HESD (Honda Electronic Steering Damper)

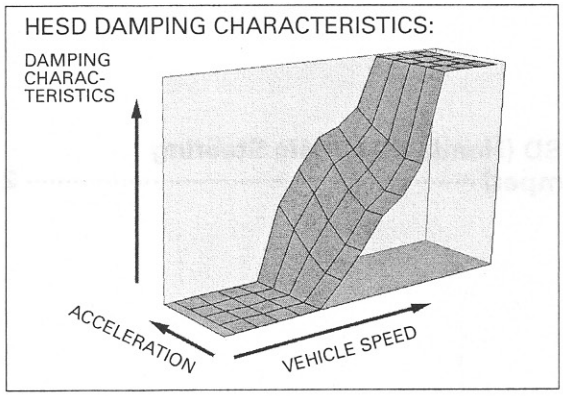
This motorcycle is equipped with the Honda Electronic Steering Damper (HESD).

The HESD system consists of the following components.
- Steering damper assembly with linear solenoid
- VS (vehicle speed) sensor
- ECM
- Malfunction indicator lamp (MIL) and HESD indicator

The steering damper assembly is installed on the main frame near the steering head pipe and the linkage arm is installed on the top fork bridge.

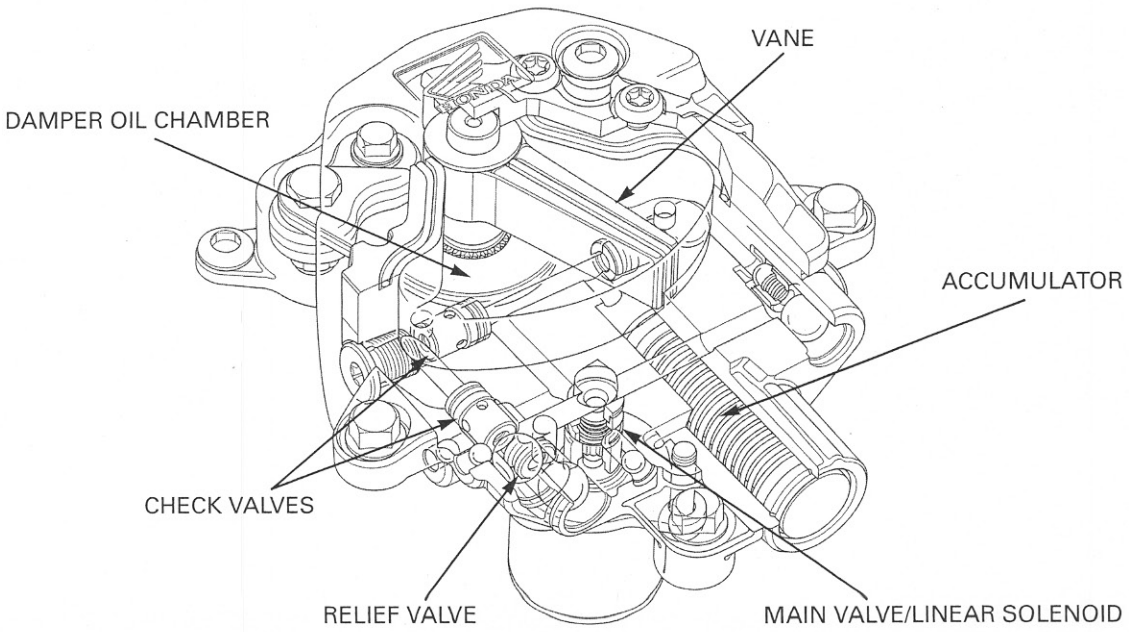
The damping characteristics are automatically controlled by the ECM in response to vehicle speed and acceleration and offers optimum handling over a wide range of riding conditions.

HESD employs a hydraulic rotary damper unit. The hydraulic oil is filled into the steering damper and is sealed permanently. The steering damper unit is not serviceable.

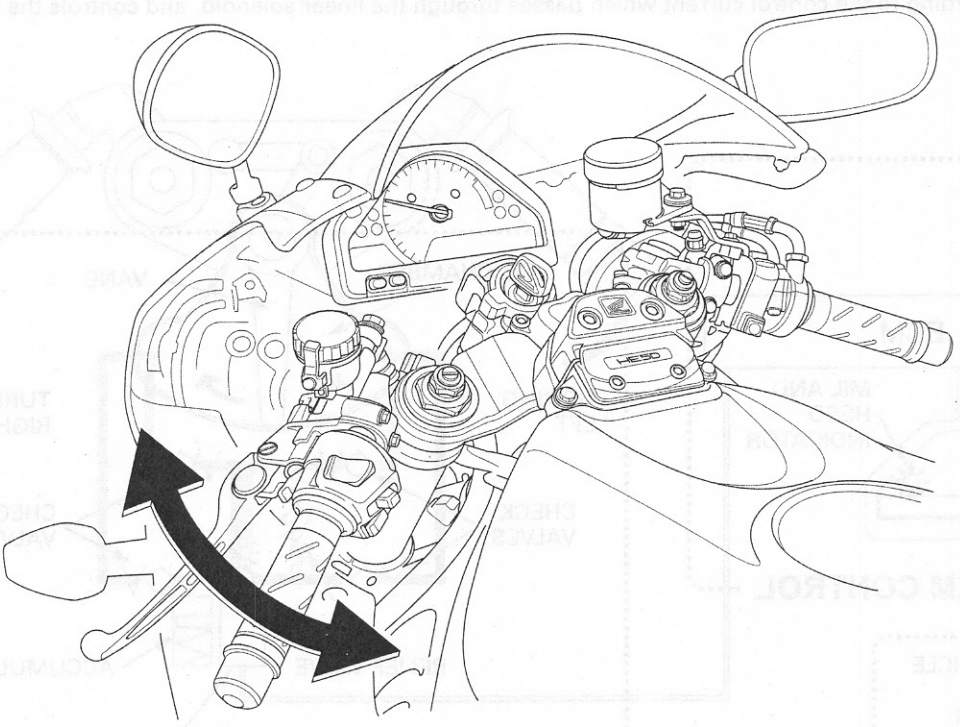


Each component of HESD functions as follows.

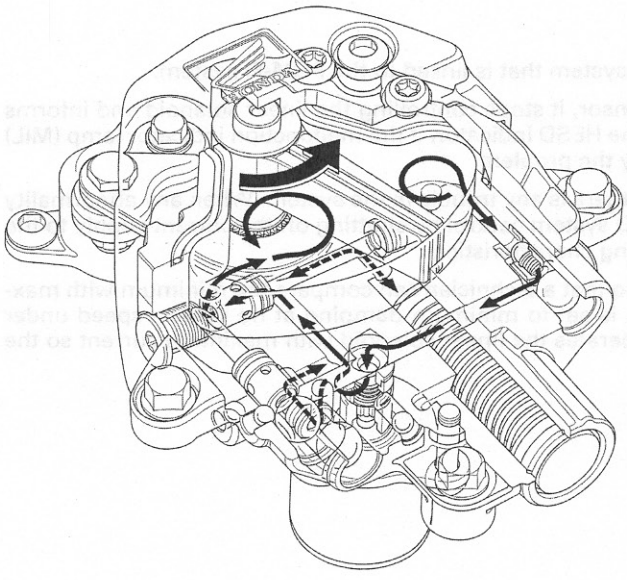
- **Damper oil chamber/Vane**
  The damper oil chamber is divided in two by a moving vane connected internally to the linkage arm. The edge of the vane is covered with an oil seal so that the left and right chambers are sealed from each other. Therefore oil moves between the left and right sides of the chamber via check valve controlled hydraulic passages.
- **Check valve**
  Four one-way check valves ensure that oil flows through the main valve in only one direction, whether the vane is moved left or right.
- **Accumulator**
  Accumulator compensates for temperature-induced changes in oil volume.
- **Main valve/Linear solenoid**
  The opening of the main valve is controlled by a linear solenoid that receives its control signals from the ECM. The damping characteristics are varied by the main valve/linear solenoid.
- **Relief valve**
  The relief valve controls and sets a limit to the maximum damping force.



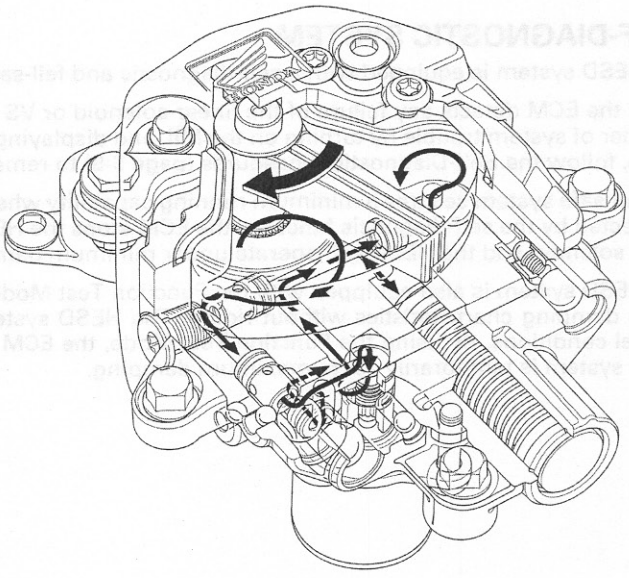
DAMPER OIL FLOW DIAGRAM



WHEN THE STEERING MOVES TO LEFT:

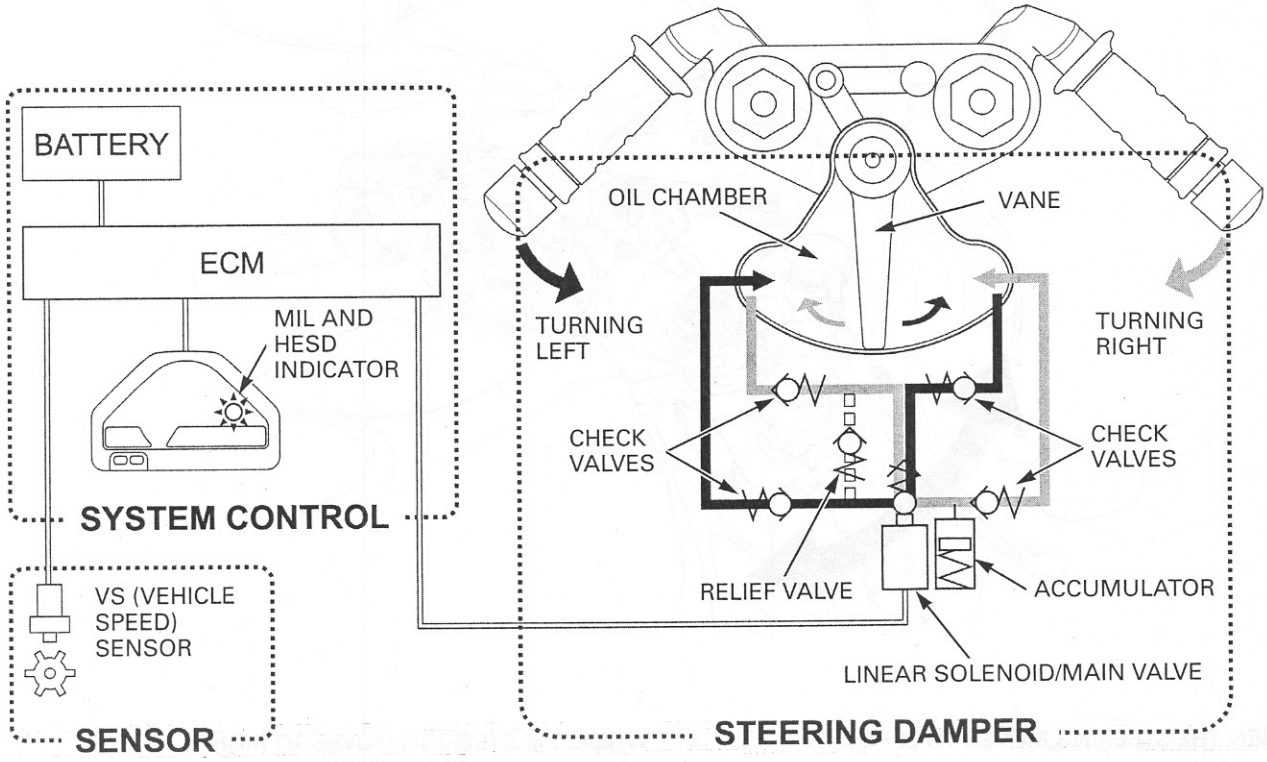


WHEN THE STEERING MOVES TO RIGHT:



CONTROL SYSTEM

Receiving the signal from the VS sensor, the ECM calculates the vehicle speed and rate of acceleration. The ECM outputs the control current to the linear solenoid coil based upon the vehicle speed and acceleration. The linear solenoid depresses the main valve according to the control current which passes through the linear solenoid, and controls the damping characteristics of HESD.



SELF-DIAGNOSTIC SYSTEM

The HESD system is equipped with a self-diagnostic and fail-safe system that is linked to the PGM-FI system.

When the ECM detects any failure of the linear solenoid or VS sensor, it stops controlling the linear solenoid and informs the rider of system trouble by turning on the MIL and displaying the HESD indicator. If the malfunction indicator lamp (MIL) blinks, follow the Self-Diagnostic Procedures (page 6-9) to remedy the problem.

The fail-safe system secures a minimum running capability when there is any trouble in the system. When any abnormality is detected by the self-diagnosis function, the ECM stops the HESD system control by shutting off the current supply to the linear solenoid and the HESD will operate under minimum damping characteristics.

The HESD system is also equipped with the Function Test Mode so that a technician can compare the minimum with maximum damping characteristics without riding. The HESD system is set to minimum damping at no vehicle speed under normal conditions. By using the Function Test Mode, the ECM operates the linear solenoid with maximum current so the HESD system is temporarily set to maximum damping.