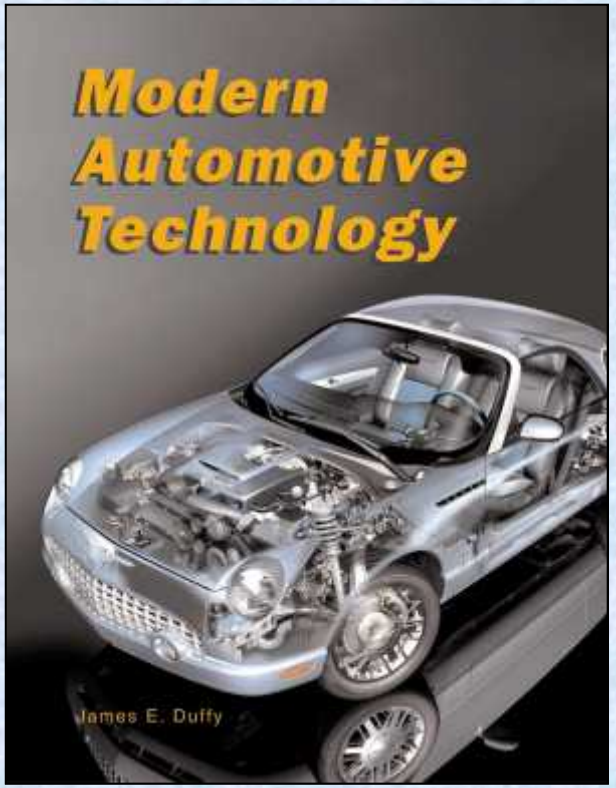
PowerPoint for

Modern Automotive Technology



by

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Chapter 38

Sound Systems and Power Accessories

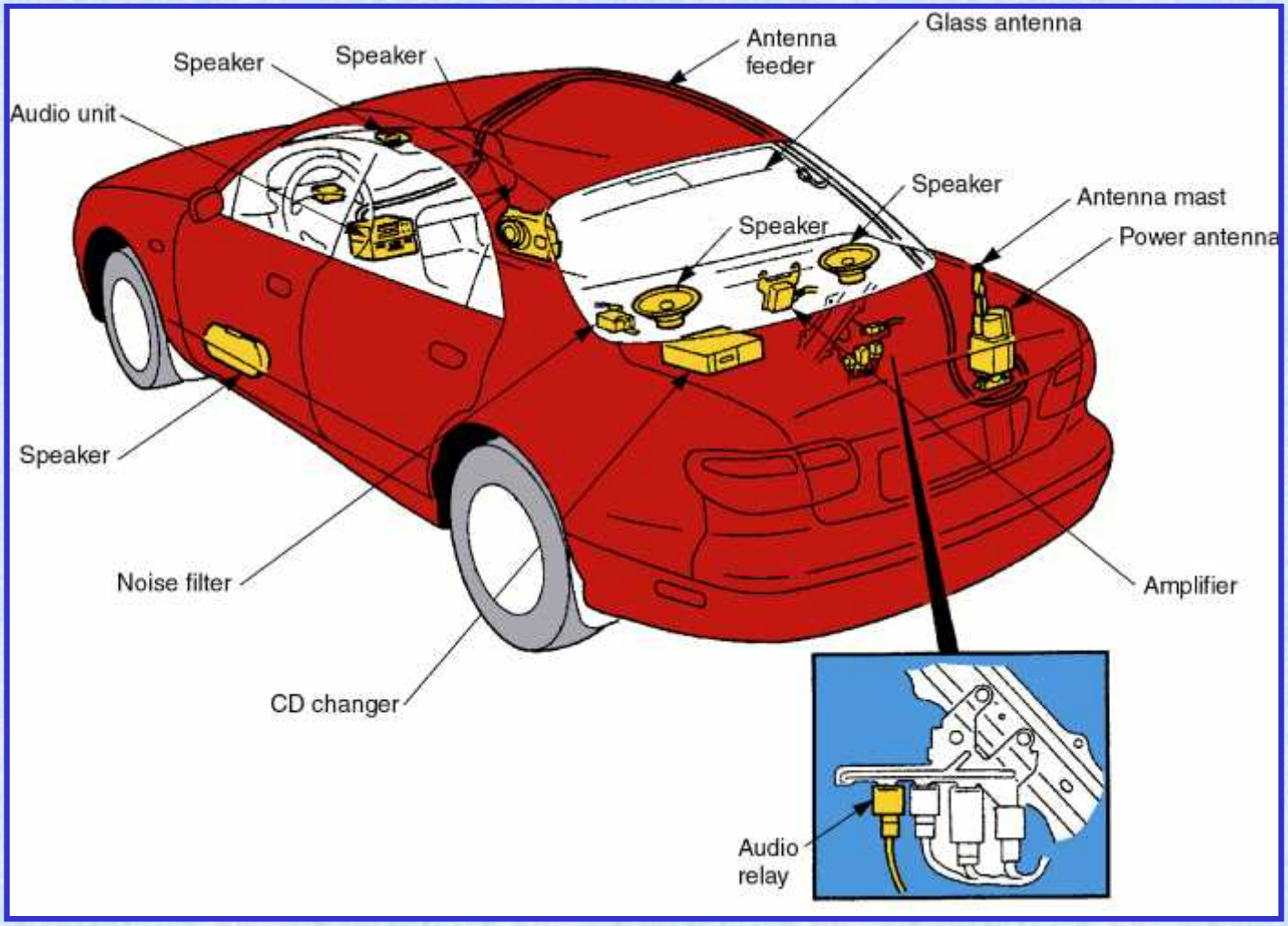
Contents (13 Topics)

- Sound systems
- Power seats
- Power windows
- Power door locks
- Power trunk release
- Power steering wheel
- Rear window defogger

Contents

- Heated windshield
- Reminder system
- Cruise control systems
- Power mirrors
- Cellular mobile telephone
- Driver information center

Sound Systems



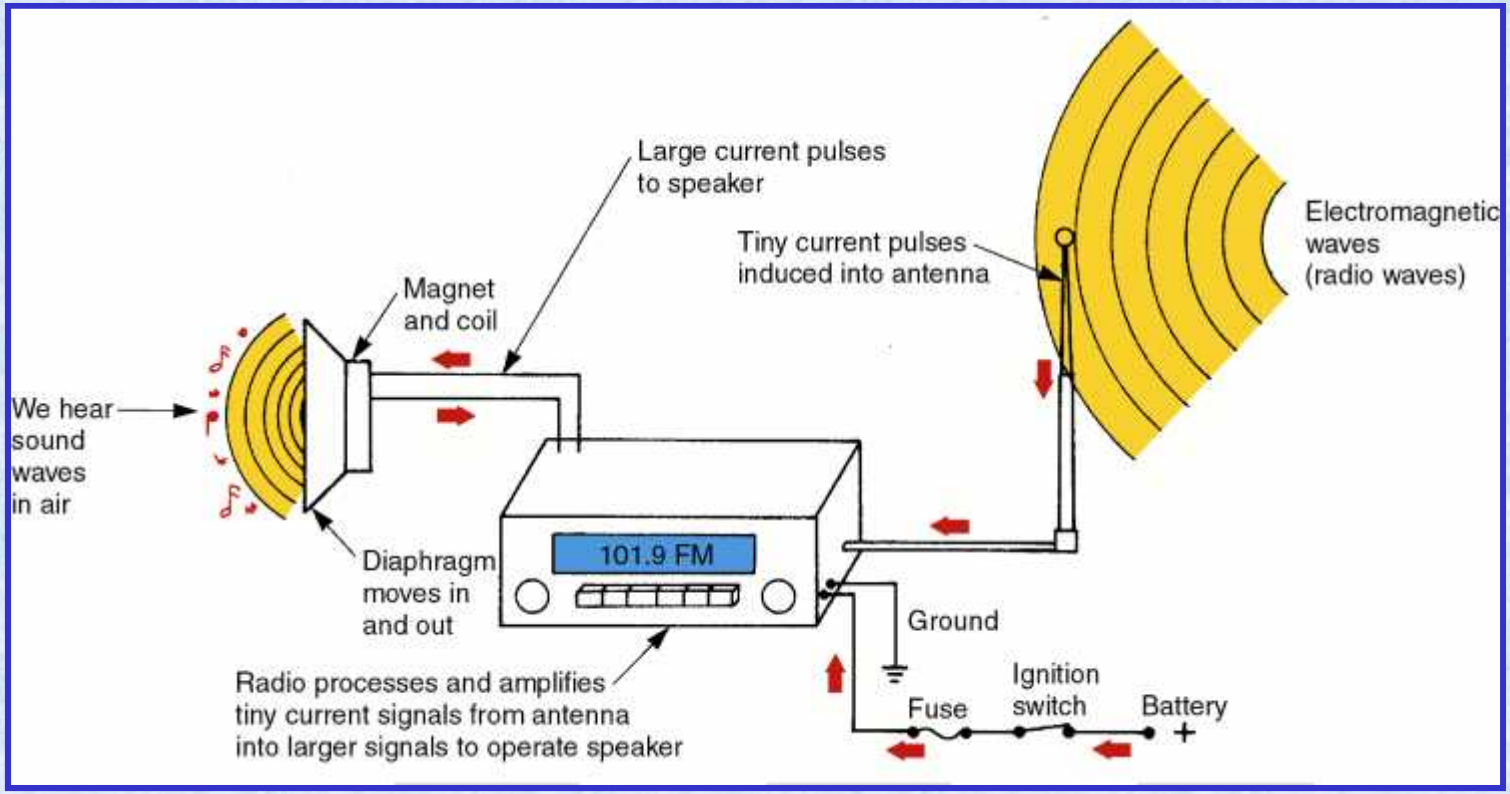
Radio System

- Components:
  - antenna
  - radio (receiver-amplifier)
  - power supply circuit
  - speakers

Basic Operation

- The radio station broadcasts an electromagnetic signal
- When the signal moves past the antenna, tiny electrical modulations (fluctuations) are induced in the antenna
- The radio amplifies this signal to operate the speakers
- The speaker diaphragm moves back and forth, producing air pressure waves

Basic Operation



Sound System

- Components:
  - AM/FM radio
  - tape player
  - amplifier
  - sub-woofer speaker
  - CD player
  - power antenna

Radio

- Electronic circuits that receive and amplify a radio signal to operate the speakers
- The tuner is used to select frequencies

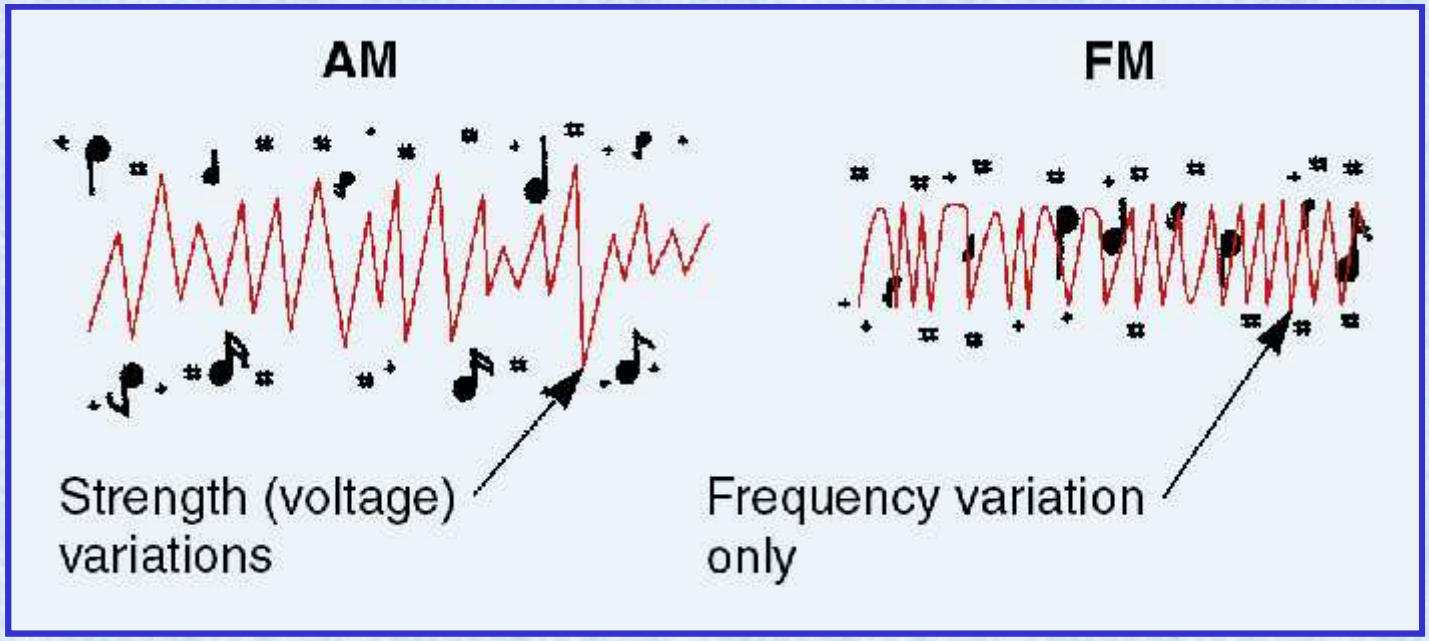
AM Radio

- AM signals vary in amplitude (strength)
- Frequency range: 530–1610 kilohertz (kHz)
- The signal is reflected off the ionosphere, giving it long range

FM Radio

- FM signals vary in frequency
- Frequency: 88–108 megahertz (MHz)
- The signal is not reflected off the ionosphere, limiting its range

AM versus FM Signals

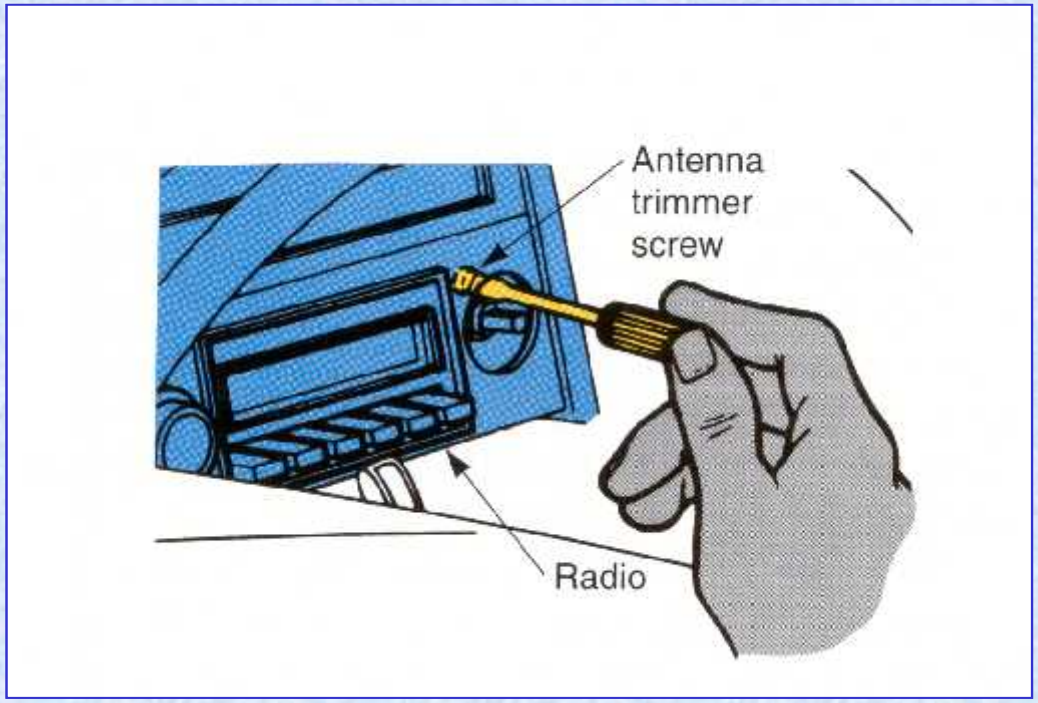


Radio Service

- If a radio fails to work, check the fuse
- Other external problems:
  - power supply lead
  - speakers and connections
- Internal problems should be repaired by a radio repair technician

Antenna Trimmer Screw

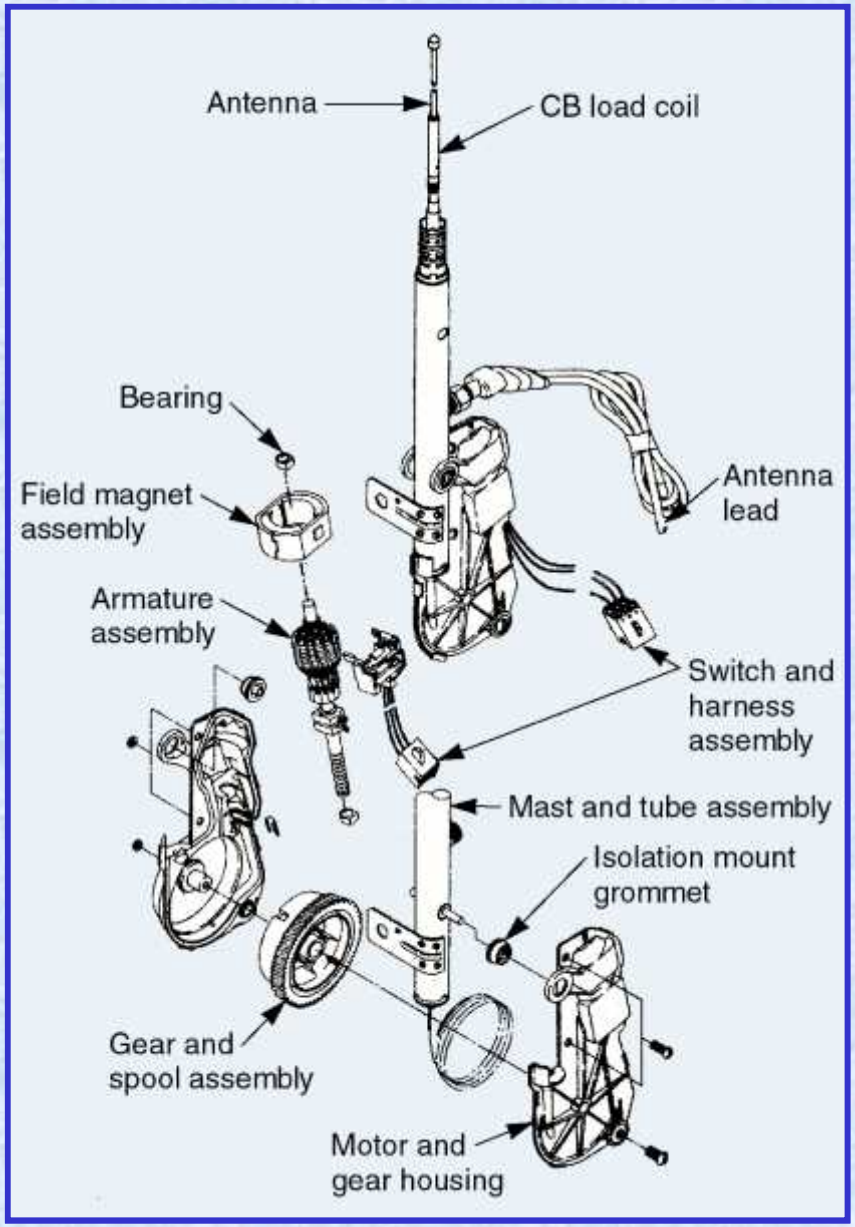
Adjust for maximum volume and clarity



Antennas

- Types:
  - very fine piece of wire in window glass
  - metal mast (rod)
- A power antenna telescopes (extends) when the radio is turned on
- An electric motor operates a cable or slide mechanism on the mast

Power Antenna Components



Antenna Service

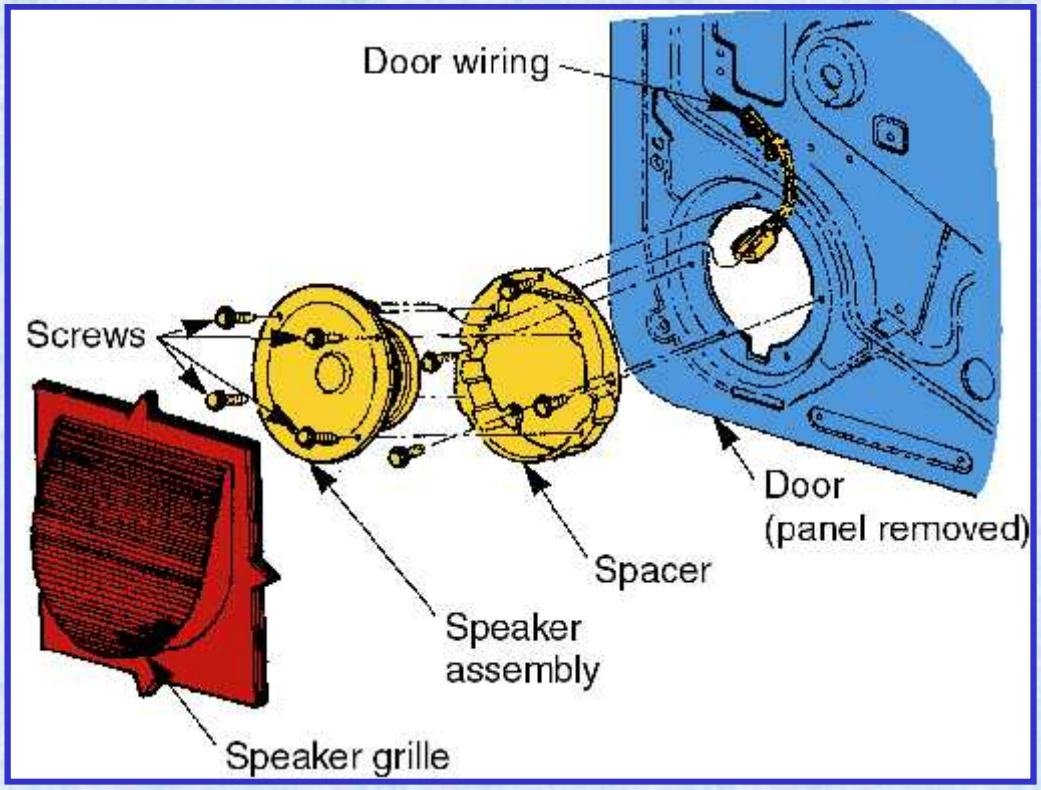
- Connect a known good antenna
- On a power antenna, check for power to the motor with a test light or voltmeter

Speakers

- Permanent magnet and a coil of wire mounted on a flexible diaphragm that convert electricity into motion and sound
- When current passes through the coil, magnetism pulls the coil and diaphragm toward the magnet
- Rapid movement of the diaphragm causes pressure waves in the air (sound)

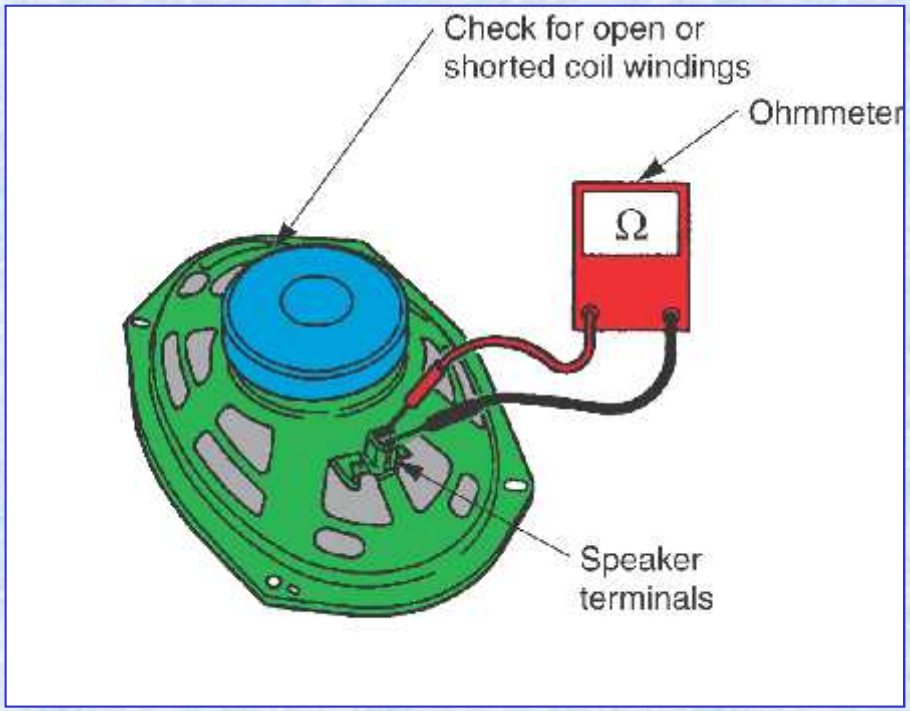
Speakers

Loose mounting screws may sound like a blown speaker



Speaker Service

Measure with an ohmmeter
4–8 ohms resistance



Tape Player

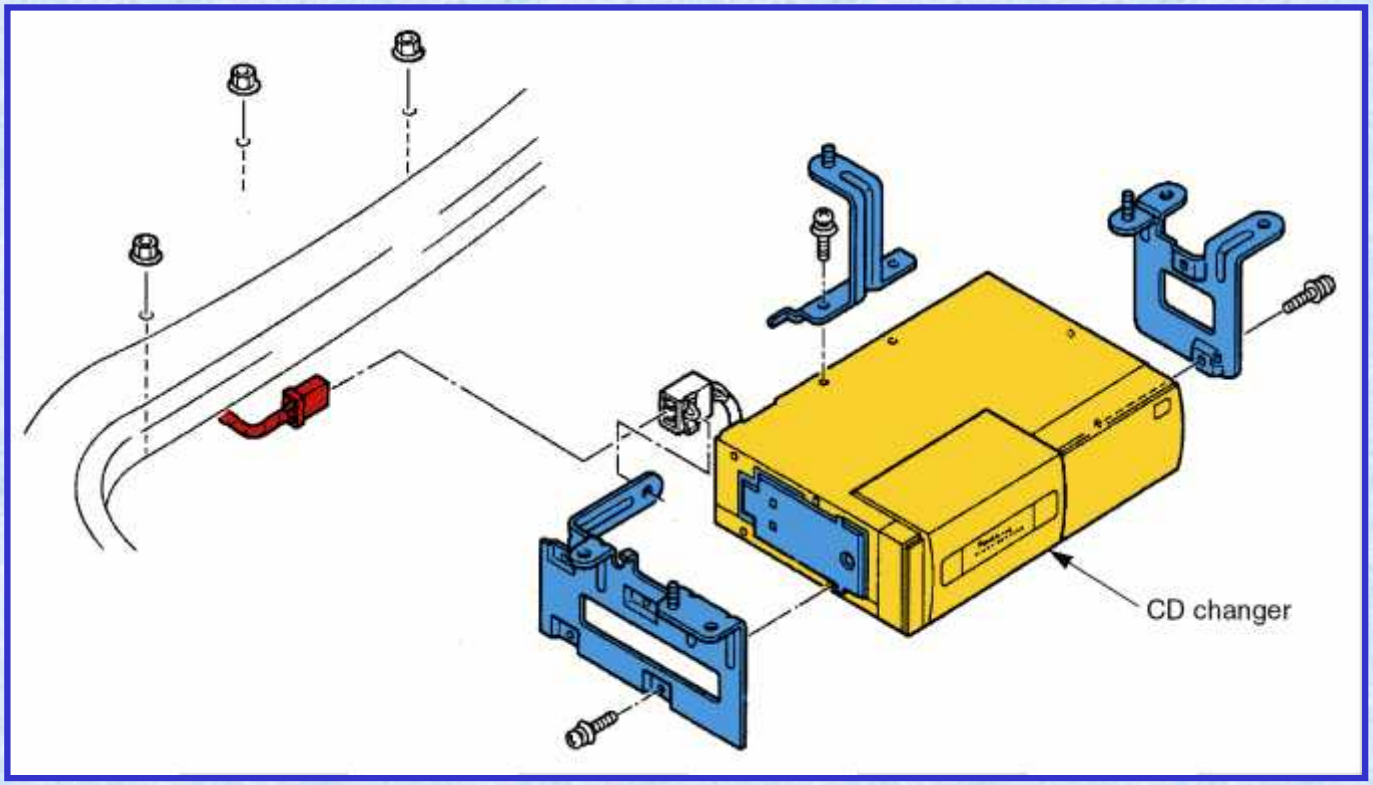
- Remove any broken tapes
- Clean the tape head
- Check power and grounds

CD Players

- Compact disc players
- Use a plastic disc
- Play music digitally
- Locations:
  - in dash
  - in trunk

CD Player

Check for stuck CD's, dirty heads, power, and grounds



Radio Noise

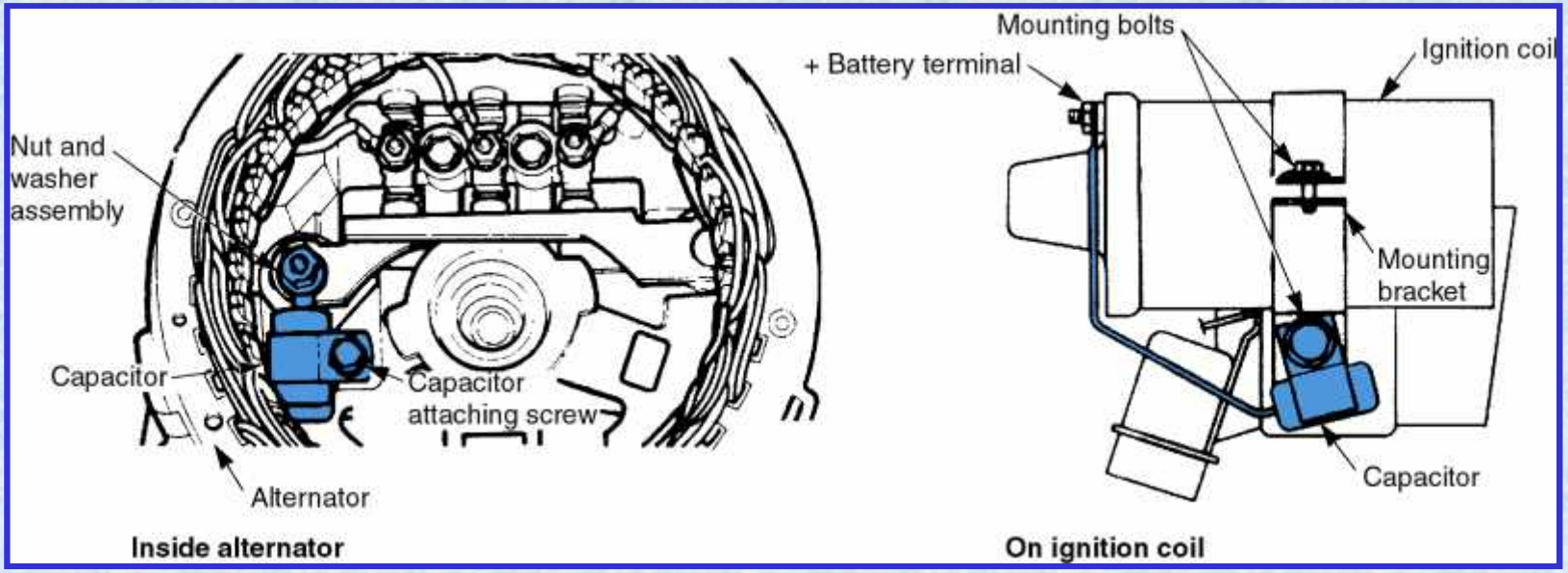
- Interference or static (popping, clicking)
- Causes:
  - faulty antenna
  - open or shorted noise suppressor (capacitor)
  - faulty spark plug wire
  - faulty radio
  - distant stations

Radio Noise

- A noise that changes with engine speed may be caused by faulty ignition or charging systems
- Noise suppressors are capacitors that absorb voltage fluctuations, smoothing the current
  - found at the alternator, ignition coil, distributor, or blower motor

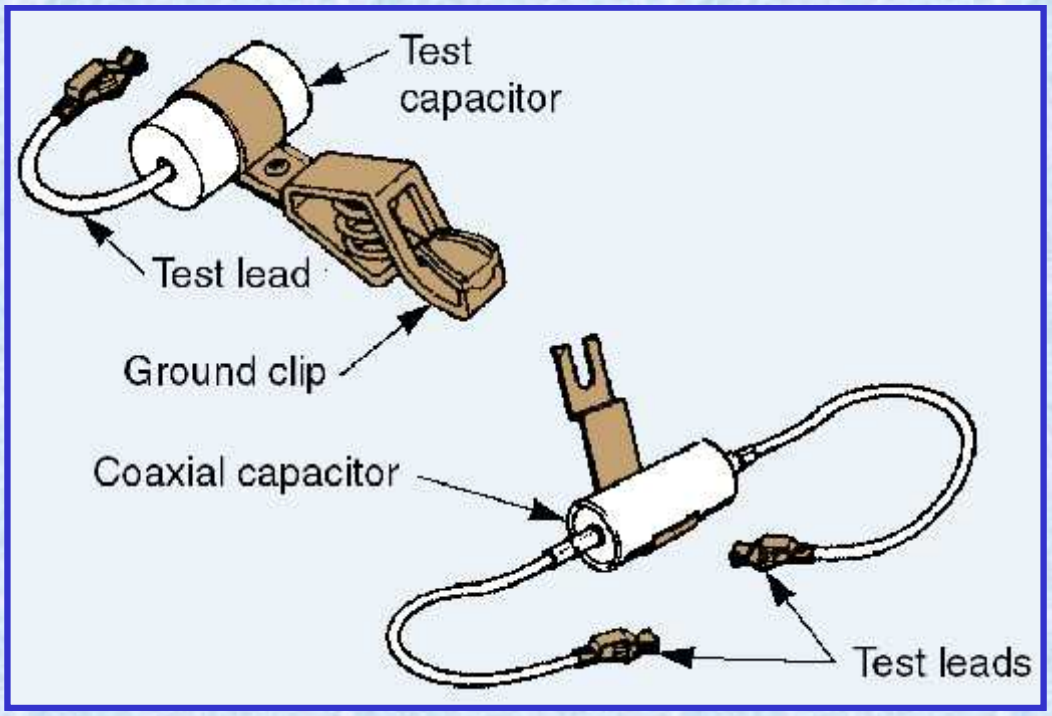
Noise Suppressors

Two common locations



Clip-On Capacitor

If the static quiets when the test unit is connected, the old capacitor is bad

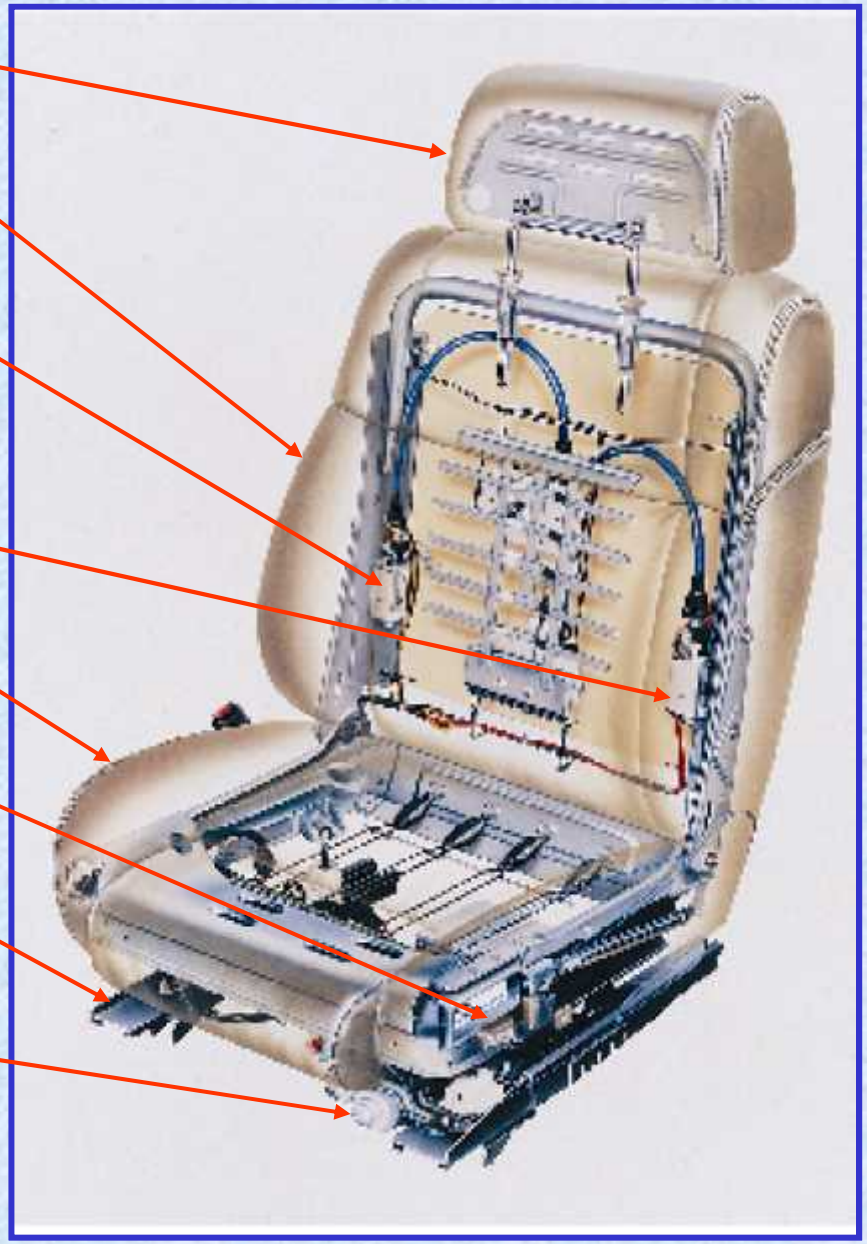


Power Seats

- Components:
  - fuses or circuit breakers
  - switches
  - electric motor and drive assembly
  - related wiring
- When activated by a switch, the reversible DC motors operate a gear mechanism, positioning the seat

Power Seat

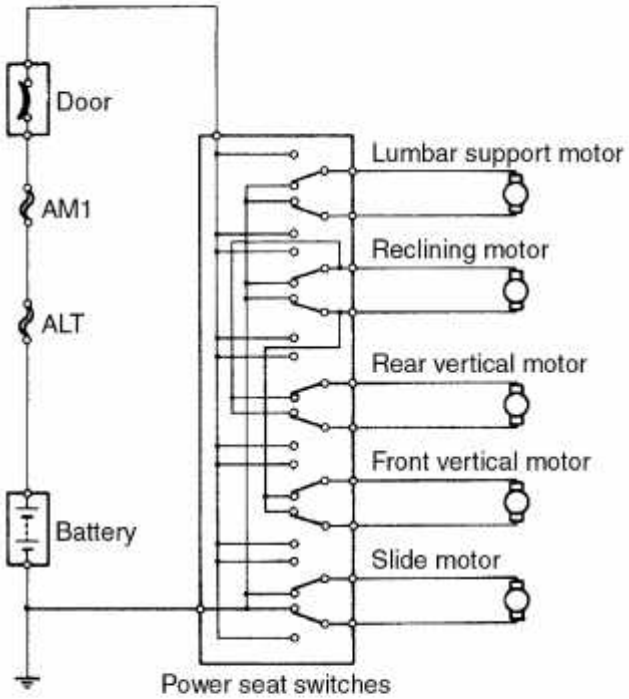
Seat removal may be needed to service the seat motors



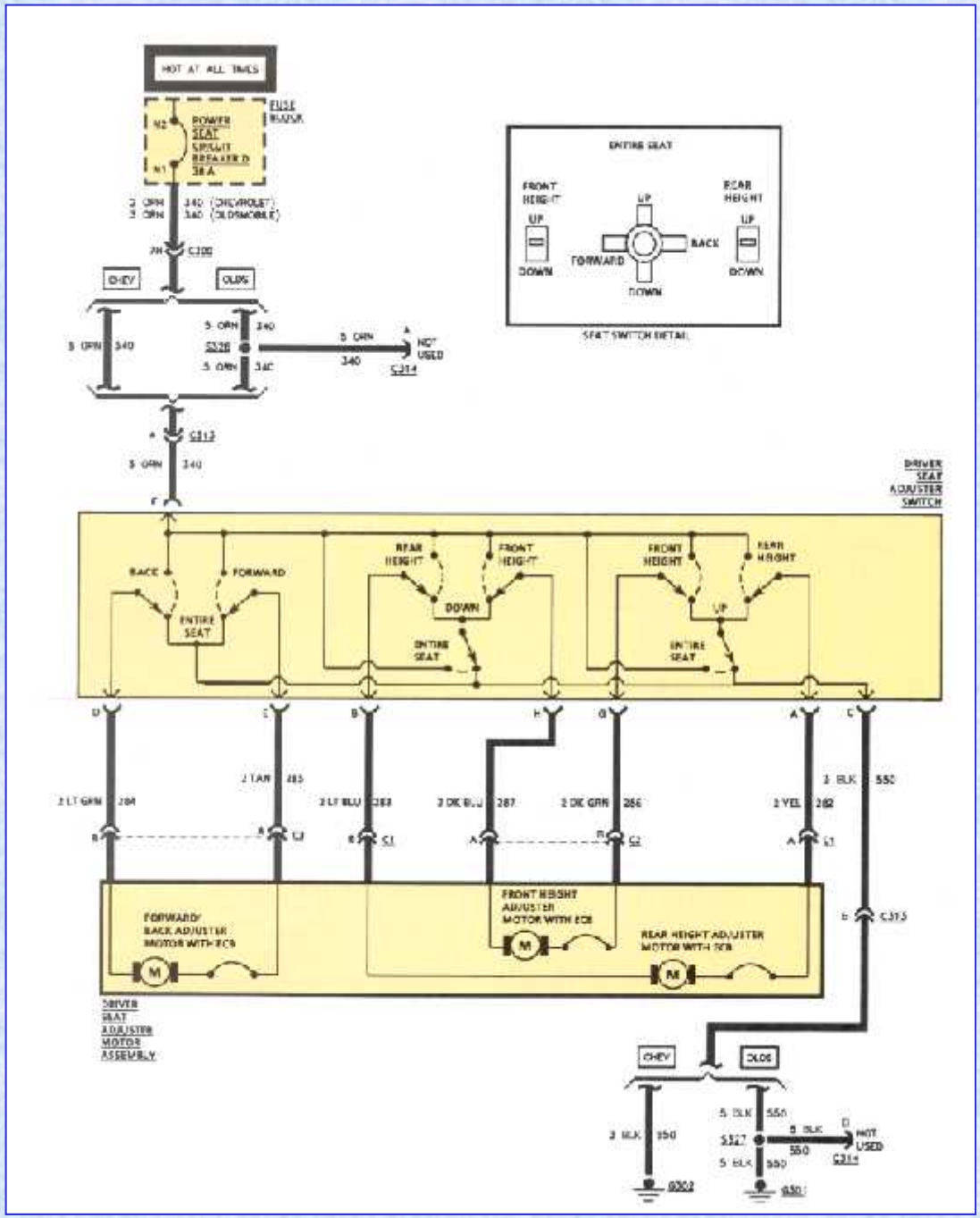
Power Seat

Each motor operates different seat adjustments

Driver's seat



Electrical circuit
(driver's seat-standard type)



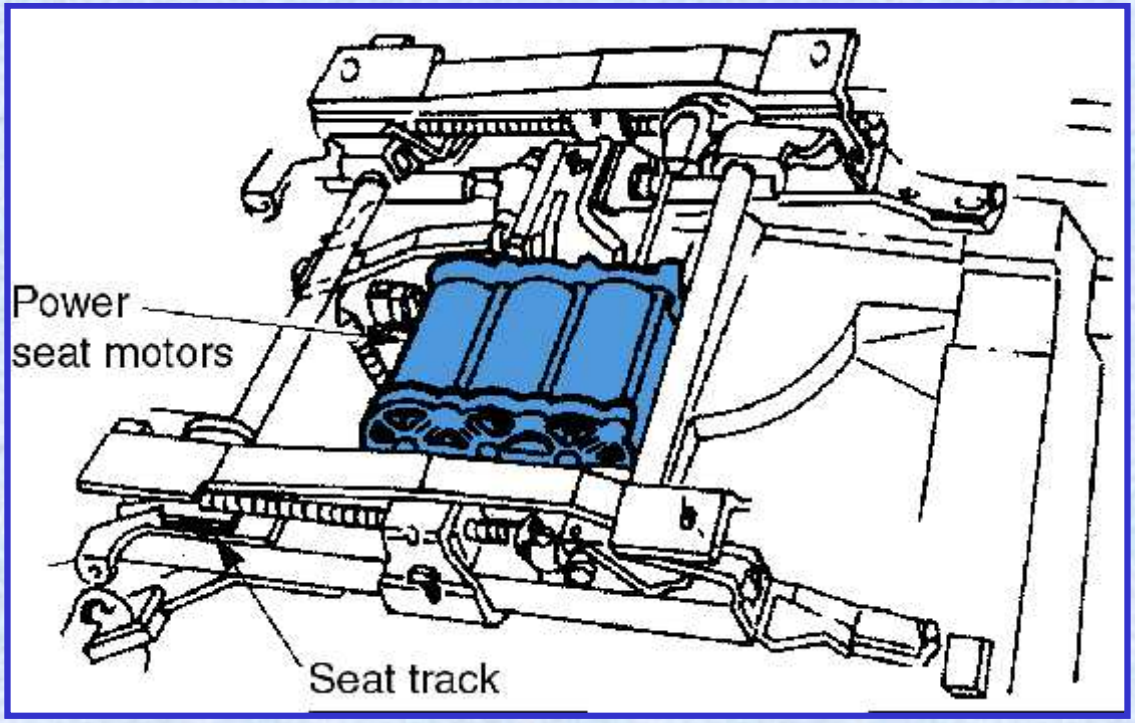
Memory Seats

- A small computer “remembers” seat positions for several drivers
- May be networked to remember seat, steering wheel, rearview mirror, and electronic suspension settings for each driver

Power Seat Service

- Verify if one or both seats fail to function
- If both seats fail, check common circuits such as fuses, circuit breakers, and connections
- If only one seat fails, check the components affecting only that seat

Power Seat Mechanism



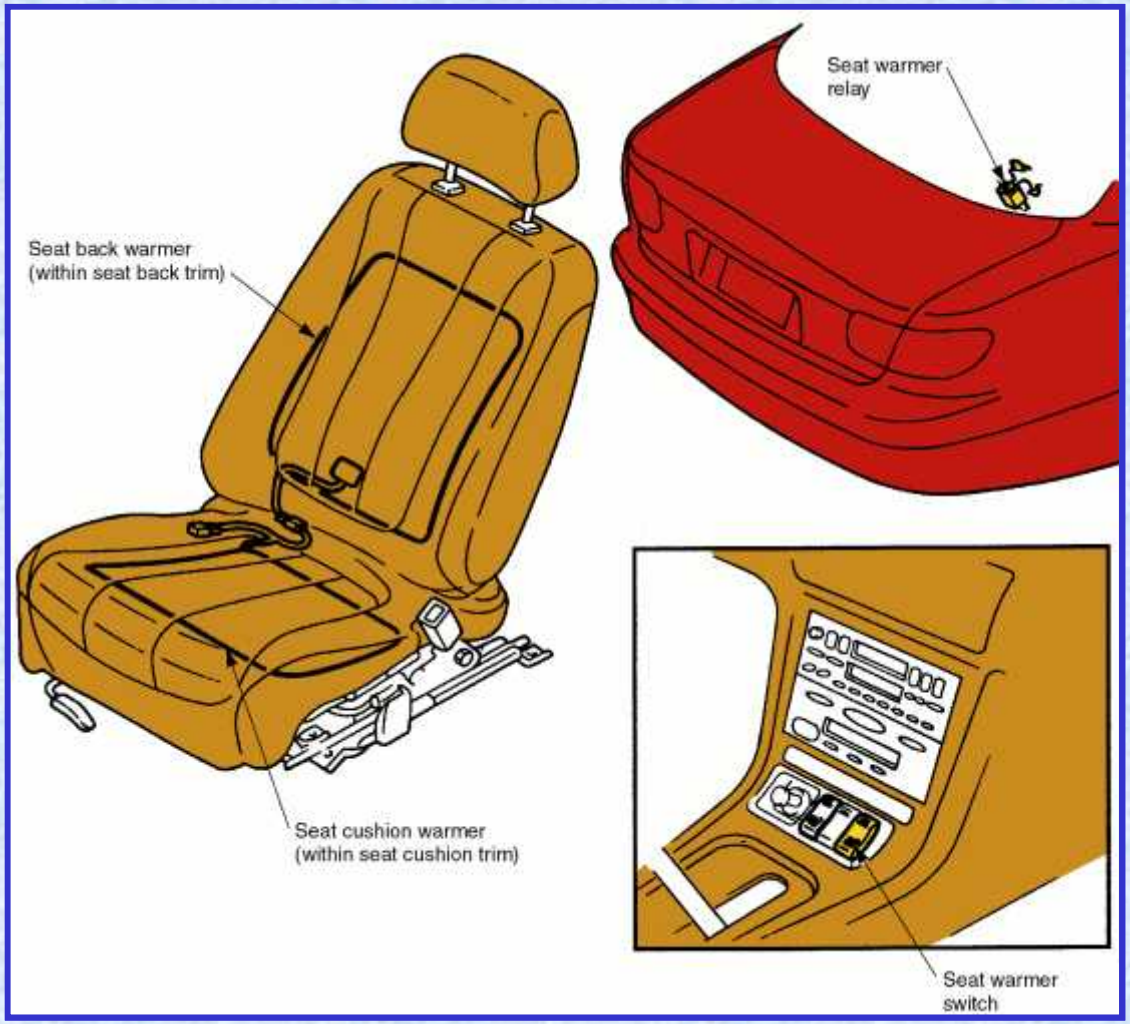
Heated Seats

- Components:
  - heating element
  - switch
  - relay
  - related wiring
- Warms the seat cushions in cold weather using internal resistance wires

Heated Seats

Check for power to the resistance wires

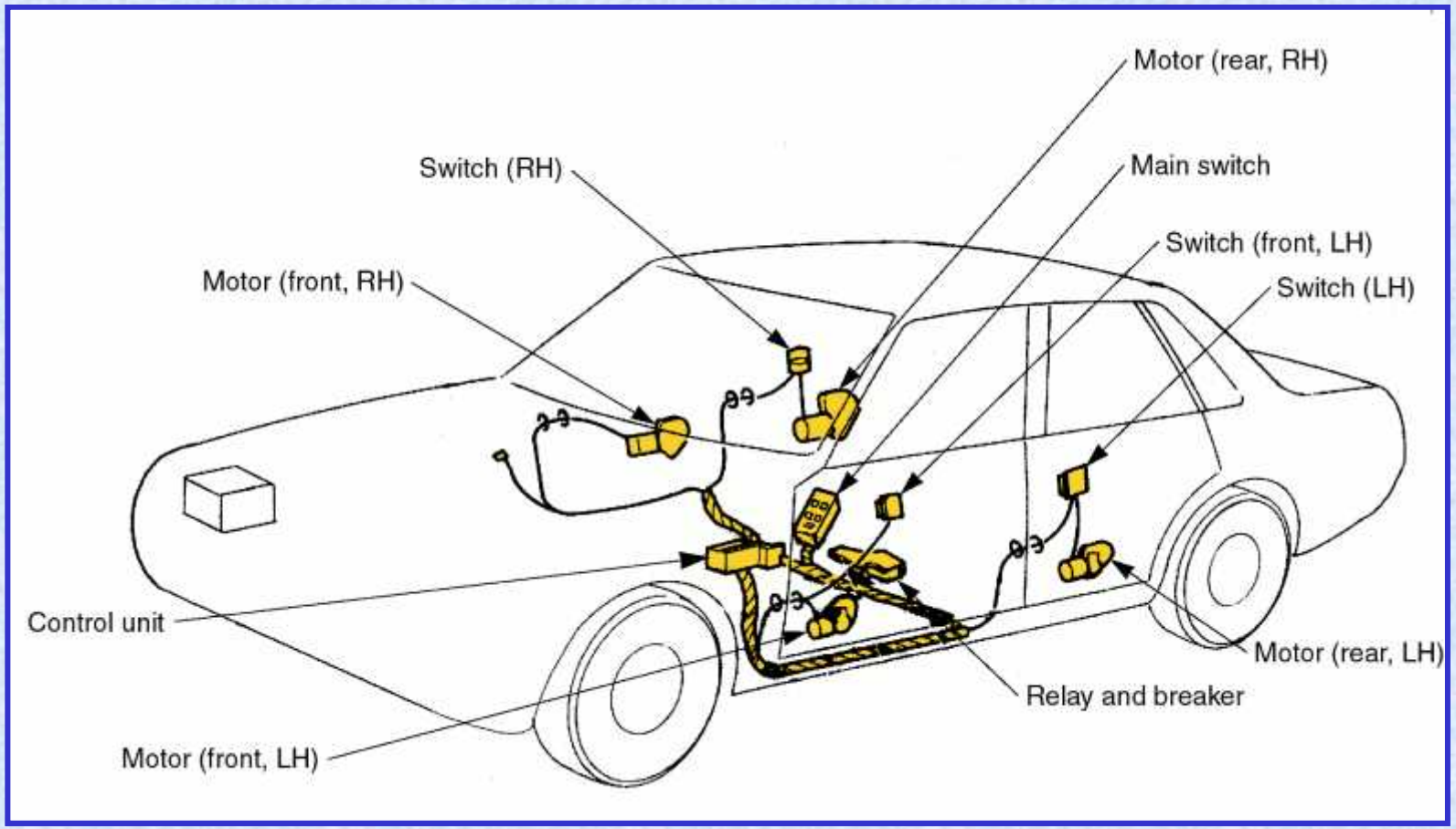
Check the resistance wires with an ohmmeter



Power Windows

- Components:
  - control switches
  - reversible electric motor
  - circuit breaker
  - fuse
  - related wiring
- Operates some, or all of the car's side windows electrically

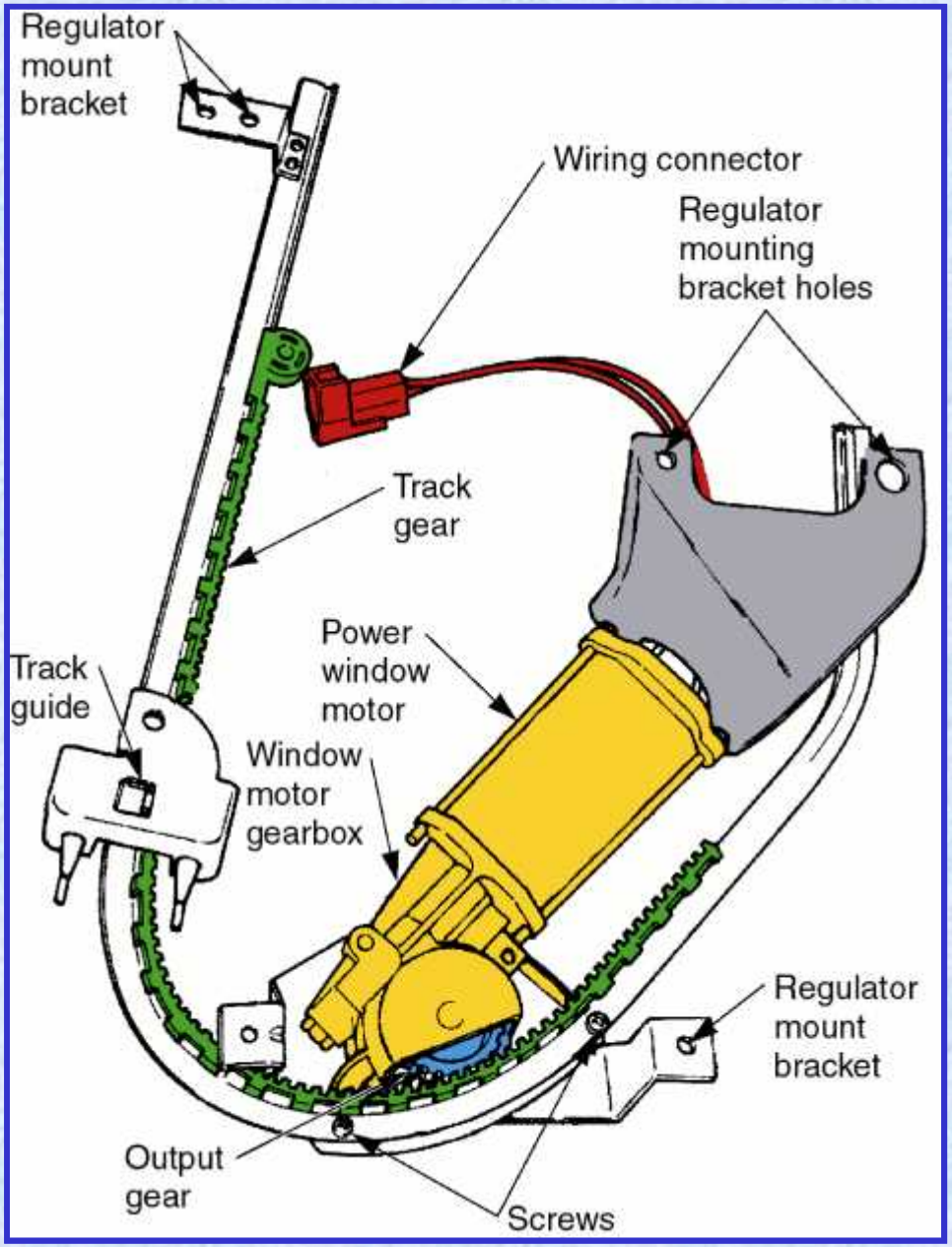
Power Window System



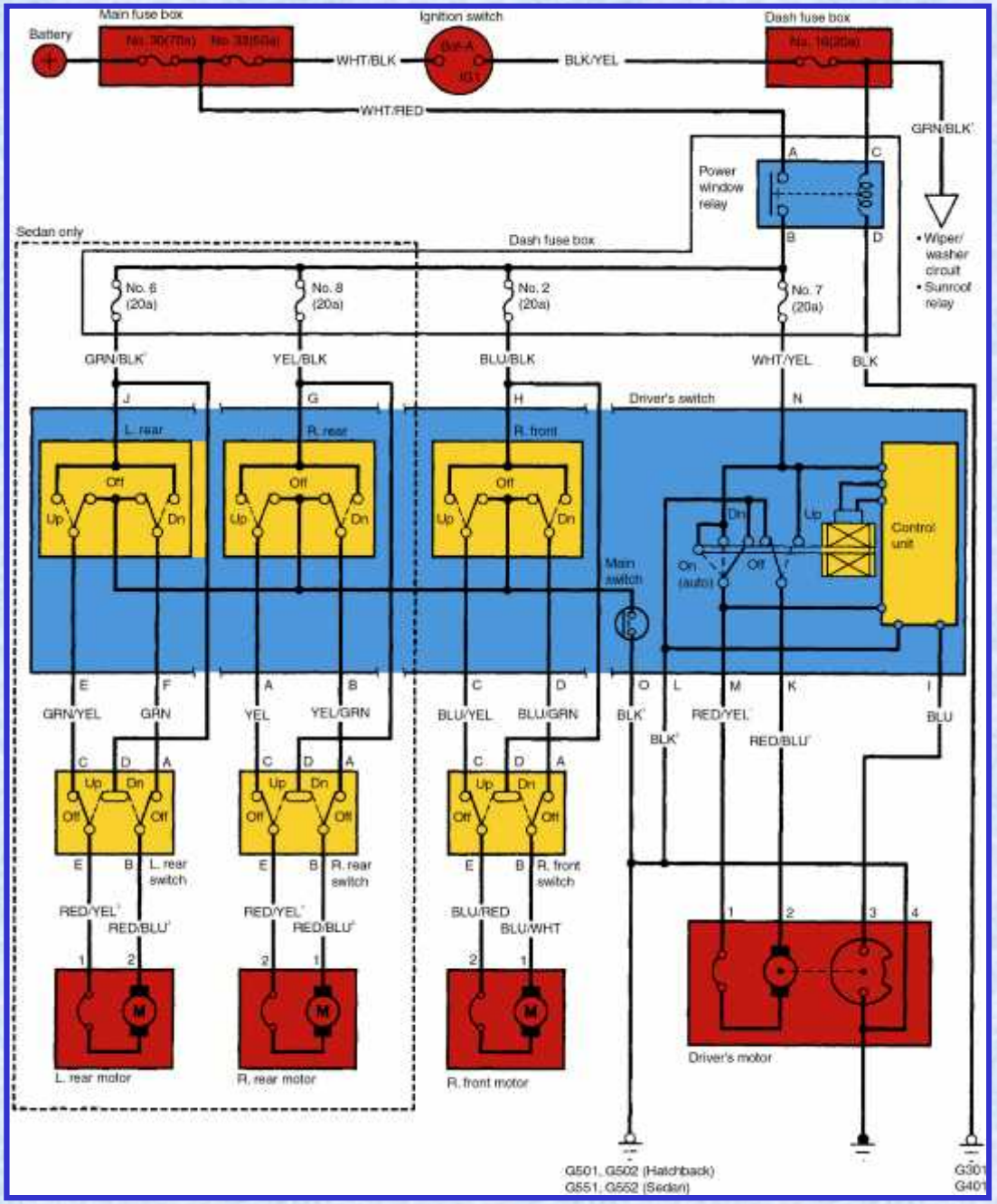
Power Windows

- A motor and regulator mechanism is located in each door
- A gearbox converts the motor's rotary motion to linear motion to drive the window up and down
- A circuit breaker protects the motor if the switch is held on one position too long or if window is frozen in place

Motor and Regulator



Power Window Circuit



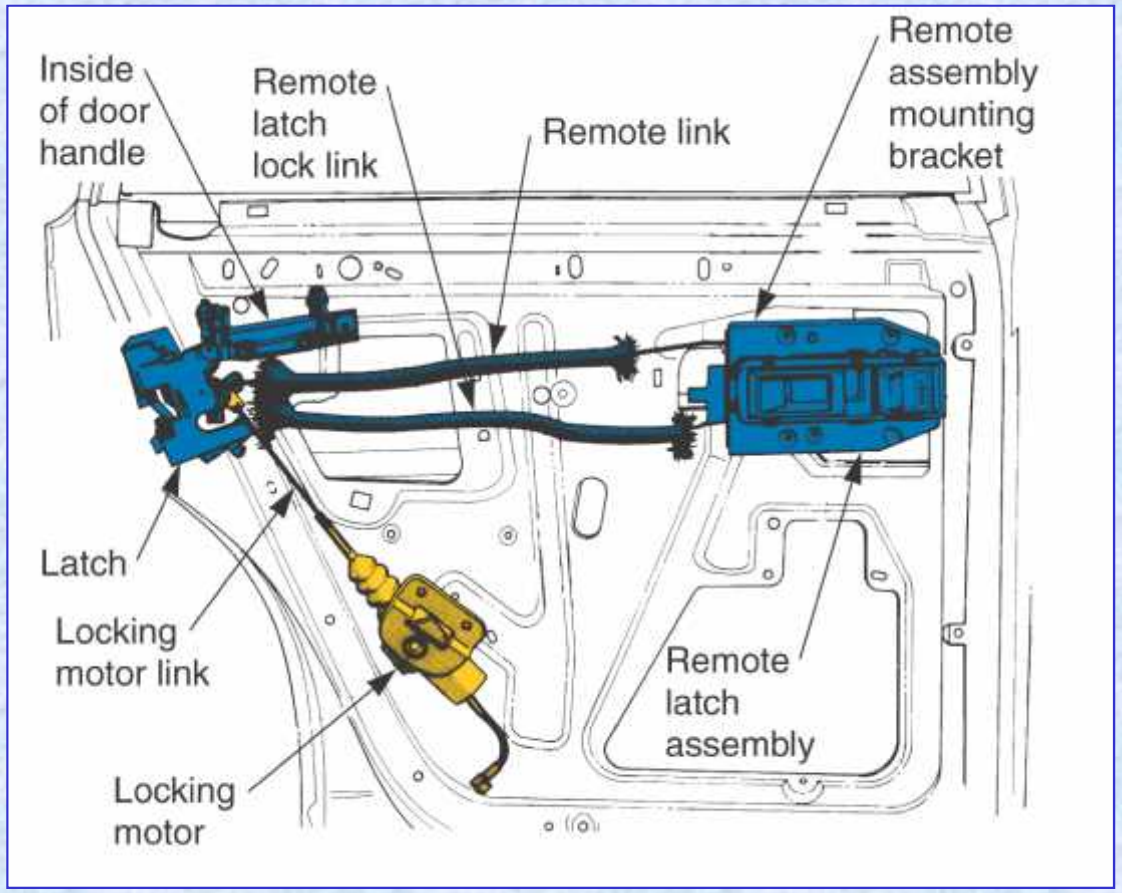
Power Door Locks

- Components:
  - switches
  - solenoids or motors
  - fuse
  - related wiring
- Operates the door lock mechanisms

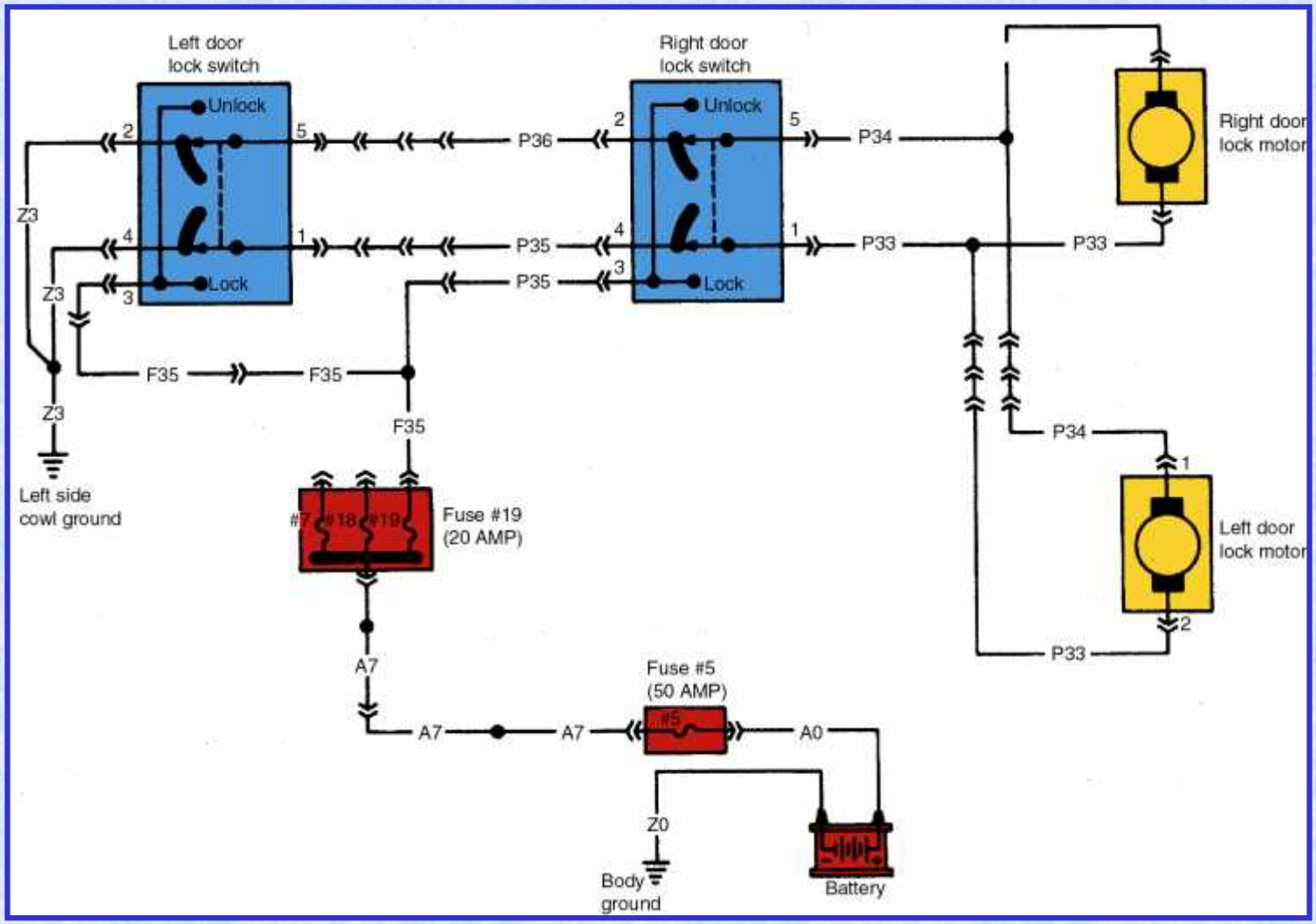
Power Door Locks

- When the door key is turned, or the interior switch is closed, the motors or solenoids move the arms on the door latches to lock or unlock the doors
- If all locks fail, check the main fuse and connections
- If only one door lock fails, check its switch and solenoid or motor

Power Door Lock System



Power Door Lock Circuit



Power Trunk Release

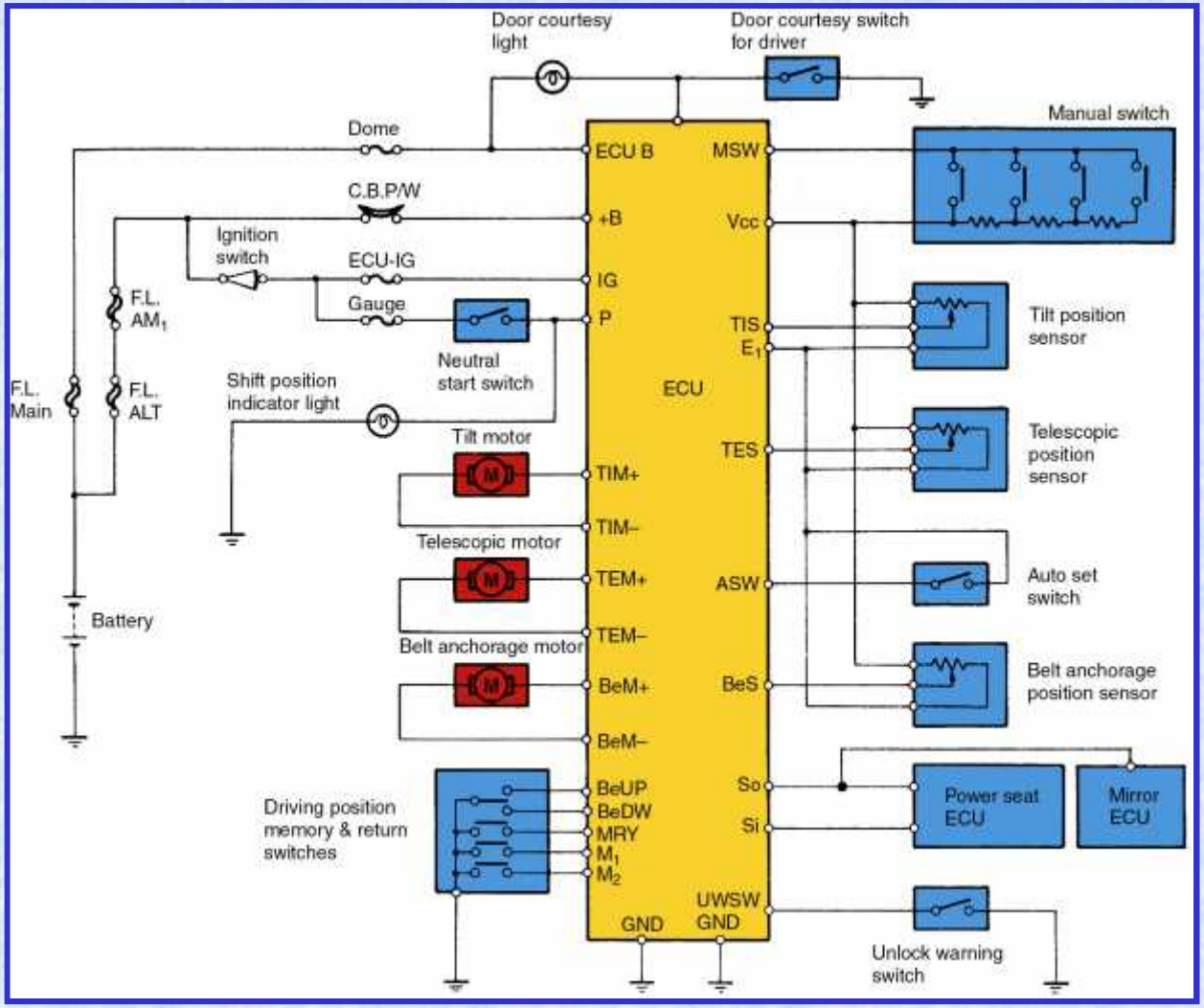
- Components:
  - solenoid mounted on the trunk latch
  - fuse
  - switch
- When the trunk release switch is closed, it sends power to the trunk latch
- The trunk pops open
- Most problems are in the switch or solenoid

Power Steering Wheel

- Components:
  - computer
  - switches
  - sensors
  - motors
- Automatically tilts and telescopes the steering wheel

Power Steering Wheel Circuit

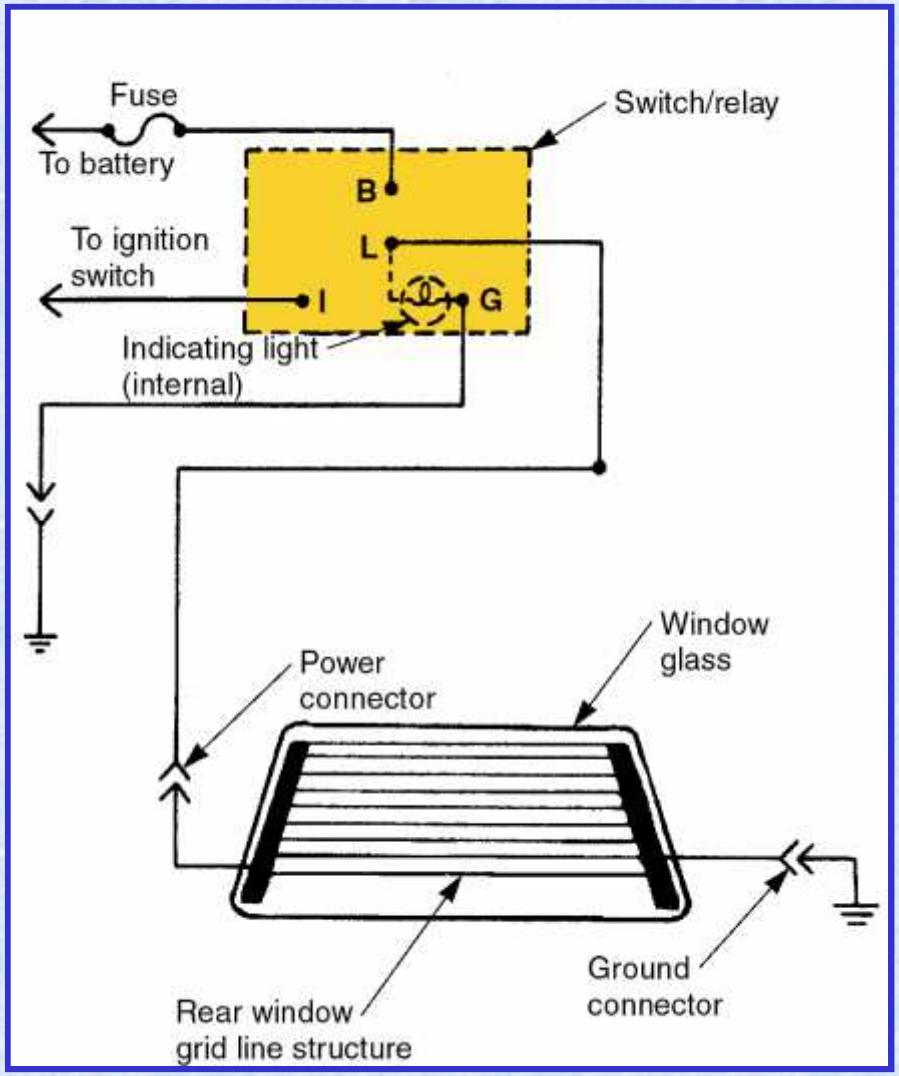
Programmed to position for each driver



Rear Window Defogger

- Components:
  - switch
  - relay
  - indicating light
  - window heating grid
- When switched on, current flows to the heating grid, causing it to heat up
- The grid is composed of resistance wire on or in glass

Rear Window Defogger Circuit



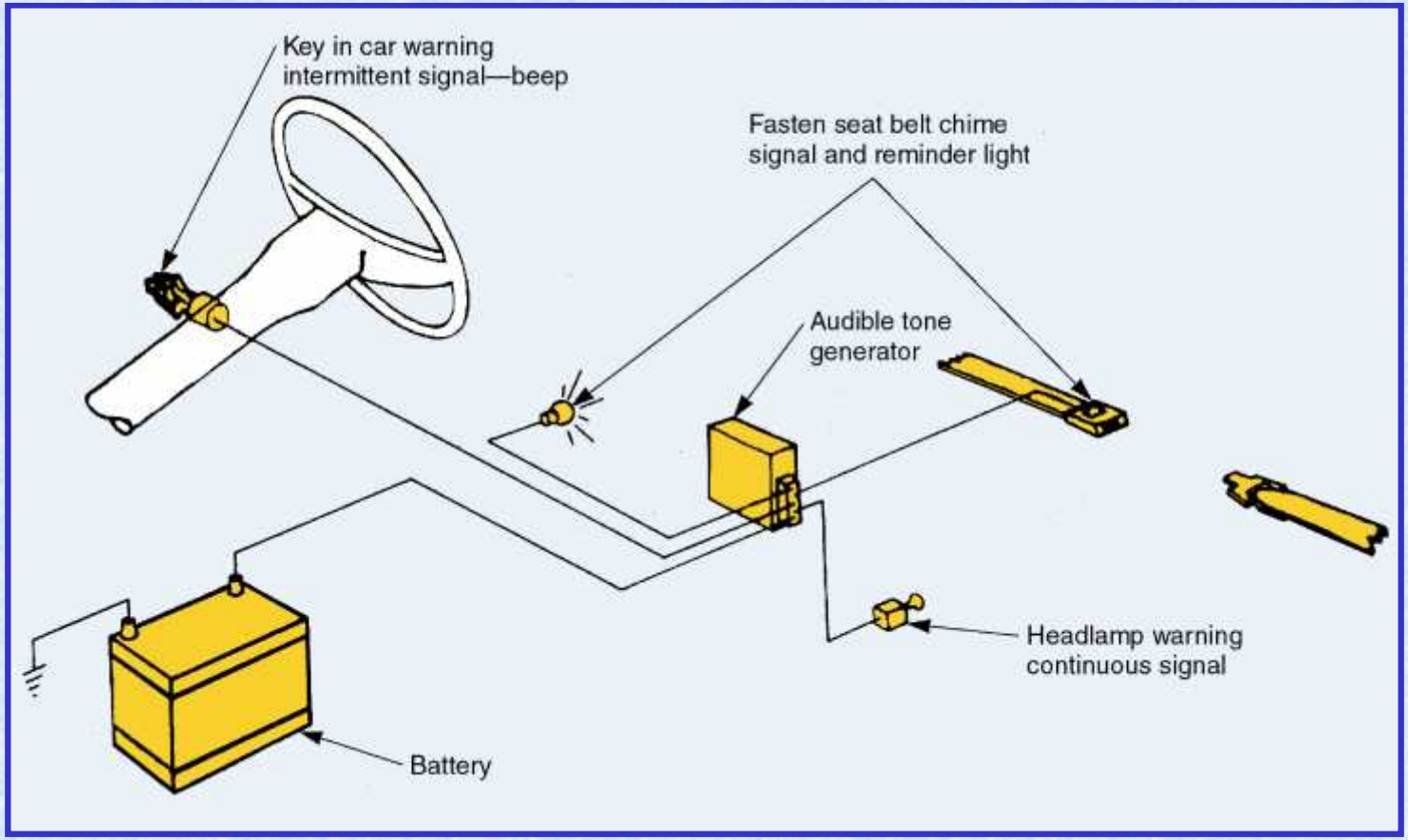
Heated Windshield

- A special conductive film is sandwiched inside the windshield glass
  - made of zinc and tin oxide material
- When high voltage (70–90 volts) is applied to the film, the glass heats up, melting ice and snow

Reminder System

- Warning or chime system
- Warns driver of several conditions
  - seat belts are not fastened, engine on
  - keys in ignition, engine off
  - headlamps on, engine off

Reminder System



Cruise Control System

Uses a computer, sensors, and a throttle actuator to maintain vehicle speed

Components

- Power switches
  - feed current to the computer
  - activate the system
- Control switch
  - signals the computer to maintain the present vehicle speed
- Vehicle speed sensor
  - feeds a pulsing signal into the computer
  - the signal represents the car’s velocity

Components

- Cruise control module
  - uses input signals to control outputs to the throttle actuator
- Throttle actuator (servo)
  - physically moves the engine throttle lever
  - controls engine power and vehicle speed

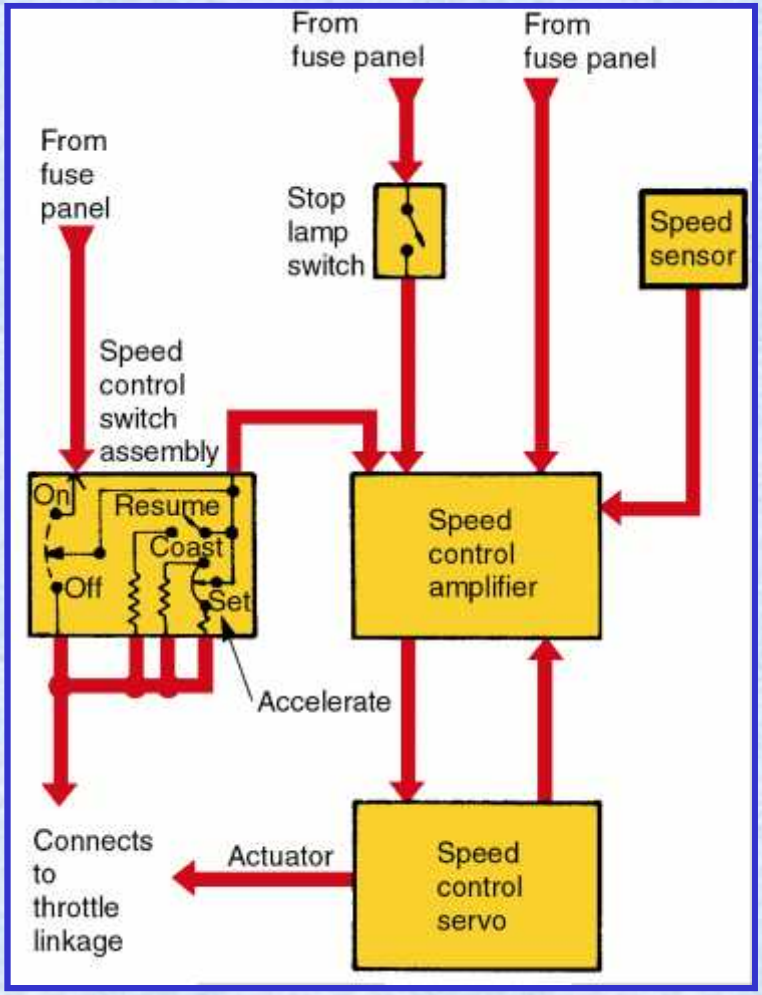
Components

- Brake light switch
  - signals the computer to shut off the cruise control when the brakes are applied
- Clutch switch
  - signals the computer to deactivate the cruise control when the clutch pedal is depressed
- Neutral safety switch
  - signals the computer to shut off the cruise control when the shift lever is moved out of drive

Operation

- When driver activates system, power is fed to the cruise control module
- The module activates the speed control servo (throttle actuator)
- The servo pulls on throttle linkage to maintain vehicle speed
- The speed sensor sends pulses to the cruise control module to monitor speed

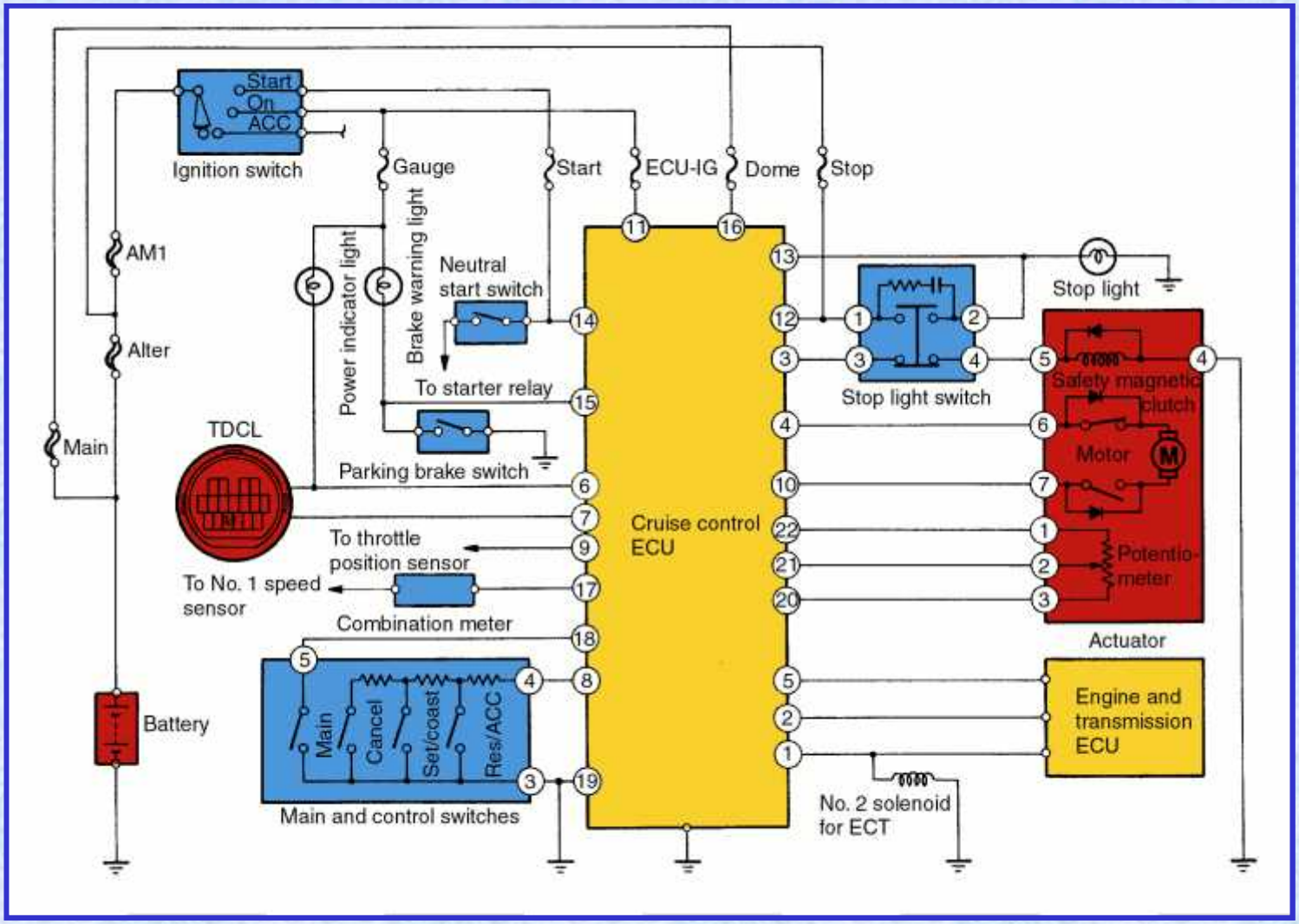
Electronic Cruise Control System



Cruise Control Service

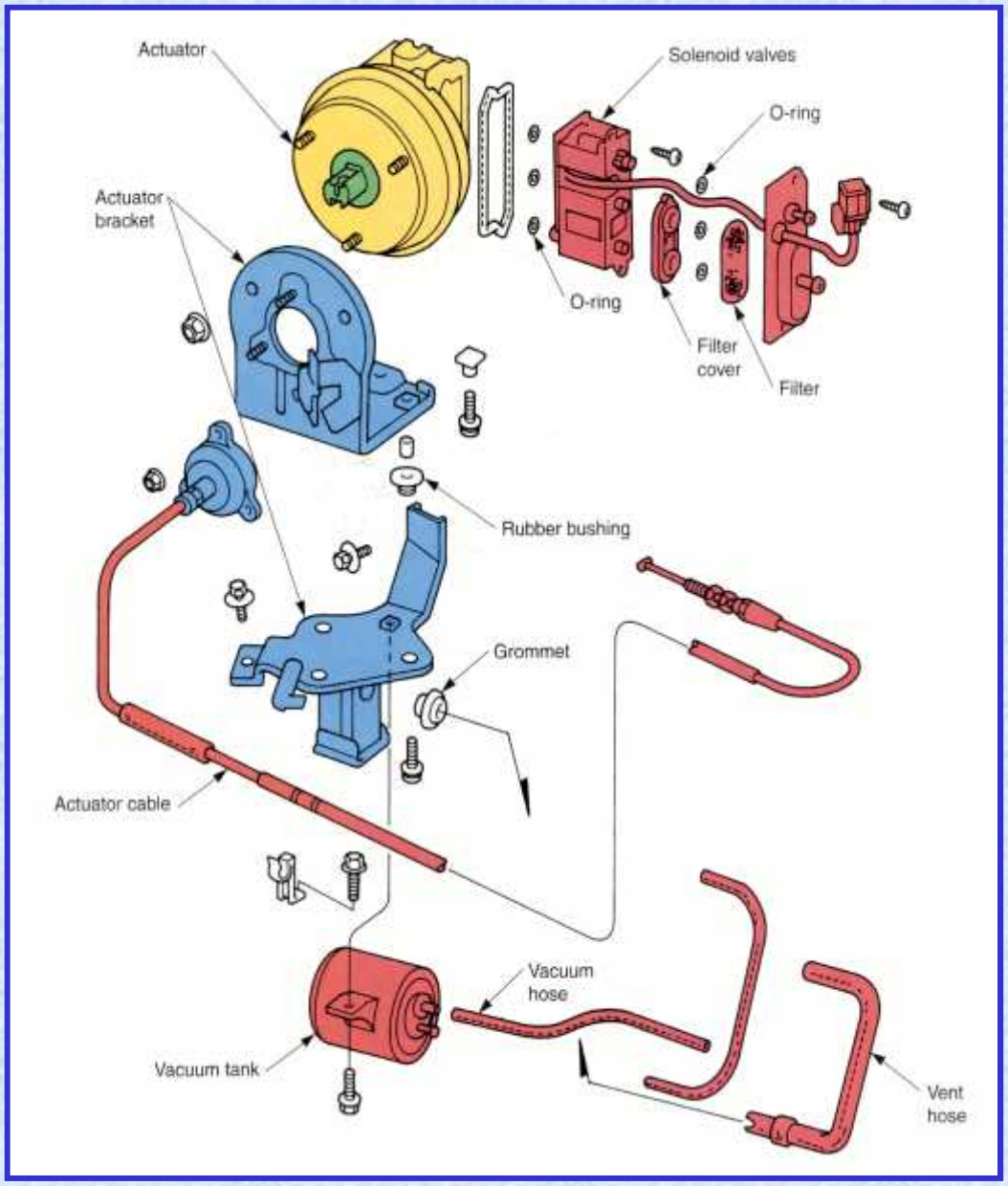
- Check the following:
  - fuse
  - power feed and grounds
  - brake light switch
  - on and resume switch operation
  - vacuum actuator and lines if equipped
- The computer is usually suspected only after these checks

Electronic Cruise Control Circuit



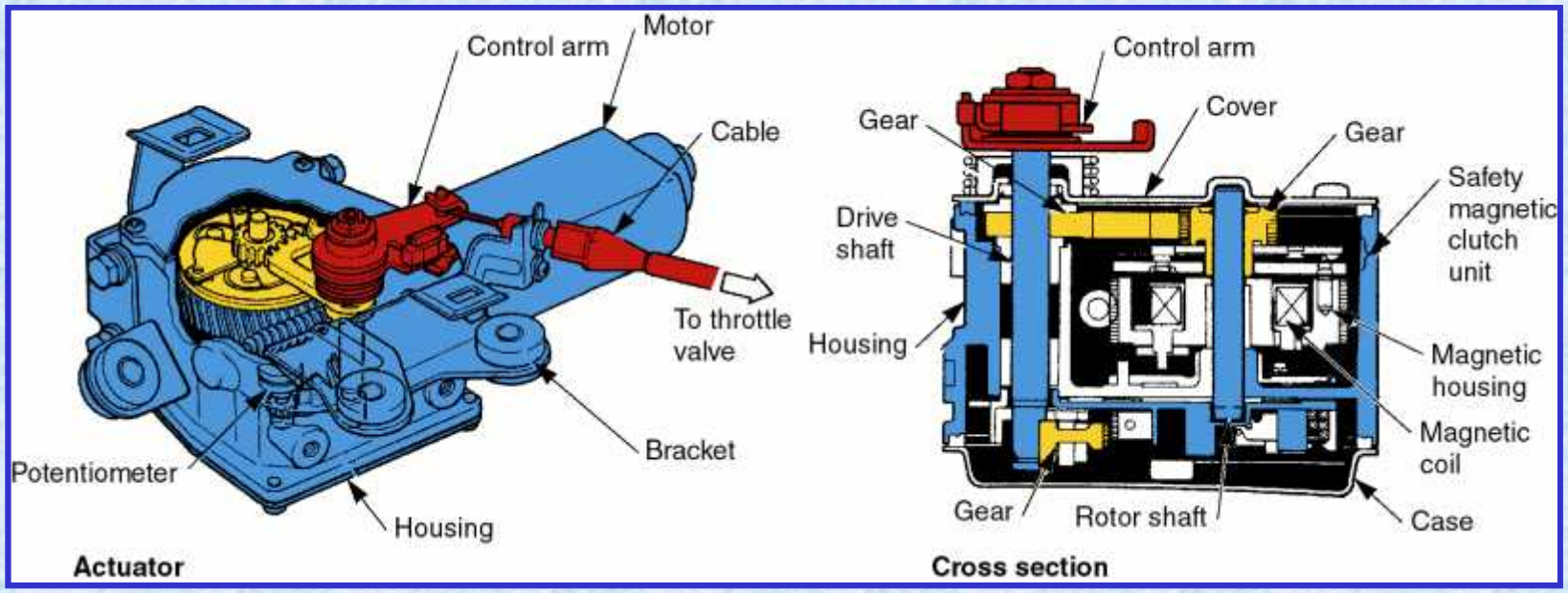
Electro-Pneumatic Actuator

Solenoids control vacuum to the diaphragm



Motor-Operated Actuator

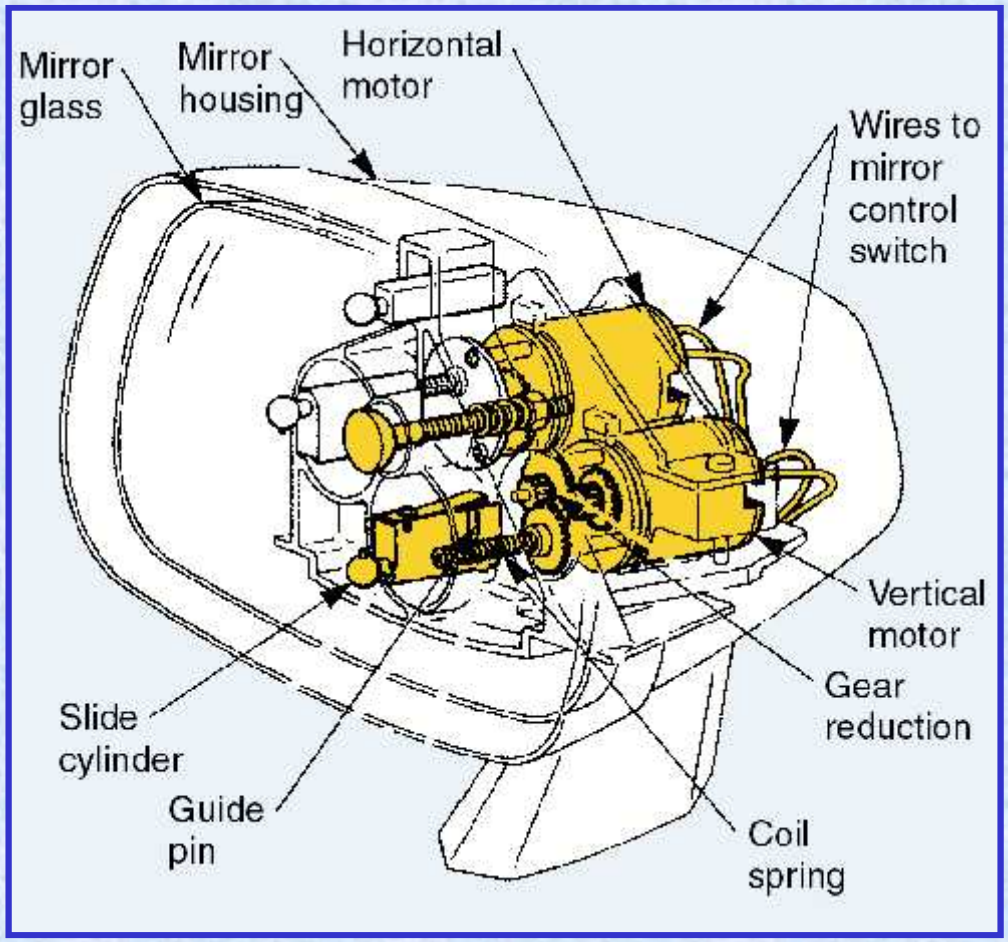
The ECU drives the motor in the desired direction



Power Mirrors

- Tiny reversible electric motors tilt the side view mirror into different positions
- A multi-position “joy switch” energizes each motor
- If neither mirror works, check the fuse and power supply circuit
- If only one mirror fails, check its switch and motors

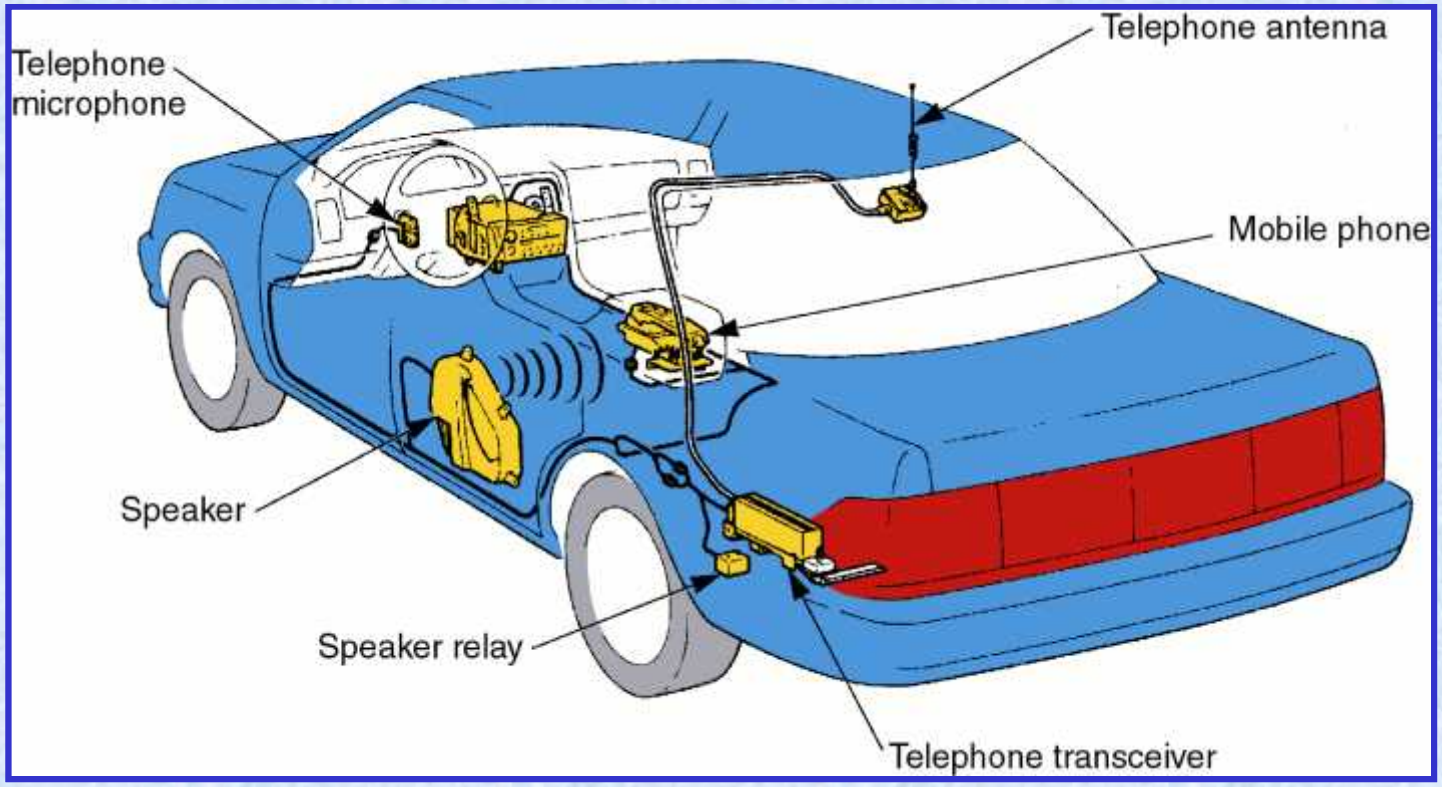
Power Mirror



Cellular Mobile Telephone

- Uses a transceiver to communicate with other people via phone station towers
- Some can be used hands-free

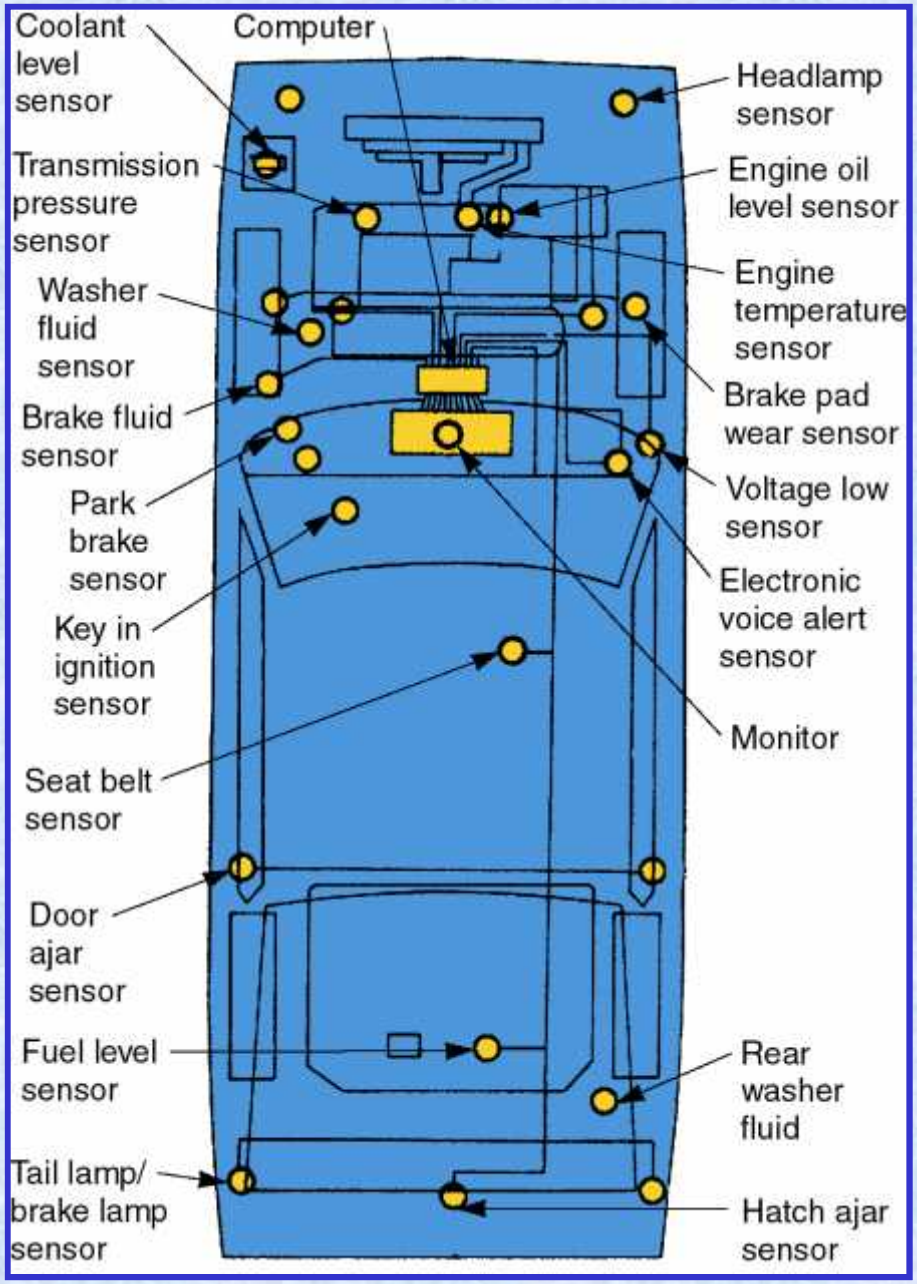
Cellular Phone System



Driver Information Center

- Components:
  - computer
  - small speaker or digital display
  - sensors and switches
- Informs driver of various conditions
- Outputs a display or spoken words
  - e.g. “Your washer fluid is low”

Components



Driver Information Center Circuits