

Sudden Acceleration,
Unwanted Acceleration,
Unintended Acceleration

Whatever name is attached to it the condition of a vehicle accelerating without operator input really does occur. The automobile manufacturers would have you believe that there is no such thing there is only “operator error”. Yet in more than 90% of the stop to sudden acceleration events that have been reported, to manufacturers and to NHTSA, there is no proof of operator error and the events fall into the “failure to duplicate” or “cause unknown” categories. This means that in the cases where the vehicle is still driveable after an incident that it did not do it again or that no apparent mechanical or operator fault evidence was found.

Let’s consider what is known about vehicles and the potential for this condition.

- 1) Sudden accelerations of the stop to sudden variety only started after the advent of the fuel injected engine. This advance made possible the wide spread application of the electronic cruise control.
- 2) The more widespread the use of cruise control, its inclusion in a vehicle as a standard item versus as an accessory, the more reported incidents that occurred.
- 3) It is universally accepted that only two mechanisms in a vehicle can open the throttle, the operator’s foot on the accelerator pedal and the cruise control.
- 4) Ford Motor Company, in one of their studies of sudden acceleration, defined six mechanisms by which a vehicle can go to wide open or near wide open throttle.
 - Throttle mechanical problems
 - Speed control mechanical problems
 - Engine air leaks
 - Engine mechanical displacement
 - Driver
 - Electronic — including transients signals and other forms of EMI (electromagnetic interference)

Some mechanical problems have been found which can result in a failure to decelerate and/or a rapid acceleration due to throttle plate sticking. Unlike the mechanical problems the electronic conditions which can occur will leave no trace behind. Your computers freezes up, turn it off and then back on and its fine. This is an EMI problem also. No one could tell you what caused it.

- 5) The hazards associated with EMI have been around since the advent of electricity. Catastrophic events due to EMI have been recorded in the aircraft, medical, industrial, wheel chair, and any field which uses electronics and computers. The study of EMI and its mitigation, EMC — electromagnetic compatibility, have become a complete field of specialization in Electrical Engineering.

- 6) Under the hood of a car exists not only one of the harshest physical environments for electronics, heat, dirt, moisture and corrosives; but also one of the harshest EMI environments. Numerous EMI generating devices are in constant close proximity. The electronic components under the hood are not only receptors of the EMI they are generators of EMI.
- 7) Although there are some protective measures taken on the printed circuit boards of the electronic components for EMI, there is virtually no protection of the wiring and interconnections of the components.
- 8) Methods are known and available to the automobile industry to make the wiring safer but they are not employed due to cost considerations. Basically, the random nature of a sudden acceleration event does not warrant the cost of the preventive measures that can be designed into the vehicle and its wiring.
- 9) The effects of EMI have proven costly to impossible to duplicate in other industries and are so in the automotive industry. With billions upon billions of signal combinations possible through the myriad wiring circuits lumped into wiring harnesses in the average car testing is not economically feasible. The automotive industry refuses to follow in the footsteps of other industries and design out the potential for EMI up front.

As vehicles become more and more sophisticated with electronics incidents of sudden acceleration will continue to occur and may even increase. There is a pattern evolving regarding drive by wire systems having sudden acceleration events. These systems replace the mechanical, cable operated, accelerator and cruise control connection to the throttle plate with an all electronic/electrical assembly. This method drives the throttle from the vehicle's electronic engine controller which can have up to 130 connections. This is 130 possible pathways for EMI and the potential for 2^{130} possible signal combinations to be generated at any instant in time.