Driveway Sentry may have been magnetically overloaded

I built two of the Driveway Monitor units from July and August 2015 issues (www.siliconchip.com.au/Series/288) but I have not been able to get any sense out of either of them.

I have not added the RF units but installed a connector at the TX1 location so that the RF transmitter can be added later. To make sure that I hadn't got the chip mixed up with blanks, I re-flashed the PICs. Both units exhibit the following:

- no voltage on the V_{CC} pin of TX1
- 5V DC on the V_{CC} pin in diagnostic mode
- IC1 output is 2.49V in diagnostic mode, no change when a magnet is introduced to the sensor
- IC1 output is 0.28-0.36V between output and reference during normal operation; no change when a magnet is introduced to the sensor
- supply voltage is 5.5V DC
- nothing can be detected on the data pin of TX1 when a magnet goes over sensor

Any help with this would be appreciated. (W. M., Wynnum, Qld)

- The HMC1021 magnetic field sensor is designed to detect the very small changes in the earth's magnetic field changes when a metallic object is brought near.

A nearby magnet would tend to drastically overload the sensor. We think the magnetic field sensor may have temporarily latched up due to the strong magnetic fields introduced with a magnet.

We recommended using a large pair of pliers as a "magnetic disturbance field". It may be that you will need to leave the driveway monitor running and powered up for a while without a magnet nearby so that the set and reset pulses that occur every 10 seconds have a chance to remove the re-magnetisation of the sensor before the sensor will operate correctly.

Honeywell, the manufacturer of the HMC1021 sensor, states:

Set/Reset Strap Operation

The reasons to perform a set or reset on an AMR sensor are: 1) to recover from a strong external magnetic field that likely has magnetised the sensor; 2) to optimise the magnetic domains for most sensitive performance; and 3) to flip the domains for extraction of bridge offset under changing temperature conditions.

Strong external magnetic fields that exceed a 10 to 20 gauss "disturbing field" limit can come from a variety of sources.

The most common types of strong field sources come from permanent magnets such as speaker magnets, nearby high current conductors such as welding and power feeder cables, electric motors (eg, domestic vacuum cleaners) and by magnetic coils in electronic equipment such as CRT monitors and power transformers.

Magnets exhibit pole face strengths in hundreds to thousands of gauss. These high intensity magnetic field sources do not permanently damage the sensor elements, but the elements will be oriented to the exposed fields rather than the required easy axis directions.

The result of this re-magnetisation of the sensor elements, the sensor will lack sensitivity or indicate a "stuck" sensor output. Using the set and reset pulses will magnetically "restore" the sensor.