Curriculum Guide

Program Area: Automotive

Standard 1.0 – PERFORM ENGINE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
1.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical services bulletin	Research applicable vehicle and service information, vehicle service history, service precautions, and technical services bulletin	Explain what is included in service information Explain what a Cylinder leakage tester does	Technical service bulletins TSB	x
			Use various research methods to identify vehicle information, service information, fluid capacities, recalls Decipher a VIN Code	VIN Recall Campaign	
1.2	Verify operation of the instrument panel engine warning indicators.	Verify operation of the instrument panel engine warning indicators.		Warning indicators. Instrument panel/cluster	x
			Identify different warning lights on the instrument panel Verify warning lights operation	Check Engine/MIL	
1.3	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	Explain how to identify a fluid leak Visually	Coolant	X
			Identify colors of fluids as related to possible leakage	Hydraulic fluid ATF Synthetic Oil/conventional oil	

Standard 1.0 – PERFORM ENGINE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
1.4	Install engine covers using gaskets, seals, and sealers as required	Install engine covers using gaskets, seals, and sealers as required		Gasket Seals Sealers	x
			Explain what to do before putting on a new gasket (clean surfaces, prepare them) Explain why it is important to use the proper torque sequence /specification	Cork gasket Silicone RTV Torque Metal Gasket Rubber Gasket	
1.5	Remove and replace timing belt; verify correct camshaft timing.	Remove and replace timing belt; verify correct camshaft timing.	Repairing a timing a camshaft	Camshaft	X
			Side effects of not having crank and cam timed properly (Engine damage, rough idle, no horse power, no acceleration, no start) Proper service interval for replacing timing belt (specification for vehicle)	Tensioner Timing Crankshaft Timing marks Top Dead Center TDC Bottom Dead Center BDC Interference Engine	

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Standard 1.0 – PERFORM ENGINE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
1.6	Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.	Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.	Thread repair process		X
			Process for removing broken bolts Use tap and die set to repair threads Identifying bolt thread pitch, size, grade, and metric or SAE	Metric SAE Thread pitch Bolt grade Thread Count Torque Tap and Die Easy out	
1.7	Identify hybrid vehicle internal combustion engine service precautions.	Identify hybrid vehicle internal combustion engine service precautions.	Disabling/disconnect high voltage circuit in a hybrid vehicle Service Information which is different than a service manual, MSD sheets etc.	Hybrid MSD/MSDS Circuit	x
			Difference in the harness color codes of a hybrid vehicle Identify precautionary measures needed for hybrid vehicle that differ from gas vehicles		

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Standard 1.0 – PERFORM ENGINE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
1.8	Adjust valves (mechanical or hydraulic lifters).	Adjust valves (mechanical or hydraulic lifters).	Determine too much valve clearance	Valve Hydraulic lifter Solid lifter (mechanical) Valve lash Feeler gauge	x
			Determine the side effects of valves that not adjust properly		
1.9	Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core; determine necessary action	Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core; determine necessary action	Safety precaution when inspecting a cooling system Identify the symptoms of a clogged PCV system Never remove radiator cap when engine is hot	PCV –Positive, Crankcase ventilation system	x
			Describe the proper procedure for pressure testing the cooling systems Explain the proper dilution of water and antifreeze? Properly drain and refill the system Proper disposal and handling of antifreeze	Coolant dye Thermostat /and housing Radiator Coolant / antifreeze Pressure cap Heater core Radiator hoses Water pump	

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Standard 1.0 – PERFORM ENGINE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
1.10	Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.	Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.		Tensioners Pulleys Alignment	x
			Explain the importance of having the belt tension proper Identify a bad belt Visually inspect belt alignment	Serpentine belt V belt Bearing Idler pulley Tension gauge	
1.11	Remove, inspect, and replace thermostat and gasket/seal.	Remove, inspect, and replace thermostat and gasket/seal.	Explain where most thermostats are installed		x
			Describe the proper way to install a thermostat Spring side towards engine with vent hole facing up. Describe the proper procedure to install the thermostat housing (inspect, clean, reseal)	Thermostat Thermostat housing Gasket Seals O-ring	
1.12	Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.	Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.			x

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Standard 1.0 – PERFORM ENGINE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Describe the proper procedure for pressure testing the cooling systems Identify the proper dilution of water and antifreeze Properly drain and refill the system Proper disposal and handling of antifreeze	Coolant dye Thermostat /and housing Radiator Coolant/ antifreeze Pressure cap Heater core Radiator hoses Water pump	
1.13	Perform engine oil and filter change.	Perform engine oil and filter change.	Explain how to properly perform an oil change Be able to provide step by step		x
			Proper disposal of used engine oil Purpose of oil changes Explain often to change oil Factors that play a role in how often to change oil (driving conditions, environment)	Oil filter Oil filter wrench Catch pan Drain plug Dip stick Funnel Engine Oil SAE Viscosity API Service Rating Oil change interval	

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				Synthetic Oil Conventional Oil	

STANDARD 2.0 – PERFORM AUTOMATIC TRANSMISSION AND TRANSAXLE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
2.1	Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins	Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins			x
			Use various research methods to identify vehicle information, service information, fluid capacities, recalls Decipher a VIN Code	Technical service bulletins TSB	
2.2	Check fluid level in a transmission or a transaxle equipped with a dip-stick	Check fluid level in a transmission or a transaxle equipped with a dip-stick		Transaxle, Transmission	x
			List procedures for checking ATF	Dip-stick ATF	
2.3	Check fluid level in a transmission or a transaxle not equipped with a dip-stick	Check fluid level in a transmission or a transaxle not equipped with a dip-stick			x
			Completed as per manufacturer recommendations	Dip-stick ATF	

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STANDARD 2.0 – PERFORM AUTOMATIC TRANSMISSION AND TRANSAXLE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
2.4	Check transmission fluid condition; check for leaks	Check transmission fluid condition; check for leaks			x
			Methods to diagnose transmission fluid conditions (smell, color, viscosity, texture) Identify possible areas transmission fluid can leak from (pan, axle seals, cooling lines)	Axle seals Cooling lines Pan	
2.5	Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch	Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch	Describe why on an automatic transmission a starter only operates with a remote starter switch		x
			Visually inspect and check for looseness, oil soaked, loose electrical connections	Neutral safety switch Range switch Shift linkage	
2.6	Inspect for leakage at external seals, gaskets, and bushings	Inspect for leakage at external seals, gaskets, and bushings		Bushings	x
			Identify possible areas transmission fluid can leak from (pan, axle seals, cooling lines)	Seals Gasket	
2.7	Inspect power train mounts	Inspect power train mounts		Trans mounts	x
			Visually inspect by looking for cracks, chunks missing	Transmission mounts	

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STANDARD 2.0 – PERFORM AUTOMATIC TRANSMISSION AND TRANSAXLE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
2.8	Drain and replace fluid and filter(s)	Drain and replace fluid and filter(s)			x
			How to identify the proper transmission fluid and capacity for a vehicle (manufacturer) Proper procedure for changing fluids? Change Interval (manufacture recommendation)	Transmission Filter Gasket Torque ATF	
2.9	Describe the operational characteristics of a continuously variable transmission (CVT)	Describe the operational characteristics of a continuously variable transmission (CVT)		CVT Continuously variable transmission	x
			As speed increases gear ratio changes, no shifting occurs	Gear ratios	
2.10	Describe the operational characteristics of a hybrid vehicle drive train	Describe the operational characteristics of a hybrid vehicle drive train			x
			Utilizes two types of motors to propel vehicles for fuel efficiency	Hybrid Electric motor Engine Battery pack Storage	

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STANDARD 3.0 – PERFORM MANUAL DRIVE TRAIN AND AXLE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
3.1	Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins	Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins			x
			Use various research methods to identify vehicle information, service information, fluid capacities, recalls Decipher a VIN Code	Technical service bulletins TSB	
3.2	Drain and refill manual transmission/transaxle and final drive unit	Drain and refill manual transmission/transaxle and final drive unit	Describe pickle finger		x
			Proper procedure how to drain and refill on a manual transmission and differential	Gear oil Gear lube Drain Plug ATF Differential Differential cover	
3.3	Check fluid condition; check for leaks	Check fluid condition; check for leaks of manual transmission and differential			x

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STANDARD 3.0 – PERFORM MANUAL DRIVE TRAIN AND AXLE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Proper procedure for checking level and condition of manual/differential fluid (smell, Level, viscosity, color, texture) Identify possible areas leakage can happen (tale shaft seal, axle seal, pinion seal, plugs)		
3.4	Check and adjust clutch master cylinder fluid level	Check and adjust clutch master cylinder fluid level	Check and adjust fluid, Sticky Relay	Sticky Relay	x
			Visually inspect fluid level and condition. (clear not dark)	Clutch master cylinder Slave cylinder Reservoir	
3.5	Check for system leaks	Check for system leaks of clutch hydraulic system			x
			Visually inspect for leaks (dampness on floor board or bell housing)	Clutch master cylinder Slave cylinder Reservoir Flex hose	
3.6	Describe the operational characteristics of an electronically-controlled manual transmission/transaxle	Describe the operational characteristics of an electronically-controlled manual transmission/transaxle			x
			Shifting by electrical current	Electric solenoid	

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STANDARD 3.0 – PERFORM MANUAL DRIVE TRAIN AND AXLE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
3.7	Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals	Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals		FWD front wheel drive, Seals, Hubs	x
			Indications of failed FWD wheel bearings (noise, looseness, tire wear) Follow manufacturers recommendations for R and R	Bearings Roller bearings Needle bearing Spindle/knuckle	
3.8	Inspect, service, and replace shafts, yokes, boots, and universal/CV joints	Inspect, service, and replace shafts, yokes, boots, and universal/CV joints		Shafts Yokes Boots CV joints	x
			Indications of worn CV joint or U joint (noise, looseness) Grease zerk Procedure for replacing and removing U joint and CV joint	Universal joint Grease zerk	
3.9	Clean and inspect differential housing; check for leaks; inspect housing vent	Clean and inspect rear differential housing; check for leaks; inspect housing vent	Explain checking differential housing inspections	Differential housing Housing vent	x
			Visually inspect for leaks checking axle seals, dif cover, pinion seal		

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STANDARD 3.0 – PERFORM MANUAL DRIVE TRAIN AND AXLE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
3.10	Check and adjust differential housing fluid level	Check and adjust differential housing fluid level			x
			Procedure how to check and adjust fluid level and dif	Gear Lube Differential housing Fill plug	
3.11	Drain and refill differential housing	Drain and refill differential housing			x
			Proper procedure how to drain and refill dif Disposal of oil	Drain plug Dif Cover	
3.12	Inspect and replace drive axle wheel studs	Inspect and replace drive axle wheel studs			x
			Visual inspection for damage of wheel stud Proper procedure for replacing a wheel stud	Wheel stud Lug nut Hub assembly	
3.13	Inspect front-wheel bearings and locking hubs	Inspect front-wheel bearings and locking hubs			x
			Visual inspection of front wheel bearings Clean and repack wheel bearings	Locking Hubs Wheel Bearing Race	

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STANDARD 3.0 – PERFORM MANUAL DRIVE TRAIN AND AXLE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
3.14	Check for leaks at drive assembly seals; check vents; check lube level	Check for leaks at front drive assembly seals; check vents; check lube level		Lube	x
			Visually inspect for leaks checking axle seals, dif cover, pinion seal	Gear Lube Differential housing Fill plug	

STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
4.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins			x
			Use various research methods to identify vehicle information, service information, fluid capacities, recalls Decipher a VIN Code	Technical service bulletins TSB	
4.2	Disable and enable supplemental restraint system (SRS)	Disable and enable supplemental restraint system (SRS)	Process for final inspection of SRS Supplemental Restraint System Air Bag System	SRS Supplemental restraint system	x

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Procedure to disable and enable SRS Identify proper color coding of wires for SRS (Yellow) Safety considerations for SRS - disable SRS, Static electricity)	Grounding Static Electricity Air bags	
4.3	Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots	Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots	Identify a Tie Rod	Tie rod Control Arm Drive Axle Ball joint	x
			Inspect for leaks at the bellows or play on the joint	Rack and pinion Bellows boots	
4.4	Determine proper power steering fluid type; inspect fluid level and condition	Determine proper power steering fluid type; inspect fluid level and condition	Identify the problem if there is a growling noise in power steering pump Identify the problem if the power rack and pinion system is hard to turn		x
			Checking the proper fluid conditions per manufacturer	Power steering fluid Dip-stick	
4.5	Flush, fill, and bleed power steering system	Flush, fill, and bleed power steering system	Explain the procedure for bleeding, flush, fill, and bleed		x
			Identify the difference between flush and bleed	Flush Bleed	

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
4.6	Inspect for power steering fluid leakage; determine necessary action	Inspect for power steering fluid leakage; determine necessary action	Limits output pressure of power steering pump		x
			Identify places a steering system can leak from cooler, rack, pump, hose ends	High pressure hose Low pressure/Return hose	
4.7	Remove, inspect, replace, and adjust power steering pump drive belt	Remove, inspect, replace, and adjust power steering pump drive belt	Explain how to replace a power steering pump belt		x
			Identify visual cues to determine a bad belt		
4.8	Inspect and replace power steering hoses and fittings	Inspect and replace power steering hoses and fittings	Installing a new power steering hose, flush refill and bleed		x
				Hose clamps	
4.9	Replace power steering pump filter(s)	Replace power steering pump filter(s)	Procedure for replacing power steering pump Removing a power steering pump		x

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
4.10	Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper	Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper	Warn idle arm causes what types of problems and how do you correct the issue Vertical looseness in an idler arm indicates it is worn and should be replaced Schematic of a centerlink connection of pitman arm and the idler arm		x
				Pitman arm Centerlink Idler Arm Mountings Tie rod ends Steering damper	
4.11	Inspect tie rod ends (sockets), tie rod sleeves, and clamps	Inspect tie rod ends (sockets), tie rod sleeves, and clamps	Adjusted toe		x
			Visual inspection of torn boot and looseness in joint	Ball joint Inner tie rod Outer tie rod Tie rod boot	
4.12	Inspect upper and lower control arms, bushings, and shafts	Inspect upper and lower control arms, bushings, and shafts	Rubber bushings and the suspension system	Suspension system	x

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Visual inspection of rubber bushings and symptoms (any movement, forward or back, tire ware)	Shafts Upper control arm Lower control arm Bushings	
4.13	Inspect and replace rebound and jounce bumpers	Inspect and replace rebound and jounce bumpers		Rebound bumpers, Jounce bumpers	x
			Visual inspection that the rubber is present	Rebound Jounce	
4.14	Inspect track bar, strut rods/radius arms, and related mounts and bushings	Inspect track bar, strut rods/radius arms, and related mounts and bushings	Function of strut rod A harsh ride indicates rubber bushing are replaced with Urethane bushings Many symptomatic problems must identify	Strut, Track Bar,	x
				Mounts Bushings Radius arm	
4.15	Inspect upper and lower ball joints (with or without wear indicators)	Inspect upper and lower ball joints (with or without wear indicators)	Ball joints- Placing the jack when working on ball joints Difference between load carrying and non-load carry ball joints	Load carrying, non-load carrying, Radius arms, Ball joints	x

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			What should be inspected, broken boot, leaking grease, excessive movement	Control arms	
4.16	Inspect suspension system coil springs and spring insulators (silencers)	Inspect suspension system coil springs and spring insulators (silencers)			x
			Procedure on checking ride height Visual inspection of rubber spring insulators Brittleness, missing pieces	Suspension Coil Springs Spring Insulators	
4.17	Inspect suspension system torsion bars and mounts	Inspect suspension system torsion bars and mounts	Number of torsion bars in a rear suspension	Torsion bars	x
			Check ride height		
4.18	Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links	Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links	Explain what to do to change riding height Purpose of a stabilizer bar	Stabilizer bar	x
			Visual inspections of bushings Indications of bad sway bar bushing/endlinks clunking, body roll	Sway Bar bushings Sway bar endlink	

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
4.19	Inspect strut cartridge or assembly	Inspect MacPherson strut cartridge or assembly	MacPherson struts are two parts. The coil spring and shock absorber Purpose of a shock absorber strut cartridge	Suspension Oscillation	x
				MacPherson struts Shock absorber	
4.20	Inspect front strut bearing and mount	Inspect front strut bearing and mount			x
			Visual inspections of front strut bearing and mount- should turn smoothly, no popping noises	Strut bearing Strut mount Inspection	
4.21	Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms	Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms			x
			Visual inspection of arms, looking for bent arm, bad bushing, rear alignment issues, Clunking noises on acceleration or decelerations, dog tracking	Lateral Links Track Bars	
4.22	Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts	Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts	Describe what happens if a coil spring is not compressed before removal	Rear suspension Leaf Spring Insulators Shackles Brackets	x

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Inspect bushings insulators, leaf springs look for broken center pin	Center pin/bolt	
4.23	Inspect, remove, and replace shock absorbers; inspect mounts and bushings		Shock absorber purpose (rebound of the springs)	Shock absorbers Mounts	x
			Proper procedure on how to replace shocks (adding pressure to control arm) Diagnosing shock problems (push on corner of vehicle for rebound) Visual inspection looking for wet shock and dirt	Rebound Jounce Hydraulic Oscillation	
4.24	Inspect electric power-assisted steering	Inspect electric rack and pinion power-assisted steering	Small Electric Motor in relationship to steering		x
			Inspect electrical wires and harness for good connection	Electric power-assisted steering	
4.25	Identify hybrid vehicle power steering system electrical circuits and safety precautions	Identify hybrid vehicle power steering system electrical circuits and safety precautions	Safety precautions can be found in service information		x
			Follow recommended manufacturers procedures		
4.26	Describe the function of the power steering pressure switch	Describe the function of the power steering pressure switch			x
			Describe the operation of the power steering pressure switch	Power steering pressure switch	

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
4.27	Perform prealignment inspection and measure vehicle ride height; determine necessary action	Perform prealignment inspection and measure vehicle ride height; determine necessary action	Proper way to restore rider height on the rear of a vehicle (replace springs) What causes a pull (unequal tire pressure)		x
				Pre-alignment inspection Ride Height Misalignment	
4.28	Inspect tire condition; identify tire wear patterns; check for correct size and application (load and speed ratings) and adjust air pressure; determine necessary action	Inspect tire condition; identify tire wear patterns; check for correct size and application (load and speed ratings) and adjust air pressure; determine necessary action	Tread wear patterns shows what information Tire ware Feather edges type of tire wear caused by excessive toein Wearing on both edges of tire tread under inflation Cause of 1 tire wearing on the inside only negative Camber	Camber Over inflation Wheel Imbalance Misalignment Feather edges	x

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Proper way to inflate tires (door for pressure)	Dry rotting Under inflation Cupping Toe in and Toe out Tread depth Tire pressure gauge	
4.29	Rotate tires according to manufacturer's recommendations	Rotate tires according to manufacturer's recommendations	Following service information for procedure		x
			Identify different tire rotation sequence	Tire rotation	
4.30	Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic)	Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic)	Symptomatic Dynamic imbalance cause wheel Shimmy	Dynamic imbalance	x
				Static imbalance Dismount Wheel/rim Tape Weights Clip on weights	
4.31	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor	Following manufacturer and vehicle service recommendation Identifying information in Manufacturer's recommendation and vehicle service information		x

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
				TPMS	
4.32	Inspect tire and wheel assembly for air loss; perform necessary action	Inspect tire and wheel assembly for air loss; perform necessary action	vehicle service information		x
			Visual inspection of tire check pressure Submerge tire in water looking for bubbles		
4.33	Repair tire using internal patch	Repair tire using internal patch	Repairing a nail hole in a radial tire	Radial Tire	x
				Internal Patch Tire Plug Cold patch Rubber cement Tire buffer	
4.34	Identify and test tire pressure monitoring systems (indirect and direct) for operation; verify operation of instrument panel lamps	Identify and test tire pressure monitoring systems (indirect and direct) for operation; verify operation of instrument panel lamps	Determine Air Pressure use manual specifications		x
			Follow manufacturer's procedures for resetting TPMS light	Scanner	
4.35	Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system	Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system			x

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STANDARD 4.0 – PERFORM SUSPENSION AND STEERING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Follow manufacturer's procedures for removing TPMS sensor		

STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
5.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins	Show where the VIN is found and what it means	VIN	x
			Use various research methods to identify vehicle information, service information, fluid capacities, recalls Decipher a VIN Code		

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
5.2	Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS)	Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS)	Symptom loss of vacuum to the booster Causes red brake warning light on the dash staying on (problem in hydraulic circuit) Cause of dragging brakes ABS warning indicator is on or flashes (system requires service) Safely discharge accumulator pressure in the hydraulic ABS system Using a scan tool related to brakes Wheel speed centers what are they and how do they operate	ABS	x
				Road test	
5.3	Measure brake pedal height, travel, and free play (as applicable); determine necessary action	Measure brake pedal height, travel, and free play (as applicable); determine necessary action	Why is a brake pedal free travel required Symptom: excessive brake pedal travel		x
			Research specs on proper brake pedal height Demonstrate proper procedures on measuring brake pedal height	Brake pedal freeplay Brake pedal height	
5.4	Check master cylinder for external leaks and proper operation	Check master cylinder for external leaks and proper operation	Symptom: Fading brake pedal		x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Other symptom low pedal Visual inspection	Master Cylinder Reservoir	
5.5	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action	Materials that hydraulic Brake lines are made of steel Symptom: Hydraulic brake line leaking how do you repair it		x
			Visual inspection look for damage, kinks,	Flex hose Kinks Flairnut	
5.6	Select, handle, store, and fill brake fluids to proper level	Select, handle, store, and fill brake fluids to proper level	Brake fluid in the eye what do you do		x
			Brake fluid should only be used from a brand new bottle Open brake fluid should not be stored, determine the right way to store it	Brake Fluid Hygroscopic Dot 3 Dot 4 Dot 5	
5.7	Identify components of brake warning light system	Identify components of brake warning light system			x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Identify circumstance that would make the brake warning light illuminate (low fluid, loss of pressure, E brake is on)	brake warning light system E brake switch Pressure differential switch Fluid level sensor	
5.8	Bleed and/or flush brake system	Bleed and/or flush brake system	When is a brake system bled Hydraulic component is replaced Which wheel is bled first on most ABS vehicles? Right Rear How do you perform gravity bleeding non ABS brake system Replace master cylinder Closed System means When do you change hydraulic system fluids		x
				Bleed Flush Gravity Bleed Pedal bleed Vacuum bleed	
5.9	Test brake fluid for contamination	Test brake fluid for contamination			x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Visual inspection look for dark fluid or contaminated fluid Chemical test (test strips)		
5.10	Remove, clean, inspect, and measure brake drum diameter; determine necessary action	Remove, clean, inspect, and measure brake drum diameter; determine necessary action	Symptom Out-of-Round brake drum – What should be done with a lightly scored brake drum	Brake Drum	x
			Proper procedure to measure a brake drum diameter	Minimum Diameter Maximum Diameter Drum Mic Bell Mouth Out of round	
5.11	Refinish brake drum and measure final drum diameter; compare with specifications	Refinish brake drum and measure final drum diameter; compare with specifications	Propose of rubber strap wrapped around the brake drum		x
			Compute math problem on amount of drum left to machine	Brake lathe Vibration dampen	
5.12	Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble	Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble	Duo-Servo drum brakes	Brake shoes Brake springs	x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			The difference between a Duo-Servo and leading trailing system Difference between primary shoe and secondary shoe A symptom if return springs break (dragging brakes, grinding noise, Brakes don't release)	R and R Return springs Hold down spring Star adjuster Division bar E brake lever Primary Shoe Secondary shoe	
5.13	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed	Brake Shoes, piston and wheel Cylinder connections to each other		x
			Visual inspection of leakage Symptom of a sticking wheel cylinder (vehicle pull, wheel lock up)	Wheel Cylinder Piston Cup type seal Boot Honing	
5.14	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments	Describe how and when to adjust self-adjusting brake shoes		x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Proper adjusting brake shoes	Brake shoe calipers Backing plate	
5.15	Install wheel and torque lug nuts	Install wheel and torque lug nuts	STAR Pattern tightening sequence what is it and when is it used Describe when to use torque wrench?	Star (4 way), Torque Socket Impact wrench	x
			Proper installation of lugnuts	Lug nut Torque wrench Torque stick	
5.16	Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action	Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action	Reason to open bleeder screw before compressing the caliper piston (prevent contamination)	Caliper	x
				Piston Dust boot Square cut seal Hone	
5.17	Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action	Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action	Floating caliper brakes When used, what are they Symptom, On the floating caliper disc brakes the inner brake pad is wrong the outer pad is slightly worn		x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
				Sliding caliper Fixed caliper Slide pins Caliper mounting bracket Brake lube Brake clean	
5.18	Remove, inspect, and replace pads and retaining hardware; determine necessary action	Remove, inspect, and replace pads and retaining hardware; determine necessary action			x
			Indication of uneven pad ware Inspection of brake pads to determine necessary action	Brake pads Anti-rattle clips Padware sensor	
5.19	Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks	Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks			x
			Describe what action is taken for squeaky brakes (diagnostic)	Brake pads Anti-rattle clips Padware sensor Lubricate	

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
5.20	Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action	Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action	Dial Indicator used to measure rotor lateral runout	Metric micrometer Feeler Gauge Disc Micrometer	x
			Micrometer used to measure thickness variation Explain how to determine when to replace a rotor (excessive run out, heat cracks or hot spots, rotor under minimum spec)	Rotor Dial indicator Thickness variation Parallelism Runout	
5.21	Remove and reinstall rotor	Remove and reinstall rotor			x
			Before removing a rotor it should be indexed	Disc	
5.22	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications	Replace a rotor		x
			The difference between using a on car brake lathe and bench lathe	On car brake lathe	
5.23	Refinish rotor off vehicle; measure final rotor thickness and compare with specifications	Refinish rotor off vehicle; measure final rotor thickness and compare with specifications			x
			Determine if a rotor should be refinished using specs	Bench lathe Silencer belt	

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
5.24	Retract and re-adjust caliper piston on an integral parking brake system	Retract and re-adjust caliper piston on an integral parking brake system	Symptom Parking brake inoperable		x
			Procedure to push in the piston	integral parking brake system E-Brake caliper adjusting tool	
5.25	Check brake pad wear indicator; determine necessary action	Check brake pad wear indicator; determine necessary action			x
			Explain the purpose of the pad wear indicator		
5.26	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations			x
			Proper brake in procedure of brake pads follow manufacturer recommendation	Burnish	
5.27	Check brake pedal travel with, and without, engine running to verify proper power booster operation	Check brake pedal travel with, and without, engine running to verify proper power booster operation	Booster push rod is too short Cause of excessive pedal effort on a hydraulically assisted booster brake system (high booster pump pressure)		x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Proper procedure to determine if the vacuum booster is working properly	Vacuum booster Push rod Hydro-boost Check valve	
5.28	Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster	Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster	How does a vacuum brake booster multiple force (Manifold vacuum and atmospheric pressure) Process for a vacuum booster function test	Manifold vacuum Atmospheric pressure Auxiliary pump	x
				Vacuum gauge	
5.29	Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings	Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings	Symptom Tapered wheel baring that is pitted Wheel baring identification numbers (how do they face)		x
			During an inspection of wheel bearings how do you determine there is a problem (pitting, scoring/scratches, flat spots)	Pitting Scoring Spindle nut Cotter pin Wheel Seal Bearing grease Bearing preload	

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
5.30	Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed	Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed	Symptom Parking brake pedal handle has excessive travel		x
				Park brake cable Park brake lever/pedal	
5.31	Check parking brake operation and parking brake indicator light system operation; determine necessary action	Check parking brake operation and parking brake indicator light system operation; determine necessary action	Causes of parking brake failure or hold Conditions for brake warning light to illuminate ABS Failure Overfilled reservoir		x
				ABS Illuminate	
5.32	Check operation of brake stop light system	Check operation of brake stop light system	Conditions for brake warning light to illuminate		x
				Brake light Brake stop switch Center high mounted stop light (CHMSL)	
5.33	Replace wheel bearing and race	Replace wheel bearing and race	Describe when to adjust wheel bearing preload Clean a wheel bearing		x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
				Race Preload	
5.34	Identify traction control/vehicle stability control system components	Identify traction control/vehicle stability control system components			x
			Describe the operation of stability/traction control	Wheel speed sensor Tone wheel Control Module stability control system Traction control system Computer input Computer output Solenoids ABS Hydraulic unit Steering angle sensor Yaw sensor	
5.35	Describe the operation of a regenerative braking system	Describe the operation of a regenerative braking system			x

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STANDARD 5.0 – PERFORM BRAKE SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Explain a regenerative braking system	regenerative braking system	

STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
6.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins		Information in Technical service bulletins and service repair manuals		x
			Use various research methods to identify vehicle information, service information, fluid capacities, recalls Decipher a VIN Code		
6.2	Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law)		Purpose if a diode in an electrical system Short is caused by 2 insulated wires melt together Characteristics of a series circuit OHMS Law Formula	Parallel Circuit OHMS Law Formula Current Supply Voltage Total Resistance Circuit amperage	x

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			Schematics of electrical/electronic series		
STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
				Series circuit Ohm Series Parallel	
6.3	Use wiring diagrams to trace electrical/electronic circuits		Math question to determine resistance		x
			Using a wiring diagram identify components	Wiring diagram	
6.4	Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance		Amperage Test for a parasitic drain Testing a circuit for amperage (DVOM is connected in a series)	Amperage Voltage Resistance OHMS DMM DVOM	x
			Proper use of a DMM (hook up, reading data)	Voltage drop Ground Parasitic drain/draw	
6.5	Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits		Symptom Cause and effect one headlamp is dimmer than the other Symptom Intermittent horn operations	Intermittent Dimmer	x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Diagram to indicate causes of electrical problems	Short to ground Short to voltage Open circuit	
6.6	Check operation of electrical circuits with a test light		Self-Powered test light test continuity between 2 ends of the same wire		x
				Test light Continuity	
6.7	Check operation of electrical circuits with fused jumper wires		A fused jumper wire is used to test headlamp or tale lamp		x
			Jumper wires are used to by-pass relays and switches	Fused jumper wires Relay	
6.8	Measure key-off battery drain (parasitic draw)		Symptom Cause of battery going dead overnight Parasitic draw	Parasitic draw	x
			What is an acceptable range for parasitic draw		
6.9	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action				x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Identify types of fuses Identify characteristics of a bad fusible link or circuit breaker? Describe the purpose of a fuse or breaker	Fusible link Circuit breaker Fuse Mini fuse Maxi fuse Glass bulb fuse	
6.10	Perform solder repair of electrical wiring		Best method to repair a broken wire solder with shrink tubing		x
				Solder Soldering iron Rosin Core Heat shrink/Shrink Tubing Electrical Tape	
6.11	Replace electrical connectors and terminal ends		Sized wire used with a yellow insulated crimped connector Color butt connector used with 14-16 gauge wire blue Blower motor repair when to cut off or hardwire the electrical connector Identify colors of wire and uses		x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			When using terminal ends to repair wires what should be considered (tight connection, not too much loss of insulation, correct size connector for the wire)	Butt Connector Wire stripper Crimping tool	
6.12	Perform battery state-of-charge test; determine necessary action		What would the open circuit voltage be on a fully charged battery 12.6 volts		x
				State-of-charge test	
6.13	Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action		Where the clamp is placed to set up a battery load test (tester cable)		x
			A battery load tests indicates it is under specification, what is the next step in the diagnostic process (recharge and test again)	Capacity test Load test Cold cranking amps CCA	
6.14	Maintain or restore electronic memory functions		What do you do in a loss of preset stations in a vehicle?		x
				electronic memory functions preset stations Memory saver	

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
6.15	Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold downs		Symptom Vehicle has slow or no crank condition	Electrolyte mixture of sulfuric acid and water in a battery	x
			Identify routine maintenance of a battery (clamps, terminals, electrolight)	Distilled water Hydrometer Baking soda/Sodium bicarbonate Battery terminal cleaner Battery hold down	
6.16	Perform slow/fast battery charge according to manufacturer's recommendations		Explain what determines charge rate and time when changing a battery (state of charge and type of battery)		x
				Slow charge Fast charge Battery charger Trickle charger	
6.17	Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply		Steps to jump start a vehicle		x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Proper steps to hook up battery cables	Jump start Jumper cables Booster battery pack Auxiliary	
6.18	Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions		Conductor color that represents high voltage in a hybrid vehicle (orange)		x
				Hybrid	
6.19	Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery		Identify what accessory requires a manual reset (Radio or Clock) BCM - What is it and when to use to trouble shoot problems	BCM	x
				Modules Trouble shoot Reinitialize Body control module BCM	
6.20	Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures		Explain why a 12 volt battery would be used in a hybrid		x
			In a hybrid vehicle there are two types of batteries what is the purpose of the auxiliary battery	Auxiliary battery	

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
6.21	Perform starter current draw test; determine necessary action		Draw test how to perform Symptom Slow crank condition (Low battery bad starter engine problem)	Starter	x
			Properly perform a current draw test What is the acceptable range of amperage draw on a starter	Current draw test	
6.22	Perform starter circuit voltage drop tests; determine necessary action	Perform starter circuit voltage drop tests; determine necessary action	Schematic of volt meter read it	Volt Meter	x
			Diagram of voltage drop on the positive battery cable what is the next step		
6.23	Inspect and test starter relays and solenoids; determine necessary action	Inspect and test starter relays and solenoids; determine necessary action	Pull-in winding as it relates to test starter relays		x
			Demonstrate how to test a relay Demonstrate how to jumpstart the starter solenoid	Starter solenoid	
6.24	Remove and install starter in a vehicle	Remove and install starter in a vehicle	First step in replacing a starter and steps thereafter		x
				Shims	

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
6.25	Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action	Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action	Symptom Side door lock switch will not operate on one side Schematic jumper terminals are to be used to bypass the starting circuit		x
			How is continuity of the wires tested in the starting system?		
6.26	Perform charging system output test; determine necessary action	Perform charging system output test; determine necessary action	What the first thing to do to perform a charging system output test (check battery condition)		x
			What is the acceptable output of an alternator (13 -14 volts)	Alternator Charging Output	
6.27	Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment	Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment	Correct charging voltage of the alternator is working 14 V 6.26 Symptom a loose belt what causes it and what problem could it cause		x
				Generator	
6.28	Remove, inspect, and re-install generator (alternator)	Remove, inspect, and re-install generator (alternator)	Steps in disconnecting an alternator Scenario		x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
6.29	Perform charging circuit voltage drop tests; determine necessary action	Perform charging circuit voltage drop tests; determine necessary action	Lowest acceptable voltage when load testing a battery 9.6 Meter reading- standard vs. non standard	Volts Voltage drop test	x
			How is a volt drop detected in the charging circuit	Charging circuit	
6.30	Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed	Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed	When do you aim the lights of the vehicle Scenario Impact of skin oils on a light on a bulb Signal bulb out how it effects turn signal operation	Sockets	x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			A broken filament effects the circuit of a light bulb in what way	Auxiliary lights Interior lamps Exterior lamps Fog light Dome light Headlight Turn signal/flasher Turn signal switch Headlight switch Hazard lights Dimmer switch Multi-function switch Reverse lights High Beams Daytime running lights Parking lights Filament	
6.31	Aim headlights	Aim headlights	When do you aim the lights of the vehicle Scenario		x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
				Aim	
6.32	Identify system voltage and safety precautions associated with high-intensity discharge headlights	Identify system voltage and safety precautions associated with high-intensity discharge headlights			x
			Manufacturer's specifications	High intensity discharge HID	
6.33	Disable and enable airbag system for vehicle service; verify indicator lamp operation	Disable and enable airbag system for vehicle service; verify indicator lamp operation	What color wire is SRS associated with on a steering column yellow	SRS	x
6.34	Remove and reinstall door panel	Remove and reinstall door panel			x
			Follow manufacturers specifications for proper removal due to the variety	Door panel	
6.35	Describe the operation of keyless entry/remote-start systems	Describe the operation of keyless entry/remote-start systems	What cause an electrical door lock inoperable (defective switch) What cause rear doors to not open from the inside (child safety locks)		x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Describe the operation of keyless entry and remote entry system (radio frequency)	Child safety locks Remote start systems Keyless entry Inoperable Defective Door lock actuator Key fob	
6.36	Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators	Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators	First step in diagnosing and inoperable fuel gauge consult the service information Visual signs on an electrical circuit board that indicate problems (burnt or discolored marks) What may activate the SRS warning light restraint system open circuit What might cause a fuel gauge to be inoperable worn float potentiometer		x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Resetting maintenance indicators see manufacturer's recommendation	Potentiometer Panel gauges Maintenance light Fuel light Tachometer Speedometer Temperature gauge Oil pressure gauge Fuel gauge Transmission temperature gauge Trip	
6.37	Verify windshield wiper and washer operation; replace wiper blades	Verify windshield wiper and washer operation; replace wiper blades	Reason a windshield wiper won't turn on dead battery ignition switch off blown fuse Symptom low windshield washer pressure		x

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STANDARD 6.0 – PERFORM ELECTRICAL / ELECTRONIC SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Causes of washer not spraying (clogged tube, broken hose, bad motor) Procedure for changing wiper blades	Windshield wiper Windshield wiper motor Windshield wiper blade Washer fluid Washer motor Washer reservoir Windshield wiper switch	

STANDARD 7.0 – PERFORM HEATING AND AIR CONDITIONING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
7.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins			x
			Use various research methods to identify vehicle information, service information, fluid capacities, recalls Decipher a VIN Code		

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STANDARD 7.0 – PERFORM HEATING AND AIR CONDITIONING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
7.2	Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action	Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action			x
			Symptom a lose belt what causes it and what problem could it cause		
7.3	Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions	Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions			x
			Identify the type of system a hybrid uses to produce A/C		
7.4	Inspect A/C condenser for airflow restrictions; determine necessary action	Inspect A/C condenser for airflow restrictions; determine necessary action			x
			Visual inspection of the A/C condenser (bugs, leaves, dirt) What happens with a clogged condenser (no cold air)	Condenser Low speed fan High speed fan Air flow	
7.5	Inspect engine cooling and heater systems hoses; perform necessary action	Inspect engine cooling and heater systems hoses; perform necessary action			x

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STANDARD 7.0 – PERFORM HEATING AND AIR CONDITIONING SYSTEM SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Visual inspection of hoses for leaks, cracks tares)	Heater hoses Radiator hoses Clamps Coolant	
7.6	Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; perform necessary action	Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; perform necessary action			x
			Describe the operation of the mode door, blend door, recirculation door What is the result of a clogged cabin filter (dust order, low air flow)	Cabin air filter Outlets Ducts Blend door actuator Mode door actuator Panel Defrost Floor vent Recirculation door Condensation drain	
7.7	Identify the source of A/C system odors	Identify the source of A/C system odors			x
			Explain the result of a clog in the condensation drain (mildew smell, sloshing water, water on floorboard)		

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STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
8.1	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins	8th digit of the Vin number the engine size technical step by step diagnostic can be found Mitchell-on-demand and the service information		x
			Use various research methods to identify vehicle information, service information, fluid capacities, recalls Decipher a VIN Code		
8.2	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action	Explain when and how do you perform a vacuum leak test Symptom Intake manifold vacuum reading that fluctuates 10 to 17 inches of the vacuum what causes it Burned valve	Manifold	x
				Vacuum Vacuum gauge Fluctuate	

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STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
8.3	Perform cylinder power balance test; determine necessary action	Perform cylinder power balance test; determine necessary action	Explain what indicates a bad cylinder (no change in the RPM) Explain what a Power Balance Test identifies - Weak or dead cylinder Symptom one cylinder shows a shorter than normal firing spike spark plug	Revolution per minute (RPM)	x
				Cylinder balance test	
8.4	Perform cylinder cranking and running compression tests; determine necessary action	Perform cylinder cranking and running compression tests; determine necessary action	Symptom Engine failed a compression test (out of time, camshaft, burned valve, blown head gasket) What is a “wet” Compression test, how and when Cranking Compression test when, how why		x

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STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
				Compression Compression gauge Wet Compression test Dry Compression test Head gasket Running compression test	
8.5	Perform cylinder leakage test; determine necessary action	Perform cylinder leakage test; determine necessary action	Where must the piston be located (TDC Compression Stroke) Cylinder leakage test can identify what problems	TDC	x
				Cylinder leakage Cylinder leakage tester Compression stroke	

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STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
8.6	Verify engine operating temperature	Verify engine operating temperature	When performing an emission test what sound the engine temperature be (operating temperature) A lean misfire cause an increase in what gasses 0_2 and HC Cause of engine over heating Condition causes engine code "*coolant temperature too low"* Stuck open thermostat Thermostat rating problem Coolant fan Tool used to check coolant Temperature	Inferred thermometer Scan tool	x
				Temperature gauge Engine coolant temperature sensor	

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STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
8.7	Remove and replace spark plugs; inspect secondary ignition components for wear and damage	Remove and replace spark plugs; inspect secondary ignition components for wear and damage	Process for checking spark on a distributor less ignition Cause of a no spark condition (loss of crank shaft positions Symptom Spark at the coil but no spark out of the distributor cap (bad rotor, bad distributor cap) Cause of bad spark plugs lack of power, hard starting and misfiring	Distributor cap Misfiring	x
			Identify types of spark plugs Describe the problems that occur in the secondary ignition	Secondary ignition Secondary windings Coil wire Rotor Spark plug wires Spark plugs Ignition coil Spark plug gap Iridium Platinum Copper core	

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STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
8.8	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable	Correct procedures for clearing OBDII trouble codes scan tool What is the ideal air fuel ratio at which the engine provides best immersions (Stoichiometer) What cause a PCM module communication error (blown fuse) How do you connect a scan tool to a vehicle (use a data link connector)	Stoichiometer	x
			What is the purpose of freeze frame data (to see what engine conditions were happening at the time of the fault) What are examples of engine monitors (fuels system monitor, catalyst, evap monitor)	Scanner Scan tool Power train control Module PCM Electronic control unit ECU Diagnostic trouble code DTC Malfunction Indicator light MIL	

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				Date Link Connector DLC On board diagnostic II OBDII Freeze frame data Monitors Communication Module Vehicle communication interface VCI	
STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
8.9	Describe the importance of operating all OBDII monitors for repair verification	Describe the importance of operating all OBDII monitors for repair verification			x
			What is the purpose of having OBDII monitors?	Verification	
8.10	Replace fuel filter(s)	Replace fuel filter(s)	Step to replace a fuel filter		x
			How do you know it is time to replace a fuel filter (service manual, lack of power)	Fuel filter Fuel pressure Disconnect tool	
8.11	Inspect, service, or replace air filters, filter housings, and intake duct work	Inspect, service, or replace air filters, filter housings, and intake duct work			x

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STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Identify steps to replace air filter Signs that an filter should be replaced (dirt, debris, rich coat)	Air filter	
8.12	Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action	Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action	Procedure use to check plugged catalytic converter (loosen exhaust components, measure the engine vacuum, measure engine back pressure)	Catalytic converter Exhaust Heat shields	x
			Explain the purpose of a catalytic converter Identify procedures for finding leaks in the exhaust system (listen, look, feel)	Resonator Tail pipe Exhaust manifold Muffler Integrity Exhaust hangers	
8.13	Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed	Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed	Perform an exhaust back pressure test remove the oxygen sensor Symptom A turbocharged vehicle has low power output what do you do check operation of wastegate and check the intake system for restriction		x

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STANDARD 8.0 – PERORM ENGINE PERFORMANCE SERVICES					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			How is loose exhaust corrected Identify an exhaust leak		
8.14	Check and refill diesel exhaust fluid (DEF)	Check and refill diesel exhaust fluid (DEF)			x
			Identify the purpose of DEF	Diesel exhaust Fluid DE	
8.15	Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action	Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action	Test a PCV for proper operation (remove and shake, check for vacuum at the valve)		x
			Describe the purpose of the PCV system (help vent the crankcase)	positive crankcase ventilation PCV PCV valve Blowby Crank case Hydrocarbons Carbon monoxide Oxides of nitrogen Intake Vacuum	

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STANDARD 9.0 – PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
9.1	Identify general shop safety rules and procedures	Identify general shop safety rules and procedures	Describe why and what it means to lock out equipment		x
			Describe the procedure for reporting injuries		
9.2	Utilize safe procedures for handling of tools and equipment	Utilize safe procedures for handling of tools and equipment			x
			Only use tools and equipment that have been demonstrated and tested off by the instructor.		
9.3	Identify and use proper placement of floor jacks and jack stands	Identify and use proper placement of floor jacks and jack stands			x
			Practice lifting a car using a floor jack Identify the proper placement of floor jacks and jack stand	Floor jack Jack stands	
9.4	Identify and use proper procedures for safe lift operation	Identify and use proper procedures for safe lift operation			x
			Proper procedure for safely lifting a vehicle	Hoist Lift Drive on lift/hoist	
9.5	Utilize proper ventilation procedures for working within the lab/shop area	Utilize proper ventilation procedures for working within the lab/shop area			x
			When would a shop need to be ventilated (carbon monoxide)	Ventilation	

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STANDARD 9.0 – PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
9.6	Identify marked safety areas	Identify marked safety areas			x
			Yellow marks are walkways Red marks are danger areas		
9.7	Identify the location and the types of fire extinguishers and other fire safety equipment		Describe the different types of fire extinguishers	Fire blanket Fire extinguisher (ABC)	x
9.8	Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment	Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment			x
			Describe how to use a fire extinguisher Describe how to use a fire blanket		
9.9	Identify the location and use of eye wash stations	Identify the location and use of eye wash stations			x
			Describe the purpose of an eye wash station	Eye was station	
9.10	Identify the location of the posted evacuation routes				x
			Describe the purpose of an evacuation route	Evacuation route	
9.11	Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities	Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities			x

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STANDARD 9.0 – PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
			Describe the implication of not practicing proper safety procedures (eye damage, cuts, Abrasions, hearing impairment, burns)	PPEs	
9.12	Identify and wear appropriate clothing for lab/shop activities	Identify and wear appropriate clothing for lab/shop activities			x
			Describe appropriate clothing for the lab (closed toe shoes, no loose clothing)		
9.13	Secure hair and jewelry for lab/shop activities	Secure hair and jewelry for lab/shop activities			x
			Describe the importance of having hair tied back Describe the importance of not wearing jewelry		
9.14	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits			x
			Describe why is important to disable an airbag properly Why follow manufacturer procedures for disabling high voltage hybrid circuits		

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STANDARD 9.0 – PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
9.15	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.)	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.)			x
			Describe why is important to properly depressurize a fuel injection system		
9.16	Locate and demonstrate knowledge of material safety data sheets (MSDS)	Locate and demonstrate knowledge of material safety data sheets (MSDS)	Explain what an SDS contains		x
			Read and interpret an MSD sheet		
9.17	Identify tools and their usage in automotive applications	Identify tools and their usage in automotive applications			x
				Pry bar Brass hammer Impact sockets	
9.18	Identify standard and metric designation	Identify standard and metric designation			x
			Convert standard to metric and metric to standard mathematically Differentiate what type of measurement is used for a particular vehicle	Metric measurement Standard measurement	

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STANDARD 9.0 – PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS					
Measurement Criteria		**Concepts**	**Implementation**	**Terminology**	**Testing Item**
9.19	Demonstrate safe handling and use of appropriate tools	Demonstrate safe handling and use of appropriate tools			x
			Select the appropriate tool for the job		
9.20	Demonstrate proper cleaning, storage, and maintenance of tools and equipment	Demonstrate proper cleaning, storage, and maintenance of tools and equipment			x
			Describe why is important to clean tools Describe why is it important to return tool to their appropriate storage place		
9.21	Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper)	Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper)			x
			Read a micrometer Proper handling of micrometer and dial-indicator		
9.22	Identify information needed and the service requested on a repair order	Identify information needed and the service requested on a repair order			x
			Read and interpret a work order	Repair order Work order	
9.23	Identify purpose and demonstrate proper use of fender covers, mats				x
STANDARD 9.0 – PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS					

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Measurement Criteria		Concepts	Implementation	Terminology	Testing Item
			Describe the purpose of using fender covers and mats Describe how you maintain a clean car for the customer		
9.24	Demonstrate use of the three C's (concern, cause, and correction)	Demonstrate use of the three C's (concern, cause, and correction			x
			What are the three c's? Scenario		
9.25	Review vehicle service history	Review vehicle service history			x
			Describe why it is important to know the vehicle service history of a car		
9.26	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction			x
			Complete a work order Identify parts of a work order		
9.27	Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.)	Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.)			x
STANDARD 9.0 – PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS					

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Measurement Criteria		Concepts	Implementation	Terminology	Testing Item
			Describe what should be done to the car before returning to the customer (car washed, no fingerprints, Steering wheel clean, radio station off)		

Technology

A

ABS: Anti-lock brake system; an electrical-mechanical computerized brake system to prevent wheel lockup during hard braking so that the driver does not lose control of steering

ABS Hydraulic unit: A part in the brake system that may consist of valves and solenoids to isolate wheel brake units to prevent wheel lockup under hard braking. May or may not also house the computer circuit to operate valves and solenoids

Aim: To point or direct as in adjusting headlights

Air bags: The inflatable component of the SRS (supplemental restraint system) that may be housed in the steering wheel crash pad, dash, seats or pillars

Air filter: A filter commonly made of pleated paper tp filter the air coming into the engine through the intake system

Air flow: The passage of air which moves around an object (esp. a vehicle) or through an air duct (e.g., ventilation system or exhaust system)

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Alignment: When referring to wheel alignment, it is the proper adjustment of a vehicle's front or rear suspension for camber, toe-in, toe-out, kingpin inclination or steering axis inclination, and turning radius or toe-out on turns, caster, and ride height. Four-wheel alignment is necessary for front-wheel drive vehicles

Alternator: A device which produces **AC** by converting the engine's turning (mechanical) energy into alternating electrical current at all engine speeds. The AC must be rectified (converted from AC to DC) by using diodes before reaching the vehicle's electrical system

Amperage: The strength of an electric current in amperes. Electron or current flow of one coulomb per second past a given point in circuit

Anti-rattle clips: A device that attaches to disc brake pads to keep them from making a rattle noise when the brakes are not applied

API: Abbreviation for American Petroleum Institute, the organization that classifies oil

ATF: Abbreviation for Automatic Transmission Fluid The fluid used for lubricating and cooling an automatic transmission

Atmospheric pressure: The force due to atmosphere per unit area Atmospheric pressure at sea level is 147 psi absolute; it decreases as altitude increases

Auxiliary: Additionally, supplementary Equipment or component that is added to the main propulsion unit

Auxiliary battery: An additional battery that may be used to power a separate load such as a stereo or camper

Auxiliary lights: Extra illumination device such as fog lights, spot light, and driving lights which are intended to improve visibility under adverse conditions

Auxiliary pump: Supplementary pump whether it be for air, water, fuel or another fluid

Axle seals: Seals that contact between the axle and axle housing to prevent loss of lubricating fluid

B

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Backing plate: The part of a drum brake to which the wheel cylinder(s) and the brake shoes are attached

Baking soda/Sodium bicarbonate: A compound when mixed with water is used to neutralize battery acid

Ball joints: A flexible Joint using a ball and Socket type of construction, used in Steering linkage setups, steering knuckle pivot supports, etc Their flexibility helps to compensate for the changes in the wheel and steering when turning or hitting a bump on the road There are usually upper and lower ball joints attached to the upper and lower A-arms

Battery charger: An electric device which is plugged into an electrical outlet (eg, 110 volt AC) and connected to the two terminals of the battery to restore the state of charge in the battery

Battery hold down: A hold down device which secures the battery from moving around

Battery pack: A device that houses multiple batteries to be used together in a single unit

Battery terminal cleaner: A specially designed brush set which cleans the outside terminals of the battery post as well as the inside of the battery cable so that good contact is made

BCM: Abbreviation for Body Control Module Key element of self-diagnostic system used to control vehicle functions based on monitored inputs especially those not related to engine or transmission control

Bearing: The area of a unit in which the contacting surface of a revolving part rests in order to minimize wear and friction between two surfaces

Bearing grease: A Lubricant (made from oil and metallic soaps) which reduces the friction between moving pieces of metal and also prevents moisture from causing metal to rust

Bearing preload: Amount of static pressure exerted on a bearing or a set of bearings The preload is usually adjusted by a threaded collar or shims

Bell Mouth: A form of brake drum distortion in which the open edge of the drum has a large diameter than the closed edge

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Bellows boots: A sealed, accordion-type chamber (gas filled or vacuum) which expands and contracts in accordance with temperature changes or provides a seal during movement of parts

Bench lathe: The machine used to resurface the friction surfaces of brake discs or drums

Bleed: To remove air bubbles from hydraulic lines and components of a system

Blend door actuator: An electrical mechanism for moving or controlling something indirectly instead of by hand, such as the blend door in the HVAC system The output device that the PCM controls

Body control module BCM: See BCM

Bolt grade: The strength factor of a fastener (ie, nuts and bolts)

Booster battery pack: Devices used to jump start a vehicle when the battery has insufficient power to crank the engine

Boot: A flexible rubber or plastic cover used to protect against water and dirt

Bottom Dead Center BDC: The lowest point of the piston and Connecting rod travel in a cylinder

Brackets: A support device which is often a right-angled shape or triangle shape designed to support or mount something

Brake clean: Typically an aerosol product designed to clean brake pads or shoes of grease or dirt

Brake Drum: A Cast iron or Aluminum Housing bolted to the wheel, that rotates around the brake shoes

Brake Fluid: A special fluid used in Hydraulic brake systems to stop or slow the vehicle

Brake lathe: A machine used to refinish brake drums and disc brake rotors

Brake light: A red light at the rear of the vehicle which is activated when the brakes are applied

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Brake lube: A specialized high-heat lubricant used in the assembly of brakes

Brake pads: The friction material or lining which is secured to metal plates They press against the Brake disc or rotor to enable the wheel to stop

Brake pedal free play: The amount of travel before any action takes place In a brake pedal, it is the distance the pedal moves before the pistons in the master cylinder are actuated

Brake pedal height: A distance measured from a point on the body or dash to the brake pedal to determine proper adjustment

Brake shoe calipers: Maybe should be brake pad calipers otherwise I am not sure what these are The device in a disc brake that converts hydraulic pressure back into the mechanical force used to apply the brake pads against the rotor

Brake shoes: That part of the brake system, located at the wheels, upon which the Brake lining is attached There are usually two shoes (curved or arc-shaped pieces) in each wheel When the wheel cylinders are actuated by hydraulic pressure they force the brake shoes apart and bring the lining into contact with the Brake drum In this way the vehicle is slowed or stopped

Brake springs: A spring which is attached to the two brake shoes After the brake is applied, this spring pulls the shoes away from the drum

Brake stop switch: A switch which completes the electrical circuit to the stop lamp(s) when the brake(s) is (are) applied

Brake warning light system: An indicator light on the instrument panel which indicates problems such as low fluid level in the brake fluid reservoir, a malfunction in any of the hydraulic brake circuits, or excessive wear of the brake pads or shoes It also illuminates when the parkbrake is applied When the ignition is first started, the light will illuminate momentarily to show that the light is working

Brass hammer: A hammer with a brass head which is used to pound steel pins etc into place without damaging them because the brass head is softer than steel

Burnish: The process of breaking-in new brake pads or shoes so the linings conform to the disc or drum friction surfaces

Bushings: A protective liner or sleeve that cushions noise, friction, or movement; suspension bushings are often made from two pipes (one inside the other) with a sleeve of rubber in the space between the two pipes

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Butt Connector: A solderless wire connector used to permanently join two wire ends together

C

Cabin air filter: A device that removes contaminants from external air entering the ventilation system

Caliper: See Brake shoe calipers

Caliper mounting bracket: The component that connects a brake caliper to the steering knuckle, hub carrier, or rear axle

Camber: A wheel Alignment adjustment of the inward or outward tilt on the top of the wheel when viewed from the front of the vehicle

Campaign: Possibly recall notice; A notice by a manufacturer to the owners of a defective/unsafe vehicle or vehicle component (as well as dealers) that a recall has occurred

Camshaft: A shaft with Cam lobes (bumps) which is driven by gears, a belt, or a Chain from the crankshaft The lobes push on the Valve lifters to cause the valves to open and close The camshaft turns at half the speed of the crankshaft

Capacity test: In terms of a battery, a test to determine how many CCA's a battery has

Carbon monoxide: A "greenhouse gas" that is a byproduct of the combustion of fossil fuels and that consists of a single carbon atom bonded to a single oxygen atom

Catalytic converter: A canister in the exhaust system, usually situated before the muffler, containing a substance that reacts chemically with the exhaust in order to reduce harmful emissions

Catch pan: A pit or low mounted container into which liquid is drained

Center high mounted stop light (CHMSL): Third brake light mounted in the middle of the rear window or on some cars integrated in the trailing edge of the rear deck spoiler

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Center pin/bolt: The individual leafs are held together by a center bolt that passes through a hole in the center of each leaf It is also used to locate the axle on the spring

Centerlink: A central steering link that connects the pitman arm to the idler arm

Charging: The action of passing an electric current through a battery to restore it to the active (charged) state

Charging circuit: A system that, using a Fan belt driven by the engine, enables the Alternator (or Generator) to generate electrical current, which is stored in the battery and delivered to the electrically operated parts of the vehicle

Check Engine/MIL: A light on the instrument panel which is illuminated when one of the engine sensors or components does not function properly

Check valve: A one-way, in-line spring-loaded ball or piston valve that permits flow of liquids or gases in one direction only and closes to prevent passage in the opposite direction

Child safety locks: On the rear doors of a car, a specially designed locking device can be set to normal or to childproof When set to childproof, the door cannot be opened from the inside

Circuit: A source of electricity (battery), a resistance unit (headlight, etc) and wires that form a path for the flow of electricity from the source through the unit and back to the source The path of electrical current through an Electrical system

Circuit amperage: The amount of amperage flowing through the circuit

Circuit breaker: A protective device that will make and break the flow of electric current when current draw becomes excessive or overloaded Unlike the fuse, it does not blow out but vibrates on and off thus giving the driver some light to stop by

Clamps: A fastening device which secures something within its jaws without constant human pressure

Clip on weights: A wheel weight that is clipped on the rim between the rim and the tire It is used to balance a wheel

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Clutch master cylinder: In a manual-transmission vehicle with a hydraulically actuated clutch, a small-bore hydraulic cylinder mechanically connected to the clutch pedal that actuates a slave cylinder, which in turn actuates the clutch fork that disengages the clutch when the clutch pedal is depressed

Coil Springs: A section of spring steel rod wound in a spiral pattern or shape Widely used in both Front and Rear suspension systems

Coil wire: The high tension wire going from the coil to the distributor or spark plug

Cold cranking amps CCA: Measurement of cranking amperes a battery can deliver over a period of 30 seconds at 0°F (-18°C)

Cold patch: The added part used to repair a component, eg, a rubber disc glued to a tube to cover a nail hole

Communication: The continuous flow of information between computers and sensors and outputs

Compression: Increased pressure caused as volume is reduced Also movement of suspension components against spring pressure caused by a force against wheel

Compression gauge: Instrument used to measure positive pressures (pressures above atmospheric pressures) only

Compression stroke: The second stroke of the Four-stroke cycle, in which the piston moves upward from Bottom dead center to Top dead center, compressing the fuel-air mixture

Computer input: Signals from sensors, switches, or solenoids sent to a powertrain control module describing the operational state or condition of those devices at a particular moment

Computer output: Signals sent from a powertrain control module to actuators, relays, or solenoids to control the operations of those devices

Condensation drain: A drain in the HVAC system provided to drain the liquid formed by the cooling of the refrigerant back to its liquid state

Condenser: 1) The unit in an air conditioning system that cools the hot compressed refrigerant and turns it from a vapor into a liquid 2) Electrical device made of dry metal and dry insulation; used to store electrons

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Continuity: A continuous path for the flow of an electrical current

Control Arm: A metal Strut on the suspension which is located at the top and bottom of the wheel spindle The upper and lower control arms allow the front wheels to change direction

Control Module: An electronics module or a computer that receives input from various sensors to determine the operating condition of the related components at a particular moment The module or computer responds to these signal inputs by sending signals to various controls to meet predetermined operating instructions for basic operation of the system

Conventional Oil: A petroleum based oil

Coolant: Also known as "antifreeze" A mixture of water and ethylene glycol that has both a higher boiling point and a lower freezing point than plain water

Coolant dye: Coloring agent added to aid in the locating of leaks

Coolant/antifreeze: See coolant

Cooling lines: A tube or hose that provides a path from the unit to the cooling device

Copper core: The center electrode of a spark plug or the center wires of a high tension wire which is made of copper

Cork gasket: A material made of cork placed between two metal parts to insure proper sealing

Cotter pin: A fastener shaped like a pin, but split up the center After it is inserted, the legs are bent around the item containing the hole A length of wire which is folded almost in half and the bend forms an eye

Crank case: The lower part of the engine that surrounds the crankshaft It contains the crankshaft, piston cylinders, connecting rods and other moving parts of the engine

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Crankshaft: A main rotating shaft running the length of the engine The crankshaft is supported by main bearings Portions of the shaft are offset to form throws to which the connecting rods are attached As the pistons move up and down, the connecting rods move the crankshaft around The turning motion of the crankshaft is transmitted to the transmission and eventually to the driving wheels

Crimping tool: A tool which looks like pliers with serrated jaws which are used to attach fittings to the end of an electrical wire

Cup type seal: A circular rubber seal with a depressed center surrounded by a raised sealing lip Cup seals can contain high pressure in one direction, but do not seal in the other

Cupping: Cups or scalloped dips appearing around the edge of the tread on one side or the other, almost always indicate worn (sometimes bent) suspension parts

Current: See amperage

Current draw test: A test by which the maximum electrical current is measured

CV joints: A type of Universal joint so designed as to create a smooth transfer of torque from the driven shaft to the driving shaft without any fluctuations in the speed of the driven shaft

CVT Continuously variable transmission: A transmission with a continuously variable drive ratio (as opposed to conventionally stepped gear ratios) that maintains a steady acceleration curve with no pauses for gear changes

Cylinder balance test: A cylinder power balance test is performed to locate the cylinder causing a lack of power and not contributing to the engine's balance and performance

Cylinder leakage: A term used to describe the amount of air that leaks out of the combustion chamber during the compression stroke

Cylinder leakage tester: A leak-down tester is a measuring instrument used to determine the condition of internal combustion engines by introducing compressed air into the cylinder and measuring the rate at which it leaks out

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D

Date Link Connector DLC: A scan tool connector provided by the manufacturer to allow the technician to access the vehicle computer system

Daytime running lights: A safety-oriented lighting system in which the headlights or other front lights are constantly on even during the day They help to prevent possible accidents because oncoming traffic can be seen

Defective: A description of a component which is faulty or flawed

Defrost: The action of removing frost from the inside of a window or the outside of a mirror by means of blowing air or heated wires imbedded in the glass

Diagnostic trouble code (DTC) - code stored inside the vehicles computer that tells the technician the exact component that is faulty

Dial indicator- measuring tool used to check small clearances up to 001", clearance is read on a dial

Diameter- straight line passing through the center of a circle with the end points on circle

Diesel exhaust fluid (DEF) - a non-hazardous solution which is 32% urea and 67% water, sprayed into the exhaust stream it breaks down dangerous NOX emissions into harmless nitrogen and water

Dif cover- covers the differential gear in an axle housing

Differential- a gear assembly that transmits power from the drive shaft to the wheels, also allows vehicle to corner without dragging one wheel

Differential cover- covers the differential gear in axle housing

Differential housing- housing the differential gears which allow wheels to turn at different rates while turning

Dimmer- person or thing that dims

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Dimmer switch- switch in the headlight circuit used to switch electricity between low and high

Dip stick- rod used to measure oil leak

Disc- a parallel- faced rotating component of a disc brake system acted upon by brake pads to slow or stop the vehicle, AKA rotor

Disc micrometer- for measuring thickness of various parts

Disconnect tool- tool used to disconnect fuel lines

Dismount- remove tire from wheel

Distilled water- involves boiling water then condensing the stream to produce clean water

Distributor cap- covers the top of the distributor protecting the rotor and ignition parts, distributes electricity through plug wires

Division bar- a strip of metal separating and holding windows

DMM- digital multi meter

Dome light- small light under the roof of an automobile

Door lock actuator- little motor that moves the lock up and down inside your door when you hit the lock/unlock button

Door panel- Trim panel inside a door designed to help insulate and improve the comfort level in the cabin of a vehicle

Dot 3- glycol-ether based brake fluid with a dry boiling point of 401 degrees

Dot 4- Same make up as dot3 but with a higher boiling point

Dot 5- silicone based, will not absorb water

Drain plug- removable plug for holding liquid in a container

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Drive axle- transmits power from the transmission to the wheels

Drive on lift/hoist- designed to raise car safely off the floor

Drum mic- micrometer used to measure brake drums

Dry compression test- a standard test used to determine the condition of an internal combustion engine

Dry rotting- the degrading of a material due to exposure to extremes

Ducts- a channel or tube deigned to deliver or remove air

Dust boot- a cover for a universal joint

DVOM- electronic measuring instrument that combines several functions Amp meter, ohm meter, voltmeter

Dynamic imbalance- occurs when there is unequal weight on both sides of the tires and wheels centerline

E

E brake level- a rigid hand brake

E brake switch- breaks an electric circuit to warn that E brake is applied

Easy out- tool to remove broken fasteners

E-brake caliper adjusting tool- tool used to reset E brake caliper piston

Electric motor- machine that converts electrical energy to mechanical energy

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Electric power-assisted steering- uses an electric motor to assist the driver, sensors detect the position and torque of the steering column and applies torque via the motor attached to either the steering gear or column

Electric solenoid- current used to convert electrical energy to mechanical energy

Electrical tape- tape used to insulate electrical wires that conduct electricity

Electrolyte mixture of sulfuric acid and water in a battery- electrolic conductor, a conducting medium in which the flow of current is accompanied by the movement of matter in the form of ions

Electronic control unit (ECU) - controls one or more of the electrical systems in a car

Electronic memory functions-

Engine- power source that propels a vehicle

Engine coolant temperature sensor- used to measure the temperature of the engine coolant in an internal combustion engine

Engine oil- used to lubricate the moving parts in an internal combustion engine

Evacuation route- predetermined emergency evacuation plan

Exhaust- spent fuel, by product of burning fuel

Exhaust hangers- exhaust system supports

Exhaust manifold- parts used to channel exhaust away from engine

Exterior lamps- used to make vehicle visible at night

Eye wash station- used to flush contaminants from face and eyes

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F

Fast charge- charging a battery using a higher rate of Amperes

Feather edges- Edges are tapered to feel smooth

Feeler gauge- used to measure small gaps

Filament- thin wire in a light bulb that glows when electricity passes through it

Fill plug- a part used to fill the hole designed to add lubrication

Fire blanket- blanket of fireproof material used to smother small fires

Fire extinguisher- fire protection device used to extinguish or control small fires

Fixed caliper- caliper with opposing pistons both inboard and outboard

Flair nut- nut designed to fasten the end of tubing

Flex hose- a flexible pipe for conveying liquid or gas

Floor jack- a tool designed to help lift a car or other objects off the floor

Fluctuate- to shift back and forth uncertainly

Fluid level sensor- designed to measure the fluid in a container

Flush- to cleanse by rushing large amounts of fluid through something

Fog light- head light designed to penetrate fog

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Freeze frame data- a record of engine conditions when a malfunction is detected

Fuel filter- filters impurities from fuel

Fuel gauge- informs driver of fuel available in the tank

Fuel light- tells you there is a set amount of fuel left in the tank

Fuel pressure- amount of force pushing fuel to the engine

Funnel- cone shaped tool used to guide liquid into a small opening

Fuse- safety device with a small wire that melts if an electric overload occurs

Fused jumper wires- wire with a fuse in line, used to test circuits

Fusible link- two strips of a metal soldered together with an alloy designed to melt at a certain temperature allowing the circuit to break

FWD front wheel drive- vehicle powered by the front wheels

G

Gasket- designed to keep two parts from leaking

Gear lube- lubricant designed specifically for transmissions, transfer cases, and differentials

Gear oil- lubricant designed specifically for transmissions, transfer cases, and differentials

Gear ratios- the input speed relative to the output speed

Generator- machine that converts mechanical energy to electrical energy

This project partially funded in Partnership with AZ CTE Programs of Study

Glass bulb fuse- fuse enclosed in a glass tube

Gravity bleed- the process of purging brake lines of air using gravity or atmospheric pressure

Grease zerk- fitting to grease joints with a grease gun

Ground- a connection to a particular point in an electrical circuit

Grounding- a connection to a particular point in an electrical circuit

H

Hazard lights- flashing lights to warn of a possible obstacle

Head gasket- seal between a block and head

Headlight- powerful light at the front of a vehicle

Headlight switch- switch to turn on headlamps

Heat shields- a device providing protection from excessive heat

Heat shrink/ shrink tubing shrinkable plastic tube used to insulate wire

Heater core- radiator like device used in heating the cabin of a vehicle

Heater hoses- transport coolant from engine to heater core

High beams- brighter head light circuit for improved visibility @ night

High intensity discharge HID- type of HL which produces light by means of an electric arc between * electrodes housed inside an arc tube

This project partially funded in Partnership with AZ CTE Programs of Study

High pressure hose- hose designed to withstand high pressures

High speed fan- Designed to move air at a faster rate

Hoist- To raise or lift something using cables and pulleys or a hydraulic ram

Hold down spring- Holds brake shoes to the backing plate

Hone- An abrasive stone

Honing- the process that produces a precision finish

Hose clamps- clamps to fasten the end of a hose to a male nipple

Housing vent- allows ventilation for an axle housing or other gear box

Hub assembly- wheel bearing and hub hold the wheel on the car

Hubs- center where the wheels mount

Hybrid- Mixture of electric and gas powered

Hydraulic fluid- the medium which transfers power

Hydraulic lifter- sits between the cam shaft and the valve encasing a piston held at its outer most by a strong spring

Hydro-boost- uses the power steering pump pressure to assist braking

Hydrocarbons- organic compounds made of only hydrogen and carbon atoms found in crude oil

Hydrometer- an instrument used to measure specific gravity or density of liquids

Hygroscopic- Absorbs and retains moisture

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I

Idler arm- A pivoting support for the steering linkage

Idler pulley- Used to align or tighten a belt or chain

Ignition coil- an induction coil in an auto ignition system which transforms the battery's low voltage into the thousands volts needed to create the spark in the spark plug

Illuminate- To light up something

Impact sockets- Sockets made to withstand the higher forces of an impact wrench usually black in color Diagnostic trouble code DTC

Impact wrench: A tool that provides impacting torque to a fastener Commonly used to remove wheel lug nuts

Infrared thermometer: This tool reads energy in the infrared energy range to determine the temperature of an object Uses digital display for temperature display Note: Does not work well on reflective surfaces or liquids

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Inner tie rod: Ball and Socket Joint used in both parallelogram, rack and pinion steering systems Transfers steering movement while allowing wheel vertical travel

Inoperable: Not working, not repairable, Non-serviceable

Inspection: Observing, measuring, testing a system or component for proper operation to determine if repair is needed

Instrument panel: The part of the dash where the vehicles gauges/instruments are located; some manufactures describe the panel as the complete dash (Drive and Passenger Sides)

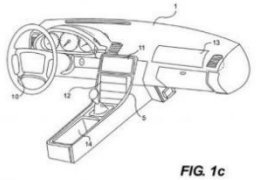

FIG. 1c

Instrument panel/cluster: Where the gauges are mounted, usually one complete unit that can be removed Most of the gauges/instruments are located here

Insulators: The vinyl coating on the outside of wire to insulate voltage from other wires/chassis; can also describe motor/transmission mounts and shock absorbers

Intake Vacuum: Vacuum transferred to the intake manifold by pistons traveling down in the cylinder where vacuum or a low pressure is created by piston downward movement during the intake stroke

Integral parking brake system: Parking/Emergency Brake that shares components of the service brakes; commonly found with rear disc brake where the parking brake is part of the rear brake caliper

Integrity: Used to describe a person's morals or lack of

Interference Engine: An engine design where piston and valve contact is possible if valve timing fails or is not correct; requires major engine repair if this occurs

Interior lamps: Lights to illuminate the interior of the vehicle, usually turned on when a door is opened Examples: Dome, Map, Under Dash lights

Intermittent: Used to describe a symptom that does not happen every time or under the same conditions and is hard to reproduce

Internal Patch: Repair of a leak from the inside; commonly used in tire repair

Iridium: A metal with a high melting point of 4,436F/2447C Commonly used to coat the electrode and ground strap points where arching will occur, providing longer service life of a spark plug

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J

Jack stands: Used to support a vehicles weight when being serviced; typically when tires are removed or low ground clearance is a problem
Note: Use a jack stand with the proper weight rating for the vehicle you are working on

Jounce: A vehicles suspension is compressed Suspension components are traveling upward

Jounce bumpers: Also known as bump stops When a vehicles suspension is jounced to the point of maximum compression and frame to suspension contact is possible; the Jounce Bumper is made of a hard rubber to slow and soften this contact when it occurs

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Jump start: The process of using a booster battery, jump start pack, battery charger or another vehicle to provide boost voltage in an attempt to start a vehicle with a dead battery

Jumper cables: Used to connect a discharged battery in a vehicle to a booster battery or another vehicle to provide boost voltage in an attempt to start the vehicle with the discharged battery

K

Key fob - A remote control car door opener such as the common "clicker" used with most modern automobiles

Keyless entry - an electronic lock that controls access to a building or vehicle without using a traditional mechanical key

Kinks - a short tight twist or curl caused by a doubling or winding of something upon itself

L

Lateral Links - A suspension link that is aligned to resist sideways motions in a wheel

Leaf - A length of flat spring steel plates bent in an arch usually with curled ends to allow mounting to the frame Two holes are drilled in the center to mount a u-bolt shackle which surrounds the axle Some applications need only one leaf spring; but most have several leaves, each smaller than the other, nested together Only the longest one is mounted to the frame

Lift - The action of the rear end of the vehicle to rise during braking

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Load carrying/non-load carrying,- Load carrying may be compression loaded or tension loaded Load carrying wears faster than non-load carrying

Load test - A test applied to a battery; although the battery indicates 12 volts or more, it may not meet the amperage for which it is rated A tester with a variety of amperage loads can be applied to determine if the battery is good

Locking Hubs - Hubs that connect the front wheels to the front drive axles when they are in the locked position

Low pressure/Return hose - The return hose usually connects to the power steering pump with a hose clamp and operates under low pressure but must withstand high temperatures and resist damage from the power steering fluid

Low speed fan - most automotive electric fans are capable of running at different speeds depending on requirements. The speed is controlled through the use of resistors. In the case of a single speed fan, a low speed would indicate a high resistance circuit or a failing fan motor.

Lower control arm - also known as an A-arm, is a hinged suspension link between the chassis and the suspension upright or hub that carries the wheel

Lube - The greasing of the steering system, suspension system, and drivetrain

Lubricate - The process of reducing friction between the moving parts of an engine

Lug nut - The nuts which secure the wheels to the vehicle

M

MacPherson struts - A suspension system in which the strut is connected from the steering knuckle to an upper strut mount, and the strut replaces the shock absorber

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Maintenance light - The check engine light, or malfunction indication light, as it's known to the auto elite, is designed to keep the driver informed of any number of sensor failures or engine irregularities

Malfunction Indicator light MIL - also known as a check engine light, is a tell-tale to indicate malfunction of a computerized engine management system It is found on the instrument panel of most automobiles When illuminated, it is typically either an amber or red color

Manifold - Collects the exhaust gases from multiple cylinders into one pipe

Manifold vacuum – is an effect of a piston's movement on the induction stroke and the choked flow through a throttle in the intake manifold of an engine It is a measure of the amount of restriction of airflow through the engine, and hence of the unused power capacity in the engine

Maxi fuse – Little fuse brand name for a larger automotive blade style fuse designed to carry higher currents

Master Cylinder - The liquid-filled cylinder in the hydraulic brake sys- tem or clutch where hydraulic pressure is developed when the driver depresses a foot pedal

Memory saver - The purpose of this device is to preserve the memory of a car (ECU, radio codes etc.) while the main 12V battery is disconnected or replaced

Metal Gasket - a mechanical seal which fills the space between two or more mating surfaces, generally to prevent leakage from or into the joined objects while under compression

Metric measurement: Finding the dimension of an object using the Metric measuring system, Metric system is used worldwide except in the United States and Britain Most American cars made in the last few years use mostly Metric fasteners

Metric micrometer: A precision measuring device capable of resolutions of 1/1000th of a millimeter

Mini fuse: A type of automotive current limiting device found on later model vehicles It is very small in size compared to fuses previously used; this is an advantage because some vehicles use almost 100 fuses rather than 10 used 25 years ago

Minimum: The smallest allowable size in automotive brake systems the is a specification for minimum thickness of brake rotors and drums, if the part measures less that minimum it must be replaced

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Misalignment: On a motor vehicle the wheels must be aligned to the centerline of the car, if not it is considered misaligned. This also applies to accessory drive pulleys on the engine, the must be aligned to each other

Misfiring: A condition where one or more cylinders are not firing or are firing intermittently

Mode door actuator: An electric or vacuum operated device that moves a door in automotive HVAC systems

Module: A device that contains a solid state electronic device that controls a system within a motor vehicle

Monitors: on a motor vehicle monitors refers to a software routine that keeps track of various systems on the vehicle

Mountings: On a motor vehicle a mounting is a place where components can be attached to the vehicle

Mounts: Usually a cushion installed between an engine or transmission and the mounting point on the vehicle

MSD/MSDS: Acronym for Material Safety Data Sheet

Muffler: A device in the exhaust system used to reduce the exhaust noise of the engine

Multi-function switch: A lever usually mounted on the steering column through which the operator can control more than one device, usually turn signals, wipers, cruise control, headlamps and dimmer

N

Needle bearing: Shaped like a small round rod, needle bearings are usually found in u-joints and transmissions

Neutral safety switch: A device that inhibits the ability to start the engine unless the transmission is in park or neutral

O

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OHMS Law Formula: a formula utilizing the relationship between voltage, resistance and current flow to diagnose or describe the characteristics of an electrical circuit

Oil change interval: A period expressed in mileage and/or time when the engine oil should be changed; differs according to temperatures, conditions and loading of the vehicle

Oil filter: A device through which the engine oil flows to remove dirt and foreign debris from the engine oil; usually replace at the time of engine oil replacement

Oil filter wrench: A special tool designed to firmly grip the oil filter and safely remove it

Oil pressure gauge: A device that can measure the pressure of engine oil when the engine is running

On board diagnostic II OBDII: A federal specification for the emissions of automobile and light trucks sold and operated in the United Stated beginning with the 1996 model year

On car brake lathe: A device that can resurface disk brake rotors while they are still on the car Advantages include time savings and a more true finish in relationship to the car

Open circuit: a wiring system that will not allow current to flow because of a lack of continuity

O-ring: Usually a round circular rubber seal used to help seal a system that you would not want to leak Used in fuel delivery systems and refrigerant gas systems

Oscillation: regular variation in magnitude or position around a central point

Out of round: Not perfectly round

Outer tie rod: the component of a steering system that connects to the steering knuckle

Outlets: A housing or opening that allows fluid or gas to escape from a system

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Output: The amount of energy or work that a system produces

Over inflation: The amount of pressure that is above specification

Oxides of nitrogen: A component of exhaust gasses generated by internal combustion engines; it is considered to be detrimental to the environment and as such the amount that is produce is tightly regulated

P

Padware sensor-A device used to warn the user and/or owner of a vehicle that the brake pad is in need of replacement

Panel-A usually vertical mount for controls or dials (as of instruments of measurement)

Panel gauges- A panel on which are mounted an array of dials, lights, and gauges that monitor the performance of a machine or device

Parallel Circuit-A parallel circuit has more than one resistor (anything that uses electricity to do work) and gets its name from having multiple (parallel) paths to move along Charges can move through any of several paths If one of the items in the circuit is broken then no charge will move through that path, but other paths will continue to have charges flow through them Parallel circuits are found in most household electrical wiring This is done so that lights don't stop working just because you turned your TV off

Parallelism- The state of being parallel or of corresponding in some way

Parasitic drain/draw- Electrical current from the battery that continues to flow, even when the vehicle is switched off

Park brake cable- A thin, steel cable that connects the parking brake lever to the parking brake shoes

Park brake lever/pedal-A mechanical lever or pedal that activates a vehicle's parking brake via a cable or electric motor

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Parking lights- Vehicle lights that provide nighttime standing-vehicle visibility. They are designed to use little electricity, so they could be left on for periods of time while parked

PCV –Positive, Crankcase ventilation system- The PCV system is a control device which sends partially burned gases that come from the engine's crankcase to the combustion chamber

PCV valve-A valve that controls the amount of burnt gasses in the PCV system

Pedal bleed-Is the procedure performed on hydraulic brake systems whereby the brake lines are purged of any air bubbles, by using the brake pedal's up and down motion

Piston-A piston is a component of reciprocating engines It is the moving component that is contained by a cylinder and is made gas-tight by piston rings In an engine, its purpose is to transfer force from expanding gas in the cylinder to the crankshaft via a piston rod and/or connecting rod Pitman arm- The Pitman arm is a linkage attached to the steering box sector shaft, that converts the angular motion of the sector shaft into the linear motion needed to steer the wheels

Pitting- Is a form of extremely localized corrosion that leads to the creation of small holes in various types of metal

Platinum-A dense precious grey metal often used on spark plug electrodes

Potentiometer- Essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name

Power steering fluid-Power steering fluid is a type of hydraulic fluid designed specifically for use in power steering systems on most modern automobiles, and other vehicles; when serving its intended purpose, power steering fluid is the medium through which power is transferred from the steering wheel to the vehicle's steering mechanisms

Power steering pressure switch- The purpose of the switch is to raise the idle speed of the engine when you are turning the steering wheel at very low or no velocity (eg parking) so the engine doesn't die

Power train control Module PCM- On-board computer, or essentially the "brain" of the engine control system

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PPEs- Is personal protective equipment worn to minimize exposure to serious workplace injuries and illnesses

Pre-alignment inspection- An inspection performed to ensure that the vehicle is an appropriate candidate for alignment

Preload- The amount of static pressure applied to a device! Such as the pinion bearing preload, this is the amount of resistance of rotation after it is assembled!

Preset stations-Set in advance radio adjusted to receive certain stations

Pressure cap-A special cap for the radiator, it holds a predetermined amount of pressure on the water in the cooling system, this enables the water to run hotter without boiling

Pressure differential switch- The purpose of the Differential Pressure Switch is to sense a difference in pressure between two pressure sources in a control process

Primary Shoe- The brake shoe that faces the front of the vehicle while the secondary faces the rear

Pry bar- A heavy iron lever with one end forged into a wedge crowbar, pry, wrecking bar

Pulleys-A wheel with a grooved rim around which a belt passes; it acts to change the direction of a force applied to the belt and is chiefly used to power accessories like power steering and air conditioning

Push rod- A rod operated by cams that opens and closes the valves in an internal combustion engine

R

R and R-Remove and repair

Race- The surfaces on the cup and cone of a bearing where the rolling elements make contact

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Rack and pinion- A device in an automobile's steering system that converts rotary motion into linear motion and vice versa, in which a gearwheel (the pinion) engages with a flat toothed bar (the rack)

Radial Tire- Is a vehicle tire design where the cord plies are arranged at 90 degrees to the direction of travel, or radially (from the center of the tire)

Radiator- An engine-cooling device in a motor vehicle or aircraft consisting of a bank of thin tubes in which circulating fluid is cooled by the surrounding air

Radiator hoses- a flexible hose between the radiator and the engine block cooling system, engine cooling system

Radius arms-A radius rod (also called a radius arm or a torque arm) is a suspension link intended to control wheel motion in the longitudinal (fore-aft) direction The link is connected (with a rubber or solid bushing) on one end to the wheel carrier or axle, on the other to the chassis or unibody of the vehicle

Rear suspension- Is the system of tires, tire air, springs, shock absorbers and linkages that connects a vehicle to its wheels and allows relative motion between the two

Rebound- Refers to the rate at which the suspension component returns to its original configuration after absorbing a shock

Rebound bumpers-A taper shaped dense foam or rubber piece that fits on the shock shaft, or lower control arm; rebound bumpers limit movement to keep a vehicle's suspension from bottoming out

Recall- a notice sent by a vehicle manufacturer to owners of a vehicle or part advising them the vehicle or part may have a serious defect and that the manufacturer's dealers will make any necessary replacement or repairs free of charge

Recirculation door- The door that changes the air recirculation from outside air to inside air

Regenerative braking system- A method of assisting the deceleration of a hybrid or electric vehicle in which the vehicle's electric motor switches from drive/output mode to generator mode It recharges the battery by converting a portion of the vehicle's kinetic energy into electrical energy

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Reinitialize- set computer to the value or put in the condition appropriate to the start of an operation

Relay- a magnetically operated switch used to make or break current flow in a circuit

Remote start systems- A feature of a vehicle's electronic key fob that controls the vehicles ignition

Repair order- Sales document for recording all the business processes that are involved in processing faulty goods that a customer sends in for repair

Reservoir- a tank or bottle used to hold a reserve of fluid, such as coolant or washer fluid

Resistance- the measure of opposition to electrical flow in a circuit

Resonator- A small muffler-like device that is placed in an exhaust system to further reduce exhaust noise

Return springs- A spring positioned to close a valve or return a brake show back to its resting position

Reverse lights- White lights fitted to the rear of a vehicle; they provide the driver with vision behind the vehicle at night, and also alert other drivers to the fact that the vehicle is to be reversed

Revolution per minute (RPM)- measurement of how fast the engine's internal components are spinning

Ride Height – the amount of space between the base of an automobile tire and the underside of the chassis (Also known as ground clearance)

Road test- a test of the performance of a vehicle or engine on the road

Roller bearings- Bearings which contain hardened roller ball bearings between two races

Rosin Core- A solder that combines a metal alloy with a pitch-like organic compound; together, the substances melt easily and adhere well to copper and other metals creating a strong bond that conducts electricity

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Rotor- A flat metal disc that serves as the friction surface for the front brake assemblies

RTV- (Room Temperature Vulcanization silicone) a type of silicone rubber made from a two-component system; it is available in a hardness range of very soft to medium

Rubber cement- A cement or adhesive containing rubber in a solvent

Rubber Gasket- used to seal off certain parts and must be heat and cold resistant, weather ability, and a lack of absorption with toughness, flexibility, and friction properties

Running compression test- used to pinpoint the cause of a misfire when all of the usual tests return normal results Also used by performance tuners to verify that each cylinder is contributing equally to the engine's overall power output

Runout- The side-to-side distortion or play of a rotating part

S

SAE- Society of Automotive Engineers

Scan tool- An electronic tool, usually handheld, that is used to read and interpret diagnostic codes and engine sensor information

Scanner- An electronic tool, usually handheld, that is used to read and interpret diagnostic codes and engine sensor information (Commonly referred to as a scan tool)

Scoring- Scratching or grooves on a finished surface

Sealers- a device or substance used to seal something

Seals- A formed device made of plastic, rope, neoprene, or Viton Used to prevent oil leakage around a moving part, such as a shaft

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Secondary ignition- the ignition system in any car has two circuits that result in a spark firing at the end of the spark plug - the first circuit goes between the coil and the spark plug

Secondary shoe- The brake shoe whose friction surface faces the rear of the vehicle

Secondary windings- The high voltage winding in a coil; it is made of very fine wire

Series circuit- A circuit with only one path for electrons to flow; each component is dependent on the next

Series Parallel- A circuit in which a series and parallel circuits are combined

Serpentine belt- A single belt used to drive all of the engine-driven accessories

Service Rating- The American Petroleum Institute rates motor oils in the US, through a system for determining a motor oil's proper use based upon its viscosity and energy conservation qualities

Shackles- links for connecting a leaf spring to the frame

Shafts- a driveshaft is a rotating shaft that transmits torque from engine to wheels

Shift linkage- A cable or mechanical linkage used to shift a transmission into its various gears

Shims- A thin piece of brass, steel, or plastic inserted between two parts to adjust the distance between them; commonly used to adjust alignment of wheels

Shock absorber- An oil or gas filled device used to control spring oscillation in suspension systems

Short to ground- An accidental grounding of an electrical circuit or electrical device

Short to voltage- if the wire is touching a hot wire Load device is on even though switch is off

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Silencer belt- also referred to as chatter belt; makes sure the drum doesn't vibrate and mess up the feed as it is cutting

Silicon- An element that is neither a good conductor nor insulator by doping silicon with different elements its characteristics can be changes It is used to make transistors, integrated circuits, and other semiconductor devices

Slave cylinder- A hydraulic cylinder used to produce movement of the clutch fork

Slide pins- The caliper slide pin allows the sliding caliper to float on the pins

Sliding caliper- move in and out relative to the rotor and have one or two pistons only on the inboard side of the rotor

Slow charge- charging the battery slowly to make sure it has all the electricity it can have

Socket –a tool fitting that goes on a ratchet or breaker bar to loosen or tighten bolts

Solder- is a fusible metal alloy used to join together metal workpieces and having a melting point below that of the workpiece

Soldering iron- a tool used for melting solder and applying it to metals that are to be joined

Solenoids- a cylindrical coil of wire acting as a magnet when carrying electric current

Solid lifter (mechanical)- a device that lifts an object

Spark plug gap-the space provided for the spark to jump between two electrodes

Spark plug wires-routed near or even on top of very hot components, such as exhaust manifolds The outer layer of a spark plug wire is typically a heat resistant material, such as silicone rubber

Spark plugs-provides a gap for a spark to jump

Speedometer- tells how fast a vehicle is going

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Spindle nut- goes on to the spindle with a torque spec and has the hub assembly on it

Spindle/knuckle- a part of the suspension system that carries the hub for the wheel and attaches to the upper and lower control arms

Spring-absorbs bumps or holes that are in the road to give the car a smoother ride

Spring Insulators- piece of rubber that prevents the spring from rubbing on the frame of the car

Square cut seal- a seal in the brake caliper that prevents brake fluid from leaking, and helps pull the piston back

SRS- Supplemental Restraint System

SRS Supplemental restraint system - designed to supplement the driver's seat belt to help reduce the risk or severity Using air bag deployment system

Stability control system- prevents the vehicle from rolling while performing a turn

Stabilizer bar- a steel bar that connects suspension components on opposite wheels, a measure to combat body roll

Standard measurement-accepted or approved instance or example of a quantity or quality against which others are judged or measured or compared

Star (4 way) - a tool head that is put on top of bolts

Star adjuster- a screw device that is used to adjust drum brake shoes

Starter- an automatic device for starting a machine, especially the engine of a vehicle

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Starter solenoid-is the part of an automobile which switches a large electric current to the starter motor, in response to a small control current, and which in turn sets the engine in motion Its function is thus identical to that of a transistor, but using an electromagnetic solenoid rather than semiconductor to perform the switching In many vehicles the solenoid also engages the starter pinion with the ring gear of the engine

State-of-charge test- a test that shows the available capacity expressed as a percentage of charge left in a battery

Static Electricity- a stationary electric charge built up on an insulating material

Static imbalance- Tire condition caused by uneven weight distribution around the circumference of the tire resulting in bounce

Steering angle sensor- used to measure the overall steering angle during the movement of the steering wheel

Steering damper- damping device designed to inhibit an unwanted, uncontrolled movement of a vehicle steering mechanism

Sticky Relay- a relay that doesn't work properly

Stoichiometer- (chemistry) the relation between the quantities of substances that take part in a reaction or form a compound (typically a ratio of whole integers); comparison of air to fuel 147 to 1

Storage- space that is provided to store objects

Strut-suspension component containing a shock damper and cartridge and a coil spring; sometimes a replacement for rear axle's shock absorbers, and front upper control arms

Strut bearing-what lets the wheel spin with little friction

Strut mount-what mounts the strut to the frame of the car

Strut-Suspension part that helps to prevent excessive control arm movement

Supply Voltage- The voltage obtained from a power source for operation of a circuit or device

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Suspension- absorbs bumps or holes in the road to give the vehicle a smoother ride

Suspension Oscillation-the up and down movement of the suspension system

Suspension system- Suspension is the system of springs, shock absorbers and linkages that connects a vehicle to its wheels and allows relative motion between the two

Sway Bar bushings-rubber that prevents metal on metal grinding, and helps absorb some of the bumps

Supply voltage- The voltage obtained from a power source for operation of a circuit or device-

Synthetic Oil- Synthetic oil is not only refined but also distilled

Synthetic Oil/conventional oil- Synthetic oil is not only refined but also distilled

T

Tachometer- is an instrument measuring the rotation speed of a shaft or disk; measures RPM or revolutions per minute of the crankshaft

Tail pipe- The pipe through which exhaust gases from an engine are discharged

Tap and Die- tools used to create screw threads

Tape Weights-tape that replaces the traditional lead weights for a wheel

TDC – Top Dead Center- the highest point a piston will reach

Technical service bulletins- Bulletins sent out by manufacturer explaining problems that have occurred on several of their cars; explains cause and correction and testing procedures

TSB- acronym for Technical service bulletins

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Temperature gauge – signal that reads how hot or cold an object is

Tensioner- a device to take the slack out of a fan belt or timing chain/belt

Test light – devices that show presence of current by lighting a small light

Thermostat-opens or closes when coolant is at certain temperatures

Thermostat housing- component that holds the thermostat in place, usually has hose connection on it

Thickness variation-how thick or thin something is; how much it changes from original size

Thread Count-how many threads are in an inch

Thread pitch-how many threads are in an inch

Tie rod- ties your vehicle's steering rack to the steering arm

Tie rod boot-keeps dirt and water out of the tie rod

Tie rod ends- connects the steering linkage to the wheels of a vehicle

Timing marks- indicator used for setting the timing of the ignition system of an engine

Tire buffer- a tool used to make wheels shiny

Tire Plug- a piece of rubber used to patch a hole in a leaking tire

Tire pressure gauge- measures the pressure inside a tire

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Tire rotation- the practice of moving the wheels and tires of an automobile from one position to another, to ensure even tire wear

Toe in and Toe out-the angle in or out of the front most part of the front tires

Tone wheel-The tone wheel, or exciter ring is a ring on the outer CV shaft that tells the computer how fast the wheel is moving

Top Dead Center TDC-the highest point a piston will reach

Torque- how much pressure it takes to spin a nut

Torque stick- goes on an impact wrench to prevent it from over torqueing a nut

Torque wrench- prevents a nut from being over torqued by setting a specific torque to the wrench

Torsion bars- metal bar that functions as a spring

Total Resistance- the sum of all of the resistance in a circuit

TPMS- Tire Pressure Monitoring System- it monitors the vehicles tire pressure lights an icon on dash

Track Bar - (also called Panhard bar) is a suspension link that provides lateral location of the axle Used primarily in rear suspensions and four wheel drive trucks

Traction control system- A computer-controlled system added to ABS to help prevent loss of traction while the vehicle is accelerating

Trans mounts - A mount used to attach transmission to the vehicle.The mount is made of steel with rubber insulation so it will dampen transmission vibration

Transaxle- A type of transmission typically used in front-wheel drive vehicles in which the transmission also includes the differential and final drive gear

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Transmission -An assembly that houses a variety of gear sets that allow the vehicle to be driven at a wider range of speeds and terrain conditions than would be possible without a transmission

Transmission Filter- Filter, usually accessed in an automatic transmission by removing Transmission oil pan Filter should be replaced when servicing transmission according to manufacturer's maintenance schedule

Transmission mounts - A mount used to attach transmission to the vehicle. The mount is made of steel with rubber insulation so it will dampen transmission vibration

Transmission temperature gauge - A gauge located in the instrument panel that will inform the driver of the transmission temperature; usually original equipment on high end or performance vehicles

Tread depth- height of tread usually measured in 32nds of an inch Considered worn out at 2/32 of an inch

Trickle charger - A battery charger that charges at a slow rate, usually 1-5 amps

Trip - A cycle where a vehicle is started driven and then stopped; usually used in vehicle computer programs to set MIL light Most malfunctions have to happen at least 2 trips to set a diagnostic code and turn on the Malfunction Indicator Light

Trouble shoot - To use a systematic approach with steps to diagnose the cause of a malfunction

Turn signal switch- A switch that turns the left and right turn signal lights on and off

Turn signal/flasher- electronic component used to control voltage to turn signal and flasher bulbs in a vehicle. A flasher can use an electromagnetic coil and contact points or use transistors to cause the bulbs to be turned off and on

U

Under inflation- When a tire has less air pressure than specifications call for; will wear tires on both outside edges

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Universal joint- A cross-shaped joint with bearings on each leg where one set of parallel legs is connected to the end of one shaft and the other set of parallel legs is connected to the end of a second shaft; this arrangement allows the shafts to operate at shallow angles to each other

Upper control arm - Component that serve as a primary load-bearing element of a vehicle's suspension system; control arms can be formed in different ways In the A-arm style, sometimes referred to as a wishbone control arm, the arm is a relatively flat triangular part that mounts to the frame or subframe at each leg of the A They usually have rubber bushings where they attach to the frame and ball joints where they attach to the steering knuckle

V

V belt – V belt is a loop of flexible material used to mechanically link two or more rotating shafts, their general cross-section shape is trapezoidal (hence the name "V")

Vacuum - A pressure in an enclosed area that is lower than atmospheric pressure Measured in inches Hg

Vacuum bleed- Bleeding process that uses a vacuum bleeder to pull the air and old brake fluid from the system

Vacuum booster- A component usually located on the firewall between the brake pedal lever and the master cylinder It uses a diaphragm and the difference of low manifold pressure and higher atmospheric pressure to amplify force that is applied to the master cylinder

Vacuum gauge - A device used to measure the amount of vacuum an engine can generate during various operating conditions

Valve - A device used to control the flow of air and fuel into the combustion chamber and exhaust gases out of the combustion chamber

Valve lash - the mechanical clearance in the valvetrain from the valve tip to the rocker in a engine using solid lifters

Vehicle communication interface (VCI) - Using a scanner or computer to communicate with Electronic Control Modules in a vehicle, usually to gather data or reprogram the software

Ventilation – in a vehicle it is the system of doors and ducts used to control the flow of air to heat and cool the interior

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Verification - Used in a systematic procedure to repair a vehicle. The technician will verify the problem the customer complained of and then test the vehicle after the repair to verify the repair was done correctly and fixed the problem

Vibration dampener - Also called a Harmonic Balancer; A round metal disc connected to the front of the crankshaft that smoothes out torsional vibrations created by the crankshaft

VIN - VIN stands for vehicle identification number and is a unique serial number that is assigned to each vehicle produced It is usually located on the front left corner of the windshield and is also inscribed on various vehicle parts The VIN is unique worldwide, identifying the country of manufacture, manufacturer's name, division name, model, and other important information

Viscosity - A fluids ability to flow Used to classify lubricants

Volt Meter - A meter used to measure voltage Modern day meters are digital

Voltage - Measure of electrical pressure -also called electromotive force

Voltage drop - The amount of voltage used in an electrical circuit between 2 components; the higher the voltage drop the higher the resistance

Voltage drop test - Test using volt meter to measure voltage drop between 2 points in a circuit Connect volt meter in parallel between 2 points to be tested and must have current flowing through circuit

Volts - Unit used to measure electrical pressure

W

Warning indicators - Figures or words that will light up on the instrument panel or information screens on dashboard that can indicate faults with various systems on the vehicle

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Washer fluid - (also called windshield washer fluid windshield wiper fluid, wiper fluid) is a fluid for motor vehicles that is used in cleaning the windshield with the windshield wiper while the vehicle is being driven Usually contains a type of anti-freeze to keep it from freezing in cold climates

Washer motor - A pump that is turned by an electric motor that pumps washer fluid from the reservoir to the nozzles that squirt the fluid on to the windshield

Washer reservoir -Type of container that stores windshield washer fluid

Water pump- Mechanical pump usually driven by timing belt or belt connected to crankshaft pulley The water pump circulates engine coolant trough the engine and then through the radiator and heater core

Wet Compression test - Type of compression test where a small amount of oil is put in a cylinder with low compression, and then tested again If the compression goes up, this would indicate worn piston rings

Wheel Bearing - A component that allows the wheels to rotate freely while supporting the weight of the vehicle, made up of an inner race, outer race, rollers or balls, and a cage

Wheel Cylinder - A hydraulic cylinder with one or two pistons, seals, dust boots, and a bleeder screw that pushes the brake shoes into contact with the brake drum to slow or stop the vehicle

Wheel Imbalance - When a wheel and tire assembly has one side of the tire that is heavier than the other side This will cause a vibration when the car is driven at higher speeds

Wheel Seal - A Seal used to keep lubrication contained on wheel bearings and to keep dirt and moisture out

Wheel speed sensor - A device that creates an analog or digital signal according to the speed of the wheel; this signal is used by various systems in a vehicle, including but not limited to: ABS, speedometer, engine and transmission management, cruise control

Wheel stud - Threaded fasteners that are pressed into the wheel hub flange and used to bolt the wheel onto the vehicle

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Wheel/rim - A circular component that is made of steel or lighter alloys, it is intended to rotate on an axial bearing; a tire is mounted to the wheel

Windshield wiper- A device used to remove rain and debris from a windscreen or windshield. A wiper generally consists of an arm, pivoting at one end and with a long rubber blade attached to the other The blade is swung back and forth over the glass, pushing water from its surface

Windshield wiper blade - a long rubber blade attached to an arm, pivoting at one end; should be replaced if rubber is hard or ripped

Windshield wiper motor - Electric motor that operates windshield wipers

Windshield wiper switch - Switch that controls speed of the windshield wipers

Wire stripper - Tool used to remove insulation from electrical wires

Wiring diagram - A schematic drawing and symbol representation of the wiring and components in an electrical circuit, also called electrical schematic

Work order- A form used by shops to collect information regarding a vehicle coming in for repair Initial information for the repair order includes customer and vehicle details, along with a brief description of the customer's complaint(s)

Y

Yaw sensor - A sensor that measures the amount a vehicle is turning around its vertical axis This is felt when the vehicle deviates from its straight path, as when skidding sideways and the rear comes around Information is used by the ESC system to know how much a vehicle is turning

Yokes - A yoke is a kind is strap that holds a bearing in place; usually used in a driveline to hold universal joints in place

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