

Construction and Function

TCS Control unit

Driving Control

When the drive wheel speed exceeds the vehicle speed by a given amount, the TCS control unit judges that the drive wheels are slipping, and it outputs the traction control signal to reduce engine power.

Handling Control

Based on signals about right and left driven wheel rotational speeds, the control unit calculates the vehicle's "yaw" rate (the turn rate of the vehicle's body). Based on signals from the steering angle sensor, the control unit also calculates the yaw rate expected by the driver. If the difference between actual and expected yaw rates is substantial — that is, if the direction of the vehicle's body will exceed the driver's expected line — the control unit signals the TCS control valve actuator and PCM, thus reducing engine power and maintaining the expected line.

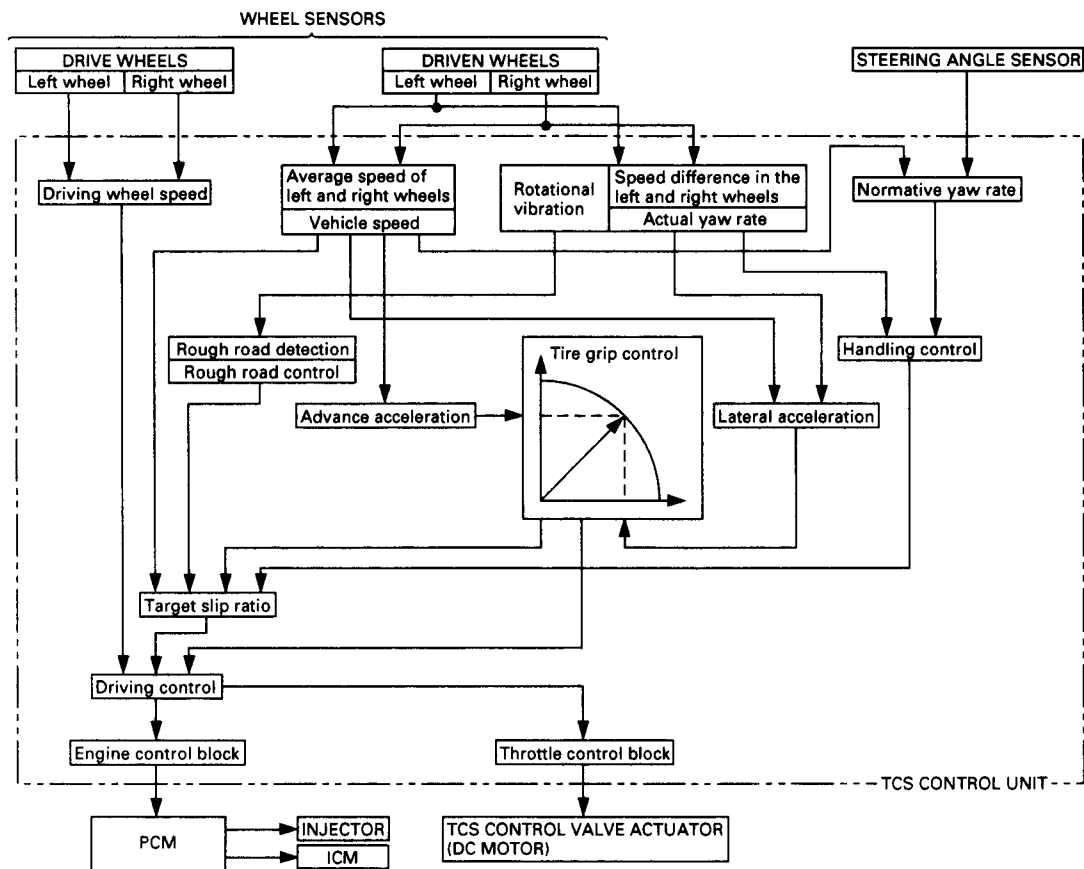
Rough Road Control

Based on signals from the wheel sensors, the control unit detects a rough road based on frequency of wheel rotational vibration. The control unit then signals the TCS control valve actuator and PCM to relax engine power, thus improving acceleration efficiency.

Grip Control

Based on signals about wheel speed and yaw rate, the control unit determines the efficiency of the grip of the tires on the road and signals the TCS control valve actuator and PCM to relax engine power if necessary, thus improving grip.

Main Control Block



System Description

Fail-Safe Function

If the control unit detects an abnormality, it shuts the traction control system off and causes the TCS indicator light to come on. However if the abnormality is detected while the TCS is activated, the control unit first establishes the appropriate wheel spin velocity, then shuts the system down, thus preventing excessive wheel spin.

Self-Diagnosis Function

If the control unit detects an abnormality, it records a Diagnostic Trouble Code (DTC) which can be used to diagnose the problem. The DTC is shown at the TCS indicator light when the Service Check connector terminals are connected with the SCS service connector.

Steering Angle Detection

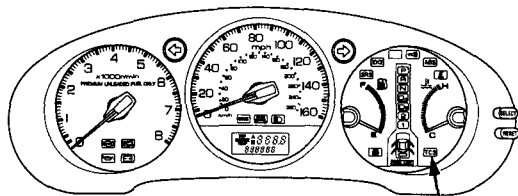
Steering angle is detected by the steering angle sensor. A disc with a regular pattern of slits is positioned between the facing parts of a light emitting part (LED), and a light receiving part (photo transistor). As the disc rotates, it interrupts the light from the LED. The light which passes through a slit is converted into the electric current by the photo transistor, and the waveform of this electric current is shaped by the comparator to output the disc rotation as a rectangular signal.

The analysis performance of the system is improved by providing the fixed slit in front of the LED, and thereby identifying the brightness and darkness of the light which is received at the photo transistor.

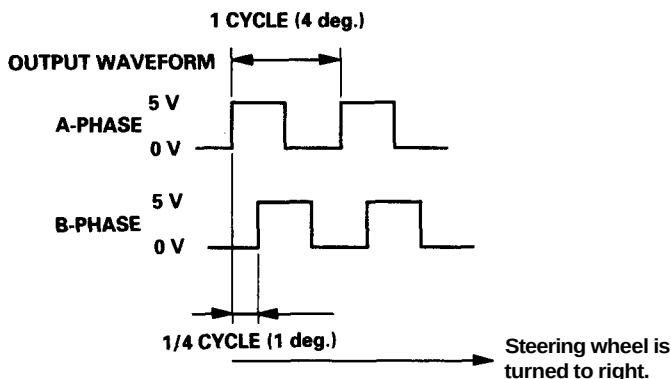
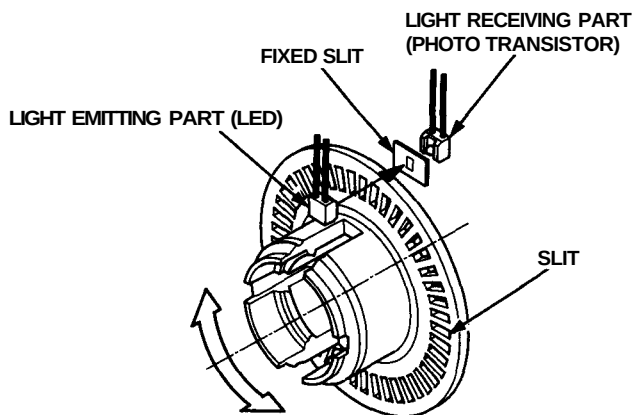
The output signal is a 2-phase output (A-phase and B-phase), and the steering wheel turning angle and the turning direction are calculated by the TCS control unit.

Vehicle Speed Detection

Wheel rotation speed is detected by the wheel sensors, located at each wheel. The signals are sent to the control unit, which compares each wheel's speed and determines whether traction control is required.

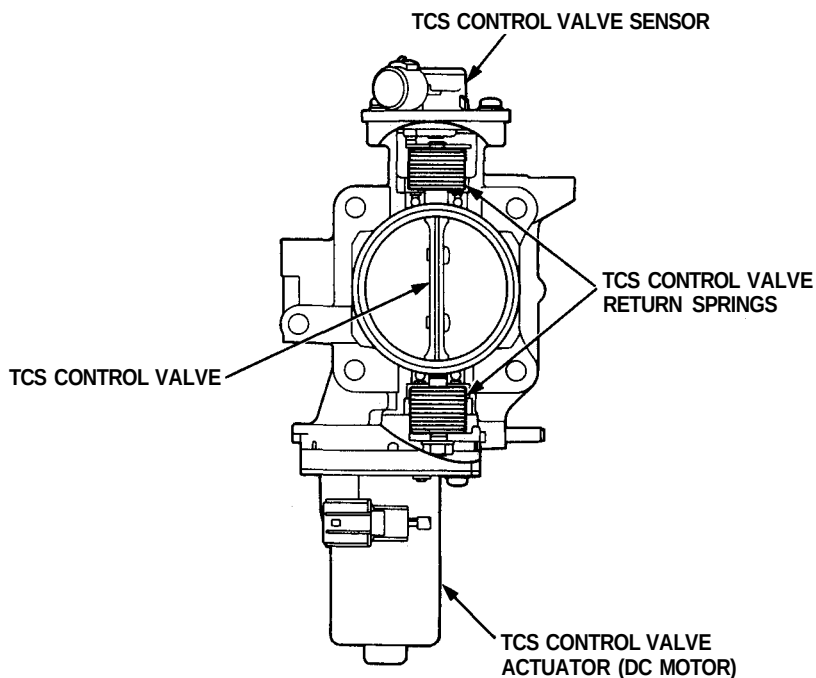


TCS INDICATOR LIGHT

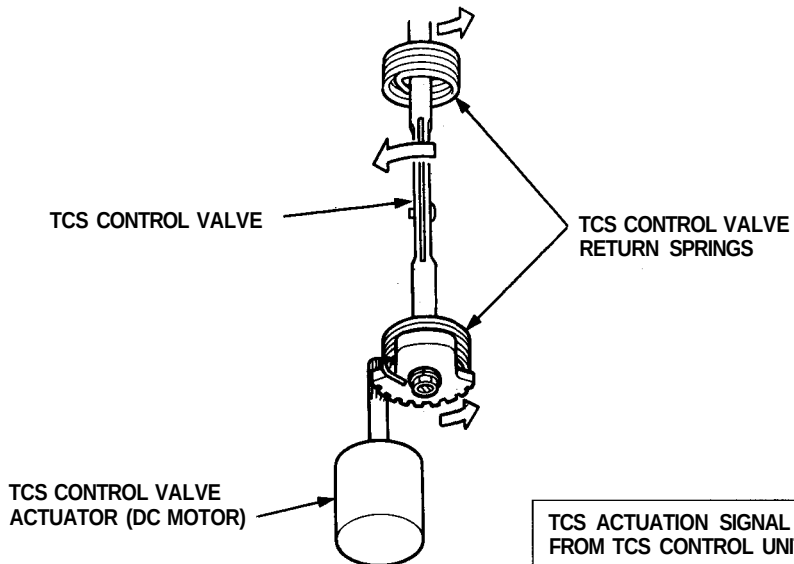


Engine Output Control

When the TCS is activated, the TCS control unit signals the TCS control valve actuator and PCM. The actuator is linked to the TCS control valve which is normally returned to the fully open position by the two return springs. Although the throttle valve is still within the driver's control, the engine output is relaxed by the TCS control valve and PCM to achieve optimum traction.



DURING NORMAL DRIVING:



DURING TCS ACTUATION:

