Automotive Networks

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Networks and Multiplexing

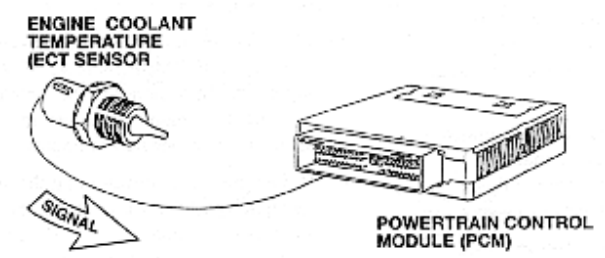
- Network - a network refers to the control modules and wiring that allow information to be sent or received using an electrical or electronic medium
- Multiplexing - an operating strategy that enables networked control modules to communicate during normal vehicle operation
- Speed measured in Baud Rate

Baud Rate

- The speed at which communication is transmitted.
- Bytes per second
- 8 bits = 1 byte
- 1byte is the smallest piece of information sent to network.
- Example:
  - Letter "M" = bit
  - Word "Moderate" = byte

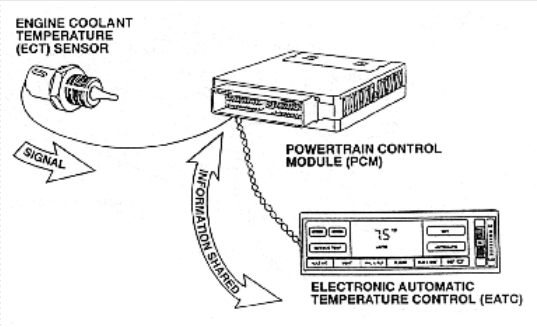
No Network Communication

- Sensor input and electronic processing
- No data sharing



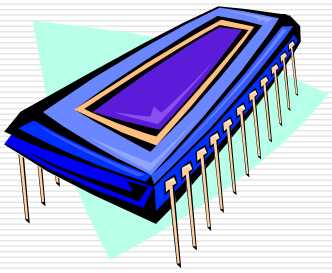
Network Communication

- Data sharing between modules

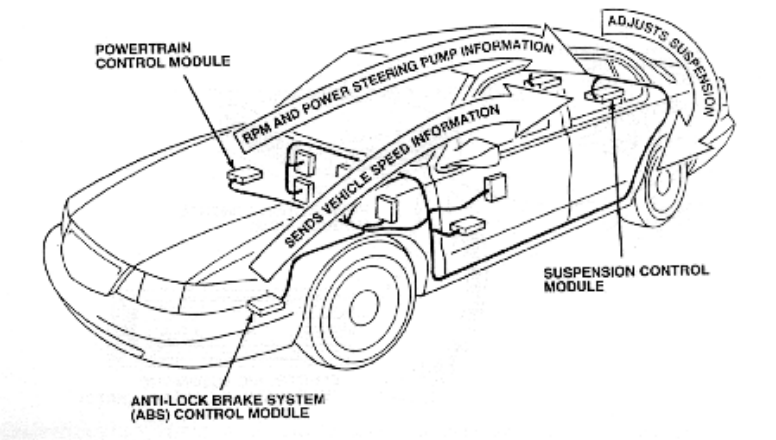


Advantages of Networking

- input sensor information can be shared between modules
- complex vehicle system operation requiring more than one module can be performed/coordinated
- improved diagnostic capability

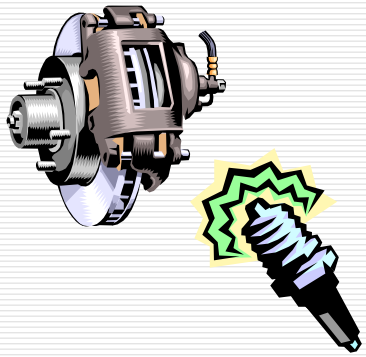


Suspension Control Network



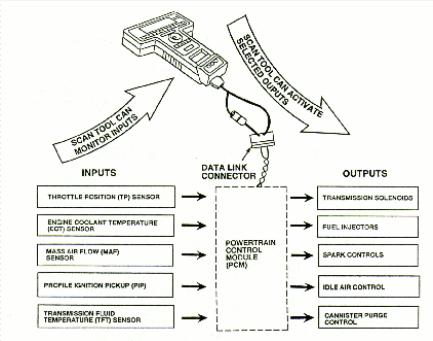
Traction Control Network

- ABS control module pulses drive wheel brakes to control wheel spin
- PCM retards ignition timing or reduces throttle angle to reduce engine torque



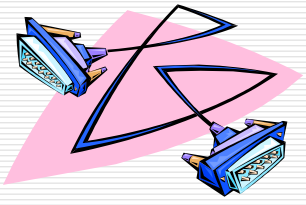
NGS - PCM Network

- **Active Commands** - allows scan tool to activate control module outputs
- **Parameter Identification (PID) Data** - allows scan tool to view input sensor data and **output control commands**

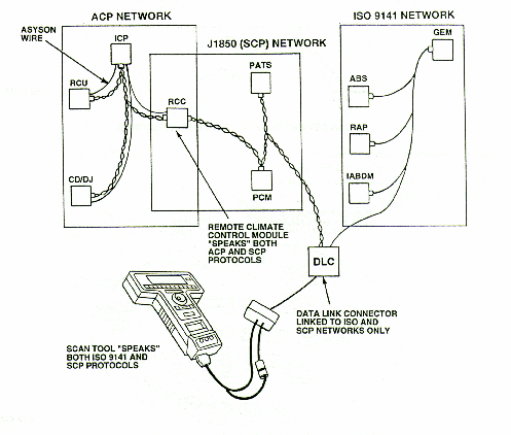


Ford Network Protocols

- **J1850** - Standard Corporate Protocol (**SCP**)
  - twisted pair of wires between modules and DLC
- **ISO 1941** - International Standards Organization (ISO) Protocol
  - single wire between module and DLC
- **ACP** - Audio Control Protocol
  - twisted pair of wires between modules with a third "wake-up" wire

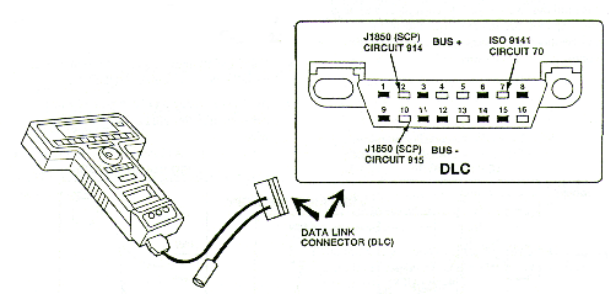


Data Bus



ISO and SCP Diagnostics

- scan tools can access **ISO 9141** and **J1850 (SCP)** networks



ACP Network Diagnostics

- ACP networks are diagnosed through a control panel
- Enter Diag. mode.
  - Press Seek/down and preset #3 buttons and hold for five seconds.
  - Preset #1 systems check
  - "Tune up" for system DTC's
  - Refer to code chart.
- Display test
  - Diag mode
  - Preset #5
- Chassis software configuration.
  - Diag mode
  - Preset #3
  - Verify latest software and match of chassis id.
- Rear chassis ROM/EEPROM
  - Diag mode
  - Preset #4
- Walk around
  - Diag mode
  - Preset #2