

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE E – DRIVE LINE

WSC2015\_TP33\_Module E\_RS\_EN

### Report Sheet

Submitted by:

Name:

Heinrich Trienbacher IT

Edson Silva BR

Markku Suonpää FI

Yoshikazu Honda JP

Sulaiman Hashami OM

Chun Hsin Chang TW

Saksit Sooksukon TH





# COMPETITOR INSTRUCTIONS

## MODULE E – DRIVE LINE

EQUIPMENT: VW TRANSMISSION MQ25 6F

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		E	EN

Description	Specification	Actual	OK	Not OK
Input shaft shim thickness				
Output shaft shim thickness				
Gap of synchro-ring for 1st gear				
Gap of synchro-ring for 2nd gear				
Gap of synchro-ring for 3rd gear				
Gap of synchro-ring for 4th gear				
Gap of synchro-ring for 5th gear				
Gap of synchro-ring for 6th gear				
Differential shim thickness				

## Skill name

## Automobile Technology

## Criteria

## Mark

A	Engine Management Systems	20,00
B	Steering Brake Suspension systems	20,00
C	Electrical Systems	20,00
D	Engine Mechanical	20,00
E	Driveline	20,00

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
A1	Health and Safety		<input type="checkbox"/> Seat cover and fender cover placed to the car. <input type="checkbox"/> No Damage to vehicle or equipment <input type="checkbox"/> No unsafe work practices <input type="checkbox"/> Task completed and all tools put away. <input type="checkbox"/> Asked for exhaust filter prior to attempted start of engine	
A2	Power Supply		<input type="checkbox"/> Engine oil checked prior to starting vehicle <input type="checkbox"/> Verifies battery voltage <input type="checkbox"/> Diagnose the smart key fob not detected <input type="checkbox"/> Repaired smart key fob fault <input type="checkbox"/> Diagnose main power supply (Mega 2) fuse 125Amp <input type="checkbox"/> Rectified fault at fuse 125Amp	

A3	Engine Management	<ul style="list-style-type: none"> <li><input type="radio"/> Diagnose - open circuit in Engine Management Main relay (30 - 8)</li> <li><input type="radio"/> Replaced Engine Management PCM Main relay</li> <li><input type="radio"/> Diagnose malfunction inside Starter Button</li> <li><input type="radio"/> Replace Starter Button</li> <li><input type="radio"/> Diagnose Start Button Fuse F18 BCM open circuit</li> <li><input type="radio"/> Requested and Replaced Fuse F18 BCM with correct fuse rating</li> <li><input type="radio"/> Diagnose Fuse F13 BCM (5 A) open circuit</li> <li><input type="radio"/> Requested and Replaced Fuse F13 BCM with correct fuse rating</li> <li><input type="radio"/> Diagnose - open circuit in Starter relay (86 - 85)</li> <li><input type="radio"/> Replaced Starter Relay</li> <li><input type="radio"/> Diagnose - open circuit in Fuel Pump relay (30 - 87)</li> <li><input type="radio"/> Replaced Fuel Pump relay</li> <li><input type="radio"/> Diagnose - Open Circuit in fuel pump fuse F58 20 Amp</li> <li><input type="radio"/> Replaced Fuse F58 with correct rating 30A fuse</li> <li><input type="radio"/> Diagnose Power Train CAN Short Circuit</li> <li><input type="radio"/> Diagnose Open Circuit Brake Pedal Switch</li> <li><input type="radio"/> Replace Brake Pedal Switch</li> <li><input type="radio"/> Diagnosed Fuse F47 BJB Brake Pedal Switch Supply Open Circuit</li> <li><input type="radio"/> Replaced Fuse F47 BJB with correct rating 10A Fuse</li> </ul>
A4	Engine Tuning	<ul style="list-style-type: none"> <li><input type="radio"/> Diagnose Open Circuit Fuse BJB Fuse 11</li> <li><input type="radio"/> Replaced Fuse BJB F11 with correct rating 15A fuse</li> <li><input type="radio"/> Diagnose G110 bolt removed Ignition Coil Ground</li> <li><input type="radio"/> Rectify Ground</li> <li><input type="radio"/> Diagnose engine management sensor circuit supply fault</li> <li><input type="radio"/> Reconnect misplaced sensor multiplugs</li> <li><input type="radio"/> Diagnose (Exhaust) Camshaft Position Sensor 12</li> <li><input type="radio"/> Replace Camshaft Position Sensor 12 wiring harness</li> <li><input type="radio"/> Diagnose Accelerator Pedal Sensor (Open Circuit)</li> <li><input type="radio"/> Replaced Accelerator Pedal Sensor</li> <li><input type="radio"/> Diagnose spark plug cyl.1</li> <li><input type="radio"/> Replaced spark plug cyl.1</li> <li><input type="radio"/> Diagnose ignition coil cylinder 1 (OC pin N)</li> <li><input type="radio"/> Replaced ignition coil cylinder 1</li> <li><input type="radio"/> Diagnose fuel injector open circuit cylinder 1</li> <li><input type="radio"/> Replaced wiring harness/connector for injector cylinder 1</li> <li><input type="radio"/> Engine runs, all DTC's are deleted, the MIL and other malfunctions are cleared</li> <li><input type="radio"/> Fill in the Gas Analyzing measurement for the correct value (CO, HC, O<sub>2</sub>, NOx)</li> </ul>

A5 Oscilloscope

O	Fill in the Gas Analyzing measurement in the right value (CO, CO <sub>2</sub> )	0
J	Perform a relative compression test with the FSA 740	1
		2
		3
O	Correct answer to question 1	
O	Correct answer to question 2	
O	Correct answer to question 1	
O	Correct answer to question 2	
O	Correct answer to question 1	
O	Correct answer to question 1	
O	Correct answer to question 1	
O	Correct answer to question 2	
J	Correct pattern displayed and drawn on report sheet for No.2 Ign	0
		1
		2
		3
J	Correct pattern displayed and drawn on report sheet for Injector 4	0
		1
		2
		3
J	Correct pattern displayed and drawn on report sheet for injector 4	0
		1
		2
		3
J	Correct pattern displayed and drawn on report sheet for injector	0
		1
		2
		3
J	Correct pattern displayed and drawn on the report sheet for Oxyg	0
		1
		2

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
B1	Preparation		<ul style="list-style-type: none"> <li><input type="radio"/> Used hoist and lift locks at all times.</li> <li><input type="radio"/> Used Fender Covers and requests internal covers</li> <li><input type="radio"/> Personal protection used when required</li> <li><input type="radio"/> Take gloves and glasses while working with brakefluid</li> <li><input type="radio"/> Correct use of tools, and no damage</li> <li><input type="radio"/> Clean Workstation during competition</li> <li><input type="radio"/> completed tool boxes after finished task</li> <li><input type="radio"/> the wheel alignment system is prepared for the next task</li> <li><input type="radio"/> fill in the values of torques and draw signal in the report sheet</li> </ul>	3
B2	SUSPENSION		<ul style="list-style-type: none"> <li><input type="radio"/> Lift up the car in the correct way</li> <li><input type="radio"/> remove wiper motor</li> <li><input type="radio"/> remove wheel</li> <li><input type="radio"/> remove water guard plate</li> <li><input type="radio"/> find defective stabilizer bar</li> <li><input type="radio"/> separate speed sensor</li> <li><input type="radio"/> remove and check shock absorber</li> <li><input type="radio"/> remove coil spring</li> <li><input type="radio"/> remove front spring bumper</li> <li><input type="radio"/> install coil spring and bumper</li> <li><input type="radio"/> install complete shock absorber</li> <li><input type="radio"/> tighten the bolts with correct torque</li> <li><input type="radio"/> install new stabilizer bar</li> <li><input type="radio"/> install and check optically the speed sensor left</li> <li><input type="radio"/> find broken speed sensor and replace the sensor left</li> <li><input type="radio"/> install wiper motor</li> <li><input type="radio"/> install water guard plate</li> <li><input type="radio"/> install wheel with correct Torque</li> <li><input type="radio"/> remove brake caliper</li> <li><input type="radio"/> remove brake disc and make matchmarks or check runout</li> </ul>	

B3 BRAKES

- separate tie rod end
- separate lower suspension arm
- separate front drive shaft
- remove front axle assembly
- remove and check lower ball joint
- use correct torque for all nuts and bolts
- Use special tool to separate joint
- remove nut and find missing cotter pin
- remove tie rod ball with special tool
- replace tie rod end tighten with correct torque and cotter pin
- set wheel straight ahead
- secure steering wheel
- remove silencer sheet
- open and check steering intermediate shaft
- separate tie rod ends and with special tool
- separate front stabilizer
- remove the front suspension crossmember (frame)
- replace lower arm right
- install and check the front suspension crossmember (frame)
- install steering intermediate shaft
- install silencer sheet
- use correct torque for all nuts and bolts

B4 WHEEL ALIGNMENT

- disconnect flexible hose
- replace brake caliper with right torque
- bleed the brake system
- fill brake fluid to the right level
- install in the right position and the correct torque
- ask for a new bolt and a gasket
- connect diagnostic tool (no communication with ABS)
- find blown fuse in fuse box passenger room
- use wiring diagram
- find troublecode with diagnostic tool
- make measurement on the speed sensor rear right
- find shortcut on wiring speed sensor rear right and fixed it
- draw signal from scope of fixed sensor in the report sheet
- inspect tires
- measure vehicle height (front 90-95mm / rear 46-53mm )

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
		<input type="radio"/> bounce the car <input type="radio"/> check and set tire pressure to the correct value <input type="radio"/> check the suspension and steering system optically <input type="radio"/> check the wheel bearing gap (only by hand without tools) <input type="radio"/> Align head mounted securely in correct positions <input type="radio"/> Compensates by rotating wheel <input type="radio"/> Brake pedal depressor installed, <input type="radio"/> locking pins removed before turning <input type="radio"/> Identifies improper camber angle on the left rear wheel <input type="radio"/> fix wheel bearing assembly (bring to correct position) <input type="radio"/> Vehicle re-aligned to factory specifications		
C1	Health, safety and Housekeeping		<input type="radio"/> All PPE worn when required <input type="radio"/> Car protection used. Wing, seat and steering wheel covers <input type="radio"/> No damage to vehicle or equipment <input type="radio"/> Restore work area	
C2	General electrical		<input type="radio"/> Obtains reference voltage and ground at battery <input type="radio"/> Using the wiring diagram that are required for the tasks <input type="radio"/> Complets the given drawing for electrical circuit. <input type="radio"/> Identifies fuse SB11(3Amp wrong) blown, Short circuit J285 by sv <input type="radio"/> Out side air temp (Ambient temperature sensor) sensor(G17)(Ba <input type="radio"/> Fuse SB15 broken no supply to J533 Interface (5 amp) (WD 147 <input type="radio"/> SB8 defekt for relay J681(Terminal15 Power Supply-Relais 2) (W	
C3	Door and window functions		<input type="radio"/> Checked the funktion of driverside dorlock, No funktion <input type="radio"/> Found: No function of power windows, passenger door (WD 135/ <input type="radio"/> Checked the funktion of (FR) Window regulator switch in front pa <input type="radio"/> Checked: No funktion of rear windows, child safety constant "ON <input type="radio"/> Centrallocking not working RL door J388 pin T18c/3(br/we) oper	



C4	Lighting System	<ul style="list-style-type: none"> <li><input type="radio"/> Identifies all inoperable external lights (FL- no LowBeam / FR-flas</li> <li><input type="radio"/> Platelight not working , Left number plate light - reversed pins in d</li> <li><input type="radio"/> Inproper function Rear lights, turning, brake and rear light (WD13</li> <li><input type="radio"/> Checks and identifies missing power (to E1 - Head Light switch)</li> <li><input type="radio"/> Locate and repair missing earth for FR headlight unit -Earth point</li> <li><input type="radio"/> RL flasher bulb blown - &gt; replace bulb,</li> <li><input type="radio"/> MX1 - Front left headlight pin 11 disconnected at T14e -(gr/bl)at l</li> </ul>		
C5	Rear Bonnet/Wiper	<ul style="list-style-type: none"> <li><input type="radio"/> Found: No function of rear bonnet lock</li> <li><input type="radio"/> Change two signal wires going in to wiper motor pins 2-3 works c</li> <li><input type="radio"/> Missing fuse SB27 for X contact relay result no power at fuse for</li> </ul>		
C6	Front Bonnet/Wiper	<ul style="list-style-type: none"> <li><input type="radio"/> fuse for front wiper sb22 (WD 134/15) (J400 - Wiper motor contro</li> <li><input type="radio"/> conector at front wiper disconnected -&gt; connect</li> <li><input type="radio"/> front bonnet switch short to ground (WD134/14) (F266 - Front Bo</li> </ul>		
C7	Mesurement Fluke 123	<ul style="list-style-type: none"> <li><input type="radio"/> Measure 1, Rear light function with Oscilloscope fluke 123</li> <li><input type="radio"/> Measure 2, Brake light function with Oscilloscope fluke 123</li> <li><input type="radio"/> Measure 3, Pattern of the can-high signal in the comfort system,</li> <li><input type="radio"/> Measure 4 scope and sketch lin signal</li> </ul>		
C8	Diagnostics Bosch KTS	<ul style="list-style-type: none"> <li><input type="radio"/> Able to retrive information by U31 (OBD) pin 6 and 14 switch pos</li> <li><input type="radio"/> Able to clear fault codes and re sett systems.with KTS</li> </ul>		
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
D1	Preparation	<ul style="list-style-type: none"> <li><input type="radio"/> Organise work station, tools, manuals</li> <li><input type="radio"/> Check engine oil - none in the engine</li> <li><input type="radio"/> Check engine free rotation</li> <li><input type="radio"/> Calibrate measuring equipment - Micrometer</li> </ul>		
D2	Engine Cylinder Leakage Test	<ul style="list-style-type: none"> <li><input type="radio"/> Turned engine to TDC for cylinder under test</li> </ul>		

D3	Engine Dismantling	<ul style="list-style-type: none"> <li><input type="radio"/> Performed test in firing order</li> <li><input type="radio"/> Identified 2 correct faults</li> <li><input type="radio"/> Identified all 3 faults correctly</li>   <li><input type="radio"/> Used 0197-3a to clamp cam before removing caps - W/O damage</li> <li><input type="radio"/> Removed cylinder head &amp; protected the gasket face</li> <li><input type="radio"/> Ensured hydraulic lash adjusters stay in original positions</li> <li><input type="radio"/> Remove exhaust valves from cylinder #1</li> <li><input type="radio"/> Identified &amp; removed #2 piston assembly without damage</li> <li><input type="radio"/> Removed piston rings without damage</li> </ul>
D4	Measurement & Inspection	<ul style="list-style-type: none"> <li><input type="radio"/> Inspected &amp; ensured clean cylinder head surface &amp; free of damage</li> <li><input type="radio"/> Measured warp diagonally (2) &amp; longitudinally (2)</li> <li><input type="radio"/> Measured cylinder head overall height</li> <li><input type="radio"/> Measure intake camshaft lobe height</li> <li><input type="radio"/> Measure exhaust camshaft lobe height</li> <li><input type="radio"/> NOTE: do not remove double bearing #3</li> <li><input type="radio"/> Measure #1 cylinder exhaust valves (2) spring free height</li> <li><input type="radio"/> Measure exhaust valves (2) length</li> <li><input type="radio"/> Measure exhaust valve stem diameters (2)</li> <li><input type="radio"/> Measured piston diameter (correct position) ( +/- 0.01mm)</li> <li><input type="radio"/> Accurate measurement Cylinder Bore ( +/- 0.01mm) Top</li> <li><input type="radio"/> Accurate measurement Cylinder Bore ( +/- 0.01mm) Middle</li> <li><input type="radio"/> Accurate measurement Cylinder Bore ( +/- 0.01mm) Bottom</li> <li><input type="radio"/> Calculated &amp; report bore ovality using available tools</li> <li><input type="radio"/> Calculated &amp; report bore taper using available tools</li> <li><input type="radio"/> Measured or calculated piston to bore clearance (Top)</li> <li><input type="radio"/> Measured top compression ring end gap</li> <li><input type="radio"/> Measure #2 Crankshaft Big End journal diameter ( +/- 0.01mm)</li> <li><input type="radio"/> Use special tool to centre M/B bearings half shell</li> <li><input type="radio"/> Measured crankshaft thrust clearance / end float ( +/- 0.01mm)</li> <li><input type="radio"/> Refitted rings in correct position without damage</li> </ul>
D5	Reassembly	<ul style="list-style-type: none"> <li><input type="radio"/> Lubricate rings &amp; Check free movement prior to refitting</li> <li><input type="radio"/> Refit piston correctly protecting the crankshaft journals first time</li> <li><input type="radio"/> Use special tool to centre B/E bearings &amp; Lube bearings</li> <li><input type="radio"/> Requested new main bearing and B/E cap bolts</li> <li><input type="radio"/> Fitted correctly and torqued Big End cap bolts</li> <li><input type="radio"/> Asked for sealant - sump etc...</li> </ul>

D6	Task Completion	<ul style="list-style-type: none"> <li>O Torqued M/Brg &amp; sump bolts in correct order</li> <li>O Requested new cylinder head gasket &amp; bolts (install old)</li> <li>O Requested Molycote G Rapid Plus E3 (install without)</li> <li>O Torque cylinder head bolts correctly and in order</li> <li>O Torque camshaft cap bolts in correct order</li> <li>O Fit cam caps in correct order &amp; orientation</li> <li>O Requested replacement seals</li> <li>O Refitted cams in correct position first time</li> <li>O Used special tools as listed to retain &amp; position cams</li> <li>O Request replacement seals for inlet cam (2)</li> <li>O Fitted dummy chain tensioner</li> <li>O Request replacement bolts for Cam gears</li> <li>O Repositioned engine to lock position using special tool (pin)</li> <li>O Engine timed correctly</li>   <li>O Rotate the engine 2 full turns to check correct assembly</li> <li>O Engine and test report completed</li> <li>O Used safety glasses appropriately</li> <li>J All tools returned to correct location</li>   <li>J Work area clean &amp; tidy throughout the module</li> </ul>		0 1 2 3  0 1 2 3
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
E1	Workpractice, cleanliness and security	J	General work security (safety)	0 1

			2
			3
		J	0
			1
			2
			3
		J	0
			1
			2
			3
E2	Disassemble the transaxle		
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
E3	Input Shaft Inspection		
		O	
		O	
		O	
		O	
E4	5th and 6th gears and Output Shaft Inspection.		
		O	

E5	Input shaft Shim adjustment	<ul style="list-style-type: none"> <li><input type="radio"/> Check 6th gear synchronizer.</li> <li><input type="radio"/> Check 5th gear synchronizer.</li> <li><input type="radio"/> Wave spring washer and ask for a new synchronizer 5th gear</li> <li><input type="radio"/> Install locking pieces and springs.</li> <li><input type="radio"/> Check 1st and 2nd gear synchronizer rings for wear - press and f</li> <li><input type="radio"/> Check 3rd and 4th gear synchronizer rings for wear - press and fe</li> <li><input type="radio"/> Bearing support damaged</li> <li><input type="radio"/> Locking collar with synchro-hub for 1st and 2nd gears in wrong p</li> <li><input type="radio"/> Needle bearing for 2nd gear damaged</li> <li><input type="radio"/> Reassemble output shaft correctly.</li> <li><input type="radio"/> Ring/tapered-roller bearing in the clutch housing with a adjust wa</li> </ul>
E6	Output shim adjustment	<ul style="list-style-type: none"> <li><input type="radio"/> Install tapered roller bearing outer race without shim into gearbox</li> <li><input type="radio"/> Rotate input shaft and set dial gauge preload.</li> <li><input type="radio"/> Find value thickness of shim in the table and insert shim of deter</li> <li><input type="radio"/> Bearing play should be 0,01 - 0,09mm.</li> </ul>
E7	Differential Shim adjustment	<ul style="list-style-type: none"> <li><input type="radio"/> Ring/tapered-roller bearing in the clutch housing with a adjust wa</li> <li><input type="radio"/> Insert dial gauge. Output shaft up and down,write down the clear</li> <li><input type="radio"/> Output shaft up and down,write down the clearance on the dial ga</li> <li><input type="radio"/> Find value in the table. Measure shim with micrometer.</li> </ul>
E8	Reassemble	<ul style="list-style-type: none"> <li><input type="radio"/> Pull out seal and sleeve of differential.</li> <li><input type="radio"/> Change the bearings and racers from the clutch housing side.</li> <li><input type="radio"/> Position the gearbox housing and set the dial gauge. Move differ</li> <li><input type="radio"/> Find value in the table.Check shim with micrometer</li> <li><input type="radio"/> Insert the differential, input and output shaft</li> <li><input type="radio"/> Install the reverse gear shift fork and selector forks</li> <li><input type="radio"/> Fix the gearbox housing with all bolts, fix the pivot pins and rever</li> <li><input type="radio"/> Install both flange shafts with pressure springs.</li> <li><input type="radio"/> Use the screw thread M10X1,00 to clean the threads in the shaft</li> <li><input type="radio"/> Install 5th and 6th gears and fix with bolts.</li> <li><input type="radio"/> Adjusted the clearance 5th and 6th speed glove.</li> <li><input type="radio"/> Install cover of the 5th and 6th speed.</li> <li><input type="radio"/> Ball pin damaged</li> <li><input type="radio"/> Fix all bolts and nuts with correct torque and angle</li> <li><input type="radio"/> Check functionality of gearbox.</li> </ul>



Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
	Yes / No	1	0,10
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	2	0,20
Instrument displays fault present	Yes / No	4	0,30
Requested new key fob batteries, Expert to provide	Yes / No	3	0,20
Open circuit Power Supply F2	Yes / No	4	0,30
	Yes / No	3	0,20

Criterion  
A

Total  
Mark

20,00

[PCM Main Relay] - R9 BJB	Yes / No	4	0,40
	Yes / No	4	0,20
Open Circuit (pin 1-4) and (pin 6 to 3 Ground)	Yes / No	4	0,50
	Yes / No	6	0,20
	Yes / No	4	0,30
	Yes / No	2	0,20
Steering Column, Dash Panel, Data Link Connector	Yes / No	4	0,30
	Yes / No	2	0,20
	Yes / No	4	0,40
	Yes / No	5	0,20
	Yes / No	4	0,50
	Yes / No	3	0,20
	Yes / No	4	0,40
	Yes / No	3	0,20
Expert to advise no repair required, Expert to reset!	Yes / No	3	0,50
Open circuit between pins (1 and 4) and (2 and 3)	Yes / No	4	0,50
	Yes / No	3	0,30
	Yes / No	4	0,30
	Yes / No	3	0,20
Ignition Coil Supply Pin 3 on ignition coil	Yes / No	4	0,30
	Yes / No	3	0,30
	Yes / No	4	0,50
Expert to advise cover intake system prior to repair	Yes / No	3	0,30
Multiplug for fuel pressure sensor and map sensor swapped	Yes / No	4	0,80
	Yes / No	6	0,20
Pin 3 broken inside wiring harness	Yes / No	4	0,40
	Yes / No	5	0,30
Inside pedal module between Pin 1 and Pin 5	Yes / No	4	0,50
	Yes / No	6	0,30
	Yes / No	4	0,40
Applied torque to 12nm	Yes / No	5	0,20
	Yes / No	4	0,40
Asked for dielectric grease	Yes / No	5	0,30
	Yes / No	4	0,50
	Yes / No	6	0,30
	Yes / No	6	1,00
	Yes / No	2	0,30



	Yes / No	2	0,30
		3	0,50
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values			
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
		2	0,40
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values		2	0,40
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values		2	0,40
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values		2	0,40
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values		2	0,40

Clear drawn scope traces with both X-Y scales values

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
	Y/N	1	0,10
	Y/N	1	0,20
work with machines, compressed air	Y/N	1	0,20
always when working with brakefluid	Y/N	1	0,20
	Y/N	1	0,20
No tools, cleaning rags lay on the car when not in use	Y/N	1	0,10
they must be looked the same way as task start	Y/N	1	0,10
the wheel aligner is correct installed and ready to use	Y/N	1	0,10
square wave/ This order 50Nm/24Nm/58Nm/39Nm	Y/N	2	0,20
use placemets under car on the right position	Y/N	1	0,20
	Y/N	5	0,20
	Y/N	5	0,20
	Y/N	5	0,20
dust cover is missing	Y/N	4	0,30
	Y/N	3	0,20
minimum press shock absorber 4 times	Y/N	4	0,30
	Y/N	4	0,30
	Y/N	4	0,30
fixe spring insulator and correct mounted coil spring	Y/N	1	0,20
	Y/N	1	0,40
39Nm top/240Nm main bolts low side/47Nm central	Y/N	5	0,40
competitor has to ask for a new stabilizer bar, 74Nm	Y/N	4	0,20
	Y/N	4	0,30
29Nm	Y/N	4	0,30
	Y/N	5	0,20
	Y/N	5	0,20
102.9Nm	Y/N	5	0,20
30Nm	Y/N	5	0,10
don't make marks he has to measure the runout	Y/N	4	0,40

Criterion B Total Mark 20,00

	Y/N	5	0,20
	Y/N	5	0,20
	Y/N	1	0,20
	Y/N	5	0,20
103Nm center / 89Nm one bolt and two nuts	Y/N	4	0,20
press brake f. tighten center nut driveshaft 216Nm	Y/N	4	0,40
	Y/N	1	0,20
the competitor has to ask for a cotter pin	Y/N	4	0,40
	Y/N	5	0,20
49Nm	Y/N	4	0,20
	Y/N	5	0,10
	Y/N	1	0,20
	Y/N	5	0,20
	Y/N	1	0,20
	Y/N	5	0,20
	Y/N	1	0,20
	Y/N	5	0,30
137Nm Bolt A / 126Nm Bolt B	Y/N	5	0,30
	Y/N	4	0,40
35Nm	Y/N	5	0,20
	Y/N	5	0,20
see on printed picture	Y/N	5	0,30
	Y/N	5	0,20
30Nm for cyl. assembly/106.8Nm cylinder mounting	Y/N	5	0,40
	Y/N	1	0,40
	Y/N	5	0,30
15.2Nm to line /29Nm shock absorber and cylinder	Y/N	5	0,40
	Y/N	4	0,30
	Y/N	6	0,20
10A inside fuse box ECU IG No2	Y/N	3	0,40
	Y/N	3	0,40
	Y/N	6	0,20
	Y/N	3	0,40
shortcut in the connector of ABS Sensor rear right	Y/N	3	0,40
	Y/N	2	0,40
	Y/N	4	0,30
	Y/N	4	0,20

210-220kPa,30-32psi,2.2 bar	Y/N	5	0,10
	Y/N	4	0,20
	Y/N	4	0,40
	Y/N	4	0,30
	Y/N	4	0,40
	Y/N	4	0,20
	Y/N	5	0,30
plates on car lift	Y/N	5	0,20
there are washers inside bearing assesmbly	Y/N	4	0,40
remove washers	Y/N	5	0,50
all values are green except. measurement on 20deg	Y/N	4	0,40

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,30
	Yes / No	1	0,30
	Yes / No	3	0,30
	Yes / No	1	1,00
	Yes / No	2	1,40
	Yes / No	3	1,50
	Yes / No	3	1,00
	Yes / No	3	0,30
	Yes / No	3	0,40
Checked wiring at wirediagram(WD135/5) Module J386 - Found: T20a pin, No yellow wire in pin nr 13	Yes / No	3	0,60
Missing main ground signal to the doors, measuring with r Found: Locate the ground 43, missing cable, RHS floor (E	Yes / No	3	0,30
Found: Switch E107, wire brown/green T4am, moved from	Yes / No	3	0,40
Checked the wiring diagram: J386 pin T32a/14(vi/gn): and	Yes / No	3	0,60
	Yes / No	3	0,60

Criterion C      Total Mark      20,00

	Yes / No	2	1,00
	Yes / No	3	0,40
	Yes / No	3	0,40
	Yes / No	3	0,40
	Yes / No	3	0,30
	Yes / No	3	0,20
	Yes / No	3	0,50
Manage to open the bonnet, using the manuell safety door	Yes / No	3	0,50
Found: Powersupply missing in junction T17L, pin nr 9 (red)	Yes / No	3	0,50
Fault x contact relay J59 Terminal2 disconnected(,SC 29 (	Yes / No	3	1,00
	Yes / No	3	0,30
	Yes / No	3	0,10
	Yes / No	3	0,50
	Yes / No	6	0,50
	Yes / No	6	0,50
	Yes / No	3	0,50
	Yes / No	6	0,50
ground pins 4 and 5 move to 12and 13 (T16 - 16-pin conn	Yes / No	3	1,00
	Yes / No	3	1,50
Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
		1	0,30
		4	0,10
		4	0,20
		1	0,50
		3	0,20

Criterion D    Total Mark    20,00

3	0,30
2	0,40
4	0,40
6	0,50
1	0,30
1	0,20
5	0,50
5	0,30
5	0,20
1	0,20
1	0,30
1	0,30
1	0,30
1	0,30
1	0,30
1	0,30
1	0,30
1	0,30
1	0,50
1	0,50
1	0,50
1	0,50
4	0,50
4	0,50
4	0,40
1	0,50
1	0,30
6	0,30
1	0,50
5	0,20
5	0,20
5	0,20
6	0,30
2	0,20
5	0,30
2	0,20

		5	0,30
		2	0,40
		2	0,20
		1	0,30
		1	0,30
		1	0,30
		2	0,20
		5	0,20
		5	0,40
		2	0,20
		6	0,20
		2	0,20
		5	0,20
		1	0,50
		1	0,50
		2	0,60
		1	0,20
		1	0,60
Not all tools return Specialty tools only stored and cleaned correctly Toolbox tools only stored and cleaned correctly Specialty and toolbox tools stored and cleaned correctly			
Work area messy Below industry standard: spills not cleaned up; tools left on Maintain industry standard: Spills cleaned up at the end of Exceed industry standard: Spills cleaned up immediately;		1	0,60
Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
The competitor dosnt works safety. The competitor works safety		1	1,00

Criterion E Total Mark 20,00

The competitor works very safety.(he takes also the points			
The competitor works excellent safety (he takes also the p			
		3	1,00
Requested the expert all the parts to be replaced reported			
Requested the expert all the parts to be replaced reported			
Requested the expert all the parts to be replaced reported			
Requested the expert all the parts to be replaced reported		1	1,00
Special tools, Universal and measuring instruments were c			
Cleaned and organized the measuring instruments on the			
Cleaned and organized on the workbench special tools an			
He wiped his universal tools and put in the cart tools, clear			
		4	0,40
Alternately loosened all bolts and removed.		5	0,10
Ask for a new magnet, mount the new one.X	Yes / No	2	0,20
Following the technical literature orientations Erwin.	Yes / No	5	0,15
Engaging the 5th gear and 1st gear.	Yes / No	5	0,15
Using the appropriate tool.	Yes / No	5	0,20
Following the technical literature orientations Erwin.	Yes / No	5	0,20
In the neutral position.	Yes / No	5	0,20
Ask for new and change the selector shaft.X		2	0,30
Ask for new and change.X	Yes / No	2	0,30
Ask for a new tapered ring and change.X		2	0,30
Do not removed the bolts for output shaft bearing support.	Yes / No	5	0,22
Ask for new pivot pin and mount.X	Yes / No	2	0,22
Tell the expert and mount the wrong position.XX		2	0,30
Following the technical literature orientations Erwin.	Yes / No	5	0,25
The housing of selector segmentes is bigger. Need remov		2	0,30
Following the technical literature orientations Erwin.	Yes / No	5	0,15
Ask for new, but mount without.XX		2	0,30
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.		5	0,50
Ask for a new gear, but remount the fault gear wheel.XX		2	0,30
Ask for a new, but remount the fault part.XX		2	0,30
Following the technical literature orientations Erwin.		5	0,42
Following the technical literature orientations Erwin.	Yes / No	4	0,22



Measure gap with a feeler gauge(1-1.7; 0,5mm)	1-1,7; 0,5mm, y/n	4	0,25
Measure gap with a feeler gauge(1-1.7; 0,5mm)	1-1,7; 0,5mm, y/n	4	0,25
Ask for a new, but remount without the part and old synch		2	0,20
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.		1	0,50
Following the technical literature orientations Erwin.	Yes / No	4	0,50
Ask for a new, but remount the old.XX		2	0,20
Tell to expert the wrong position, but mount wrong.XX		2	0,30
Ask for a new, but mount the old part.XX		2	0,30
Following the technical literature orientations Erwin.	Yes / No	1	0,60
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,25
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,40
Following the technical literature orientations Erwin.	0,01 - 0,09mm. y/n	4	0,40
Following the technical literature orientations Erwin.	0,65mm. y/n	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,40
Following the technical literature orientations Erwin.	Yes / No	1	0,25
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,40
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	1	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	off less than 0.20 r	4	0,20
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Ask for a new part and mount new.X		4	0,20
Following the technical literature orientations Erwin.		1	1,00
Following the technical literature orientations Erwin.	Yes / No	4	0,42



Competition	Total Mark	100,00
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# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE A – ENGINE MANAGEMENT SYSTEMS

WSC2015\_TP33\_Module A\_CI\_EN

Submitted by:

Name:

John Dawson UK

Lee De Sousa ZA

Michael Elder US

Marcel Frick LI

Carsten Garbers DK

Min Woo Lee KR

Luis Inostroza CL

Antonio Gonzalez





# COMPETITOR INSTRUCTIONS

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		A	EN

### INSTRUCTIONS

Criteria A1 and A2 must be completed in order shown below. A3 and A4 can be completed in any order. Any identified faults are to be reported to the Expert. The expert will advise the correct repair action to be taken by the competitor.

ENGLISH	TRANSLATION
<p><b>A1.</b> The engine will not rotate. Make all necessary repairs that allows the engine to rotate</p> <p>The scan tool cannot be used to perform this part of your test</p> <p><b>Note:</b> You have <b>80</b> minutes to complete this part of the Module. If you fail to get the engine rotating you will be sent to the competitors room for a imposed <b>ten</b> minute penalty.</p> <p>The Experts will rectify the faults, after <b>Ten</b> minutes the competitor will return to begin work on <b>A2.</b> T</p> <p>The competitor will be awarded marks for any faults found in <b>A1.</b></p>	



<b>A2.</b>	<p>The engine will not run, make all the necessary repairs to enable the engine to run without any faults. All diagnostic equipment is available</p> <p><b>Note:</b> You have <b>60</b> minutes to complete Criteria <b>A2</b>. If you fail to get the engine running correctly with no faults present you will be sent to the competitors room for a imposed <b>ten</b> minute penalty.</p> <p>The Experts will rectify the faults, after <b>ten</b> minutes the competitor will return to begin work on <b>Criteria A3 and A4</b>. The competitor will be awarded marks for any faults found in <b>A2</b>.</p>	
<b>A3.</b>	Complete all requirements on .A3 report sheet	
<b>A4.</b>	Complete all requirements on .A4 report sheet	

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE A – ENGINE MANAGEMENT SYSTEMS

WSC2015\_TP33\_Module A\_RS\_EN

### Report Sheet

Submitted by:

Name:

John Dawson UK

Lee De Sousa ZA

Michael Elder US

Marcel Frick LI

Carsten Garbers DK

Min Woo Lee KR

Luis Inostroza CL

Antonio González ES





# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		A	EN

ENGLISH	TRANSLATION
<p>A3 Using the Oscilloscope provided, Perform a Relative Cylinder Compression test with Injector Synchronisation.</p> <p>Draw the 'scope trace' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Trace Here Below:</u></p> <div style="border: 1px solid black; width: 100%; height: 300px; margin-top: 10px;"></div>	



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH		TRANSLATION
A3	Using the Scangas meter provided, analyse the exhaust emissions from the test vehicle under the following condition. i) Engine Idle Speed ii) Fast Idle Cruise Speed (2000 RPM).	
<u>Record the results in the table below:</u>		
<b>Emission Gas</b>	<b>i. Engine Idle Speed</b>	<b>ii. Engine Cruise Speed</b>
<b>C0</b>		
<b>HC</b>		
<b>C02</b>		
<b>O2</b>		
<b>Lambda</b>		





ENGLISH		TRANSLATION
A4	<p>1. Using the Oscilloscope provided, display <b>No.2</b> Ignition Coil <b>Command Signal</b> and <b>Primary Current</b> 'Scope Trace' at Idle.</p> <p>Draw the 'scope traces' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Scope traces here below:</u></p> <div style="border: 1px solid black; height: 300px; width: 100%;"></div>		
<p><b>Question: Show on the scope traces, using arrows and letters, the information from Q1 – Q2 below:</b></p> <p>Q1, <b>A</b> = Primary Ignition Dwell Time</p> <p>Q2, <b>B</b> = Primary Current Saturation</p>		



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

	ENGLISH	TRANSLATION
A4	<p>2. Using the Oscilloscope provided, display <b>No.4 Fuel Injector Current</b> and <b>Voltage</b> 'Scope Trace' at Idle.</p> <p>Draw the 'scope traces' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Scope traces here below:</u></p>		
<p><b>Question: Show on the scope traces, using arrows and letters, the information from Q1 – Q2 below:</b></p>		
<p>Q1, <b>A</b> = Injector Holding Current</p>		
<p>Q2, <b>B</b> = Injector Voltage Disipation</p>		



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH	TRANSLATION
A4	<p>3. Using the Oscilloscope provided, display <b>No.4 Fuel Injector Current</b> and <b>Voltage</b> 'Scope Trace' at <b>2000rpm</b>.</p> <p>Draw the 'scope traces' below: (Include time, voltage and current scales).</p>
<p><u>Draw the Scope traces here below:</u></p> <div style="border: 1px solid black; height: 350px; width: 100%; margin: 10px 0;"></div> <p>Compare to the test A4.2 did the Injector on Time (Circle your answer below)</p> <ol style="list-style-type: none"> <li>1. Increase</li> <li>2. Decrease</li> </ol>	



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH		TRANSLATION
A4	<p>4. Using the Oscilloscope provided, display <b>No.4 Fuel Injector Current</b> and <b>Voltage</b> 'Scope Trace' at Wide Open Throttle.</p> <p>Draw the 'scope traces' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Scope traces here below:</u></p> <div style="border: 1px solid black; height: 300px; width: 100%;"></div>		
<p>What caused the injector On Time change during this test? (Circle your answer below)</p> <ol style="list-style-type: none"><li>1. The engine load was greater</li><li>2. Increased injection frequency</li></ol>		



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH		TRANSLATION
A4	<p>5. Using the Oscilloscope provided, display a single Pre Catalyst Wideband Oxygen Sensor Output Voltage 'Scope Trace' at <b>Fast Idle Speed (2000rpm)</b>, <b>Idle</b> and Then <b>Wide Open Throttle</b> and <b>back to Idle</b>.</p> <p>Draw the 'scope trace' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Scope trace here below:</u></p> <div style="border: 1px solid black; height: 200px; width: 100%;"></div>		
<p><b>Question: Show on the scope trace, using arrows and letters, the information from Q1 – Q2 below:</b></p> <p>Q1, <b>A</b> = Wide Open Throttle (<b>Rich Mixture</b>)</p> <p>Q2, <b>B</b> = Deceleration/Overrun (<b>Lean Mixture</b>)</p>		

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE B – STEERING BRAKE SUSPENSION SYSTEMS

WSC2015\_TP33\_Module B\_CI\_EN

Submitted by:

Name:

Eduardo Fonseca PT  
Wolfgang Kammerer AT  
Philippe Kever BE  
Pedro Iván Pérez Gayón CO  
Reza Varmarzyar IR  
Taoufik Zirari MA  
Hamad Ali Aljufairi BH  
Andrey Zhigulskiy RU





# COMPETITOR INSTRUCTIONS

## MODULE B – STEERING BRAKE SUSPENSION SYSTEMS

EQUIPMENT: TOYOTA COROLLA

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		B	EN

### INSTRUCTIONS

**B4 Must be performed last**

	ENGLISH	TRANSLATION
B1	Complete the task according to industry standards	
B2	Replace shock absorber front left Replace lower ball joint front left Replace tie rod end front left Replace lower arm front right	
B3	Replace front left brake calliper Replace flexible brake hose front left Check and repair the ABS	
B4	Perform a 4 wheel alignment according to manufactures specifications Print out the final report sheet	



# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE B – STEERING BRAKE SUSPENSION SYSTEMS

WSC2015\_TP33\_Module B\_RS\_EN

### Report Sheet

Submitted by:

Name:

Eduardo Fonseca PT  
Wolfgang Kammerer AT  
Philippe Kever BE  
Pedro Iván Pérez Gayón CO  
Reza Varmarzyar IR  
Taoufik Zirari MA  
Hamad Ali Aljufairi BH  
Andrey Zhigulskiy RU





# COMPETITOR INSTRUCTIONS

## MODULE B – STEERING BRAKE SUSPENSION SYSTEM

EQUIPMENT: TOYOTA COROLLA

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		B	EN

ENGLISH	TRANSLATION
---------	-------------

Draw the signal with correct values in the X / Y coordinates from the wheel speed sensor left front you measured with the scopemeter approximately 10Rpm:


Write down the correct torque for following parts:

Steering wheel:

Front stabilizer bar:

Steering link assembly:

Front transport hook:

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE C – ELECTRICAL AND ELECTRONIC SYSTEMS

WSC2015\_TP33\_Module C\_CI\_EN

### Submitted by:

Anthony Hoey IE  
Jan Börstell SE  
Jack Murray NZ  
Tik Kee Chin HK  
Amogh Dixit IN  
Vidar Strande NO  
Cheah Wing Yew MY  
Rudolf Angerer DE  
John Francis AU





# COMPETITOR INSTRUCTIONS

## MODULE C – ELECTRICAL AND ELECTRONIC SYSTEMS

EQUIPMENT: VW TIGUAN

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		C	EN

### INSTRUCTIONS

C2 has to be done before moving to next task, competitor can shift between C3-C6 as many times he/she likes. When going to C7 no return to tasks C3-C6 is allowed!

	ENGLISH	TRANSLATION
C1	Complete task according to industry standards	
C2	<ul style="list-style-type: none"><li>Complete the wiring diagrams so that the correct function are achieved and meet industrial standards. Maximum time 30min</li></ul>	
C3	<ul style="list-style-type: none"><li>Check function of all gauges-instruments. Advise expert of faults before repair.</li></ul>	
C4	<ul style="list-style-type: none"><li>Check all external lights on the car, advise expert before repairing faults. Fill out report sheet, with the correct values</li></ul>	



C5	<ul style="list-style-type: none"><li>• Check all door operations, advice expert before repair of faults. Perform a measurement on CAN-high comfort system, freeze screen on tool when you are satisfied and show expert before moving on.</li></ul>	
C6	<ul style="list-style-type: none"><li>• Check complete wiper functions, advise expert before repair of faults. Perform a measurement on LIN signal (wiper system, freeze screen on tool when you are satisfied and show expert before moving on.</li></ul>	
C7	<ul style="list-style-type: none"><li>• Check fault codes with diagnostic tool, reset fault codes and inform expert of result.</li></ul>	

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE C – ELECTRICAL AND ELECTRONIC SYSTEMS

WSC2015\_TP33\_Module C\_RS\_EN

### Report Sheet

Submitted by:

Name:

Ross Ansell IE  
Jan Börstell SE  
Jack Murray NZ  
Tik Kee Chin HK  
Amogh Dixit IN  
Vidar Strande NO  
Cheah Wing Yew MY  
Rudolf Angerer DE  
John Francis AU





# COMPETITOR INSTRUCTIONS

## MODULE C – ELECTRICAL AND ELECTRONIC SYSTEMS

EQUIPMENT: VW TIGUAN

### TIME ALLOWED




Module duration 3 Hours

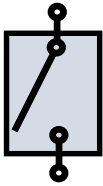
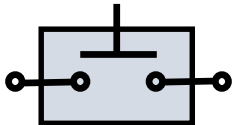
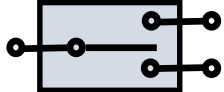
COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		C	EN

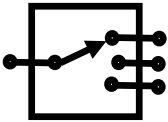
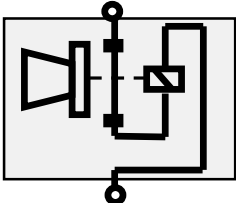
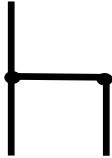


## DIN Circuit Symbols

C2

					
<b>A</b>	<b>Motor (1.5kW)</b>	<b>B</b>	<b>Battery</b>	<b>C</b>	<b>Fuse</b>

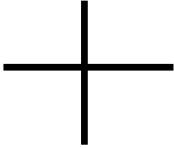
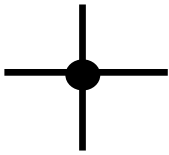

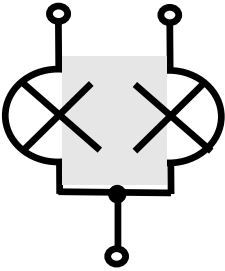
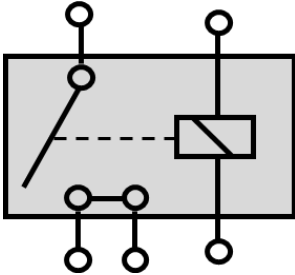
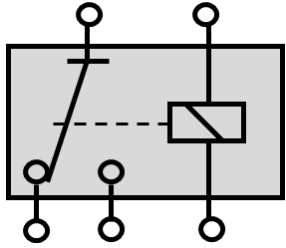
					
<b>D</b>	<b>On / Off switch</b>	<b>E</b>	<b>Momentary Switch</b>	<b>F</b>	<b>Momentary Changeover Switch</b>

					
<b>G</b>	<b>Ignition Switch</b>	<b>H</b>	<b>Horn</b>	<b>J</b>	<b>Wire Junction in harness</b>





## C2

					
<b>K</b>	<b>Wires Crossing</b>	<b>L</b>	<b>Wires Joined</b>	<b>M</b>	<b>Globe</b>
					
<b>N</b>	<b>Double Globe</b>	<b>P</b>	<b>Relay</b>	<b>Q</b>	<b>Relay</b>



Draw the following 3 circuits using the supplied DIN symbols and drawing materials.  
Maximum time permitted 30 minutes.

Identify relay standard pin numbers [30,85,86,87,87a] and fuse ratings.

Marks will be awarded for neatness, correct layout, labelling component values and circuit function.

1/ **Stop light circuit** including:

Symbol Letter	Quantity
B	1
C [10A]	1
E	1
G	1
M	3
N	2

2/ Switched earth **Horn circuit** including:

Symbol Letter	Quantity
B	1
C [5A & 10A]	2
E	1
G	1
H	2
P	1

3/ **Power window circuit** including:

Clearly mark the up [1] and down [2] positions on the switch/es and the fuse ratings.

Calculate the minimum standard rated fuse for the electric motor **A** and label the fuses

Symbol Letter	Quantity
A	1
B	1
C [10A & ?A]	2
F	1
Q	2



PWM rear light signal

**C4**


PWM Brake light signal (RH):




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# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE D – ENGINE MECHANICAL

WSC2015\_TP33\_Module D\_CI\_EN

Submitted by:

Name:

Qiyi Guo CN

Quoc Huy VN

Jean-Luc Marcilly FR

Naser Muhaisen AE

Martin Restoule CA

Ridwan Ridwan ID

Victor de Roy van Zuydewijn NL





# COMPETITOR INSTRUCTIONS

## MODULE D – ENGINE MECHANICAL

EQUIPMENT: PSA 1.6 L 16 VALVE DIRECT INJECTION TURBOCHARGED

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		D	EN

### INSTRUCTIONS

All work to be completed in the order below

	ENGLISH	TRANSLATION
D1	<ul style="list-style-type: none"><li>Perform cylinder leakage test on all cylinders and record results</li></ul>	
D2	<ul style="list-style-type: none"><li>Dismantle engine</li></ul>	
D3	<ul style="list-style-type: none"><li>Perform measurements on report sheets</li></ul>	
D4	<ul style="list-style-type: none"><li>Determine serviceability of components</li></ul>	
D5	<ul style="list-style-type: none"><li>Reassemble engine</li></ul>	
D6	<ul style="list-style-type: none"><li>Perform all work according to industry standards</li></ul>	

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE D – ENGINE MECHANICAL

WSC2015\_TP33\_Module D\_RS\_EN

### Report Sheet

Submitted by:

Name:

Qiyi Guo CN

Quoc Huy VN

Jean-Luc Marcilly FR

Naser Muhaisen AE

Martin Restoule CA

Ridwan Ridwan ID

Victor de Roy van Zuydewijn NL





# REPORT SHEET

## MODULE D – ENGINE MECHANICAL

EQUIPMENT: PSA 1.6 L 16 VALVE DIRECT INJECTION TURBOCHARGED

### TIME ALLOWED

Module duration      3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		D	EN

### Engine Identification

Engine Family	PSA 1.6 TGDI EP6CDTM [5FE]
Capacity	1598cc

### Cylinder Leakage Test

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
Enter the leakage per cylinder in the spaces provided			
%	%	%	%
Circle the appropriate selection below			
PASS / FAIL	PASS / FAIL	PASS / FAIL	PASS / FAIL
Enter the leak location in the spaces provided			
Leak Location	Leak Location	Leak Location	Leak Location

Report diagnosis based on readings





Cylinder Head		
	Measured	Specification
Overall Height		
Surface Warp / Bend		

Serviceable **YES**  **NO**

Camshaft		
	Measured	Specification
Cyl 1 Exhaust lobe Height		
Cyl 1 Intake lobe Height		

Serviceable **YES**  **NO**

Valves, Guides & Springs		
Valve	Length	Stem Diameter
Cyl 1 - Exhaust 1		
Cyl 1 - Exhaust 2		
Valve Spring	Free Length	
Cyl 1 - Exhaust 1		
Cyl 1 - Exhaust 2		

Serviceable **YES**  **NO**

## Cylinder Block



	Measured	Specification
Surface Warp / Bend		

Serviceable **YES**  **NO**

### Cylinder Bore

Cylinder Taper & Ovality						
Cylinder	Specification	Measurement (A1 across thrust)				Ovality
2	Ovality	A1 Top		A2		
		B1 Middle		B2		
		C1 Bottom		C2		
	Taper	A-C				

Serviceable **YES**  **NO**

Piston		
Piston #	Spec Ø	Measurement At point Q2
2		

Serviceable **YES**  **NO**

Piston Ring		
Top Ring Gap	Specification	Measurement
Piston 2		

Serviceable **YES**  **NO**

### Crank Pin Journal #2

Diameter 1	Diameter 2	Diameter 3	Diameter Average
J1	J2	J3	J
K1	K2	K3	K
L1	L2	L3	L



Diameter J	Diameter K	Diameter L	Max Ovality
J1	J2	J3	
K1	K2	K3	
L1	L2	L3	
			Max Taper

Serviceable **YES**  **NO**

Crankshaft Axial Play/Thrust Clearance	
Axial Play/Thrust Clearance	Specification

Serviceable **YES**  **NO**

### Report Notes

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# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE E – DRIVE LINE

WSC2015\_TP33\_Module E\_CI\_EN

Submitted by:

Name:

Heinrich Trienbacher IT

Edson Silva BR

Markku Suonpää FI

Yoshikazu Honda JP

Sulaiman Hashami OM

Chun Hsin Chang TW

Saksit Sooksukon TH





# COMPETITOR INSTRUCTIONS

## MODULE E – DRIVE LINE

EQUIPMENT: VW TRANSMISSION MQ25 6F

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		E	EN

### INSTRUCTIONS

All work to be completed in the order below

	ENGLISH	TRANSLATION	
E1	Complete the task according to industry standards		
E2	Disassemble the Transmission.		
E3	Perform inspection and measurements of the transaxle according to the report sheet.		
E4	Assembly the MT and carry out adjustment as required by the manufacturer.		
E5	Measurement and faults must be shown to the Expert.		

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE A – ENGINE MANAGEMENT SYSTEMS

WSC2015\_TP33\_Module A\_RS\_EN

### Report Sheet

Submitted by:

Name:

John Dawson UK

Lee De Sousa ZA

Michael Elder US

Marcel Frick LI

Carsten Garbers DK

Min Woo Lee KR

Luis Inostroza CL

Antonio González ES





# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		A	EN

ENGLISH	TRANSLATION
<p>A3 Using the Oscilloscope provided, Perform a Relative Cylinder Compression test with Injector Synchronisation.</p> <p>Draw the 'scope trace' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Trace Here Below:</u></p> <div style="border: 1px solid black; height: 300px; width: 100%;"></div>	



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH		TRANSLATION
A3	Using the Scangas meter provided, analyse the exhaust emissions from the test vehicle under the following condition. i) Engine Idle Speed ii) Fast Idle Cruise Speed (2000 RPM).	
<u>Record the results in the table below:</u>		
<b>Emission Gas</b>	<b>i. Engine Idle Speed</b>	<b>ii. Engine Cruise Speed</b>
<b>C0</b>		
<b>HC</b>		
<b>C02</b>		
<b>O2</b>		
<b>Lambda</b>		





ENGLISH		TRANSLATION
A4	<p>1. Using the Oscilloscope provided, display <b>No.2</b> Ignition Coil <b>Command Signal</b> and <b>Primary Current</b> 'Scope Trace' at Idle.</p> <p>Draw the 'scope traces' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Scope traces here below:</u></p> <div style="border: 1px solid black; height: 300px; width: 100%;"></div>		
<p><b>Question: Show on the scope traces, using arrows and letters, the information from Q1 – Q2 below:</b></p> <p>Q1, <b>A</b> = Primary Ignition Dwell Time</p> <p>Q2, <b>B</b> = Primary Current Saturation</p>		



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH		TRANSLATION
A4	<p>2. Using the Oscilloscope provided, display <b>No.4 Fuel Injector Current</b> and <b>Voltage</b> 'Scope Trace' at Idle.</p> <p>Draw the 'scope traces' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Scope traces here below:</u></p> <div style="border: 1px solid black; height: 300px; width: 100%;"></div>		
<p><b>Question: Show on the scope traces, using arrows and letters, the information from Q1 – Q2 below:</b></p> <p>Q1, <b>A</b> = Injector Holding Current</p> <p>Q2, <b>B</b> = Injector Voltage Disipation</p>		



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH	TRANSLATION
A4	3. Using the Oscilloscope provided, display <b>No.4 Fuel Injector Current</b> and <b>Voltage</b> 'Scope Trace' at <b>2000rpm</b> . Draw the 'scope traces' below: (Include time, voltage and current scales).
<p><u>Draw the Scope traces here below:</u></p> <div data-bbox="233 815 1401 1639"></div> <p>Compare to the test A4.2 did the Injector on Time (Circle your answer below)</p> <ol style="list-style-type: none"><li>1. Increase</li><li>2. Decrease</li></ol>	



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH		TRANSLATION
A4	<p>4. Using the Oscilloscope provided, display <b>No.4 Fuel Injector Current</b> and <b>Voltage</b> 'Scope Trace' at Wide Open Throttle.</p> <p>Draw the 'scope traces' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Scope traces here below:</u></p> <div style="border: 1px solid black; height: 300px; width: 100%;"></div>		
<p>What caused the injector On Time change during this test? (Circle your answer below)</p> <ol style="list-style-type: none"><li>1. The engine load was greater</li><li>2. Increased injection frequency</li></ol>		



# COMPETITOR REPORT SHEET

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

ENGLISH		TRANSLATION
A4	<p>5. Using the Oscilloscope provided, display a single Pre Catalyst Wideband Oxygen Sensor Output Voltage 'Scope Trace' at <b>Fast Idle Speed (2000rpm)</b>, <b>Idle</b> and Then <b>Wide Open Throttle</b> and <b>back to Idle</b>.</p> <p>Draw the 'scope trace' below: (Include time, voltage and current scales).</p>	
<p><u>Draw the Scope trace here below:</u></p> <div style="border: 1px solid black; height: 200px; width: 100%;"></div>		
<p><b>Question: Show on the scope trace, using arrows and letters, the information from Q1 – Q2 below:</b></p> <p>Q1, <b>A</b> = Wide Open Throttle (<b>Rich Mixture</b>)</p> <p>Q2, <b>B</b> = Deceleration/Overrun (<b>Lean Mixture</b>)</p>		

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE C – ELECTRICAL AND ELECTRONIC SYSTEMS

WSC2015\_TP33\_Module C\_RS\_EN

### Report Sheet

Submitted by:

Name:

Ross Ansell IE  
Jan Börstell SE  
Jack Murray NZ  
Tik Kee Chin HK  
Amogh Dixit IN  
Vidar Strande NO  
Cheah Wing Yew MY  
Rudolf Angerer DE  
John Francis AU





# COMPETITOR INSTRUCTIONS

## MODULE C – ELECTRICAL AND ELECTRONIC SYSTEMS

EQUIPMENT: VW TIGUAN

### TIME ALLOWED

Module duration 3 Hours




COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		C	EN

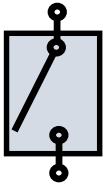
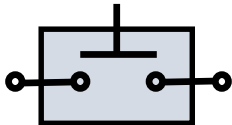
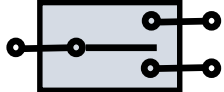


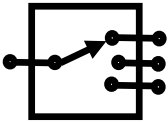
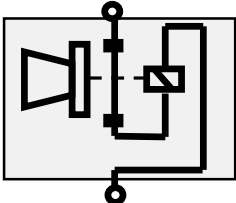
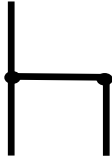


## DIN Circuit Symbols

C2

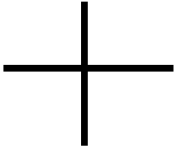
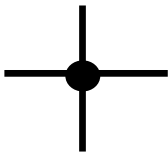

					
<b>A</b>	<b>Motor (1.5kW)</b>	<b>B</b>	<b>Battery</b>	<b>C</b>	<b>Fuse</b>

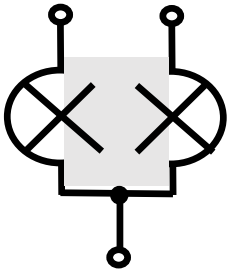
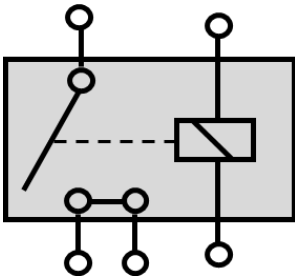
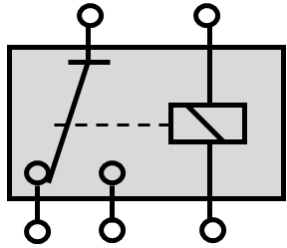
					
<b>D</b>	<b>On / Off switch</b>	<b>E</b>	<b>Momentary Switch</b>	<b>F</b>	<b>Momentary Changeover Switch</b>

					
<b>G</b>	<b>Ignition Switch</b>	<b>H</b>	<b>Horn</b>	<b>J</b>	<b>Wire Junction in harness</b>



## C2

					
<b>K</b>	<b>Wires Crossing</b>	<b>L</b>	<b>Wires Joined</b>	<b>M</b>	<b>Globe</b>

					
<b>N</b>	<b>Double Globe</b>	<b>P</b>	<b>Relay</b>	<b>Q</b>	<b>Relay</b>



Draw the following 3 circuits using the supplied DIN symbols and drawing materials.  
Maximum time permitted 30 minutes.

Identify relay standard pin numbers [30,85,86,87,87a] and fuse ratings.

Marks will be awarded for neatness, correct layout, labelling component values and circuit function.

1/ **Stop light circuit** including:

Symbol Letter	Quantity
B	1
C [10A]	1
E	1
G	1
M	3
N	2

2/ Switched earth **Horn circuit** including:

Symbol Letter	Quantity
B	1
C [5A & 10A]	2
E	1
G	1
H	2
P	1

3/ **Power window circuit** including:

Clearly mark the up [1] and down [2] positions on the switch/es and the fuse ratings.

Calculate the minimum standard rated fuse for the electric motor **A** and label the fuses

Symbol Letter	Quantity
A	1
B	1
C [10A & ?A]	2
F	1
Q	2



PWM rear light signal

**C4**


PWM Brake light signal (RH):




|

## Skill name

## Automobile Technology

## Criteria

## Mark

A	Engine Management Systems	20,00
B	Steering Brake Suspension systems	20,00
C	Electrical Systems	20,00
D	Engine Mechanical	20,00
E	Driveline	20,00

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
A1	Health and Safety		<input type="checkbox"/> Seat cover and fender cover placed to the car. <input type="checkbox"/> No Damage to vehicle or equipment <input type="checkbox"/> No unsafe work practices <input type="checkbox"/> Task completed and all tools put away. <input type="checkbox"/> Asked for exhaust filter prior to attempted start of engine	
A2	Power Supply		<input type="checkbox"/> Engine oil checked prior to starting vehicle <input type="checkbox"/> Verifies battery voltage <input type="checkbox"/> Diagnose the smart key fob not detected <input type="checkbox"/> Repaired smart key fob fault <input type="checkbox"/> Diagnose main power supply (Mega 2) fuse 125Amp <input type="checkbox"/> Rectified fault at fuse 125Amp	

A3	Engine Management	<ul style="list-style-type: none"> <li><input type="radio"/> Diagnose - open circuit in Engine Management Main relay (30 - 8</li> <li><input type="radio"/> Replaced Engine Management PCM Main relay</li> <li><input type="radio"/> Diagnose malfunction inside Starter Button</li> <li><input type="radio"/> Replace Starter Button</li> <li><input type="radio"/> Diagnose Start Button Fuse F18 BCM open circuit</li> <li><input type="radio"/> Requested and Replaced Fuse F18 BCM with correct fuse rating</li> <li><input type="radio"/> Diagnose Fuse F13 BCM (5 A) open circuit</li> <li><input type="radio"/> Requested and Replaced Fuse F13 BCM with correct fuse rating</li> <li><input type="radio"/> Diagnose - open circuit in Starter relay (86 - 85)</li> <li><input type="radio"/> Replaced Starter Relay</li> <li><input type="radio"/> Diagnose - open circuit in Fuel Pump relay (30 - 87)</li> <li><input type="radio"/> Replaced Fuel Pump relay</li> <li><input type="radio"/> Diagnose - Open Circuit in fuel pump fuse F58 20 Amp</li> <li><input type="radio"/> Replaced Fuse F58 with correct rating 30A fuse</li> <li><input type="radio"/> Diagnose Power Train CAN Short Circuit</li> <li><input type="radio"/> Diagnose Open Circuit Brake Pedal Switch</li> <li><input type="radio"/> Replace Brake Pedal Switch</li> <li><input type="radio"/> Diagnosed Fuse F47 BJB Brake Pedal Switch Supply Open Circu</li> <li><input type="radio"/> Replaced Fuse F47 BJB with correct rating 10A Fuse</li> </ul>
A4	Engine Tuning	<ul style="list-style-type: none"> <li><input type="radio"/> Diagnose Open Circuit Fuse BJB Fuse 11</li> <li><input type="radio"/> Replaced Fuse BJB F11 with correct rating 15A fuse</li> <li><input type="radio"/> Diagnose G110 bolt removed Ignition Coil Ground</li> <li><input type="radio"/> Rectify Ground</li> <li><input type="radio"/> Diagnose engine management sensor circuit supply fault</li> <li><input type="radio"/> Reconnect misplaced sensor multiplugs</li> <li><input type="radio"/> Diagnose (Exhaust) Camshaft Position Sensor 12</li> <li><input type="radio"/> Replace Camshaft Position Sensor 12 wiring harness</li> <li><input type="radio"/> Diagnose Accelerator Pedal Sensor (Open Circuit)</li> <li><input type="radio"/> Replaced Accelerator Pedal Sensor</li> <li><input type="radio"/> Diagnose spark plug cyl.1</li> <li><input type="radio"/> Replaced spark plug cyl.1</li> <li><input type="radio"/> Diagnose ignition coil cylinder 1 (OC pin N)</li> <li><input type="radio"/> Replaced ignition coil cylinder 1</li> <li><input type="radio"/> Diagnose fuel injector open circuit cylinder 1</li> <li><input type="radio"/> Replaced wiring harness/connector for injector cylinder 1</li> <li><input type="radio"/> Engine runs, all DTC's are deleted, the MIL and other malfuncio</li> </ul> <ul style="list-style-type: none"> <li><input type="radio"/> Fill in the Gas Analyzing measurement for the correct value (CO,</li> </ul>

A5 Oscilloscope

O	Fill in the Gas Analyzing measurement in the right value (CO, CO <sub>2</sub> )	0
J	Perform a relative compression test with the FSA 740	1
		2
		3
O	Correct answer to question 1	
O	Correct answer to question 2	
O	Correct answer to question 1	
O	Correct answer to question 2	
O	Correct answer to question 1	
O	Correct answer to question 1	
O	Correct answer to question 1	
O	Correct answer to question 2	
J	Correct pattern displayed and drawn on report sheet for No.2 Ign	0
		1
		2
		3
J	Correct pattern displayed and drawn on report sheet for Injector 4	0
		1
		2
		3
J	Correct pattern displayed and drawn on report sheet for injector 4	0
		1
		2
		3
J	Correct pattern displayed and drawn on report sheet for injector	0
		1
		2
		3
J	Correct pattern displayed and drawn on the report sheet for Oxyg	0
		1
		2



Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
B1	Preparation		<ul style="list-style-type: none"> <li><input type="radio"/> Used hoist and lift locks at all times.</li> <li><input type="radio"/> Used Fender Covers and requests internal covers</li> <li><input type="radio"/> Personal protection used when required</li> <li><input type="radio"/> Take gloves and glasses while working with brakefluid</li> <li><input type="radio"/> Correct use of tools, and no damage</li> <li><input type="radio"/> Clean Workstation during competition</li> <li><input type="radio"/> completed tool boxes after finished task</li> <li><input type="radio"/> the wheel alignment system is prepared for the next task</li> <li><input type="radio"/> fill in the values of torques and draw signal in the report sheet</li> </ul>	3
B2	SUSPENSION		<ul style="list-style-type: none"> <li><input type="radio"/> Lift up the car in the correct way</li> <li><input type="radio"/> remove wiper motor</li> <li><input type="radio"/> remove wheel</li> <li><input type="radio"/> remove water guard plate</li> <li><input type="radio"/> find defective stabilizer bar</li> <li><input type="radio"/> separate speed sensor</li> <li><input type="radio"/> remove and check shock absorber</li> <li><input type="radio"/> remove coil spring</li> <li><input type="radio"/> remove front spring bumper</li> <li><input type="radio"/> install coil spring and bumper</li> <li><input type="radio"/> install complete shock absorber</li> <li><input type="radio"/> tighten the bolts with correct torque</li> <li><input type="radio"/> install new stabilizer bar</li> <li><input type="radio"/> install and check optically the speed sensor left</li> <li><input type="radio"/> find broken speed sensor and replace the sensor left</li> <li><input type="radio"/> install wiper motor</li> <li><input type="radio"/> install water guard plate</li> <li><input type="radio"/> install wheel with correct Torque</li> <li><input type="radio"/> remove brake caliper</li> <li><input type="radio"/> remove brake disc and make matchmarks or check runout</li> </ul>	

B3 BRAKES

- separate tie rod end
- separate lower suspension arm
- separate front drive shaft
- remove front axle assembly
- remove and check lower ball joint
- use correct torque for all nuts and bolts
- Use special tool to separate joint
- remove nut and find missing cotter pin
- remove tie rod ball with special tool
- replace tie rod end tighten with correct torque and cotter pin
- set wheel straight ahead
- secure steering wheel
- remove silencer sheet
- open and check steering intermediate shaft
- separate tie rod ends and with special tool
- separate front stabilizer
- remove the front suspension crossmember (frame)
- replace lower arm right
- install and check the front suspension crossmember (frame)
- install steering intermediate shaft
- install silencer sheet
- use correct torque for all nuts and bolts

B4 WHEEL ALIGNMENT

- disconnect flexible hose
- replace brake caliper with right torque
- bleed the brake system
- fill brake fluid to the right level
- install in the right position and the correct torque
- ask for a new bolt and a gasket
- connect diagnostic tool (no communication with ABS)
- find blown fuse in fuse box passenger room
- use wiring diagram
- find troublecode with diagnostic tool
- make measurement on the speed sensor rear right
- find shortcut on wiring speed sensor rear right and fixed it
- draw signal from scope of fixed sensor in the report sheet
  
- inspect tires
- measure vehicle height (front 90-95mm / rear 46-53mm )

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
		<input type="radio"/> bounce the car <input type="radio"/> check and set tire pressure to the correct value <input type="radio"/> check the suspension and steering system optically <input type="radio"/> check the wheel bearing gap (only by hand without tools) <input type="radio"/> Align head mounted securely in correct positions <input type="radio"/> Compensates by rotating wheel <input type="radio"/> Brake pedal depressor installed, <input type="radio"/> locking pins removed before turning <input type="radio"/> Identifies improper camber angle on the left rear wheel <input type="radio"/> fix wheel bearing assembly (bring to correct position) <input type="radio"/> Vehicle re-aligned to factory specifications		
C1	Health, safety and Housekeeping		<input type="radio"/> All PPE worn when required <input type="radio"/> Car protection used. Wing, seat and steering wheel covers <input type="radio"/> No damage to vehicle or equipment <input type="radio"/> Restore work area	
C2	General electrical		<input type="radio"/> Obtains reference voltage and ground at battery <input type="radio"/> Using the wiring diagram that are required for the tasks <input type="radio"/> Complets the given drawing for electrical circuit. <input type="radio"/> Identifies fuse SB11(3Amp wrong) blown, Short circuit J285 by sv <input type="radio"/> Out side air temp (Ambient temperature sensor) sensor(G17)(Ba <input type="radio"/> Fuse SB15 broken no supply to J533 Interface (5 amp) (WD 147 <input type="radio"/> SB8 defekt for relay J681(Terminal15 Power Supply-Relais 2) (W	
C3	Door and window functions		<input type="radio"/> Checked the funktion of driverside dorlock, No funktion <input type="radio"/> Found: No function of power windows, passenger door (WD 135/ <input type="radio"/> Checked the funktion of (FR) Window regulator switch in front pa <input type="radio"/> Checked: No funktion of rear windows, child safety constant "ON <input type="radio"/> Centrallocking not working RL door J388 pin T18c/3(br/we) oper	

C4	Lighting System	<ul style="list-style-type: none"> <li><input type="radio"/> Identifies all inoperable external lights (FL- no LowBeam / FR-flas</li> <li><input type="radio"/> Platelight not working , Left number plate light - reversed pins in d</li> <li><input type="radio"/> Inproper function Rear lights, turning, brake and rear light (WD13</li> <li><input type="radio"/> Checks and identifies missing power (to E1 - Head Light switch)</li> <li><input type="radio"/> Locate and repair missing earth for FR headlight unit -Earth point</li> <li><input type="radio"/> RL flasher bulb blown - &gt; replace bulb,</li> <li><input type="radio"/> MX1 - Front left headlight pin 11 disconnected at T14e -(gr/bl)at l</li> </ul>		
C5	Rear Bonnet/Wiper	<ul style="list-style-type: none"> <li><input type="radio"/> Found: No function of rear bonnet lock</li> <li><input type="radio"/> Change two signal wires going in to wiper motor pins 2-3 works c</li> <li><input type="radio"/> Missing fuse SB27 for X contact relay result no power at fuse for</li> </ul>		
C6	Front Bonnet/Wiper	<ul style="list-style-type: none"> <li><input type="radio"/> fuse for front wiper sb22 (WD 134/15) (J400 - Wiper motor contro</li> <li><input type="radio"/> conector at front wiper disconnected -&gt; connect</li> <li><input type="radio"/> front bonnet switch short to ground (WD134/14) (F266 - Front Bo</li> </ul>		
C7	Mesurement Fluke 123	<ul style="list-style-type: none"> <li><input type="radio"/> Measure 1, Rear light function with Oscilloscope fluke 123</li> <li><input type="radio"/> Measure 2, Brake light function with Oscilloscope fluke 123</li> <li><input type="radio"/> Measure 3, Pattern of the can-high signal in the comfort system,</li> <li><input type="radio"/> Measure 4 scope and sketch lin signal</li> </ul>		
C8	Diagnostics Bosch KTS	<ul style="list-style-type: none"> <li><input type="radio"/> Able to retrive information by U31 (OBD) pin 6 and 14 switch pos</li> <li><input type="radio"/> Able to clear fault codes and re sett systems.with KTS</li> </ul>		
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
D1	Preparation	<ul style="list-style-type: none"> <li><input type="radio"/> Organise work station, tools, manuals</li> <li><input type="radio"/> Check engine oil - none in the engine</li> <li><input type="radio"/> Check engine free rotation</li> <li><input type="radio"/> Calibrate measuring equipment - Micrometer</li> </ul>		
D2	Engine Cylinder Leakage Test	<ul style="list-style-type: none"> <li><input type="radio"/> Turned engine to TDC for cylinder under test</li> </ul>		

D3	Engine Dismantling	<input type="radio"/> Performed test in firing order <input type="radio"/> Identified 2 correct faults <input type="radio"/> Identified all 3 faults correctly  <input type="radio"/> Used 0197-3a to clamp cam before removing caps - W/O damage <input type="radio"/> Removed cylinder head & protected the gasket face <input type="radio"/> Ensured hydraulic lash adjusters stay in original positions <input type="radio"/> Remove exhaust valves from cylinder #1 <input type="radio"/> Identified & removed #2 piston assembly without damage <input type="radio"/> Removed piston rings without damage
D4	Measurement & Inspection	<input type="radio"/> Inspected & ensured clean cylinder head surface & free of damage <input type="radio"/> Measured warp diagonally (2) & longitudinally (2) <input type="radio"/> Measured cylinder head overall height <input type="radio"/> Measure intake camshaft lobe height <input type="radio"/> Measure exhaust camshaft lobe height <input type="radio"/> NOTE: do not remove double bearing #3 <input type="radio"/> Measure #1 cylinder exhaust valves (2) spring free height <input type="radio"/> Measure exhaust valves (2) length <input type="radio"/> Measure exhaust valve stem diameters (2) <input type="radio"/> Measured piston diameter (correct position) ( +/- 0.01mm) <input type="radio"/> Accurate measurement Cylinder Bore ( +/- 0.01mm) Top <input type="radio"/> Accurate measurement Cylinder Bore ( +/- 0.01mm) Middle <input type="radio"/> Accurate measurement Cylinder Bore ( +/- 0.01mm) Bottom <input type="radio"/> Calculated & report bore ovality using available tools <input type="radio"/> Calculated & report bore taper using available tools <input type="radio"/> Measured or calculated piston to bore clearance (Top) <input type="radio"/> Measured top compression ring end gap <input type="radio"/> Measure #2 Crankshaft Big End journal diameter ( +/- 0.01mm) <input type="radio"/> Use special tool to centre M/B bearings half shell <input type="radio"/> Measured crankshaft thrust clearance / end float ( +/- 0.01mm) <input type="radio"/> Refitted rings in correct position without damage
D5	Reassembly	<input type="radio"/> Lubricate rings & Check free movement prior to refitting <input type="radio"/> Refit piston correctly protecting the crankshaft journals first time <input type="radio"/> Use special tool to centre B/E bearings & Lube bearings <input type="radio"/> Requested new main bearing and B/E cap bolts <input type="radio"/> Fitted correctly and torqued Big End cap bolts <input type="radio"/> Asked for sealant - sump etc...

D6	Task Completion	<ul style="list-style-type: none"> <li>O Torqued M/Brg &amp; sump bolts in correct order</li> <li>O Requested new cylinder head gasket &amp; bolts (install old)</li> <li>O Requested Molycote G Rapid Plus E3 (install without)</li> <li>O Torque cylinder head bolts correctly and in order</li> <li>O Torque camshaft cap bolts in correct order</li> <li>O Fit cam caps in correct order &amp; orientation</li> <li>O Requested replacement seals</li> <li>O Refitted cams in correct position first time</li> <li>O Used special tools as listed to retain &amp; position cams</li> <li>O Request replacement seals for inlet cam (2)</li> <li>O Fitted dummy chain tensioner</li> <li>O Request replacement bolts for Cam gears</li> <li>O Repositioned engine to lock position using special tool (pin)</li> <li>O Engine timed correctly</li>   <li>O Rotate the engine 2 full turns to check correct assembly</li> <li>O Engine and test report completed</li> <li>O Used safety glasses appropriately</li> <li>J All tools returned to correct location</li>   <li>J Work area clean &amp; tidy throughout the module</li> </ul>	<ul style="list-style-type: none"> <li>0</li> <li>1</li> <li>2</li> <li>3</li>   <li>0</li> <li>1</li> <li>2</li> <li>3</li> </ul>	
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
E1	Workpractice, cleanliness and security	J	General work security (safety)	<ul style="list-style-type: none"> <li>0</li> <li>1</li> </ul>

			2
			3
		J	0
			1
			2
			3
		J	0
			1
			2
			3
E2	Disassemble the transaxle		
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
		O	
E3	Input Shaft Inspection		
		O	
		O	
		O	
		O	
E4	5th and 6th gears and Output Shaft Inspection.		
		O	

E5	Input shaft Shim adjustment	<ul style="list-style-type: none"> <li><input type="radio"/> Check 6th gear synchronizer.</li> <li><input type="radio"/> Check 5th gear synchronizer.</li> <li><input type="radio"/> Wave spring washer and ask for a new synchronizer 5th gear</li> <li><input type="radio"/> Install locking pieces and springs.</li> <li><input type="radio"/> Check 1st and 2nd gear synchronizer rings for wear - press and f</li> <li><input type="radio"/> Check 3rd and 4th gear synchronizer rings for wear - press and fe</li> <li><input type="radio"/> Bearing support damaged</li> <li><input type="radio"/> Locking collar with synchro-hub for 1st and 2nd gears in wrong p</li> <li><input type="radio"/> Needle bearing for 2nd gear damaged</li> <li><input type="radio"/> Reassemble output shaft correctly.</li> <li><input type="radio"/> Ring/tapered-roller bearing in the clutch housing with a adjust wa</li> </ul>
E6	Output shim adjustment	<ul style="list-style-type: none"> <li><input type="radio"/> Install tapered roller bearing outer race without shim into gearbox</li> <li><input type="radio"/> Rotate input shaft and set dial gauge preload.</li> <li><input type="radio"/> Find value thickness of shim in the table and insert shim of deter</li> <li><input type="radio"/> Bearing play should be 0,01 - 0,09mm.</li> </ul>
E7	Differential Shim adjustment	<ul style="list-style-type: none"> <li><input type="radio"/> Ring/tapered-roller bearing in the clutch housing with a adjust wa</li> <li><input type="radio"/> Insert dial gauge. Output shaft up and down,write down the clear</li> <li><input type="radio"/> Output shaft up and down,write down the clearance on the dial ga</li> <li><input type="radio"/> Find value in the table. Measure shim with micrometer.</li> </ul>
E8	Reassemble	<ul style="list-style-type: none"> <li><input type="radio"/> Pull out seal and sleeve of differential.</li> <li><input type="radio"/> Change the bearings and racers from the clutch housing side.</li> <li><input type="radio"/> Position the gearbox housing and set the dial gauge. Move differ</li> <li><input type="radio"/> Find value in the table.Check shim with micrometer</li> <li><input type="radio"/> Insert the differential, input and output shaft</li> <li><input type="radio"/> Install the reverse gear shift fork and selector forks</li> <li><input type="radio"/> Fix the gearbox housing with all bolts, fix the pivot pins and rever</li> <li><input type="radio"/> Install both flange shafts with pressure springs.</li> <li><input type="radio"/> Use the screw thread M10X1,00 to clean the threads in the shaft</li> <li><input type="radio"/> Install 5th and 6th gears and fix with bolts.</li> <li><input type="radio"/> Adjusted the clearance 5th and 6th speed glove.</li> <li><input type="radio"/> Install cover of the 5th and 6th speed.</li> <li><input type="radio"/> Ball pin damaged</li> <li><input type="radio"/> Fix all bolts and nuts with correct torque and angle</li> <li><input type="radio"/> Check functionality of gearbox.</li> </ul>





Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
	Yes / No	1	0,10
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	2	0,20
Instrument displays fault present	Yes / No	4	0,30
Requested new key fob batteries, Expert to provide	Yes / No	3	0,20
Open circuit Power Supply F2	Yes / No	4	0,30
	Yes / No	3	0,20

Criterion  
A

Total  
Mark

20,00

[PCM Main Relay] - R9 BJB	Yes / No	4	0,40
	Yes / No	4	0,20
Open Circuit (pin 1-4) and (pin 6 to 3 Ground)	Yes / No	4	0,50
	Yes / No	6	0,20
	Yes / No	4	0,30
	Yes / No	2	0,20
Steering Column, Dash Panel, Data Link Connector	Yes / No	4	0,30
	Yes / No	2	0,20
	Yes / No	4	0,40
	Yes / No	5	0,20
	Yes / No	4	0,50
	Yes / No	3	0,20
	Yes / No	4	0,40
	Yes / No	3	0,20
Expert to advise no repair required, Expert to reset!	Yes / No	3	0,50
Open circuit between pins (1 and 4) and (2 and 3)	Yes / No	4	0,50
	Yes / No	3	0,30
	Yes / No	4	0,30
	Yes / No	3	0,20
Ignition Coil Supply Pin 3 on ignition coil	Yes / No	4	0,30
	Yes / No	3	0,30
	Yes / No	4	0,50
Expert to advise cover intake system prior to repair	Yes / No	3	0,30
Multiplug for fuel pressure sensor and map sensor swapped	Yes / No	4	0,80
	Yes / No	6	0,20
Pin 3 broken inside wiring harness	Yes / No	4	0,40
	Yes / No	5	0,30
Inside pedal module between Pin 1 and Pin 5	Yes / No	4	0,50
	Yes / No	6	0,30
	Yes / No	4	0,40
Applied torque to 12nm	Yes / No	5	0,20
	Yes / No	4	0,40
Asked for dielectric grease	Yes / No	5	0,30
	Yes / No	4	0,50
	Yes / No	6	0,30
	Yes / No	6	1,00
	Yes / No	2	0,30

	Yes / No	2	0,30
		3	0,50
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values			
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
As per Experts report sheet	Yes / No	2	0,20
		2	0,40
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values		2	0,40
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values		2	0,40
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values		2	0,40
Not attempted			
Unclear scope traces drawn, No or incorrect X-Y scale values			
Clearly drawn scope trace with incorrect X-Y scale values			
Clear drawn scope traces with both X-Y scales values		2	0,40

Clear drawn scope traces with both X-Y scales values

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
	Y/N	1	0,10
	Y/N	1	0,20
work with machines, compressed air	Y/N	1	0,20
always when working with brakefluid	Y/N	1	0,20
	Y/N	1	0,20
No tools, cleaning rags lay on the car when not in use	Y/N	1	0,10
they must be looked the same way as task start	Y/N	1	0,10
the wheel aligner is correct installed and ready to use	Y/N	1	0,10
square wave/ This order 50Nm/24Nm/58Nm/39Nm	Y/N	2	0,20
use placemets under car on the right position	Y/N	1	0,20
	Y/N	5	0,20
	Y/N	5	0,20
	Y/N	5	0,20
dust cover is missing	Y/N	4	0,30
	Y/N	3	0,20
minimum press shock absorber 4 times	Y/N	4	0,30
	Y/N	4	0,30
	Y/N	4	0,30
fixe spring insulator and correct mounted coil spring	Y/N	1	0,20
	Y/N	1	0,40
39Nm top/240Nm main bolts low side/47Nm central	Y/N	5	0,40
competitor has to ask for a new stabilizer bar, 74Nm	Y/N	4	0,20
	Y/N	4	0,30
29Nm	Y/N	4	0,30
	Y/N	5	0,20
	Y/N	5	0,20
102.9Nm	Y/N	5	0,20
30Nm	Y/N	5	0,10
don't make marks he has to measure the runout	Y/N	4	0,40

Criterion B Total Mark 20,00

	Y/N	5	0,20
	Y/N	5	0,20
	Y/N	1	0,20
	Y/N	5	0,20
103Nm center / 89Nm one bolt and two nuts	Y/N	4	0,20
press brake f. tighten center nut driveshaft 216Nm	Y/N	4	0,40
	Y/N	1	0,20
the competitor has to ask for a cotter pin	Y/N	4	0,40
	Y/N	5	0,20
49Nm	Y/N	4	0,20
	Y/N	5	0,10
	Y/N	1	0,20
	Y/N	5	0,20
	Y/N	1	0,20
	Y/N	5	0,20
	Y/N	1	0,20
	Y/N	5	0,30
137Nm Bolt A / 126Nm Bolt B	Y/N	5	0,30
	Y/N	4	0,40
35Nm	Y/N	5	0,20
	Y/N	5	0,20
see on printed picture	Y/N	5	0,30
	Y/N	5	0,20
30Nm for cyl. assembly/106.8Nm cylinder mounting	Y/N	5	0,40
	Y/N	1	0,40
	Y/N	5	0,30
15.2Nm to line /29Nm shock absorber and cylinder	Y/N	5	0,40
	Y/N	4	0,30
	Y/N	6	0,20
10A inside fuse box ECU IG No2	Y/N	3	0,40
	Y/N	3	0,40
	Y/N	6	0,20
	Y/N	3	0,40
shortcut in the connector of ABS Sensor rear right	Y/N	3	0,40
	Y/N	2	0,40
	Y/N	4	0,30
	Y/N	4	0,20

210-220kPa,30-32psi,2.2 bar	Y/N	5	0,10
	Y/N	4	0,20
	Y/N	4	0,40
	Y/N	4	0,30
	Y/N	4	0,40
	Y/N	4	0,20
	Y/N	5	0,30
plates on car lift	Y/N	5	0,20
there are washers inside bearing assesmbly	Y/N	4	0,40
remove washers	Y/N	5	0,50
all values are green except. measurement on 20deg	Y/N	4	0,40

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
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Criterion C      Total Mark      20,00

	Yes / No	1	0,20
	Yes / No	1	0,20
	Yes / No	1	0,30
	Yes / No	1	0,30
	Yes / No	3	0,30
	Yes / No	1	1,00
	Yes / No	2	1,40
	Yes / No	3	1,50
	Yes / No	3	1,00
	Yes / No	3	0,30
	Yes / No	3	0,40
Checked wiring at wirediagram(WD135/5) Module J386 - Found: T20a pin, No yellow wire in pin nr 13	Yes / No	3	0,60
Missing main ground signal to the doors, measuring with r Found: Locate the ground 43, missing cable, RHS floor (E	Yes / No	3	0,30
Found: Switch E107, wire brown/green T4am, moved from	Yes / No	3	0,40
Checked the wiring diagram: J386 pin T32a/14(vi/gn): and	Yes / No	3	0,60
	Yes / No	3	0,60

	Yes / No	2	1,00
	Yes / No	3	0,40
	Yes / No	3	0,40
	Yes / No	3	0,40
	Yes / No	3	0,30
	Yes / No	3	0,20
	Yes / No	3	0,50
Manage to open the bonnet, using the manuell safety door	Yes / No	3	0,50
Found: Powersupply missing in junction T17L, pin nr 9 (red)	Yes / No	3	0,50
Fault x contact relay J59 Terminal2 disconnected(,SC 29 (	Yes / No	3	1,00
	Yes / No	3	0,30
	Yes / No	3	0,10
	Yes / No	3	0,50
	Yes / No	6	0,50
	Yes / No	6	0,50
	Yes / No	3	0,50
	Yes / No	6	0,50
ground pins 4 and 5 move to 12and 13 (T16 - 16-pin conn	Yes / No	3	1,00
	Yes / No	3	1,50
Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
		1	0,30
		4	0,10
		4	0,20
		1	0,50
		3	0,20

Criterion D    Total Mark    20,00



3	0,30
2	0,40
4	0,40
6	0,50
1	0,30
1	0,20
5	0,50
5	0,30
5	0,20
1	0,20
1	0,30
1	0,30
1	0,30
1	0,30
1	0,30
1	0,30
1	0,30
1	0,30
1	0,50
1	0,50
1	0,50
1	0,50
4	0,50
4	0,50
4	0,40
1	0,50
1	0,30
6	0,30
1	0,50
5	0,20
5	0,20
5	0,20
6	0,30
2	0,20
5	0,30
2	0,20

		5	0,30
		2	0,40
		2	0,20
		1	0,30
		1	0,30
		1	0,30
		2	0,20
		5	0,20
		5	0,40
		2	0,20
		6	0,20
		2	0,20
		5	0,20
		1	0,50
		1	0,50
		2	0,60
		1	0,20
		1	0,60
Not all tools return Specialty tools only stored and cleaned correctly Toolbox tools only stored and cleaned correctly Specialty and toolbox tools stored and cleaned correctly			
Work area messy Below industry standard: spills not cleaned up; tools left on Maintain industry standard: Spills cleaned up at the end of Exceed industry standard: Spills cleaned up immediately;		1	0,60
Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
The competitor dosnt works safety. The competitor works safety		1	1,00

Criterion E Total Mark 20,00

The competitor works very safety.(he takes also the points			
The competitor works excellent safety (he takes also the p			
		3	1,00
Requested the expert all the parts to be replaced reported			
Requested the expert all the parts to be replaced reported			
Requested the expert all the parts to be replaced reported			
Requested the expert all the parts to be replaced reported		1	1,00
Special tools, Universal and measuring instruments were c			
Cleaned and organized the measuring instruments on the			
Cleaned and organized on the workbench special tools an			
He wiped his universal tools and put in the cart tools, clear			
		4	0,40
Alternately loosened all bolts and removed.		5	0,10
Ask for a new magnet, mount the new one.X	Yes / No	2	0,20
Following the technical literature orientations Erwin.	Yes / No	5	0,15
Engaging the 5th gear and 1st gear.	Yes / No	5	0,15
Using the appropriate tool.	Yes / No	5	0,20
Following the technical literature orientations Erwin.	Yes / No	5	0,20
In the neutral position.	Yes / No	5	0,20
Ask for new and change the selector shaft.X		2	0,30
Ask for new and change.X	Yes / No	2	0,30
Ask for a new tapered ring and change.X		2	0,30
Do not removed the bolts for output shaft bearing support.	Yes / No	5	0,22
Ask for new pivot pin and mount.X	Yes / No	2	0,22
Tell the expert and mount the wrong position.XX		2	0,30
Following the technical literature orientations Erwin.	Yes / No	5	0,25
The housing of selector segmentes is bigger. Need remov		2	0,30
Following the technical literature orientations Erwin.	Yes / No	5	0,15
Ask for new, but mount without.XX		2	0,30
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.		5	0,50
Ask for a new gear, but remount the fault gear wheel.XX		2	0,30
Ask for a new, but remount the fault part.XX		2	0,30
Following the technical literature orientations Erwin.		5	0,42
Following the technical literature orientations Erwin.	Yes / No	4	0,22

Measure gap with a feeler gauge(1-1.7; 0,5mm)	1-1,7; 0,5mm, y/n	4	0,25
Measure gap with a feeler gauge(1-1.7; 0,5mm)	1-1,7; 0,5mm, y/n	4	0,25
Ask for a new, but remount without the part and old synch		2	0,20
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.		1	0,50
Following the technical literature orientations Erwin.	Yes / No	4	0,50
Ask for a new, but remount the old.XX		2	0,20
Tell to expert the wrong position, but mount wrong.XX		2	0,30
Ask for a new, but mount the old part.XX		2	0,30
Following the technical literature orientations Erwin.	Yes / No	1	0,60
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,25
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,40
Following the technical literature orientations Erwin.	0,01 - 0,09mm. y/n	4	0,40
Following the technical literature orientations Erwin.	0,65mm. y/n	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,40
Following the technical literature orientations Erwin.	Yes / No	1	0,25
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,30
Following the technical literature orientations Erwin.	Yes / No	4	0,40
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	Yes / No	1	0,22
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Following the technical literature orientations Erwin.	off less than 0.20 r	4	0,20
Following the technical literature orientations Erwin.	Yes / No	5	0,22
Ask for a new part and mount new.X		4	0,20
Following the technical literature orientations Erwin.		1	1,00
Following the technical literature orientations Erwin.	Yes / No	4	0,42



Competition	Total Mark	100,00
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# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE D – ENGINE MECHANICAL

WSC2015\_TP33\_Module D\_RS\_EN

### Report Sheet

Submitted by:

Name:

Qiyi Guo CN

Quoc Huy VN

Jean-Luc Marcilly FR

Naser Muhaisen AE

Martin Restoule CA

Ridwan Ridwan ID

Victor de Roy van Zuydewijn NL





# REPORT SHEET

## MODULE D – ENGINE MECHANICAL

EQUIPMENT: PSA 1.6 L 16 VALVE DIRECT INJECTION TURBOCHARGED

### TIME ALLOWED

Module duration      3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		D	EN

### Engine Identification

Engine Family	PSA 1.6 TGDI EP6CDTM [5FE]
Capacity	1598cc

### Cylinder Leakage Test

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
Enter the leakage per cylinder in the spaces provided			
%	%	%	%
Circle the appropriate selection below			
PASS / FAIL	PASS / FAIL	PASS / FAIL	PASS / FAIL
Enter the leak location in the spaces provided			
Leak Location	Leak Location	Leak Location	Leak Location

Report diagnosis based on readings



Cylinder Head		
	Measured	Specification
Overall Height		
Surface Warp / Bend		

Serviceable **YES**  **NO**

Camshaft		
	Measured	Specification
Cyl 1 Exhaust lobe Height		
Cyl 1 Intake lobe Height		

Serviceable **YES**  **NO**

Valves, Guides & Springs		
Valve	Length	Stem Diameter
Cyl 1 - Exhaust 1		
Cyl 1 - Exhaust 2		
Valve Spring	Free Length	
Cyl 1 - Exhaust 1		
Cyl 1 - Exhaust 2		

Serviceable **YES**  **NO**

## Cylinder Block





	Measured	Specification
Surface Warp / Bend		

Serviceable **YES**  **NO**

### Cylinder Bore

Cylinder Taper & Ovality						
Cylinder	Specification	Measurement (A1 across thrust)				Ovality
2	Ovality	A1 Top		A2		
		B1 Middle		B2		
		C1 Bottom		C2		
	Taper	A-C				

Serviceable **YES**  **NO**

Piston		
Piston #	Spec Ø	Measurement At point Q2
2		

Serviceable **YES**  **NO**

Piston Ring		
Top Ring Gap	Specification	Measurement
Piston 2		

Serviceable **YES**  **NO**

### Crank Pin Journal #2

Diameter 1	Diameter 2	Diameter 3	Diameter Average
J1	J2	J3	J
K1	K2	K3	K
L1	L2	L3	L



<b>Diameter J</b>	<b>Diameter K</b>	<b>Diameter L</b>	<b>Max Ovality</b>
J1	J2	J3	
K1	K2	K3	
L1	L2	L3	
			<b>Max Taper</b>

Serviceable **YES**  **NO**

<b>Crankshaft Axial Play/Thrust Clearance</b>	
<b>Axial Play/Thrust Clearance</b>	<b>Specification</b>

Serviceable **YES**  **NO**

**Report Notes**

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# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE B – STEERING BRAKE SUSPENSION SYSTEMS

WSC2015\_TP33\_Module B\_RS\_EN

### Report Sheet

Submitted by:

Name:

Eduardo Fonseca PT  
Wolfgang Kammerer AT  
Philippe Kever BE  
Pedro Iván Pérez Gayón CO  
Reza Varmarzyar IR  
Taoufik Zirari MA  
Hamad Ali Aljufairi BH  
Andrey Zhigulskiy RU





# COMPETITOR INSTRUCTIONS

## MODULE B – STEERING BRAKE SUSPENSION SYSTEM

EQUIPMENT: TOYOTA COROLLA

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		B	EN

ENGLISH	TRANSLATION
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Draw the signal with correct values in the X / Y coordinates from the wheel speed sensor left front you measured with the scopemeter approximately 10Rpm:


Write down the correct torque for following parts:

Steering wheel:

Front stabilizer bar:

Steering link assembly:

Front transport hook:

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE A – ENGINE MANAGEMENT SYSTEMS

WSC2015\_TP33\_Module A\_CI\_EN

Submitted by:

Name:

John Dawson UK

Lee De Sousa ZA

Michael Elder US

Marcel Frick LI

Carsten Garbers DK

Min Woo Lee KR

Luis Inostroza CL

Antonio Gonzalez





# COMPETITOR INSTRUCTIONS

## MODULE A – ENGINE MANAGEMENT SYSTEMS

EQUIPMENT: FORD FUSION ECCOBOOST

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		A	EN

### INSTRUCTIONS

Criteria A1 and A2 must be completed in order shown below. A3 and A4 can be completed in any order. Any identified faults are to be reported to the Expert. The expert will advise the correct repair action to be taken by the competitor.

ENGLISH	TRANSLATION
<p><b>A1.</b> The engine will not rotate. Make all necessary repairs that allows the engine to rotate</p> <p>The scan tool cannot be used to perform this part of your test</p> <p><b>Note:</b> You have <b>80</b> minutes to complete this part of the Module. If you fail to get the engine rotating you will be sent to the competitors room for a imposed <b>ten</b> minute penalty.</p> <p>The Experts will rectify the faults, after <b>Ten</b> minutes the competitor will return to begin work on <b>A2.</b> T</p> <p>The competitor will be awarded marks for any faults found in <b>A1.</b></p>	



<b>A2.</b>	<p>The engine will not run, make all the necessary repairs to enable the engine to run without any faults. All diagnostic equipment is available</p> <p><b>Note:</b> You have <b>60</b> minutes to complete Criteria <b>A2</b>. If you fail to get the engine running correctly with no faults present you will be sent to the competitors room for a imposed <b>ten</b> minute penalty.</p> <p>The Experts will rectify the faults, after <b>ten</b> minutes the competitor will return to begin work on <b>Criteria A3 and A4</b>. The competitor will be awarded marks for any faults found in <b>A2</b>.</p>	
<b>A3.</b>	Complete all requirements on .A3 report sheet	
<b>A4.</b>	Complete all requirements on .A4 report sheet	

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE C – ELECTRICAL AND ELECTRONIC SYSTEMS

WSC2015\_TP33\_Module C\_CI\_EN

### Submitted by:

Anthony Hoey IE  
Jan Börstell SE  
Jack Murray NZ  
Tik Kee Chin HK  
Amogh Dixit IN  
Vidar Strande NO  
Cheah Wing Yew MY  
Rudolf Angerer DE  
John Francis AU







# COMPETITOR INSTRUCTIONS

## MODULE C – ELECTRICAL AND ELECTRONIC SYSTEMS

EQUIPMENT: VW TIGUAN

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		C	EN

### INSTRUCTIONS

C2 has to be done before moving to next task, competitor can shift between C3-C6 as many times he/she likes. When going to C7 no return to tasks C3-C6 is allowed!

	ENGLISH	TRANSLATION
C1	Complete task according to industry standards	
C2	<ul style="list-style-type: none"><li>Complete the wiring diagrams so that the correct function are achieved and meet industrial standards. Maximum time 30min</li></ul>	
C3	<ul style="list-style-type: none"><li>Check function of all gauges-instruments. Advise expert of faults before repair.</li></ul>	
C4	<ul style="list-style-type: none"><li>Check all external lights on the car, advise expert before repairing faults. Fill out report sheet, with the correct values</li></ul>	



C5	<ul style="list-style-type: none"><li>• Check all door operations, advice expert before repair of faults. Perform a measurement on CAN-high comfort system, freeze screen on tool when you are satisfied and show expert before moving on.</li></ul>	
C6	<ul style="list-style-type: none"><li>• Check complete wiper functions, advise expert before repair of faults. Perform a measurement on LIN signal (wiper system, freeze screen on tool when you are satisfied and show expert before moving on.</li></ul>	
C7	<ul style="list-style-type: none"><li>• Check fault codes with diagnostic tool, reset fault codes and inform expert of result.</li></ul>	

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE D – ENGINE MECHANICAL

WSC2015\_TP33\_Module D\_CI\_EN

Submitted by:

Name:

Qiyi Guo CN

Quoc Huy VN

Jean-Luc Marcilly FR

Naser Muhaisen AE

Martin Restoule CA

Ridwan Ridwan ID

Victor de Roy van Zuydewijn NL





# COMPETITOR INSTRUCTIONS

## MODULE D – ENGINE MECHANICAL

EQUIPMENT: PSA 1.6 L 16 VALVE DIRECT INJECTION TURBOCHARGED

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		D	EN

### INSTRUCTIONS

All work to be completed in the order below

	ENGLISH	TRANSLATION
D1	<ul style="list-style-type: none"><li>Perform cylinder leakage test on all cylinders and record results</li></ul>	
D2	<ul style="list-style-type: none"><li>Dismantle engine</li></ul>	
D3	<ul style="list-style-type: none"><li>Perform measurements on report sheets</li></ul>	
D4	<ul style="list-style-type: none"><li>Determine serviceability of components</li></ul>	
D5	<ul style="list-style-type: none"><li>Reassemble engine</li></ul>	
D6	<ul style="list-style-type: none"><li>Perform all work according to industry standards</li></ul>	

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE E – DRIVE LINE

WSC2015\_TP33\_Module E\_CI\_EN

Submitted by:

Name:

Heinrich Trienbacher IT

Edson Silva BR

Markku Suonpää FI

Yoshikazu Honda JP

Sulaiman Hashami OM

Chun Hsin Chang TW

Saksit Sooksukon TH





# COMPETITOR INSTRUCTIONS

## MODULE E – DRIVE LINE

EQUIPMENT: VW TRANSMISSION MQ25 6F

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		E	EN

### INSTRUCTIONS

All work to be completed in the order below

	ENGLISH	TRANSLATION	
E1	Complete the task according to industry standards		
E2	Disassemble the Transmission.		
E3	Perform inspection and measurements of the transaxle according to the report sheet.		
E4	Assembly the MT and carry out adjustment as required by the manufacturer.		
E5	Measurement and faults must be shown to the Expert.		

# TEST PROJECT AUTOMOBILE TECHNOLOGY

## MODULE B – STEERING BRAKE SUSPENSION SYSTEMS

WSC2015\_TP33\_Module B\_CI\_EN

Submitted by:

Name:

Eduardo Fonseca PT  
Wolfgang Kammerer AT  
Philippe Kever BE  
Pedro Iván Pérez Gayón CO  
Reza Varmarzyar IR  
Taoufik Zirari MA  
Hamad Ali Aljufairi BH  
Andrey Zhigulskiy RU





# COMPETITOR INSTRUCTIONS

## MODULE B – STEERING BRAKE SUSPENSION SYSTEMS

EQUIPMENT: TOYOTA COROLLA

### TIME ALLOWED

Module duration 3 Hours

COMPETITOR NAME	COUNTRY CODE	MODULE	TRANSLATED LANGUAGE
		B	EN

### INSTRUCTIONS

**B4 Must be performed last**

	ENGLISH	TRANSLATION
B1	Complete the task according to industry standards	
B2	Replace shock absorber front left Replace lower ball joint front left Replace tie rod end front left Replace lower arm front right	
B3	Replace front left brake calliper Replace flexible brake hose front left Check and repair the ABS	
B4	Perform a 4 wheel alignment according to manufactures specifications Print out the final report sheet	