LKK Auto Consultants Pte Ltd
Company Registration No. 199607198R
51 UBI AVE 1, #01-25 PAYA UBI INDUSTRIAL PARK, SINGAPORE 408933 TEL : (065) 62563561 FAX : (065) 67414108

Your Ref: TP/IP/47933/2019 5th September 2019
Our Ref : CI/TPD19013965/P

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

MECHANICAL INSPECTION REPORT OF POLICE HILUX GZ 3294D

1. I refer to your request on 22th Aug 2019 to conduct a physical inspection of a Police Hilux bearing registration number GZ 3294D (herein referred to as "**Police Hilux**"), which was involved in a road traffic accident on 1st Aug 2019.

2. The objective of the inspection is to determine if there was any possible mechanical failure to the Police Hilux that may have contributed to the accident.

3. Following the request, I had carried out a physical inspection of the Police Hilux on 4th Sep 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.

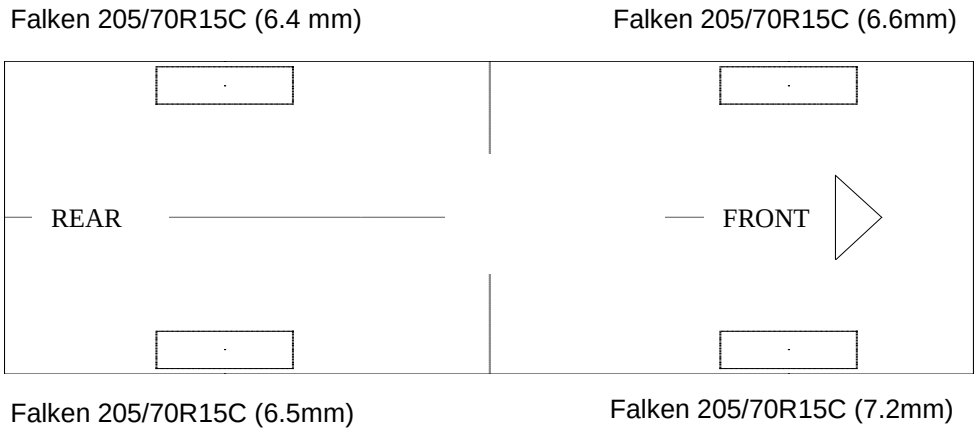
General Condition

4. The mileage of the Police Hilux at the time of my inspection was 431,102km.

5. The Police Hilux was observed to have sustained damage at its front portion. Its front bonnet, front grille, front bumper, front number plate, front radiator, left and right fender were amongst the body parts that were damaged as a result of the accident.

Tyres and Wheel Rims

6. The condition of the Police Hilux's 4 tyres was observed 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 4 tyres. The 4 tyres were also observed to be sufficiently inflated for vehicular operation. The tyre brand, tyre size and remaining tread depth of the 4 tyres were recorded as follows:-



7. The 4 tyres were observed to be wrapped around standard alloy wheel rims that were found to be without any damage. See photo 1 – 12 below.

Photo 1 shows a general view of the Police Hilux's front body at the time of my inspection. The Police Hilux was observed to have sustained damage at its front portion. Its front bonnet, front bumper, front grille, front number plate, front radiator, left and right fender were amongst the body parts that were damaged as a result of the accident.

Photo 2 shows the close up view of the Police Hilux's front body at the time of my inspection. The Police Hilux was observed to have sustained damage at its front bonnet (circled) as a result of the accident.

Photo 3 shows a close up view of the Police Hilux's front body at the time of my inspection. The front portion of the Police Hilux was observed to have sustained damage, its front grille, front bumper and number plate (arrowed) as a result of the accident.

Photo 4 shows a close up view of the Police Hilux's front body at the time of my inspection. The front portion of the Police Hilux was observed to have sustained damage, its front radiator (arrowed) as a result of the accident.

Photo 5 shows a general view of the Police Hilux's right body at the time of my inspection. The right portion of the Police Hilux was observed to have sustained damage; its right fender was damaged as a result of the accident.

Photo 6 shows a close up view of the Police Hilux's right body at the time of my inspection. The right portion of the Police Hilux was observed to have sustained damage; its right fender (circled) was damaged as a result of the accident.

Photo 7 shows a general view of the Police Hilux's left body at the time of my inspection. The left portion of the Police Hilux was observed to have sustained damage; its left fender was damaged as a result of the accident.

Photo 8 shows a close up view of the Police Hilux's left body at the time of my inspection. The left portion of the Police Hilux was observed to have sustained damage; its left fender (circled) was damaged as a result of the accident.

Photo 9 shows the condition of the front right tyre of the Police Hilux, which was observed to be in serviceable condition with remaining tread depth of approximately 7.2mm. The tyre was sufficiently inflated for vehicular operation with no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread. The 4 tyres of the Police Hilux were wrapped around standard alloy wheel rims without any damage.

Photo 10 shows the condition of the rear right tyre of the Police Hilux, which was observed to be in serviceable condition with remaining tread depth of approximately 6.5mm. The tyre was also observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s).

Photo 11 shows the condition of the rear left tyre of the Police Hilux, which was observed to be in serviceable condition with remaining tread depth of approximately 6.4mm. The tyre, which was wrapped around alloy wheel rim, was also observed to be sufficiently inflated for vehicular operation. The 4 tyres of the Police Hilux were wrapped around standard alloy wheel rims.

Photo 12 shows the condition of the front left tyre of the Police Hilux, which was observed to be in serviceable condition with remaining tread depth of approximately 6.6mm. 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 Police Hilux's 4 tyres.

Engine Compartment & Operating Fluids

8. Upon examination of the engine compartment of the Police Hilux, I had observed all the parts and components inside the engine compartment to be intact and unaffected by the accident. The engine oil and power steering fluid were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids. However the brake fluid and coolant were observed to be insufficient.

9. My subsequent checks on the underside of the Police Hilux however revealed sign(s) or indication(s) of brake fluid leak(s) and fluid stain(s).

10. Further examination of the engine compartment revealed no sign(s) or indication(s) of fluid leakage and/or fluid stain within the engine compartment of the Police Hilux. See photo 13 – 18 below.

Photo 13 shows a general view of the Police Hilux's engine compartment. The various parts and components inside the engine compartment were unaffected by the accident. There was also no sign(s) or indication(s) of fluid leakage and/or fluid stain within the engine compartment.

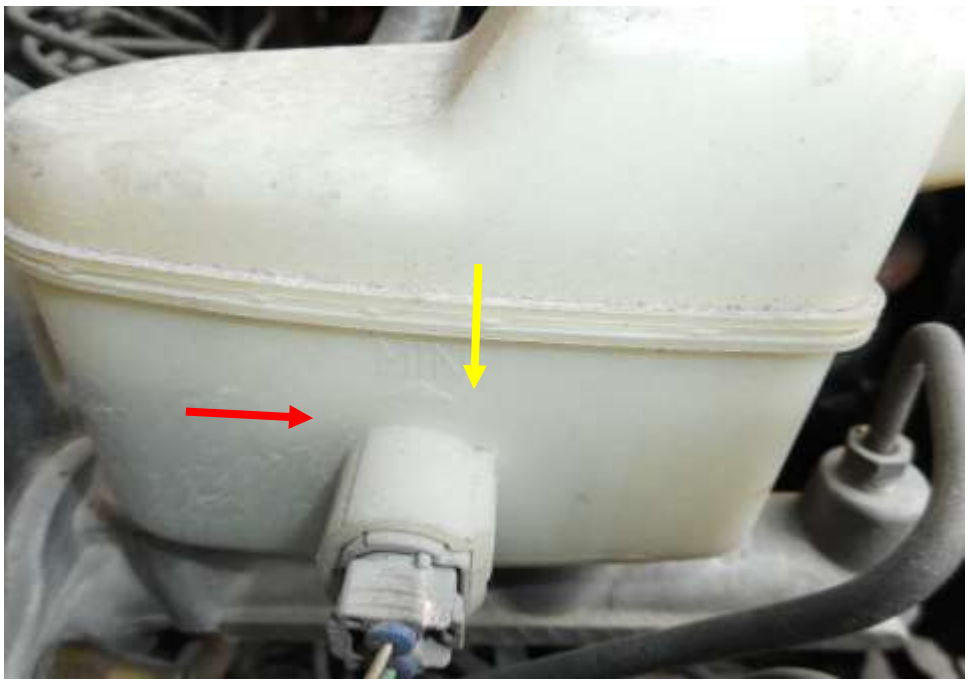


Photo 14 shows the brake fluid reservoir of the Police Hilux at the time of my inspection. The brake fluid was observed to be of insufficient level (red arrow) due to a leakage at the brake capliers. The brake fluid was found to be below the minimum mark (yellow arrow)

Photo 15 shows checks being carried out to the engine coolant of the Police Hilux at the time of my inspection. The engine coolant was observed to be of insufficient level due to the damage to the front radiator which causes a leakage of coolant fluids.

Photo 16 shows checks being carried out to the Power steering fluid of the Police Hilux at the time of my inspection. The steering fluid was observed to be of sufficient level and without any visible contamination.

Photo 17 shows the engine oil dip stick of the Police Hilux at the time of my inspection. The engine oil was observed to be of sufficient level and without any visible contamination.

Photo 18 shows the undercarriage of the Police Hilux, at the area where the engine housing and transmission housing are located. I did not find any sign(s) or indication(s) of fluid leak and/or fluid stain(s) on the underside of the Police Hilux.

Braking System & Steering System

11. Static brake tests conducted on the Police Hilux revealed abnormality. The brake booster did not respond well to the various tests conducted. There was abnormal movement of the brake pedal when it was depressed the brake pedal had sink down onto the floorboard. In general, the static brake tests had suggested that there was internal leakage of pressure/vacuum in the braking system of the Police Hilux. The braking system of the Police Hilux was in unserviceable condition.

12. The brake fluid was also of insufficient level. There was sign(s) of old and fresh brake fluid stains leaking out from the front left brake caplier and old stains on the front right caplier and rear left drum brake as well.

13. Static test on the steering system of the Police Hilux 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 steering rack and pinion, tie rods, tie rod ends and ball joints revealed that these components were all generally in good condition. See photo 19 - 24 below.

Photo 19 shows the old stain of brake fluids leakage on the rear left drum brake surface (circled) at the time of my inspection of the Police Hilux. Static tests of the Police Hilux's braking system had indicated that there was internal leakage of pressure/vacuum.

Photo 20 shows the brake hose/pipe (arrowed) of the drum brake at the rear right wheel of the Police Hilux. No leakage of brake fluid was observed.

Photo 21 shows the old stain of brake fluids leakage on the front right brake caplier surface (circled) at the time of my inspection of the Police Hilux. Static tests of the Police Hilux's braking system had indicated that there was internal leakage of pressure/vacuum.

Photo 22 shows the old stain and fresh brake fluids leakage on the front left brake caplier (circled) and rims surface (arrowed) at the time of my inspection of the Police Hilux. Static tests of the Police Hilux's braking system had indicated that there was internal leakage of pressure/vacuum.

Photo 23 shows the various undercarriage components at the front right wheel of the Police Hilux, in particular the steering tie rod (red arrow) The various steering components were all found to be intact, suggesting that the steering system of the Police Hilux was likely to be in serviceable condition at the material time of accident. There was also no sign of fluid stain observed on the various undercarriage components at the front right wheel of the Police Hilux.

Photo 24 shows the various undercarriage components at the front left wheel of the Police Hilux, which had included the steering tie rod (red arrow). The various undercarriage components of the Police Hilux were all found to be intact without any visible damage.

Electronic Safety / Warning Indicators

14. The Police Hilux's automatic self-test of the functionality of its various electronic operating system like the Anti-Lock Brake System (ABS) during cranking of the engine had indicated that the system were in working condition and without abnormality. This can be established from the warning lights disappearing from the instrument panel after the self-test. See photo 25 & 26 below.

Photo 25 shows the warning light for Anti-Lock Brake System (ABS) appearing on the instrument panel of the Police Hilux during the self-test of its various electronic operating systems when its engine was cranked.

Photo 26 shows no warning lights illuminated on the instrument panel of the Police Hilux after the engine was cranked. This would suggest that there was no abnormality to the various electronic operating systems of the Police Hilux, like the ABS.

Operational Behaviour of the Police Hilux

15. A short operational test of the Police Hilux to primarily determine whether there was any abnormality to its engine system, its transmission system and braking system was subsequently carried out.

16. During the operational test, the transmission system of the Police Hilux was able to be shifted to drive mode and reverse mode without any difficulty. There was no abnormal sounds heard and/or abnormal behaviour of the Police Hilux's engine system. It was able to move forward and backward normally.

17. However the braking system was found to be in unserviceable condition as the Police Hilux was unable to fully slow down and come to a complete stop by depressing the brake pedal. The use of emergency handbrake was required to slow down and come to a complete stop, due to the was internal leakage of pressure/vacuum and external brake fluid leakage from the front left brake caplier of the braking system (Refer to photo 1 & 27)

Photo 27 shows the front left wheel of the Police Hilux turned to its full right. During my steering system test, I did not experience any abnormal free play and/or resistance when I had turned the steering wheel towards the left and right. However the braking system of the Police Hilux was found to be unserviceable and required the use of emergency handbrake to slow down and stop the vehicle.

Conclusion

18. From my physical inspection of the Police Hilux, it appears that its engine system, transmission system, steering system were all in serviceable condition. However I had found the Police Hilux's braking system to be in not a serviceable condition and may have caused and/or contributed to the accident.

19. A short operational test of the Police Hilux, which I had conducted, revealed that applying of the foot brake was not able to slow down and bring the Police Hilux to a complete stop and thus the emergency handbrake had to be applied to slow and stop the Vehicle. This was due to internal leakage of pressure/vacuum and external brake fluid leakage from the braking system.

20. The 4 tyres of the Police Hilux 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 4 tyres. The 4 tyres were also observed to be sufficiently inflated for vehicular operation with remaining tread depth of approximately 6.4mm to 7.2mm.

Sherwin Beh
Technical Investigator

Ang Bryan Tani
AMSOE, AMIRTE, AFF SAE, M.MATAI, AFF.Inst.AEA
Senior Technical Investigator
Technical Investigation & Reconstructionist (SAE-A)