A8 ENGINE PERFORMANCE

	MAST - 1200 Hours	AST - 840 Hours	MLR - 540 Hours	CL-1930	EM-140C ALL	EM-140S-HY04	EM-140S-GM06A	EM-141S + EM-145S	EM-200-14	EM-200-22	EM-200-25	EM-330-1
A. General												
1. Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS).	P-1	P-1	P-1		X	X	X	X	X	X		X
2. Retrieve and record on-board diagnostics, DTCs, monitor status, and freeze frame data; clear codes and data when directed.	P-1	P-1	P-1		X	X	X	X				X
3. Verify proper engine cooling system operation; determine needed action.	P-1	P-1	P-1		X	X	X	X				
4. Verify correct camshaft timing including engines equipped with variable valve timing (VVT) systems; determine needed action.	P-1	P-1	P-1		X	X	X	X				
5. Identify and interpret engine performance concerns; determine needed action.	P-1	P-1			X	X	X	X				
6. Diagnose abnormal engine noises or vibration concerns; determine needed action.	P-2	P-3			X	X	X	X				
7. Diagnose the cause of excessive oil consumption, coolant consumption, unusual exhaust color, odor, and sound; determine needed action.	P-2	P-2						X				
8. Perform engine manifold pressure tests (vacuum/boost); determine needed action.	P-1	P-1			X	X	X	X				
9. Perform cylinder power balance test; determine needed action.	P-1	P-2			X	X	X	X				
10. Perform cylinder cranking and running compression tests; determine needed action.	P-1	P-1			X	X	X	X				
11. Perform cylinder leakage test; determine needed action.	P-1	P-1			X	X	X	X				
B. Computerized Controls												
1. Identify computerized control system components and configurations.	P-1	P-1	P-1		X	X	X	X	X			X
2. Access and use service information to perform step-by-step (troubleshooting) diagnosis.	P-1	P-1			X	X	X	X	X	X		X
3. Perform active tests of actuators using a scan tool; determine needed action.	P-1	P-1			X	X	X	X				
4. Demonstrate knowledge of OBD readiness flags, monitors, and drive cycle for repair verification.	P-1	P-1			X	X	X	X		X		
5. Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM), digital storage oscilloscope (DSO), and/or scan tool; determine needed action.	P-1	P-2		X	X	X	X	X	X		X	X
6. Describe the process for reprogramming or recalibrating the powertrain/engine control module (PCM/ECM).	P-1	P-1			X	X	X	X				
7. Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes (DTC); obtain, graph, and interpret scan tool data.	P-1				X	X	X	X				X
8. Diagnose emissions or driveability concerns without stored or active diagnostic trouble codes; determine needed action.	P-1				X	X	X	X				
9. Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, HVAC, automatic transmissions, non-OEM installed accessories, or similar systems); determine needed action.	P-2						X					
C. Ignition System												
1. Identify ignition system components and configurations.	P-1	P-1	P-1		X	X	X	X	X			X
2. Remove and replace spark plugs; inspect secondary ignition components for wear and damage; determine needed action.	P-1	P-1	P-2		X	X	X	X				
3. Diagnose no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns related to ignition system problems; determine needed action.	P-1	P-2			X	X	X	X	X		X	X
4. Inspect and test crankshaft and camshaft position sensor(s); determine needed action.	P-1	P-2			X	X	X	X	X		X	X
5. Inspect, test, and/or replace ignition control module and/or powertrain/engine control module; reprogram/initialize as needed.	P-2	P-2			X	X	X					
D. Fuel, Air Induction, and Exhaust Systems												
1. Identify fuel, air induction, and exhaust system components and configurations.	P-1	P-1	P-1		X	X	X	X				X

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2. Replace fuel filter(s) where applicable.	P-3	P-3	P-3									
3. Inspect, service, or replace air filters, filter housings, and intake duct work.	P-1	P-1	P-1		X	X	X	X				
4. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields for leaks and unmetered air; determine needed action.	P-1	P-1	P-1		X	X	X	X				
5. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine needed action.	P-1	P-1	P-1		X	X	X	X				
6. Check and refill diesel exhaust fluid (DEF).	P-3	P-3	P-3									
7. Check fuel for quality, composition, and contamination; determine needed action.	P-1	P-2			X	X	X	X				
8. Inspect and test fuel pump(s) and pump control system for pressure, regulation, and volume; determine needed action.	P-1	P-1			X	X	X	X				
9. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.	P-1	P-1			X	X	X	X				
10. Inspect, test, and/or replace fuel injectors on low- and high-pressure systems.	P-1	P-2				X	X	X				X
11. Verify proper idle speed; determine needed action.	P-1	P-1			X	X	X	X				X
12. Perform exhaust system back-pressure test; determine needed action.	P-2	P-2			X	X	X	X				
13. Demonstrate knowledge of the operation of turbocharger/supercharger systems.	P-2	P-2			X	X	X	X				X
14. Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, engine run-on, and emissions problems related to fuel, air induction, and exhaust system problems; determine needed action.	P-2						X					
E. Emissions Control Systems												
1. Identify emission control system components and configurations.	P-1	P-1	P-1		X	X	X	X		X		
2. Inspect, test, service, and/or replace positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; determine needed action.	P-2	P-2	P-2		X	X	X	X				
3. Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine needed action.	P-2	P-2			X	X	X	X				
4. Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; inspect, test, service and/or replace electrical/electronic sensors, controls, wiring, tubing, exhaust passages, coolers, vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) system; determine needed action.	P-1	P-2			X	X		X				
6. Diagnose emission and driveability concerns caused by catalytic converter system; determine needed action.	P-1	P-1			X	X	X	X				
7. Diagnose emissions and driveability concerns caused by the evaporative emissions control (EVAP) system; determine needed action.	P-1	P-1			X	X	X	X		X		