

Your Ref: SGT 8898K  
Our Ref : CI/TP20009517/D

10 September 2020

**Ms Tan Gee Wai**

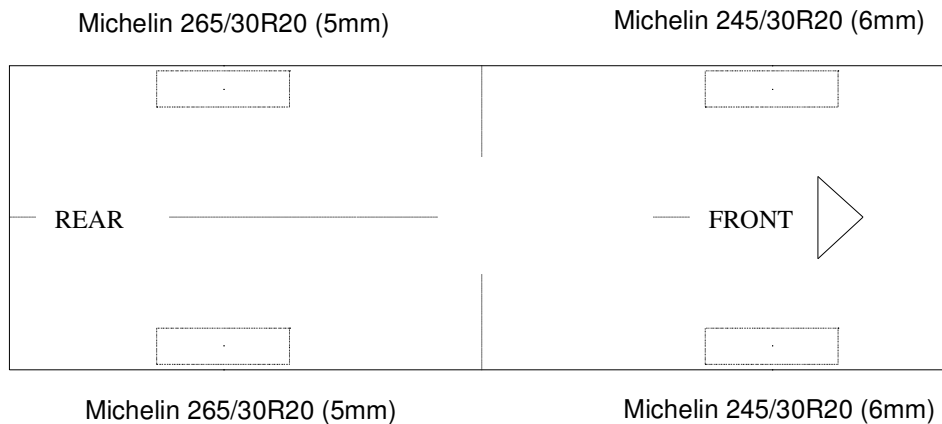
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Singapore 768012

**AUTOMOBILE TECHNICAL INSPECTION REPORT OF A MERCEDES BENZ  
E250 COUPE WITH REGISTRATION NUMBER SGT 8898K**

1. I refer to your request dated 18 August 2020 to carry out a physical inspection of a Mercedes Benz E250 Coupe with registration number SGT 8898K (herein referred to as "**Motor Car**").
2. The purpose of the inspection was to check on the mechanical condition of the Motor Car in relation to an issue experienced by Ms Tan Gee Wai whilst driving the Motor Car on 16 August 2020 or thereabouts.
3. Briefly, Ms Tan Gee Wai bought the Motor Car from a used car dealer and took possession of it on 21 July 2020. The mileage of the Motor Car when she took over was 133,039km. On 16 August 2020 or thereabouts, as she was driving the Motor Car, she experienced an incident whereby the Motor Car was not able to move or accelerate when she stepped on the accelerator pedal despite hearing the engine revving.

**Physical Inspection of the Motor Car**

4. Following the request, the Motor Car was physically inspected by me on 19 August 2020 at the premise of D'Motorwerkz Pte Ltd, located at 280 Woodlands Industrial Park E5, Harvest @ Woodlands #01-03/04, Singapore 757322. The mileage of the Motor Car at the time of my inspection was 134,187km.
5. The Motor Car was observed to be in a relatively good general condition with no loose exterior fittings observed.
6. It was fitted with 20inch sport wheel rims that were wrapped with tyres that were observed to be of serviceable condition. The tyres were also sufficiently inflated for vehicular operation. The tyre brand, tyre size and approximate remaining tread depth of the 4 tyres of the Motor Car were recorded as follows: -



7. My examination of the Motor Car's engine compartment revealed that the various parts and components inside the engine compartment were all intact and properly fitted. The engine oil, brake fluid and engine coolant were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.
8. Static brake tests conducted on the Motor Car revealed no abnormality. The brake booster had responded well to the various tests conducted. There was also no abnormal movement of the brake pedal when it was depressed. The brake hoses and brake pipes were all intact with no leakage found. In general, the static brake tests had suggested that there was no internal leakage of pressure/vacuum in the braking system of the Motor Car and that the braking system is in serviceable condition.
9. Static test on the steering system of the Motor Car also revealed no abnormality to the steering system. I did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions. My visual examination of the various steering components which had included the rack and pinion, tie rods, tie rod ends, and ball joints revealed that these components were all generally in good condition.
10. My checks on the underside of the Motor Car, after the Motor Car was hoisted up, revealed no sign(s) or indication(s) of fluid leakage and/or fluid stain(s). All undercarriage components of the Motor Car were also observed to be intact and secured in an appropriate manner. See photo 1 – 3 below.



**Photo 1** shows the rear left body of the Motor Car at the time of my inspection. The Motor Car was observed to be in relatively good general condition with no loose exterior fittings observed.



**Photo 2** shows the front right body of the Motor Car at the time of my inspection. The Motor Car was observed to be in relatively good general condition with no loose exterior fittings observed. The mileage of the Motor Car at the time of my inspection was recorded to be 134,187km.



**Photo 3** shows a general view of the engine compartment of the Motor Car at the time of my inspection. The various parts and components inside the engine compartment were all observed to be intact and properly fitted. There was also no sign(s) or indication(s) of fluid leak and/or fluid stain found inside the engine compartment. The engine oil, brake fluid and engine coolant were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids

### **Check Engine Light & SRS Light**

11. Upon starting the engine of the Motor Car, I had noted that the check engine light and SRS light (Supplemental Restraint System) were illuminated on the instrument panel. The illumination of these lights indicates a fault(s) in the engine system and a fault(s) in the SRS of the Motor Car.
12. To check on the fault of these systems, an On-board Diagnostic scan or more commonly referred to as OBD scan was carried out to the Motor Car. The OBD scan involves scanning of the various electronic computer modules that are fitted on the Motor Car like the engine control module, airbag control module and transmission control module amongst others. These control modules communicate with each other electronically for optimum and efficient operation of the Motor Car.
13. The result at the end of the OBD scan revealed transmission gear slippage in the Motor Car's transmission system causing the check engine light to be illuminated, and a faulty front right seat belt buckle, which caused the SRS light to be illuminated. See photo 4 - 7 below.





**Photo 4** shows the check engine light (yellow arrow) and SRS light (red arrow) illuminated on the Motor Car's instrument panel. The illumination of these lights indicates a fault(s) in the engine system and a fault(s) in the Supplemental Restraint System of the Motor Car.



**Photo 5** shows the OBD scan being carried out to the Motor Car to establish the cause(s) of the check engine light and the SRS light that were illuminated on the instrument panel of the Motor Car. The result at the end of the OBD scan revealed transmission gear slippage in the Motor Car's transmission system causing the check engine light to be illuminated, and a faulty front right seat belt buckle, causing the SRS light to be illuminated.


N15/3 - Transmission control for 5-speed transmission (ETC [EGS])				-f-
MB object number for hardware	003 446 43 10	Diagnosis identifier	3/84	
Hardware version	48/06	Software version	43/09	
Production date	20/06/16	Supplier ID	8	
Supplier	Siemens	Control unit variant	Diagversion54_EGS53	
MB object number for software (code)	002 448 58 10	Manufacturer-specific serial number	2002862	
Fault	Text			Status
0731	The gear is implausible or the transmission is slipping (gear "1").			S 
	<b>Name</b>	<b>First occurrence</b>	<b>Last occurrence</b>	
	Symptom	---	51	
	Time elapsed since the ignition was switched on [s]	1311.00sec	1178.00sec	
	Power supply	12.50V	12.50V	
	Oil temperature of transmission	73.00°C	78.00°C	
	Actual gear	1	1	
	Target gear	1	1	
	Selector lever position	NOT AVAILABLE	NOT AVAILABLE	
	Output speed	313.00 1/min	291.00 1/min	
	Turbine speed	1830.00U/min	3180.00U/min	
	Fault freeze frame data for the development department (8)	---	40	
	Fault freeze frame data for the development department (4)	---	RESTORE from fault memory	
	Fault freeze frame data for the development department (3)	---	NOT ACTIVE	
	Fault freeze frame data for the development department (6)	---	NO	
	Fault freeze frame data for the development department (10)	---	01	
19.08.2020 12:26:06		05/2019	WDD2073472F067666	
Copyright 1999 Daimler AG		207.347	Page '1' of '10'	

Photo 6 shows a screenshot of the printout result of the OBD scan that was carried out to the Motor Car. The cause of the check engine light illuminated on the instrument panel of the Motor Car was due to transmission gear slippage (red arrow) in the Motor Car's transmission system. The yellow arrow in the photograph highlights the lighted up status of this fault.


A76/1 - Right front reversible emergency tensioning retractor (RevETR- RF)				-i-
MB object number for hardware	212 827 06 45	MB object number for software	212 902 43 02	
Diagnosis identifier	00050B	Hardware version	08/41 00	
Software version	09/21 00	Boot software version	08/18 00	
Hardware supplier	Autoliv	Software supplier	Autoliv	
Control unit variant	P164			
Event	Text			Status
520908	The CAN message from control unit 'N2/10 (Supplemental restraint system control unit)' is faulty.			A+S 
	<b>Name</b>	<b>First occurrence</b>	<b>Last occurrence</b>	
	Frequency counter	---	1	
	Main odometer reading	134166km	134166km	
	Number of ignition cycles since the last occurrence of the fault	---	0	
				A+S=CURRENT and STORED
N10/1 - Front signal acquisition and actuation module (Driver-side SAM)				-i-
MB object number for hardware	212 901 61 00	MB object number for software	212 902 44 03	
Diagnosis identifier	000158	Hardware version	08/43 01	
Software version	09/49 70	Boot software version	09/49 70	
Hardware supplier	Bosch	Software supplier	Bosch	
Control unit variant	172_B01A			
Event	Text			Status
U012100	Communication with ESP has a malfunction. _			A+S
	<b>Name</b>	<b>First occurrence</b>	<b>Last occurrence</b>	
	Frequency counter	---	1.00	
	Main odometer reading	134128.00km	134128.00km	
	Number of ignition cycles since the last occurrence of the fault	---	0.00	
				A+S=CURRENT and STORED
19.08.2020 12:26:06		05/2019	WDD2073472F067666	
Copyright 1999 Daimler AG		207.347	Page '6' of '10'	

Photo 7 shows a screenshot of the printout result of the OBD scan that was carried out to the Motor Car. The cause of the SRS light illuminated on the instrument panel of the Motor Car was due to a faulty front right seat belt buckle (red arrow). The yellow arrow in the photograph highlights the lighted up status of this fault.



14. In automotive terms, transmission gear slippage refers to when the gears in the transmission of a motor vehicle fail to engage or synchronize properly. For example, the correct gear set cannot be engaged in line with the RPM range of the engine. When there is a transmission gear slippage, a driver may experience delayed acceleration, RPM of engine constantly at the mid-high range, burning smell, unable to reverse or in worst case scenario vehicle is unable to move, amongst others.
15. Common cause(s) of transmission gear slippage includes low, worn or burnt transmission fluid, worn clutch plate or gear set, worn transmission bands, faulty torque convertor and faulty solenoids amongst others. For the Motor Car, I had found the condition of its transmission fluid to be burnt/blackened when checks were carried out during my inspection of the Motor Car. Automatic transmission fluid is typically reddish in colour. See photo 8 & 9 below.



**Photo 8** shows removal of the transmission fluid drain plug for checks on the transmission fluid of the Motor Car. This was during my inspection of the Motor Car.

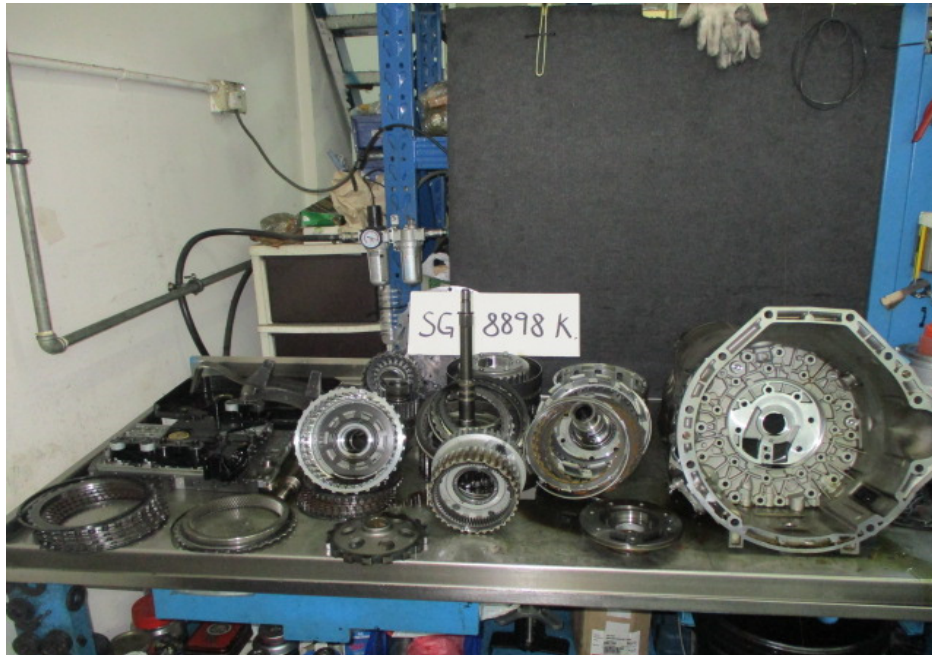


**Photo 9** shows the transmission fluid that was collected from the Motor Car. The transmission fluid of the Motor Car was observed to be burnt/blackened. A typical automatic transmission fluid colour is reddish.

### **Transmission Dismantled**

16. Arrangement was made to dismantle the Motor Car's transmission assembly and a further inspection was carried out by me on 24 August 2020 after all mechanical parts inside the transmission housing were dismantled and separated.
17. At this inspection, I had found several clutch plates worn, burnt marks on several gear set, worn bushing and a broken input shaft diaphragm. Such condition are signs that the transmission of the Motor Car had overheated. See photo 10 – 15 below.





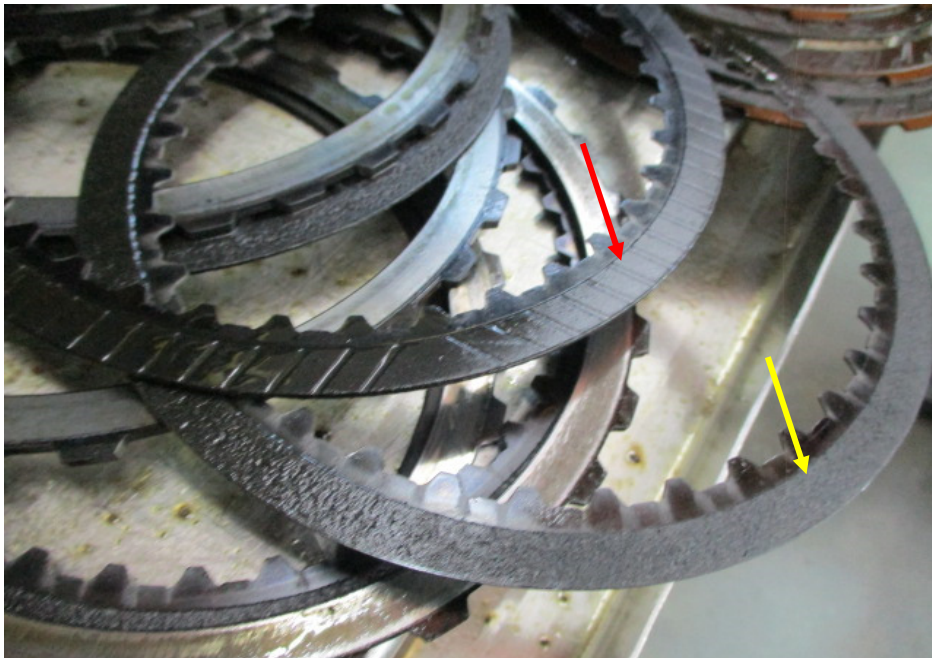
**Photo 10** shows the Motor Car's transmission assembly dismantled with all mechanical parts inside the transmission housing dismantled and separated. This was on 24 August 2020. Examination of these mechanical parts revealed signs that the transmission of the Motor Car had overheated.



**Photo 11** shows burnt marks (arrowed) found on several transmission gear set. This is an indication of an overheated transmission.

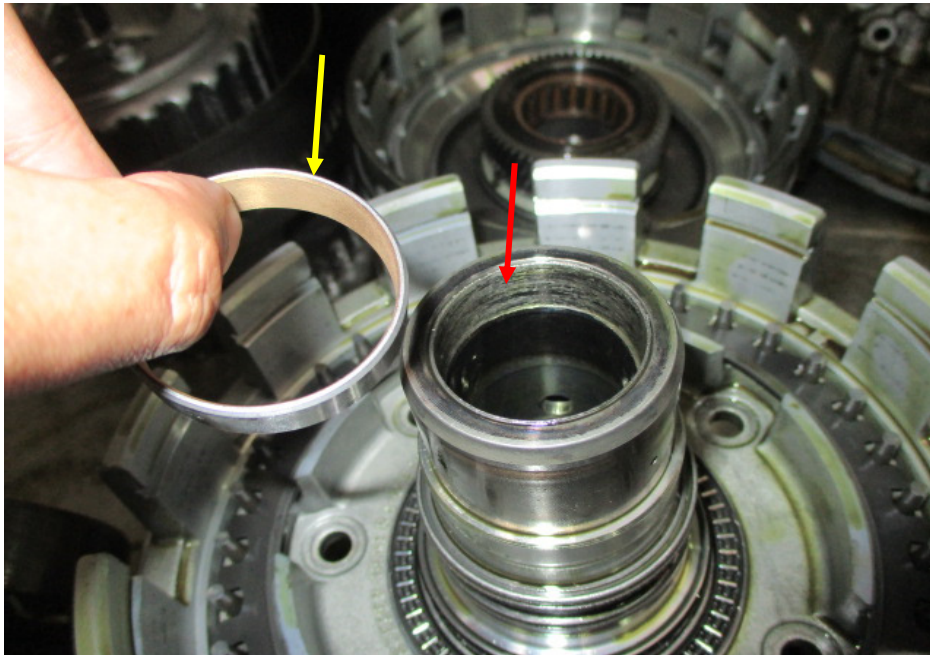


**Photo 12** shows the clutch plates and clutch discs that were removed from the Motor Car's transmission assembly.



**Photo 13** shows signs of worn clutch plate. The lines (red arrow) on the frictional surface of the clutch plate were no longer visible (yellow arrow) on some of the Motor Car's clutch plate. This is an indication of a worn clutch plate.





**Photo 14** shows scoring marks (red arrow) seen on the inner circumference of the worn bushing as compared to a new bushing (yellow arrow). The scoring marks seen on the worn bushing is an indication of overheating.



**Photo 15** shows one of the diaphragms attached to the transmission input shaft broken.



## Conclusion

18. Basing on the observations gathered during the course of my inspection of the Motor Car and its dismantled transmission assembly, it would appear to me that the transmission of the Motor Car had overheated. The overheating was either a result of transmission gear slippage as seen from the worn clutch plates after the Motor Car's transmission assembly was dismantled, or from the condition of the Motor Car's transmission fluid, which was found to be in a burnt/blackened condition.
19. For the first possible cause (transmission gear slippage), the worn clutch plates were not able to hold or engage the gear set adequately, causing the Motor Car's transmission to slip. The inability to hold or engage the gear set adequately creates an extensive amount of heat arising from frictional resistance when the clutch plates rub against each other (unable to be held in place). This heat burns the transmission fluid flowing along the various gears, clutches, shafts etc that are within the transmission assembly.
20. Transmission fluid that is burnt loses its viscosity and is not able to provide adequate protective film (lubrication) between the moving gears and shafts that are within the transmission assembly. This creates additional frictional heat, leaving the burnt marks as seen on some of the gear sets after the transmission assembly of the Motor Car was dismantled.
21. On the other hand, the transmission gear slippage of the Motor Car could have also been caused by the condition of the transmission fluid of the Motor Car as seen at the time of my inspection. Transmission fluid that has not been replaced at regular interval will similarly lose its viscosity characteristic. As commented in the preceding paragraph, there will be inadequate protective film (lubrication) between moving gears and shafts within the transmission assembly, which would lead to frictional heat generating when the transmission is in operation. The clutch plate correspondingly wears off due to the inadequate protective film (lubrication) causing slippage in the transmission gears of the Motor Car.
22. For this case, regardless of whether the worn clutch plates or the condition of the transmission fluid was the root cause of the Motor Car's transmission gear slippage, both these causes would usually have to be present for some time before a Motor Car's transmission system will fail/breakdown.

23. To further explain paragraph 22, like all friction material, the wearing off of the friction material of the clutch plate will happen over a period of time and; the condition of transmission fluid does not deteriorate overnight. A safe recommended mileage range for transmission fluid replacement is typically after about 30,000km or 40,000km mileage of usage. Transmission fluid that has not been replaced after a significant mileage of usage loses its viscosity and lubricating abilities.
24. Given that the Motor Car travelled a distance of approximately 1,148km since Ms Tan Gee Wai took possession, either of this root cause would more than likely had existed before the Motor Car was handed over to her.
25. Similarly, the Motor Car's faulty front right seat belt buckle that triggered the illumination of the SRS light would typically fail after activation of the Motor Car's SRS, like the deployment of the driver's air bag and/or driver's seat belt. Since the Motor Car was not involved in any accident during this 1,148km, it would not be unreasonable to expect that the faulty front right seat belt buckle of the Motor Car had also existed before the Motor Car was handed over to Ms Tan Gee Wai.
26. The failure/breakdown of the Motor Car's transmission system and faulty front right seat belt buckle renders the Motor Car not road worthy as the Motor Car may potentially become immovable posing a danger to the driver and other road users, and potentially fail to restrain a driver to the driver seat when the SRS is activated. To return the Motor Car to a road worthy condition, its transmission assembly needs to be overhauled (at minimum) or replaced with a new unit. The front right seat belt buckle needs to be replaced with a new part.

**Ang Bryan Tani**

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