



- b. Identify vehicle identification numbers, electronic service information, and service repair orders.
- c. Methodically approach and diagnosis problems in electrical/electronic systems, in order to make a direct, thorough and economical diagnosis.
- d. Do basic testing and service on body electrical/electronic systems and basic electrical systems
- e. Perform basic “in-car” diagnostics and repairs.
- f. Understand the basic concepts and procedures to successfully repair late model electrical/electronic systems.

## **OUTLINE OF INSTRUCTION:**

### **I. Electronics**

#### **A. Systems**

#### **B. Modules**

- 1) Types
- 2) Networking and Communications

### **II. Circuit Devices/Symbols**

#### **A. Diodes**

- 1) Zener-Type
- 2) Photo-Type
- 3) LED's

#### **B. Transistors**

- 1) NPN
- 2) PNP
- 3) J-FET

#### **C. Sensors**

- 1) Hall effect
- 2) Variable reluctance sensor (VRS)
- 3) Piezoelectric
- 4) Piezoresistive
- 5) Thermister
- 6) Photoresister
- 7) Phototransistor
- 8) Potentiometer

### **III. Lighting Systems (Understand the Typical Operation for Each Circuit)**

#### **A. Headlight Circuit**

- 1) High beam lamps
- 2) Low beam lamps
- 3) Dimmer switch
- 4) Switch rheostat
- 5) Daytime running lamps (DRLs)
- 6) Wiring
- 7) Test, aim, and replace headlights
- 8) High intensity discharge (HID) lamps

#### **B. Stop Lamp Circuit (Including High Mount Lamp)**

- 1) Adjust stop light switch
- 2) Test stop light portion of turn signal switch

- C. Directional Signal Circuit
  - 1) Flasher types
  - 2) Switch replacement
  - 3) Flashing speed
  - 4) Bulb wattage
- D. Hazard Warning Lights
- E. Tail Lamp Circuit
- F. Back-Up Lamp Circuit
- G. Instrument Panel Displays and Interior Lights
  - 1) Printed circuit boards/connectors/wires
  - 2) Liquid Crystal Display (LCD)
- H. Problem/Diagnosis
  - 1) Intermittent, dim, or no headlight operation
  - 2) No dash light brightness control
  - 3) No flash on one or both sides
  - 4) No hazard flasher lights
  - 5) Brighter than normal lights
  - 6) No back-up lights
  - 7) No tail lamps
  - 8) No stop lamps

#### IV. Accessory Systems

- A. Basic Theory of Operation for Each Component/Circuit
- B. Basic Troubleshooting Procedures (Including Printed Circuits)
  - 1) Oil sending unit
  - 2) Fuel gauge and tank sending unit
  - 3) Temperature warning
  - 4) Horns
  - 5) Constant voltage regulator for dash instruments
  - 6) Buzzer/relays/timers/voice alert
  - 7) Air bags
  - 8) Wiper/washer circuit
  - 9) Power side window and power side mirrors
  - 10) Power tailgate
  - 11) Power seat circuit and heated seat circuit
  - 12) Electric door locks
  - 13) Defogger switches, grid, and blower motors
  - 14) Radio power circuit
  - 15) Radio speaker and antenna (trim procedure)
  - 16) Cruise control cables, regulator, servo, and hoses
  - 17) Clock circuit
  - 18) Cigar lighter circuit
  - 19) Sunroof and convertible top circuits
  - 20) Keyless lock/unlock circuits
  - 21) Anti-theft circuits
  - 22) Electric door lock and illuminated entry
  - 23) Miles-to-empty fuel circuit
  - 24) Key fob transmitter circuit
  - 25) Scan tool diagnostics

### C. Problem/Diagnosis

- 1) Slow, intermittent, or no power window operation
- 2) Radio static
- 3) Weak, intermittent, or no radio reception
- 4) Unregulated, intermittent, or no cruise control
- 5) Constant, intermittent, or no horn operation
- 6) Wiper speed control and park problems (including pulsating type)
- 7) No windshield washer operation
- 8) High, low, or no gauge readings
- 9) Constant warning buzzer operation
- 10) Poor rear window defogger operation
- 11) No power seat operation
- 12) No power window operation
- 13) Poor or no electric door lock operation
- 14) No keyless lock/unlock device operation
- 15) No electric sunroof or convertible top operation
- 16) Poor heated mirror operation
- 17) No clock operation

### V. New Electrical/Electronics Technologies

#### **REQUIRED TEXTBOOKS AND MATERIALS:**

To be announced by the instructor.

#### **NATEF:**

This course fulfills 80 hours of the 230 hours required by **NATEF** for A6. See COE 111.