

Your Ref: TP/IP/49159/2017
Our Ref : CI/TPD18000512/Z

22nd January 2018

Fatal Accident Investigation Team

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

MECHANICAL INSPECTION REPORT OF PRIME MOVER XD 3311C

1. We refer to your request on 20th September 2017 to conduct a physical inspection of a prime mover bearing registration number XD 3311C (herein referred to as "**Prime Mover**"), which was involved in a road traffic accident on 14th September 2017.
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Prime Mover that may have contributed to the accident.
3. Following the request, we had carried out a physical inspection of the Prime Mover on 20th October 2017 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 Prime Mover at the time of our inspection was not recorded as its engine could not be started due to a flat battery.
5. The Prime Mover was observed to have sustained relatively minor impact damages at its left & right front body. Its front left & front lower bumper was observed to be slightly scratched. Its left hand side headlamp was observed to be broken. See photo 1 – 8 below.

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Photo 1 shows a general view of the front portion of the Prime Mover at the time of our inspection. The Prime Mover was observed to have sustained relatively minor damage at its front body.



Photo 2 shows a general view of the front left body of the Prime Mover at the time of our inspection. The Prime Mover was observed to have sustained relatively minor damage at its left front lower bumper (circled) & cracked left headlamp.

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Photo 3 shows a general view of the front right body of the Prime Mover at the time of our inspection. The Prime Mover was observed to have sustained relatively minor damage at its left front lower bumper (circled).



Photo 4 shows a semi-close up view of the minor scratches on the left front lower bumper of the Prime Mover.

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Photo 5 shows a semi-close up view of the front right body of the Prime Mover at the time of our inspection. The Prime Mover was observed to have sustained relatively minor damage at its front right lower bumper (circled).



Photo 6 shows a close up view of the minor scratches on the left front lower bumper of the Prime Mover.

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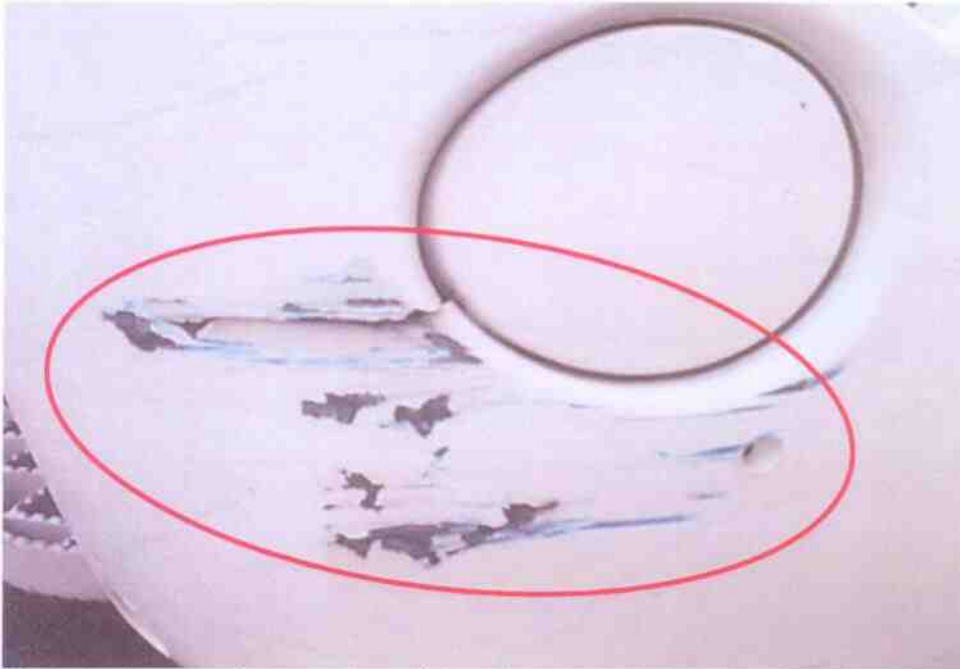


Photo 7 shows a close up view of the minor scratches on the front right lower bumper of the Prime Mover.



Photo 8 shows a semi-close up view of the minor scratches on the front lower bumper of the Prime Mover.

Tyres and Wheel Rims

6. The 2 front tyres and 8 rear tyres that were fitted on the Prime Mover were all observed to be in serviceable condition and sufficiently inflated for vehicular operation. 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 10 tyres. The tyre brand, tyre size and remaining tread depth of the Prime Mover's 10 tyres were recorded as follows:-

Good Year Fuelmax S 315/80R R22.5 (3mm)	Ling Long LLDO1 315/80R R22.5 (11mm)	Bridgestone R150 315/80R 22.5 (11mm)
		
Good Year Fuelmax S 315/80R R22.5 (6mm)	Ling Long LLDO1 315/80R R22.5 (10mm)	Bridgestone R150 315/80R 22.5 (10mm)

7. The 10 tyres of the Prime Mover were observed to be wrapped around standard alloy wheel rims that were found to be without any damage. See photo 9 – 14 below.

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Photo 9 shows the condition of the front left tyre of the Prime Mover, which was observed to be in serviceable condition with remaining tread depth of approximately 11mm.



Photo 10 shows the condition of the front right tyre of the Prime Mover, which was observed to be in serviceable condition with remaining tread depth of approximately 10mm.



Photo 11 shows the condition of the rear left tyres of the Prime Mover, which were observed to be in serviceable condition with remaining tread depth of approximately 3mm. The tyres were also observed to be sufficiently inflated for vehicular operation.



Photo 12 shows the condition of the rear right tyres of the Prime Mover, which were observed to be in serviceable condition with remaining tread depth of approximately 6mm. The tyres were also observed to be sufficiently inflated for vehicular operation.



Photo 13 shows the condition of the rear left tyres (Centre Axle) of the Prime Mover, which were observed to be in serviceable condition with remaining, tread depth of approximately 11mm. The tyres were also observed to be sufficiently inflated for vehicular operation.



Photo 14 shows the condition of the rear right tyres (Centre Axle) of the Prime Mover, 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.

Engine Compartment & Operating Fluids

8. The engine compartment of the Prime Mover could not be closely examined as it was located directly under the front cabin. To access the engine compartment, the front cabin of the Prime Mover would have to be manually lifted by using the hydraulic jack fitted on the Prime Mover 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 a flat battery. We were thus only able to inspect the engine compartment from the underside of the Prime Mover.
9. From the underside, the engine assembly and transmission assembly of the Prime Mover were both observed to be covered with fresh fluid. Suggesting that fluid leakage had occurred as a result of the accident.
10. With regard to the operating fluids, we were not able to inspect all operating fluids. The operating fluids were inaccessible due to their reservoir tanks and/or dip stick being within the engine compartment of the Prime Mover. See photo 15 - 19 below.



Photo 15 shows the front panel of the Prime Mover open for checks on some of the components of the cooling system.



Photo 16 shows the engine compartment of the Prime Mover at the time of our inspection. The engine compartment of the Prime Mover could not be closely examined as it was located directly under the front cabin.



Photo 17 shows from the underside, the engine assembly and transmission assembly of the Prime Mover were both observed to be covered with fresh fluid, suggesting that fluid leakage had occurred as a result of the accident.



Photo 18 shows from the underside, the engine assembly and transmission assembly of the Prime Mover were both observed to be covered with fresh fluid, suggesting that fluid leakage had occurred as a result of the accident.



Photo 19 shows from the underside, a deep scratch had occurred as a result of the accident. However, it does not affect the alignment of the steering rack.

Steering System & Braking System

11. The mechanical components of the Prime Mover's steering system were all found to be visually intact and undamaged. The steering shaft and steering rack of the Prime Mover were observed to be intact and securely attached to the front left wheel and front right wheel. The steering ball joints were also observed to be in a serviceable condition despite deep scratch observed on the below portion of the steering rack likely due to the consistency of the accident. Visually it does not show any misalignment on the steering system.
12. Although the steering system could not be tested at the time of our inspection (engine unable to be started), it is likely that the steering system of the Prime Mover was in serviceable condition at the material time of accident since its mechanical components were all found to be generally intact and securely fitted. See photo 20 & 21 below.



Photo 20 shows some of the undercarriage components at the front right side of the Prime Mover. We were not able to conduct any test(s) on the steering system of the Prime Mover as its engine could not be started. However our visual checks on the various mechanical components of the steering system like its steering shaft (arrowed) revealed all to be intact and in good condition. The steering system of the Prime Mover is hence likely to be in serviceable condition at the time of accident despite deep scratch observed on the below portion of the steering rack likely due to the consistency of the accident. Visually it does not show any misalignment on the steering system.

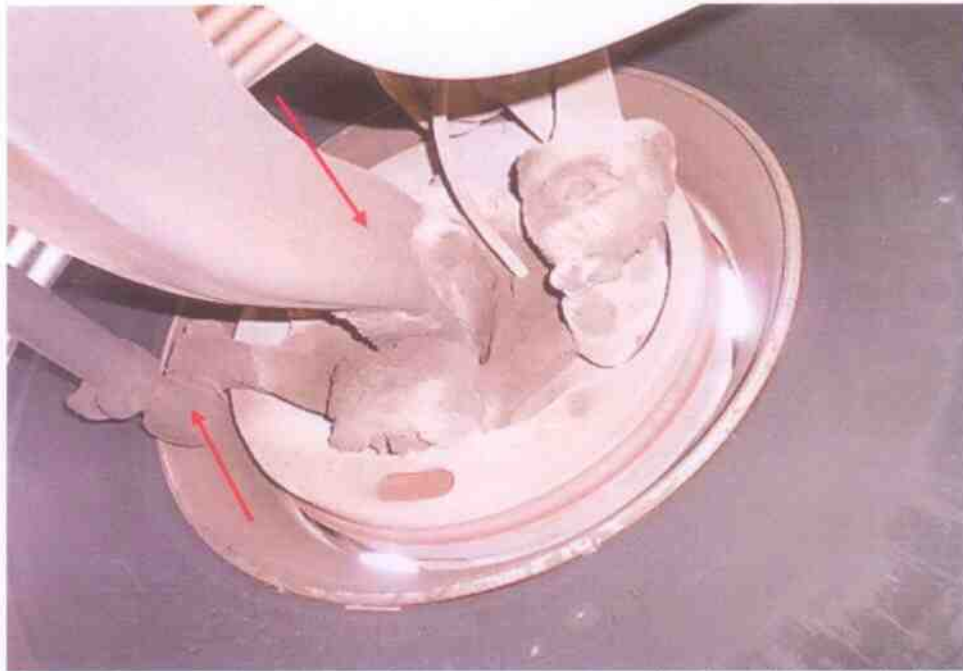


Photo 21 shows the undercarriage components at the front left wheel of the Prime Mover. The various undercarriage components of the Prime Mover were all observed to be intact and without any visible damage. This had included the steering rack (arrowed) of the Prime Mover.

13. The braking system of the Prime Mover 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.
14. Since the engine of the Prime Mover could not be started, we were hence not able to carry out test(s) on whether there was any leakage of compressed air that could have affected the braking efficiency of the Prime Mover. However the air pipes, air tanks and connecting valves had all appear to be in good general condition and securely fitted upon our visual examination of these parts.
15. Checks on the brake shoes (brake pads) at the front wheels and rear wheels of the Prime Mover 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 Prime Mover's braking system appear to suggest that its braking system was in serviceable condition at the material time of accident. See photo 22 - 26 below.



Photo 22 shows a general view of the air tanks, valves, pipes and hoses, which are some of the components for the full air-assisted braking system of the Prime Mover. These components were unaffected by the accident. It had all appeared to be in good general condition and securely fitted upon my visual examination of these parts.



Photo 23 shows a general view of the air tanks, valves, pipes and hoses, which are some of the components for the full air-assisted braking system of the Prime Mover. These components were unaffected by the accident. It had all appeared to be in good general condition and securely fitted upon my visual examination of these parts.



Photo 24 shows the brake air cylinder (arrowed) at the rear left & right wheel of the Prime Mover. 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 rear wheels. Upon checking, we had found all the brake air cylinders to be undamaged and securely fitted to all the wheels of the Prime Mover.

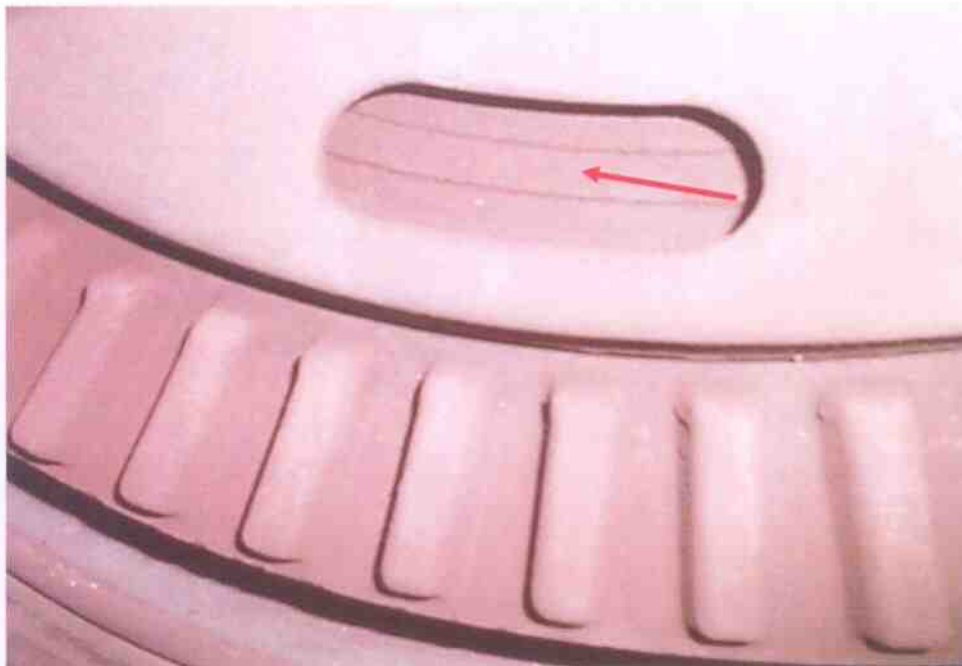


Photo 25 shows the brake shoes (brake pads) location at the rear left wheel of the Prime Mover. The brake shoes (brake pads) of the Prime Mover were all found to be in serviceable condition with sufficient frictional material for operational purposes.

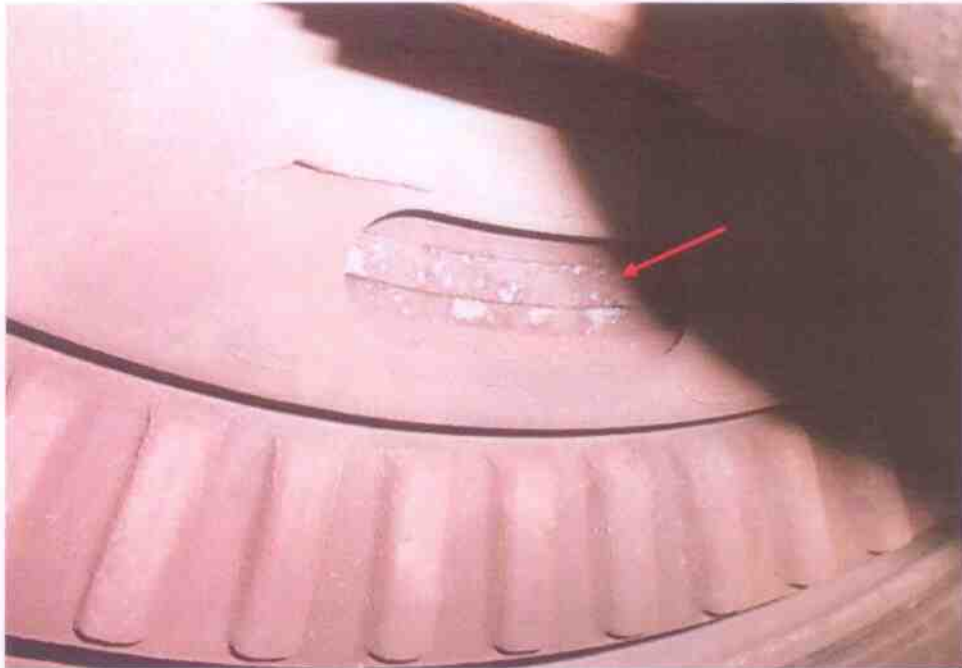


Photo 26 shows the brake shoes (brake pads) at the rear right wheel of the Prime Mover. The brake shoes (brake pads) of the Prime Mover were all found to be in serviceable condition with sufficient frictional material for operational purposes.

Electronic Safety / Speed Limit Device

16. The Prime Mover 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.
17. The speed limiting device (80km/hr) was similarly unable to be tested due to the Prime Mover's flat battery.

Operational Behaviour of the Prime Mover

18. As the engine of the Prime Mover could not be started, we were 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.

Conclusion

19. At the time of our inspection of the Prime Mover, its steering system and braking system could not be tested as the Prime Mover's engine could not be started. However basing on our observations, it would appear that the steering system and braking system of the Prime Mover were in serviceable condition. This is taking into consideration that all the various mechanical components were found to be intact and undamaged.
20. In general, the observation gathered from our physical inspection of the Prime Mover had indicated no evidence to suggest possible mechanical failure to the Prime Mover that may have contributed to the accident.
21. The 10 tyres fitted on the Prime Mover were also found to be in serviceable condition. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the surface of the 10 tyres. The tyres were also sufficiently inflated for vehicular operation with remaining tread depth of approximately 3mm to 11mm.



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