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MiscRes: Magazine Articles

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"Gold or Garbage?", How to Tell if that Basket Case is Worth Buying

TECH & HOW-TO

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HOW TO

OLD IRON

GOLD OR GARBAGE?

How To Tell If That Basket Case Is Worth Buying

Text and photos by Chris and Mark Maida

Buying an Ironhead Sportster is probably the cheapest way to get your butt on a Harley. And for you adventurous ones, buying a basket case could be the way to get there even cheaper. Back when we had our bike shop, we



This is how you usually get to see the engine and tranny. Though this looks like a pile of garbage, it could be a gold mine of good parts. Be sure to check the engine numbers (see the story "Numbers Game") before bothering with anything else.



First check the lower end. Start by grabbing the front connecting rod and pulling it up and down, (or away and towards) its crank pin. If you detect any movement up and down, the rods are shot and must be replaced or rebuilt. Plan on rebuilding the lower end.



Next, check the rod's upper end side play. Lay your steel ruler across the top of the cylinder spigot. Then grab the front rod again and move it down to its lowest position. Then measure the rod's side-to-side play as close to the wrist pin bushing as possible. If the amount of movement is $11/64$ " or more for the front rod and $3/64$ " or more for the rear one, the rods are shot. Plan on rebuilding the lower end.



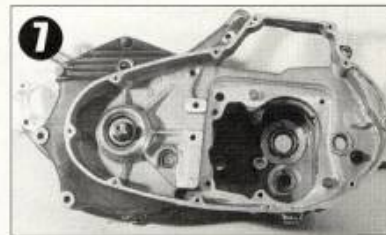
With the ruler still on the spigot, insert a flat-bladed screwdriver between the flywheels and case as shown. Holding the rod towards the left, use the screwdriver to move the flywheel assembly to the right. Make the flywheel move back and forth and note how much it moves. The allowable side play is $.001$ "-. $.006$ ". This is too small to even measure with a steel ruler. If you detect enough movement to measure, the end play is too big. The cases must be split and the Timken bearing replaced.



Next, get your flat feeler gauge and insert it as shown. The clearance here should be no more than $.010$ ". Again, more means it's rebuild time.



On the right, or pinion side, try to move the shaft side-to-side. Any movement means the bearing must be replaced and possibly the race must be lapped. Translation: split the cases. (You may also be able to detect in-and-out movement. If you do, the Timken's bad. Split the case.)



Take the time to check all the case's threaded holes, like the ones for the cylinders, lifter (tappet) blocks, cam and primary covers, transmission door, etc. While stripped threads may not keep you from buying an engine, it does add, sometimes considerably, to the cost of the rebuild.

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bought many a basket case. And from what we can see, things are no different now than they were back in the day. A basket case is born when someone disassembles an engine, usually to chrome and/or rebuild it. Unfortunately for them, they go way beyond their ability and haven't a clue as to how to reassemble it. The parts then sit in a garage or basement until the owner gets tired of looking at the boxes and decides to sell them. One advantage of buying this load of metal is that you can save a considerable amount of money over buying a running machine. Another is that you'll know *exactly* what is in your engine when the build is done.

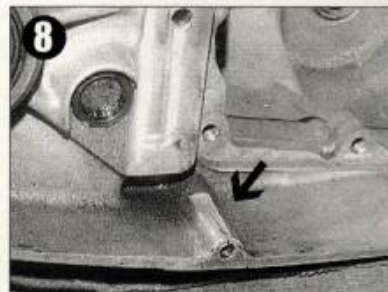
However, basket cases are also a way some people use to get rid of every broken or shot part in their garage. And though you bought the boxes pretty cheap, you may end up paying twice the price of a running

engine to get that pile of iron to start and keep running.

To keep from getting ripped off, you have to know how to tell if the parts before you can be reassembled into a running machine without having to throw in too much more cash. Yep, that's right. Understand that you will be buying new parts no matter how many good parts are in the boxes. There's two main reasons for this. First, even if you were to take apart a good engine, you will probably find stuff that should be replaced. Second, parts get lost when they are stored in boxes. So count on doing some replacing. (Also count in a fudge factor for all the stuff that's missing or bad that you didn't catch.)

When we would check out a basket — though we had the tools and equipment to do a very thorough inspection — we usually used a quick-and-dirty method to tell

whether the engine was really just taken apart or a collection of expensive paperweights. These photos will show you what we did to get an idea about the general condition of an Ironhead engine. And though we used an Ironhead for this story, the same holds true for Evos. Evo components are bad because of the same reasons that Ironhead ones are. They just have a different part number.



8 Split primary cover screw holes (see arrow) are usually due to the owner cranking a screw in even though it was jamming up. Sometimes dirt and grit get into the hole and make the hole too shallow for the screw. A little cleaning would have prevented this weld, drill and thread job.



9 Be sure to check the rest of the case for cracks, too. This missing chunk (see arrow) should be replaced — by welding — but can easily be overlooked during a pre-purchase inspection.



10 Don't forget to inspect the three drain holes on the bottom of the case. Give the oil pump surface (see arrow) a good look, too. A gouge or scratch here will give you an un-repairable oil leak.

BORED?

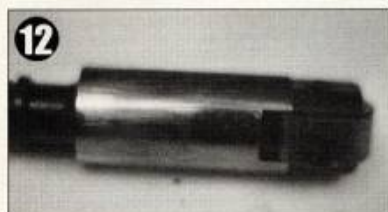
To see how far the cylinder is bored out or worn, you can use the old piston and your feeler gauge. What you are going to do is measure the amount of space, also called the clearance, between the cylinder and the piston. Start by cleaning away any carbon build-up at the top of the cylinder's bore and on the piston. Then remove the piston rings. Now insert your feeler gauge and the old piston as shown in photo #16 but go deeper into the cylinder than we did here. Note that we have the feeler gauge well below the grooves for the rings, away from the piston's wrist pin hole. Be sure to do the same. Pistons are ovals, not perfect circles like the rings. If you measure the clearance between the piston and the cylinder by the piston's wrist pin holes or near the ring grooves, you'll get an incorrectly large reading. The first set of measurements must be taken at least an inch from the top of the cylinder. Be sure to take four readings, one at each head bolt hole. Write the numbers down noting the position of the reading. For example, front left: .006"; front right: .005"; etc.

Now move the piston down to the center of the cylinder and take four measurements, just like you did for the first set. Write these down, too. So now that you have eight measurements, what do they mean? Well, if the two sets of measurements for the same location are different, or if one side has more clearance than another, the cylinder is egg-shaped or tapered and must be bored out to the largest of all the measurements, at the least. For example, if the upper front left is .006" and the upper rear left is .004", then the cylinder is egged and must be bored out to the next .010" oversize. If you get consistent readings of .003", for example, give or take .001", that means the cylinder is worn but not egged or tapered. You may be able to just have it honed and fitted with new oversize rings. If you are taking the measurements correctly but getting readings like .030", that piston isn't from that cylinder. Ditto if the piston won't fit in the cylinder.

Finally, be sure to look for gouges or scouring in the cylinder. If these are too deep, the cylinder can't be bored out large enough to remove them. Translation: It's junk. How deep is too deep? If the cylinder is already bored .030", but has a gouge about .040" deep, the cylinder is junk. Just add the two (.030" + .040") and you get .070". Ironhead cylinders can only be bored out .070" over stock maximum. (We don't recommend going over .050".) To get an idea of how much .040" is, use the fingers of the feeler gauge to get that value and use that as a rough guide. If you are in doubt, or the cylinder is close to being bad, figure it as bad when you tally up the cost. Don't get stuck paying for expensive doorstops.



You should inspect all the tappets and tappet blocks for scouring. Use this method to remove the block from the case. (We'll show you more on this in an upcoming issue.) The marks in here (see arrow) are not as critical but they also can't be vertical gouges or oil will leak past the tappet block O-rings.



Here's a scoured tappet. The tappet block will have similar marks on the inside. If the marks are not more severe than these, you can have the tappet block honed out. The tappet, however, is shot.



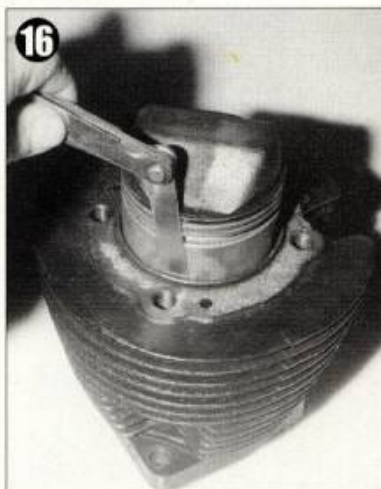
To check the connecting rod bushings, insert a piston wrist pin as shown. Then slide it from side-to-side in the bushing. Don't try to wiggle it from side-to-side because that will make it feel sloppy even if it's okay. If the pin slides with resistance through the bushing, it is usable. If the pin slides very loosely, the bushing is worn and should be replaced. If the pin feels like it hits a loose spot as it passes through the bushing and then gets tighter again, that's a wear spot on the pin not in the bushing. Judge the bushing on how only the pin's ends feel.



This piston is badly scoured (see arrow) which makes it trash. The area to the right of the scoring is what a used piston should look like. The cylinder will have similar marks in the bore and must be bored and honed to whatever oversize will clean it up.



Clean off the piston's dome to see if there's an oversize stamped in. This number (.030) identifies it as a .030" oversize piston. Sportster cylinders can go up to .070" over. If the cylinder is badly scored and must be bored more than .070" to clean it up, it's junk and must be replaced. If there's no oversize stamped on the dome, it means the piston is the stock size. That's good.



To see how far the cylinder is bored out or worn, you can use the old piston and your feeler gauge. Check out the sidebar "BORED" to see how this is done.

And while we're on the subject of numbers, the first thing you want to check is whether this is a legal engine. Check out the story "Numbers Game" on page 22 to get an idea of what to look for.

As for the special tools required, there are five that must be used whenever you check out a disassembled engine. These are the parts and service manuals for the year engine you plan to look at or buy, a flat feeler gauge, a 6- or 12-inch steel ruler that is laid out in 1/64s (you can use one that's in 1/32nds but it's a little harder to measure), and a pen and pad. The parts book lets you see, in exploded view, what you should have for the engine to be complete. Now that you know what is missing, you can figure that added cost into your



Check the bolt holes in the cylinders with a good head bolt. If the threads are cross-threaded, the cylinder is junk. See the bore of this cylinder? That's what a newly-honed cylinder looks like.



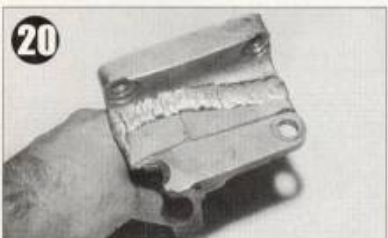
Next, check the heads. This is a newly-rebuilt one. If you see any chips or chunks missing out of the valves, figure on new valves. We always figure in a valve job every time we buy a basket unless the heads are just done and look like this one.

Check out the "For Your Info" story on page 14 to see what is involved in rebuilding iron heads.

calculations. The service manual will give you the correct tolerances for all the important components. What good is measuring clearances with a feeler gauge if you don't know what the num-



This is what the rocker box oil line's threads should look like. If you look closely, you can see that the threads start twice. Actually, it starts three times. You just can't see the other one. This is not a defect. That's the way Harley made them. You can also see that it's very easy to cross-thread these. Don't forget to check 'em.



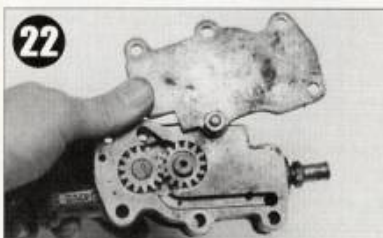
Here's a beat-up rear engine mount. It had a crack that has been welded. A corner has also been knocked off. Though the corner can be welded on again, we recommend replacement if either defect is present. Pingel makes a strong one.

bers should be? The steel rule is also used for measuring. The pen and pad are for keeping track of what you've found and tallying it up.

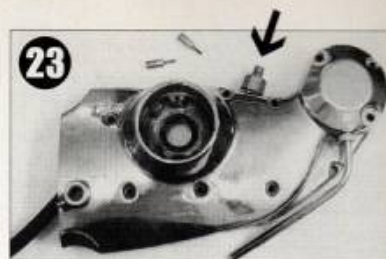
These, and a decent set of hand tools, are all you'll need to get a good idea of the general condition of the parts before you. With that information



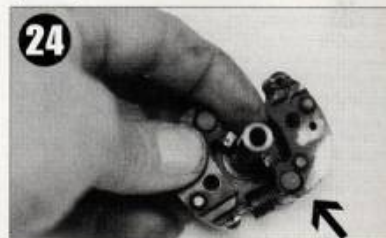
Though the cams usually are fine, check that there are no defects or chips on the lobe, both ends, or gear teeth. Replace all the cams if any defect is found.



Check the oil pump's gears and gasket surfaces. If you see any scratches or gouges on the gasket surfaces or where the gears rotate, the parts must be replaced. Marks that have no depth to them can be ignored.



Here's the cam cover. Make sure the five brass bushings on the inside face of the cover are firmly in place and have no gouges where the cams and pinion shaft ride. Also check the two threaded holes. These are for the two stand-offs (just above the cover) that hold the timing plate in place. If stripped, they can be a real pain to repair. It's probably cheaper and easier to replace the cover. Also check the threads for the tach drive unit (arrow).



This is the mechanical ignition advance unit for the ignition system. This one has one broken spring (by my index finger). This is an easy-to-replace item. However, where the weights ride on the backing plate's pins is worn oval (see arrow). The weights, and probably the whole assembly, must be replaced. Most new electronic ignitions replace this unit but not all. Check before you buy.

and a good idea of what machine shop labor and Harley parts cost, you'll have a decent estimate of how much it's going to run you to put this beast together. You can then make an informed decision about whether you've found gold or garbage.

In upcoming issues, we will be covering all aspects of an engine and tranny rebuild. And though we will probably be using quality aftermarket parts in these builds and repairs, you can also install good used parts or new genuine Harley ones. The build is the same as long as the parts are made correctly and are serviceable. The clearances in the these photos are taken from Harley's 1970 to 1976 Sportster Service Manual. Check your manual for the clearances for your engine. ■

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