valve types.

The old style valve has two components that form the body, whereas the newer valve has three. You can identify the valve model by examining the hexagonal nut portion that threads into the spindle. The brass nut on the old style is ¼ inch thick (0.205 inch) with the newer style ½ inch thick (0.500 inch). The identification is critical in determining how you will approach the disassembly.

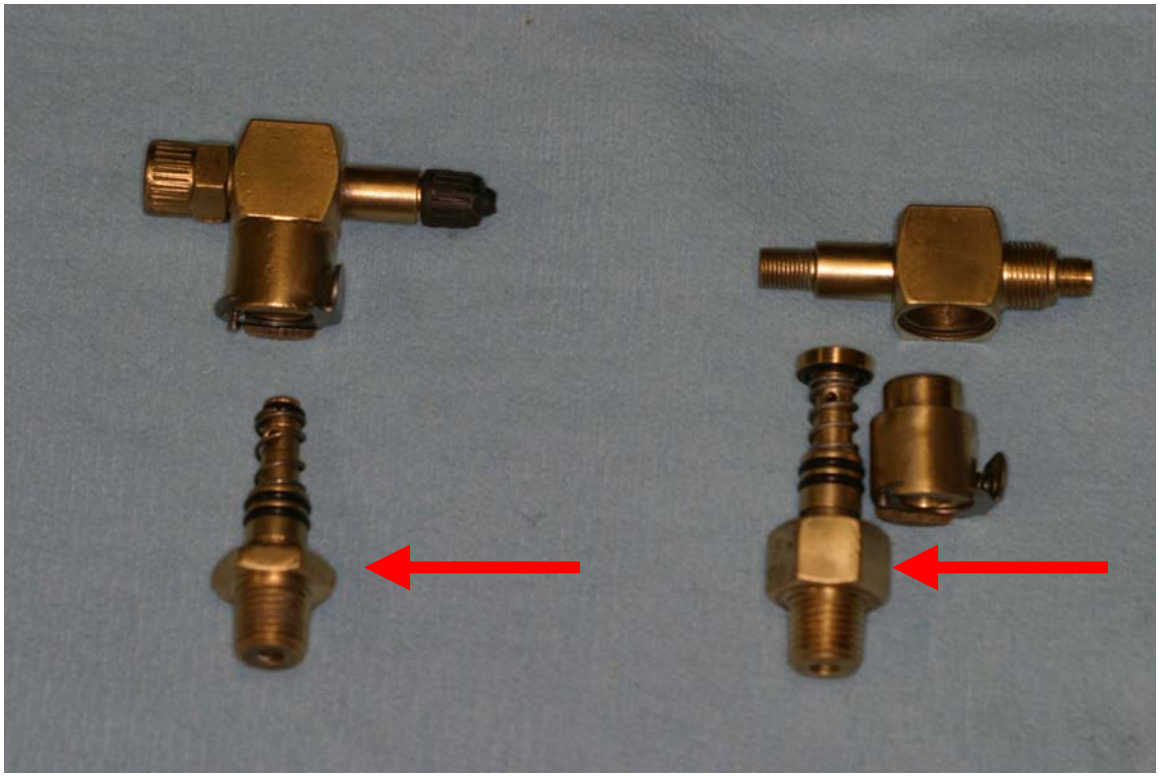

Figure 2 (Above) The old style valve is left, new style right.

To disassemble the old style valve, place the main body in a vise securely. Using wood stirring sticks between the brass valve and the vise jaws will protect it from scratches. Place a chisel on the hexagonal nut and using a plastic mallet hit the chisel with moderate force. Rotate the hexagonal nut 180 degrees and repeat procedure until the stem separates from the base.

Figure 3 (Left) Placement of the chisel for old style valves.

To disassemble the newer style valves, the chisel is placed where the square portion of the body joins the cylindrical portion.

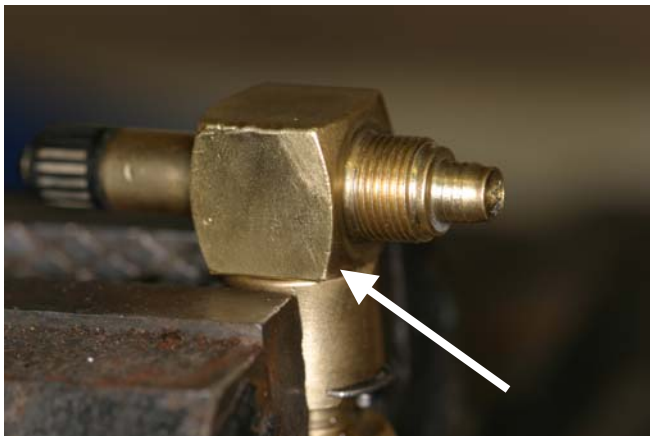

Figure 4 (Left) Location for placement of the chisel on new style valves. (Right) Chisel in position.

The old style valve DOES NOT have any further disassembly, so omit this step. Once the main valve is separated, removing the brass disc that threads on the shaft of the new style valve further disassembles the mechanism. Holding the main stem portion in a vise, place wood painters sticks on either side of the brass disc, clamp with a Vise-Grip and rotate in a counter-clockwise fashion.

Figure 5 (Left) Cylindrical body housing removed (Right) Removal of brass seating disk

Figure 6 (Left) Press in the tab, separate the two components and remove the spring. This exposes the O-rings on the main shaft that tend to cause valve leaks.

I have only replaced the O-rings on the main shaft that has cured all of my leaking valves so far. I use a Metric P8 Nitrile O-ring having a diameter of 11.56 mm, thickness of 1.62 mm. There is an O-ring on the sealing surface of the brass disc, an O-ring inside the short barrel that houses the silver tab and an O-ring that seals the cylindrical portion to the square portion of the housing. These are cleaned with isopropyl alcohol or acetone. All external surfaces of the brass fixtures can be buffed with a Dremmel having a wire wheel. Clean the tab and the adjacent brass surface with both the tab pushed (in) and (out). To release the tab, push in the little silver spring-pin.

Reassembly is the reversal of this procedure. To complete the assembly, orient the tab to the valve stem correctly, insert the cylindrical body portion into the square body portion confirming that the o-ring seal is present and either compress the halves in a vise (protecting the thread surfaces with wood) or use a plastic mallet to drive them together.

Figure 7 Using a vise to press in the valve body components.

To repair the old style valves, clean all surfaces, replace the O-rings on the shaft (same Metric P8 O-Rings) and reassemble in similar fashion.

Replacing The Hub Spindle Seal:

If in your diagnostic workup item #3 occurred and the vent leak test was positive, you need to replace the spindle seal. Disengage the CTIS from both wheels. Some people have replaced this seal with the tie rod (front hubs) or stabilizer (rear hubs) still connected by swinging the cover away from its mating hub surface. I find it easier to do this job at the bench. To remove the tie rod or stabilizer, remove the cotter key from the castle nut and then the castle nut itself (1 1/16 inch socket) while the truck weight is still on the suspension system. Now jack up the truck, place on a jackstand, chock the wheels, disconnect the CTIS valve from the hub (7/8 inch) and remove the tire. Remove the airline to the rear of the hub. There is a swivel joint on this line. The 5/8-inch side is fixed to the braided line with the 13/16-inch side the portion that rotates.

Using a pickle fork, break the tie rod (front wheels) or stabilizer bar (rear wheels) free of the control arm. Swing it out of the way.

Move the hub so you have good access to the four bolts (20mm socket) that attach the steering control arm to the hub. Remove these bolts. There are two thick spacers that go beneath the protective covers of the airline and four flat washers. Remove the cover. Gear lube will leak out at this point so place a catch basin below the hub. All of the internal components must be protected from debris for these are machined surfaces. With the cover removed, you now have access to the spindle clamp nut.

Figure 8 (Left) The Hub with the control arm plate removed. This exposes the clamp nut that holds the spindle. Above this is the exposed halfshaft input seal.

I prefer to take the control arm plate to the bench for the seal removal and installation. I just find it easier to properly seat the seal on a flat stable surface. At the bench, remove the internal snap ring using small tipped snap-ring pliers.

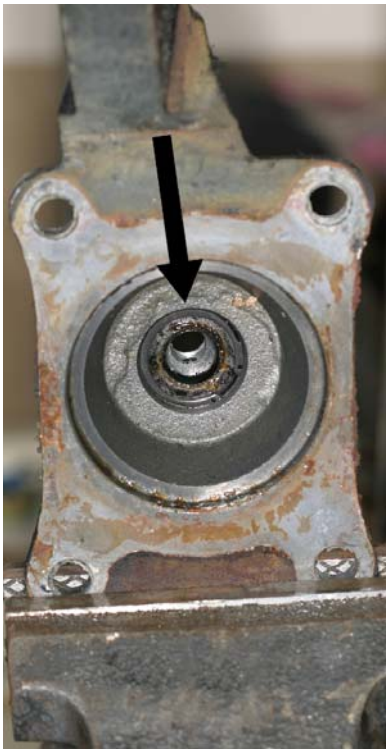

Figure 9 (Right) This photograph demonstrates the spindle seal with the snap-ring in place.

To remove the seal, flip the housing over, place a long blunt surface punch through the airline opening and hammer out the seal.

To reassemble, place the new seal into the housing, use a large socket with hammer to drive the seal into place. It is important that the seal is pressed in place …..level. When the seal is below the snap ring notch, it is properly seated. Replace the snap-ring. The steering cover and hub must have all old anaerobic sealer removed and a new coating of RTV Silicone applied prior to reassembly. Reassembly is basically a reversal of the above procedure.

The AMG recommended torque for the steering cover is 65 ft-lbs; the tie rod castle nut is 70 ft-lbs. I would recommend attaching the airline on the hub, blocking off the CTIS valve hole using a closed valve and pressure testing the system BEFORE you attach the tie rod end.

Figure 10 (Above) Using a long punch, catch the edge of the seal and hit the punch briskly with a hammer to unseat it.