

*D. The Safety Need for Fail-Safe Provisions for Automatic Engine Stopping and Restarting While the Transmission and/or Transmission Shift Lever Are in Gear*

With any automatic system that is critical to the safe operation of a motor vehicle, there is concern about what happens during a failure mode. For systems that allow the engine to stop and restart while the transmission and/or transmission shift lever remain in a drive position, it is important that the automatic starting of the engine does not cause the vehicle to unexpectedly surge forward or rearward both during normal operation and during failure modes. It is also important that when the vehicle is stopped, the engine stops automatically, the driver releases the brake pedal and depresses the accelerator to move the vehicle, that the engine restarts and is prepared to move the vehicle in a reasonable amount of time.

From the driver's perspective, the Prius behaves like an ICE automatic transmission only vehicle. The potential for the automatic restarting of the engine to confuse the driver and cause unexpected surging of the vehicle due to driver shifting errors is not an issue with the THS on the Prius. The Prius is an electric vehicle with a gasoline engine that assists when the batteries need charging or when additional motive power is required during acceleration and the electric motor provides creep force in both the forward and rearward directions regardless of whether the gasoline engine is running.

The Honda Insight does not have creep force in Drive when the idle-stop system operates. Any slow, forward motion of the vehicle that occurs is developed by the idling engine and automatic transmission after it starts. This takes place after the driver has released the brake pedal. One of the sensors that the Honda system receives input from is the brake switch, which indicates whether the brake is depressed or released. If the brake switch should fail open and the brake is depressed without the idle-stop sensing it, the idle-stop would cease to function. If the failure took place while the idle-stop function was operating, the engine would start and run at idle speed. This would not be an unsafe condition because the driver's foot is on the brake. The running engine would initiate slow, forward motion of the vehicle but a small amount of additional force on the already depressed brake pedal would hold the vehicle stationary. If the brake switch failed closed while the idle-stop system was operating and then the brake was released, the system would not

sense the brake release and the engine would not restart. If the failure occurred while the vehicle was being driven, it would fail to restart during the next cycle. This failure mode would be no different than any of the many other failures that could cause an ICE only motor vehicle to stall in traffic. Thus, the current designs of the Prius and Insight do not introduce any failure mode safety issues over those that presently exist in ICE automatic transmission only vehicles.

It is anticipated that idle-stop technology will eventually be applied to ICE only vehicles (non-hybrid electric). We expect that these new designs will be very similar to the system used on the Insight/Civic hybrid electric vehicle. Systems that may permit unexpected, sudden surging of the vehicle when the ICE automatically restarts would not meet the need for safety. Even when the vehicle is stopped and the accelerator is fully depressed during automatic engine starting, such systems should contain safeguards that prevent sudden, unexpected surging of the vehicle. NHTSA requests comments on specifying a maximum throttle position regardless of the driver's input, for example, when the vehicle is stopped and the engine is about to automatically restart, if the driver's throttle input is greater than one-fourth of the maximum throttle, the throttle would automatically be limited to one-fourth of the maximum throttle during automatic engine restart.

The issue of timely restarting during normal operation is again of no concern to vehicles like the Prius. The electric motor of the Prius produces creep force and is also available to drive the vehicle when the engine is not running or if it would be slow to start. On the Insight/Civic hybrid electric vehicle, when the brake is depressed, the gasoline engine will stop when the vehicle speed is below 5 miles per hour. While the vehicle is stopped and the brake is depressed, the transmission automatically shifts into Neutral. When the brake is released, brake fluid pressure is maintained, the engine starts in Neutral then automatically shifts to Drive, and the vehicle moves slowly forward. This sequence occurs very rapidly.

In normal situations, the propulsion system is available to move the vehicle by the time the driver's foot moves from the brake to the accelerator. As earlier discussed, in March of 1984, NHTSA terminated rulemaking on ZEMCO's crude but similar system. Among the numerous safety concerns which led the agency to terminate rulemaking was the ZEMCO system's excessive delay in

engine restarting. It is important that the time required for the engine to restart not become excessive as the vehicle ages and the system wears for designs where the propulsion system is disabled while the vehicle is stopped and the propulsion system must be re-enabled before the vehicle can move.

NHTSA requests comments on requiring a control that would allow the operator to lock out or turn off the idle-stop system in the event that restarting time becomes excessive or a malfunction occurs. NHTSA seeks input on what would be a reasonable maximum allowable time for the propulsion system to be available to move the vehicle after the brake pedal is released.

## VI. Leadtime

We propose that if made final, the changes apply to passenger cars, multipurpose passenger vehicles, trucks and buses manufactured on or after the first September 1st that occurs two or more years after the publication of the final rule. Public comment is sought on this proposed lead time. We believe that two years is sufficient lead time for industry since we do not believe that compliance with this proposed rule would involve any new technology, or performance specifications that manufacturers cannot meet with existing design, tooling, or manufacturing capabilities. We further believe that conducting the proposed test procedures would not involve any new technologies or procedures that manufacturers would find difficult to conduct. Since this rulemaking would not make any substantive changes in the scope of FMVSS No. 102, manufacturers of passenger cars, multipurpose passenger vehicles, trucks or buses that are available for sale at the time this notice of proposed rulemaking is issued would not need to make any changes in vehicle manufacturing processes or procedures to ensure that their vehicles meet the amended FMVSS No. 102.

## VII. Regulatory Analyses and Notices

### A. Executive Order 12866 and DOT Regulatory Policies and Procedures

Executive Order 12866, "Regulatory Planning and Review" (58 FR 51735, October 4, 1993), provides for making determinations whether a regulatory action is "significant" and therefore subject to Office of Management and Budget (OMB) review and to the requirements of the Executive Order. The Order defines a "significant regulatory action" as one that is likely to result in a rule that may: