Routine Maintenance 101

One of my main income-generating activities involves 'routine' maintenance services on Hondas. I find customers are normally more receptive to paying for preventive maintenance at this time of year, especially if it could mean being stranded in the Minnesota snow if the work is postponed. Things like weak ignition systems, tired coolant and bald tires just seem to find a more attentive audience when they're discussed just as Winter turns the sky grey and the wind cold. Blending routine maintenance with work of a more critical, immediate nature can not only give your customers what they need, but also provide you with the work you need.

The service manual for my 1996 Civic says to "follow the Normal Conditions Maintenance Schedule if the severe driving conditions specified in the Severe Conditions Maintenance Schedule do not apply." Okay, let's see what "severe" really means. Quoting from the manual:

- Driving fewer than five miles per trip.
- Driving in extremely hot conditions (over 90 degrees F).
- Extensive idling or long periods of stop-and-go driving.
- Trailer towing, driving with a car-top carrier or driving in mountains.
- Driving on muddy, dusty or de-iced roads.

NOTE: If the car is occasionally driven under a "severe" condition, you should follow the Normal Conditions Maintenance Schedule.

How does that compare with my 'normal' driving habits?

- I drive 40 miles each way to work, but my two-mile trips to the grocery store every weekend put me in the Severe category.
- From July through August we get more than one very hot day here in Minnesota, so I imagine the rest of you see some pretty warm days as well.
- On my commute home, extended idling in the metered freeway on-ramps put me right smack in the middle of Severe Conditions.
- My owner's manual expressly states that towing a trailer will void my new car warranty, so I won't even go there.
- From November through April, we snowplow and salt the roads here in Minnesota. While I've never checked the bag after vacuuming the street in front of my house, I'll assume there's some dust mixed in, too.

All kidding aside, when we discuss maintenance with our customers, it's safe to figure that almost every vehicle that comes into the shop qualifies for treatment under the "Severe Driving Conditions" heading.

Photo 1: *I can't overstress the importance of replacing the oil drain bolt aluminum washer every time you change oil, and torquing the bolt to 31-33 lb.ft. If you try to tighten the old washer, you'll stress the bolt and the pan until the threads are junk, the pan's distorted and can't seal.*

Those 7500-mile oil change intervals make good advertising copy for unwary buyers, but they are rarely the appropriate choice out here in the real world.

Oil Changes

The severe-driving-conditions recommendation for oil changes is 3750 miles. My employer offers our customers a flat-fee oil change package. After paying a one-time, upfront fee, we change the oil and filter every three months or 3500 miles, whichever occurs first, for the life of the car. This is by no means a get-rich-quick scheme. But it does keep the customer coming back regularly! This offers the opportunity to find potential problems, catch up on the manufacturer's service campaigns and provide the customer various other conveniences. The customer dips into his or her wallet just once for this service — the next however-many oil changes are entirely free.

When changing oil on Hondas, always replace the aluminum crush-washer on the drain bolt and always torque the bolt to 31-33 lb.ft. (**Photo 1**). The oil drain bolt may become difficult to remove. The drain bolt threads may be 'shark-finned,' meaning angled to one side and dropping straight off on the other, rather than in the isosceles, symmetrical shape they originally had. Also the drain hole opening may be dimpled out, rather than flat. All of this damage occurs if the drain bolt has been over-torqued by some gorilla.

This nifty kit (**Photo 2**) is available from Sure-Seal (**Circle Number 112**) to put things back in order. The drift fits into the drain hole. When smacked with a hammer, the drift returns the oil pan to its original configuration. A thread restorer returns the threads to their original angles (**Photo 3**). After this procedure, a new OE drain bolt and washer can once again seal the opening.

If the threads in the pan are too far gone to use the OE bolt, the kit also comes with an O-ringed drain bolt requiring only 10-15 lb.ft. of torque. An oversized thread restorer and Sure Seal oversize bolt are also available for worst-case scenarios.

Have you ever removed an oil filter that didn't drip oil all over the exhaust pipe? Do you know why that happens? There is an anti-drainback bladder in most oil filters designed to keep oil in the main oil gallery when the engine is shut off. This keeps the oil gallery primed, so the time needed to completely fill the oil passages when you first start the engine is kept to a minimum — reducing engine bearing wear. If nothing comes out of the filter, this means all the oil has drained back into the pan. Every time that engine started, it started with an empty main oil gallery. Point this out to your customer if you see it, and recommend the use of quality oil filters to promote long engine life.

Once you have the old oil filter off, check the filter base to be sure the rubber filter o-ring is on the old filter, not stuck to the block. I've seen more than one Honda engine nuked because two oil filter O-rings were left on the block. One blows out as soon as the car hits the freeway, the engine dumps its oil load in seconds, and the motor grenades before the customer sees the oil light. Not a fun experience, especially for the last guy to do an oil change. Make it a point to check the filter and the mounting pad so you don't get burned.

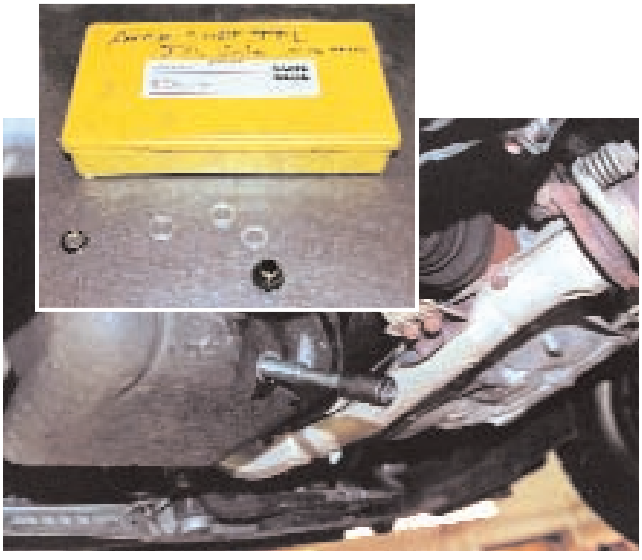


Photo 2 *(inset)* ***and 3 (****above)****:* *If the pan or drain bolt is ruined, try to salvage it with this Sure-Seal kit. It comes with a drift to reshape an elongated oil drain opening and two thread restorers (Photo 3) that re-forge the OE thread rather than cut it like a tap. This may allow you to use a new OE bolt and washer. If the threads are too far gone to hold the 33 lb.ft. torque, use the Sure-Seal drain bolt slotted for a supplied O-ring. It only needs 10-15 lb. ft. to seal and stay put.*

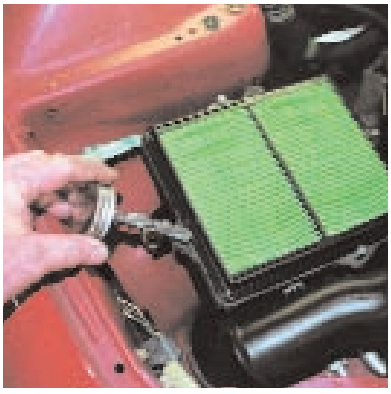


Photo 4: *Don't expect more than 30,000 miles from a Honda air filter. Make sure you have the air filter housing completely installed around the filter and all hoses and connections are on right. A little dab of antiseize on the threaded portion of the screws or the nuts can keep them from rusting in place, which they otherwise will.*

Air Filters

The factory recommends replacing the air filter every 30,000 miles and inspecting it every 15,000. That interval applies to just about every Honda out there. Make sure the filter housing is securely in place after installing the filter. On the filter housings that are held together with screws rather than clips, put a dab of antiseize on the threads (**Photo 4**) to keep the screws from seizing someday.

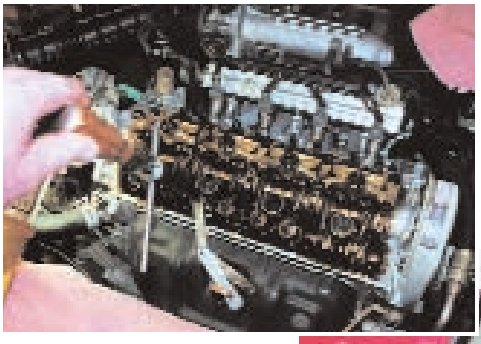
Valve Clearance Inspection

I remember when new Hondas got their first scheduled valve adjustment at 5000 miles, then at 15,000 miles, followed by every 15,000 miles after that. Life was good for service techs. Today, the first recommended valve adjustment on my Civic came at 30,000 miles. Some of the newer V6 engines don't need to have their valves inspected and/or adjusted until 105,000 miles! Even then they'll only need adjustment if they are noisy. As oil technology and engine metallurgy have improved, engines aren't wearing as they once did, so valve adjustments last a long while.

Always adjust Honda valves to the loose end of the spec. The engine must be cold (less than 100 degrees F), so plan your service appointments accordingly. The slightly loose valves allow the engine to produce more vacuum at idle, which allows it to run smoother (those speed-density fuel systems love their vacuum!). The engine will get better fuel economy as well. A light drag on the feeler gauge indicates a proper adjustment (**Photo 5**). I couldn't figure out how to keep one hand on the tool, another on the feeler gauge and still snap the shutter.

Adjust each valve with that cylinder at TDC. Look at the cam gear. If you see the word *UP* above the cam bolt, and the lines on cam gear lined up with the valve cover surface of the head, you are at #1 TDC. Adjust #1 cylinder, then rotate the crank by hand in the normal, counterclockwise direction. (**Photo 6**). When the line on the camshaft gear is vertical, adjust #3, then move the mark back to horizontal (with the word *UP* down), adjust #4, then back to vertical, (*UP* should be at 3 o'clock) and adjust #2. It doesn't much matter where you start the sequence if you know where you are as long as the cylinder is at TDC when you adjust its valves. When finished with all four, go over the adjusting lock nuts and make sure they are torqued to 14-16 lb. ft.

Put the valve cover back on with a new gasket and a dab of Honda "Ultra Flange" at the corners of the gasket (**Photo 7**). Zip the nuts back on with a 3/8-drive speed handle, instead of air tools. This gives you a better indication whether the valve cover nuts are tight enough, but not overtorqued.



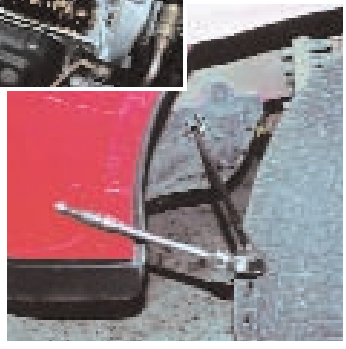


Photo 5 *(above) and* ***6*** *(right):* *Adjust the valves to the loose end of the spec on a cold engine (less than 100 degrees F). Adjust the valves on each cylinder while that cylinder is at TDC. Use a wrench on the crank 17- or 19mm bolt and turn it by hand (**Photo 6**). When completed, torque the lock nuts to 14 lb. ft.*

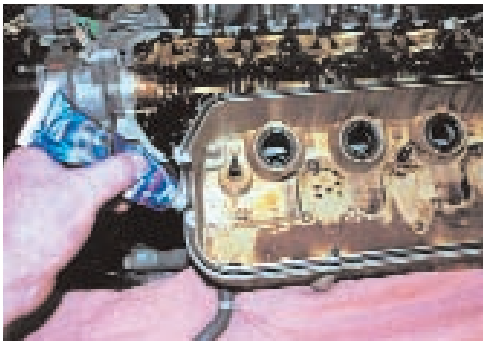


Photo 7: *Use a new gasket on the valve cover and a little Honda "Ultra Flange" or similar gasket sealer in the corners of the gasket. Clean the sealing surface of the head of all oil and dirt. Tighten the valve cover bolts/nuts by hand until they are tight, but not overtorqued.*

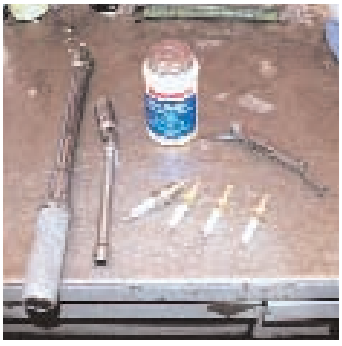


Photo 8: *Make sure the plugs you're using are right for the application. Don't use standard plugs where platinums are specified. Use antiseize on the threads and hand-tighten the plugs to 13 lb.ft. Use only a wire gapper to set the plug gaps. The sliding wedge type can cause plug damage while gapping the electrodes.*

Spark Plugs

Most Honda engines should get new spark plugs at 30,000 miles. Engines equipped with platinum tip plugs will go to 60,000, but a few of the new V6's are designed to go 105,000 miles on a set of platinum plugs.

Spark plugs don't just affect themselves or the potential for misfire when they get old. As the gap increases, it also increases the demand on the coil to produce higher voltage, which in turn increases the demand on the igniter to toggle the coil, and so on. An old plug may require as much voltage from the coil at idle as it did to run full throttle when it was new with a fresh 0.040-inch gap. When I see a car with a coil and igniter failure, I can't help but think that 'deferred plug maintenance' was a factor.

Air tools are fine for spark plug removal, but never use them to install plugs. This can crack the porcelain internally, which may lead to premature or severe plug failure (part of the plug drops into the cylinder and does very bad things). Over the years, I've seen many complaints and claims of one spark plug brand or another destroying an engine. In every case I know of, it could be proven that the plug had been overtorqued, improperly gapped (wrong gapping method) or the wrong plug had been installed, so be careful. Use all the tools in **Photo 8**. Set the gap with a wire gauge — not a sliding gauge that can crack the electrode or the porcelain. Dab some antiseize on the plug threads, turn them in by hand and torque them to 13 lb.ft. It shouldn't take any longer to do it right than to do it wrong. And you don't have anything to fix afterward.

Coolant

Change Honda engine coolant at 45,000 miles or 36 months, then every 30,000 miles after that. The main thing to stress here is coolant quality. Many years ago, I noticed coolant in some cars that looked worse just one year after it was flushed and replaced when compared with other cars that had three years on their factory fill. There were two reasons for this problem: the shop I was working for at the time was using bottom-of-the-barrel bulk coolant ('gotta save every buck, you know!'), and the water in that community was very hard.

The owner's manual for my 1951 Minneapolis Moline UTU tractor says to use a mix of "antifreeze coolant and soft water." I guess not much has changed. The quality of the water in the mix is just as important as the quality of the coolant. My current employer provides distilled water, as well as a top quality coolant (**Photo 9**). This combination will provide the owner with another 30,000 miles of service.

Unless you have flushing equipment, you'll probably be doing a drain-and-fill rather than a flush. Turn the heater on full hot for draining as well as for refilling the coolant. Drain the radiator, and be sure to check the O-ring on the drain valve. Make sure it's not cracked or flattened and unable to conform. It's no fun to see the radiator drain dripping in the parking lot after changing someone's coolant. Open the coolant bleeder (**Photo 10** shows a typical bleeder-bolt) and fill until the coolant runs from the bleeder, then tighten the bleeder bolt and continue filling. Also drain, clean and refill the recovery jug to finish the job. See *Tech Tips* this month and last for easy ways to do that job even when it's next to impossible to remove the overflow jug.

Photo 9: *The water you mix with your antifreeze formula is just as important as the antifreeze. Even though today's antifreezes use all kinds of rust and corrosion inhibitors, a very high mineral content (very hard water) can still cause problems. If it isn't in the water in the first place, it doesn't need treating.*

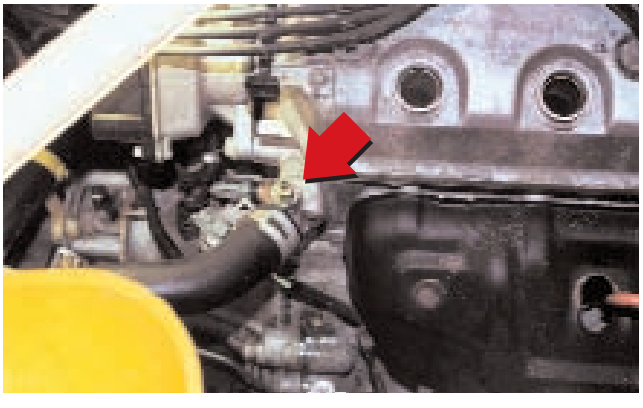


Photo 10: *Drain and fill the coolant with the heater set to full hot and this coolant bleeder open. Fill the coolant until it flows out the bleeder, then close it and fill to the cap. Most Honda engines typically have a bleeder in this location.*

Even a drain and fill gives good results, especially if it's performed regularly using quality coolant. When the customer comes back for a coolant flush at 75,000 miles, it doesn't look like it needs it — which is the whole idea. It's maintenance, not repair.

Transmission Fluid

This is a subject I could preach about. Somebody fetch me a pulpit! Honda says 30,000 miles for most models and up to 60,000 miles on others for automatic transmission fluid replacement. I've rebuilt a trainload of Honda auto transmissions, and I think this recommendation is just nutty. I change the fluid on my wife's 1989 Accord every 15,000 miles and use type F fluid because I like the firmer shifts as well as extended life. While some Honda owners prefer the shift quality provided by the factory fill or Dexron II, you still can't change it too often in my book. There is no serviceable transmission filter. Just a simple drainbolt, crush-washer and a torque spec. How hard is that?

The factory ATF is *really* good stuff. It eliminates a lot of converter hunting and shuddering problems. Sometimes I'll get a Honda in my workbay with shifting or driveability problems. A road test usually confirms the transmission doesn't have any slipping clutches or major problems. The harsh lock-up or other not-so-serious shift quality symptoms are usually caused by tired ATF. I'll run three changes of Honda ATF through the trans (so I flush the torque converter fluid as well), which cures most if not all of these problems. If the trans fluid had been changed at frequent intervals with Honda or other good quality fluid, the owner probably never would have experienced any shift quality or driveability deterioration in the first place. Again, that's why we do routine maintenance!

Brake Fluid

Maintenance intervals have changed with newer Hondas, but if you stick with two years or 30,000 miles for flushing brake fluid, your customers brake hydraulics should last a long time. I believe every master cylinder failure is due to a failure to change the brake fluid at regular intervals. There is no mention of the clutch fluid in the maintenance schedule, but that needs to be changed just like brake fluid, because that's what it is.

Photo 11 shows a great deal of sludge found in the master cylinder strainer of this '94 Civic. Even though there was only 35,000 miles on it, the fluid looked terrible. The mileage wasn't the problem. Being six years old was. Heading into winter and freezing temperatures with moisture in the brake fluid is particularly undesirable. We hear scary stories about brake fade from boiling brake fluid, contaminated with water. Consider how a car would feel with *frozen* hydraulic fluid in the brake system! That should provide an even greater incentive for your customer to let you flush the brake hydraulic system.

Don't simply suck out the old fluid with a turkey baster (**Photo 12**), Fill the baster, then force it back into the master cylinder to try to mix the sludge with the new fluid. After sloshing back and forth a few times, the sludge is in full suspension with the fluid. That way, you'll get out as much sludge as possible when you finally capture and remove the fluid. Besides just wanting the sludge out, you also want to minimize the chance any of it will find its way into the ABS components when you flush the rest of the system.

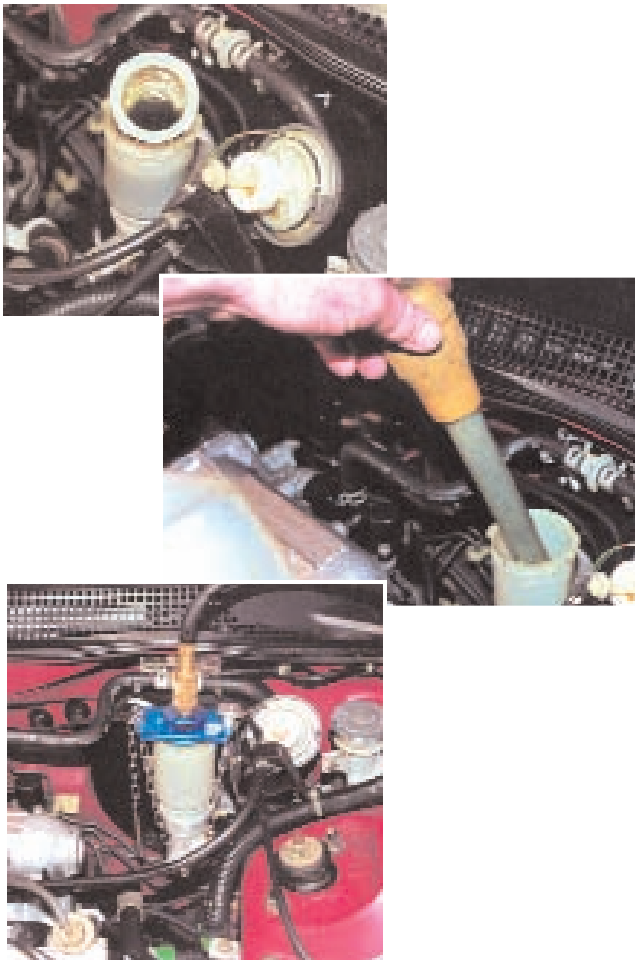


***Photo 11** (top), **12** (center) and **13** (bottom): Change brake fluid every two years or 30,000 miles. This stuff has barely 35,000 miles on it, but is six years old and pretty gunky. Slosh the fluid back and forth in the reservoir with your turkey baster (**Photo 12**) to suspend as much junk as you can before you finally remove it. Use a pressure or vacuum bleeder (**Photo 13**) to thoroughly flush the system. Use a good quality DOT 3 or 4 brake fluid from a sealed container.*

Fill the reservoir with clean DOT 3 or 4 fluid, then use a mechanical bleeder to flush the caliper and drum system. I use a pressure bleeder with a specific adapter to minimize mess and maximize efficiency (**Photo 13**), but vacuum bleeders work great too. I am not a fan of the dripping-bleeder-screw method. Forcing fluid through the system is the only way to remove all the contaminants.

Emission Systems

Spend most of your time in this area visually inspecting hoses and solenoids for breaks, cracks or porosity. Check the fuel vapor canister (**Photo 14**) for cracks, broken fittings and problems like that. See how the car acts during a hot restart. Flooding or off-idle hesitations that last for the first minute or so after a hot restart may indicate a canister full of liquid fuel or some related failure. Ask the owner whether he tops off the tank, and convince him to stop the practice if he does.

Tires

Honda recommends tire rotation at 7500-mile intervals, which boils down to every other oil change in the real world. This provides an excellent inspection-interval opportunity. While you have the wheels off, check the brake pads to make sure they're wearing evenly on both sides of each rotor. This is a great chance to spot a sticking caliper slide or piston. You'll see uneven pad wear from side to side or one pad more worn than the others.

Most tires have wear indicators at 2/32nds. If the tires are worn to the indicators, it's time to replace the tires. In reality, when tires are worn to 4-5/32nds, they're really not that safe anymore. When the factory tires on my Civic reached 5/32nds, they were very dangerous in the rain, even though they still looked like they had good tread. Evidently a tire can aquaplane even if the tread still looks good.

Fluid Levels and Condition

While you're checking the car over at the 7500-mile interval, also check all the fluid levels. Check for crud in the master cylinder strainer cup. Check the power steering fluid for level and clarity. Top off the coolant reservoir to the MAX line and fill the customer's windshield washer jug with the appropriate fluid.

Belts

Honda recommends timing belt replacement at 90,000 miles or 72 months. Recently I repaired a 1991 Integra with 75,000 miles and a broken timing belt. Think *time*, not just *miles*. I also change all the accessory belts and strongly urge replacing the water pump at the same time as well. Many water pumps are dribbling from the weep holes at 90,000 miles.

Photo 14: *Visually inspect the charcoal canister and its connecting hoses. Make sure the hose on the bottom isn't kinked or broken off. Make sure all wire connections are in place and no hoses are split, especially at the valve cover breather. The service manual for this model makes no mention about fuel filter replacement (top of this photo), but taking it past 90,000 miles is a false economy. 60,000 miles seems like a more sensible interval.*

Miscellaneous

Also at every 7500 miles, check the CV boots for cracks, look for broken front springs, loose ball joints and tie rod ends, loose rear upper arm joints, broken sway bar links, leaking upper radiator tanks, broken engine mounts, exhaust heat shields, broken or rusty exhaust pipes and mufflers. Check the parking brake adjustment. If it's loose, adjust the rear brakes or inspect the rear calipers for a stuck e-brake lever. It's *never* the cable that needs adjusting. Check the upper radiator hose for swelling near the thermostat housing. Check for power steering fluid leaking from the rack boots.

It may not be glamorous, but maintenance work is what keeps shops running from day to day. Maintenance provides the opportunity to spot the bigger service jobs that keep your shop solidly in the black. If you can sell the majority of the maintenance work that must be done, have the patience to wait for your customers to return for the work that should be done, and can do all of the work correctly, you'll have no difficulty keeping customers hooked to your shop. I tell my customers "I plan to get every dime you're going to spend servicing your car, no matter how long I have to wait for it." ■

— By Marlowe Peterson