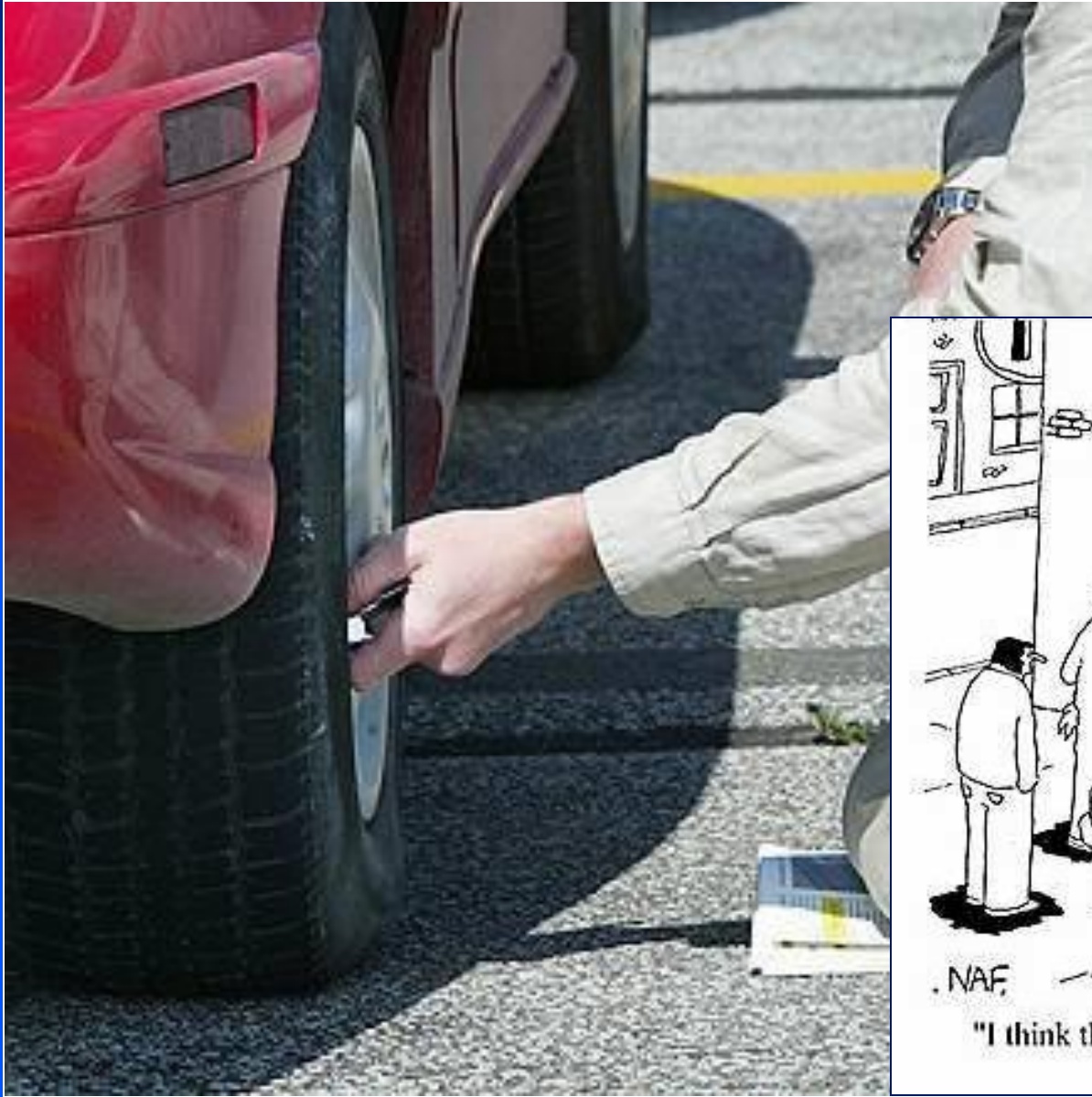
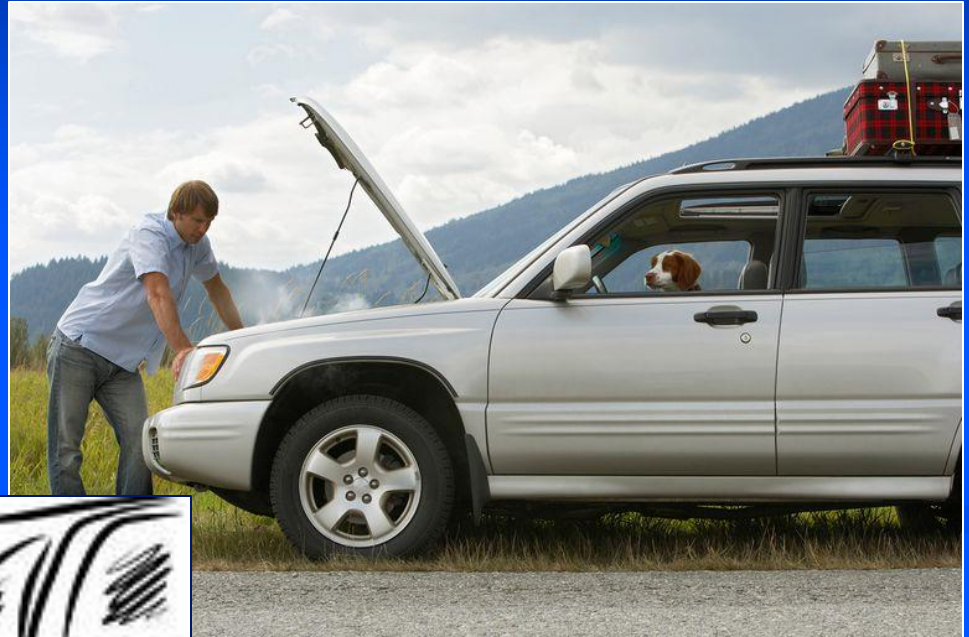


Routine Preventative Maintenance

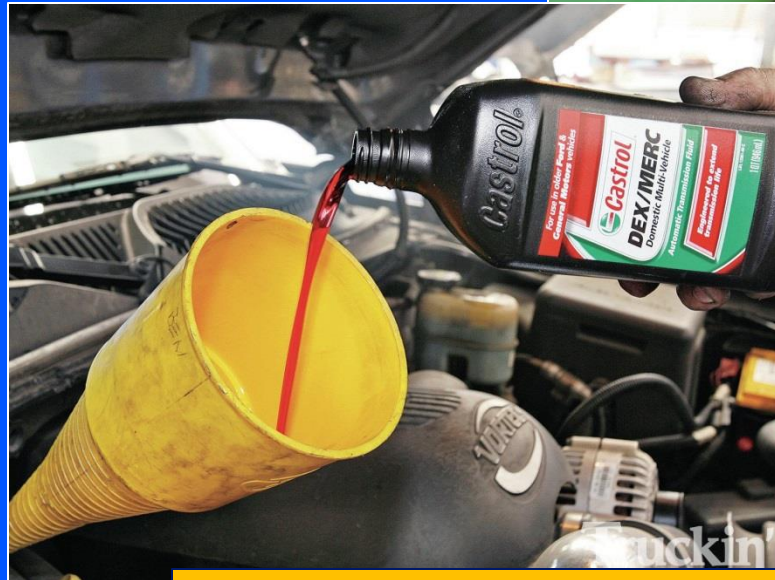


Routine Preventative Maintenance

- to maximize fuel economy & longevity of a vehicle and minimize breakdowns, maintenance should be performed regularly
- the frequency will depend on...
 - type of driving
 - distance driven every month
 - age and condition of the vehicle



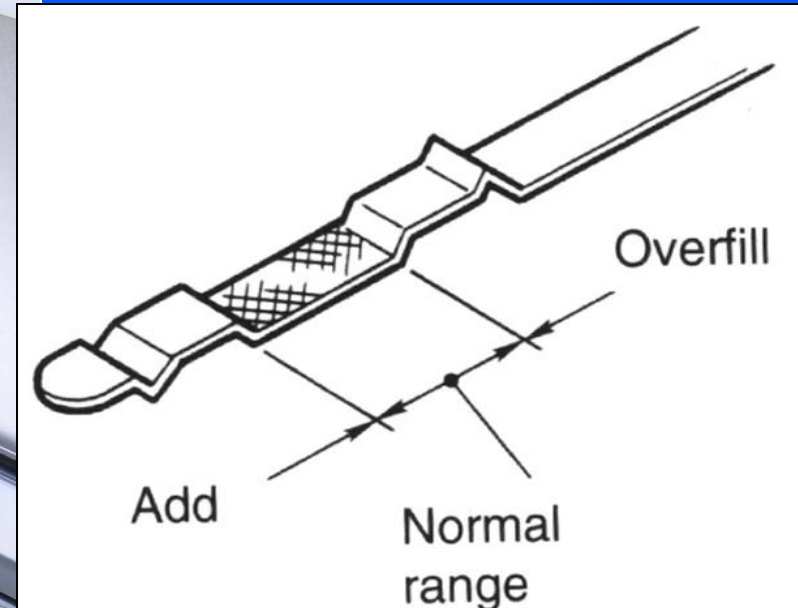
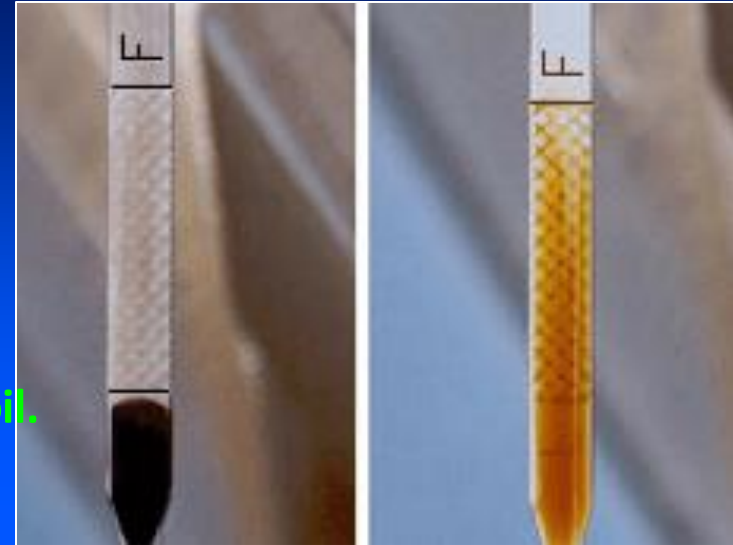
Vehicle Fluids...



- modern vehicles require very specific fluids
- check the owner's manual or consult Mitchell for the correct fluid

Inspecting Engine Oil Level & Condition

1. engine off
 2. vehicle must be on level ground.
 3. remove the dipstick and wipe it clean.
 4. reinsert the dipstick and remove it again.
 5. oil level should be at the full mark.
- if it is at the add mark, add 1 liter of new engine oil.



Engine Coolant

1. visually inspect the coolant level & condition in the expansion bottle

(DO NOT REMOVE THE RADIATOR CAP if the cap is warm or hot!)

2. if it is low, add a mixture of water and antifreeze - 50% each

- most coolants are concentrated – some are already diluted (read the container)
- standard antifreeze: green, yellow or blue
- long life coolant: red or blue



Do NOT mix these 2 coolants!



Can I use universal engine coolant???

Testing Engine Coolant

1) Use an antifreeze tester to examine color, clarity & temperature protection level



2) Test the coolant for excessive acidity by using a voltmeter

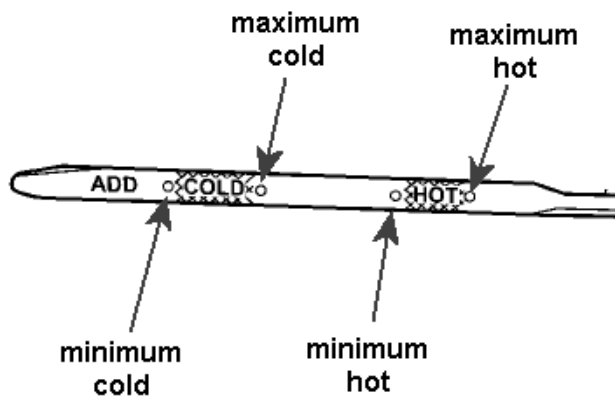
- connect negative to ground & place the positive voltmeter lead into the coolant
 - ❖ <.5 volt is acceptable
 - ❖ >.6 volt coolant is too acidic & needs replacing

Automatic Transmission Fluid - ATF

new ATF

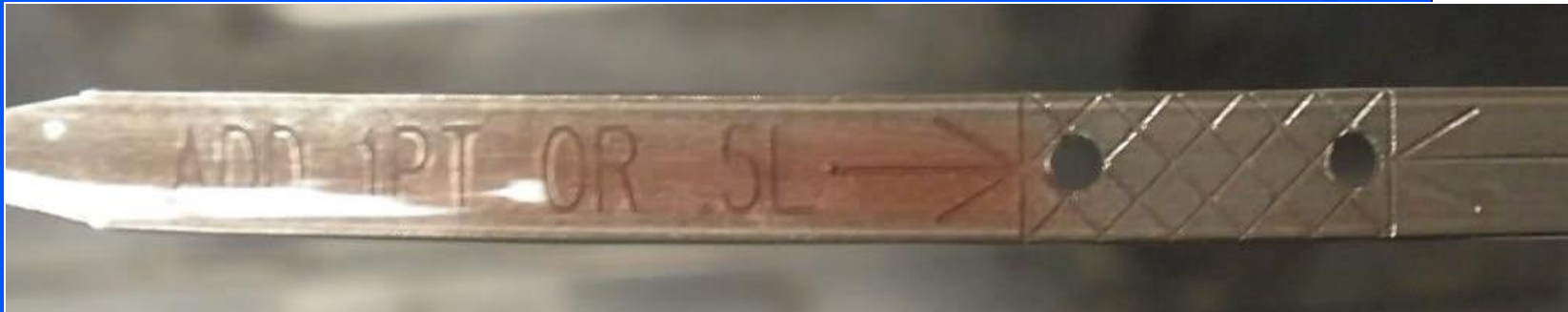
1. Vehicle on level ground.
2. Engine running (most cars).
3. Remove the dipstick and wipe it clean.
4. Reinsert the dipstick and remove it again.
5. Level should be at the full mark if the engine is warmed up or at the add mark if it is cold.

DO NOT OVERFILL THE TRANSMISSION!



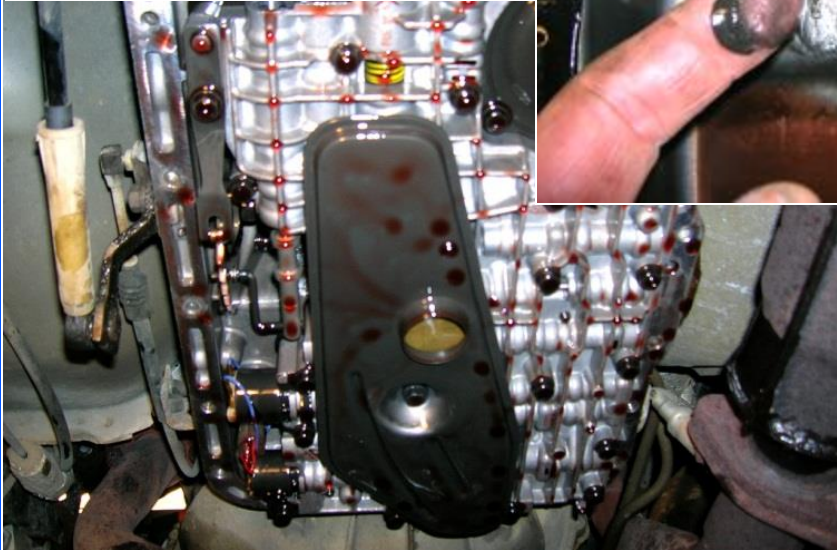
- some modern vehicles don't have dipsticks
- they are meant to be "dealer-only" items
- there is usually a work-around for these vehicles

oxidized ATF



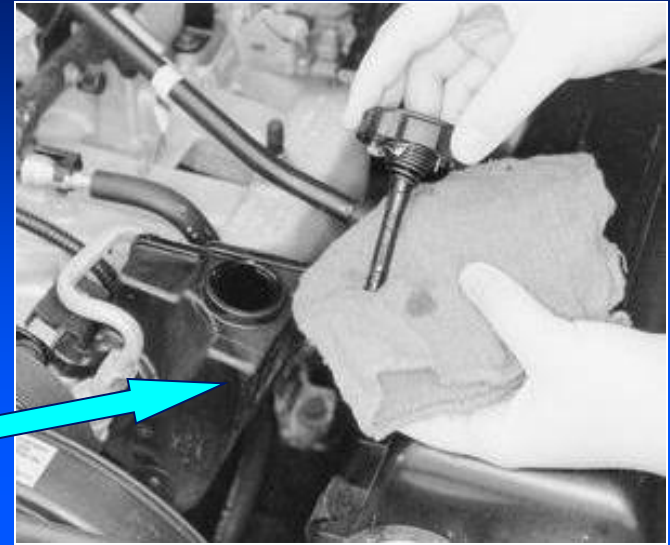
Automatic Transmission Fluid (ATF)

- ATF should be replaced periodically - check the service schedule in Mitchell or owner's manual



Power Steering Fluid

- Oil level should be at the full mark if the engine is completely warmed up or at the add mark if it is cold.



✓**Tech Tip:** Check the owner's manual or read the dipstick to make sure you are adding the correct type of power steering fluid – this is critical!



Brake Fluid

1. Clean the brake fluid reservoir and ensure the fluid is full.
2. Remove the cap and look at the color of the fluid
 - ~ it should look like apple juice
 - ~ if it is gray or black, it should be flushed out
 - ~ regardless of color & # of km's, it should be replaced every 2 years

Tech Tip: Never use oil in the brake system!

Tech Tip: Be careful - brake fluid can ruin the paint!!!

Tech Tip: Only use new brake fluid from a sealed container.



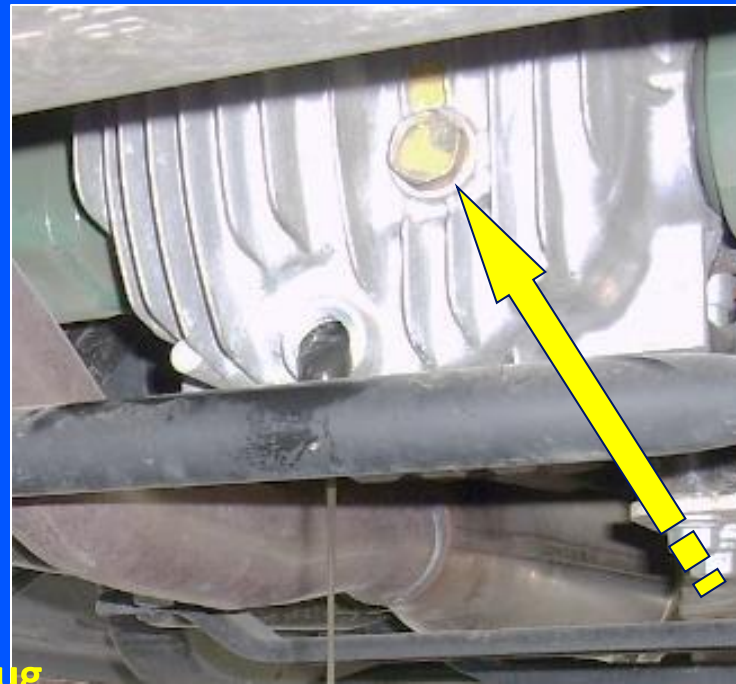
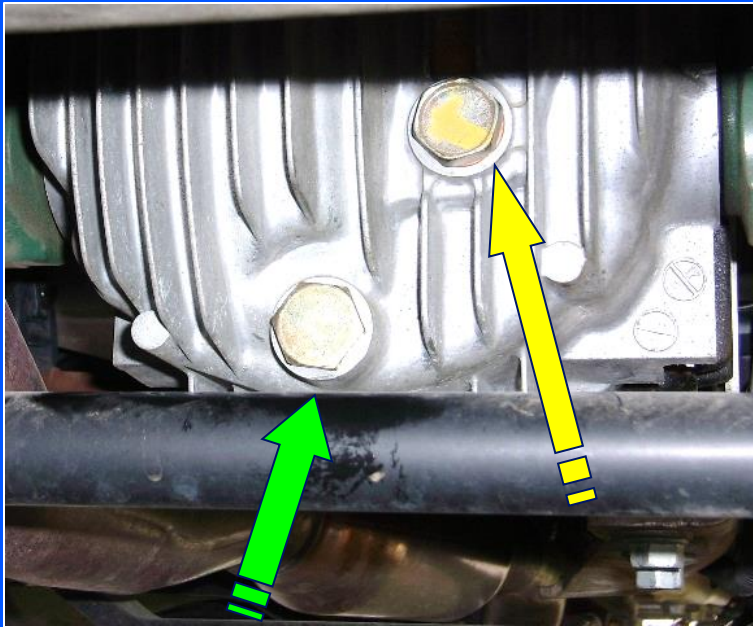
Hydraulic Clutch Fluid – used on some manual transmissions

- Hydraulic clutches use brake fluid as the working fluid

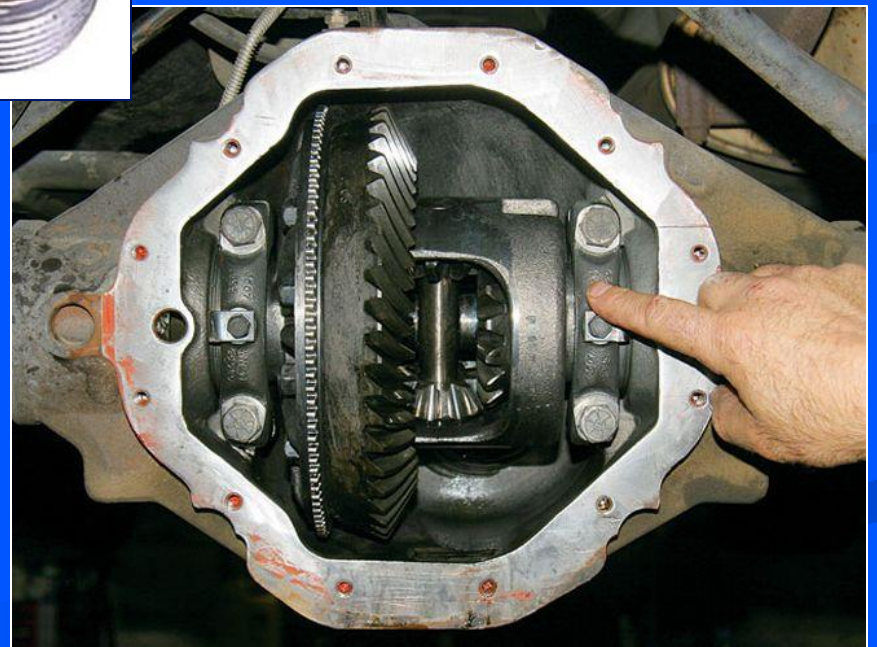
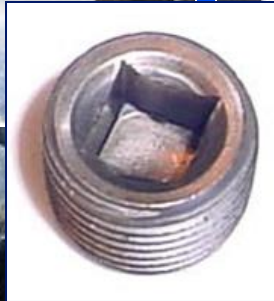
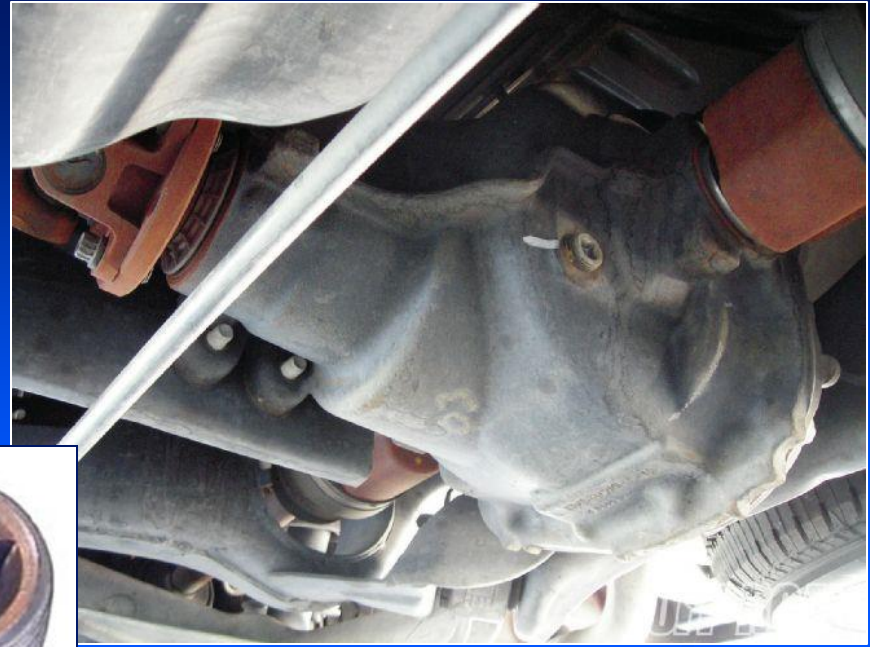


Differential Fluid level (rear drive & 4 wheel drive vehicles)

- Differentials require gear oil (much thicker than engine oil)
- Some differentials employ a limited slip device which may require a specialized lubricant
- Check the owner's manual or consult Mitchell
- Oil level should be at the bottom of the filler plug hole (yellow arrow)

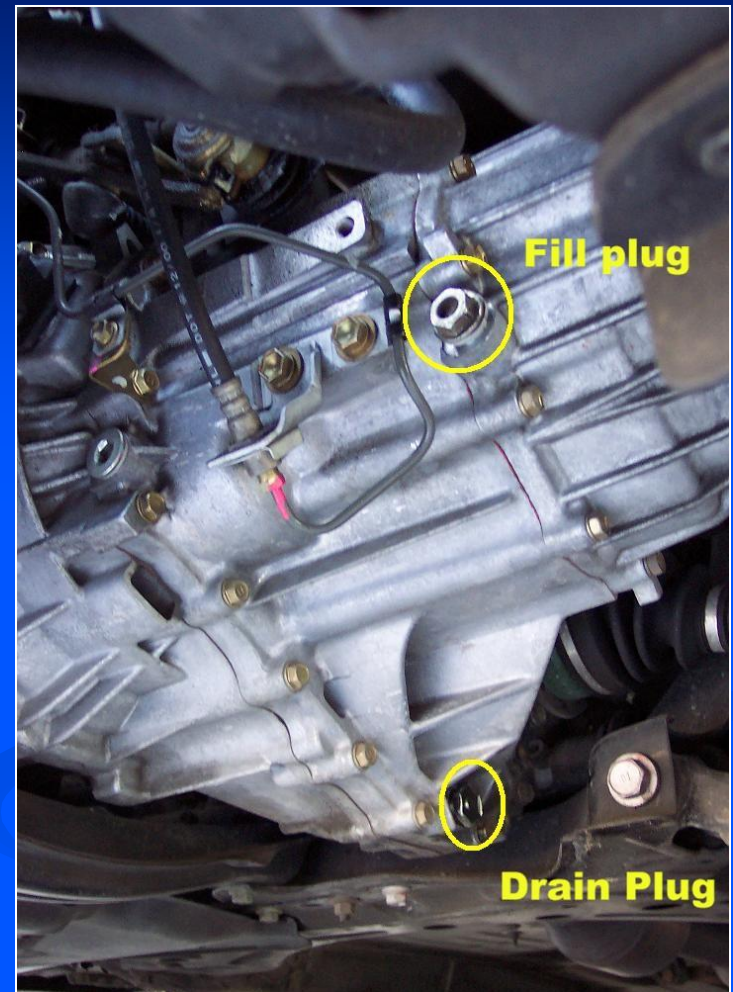
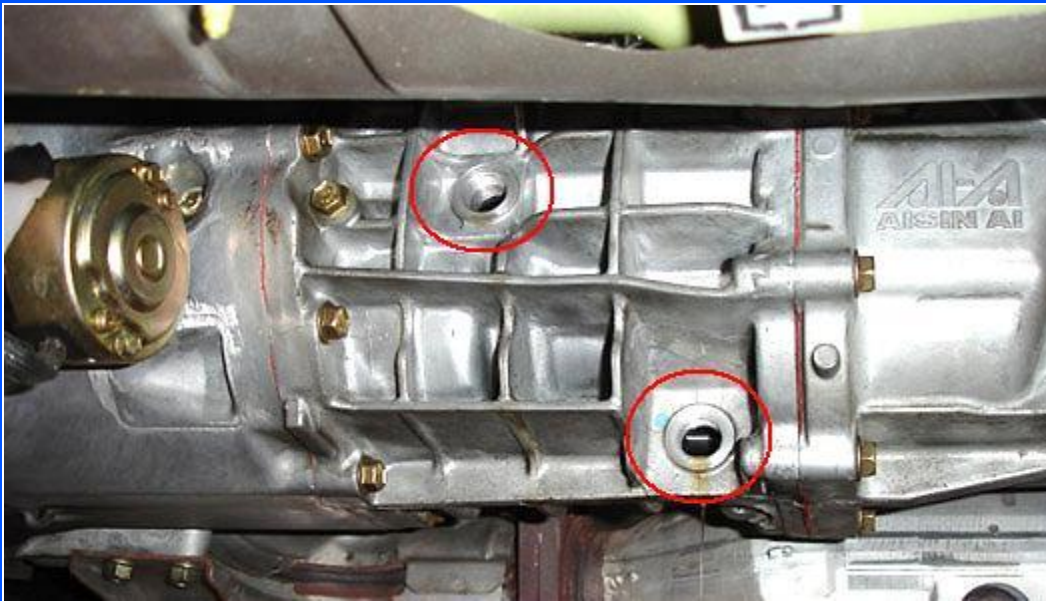


- green arrow is pointing to the drain plug



Checking Manual Transmission Fluid

- manual transmissions use either...
 - ✓ 80W90 weight gear oil
 - ✓ engine oil
 - ✓ Automatic Transmission Fluid
- check with owner's manual or consult Mitchell



Windshield Washer Fluid

- Do not use plain water!
- Don't use other soaps like dishwashing detergent!



Other important routine maintenance items..



Door Hinges

- squirt a small amount of oil on the moving hinge pins
- don't forget hood hinges and trunk/hatch hinges



Engine Air Filters

- engines suck in huge quantities of air
- removes dust so that piston rings and cylinder walls aren't damaged

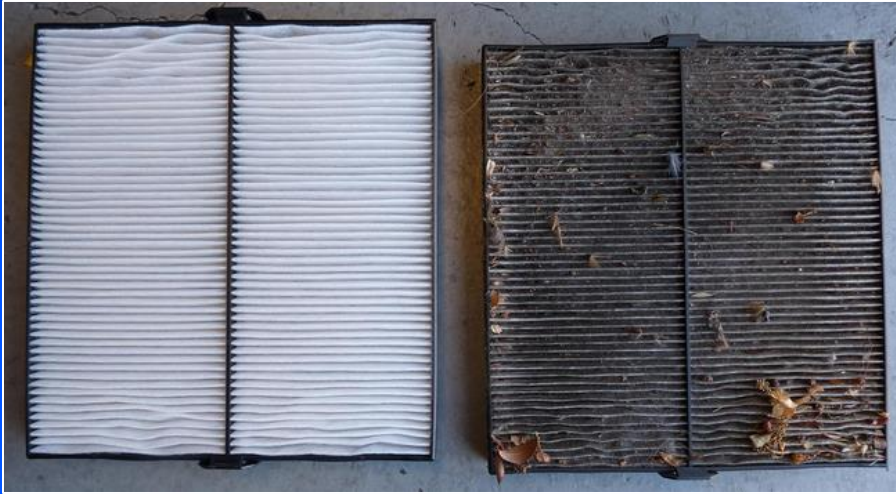
Tech Tips:

- ❖ dirty air filters cause the engine to run rich
- ❖ this wastes fuel and pollutes the environment



Cabin Air Filter

- common on cars built since the late 1990's
- traps dust, bugs, etc. from entering the ventilation system
- replace yearly under average driving conditions

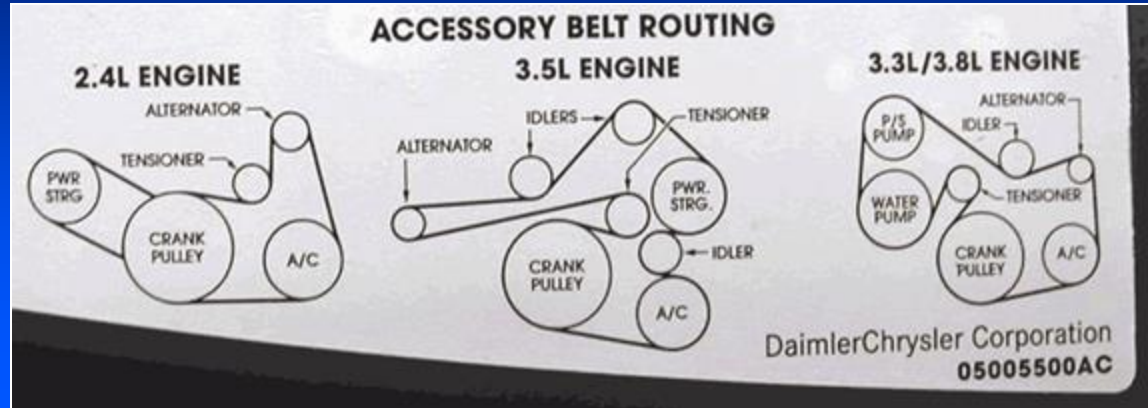


Accessory Drive Belts

- belt(s) spin alternator, water pump, power steering pump & AC compressor
- can be either a v-belt or...
- a serpentine belt (pictured on next slide)
- check for cracks, tears or glazing (a polished surface)



Accessory Drive Belt Inspection



Tire Pressure

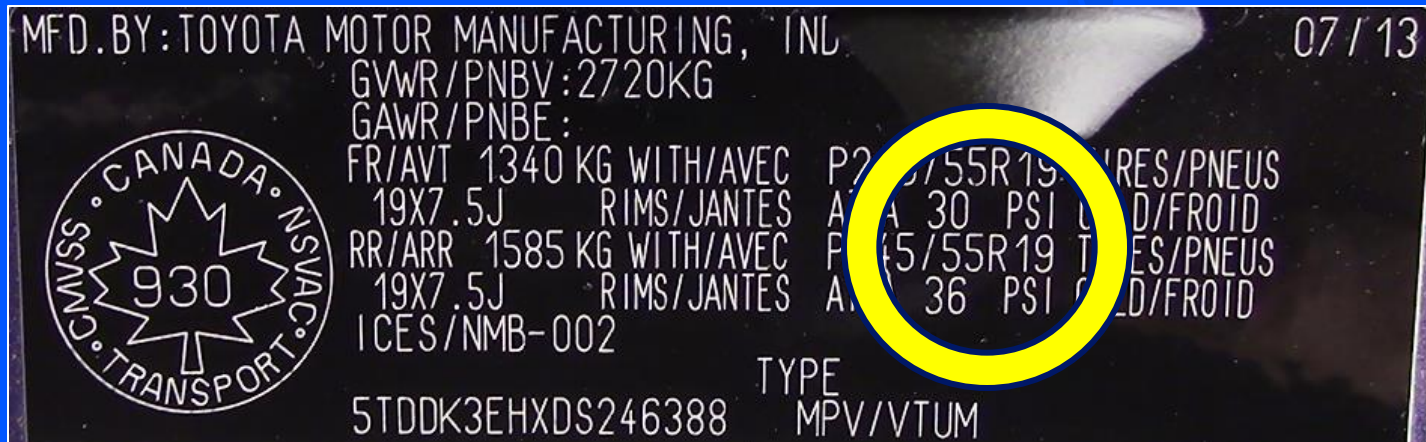
- incorrect tire pressure can...

- waste fuel
- cause poor handling
- shorten tire life
- reduce braking efficiency



- tire pressure is listed on a sticker on the driver's door jamb or glove box door

- typical tire pressures are between 26 and 32 PSI



Engine Oil Changes

- engine oil minimizes metal-to-metal contact
- without oil, an engine would run for a few minutes and then seize!
- over time, oil gets dirty and condensation accumulates
- engine oil typically needs to be replaced every 5,000 to 12,000 km
 - ❖ check manufacturer's recommendations



Changing engine oil

1. warm up the engine (at least 10 minutes)
2. shut off the engine
3. use a socket or closed-end wrench to remove the drain plug
 - the engine & its oil will be hot! be careful not to burn your fingers!
4. allow the oil to drain completely (10 minutes or more)



Replace Oil Filter

Oil filter removes metal particles & dust

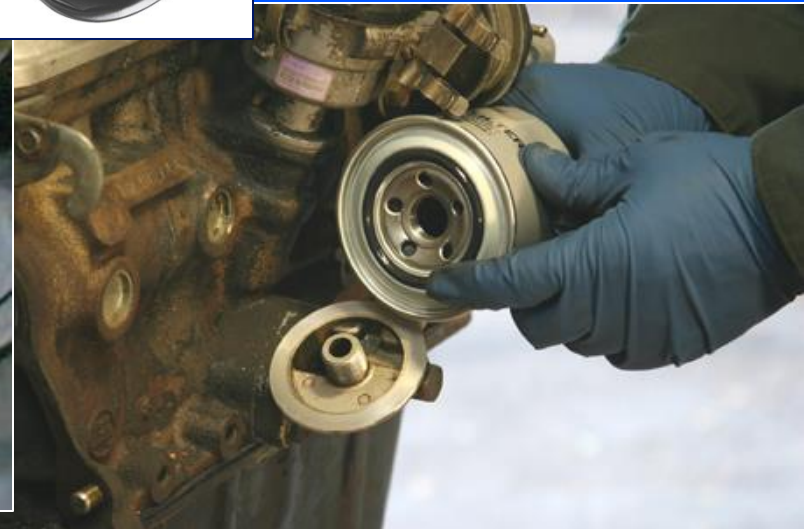


5. Unscrew it counterclockwise by hand or with an oil filter wrench

➤ filter will leak out ½ liter of oil or more – use drip pan!

6. Oil the new gasket with clean oil

7. Install the new oil filter and tighten it by **hand**, **not** with the oil filter wrench!!!

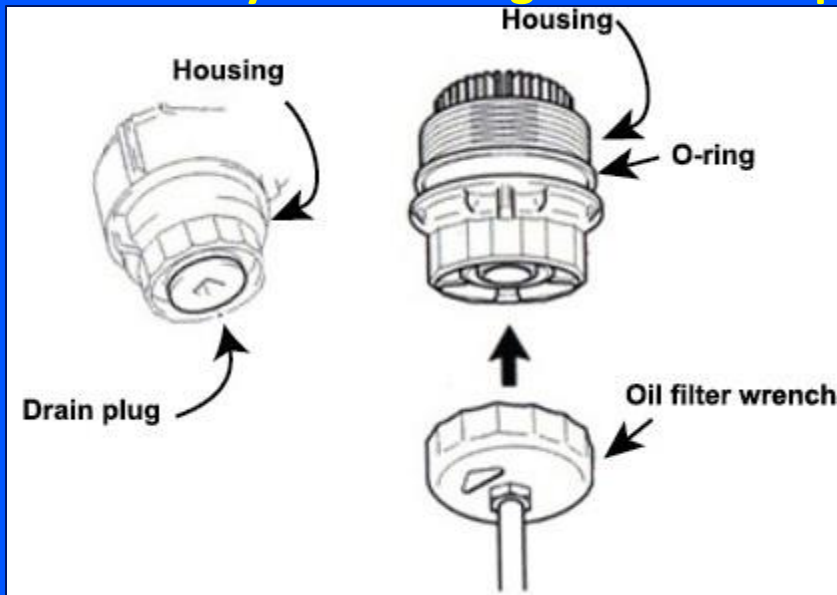


Replace Oil Filter

Many late model vehicles use a cartridge style oil filter...



Remove it by unscrewing it with the appropriate oil filter wrench



Drain Plug Gasket

8. inspect the drain plug gasket – replace if needed

➤ Roger can provide you with a new one

9. reinstall the plug by hand first, followed by the wrench



Adding New Oil

9. Add the correct amount and type of oil (use a funnel)

Amount of oil to start with:

- 3 or 4 cylinder engines – 3 liters of oil
- 6 or 8 cylinder engines – 4 liters of oil

- check the level on the dipstick at this point
- the amount of oil between low and full is 1 liter
- read the oil cap or consult “Mitchell” for the correct viscosity



Completing the oil change...

10. Once the dipstick shows the oil level is full, you are ready to start the engine!

- **DO NOT** press on the gas pedal!
- Immediately check the oil filter & drain plug for leaks
- Make sure the oil light goes out after 5 – 10 seconds, or the oil pressure gauge moves into the normal range after 5 – 10 seconds
- Shut off the engine and recheck your oil level – add more oil if needed

