Things That Go "Tink" In Your Engine

TRACKING THE WILD AIR LEAK

It leaks in; not out

By Ned Owens

"What you've got there is an air leak," seems to be the final word, when you can't find out from anyone why your engine just won't run properly.

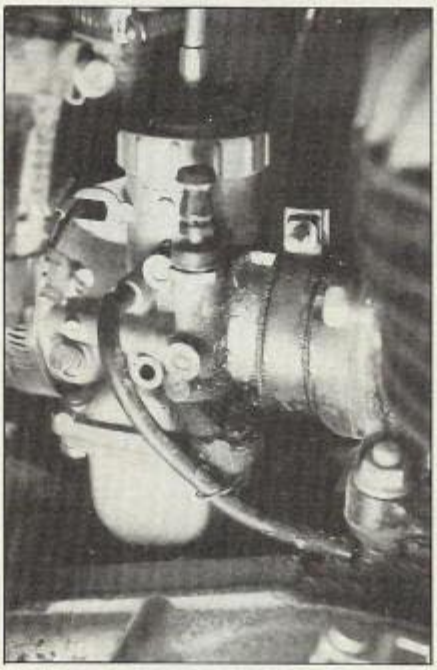
You are at the end of your rope, and you've tried everything else — picking your buddies' brains until nothing was left but the damp cranium walls. You've managed to completely befuddle 11 service managers at all the shops in town with a 14-minute phone discussion — half of it with the parts girl.

Finally, someone who knows someone else's Dad who rides stops in and puts the matter to rest with the line, "What you got there is an air leak." The last part is intoned as something almost surreal. Obviously caused and cured by infamous connections with the netherworld.

Air leaks *are* harder to find than most problems, but they are not insurmountable. An air leak will usually produce some fairly recognizable symptoms. When the engine is hot, but the idle speed is very high — it sort of "runs on" — then you probably have an air leak. Also, if you seize a piston, rebore and seize again, then you probably have an air leak. If your machine is detonating — a rattling, pinging, clinking, tinking noise is heard — or your plug reading is extremely lean, then this also indicates an air leak somewhere in the system. An air leak doesn't mean that air is leaking *out*, but rather leaking *in*.

The system is the carb and manifold, filter, boot, the bottom end (in a two-stroke) and the top end. Any mating surface, gap or hole in any part of this system will cause additional air to be pulled into the engine, thereby leaning the mixture.

Each of the parts of the system can develop these leaks through wear, neglect, accident or improper manufacture. We'll take each component and describe the problems, what to look for, and suggest a cure.



One of the most common air leaks is around the intake manifold. It can leak at the clamp on the carb, at the flange on the cylinder, or head on four-strokes, or the rubber will split with age.

Filter

Air filters, by the nature of their construction, limit the amount of air that is pulled into the engine at a given engine speed. Your jetting is set with this "obstruction" in mind. If the filter develops a large hole, or comes loose and loses its seal between the air box and its lid, then it allows more air into the engine and leans out the mixture. Proper filter maintenance and replacement is the cure. If your filter is bolted in, use nylon lock nuts, double nuts or some other precaution to prevent the filter from coming loose. If the filter is torn, toss it, and find a replacement.

Air box boot

This connection between the carb and the filter will produce the same lean condition if there is a hole or tear in it. Also, if the clamps on the ends are loose or the seal on the carb or box is not tight, then you will have an air leak.

Carburetor

Normally, the carb will develop air leaks in only a couple of places. One is the top of the carb, whether it be the bolt-on or screw-on type. On the screw-top type, like a Mikuni, ensure that the rubber gasket is in place. If the top is loose, it will pull extra air. (It will also probably come off, causing a stuck throttle situation.) If the air bleed screw, the idle screw or the choke assembly have backed out or fallen out, the carb will suck more air through these "holes." Make sure that all parts are present and properly installed, and that the clamps on the boot and manifold are tight.

Manifold

Rubber manifolds will eventually harden and deform, or will crack from age or from an unsupported carb/sock filter combination. Some manifolds are bolted to the cylinder or head via a gasket which fails to seal. Sometimes overtightening a two-bolt rubber flange will cause it to warp and pull air. If the mating surface on the cylinder is found to be warped or gouged, then resurfacing may be necessary. A good

fuel-impervious gasket compound can make up for a small gap. Replace rubber flange manifolds regularly. They are reasonably inexpensive, especially compared to the cost of a top end.

Cylinder (two-strokes)

Since the cylinder on a two-stroke acts as a seal for the pressurized bottom end, it has several places from which to suck air. In this particular area there is a two-way leak — it not only sucks air, but it also blows out a small amount of gas/oil air mix, depending on the position of the piston during the stroke. As a result, a leaking base gasket will cause a wet drool around part or all of the base gasket flange area, including the cases and the base of the cylinder. This mating surface can become warped from excessive heat. It should be noted that a greased, fresh base gasket will *not* always seal a warped base condition. Either resurfacing or a quality gasket goo is the cure.

Gouging from previous gasket removal techniques are many times the cause of a base gasket leak. If the cylinder gets loose once, or is improperly tightened down, a good seal is lost and the gasket should be replaced.

Head

If the cylinder head comes loose and the gasket gets burned, or if a new gasket is improperly installed, or the head is not torqued in the specified sequence to the proper specifications, then the head will leak. It will pull air into the cylinder during the intake stroke and will also cause a loss of compression. Seepage almost always accompanies a leaking head gasket. Look for the wetness between the head and cylinder.

Another place to look for an air leak on the head is the spark plug and its hole. If the plug is loose, or the sealing washer has been mashed down too many times or is missing, then air can be sucked past the threads on the plug. Spark plug manufacturers and tuners both specify that if a plug is removed, a new gasket should be installed before the plug is reinstalled. Spares are not easy to find, though. It is also possible that the plug itself is defective and is pulling air through its body from a leak in the insulator. Usually, the plug will fail at that point, though.

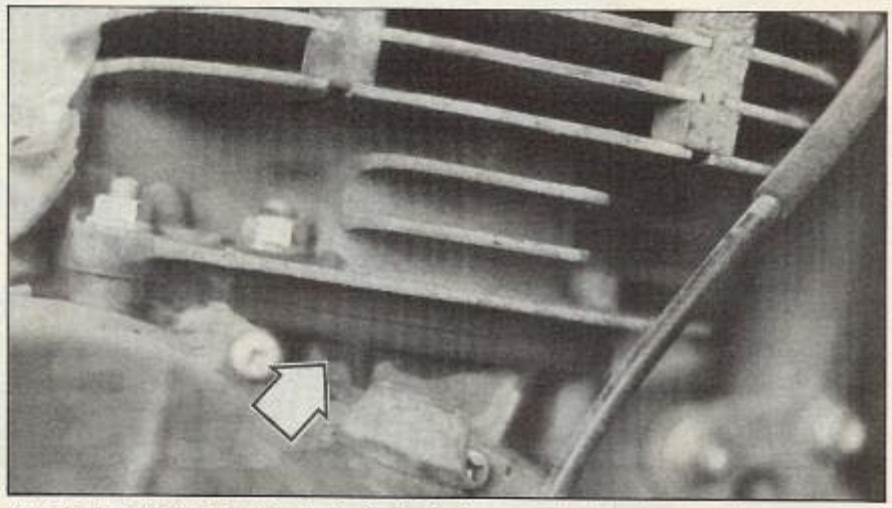
On four-strokes, the intake manifold is bolted to the head, so the mating surface must be sanitary, with gaskets in good condition.

Crankcases (two-stroke)

Since, as we mentioned before, the two-stroke has a pressurized bottom end, an eye must be kept out for leaks in this critical area, too. Usually, the largest causes of air leaks in the cases can be found in the cylinder/cases mating area discussed earlier, but another biggie is the mag seal, or dry seal. It is one of two seals on each end of the crankshaft that keep the crankcase air-tight. The other seal usually rides in gearbox oil, and causes different problems. The mag seal, though, is the seal between the crankcase and the magneto case, which is normally full of air. If this seal starts to leak it is harder to detect, because the leak is normally not visible unless the mag cover, and sometimes the flywheel, coils, or points plate, are removed.

If there is a leak at the mag seal, there will usually be seepage around the seal, or there will be a fine, oil-mist coating on the flywheel, or any of the other parts. If you pull off the mag cover and goo is puddled in the bottom, then you definitely have a mag seal leak.

Mag seals leak for a number of reasons. If the crank twists and gets out of true, it will ruin a seal in a hurry. The seals also get a lot of abuse from the high-revving shaft, and normally have minimal lubrication. They can also get hard just from age.



Another big favorite with air leaks is the base gasket on two-strokes. Improper torque on the cylinder fasteners, old or pinched gasket or a warped cylinder or cases are usually the causes.

One area that is often overlooked is a leak at the spark plug. If the plug is removed and reinstalled, then the gasket (ring) may not seal properly, causing air to be pulled into the cylinder past the threads.

Sometimes a mag seal will get "blown out" or the lip will get turned under after a faulty petcock or carb float needle sticks open and floods the bottom end. If the unsuspecting rider tries to kick the machine over, or bump-start it, the pressure can partially blow out the lip of the seal, causing a leak.

Cure for the leaking seal is replacement. Most mag seals on most engines can be replaced externally, but some require splitting the cases.

Miscellaneous

Some rotary-valved two-strokes have two dry seals, as well as sidecase sealing between the filter element and the valve. Also, keep an eye on the rubber grommets around the cable and choke and the access plugs in the carb shrouds on these rotaries.

Some two-strokes have crankcase drains. Make sure these bolts are not loose or missing.

There are also other factors that will cause lean symptoms, which may appear at first to be air leaks. Crud in the carb, that partially obstructs a jet, will cause a fuel/air imbalance, so ensure that the carb is functioning properly before you start to search out the air leak.

Air leaks that are nearly impossible to detect, but have cropped up in the past, are cracks in the cylinder liner, cracks in heads, and improperly machined or damaged cases. (Look for wet spots around the front and underneath the crankcase at the case seams.)

But if you keep seizing the same engine, or run lean to detonation, or run hot and you've checked everything else, then go hunting after the wild air leak. Now that you know where to look, it should be easier to capture this elusive, deadly gasp. □