928 Periodic Inspection
1987-1995 Models
Version 1.1, 928 Frenzy #13 - October 2009

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928OC.ORG

1 Overview

1.1 Purpose

The assumption is that you have a 928. Or perhaps you are going to go "inspect" a 928 with the thought of buying it. Or, maybe you already bought a 928 and are wondering "now what?" In the first case you have a need to develop and maintain knowledge of the overall state of your car. In the second case, you need to quickly get an understanding of what you might be "getting into." In the last case, you need to know what you've already gotten yourself into.

What follows are listings and descriptions of inspection tasks that you can perform in pursuit of those goals. In the first case, you might look at these items as a "yearly inspection" check list. In the second case you might consider these items part of a "pre-purchase inspection." In the last case, you can use the tasks to help form a prioritized list of maintenance items.

If you've had a 928 for a while, you likely don't need to do all of the inspection tasks every year. If you drive your 928 *at least* infrequently, many of the tasks - like the Test Drive, Instrument and Accessory tests - are conducted as a result of your driving. If you are thinking about buying a 928, you will need to decide which of the tasks you are prepared to do, which are absolutely essential to do, and what you can reasonably convince the current owner to allow you to do. In the last case you have both the luxury and necessity of doing them all.

The list of inspection tasks is not comprehensive. It isn't meant to be the be-all end-all of lists. You will likely think of additional tasks or may hear others recommend additional tasks. Feel free to add them to your personal list of inspection tasks.

The list *is*, however, meant to be a task list almost anyone can do, in a reasonable amount of time, with a minimum of tools and a minimum level of skill. A leak-down or compression test is notably omitted from the tasks because those reasons.

Also, in a few cases, the tasks are not described in exacting detail. For these lightly-documented tasks, extensive reference material is available elsewhere and the skill level to conduct them is slightly above-minimum.

If you plan to proceed with all the tasks and have available all of the required tools, you should assume that it will take you 3 to 4 hours to completely go through the list if you have a 5-speed 928. Add an hour or three if you have an automatic-equipped 928.

1.2 Tools

Many of the inspection items require no special tools and can be conducted with the 928 on the ground. You can get a pretty good *rough* idea of the health of a 928 through a good test drive, a *thorough* inspection of the engine bay, observation of instruments, and operation of accessories.

However, the more interesting tests require more than the Mark I Eye Ball. To go through all of the inspection items you will need:

- **A means to examine the front underside of the car with the suspension loaded (e.g ramps, alignment rack, four-post lift, etc.)**
- **A means to examine the underside of the car with the suspension unloaded (e.g. floor jack and stands, two-post lift, etc.)**
- **A telescoping inspection mirror**
- **A multi-meter**
- **Test lead extensions for your meter (two lengths of wire, preferably with alligator clips at each end.)**
- **Two adaptor wires constructed from short lengths (< 12”) of wire with narrow spade connectors at each end.**
- **Tools to remove the two belly pans.**
- **Tools to remove the passenger-side timing belt cover (and a belt tension tool if you want to check the belt tension along with a hand oil-pump if you want to check tensioner oil level.)**
- **Tools to conduct a flex plate (and optionally a crank end-play) check.**
- **A very long screw driver (at least 12”) and a set of Allen wrenches (to remove the fuel rail covers and Mass-Air Sensor.)**
- **Vacuum Hand-Pump (preferably with Gauge)**

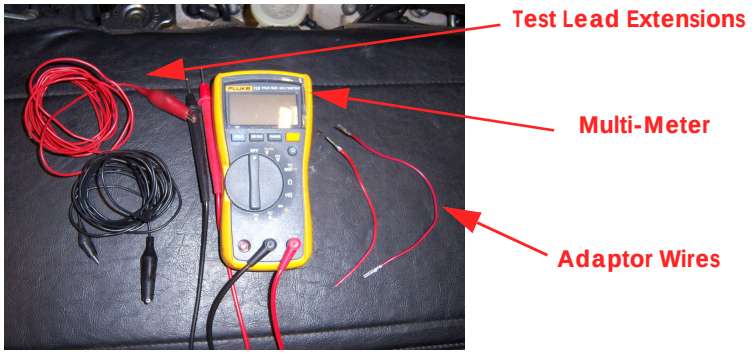

Figure 1: Poor Man’s “Bosch Hammer” Diagnostic Tool

Figure 2: Vacuum Hand Pump w/Gauge

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2 Test Drive

A test drive is a very useful diagnostic tool… if it isn't your 928. You "test drive" your 928 all the time so you have become used to its unique characteristics. But, if you are actually *test driving* a 928 you can learn a lot about the car in a short time. A proper test drive needs to be conducted on a variety of roads and a variety of speeds. You need to do some highway, some in-town, and some twisty-road driving.

When you are doing your test drive it is important to keep your mind focused on the "test" part and not-so-much on the "drive" part. As you traverse the various phases of your drive remind yourself of what you are trying to test or learn at each stage and throughout the drive.

2.1 Dynamics

✔,X,?	Characteristic	Observations
	Engine Idle	
	Engine Smoothness	
	Engine Power	
	Vibration	
	Tracking	
	Suspension	
	Brakes	
	Noises	

With Tester

If you have access to a Bosch Hammer (or one of the other available diagnostic tools) you should use it during your test drive to monitor engine temperature reported to the EZK ECU and you should also do a knock test.

✔,X,?	Characteristic	Observations
	Operating Temperature	
	Knock Count	

2.2 Instruments

During and after your test drive you should determine if all of the instruments and warning lights in the instrument pod are operating.

✔,X,?	Component	✔,X,?	Component
	Oil Pressure Gauge		Fuel Level Gauge
	Temperature Gauge		Voltmeter
	Speedometer		Tachometer
	Odometer		PRDNL Lights
	Backlighting		Warning Lights
	Dimmer		Cruise Control
	Hazard Lights		Wipers
	Odometer		Trip Odometer

When you turn on the ignition all the warning lights should light up. Check what you see on the dash against the owner's manual. Non-functional warning lights can represent a serious issue. The light bulbs do burn out, but not that often. Exactly what the serious issue may, or may not be, will vary depending upon the non-functioning light.

A non-functional timing belt tension warning light may indicate that the belt warning system has been intentionally grounded. On a '90 or newer model a non-functional air bag warning light may mean that the air bag system has

Figure 3: Warning Lights '87-'88

Figure 4: Warning Lights '89-'95

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been rendered non-functional. (Note, that the air bag light will normally go out after a few seconds, unlike the other warning lights.)

Also, the instrument test is also a good diagnostic to perform before and after you do any work to the pod. That way if something doesn't work after you are done, you'll know that you may have broken it.

2.3 Accessories

The last phase of your test drive is to determine the accessories that work and those that don't.

✔,X,?	Left	✔,X,?	Right
	Power Window		Power Window
	Side-view Mirror		Side-view Mirror
	Hatch Release		Hatch Release
	Door Lock		Door Lock

✔,X,?	Component	✔,X,?	Component
	Sunroof		Rear Wiper
	Front A/C		Rear A/C
	Central Locking		Odometer / Timer Reset
	HVAC Blower		HVAC Flaps
	Radio		Clock
	Interior Lights		PSD ('90-'95)

The last item in the above table - PSD - is not really an accessory. However, it is easy to do a basic operation check before or after your drive. Whenever you turn on the ignition, you should hear a click and short-duration "whiney" sound from the left-rear corner of the car. These sounds are the PSD relay activating and the PSD pump pressurizing.

Figure 5: Accessories: What works? What doesn't?

3 Suspension - Loaded

The next set of inspection tasks require that the suspension be loaded. Actually, only the steering rack and tie-rod tests require a loaded suspension. But, it is convenient to check the state of the rest of the front suspension while you are looking at the rack and tie-rods.

The suspension must be loaded to perform the rack and tie-rod tests because the tolerances are so small. You need to put a lot of force on the components to give them resistance to movement. Using the weight of the car to apply that force is far easier than using tools.

The easy way to conduct the loaded suspension tests is to drive the car onto an alignment rack or a four post lift and lift the car up. The practical way is to drive the car onto ramps to raise the front end off the ground while keeping weight on the front wheels. In either case, you will need a helper to stay in the driver's seat.

If the car has its belly pans you'll need to remove them before you can examine the steering and front suspension.

3.1 Steering Components

✔,X,?	Left	✔,X,?	Right
	Steering Rack Boot		Steering Rack Boot
	Inner Tie-Rod Joint		Inner Tie-Rod Joint
	Outer Tie-Rod Joint		Outer Tie-Rod Joint
	Upper Ball-Joint		Upper Ball-Joint
	Lower Ball-Joint		Lower Ball-Joint

First, pull both steering rack boots toward the outside of the car to expose the inner tie-rod joints and the steering arms. Once the boots are free, check them carefully for holes or about-to-appear cracks. Rotate them around completely to check the entire surface of each boot. If a boot has holes in it, you will need to replace it quickly or risk destroying the steering rack's seals.

Next, examine the steering arms. The arms should have a light coating of grease and should be free of dirt and debris. If red ATF fluid poured onto your head when you removed one of the rack boots then the rack's seals are leaking.

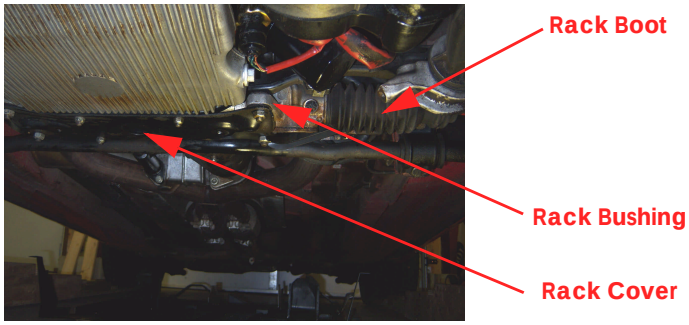

Figure 6: Steering Rack

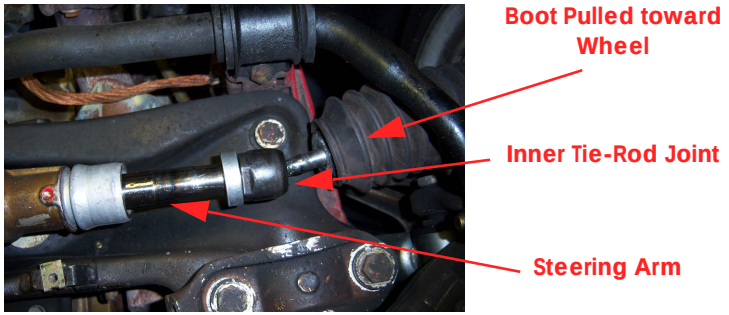

Figure 7: Steering Rack Exposed

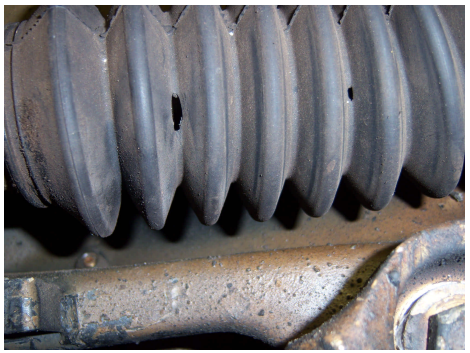

Figure 8: Steering Rack Boot (Bad)

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A bit of ATF on the steering arms indicates that the seals are nearing the end of their useful lives. You'll need to monitor the power steering fluid level.

Now you need to get your helper - in the driver's seat - to apply force to the tie-rods. With the engine not running, have you helper turn the steering wheel until resistance is felt. They should turn the wheel hard enough to load the suspension, but not hard enough to turn the wheels any significant amount. Have your helper turn the wheel in one direction until resistance builds, then turn the wheel the other direction until resistance builds. Have your help continue to cycle the wheel back and forth slowly while you conduct your examinations:

- **Steering Arms**

The steering rack arms should move in and out of the body of the rack with movement only on the same axis as the rack itself: left to right. If you see that the arms move up and down, or forward and backwards before they begin to move left or right then your rack is internally worn. The result will be an on-center dead-spot in the steering and sloppy handling when driving twisty roads.

- **Rack Bushings**

Examine the rack body itself as your helper loads and unloads the suspension. If the rack bushings are in good shape you should see the rack body move a few millimeters. If you see a lot of movement then the bushings need to be replaced. The effect of bad bushings will be as above.

- **Inner Tie-Rod Joints**

Next, as your helper continues to cycle the suspension load, watch the movement of the inner tie-rod ball joints. A ball joint should allow rotational movement *only*. There must be no movement of the ball-part of the joint in the cup-part of the joint except for rotation. Watch the ball joint carefully. If you see a delay in the movement of one part of the joint - the cup moves first and then the ball moves - the joint is worn.

- **Outer Tie-Rod and Lower Ball Joints**

If the outer tie-rod is well-worn you may be able to detect movement other than rotation. However, the angle and geometry makes it difficult and you may need to stare at the moving outer joint for quite a bit.

From this angle under the car, you may be able to see some rotational movement of the lower ball joint. But, you're unlikely to diagnose a bad

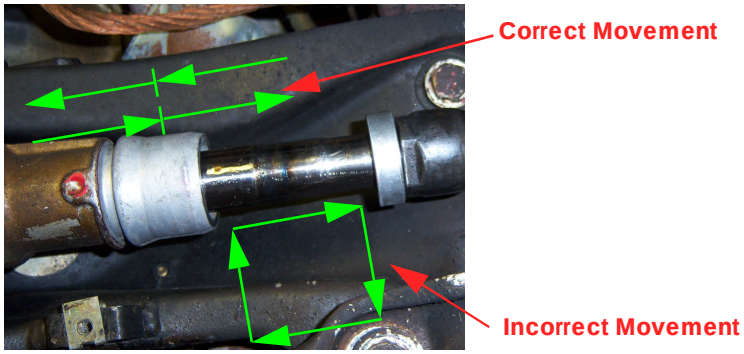

Figure 9: Steering Arm Diagnosis

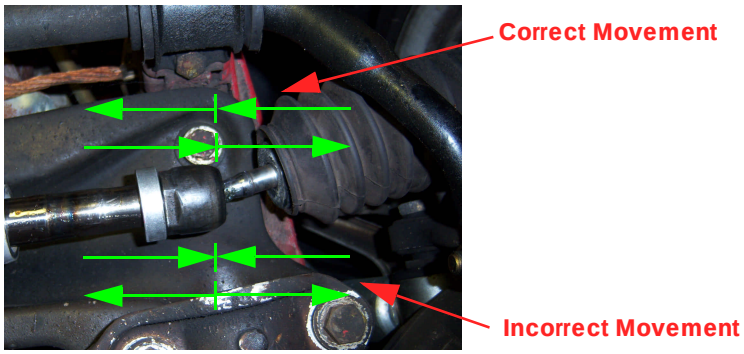

Figure 10: Inner Tie-Rod Joint Diagnosis

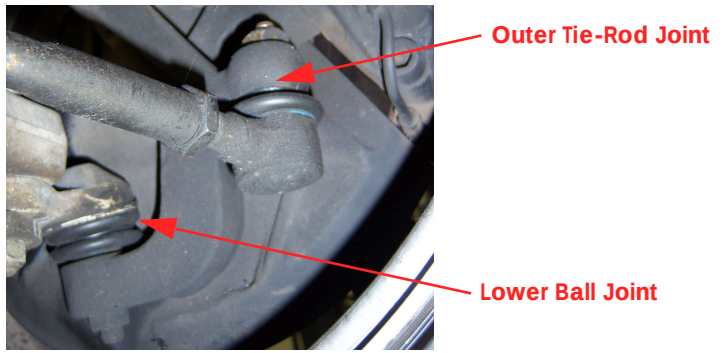

Figure 11: Outer Tie-Rod and Lower Ball Joints

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lower ball joint unless it is very, very worn.

What is important is to make sure that the boots around the ball joints are not torn or cracked. If they are, then the ball joints will wear out in short order. If you're looking at your own 928, plan to get the boots replaced as soon as possible. If you're looking at buying the car you're examining, then assume any ball joint with a busted boot is bad.

- **Upper Ball Joints**

Complete your inspection by checking the condition of the upper ball joint boots. Look for cracks and/or signs of grease in the vicinity of the boot.

Figure 12: Upper Ball Joint

3.2 Additional Front Suspension

If you have doubts about the health of the upper or lower ball joints, then the next step is to remove the front wheels when you get to the tasks in the "Front Wheel Wells" section and to load up each ball joint using one or more big crow bars to force them to move (or not.)

3.3 Miscellaneous

✔,X,?	Component	✔,X,?	Component
	Steering rack arm movement.		Steering rack seals
	Steering Rack Bushings		PS Line from Pump
	Plastic Belly Pan		PS Line to Cooler
	Metal Belly Pan		Alternator Fresh Air Hose

While you are checking the rack, check the condition of the power steering lines that supply the rack. Are they dry? Or leaking?

What is the condition of the plastic belly pan?

What about the alternator's fresh air hose?

4 Front Wheel Wells

The next three sections of inspection tasks are best conducted with the entire car off the ground and the suspension unweighted. However, you can do most of the front and rear wheel well checks with the car on the ground. However, you will not be able to check the front wheel bearings. And you'll only be able to examine the brakes with an inspection mirror and only if there is sufficient clearance between the wheel and brake calipers.

If the car is still equipped with its stock-sized wheels, then you may need to get the car up and remove the wheels to perform inspections you can trust.

✔,X,?	Left, Front	✔,X,?	Right, Front
	Even Tire Wear		Even Tire Wear
	Wheel Bearing Adjustment		Wheel Bearing Adjustment
	Pads (Thickness, Even Wear)		Pads (Thickness, Even Wear)
	Rotor (Thickness, Cracks)		Rotor (Thickness, Cracks)
	Pad Guide Plates		Pad Guide Plates
	Flexible Brake Line		Flexible Brake Line
	ABS/PW/RDK Harnesses		ABS/PW/RDK Harnesses
	Fender Liner		Fender Liner
	Splash Guard		Splash Guard

Figure 13: Busted Splash Guards from Bottoming Out

4.1 Front Wheel Bearings

If you've got the car off the ground for this section then the first thing to do is to check the front wheel bearings. Grab one front wheel at the 12 and 6 o-clock positions. Pull the top of the wheel towards you while you push the bottom of the wheel away. Then do the reverse. Quickly cycle the wheel in this way a few times. A properly adjusted 928 front wheel bearing will exhibit a faint perception of movement. If you cannot feel any movement at all the bearing may be over-tight. If you definitely feel movement - or can hear the wheel "click" when you torque it - then the bearing is too loose. If you are not quite sure if it is moving or not, then the bearing is adjusted correctly.

If the front suspension is worn - ball joints, upper control arm bushings, etc. - then you may need to have a helper do the wheel torquing while you carefully watch the wheel. If you can see the brake disk move relative to the upper or lower control arms then your wheel bearings are out of adjustment.

Out of adjustment wheel bearings should be adjusted to specification and then checked after a few hundred miles. If they are once again loose, or if they cannot be adjusted to specification in the first place then they need to be immediately replaced. If you run loose bearings for too long, you may wear the wheel spindles.

4.2 Brakes

If the 928 you're investigating has it's stock front wheels then you'll probably need to remove them to examine the brake pads and calipers. If, like most 928s, it has larger-sized wheels then you can use an inspection mirror to look at the brakes.

- **Even Pad Wear**

Uneven pad wear is an indication of air bubbles in the brake hydraulic system or of a mechanical problem with the brake caliper.

- **Rotor Condition**

Do the brake discs have a lot of cracks? Do they have a lip on the outer edge of the rotor that's thicker than 2 or 3 millimeters? If so, then the rotors are at the end of their life.

- **Guide Plate Condition**

Are the pad guide plates straight and flush against the leading and trailing edge of the caliper's pad bore? If they are warped you may not be able to insert new pads into the calipers. If you can - by hammering them in perhaps - then they will not retract when brake pressure is released. You'll need to either replace the warped guide plates or grind off the edges of your new pads.

- **Flexible Brake Lines**

Obviously decrepit? Wet with fluid? Cracking?

4.3 Other Front Wheel Well

Is the tire wear uneven? If so, then the car needs a proper alignment.

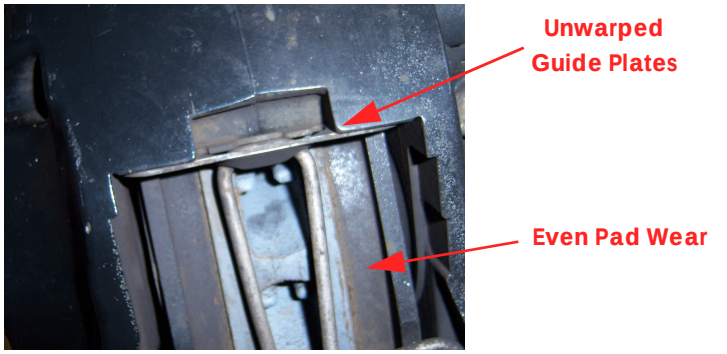

Figure 14: Good Condition Calipers

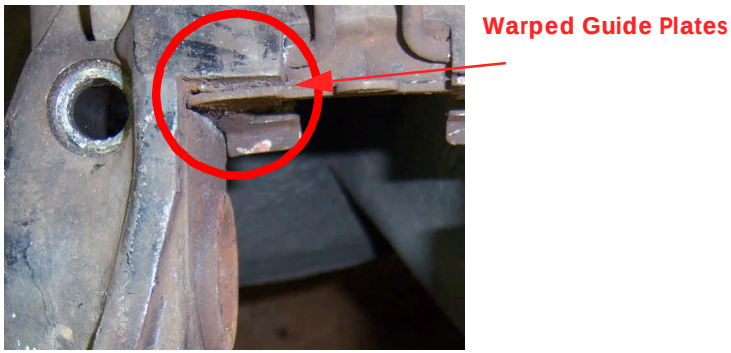

Figure 15: Bad, Bad Calipers

Trace the harnesses for the pad sensors, ABS, and RDK (if you care about RDK). Are they in good condition? Are the various hold-down clamps present?

What shape are the splash guards in? Are they separated from the front air dam? If so, then the car's been bottomed out heavily at least once.

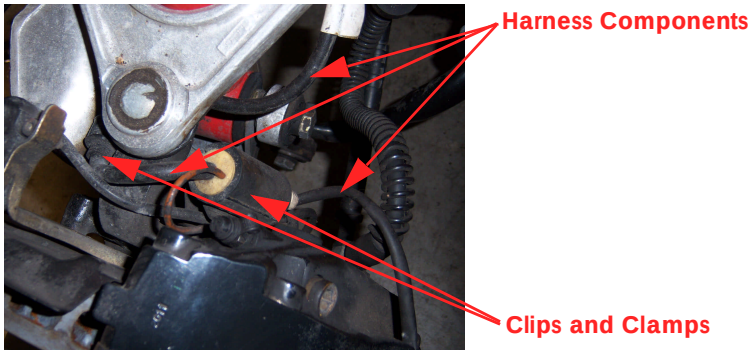

Figure 16: ABS/Pad Ware/RDK Harness

5 Rear Wheel Wells

The inspection points for the rear wheel wells are the same as for the front - except that there is no bearing adjustment you can check and no splash guards.

✔,X,?	Left, Rear	✔,X,?	Right, Rear
	Even Tire Wear		Even Tire Wear
	Pads (Thickness, Even Wear)		Pads (Thickness, Even Wear)
	Rotor (Thickness, Cracks)		Rotor (Thickness, Cracks)
	Pad Guide Plates		Guide Plates
	Flexible Brake Line		Flexible Brake Line
	ABS/PW/RDK Harnesses		ABS/PW/RDK Harnesses
	Fender Liner		Fender Liner

Pad guide warping is more common in the rear calipers since they are typically serviced less than the fronts and also see use.

A typical problem for '87-'88 928s is shredding of the harness covering for the rear ABS/Pad Sensors. The harnesses are just a bit too short. Later-model ABS harnesses are a bit longer and aren't stressed as much.

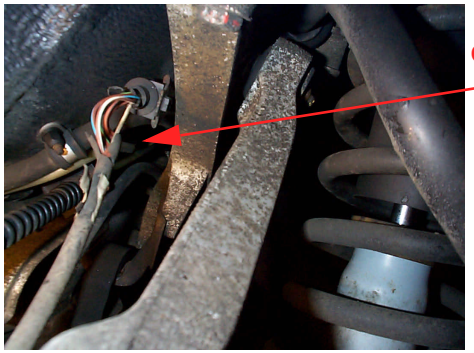

Figure 17: Rear ABS Harness

6 Underneath

The next steps in the inspection of your 928 is a through examination of the underside of the car. You need to check for leaks of all kinds from front to back and to check the condition of the four CV boots on the rear axles.

✔,X,?	Left	✔,X,?	Right
	Oil Cooler Hoses		Transaxle Cooler Hoses (Autos, GTSs)
	Exhaust test port (pre-89.5)		Exhaust test port (pre-89.5)
	Cam Cover Gasket		Cam Cover Gasket
	Outer CV Boot		Outer CV Boot
	Inner CV Boot		Inner CV Boot

Start at one end of the car and work your way to the other. When you get to the rear of the car, check the half-shaft boots. You'll need to turn each rear wheel through a full rotation to get a look at the whole of each boot.

✔,X,?	Component	✔,X,?	Component
	Clutch slave (5-Speed)		Lines to slave (5-Speed)
	Clutch disc thickness (5-Speed)		Oil Pan Gasket
	Motor Mounts		Exhaust
	Transaxle Pan Gasket (Auto)		Engine Ground Cable
	02 Sensor Wiring		Heat Shields

On 5-speed 928s, assume the transaxle input shaft seal is leaking. They all do.

You can also check clutch wear. If more than 2 - 3 mm of the release arm is visible through the inspection hole in the lower bell housing cover then the disc is worn (or there's a problem with the clutch pack.)

Check hydraulics for leaks. Check the pan of the transaxle if it's an auto 928.

How's the exhaust? Any rust? Holes? How are the rubber hangers?

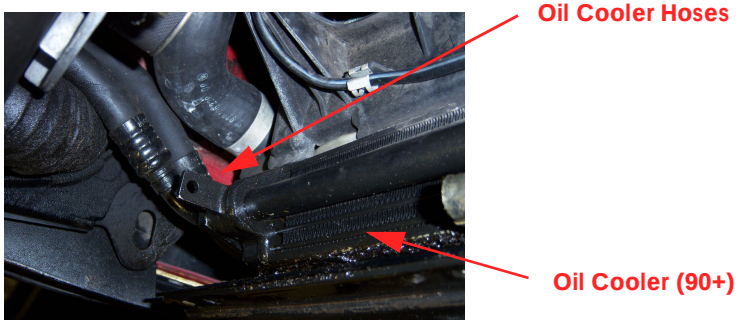

Figure 18: Leaky Oil Cooler and/or Cooler Hoses

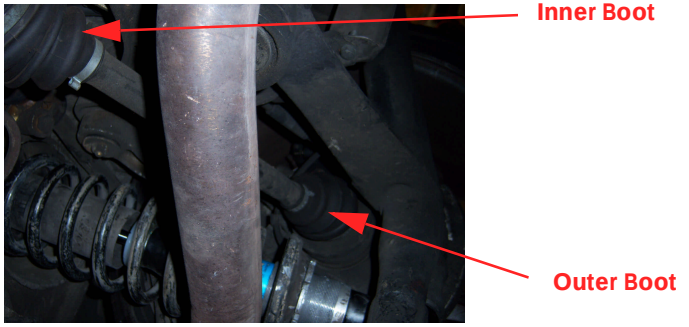

Figure 19: CV Joint Boots

Loose heat shields? If a 5-speed is the little “elbow” heat shield for the flexible clutch hose present? Are both motor mount heat shields present?

Look up at the corners of the cam covers. Are they wet with oil?

Look at the back of the heads. Are the cam plugs leaking?

Oil pan gasket?

Oil Cooler Hoses?

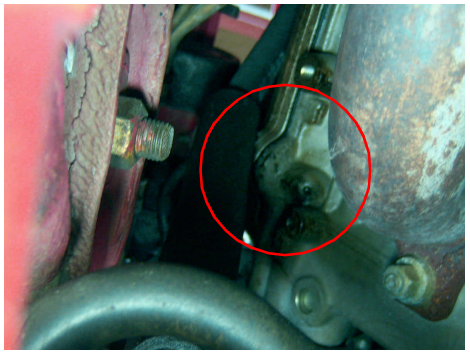

Figure 20: Leaking Cam Cover

7 Engine Bay

A thorough examination of the engine bay of a 928 can tell you quite a bit about the car. Every item in the engine bay has a story to tell that may or may not be consistent with the story you've been told or that which you believe to be true.

If you are looking at a 928 that comes with a claim of super-low miles only accumulated on sunny days then just about every bit of the cadmium plating on fasteners, hose crimps and clamps, and other various bits (like the hood latch receiver) should still be gold in color.

If the 928 you're inspecting comes with a claim of just having been through an intake refresh then not only should the gaskets not be leaking, but all the hoses should feel new and all the vacuum lines should be properly routed and properly connected.

If you are taking a hard look at your own 928 on a yearly basis, you probably don't have to worry about vacuum lines re-routing themselves, but you do need to monitor the condition of hoses and gaskets and other wear items.

Some of the items below may seem trivial. For example: air box straps. The lists that follow are intended to enumerate the more-important items. A comprehensive list of things you could check under the hood from important to trivial would be similar in length to volumes 1 and 1A of the factory shop manuals. Trivial-seeming items in the list are meant mainly to remind you to look at everything. As you do, make your own notes about some of the unlisted items that you might want to replace, clean, etc.

7.1 Quick Checks

Begin your inspection of the engine bay with the air box. Unlatch the straps, remove the air box lid, and look at the air filter. Quite a few 928 air filters are installed upside down.

✔,X,?	Component	✔,X,?	Component
	Air box Straps (Condition)		ATF / Gear Oil Cooler Hoses (Auto, GTS)
	Air Filter (Orientation, Condition)		Jump Post Cover and Cap
	Lower Air box (MAF Seal)		Main Harness at Jump Post (Routing, Cond.)

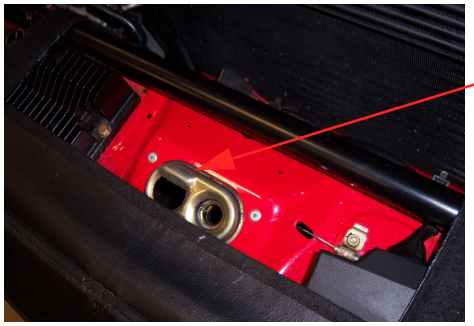

Figure 21: Evidence of sunny day-only driving

Figure 22: Correctly-Oriented Air Filter

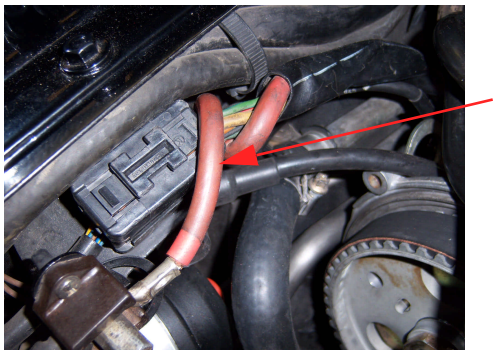

Figure 23: Un-fused Main Power

✔,X,?	Component	✔,X,?	Component
	Exhaust Test Ports (pre-89.5)		Hall Sensor Harness Routing
	E-clips on headlight motor arm		Blue Hose to CMC (5-Speed)
	Radiator Pressure Relief Fitting		Brake Fluid Reservoir Seals
	Ignition Stage Grounds		PS Line from Cooler
	Jump Post Ground		PS Line to Pump
	ABS Harness (Cover, Condition, Routing)		Temp-II / NTC-II (Harness and Leak)
	Oil Cooler Hoses (pre-90)		Gauge Sender (Harness and Leak)
	A/C Hoses		Water Bridge Seals
	Accessory Belts		Oil Filler Neck Seal

For later checks, you'll need to remove the lower air box. When you do, examine the air box's seal to the Mass-Air Sensor.

From the air box, move either left or right and then around the engine bay in a circle and back to the air box. You're looking for leaky hoses, sweating gaskets, frayed wires, crusty ground points, etc.

Pay special attention to the ABS power lead and the main power lead at the jump post. These two leads go straight to the battery and are un-fused. The insulation surrounding their copper cores can become dry and brittle with age and due to damage from re-routing during maintenance. A short through these leads can be deadly.

Check all the hoses you can see for leaks, bulges or damage. Power steering fluid reservoir lines will drip ATF all over the front of the engine bay. Leaking oil cooler lines will cover the bottom of the motor in motor oil. On the right side of the radiator transmission cooling lines (if an Auto or GTS) can leak.

Check the base of the water bridge where it meets with the block. If it is wet with coolant then it is leaking. Check under the water bridge in the little valleys on either side. Are they filled with oil? If so, then the oil filler neck may be leaking. If only on the right side then it may be a breather hose.

Are the connectors to the temperature sensors on the water bridge in good condition?

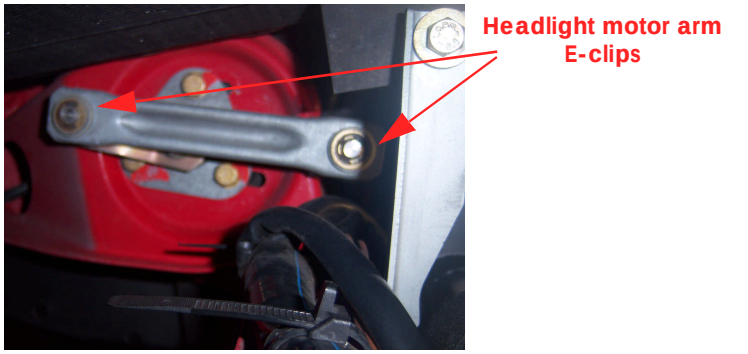

Figure 24: Headlight Motor Arm

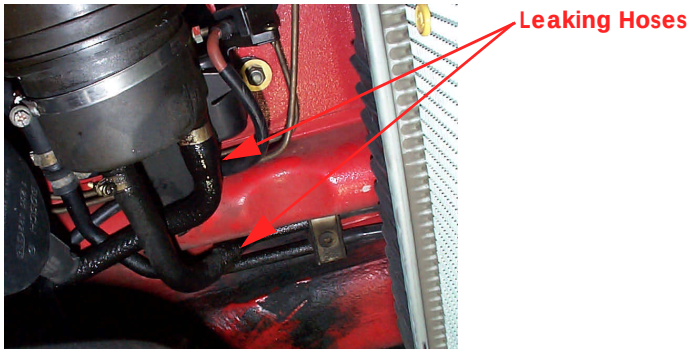

Figure 25: Power Steering Reservoir Hoses

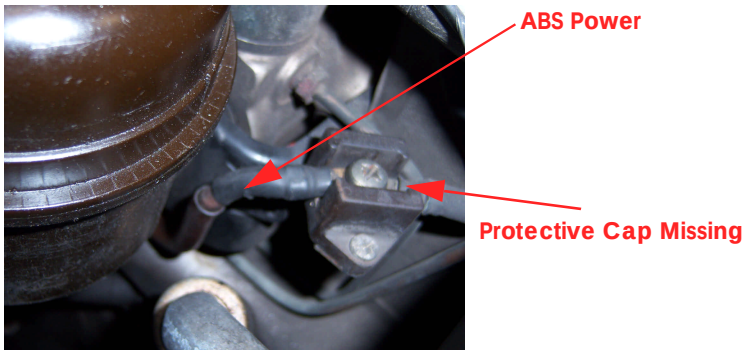

Figure 26: ABS Power Lead

7.2 Breather Hoses

The right-side breather hoses on 928s are, usually, the ones that leak first. When they leak they will begin the fill the engine valley with oil and will introduce unmeasured air to the engine. The former will tend to produce smoke and to deteriorate the knock sensors. The latter will cause poor engine operation.

✔,X,?	Component	✔,X,?	Component
	Cross-Head (GTS)		Tank Vent "Y" Hose
	Right-Side Rear		Vacuum Source, Side Intake
	Right-Side Front (S4/GT)		Vacuum Source, Air Guide
	Air Guide to Filler Neck (GTS)		MAF Guide

Good breather hoses are firm but flexible. Bad breather hoses are hard or very very soft. The exception is the GTS cross-head breather hose that is very soft when new.

Note that early '93 GTSs have a hybrid breather hose configuration with no cross-head hose and a right-front breather that directly connects to the right side of the filler neck.

7.3 Primary Vacuum

When you take a first look at a 928's engine bay, the routing and connection of all the small-diameter vacuum lines is one of the easiest visual checks. Any vacuum line that is mis-routed or obviously mis-connected is likely the tip of a pending intake R&R iceberg.

✔,X,?	Component	✔,X,?	Component
	Tank Vent		Air Pump
	5-way to Air guide		Front Dampener
	Regulator		Shift Modulator (Auto)
	Rear Dampener		

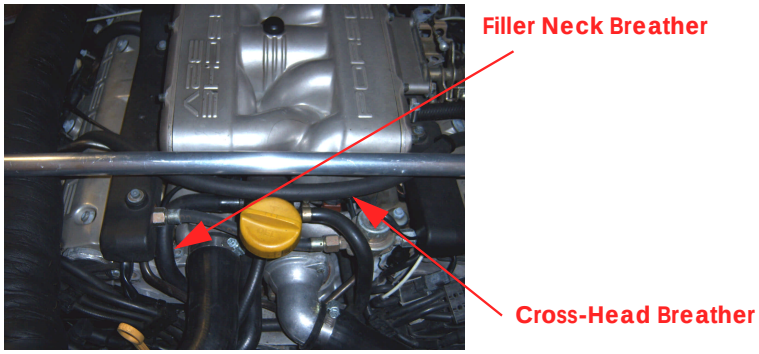

Figure 27: GTS-specific Breather Hoses

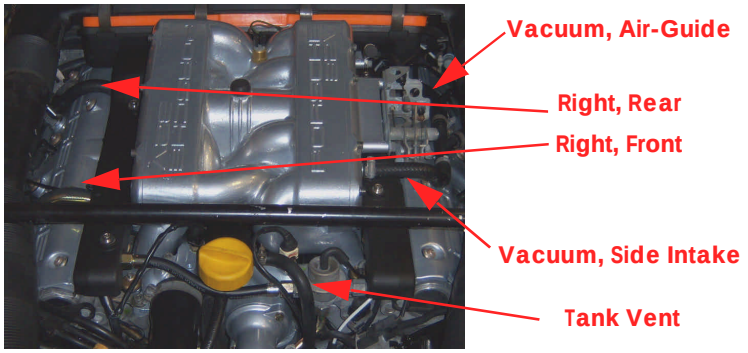

Figure 28: Breather Hoses

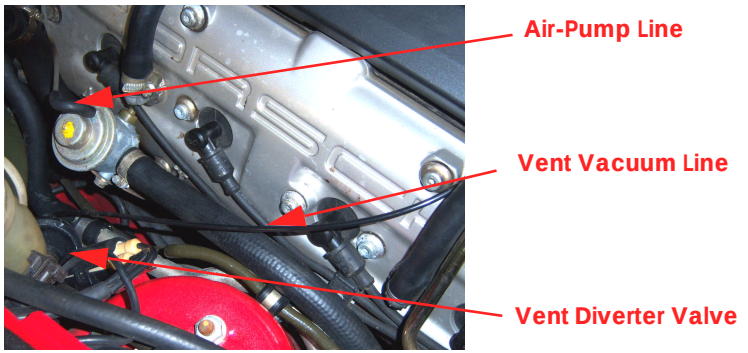

Figure 29: Tank Vent and Air Pump Vacuum

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The vacuum system on the 928 can be divided into two sub-systems. One - the primary vacuum system - operates on intake manifold vacuum (either in proportion to, or related to, manifold vacuum.) The secondary vacuum system operates on constant vacuum supplied by the vacuum reservoir when the manifold is not under vacuum.

The primary vacuum system feeds the fuel pressure dampeners, pressure regulator, air pump diverter valve, tank vent diverter valve, and the shift firmness valve (on automatic 928s.)

The origin of the air pump and diverter valve lines cannot be inspected with the intake in place. But, their routes can be.

The rest of the primary system can be inspected once the air box, fuel rail covers, and Mass-Air Sensor are removed.

But, before you remove the Mass-Air Sensor, you can do a quick manifold vacuum check with your hand pump. Disconnect the vacuum line from the front fuel pressure dampener and plug your hand-pump into the line. Then start the motor. If the vacuum line is correctly hooked up and the engine is in good health you should see 17 to 18 in-mg vacuum on the pump's gauge. If you see no vacuum then the routing of the vacuum system is suspect. If you see less than 16 in-mg the engine probably has intake leaks.

With the quick manifold vacuum check done, stop the engine and remove the Mass-Air Sensor and the fuel rail covers. You can leave the left-side cover on if it is hard to remove. But, the right-side cover needs to be removed to get your extra-long screw driver to the Mass-Air Sensor's clamp.

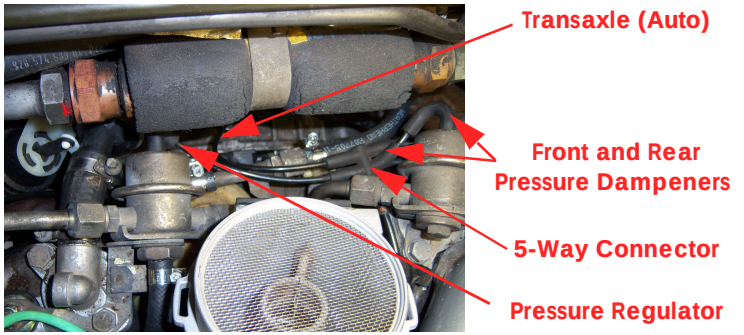

Figure 30: Regulator and Dampener Vacuum

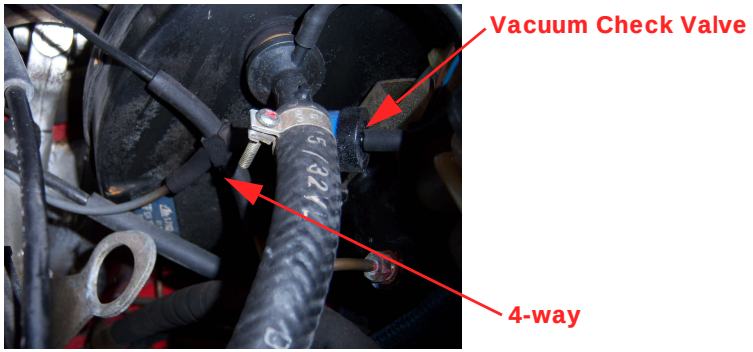

Figure 31: Vacuum Check Valve and 4-way.

7.4 Accessory Vacuum

If you've operated the engine within an hour or two of beginning the inspection of the engine the accessory vacuum system should contain vacuum. This system operates the resonance flap and the dash vent flaps of the HVAC system. On '87 (and older) 928s it also operates the cruise control.

✔,X,?	Component	✔,X,?	Component
	Check Valve		To HVAC

✔,X,?	Component	✔,X,?	Component
	To Resonance Flap		To Reservoir (and CC for pre-88)
	Flap Supply		Check Valve Operation
			HVAC Circuit Integrity

A quick check of the secondary system is to disconnect the supply line to the resonance flap. If the system is holding vacuum you will here the “hiss” of escaping vacuum. Plug the line into your vacuum hand pump.

If the system holds vacuum with the engine off, the next step is to test the HVAC system for leaks. (If the system doesn’t hold vacuum you’ll need to test the HVAC system for leaks anyway.) With your hand pump connected and visible from the driver’s seat, turn on the ignition. Then turn the HVAC blower to setting 1. And then manipulate the vent controls.

If, while you are manipulating the vent controls, you see the hand pump gauge drop quickly to zero then you have a vacuum leak in the dash. If you are doing this test with a system that doesn’t hold vacuum then you’ll need to “re-fill” the system with vacuum periodically by pumping the hand-pump (a lot) to evacuate the system.

If disconnecting the flap supply line results in no “hiss” of escaping vacuum, you need to disconnect the vacuum system at the 4-way connector at the check valve and test each branch of the system to find the leak.

First check the vacuum check valve. Disconnect it from the 4-way and the brake booster. The “black” side of check valve should hold no vacuum. The “blue” side - which should have been plugged into the 4-way - should hold vacuum. If either of these is not the case the check valve is bad.

Check the other three branches of the vacuum system with your hand pump. For the branch that goes to the vacuum reservoir (and CC on pre-88s) you’ll need to pump a lot to begin filling the reservoir. The same is true for the HVAC branch.

Check all the connections and the 4-way. As the 4-way and other vacuum connectors get old they leak.

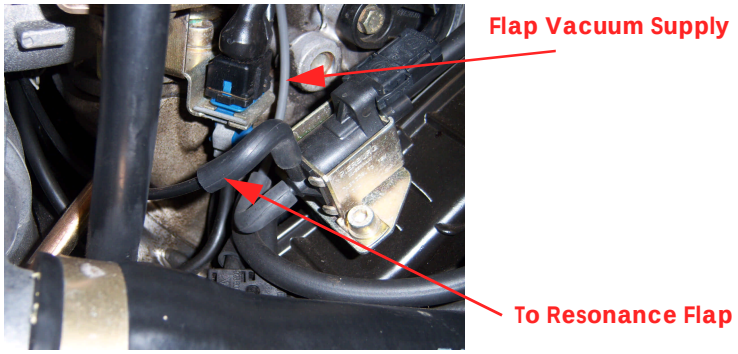

Figure 32: Resonance Flap Vacuum

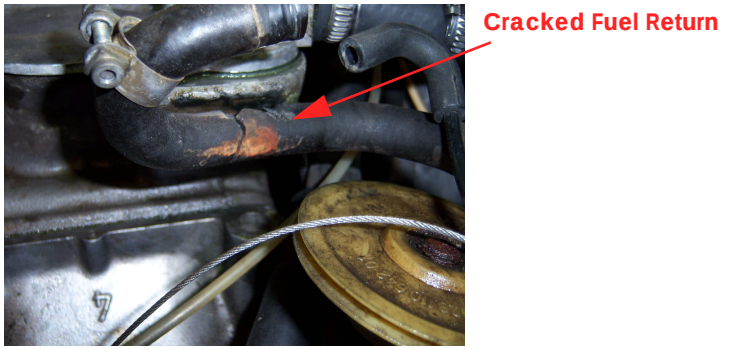

Figure 33: A Fuel Fire Waiting to Happen

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7.5 Fuel Lines

If the 928 you are looking at has not had its flexible fuel lines replaced then they need to be replaced very soon. The main purpose of checking the lines is to determine if you need to replace them before you drive the car at all.

✔,X,?	Fuel Line	✔,X,?	Fuel Line
	Front, Between Rails		Rear, "U" Hose
	Front, Supply		Rear, Return (two on '87)

In order to check the supply and rear fuel lines you need an inspection mirror. Otherwise you can only see part of each line. The rear return line, in particular, is usually damaged underneath where you cannot see the damage.

For each fuel line check for cracks or discoloration. Any cracks indicate that the fuel line needs to be changed immediately.

For the front fuel line notice that it runs very close to the oil filler neck. The front fuel line typically abrades due to rubbing against the neck. Deform the line so that you can see the part of the line under the neck. Is it cracked? Has the outer covering been almost worn away? If so, that is a dangerous line. If you can turn the crimp fittings of the front fuel line then it needs to be replaced soon.

7.6 Gasket Checks

✔,X,?	Component	✔,X,?	Component
	Intake Gaskets, Pressure Gaskets		Cam Cover and Pressure Gaskets
	Intake Coating		Cam Cover Plugs
	Cam Cover Coating		

Before you leave the engine bay check the intake and cam cover gaskets.

Is there a heavy coat of oil under the fuel rails between the intake and the head? Are the pressure gaskets under the ten intake nuts sweating oil?

Run your hand along the lower edge of each cam cover at the gasket. Is your hand now wet with oil? How much oil is sweating from the cam cover plugs on the left side?

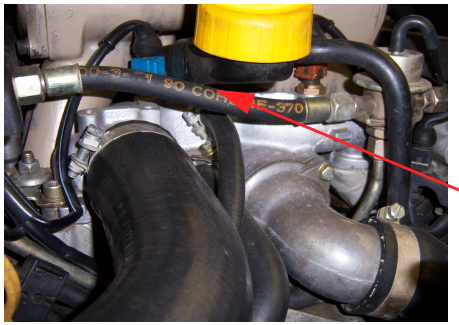

Figure 34: Front Fuel Line

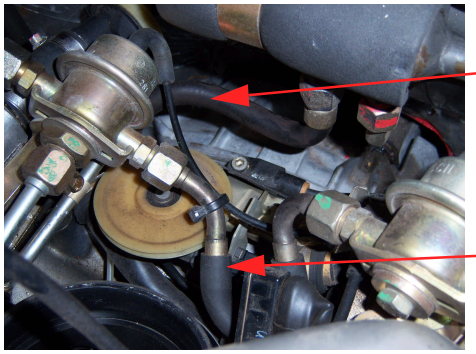

Figure 35: Rear Fuel Lines

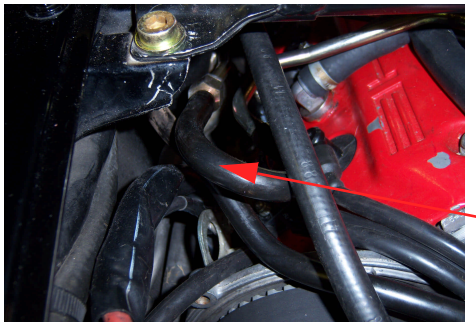

Figure 36: Front Fuel Line

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8 ECU Codes / Drive Links

8.1 With Tester

If you have a diagnostic tester (e.g. The Bosch Hammer, JDS Spanner, etc.) then you should use it. Check all the sensors and actuators and write down any ECU error codes for later referral.

✔,X,?	EZK	✔,X,?	LH
	NTC Temp-II Sensor at Idle		Idle Switch
	NTC Temp-II Sensor Warm		Wide-Open Throttle Switch
	Knock Count During Test Drive		Idle Stabilizer Valve
	Speed Sensor		Tank Vent Solenoid
			Resonance Flap
			A/C Switch
			Idle Reduction

Also, make sure to use the tester on your test drive to note operating temperatures and to do a knock test.

8.2 Without Tester

While a tester can speed up investigation of engine components, a simple multi-meter can be used to check a number of them. Without a tester, you conduct tests by checking resistances between specific pins of the ECU connectors for the LH and EZK or by bridging and grounding certain pins. To conduct the tests, you must first identify the ECUs and disconnect their 35-pin harness connectors.

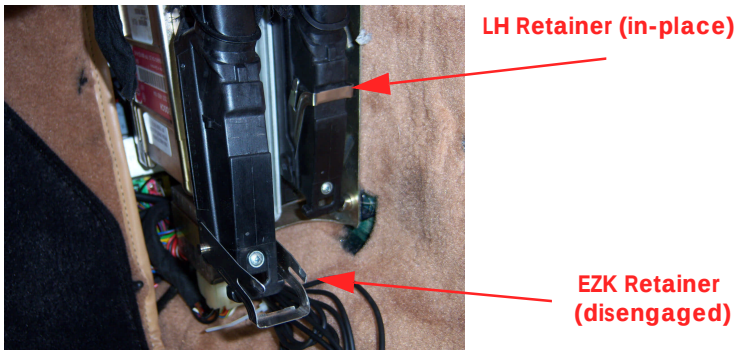

Figure 37: ECU Harness Connectors

The ECUs are located on the passenger side on the outer side of the foot well.

✔,X,?	EZK	✔,X,?	LH
Ω	NTC Temp-II Sensor @___°F	Ω	NTC Temp-II Sensor @___°F
Ω	NTC Temp-II Sensor @___°F	Ω	NTC Temp-II Sensor @___°F
	Idle Switch		Idle Switch
	Wide-Open Throttle Switch		Wide-Open Throttle Switch
			Idle Stabilizer Valve
			Flap
			Tank Vent

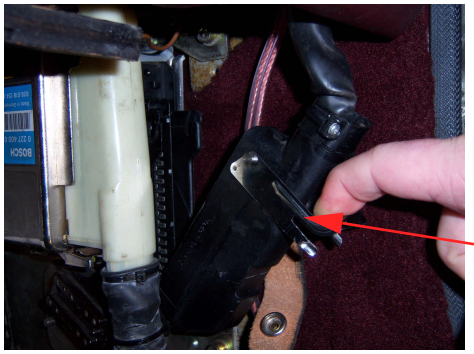

Figure 38: Disengaging ECU Connectors

Uncover them by removing the carpeted “hump” on the foot well by unscrewing the round black plastic fastener and then withdrawing the “hump.” The EZK ECU is the outer silver-cased device and the LH is between the foot well and the EZK.

Disengage an ECU harness connector by first levering-down the silver retainer. This will partially withdraw one end of the connector from the ECU. The other end of the connector is retained by a keyed hook that will pivot around the ECU-side of the connection. Pull the silver retainer away from the ECU to begin pivoting the other end of the connector, then use your hand to complete the rotation of the connector until you can disengage the hook on the connector from the ECU.

The connector needs to pivot almost 90-degrees to disengage from the ECU. You may find that you may need to deform the package tray a bit to get sufficient room.

Re-connection of the 35-pin connectors is the reverse of disconnection. Each connector’s “hook” is keyed to the ECU, so, you have to try really, really hard to mis-connect them.

As you conduct the test below, double check that you are testing the correct pins. Use the “blank” pin slots in each connector to ensure the right orientation and the correct pins. Note, that the orientation of the LH connector with respect to the harness cable is different depending upon the model year 928 you are testing.

In addition to a multi-meter, you will need a way to connect your meter's test leads to various pins on the ECUs and to a ground contact. A simple way to do this is to either buy or fabricate two test lead extensions and to construct two adaptor wires with spade connectors at each end.

The test lead extensions should be at least two feet long with alligator clips at each end. The adaptor wires need be no more than 4 to 6 inches in length. The spade connectors need to be narrow enough to be inserted into the ECU connector's female pins. Wire, alligator clips, and connectors can be obtained from Radio Shack or an electronics supply store.

Engine Temperature Sensor (Temp-II / NTC-II)

The Temp-II sensor contains two distinct temperature sensors. One "side" is read by the LH ECU and the other is read by the EZK ECU. Check the resistance of both circuits of the Temp-II sensor to ensure that consistent temperature data is reaching both ECUs.

Switch your multi-meter to resistance mode. Check the Temp-II resistance by connecting the meter to an ECU's ground pin and the ECU's Temp-II sensor pin. Note the measured resistance and check it against the table below. The resistances for the two Temp-II circuits should be within a few percent of each other. If the resistances are significantly different or if either value differs from the table below then either the Temp-II sensor is non-functional or there is a wiring harness issue between the sensor and the ECU connectors.

Unplug both the LH and EZK connectors.

For the LH:

- **Ground: Pin 17**
- **Temp-II: Pin 13**

For the EZK:

- **Ground: Pin 18**
- **Temp-II: Pin 19**

Ideally, you should test the NTC-II resistance values at two different temperatures: engine cold and engine at operating temperature.

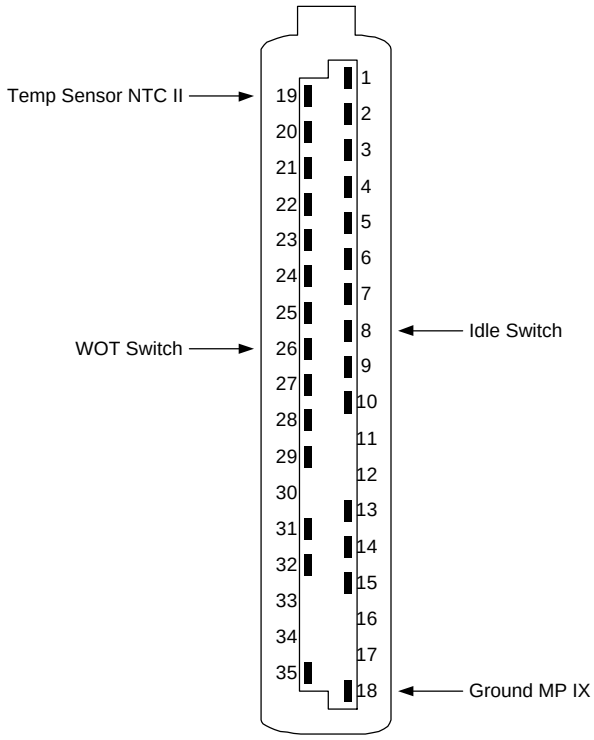

Figure 39: EZK Connector

Engine Temperature	NTC-II Resistance
0°C / 32°F	4.4 - 6.8 kΩ
15 - 30°C / 59 - 86°F	1.4 - 3.6 kΩ
40°C / 104°F	1.0 - 1.3 Ω
80°C / 176°F	250 - 290 Ω
100°C / 212°F	100 - 210 Ω

Figure 40: Temp-II / NTC-II Temperature vs. Resistance

Idle/WOT Switch

Like the NTC-II sensor, the idle/wide-open throttle (WOT) switch sends signals to both ECUs. The idle switch should be closed at idle and open just off-idle. The WOT switch should be open at idle and should close as the throttle pedal reaches full travel.

Four tests are necessary to test the idle/WOT switch. In each test you will connect your multi-meter in resistance mode to an ECU ground pin and to either the idle or WOT pin. Connect your meter and place it where you can see the display from the driver's seat (or draft a helper.) Clip your test lead extension wires to your multi-meter's probes and to your adaptor wires. Then, for each test, plug your adaptor wire's spade terminals into the appropriate pins on the ECU connectors.

An open switch should have infinite resistance. A closed switch should have at most fraction of an Ohm resistance. For example: when testing the idle switch the meter should read less than one Ohm with no pressure on the throttle pedal and should read infinite resistance (e.g. "OL", "Inf", etc.) with light pressure on the pedal. The WOT switch will operate in reverse: infinite resistance with no pressure on the pedal and less than one Ohm with the pedal almost all the way to the stop.

If the idle switch or the WOT switch is non-functional on both tests then the idle/WOT is likely broken. If a switch test fails for one ECU and not the other then wiring issues are the likely cause. However, a wiring issue could also cause a switch test to fail for both ECUs.

Unplug both the LH and EZK connectors. Set up your multi-meter in resistance mode and connect it as described below for each of the tests.

Idle Switch on the LH:

- **Ground: Pin 17**
- **Idle Switch: Pin 2**

Idle Switch on the EZK:

- **Ground: Pin 18**
- **Idle Switch: Pin 8**

WOT Switch on the LH:

- **Ground: Pin 17**

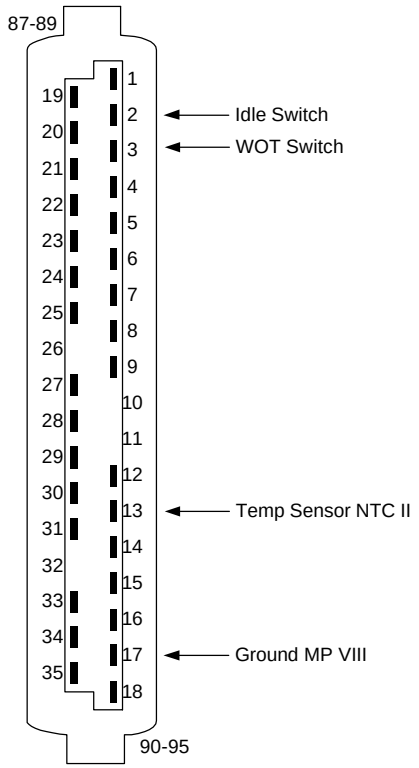

Figure 41: LH Connector (Temp-II, Idle/WOT Switch)

- **WOT Switch: Pin 3**

WOT Switch on the EZK:

- **Ground: Pin 18**
- **WOT Switch: Pin 26**

Idle Stabilizer

The following three tests require that power be supplied to the components being tested. The Idle Stabilizer Valve (ISV), Resonance Flap, and Tank Vent are supplied power via the LH relay. The LH relay can be activated by bridging pins 17 and 21 on the LH ECU connector with one of your adaptor wires.

Once powered-up, the ISV can be activated by grounding pin 33 on the LH connector. A good way to do this is to use one of your test lead extension wire clipped to the ground point above the fuse panel and the other to your second adaptor wire. Then, just touch the other end of the adaptor wire to the correct ECU pin.

- **Bridge pin 17 and pin 21 of the LH connector.**
- **Ground pin 33 to activate the ISV.**

If the ISV is operating, you will here a click from the engine bay when you disconnect ground from pin 33.

Resonance Flap

If you've recently (with a few hours) run the engine of the 928 you are testing and it does not have a significant vacuum system leak, then you can also test the operation of the Resonance Flap.

- **Bridge pin 17 and pin 21 of the LH connector.**
- **Ground pin 34 to activate the Flappy.**

If you hear a click when you remove ground from pin 34 then your resonance flap is operating. If you don't then you have a non-operating flap actuator and/ or vacuum leaks or wiring issues.

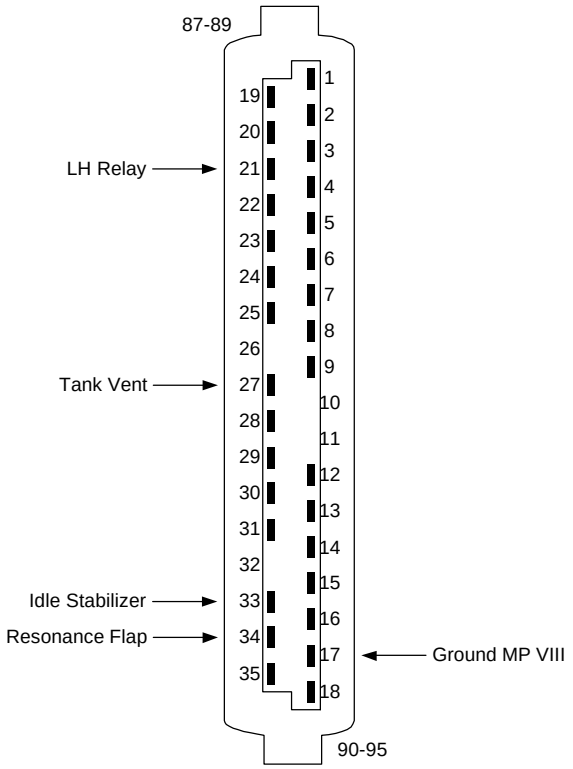

Figure 42: LH Connector (ISV, Flap, Tank Vent)

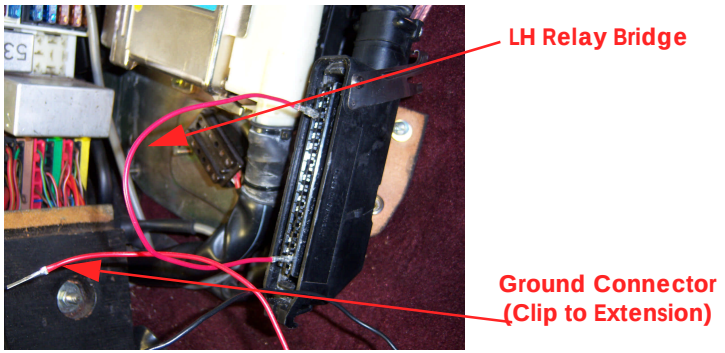

Figure 43: Disengaging ECU Connectors

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Tank Vent

The Tank Vent Solenoid can be tested in the same manner as the ISV. But, the click that the tank vent makes is very, very faint. You will need absolute quiet or a helper.

- **Bridge pin 17 and pin 21 of the LH connector.**
- **Ground pin 27 to activate the Tank Vent Solenoid.**

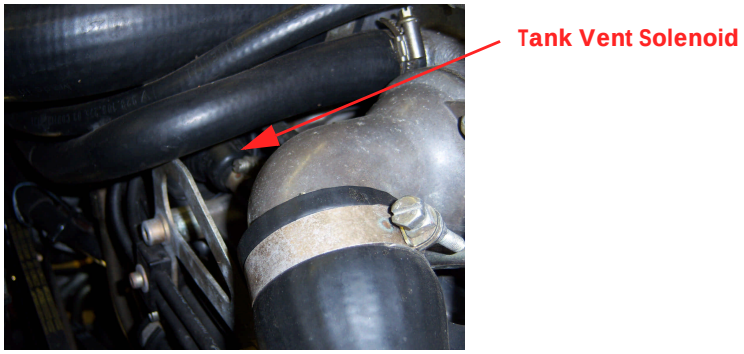

Figure 44: Tank Vent Solenoid

9 Timing Belt

long-time 928 owners have a healthy respect for the condition of the timing belt system. Despite the fact that the belt itself has a maintenance schedule while the other parts that it touches do not, the timing belt is almost never a problem. Problems with the timing belt are usually due to one or more problems with other parts of the *system*.

Porsche recommends checking the belt tension every two years or 30k-miles. When you read “Checking the belt tension” you should hear “Checking the belt system.” Conscientious 928 owners check their belt system every year.

If you are looking at buying a 928 then the health of the belt system is a very important consideration. If the service history of the belt system is unknown then the health of the system needs to be checked as soon as possible. Even if the car comes with service records of recent belt maintenance you should not take the records at face value until you’ve checked the system yourself.

A visual inspection of a few components of the belt system can be conducted in less than an hour. A thorough inspection will require from one to two hours and will require a belt tension tool (e.g. Porsche 9201, “Kempf” tool, etc.) and an oil hand pump to check the oil in the tensioner.

✔,X,?	Component	✔,X,?	Component
	Tension Warning System		Spark Plug Wires
	Belt Condition		Distributor Cap
	Idler Roller		Rotor
	Belt Tracking		Air Pump Filter
	Measured Belt Tension		

9.1 Visual Belt Inspection

To inspect the belt you need to remove the distributor cap, rotor, and belt cover on the passenger side. Depending upon the car and your dexterity, you may need to remove the stock fan shroud. Removing the fan shroud may be easy or hard depending upon the year and transmission type of the 928 being inspected.

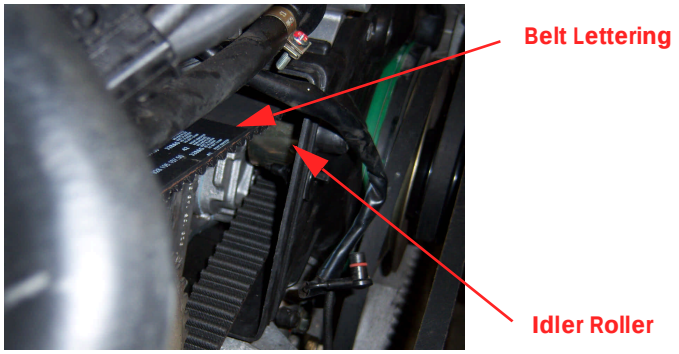

Figure 45: A new timing belt and roller

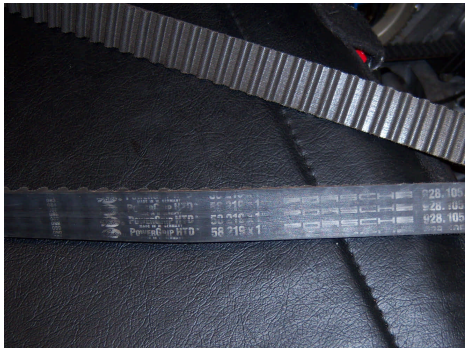

Figure 46: 44k-mile 19 year-old factory-installed timing belt

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But, before you do that, remove the fresh air tubes that feed the air box and start the engine. With the engine running observe the tracking of the belt through the holes in the top of the belt covers. Is the belt tracking in the center (or very close to the center) of both cam sprockets? Is it tracking in the same place on both sprockets?

Turn off the engine. Wipe the inside of the holes with your finger. Is your finger covered with belt dust? Or just a bit of dirt?

Once the belt is exposed you can visually check two indicators of belt system health:

- **Does the belt still have manufacturers' lettering on the smooth face of the belt?**

  If the belt is believed to have been changed within the last four or-so thousand miles then the lettering indicating the manufacturer and part number should be clearly readable. You will need to turn the crank by hand many times to rotate the belt one complete revolution to be sure you've examined all the belt's surface.

  If you find that an allegedly-new belt has no markings on it, then the age of the belt or the health of the system is suspect. Keep in mind, though, that nice belt lettering doesn't tell you that the belt is new. Absence of lettering indicates that the belt may not be new. Nice lettering tells you nothing.

- **Does the idler roller look gold-ish in color? Or is it silver? Or is it almost black?**

  The idler roller does not touch the timing belt as installed. The idler only turns when the belt is loose. With a healthy belt system the idler turns infrequently - for instance during startup and during trailing throttle from high RPM.

  If the idler roller's gold-colored plating is still clearly or mostly intact then this is an indication that records of a recent service may in fact be genuine. If the roller is silver in color - the plating has worn away or has oxidized - then the roller is old or the belt has been touching it quite a bit. This indicates that records of a recent belt service are suspect.

  If the roller is noticeably black, this indicates that the belt has been loose for a long time and/or that the belt is dusting the roller. This is a bad sign and a clear indication that the system is not in good condition despite any records to the contrary.

9.2 Other, Easy Inspections

As you remove the components to access the belt you can also check the condition of the inside of the distributor caps, the health of the rotors, plug and coil wires, and fan shroud wiring.

You can also check the functioning of the belt tension warning system. As you put everything back together, unplug the connector for the tension warning system from the center belt cover.

Once everything is back together, operate the engine for at least 5 minutes. Within 5 minutes the belt tension warning indicator should light on the instrument cluster. When you've tested the system, reconnect the circuit at the center belt cover.

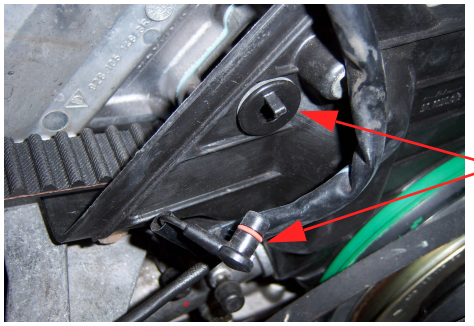

Figure 47: Tension Warning Circuit

9.3 Thorough Inspection

A thorough inspection of the belt system requires that you check the tension and the oil level in the belt tensioner. Reference material for these tasks is widely available. You will need a tension measurement tool and an oil hand pump.

- **Belt tension**

If the belt has allegedly been recently serviced then expect to find the belt either properly tensioned or slightly loose.

If you are looking at a 928 you don't own (yet, perhaps) then be more concerned with a too-tight belt than a too-loose belt. A too tight belt will wear out cam sprockets and rollers very quickly. They may already be worn out.

Figure 48: "Kempf" tool and oil hand pump.

- **Tensioner Oil**

It is normal for the tensioner to loose a small amount of oil over time. Don't be concerned if you have to give your hand pump a few squeezes before you see oil drip out of the drain fitting... as long as you don't see any fresh oil under the tensioner.

If you have to pump several ounces of oil through the tensioner then the tensioner was dry. At this point you'll probably see all your fresh oil on the ground.

An empty or leaking tensioner is a sign that any recent belt service records are not to be trusted at all.

Figure 49: Leaking tensioner

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10 Flex Plate

A problem unique to 1987 or newer automatic 928s is engine thrust bearing failure (and consequent destruction of the engine) due to the drive shaft consistently pushing the crank towards the front of the block (and thereby wearing out the block's thrust bearing.)

If you already own an automatic 1987 or newer 928 then you should check for flex plate tension every year. If you are considering the purchase of an automatic 928 then checking the flex plate and measuring crank end-play (thrust bearing wear) should be considered a mandatory pre-purchase inspection task.

Checking the flex plate and measuring crank end-play requires that you be able to get under the car, disconnect the exhaust from the engine exhaust manifolds, and remove the lower bell housing cover. You should set aside one to three hours for this inspection task.

References for performing the check are available from numerous sources.

	Component		**Component**
	Flex Plate Measured Flex		Crank End-Play Measurement

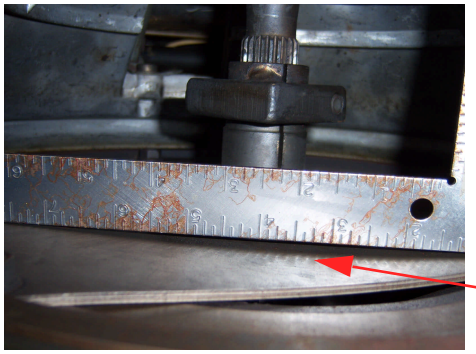

Figure 50: Flex Plate check - showing flexing

11 Lights

A final inspection task is to check the exterior lights. Doing this check once per year, prior to your safety inspection can be a stress-saver. Checking the exterior lights of a car you are interested in purchasing is a good idea, since you'll need to get a new sticker after the purchase.

✔,X,?	Left	✔,X,?	Right
	Front Side Marker		Front Side Marker
	Front Turn Signal		Front Turn Signal
	Head Light - Low Beam		Head Light - Low Beam
	Head Light - High Beam		Head Light - High Beam
	Fog Light		Fog Light
	Additional High Beam		Additional High Beam
	Door-End Light		Door-End Light
	Rear Side Marker		Rear Side Marker
	Rear Turn Signal		Rear Turn Signal
	Reverse Light		Reverse Light
	Tail Light		Tail Light
	Brake Light		Brake Light
	Center Brake Light		

12 Consolidated Tables

Test Drive - Dynamics

✔,X,?	Characteristic	Observations
	Engine Idle	
	Engine Smoothness	
	Engine Power	
	Vibration	
	Tracking	
	Suspension	
	Brakes	
	Noises	

Test Drive - With Tester

✔,X,?	Characteristic	Observations
	Operating Temperature	
	Knock Count	

Test Drive - Instruments

✔,X,?	Component	✔,X,?	Component
	Oil Pressure Gauge		Fuel Level Gauge
	Temperature Gauge		Voltmeter
	Speedometer		Tachometer
	Odometer		PRDNL Lights
	Backlighting		Warning Lights
	Dimmer		Cruise Control

Test Drive - Instruments

✔,X,?	Component	✔,X,?	Component
	Hazard Lights		Wipers
	Odometer		Trip Odometer

Test Drive - Accesssories I

✔,X,?	Left	✔,X,?	Right
	Power Window		Power Window
	Side-view Mirror		Side-view Mirror
	Hatch Release		Hatch Release
	Door Lock		Door Lock

Test Drive - Accesssories II

✔,X,?	Component	✔,X,?	Component
	Sunroof		Rear Wiper
	Front A/C		Rear A/C
	Central Locking		Odometer / Timer Reset
	HVAC Blower		HVAC Flaps
	Radio		Clock
	Interior Lights		PSD (‘90-’95)

Suspension Loaded - Steering Components

✔,X,?	Left	✔,X,?	Right
	Steering Rack Boot		Steering Rack Boot
	Inner Tie-Rod Joint		Inner Tie-Rod Joint
	Outer Tie-Rod Joint		Outer Tie-Rod Joint

Suspension Loaded - Steering Components

✔,X,?	Left	✔,X,?	Right
	Upper Ball-Joint		Upper Ball-Joint
	Lower Ball-Joint		Lower Ball-Joint

Suspension Loaded - Miscellaneous

✔,X,?	Component	✔,X,?	Component
	Steering rack arm movement.		Steering rack seals
	Steering Rack Bushings		PS Line from Pump
	Plastic Belly Pan		PS Line to Cooler
	Metal Belly Pan		Alternator Fresh Air Hose

Front Wheel Wells

✔,X,?	Left, Front	✔,X,?	Right, Front
	Even Tire Wear		Even Tire Wear
	Wheel Bearing Adjustment		Wheel Bearing Adjustment
	Pads (Thickness, Even Wear)		Pads (Thickness, Even Wear)
	Rotor (Thickness, Cracks)		Rotor (Thickness, Cracks)
	Pad Guide Plates		Pad Guide Plates
	Flexible Brake Line		Flexible Brake Line
	ABS/PW/RDK Harnesses		ABS/PW/RDK Harnesses
	Fender Liner		Fender Liner
	Splash Guard		Splash Guard

Rear Wheel Wells

✔,X,?	Left, Rear	✔,X,?	Right, Rear
	Even Tire Wear		Even Tire Wear
	Pads (Thickness, Even Wear)		Pads (Thickness, Even Wear)
	Rotor (Thickness, Cracks)		Rotor (Thickness, Cracks)
	Pad Guide Plates		Guide Plates
	Flexible Brake Line		Flexible Brake Line
	ABS/PW/RDK Harnesses		ABS/PW/RDK Harnesses
	Fender Liner		Fender Liner

Underneath I

✔,X,?	Left	✔,X,?	Right
	Oil Cooler Hoses		Transaxle Cooler Hoses (Autos, GTSs)
	Exhaust test port (pre-89.5)		Exhaust test port (pre-89.5)
	Cam Cover Gasket		Cam Cover Gasket
	Outer CV Boot		Outer CV Boot
	Inner CV Boot		Inner CV Boot

Underneath II

✔,X,?	Component	✔,X,?	Component
	Clutch slave (5-Speed)		Lines to slave (5-Speed)
	Clutch disc thickness (5-Speed)		Oil Pan Gasket
	Motor Mounts		Exhaust
	Transaxle Pan Gasket (Auto)		Engine Ground Cable
	02 Sensor Wiring		Heat Shields

Engine Bay - Quick Checks

✔,X,?	Component	✔,X,?	Component
	Air box Straps (Condition)		ATF / Gear Oil Cooler Hoses (Auto, GTS)
	Air Filter (Orientation, Condition)		Jump Post Cover and Cap
	Lower Air box (MAF Seal)		Main Harness at Jump Post (Routing, Cond.)
	Exhaust Test Ports (pre-89.5)		Hall Sensor Harness Routing
	E-clips on headlight motor arm		Blue Hose to CMC (5-Speed)
	Radiator Pressure Relief Fitting		Brake Fluid Reservoir Seals
	Ignition Stage Grounds		PS Line from Cooler
	Jump Post Ground		PS Line to Pump
	ABS Harness (Cover, Condition, Routing)		Temp-II / NTC-II (Harness and Leak)
	Oil Cooler Hoses (pre-90)		Gauge Sender (Harness and Leak)
	A/C Hoses		Water Bridge Seals
	Accessory Belts		Oil Filler Neck Seal

Engine Bay - Breather Hoses

✔,X,?	Component	✔,X,?	Component
	Cross-Head (GTS)		Tank Vent “Y” Hose
	Right-Side Rear		Vacuum Source, Side Intake
	Right-Side Front (S4/GT)		Vacuum Source, Air Guide
	Air Guide to Filler Neck (GTS)		MAF Guide

Engine Bay - Primary Vacuum

✔,X,?	Component	✔,X,?	Component
	Tank Vent		Air Pump
	5-way to Air guide		Front Dampener
	Regulator		Shift Modulator (Auto)
	Rear Dampener		

Engine Bay - Accessory Vacuum

✔,X,?	Component	✔,X,?	Component
	Check Valve		To HVAC
	To Resonance Flap		To Reservoir (and CC for pre-88)
	Flap Supply		Check Valve Operation
			HVAC Circuit Integrity

Engine Bay - Fuel Lines

✔,X,?	Fuel Line	✔,X,?	Fuel Line
	Front, Between Rails		Rear, “U” Hose
	Front, Supply		Rear, Return (two on ‘87)

Engine Bay - Gasket Checks

✔,X,?	Component	✔,X,?	Component
	Intake Gaskets, Pressure Gaskets		Cam Cover and Pressure Gaskets
	Intake Coating		Cam Cover Plugs
	Cam Cover Coating		

ECU Codes / Drive Links - With Tester

✔,X,?	EZK	✔,X,?	LH
	NTC Temp-II Sensor at Idle		Idle Switch
	NTC Temp-II Sensor Warm		Wide-Open Throttle Switch
	Knock Count During Test Drive		Idle Stabilizer Valve
	Speed Sensor		Tank Vent Solenoid
			Resonance Flap
			A/C Switch
			Idle Reduction

ECU Codes / Drive Links - Without Tester

✔,X,?	EZK	✔,X,?	LH
Ω	NTC Temp-II Sensor @___°F	Ω	NTC Temp-II Sensor @___°F
Ω	NTC Temp-II Sensor @___°F	Ω	NTC Temp-II Sensor @___°F
	Idle Switch		Idle Switch
	Wide-Open Throttle Switch		Wide-Open Throttle Switch
			Idle Stabilizer Valve
			Flap
			Tank Vent

Timing Belt

✔,X,?	Component	✔,X,?	Component
	Tension Warning System		Spark Plug Wires
	Belt Condition		Distributor Cap
	Idler Roller		Rotor
	Belt Tracking		Air Pump Filter

Timing Belt

✔,X,?	Component	✔,X,?	Component
	Measured Belt Tension		

Flex Plate

	Component		Component
	Flex Plate Measured Flex		Crank End-Play Measurement

Lights

✔,X,?	Left	✔,X,?	Right
	Front Side Marker		Front Side Marker
	Front Turn Signal		Front Turn Signal
	Head Light - Low Beam		Head Light - Low Beam
	Head Light - High Beam		Head Light - High Beam
	Fog Light		Fog Light
	Additional High Beam		Additional High Beam
	Door-End Light		Door-End Light
	Rear Side Marker		Rear Side Marker
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	Brake Light		Brake Light
	Center Brake Light		

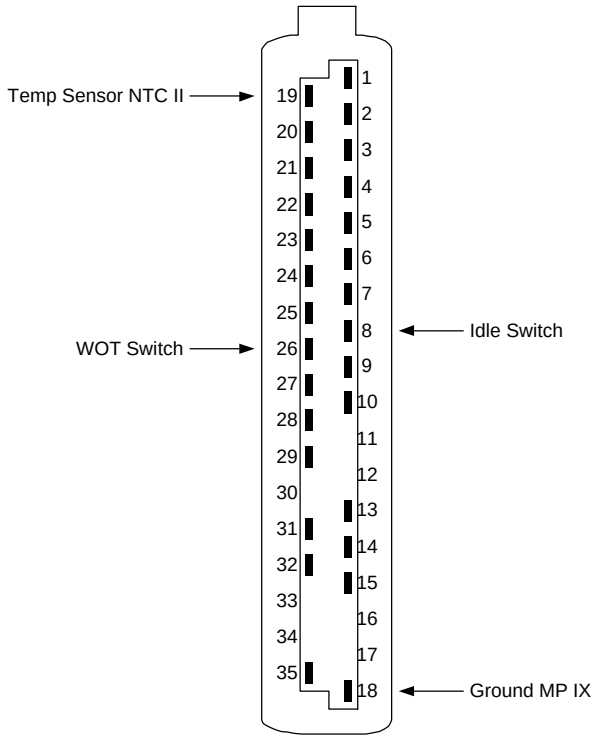

Figure 51: EZK Connector

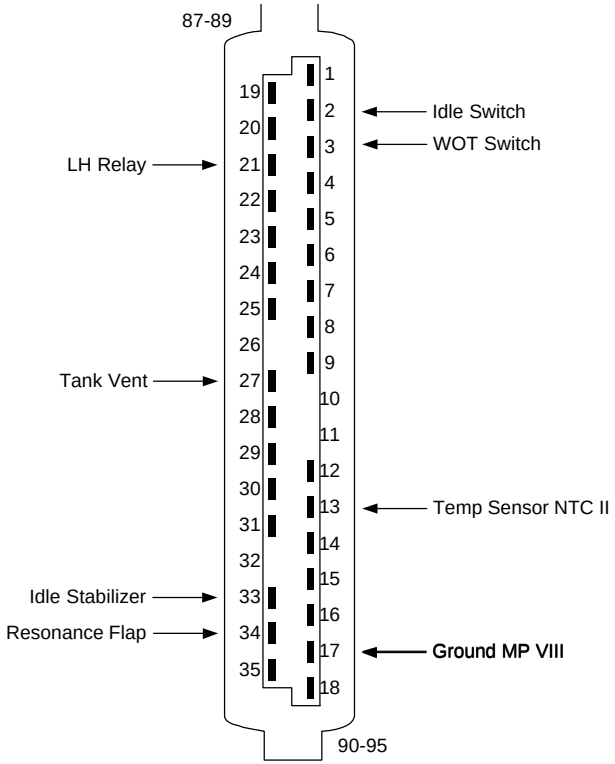

Figure 53: LH Connector (Temp-II, Idle/WOT Switch)

Engine Temperature	NTC-II Resistance
0°C / 32°F	4.4 - 6.8 kΩ
15 - 30°C / 59 - 86°F	1.4 - 3.6 kΩ
40°C / 104°F	1.0 - 1.3 Ω
80°C / 176°F	250 - 290 Ω
100°C / 212°F	100 - 210 Ω

Figure 52: Temp-II / NTC-II Temperature vs. Resistance

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