NYS SkillsUSA Automotive Technology Virtual Project

Scope of the Contest
To evaluate each contestant’s preparation for employment and to recognize outstanding students for excellence and professionalism in the field of automotive technology.

Knowledge Performance
The contest will include a Resume and Video with Oral Presentation of scenarios. The video demonstration is a presentation of the diagnostic procedure, correct tool usage and recommendations. Contestants should ensure they are narrating the steps they are taking and the results of their measurements and tests.
*See SkillsUSA Virtual Technical Standards for competencies measured.

Contest Information (All items must be received by due date)

- **PDF Resume**
  - Upload one file with contestant’s one-page resumes and include the video Recording. Link to be announced by April 1st.

Video of Demonstrated Procedures
- Through a recorded video, record the contestant diagnosing two of the customer complaints from the list below. **One must be an electrical fault.** The video needs to show the student explaining the steps they would use to diagnose the customers concern including: visual inspection, measurements taken and why they were taken. The student should explain what the expected results would be. One camera should show the entire lab/workspace the student is in, and the second camera should be focused on the student as they complete tasks. *Ensure lighting, audio and video are high quality

  - The video may be recorded as one continues recording, or it can be broken into segments if needed for time constraints. All video segments must be uploaded as hyperlinks to all contestant’s resumes.

  - **Contestant number must be shown at all times.**

Scoring Information
The following pre-submission items will be judged by industry professionals prior to virtual in-person Zoom session

1. Resume with embedded links to written outline and video
2. Written submission for clarity, conciseness, grammar, punctuation, and spelling.
3. This submission will be used to clarify the steps and procedures in their video submission.
4. Skill demonstration in video
Task List One

Pick one of the following customer complaints to diagnose.

Symptom: The Customer states that the vehicle cranks slow at times.

Instructions: A time limit of two hours applies to the diagnostic scenario video. No actual bug needs to be installed into the demonstration machine. Instead, the participant will treat each test he or she completes as if it has passing results, this will send the participant to the next logical diagnostic step. The participant should run out of tests and end with an inconclusive result. The participant shall announce what test he or she is about to perform before proceeding with that test.

Necessary Equipment:
- A vehicle that utilizes a modern starting system that incorporates at least one relay. Activation of the automotive style relay can come from an ignition switch or ECM, either is acceptable.

Suggested Tooling:
- Battery Load tester w/ Amp Clamp
- Digital Multi meter / and pin-out & probe kit
- Remote starter switch
- Self-powered test lamp
- 12v test lamp
- Basic tool set.
- Timing light
- Jumper cables
- Battery charger
- Proper PPE
- Battery terminal and clamp cleaning tool
- Jumper wire, with alligator clip ends

Video of Demonstrated Procedures
Through a recorded video session, record the contestant completing the tasks. One camera should show the entire lab/workspace the student is in, and the second camera should be focused on the student as they complete tasks. *Ensure lighting, audio and video are high quality

Symptom: The Customer states that the charge lamp is illuminated and the vehicle stalled and will not start unless the vehicle is jump started.

Instructions: A time limit of two hours applies to the diagnostic scenario video. No actual bug needs to be installed into the demonstration machine. Instead, the participant will treat each test he or she completes as if it has passing results, this will send the participant to the next logical diagnostic step. The participant should run out of tests and end with an inconclusive result. The participant shall announce what test he or she is about to perform before proceeding with that test.
Necessary Equipment:

- A vehicle that utilizes a modern charging system will either an internal voltage regulator or PCM controlled voltage regulation

Suggested Tooling:

- Battery Load tester w/ Amp Clamp
- Digital Multi meter / and pin-out & probe kit
- Scan tool
- Self-powered test lamp
- 12v test lamp
- Basic tool set.
- Jumper cables
- Battery charger
- Proper PPE
- Battery terminal and clamp cleaning tool
- Jumper wire, with alligator clip ends

Video of Demonstrated Procedures

Through a recorded video session, record the contestant completing the tasks. One camera should show the entire lab/workspace the student is in, and the second camera should be focused on the student as they complete tasks. *Ensure lighting, audio and video are high quality*
Task #2 Customer Complaint

Symptom: The Customer states that the brake pedal pulsates when the brakes are applied.

Instructions: A time limit of two hours applies to the diagnostic scenario video. No actual bug needs to be installed into the demonstration machine. Instead, the participant will treat each test he or she completes as if it has passing results, this will send the participant to the next logical diagnostic step. The participant should run out of tests and end with an inconclusive result. The participant shall announce what test he or she is about to perform before proceeding with that test.

Necessary Equipment:
- A vehicle that utilizes hydraulic brake system with either front rear master cylinder or diagonal brake master cylinder. Suggested Tooling:
  - Micrometer
  - Dial indicator
  - Brake pad thickness gauge
  - Basic tool set.
  - Service information on brake specifications
  - Proper PPE

Video of Demonstrated Procedures
Through a recorded video session, record the contestant completing the tasks. One camera should show the entire lab/workspace the student is in, and the second camera should be focused on the student as they complete tasks. *Ensure lighting, audio and video are high quality
NYS SkillsUSA Automotive Technology (VIRTUAL)

PURPOSE
To evaluate each contestant preparation for employment and to recognize outstanding students for excellence and professionalism in the field of automotive technology.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with automotive technology as the occupational objective.

CLOTHING REQUIREMENT
Contest Specific – Mechanic
- White crew neck short-sleeved T-shirt
- Work pants or jeans,
- Leather or steel toed work shoes.
- Hair must be contained.
- Safety glasses with side shields or goggles, (Prescription glasses can be used only if they are equipped with side shields approved by OSHA(Z-87). If not, they must be covered with goggles.)
Contest Clothing Notes (Apply ONLY to Virtual Competitions):
- Contestant clothing options include the following:
  o Official Competition Clothing.
  o Trade Appropriate Clothing.
  o Professional Dress.
  o Business Casual.
- Clothing must meet industry safety standards.
- No identification of the contestant, school or state is allowed on clothing.
- No offensive, vulgar or inappropriate images or text are not allowed on contestants clothing.
- No shorts or sleeveless shirts are allowed.
- Skirts must be at least knee-length.
- Proper Personal Protective Equipment (PPE) must be worn by contestant to meet all state, local and school requirements due to COVID-19. Scoring deductions may only be given and/or disqualification of contestant if clothing safety standards are not met.

SAFETY INSTRUCTION AND VERIFICATION OF TRAINING
Important: Both the instructor and the contestant certify by agreeing to enter this contest that the contestant has received instruction in diesel technology and has demonstrated knowledge of the operation and safe use of the following tools, equipment and machines:
1. Oxyacetylene welding and cutting
2. Drill press
3. Hand tools
4. Hydraulic systems
5. Electric welding
6. Metal grinders

They also certify that NYS SkillsUSA Inc., the national technical committee and national judges are released from all responsibilities relating to personal injury resulting from their use.

Contestants will be removed from competition if proper training has not been provided and/or they are using the equipment in an unsafe manner.

EQUIPMENT AND MATERIALS
Supplied by the contestant:
1. All materials, tools and equipment needed for the contest
2. Computer with high-speed internet capability and camera to use applications such as Zoom, Teams, etc. The minimum recommended internet bandwidth speeds for joining Zoom meetings, accessing on-demand curriculum
and other online operations is 2.0 Mbps up and down. You can test your current internet speeds by following this link: www.speedtest.net. Allow the page to load and click on GO.

3. A secondary camera(s) may be required to provide judges with the ability to view contestants from different angles. Additional camera requirements will be located on the at NYS SkillsUSA website.

4. A contest Proctor will be required to be on site to assist judges. A local industry expert is preferred to serve as the Proctor and shall not be an individual that has been involved with the training of the contestant(s). The Proctor will serve as the onsite ‘hands and eyes’ for the judges. Proctor will follow instructions from the judges for safety and operations related to the competition. Proctor may be asked by judges to perform several tasks such as operating a portable camera to show specific components or steps, measure parts, or any task that will provide judges with information needed to assist in accurate scoring of the contestants work or presentation. However, the Proctor shall not serve as a judge nor have any influence on contestant scores.

5. The contestants instructor or advisor shall be on site to observe all competition activities to ensure a safe and healthy competition experience for all participants. That instructor or advisor will not be allowed to interact or interfere with the competitor unless a safety issue arises that requires interaction. Any other support or interaction between the contestant and the instructor/advisor will result in disqualification.

6. All competitors must create a one-page résumé and submit an electronic copy to the technical committee chair. Link will be provided by April 1, 2021.

**Contest Guidelines**

1. The following general shop safety rules will be followed:
   a. Safety glasses must be worn at all times when in the work area. If the contestant is taking a written test or is in a job interview, safety glasses can be removed. No loose clothing is permitted.
   b. Long hair must be tied behind the head or netted.
   c. Gloves must not be worn during operation of machinery, except while doing electric welding and oxyacetylene welding and cutting operations.
   d. Any liquid or grease spilled must be cleaned up immediately and reported to the judge.
   e. All injuries, no matter how slight, must be reported immediately to the judge.
2. In addition, contestants will be judged on general shop skills, problem-solving skills, shop safety and a written test. Points allowed will be assigned by the technical committee based on the difficulty of the assigned task.

**Standards and Competencies**

*Note for Virtual Competitions:* Contestants may not be required to perform all the standards and competencies listed in this section. However, contestants should be prepared to perform components in all areas. Prior to the competition, the technical committee may determine which standards and competencies contestants will be perform for the virtual contests. The technical committee will determine if additional information is needed for contestants prior to the competition. These changes will be posted on the NYS SkillsUSA website.

**DET 1.0** — Demonstrate competencies related to using precision measurements in diesel equipment technology

1.1 Interpret and follow verbal instructions
1.2 Interpret and follow written instructions
1.3 Read and explain basic prints
1.4 Use dial indicator
1.5 Calibrate dial indicator
1.6 Use valve spring compressor to remove valve from head
1.7 Use valve spring compressor to install valve in head
1.8 Use metric micrometers
1.9 Use U.S. standard micrometers
1.10 Record metric measurements correctly
1.11 Record U.S. standards correctly
1.12 Use bore gauge correctly
1.13 Compare readings taken with standards to determine if part is within manufacturers tolerances
1.14 Use dial calipers
1.15 Calibrate dial calipers
1.16 Use an inside telescoping gauge
1.17 Use a depth micrometer

**DET 2.0** — Demonstrate competencies needed to complete live engine troubleshooting

2.1 Inspect fuel, oil and coolant levels, condition and consumption; determine needed action
2.2 Diagnose causes of engine fuel, oil, coolant, air and other leaks; determine needed action
2.3 Interpret engine noises; determine needed action
2.4 Observe engine exhaust smoke color and quantity; determine needed action
2.5 Perform air intake system restriction and leakage tests; determine needed action
2.6 Perform intake manifold pressure (boost) test; determine needed action
2.7 Perform exhaust back pressure test; determine needed action
2.8 Perform crankcase pressure test; determine needed action
2.9 Diagnose no cranking, cranks but fails to start, hard starting and starts but does not continue to run problems; determine needed action
2.10 Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration and shutdown problems; determine needed action
2.11 Diagnose engine vibration problems; determine needed action
2.12 Check, record and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action
2.13 Perform cylinder compression test; determine needed action
2.14 Test engine oil pressure and check operation of pressure sensor, gauge and/or sending unit; determine needed action
2.15 Check engine coolant type, level, condition and consumption; determine needed action
2.16 Test coolant temperature and check operation of temperature sensor, gauge and/or sending unit; determine needed action
2.17 Inspect thermostatic cooling fan system (hydraulic, pneumatic and electronic) and fan shroud; replace as needed
2.18 Inspect turbocharger(s), wastegate and piping systems; determine needed action
2.19 Check air induction system: piping, hoses, clamps and mounting; check for air restrictions and leaks; service or replace air filter as needed
2.20 Remove and reinstall turbocharger/wastegate assembly
2.21 Inspect intake manifold, gaskets and connections; replace as needed
2.22 Inspect, clean and test charge air cooler assemblies; replace as needed
2.23 Inspect exhaust manifold, piping, mufflers, exhaust after-treatment device(s) and mounting hardware; repair or replace as needed
2.24 Inspect and test pre-heater/inlet air heater, or glow plug system and controls; perform needed action
2.25 Inspect and test exhaust gas recirculation (EGR) system; determine needed action
2.26 Check fuel level, quality and consumption; determine needed action
2.27 Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system and supply and return lines and fittings; determine needed action
2.28 Inspect, clean and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates and mounting hardware; determine needed action
2.29 Inspect and test low pressure regulator systems (check valves, pressure regulator valves and restrictive fittings); determine needed action
2.30 Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump
2.31 Inspect, test and adjust engine fuel shut-down devices and controls; determine needed action
2.32 Inspect high-pressure injection lines, hold downs, fittings and seals; replace as needed
2.33 Inspect and diagnose electronic fuel management system
2.34 Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage and resistance readings using a digital multimeter (DMM); determine needed action
2.35 Interface with vehicles on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC-based software and/or data scan tools); determine needed action
2.36 Locate and use relevant service information (to include diagnostic procedures, flow charts and wiring diagrams)
2.37 Inspect and replace electrical connector terminals, seals and locks
2.38 Inspect and test switches, sensors, controls, actuator components and circuits; adjust or replace as needed
2.39 Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters

2.40 Inspect, test and adjust electronic unit injectors (EUI); determine needed action

2.41 Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable)

2.42 Perform cylinder contribution test using recommended electronic diagnostic tool

2.43 Perform engine timing sensor calibration (if applicable)

2.44 Perform on-engine inspections and tests on hydraulic electronic unit injectors and system electronic controls; determine needed action

2.45 Inspect and adjust engine compression/exhaust brakes; determine needed action

2.46 Inspect, test and adjust engine compression/exhaust brake control circuits, switches and solenoids; repair or replace as needed

2.47 Inspect engine compression/exhaust brake housing, valves, seals, screens, lines and fittings; repair or replace as needed

2.48 Read and follow written directions

2.49 Comprehend and follow verbal directions

2.50 Diagnose engine-related problems

2.51 Comprehend and follow diagnostic procedures

2.52 Use basic diagnostic tools

2.53 Comprehend and follow general safety requirements

2.54 Demonstrate knowledge of safety requirements when working around running engines

2.55 Demonstrate knowledge of pre-trip inspection before starting engine (fuel, coolant, oil, belts, etc)

2.56 Explain the basic operations of a diesel engine (key, throttle control, gauge cluster)

2.57 Explain the principles of the four-cycle (stroke) engine (intake, compression, power, exhaust)

2.58 Describe related environmental concerns (fuel/oil/filter disposal)

2.59 Use basic computer operating skills and diagnostic programs

DET 3.0 (Standard 7) — Demonstrate competencies related to drive line component and system diagnosis and repair

3.1 Distinguish lubricant leaks and lubricant seeps per specifications

3.2 Remove and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs and seals

3.3 Remove and replace drive axle carrier assembly from drive axle housing

3.4 Remove and replace axle shafts

3.5 Check drive axle fluid level and condition

3.5.1 Determine needed service

3.5.2 Add proper type of lubricant

3.6 Remove and replace driveline yokes

3.7 Disassemble carrier assembly internal/external components

3.8 Inspect carrier assembly components to determine reuse, to include but not limited to: spider gears, cross, side gears, thrust washers, case halves, bearings, ring gear, pinion, inter-axle differential case assembly components, driver-controlled differential lock components, inter-axle differential lock components, drive axle lubrication system pump, troughs, collectors, slingers, tubes, filters, driveline yoke, spigot bearing, adjusting rings, carrier case, and planetary gear-type two-speed axle assembly including: case, idler pinion, pins, thrust washers, sliding clutch gear, shift fork, pivot, seals, cover and springs
3.9 Inspect, repair, or replace two-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines and connectors

3.10 Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings and controls

3.11 Assemble carrier assembly internal/external components

3.12 Inspect, adjust or replace ring gear thrust block/bolt

3.13 Assemble drive pinion assembly in carrier housing and adjust bearing preload to specification

3.14 Assemble drive pinion assembly in carrier housing and adjust pinion depth to specification

3.15 Check, and if possible, set ring gear run-out to specification

3.16 Assemble main differential, check rotating resistance and adjust to specification

3.17 Install main differential case and ring gear and set bearing preload to specification

3.18 Remove and replace the ring gear from the flange case half of the main differential case

3.19 Check and interpret ring gear and pinion tooth contact pattern; determine needed action; if necessary, adjust to specification

3.20 Set ring and pinion gear backlash to specification

3.21 Assemble main differential lock components

3.22 Assemble inter-axle differential components

3.23 Check input shaft end play, adjust as necessary per specifications

3.24 Adjust ring gear thrust screw clearance per specifications

3.25 Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings to specifications

3.26 Diagnose drive axle for wheel bearing noise and damage; perform needed action

3.27 Inspect and test drive axle temperature gauge and sending unit/sensor; determine needed action

3.28 Diagnose drive axle(s)/drive unit noise, vibration and overheating problems; determine needed action

DET 4.0 (Standard 9) — Demonstrate knowledge of basic hydraulic theory and demonstrate competencies needed to inspect, diagnose and service hydraulic systems

4.1 Demonstrate knowledge of fluids (e.g., fluids have no shape of their own, are practically incompressible, apply equal pressure in all directions and provide great increases in work force)

4.2 Explain the function of a reservoir, pump, filters, relief valve, control valve and a cylinder in relation to each other both descriptively and schematically

4.3 Describe a basic, but complete, open center hydraulic system, explaining the operation of the system, the route of fluid during the use of a function and the route of the fluid while the machine is running when no hydraulic function is being used

4.4 Describe a basic, but complete, closed center hydraulic system, explaining the operation of the system, the route of fluid during the use of a function and the route of the fluid while the machine is running when no hydraulic function is being used

4.5 Identify open and closed center systems and the benefits of those applications on vocational equipment

4.6 Describe the purpose of a charge circuit

4.7 Explain the differences between hydraulic and hydrostatic systems
4.8 Identify hydraulic and hydrostatic applications and the benefits of those applications on vocational equipment
4.9 Exhibit the ability to select the proper hose for a given function, taking into consideration the flow needed, pressures to be used, routing, clamping, fittings required and pulsating of lines
4.10 Identify and select various fittings and thread styles (O-ring boss, NPT, NPTF, British, Metric, O-ring flange, ORFS, etc.)
4.11 Describe the use of various filters in hydraulic and hydrostatic systems
4.12 Understand oils and show familiarity with various fluids and their effects on hydraulic systems
4.13 Describe the applications and reactions of various types of sealants with different types of hydraulic systems
4.14 Practice good hydraulic maintenance and safety practices
4.15 Describe proper contamination control procedures dealing with hydraulics
4.16 Follow the proper manufacturers cleaning/flushing procedures

DET 5.0 (Standard 11) — Perform basic shop skills
5.1 Demonstrate reading comprehension skills
5.2 Comprehend and follow verbal directions
5.3 Identify root cause of engine component failures
5.4 Identify root cause of transmission component failures
5.5 Identify root cause of carrier component failures
5.6 Interpret oil analysis readings
5.7 Identify root cause of elevated oil analysis readings
5.8 Identify mechanical type failures
5.9 Identify operator error type failures
5.10 Identify environmental type failures

DET 6.0 (Standard 13) — Demonstrate the competencies to diagnose, service and repair HVAC systems in a given situation at the operator environment station
6.1 Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action
6.2 Verify the need for service or repair of HVAC systems based on unusual visual, smell and touch conditions; determine needed action
6.3 Identify system type and components (cycling clutch orifice tube — CCOT, expansion valve) and conduct performance test(s) on HVAC systems; determine needed action
6.4 Diagnose the cause of temperature control problems in the A/C system; determine needed action
6.5 Identify refrigerant type and check for contamination; determine needed action
6.6 Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action
6.7 Diagnose A/C system problems indicated by visual, aural, smell and touch procedures; determine needed action
6.8 Perform A/C system leak test; determine needed action
6.9 Evacuate A/C system using appropriate equipment
6.10 Internally clean contaminated A/C system components and hoses
6.11 Charge A/C system with refrigerant
6.12 Identify lubricant type needed for system application
6.13 Diagnose, service and repair compressor and clutch components in a HVAC system
   6.13.1 Diagnose A/C system problems that cause protection devices (pressure, thermal and electronic) to interrupt system operation; determine needed action
   6.13.2 Inspect, test and replace A/C system pressure and thermal and electronic protection devices
   6.13.3 Inspect and replace A/C compressor drive belts, pulleys and tensioners; adjust belt tension and check alignment
   6.13.4 Inspect, test, service and replace A/C compressor clutch components or assembly
   6.13.5 Inspect and correct A/C compressor lubricant level (if applicable)
   6.13.6 Inspect, test and replace A/C compressor
   6.13.7 Inspect, repair or replace A/C compressor mountings and hardware
6.14 Diagnose, service and repair evaporator, condenser and related components in a HVAC system
   6.14.1 Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier and hoses
   6.14.2 Inspect A/C system hoses, lines, filters, fittings and seals; determine needed action
   6.14.3 Inspect A/C condenser for proper air flow
   6.14.4 Inspect and test A/C system condenser and mountings; determine needed action
   6.14.5 Inspect and replace receiver/drier or accumulator/drier
   6.14.6 Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube); determine needed action
   6.14.7 Inspect and replace orifice tube
   6.14.8 Inspect and test cab/sleeper evaporator core; determine needed action
   6.14.9 Inspect, clean and repair evaporator housing and water drain; inspect and service or replace evaporator air filter
   6.14.10 Identify and inspect A/C system service ports (gauge connections); determine needed action
   6.14.11 Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action
6.15 Diagnose, service and repair heating and engine cooling components in a HVAC system
   6.15.1 Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action
   6.15.2 Diagnose window fogging problems; determine needed action
   6.15.3 Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature and conditioner concentration; determine needed action
   6.15.4 Inspect engine cooling and heating system hoses, lines and clamps; determine needed action
   6.15.5 Inspect and test radiator, pressure cap and coolant recovery system (surge tank); determine needed action
   6.15.6 Inspect water pump for leaks and bearing play; determine needed action
   6.15.7 Inspect and test thermostats, by-passes, housings and seals; determine needed repairs
   6.15.8 Recover, flush and refill with recommended coolant/additive package; bleed cooling system
   6.15.9 Inspect thermostatic cooling fan system (hydraulic, pneumatic
and electronic) and fan shroud; replace as needed

6.15.10 Inspect and test heating system coolant control valve(s) and manual shut-off valves; determine needed action

6.15.11 Inspect and flush heater core; determine needed action

6.16 Diagnose, service and repair electrical operating systems and related control components in a HVAC system

6.16.1 Diagnose the cause of failures in HVAC electrical control systems; determine needed action

6.16.2 Inspect and test A/C heater blower motors, resistors, switches, relays, modules, wiring and protection devices; determine needed action

6.16.3 Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes and protection devices; determine needed action

6.16.4 Inspect and test A/C-related electronic engine control systems; determine needed action.

6.16.5 Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors, wiring and protection devices; determine needed action

6.16.6 Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring and protection devices; determine needed action

6.16.7 Inspect and test HVAC system electrical control panel assemblies; determine needed action

6.17 Diagnose, service and repair air, vacuum and mechanical switches and controls; determine needed action

6.17.2 Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action

6.17.3 Inspect, test and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action

6.17.4 Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action

6.17.5 Inspect and test HVAC system vacuum reservoir(s), check valve(s) and restrictors; determine needed action

6.17.6 Inspect, test and adjust HVAC system ducts, doors and outlets; determine needed action

6.18 Demonstrate knowledge of refrigerant recovery, recycling and handling procedures in accordance with published EPA and appropriate SAE 'J' standards for R-12, R-134a and EPA approved refrigerant blends

6.18.1 Maintain and verify correct operation of certified equipment

6.18.2 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant

6.18.3 Recycle refrigerant

6.18.4 Handle, label and store refrigerant

6.18.5 Test recycled refrigerant for non-condensable gases

6.19 Perform various tasks by navigating vehicle
dash controls, including onboard diagnostics, users settings, display settings, etc.

6.18.1 (ELD) Electronic Logging Device
- navigation from the operator environment with understanding of Federal Mandate

6.18.2 (CMS) Collision Mitigation Systems - Functional alert systems and notifications in operator environment

6.18.3 (ESC) Electronic Stability Control
- Functional alert system and notifications in operator environment.

6.20 Perform various tasks by navigating vehicle sound system controls