

Walk Around Visual Inspection

Your experienced first impression counts for a lot when eyeballing a vehicle, especially if you're checking a used vehicle for a prospective buyer. How's its "curb appeal"? Would you buy this used car? Do doors, hood and deck lid line up? Are there tell-tale wrinkles in the finish? Obvious collision repairs? Does it sit straight or does it lean?

a1 -Exterior Lighting

A walk around check should include exterior lighting: do all lights work? Are there any cracked or missing lenses?

Don't overlook such things as the "opera lamps" on the door pillars of some of the luxury cars or center grille lights on others. Are all of them functioning?

Take a look at the lighted grille you'll find on a Pontiac Grand Prix or Mercury Sable. Pick ups and vans may be equipped with additional exterior lights that need to be checked. For example, turn signals in outside rear view mirrors in Ford Explorers or midship turn signals on Saab 9000.

Test Drive

Because this can be the quickest (sometimes the only) way discrepancies will show up, be sure to allocate enough time for a comprehensive road test. A test drive should involve more than a quick run down the road in the vicinity of your shop. Instead, map out a route that incorporates some of the more common driving conditions the customer might encounter, including stop and go driving, curved roads, hills and rough terrain. If possible, include a stretch of highway speed driving.

Checking The Bells And Whistles

b1 - Electrical Accessories

Sounds simple enough, but beyond such obvious things such as operation of accessories, radio/tape deck or power seats and windows, it's easy to overlook hidden buttons like the rear deck lid or fuel door release. A seemingly minor fix, especially in the case of a computerized option, can make a big difference to the prospective buyer of a used car.

b2 - Warning Lights

With the ignition key on, but before starting the engine, see that all warning lamps work. An inoperative brake warning light, for example, could be masking a problem in the braking system, as could any disabled warning light that could hide a problem with a used car. Does the brake light turn off when the parking brake is released? (Note: push the parking brake pedal one or two clicks to activate the light in case the parking brake cables are frozen. This will keep you from locking the brakes in the parking lot.) Do

interior courtesy lights, engine compartment and trunk lights turn on and off when they should?

b3 - Gauges

Are any warning lamps lit when they shouldn't be? On vehicles so equipped, do all gauges work and appear to be accurate?

b4 - Speedometer & Odometer

Do both the speedometer and odometer work? Look for evidence of odometer tampering, i.e., uneven spacing between numbers or a hole in the lens where the numbers have been moved with a fine wire or pick.

b5 - Instruments

In your overview of instruments, you may find in addition to the usual gauges, a miles to empty and fuel economy indicator, built-in compass or more sophisticated navigational instrumentation. Include these in your road test.

b6 - Heater /Air Conditioner

Make sure there's good control of the various modes of the heat/air conditioning system, that the defroster blows warm air and that the a/c puts out cold air. Due to the various options available today, make sure that you check the passenger side if that has separate controls. On dual air such as luxury cars, SUVs and vans, check performance of the rear system as well as front.

b7 - Engine Performance

The road test is your opportunity to detect performance deficiencies such as power loss, bucking, loping and/or sluggish acceleration when downshifting into passing gear. Listen for unusual noises, detonation or valve clatter.

b8 - Transmission Performance,

Does it shift smoothly both up and down and at the right speeds? Any indication of slippage? Does the torque converter lock up when it should? Is the kick-down normal?

b9 - Brake Performance

Look for signs of brake fading or pulling to one side or the other. Other signs of brake problems include pedal pulsation (which also may be felt in a high speed application), chattering or squealing. Find a safe place for a few heavy brake applications. (Keep in mind that you don't know this vehicle. It could surprise you.)

b10 - Steering Performance

Is steering responsive? How does the vehicle steer on a flat, straight stretch of road? Any indication of wandering or pulling in one direction or the other? Do you notice tire squeal on turns? Is there too much free play in the wheel? Does the power steering perform properly when parking or in tight turns such as maneuvering in a parking lot?

b11 - Suspension

Weak shocks and struts will show up on this rough road part of your test. How does the vehicle ride? Is it hard to handle or does it lose traction on an uneven or "washboard" surface? Does it wallow, sway or feel as if it might roll over on S turns? Do the tires squeal excessively when going around corners? Does it continue to bob up and down after a quick stop or a dip in the road?

b12 Vibration and/or Noise

If you notice a vibration and/or noise, at what speed does it (or they) occur? Does it seem to be related to part of the running gear, to the engine or drive train? (Put selector into neutral to help sort out engine noise vs. drivetrain noise.) On deceleration or acceleration? Do you notice one or both? Considering the time that might be required to find the source of an unusual vibration or noise, do not attempt diagnosis during the road test; just note the symptoms and circumstances.

Under The Hood

While the term "under-the-hood" immediately brings dipsticks and fluids to mind, you may discover anything from flood or collision damage to a ragged drive belt.

c1 - Brake Fluid

Here we are looking for more than fluid level, of course. Condition is critical, especially on vehicles with antilock braking systems, especially in humid zones since brake fluid absorbs moisture. Some ABS systems are required to be flushed and the fluid be replaced at 30,000 miles. Be sure to confirm whether or not that has been done.

c2 - Coolant pH

Before any coolant check, be sure it is sufficiently cool for the obvious safety reasons. Checking the coolant's alkaline or acidity level is a procedure rarely done as a routine service. Regardless of how it looks, coolant pH should be litmus checked at least annually, along with the freeze protection level, to ensure long life of cooling system components. Due to changing automotive and coolant technologies, and extensive practical experience from the field be advised that the guidelines for Ph adjustment be set between 8.5 and 9.3. Corrosive coolant couple with inferior grounds leads to a phenomenon known as electrolysis -a condition that sets up when the acidic coolant

electrochemically reacts with the dissimilar metals (steel, aluminum cast iron) in the engine, and cooling system. This causes corrosion of the metal surfaces which ultimately leads to the generation of stray electrical current in the system. In effect, the engine and radiator become a battery, with the coolant serving as very willing electrolyte!

To test for electrolysis hook one DMM probe to battery negative while placing the other directly in the coolant. (Don't let the probe tip touch the radiator!) Like a voltage drop test, you'll want the engine running and as many accessories as possible on to load the circuits and get accurate results. What you're looking for is an upper limit of about 300mV, with under 100mV preferable.

Above the 300mV max? Identify the problem circuit, clean its ground thoroughly with a wire brush, then retest.

Still above the 300mV threshold? Then it's time to swap out the old antifreeze.

c3 - Coolant Leaks

Pressure test the system to look for seepage on the radiator core, tank or fittings. While the system is pressurized inspect the system for seepage at hose connections, water pump and other vulnerable areas. Test the pressure cap for leakage and release at the prescribed pressure. Inspect the seals and contact surfaces, including the condition of the filler neck mating surface. Also inspect the heater core which could show signs of seepage such as dampness and odor of antifreeze.

c4 - Radiator

Here we are checking the condition of, rather than the contents of, the radiator. As stated above, be sure the system has cooled down enough to remove the pressure cap safely. Are the cooling fins straight and intact? Can you see anything that could be restricting the air flow on the front of the radiator, such as leaves or paper? (Note: a vehicle equipped with a bug screen may reduce airflow by as much as 30%.)

On some newer vehicles this examination can be difficult because of limited visual access. But the time and effort can be well worth while.

c5 - Timing Belt

Requirements for replacing the timing belt vary widely. Check manufacturer's replacement requirements or those of a reputable manufacturer of timing belts. Recommendations can range from as low as every 50,000 miles to "never". This is another good reason for having access to the vehicle's service history (or an owner with an accurate memory.) Advise the owner if the vehicle has an "interference" engine or not, and what this means relative to timing belt replacement.

c6 - Battery Test

With the advent of "maintenance free" batteries, specific gravity (hydrometer) tests have become a thing of the past. Now they should be load tested with a carbon pile tester. Any

battery over 4 years old is a good candidate for replacement so, once again, the maintenance records can be invaluable. Your customer would appreciate knowing if his battery is in borderline condition.

c7 - Abnormal Under-Hood Noise

Listen for worn bearings in the alternator, power steering pump or other components. Belt tensioner (idler) pulleys, now common with serpentine belts, also are subject to bearing or bushing wear. The tell-tale hiss of a vacuum leak is most noticeable during your under-hood inspection, as is an exhaust manifold leak.

c8 & c9 - Charging System Output

This procedure, to determine alternator and voltage regulator performance, generally is done at 2,500 rpm (check manufacturer's specifications) first using a VAT tester to check voltage output. Then check fast idle output in amps by using a carbon pile tester to load the alternator. Here's where a slipping drive belt may show up.

c10 - Starter Cranking Amperage

How's the starter performing? This is a warm engine cranking amperage test, with pass/fail determined by your information system.

c11 - Engine Noise

This differs from under-hood noise, (see c7) in that we are looking for abnormal sounds from the engine, per se. Now you'll be running the engine at different speeds to listen for valvetrain noise, rod knock, piston slap, crankshaft end play or timing chain noises.

Air Conditioning /Heating System

d1 - Identifying The System

For an overview of the system, begin with the identification decals under the hood. While R-12 and 134 A are the standard OEM systems, there are many other types of refrigerants you may encounter. If, for example, a conversion was made using a butane or propane based refrigerant, the owner should know that.

This information helps not only a used car shopper but also an owner who may not know what was used when his system was converted. This information is found on the (mandatory) decal located under the hood. If the system is something other than R-12, or R-134A please identify it in the comment section.

d2 - Air Conditioner Condenser

As in the case of the cooling system radiator, air flow restriction can be a problem when the condenser becomes plugged or restricted with debris. Be sure to take a look.

d3 - A/C Duct Temperature

This could have been done during the road test, but include it as part of the AC procedure. Is it putting out cold air? Remember that duct temperature is greatly affected

by outside temperature and humidity. If unable to check, make a note on the inspection form.

d4 & d5 - Heat Duct Temperature

This, of course, is checked with the engine at normal operating temperature. This is a good time to check blower motor output as well as defroster output, temperature and air duct valve operation. Air conditioning/ heating systems on some vehicles incorporate an air filter, Confirm whether or not such is the case on the one you are inspecting and, if so equipped, whether or not it needs to be changed.

If you have not looked (or sniffed) for heater core seepage during the cooling system pressure check, do so now. If the customer has reported being unable to remove abnormal accumulations of moisture on the inside of the windshield, that's a good indication of heater core seepage.

Engine Analysis

This is an overview of engine condition including those computerized controls that affect performance, economy and emissions.

e1 - Throttle plates/idle speed passage

This is especially critical on older fuel-injected vehicles with high mileage. Is the air passage restricted and dirty? As with other parts of the inspection procedure, your objective is not to take corrective measures, only to report findings and make necessary recommendations.

e2 - Gas Cap

No longer is this merely a device to keep gas from sloshing out of the tank; it has become part of the emission control system. Is this the original cap? If not, is it the correct replacement for this vehicle? Check the O ring; is it making a good seal? If this, is a locking gas cap, is there a key? (An especially important factor with a used vehicle.)

e3 - Diagnostic Scope Test On Primary Ignition

This a simple scope test to detect patterns that indicate problems with the crank sensor, cam sensors, the distributor switching device or other parts of the primary ignition system.

e4 - Secondary Ignition

Another scope test, you are looking for extremely high or low values, not for diagnostic purposes but to call it to the customer's attention. This time you're looking for existing or potential causes of misfiring spark plugs. This can be due to defective wires or distributor cap or the spark plugs themselves, or even a sign of major engine problems. With consumers expecting longer periods of service free driving, it is not unusual to find vehicles that have been driven far beyond the normal life expectancy of engine components that affect performance and emissions.

e5 - Idle Quality

This evaluation is subjective. Thanks to computer controlled fuel injection and ignition systems, most engines run very smoothly. But rough idle, loping or stalling should be noted. Defective engine mounts can exaggerate rough idling.

e6 - Idle Speed

Confirm specified idle speed on the rpm scale of your scope. Note, also, unstable idle speed or surging.

e7 - Spark Plug

Examining the firing tip of a spark plug can disclose a lot about the engine. At least one plug should be removed or, on a V-6 or V-8, one on either side. Look for signs of wear (gap), burned electrodes (due to excessively lean fuel/air mixture), oil fouling (indicating internal engine problems), carbon fouling or other discrepancy.

e8 - Malfunction Indicator Lamp (MIL)

Does it work? The light should come on with the ignition key turned on with engine not running. Again, this notation is not for diagnostic purposes, only to make the customer aware if it does not function.

e9 - DTC Codes, Current and History

Record any current codes and/or history codes by number to indicate problems that exist or that may exist. If any are found the customer should be advised that, based on these findings, additional testing is necessary.

e10 - Emission System Visual Inspection

Inspect all emission systems for missing components or tampering. EGR system, catalytic converter (has it been removed or bypassed?) Take nothing for granted. Because these systems vary widely, check your data source with each inspection. You don't want your customer buying a car that has had emissions system tampering. This also can show up on a customer's vehicle that's been serviced by someone who's dishonest, ignorant or both.

e11 - Exhaust Emissions (HQ)

This test is done at idle and at 2500 rpm with the engine at normal operating temperature in "closed loop" mode. Also, the catalytic converter should be warmed up enough to be effective.

e12 - Exhaust Emissions (CO)

Again, this is done at both idle and 2500 rpm, following recommendations provided by the tool/equipment manufacturer. Your objective here is not to diagnose the condition but to identify a gross polluter. If further testing is needed this should be noted and the customer so advised.

Undercar

This is your opportunity to get a good look at what's going on underneath: loose or missing parts, fluid leaks etc. Be sure that all safety precautions have been taken when putting the vehicle on the lift.

f1 - Tire Pressure and Condition

This part of the inspection should include a close look at all four tires plus the spare. Look for uneven wear, measuring each tread at the center and outer edges. Report the minimum reading and, where applicable, the uneven wear conditions.

f2 - Lug Nut Torque

Do not overlook this one! Check specs for the vehicle in question and torque all lug nuts, not only to be sure wheels don't fall off but also because of the possibility of rotor warping.

Note that space is provided for lug nut torque entries. If a liability issue were to arise the form should show that the lug nuts were tightened to this specific number of foot pounds, as per manufacturer's recommendations.

Steering And Front Suspension

Check your resources to confirm the manufacturer's steering system component specifications. Some vehicles have wear indicators, others have run-out indicators. Verify your pass/fail specs before failing a vehicle.

g1 - Rack and Pinion

Ask the customer if the vehicle is hard to, steer when it first is started in the morning. This condition, generally known in automotive circles as "morning sickness", is common to many vehicles of the late '80 - early '90 vintage.

g2 - Gearbox

If the vehicle has a steering gear box, check to see if it has too much play and needs adjusting. Beyond that, look for leaks, worn bushings and other wear-vulnerable areas.

g3 - Steering Gear Linkage Components

This category encompasses the pitman arm, idler arm, relay rod/drag link, tie rods and tie rod- ends, ball joints, control arms and strut rods. Abide by the original equipment manufacturer's recommendations. There are situations where you may find what appears to be excessive play in a part. Be certain that it IS excessive, beyond specifications, before listing the condition as a "fail".

To uphold the credibility of the Certified Inspection you need to rely on OEM specs which can be more lenient than you're inclined to be. We need factory specifications to back up your pass/fail recommendations.

g4 & g5 - Suspension Components

Here we are dealing with springs/torsion bars/suspension air bags, shock absorbers and struts. Check your T.S.B.'s. These categories call for special attention to the non-traditional systems such as the "air ride" on some Lincoln Continentals, air springs and other such air systems. Some have automatic leveling mechanisms which should be checked.

Note whether the vehicle holds its ride-height after sitting for a half hour or so.

g6 - Frame Rails I Unibody Condition And Floor Plans

These are areas of rust-vulnerability, especially critical on vehicles which have been driven in the northern "rust belt" or in close proximity to ocean salt spray. A rusted frame or floor pan can mean the whole vehicle is or soon will be unsafe in an accident. Rust also suggests looking further for rust-critical areas such as steel hydraulic tubing in the braking and fuel system. This is another opportunity to inspect for collision repairs that might be spotted only from underneath.

A used car tip: look for holes drilled for a trailer hitch that's been removed.

g7 Front Cradle Mounts Take a close look at the rubber bushings; they are prone to failure.

Rear Suspension

h1 - Control Arms, Ball Joints, Tie Rods / Ends, Tracking Arms

Again, you should rely on your information source for manufacturer's specifications.

h2 - Rear Axle

On front drive vehicles with solid rear axles, such as some Chrysler products, look for creaking and sounds of cracks, and/or lubricant leaks in rear axles of rear wheel drive vehicles. (These can often be visually identified by a rusty area forming around a structural crack.)

h3 & h4 - Rear Springs, Automatic Leveling, Air Suspension

As stated in (g4) check T.S.B.'s and manufacturer's specifications. See if the automatic leveling system works when a load is placed on the rear. Make a note of the type of system and record the ride height as compared with recommendations.

If the vehicle is equipped with aftermarket air shocks or other suspension assist system see if it is functioning normally.

Take special care to look for weak rear springs and worn bushings in load carrying vehicles.

h5 - Frame Rails / Underbody Construction And Floor Panels

As stated in footnote (g6) you're inspecting for rust or collision repairs.

Drivetrain Undercar

i1 - Miscellaneous Fluid Leaks

This category covers any leaks that have not been specified before, including transmission, hydraulically operated clutch, braking system, rear axle, shock absorbers, cooling system and gas tank/fuel lines.

i2 - Front Axle Leaks

On a four wheel drive vehicle look for front axle leaks such as a pinion seal, inspection cover gaskets of axle seal. On a front wheel drive vehicle look for output shaft seal leaks.

i3 - Transmission Leaks

This applies to both front and rear wheel drive vehicles. Note leaks on the transaxle on front drive vehicles.

i4 - Front Drive Axles

Some four wheel drive vehicles use universal joints; others use CV joints. Give universal joints both a visual and a physical check to note excessive movement.

i5 - CV Joints

Should be examined for leakage and for condition of the boots (see 15). Loose joints or cracked or cut boots should be noted. If a boot appears to have been cracked for a long time, the lubricant already may have leaked out and the joints are likely to be damaged. If so, it probably will have shown up in the test drive. This undercar inspection would confirm the condition.

The same procedure applies to rear CV joints which are in more common use today.

i6 - Engine / Transmission Mounts

Use a pry bar to check the integrity of both engine and transmission mounts. The most common effect of loose or broken mounts is shaking or vibration. On a front wheel drive vehicle a broken mount can affect chassis alignment because the engine / transmission will change position within the engine compartment.

Exhaust System

j1 - A.I.R. Tubes

This inspection should begin at the exhaust manifold and continue to the tail pipe. Look for components that may be rusting through, failing or broken hangers.

Be sure the air injection/recirculation (A.I.R.) tubes are connected from the top end to the catalytic converter. Also, on vehicles which have A.I.R. check valves incorporated in the line, inspect the valves to confirm that they are functioning normally,

j2 - Emission System Tampering

As stated above, the catalytic converter, as well as the air injection tubes are critical aspects of the emission control system ... This is an additional reminder to give them a close look while under the vehicle. You may want to use a rubber mallet on the, exhaust to pinpoint loose and rattling heat shields.

Brakes

k1 & k2 - Brake Pads

Measure pad thickness in millimeters. Then, referring to OEM specifications or your state guidelines for that vehicle, compare that measurement with new vehicle pad thickness. Remaining service life is stated as a percentage of original. Knowing whether or not brake work is imminent is valuable information for the owner or the prospective owner. Each wheel should be removed, the brake components inspected and condition reported. Note that (k1) and (k2) are repeated in order to list condition of all four brakes.

k3 - Rear Wheel Cylinders

Inspect rear wheel cylinders, on drum brakes, paying special attention to leaks and the integrity of the cylinder mounting on the backing plate.

k4 - Rear Proportioning Valve Linkage

Chrysler minivans and many pickup trucks have this feature in their braking systems to adjust braking performance to changing loads. The valve is part of the master cylinder on most vehicles. On the above mentioned vehicles, however, where the valve is separate, inspect that the valve is there and operating properly.

k5 - Rear Front Rotors / Drums

Record the condition and thickness of both front and rear rotors and/or drums. As in the case of pads and lining, we need to compare these findings with the factory "discard" recommendations.

Also be on the lookout for signs of warping and scoring that may indicate the need for resurfacing or replacing rotors or drums.

k6 - Rear Brake Hardware

Inspect for rust, corrosion and general integrity of brake hardware. Where applicable, check the condition of the parking brake return springs.

Maintenance Schedule

What's the next major scheduled maintenance this vehicle will need? If, for example, the 60,000 mile comprehensive maintenance (per manufacturer's recommendations) is

coming due, the owner or buyer should be reminded of what involved, another added value of the Certified Inspection Service.