

## **Ken Harris TR-3B engine misfire saga.**

### **Mechanical History**

I've owned this Triumph since the seventies and used it as a daily driver to and from work, 2 miles from my home. Once a week, I would take the car out for a longer drive to get it good and hot and hopefully blow the carbon out.

In the mid 1990's, my teenage son and I did a ground up restoration leaving no stone unturned. The only thing we did not attempt was to rebuild the differential.

On the engine, I replaced cylinders, pistons, all bearings, and had the head reworked by a local machine shop. The shop put in steel valve seats and new valve guides. I believe one or two valves were replaced, but all others were ok. The cam and cam followers looked ok, so I did not replace them. End float on the cam was within spec.

At that time, I did a total rebuild on the carbs with new butterfly, throttle shafts, shaft bushings, jets, and needles. I also replaced all the wire looms.

After the rebuild, the car continued to run very well and was used as a daily driver for another fifteen years.

At some point, around 2010, the engine didn't produce the power it should have, so I started to investigate possible causes. Although the engine rebuild was now 15 years old, the miles on the engine were very low. (2 miles to work and back). I checked compression and it was good. I was wondering if the cam lobes were worn since it was still original and had not been replaced. I measured the lift of each valve and saw that they all lifted the same amount.

After doing all the "easy" changes including tune-up, carb adjustment, valve adjustment, etc, I decided to change the timing chain and sprockets. There were no timing marks, so I followed the manual process to ensure the sprockets were on correctly and cam and crank were correctly timed. I did not have a timing wheel, but believed I did a good job without it.

After cleaning the distributor and changing the advance springs with no improvement in performance, I purchased a Pertronix "flamethrower" distributor with new coil and wires from Moss. I noticed a slight improvement in performance, but not enough to satisfy me. I continued to make adjustments in fuel and timing.

The performance of the engine did not improve, but the car ran "ok" so I continued to drive it until retirement. The car sat for several years after retirement, and I only started it every few months to keep things lubricated.

### **Current Events (2021 and 2022)**

Now that I have more time, I'm determined to figure out why the engine will not perform. Hopefully, with your help, the car will run well again, and I'll be able to enjoy it as I used to.

If you've been following this thread, you are aware of the many things I've tried, without results. One member of the forum asked if I could summarize the things that have been done, so here is my attempt to do so. I hope the reader doesn't get bored and give up.

Before I first posted on the forum, I'd done the following:

- Drained the fuel tank of old gas, flushed it and tried to swab it out from the gas cap and visually inspecting the best I could with flashlight. I blew backwards through the entire fuel lines to "flush" the lines and make sure there was nothing restricting the flow. I replaced the fuel float to get the gage to read again.
- Dismantled the carbs, cleaned them, and replaced the seals. Adjusted floats with 5/16 rods.
- Installed an in-line clear plastic fuel filter just before the carbs.
- Put new fuel in the tank. 88 octane, non-ethanol gas. (cannot get higher octane non ethanol gas in Tallahassee)
- Thinking the timing chain was put on incorrectly, I removed the valve cover and turned the engine over to the "balance point" of number 4 cylinder and saw that number one cylinder was exactly at TDC.

***The engine starts, idles rough, and misfires on acceleration under a load. No adjusting seems to help. I always smell like unburned fuel after running the engine. Plugs foul quickly with black soot. I clean them often. After trying everything I could think of, I swallowed my pride and decided to look for help.***

There are no experienced Triumph mechanics in Tallahassee, so I reached out to the forum for help.

The following is a summary of things tried since joining the forum discussion.

**5/21/2022 –**

- Compression tested at 175 psi on all cylinders, New distributor cap, new rotor, new copper core wires, new plugs, points, and condenser in the original distributor. Points set at .015. Timing set statically at 5 deg. Btdc.
- Fuel is 88 octane non ethanol gas.
- Carbs adjusted per manual procedure and are set at 15 flats and 18 flats open with SM needles. (I know this sounds too rich, but that's where it idles best) Note: idle is around 600 rpm, and not as low as I'd like. If I tried to lean the carbs, the engine would suddenly stall, so I left them at 15 and 18 flats.
- Plug wires in correct order.

***When driving the car, the engine will misfire with slight acceleration. Harder acceleration (roughly half throttle) it misfires badly with occasional backfire through carbs. Engine runs best when timing is advanced more. Again, plugs are black with soot and I can smell unburned fuel.***

Here's what has been done to each system since May 21<sup>st</sup> to identify problems and search for solutions. **Yellow** highlighted statements are still on the "to do" list although I don't believe they are

the highest of priorities. Red text questions are unanswered. If anyone can help or think they are irrelevant, please let me know.

## Fuel system

- Carbs cleaned and new gaskets throughout. Jets move smoothly with little friction, so choke doesn't "stick".
- I've done a quick test to see if the intake manifold gasket is leaking causing a lean mixture. I sprayed carb cleaner around the gasket (top only) and found no change in engine rpm. While doing so, I sprayed the throttle shafts with no change in rpm. Should I run another test or just replace the gasket?
- One float valve seemed to stick slightly, so I replaced both valves and reset them with 5/16 rod according to the manual. I have not gone back to view the fuel level in the jets as a secondary check on fuel levels.
- Replaced the jets and needles with new "SM" needles. Measured the needles against factory specs. Needles are perfect. The shoulder of the needle is flush with the pistons. Jets are centered per manual.
- 10W30 oil in dashpots. Pistons move freely with no sticking.
- Small passages in the carbs for fuel to flow have been checked within the past year, but I have not revisited this item again because I believe they are clean.
- New clear plastic fuel filter is in line just before the carbs. No dirt shows up in filter after 30 minutes of running.
- The fuel pump is rebuilt with new diaphragm and check valves. The pump has been tested and flows fuel well at the carbs. The fuel pump is missing the screen. They are on backorder at Moss.
- New 88 octane, ethanol free gas is in the tank. Cannot get higher ethanol free gas in Tallahassee. Is 88 octane good enough or should I use high octane ethanol fuel?
- New ¼ in rubber fuel lines from steel line to fuel pump and from fuel pump to steel line running to carbs. A member advised me that the rubber fuel line upstream of the pump should be 5/16. I need to replace.

## Electrical System

- After determining the old original distributor was badly worn because the amount of spark was jumping around erratically, it has been replaced with a Pertronix "Flamethrower" solid state distributor.
- New ignition wires and coil have been added. (Recommended by Moss to go with distributor.)
- Voltage to the distributor is good.
- Spark jumps ½ inch indicating good coil.
- Vacuum line from carb to distributor has new fittings and has been tested for leaks. I need to draw a new advance curve for this distributor.

- The engine seems to run best at idle when the spark advance is over 15 degrees at 600 rpm. This doesn't seem right to me. **What spark advance at 600 rpm is recommended as a starting point for 88 octane fuel?**

## Mechanical

- Measured lift on all valves (drop dial indicator on top of valve springs.) to determine if any cam lobes were excessively worn. All valves lift between .356 and .365 inch. It appears all lobes have worn evenly. **Does anyone know what the valve lifts should be and what the wear limits are?**
- Valve timing (timing chain) is suspect because it wasn't checked with a degree wheel. It has been checked without removing timing cover using two methods.
  1. Rotate crankshaft until cylinder #4 is at the point of balance on the cam. (See manual) When the point of balance is achieved, the number one piston should be at TDC on the compression stroke.
  2. A member suggested this other method to check the cam timing. I measured the amount the intake and exhaust valves are open when at TDC on the exhaust stroke of number one cylinder. The intake valve was open .033 inch and exhaust .023 inch. (They should be opened the same amount.) The difference in the amount of openness was .010 inch. Rotating the crank enough to change the lift by .010 took an additional 1/8 of an inch on the pulley or about 2 deg. Of rotation. **Does anyone have any thoughts about this result?**
  3. **Should I replace the cam?**
- Intake valves are set at .010 and exhaust at .012 per manual.
- One valve is noisy and has been for many years although it's adjusted to spec. I wonder if it could be hanging up on occasion causing the backfire through the carbs. I think it's in cylinder 4, but not sure. Could the valve guide be loose? If so, what would cause it to backfire through the carbs only upon acceleration? **Do I need to pull the head to find out?**
- The exhaust was replaced in the 90's with a stainless-steel exhaust made to Triumph standards. **Could a plugged exhaust cause these issues?** I ran a borescope up the exhaust past the muffler and saw no clogging.

## Today

At this point I'm stuck except to do a few things highlighted in yellow above. The next steps are rather major and may include:

- New cam and degree the valve timing
- Pull the head to remove carbon and inspect the valves and rockers. Renew badly worn parts.
- Inspect the exhaust manifold for carbon restrictions.

Everyone has been very supportive with your ideas of what could be the issue so far. I welcome more thoughts and things for me to try before tearing into the engine.

Thanks! Ken