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General Investigation Team

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

MECHANICAL INSPECTION REPORT OF POLICE MOTOR CAR QX 1024Y

1. I refer to your request on 08th July 2019 to conduct a physical inspection of a Motor Car bearing registration number QX 1024Y (herein referred to as “**Police Car**”), which was involved in a road traffic accident on 19th June 2019
2. The objective of the inspection is to determine if there was any possible mechanical failure to the Police Car that may have contributed to the accident.
3. Following the request, I had carried out a physical inspection of the Police Car on 29th July 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

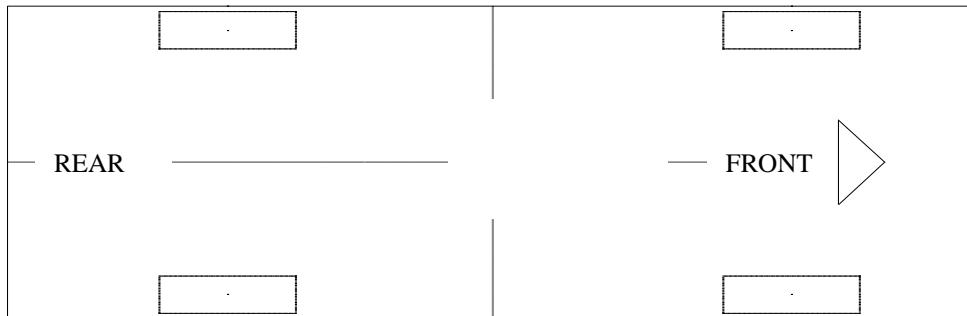
4. The mileage of the Motor Car at the time of my inspection was recorded 116,671km
5. The Police Car was observed to have sustained minor damages at its frontal portion. Its front bumper was damage as a result of the accident at the time of my inspection.

Tyres and Wheel Rims

6. The condition of the Police Car'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:-

Falken 205/55R16 (3.2mm)

Falken 205/55R16 (4.3mm)



Falken 205/55R16 (4.4mm)

Falken 205/55R16 (5.9mm)

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 – 9 below.



Photo 1 shows a front general view of the Police Car's at the time of my inspection. The front portion of the Police Car observed to have sustained minor damages at its frontal portion. Its front bumper was damage as a result of the accident at the time of my inspection. The mileage of the Police Car at the time of my inspection was recorded to be 116,671km.



Photo 2 shows a close up view of the Police Car's at the time of my inspection. The front portion of the Police Car observed to have sustained minor damages at its frontal portion. Its front bumper (circled) was damage as a result of the accident at the time of my inspection.



Photo 3 shows a general view of the Police Car's right body panel at the time of my inspection. The right portion of the Police Car was observed to have been unaffected by the accident.



Photo 4 shows a general view of the Police Car's left body panel at the time of my inspection. The left portion of the Police Car was observed to have been unaffected by the accident.



Photo 5 shows a general view of the Police Car's rear body at the time of my inspection. The rear portion of the Police Car was observed to have been unaffected by the accident.



Photo 6 shows the condition of the front right tyre of the Police Car, which was observed to be in serviceable condition with remaining tread depth of approximately 5.9mm. 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 Car were wrapped around standard alloy wheel rims without any damage.



Photo 7 shows the condition of the rear right tyre of the Police Car, which was observed to be in serviceable condition with remaining tread depth of approximately 4.4mm. The tyre was also observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s).



Photo 8 shows the condition of the rear left tyre of the Police Car, which was observed to be in serviceable condition with remaining tread depth of approximately 3.2mm. The tyre was also observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s).



Photo 9 shows the condition of the front left tyre of the Police Car, which was observed to be in serviceable condition with remaining tread depth of approximately 4.3mm. The tyre was also observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s).

Engine Compartment & Operating Fluids

8. Upon examination of the engine compartment of the Police Car, I had observed all the parts and components inside the engine compartment to be intact and unaffected by the accident. The brake fluid, engine oil and engine coolant were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.
9. 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 Car.
10. My subsequent checks on the underside of the Police Car also revealed no sign(s) or indication(s) of fluid leak and/or fluid stain(s). Visually, the various undercarriage components of the Police Car were all observed to be intact and without any visible damage. See photo 10 - 14 below.



Photo 10 shows a general view of the Police Car'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 11 shows the brake fluid reservoir of the Police Car at the time of my inspection. The brake fluid was observed to be of sufficient level (arrowed) and without any visible contamination.



Photo 12 shows checks being carried out to the engine coolant of the Police Car at the time of my inspection. The engine coolant was observed to be of sufficient level (arrowed) and without any visible contamination.



Photo 13 shows the engine oil dip stick of the Police Car at the time of my inspection. The engine oil was observed to be of sufficient level and without any visible contamination.



Photo 14 shows the undercarriage of the Police Car, 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 Car.

Braking System & Steering System

11. Static brake tests conducted on the Police Car revealed no abnormality. The 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 Police Car. The braking system of the Police Car was likely to be in serviceable condition at the material time. This was taking into consideration that the brake fluid was of sufficient level, and also that there was no sign(s) of brake fluid leakage along the brake hoses and brake pipes.
12. Static test on the steering system of the Police Car 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 steering rack and pinion, tie rods, tie rod ends and ball joints revealed that these components were all generally in good condition. See photo 15 - 20 below.



Photo 15 shows the brake hose/pipe (arrowed) at the rear left wheel of the Police Car. I did not observe any leakage of brake fluid at the time of my inspection of the Police Car. Static tests of the Police Car's braking system had indicated that there was no internal leakage of pressure/vacuum. The undercarriage components of the Police Car were also all found to be intact and without any visible damage.



Photo 16 shows the brake hose/pipe (arrowed) at the rear right wheel of the Police Car. I did not observe any leakage of brake fluid at the time of my inspection of the Police Car. Static tests of the Police Car's braking system had indicated that there was no internal leakage of pressure/vacuum. The undercarriage components of the Police Car were also all found to be intact and without any visible damage.



Photo 17 shows the brake hose/pipe (arrowed) at the front right wheel of the Police Car. No leakage of brake fluid was observed. Visual examination of the various components of the braking system like the brake caliper (circled), brake booster, brake pedal etc had revealed all to be intact and without visible damage.



Photo 18 shows the brake hose/pipe (arrowed) at the front left wheel of the Police Car. No leakage of brake fluid was observed. Visual examination of the various components of the braking system like the brake caliper (circled), brake booster, brake pedal etc had revealed all to be intact and without visible damage.



Photo 19 shows the various undercarriage components at the front right wheel of the Police Car, in particular the steering tie rod (arrowed). The various steering components were all found to be intact, suggesting that the steering system of the Police Car 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 Car.



Photo 20 shows the various undercarriage components at the front left wheel of the Police Car, which had included the steering tie rod (red arrow) and front left drive shaft (yellow arrow). The various undercarriage components of the Police Car were all found to be intact without any visible damage.

Electronic Safety / Warning Indicators

13. The Police Car's automatic self-test of the functionality of its various electronic operating systems like the Anti-Lock Brake System (ABS), Electric Power Steering System (EPS) and Traction Control (TC) during cranking of the engine had indicated that these systems 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 21 & 22 below.



Photo 21 shows the warning light for Anti-Lock Brake System (ABS), Electric Power Steering System (EPS), Supplemental Restraint System (SRS) and Traction Control (TC) appearing on the instrument panel of the Police Car during the self-test of its various electronic operating systems when its engine was cranked.



Photo 22 shows no warning lights illuminated on the instrument panel of the Police Car after the engine was cranked. This would suggest that there was no abnormality to the various electronic operating systems of the Police Car, like the ABS, EPS, SRS and TC etc.

Operational Behaviour of the Police Car

14. A short operational test of the Police Car, to primarily determine whether there was any abnormality to its engine system, its transmission system and braking system was subsequently carried out.
15. During the operational test, the transmission system of the Police Car 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 Car'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 Police Car was able to slow down and come to a complete stop upon depressing of the brake pedal. See photo 23 below



Photo 23 shows the front right wheel of the Police Car 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 the left and right. This would suggest that the steering system of the Police Car was likely to be in serviceable condition at the material time of accident.

16. However, the braking efficiency of the Police Car appears to have been compromised the brake discs had rust build up on the surface due to oxidation of metal occurs as the prolonged stationary impoundment of the Police Car, under rain and shine environment which causes rust to build up. In normal circumstances, the rust will be worn away by the engagement of the brake pads to the brake discs as soon as driving occurs. However for this particular case the rust had remained after driving.

17. The rust had formed a layer between the frictional material of the brake pads and the disc brake surface, preventing the frictional material from coming into contact directly with the brake pads and brake discs. More effort would then be needed to press the brake pads towards the surface of the brake discs. This was the case for the Police Car that I had inspected where more effort was required to stop the rotation of the rear wheels. See photo 24 - 31 below



Photo 24 shows general view of the front left brake disc (arrowed) at the front left wheel of the Police Car after carrying out the operation tests. Visual examination of the brake disc shows no existing rust on the surface of the disc, as this is caused by the brake pads depressing against the brake discs when the brakes was applied to stop the vehicle. This is under the serviceable condition of the braking system



Photo 25 shows the close up view of the front left brake disc (arrowed) at the front left wheel of the Police Car after carrying out the operation tests. Visual examination of the brake disc shows no existing rust on the surface of the disc, as this is caused by the brake pads depressing against the brake discs when the brakes was applied to stop the vehicle. This is under the serviceable condition of the braking system



Photo 26 shows general view of the front right brake disc (arrowed) at the front right wheel of the Police Car after carrying out the operation tests. Visual examination of the brake disc shows no existing rust on the surface of the disc, as this is caused by the brake pads depressing against the brake discs when the brakes was applied to stop the vehicle. This is under the serviceable condition of the braking system



Photo 27 shows the close up view of the front right brake disc (arrowed) at the rear right wheel of the Police Car after carrying out the operation tests. Visual examination of the brake disc shows no existing rust on the surface of the disc, as this is caused by the brake pads depressing against the brake discs when the brakes was applied to stop the vehicle. This is under the serviceable condition of the braking system



Photo 28 shows general view of the rear left brake disc (arrowed) at the rear left wheel of the Police Car after carrying out the operation tests. Visual examination of the brake disc shows the existing rust on the surface of the disc, this is caused by the brake pads not depressing against the brake discs when the brakes was applied to stop the vehicle. This affect has greatly decreased the braking efficiency of the braking system.



Photo 29 shows the close up view of the rear left brake disc (arrowed) at the rear left wheel of the Police Car after carrying out the operation tests. Visual examination of the brake disc shows the existing rust on the surface of the disc, this is caused by the brake pads not depressing against the brake discs when the brakes was applied to stop the vehicle. This affect has greatly decreased the braking efficiency of the braking system.



Photo 30 shows general view of the rear right brake disc (arrowed) at the rear right wheel of the Police Car after carrying out the operation tests. Visual examination of the brake disc shows the existing rust on the surface of the disc, this is caused by the brake pads not depressing against the brake discs when the brakes was applied to stop the vehicle. This affect has greatly decreased the braking efficiency of the braking system.



Photo 31 shows the close up view of the rear right brake disc (arrowed) at the rear right wheel of the Police Car after carrying out the operation tests. Visual examination of the brake disc shows the existing rust on the surface of the disc, this is caused by the brake pads not depressing against the brake discs when the brakes was applied to stop the vehicle. This affect has greatly decreased the braking efficiency of the braking system.

Conclusion

18. From my physical inspection of the Police Car, it appears that its engine system, transmission system, steering system were all in serviceable condition. I had found evidence(s) to suggest that there was possible mechanical failure to the Police Car that may have caused and/or contributed to the accident.
19. A short operational test of the Police Car, which I had conducted, revealed a longer stopping distance and effort to bring the Police Car to a complete stop.
20. However, the braking system was found to be not efficient and had possibly caused and/or contributed to the accident.

21. The 4 tyres of the Police Car 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 3.2mm to 5.9mm.

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