OBJECTIVES

- Discuss the need for electronic stability control (ESC).
- List the sensors needed for the ESC system.
- Describe how a traction control (TC) system works.
- List the steps in the diagnostic process for ESC and TC system faults.

THE NEED FOR ELECTRONIC STABILITY CONTROL

- Purpose and Function
  - Electronic stability control (ESC) is a system designed to help drivers keep control of their cars.
  - Helps prevent run-off-road crashes and rollovers.
THE NEED FOR ELECTRONIC STABILITY CONTROL

- System Requirements
  - ESC has the following features:
    - Applies individual brakes to maintain directional stability.
    - Uses sensors to determine if vehicle is not under control.
    - Uses steering wheel position sensor to determine intended direction.

- ESC operates at all vehicle speeds except low speeds.

- ESC applies individual brakes if either of these conditions occur:
  - Oversteering: rear of vehicle moves outward or breaks loose
  - Can result in loss of control
THE NEED FOR ELECTRONIC STABILITY CONTROL

• System Requirements
  • ESC applies individual brakes if either of these conditions occur:
    • Understeering: front of vehicle continues straight when turning

• ESC lamp—called telltale lamp—remains on as long as malfunction exists when ignition is on
• Telltale lamp flashes to indicate when ESC system is operating

• Some manufacturers install switch to temporarily disable ESC
• Feature useful on certain occasions
  • When a vehicle is stuck in sand or gravel
THE NEED FOR ELECTRONIC STABILITY CONTROL

- System Requirements
  - Feature useful on certain occasions
  - When vehicle is being operated on racetrack

ESC SENSORS

- Steering Wheel Position Sensor
  - May also be called a hand-wheel position sensor
  - Provides computer with signals related to steering wheel position, speed, and direction

ESC automatically turns back on when ignition is turned off and then on again.
ESC SENSORS

- Vehicle Speed Sensor
  - Used by Electronic Brake Control Module to help control suspension system
  - Vehicle speed (VS) sensor is magnetic sensor
  - VS sensor generates analog signal whose frequency increases as speed increases

ESC SENSORS

- Lateral Acceleration Sensor
  - Provides suspension control module with feedback regarding cornering forces
  - This type of sensor called G-sensor

ESC SENSORS

- Lateral Acceleration Sensor
  - Letter “G” stands for gravity
  - Information processed by suspension control module
ESC SENSORS

- Lateral Acceleration Sensor
  - Module provides appropriate damping on inboard and outboard dampers during cornering events
  - This sensor can be stand-alone unit or combined with yaw rate sensor

- Lateral Acceleration Sensor
  - Typically mounted in passenger compartment:
    - Under front seat
    - In center console
    - On package shelf

- Yaw Rate Sensor
  - Provides information to suspension control module and EBCM
  - Information used to determine how far vehicle has deviated from intended direction
ESC SENSORS

• Yaw Rate Sensor
  • Can be stand-alone unit or combined with lateral acceleration sensor
  • Typically mounted under front seat, in center console, or on rear package shelf
  • Sensor sets DTC codes

TRACTION CONTROL

• Traction Control Operation
  • Outputs of TC system can include one or more of the following:
    • Retard ignition timing to reduce engine torque
    • Decrease fuel injector pulse-width to reduce fuel delivery to reduce engine torque
  • Reduce amount of intake air if engine is equipped with an electronic throttle control (ETC)
    • Reducing intake air will reduce engine torque
    • Upshift the automatic transmission/transaxle
      • Shifting into higher gear reduces torque
  • Traction Control Operation
    • Most TC systems can reduce positive wheel slip at all speeds
ESC/TC DIAGNOSIS

• ESC and TC systems use some of the same sensors and controllers
• Diagnosis is about the same for both
• Follow recommended procedures in service information

ESC/TC DIAGNOSIS

• Usual procedure follows these steps:
  • STEP 1: Verify customer concern.
  • STEP 2: Perform thorough visual inspection.
  • STEP 3: Check service information for specified procedure to retrieve DTCs.
    • Check related technical service bulletins
    • Most vehicles require factory-brand scan tool

ESC/TC DIAGNOSIS

• STEP 4: Following troubleshooting procedure specified to fix root cause of problem.
• STEP 5: Repair the fault.
• STEP 6: Road test the vehicle under same conditions that caused the fault.
SUMMARY

- ESC lamp—called telltale lamp—remains on as long as malfunction exists when ignition is on
- VS sensor generates analog signal whose frequency increases as speed increases
- Most TC systems can reduce positive wheel slip at all speeds
- ESC and TC systems use some of same sensors and controllers