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29th May 2019

Fatal Accident Investigation Team

Traffic Police Department
Singapore Police Force
10 Ubi Avenue 3
Singapore 408865

MECHANICAL INSPECTION REPORT OF MOTOR BUS JDS 8768

1. We refer to your request on 29th April 2019 to conduct a physical inspection of a motor bus bearing registration number JDS 8768 (herein referred to as "**Motor Bus**"), which was involved in a fatal road traffic accident on 26th February 2018.
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Motor Bus that may have contributed to the accident.
3. Following the request, we had carried out a physical inspection of the Motor Bus on 27th May 2019 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. We now set out below our observations and comments with respect to this inspection.

General Condition

4. The mileage of the Motor Bus at the time of our inspection was not able to be recorded as the whole dashboard including the odometer has been damaged by the accident.
5. The Motor Bus was observed to have sustained extensive major damages at its frontal portion. Its right & left doors, body panels. Its windscreens lower bumper was observed to be damaged; its front panel was observed to be damaged and its entire windshield was observed to be shattered and pushed inwards towards the rear of the Motor Bus at time of our inspection. See Photo 1 - 18



Photo 1 shows the damaged instrument cluster. Therefore no mileage is recorded at the time of our inspection.



Photo 2 shows the number plate of the Motor Bus at the time of our inspection.



Photo 2 shows a general view of the front body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its front portion and its entire front windshield (circled) was observed to be shattered and pushed inwards towards the rear as a result of the accident's collision.



Photo 3 shows a general view of the front body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its front portion (circled) as a result of the accident's collision.



Photo 4 shows a general view of the front right side body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its front right portion as a result of the accident's collision.



Photo 5 shows a close up view of the front right side body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its front portion as a result of the accident's collision.



Photo 6 shows a close up view of the right side body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its front portion as a result of the accident's collision.



Photo 7 shows a close up view of the driver's cabin and its various driver systems at the time of our inspection and was observed to have sustained extensive damages, the operational road testing and electronics systems check of motor bus is immobilized as a result of the accident's collision.



Photo 8 shows a close up view of the driver's foot well and its various driver systems at the time of our inspection and was observed to have sustained extensive damages, the operational road testing and electronics systems check of motor bus is immobilized as a result of the accident's collision.



Photo 9 shows a general view of the front & left side body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its side portion as a result of the accident's collision.



Photo 10 shows a close up view of the front and left side body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its front entry/exit door upper portion as a result of the accident's collision.



Photo 11 shows a close up view of the front and left side body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its front entry/exit door lower portion as a result of the accident's collision.



Photo 12 shows a close up view of the left side body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its side windscreen as a result of the accident's collision.



Photo 13 shows a close up view of the left side body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its side wheel arch portion as a result of the accident's collision.



Photo 14 shows a general view of the rear right body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at its rear right portion as a result of the accident's collision.



Photo 15 shows a close up view of the rear windscreen of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at sections of its side windscreen and body panel portion as a result of the accident's collision.



Photo 16 shows a close up view of the rear right body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained extensive damages at sections of its side windscreen and body panel portion as a result of the accident's collision.



Photo 17 shows a general view of the rear right portion (circled) of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained extensive damages at its rear right portion as a result of the accident's collision.



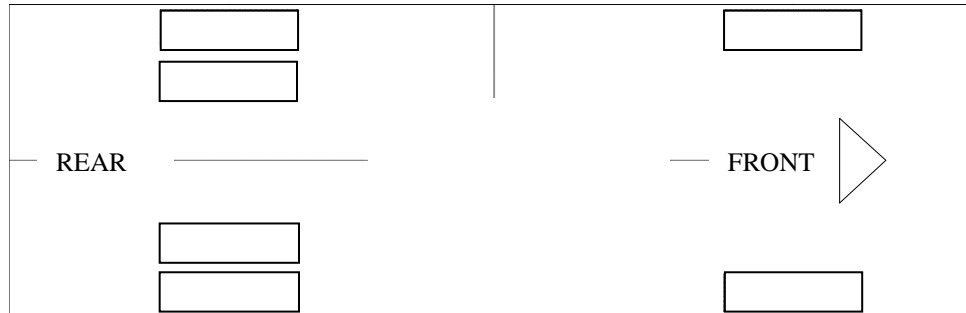
Photo 18 shows a close up view of the rear right portion of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained extensive damages at its rear right portion as a result of the accident's collision.

Tyres and Wheel Rims

6. The 5 out of 6 tyres fitted on the Motor Bus were all observed to be in serviceable condition and sufficiently inflated for vehicular operation. Only the front left tyre was found to be deflated and dislodged from the rims likely due to the impact caused by the accident. We did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. The tyre brand, tyre size and remaining tread depth of the Motor Bus's 6 tyres were recorded as follows:-

TOYO M170 11 R22.5 (5.9mm)

TOYO M170 11 R22.5 (14mm) (Dislodged)



TOYO M170 11 R22.5 (10.4mm)

TOYO M170 11 R22.5 (14.2mm)

7. The 6 tyres were observed to be wrapped around standard alloy wheel rims. Only the front left tyre was found to be deflated and dislodged from the rims likely due to the impact caused by the accident. The other 5 tyres were found to be without any damage. See photo 18 – 21 below.



Photo 18 shows the condition of the front right tyre of the Motor Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 14.2mm. The tyre was also observed to be sufficiently inflated for vehicular operation.



Photo 19 shows the condition of the rear right tyre of the Motor Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 10.4mm. The tyre was also observed to be sufficiently inflated for vehicular operation.



Photo 20 shows the condition of the front left tyres of the Motor Bus, which were observed to be deflated and dislodged from the rims likely due to the impact caused by the accident. With remaining tread depth of approximately 14mm.



Photo 21 shows the condition of the rear right tyres of the Motor Bus, which were observed to be in serviceable condition with remaining tread depth of approximately 5.9mm. The tyres, which were wrapped around standard alloy wheel rims, were also observed to be sufficiently inflated for vehicular operation.

Engine Compartment & Operating Fluids

8. Upon examination of the various operational fluid of the Motor Bus, only the engine oil and coolant tank compartment of the Motor Bus could not be inspected due to the induced damage of the accident to the engine compartment area, we had observed all the parts and components other than the engine compartment to be intact and unaffected by the accident. The brake fluid and steering fluid were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.
9. Further examination of the operational fluids revealed no sign(s) or indication(s) of fluid leakage and/or fluid stain within the other various fluids compartment of the Motor Bus.
10. Our subsequent checks on the underside of the Motor Bus visually, the various undercarriage components of the Motor Bus were observed to be intact and without any visible damage except for the damages caused by the accident. See photo 22 – 25 below.



Photo 22 shows the general engine compartment of the Motor Bus located at the front of the Motor Bus. No inspection could be done due to the extensive induced frontal damage into the cabin area from the accident.



Photo 23 shows the close up engine compartment of the Motor Bus was located at the front of the Motor Bus. No inspection could be done due to the extensive induced frontal damage into the cabin area from the accident.



Photo 24 shows the engine undercarriage of the Motor Bus. No leakage or fluids was observed at time of our inspection.



Photo 25 shows the power steering fluid of the Motor Bus. It was observed to have no fluid reading due to the induced damage to it likely cause by the accident at the time of our inspection

Steering System & Braking System

11. The mechanical components of the Motor Bus's steering system were all found to be visually intact and undamaged. Static test on the steering system of the Motor Bus also revealed no abnormality to the steering system. We did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions. Our visual examination of the various steering components which had included the rack and pinion, tie rods, tie rod ends and ball joints had revealed that these components were all generally in good condition. See photo 26 to 28 below.



Photo 26 shows some of the mechanical components (arrowed) of the Motor Bus's steering system. The steering system of the Motor Bus shows to be intact and is likely to be in serviceable condition at the time of accident.



Photo 27 shows the front right wheel components of the front steering system of the Motor Bus. The various undercarriage components of the Motor Bus were all observed to be intact and without any visible damage. This had included the steering rack and steering ball joints (arrowed) of the Motor Bus, which were observed to be securely attached to the front right wheel.

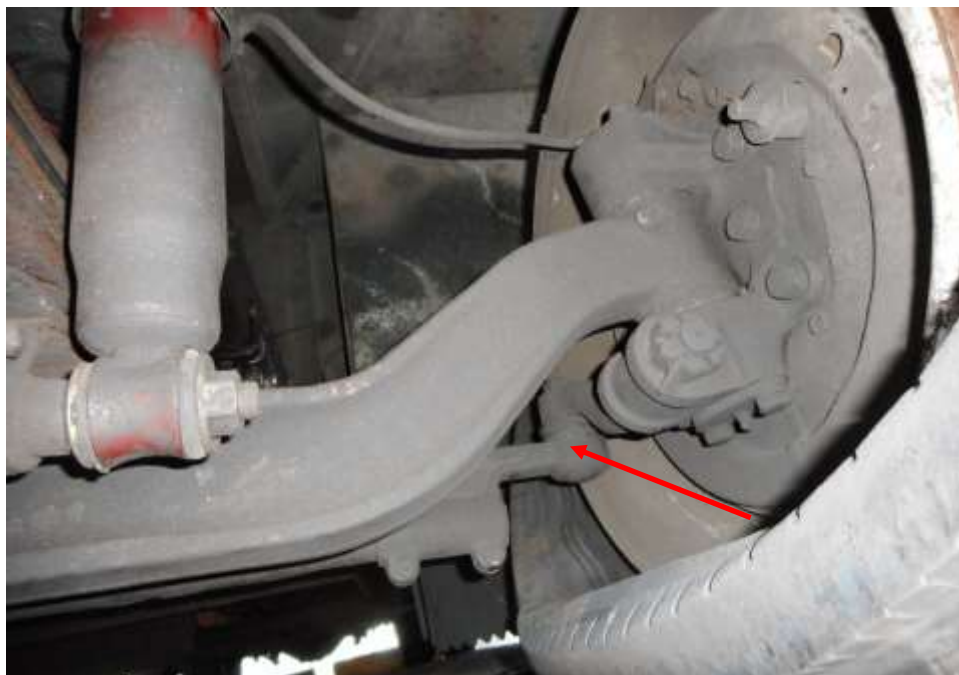


Photo 28 shows the front left wheel components of the front steering system of the Motor Bus. The various undercarriage components of the Motor Bus were all observed to be intact and without any visible damage. This had included the steering rack and steering ball joints (arrowed) of the Motor Bus, which were observed to be securely attached to the front left wheel.

12. The braking system of the Motor Bus was noted to be of Air-over-hydraulic brake system. Briefly, in this system, compressed air is used to press onto the brake shoes (for drum brakes) or onto the brake pads (for disc brakes), through the respective braking mechanism, thus slowing the rotation of the wheels.

13.3 of air tanks in particular were observed to be also in serviceable condition. But the reading of the air built up of the air brake cylinder was (unable) to be viewed or tested due to the damage on the instruments panel in the driver's cabin. See photo 29.



Photo 29 shows the damaged instrument cluster. Therefore no reading is recorded for the air-braking system.

14. In general, our visual inspection of the mechanical components of the Motor Bus's Air-braking system appear to suggest that its braking system was in serviceable condition at the material time of accident. See photo 30 – 34 below.



Photo 30 shows a general view of the air tank, valves, pipes and hoses, which are some of the components for the air-assisted braking system of the Motor Bus. This was at the underside of the Motor Bus's body. There were no damages observed at time of our inspection.



Photo 31 shows some of the Air-brake relay unit of the Motor Bus's braking system (including hoses). Visual check on the mechanical components shows that it was in serviceable condition at the time of accident.



Photo 32 shows a close up view of first and second air cylinders, valves and hoses of the air-assisted braking system of the Motor Bus. This was at the underside of the Motor Bus's body. There were no damages observed at time of our inspection.



Photo 33 shows a close up view of the third air cylinder, valves and hoses of the air-assisted braking system of the Motor Bus. This was at the underside of the Motor Bus's body. There were no damages observed at time of our inspection.



Photo 34 shows the release of residue air in cylinder indicating the air-cylinder was in serviceable condition during time of our inspection.

Electronic Safety / Operational indicators

15. The Motor Bus's automatic self-test of the functionality of its various electronic operating systems at the time of our inspection was not able to be recorded as the whole dashboard including the odometer has been damaged by the accident

Others

16. Based on my finding on the servicing records for the duration 1st February 2016 to 20th February 2019, provided by the bus maintenance company of this Motor Bus:-
17. The last servicing of the Motor Bus was carried out on 20th February 2019. During this servicing, the brake linings (brake pads) and various components are amongst the items that were replaced. Prior to this, there was previous replacement carried out on the brake linings and various brake components on 02nd November 2016, 17th February 2017, 23 August 2017, 26th October 2017 and 04th June 2018.

Conclusion

18. Generally, the servicing records provided had showed the Motor bus was regularly maintained.
19. An operational test of the Motor Bus was not able to be performed due to the induced impact damages to the operational components of the Motor Bus. (unable to operated)
20. The observation gathered from our physical inspection of the Motor Bus had indicated no evidence to suggest possible mechanical failure to the Motor Bus that may have contributed to the accident.
21. The 5 out of 6 tyres fitted on the Motor Bus were all observed to be in serviceable condition and sufficiently inflated for vehicular operation. Only the front left tyre was found to be deflated and dislodged from the rims likely due to the impact caused by the accident. However we did not find any tear cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. All with remaining tread depth of approximately mm to 5.9mm-14.2mm.

Sherwin Beh

Technical Investigator

Ang Bryan Tani

AMSOE, AMIRTE, AFF SAE, M.MATAI, AFF.Inst.AEA

Senior Technical Investigator

Technical Investigation & Reconstructionist (SAE-A)

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