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23rd January 2018

General Investigation Team B
Traffic Police Department
Singapore Police Force
10 Ubi Avenue 3
Singapore 408865

MECHANICAL INSPECTION REPORT OF TOW TRUCK XD 8880T

1. We refer to your request on 13th December 2017 to conduct a physical inspection of a tow truck bearing registration number XD 8880T (herein referred to as "**Tow Truck**"), which was involved in a road traffic accident on 13th November 2017.
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Tow Truck that may have contributed to the accident.
3. Following the request, we had carried out a physical inspection of the Garbage Truck on 23rd January 2018 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 Tow Truck at the time of our inspection was 26,320km.
5. The Tow Truck was observed to have sustained damages at its left front body. Its front left lower bumper was observed to be buckled inwards pushing towards the rear of the Tow Truck. Its windshield was observed to be cracked. Its steering systems, braking systems & transmission systems were amongst the affected components observed to be damaged due to the accident's collision impact.
6. Further investigation on the other parts of the Tow Truck reveals that the front left tyre across the tread pattern surface was chipped off. See photo 1 to 6.

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Photo 1 shows a general view of the rear body of the Tow Truck at the time of our inspection. The Tow Truck was observed to be in good condition without any damages on its rear body portion.



Photo 2 shows a general view of the front body of the Tow Truck at the time of our inspection. The Tow Truck was observed to have sustained damages at its left front body. Its front left lower bumper was observed to be buckled inwards pushing towards the rear of the Tow Truck. Its windshield was observed to be cracked. Its steering systems, breaking systems & transmission systems were amongst the affected components observed to be damaged due to the accident's collision impact.



Photo 3 shows a general view of the front left body of the Tow Truck at the time of our inspection. Its front left lower bumper was observed to be buckled inwards pushing towards the rear of the Tow Truck. Its windshield was observed to be cracked. Its steering systems, breaking systems & transmission systems were amongst the affected components observed to be damaged due to the accident's collision impact.



Photo 4 shows a semi close-up view of the cracked windshield.



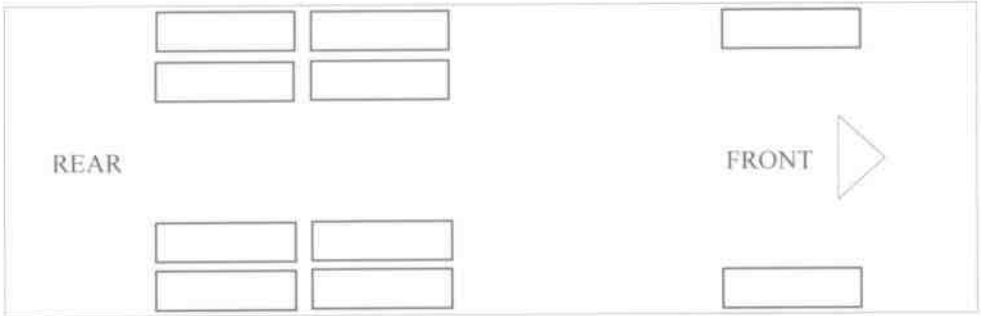
Photo 5 shows a semi close-up view of the damaged area on the front left hand side of the Tow Truck.



Photo 6 shows a semi close-up view of the damaged air pressure tank. It was dislodged from the original installation likely due to the accident's impact.

Tyres and Wheel Rims

7. The 10 tyres fitted on the Tow Truck were found to be in serviceable condition despite 01 tyre from the front left was found to be with damages. The front left tyre on the tread pattern surface was found to be chipped off. However, further investigation revealed there was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 10 tyres. The 10 tyres were sufficiently inflated for vehicular operation.
8. 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 tyres. The tyre brand, tyre size and remaining tread depth of the Tow Truck's 10 tyres were recorded as follows:-

Firenza SSM 10 315/80 R22.5 (10mm)	Firenza SSD 08 315/80 R22.5 (10mm)	Agate HF121 315/80 R22.5 (10mm) (Chipped off)
		
Firenza SSM 10 315/80 R22.5 (8mm)	Agate HF638 315/80 R22.5 (5mm)	Agate HF121 315/80 R22.5 (8mm)

9. The 10 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photo 7 – 12 below.



Photo 7 shows the condition of the front left tyre of the Tow Truck, which was observed to be chipped off at time of our inspection. However, it was still in serviceable condition with remaining tread depth of approximately 10mm.



Photo 8 shows the condition of the front right tyre of the Tow Truck, which was observed to be in serviceable condition with remaining tread depth of approximately 8mm.



Photo 9 shows the condition of the rear left tyres (centre axle) of the Tow Truck, which were observed to be in serviceable condition with remaining tread depth of approximately 10mm. The tyres were also observed to be sufficiently inflated for vehicular operation.



Photo 10 shows the condition of the rear left tyres of the Tow Truck, which were observed to be in serviceable condition with remaining tread depth of approximately 10mm. The tyres were also observed to be sufficiently inflated for vehicular operation.



Photo 11 shows the condition of the rear right tyres of the Tow Truck, which were observed to be in serviceable condition with remaining, tread depth of approximately 8mm. The tyres were also observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s) on the outer and the inner sidewalls.



Photo 12 shows the condition of the rear right tyres (centre axle) of the Garbage Truck, which were observed to be in serviceable condition with remaining, tread depth of approximately 5mm. The tyres, which were wrapped around standard alloy wheel rims, were also observed to be sufficiently inflated for vehicular operation.

Engine Compartment & Operating Fluids

10. The engine compartment of the Tow Truck could not be closely examined as it was located directly under the front cabin. To access the engine compartment, the front cabin of the Tow Truck would have to be manually lifted by using the hydraulic jack fitted on the Tow Truck that is specific for this purpose. At the time of our inspection, the motor for this hydraulic jack was not able to operate due to some supporting components were affected due to the damages sustained from the accidents impact. We were thus only able to inspect the engine area from the underside of the Tow Truck.
11. From the underside, the engine assembly was observed to be intact and unaffected by the collision. Except for the transmission assembly, the propeller shaft that was connected to the centre axle was observed to be dislodged from the original installation. It was believe to be broken due to the accident's impact. However, there was no sign(s) or indication(s) of fresh fluid leak and/or fluid stain found.
12. For this case, we was not able to inspect all of the operating fluids such as the engine oil, brake fluid, steering fluid & engine coolant as the fluids were inaccessible due to their reservoir tank and/or dip stick being within the engine compartment of the Tow Truck. See photo 13 - 15 below.



Photo 13 shows a semi close-up view of the damaged hydraulic jack that lifted up the front cabin likely due to the accident's collision impact.



Photo 14 shows a general view of the underside of the engine compartment area. The engine assembly was observed to be intact and unaffected by the collision. There was also no sign(s) or indication(s) of fresh fluid leak and/or fluid stain found.



Photo 15 shows the propeller shaft of the Tow Truck at the time of our inspection. It was observed to be dislodged from the original installation likely due to the accident's collision impact.

Steering System & Braking System

13. The mechanical components of the Tow Truck's steering systems were found to be damaged due to the accident's collision impact. The steering shaft of the Tow Truck was observed to be dislodged from the front left wheel. The steering ball joint was observed to be missing from its housing bracket. Hence, disabling the basic operational function of the steering system. Therefore, steering test could not be conducted. See photo 16 & 17 below.



Photo 16 shows the steering rod at the front left wheel of the Tow Truck. It was observed to be dislodged from the original installation likely due to the accident's collision impact.

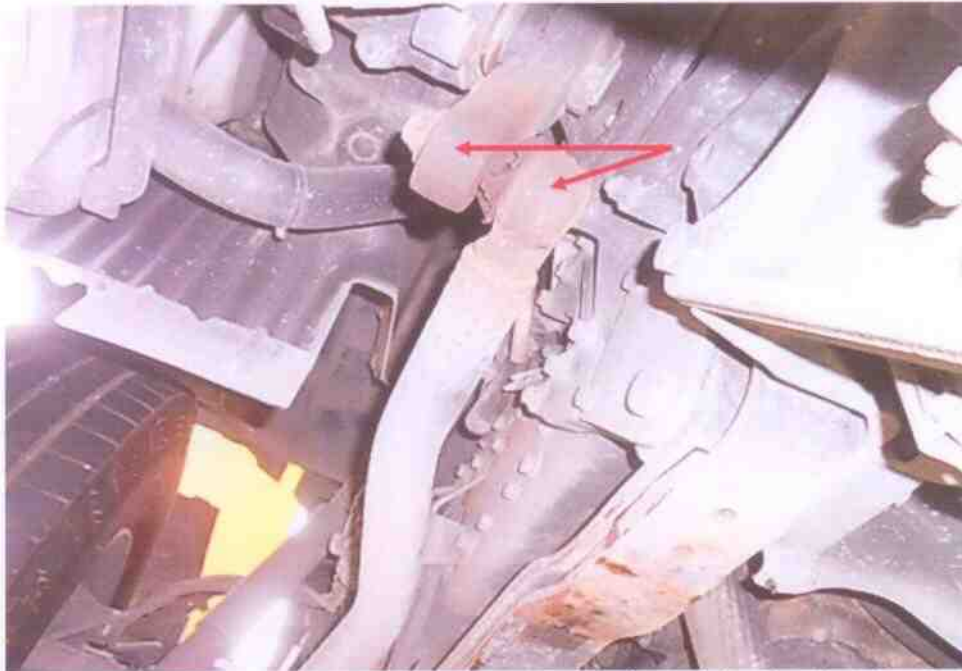


Photo 17 shows the steering components at the front right wheel of the Tow Truck. It was observed to be intact and without any visible damage.

14. The braking system of the Tow Truck was noted to be of a full air-assisted braking 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.
15. Upon starting the engine of the Tow Truck; there was an abnormal hissing sound while in idling mode. Further investigation on the abnormal sound found that it came from the air pressure tank. A checked on the air pressure meter display on the dashboard revealed that the pressure was not up to the operational range. Hence, concludes that there's air leakage of compressed air that comes from the air tanks, hoses and connecting valves likely due to the accidents collision impact.
16. Checks on the brake shoes (brake pads) at the front wheels and rear wheels of the Tow Truck revealed that the brake shoes (brake pads) were in serviceable condition with sufficient frictional material for operational purposes. In general, our visual inspection of the mechanical components of the Tow Truck's braking system appear to suggest that its braking system was in serviceable condition at the material time of accident despite the leakage of pressurised air due to the damage of its air tanks, hoses and connecting valves likely due to the accidents collision impact. See photo 18 - 22 below.



Photo 18 shows the air tanks, valves, pipes and hoses, which was found to be damaged as a result of the accident's impact.



Photo 19 shows the hoses of the air pressure tanks, which are some of the components for the air-assisted braking system of the Tow Truck. These components were found to be cut & dislodged from the original installation. Hence, causing air leakage to the compressed air for the braking system.



Photo 20 shows the air pressure meter on the dashboard, it indicates that there a low pressure on the air pressure while in idling mode.



Photo 21 shows the brake hoses (arrowed) leading to the rear right wheel of the Tow Truck. At the time of our inspection, the various mechanical components of the air-assisted hydraulic braking system of the Tow Truck were all found to be in good general condition and securely fitted.



Photo 22 shows the brake air cylinder (arrowed) at the front right wheel of the Tow Truck. Such air cylinder, which is amongst the various components for the full air-assisted braking system, can be found attached to all the front wheels and all the wheels of the Tow Truck. Upon our checks, we had found all the brake air cylinders to be undamaged and securely fitted to all the wheels of the Tow Truck.

Electronic Safety / Speed Limit Device

17. The Tow Truck was not fitted with any electronic safety feature(s) like Anti-Brake Lock System (ABS), Supplemental Restraint System (SRS) etc. There was hence no test carried out on the functionality of these systems.
18. The speed limiting device was similarly unable to be tested due to the damages sustained on its steering system & braking system.

Operational Behaviour of the Tow Truck

19. We were hence not able to carry out any operational test(s) to primarily determine whether there was any operational abnormality to its engine system, transmission system, steering system and braking system due to the damages sustained on the earlier mentioned operating systems. This was likely due to the accident's impact damages.

Conclusion

20. For this particular case, we were unable to determine whether there was any possible mechanical failure to the Tow Truck that may have contributed to the accident. This was mainly due to the extent of damages that it had sustained. Its transmission system, steering system and braking system were all damaged as a result of the accident.
21. The 10 tyres fitted on the Tow Truck were also found to be in serviceable condition despite 01 tyre from the front left tyre was found to be with damages likely due to the accident's collision impact. The front left tyre on the tread pattern surface was found to be chipped off. However, further investigation revealed there was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 10 tyres. The 10 tyres were sufficiently inflated for vehicular operation with remaining tread depth of approximately 5mm to 10mm.
22. Our findings were based solely on a static and visual inspection of the Tow Truck. No operational test could be carried out to the Tow Truck given the extent of damages that it had sustained as a result of the accident.



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