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Our Ref : CI/TPD19011811/P

16th August 2019

Fatal Accident Investigation Team

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

MECHANICAL INSPECTION REPORT OF MOTOR BUS PZ 1144K

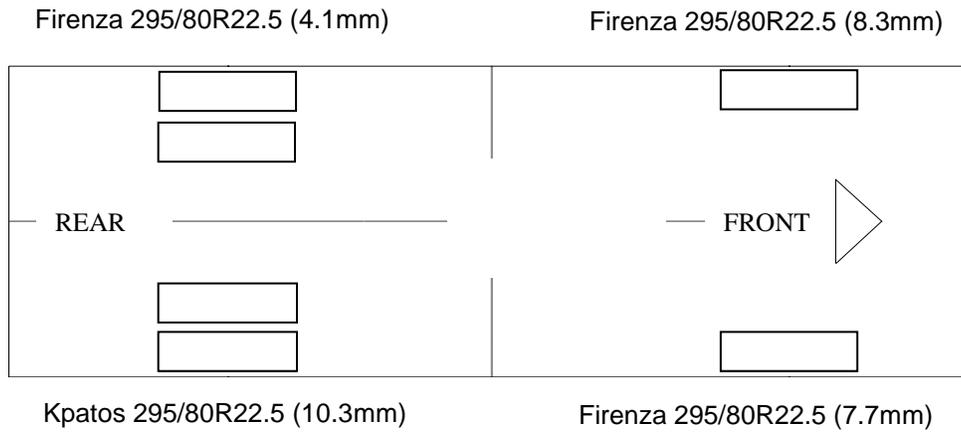
1. I refer to your request on 3rd July 2019 to conduct a physical inspection of a Motor Bus bearing registration number PZ 1144K (herein referred to as "**Motor Bus**"), which was involved in a fatal road traffic accident on 19th June 2019.
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Motor Bus that may have contributed to the accident.
3. Following the request, I had carried out a physical inspection of the Motor Bus on 14th August 2019 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. I now set out below my observations and comments with respect to this inspection.

General Condition

4. The mileage of the Motor Bus at the time of my inspection was 287,809km.
5. The Motor Bus was observed to have sustained damages at its frontal and rear portion. Its front bumper, rear right brake lamp, rear bonnet hinge and rear bumper was damage as a result of the accident at the time of my inspection.

Tyres and Wheel Rims

6. The 2 front tyres and 4 rear tyres of the Motor Bus were observed to be in serviceable condition and sufficiently inflated for vehicular operation. I 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 6 tyres of the Motor Bus were recorded as follows:-



7. The 6 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photo 1 – 11 below.



Photo 1 shows a general view of the instrument cluster of the Motor Bus at the time of my inspection. The mileage of the Motor Bus was 287,809km



Photo 2 shows a general view of the front body of the Motor Bus at the time of my inspection. The Motor Bus was observed to sustain damage at its front portion. Its front bumper was damaged as a result of the accident.



Photo 3 shows a close up view of the front body of the Motor Bus at the time of my inspection. The Motor Bus was observed to sustain damage at its front portion. Its front bumper (circled) was damaged as a result of the accident.



Photo 4 shows a general view of the Motor Bus's rear body at the time of my inspection. The Motor Bus was observed to sustained damage at its rear portion. Its rear right brake lamp, rear bonnet hinge and rear bumper was damaged as a result of the accident.



Photo 5 shows a close up view of the Motor Bus's rear body at the time of my inspection. The Motor Bus was observed to sustained damage at its rear portion. Its rear right brake lamp (circled) and rear bumper (arrowed) was damaged as a result of the accident.



Photo 6 shows a general view of the right body of the Motor Bus at the time of my inspection. The Motor Bus was observed to be in good general condition and unaffected to by the accident.



Photo 7 shows a general view of the left body of the Motor Bus at the time of my inspection. The Motor Bus was observed to be in good general condition and unaffected to by the accident.



Photo 8 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 7.7 mm. The tyre, which was wrapped around standard steel wheel rim, was also observed to be sufficiently inflated for vehicular operation. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres that were fitted on the Motor Bus.



Photo 9 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 10.3mm. The tyre, which was wrapped around standard steel wheel rim, was also observed to be sufficiently inflated for vehicular operation.



Photo 10 shows the condition of the rear left tyres of the Motor Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 4.1mm. The tyres, which were wrapped around standard steel wheel rim, were also observed to be sufficiently inflated for vehicular operation. There was also no damage found on all 6 steel wheel rims of the Motor Bus.



Photo 11 shows the condition of the front left tyres of the Motor Bus, which were observed to be in serviceable condition with remaining tread depth of approximately 8.3mm. There was also no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres that were fitted on the Motor Bus.

Engine Compartment & Operating Fluids

8. The impact from the collision had affected the engine compartment of the Motor Bus. Parts towards the rear of the engine compartment were observed to be damaged. The hinges of the Motor Bus rear bonnet were also affected and I was unable to unlock and lift the rear bonnet to carry out examination of the Motor Bus's engine compartment. The various operating fluids like its engine coolant, brake fluid and transmission fluid etc were hence unable to be inspected.
9. However the reading of air brake cylinder for the air brakes can be visually read on the instrument cluster of the Motor Bus. See photo 12 and 13 below.



Photo 12 shows the damage to the rear bonnet hinges (arrowed) Motor Bus rear bonnet, rendering it unable to be unlocked and lifted up to carry out examination of the Motor Bus engine compartment as a result of the accident.



Photo 13 shows the air readings from the air brake cylinders of the Motor Bus at the time of my inspection. The air in the cylinder (arrowed) was observed to be of insufficient level at the time of my inspection

Steering System & Braking System

10. Static brake tests conducted on the Motor Bus revealed no abnormality. The air brake booster had responded well to the various tests conducted. There was also no abnormal movement of the brake pedal when it was depressed. In general, the static brake tests had suggested that there was no internal leakage of pressure/vacuum in the braking system of the Motor Bus. The braking system of the Motor Bus was likely to be in serviceable condition at the material time. This was also taking into consideration that the air brake was of sufficient level, and also that there was no sign(s) of air leakage along the brake hoses, brake pipes and air cylinders.
11. Static test on the steering system of the Motor Bus 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 had revealed that these components were all generally in good condition. See photo 14 - 22 below.



Photo 14 shows the brake pipe (arrowed) at the rear right wheel of the Motor Bus. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Bus. My static tests of the Motor Bus's braking system, along with my visual examination of the various mechanical components in the braking system, had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Bus was likely to be in serviceable condition at the material time of accident.

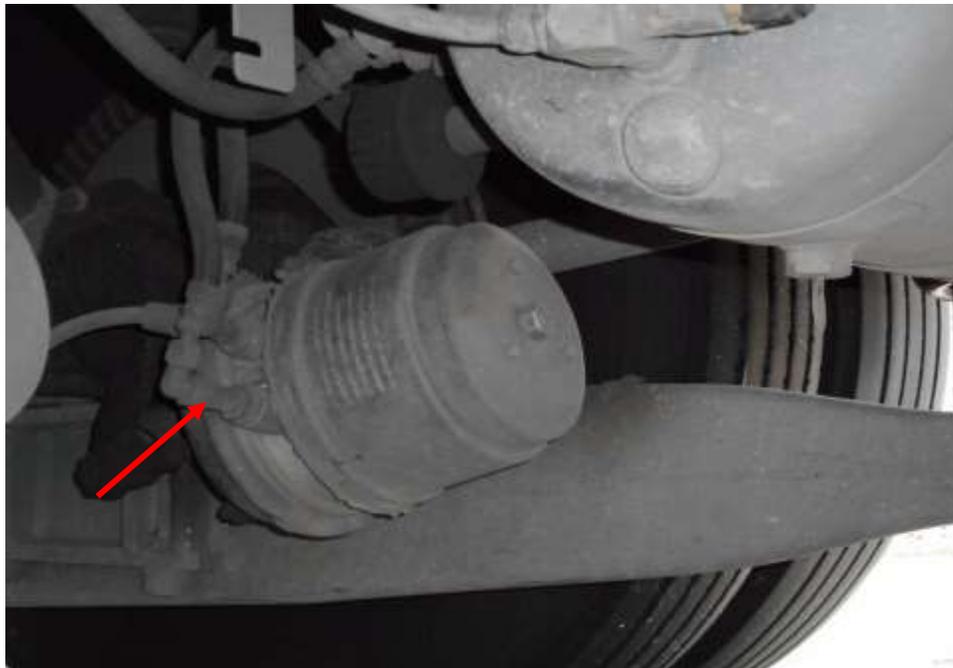


Photo 15 shows the brake pipe (arrowed) at the rear left wheel of the Motor Bus. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Bus. My static tests of the Motor Bus's braking system, along with my visual examination of the various mechanical components in the braking system, had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Bus was likely to be in serviceable condition at the material time of accident.



Photo 16 shows the brake pipe (arrowed) at the front right wheel of the Motor Bus. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Bus. My static tests of the Motor Bus's braking system, along with my visual examination of the various mechanical components in the braking system, had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Bus was likely to be in serviceable condition at the material time of accident.



Photo 17 shows the brake pipe (arrowed) at the front left wheel of the Motor Bus. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Bus. My static tests of the Motor Bus's braking system, along with my visual examination of the various mechanical components in the braking system had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Bus was likely to be in serviceable condition at the material time of accident.



Photo 18 shows the air brake cylinder (arrowed) at the undercarriage of the Motor Bus. I did not observe any leakage of air brake fluid at the time of my inspection of the Motor Bus. My static tests of the Motor Bus braking system, along with my visual examination of the various mechanical components in the braking system had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Bus was likely to be in serviceable condition at the material time of accident.



Photo 19 shows the various undercarriage components at the front right wheel of the Motor Bus, in particular the steering tie rod end (arrowed). The various steering components were all found to be intact, suggesting that the steering system of the Motor Bus was likely to be in serviceable condition at the material time of accident. There was also no sign of fluid stain(s) observed on the various undercarriage components.



Photo 20 shows the various undercarriage components at the front left wheel of the Motor Bus, in particular the steering tie rod end (arrowed). The various undercarriage components of the Motor Bus were all found to be intact without any visible damage. There was also no sign of fluid stain(s) observed on the various undercarriage components.



Photo 21 shows the steering box component (arrowed) at the undercarriage of the Motor Bus was found to be intact without any visible damage. There was also no sign of fluid stain(s) observed on the various undercarriage components.



Photo 22 shows the front right wheel of the Motor Bus turned to its full left. During my steering system test, I did not experience any abnormal free play and/or resistance when I had turned the steering wheel towards full left and full right. This would suggest that the steering system of the Motor Bus was likely to be in serviceable condition at the material time of accident.

Electronic Safety / Warning Indicators

12. The Motor Bus was not fitted with any electronic safety feature(s) like Anti-Brake Lock System (ABS), Supplemental Restraint System (SRS) etc. There hence no test carried out on the functionality of these systems.

Operational Behaviour of the Motor Bus

13. A short operational test to the Motor Bus, to primarily determine whether there was any abnormality to its various operating systems like its engine system, its transmission system, steering system and braking system was subsequently carried out. The test was conducted by driving the Motor Bus forward, stopping, before reversing and coming to a stop again.

14. During the operational test, the various transmission gears of the Motor Bus were able to be engaged without any difficulty by stepping on the clutch pedal and manually shifting the gear lever. There were no abnormal sounds heard and/or abnormal behaviour of the Motor Bus's engine system. It was able to move forward and backward normally. The braking system was also found to be in working condition as the Motor Bus was able to slow down and come to a complete stop upon depressing of the brake pedal. Refer to photo 2 and 22.

Conclusion

15. From my physical inspection of the Motor Bus, it appears that its engine system, steering system, braking system and transmission system were all in serviceable condition. I did not find any evidence(s) to suggest that there was possible mechanical failure to the Motor Bus that may have caused and/or contributed to the accident. This is also taking into consideration that the operational test of the Motor Bus, which I had conducted, did not produce any sign(s) or symptom(s) to suggest that there was any abnormality to its various operating systems.
16. The 2 front tyres and 4 rear tyres fitted on the Motor Bus were also found to be in serviceable condition. I 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 6 tyres were also observed to be sufficiently inflated for vehicular operation with remaining tread depth of approximately 4.1mm – 10.3mm.

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