Name_____ WO #_____

Motorcycle_____ Date_____

BREAKING IN A NEW ENGINE

New engines and upper-end overhauls need to be properly broken-in to ensure trouble-free service. Improper break-in of a fresh engine can result in piston seizure. It is our experience that the major reason that pistons seize in a newly rebuilt engine is due to rider error. Simply stated, the rider pushes the motorcycle too hard before the piston rings have properly seated. One of the major functions of the piston rings is to transfer combustion heat from the piston to the cylinder walls, and then out to the fins. Heat transfer is not optimum until the rings have been fully seated. We have found that it takes approximately 500 miles to fully seat the piston rings. The instructions given here should be strictly followed:

Before installing your rebuilt engine or reconditioned engine components:

*Flush and clean your oil tank/reservoir and all oil lines. Check inside tank with a light to ensure ALL sludge and particles are removed. If your oil tank has been bead-blasted or glass-beaded throw it out and get a different one. Change/clean all oil filters/screens, if applicable. Confirm oil lines are connected properly; Call 408-998-4495 if there is ANY QUESTION as to how your oil lines connect. Use Torco break-in oil, (available at Rabers, TBO40), for first 100 miles.

*Flush and clean fuel tank and get fresh, high-octane fuel. Avoid the cheapie brands. We recommend a minimum 100 octane. For help in locating fresh, high-octane fuel, see http://www.ctracing.com/race_fuel.htm ..or.. http://www.davebarton.com/Unleaded_Racing_Fuel_in_SoCal for California and Nevada specifically.

*Confirm correct carburetor jetting and new air filter(s). Be sure to synchronize carbs on multi-carbed engines.

*Confirm proper ignition timing. This is very important. If Rabers has installed the ignition, we have static timed it to run but it will need to be confirmed with a timing light (where applicable). If you are unsure about whether your ignition timing is set to run, call 408-998-4495.

If your engine is fully assembled, disregard the next two paragraphs and proceed to Step (1).

**If you are installing a cylinder or cylinder head, torque cylinder base nuts, then torque all cylinder head bolts or nuts as per torque and sequence in your workshop manual. After initial torque you must adjust valves : INTAKE ____ and EXHAUST ____.

*** If you are installing rocker boxes only, on a rebuilt Triumph twin, torque four long inner head bolts that go through the rocker boxes, as per torque and sequence in your workshop manual. After initial torque you must adjust valves : INTAKE ____ and EXHAUST ____.

1) For the initial starting, run the engine around 2000 RPMs until the lower cylinder fins are too hot to touch, usually two or three minutes. Shut it down and let the engine cool thoroughly (this is ***minimum*** four hours to cool). Re-torque cylinder base nuts, then all cylinder head bolts or nuts as per torque and sequence in your workshop manual. After re-torque you must re-adjust valves : INTAKE ____ and EXHAUST ____.
!!You are now able to go for a short, controlled ride!!

2) Avoid freeway riding. Vary the RPM constantly ~ Avoid sustained engine speeds ~ Do not exceed 4500 RPM as this can tend to cause cylinder wall glazing, which keeps the rings from seating properly. Avoid letting the engine idle; fresh cam and lifter surfaces are particularly vulnerable in the first 20 minutes of use and they rely on the spinning crank to bathe them in oil.

3) NO two-up riding or carrying loads. NO long uphill climbs.

4) Choose cooler times of day like early morning or dusk. Avoid midday heat and thick commute traffic.

5) While riding, keep the engine revs above 3,000 rpm. Accelerating from engine speeds below 3,000 rpm causes the engine to lug, or work much too hard. You will often hear piston pre-ignition or "pinging" when the engine is being lugged. (the pinging sound is often mistaken for mechanical noise and has very often been described as "something came loose around the head and started rattling") Continuing to ride with engine "pinging" will quickly burn a hole through the piston crown.

6) While riding, shift up and down through the gears, like stoplight to stoplight or riding a twisting road. Riding conditions where you are constantly up-shifting and down-shifting provide ideal conditions for engine break-in.

7) Refuel with fresh, high-octane fuel. Avoid the cheapie brands. We recommend minimum 100 octane. For help in locating fresh, high-octane fuel, see http://www.ctracing.com/race_fuel.htm ..or.. http://www.davebarton.com/Unleaded_Racing_Fuel_in_SoCal for California and Nevada specifically.

8) After 100 miles, drain the break-in oil while it is still hot. Refill with quality motorcycle oil containing molybdenum, phosphorous and zinc. We recommend Torco MPZ. It is very important to use oils containing these additives. (shop carefully, most oils from chain auto stores and mega-marts do not contain these additives) Change the engine oil at 500 and 1000 miles, then go to the regularly advised intervals.

9) As per Step (1) you have done the first re-torque and re-adjust. The cylinder head and cylinder need to be retorqued and the valves reset **over the course of the break-in**. How often depends on the particular motorcycle. The first re-torque/re-adjust after riding your motorcycle is due in:_____miles. Tight valves (especially intake valves) can cause the engine to run lean, and result in a piston seizure. If you feel that your engine becomes noticeably easier to kick over, even before you are due for a retorque/re-adjust, call us so we can determine if we need to see the motorcycle right away.

10) These are air-cooled engines. For the engine to be cooled properly, the air must be flowing around the fins. Do not let your motorcycle sit and idle for extended periods.

11) If you feel your motorcycle slowing down, and giving it more throttle continues to slow the RPM, this indicates the beginning of a seizure. Pull over to the side of the road and shut the engine off immediately. If noticed in time, permanent damage may be avoided.

12) If you need help or explanation, call 408-998-4495 and ask. The phone call is gonna be cheaper than another repair.

By signing below, I acknowledge that I have received a copy of these instructions and have read the above and understand the instructions for properly breaking in my motorcycle engine or engine parts.

Signed_____Date_____