Arizona CTE

Automotive Technologies

PERFORM ENGINE SERVICES—GENERAL 1.0

- **1.1** Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins 1.1
- **1.2** Verify operation of the instrument panel engine warning indicators 1.2
- **1.3** Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action 1.3
- **1.4** Install engine covers using gaskets, seals, and sealers as required 1.4
- **1.5** Verify engine mechanical timing 1.5
- **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 1.6
- **1.7** Identify service precautions related to service of the internal combustion engine of a hybrid vehicle 1.7
- **1.8** Adjust valves (mechanical or hydraulic lifters) 1.8
- **1.9** Identify components of the cylinder head and valve train 1.9
- **1.10** Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core and galley plugs; determine necessary action 1.10
- **1.11** Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment 1.11
- **1.12** Remove, inspect, and replace thermostat and gasket/seal 1.12
- **1.13** Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required 1.13
- **1.14** Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required 1.14
- **5** Identify components of the lubrication and cooling systems 1.15

Skip to main content

PERFORM AUTOMATIC TRANSMISSION AND TRANSAXLE SERVICES—GENERAL 2.0	**2.1** Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins 2.1
	2.2 Check fluid level in a transmission or a transaxle equipped with a dip-stick 2.2
	2.3 Check fluid level in a transmission or a transaxle not equipped with a dip-stick 2.3
	2.4 Check transmission fluid condition; check for leaks 2.4
	2.5 Identify drive train components and configuration 2.5
	2.6 Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch 2.6
	2.7 Inspect for leakage at external seals, gaskets, and bushings 2.7
	2.8 Inspect, replace and/or align power train mounts 2.8
	2.9 Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification 2.9
	2.10 Describe the operational characteristics of a continuously variable transmission (CVT) 2.10
	2.11 Describe the operational characteristics of a hybrid vehicle drive train 2.11
PERFORM MANUAL DRIVE TRAIN AND AXLE SERVICES—DRIVE SHAFT, HALF SHAFTS, UNIVERSAL JOINTS AND CONSTANT VELOCITY (CV) JOINTS (FRONT, REAR, ALL WHEEL AND 4-WHEEL DRIVE) 3.0	**3.1** Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins 3.1
	3.2 Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification 3.2
	3.3 Check fluid condition; check for leaks 3.3
	3.4 Identify manual drive train and axle components and configuration 3.4
	3.5 Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification 3.5
	3.6 Check for hydraulic system leaks 3.6
	3.7 Describe the operational characteristics of an electronically controlled manual transmission/transaxle 3.7
	3.8 Inspect, remove, and/or replace bearings, hubs, and seals 3.8
	3.9 Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints 3.9
	3.10 Inspect locking hubs 3.10

Skip to main content

	3.11 Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification 3.11
	3.12 Clean and inspect differential case; check for leaks; inspect housing vent 3.12
	3.13 Check and adjust differential case fluid level; use proper fluid type per manufacturer specification 3.13
	3.14 Drain and refill differential housing 3.14
	3.1 Inspect and replace drive axle wheel studs 3.15
PERFORM SUSPENSION AND STEERING SYSTEM SERVICES—GENERAL 4.0	**4.1** Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins 4.1
	4.2 Disable and enable supplemental restraint system (SRS); verify indicator lamp operation 4.2
	4.3 Identify suspension and steering system components and configurations 4.3
	4.4 Inspect rack and pinion steering gear inner tie rod ends (sockets) bellows boots 4.4
	4.5 Inspect power steering fluid level and condition 4.5
	4.6 Flush, fill, and bleed power steering system using proper fluid type per manufacturer specification 4.6
Inspect for power steering fluid leakage 4.7	**4.8** Remove, inspect, replace, and/or adjust power steering pump drive belt 4.8
	4.9 Inspect and replace power steering hoses and fittings 4.9
	4.10 Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper 4.10
	4.11 Inspect tie rod ends (sockets), tie rod sleeves, and clamps 4.11
	4.12 Inspect upper and lower control arms, bushings, and shafts 4.12
	4.13 Inspect and replace rebound bumpers 4.13
	4.14 Inspect track bar, strut rods/radius arms, and related mounts and bushings 4.14
	4.15 Inspect upper and lower ball joints (with or without wear indicators) 4.15
	4.16 Inspect suspension system coil springs and spring insulators (silencers) 4.16
	7 Inspect suspension system torsion bars and mounts 4.17

Skip to main content

4.18 Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links 4.18

4.19 Inspect, remove and/or replace strut cartridge or assembly; inspect mounts and bushings 4.19

4.20 Inspect front strut bearing and mount 4.20

4.21 Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms 4.21

4.22 Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts 4.22

4.23 Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings 4.23

4.24 Inspect electric power steering assist system 4.24

4.25 Identify hybrid vehicle power steering system electrical circuits and safety precautions 4.25

4.26 Describe the function of steering and suspension control systems and components (e.g., active suspension and stability control) 4.26

4.27 Perform prealignment inspection; measure vehicle ride height 4.27

4.28 Describe alignment angles (camber, caster and toe) 4.28

4.29 Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label 4.29

4.30 Rotate tires according to manufacturer's recommendation including vehicles equipped with tire pressure monitoring systems (TPMS) 4.30

4.31 Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly 4.31

4.32 Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor 4.32

4.33 Inspect tire and wheel assembly for air loss; determine necessary action 4.33

4.34 Repair tire following vehicle manufacturer-approved procedure 4.34

4.35 Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps 4.35

Skip to main content

	4.36 Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS), including relearn 4.36
PERFORM BRAKE SYSTEM SERVICES—GENERAL 5.0	**5.1** Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins 5.1
	5.2 Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS) 5.2
	5.3 Install wheel and torque lug nuts 5.3
	5.4 Identify brake system components and configuration 5.4
	5.5 Describe proper brake pedal height, travel, and feel 5.5
	5.6 Check master cylinder for external leaks and proper operation 5.6
	5.7 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports 5.7
	5.8 Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification 5.8
	5.9 Identify components of hydraulic brake warning light system 5.9
	5.10 Bleed and/or flush brake system 5.10
	5.11 Test brake fluid for contamination 5.11
	5.12 Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability 5.12
	5.13 Refinish brake drum and measure final drum diameter; compare with specification 5.13
	5.14 Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble 5.14
	5.15 Inspect wheel cylinders for leaks and proper operation; remove and replace as necessary 5.15
	5.16 Preadjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments 5.16
	5.17 Remove and clean caliper assembly; inspect for leaks and damage/wear; determine necessary action 5.17
	5.18 Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action 5.18

Skip to main content

5.19 Remove, inspect, and/or replace brake pads and retaining hardware; determine necessary action 5.19

5.20 Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks 5.20

5.21 Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine necessary action 5.21

5.22 Remove and reinstall/replace rotor 5.22

5.23 Refinish rotor on vehicle; measure final rotor thickness and compare with specification 5.23

5.24 Refinish rotor off vehicle; measure final rotor thickness and compare with specification 5.24

5.25 Retract and re-adjust caliper piston on an integral parking brake system 5.25

5.26 Check brake pad wear indicator; determine necessary action 5.26

5.27 Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation 5.27

5.28 Check brake pedal travel with, and without, engine running to verify proper power booster operation 5.28

5.29 Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster 5.29

5.30 Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings 5.30

5.31 Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as necessary 5.31

5.32 Check parking brake operation and parking brake indicator light system operation; determine necessary action 5.32

5.33 Check operation of brake stop light system 5.33

5.34 Replace wheel bearing and race 5.34

5.35 Inspect and replace wheel studs 5.35

5.36 Identify traction control/vehicle stability control system components 5.36

7 Describe the operation of a regenerative braking system 5.37

Skip to main content

PERFORM ELECTRICAL/ELECTRONIC SYSTEM SERVICES—GENERAL 6.0

- **6.1** Research vehicle service information including vehicle service history, service precautions, and technical service bulletins 6.1
- **6.2** Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law) 6.2
- **6.3** Use wiring diagrams to trace electrical/electronic circuits 6.3
- **6.4** Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance 6.4
- **6.5** Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits 6.5
- **6.6** Use a test light to check operation of electrical circuits 6.6
- **6.7** Use fused jumper wires to check operation of electrical circuits 6.7
- **6.8** Measure key-off battery drain (parasitic draw) 6.8
- **6.9** Inspect and test fusible links, circuit breakers, and fuses; determine necessary action 6.9
- **6.10** Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair) 6.10
- **6.11** Identify electrical/electronic system components and configuration 6.11
- **6.12** Perform battery state-of-charge test; determine necessary action 6.12
- **6.13** Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action 6.13
- **6.14** Maintain or restore electronic memory functions 6.14
- **6.15** Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold downs 6.15
- **6.16** Perform slow/fast battery charge according to manufacturer's recommendations 6.16
- **6.17** Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply 6.17
- **6.19** Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery 6.19
- **6.20** Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures 6.20

Skip to main content

	6.21 Perform starter current draw test; determine necessary action 6.21
	6.22 Perform starter circuit voltage drop tests; determine necessary action 6.22
	6.23 Inspect and test starter relays and solenoids; determine necessary action 6.23
	6.24 Remove and install starter in a vehicle 6.24
	6.25 Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action 6.25
	6.26 Demonstrate knowledge of an automatic idle-stop/start-stop system 6.26
	6.27 Perform charging system output test; determine necessary action 6.27
	6.28 Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment 6.28
	6.29 Remove, inspect, and/or reinstall generator (alternator) 6.29
	6.30 Perform charging circuit voltage drop tests; determine necessary action 6.30
	6.31 Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as necessary action 6.31
	6.32 Aim headlights 6.32
	6.33 Identify system voltage and safety precautions associated with high-intensity discharge headlights 6.33
	6.34 Disable and enable supplemental restraint system (SRS); verify indicator lamp operation 6.34
	6.35 Remove and reinstall door panel 6.35
	6.36 Describe the operation of keyless entry/remote-start systems 6.36
	6.37 Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators 6.37
	6.38 Verify windshield wiper and washer operation; replace wiper blades 6.38
PERFORM HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEM SERVICES—GENERAL 7.0	**7.1** Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins 7.1
	7.2 Identify heating, ventilation and air conditioning (HVAC) components and configuration 7.2
	Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary 7.3

Skip to main content

	7.4 Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions 7.4
	7.5 Inspect A/C condenser for airflow restrictions; determine necessary action 7.5
	7.6 Inspect engine cooling and heater systems hoses and pipes; determine necessary action 7.6
	7.7 Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; determine necessary action 7.7
Identify the source of A/C system odors 7.8	**7.8** Identify the source of A/C system odors 7.8
PERFORM ENGINE PERFORMANCE SERVICES—GENERAL 8.0	**8.1** Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins 8.1
	8.2 Perform engine absolute manifold pressure tests (vacuum/boost); document results 8.2
	8.3 Perform cylinder power balance test; document results 8.3
	8.4 Perform cylinder cranking and running compression tests; document results 8.4
	8.5 Perform cylinder leakage test; document results 8.5
	8.6 Verify engine operating temperature 8.6
	8.7 Remove and replace spark plugs; inspect secondary ignition components for wear and damage 8.7
	8.8 Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable 8.8
	8.9 Describe the use of the OBD monitors for repair verification 8.9
	8.10 Replace fuel filter(s) where applicable 8.10
	8.11 Inspect, service, or replace air filters, filter housings, and intake duct work 8.11
	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 8.12
	8.13 Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action 8.13
	4 Check and refill diesel exhaust fluid (DEF) 8.14

Skip to main content

	8.15 Inspect, test, and service positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action 8.15
PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS 9.0	**9.1** Identify general shop safety rules and procedures 9.1
	9.2 Utilize safe procedures for handling of tools and equipment 9.2
	9.3 Identify and use proper placement of floor jacks and jack stands 9.3
	9.4 Identify and use proper procedures for safe lift operation 9.4
	9.5 Utilize proper ventilation procedures for working within the lab/shop area 9.5
	9.6 Identify marked safety areas 9.6
	9.7 Identify the location and the types of fire extinguishers and other fire safety equipment 9.7
	9.8 Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment 9.8
	9.9 Identify the location and use of eye wash stations 9.9
	9.10 Identify the location of the posted evacuation routes 9.10
	9.11 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities 9.11
	9.12 Identify and wear appropriate clothing for lab/shop activities 9.12
	9.13 Secure hair and jewelry for lab/shop activities 9.13
	9.14 Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits 9.14
	9.15 Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.) 9.15
	9.16 Locate and demonstrate knowledge of material safety data sheets (MSDS) 9.16
	9.17 Identify tools and their usage in automotive applications 9.17
	9.18 Identify standard and metric designation 9.18
	9.19 Demonstrate safe handling and use of appropriate tools 9.19
	9.20 Demonstrate proper cleaning, storage, and maintenance of tools and equipment 9.20

Skip to main content

9.21 **Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper)** 9.21

9.22 **Identify information necessary and the service requested on a repair order** 9.22

9.23 **Identify purpose and demonstrate proper use of fender covers and mats** 9.23

9.24 **Demonstrate use of the three C's (concern, cause, and correction)** 9.24

9.25 **Review vehicle service history** 9.25

9.26 **Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction** 9.26

9.27 **Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel)** 9.27