| Trends in vehicle electronics | Exercise 5 | |
|---|---|---|
| **The measurement of TDC and crankshaft speed** | | **ZPSiSS, 2011** |

# 1. Basic of sensoring

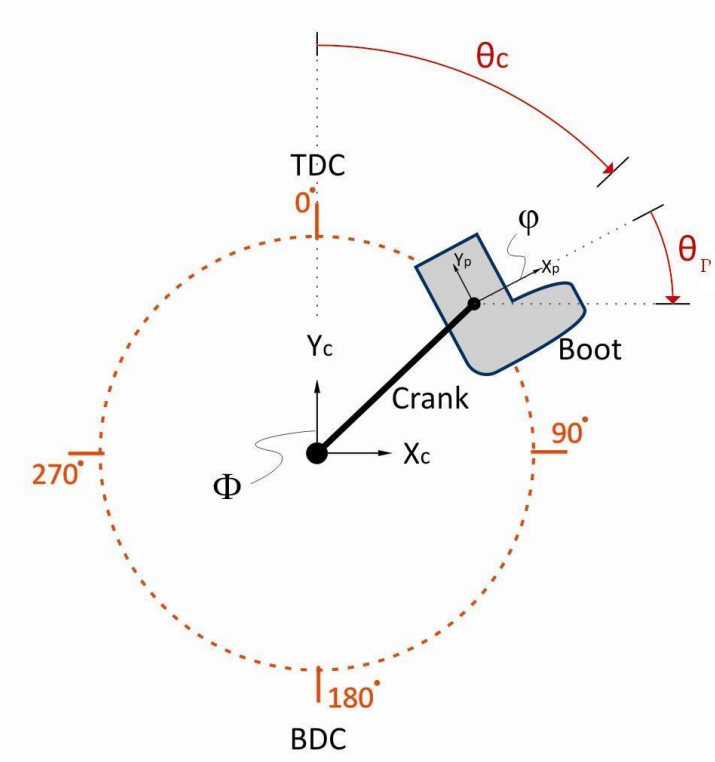
## 1.1. Introduction

Vehicle micro processor controlled systems continually monitor the operating conditions of the car. Through sensors, computers receive vital information about a number of conditions, allowing minor adjustments to be made far more quickly and accurately than mechanical systems. Sensors convert input variables such as temperature, pressure, speed, position and other into either digital or analog electrical signals.

The inductive sensor consists of a bar magnet with a soft magnetic pole pin supporting an induction coil with two connections. When a ferromagnetic ring gear turns past this sensor, it generates a voltage in the coil which is directly proportional to the periodic variation in the magnetic flux. The rotational speed is reflected on a periodic interval between the voltage's zero transition points. The sensor is showed in figure below.

**T**op **D**ead **C**entre of piston #1 is the datum point from which ignition system measurements are made and the firing order is determined. For example, ignition timing is normally specified as degrees before top dead centre (BTDC) although a very few small and fast-

burning engines require a spark just after top dead centre (ATDC).




### 1.2. Experiment description

Plug oscilloscope into sensor's wire. Choose properly tools (oscilloscope, probes, clamp, digital multimeter) to fill table and draw chart (ω=f(u)).

| No. | Crankshaft speed [rpm] | u [V] |
|---|---|---|
| 1. | 400 | |
| 2. | 500 | |
| 3. | 600 | |
| 4. | 700 | |
| 5. | 800 | |
| 6. | 900 | |
| 7. | 1000 | |
| 8. | 1100 | |
| 9. | 1200 | |
| 10. | 1300 | |
| 11. | 1400 | |
| 12. | 1500 | |

Make an oscillogram and Mark TDC on it.