Electromagnetic radiation from car spark plugs

Electromagnetic radiation and health

Survey of electromagnetic radiation on Gabriola

Electromagnetic radiation from car door openers and the sun

I sometimes point out in discussions that car spark plugs emit electromagnetic radiation at levels comparable to those that some people consider to be a health hazard. But do they really?

Car spark plugs produce very roughly (I'm told) 100mJ of energy in a pulse lasting say 2 ms. This is for the duration of the spark about 50 W. A four-stroke engine at say a modest 3000 rpm with six cylinders will be producing sparks at about 6 ×(3000/4)/60 = 75 per second. The continuous power is thus about 75 × 100E-3 = 7.5 W. A considerable fraction of this will be lost in heating, but let's guess and say only 10% gets converted into RF energy. This is still 0.75 W over a frequency range 10 kHz to 10 GHz.

Having said that, I later made some actual measurements on my own car, a 1990 Subaru.

Using a CORNET ED85EX meter with a sensitivity of -55 dBm and a frequency range of 1 MHz to 8 GHz, I was unable to detect any radiation either inside the car or under the hood a metre or so away from the engine.

I then switched to my TriField 100 XE meter which measures magnetic fields up to a frequency of around 100 kHz, although it is only calibrated at 60 Hz.

Inside the car, the meter read between 0.13–0.17 µT (1 microtesla = 10 milligauss) depending on engine speed. Under the hood, the readings were in the range 2–3 µT with the engine idling, with hot spots very close to the engine in excess of 10 µT.

One of the problems of this type of (inexpensive) meter however is that the readings only apply at 60 Hz because their "magnetic" sensors are actually measuring induced voltage. The 100 XE's frequency response peaks in the range 500 Hz–2 kHz where its magnetic field strength reading is roughly eight times what it should be.

A field of 2 µT is equivalent in the far-field of a radiation power density of close to 1000 W/m^2, which is hard to believe. Clearly, we are dealing here with near-field radiation, meaning the frequency of most of the radiation is low, as would be expected of a car's ignition system incorporating RC filtering.

I would conclude that RF radiation from spark plugs is not a problem as far as it being a health hazard is concerned. The combination of the screening effect of the metal of the car, and RF suppression measures incorporated by the car manufacturer in the spark plug cables, reduces it to negligibly small levels.

I don't think anyone would consider the measured 0.1–0.2 µT inside the car a hazard, though it is an order of magnitude higher than what exists at 60 Hz in most of our house.