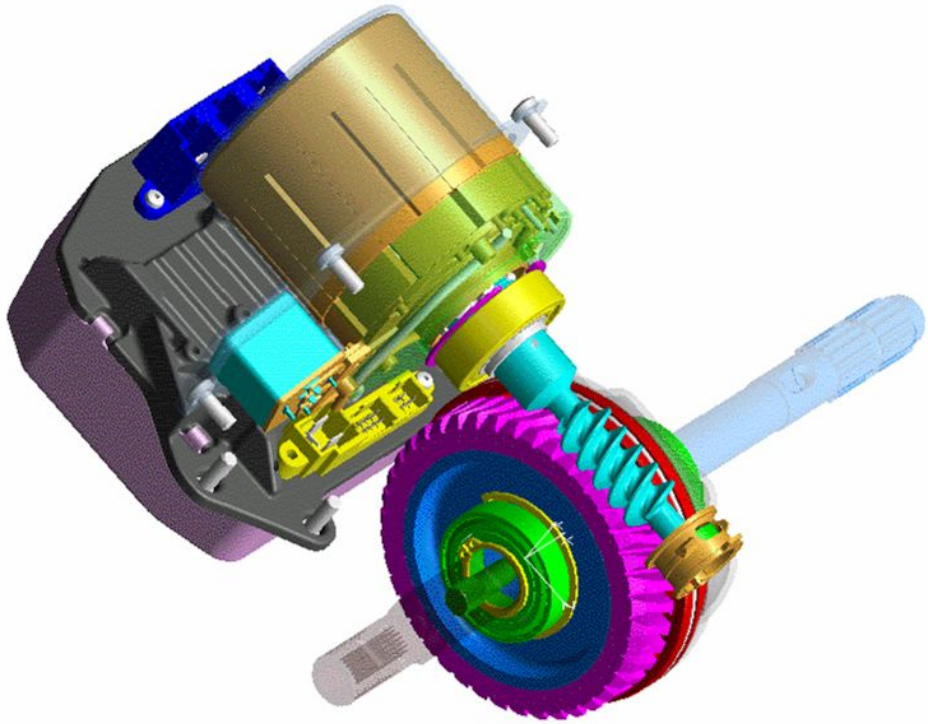
MDPS (TRW)



Application

Model	Engine	Gen	M/East	EU	Aust.	CAN	USA
TB F/L ('05.6)	ε-1.1	O	O	O			
	α -1.4	O	O	O	-		
	α -1.6	O	O	O	-		
	U-1.5	S	S	S			
MC	α -1.4	S	S	S			
	α -1.6	S	S	S	-	-	-
	U-1.6	S	S	S			
HD	γ-1.6	S	S	S	-	-	-
	β-2.0	S	S	S	S	S	S
	U-1.6	S	S	S	-	-	-

Item	MC	HD
Max. Current	65A	78A
Diameter [D]	Φ76mm	Φ86.5mm
Length [L]	125mm	55mm
Weight	2.6kg	2kg
Rated torque	34N.m	58N.m
Motor type	D/C	A/C

- Applied in both LHD and RHD as a standard including North American market.

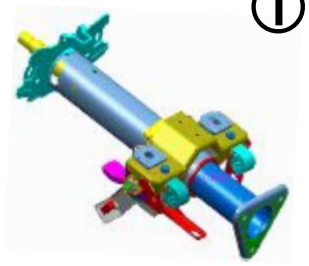
- TRW GEN2 (Model name)

- Smaller and light motor applied

- Higher torque capacity

Introduction

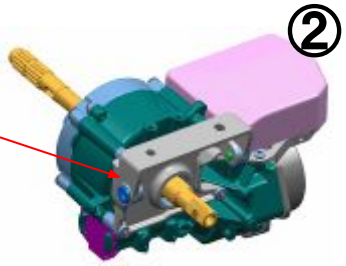
System structure



①

Steering Column

LWR MT'G BRKT

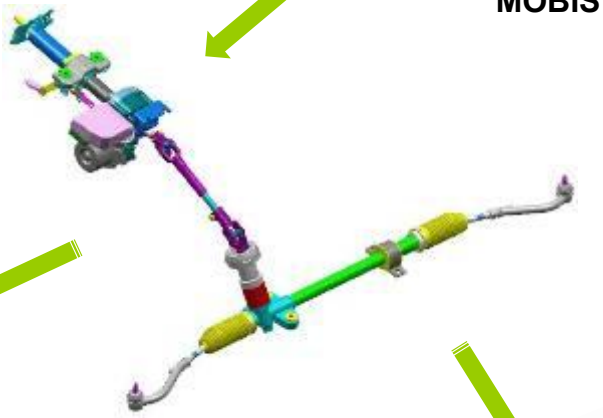


②

Power Head

MOBIS

COCKPIT MODULE

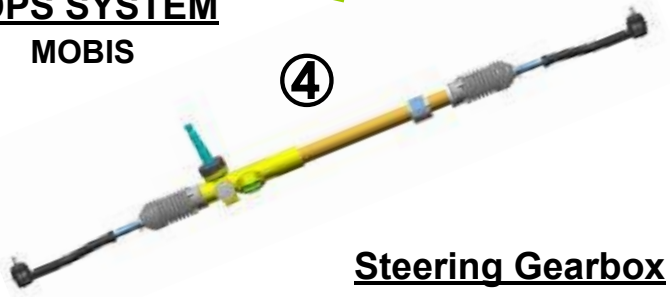


MDPS SYSTEM

MOBIS

③

U/Joint



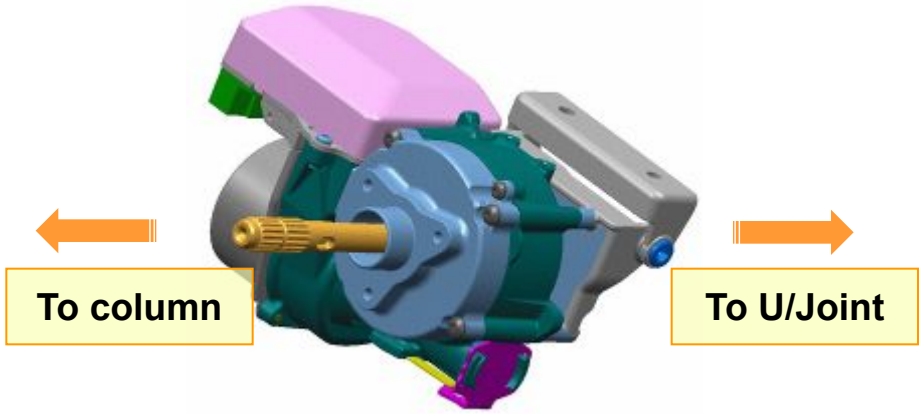
④

Steering Gearbox

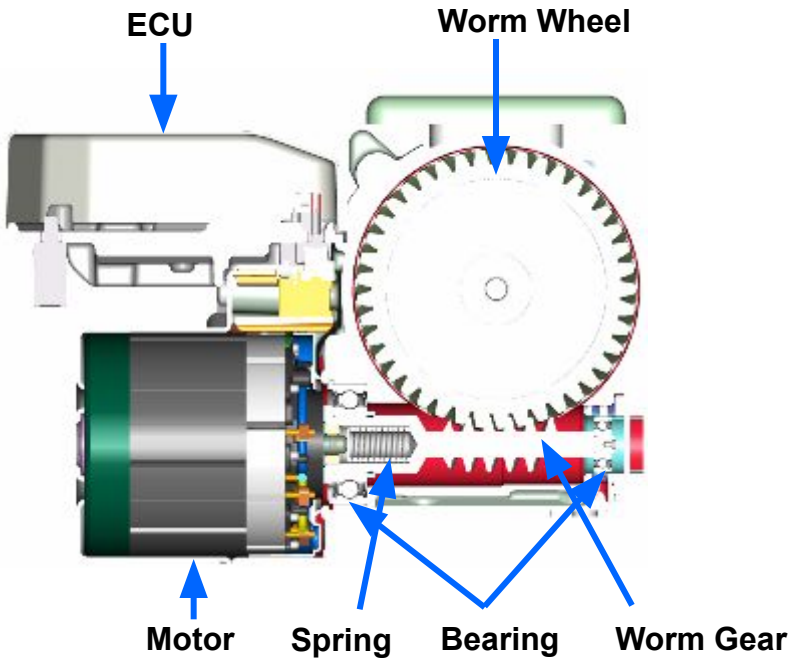
CHASSIS MODULE

MOBIS

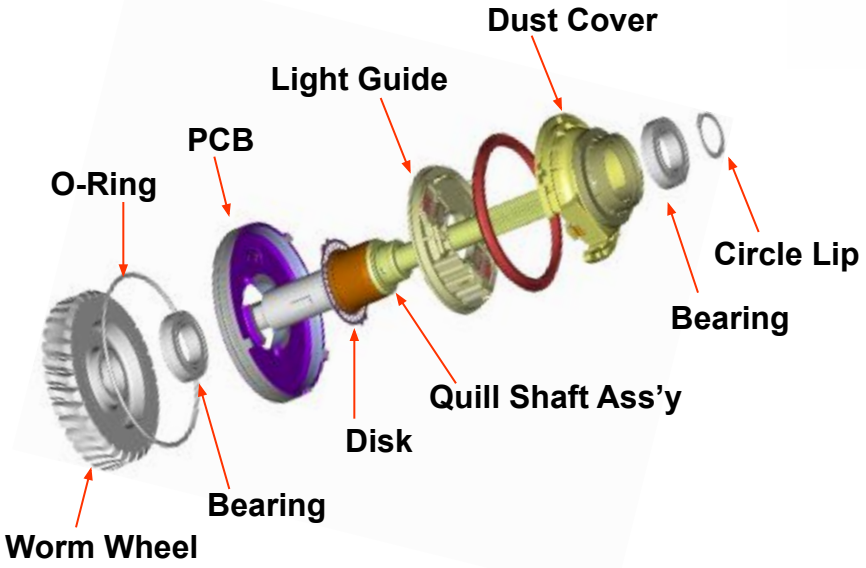
Power head



ASS'Y exterior



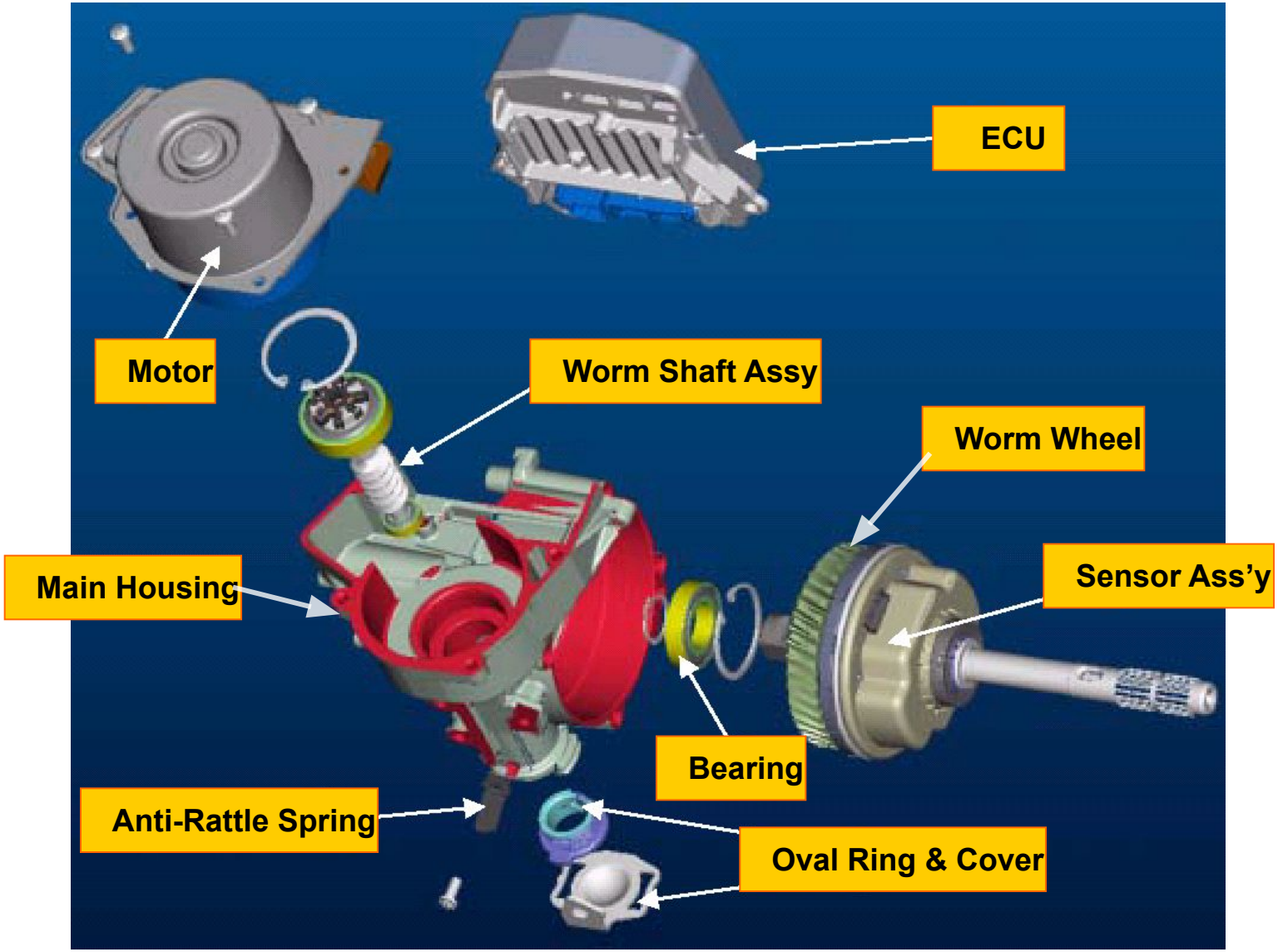
ASS'Y section view



Sensor deploy view

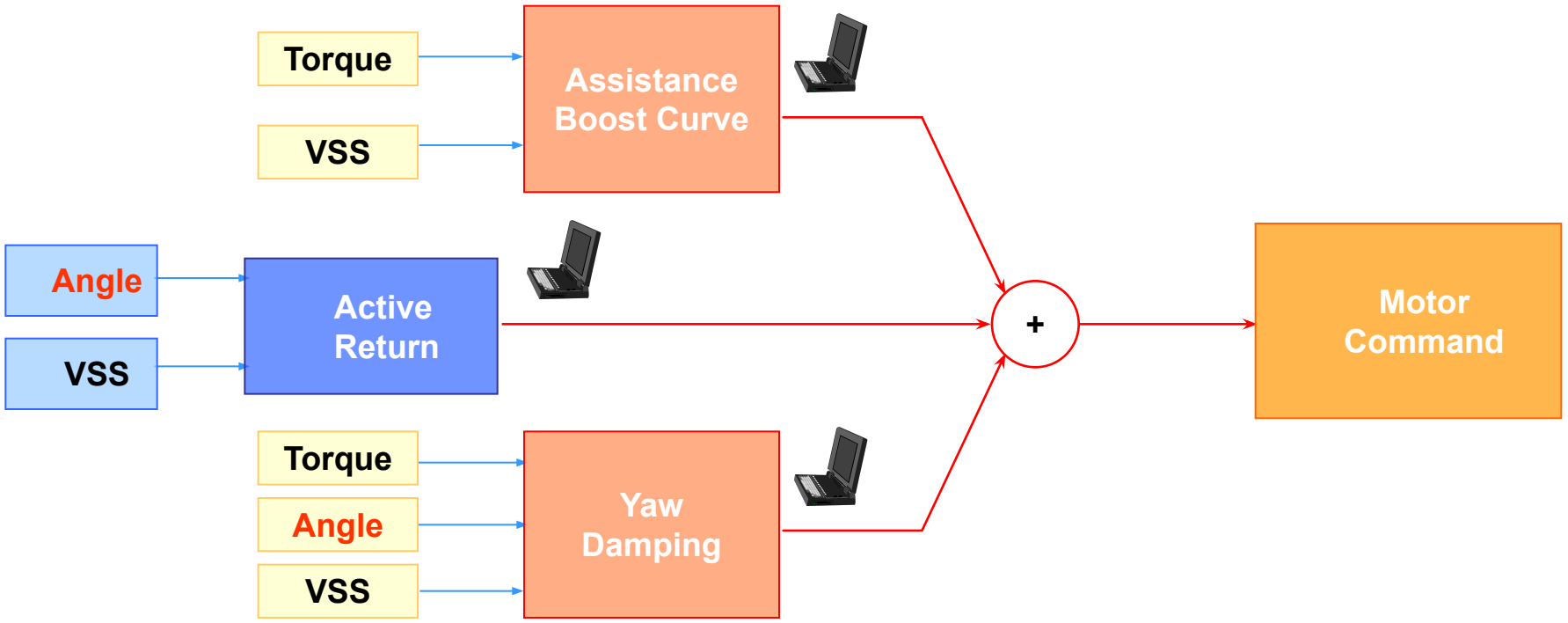
Components

Power head

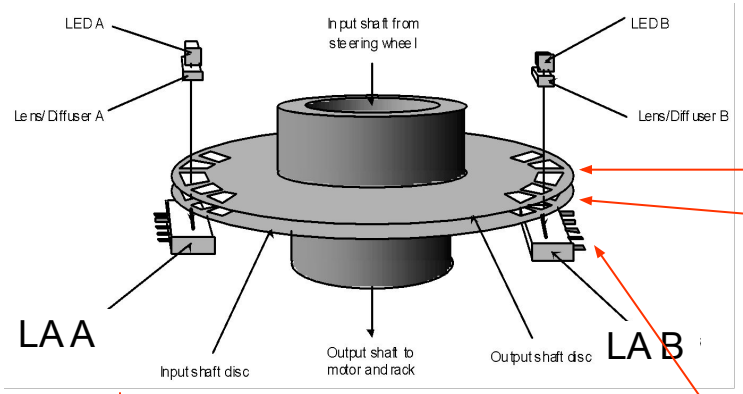


Control logic

- **Main input signals for the control logic**
  - ① Steering Wheel Torque
  - ② Steering Wheel Position (Angle)
  - ③ Vehicle Speed

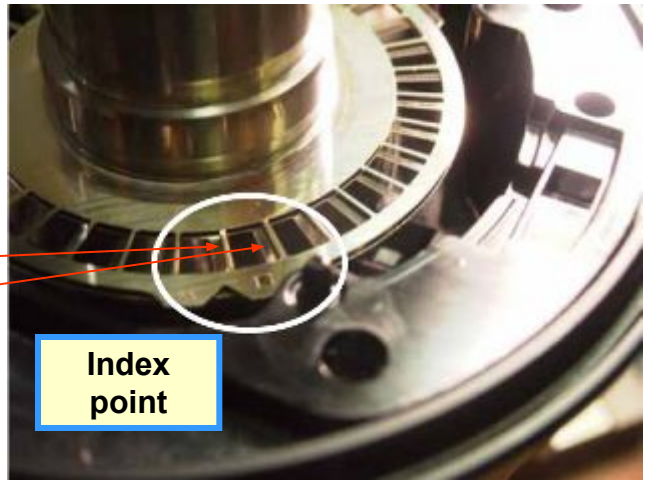


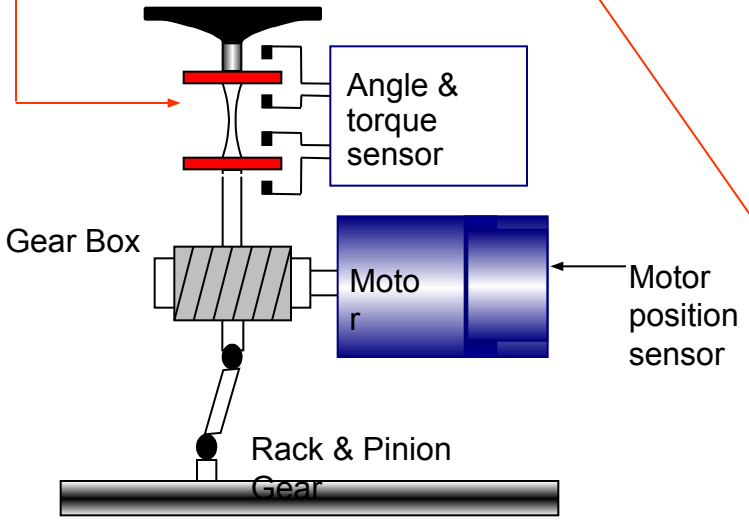
Torque sensor principle

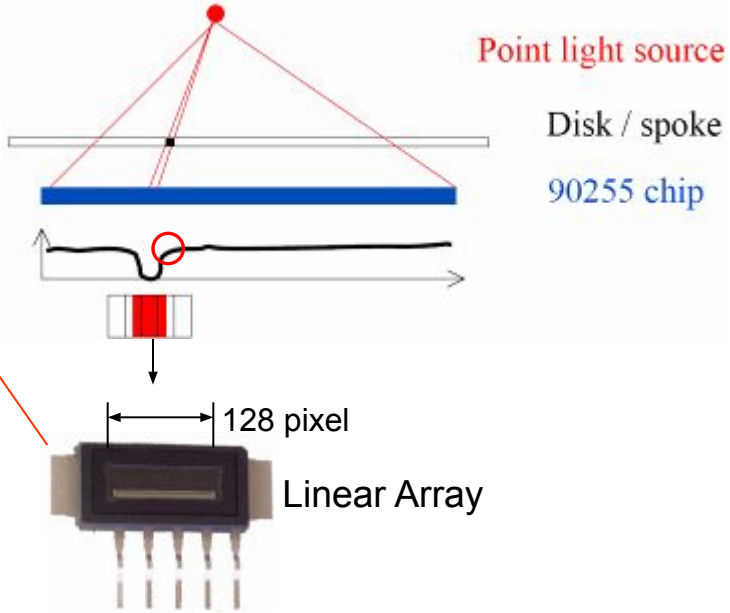


Narrow spoke disk

wide spoke disk



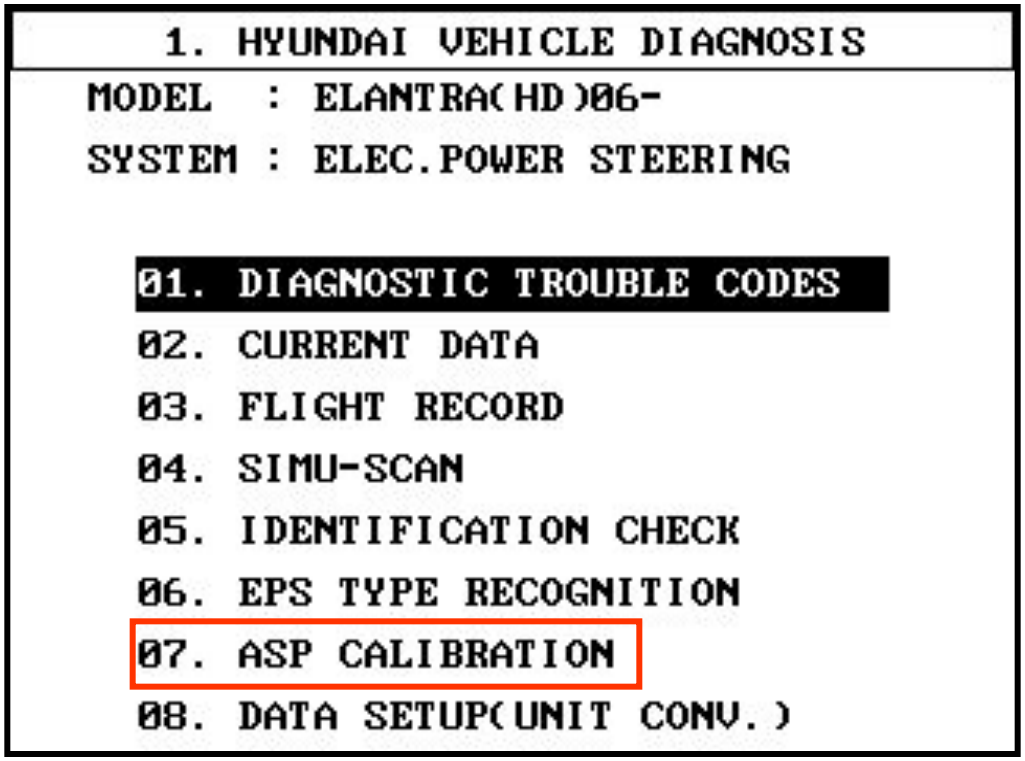




ASP (Absolute Steering Position) calibration

When ?

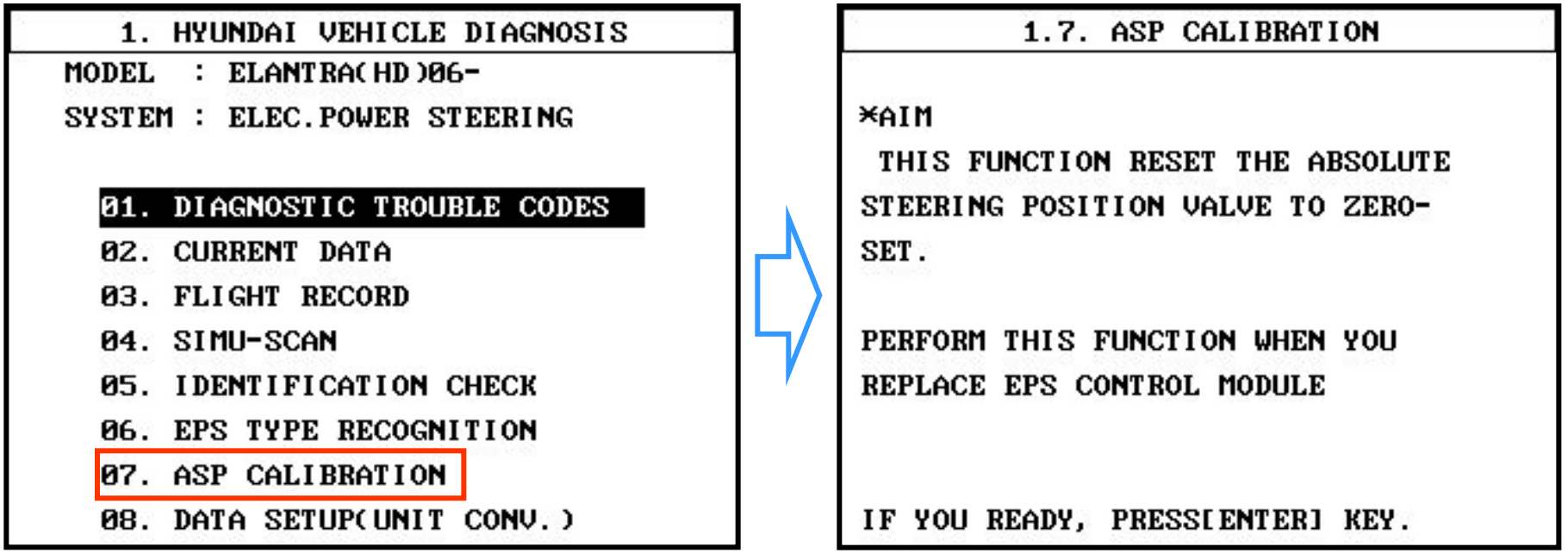
- MDPS Assmbly was replaced with new one or used one from the other vehicles.
- MDPS ECM (TBD) was replaced with new one or used one from the other vehicles.
- After wheel alignment adjustment.



ASP (Absolute Steering Position) calibration

How?

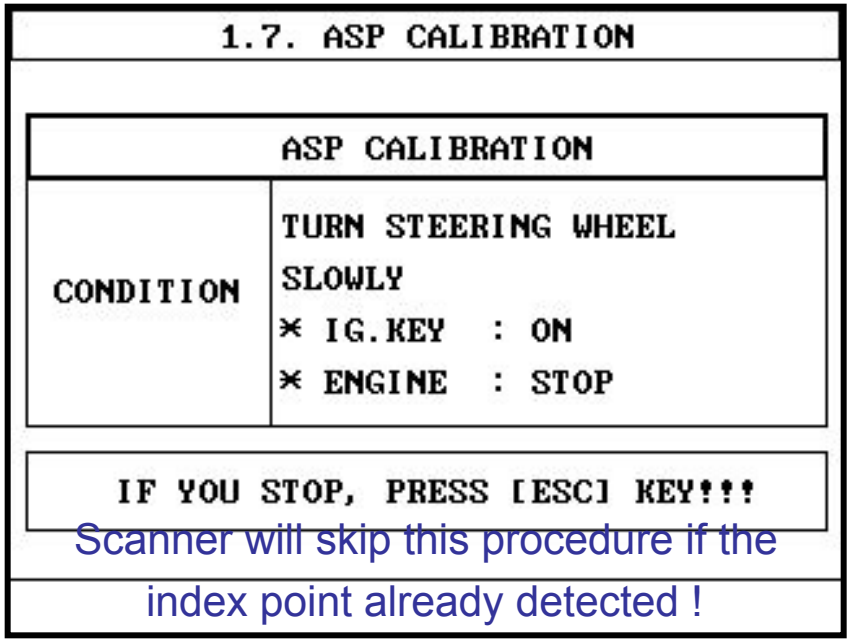
1) Ignition key ON (engine off) and set the front tire and steering wheel on the center (neutral) position.
   - For lower steering effort, IG ON(engine run) □ IG off and on whithin 2~3 seconds.
2) Connect the scanner and Enter into the 'ASP calibration' menu on the scanner.



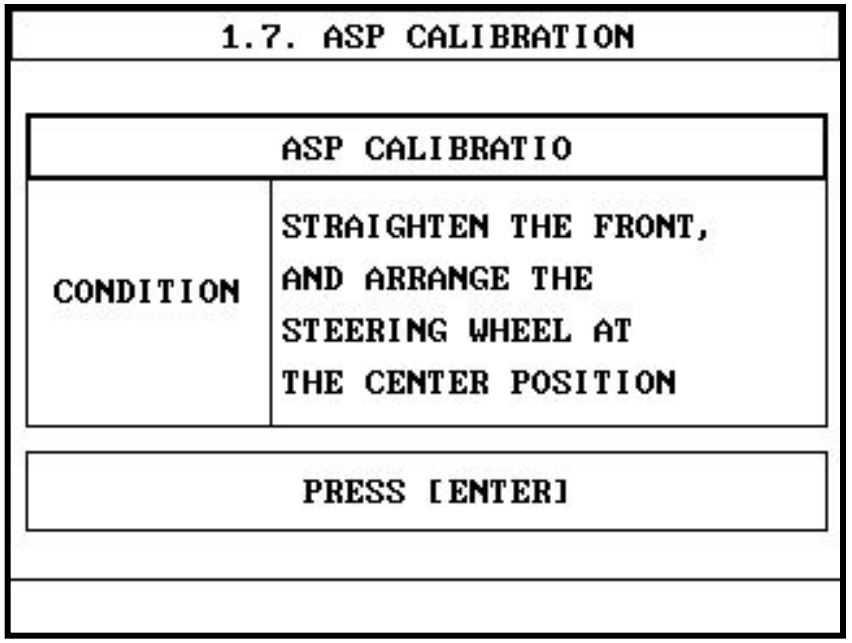
ASP (Absolute Steering Position) calibration

How?

3) Rotate the steering wheel more than ±180°(Left and right) from the center position
   - To detect the location of index point.
4) Rotate the steering (left and right) wheel until the screen in the scanner becomes as below.
   That is, if the index point is detected, the next procedure will be followed automatically.



Scanner will skip this procedure if the index point already detected !

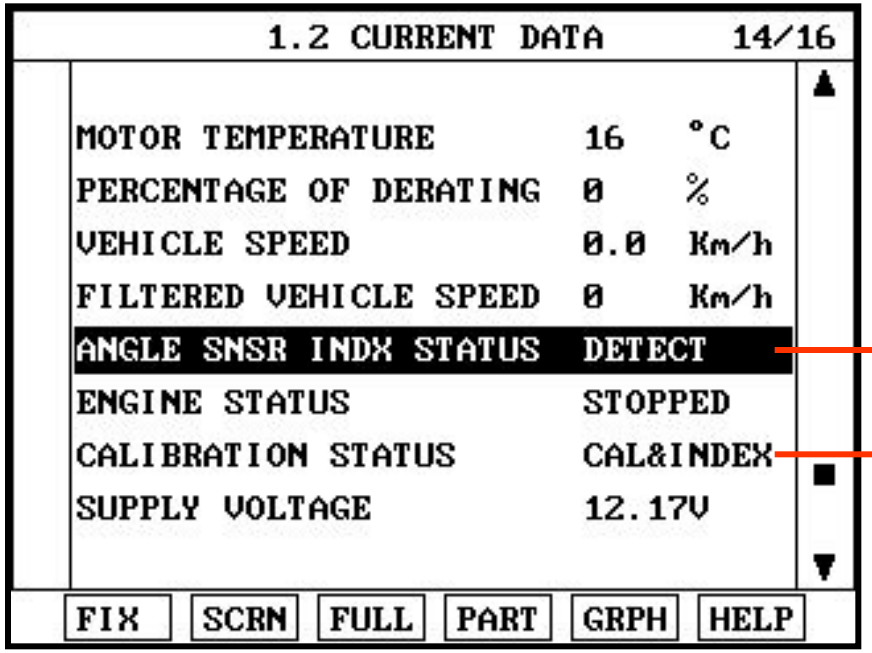


ASP (Absolute Steering Position) calibration

How?

5) Set the front tire and steering wheel on the neutral position (±2°) and press enter key in the scanner. .

6) Press the esc key and move to the current data in order to confirm the calibration status.



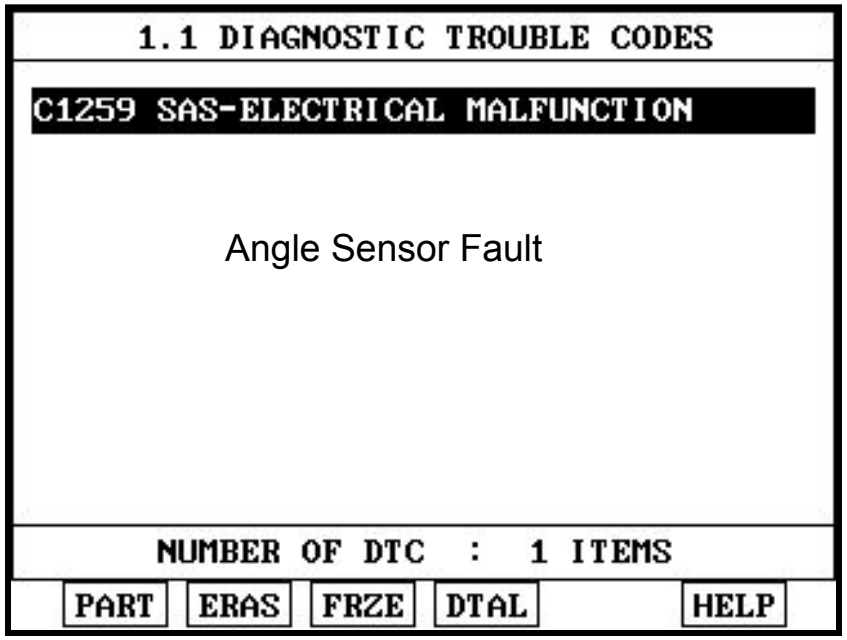
'Detect' or 'Not detect':
Every IG off & on, this value will show 'detect' or 'not detect' depending on the steering wheel position. But it will get 'detect' naturally as the steering wheel is rotated more than 180° while driving. ('not detect' does not mean the calibration fault.)

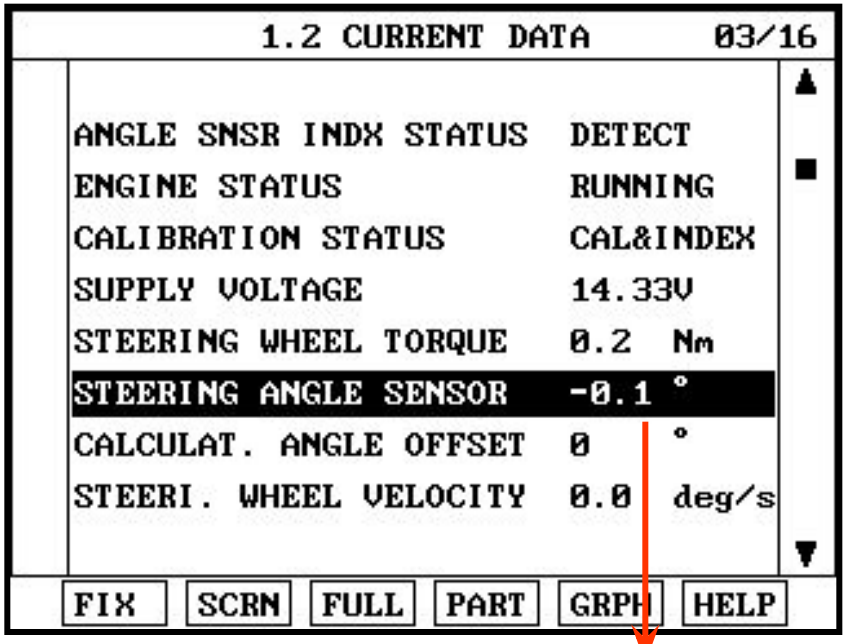
CAL&INDEX: Calibration is OK and Index was found.

ASP (Absolute Steering Position) calibration

How?

7) Finally check the system rotating the steering wheel and also DTC must be checked. If you have following DTC after ASP calibration, it means that the steering wheel neutral position was *excessively* out of specification (step '1') and you have to try again from the first step.





After DTC detection, the angle value will be fixed by zero.

ASP (Absolute Steering Position) calibration

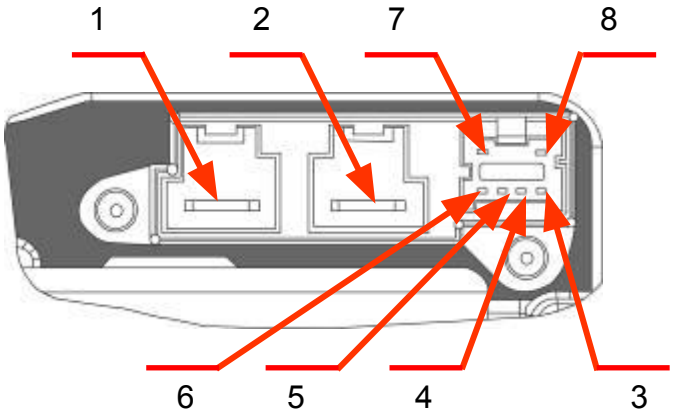
What happen if it is not done?

1) In case of replacement with new part
   - Motor assist is available but warning lamp will blink and active return (on-center control) will stop.
2) In case of replacement with used part
   - Motor assist is available and warning lamp will not turn on. Active return (on-center control) will stop.

What happen if it was done with wrong way? (improper steering wheel center position)

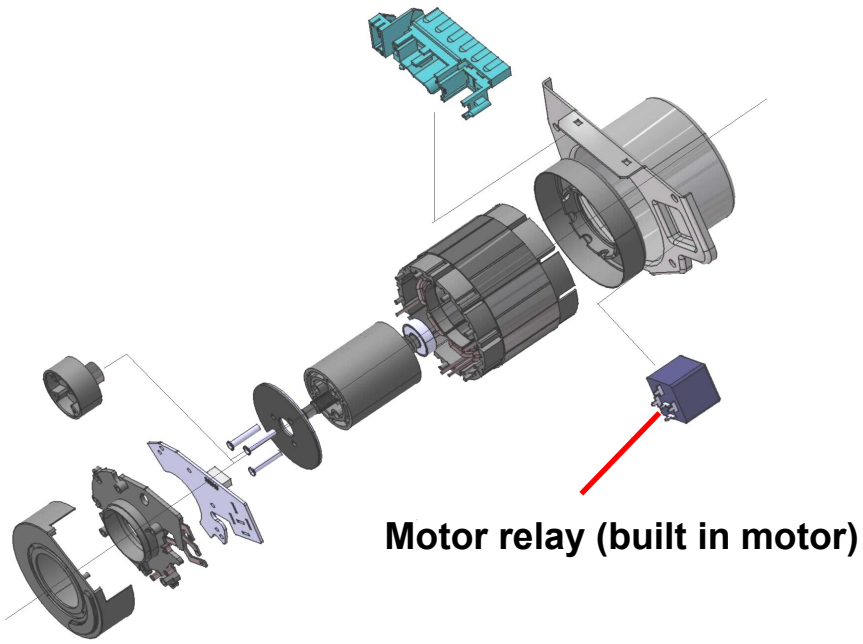
- You may have DTC (C1259) without warning lamp on. However, the motor assist is available but the active return (on-center control) will stop.

Input & Output



Symbol	Description	Pin No.	Reference
Vbatt	Battery(+)	1	
GND	Battery(-)	2	
CAN_BUS	CAN High	3	CAN 2.0B, 500kbps
CAN_BUS	CAN Low	6	CAN 2.0B, 500kbps
CAN_BUS	CAN High	7	Not used
CAN_BUS	CAN Low	4	Not used
IGN	Ignition switch input	5	
NC	Spare	8	Not used

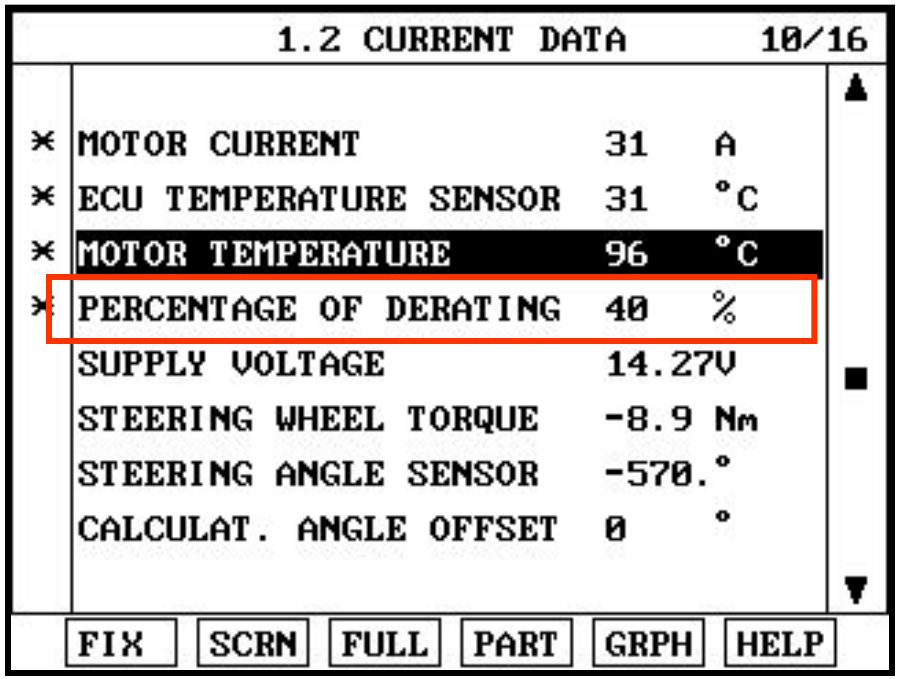
Power supply & Relay



ECM relay (built in ECM)

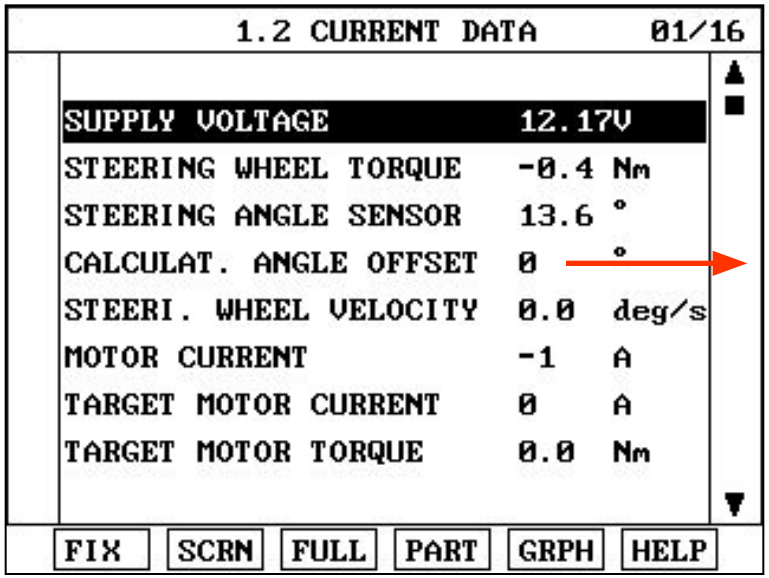
- Every ignition off from engine running, the relay will sound (off) after 2~3 seconds.
- However, if you turn the ignition on before 2~3 seconds, the motor assist is available under the ignition on condition even though the engine is not running.

Overheat Protection (Derating motor current)

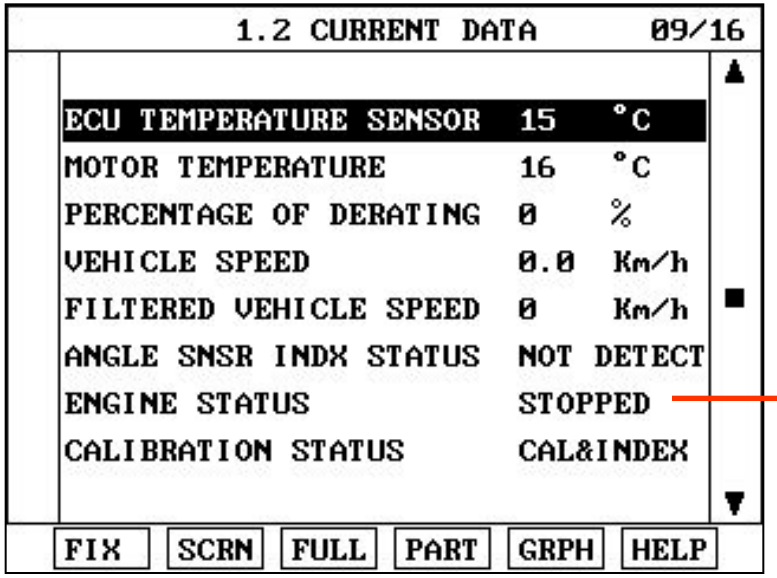


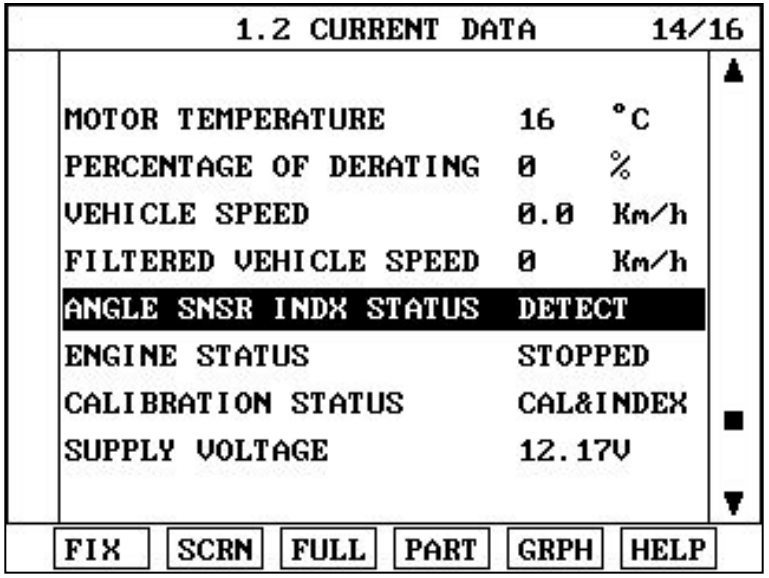
- Before the DTC(C1603) is detected (before the temperature reaches 85°), as soon as the steering torque reaches to maximum value, the motor current will decrease by 40% immediately in order to prevent the overheat in the system in advance.

Understanding of service data



Compensation value

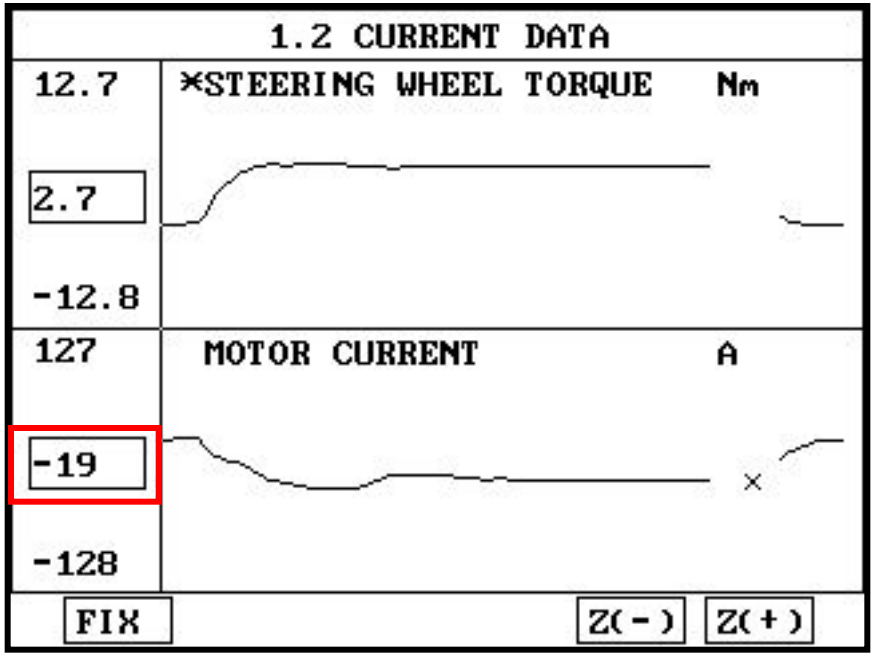




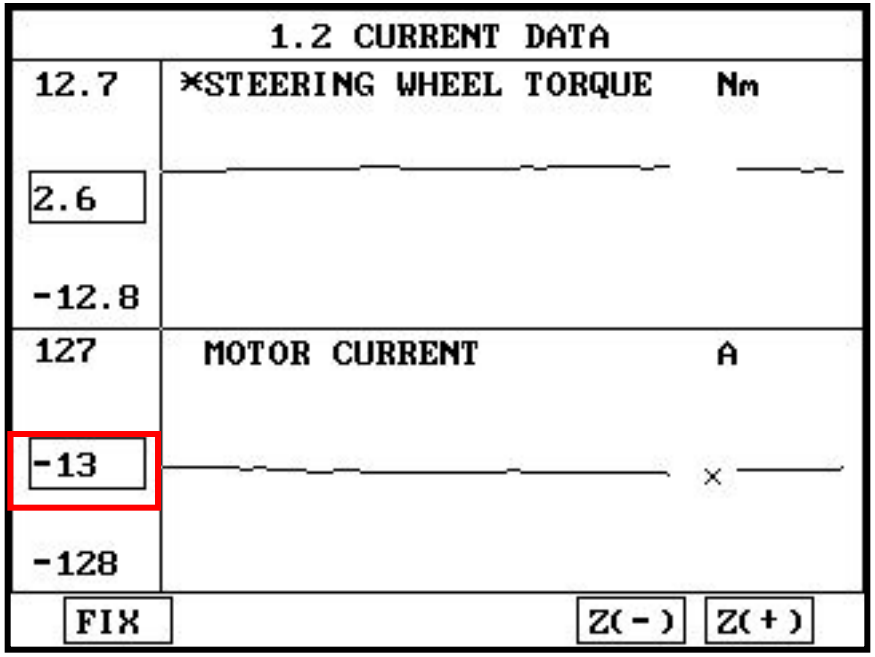
- Stopped
- Cranking
- Running

Failsafe for vehicle speed signal fault

- The vehicle speed signal comes from PG-B in A/T through PCM(or TCM) and CAN.
- Warning lamp OFF, No DTC and Motor ON (Default vehicle speed is 40km/h)



Normal condition



PG-B open circuit

Failsafe for IGN1 signal fault

- IG1 signal is used to detect the engine status (not for the MDPS ECM system power)

Items	While engine running	Before engine start
Failure	Ignition signal open circuit	
Warning lamp	X	O
Motor Assist (while engine run)	O	X
DTC	C1103	C1103

Failsafe for engine speed signal fault

For example, disconnect the CKP sensor while driving and confirm the symptom.

- Warning lamp ON (IG On condition),
- No DTC
- Motor assist ON for 30 seconds and turn off for the safety.

Failsafe for CAN fault

One or two CAN lines (High or Low) are open/short to ground circuit OR

Both CAN lines (High & Low) are shorted circuit each other

1) Warning lamp turns on immediately. (while driving or IG on before engine starting)
2) Motor assists the steering under the ignition on condition. (engine running or not)
3) Motor assists the steering for about 1 minute under the ignition off condition.
   (Because cannot identify the engine is running or not)
4) Relevant DTC for CAN is stored. (C1611 CAN Timeout EMS)
   - Must clear DTC with scanner. (Not erased automatically even though the fault is disappeared)
5) Not possible to communicate with the scanner.

Warning lamp

1) Warning lamp ON + Motor stop: Critical fault
   - Torque sensor fault
   - Motor or Relay fault
   - MDPS ECM internal fault
   - IG signal fault (from next power cycle)

2) Warning lamp ON + Motor assist: Minor fault
   - CAN related faults

3) Warning lamp OFF + Motor assist: Minor fault
   - ASP calibration failure
   - Variant coding fault
   - Vehicle speed signal fault

4) Warning lamp OFF + Motor stop
   - Battery voltage high or low

Varient coding