

Your Ref: TP/IP/50357/2018
Our Ref : CI/TPD18018432/Z

24th January 2019

General Investigation Team

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

MECHANICAL INSPECTION REPORT OF MOTOR LORRY GT 4254U

1. We refer to your request on 27th September 2018 to conduct a physical inspection of a motor lorry bearing registration number GT 4388A (herein referred to as "**Motor Lorry**"), which was involved in a road traffic accident on 04th September 2018.
2. The purpose of this inspection is to primarily determine if there was any possible mechanical failure to the Motor Lorry that may have contributed to the accident.
3. Following the request, we carried out a physical inspection of the Motor Lorry on 29th October 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 Motor Lorry at the time of our inspection was not recorded as its ignition system and front cabin was severely damaged by the collision.
5. The Motor Lorry had sustained extensive impact damage at its frontal, left, & right portion including its rear right tyre. The impact force was relatively significant, causing its entire front cabin to be pushed inwards and corrugated. Several mechanical parts and components at the frontal portion were also severely damaged as a result of the accident.
6. The dashboard, windshield, steering system, driver's brake/accelerator pedal, floor panel, driver's & passenger's doors/glass and braking system inside the front cabin were all observed to be pushed/ buckled inwards, towards the rear of the Motor Lorry. See photo 1 to 7 below.



Photo 1 shows a general view of the frontal portion of the Motor Lorry at the time of our inspection. The Motor Lorry was observed to have sustained extensive impact damage at its frontal, left & right portion. The impact force was relatively significant, causing its entire front cabin to be pushed inwards and corrugated.



Photo 2 shows a general view of the frontal right portion of the Motor Lorry at the time of our inspection. A number of mechanical parts and components at the frontal portion were also severely damaged as a result of the accident.

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Photo 3 shows a general view of the front left portion of the Motor Lorry at the time of our inspection. The Motor Lorry was observed to have sustained extensive impact damage at its front left portion. The impact force was relatively significant, causing its entire front cabin to be pushed inwards and corrugated.



Photo 4 shows the interior of the front cabin. The dashboard, steering wheel, floor panel and braking system (pedal) inside the front cabin were all observed to be pushed/buckled inwards, towards the rear of the Motor Lorry. This is consistent to the nature of this accident where the direction of impact onto the Motor Lorry was from the front to rear direction.

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Photo 5 shows a general view of the rear right portion of the Motor Lorry at the time of our inspection. The rear portion was observed to be unaffected by the accident.



Photo 6 shows a general view of the rear right portion of the Motor Lorry at the time of our inspection. The rear portion was observed to be unaffected by the accident. The rear portion (deflated tyres & misalignment of tail lamp) was observed to be relatively affected by the accident.



Photo 7 shows a general view of the rear portion of the Motor Lorry at the time of my inspection. The rear portion was observed to be unaffected by the accident.

Tyres and Wheel Rims

7. The 2 front tyres, rear right inner tyre and 2 rear left tyres of the Motor Lorry were 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 4 tyres.
8. As for the outer rear right tyre of the Motor Lorry, it was observed to be deflated likely due to the accident's collision. We found torn/cut mark on the outer rear right tyre that causes the tyre to be deflated as a result of the accident.
9. The tyre brand, tyre size and remaining tread depth of the 6 tyres were recorded as follows:-

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Falken linam R51x 155 R12c 8PR (3mm)

Falken linam R51x 185 R14c 8PR (5mm)

<div style="text-align: center;"> <input type="text"/> <input type="text"/> </div>	<div style="text-align: center;"> <input type="text"/> </div>
<div style="text-align: center;">REAR</div>	<div style="text-align: center;">FRONT</div>

Falken linam R51x 155 R12c 8PR (2mm)
(Cut/torn & deflated)

Falken linam R51x 185 R14c 8PR (5mm)

10. The 5 tyres (front left, front right, rear right (inner) & rear left (inner & outer)) were observed to be wrapped around a standard steel wheel rims that were found to be in a normal condition.
11. As for the rear right tyre (rear right outer) were observed to be wrapped around a standard steel wheel rims that were found to have sustained dented edges & torn/cut marks that caused the tyres to be deflated due to the accident's impact collision. See photo 8 – 13 below.



Photo 8 shows the condition of the front left tyre of the Motor Lorry, which was observed to be in serviceable condition with remaining tread depth of approximately 5mm. There was also no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of this tyre.



Photo 9 shows the condition of the front right tyre of the Motor Lorry. The front right tyre was observed to be in serviceable condition with remaining tread depth of approximately 5mm. There was also no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of this tyre.



Photo 10 shows the condition of the rear left tyres of the Motor Lorry, which was observed to be in serviceable condition with remaining tread depth of approximately 8mm. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of this 2 tyres.

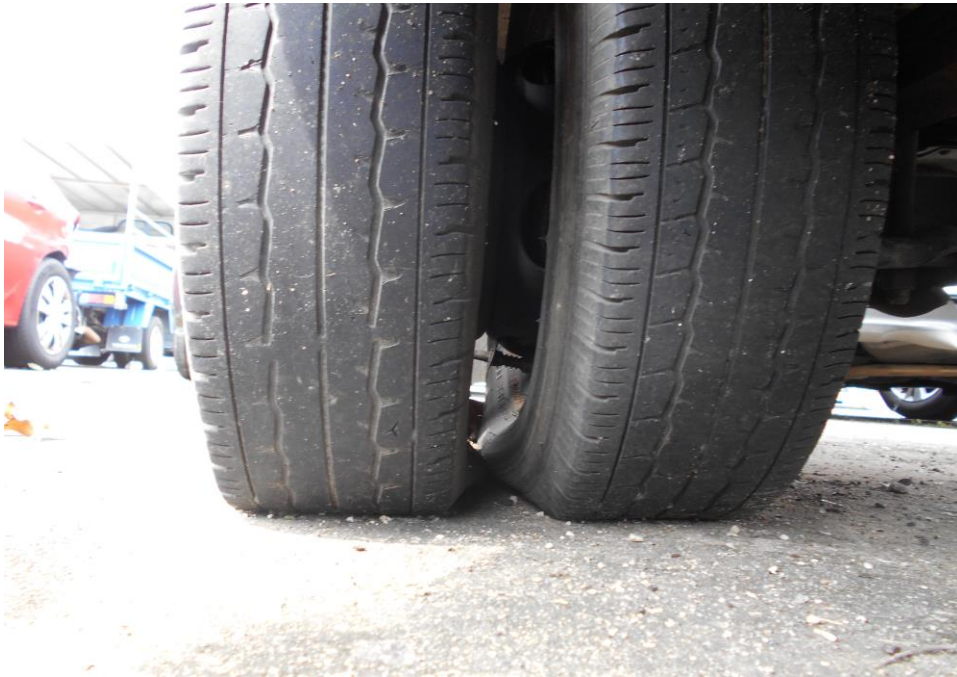


Photo 11 shows the condition of the rear right tyres of the Motor Lorry, which was observed to have sustained cut/torn mark & deflated with remaining tread depth of approximately 2mm. This was likely due to the accident's impact collision.



Photo 12 shows the condition of the rear right tyres (outer) of the Motor Lorry, which was observed to be deflated due to the dented rim & cut mark as a result of the accident.



Photo 13 shows the condition of the rear right tyres (outer) of the Motor Lorry, which was observed to be deflated due to the dented rim & cut mark as a result of the accident.



Photo 14 shows the condition of the rear right tyres (inner) of the Motor Lorry, which was observed to be unaffected by the accident's impact.

Engine Compartment & Operating Fluids

12. The engine compartment of the Motor Lorry, which was located beneath the front cabin, could not be closely inspected given the extensive damages to the front cabin. Our visual checks from the underside of the Motor Lorry had however appear to indicate that the engine assembly and transmission assembly were both intact and unaffected by the collision.
13. With regard to the operating fluids, we were unable to inspect most of the fluids. This is due to their reservoir tanks and/or dip stick being within the damaged area of the Motor Lorry. For the coolant fluid, we are able to visual the engine coolant reservoir tank that was located at the external right side of the cabin & it shows that the fluid was at a sufficient level mark. However, for brake fluid it shows an insufficient level inside the brake fluid reservoir. Further examination reveals that the brake fluid falls below the min lever mark at the reservoir tank.
14. Visual checks on the underside of the Motor Lorry had revealed its various undercarriage components to be intact and without visible damage. See photo 15 & 16 below.



Photo 15 shows the underside of the Motor Lorry, at the area where the engine is located. We were not able to closely inspect the engine compartment of the Motor Lorry due to the extensive damage to its front cabin. Our visual checks from the underside had however appear to indicate that the engine assembly and transmission assembly were both intact and unaffected by the collision.



Photo 16 shows the transmission assembly (arrowed) of the Motor Lorry intact and unaffected by the collision.

Steering System & Braking System

15. We were not able to conduct any tests on the steering system and braking system of the Motor Lorry. This was mainly due to the extensive damage of the Motor Lorry's front cabin, which had affected several mechanical components of the steering system and braking system like the steering wheel shaft and steering box amongst others as a result of the accident.
16. Brake fluids were observed to be insufficient in the brake reservoir tank. However, further visual examination on the brake hoses, brake reservoir tank and braking system related components reveals that it was not affected by the accident's impact collision.
17. We were however able to carry out visual checks on the mechanical components of the steering system. The steering shaft steering box and steering rack of the Motor Lorry 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. However, the steering box which was located at the front lower portion was found to be stuck to the buckled lower metal bumper portion likely due to the accident's impact collision. See photo 17 - 31 below.

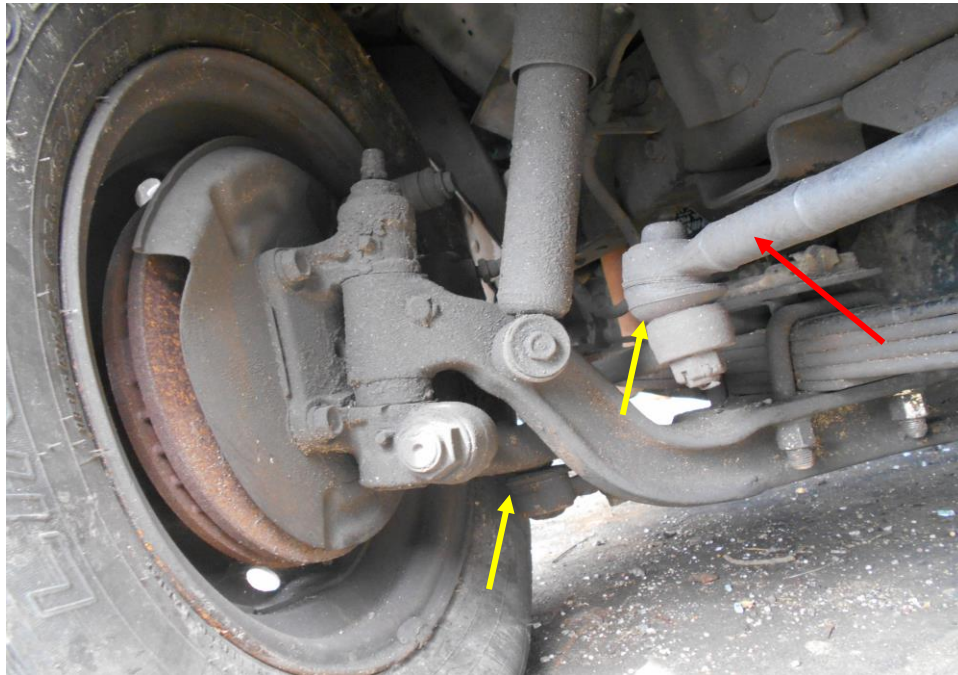


Photo 17 shows the undamaged steering shaft (red arrow) of the Motor Lorry. The steering tie rods (yellow arrow) of the Motor Lorry were however observed to be intact and securely attached to the front right wheel. The steering ball joints were also observed to be in a serviceable condition.



Photo 18 shows the undercarriage components at the front left wheel of the Motor Lorry. The various undercarriage components of the Motor Lorry were all observed to be intact and without any visible damage. This had included the steering rack (arrowed) of the Motor Lorry.

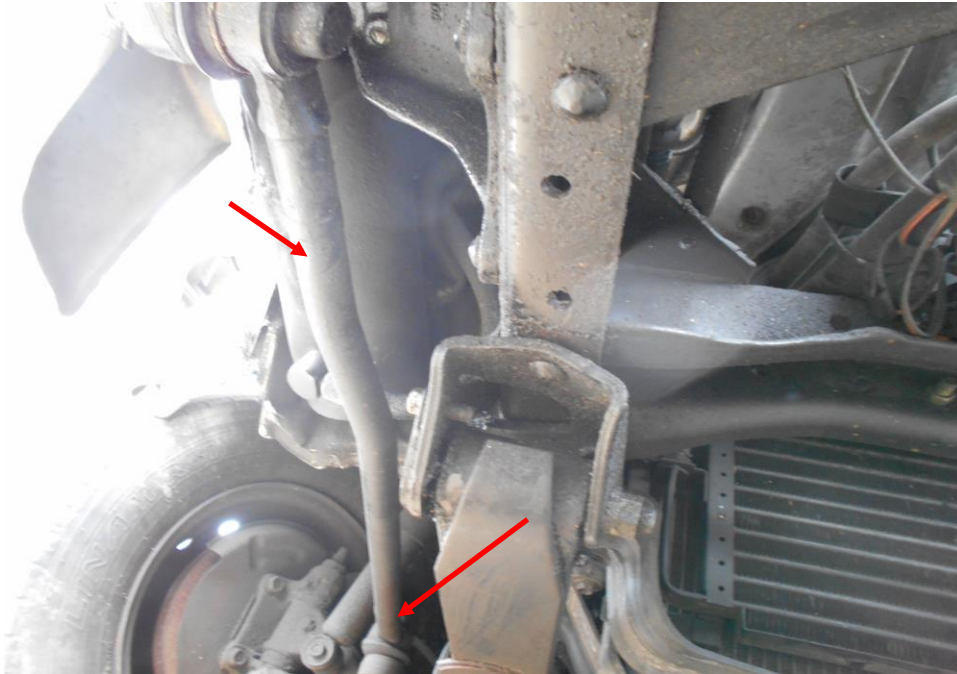


Photo 19 shows the undercarriage components at the front right wheel of the Motor Lorry. The steering rod was observed to be intact and without any visible damage.



Photo 20 shows the undercarriage components at the centre portion of the Motor Lorry. The steering rod was observed to be intact and without any visible damage.



Photo 21 shows the undercarriage components at the front right lower portion of the Motor Lorry. The steering box was observed to be stuck into the buckled lower metal bumper as a result of the accident which disabling the normal operation of the steering system.



Photo 22 shows the brake hose (arrowed) at the rear wheels of the Motor Lorry. At the time of our inspection, we did not find any sign(s) of brake fluid leakage along the brake hoses and brake pipes.



Photo 23 shows the brake hose (arrowed) at the rear wheels of the Motor Lorry. At the time of our inspection, we did not find any sign(s) of brake fluid leakage along the brake hoses and brake pipes.

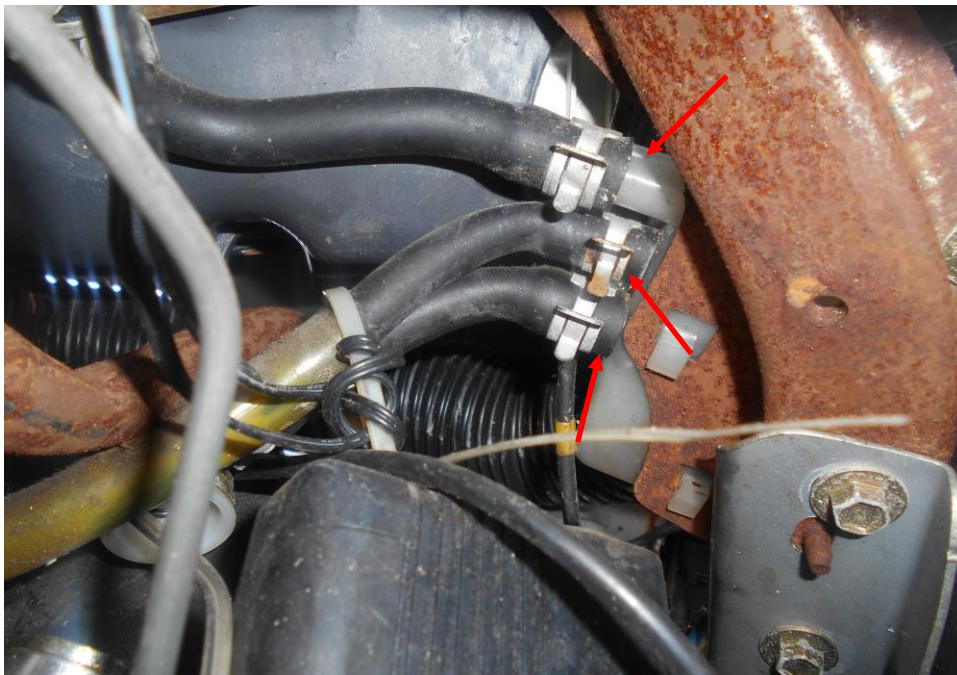


Photo 24 shows the brake hose (arrowed) at the outlet of the brake fluid reservoir of the Motor Lorry. At the time of our inspection, we did not find any sign(s) of brake fluid leakage along the brake hoses and brake pipes.

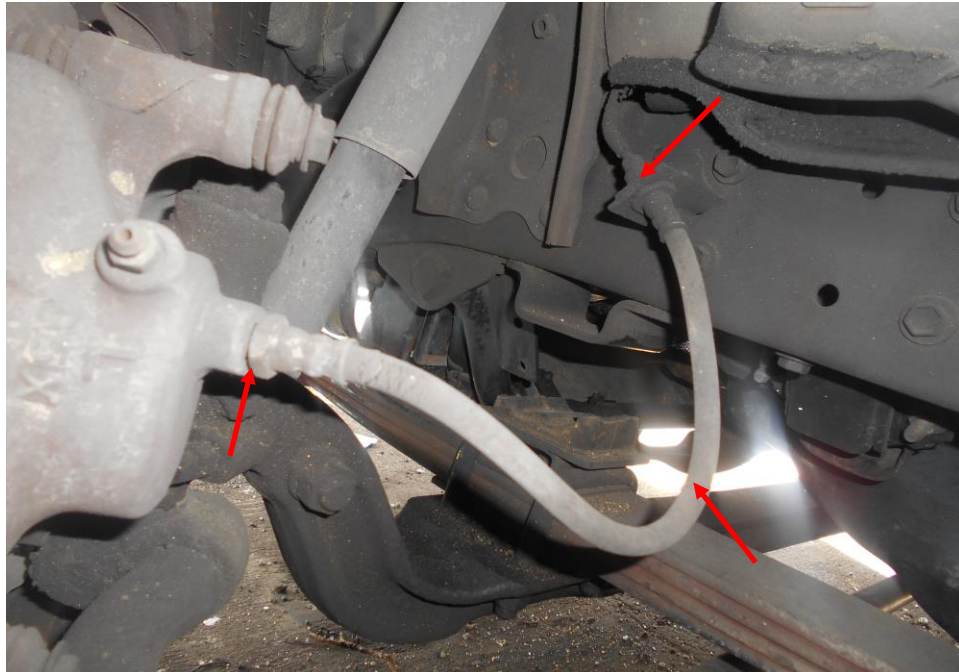


Photo 25 shows the brake hose (arrowed) at the undercarriage area of the Motor Lorry. At the time of our inspection, we did not find any sign(s) of brake fluid leakage along the brake hoses and brake pipes.

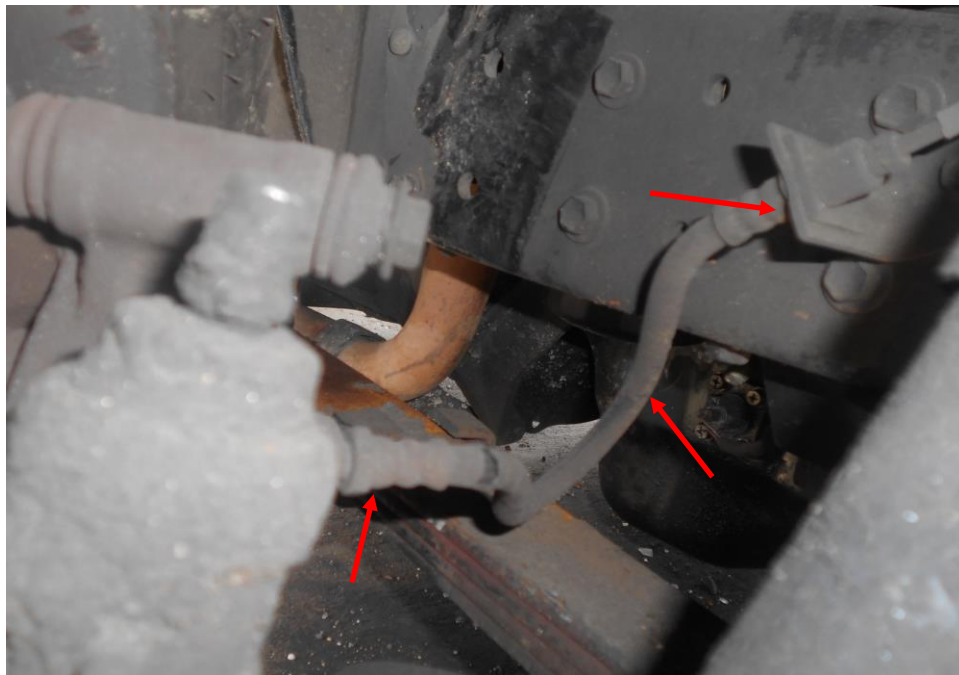


Photo 26 shows the brake hose (arrowed) at the undercarriage area of the Motor Lorry. At the time of our inspection, we did not find any sign(s) of brake fluid leakage along the brake hoses and brake pipes.



Photo 27 shows the brake booster & brake pedal of the Motor Lorry. At the time of our inspection, we did not find any sign(s) of brake fluid leakage around the Braking system components.

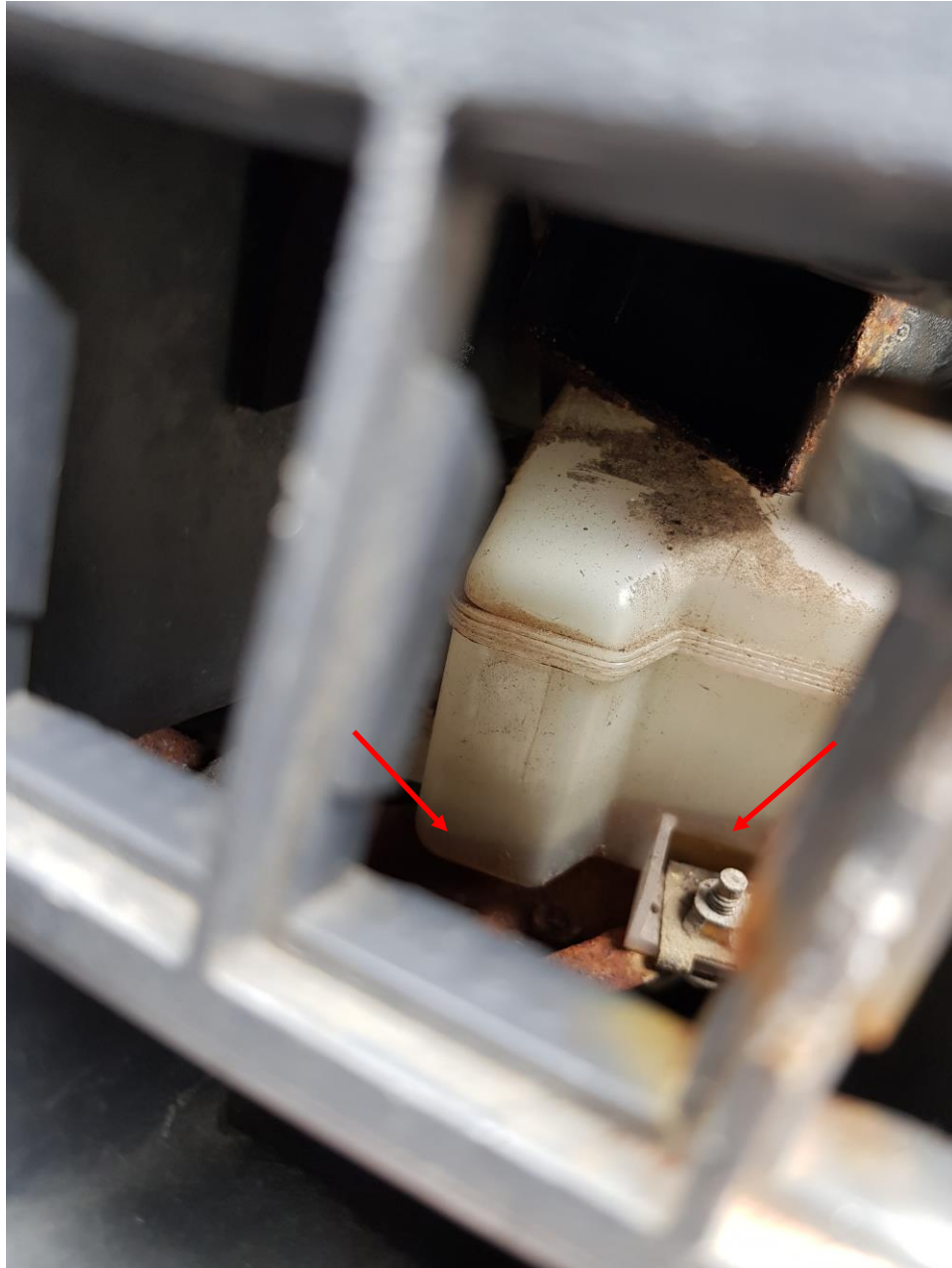


Photo 28 shows the insufficient brake fluid at time of our examination.

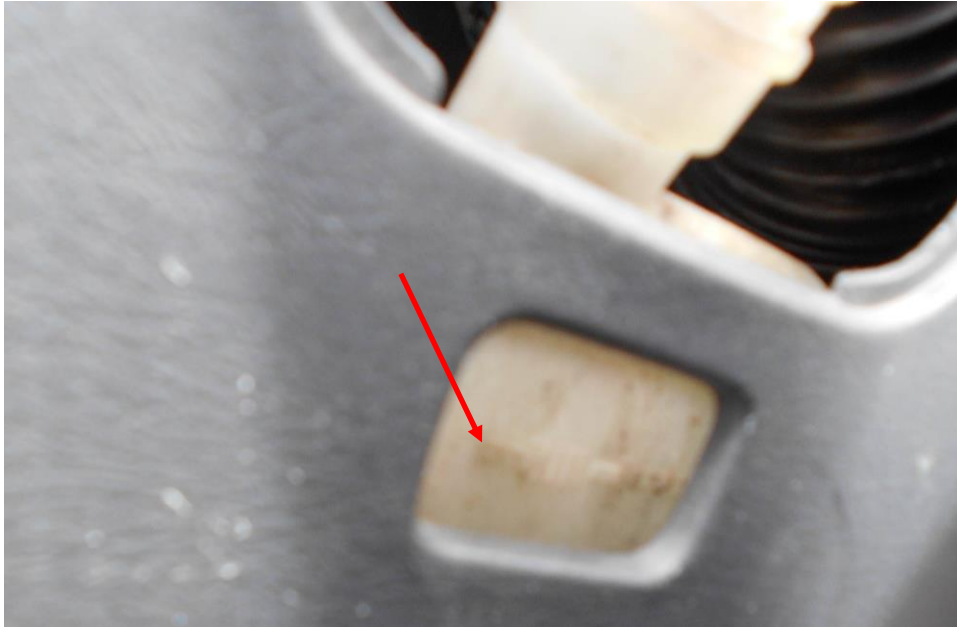


Photo 29 shows the minimum mark on the brake fluid reservoir.



Photo 30 shows the internal view of the brake fluid reservoir tank which was observed to be below the minimum mark of the reservoir tank.



Photo 31 shows the brake fluid indicator from inside the brake reservoir. We note that it was dry at time of our examination & no brake fluid was observed touching the indicator.

Electronic Safety / warning indicators

18. The Motor Lorry 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. In any case, as the test would involve cranking of the Motor Lorry's engine, the severe damages to the ignition system itself did not allow us to perform this test.

Operational Behaviour of the Motor Lorry

19. No operational test to primarily determine whether there was any abnormality to the engine system, transmission system steering system and braking system of the Motor Lorry could be conducted given the extent of damage that it had sustained.

Conclusion

20. At the time of our inspection of the Motor Lorry, its steering system could not be tested (due to damage as a result of the accident).
21. Its braking system was however found not to be in serviceable condition. This was due to the brake fluid found to be insufficient at time of our inspection. During our investigation on the braking system supporting components which includes brake hoses, brake booster and brake pedal, we did not find any damages to the said components that could cause the brake fluid leakage.
22. For this particular case, we are of the opinion that the insufficient brake fluid contributes to the braking deficiency at the material time of the accident. This is because if the brake fluid gets too low, air gets into the master cylinder. When this happens the brake pedal will get soft when it is pushed. Hence, conclusively the braking performance is affected if air gets in the brake's hydraulic system.
23. The 2 front tyres, rear right inner tyre and 2 rear left tyres of the Motor Lorry were 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 5 tyres.
24. As for the outer rear right tyre of the Motor Lorry, it was observed to be deflated likely due to the accident's collision. We found torn/cut mark on the outer rear right tyre that causes the tyre to be deflated as a result of the accident.
25. The 6 tyres remaining tread depth was measured to an approximately 2mm to 5mm each.

26. Our findings were based solely on a static and visual inspection of the Motor Lorry. No operational test could be carried out to the Motor Lorry given the extent of damage that it had sustained as a result of the accident.

Rohaizal A. Rahim
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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