

# CDX Plus ASE Menu Topic List

Category	Topic area	Topic group	Topic
Foundation & Safety	Occupational Safety & Health	Hazards & emergencies	Basic safety introduction • Identifying hazards • Evacuating in an emergency • Fuel fires • Fire extinguishers • Using an MSDS • Removing toxic dust • Lifting equipment • Moving & road testing vehicles • Running engines • Used engine oil • Vehicle valeting hazards • Electrical safety
		Personal & property safety	Personal protection • Basic injury prevention • Basic first aid & CPR • Property security
		Occupational safety & health tasksheets	C451: Identify general shop rules & procedures. (Foundation & Safety) • C452: Use safe tool handling procedures. (Foundation & Safety) • C455: Use proper ventilation procedures. (Foundation & Safety) • C456: Identify marked safety areas. (Foundation & Safety) • C457: Identify the location & use of fire blankets. (Foundation & Safety) • C458: Identify the types & location of fire extinguishers. (Foundation & Safety) • C459: Identify the location & use of eye wash stations. (Foundation & Safety) • C460: Identify the location of posted evacuation routes. (Foundation & Safety) • C461: Use workshop personal protection items. (Foundation & Safety) • C462: Identify & wear appropriate workshop clothing. (Foundation & Safety) • C463: Comply with appropriate workshop hairstyles. (Foundation & Safety) • C465: Locate & demonstrate knowledge of MSDSs. (Foundation & Safety) • C504: Correctly store & dispose of automotive fluids. (Foundation & Safety) • C508: AST: Identify personal safety equipment. (Foundation & Safety) • C509: AST: Document safe workshop practices. ((Foundation & Safety) • C510: AST: Document compliance practices. (Foundation & Safety) • C523: Carry out personal workplace requirements. (Non-NATEF) • C533: Store & use hazardous automotive materials. (Non-NATEF) • C588: Using a fire extinguisher. (Non-NATEF)
	Hand & Power Tools	Basic tool preparation	Safety first • Hardening & tempering • Carbon-alloy
		Tools & equipment fundamentals	Lockout/tagout • Cleaning tools & equipment • Identifying defective equipment • Compressed air equipment • Rolling road & brake testing equipment • Batteries & chargers • Vehicle inspection pits • Wheel & tire safety
		Power tools	Drills & drill bits • Power grinder • Air tools
		Using electric power tools	Using an angle grinder • Using a bench grinder • Using pressure washers & cleaners
		Using air power tools	Using an air drill • Using an air impact wrench • Using an air blow gun • Using an air chisel

	Common workshop tools	Basic hand tools • Hammers • Chisels • Saws • Screw-drivers • Vices & clamps • Spanners • Sockets & accessories • Pliers • Wrenches • Files • Torque wrenches
	Automotive tools	Pipe flaring & cutting • Marking tools • Gauges • Taps & dies • Fasteners • Pullers • Punches • Riveting tools
	Using non-powered tools	Repairing an external thread • Repairing an internal thread • Removing a stud • Using a screw extractor • Using a gear puller
	Using measuring tools	Using a torque wrench & an angle gauge • Using a thread pitch gauge • Using a vacuum gauge • Using a dial indicator • Using a feeler gauge • Using a micrometer • Using a tire pressure gauge
	Hand & power tools tasksheets	C466: Identify automotive tools & their usage. (Foundation & Safety) • C468: Demonstrate safe tool handling & use. (Foundation & Safety) • C469: Demonstrate proper tool maintenance. (Foundation & Safety) • C532: Use automotive fastening systems. (Non-NATEF) • C537: Use & maintain component cleaning equipment. (Non-NATEF)
Workshop Equipment	Diagnostic equipment	Dynamometer • Pressure testers • Scan tools • Multimeters (DMM/DVOM) • Test light • Hydrometer
	Lifting equipment	Vehicle hoists • Jacks • Stands • Engine & component hoists
	Using workshop equipment	Using a two-post hoist • Using a four-post hoist • Using an engine hoist • Using a floor jack • Setting up an oxyacetylene torch • Using an oxyacetylene torch
	Workshop equipment tasksheets	C453: Use floor jacks & jack stands. (Foundation & Safety) • C454: Identify & use safe lift procedures. (Foundation & Safety) • C507: Use resistance welding equipment. (Non-NATEF) • C521: Carry out automotive engineering tasks. (Non-NATEF) • C522: Use an oxyacetylene welding plant. (Non-NATEF) • C536: Prepare a vehicle for use & shutdown after use. (Non-NATEF)
Vehicle Information	Information procedures	Locating vehicle information • Decoding a VIN • Obtaining & interpreting scan tool data • Using a repair manual • Using a shop manual • Using an owner's manual • Using a labor guide • Using a parts program • Using a service information program
	Vehicle information tasksheets	C470: Identify and use sources of service information. (Non-NATEF) • C471: Identify and use VIN information. (Foundation & Safety) • C472: Identify information needed on a repair order. (Foundation & Safety) • C475: Review vehicle service history. (Foundation & Safety) • C531: Maintain automotive stock security. (Non-NATEF)
Vehicle Configurations	Engine layouts	Identifying engines • Engine configurations

	Body designs	Sedan • Station wagon • Coupe • Hatch-back • Pick-up/utility • Light vehicle vans • General goods transport vehicles • Buses & coaches • Convertible • Truck • Vehicle closures
	Drive configurations	Engine & transmission configurations • Vehicle axles • Location of driving axles • Transmissions & final drives • 4-wheel drive transmission • Chassis • Transmission components • Chassis configurations
	Vehicle inspection procedures	Carrying out a visual inspection • Inspecting under body components • Measuring a wheelbase • Checking windshield washer liquid • Checking & replacing wiper blades • Checking a security system • Checking door hinges • Checking a seat belt • Checking interior trim • Checking driver's seat fabric • Vehicle valet service • Routine vehicle checks
	Vehicle configurations tasksheets	C473: Demonstrate proper use of fender covers & mats. (Foundation & Safety) • C474: Demonstrate use of 3Cs. (Foundation & Safety) • C476: Prepare vehicle for return to customer. (Foundation & Safety) • C481: Check & adjust windshield washer fluid level. (Non-NATEF) • C482: Check & replace wiper blades. (Non-NATEF) • C487: Determine fluid requirements. (Non-NATEF) • C488: Inspect powertrain mount. (Non-NATEF) • C489: Diagnose fluid usage level & condition. (Non-NATEF) • C502: Carry out a full valet/detail on a vehicle. (Non-NATEF) • C505: Identify vehicle types & body components. (Foundation & Safety) • C506: Make vehicle body adjustments. (Non-NATEF) • C512: Carry out a vehicle safety inspection. (Non-NATEF) • C515: Diagnose etc. vehicle chassis system faults. (Non-NATEF) • C534: Identify motor vehicle systems & functions. (Non-NATEF) • C538: Remove & replace motor body parts & trim. (Non-NATEF)
Communication	Workplace scenario 1	A day with Henry
	Active listening	I am listening • I am with you
	Art of speaking	You know what I mean? • May I ask a question? • On the phone
	People skills	The other half • Good team player • How may I help you?
	Effective reading	Practice makes perfect
	Writing at work	Yours sincerely • Job sheet • Inspection report • Equipment defect report • Accident report
	Researching	How to go about it • Where to look
	Workplace scenario 2	Another day with Henry
	Communication tasksheets	C513: Identify & agree customer vehicle needs. (Foundation & Safety) • C589: Write business correspondence. (Foundation & Safety) • C590: Job sheet. (Foundation & Safety) • C591: Inspection report. (Foundation & Safety) • C592: Equipment defect report. (Foundation & Safety) • C593: Accident report. (Foundation & Safety) • C594: Where to look. (Foundation & Safety)

Supporting Science	Units of measure	Multiples and decimals for the SI system • Length • Mass • Time • Velocity • Volume • Area • Electrical units • Pressure • Energy • Temperature • Torque • Power	
	Information & tools	Gross vehicle mass • Hardening & tempering • Carbon-alloy • Bitumen • Vacuum	
	Engines	Engine displacement • Electrolysis	
	Engine cycles	Pressure & temperature • Pressure & volume • Temperature & energy • Alloys • Engine output • Power range	
	Engine components	Grey iron • Turbulence • Valve-timing diagram • Compression ratio	
	Engine cooling	Electrolysis • Centrifugal force • Thermo-switch • Boiling point & pressure	
	Fuel systems	Bernoulli's principle • Carbon monoxide • Venturi • Volumetric efficiency • Thermal expansion • Frequency • Back-pressure • Stoichiometric ratio • Pressure & vacuum • Air density • Tachometric relay • Potentiometer • Closed loop	
	Chassis	Asbestos • Electronic stability program • Rolling friction • Traction control • Helix • Unsprung weight • Dampening • Coefficient of friction • Lever/mechanical advantage • Hydraulic pressure & force • Bleeding	
	Electrics	Absolute zero • Atoms • Electrical charge • Electrical conduction • Electrolyte	
	Electronics	Subatomic particles • Electronics • Faraday's law • Stepper motor • Tolerances • Transformer	
	Supporting science task sheets	C467: Identify standard & metric designation. (Foundation & Safety) • C496: Correctly process payment transactions. (Non-NATEF) • C511: AST: Document organizational structures. (Foundation & Safety) • C539: AST: Solve problems using calculations. (Non-NATEF)	
ASE 1: Engine Repair	Motive Power Types	Motive power fundamental principles	Pressure & temperature • Pressure & volume • Temperature & energy • Understanding power and torque
		4-stroke spark-ignition engines	Basic 4-stroke principles • 4-stroke engine cycle
		2-stroke spark-ignition engines	Basic 2-stroke principles • 2-stroke engine power stroke • 2-stroke engine cycle • 2-stroke intake system • 2-stroke cycle
		Spark-ignition engine components	Basic engine components • 4 & 2-stroke engine differences • Engine cams & camshaft • Engine power transfer • 2-stroke power transfer • Scavenging • Counter weights • Piston components • Alloys
		Rotary spark-ignition engine & components	Basic principles of the rotary engine • Basic components of the rotary engine • Rotary engine cycle • Rotary/piston engine comparison • Rotary engine power pulses • Renesis rotary engine
		Alternative engine cycles	Alternative engine cycles
		Compression-ignition engines	Basic 4-stroke diesel principles • 4-stroke diesel engine cycle • Basic 2-stroke diesel principles • 2-stroke diesel engine cycle • Three phases of combustion

	Compression-ignition engine components	Basic diesel engine components • Diesel engine passages • Diesel fuel delivery • Direct injection • Diesel valves & components • Diesel scavenging • Crankshaft rotation • Diesel crankshaft • Diesel engine pistons
	Engine characteristics	Engine output • Power range
	Motive power types tasksheets	C001: Interpret engine concern. • C004: Locate fuel oil coolant & other leaks. • C006: Diagnose oil usage & exhaust color problems. • C540: Work order: Engine repair. (2005 only)
Hybrid Drive Systems	Hybrid drive systems	Hybrid vehicles • Hybrid electric vehicle models • Hybrid vehicle systems • Series-parallel hybrid systems • Hybrid system components • Hybrid vehicle driving
Engine Removal & Refit	Preparation	Engine removal preparation & safety
	Removing the engine	Topside engine disconnection • Front accessories disconnection • Underside engine disconnection • Remove the engine
	Engine re-installing	Hoist & reconnect the engine • Connect engine peripherals
	Engine start-up	Pre-start engine check • Camshaft break-in • Engine timing adjustment
	Engine removal & refit tasksheets	C002: Research engine service information. • C003: Interpret engine & component ID numbers. • C011: Remove/reinstall engine - FWD OBDII vehicle. • C012: Remove/reinstall engine - RWD OBDII vehicle. • C047: Inspect replace & adjust engine drive belts.
Engine Components	Cylinder heads	Cylinder head • Cylinder head design • Diesel combustion chambers • Intake & exhaust passages • Gaskets • Gaskets and oil seals • Head gaskets • Turbulence
	Valves & valve trains	Valves • Valve seats • Valve seats in cylinder heads • Valve rotation • Valve stem oil seals • Intake valves • Valve trains • Valve-timing diagram • Variable valve timing
	Camshafts & drives	Camshafts & drives • Overhead camshaft • Cam lobes • Timing belts & chains • Timing belts & tensioners
	Cylinder blocks	Cylinder block • Cylinder block construction • Engine blocks & pistons • Cylinder sleeves • Grey iron
	Pistons	Pistons • Piston rings • Connecting rod • Compression ratio
	Crankshaft assemblies	Crankshaft • Engine bearings • Flywheel • Reciprocating action • Crankshaft & bearings • Valve train overview
	Engine component procedures	Testing cylinder compression • Checking idle speed • Obtaining & interpreting scan tool data • Removing & replacing a cam belt • Inspecting & adjusting an engine drive belt • Replacing an engine drive belt

	Engine components tasksheets	<ul style="list-style-type: none"> <li>• C005: Diagnose engine noises &amp; vibrations.</li> <li>• C007: Perform engine vacuum tests.</li> <li>• C008: Perform engine cylinder power balance test.</li> <li>• C009: Test cylinder compression.</li> <li>• C010: Perform engine cylinder leakage test.</li> <li>• C028: Establish camshaft timing &amp; indexing.</li> <li>• C041: Inspect etc shaft/s &amp; support bearings.</li> <li>• C485: Inspect etc. drive belts tensioners &amp; pulleys. (Non-NATEF)</li> <li>• C514: Diagnose etc. vehicle engine system faults. (Non-NATEF)</li> <li>• C541: Install engine covers using gaskets/seals. (2005 only)</li> <li>• C542: Perform common fastener &amp; thread repair. (2005 only)</li> <li>• C543: Assemble engine block. (2005 only)</li> <li>• C576: Visually inspect cylinder heads &amp; gaskets. (2005 only)</li> <li>• C577: Remove &amp; reinstall cylinder heads &amp; gaskets. (2005 only)</li> </ul>
Engine Rebuilding	Introduction to engine rebuilding	Engine rebuilding introduction • Engine removal preparation & safety
	Engine disassembly	Remove centerbolt & flywheel • Drain engine fluids • Remove front peripherals • Remove side & top peripherals • Disassemble valve train • Remove cylinder heads • Remove oil pan & timing set • Disassemble block underside • Disassemble pistons • Remove crankshaft • Remove camshaft • Remove plugs • Remove valve assembly
	Engine machining	Clean & degrease engine • Inspect & measure engine • Machine diagnosis • Machine cylinder block • Machine cylinder heads • Machine connecting rods • Clean pistons and fit new pins • Hone cylinders • Install piston rings
	Engine pre-assembly	Pre-assembly introduction • Test install camshaft • Test install crankshaft • Test install timing set • Test install pistons • Test install oil pump • Piston to valve clearance check • Long-block build-up • Paint the engine
	Engine final assembly	Fit engine plugs • Install camshaft • Install crankshaft • Install timing set • Fit piston rings • Install pistons • Install timing cover • Install rear main seal • Install oil pump & pan • Assemble heads • Install heads • Install valve train • Adjust valve lash • Install intake manifold • Install engine externals • Pre-oil engine • Install distributor • Assemble accessories

	Engine rebuilding tasksheets	<p>C013: Remove &amp; inspect cylinder head/s. (2002 only) • C014: Install cylinder heads &amp; gaskets. (2002 only) • C015: Inspect valve springs. • C016: Replace valve stem seals assembled engine. • C017: Inspect valve guides for wear. • C018: Inspect engine valves &amp; valve seats. • C019: Check valve face-to-seat contact &amp; runout. • C020: Check valve spring &amp; stem height. • C021: Inspect valvetrain components for wear. • C022: Inspect hydraulic and/or mechanical lifters. • C023: Adjust valves (mechanical or hydraulic lifters). • C024: Inspect camshaft drives for wear. • C025: Inspect &amp; replace timing belts &amp; chains. • C026: Inspect camshaft for runout &amp; wear. • C027: Inspect camshaft bearing surface for wear. • C029: Disassemble block &amp; clean for inspection. • C030: Inspect engine block for cracks &amp; warpage. • C031: Inspect &amp; restore threads in engine blocks. (2002 only) • C032: Inspect &amp; measure cylinder walls/sleeves. • C033: Deglaze &amp; clean cylinder walls.. • C034: Inspect &amp; measure camshaft bearings. • C035: Inspect &amp; measure crankshaft. • C036: Inspect &amp; measure main &amp; rod bearings. • C037: Identify piston &amp; bearing wear patterns. • C038: Inspect &amp; measure pistons. • C039: Remove &amp; replace piston pin. • C040: Inspect measure &amp; install piston rings. • C042: Inspect or replace crankshaft vibration damper. • C043: Assemble the engine with gaskets &amp; seals. (2002 only)</p>
Engine Lubrication	Oil	Functions of oil • Viscosity • Oil additives • Synthetic oils
	Lubrication systems	The lubrication system • Splash system • Pressure system • 2-stroke engine premix fuel systems • 2-stroke engine oil injection systems • Rotary engine lubrication system • Corrosion/ noise reduction
	Lubrication system components	Sump • Oil collection pan • Oil tank • Pickup tube • Oil pump • Oil pressure relief valve • Oil filters • Spurt holes & galleries • Oil indicators • Oil cooler
	Lubrication procedures	Checking engine oil • Draining engine oil • Replacing an oil filter • Refilling engine oil
	Engine lubrication tasksheets	C044: Perform engine oil pressure tests. • C045: Inspect oil pump pressure relief & pump drive. • C054: Inspect auxiliary engine oil coolers. • C055: Inspect test & replace oil temp components. • C056: Perform engine oil & filter change. • C477: Check & adjust engine oil level. (Non-NATEF) • C535: Select automotive lubricants & sealants. (Non-NATEF)
Engine Cooling	Cooling fundamentals	Cooling systems • Heat transfer • Vehicle coolant
	Cooling systems	Air cooling • Liquid cooling • Rotary engine cooling system
	Cooling system components	Basic cooling system components • Radiator • Coolant hoses • Water pump • Cooling system thermostat • Cooling fans • Temperature indicators • Radiator pressure cap • Recovery system • Boiling point & pressure • Electrolysis • Centrifugal force • Thermo-switch

		Cooling system procedures	Checking & adjusting coolant • Draining & refilling coolant • Checking & replacing a coolant hose • Testing cooling system pressure • Removing & replacing a radiator • Removing & replacing a thermostat • Inspecting & adjusting an engine drive belt • Replacing an engine drive belt
		Engine cooling tasksheets	C046: Perform cooling system cap & recovery tests. (2002 only) • C048: Inspect & replace cooling & heater hoses. • C049: Inspect test & replace thermostat & gasket. • C050: Test coolant; flush & refill cooling system. • C051: Replace water pump. • C052: Remove & replace radiator. • C053: Inspect etc. fans fan clutch shroud dams. • C478: Check & adjust engine coolant level. (Non-NATEF) • C578: Perform cooling system pressure tests. (2005 only)
ASE 2: Auto Trans- mission	Automatic Transmissions	Torque converters	Torque converter principles • Converter operation • Torque multiplication • Fluid flow • Heat exchanger • Lock-up converters • Sprag one way clutches
		Planetary gearing	Planetary gears • Simple planetary gearsets • Compound planetary gearsets • Automatic transmission brake bands • Multi-disc clutches • Plate clearance
		Electronic control transmission	Electronic control • Fully hydraulically controlled transmission • Electronic shift programs • Environment identification • Driving situation identification • Fast-off identification • Corner identification • Downhill gradient • Stop & go • Manual selection
		Layout & operation	Borg Warner 35 gearbox • Selector positions • Planetary gearset • High range powerflow • Low range powerflow
		Servos & clutches	Rear servo • Front servo • One way clutch • Multi-plate front clutch • Clutch pack • Rear clutch
		Hydraulic system & controls	Hydraulic system components • Spool valves • Regulating or flow control valves • Control valves • Orifices
		Valve types & functions	Basic valve action • Regulator & control valves • Shift & governor valves
		Pressure regulation	The primary regulating valve • Line pressure variation • Modulator valve pressure • The governor • Governor pressure • Kickdown pressure
		Flow control	Gear position 1 • 1-2 shift valve • 2-3 shift valve assembly • The servo orifice control valve • 3-2 kickdown
		Continuously variable transmission (C.V.T.)	Continuously variable transmission • Drive or reverse • The steel belt • Secondary pulley shaft
		Automatic transmissions procedures	Checking automatic transmission fluid • Changing transmission fluid & filter

Automatic transmissions  
tasksheets

C057: Interpret transmission/transaxle concern. • C058: Research transmission/transaxle service info. • C059: Interpret transmission/transaxle ID numbers. • C060: Diagnose transmission fluid loss & check level. • C061: Perform transmission/transaxle pressure tests. • C062: Perform transmission/transaxle stall test. • C063: Perform lock-up converter system test. • C064: Diagnose transmission/transaxle vacuum control. • C065: Diagnose noise & vibration concerns. • C066: Diagnose gear concerns using power flow. • C067: Inspect & adjust TV linkages cables et al. • C068: Service transmission. • C069: Inspect etc. vacuum modulator lines & hoses. • C070: Inspect repair & replace governor assembly. • C071: Inspect & replace external seals & gaskets. • C072: Inspect extension housing bushings & seals. • C073: Inspect leak test flush & replace cooler etc. (2002 only) • C074: Inspect etc. speedometer drive components. • C075: Diagnose electronic transmission control. • C076: Inspect replace & align powertrain mounts. • C077: Remove/reinstall auto transmission (RWD). • C078: Remove/reinstall transaxle & torque converter. • C079: Disassemble transmission/transaxle. • C080: Inspect etc. transmission/transaxle valve body. • C081: Inspect servo components. • C082: Inspect accumulator components. • C083: Assemble transmission/transaxle. • C084: Inspect converter flex plate pump drive & seals. • C085: Measure & check torque converter endplay. • C086: Inspect measure & reseal oil pump assembly. • C087: Measure endplay or preload. • C088: Inspect etc. thrust washers & bearings. • C089: Inspect seal rings grooves & sealing surfaces. • C090: Inspect bushings. • C091: Inspect & measure planetary gear assembly. • C092: Inspect case bores passages bushings vents. • C093: Inspect transaxle drive components. • C094: Inspect etc. transaxle final drive components. • C095: Inspect & reinstall parking components. • C096: Inspect clutch pack components. • C097: Measure clutch pack clearance. • C098: Air test clutch & servo assemblies. • C099: Inspect etc. one way clutch components. • C100: Inspect bands & drums. • C516: Diagnose etc. vehicle transmission faults. (Non-NATEF) • C544: Work order: Auto transmission/transaxle. (2005 only) • C545: Diagnose transmission hydraulics (Pascal's Law). (2005 only) • C546: Diagnose electrics (Ohm's Law). (2005 only) • C547: Inspect leak test & flush cooler lines & fittings. (2005 only)

ASE 3: Manual Drive Train	Clutches & Manual Transmissions	Clutches	Clutch principles • Single-plate clutches • Multi-plate clutches • Dual mass flywheels • Operating mechanisms
		Clutch components	Pressure plate • Driven/center plate • Throw-out bearing
		Manual transmissions	Gear ratios • Compound gear trains • Gear selection • Bearings • Oil seals & gaskets
		Gearbox layout & operation	Gearbox layouts • Transaxle designs • Gearbox operation • Baulk-ring synchromesh unit • Transaxle synchromesh unit
		Clutches & manual transmissions procedures	Checking gearbox oil • Changing manual gearbox oil • Checking & adjusting a clutch
		Clutches & manual transmissions tasksheets	C101: Identify & interpret drive train concern. • C102: Research drive train system service information. • C103: Locate drive train component ID numbers. • C104: Diagnose drive train system fluid loss. • C105: Drain & fill manual transmission & final drive. • C106: Diagnose clutch faults. • C107: Inspect clutch pedal linkage & components. • C108: Inspect hydraulic clutch operating system. • C109: Inspect clutch release components. • C110: Inspect & replace clutch components. • C111: Bleed clutch hydraulic system. • C112: Inspect etc. shaft pilot bearing or bushing. • C113: Inspect flywheel & ring gear. • C114: Inspect bell housing mating surfaces. • C115: Measure flywheel runout & crankshaft endplay. • C116: Remove/reinstall manual transmission. • C117: Disassemble etc. transmission components. • C118: Inspect extension housing & mating surfaces. • C119: Diagnose manual transmission concerns. • C120: Inspect etc. shift linkages & components. • C121: Inspect & reinstall powertrain mounts. • C122: Inspect etc.gaskets seals & sealing surfaces. • C123: Remove/replace manual gearbox final drive. • C124: Inspect etc.gear shift components. • C125: Measure transmission shafts endplay & preload. • C126: Inspect etc. synchronizer hub components. • C127: Inspect etc. speedometer drive components. • C128: Diagnose final drive noises & vibration. • C130: Inspect transmission oil pump or slingers. • C131: Inspect test & replace sensors & switches. • C483: Check & adjust differential/transfer case fluid. (Non-NATEF) • C484: Check & adjust transmission fluid level. (Non-NATEF) • C490: Drain & fill transmission/final drive unit. (Non-NATEF) • C548: Work order: Manual drive & axles. (2005 only)
Final Drive & Drive Shafts	Basic layouts	Front-wheel drive layout • Rear-wheel drive layout • Four-wheel drive layout • All-wheel drive layout • 4WD vs AWD	
	Front-wheel drive	Front-wheel drive shafts • Front-wheel final drives • Front-wheel differentials	
	Rear-wheel drive	Rear-wheel drive shafts • Universal joints • Rear-wheel final drive • Salisbury axles • Rear-wheel drive differentials • Limited slip differentials	

		Four-wheel drive (part-time)	Four-wheel drive shafts • Four-wheel final drive • Four-wheel drive transfer case • Free wheeling hubs • Four-wheel drive differentials
		All-wheel drive	Full-time four-wheel final drives • All-wheel drive transfer case • Transfer case differential action
		Final drives procedures	Checking free play • Checking drive shaft joints • Checking manual transaxle/differential oil
		Final drive & drive shafts tasksheets	C129: Remove etc. final drive components. • C132: Diagnose CV joint noises & vibration. • C133: Diagnose universal joint noises & vibration. • C134: Remove & replace FWD wheel bearing. • C135: Inspect etc. drive shafts & CV joints. • C136: Inspect etc. prop shaft center support bearings. • C137: Check & measure prop shaft balance etc. • C138: Diagnose live axle noises & vibration. • C139: Diagnose live axle fluid leakage. • C140: Inspect etc. live axle flange & pinion seal. • C141: Inspect final drive ring gear & measure runout. • C142: Remove etc. final drive pinion & ring gear. • C143: Measure & adjust final drive pinion depth. • C144: Measure etc. final drive pinion bearing preload. • C145: Measure etc. diff assembly preload & backlash. • C146: Check final drive tooth contact patterns. • C147: Inspect etc. differential pinion gears. • C148: Reassemble/reinstall diff. case assembly. • C149: Diagnose limited slip differential. • C150: Clean & inspect limited slip differential unit. • C151: Inspect/reinstall differential clutch components. • C152: Measure limited slip differential rotating torque. • C153: Diagnose drive axle shafts & bearings. • C154: Inspect & replace drive axle shaft wheel studs. • C155: Remove & replace drive axle shafts. • C156: Inspect etc. drive axle shaft seals & bearings. • C157: Measure drive axle runout & endplay. • C158: Diagnose FWD/AWD unusual steering. • C159: Inspect etc. FWD/AWD shifting controls. • C160: Remove/reinstall FWD/AWD transfer case. • C161: Service FWD/AWD transfer case. • C162: Inspect FWD front-wheel bearings & hubs. • C163: Check FWD/AWD drive assembly. • C164: Adjust etc. FWD/AWD elect. components. • C491: Inspect CV joint boots. (Non-NATEF) • C492: Remove & replace rear wheel drive shaft. (Non-NATEF) • C501: Remove & replace a live rear axle. (Non-NATEF)
ASE 4: Susp & Steering	Steering Systems	Steering principles	Steering systems • Principles of steering • Rack-and-pinion steering • Rack-and-pinion steering system • Recirculating ball & nut steering system • Four-wheel steering systems
		Steering boxes & columns	Steering columns • Rack-and-pinion gearbox • Helix • Variable ratio steering • Worm gearbox • Power steering • Steering process • Flow-control valve • Electric power assisted steering • Basic electric power steering operation
		Steering arms & components	Forward control vehicle steering • Steering linkages • Joints • Bushes/bushings

	Steering system procedures	Checking & adjusting power steering fluid • Pressure testing a power steering system • Flushing a power steering system • Inspecting & adjusting an engine drive belt • Servicing a steering system • Servicing wheel bearings
	Steering systems tasksheets	C165: Diagnose suspension & steering. • C168: Disable/enable SRS system. • C169: Remove steering wheel; center/time SRS coil. • C170: Diagnose steering column. • C171: Diagnose non-rack & pinion power steering. • C172: Diagnose rack & pinion power steering. • C173: Inspect steering joints column lock etc. • C174: Adjust worm bearing preload & sector lash. • C175: Remove & replace rack & pinion steering gear. • C176: Inspect etc. rack & pinion steering gear. • C177: Determine power steering fluid type & level. • C178: Flush fill & bleed power steering system. • C179: Diagnose power steering fluid leakage. • C180: Remove etc. power steering pump belt. • C181: Remove etc. power steering pump. • C182: Remove etc. power steering pump pulley. • C183: Inspect etc. power steering hoses & fittings • C184: Inspect etc. pitman arm rods et al. • C185: Inspect etc. tie rod ends sleeves & clamps. • C186: Diagnose steering systems using scan tool. • C203: Service or replace front/rear wheel bearings. • C479: Check & adjust power steering fluid level. (Non-NATEF) • C485: Inspect etc. drive belts tensioners & pulleys. (Non-NATEF) • C549: Work order: Suspension & Steering Systems. (2005 only) • C550: Inspect etc. electric power steering. (2005 only) • C551: Identify hybrid power steering system electrics. (2005 only)
Suspension Systems	Suspension fundamental principles	Principles of suspension • Suspension force • Unsprung weight • Wheel unit location • Dampening
	Types of suspension	Suspension systems • Solid axle • Dead axle • Independent suspension • Rear independent suspension • Rear-wheel drive independent suspension • Adaptive air suspension • Adaptive air suspension operation
	Types of springs	Coil springs • Leaf springs • Torsion bars • Rubber springs
	Shock absorber types	Hydraulic shock absorbers • Gas-pressurised shock absorbers • Load-adjustable shock absorbers • Manual adjustable-rate shock absorbers • Electronic adjustable-rate shock absorbers • Automatic load-adjustable shock absorbers
	Front suspension types & components	Strut suspension • Short/long arm suspension • Torsion bar suspension
	Rear suspension types & components	Rigid axle leaf spring suspension • Rigid axle coil spring suspension • Independent type suspension • Rigid non-drive suspension
	Suspension system layouts	Driven rear suspension layouts • Non-driven rear suspension layouts • Independent rear suspension layouts • Front suspension layouts • Bushes/bushings • Arms & linkages

	Suspension system procedures	Checking shock absorbers • Changing shock absorbers • Lubricating a suspension system • Servicing a suspension system
	Suspension systems tasksheets	C166: Research S & S service information. • C167: Interpret S & S component ID numbers. • C187: Diagnose short/long arm suspension systems. • C188: Diagnose strut suspension systems. • C189: Remove etc. upper & lower control arms. • C190: Remove etc. suspension strut rods. • C191: Remove etc. suspension ball joints. • C192: Remove etc. steering knuckle assemblies. • C193: Remove etc. short/long arm coil springs. • C194: Remove etc. torsion bars & mounts. • C195: Remove etc. stabilizer bar bushings etc. • C196: Remove etc. strut cartridge & bearing mount. • C197: Lubricate suspension & steering systems. • C198: Remove etc. coil springs & spring insulators. • C199: Remove etc. transverse links etc. • C200: Remove etc. leaf springs etc. • C201: Remove etc. strut cartridge etc. • C202: Inspect remove & replace shock absorbers. • C204: Diagnose suspension systems using scan tool.
Wheels & Tires	Wheel types & sizes	Wheels • Rim sizes & designations • Types of wheels
	Tire types & characteristics	Tires • Radial ply tires • Radial ply tire sidewalls • Tire pressure monitoring systems • Runflat tires • Space-saver tires • Tire distortion • Center of gravity
	Tire construction	Tire construction • Types of tire construction • Tire materials • Hysteresis • Tire sizes & designations • Tire information • Tire tread designs • Tire ratings for temperature & traction
	Wheel alignment fundamentals	Basic principles of wheel alignment • Caster • Camber • Scrub radius • Steering axis inclination • Toe-in & toe out • Toe-out on turns • Turning radius • Thrust angle & centerlines
	Wheels & tires procedures	Using a tire pressure gauge • Checking & adjusting tire pressure • Checking for tire wear patterns • Rotating tires • Removing a tire • Fitting a tire • Dynamic balancing a tire

		Wheels & tires tasksheets	<p>C205: Differentiate steering &amp; suspension concerns. (2002 only) • C206: Diagnose vehicle wander &amp; steering return. • C207: Perform prealignment inspection. • C208: Measure vehicle riding height. • C209: Check &amp; adjust front &amp; rear wheel camber. • C210: Check &amp; adjust caster. • C211: Check &amp; adjust front wheel toe. • C212: Center steering wheel. (2002 only) • C213: Check toe-out-on-turns. • C214: Check steering SAI &amp; included angle. • C215: Check &amp; adjust rear wheel toe. • C216: Check rear wheel thrust angle. • C217: Check for front wheel setback. • C218: Check front cradle alignment. • C219: Diagnose tire wear patterns. • C220: Inspect tires; check &amp; adjust air pressure. • C221: Diagnose wheel/tire vibrations etc. • C222: Rotate tires. • C223: Measure wheel tire axle &amp; hub runout. • C224: Diagnose tire pull problem. • C225: Balance wheel &amp; tire assembly. • C226: Dismount inspect repair &amp; remount tire. • C227: Reinstall wheel; torque lug nuts. • C228: Inspect &amp; repair tire. (2002 only) • C552: Repair tire using internal patch. (2005 only) • C553: Inspect etc. tire pressure monitoring system. (2005 only) • C579: Dismount etc. tire with pressure sensor. (2005 only) • C580: Inspect tire &amp; wheel assembly for air loss. (2005 only)</p>
ASE 5: Brakes	Braking Systems	Braking fundamentals	Principles of braking • Drum & disc brakes • Coefficient of friction • Lever/mechanical advantage • Hydraulic pressure & force • Brake fade • Regenerative braking
		Braking systems	Brake type - principles • Air brakes • Exhaust brakes • Electric brakes • Parking brakes • Engine brakes
		Braking system components	Park brake system • Brake pedal • Brake lines • Brake fluid • Bleeding • Master cylinder • Divided systems • Tandem master cylinder • Power booster or brake unit • Hydraulic brake booster • Electrohydraulic braking (EHB) • Applying brakes • Brake force • Brake light switch
		Drum brakes & components	Drum brake system • Drum brake operation • Brake linings & shoes • Backing plate • Wheel cylinders
		Disc brakes & components	Disc brake system • Disc brake operation • Disc brake rotors • Disc brake pads • Disc brake calipers • Proportioning valves • Proportioning valve operation • Brake friction materials
		Antilock braking system & components	ABS brake system • Antilock braking system operation • Principles of ABS braking • ABS master cylinder • Hydraulic control unit • Wheel speed sensors • ABS electronic control unit
		Brakes procedures	Checking & adjusting brake fluid • Replacing brake fluid • Checking brake pads • Replacing brake pads • Removing & replacing a rotor • Checking wheel cylinders • Replacing brake linings • Adjusting a park brake cable

Braking systems tasksheets

C229: Identify & interpret brake system concern. • C230: Research brake service information. • C231: Interpret brake system ID numbers. • C232: Diagnose brake system pressure. • C233: Measure brake pedal height. • C234: Check master cylinder. • C235: Remove etc.& bleed master cylinder. • C236: Diagnose hydraulic system. • C237: Inspect brake lines & flexible hoses. • C238: Fabricate and/or install brake lines. • C239: Select handle store & fill brake fluid. • C240: Inspect etc. brake system valves. • C241: Inspect etc. load sensing valve. • C242: Inspect etc. brake warning lights. • C243: Bleed brake system. • C244: Flush hydraulic brake system. • C245: Diagnose drum brakes. • C246: Remove etc. & measure brake drums. • C247: Refinish brake drum. • C248: Remove etc. drum brake components. • C249: Remove/install wheel cylinders. • C250: Pre-adjust brake shoes & parking brake. • C251: Install wheel & torque lug nuts. • C252: Diagnose concerns in disc brakes. • C253: Remove etc. brake caliper assembly. • C254: Clean etc. brake caliper mounting & slides. • C255: Remove etc. disc brake pad. • C256: Disassemble disc brake caliper assembly. • C257: Reassemble & reinstall brake calipers. • C258: Inspect etc. disc brake rotor. • C259: Remove & reinstall disc brake rotor. • C260: Refinish disc brake rotor. (2002 only) • C261: Adjust calipers with parking brake. • C262: Install wheel & torque lug nuts. • C263: Test brake pedal travel & power assist. • C264: Check brake vacuum supply. • C265: Inspect brake power booster unit & valve. • C266: Test brake hydro-boost system. (2002 only) • C267: Diagnose wheel bearings. • C268: Service wheel bearings & seals. • C269: Check park brake cables & components. • C270: Check park brake operation. • C271: Check park brake indicator light. • C272: Check brake stop light system. • C273: Replace wheel bearing & race. • C274: Inspect & replace wheel studs. • C275: Remove/install sealed wheel bearing assembly. • C276: Identify & inspect ABS components. • C277: Diagnose ABS system functions. • C278: Diagnose ABS electronic controls. • C279: Depressurize the ABS system. • C280: Bleed ABS front & rear hydraulic circuits. • C281: Remove/install ABS electrics & hydraulic. • C282: Test & service ABS speed sensors. • C283: Diagnose modified vehicle ABS system. • C284: Identify traction control system components. • C480: Check & adjust brake fluid level. (Non-NATEF) • C497: Carry out a full dynamic roller brake test. (Non-NATEF) • C554: Work order: Brakes. (2005 only) • C555: Refinish rotor off vehicle. (2005 only) • C556: Measure etc. master cylinder pushrod length. (2005 only) • C581: Inspect & test power brake system for leaks. (2005 only) • C583: Refinish disc brake rotor on vehicle. (2005 only)

ASE 6: Electrical/ Electronic	Electrical Principles	Electrical fundamentals	Basic electricity • Free electrons • Basic electronic principles • Semiconductors • Ground • Ohm's law calculations • Power equation
		Sources of electricity	Electrostatic energy • Thermo-electric energy • Electrochemical energy • Photo-voltaic energy • Piezo-electric energy • Electromagnetic induction • Electromagnetic components
		Effects of electricity	Heating effects • Chemical effects • Magnetic effects • Electrical resistance
		Circuits & measurement	Ohm's law • Electrical power • Electrical measurement • Series circuits • Parallel circuits • Parallel circuit resistance • Series-parallel circuits • Wire sizing • Networking & multiplexing • Fiber optics
		Electrical testing procedures	Using a non-powered test light • Using a lead light • Using a DVOM to measure continuity • Using a DVOM to measure voltage
		Electrical components	Capacitors • Conductors & insulators • Wires • Shielding • Wire sizes • Length vs. resistance • Fuses & circuit breakers • Relays • Ballast resistor
		Wires & connectors procedures	Stripping wire insulation • Installing a solderless terminal • Soldering wires & connectors
		Electronic components	Diodes • Resistors • Resistor ratings • Variable resistors • Thermistors • Transistors
		Batteries	Lead-acid batteries • Batteries & cells • Battery charging
		Battery maintenance procedures	Inspecting & testing a battery • Cleaning & replacing a battery • Charging a battery

Electrical principles  
tasksheets

C285: Identify & interpret electrics concern. •  
C286: Research electrics service information.  
• C287: Interpret electrics component IDs. •  
C288: Diagnose electrics circuit integrity. • C290:  
Demonstrate DMM/DVOM proper use. • C291:  
Check electrical circuits with a test light. • C292:  
Measure circuits using a voltmeter. • C293:  
Measure current flow using an ammeter. • C294:  
Check continuity/resistance with ohmmeter. •  
C295: Check electrical circuits using jumper  
wires. • C296: Locate electrics circuit problems.  
• C297: Diagnose & measure parasitic draw. •  
C298: Test fusible links circuit breakers & fuses.  
• C299: Test switches connectors wires etc. •  
C300: Repair wiring harnesses & connectors.  
(2002 only) • C301: Perform solder repair of  
electrical wiring. • C302: Perform battery state-  
of-charge test. • C303: Perform battery capacity  
test. (2002 only) • C304: Maintain or restore  
electronic memory. • C305: Inspect clean fill &  
replace battery. • C306: Perform slow/fast battery  
charge. • C307: Inspect etc battery components. •  
C308: Start a vehicle using jumper cables. •  
C323: Test gauges & gauge sending units. •  
C324: Inspect etc. gauge circuit components.  
• C325: Diagnose warning devices. • C326:  
Test instrument circuit components. • C327:  
Diagnose horn. • C328: Diagnose wiper. • C329:  
Diagnose washer. • C330: Diagnose motor-  
driven accessories. • C331: Diagnose heated  
glass. (2002 only) • C337: Remove & reinstall  
door panel. • C517: Diagnose etc. engine  
electrical faults. (Non-NATEF) • C518: Diagnose  
etc. transmission electrical faults. (Non-NATEF) •  
C524: Test an automotive electrical circuit. (Non-  
NATEF) • C526: Identify & translate a wiring  
diagram. (Non-NATEF) • C527: Carry out & test  
automotive wiring repairs. (Non-NATEF) • C557:  
Work order: Electrical & Electronics. (2005 only)  
• C558: Remove & replace terminal end from  
connector. (2005 only) • C559: Repair wiring  
harness (including CAN/BUS). (2005 only)  
• C560: Identify hybrid high voltage circuit service  
plug. (2005 only) • C561: Identify hybrid high  
voltage circuits. (2005 only) • C563: Identify  
hybrid auxiliary battery procedures. (2005 only) •  
C582: Repair connectors & terminal ends. (2005  
only) • C584: Diagnose heated glass mirror or  
seat. (2005 only)

DVOM Experiments	Setting up a DVOM for different measurements	Setting up a DVOM
	Voltage experiments	Voltage ranges • Voltage drop • Voltage drop across multiple loads • Voltage drop across unequal loads
	Current experiments	Measuring current • Current does work • Voltage affects current • Current & magnetic fields
	Resistance experiments	Measuring resistance • Resistance affects current 1 • Resistance affects current 2 • Resistance affects current 3 • Resistance affects current 4 • Resistance affects current 5
	Series circuit experiments	Series circuit experiment 1 • Series circuit experiment 2 • Series circuit experiment 3 • Series circuit experiment 4 • Series circuit experiment 5 • Series circuit experiment 6
	Parallel circuits experiments	Parallel circuits experiment 1 • Parallel circuits experiment 2 • Parallel circuits experiment 3 • Parallel circuits experiment 4 • Parallel circuits experiment 5
	Series-parallel circuit experiment	Series-parallel circuit experiment 1
	Variable resistors experiments	Variable resistors experiment 1 • Variable resistors experiment 2
	Capacitors experiment	Capacitors experiment 1
Charging, Starting & Lighting	Charging	Charging system • Alternator principles • Alternating current • Alternator components • Rectification • Phase winding connections • Rotor circuit • Voltage regulation • System operating voltage • High voltage charging systems
	Alternator construction	Rotor • Stator • Alternator end frames • Slip ring & brush assembly • Rectifier assembly • Alternator cooling fan
	Charging procedures	Checking a charging system • Removing & replacing an alternator • Inspecting & adjusting an engine drive belt • Replacing an engine drive belt
	Starting	Starting system • Starter motor principles • Starter motor construction • Starter magnet types • Starter motor engagement • Commutation • Switching
	Starting procedures	Checking a starting system • Jump-starting a vehicle
	Lighting	Lighting system • Lamps/light bulbs • Lamp/light bulb information • LED lighting
	Types of lights	Stop lights • Reverse lights • Indicators • Headlights • High intensity discharge (HID) lights • Driving lights • Fog lights • Cornering lights • Smart lighting
	Lighting circuits	Park & tail light circuits • Headlight & dip circuits • Circuit diagrams • Networking & multiplexing
	Lighting procedures	Checking lighting & peripheral systems • Checking & changing an exterior light bulb • Checking & changing a headlight bulb • Aiming headlights

	Charging, starting & lighting tasksheets	C289: Use wiring diagrams during diagnosis. • C309: Perform starter current draw tests. • C310: Perform starter circuit voltage drop tests. • C311: Inspect & test starter relays & solenoids. • C312: Remove & install starter in a vehicle. • C313: Inspect & test starter control circuits. • C314: Diagnose slow-crank/no-crank problems. • C315: Perform charging system output test. • C316: Diagnose charging system. • C317: Inspect etc. drive belts & pulleys. • C318: Remove inspect & install generator. • C319: Perform charging circuit voltage drop tests. • C320: Diagnose lighting system. • C321: Inspect replace & aim headlights & bulbs. • C322: Diagnose turn signal or hazard lights. • C338: Diagnose body system circuits. • C485: Inspect etc. drive belts tensioners & pulleys. (Non-NATEF) • C525: Identify faults and adjust lighting systems. (Non-NATEF) • C564: Identify HID headlights safety precautions. (2005 only) • C587: Perform battery capacity/ conductance test. (2005 only)	
Hybrid Drive Systems	*Hybrid drive systems	Hybrid vehicles • Hybrid electric vehicle models • Hybrid vehicle systems • Series-parallel hybrid systems • Hybrid system components • Hybrid vehicle driving	
SRS Systems	Safety systems	Airbags • Seatbelt • Vehicle safety systems • Crash sensors • Seat belt pre-tensioners • Tire pressure monitoring systems	
	SRS systems tasksheets	C334: Diagnose SRS system. • C335: Disarm & enable the airbag system. • C464: Demonstrate knowledge of SRS/ABS safety. (Non-NATEF) • C519: Diagnose etc. auxiliary electrical faults. (Non-NATEF)	
Peripheral Systems	Security systems	Security systems • Remote control keys • Theft deterrent systems	
	Entertainment & peripheral systems	Integrated communications • Body controlled lighting systems • Proximity sensors • Reflective displays	
	Satellite assisted systems	Global positioning satellites (GPS) • Triangulation/trilateration • Satellite navigation • Telematics	
	Peripheral systems tasksheets	C332: Diagnose electric lock. • C333: Diagnose cruise control systems. • C336: Diagnose radio static & reception. • C339: Check for CAN/BUS errors. • C340: Diagnose anti-theft system. • C562: Identify electronic security code components. (2005 only)	
ASE 7: HVAC	Heating & Air-conditioning	HVAC basic principles	HVAC legislation • Vehicle heating & ventilation systems • Basic air-conditioning principles • Air-conditioning capacity • Air-conditioning refrigerant • Humidity
		Fixed orifice tube air-conditioning system	Fixed orifice • Control devices
		Thermal expansion valve air-conditioning system	Thermostatic expansion valve system • Thermal expansion valves

Air-conditioning components	Air-conditioning compressors • Condensers & evaporators • Receiver drier • Lines & hoses • TX valve construction • Temperature monitoring thermostat • Refrigerants • Pressure switches • Heating elements
Climate control	Air-conditioning ECU • Ambient air temperature sensor • Servo motors • Electric servo motors • Automatic climate control sensors • Evaporator temperature sensor • Blower speed control • Ventilation systems
HVAC procedures	Checking an A/C system • Checking a heating system • Inspecting & adjusting an engine drive belt • Replacing an engine drive belt
Heating & air-conditioning tasksheets	<p>C341: Identify &amp; interpret HVAC system. • C342: Research HVAC system service info. • C343: Interpret HVAC system component IDs. • C344: Diagnose aircon system refrigeration. • C345: Diagnose aircon system noise. • C346: Identify aircon refrigerant type. (2002 only) • C347: Leak test aircon system. • C348: Inspect the condition of discharged oil. • C349: Determine HVAC recommended oil. • C350: Diagnose aircon protection devices. • C351: Inspect etc. aircon compressor drive belts. • C352: Inspect etc. aircon clutch components. • C353: Remove/install aircon compressor. • C354: Determine need for extra aircon filter. • C355: Remove etc. aircon system components. • C356: Inspect aircon condenser airflow. • C357: Remove etc. HVAC receiver/drier. • C358: Remove etc. HVAC TX valve or orifice tube. • C359: Inspect HVAC evaporator water drain. • C360: Remove/install HVAC system evaporator. • C361: Remove/install HVAC system condenser. • C370: Inspect &amp; test heater control valve/s. • C372: Diagnose HVAC electrical controls. • C373: Inspect etc. aircon components. • C374: Test etc. aircon clutch control system. • C375: Diagnose HVAC mechanical controls. • C376: Inspect etc. HVAC control panel assembly. • C377: Inspect etc. HVAC control cables &amp; motors. • C378: Inspect HVAC ducts doors hoses &amp; filters. • C379: Check auto &amp; semi-auto HVAC control systems. • C380: Use &amp; maintain refrigerant handling equipment. • C381: Identify &amp; recover aircon system refrigerant. • C382: Recycle refrigerant. • C383: Label &amp; store refrigerant. • C384: Test recycled refrigerant. • C385: Evacuate &amp; charge aircon system. • C485: Inspect etc. drive belts tensioners &amp; pulleys. (Non-NATEF) • C493: Visually inspect air-con system components. (Non-NATEF) • C494: Identify specified refrigerant type. (Non-NATEF) •</p> <p>C495: Conduct preliminary aircon system test. (Non-NATEF) • C565: Work order: HVAC. (2005 only) • C566: Record scan tool HVAC data &amp; DTCs. (2005 only) • C567: Identify hybrid AC system electrical circuits. (2005 only) • C585: Identify refrigerant use gauge to record pressure. (2005 only)</p>

Engine Cooling	*Cooling fundamentals	Cooling systems • Heat transfer • Vehicle coolant
	*Cooling systems	Air cooling • Liquid cooling • Rotary engine cooling system
	*Cooling system components	Basic cooling system components • Radiator • Coolant hoses • Water pump • Cooling system thermostat • Cooling fans • Temperature indicators • Radiator pressure cap • Recovery system • Boiling point & pressure • Electrolysis • Centrifugal force • Thermo-switch
	*Cooling system procedures	Checking & adjusting coolant • Draining & refilling coolant • Checking & replacing a coolant hose • Testing cooling system pressure • Removing & replacing a radiator • Removing & replacing a thermostat • Inspecting & adjusting an engine drive belt • Replacing an engine drive belt
	*Engine cooling tasksheets	C362: Diagnose HVAC temperature control. • C363: Perform cooling system cap & recovery tests. (2002 only) • C364: Inspect cooling/heater system hoses & belts. • C365: Inspect test & replace thermostat. • C366: Determine coolant condition & type. • C367: Flush and refill cooling system. • C368: Inspect etc. fans fan clutch shroud dams. • C369: Inspect etc. electric cooling fan & circuits. • C371: Remove inspect & reinstall heater core. • C568: Perform cooling system pressure tests. (2005 only)
ASE 8: Engine Performance	Motive Power Types	
	*Motive power fundamental principles	Pressure & temperature • Pressure & volume • Temperature & energy • Understanding power and torque
	*4-stroke spark-ignition engines	Basic 4-stroke principles • 4-stroke engine cycle
	*2-stroke spark-ignition engines	Basic 2-stroke principles • 2-stroke engine power stroke • 2-stroke engine cycle • 2-stroke intake system • 2-stroke cycle
	*Spark-ignition engine components	Basic engine components • 4 & 2--stroke engine differences • Engine cams & camshaft • Engine power transfer • 2-stroke power transfer • Scavenging • Counter weights • Piston components • Alloys
	*Rotary spark-ignition engine & components	Basic principles of the rotary engine • Basic components of the rotary engine • Rotary engine cycle • Rotary/piston engine comparison • Rotary engine power pulses • Renesis rotary engine
	*Alternative engine cycles	Alternative engine cycles
	*Compression-ignition engines	Basic 4-stroke diesel principles • 4-stroke diesel engine cycle • Basic 2-stroke diesel principles • 2-stroke diesel engine cycle • Three phases of combustion
	*Compression-ignition engine components	Basic diesel engine components • Diesel engine passages • Diesel fuel delivery • Direct injection • Diesel valves & components • Diesel scavenging • Crankshaft rotation • Diesel crankshaft • Diesel engine pistons
*Engine characteristics	Engine output • Power range	

	*Motive power types tasksheets	C386: Identify etc. engine performance concern. • C387: Research vehicle & service information. • C388: Interpret VIN & component ID numbers. • C389: Inspect engine assembly for leaks. • C390: Diagnose engine noise or vibration. • C392: Perform engine manifold pressure tests. • C393: Perform cylinder power balance test. • C394: Perform cylinder cranking compression tests. • C395: Perform cylinder leakage test. • C400: Verify correct camshaft timing. • C447: Adjust engine valves. • C448: Remove & replace timing belt. • C569: Work order: Engine Performance. (2005 only) • C570: Perform engine running compression test. (2005 only) • C572: Perform common fastener & thread repair. (2005 only) • C574: Use oxyacetylene torch to heat & cut metal. (2005 only) • C586: Check idle speed. (2005 only)
Hybrid Drive Systems	**Hybrid drive systems	Hybrid vehicles • Hybrid electric vehicle models • Hybrid vehicle systems • Series-parallel hybrid systems • Hybrid system components • Hybrid vehicle driving
	**Hybrid drive systems tasksheets	C575: Identify hybrid engine service precautions. (2005 only)
Ignition Systems	Ignition systems	Basic ignition • Ignition principles • Ignition components • Vacuum & centrifugal units • Plug firing voltage • Faraday's law
	Contact breaker ignition	Contact breaker system • Primary & secondary windings • The ballast resistor coil • Dwell angle • Spark timing
	Contact breaker components	Battery power source • Ballast resistor • Ignition coil • Ignition switches • Contact breaker • Capacitor/condensor • Distributors • Distributor types • High-tension leads • Spark plugs • Spark plug components • Advance & retard mechanisms
	Electronic systems & components	Induction • Inductive system operation • Induction wiring • Hall effect sensors • Hall effect operation • Optical type sensors
	Distributorless systems	Distributorless ignition systems • Insulated coils • Distributorless ignition system timing
	Ignition procedures	Checking ignition timing • Checking & changing a spark plug • Removing & replacing contact points
	Ignition systems tasksheets	C410: Diagnose distributorless ignition system. • C411: Diagnose distributor ignition system. • C412: Inspect etc. ignition primary wiring. • C413: Inspect etc. ignition system distributor. • C414: Inspect etc. ignition secondary wiring. • C415: Test ignition coil/s. • C416: Check etc. ignition timing & advance/retard. • C417: Inspect etc. ignition system pick-up sensor.
	Intake & Exhaust	Intake & exhaust systems
Intake system components		Intake system components • Air cleaners • Carburetor air cleaners • EFI air cleaners • Intake manifolds • Intake air heating • Volumetric efficiency • Forced induction

	Exhaust system components	Exhaust system components • Exhaust manifold • Exhaust pipe • Extractors • Mufflers • Catalytic converters • Flexible connections • Ceramic coatings • Electronic mufflers • Thermal expansion • Superchargers • Intercoolers • Frequency • Back-pressure
	Intake system procedure	Checking & changing an air filter
	Intake & exhaust tasksheets	C428: Inspect exhaust system components. • C429: Perform exhaust system back-pressure test. • C430: Test the operation of turbo/ supercharger. • C439: Test catalytic converter performance. • C486: Inspect & replace air filter. (Non-NATEF) • C530: Remove and repair/ replace exhaust system. (Non-NATEF)
Gasoline Fuel Systems	Gasoline fuel system principles	Gasoline fuel • Gasoline fuel characteristics • Controlling fuel burn • Stoichiometric ratio • Air density • Fuel supply system • Pressure & vacuum
	Carburetor operation	Carburation • Carburetor system components • Carburetor systems • Metering jets • Accelerating • Carburetor barrels
	Carbureted system components	The carburetor • Mechanical fuel pumps • Electric fuel pumps • Tanks & lines • Fuel lines • Charcoal canister • Carburetor filters
	EFI fuel supply system - principles	EFI principles • Basic EFI principles • Air supply • Air volume • Multi-point injection systems • Simultaneous injection • Efficient combustion
	EFI fuel supply system - components	Fuel pumps • Fuel filters • Tanks & lines • Fuel lines • Fuel rail • Fuel pressure regulator • Injectors • Tachometric relay • Thermostat switch • EFI sensors • Potentiometer • Auxiliary air valves • Idle speed control devices • Inertia sensors
	Fuel system procedures	Replacing a fuel filter
	Gasoline fuel systems tasksheets	C418: Diagnose carburetor-type fuel system. (2002 only) • C419: Diagnose injection-type fuel system. • C420: Check fuel for contaminants & quality. • C421: Inspect etc. fuel pumps & control systems. • C422: Replace fuel filters. • C423: Inspect etc. cold enrichment system. • C424: Inspect intake system for vacuum leaks. • C425: Inspect etc. gasoline/petrol fuel injectors. • C426: Check idle speed. (2002 only) • C427: Adjust idle speed & fuel mixture. (2002 only)
EFI Engine Management	EFI operation	Modes of EFI • Electronic fuel injection • Idle speed control systems • Feedback & looping • Cold start systems • Air measurement • Air-flow monitoring • Variable intake manifold system • Electrical functions • EFI wiring diagram
	Electronic control unit - ECU	EFI system ECU • Electronic control unit settings • Engine speed limiting • Malfunction indicator lamp
	EFI sensors	Mass airflow sensor • Manifold absolute pressure sensor • Air vortex sensor • Fuel system sensor • Temperature sensor • Throttle position sensor • Exhaust gas oxygen sensor • Crank angle sensor • Hall effect voltage sensor

	EFI engine management tasksheets	C404: Diagnose emissions/drivability without DTCs. • C406: Inspect etc. control sensors with a GMM/DSO. • C409: Diagnose interrelated systems problems.
Diesel Fuel Systems	Diesel fuel systems	Diesel fuel injection • High pressure components • Diesel fuel • Diesel fuel characteristics • Quiet diesel technology • Clean diesel technology
	Diesel fuel system components	Diesel tanks & lines • Diesel fuel filters • Lift pump • Plunger pump • Priming pump • Inline injection pump • Mechanical or pneumatic governors • Distributor-type injection pump • Diesel injectors • Glow plugs • Cummins & Detroit Diesel injection
	Diesel electronic control	Diesel electronic control systems • Common rail diesel injection system • HEUI diesel injection system
	Diesel fuel systems tasksheets	C498: Inspect & test a diesel fuel injector. (Non-NATEF) • C499: Remove & refit rotary diesel fuel injector pump. (Non-NATEF) • C500: Bench test a rotary diesel fuel injector pump. (Non-NATEF) • C503: Replace diesel engine fuel filter. (Non-NATEF) • C528: Demonstrate knowledge of a diesel fuel system. (Non-NATEF) • C529: Bleed air from a diesel fuel system. (Non-NATEF)
Alternate Fuel Systems	Alternate technology	Biodiesel fuel • Vehicle emission standards
	Fuel & battery technology	Alternative fuels • Fuel cells • Electric motors • Biodiesel
Emission Control	Creation of emissions	Sources of emission • Combustion • Combustion chamber design
	Types of emissions	Hydrocarbons • Hydrocarbons in exhaust gases • Oxides of nitrogen • Particulates • Carbon monoxide • Carbon dioxide • Sulfur content in fuels
	Emission control	Evaporation emission control • Catalytic conversion • Closed loop • Regulated emissions • Crankcase emission control • EGR valves • Controlling air-fuel ratios • Charcoal storage devices
	On-board diagnostics	OBD systems • Diagnostic trouble codes • Monitoring emissions
	Emissions procedures	Checking & cleaning a PCV valve • Obtaining & interpreting scan tool data
	Emission control tasksheets	C391: Diagnose exhaust color odor & sounds. • C396: Diagnose engine operation concerns. • C397: Analyze and interpret exhaust readings. • C401: Retrieve & record stored OBD I DTCs. • C402: Retrieve & record stored OBD II DTCs. • C403: Diagnose emissions/drivability with DTCs. • C405: Check for comms errors with a scan tool. • C407: Obtain & interpret scan tool data.

		<ul style="list-style-type: none"> <li>• C408: Use service info to diagnose engine systems.</li> <li>• C431: Diagnose concerns in the PCV system.</li> <li>• C432: Test etc. the PCV system &amp; components.</li> <li>• C433: Diagnose concerns in the EGR system.</li> <li>• C434: Inspect etc. the EGR system components.</li> <li>• C435: Inspect etc. EGR electrics sensors &amp; controls.</li> <li>• C436: Diagnose air injection &amp; catalytic converter.</li> <li>• C437: Inspect etc. mechanical air injection components.</li> <li>• C438: Inspect etc. electrical air injection components.</li> <li>• C440: Diagnose intake air temperature control system. (2002 only)</li> <li>• C441: Inspect etc. intake air temp control components. (2002 only)</li> <li>• C442: Diagnose early fuel evaporation control system. (2002 only)</li> <li>• C443: Inspect etc. early fuel evaporation components. (2002 only)</li> <li>• C444: Diagnose evaporative emissions control system.</li> <li>• C445: Inspect etc. evaporative emissions components.</li> <li>• C446: Interpret evaporative emission DTCs.</li> <li>• C520: Obtain &amp; interpret scan tool engine data. (2002 only)</li> <li>• C571: Perform scan tool active tests of actuators. (2005 only)</li> </ul>
Engine Cooling	**Cooling fundamentals	Cooling systems • Heat transfer • Vehicle coolant
	**Cooling systems	Air cooling • Liquid cooling • Rotary engine cooling system
	**Cooling system components	Basic cooling system components • Radiator • Coolant hoses • Water pump • Cooling system thermostat • Cooling fans • Temperature indicators • Radiator pressure cap • Recovery system • Boiling point & pressure • Electrolysis • Centrifugal force • Thermo-switch
	**Cooling system procedures	Checking & adjusting coolant • Draining & refilling coolant • Checking & replacing a coolant hose • Testing cooling system pressure • Removing & replacing a radiator • Removing & replacing a thermostat • Inspecting & adjusting an engine drive belt • Replacing an engine drive belt
	**Engine cooling tasksheets	C398: Verify engine operating temperature. • C399: Perform cooling system pressure tests. • C449: Remove & replace thermostat. • C450: Inspect etc. fans fan clutch shroud dams.
Engine Lubrication	*Oil	Functions of oil • Viscosity • Oil additives • Synthetic oils
	*Lubrication systems	The lubrication system • Splash system • Pressure system • 2-stroke engine premix fuel systems • 2-stroke engine oil injection systems • Rotary engine lubrication system • Corrosion/ noise reduction
	*Lubrication system components	Sump • Oil collection pan • Oil tank • Pickup tube • Oil pump • Oil pressure relief valve • Oil filters • Spurt holes & galleries • Oil indicators • Oil cooler
	*Lubrication procedures	Checking engine oil • Draining engine oil • Replacing an oil filter • Refilling engine oil
	*Engine lubrication tasksheets	C573: Perform oil & filter changes. (2005 only)