NATEF Master Automobile Service Technology (MAST) Task List Correlation Chart

The following chart correlates the *Modern Automotive Technology* textbook (©2017) to the 2013 NATEF Master Automobile Service Technology (MAST) Task List.

ENGINE REPAIR

For every task in Engine Repair, the following safety requirement must be strictly enforced:

• Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	Page #s	
I. ENGINE REPAIR			
A. General: Engine Diagnosis; Removal and Reinstallation (R & R)			
1. Complete work order to include customer information, vehicle	P-1	114–115	
identifying information, customer concern, related service history,			
cause, and correction.			
2. Research applicable vehicle and service information, such as	P-1	109–114	
internal engine operation, vehicle service history, service			
precautions, and technical service bulletins.			
3. Verify operation of the instrument panel engine warning	P-1	302–307, 381–390,	
indicators.		399–411, 415–428,	
		620–623, 1003–	
		1020	
4. Inspect engine assembly for fuel, oil, coolant, and other leaks;	P-1	137, 141–146, 150–	
determine necessary action.		151, 705–716, 735,	
		745, 755, 764, 766,	
		860-865, 873-877,	
		879, 912–920, 1028,	
		1289, 1325–1328,	
		1333	
5. Install engine covers using gaskets, seals, and sealers as	P-1	128–133, 1179–	
required.		1182	
6. Remove and replace timing belt; verify correct camshaft	P-1	1183–1189	
timing.			
7. Perform common fastener and thread repair, to include: remove	P-1	126–128	
broken bolt, restore internal and external threads, and repair			
internal threads with thread insert.			

Task Number and Description	Priority	Page #s
8. Inspect, remove, and replace engine mounts.	P-2	1050–1051
9. Identify hybrid vehicle internal combustion engine service	P-3	82, 454–458
precautions.		
10. Remove and reinstall engine in an OBD II or newer vehicle;	P-3	1062–1070, 1193–
reconnect all attaching components and restore the vehicle to		1222
running condition.		
Task Number and Description	Priority	Page #s
I. ENGINE REPAIR		
B. Cylinder Head and Valve Train Diagnosis and Repair		
1. Remove cylinder head; inspect gasket condition; install	P-1	1073–1074, 1197–
cylinder head and gasket; tighten according to manufacturer's		1200
specifications and procedures.		
2. Clean and visually inspect a cylinder head for cracks; check	P-1	1137–1141
gasket surface areas for warpage and surface finish; check		
passage condition.		
3. Inspect push rods, rocker arms, rocker arm pivots and shafts for	P-2	1040–1042, 1168–
wear, bending, cracks, looseness, and blocked oil passages		1170, 1388–1389
(orifices); determine necessary action.		
4. Adjust valves (mechanical or hydraulic lifters).	P-1	1170
5. Inspect and replace camshaft and drive belt/chain; includes	P-1	150, 1039–1040,
checking drive gear wear and backlash, end play, sprocket and		1043, 1165–1168
chain wear, overhead cam drive sprocket(s), drive belt(s), belt		
tension, tensioners, camshaft reluctor ring/tone-wheel, and valve		
timing components; verify correct camshaft timing.		
6. Establish camshaft position sensor indexing.	P-1	596
7. Inspect valve springs for squareness and free height	P-3	1159–1160
comparison; determine necessary action.		
8. Replace valve stem seals on an assembled engine; inspect valve	P-3	1059–1060, 1165
spring retainers, locks/keepers, and valve lock/keeper grooves;		
determine necessary action.		
9. Inspect valve guides for wear; check valve stem-to-guide	P-3	1143–1145
clearance; determine necessary action.		
10. Inspect valves and valve seats; determine necessary action.	P-3	1145
11. Check valve spring assembled height and valve stem height;	P-3	1159–1162
determine necessary action.		
12. Inspect valve lifters; determine necessary action.	P-2	1170
13. Inspect and/or measure camshaft for runout, journal wear, and	P-2	1165–1166
lobe wear.		

Task Number and Description	Priority	Page #s
14. Inspect camshaft bearing surface for wear, damage, out-of-	P-3	1168
round, and alignment; determine necessary action.		
I. ENGINE REPAIR		
C. Engine Block Assembly Diagnosis and Repair		
1. Remove, inspect, or replace crankshaft vibration damper	P-2	1050
(harmonic balancer).		
2. Disassemble engine block; clean and prepare components for	P-1	1071, 1073, 1078–
inspection and reassembly.		1082
3. Inspect engine block for visible cracks, passage condition, core	P-2	1043–1044, 1087–
and gallery plug condition, and surface warpage; determine		1090
necessary action.		
4. Inspect and measure cylinder walls/sleeves for damage, wear,	P-2	1093–1096, 1101
and ridges; determine necessary action.		
5. Deglaze and clean cylinder walls.	P-2	1096–1099, 1101–
		1102
6. Inspect and measure camshaft bearings for wear, damage, out-	P-3	1168
of-round, and alignment; determine necessary action.		
7. Inspect crankshaft for straightness, journal damage, keyway	P-1	1050, 1104–1108,
damage, thrust flange and sealing surface condition, and visual		1114, 1116
surface cracks; check oil passage condition; measure end play and		
journal wear; check crankshaft position sensor reluctor ring		
(where applicable); determine necessary action.		
8. Inspect main and connecting rod bearings for damage and	P-2	1048-1050, 1112
wear; determine necessary action.		
9. Identify piston and bearing wear patterns that indicate	P-3	1045–1047
connecting rod alignment and main bearing bore problems;		
determine necessary action.		
10. Inspect and measure piston skirts and ring lands; determine	P-2	1117–1118
necessary action.		
11. Determine piston-to-bore clearance.	P-2	1094
12. Inspect, measure, and install piston rings.	P-2	1118, 1124–1126
13. Inspect auxiliary shaft(s) (balance, intermediate, idler,	P-2	1132
counterbalance or silencer); inspect shaft(s) and support bearings		
for damage and wear; determine necessary action; reinstall and		
time.		
14. Assemble engine block.	P-1	1193–1221
I. ENGINE REPAIR		
D. Lubrication and Cooling Systems Diagnosis and Repair		

Task Number and Description	Priority	Page #s
1. Perform cooling system pressure and dye tests to identify leaks;	P-1	863-865, 875, 884,
check coolant condition and level; inspect and test radiator,		888-889
pressure cap, coolant recovery tank, heater core and gallery plugs;		
determine necessary action.		
2. Identify causes of engine overheating.	P-1	865–867
3. Inspect, replace, and adjust drive belts, tensioners, and pulleys;	P-1	1188
check pulley and belt alignment.		
4. Inspect and test coolant; drain and recover coolant; flush and	P-1	879-882, 884
refill cooling system with recommended coolant; bleed air as		
required.		
5. Inspect, remove, and replace water pump.	P-2	867–869
6. Remove and replace radiator.	P-2	876–877
7. Remove, inspect, and replace thermostat and gasket/seal.	P-1	870-873
8. Inspect and test fan(s) (electrical or mechanical), fan clutch, fan	P-1	877–879
shroud, and air dams.		
9. Perform oil pressure tests; determine necessary action.	P-1	915–917
10. Perform engine oil and filter change.	P-1	138–141
11. Inspect auxiliary coolers; determine necessary action.	P-3	883-884
12. Inspect, test, and replace oil temperature and pressure	P-2	364–365, 925
switches and sensors.		
13. Inspect oil pump gears or rotors, housing, pressure relief	P-2	898–901
devices, and pump drive; perform necessary action.		

AUTOMATIC TRANSMISSION AND TRANSAXLE.

For every task in Automatic Transmission and Transaxle, the following safety requirement must be strictly enforced:

• Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	Page #s
II. AUTOMATIC TRANSMISSION AND TRANSAXLE		
A. General: Transmission and Transaxle Diagnosis		
1. Identify and interpret transmission/transaxle concern,	P-1	1325–1331, 1427–
differentiate between engine performance and		1428, 1443–1447
transmission/transaxle concerns; determine necessary action.		
2. Research applicable vehicle and service information fluid type,	P-1	109–114, 138
vehicle service history, service precautions, and technical service		
bulletins.		
3. Diagnose fluid loss and condition concerns; determine	P-1	141–142, 1327–
necessary action.		1328, 1331–1333
4. Check fluid level in a transmission or a transaxle equipped with	P-1	141–142
a dipstick.		
5. Check fluid level in a transmission or a transaxle not equipped	P-1	142
with a dipstick.		
6. Perform pressure tests (including transmissions/transaxles	P-1	1329
equipped with electronic pressure control); determine necessary		
action.		
7. Diagnose noise and vibration concerns; determine necessary	P-2	1325–1329, 1357–
action.		1358, 1427
8. Perform stall test; determine necessary action.	P-3	1329
9. Perform lock-up converter system tests; determine necessary	P-3	
action.		
10. Diagnose transmission/transaxle gear reduction/multiplication	P-1	245, 517, 1267–
concerns using driving, driven, and held member (power flow)		1268, 1270–1273,
principles.		1302, 1307–1309,
		1317, 1330–1331,
		1412–1416
11. Diagnose electronic transmission/transaxle control systems	P-1	1331, 1335, 1339–
using appropriate test equipment and service information.		1340
12. Diagnose pressure concerns in a transmission using hydraulic	P-2	1312, 1314
principles (Pascal's Law).		

Task Number and Description	Priority	Page #s
II. AUTOMATIC TRANSMISSION AND TRANSAXLE		
B. In-Vehicle Transmission/Transaxle Maintenance and Repair		
1. Inspect, adjust, and replace external manual valve shift linkage,	P-2	1333–1334
transmission range sensor/switch, and park/neutral position		
switch.		
2. Inspect for leakage; replace external seals, gaskets, and	P-2	129–133, 138, 141–
bushings.		142, 1327–1328,
		1331–1333, 1439
3. Inspect, test, adjust, repair, or replace electrical/electronic	P-1	415–428
components and circuits including computers, solenoids, sensors,		
relays, terminals, connectors, switches, and harnesses.		
4. Drain and replace fluid and filter(s).	P-1	138, 141–142,
		1327–1328, 1331–
		1333
5. Inspect, replace, and align powertrain mounts.	P-2	1290–1295, 1358–
		1359, 1438
II. AUTOMATIC TRANSMISSION AND TRANSAXLE		
C. Off-Vehicle Transmission and Transaxle Repair		
1. Remove and reinstall transmission/transaxle and torque	P-1	1215, 1335, 1338–
converter; inspect engine core plugs, rear crankshaft seal, dowel		1340
pins, dowel pin holes, and mating surfaces.		
2. Inspect, leak test, and flush or replace transmission/transaxle	P-1	138, 144, 860–861,
oil cooler, lines, and fittings.		879, 1327–1328,
		1331–1333, 1335–
		1339
3. Inspect converter flex (drive) plate, converter attaching bolts,	P-2	—
converter pilot, converter pump drive surfaces, converter end		
play, and crankshaft pilot bore.		
4. Describe the operational characteristics of a continuously	P-3	1416
variable transmission (CVT).		
5. Describe the operational characteristics of a hybrid vehicle	P-3	435–449, 1303
drive train.		
6. Disassemble, clean, and inspect transmission/transaxle.	P-2	1335, 1338
7. Inspect, measure, clean, and replace valve body (includes	P-2	90–99, 1078–1082,
surfaces, bores, springs, valves, sleeves, retainers, brackets, check		1325–1331, 1335–
valves/balls, screens, spacers, and gaskets).		1339, 1412
8. Inspect servo and accumulator bores, pistons, seals, pins,	P-2	1325–1331, 1333,
springs, and retainers; determine necessary action.		1335–1339, 1412

Task Number and Description	Priority	Page #s
9. Assemble transmission/transaxle.	P-2	1293–1294, 1338–
		1339
10. Inspect, measure, and reseal oil pump assembly and	P-2	922–924
components.		
11. Measure transmission/transaxle end play or preload;	P-1	—
determine necessary action.		
12. Inspect, measure, and replace thrust washers and bearings.	P-2	—
13. Inspect oil delivery circuits, including seal rings, ring	P-2	—
grooves, and sealing surface areas, feed pipes, orifices, and check		
valves/balls.		
14. Inspect bushings; determine necessary action.	P-2	—
15. Inspect and measure planetary gear assembly components;	P-2	—
determine necessary action.		
16. Inspect case bores, passages, bushings, vents, and mating	P-2	—
surfaces; determine necessary action.		
17. Diagnose and inspect transaxle drive, link chains, sprockets,	P-2	—
gears, bearings, and bushings; perform necessary action.		
18. Inspect, measure, repair, adjust, or replace transaxle final	P-2	—
drive components.		
19. Inspect clutch drum, piston, check-balls, springs, retainers,	P-2	1309–1310, 1312,
seals, and friction and pressure plates, bands and drums;		1333
determine necessary action.		
20. Measure clutch pack clearance; determine necessary action.	P-1	—
21. Air test operation of clutch and servo assemblies.	P-1	1330–1331
22. Inspect roller and sprag clutch, races, rollers, sprags, springs,	P-2	—
cages, retainers; determine necessary action.		

MANUAL DRIVE TRAIN AND AXLES

For every task in Manual Drive Train and Axles, the following safety requirement must be strictly enforced:

• Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	Page #s
III. MANUAL DRIVE TRAIN AND AXLES		
A. General: Drive Train Diagnosis		
1. Identify and interpret drive train concerns; determine necessary	P-1	1287–1289, 1298–
action.		1300, 1405–1406
2. Research applicable vehicle and service information, fluid type,	P-1	109–114, 1289,

Task Number and Description	Priority	Page #s
vehicle service history, service precautions, and technical service		1293, 1394
bulletins.		
3. Check fluid condition; check for leaks; determine necessary	P-1	143–144
action.		
4. Drain and refill manual transmission/transaxle and final drive	P-1	1269, 1430
unit.		
III. MANUAL DRIVE TRAIN AND AXLES		·
B. Clutch Diagnosis and Repair		
1. Diagnose clutch noise, binding, slippage, pulsation, and	P-1	1245–1251
chatter; determine necessary action.		
2. Inspect clutch pedal linkage, cables, automatic adjuster	P-1	1246–1256, 1289
mechanisms, brackets, bushings, pivots, and springs; perform		
necessary action.		
3. Inspect and replace clutch pressure plate assembly, clutch disc,	P-1	1253–1257
release (throw-out) bearing and linkage, and pilot bearing/bushing		
(as applicable).		
4. Bleed clutch hydraulic system.	P-1	1256
5. Check and adjust clutch master cylinder fluid level; check for	P-1	145–146
leaks.		
6. Inspect flywheel and ring gear for wear and cracks; determine	P-1	1250, 1254
necessary action.		
7. Measure flywheel runout and crankshaft end play; determine	P-2	1050, 1114, 1116,
necessary action.		1255
Task Number and Description	Priority	Page #s
III. MANUAL DRIVE TRAIN AND AXLES		
C. Transmission/Transaxle Diagnosis and Repair		
1. Inspect, adjust, and reinstall shift linkages, brackets, bushings,	P-2	
cables, pivots, and levers.		
2. Describe the operational characteristics of an electronically-	P-3	1280, 1282
controlled manual transmission/transaxle.		
3. Diagnose noise concerns through the application of	P-2	1277–1281
transmission/transaxle powerflow principles.		
4. Diagnose hard shifting and jumping out of gear concerns;	P-2	1289
determine necessary action.		
5. Diagnose transaxle final drive assembly noise and vibration	P-3	1298–1300, 1428
concerns; determine necessary action.		
6. Disassemble, inspect, clean, and reassemble internal	P-3	1290–1294
transmission/transaxle components.		

Task Number and Description	Priority	Page #s	
III. MANUAL DRIVE TRAIN AND AXLES			
D. Drive Shaft and Half Shaft, Universal and Constant-Velocity (CV) Joint Diagnosis and Repair			
1. Diagnose constant-velocity (CV) joint noise and vibration	P-1	1347	
concerns; determine necessary action.			
2. Diagnose universal joint noise and vibration concerns; perform	P-2	1360–1361	
necessary action.			
3. Inspect, remove, and replace front wheel drive (FWD)	P-1	1392	
bearings, hubs, and seals.			
4. Inspect, service, and replace shafts, yokes, boots, and	P-1	1360–1362	
universal/CV joints.			
5. Check shaft balance and phasing; measure shaft runout;	P-2	1359	
measure and adjust driveline angles.			
III. MANUAL DRIVE TRAIN AND AXLES			
E. Drive Axle Diagnosis and Repair			
E.1 Ring and Pinion Gears and Differential Case Assem	oly		
1. Clean and inspect differential housing; check for leaks; inspect	P-2	1390	
housing vent.			
2. Check and adjust differential housing fluid level.	P-1	143–144, 1390	
3. Drain and refill differential housing.	P-1	144, 1390	
4. Diagnose noise and vibration concerns; determine necessary	P-2	1390	
action.			
5. Inspect and replace companion flange and pinion seal; measure	P-2		
companion flange runout.			
6. Inspect ring gear and measure runout; determine necessary	P-3	1398–1399	
action.			
7. Remove, inspect, and reinstall drive pinion and ring gear,	P-3	1395–1396	
spacers, sleeves, and bearings.			
8. Measure and adjust drive pinion depth.	P-3	1398	
9. Measure and adjust drive pinion bearing preload.	P-3	1398	
10. Measure and adjust side bearing preload and ring and pinion	P-3	1398	
gear total backlash and backlash variation on a differential carrier			
assembly (threaded cup or shim types).			
11. Check ring and pinion tooth contact patterns; perform	P-3	1388–1389	
necessary action.			
12. Disassemble, inspect, measure, and adjust or replace	P-3	1395–1396	
differential pinion gears (spiders), shaft, side gears, side bearings,			
thrust washers, and case.			
13. Reassemble and reinstall differential case assembly; measure	P-3	1395–1396	

Task Number and Description	Priority	Page #s
runout; determine necessary action.		
III. MANUAL DRIVE TRAIN AND AXLES		
E. Drive Axle Diagnosis and Repair		
E.2 Limited Slip Differential		
1. Diagnose noise, slippage, and chatter concerns; determine	P-3	1396–1397, 1429
necessary action.		
2. Measure rotating torque; determine necessary action.	P-3	1397
III. MANUAL DRIVE TRAIN AND AXLES		
E. Drive Axle Diagnosis and Repair		
E.3 Drive Axles		
1. Inspect and replace drive axle wheel studs.	P-1	1392, 1394
2. Remove and replace drive axle shafts.	P-1	1390–1391, 1394
3. Inspect and replace drive axle shaft seals, bearings, and	P-2	1391–1392
retainers.		
4. Measure drive axle flange runout and shaft end play; determine	P-2	1394
necessary action.		
5. Diagnose drive axle shafts, bearings, and seals for noise,	P-2	1387–1390
vibration, and fluid leakage concerns; determine necessary action.		
III. MANUAL DRIVE TRAIN AND AXLES		
F. Four-wheel Drive/All-wheel Drive Component Diagnosis and	Repair	
1. Inspect, adjust, and repair shifting controls (mechanical,	P-3	1353–1354, 1363–
electrical, and vacuum), bushings, mounts, levers, and brackets.		1364, 1394–1400
2. Inspect front-wheel bearings and locking hubs; perform	P-3	1470–1471, 1480–
necessary action(s).		1484
3. Check for leaks at drive assembly seals; check vents; check	P-3	143, 147, 1360
lube level.		
4. Identify concerns related to variations in tire circumference	P-3	—
and/or final drive ratios.		
5. Diagnose noise, vibration, and unusual steering concerns;	P-3	1470, 1561–1563
determine necessary action.		
6. Diagnose, test, adjust, and replace electrical/electronic	P-3	
components of four-wheel drive systems.		
7. Disassemble, service, and reassemble transfer case and	P-3	1363–1364
components.		

SUSPENSION AND STEERING

For every task in Suspension and Steering, the following safety requirement must be strictly enforced:

• Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	Page #s
IV. SUSPENSION AND STEERING		
A. General: Suspension and Steering Systems		
1. Research applicable vehicle and service information, vehicle	P-1	109–114, 1568,
service history, service precautions, and technical service		1747
bulletins.		
2. Identify and interpret suspension and steering system concerns;	P-1	150, 1513–1514,
determine necessary action.		1561–1563, 1574,
		1577–1580
IV. SUSPENSION AND STEERING		·
B. Steering Systems Diagnosis and Repair		
1. Disable and enable supplemental restraint system (SRS).	P-1	1747–1748
2. Remove and replace steering wheel; center/time supplemental	P-1	1565
restraint system (SRS) coil (clock spring).		
3. Diagnose steering column noises, looseness, and binding	P-2	150, 151, 1562–
concerns (including tilt mechanisms); determine necessary action.		1563
4. Diagnose power steering gear (non-rack and pinion) binding,	P-2	1561–1562
uneven turning effort, looseness, hard steering, and noise		
concerns; determine necessary action.		
5. Diagnose power steering gear (rack and pinion) binding,	P-2	1562–1563, 1567
uneven turning effort, looseness, hard steering, and noise		
concerns; determine necessary action.		
6. Inspect steering shaft universal-joint(s), flexible coupling(s),	P-2	1539, 1544
collapsible column, lock cylinder mechanism, and steering wheel;		
perform necessary action.		
7. Remove and replace rack and pinion steering gear; inspect	P-2	1568
mounting bushings and brackets.		
8. Inspect rack and pinion steering gear inner tie-rod ends	P-2	1566
(sockets) and bellows boots; replace as needed.		
9. Determine proper power steering fluid type; inspect fluid level	P-1	144, 1563
and condition.		
10. Flush, fill, and bleed power steering system.	P-2	1571
11. Inspect for power steering fluid leakage; determine necessary	P-1	1563
action.		
12. Remove, inspect, replace, and adjust power steering pump	P-1	1564
drive belt.		

Task Number and Description	Priority	Page #s
13. Remove and reinstall power steering pump.	P-2	1571
14. Remove and reinstall press fit power steering pump pulley;	P-2	1568–1569
check pulley and belt alignment.		
15. Inspect and replace power steering hoses and fittings.	P-2	1542–1543
16. Inspect and replace pitman arm, relay (center	P-2	1542
link/intermediate) rod, idler arm and mountings, and steering		
linkage damper.		
17. Inspect, replace, and adjust tie-rod ends (sockets), tie-rod	P-1	1566
sleeves, and clamps.		
18. Test and diagnose components of electronically-controlled	P-3	1527
steering systems using a scan tool; determine necessary action.		
19. Identify hybrid vehicle power steering system electrical	P-2	_
circuits and safety precautions.		
20. Inspect electric power-assisted steering.	P-3	1574
IV. SUSPENSION AND STEERING		
C. Suspension Systems Diagnosis and Repair		
1. Diagnose short and long arm suspension system noises, body	P-1	1513–1514, 1536
sway, and uneven ride height concerns; determine necessary		
action.		
2. Diagnose strut suspension system noises, body sway, and	P-1	—
uneven ride height concerns; determine necessary action.		
3. Inspect, remove, and install upper and lower control arms,	P-3	1522–1524
bushings, shafts, and rebound bumpers.		
4. Inspect, remove, and install strut rods and bushings.	P-3	1525
5. Inspect, remove, and install upper and/or lower ball joints (with	P-2	1519–1521
or without wear indicators).		
6. Inspect, remove, and install steering knuckle assemblies.	P-3	1492
7. Inspect, remove, and install short and long arm suspension	P-3	1517–1518
system coil springs and spring insulators.		
8. Inspect, remove, and install torsion bars and mounts.	P-3	1519–1520
9. Inspect, remove, and install front stabilizer bar (sway bar)	P-3	1499
bushings, brackets, and links.		
10. Inspect, remove, and install strut cartridge or assembly, strut	P-3	1517
coil spring, insulators (silencers), and upper strut bearing mount.		
11. Inspect, remove, and install track bar, strut rods/radius arms,	P-3	1522–1524
and related mounts and bushings.		
12. Inspect rear suspension system leaf spring(s), bushings, center	P-1	1518
pins/bolts, and mounts.		

Task Number and Description	Priority	Page #s
IV. SUSPENSION AND STEERING		
D. Related Suspension and Steering Service		
1. Inspect, remove, and replace shock absorbers; inspect mounts	P-1	1514–1516
and bushings.		
2. Remove, inspect, and service or replace front and rear wheel	P-1	1480–1484
bearings.		
3. Describe the function of the power steering pressure switch.	P-3	
IV. SUSPENSION AND STEERING		
E. Wheel Alignment Diagnosis, Adjustment, and Repair		
1. Diagnose vehicle wander, drift, pull, hard steering, bump steer,	P-1	1581-1589
memory steer, torque steer, and steering return concerns;		
determine necessary action.		
2. Perform prealignment inspection and measure vehicle ride	P-1	1585–1589
height; perform necessary action.		
3. Prepare vehicle for wheel alignment on alignment machine;	P-1	1589–1595
perform four-wheel alignment by checking and adjusting front		
and rear wheel caster, camber and toe as required; center steering		
wheel.		
4. Check toe-out-on-turns (turning radius); determine necessary	P-2	1592
action.		
5. Check SAI (steering axis inclination) and included angle;	P-2	1585
determine necessary action.		
6. Check rear wheel thrust angle; determine necessary action.	P-1	1591
7. Check for front wheel setback; determine necessary action.	P-2	1588
8. Check front and/or rear cradle (subframe) alignment; determine	P-3	1588–1589
necessary action.		
9. Reset steering angle sensor.	P-2	1574, 1661
IV. SUSPENSION AND STEERING		
F. Wheels and Tires Diagnosis and Repair		
1. Inspect tire condition; identify tire wear patterns; check for	P-1	148–150, 1451–
correct tire size and application (load and speed ratings) and		1453, 1467–1470,
adjust air pressure; determine necessary action.		1472
2. Diagnose wheel/tire vibration, shimmy, and noise; determine	P-2	151, 1470–1471,
necessary action.		1474, 1513
3. Rotate tires according to manufacturer's recommendations.	P-1	1472
4. Measure wheel, tire, axle flange, and hub runout; determine	P-2	1474
necessary action.		
5. Diagnose tire pull problems; determine necessary action.	P-2	1470

Task Number and Description	Priority	Page #s
6. Dismount, inspect, and remount tire on wheel; balance wheel	P-1	1474–1478
and tire assembly (static and dynamic).		
7. Dismount, inspect, and remount tire on wheel equipped with	P-2	1479
tire pressure monitoring system sensor.		
8. Inspect tire and wheel assembly for air loss; perform necessary	P-1	1478
action.		
9. Repair tire using internal patch.	P-1	1478
10. Identify and test tire pressure monitoring system (indirect and	P-2	1479–1480
direct) for operation; calibrate system; verify operation of		
instrument panel lamps.		
11. Demonstrate knowledge of steps required to remove and	P-1	1479–1480
replace sensors in a tire pressure monitoring system.		

BRAKES

For every task in Brakes, the following safety requirement must be strictly enforced:

• Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	Page #s
V. BRAKES		
A. General: Brake Systems Diagnosis		
1. Identify and interpret brake system concerns; determine	P-1	1625–1630
necessary action.		
2. Research applicable vehicle and service information, vehicle	P-1	109–114
service history, service precautions, and technical service		
bulletins.		
3. Describe procedure for performing a road test to check brake	P-1	1625, 1669
system operation; including an anti-lock brake system (ABS).		
4. Install wheel and torque lug nuts.	P-1	1473
V. BRAKES		
B. Hydraulic System Diagnosis and Repair		
1. Diagnose pressure concerns in the brake system using	P-1	1603–1604
hydraulic principles (Pascal's Law).		
2. Measure brake pedal height, travel, and free play (as	P-1	1628
applicable); determine necessary action.		
3. Check master cylinder for internal/external leaks and proper	P-1	1627, 1631
operation; determine necessary action.		
4. Remove, bench bleed, and reinstall master cylinder.	P-1	1631–1638
5. Diagnose poor stopping, pulling, or dragging concerns caused	P-3	1625–1628
by malfunctions in the hydraulic system; determine necessary		
action.		
6. Inspect brake lines, flexible hoses, and fittings for leaks, dents,	P-1	1628–1630
kinks, rust, cracks, bulging, and wear; check for loose fittings and		
supports; determine necessary action.		
7. Replace brake lines, hoses, fittings, and supports.	P-2	1634
8. Fabricate brake lines using proper material and flaring	P-2	1634
procedures (double flare and ISO types).		
9. Select, handle, store, and fill brake fluids to proper level.	P-1	1628–1629
10. Inspect, test, and/or replace components of brake warning	P-3	
light system.		
11. Identify components of brake warning light system.	P-2	1627

Task Number and Description	Priority	Page #s
12. Bleed and/or flush brake system.	P-1	1631–1634
13. Test brake fluid for contamination.	P-1	145, 1628–1629
V. BRAKES		
C. Drum Brake Diagnosis and Repair		
1. Diagnose poor stopping, noise, vibration, pulling, grabbing,	P-1	1625–1628
dragging or pedal pulsation concerns; determine necessary action.		
2. Remove, clean, inspect, and measure brake drum diameter;	P-1	1643
determine necessary action.		
3. Refinish brake drum and measure final drum diameter;	P-1	1643–1645
compare with specifications.		
4. Remove, clean, and inspect brake shoes, springs, pins, clips,	P-1	1645–1648
levers, adjusters/self-adjusters, other related brake hardware, and		
backing support plates; lubricate and reassemble.		
5. Inspect wheel cylinders for leaks and proper operation; remove	P-2	1643
and replace as needed.		
6. Pre-adjust brake shoes and parking brake; install brake drums	P-2	1648–1649
or drum/hub assemblies and wheel bearings; perform final checks		
and adjustments.		
V. BRAKES		
D. Disc Brake Diagnosis and Repair		
1. Diagnose poor stopping, noise, vibration, pulling, grabbing,	P-1	1625–1630
dragging, or pulsation concerns; determine necessary action.		
2. Remove and clean caliper assembly; inspect for leaks and	P-1	1637–1638
damage/wear to caliper housing; determine necessary action.		
3. Clean and inspect caliper mounting and slides/pins for proper	P-1	—
operation, wear, and damage; determine necessary action.		
4. Remove, inspect, and replace pads and retaining hardware;	P-1	1629, 1634, 1636
determine necessary action.		
5. Lubricate and reinstall caliper, pads, and related hardware; seat	P-1	1637–1638
pads and inspect for leaks.		
6. Clean and inspect rotor; measure rotor thickness, thickness	P-1	1638–1642
variation, and lateral runout; determine necessary action.		
7. Remove and reinstall rotor.	P-1	1641–1642
8. Refinish rotor on vehicle; measure final rotor thickness and	P-1	1640–1641
compare with specifications.		
9. Refinish rotor off vehicle; measure final rotor thickness and	P-1	1639–1640
compare with specifications.		

Task Number and Description	Priority	Page #s
10. Retract and readjust caliper piston on an integrated parking	P-3	1637–1638
brake system.		
11. Check brake pad wear indicator; determine necessary action.	P-2	—
12. Describe importance of operating vehicle to burnish/break-in	P-1	1636
replacement brake pads according to manufacturer's		
recommendations.		
V. BRAKES		
E. Power-Assist Units Diagnosis and Repair		
1. Check brake pedal travel with, and without, engine running to	P-2	1628
verify proper power booster operation.		
2. Check vacuum supply (manifold or auxiliary pump) to	P-1	1630
vacuum-type power booster.		
3. Inspect vacuum-type power booster unit for leaks; inspect the	P-1	1630
check-valve for proper operation; determine necessary action.		
4. Inspect and test hydraulically-assisted power brake system for	P-3	1630
leaks and proper operation; determine necessary action.		
5. Measure and adjust master cylinder pushrod length.	P-3	1631
V. BRAKES		
F. Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, E	tc.) Diagnosis and	Repair
1. Diagnose wheel bearing noises, wheel shimmy, and vibration	P-3	1470–1471, 1480
concerns; determine necessary action.		
2. Remove, clean, inspect, repack, and install wheel bearings;	P-1	1480, 1482–1483
replace seals; install hub and adjust bearings.		
3. Check parking brake cables and components for wear, binding,	P-2	1629, 1649
and corrosion; clean, lubricate, adjust or replace as needed.		
4. Check parking brake operation and parking brake indicator	P-1	1629, 1649
light system operation; determine necessary action.		
5. Check operation of brake stop light system.	P-1	1480–1483
6. Replace wheel bearing and race.	P-2	1484
7. Remove and reinstall sealed wheel bearing assembly.	P-2	1484
8. Inspect and replace wheel studs.	P-1	1392, 1394
V. BRAKES		
G. Electronic Brake, Traction and Stability Control Systems Dia	gnosis and Repair	
1. Identify and inspect electronic brake control system	P-1	1653–1659, 1662–
components; determine necessary action.		1663
2. Identify traction control/vehicle stability control system	P-3	1660–1661
components.		

Task Number and Description	Priority	Page #s
3. Describe the operation of a regenerative braking system.	P-3	24, 442, 1666–
		1667
4. Diagnose poor stopping, wheel lock-up, abnormal pedal feel,	P-2	1667–1668
unwanted application, and noise concerns associated with the		
electronic brake control system; determine necessary action.		
5. Diagnose electronic brake control system electronic control(s)	P-2	1663
and components by retrieving diagnostic trouble codes, and/or		
using recommended test equipment; determine necessary action.		
6. Depressurize high-pressure components of an electronic brake	P-3	1662
control system.		
7. Bleed the electronic brake control system hydraulic circuits.	P-1	1667
8. Test, diagnose, and service electronic brake control system	P-3	1663, 1665
speed sensors (digital and analog), toothed ring (tone wheel), and		
circuits using a graphing multimeter (GMM)/digital storage		
oscilloscope (DSO) (includes output signal, resistance, shorts to		
voltage/ground, and frequency data).		
9. Diagnose electronic brake control system braking concerns	P-3	—
caused by vehicle modifications (tire size, curb height, final drive		
ratio, etc.).		

ELECTRICAL/ELECTRONIC SYSTEMS

For every task in Electrical/Electronic Systems, the following safety requirement must be strictly enforced:

• Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	Page #s
VI. ELECTRICAL/ELECTRONIC SYSTEMS		
A. General: Electrical System Diagnosis		
1. Research applicable vehicle and service information, vehicle	P-1	109–114
service history, service precautions, and technical service		
bulletins.		
2. Demonstrate knowledge of electrical/electronic series, parallel,	P-1	266–268
and series-parallel circuits using principles of electricity (Ohm's		
Law).		
3. Demonstrate proper use of a digital multimeter (DMM) when	P-1	305, 355–362
measuring source voltage, voltage drop (including grounds),		
current flow, and resistance.		
4. Demonstrate knowledge of the causes and effects from shorts,	P-1	349–352, 416–417

Task Number and Description	Priority	Page #s
grounds, opens, and resistance problems in electrical/electronic		
circuits.		
5. Check operation of electrical circuits with a test light.	P-1	353–354
6. Check operation of electrical circuits with fused jumper wires.	P-1	352–353
7. Use wiring diagrams during the diagnosis (troubleshooting) of	P-1	327–342, 1716–
electrical/electronic circuit problems.		1718
8. Diagnose the cause(s) of excessive key-off battery drain	P-1	494
(parasitic draw); determine necessary action.		
9. Inspect and test fusible links, circuit breakers, and fuses;	P-1	283–284, 326–327,
determine necessary action.		365
10. Inspect and test switches, connectors, relays, solenoid solid-	P-1	419–424
state devices, and wires of electrical/electronic circuits; determine		
necessary action.		
11. Replace electrical connectors and terminal ends.	P-1	324–325
12. Repair wiring harness.	P-1	317–327, 334
13. Perform solder repair of electrical wiring.	P-1	319–320
14. Check electrical/electronic circuit waveforms; interpret	P-2	306, 379–380,
readings and determine needed repairs.		749–753, 1008–
		1018
15. Repair CAN/BUS wiring harness.	P-1	
VI. ELECTRICAL/ELECTRONIC SYSTEMS		
B. Battery Diagnosis and Service		
1. Perform battery state-of-charge test; determine necessary	P-1	492
action.		
2. Confirm proper battery capacity for vehicle application;	P-1	497–498
perform battery capacity test; determine necessary action.		
3. Maintain or restore electronic memory functions.	P-1	425
4. Inspect and clean battery; fill battery cells; check battery	P-1	499, 527–528
cables, connectors, clamps, and hold-downs.		
5. Perform slow/fast battery charge according to manufacturer's	P-1	494
recommendations.		
6. Jump-start vehicle using jumper cables and a booster battery or	P-1	496–497
an auxiliary power supply.		
7. Identify high-voltage circuits of electric or hybrid electric	P-3	355, 438, 454–458,
vehicle and related safety precautions.		499–506
8. Identify electronic modules, security systems, radios, and other	P-1	
accessories that require reinitialization or code entry after		
reconnecting vehicle battery.		

Task Number and Description	Priority	Page #s
9. Identify hybrid vehicle auxiliary (12v) battery service, repair,	P-3	—
and test procedures.		
VI. ELECTRICAL/ELECTRONIC SYSTEMS		
C. Starting System Diagnosis and Repair		
1. Perform starter current draw tests; determine necessary action.	P-1	525-526
2. Perform starter circuit voltage drop tests; determine necessary	P-1	526-527
action.		
3. Inspect and test starter relays and solenoids; determine	P-2	528–529
necessary action.		
4. Remove and install starter in a vehicle.	P-1	530, 532
5. Inspect and test switches, connectors, and wires of starter	P-2	529–530
control circuits; determine necessary action.		
6. Differentiate between electrical and engine mechanical	P-2	524
problems that cause a slow-crank or a no-crank condition.		
VI. ELECTRICAL/ELECTRONIC SYSTEMS		
D. Charging System Diagnosis and Repair		
1. Perform charging system output test; determine necessary	P-1	553–558
action.		
2. Diagnose (troubleshoot) charging system for causes of	P-1	563–564
undercharge, no-charge, or overcharge conditions.		
3. Inspect, adjust, or replace generator (alternator) drive belts;	P-1	552-553, 558-559
check pulleys and tensioners for wear; check pulley and belt		
alignment.		
4. Remove, inspect, and re-install generator (alternator).	P-1	558–559
5. Perform charging circuit voltage drop tests; determine	P-1	526–527
necessary action.		
VI. ELECTRICAL/ELECTRONIC SYSTEMS		
E. Lighting Systems Diagnosis and Repair		
1. Diagnose (troubleshoot) the causes of brighter-than-normal,	P-1	635
intermittent, dim, or no light operation; determine necessary		
action.		
2. Inspect interior and exterior lamps and sockets including	P-1	613–616
headlights and auxiliary lights (fog lights/driving lights); replace		
as needed.		
3. Aim headlights.	P-2	616–617
4. Identify system voltage and safety precautions associated with	P-2	607, 615
high-intensity discharge headlights.		

Task Number and Description	Priority	Page #s
VI. ELECTRICAL/ELECTRONIC SYSTEMS		
F. Gauges, Warning Devices, and Driver Information Systems I	Diagnosis and Repair	
1. Inspect and test gauges and gauge sending units for causes of	P-2	622–623, 883, 925
abnormal gauge readings; determine necessary action.		
2. Diagnose (troubleshoot) the causes of incorrect operation of	P-2	925
warning devices and other driver information systems; determine		
necessary action.		
VI. ELECTRICAL/ELECTRONIC SYSTEMS		
G. Horn and Wiper/Washer Diagnosis and Repair		
1. Diagnose (troubleshoot) causes of incorrect horn operation;	P-1	631–632
perform necessary action.		
2. Diagnose (troubleshoot) causes of incorrect wiper operation;	P-2	630–631
diagnose wiper speed control and park problems; perform		
necessary action.		
3. Diagnose (troubleshoot) windshield washer problems; perform	P-2	631
necessary action.		
VI. ELECTRICAL/ELECTRONIC SYSTEMS		
H. Accessories Diagnosis and Repair		
1. Diagnose (troubleshoot) incorrect operation of motor-driven	P-2	645, 647, 649, 655
accessory circuits; determine necessary action.		
2. Diagnose (troubleshoot) incorrect electric lock operation	P-2	307, 649
(including remote keyless entry); determine necessary action.		
3. Diagnose (troubleshoot) incorrect operation of cruise control	P-3	654
systems; determine necessary action.		
4. Diagnose (troubleshoot) supplemental restraint system (SRS)	P-2	1743
problems; determine necessary action.		
5. Disable and enable an airbag system for vehicle service; verify	P-1	1743, 1745–1746
indicator lamp operation.		
6. Remove and reinstall door panel.	P-1	649
7. Check for module communication errors (including CAN/BUS	P-2	767
systems) using a scan tool.		
8. Describe the operation of keyless entry/remote-start systems.	P-3	665–666
9. Verify operation of instrument panel gauges and	P-1	882-883
warning/indicator lights; reset maintenance indicators.		
10. Verify windshield wiper and washer operation, replace wiper	P-1	630
blades.		
11. Diagnose (troubleshoot) radio static and weak, intermittent, or	P-3	640-641
no radio reception; determine necessary action.		

Task Number and Description	Priority	Page #s
12. Diagnose (troubleshoot) body electronic system circuits using	P-3	
a scan tool; determine necessary action.		
13. Diagnose the cause(s) of false, intermittent, or no operation of	P-3	672–673
anti-theft systems.		
14. Describe the process for software transfers, software updates,	P-3	424–428
or flash reprogramming on electronic modules.		

HEATING AND AIR CONDITIONING

For every task in Heating and Air Conditioning, the following safety requirement must be strictly enforced:

• Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	Page #s
VII. HEATING AND AIR CONDITIONING		
A. General: A/C System Diagnosis and Repair		
1. Identify and interpret heating and air conditioning problems;	P-1	1697, 1722–1723
determine necessary action.		
2. Research applicable vehicle and service information, vehicle	P-1	109–114
service history, service precautions, and technical service		
bulletins.		
3. Performance test A/C system; identify problems.	P-1	1702–1706
4. Identify abnormal operating noises in the A/C system;	P-2	1709
determine necessary action.		
5. Identify refrigerant type; select and connect proper gauge set;	P-1	1699, 1701–1706
record temperature and pressure readings.		
6. Leak test A/C system; determine necessary action.	P-1	1706–1707
7. Inspect condition of refrigerant oil removed from A/C system;	P-2	—
determine necessary action.		
8. Determine recommended oil and oil capacity for system	P-1	1714
application.		
9. Using a scan tool, observe and record related HVAC data and	P-3	860-861, 1697-
trouble codes.		1698
VII. HEATING AND AIR CONDITIONING		
B. Refrigeration System Component Diagnosis and Repair		
1. Inspect and replace A/C compressor drive belts, pulleys, and	P-1	1709–1710
tensioners; determine necessary action.		

Task Number and Description	Priority	Page #s
2. Inspect, test, service or replace A/C compressor clutch	P-2	1709–1710
components and/or assembly; check compressor clutch air gap;		
adjust as needed.		
3. Remove, inspect, and reinstall A/C compressor and mountings;	P-2	1710
determine recommended oil quantity.		
4. Identify hybrid vehicle A/C system electrical circuits and	P-2	462
service/safety precautions.		
5. Determine need for an additional A/C system filter; perform	P-3	
necessary action.		
6. Remove and inspect A/C system mufflers, hoses, lines, fittings,	P-2	1701–1702
O-rings, seals, and service valves; perform necessary action.		
7. Inspect A/C condenser for airflow restrictions; perform	P-1	1710
necessary action.		
8. Remove, inspect, and reinstall receiver/drier or	P-2	1710
accumulator/drier; determine recommended oil quantity.		
9. Remove, inspect, and install expansion valve or orifice	P-1	1710
(expansion) tube.		
10. Inspect evaporator housing water drain; perform necessary	P-1	1708
action.		
11. Diagnose A/C system conditions that cause the protection	P-2	1710
devices (pressure, thermal, and PCM) to interrupt system		
operation; determine necessary action.		
12. Determine procedure to remove and reinstall evaporator;	P-2	1708
determine required oil quantity.		
13. Remove, inspect, and reinstall condenser; determine required	P-2	1710, 1714
oil quantity.		
VII. HEATING AND AIR CONDITIONING		
C. Heating, Ventilation, and Engine Cooling Systems Diagnosis	and Repair	
1. Inspect engine cooling and heater systems hoses; perform	P-1	1710, 1714
necessary action.		
2. Inspect and test heater control valve(s); perform necessary	P-2	1714
action.		
3. Diagnose temperature control problems in the	P-2	1714
heater/ventilation system; determine necessary action.		
4. Determine procedure to remove, inspect, and reinstall heater	P-2	1687, 1715
core.		
VII. HEATING AND AIR CONDITIONING		
D. Operating Systems and Related Controls Diagnosis and Repa	air	

Task Number and Description	Priority	Page #s
1. Inspect and test A/C-heater blower motors, resistors, switches,	P-1	1715
relays, wiring, and protection devices; perform necessary action.		
2. Diagnose A/C compressor clutch control systems; determine	P-2	1709
necessary action.		
3. Diagnose malfunctions in the vacuum, mechanical, and	P-2	1708–1710, 1714–
electrical components and controls of the heating, ventilation, and		1716, 1722–1723
A/C (HVAC) system; determine necessary action.		
4. Inspect and test A/C-heater control panel assembly; determine	P-3	—
necessary action.		
5. Inspect and test A/C-heater control cables, motors, and	P-3	—
linkages; perform necessary action.		
6. Inspect A/C-heater ducts, doors, hoses, cabin filters, and	P-1	146–147
outlets; perform necessary action.		
7. Identify the source of A/C system odors.	P-2	1708
8. Check operation of automatic or semiautomatic heating,	P-2	1716–1717
ventilation, and air-conditioning (HVAC) control systems;		
determine necessary action.		
VII. HEATING AND AIR CONDITIONING		
E. Refrigerant Recovery, Recycling, and Handling		
1. Perform correct use and maintenance of refrigerant handling	P-1	
equipment according to equipment manufacturer's standards.		
2. Identify and recover A/C system refrigerant.	P-1	1675, 1707–1708
3. Recycle, label, and store refrigerant.	P-1	153
4. Evacuate and charge A/C system; add refrigerant oil as	P-1	1711–1714
required.		

ENGINE PERFORMANCE

For every task in Engine Performance, the following safety requirement must be strictly enforced:

• Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Task Number and Description	Priority	Page #s
VIII. ENGINE PERFORMANCE		
A. General: Engine Diagnosis		
1. Identify and interpret engine performance concerns; determine	P-1	114–115, 988–999
necessary action.		
2. Research applicable vehicle and service information, vehicle	P-1	109–114, 989–990
service history, service precautions, and technical service		

Task Number and Description	Priority	Page #s
bulletins.		
3. Diagnose abnormal engine noises or vibration concerns;	P-3	151, 684–685, 994,
determine necessary action.		996, 1026, 1028,
		1036–1037, 1040,
		1042, 1047–1051
4. Diagnose the cause of excessive oil consumption, coolant	P-2	1026–1028
consumption, unusual exhaust color, odor, and sound; determine		
necessary action.		
5. Perform engine absolute (vacuum/boost) manifold pressure	P-1	997, 1034
tests; determine necessary action.		
6. Perform cylinder power balance test; determine necessary	P-2	1034–1035
action.		
7. Perform cylinder cranking and running compression tests;	P-1	1029–1034, 1055–
determine necessary action.		1056
8. Perform cylinder leakage test; determine necessary action.	P-1	1034
9. Diagnose engine mechanical, electrical, electronic, fuel, and	P-2	991–997, 1026–
ignition concerns; determine necessary action.		1035
10. Verify engine operating temperature; determine necessary	P-1	837–838
action.		
11. Verify correct camshaft timing.	P-1	1175–1179
VIII. ENGINE PERFORMANCE		
B. Computerized Controls Diagnosis and Repair		
1. Retrieve and record diagnostic trouble codes, OBD monitor	P-1	403-411, 415-416,
status, and freeze-frame data; clear codes when applicable.		994
2. Access and use service information to perform step-by-step	P-1	348–349
(troubleshooting) diagnosis.		
3. Perform active tests of actuators using a scan tool; determine	P-2	409–410, 417,
necessary action.		1004
4. Describe the importance of running all OBD II monitors for	P-1	400, 747–748,
repair verification.		952–953
5. Diagnose the causes of emissions or driveability concerns with	P-1	958
stored or active diagnostic trouble codes; obtain, graph, and		
interpret scan tool data.		
6. Diagnose emissions or driveability concerns without stored	P-1	967–968
diagnostic trouble codes; determine necessary action.		

Task Number and Description	Priority	Page #s
7. Inspect and test computerized engine control system sensors,	P-2	1014–1018
powertrain/engine control module (PCM/ECM), actuators, and		
circuits using a graphing multimeter (GMM)/digital storage		
oscilloscope (DSO); perform necessary action.		
8. Diagnose driveability and emissions problems resulting from	P-3	
malfunctions of interrelated systems (cruise control, security		
alarms, suspension controls, traction controls, A/C, automatic		—
transmissions, non-OEM installed accessories, or similar		
systems); determine necessary action.		
VIII. ENGINE PERFORMANCE		
C. Ignition System Diagnosis and Repair		
1. Diagnose (troubleshoot) ignition system related problems such	P-2	581-586, 600-601
as no-starting, hard starting, engine misfire, poor driveability,		
spark knock, power loss, poor mileage, and emissions concerns;		
determine necessary action.		
2. Inspect and test crankshaft and camshaft position sensor(s);	P-1	594–596
perform necessary action.		
3. Inspect, test, and/or replace ignition control module,	P-3	594–595
powertrain/engine control module; reprogram as necessary.		
4. Remove and replace spark plugs; inspect secondary ignition	P-1	586–591
components for wear and damage.		
VIII. ENGINE PERFORMANCE		
D. Fuel, Air Induction, and Exhaust Systems Diagnosis and Rep	oair	
1. Diagnose (troubleshoot) hot or cold no-starting, hard starting,	P-2	744–745, 808,
poor driveability, incorrect idle speed, poor idle, flooding,		991–997
hesitation, surging, engine misfire, power loss, stalling, poor		
mileage, dieseling, and emissions problems; determine necessary		
action.		
2. Check fuel for contaminants; determine necessary action.	P-2	706, 710–711
3. Inspect and test fuel pumps and pump control systems for	P-1	711–715
pressure, regulation, and volume; perform necessary action.		
4. Replace fuel filter(s).	P-1	701
5. Inspect, service, or replace air filters, filter housings, and	P-1	715–716
intake duct work.		
6. Inspect throttle body, air induction system, intake manifold and	P-2	1051
gaskets for vacuum leaks and/or unmetered air.		
7. Inspect and test fuel injectors.	P-2	745–756, 749–754,
		756–758

Task Number and Description	Priority	Page #s
8. Verify idle control operation.	P-1	767
9. Inspect integrity of the exhaust manifold, exhaust pipes,	P-1	801-802, 1051
muffler(s), catalytic converter(s), resonator(s), tailpipe(s), and		
heat shields; perform necessary action.		
10. Inspect condition of exhaust system hangers, brackets,	P-1	801-805
clamps, and heat shields; repair or replace as needed.		
11. Perform exhaust system back-pressure test; determine	P-2	975, 802–803
necessary action.		
12. Check and refill diesel exhaust fluid (DEF).	P-3	
13. Test the operation of turbocharger/supercharger systems;	P-3	817-819, 824-830
determine necessary action.		
VIII. ENGINE PERFORMANCE		
E. Emissions Control Systems Diagnosis and Repair		
1. Diagnose oil leaks, emissions, and driveability concerns caused	P-3	968–969, 971–972
by the positive crankcase ventilation (PCV) system; determine		
necessary action.		
2. Inspect, test, and service positive crankcase ventilation (PCV)	P-2	926, 968–969,
filter/breather cap, valve, tubes, orifices, and hoses; perform		971–972
necessary action.		
3. Diagnose emissions and driveability concerns caused by the	P-3	972–973
exhaust gas recirculation (EGR) system; determine necessary		
action.		
4. Diagnose emissions and driveability concerns caused by the	P-2	975–976
secondary air injection and catalytic converter systems; determine		
necessary action.		
5. Diagnose emissions and driveability concerns caused by the	P-2	972
evaporative emissions control system; determine necessary		
action.		
6. Inspect and test electrical/electronic sensors, controls, and	P-2	973
wiring of exhaust gas recirculation (EGR) systems; perform		
necessary action.		
7. Inspect, test, service, and replace components of the EGR	P-2	968
system including tubing, exhaust passages, vacuum/pressure		
controls, filters, and hoses; perform necessary action.		
8. Inspect and test electrical/electronically-operated components	P-3	973, 975
and circuits of air injection systems; perform necessary action.		
9. Inspect and test catalytic converter efficiency.	P-2	976
10. Inspect and test components and hoses of the evaporative	P-1	972

Task Number and Description	Priority	Page #s
emissions control system; perform necessary action.		
11. Interpret diagnostic trouble codes (DTCs) and scan tool data	P-3	958
related to the emissions control systems; determine necessary		
action.		

REQUIRED SUPPLEMENTAL TASKS

Task Number and Description	Page #s
Shop and Personal Safety	
1. Identify general shop safety rules and procedures.	83-84
2. Utilize safe procedures for handling of tools and equipment.	77, 83
3. Identify and use proper placement of floor jacks and jack	84
stands.	
4. Identify and use proper procedures for safe lift operation.	76–77
5. Utilize proper ventilation procedures for working within the	81
lab/shop area.	
6. Identify marked safety areas.	78
7. Identify the location and the types of fire extinguishers and	79–80
other fire safety equipment; demonstrate knowledge of the	
procedures for using fire extinguishers and other fire safety	
equipment.	
8. Identify the location and use of eyewash stations.	83
9. Identify the location of the posted evacuation routes.	78
10. Comply with the required use of safety glasses, ear protection,	83
gloves, and shoes during lab/shop activities.	
11. Identify and wear appropriate clothing for lab/shop activities.	83
12. Secure hair and jewelry for lab/shop activities.	83
13. Demonstrate awareness of the safety aspects of supplemental	54, 82, 454–458, 607
restraint systems (SRS), electronic brake control systems, and	
hybrid vehicle high voltage circuits.	
14. Demonstrate awareness of the safety aspects of high voltage	54, 82, 607
circuits (such as high intensity discharge (HID) lamps, ignition	
systems, injection systems, etc.).	
15. Locate and demonstrate knowledge of material safety data	84-85
sheets (MSDS).	
Tools and Equipment	
1. Identify tools and their usage in automotive applications.	42–54, 59–71
2. Identify standard and metric designation.	89–90
3. Demonstrate safe handling and use of appropriate tools.	42, 51–52, 59–70

Task Number and Description	Page #s
4. Demonstrate proper cleaning, storage, and maintenance of tools	41-42
and equipment.	
5. Demonstrate proper use of precision measuring tools (i.e.,	91, 93–97, 106, 880
micrometer, dial-indicator, dial-caliper).	
Preparing Vehicle for Service	
1. Identify information needed and the service requested on a	114–115
repair order.	
2. Identify purpose and demonstrate proper use of fender covers,	71
mats.	
3. Demonstrate use of the three Cs (concern, cause, and	112
correction).	
4. Review vehicle service history.	
5. Complete work order to include customer information, vehicle	114–115
identifying information, customer concern, related service history,	
cause, and correction.	
Preparing Vehicle for Customer	
1. Ensure vehicle is prepared to return to customer per	71, 148, 1222
school/company policy (floor mats, steering wheel cover, etc.).	

Workplace Employability Skills

Task Number and Description	Page #s
Personal Standards	
1. Reports to work daily on time; able to take directions and motivated to	157, 230
accomplish the task at hand.	
2. Dresses appropriately and uses language and manners suitable for the	159
workplace.	
3. Maintains appropriate personal hygiene	159
4. Meets and maintains employment eligibility criteria, such as drug/alcohol-	159
free status, clean driving record, etc.	
5. Demonstrates honesty, integrity, and reliability.	159, 230, 296, 342

Task Number and Description	Page #s
Work Habits/Ethic	
1. Complies with workplace policies/laws.	1384
2. Contributes to the success of the team, assists others and requests help	158–159, 180
when needed.	
3. Works well with all customers and coworkers.	72, 84, 180
4. Negotiates solutions to interpersonal and workplace conflicts.	158
5. Contributes ideas and initiative.	158
6. Follows directions.	158
7. Communicates (written and verbal) effectively with customers and	84, 159–160, 180
coworkers.	
8. Reads and interprets workplace documents; writes clearly and concisely.	160
9. Analyzes and resolves problems that arise in completing assigned tasks.	158
10. Organizes and implements a productive plan of work.	158–159, 854–855
11. Uses scientific, technical, engineering, and mathematics principles and	89–105, 266–272, 316, 347–
reasoning to accomplish assigned tasks.	349, 1603–1604
12. Identifies and addresses the needs of all customers, providing helpful,	84, 160, 194, 296
courteous, and knowledgeable service and advice as needed.	