MAN Energy Solutions
Future in the making

ME-C control system II

Tacho and pneumatic systems

PrimeServ Academy Copenhagen

MAN PrimeServ

Learning objectives

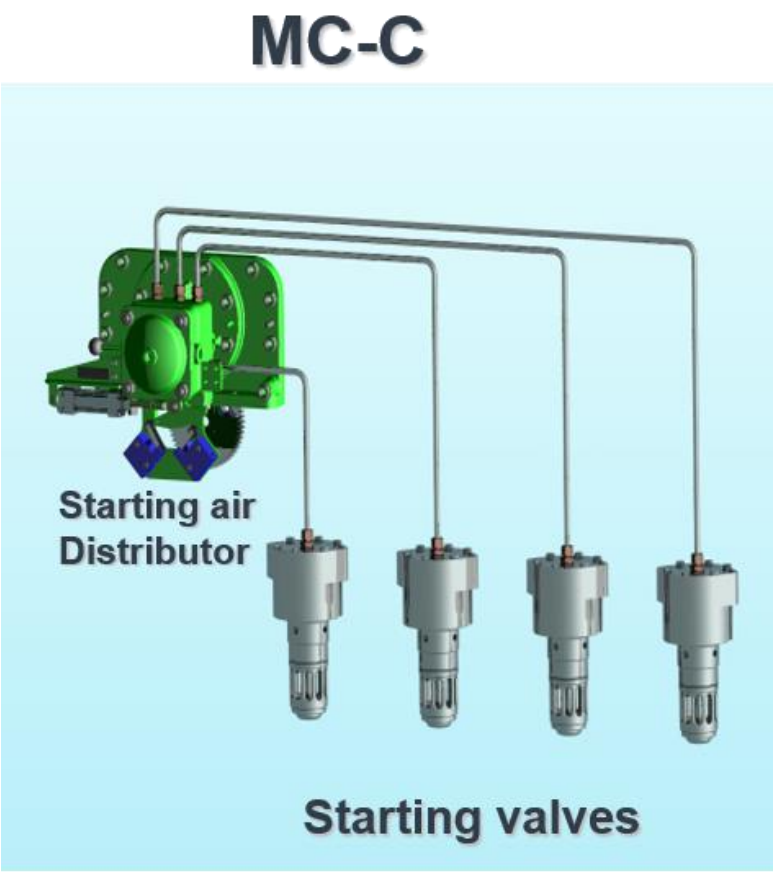
Upon completion of this module you …

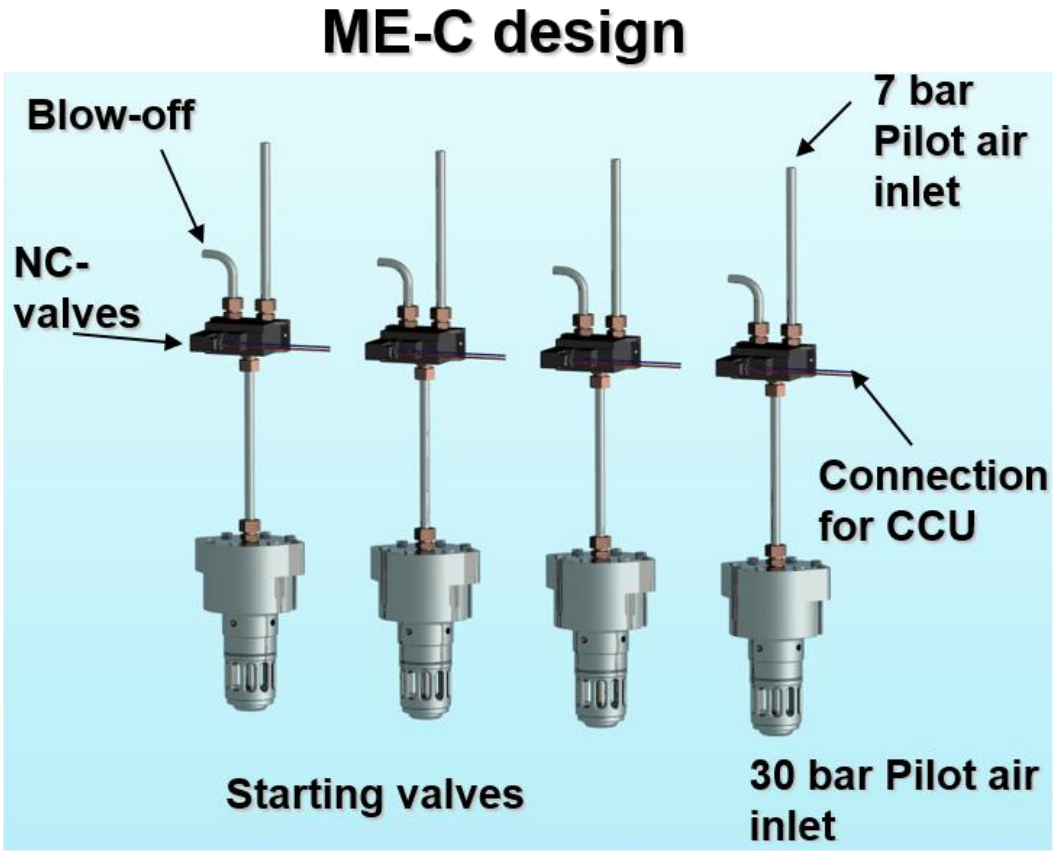
– will be able to recognize the various components in the system.

– will be able to explain the build up of the control system.

ME engine control system

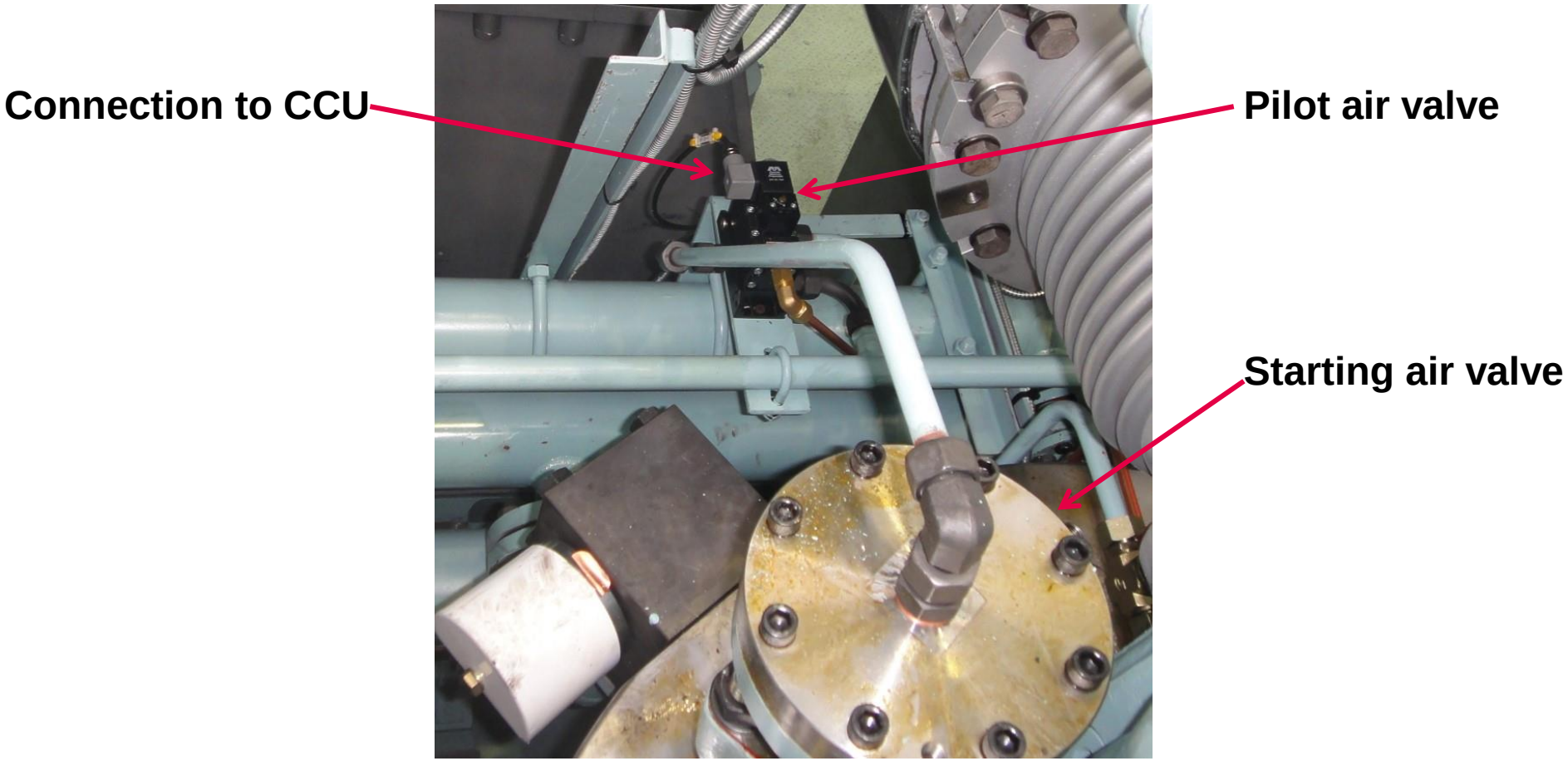
Starting and control air systems – MC to ME





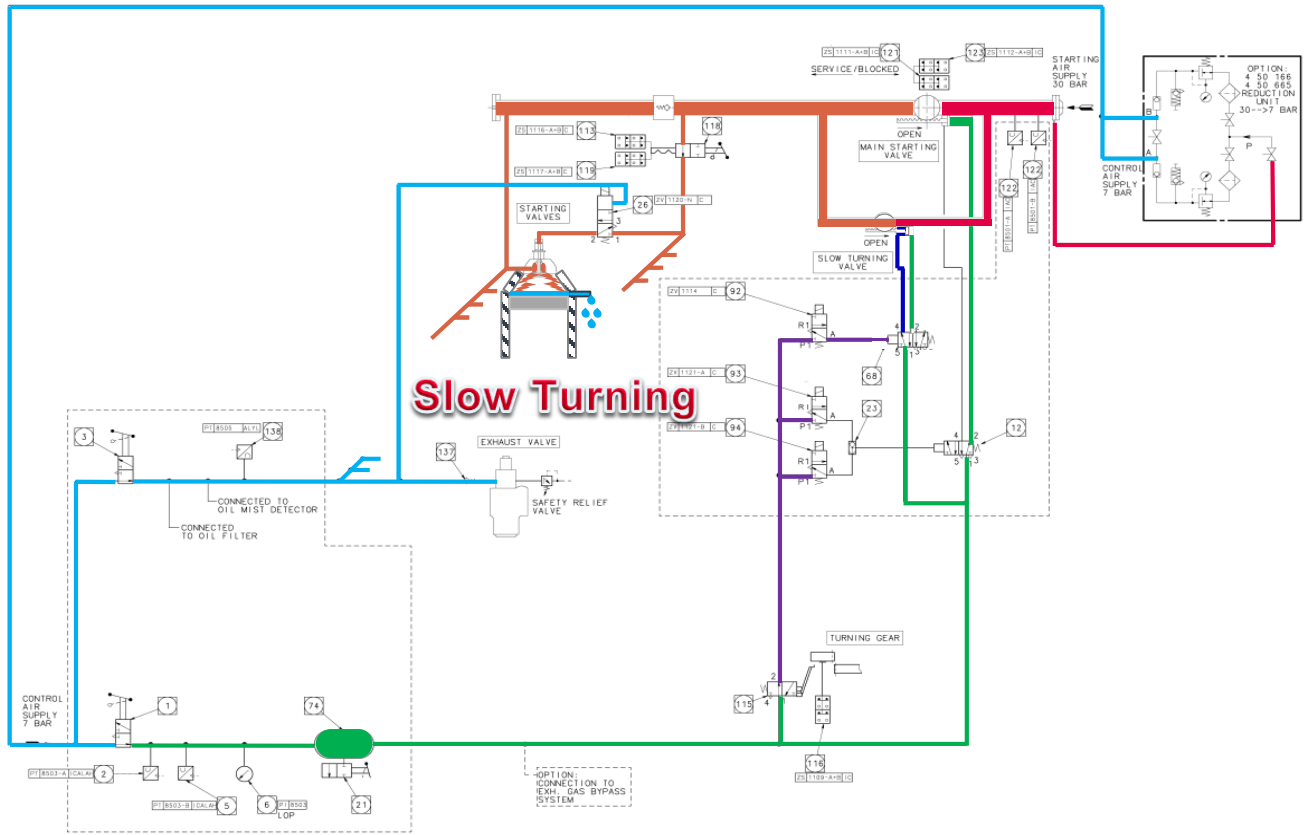
ME engine control system

Starting and control air systems – Start- and pilot air valve



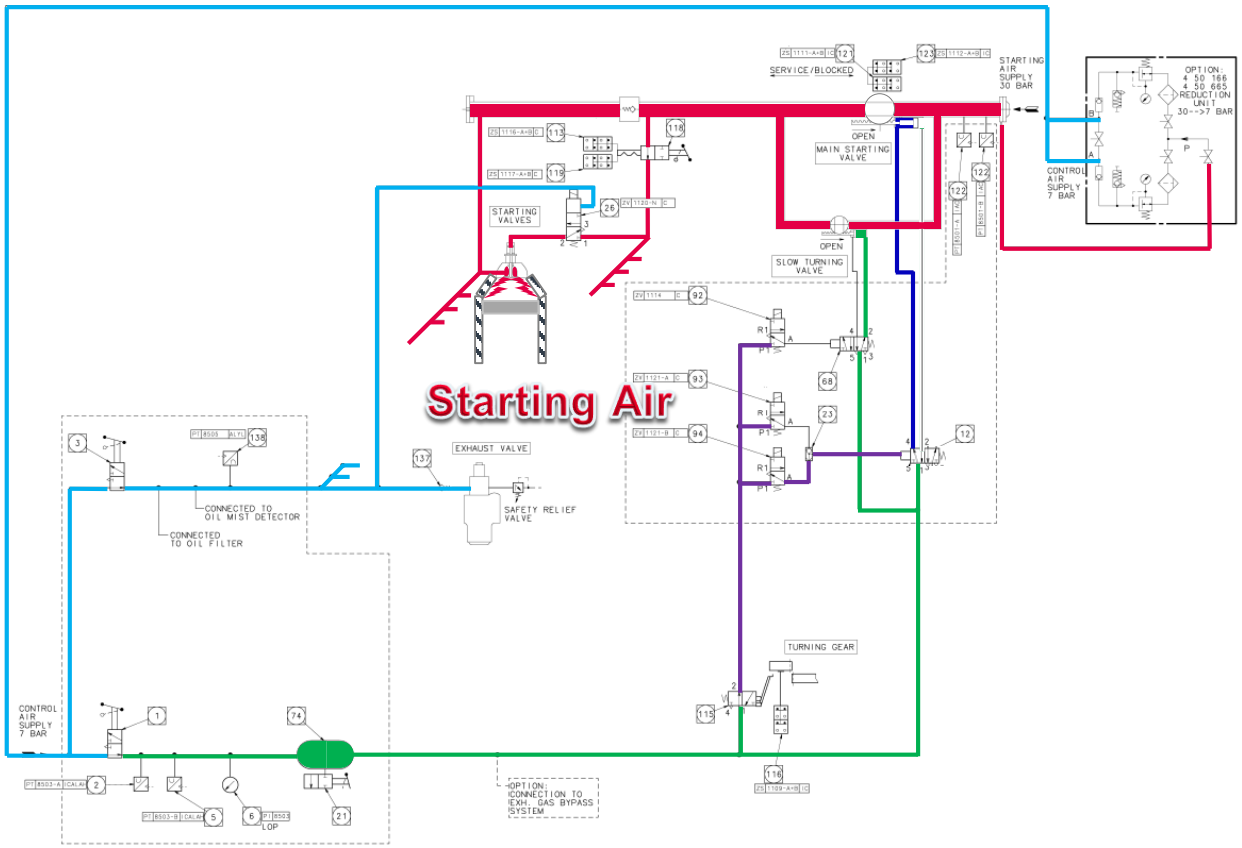
ME engine control system

Starting and control air systems – Slowturning



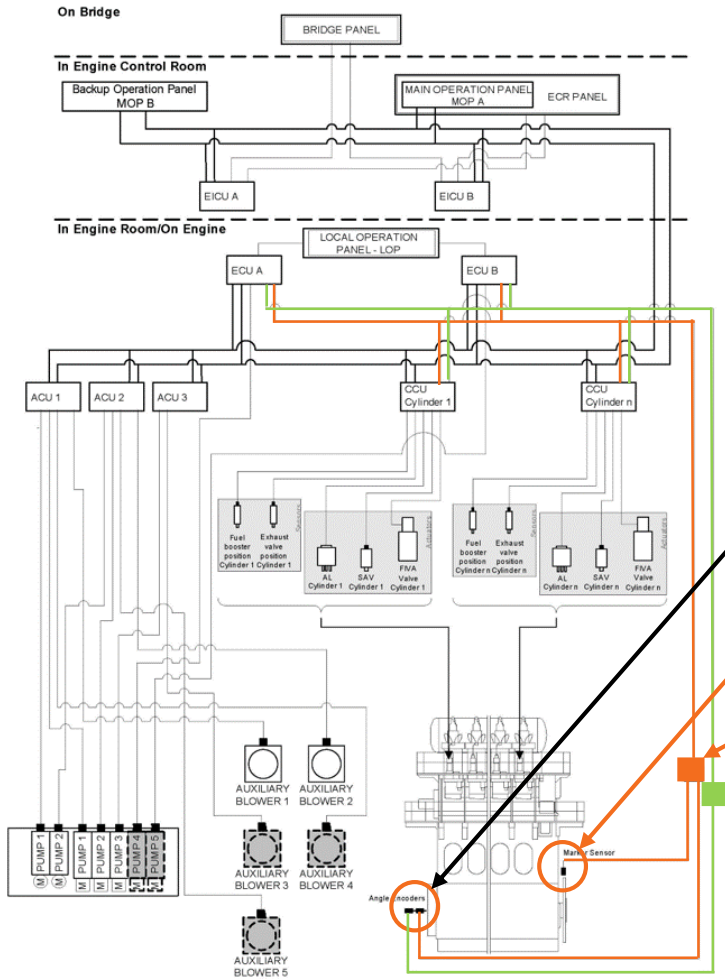
ME engine control system

Starting and control air systems – Start/Air run



ME engine introduction

Tacho system - Schematic



There are two redundant encoders in the tacho system:

- **Encoder A**
- **Encoder B**

Reference sensor at fly-wheel

ECU A

- **Tacho signal for monitoring**
- **Power supply to TSA-A**

ECU B

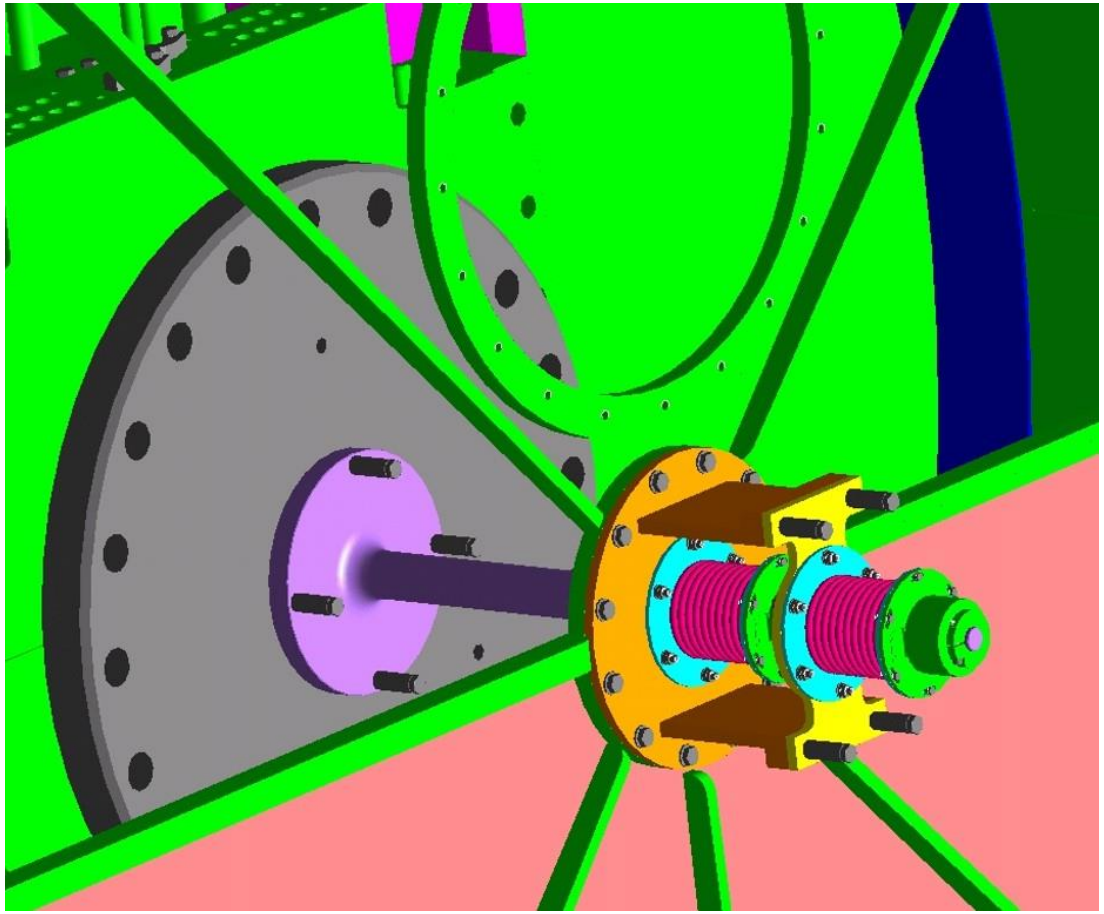
- **Tacho signal for monitoring**
- **Power supply to TSA-B**

CCU's

- **Tacho signal for operation**

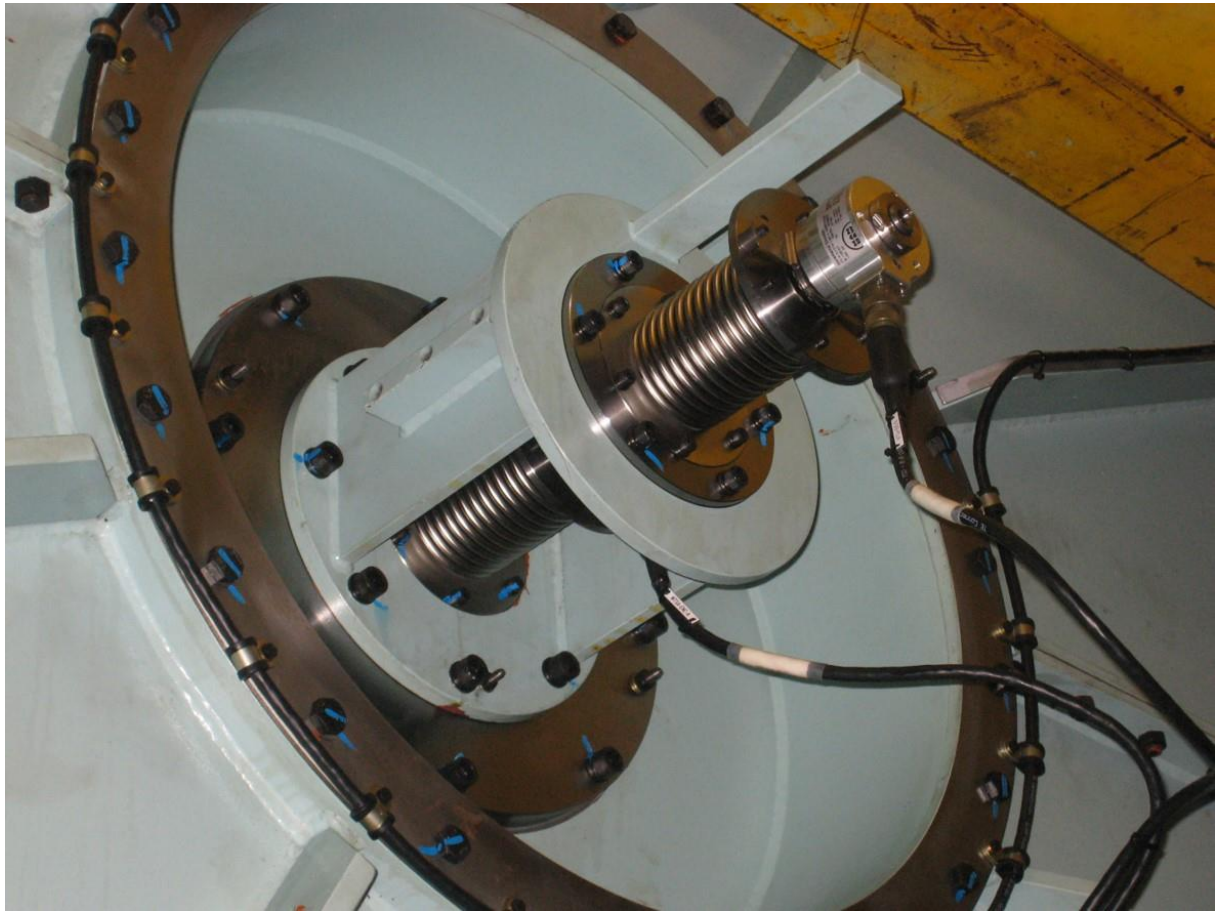
ME engine control system

Tacho system



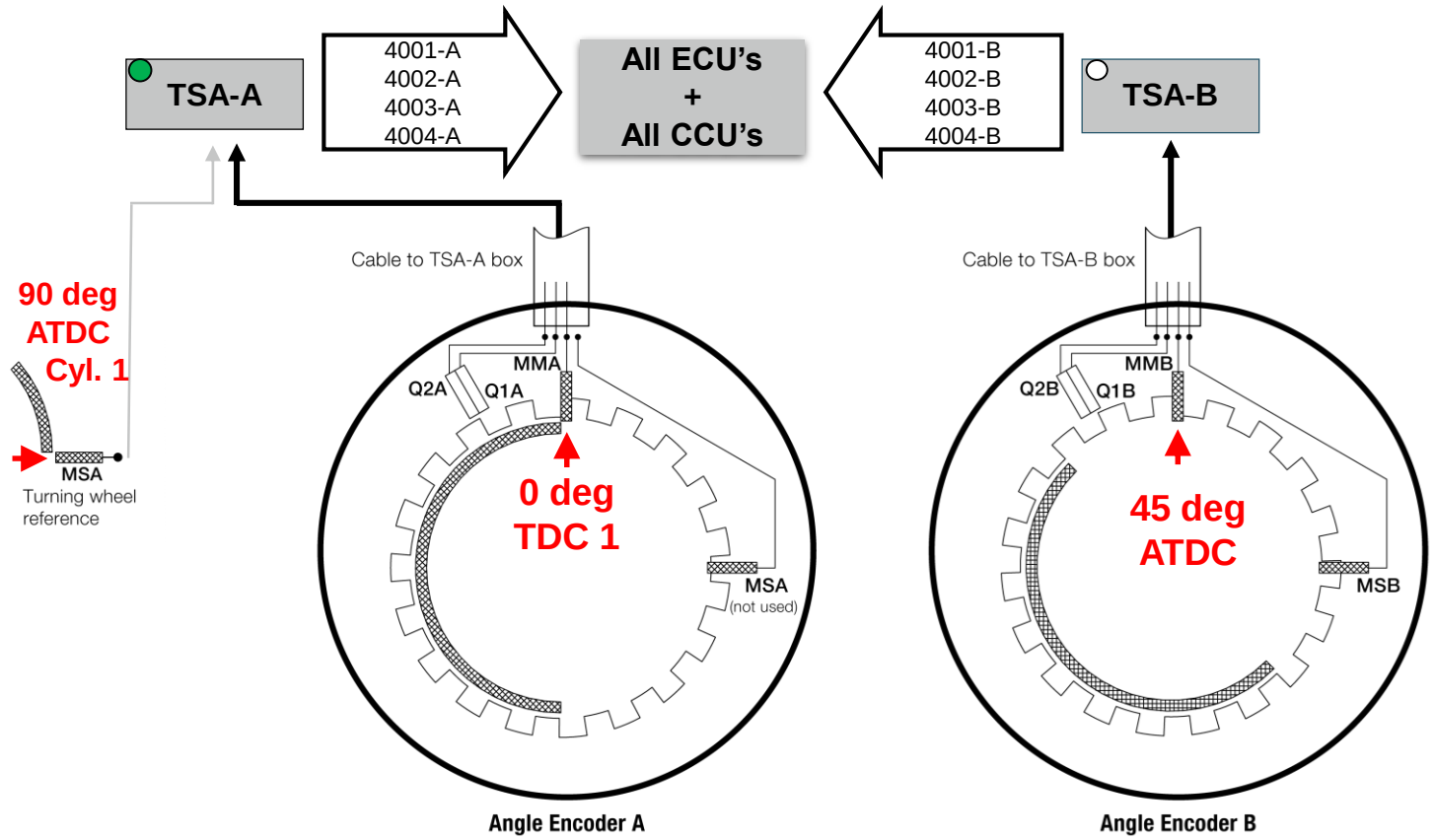
ME engine control system

Tacho system



ME engine control system

Tacho system – Angle encoders

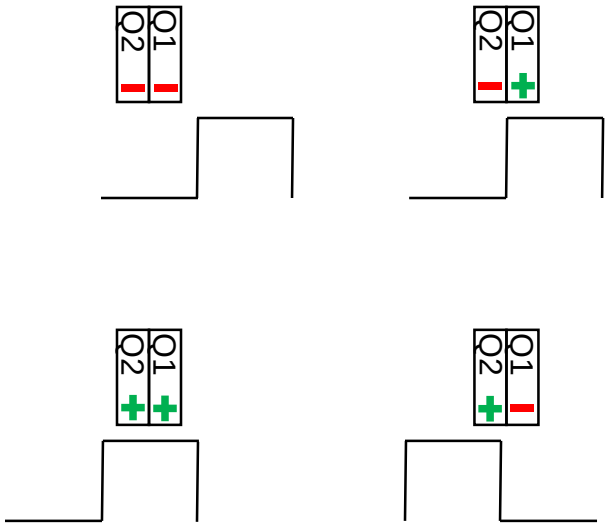


MMA = Marker Master A
MSA = Marker Slave A
Q1A = Quadrature 1A
Q2A = Quadrature 2A

MMB = Marker Master B
MSB = Marker Slave B
Q1B = Quadrature 1B
Q2B = Quadrature 2B

ME engine control system

Tacho system – Quadrature sensors



System A (powered from ECU A)
MMA = Marker Master A
MSA = Marker Slave A
Q1A = Quadrature 1A
Q2A = Quadrature 2A

System B (powered from ECU B)
MMB = Marker Master B
MSB = Marker Slave B
Q1B = Quadrature 1B
Q2B = Quadrature 2B

After initial power ON of ECS tacho will not have the position of the crankshaft.

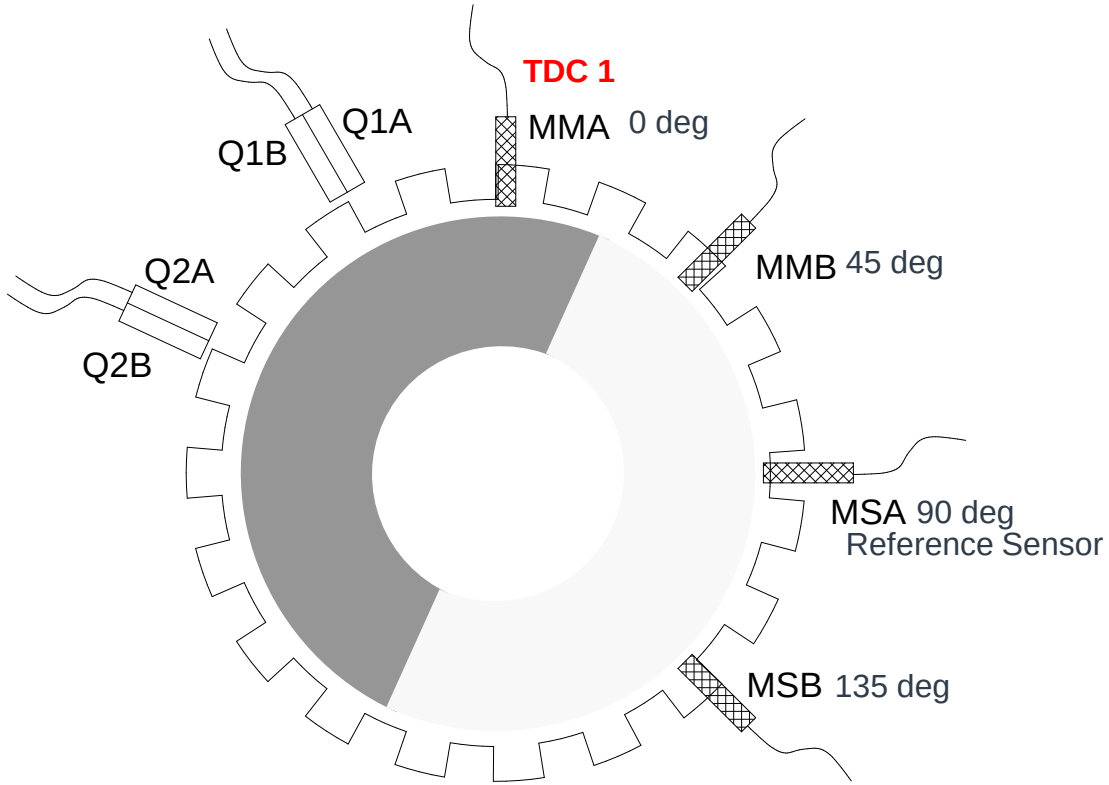
Try to start ahead, if it doesn't start, try astern, if still no start, turn by turning gear until system have position, it will have it within 1 revolution.

When start is initiated it will make 3-5 revolutions on air without fuel.

Turning by turning gear will normally only be needed if you only have 1 tacho system (one has failed)

ME engine control system

Tacho system – Angle encoders



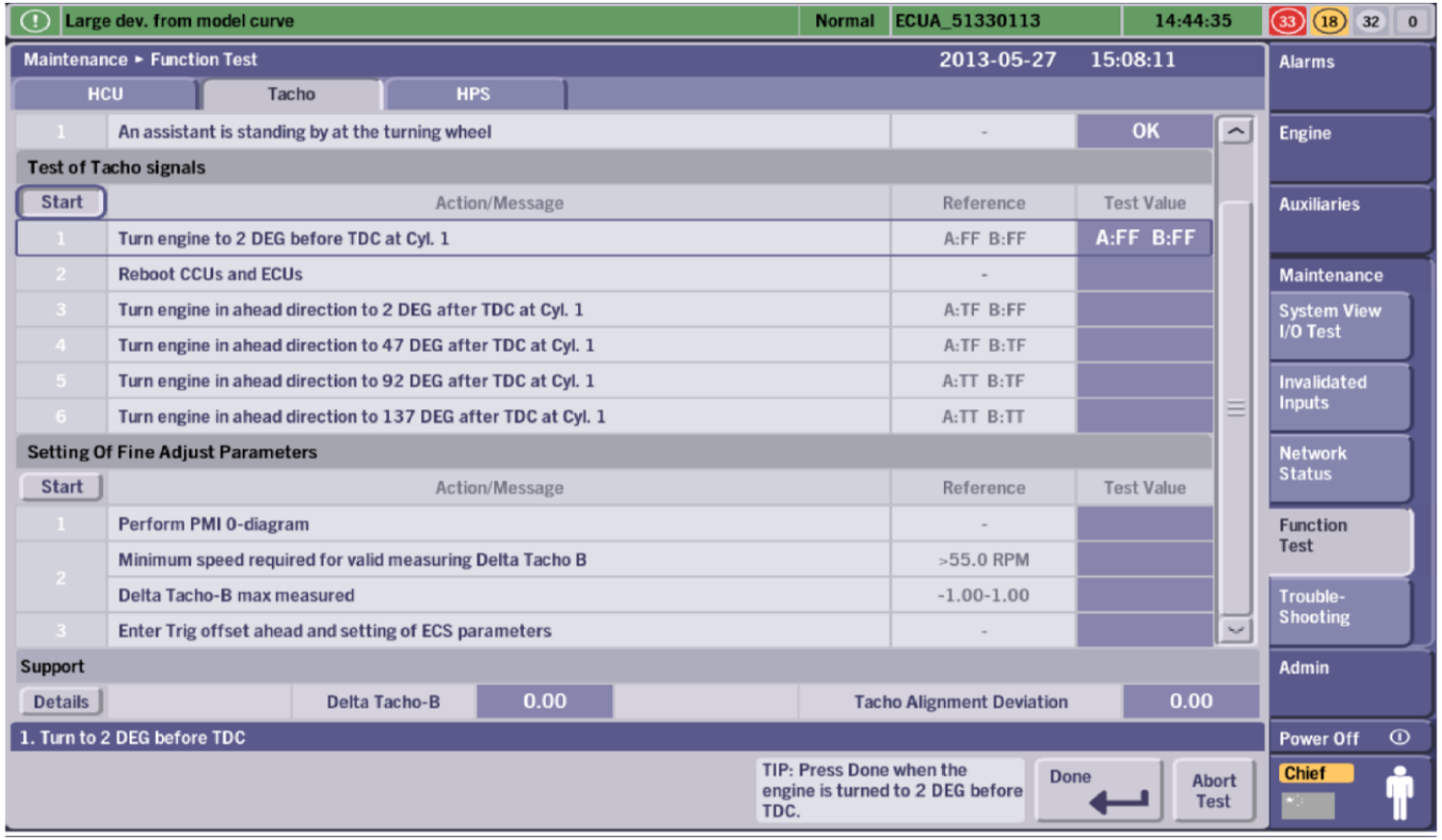
System A (powered from ECU A)
MMA = Marker Master A
MSA = Marker Slave A
Q1A = Quadrature 1A
Q2A = Quadrature 2A

System B (powered from ECU B)
MMB = Marker Master B
MSB = Marker Slave B
Q1B = Quadrature 1B
Q2B = Quadrature 2B

Pos	0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359
MMA	True	True	True	True	False	False	False	False
MMB	False	True	True	True	True	False	False	False
MSA	False	False	True	True	True	True	False	False
MSB	False	False	False	True	True	True	True	False

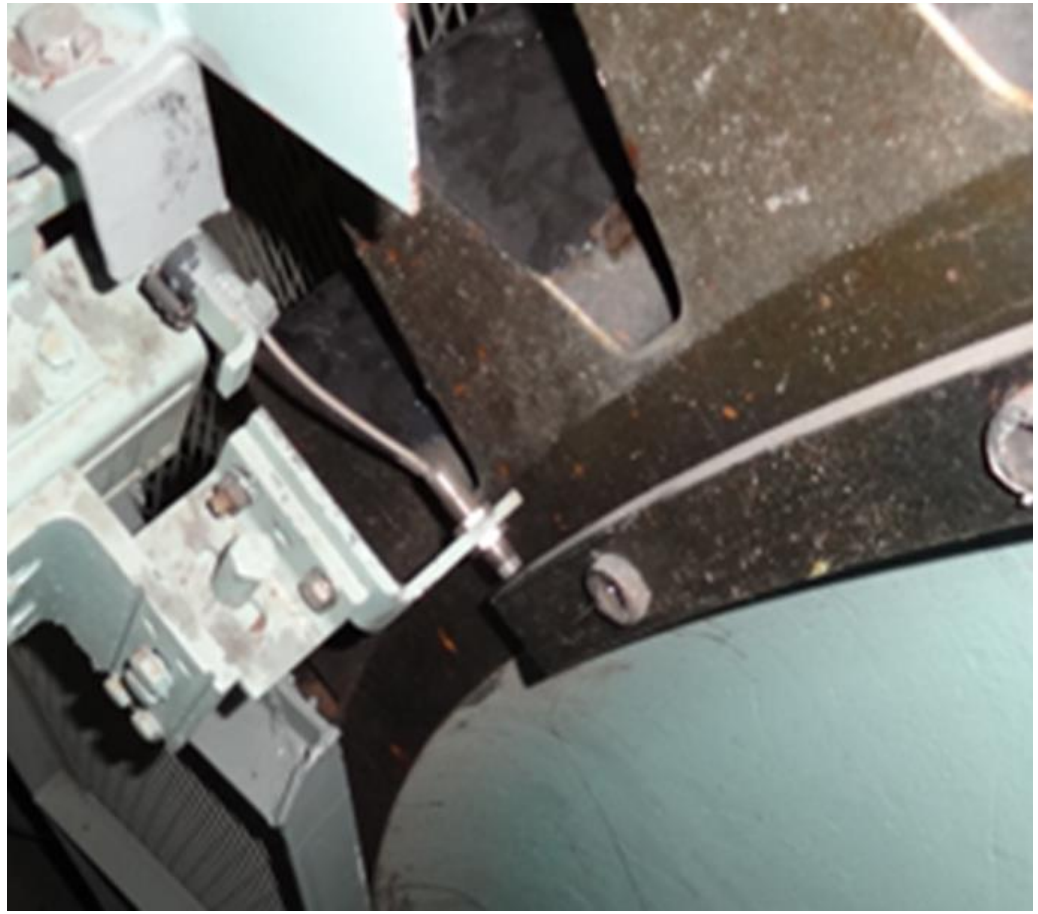
ME engine control system

Tacho system – Function test



ME engine control system

Tacho system – reference sensor

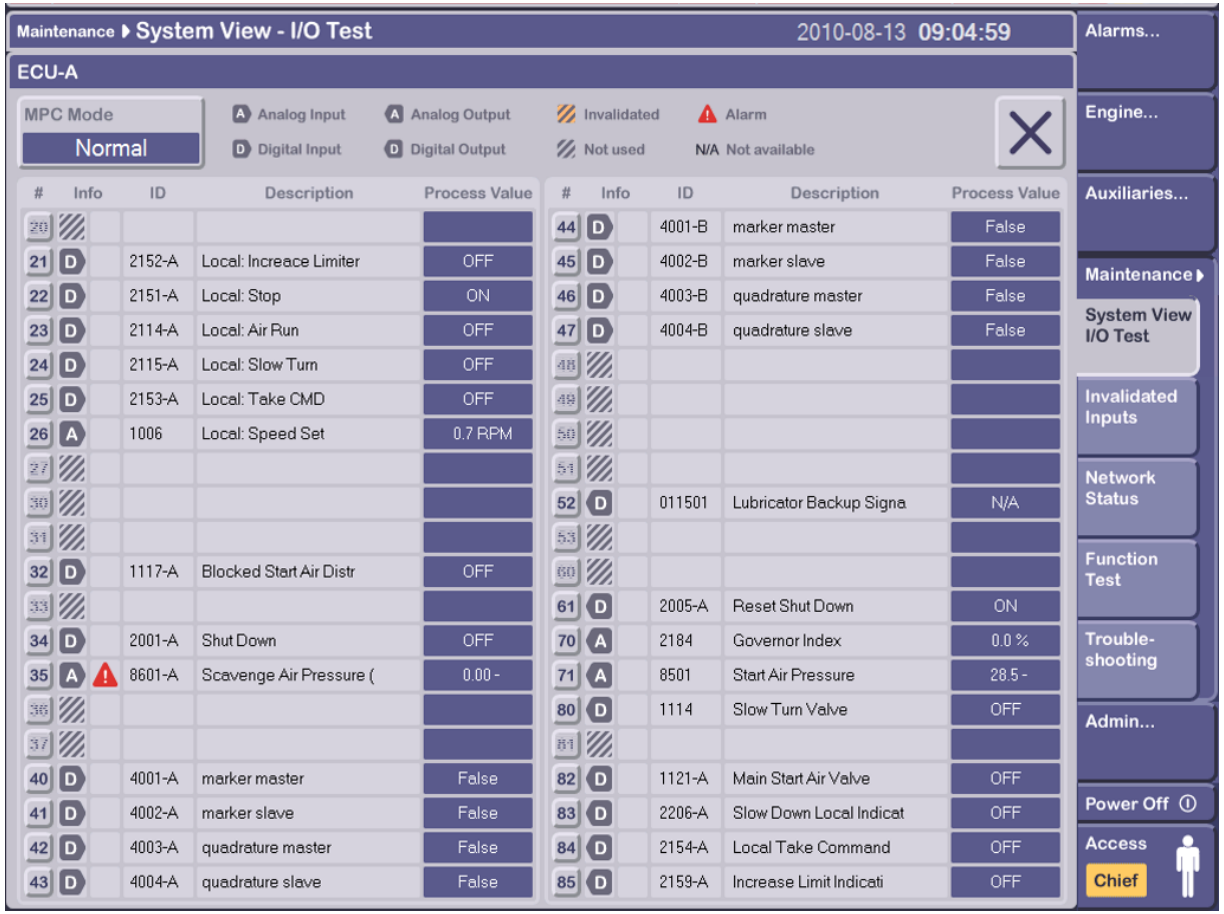


ME engine control system

Tacho system – amplifier boxes

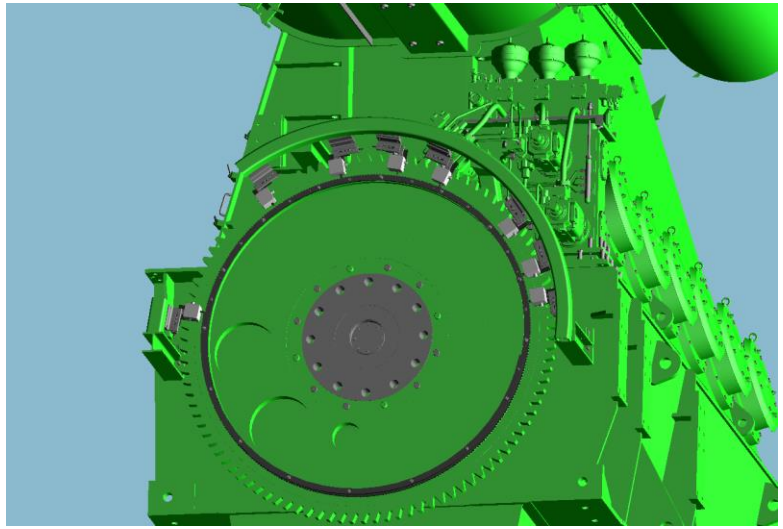
ME engine control system

Tacho system – Angle encoders channels

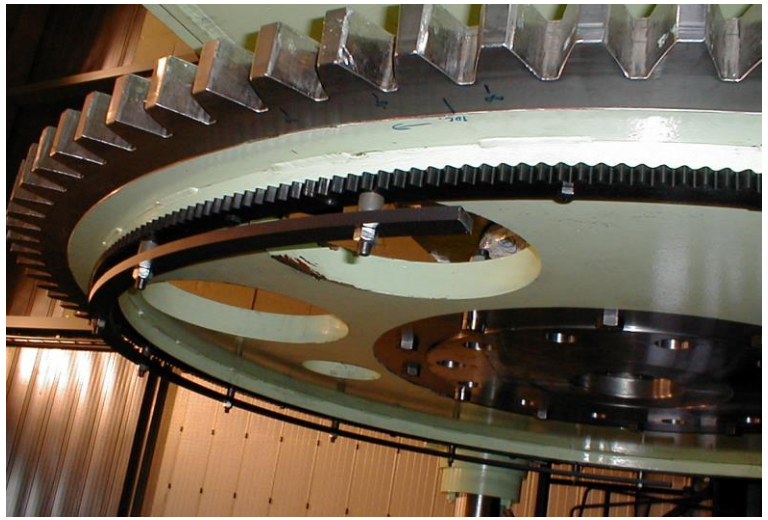


ME engine control system

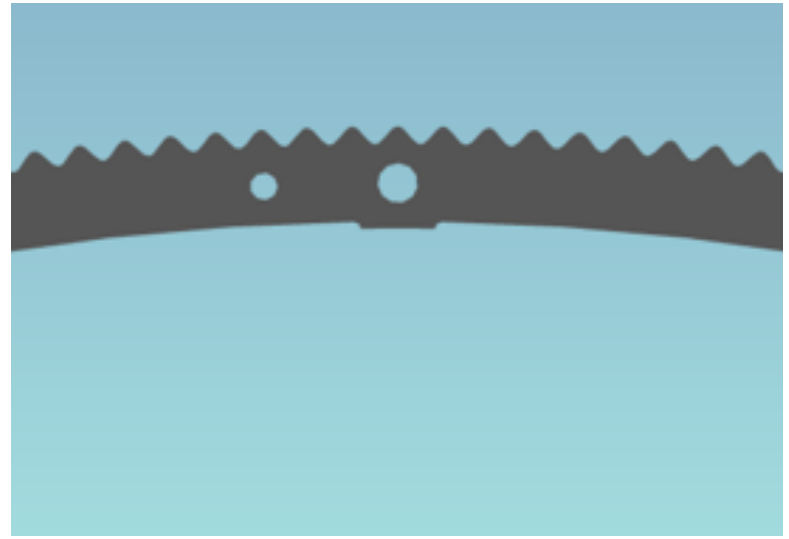
Tacho system – Trigger ring and sensors (option)



Two redundant set of sensors, that each measure engine speed and crankshaft position, for the synchronization of the control events.



Just like in the angle encoders the marker and slave sensors are being activated by a semi - circular ring.



The trigger ring consists of eight equal segments. The trigger ring has a sine - curved tooth profile.

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