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Your Ref: G/IP/05272/2019
Our Ref: CI/SPF20003502/D

03 March 2020

**Bedok Division**
Singapore Police Force
30 Bedok North Road
Singapore 469676

Attn: Investigation Officer Alfin Ng Kok Chin

**MECHANICAL INSPECTION REPORT OF AN ELECTRIC SCOOTER**

1. I refer to your request on 29 November 2019 to conduct a physical inspection of an electric scooter.

2. The objective of the inspection is to determine if there is any possible mechanical issue to the operating behaviour of the electric scooter.

3. Following the request, the electric scooter was transported to Block 5035 Ang Mo Kio Avenue 3 #01-355 Singapore 569538, by the Investigation Officer on 13 February 2020. A physical inspection, including the dismantling of several parts and components of the electric scooter, were thereafter carried out.

4. I now set out below my observations and comments with respect to this inspection.

**General Condition**

5. Firstly, it was noted that the electric scooter is a LTA registered electric scooter. The registration number as seen on the LTA tag pasted on the body of the electric scooter was 662ET.

6. The electric scooter was observed to have sustained relatively minor damage along its right side. The right side of the handlebar and right side leg rest were both observed to be scratched/cut. The seat cover was also torn.

7. The electric scooter was fitted with 2 wheels. The tyres wrapped around the 2 wheels were observed to be sufficiently inflated for operational use. They were also observed to be of serviceable condition with the tread pattern clearly visible. See photo 1 – 17 below.

8. The length, width and weight of the electric scooter were recorded as follows:

| | | |
|---|---|---|
| Length | 107cm | (leading edge of front tyre to trailing edge of rear tyre) |
| Width | 65cm | (edge of left side to edge of right side of handle bar) |
| Weight | 19.44kg | |

9. The electric motor and battery fitted on the electric scooter were checked and the following power rating information were recorded:

| | |
|---|---|
| Electric motor | 3200 Watt |
| Battery | 72 Volt |

**Photo 1** shows a general view of the electric scooter that I had inspected. The electric scooter was observed to be in good general condition however some relatively minor damage was observed along the right side of the electric scooter.

**Photo 2** shows a general view of the electric scooter that I had inspected. The electric scooter was observed to have sustained relatively minor damage along its right side. The right side of the handlebar and right side leg rest were observed to be scratched/cut. The seat of the electric scooter was also torn.


**Photo 3** shows the LTA tag that was pasted onto the body of the electric scooter. The electric scooter was noted to be a LTA registered electric scooter with registration number 662ET.

**Photo 4** shows the footrest at the right side of the electric scooter, which was observed to be scratched/cut.

**Photo 5** shows the seat cover of the electric scooter, which was observed to be torn.

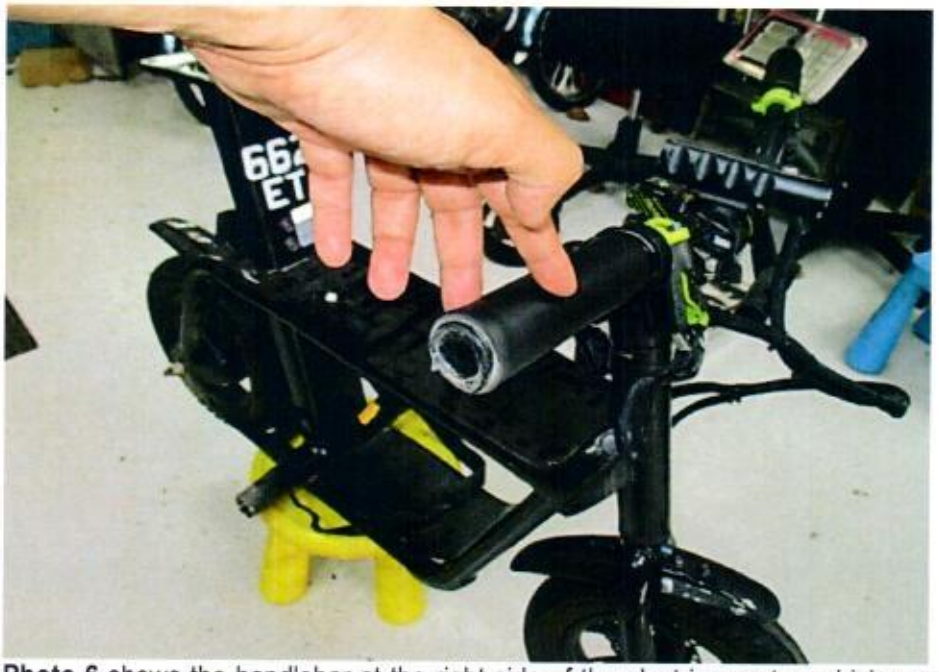

**Photo 6** shows the handlebar at the right side of the electric scooter, which was observed to be scratched/cut.

**Photo 7** shows a general view of the handlebar of the electric scooter. The handler bar of the electric scooter was able to turn left and right with any abnormality.

**Photo 8** shows the front tyre that was fitted on the electric scooter. The front tyre was observed to be of serviceable condition with the tread pattern clearly visible. It was also sufficiently inflated for operational use.

**Photo 9** shows the rear tyre that was fitted on the electric scooter. The rear tyre was observed to be of serviceable condition with the tread pattern clearly visible. It was also sufficiently inflated for operational use.

**Photo 10** shows measurements being carried out to the electric scooter. The length of the electric scooter was measured to be 107cm while the width of the electric scooter was measured to be 65cm.

**Photo 11** shows the electric scooter being weighed on a digital weighing scale. The yellow plastic chair supporting the electric scooter on the weighing scale was to prevent the tyres of the electric scooter from touching the ground during the weighing. The digital weighing scale was first calibrated to zero when the yellow plastic chair was placed on the scale.


**Photo 12** shows the weight of the electric scooter that was recorded by the digital weighing scale. The weight recorded was 19.44kg.


**Photo 13** shows the electric motor that was fitted on the rear wheel of the electric scooter. The power rating of the electric motor was observed to be 3200 Watt (arrowed). The motor in this electric motor turns/rotates when electric power is supplied from the battery of the electric scooter.

**Photo 14** shows the battery (arrowed) pack that was fitted on the electric scooter. The battery pack was removed for checks on its power ratings.

**Photo 15** shows the battery pack that was fitted on the electric scooter. The battery pack was made up of 60 battery cells. This battery pack supplies the electric power to the electric motor in order for the electric scooter to accelerate/move.


**Photo 16** shows the brand and model of the battery cells. In total the battery pack fitted on the electric scooter has 72 Volt.


**Photo 17** shows the information pasted on the battery pack of the electric scooter. The battery pack fitted on the electric scooter has 72 Volt.

## Operating Description of the Electric Scooter

10. The acceleration/movement function of the electric scooter is via a lever which acts as a throttle. This lever is located towards the right side of the handlebar. When manually depressed, the electric scooter will accelerate/move. To maintain acceleration/movement, the lever will have to be continuously depressed.

11. When this lever is depressed, electric power from the battery pack of the electric scooter is supplied to the electric motor that is fitted at the rear wheel. The motor in the electric motor then turns/rotates resulting in the rear wheel of the electric scooter to also turn/rotate. This allows the electric scooter to accelerate/move. See photo 18 & 19 below.


**Photo 18** shows the lever (arrowed) for the acceleration/movement function of the electric scooter. When this lever is depressed, electric power from the battery pack of the electric scooter is supplied to the electric motor that is fitted at the rear wheel. The motor in the electric motor then turns/rotates resulting in the rear wheel of the electric scooter to also turn/rotate. This allows the electric scooter to accelerate/move.

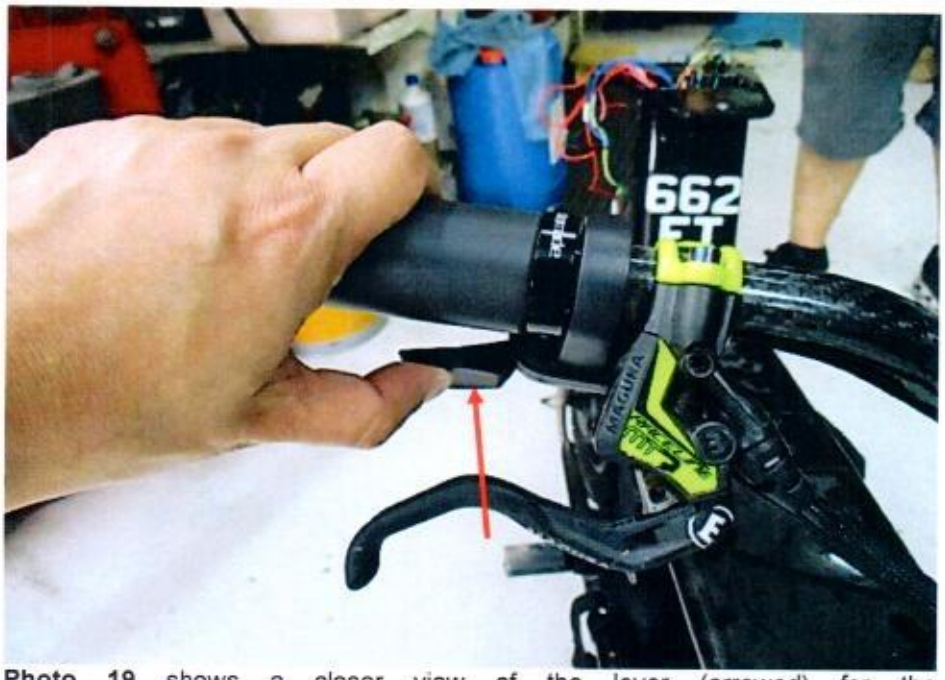


**Photo 19** shows a closer view of the lever (arrowed) for the acceleration/movement function of the electric scooter being depressed. To maintain acceleration/movement, the lever will have to be continuously depressed. Once the lever is no longer depressed, electric power to the electric motor is cut off and the electric scooter will gradually come to a stop.

12. The stopping function of the electric scooter is via 2 levers that are located, one at the right side of the handlebar and the other at the left side of the handlebar. The lever at the right side operates the brake for the front wheel while the lever at the left side operates the brake for the rear wheel. The 2 levers can be depressed simultaneously to operate the brake for the front wheel and rear wheel; or individually depressed to operate the respective brake for the front wheel or the rear wheel. Both the 2 levers are operated manually.

13. When the lever(s) is depressed, the brake is activated by cable and spring pushing the brake pads to clamp onto the brake disc at the wheels of the electric scooter. Frictional resistance from this clamping action reduces the rotation of the wheels, hence creating the braking effect for the electric scooter. See photo 20 – 22 below.


**Photo 20** shows the levers that operates the braking function of the electric scooter. The lever (yellow arrow) at the right side of the handlebar operates the brake for the front wheel while the lever (red arrow) at the left side of the handlebar operates the brake for the rear wheel. The levers can be simultaneously depressed or individual depressed.

**Photo 21** shows the braking components at the front wheel of the electric scooter. When the front brake lever of the electric scooter is depressed, the brake pad (red arrow) is pushed towards the brake disc (yellow arrow) via cable and spring. The brake pad clamps against the brake disc providing the frictional resistance to reduce the rotation of the front wheel, hence creating the braking effect for the electric scooter.

**Photo 22** shows the braking components at the rear wheel of the electric scooter. When the rear brake lever of the electric scooter is depressed, the brake pad (red arrow) clamps against the brake disc (yellow arrow), via cable and spring, hence providing the frictional resistance to reduce the rotation of the rear wheel.

## Steering System

14. The steering system of the electric scooter was tested by turning the handlebar to full left and full right. I did not feel any abnormal resistance and/or free play during this action. The front wheel of the electric scooter was able to turn in the same direction to the turned direction of the handlebar. The steering system of the electric scooter was in serviceable condition.

## Braking System

15. A static test to the braking system of the electric scooter was carried out during my inspection. The test carried out was purely to check on the operating behaviour and functionality of the electric scooter's braking system.

16. For the static test, the electric scooter was suspended from the ground ie wheels not touching ground. The throttle lever was depressed causing the rear wheel to rotate, simulating movement of the electric scooter's rear wheel. I then depressed the rear brake lever at the left side of the handlebar, and it was observed that the rear wheel stopped rotating almost instantaneously. This would indicate that the rear brake of the electric scooter was in serviceable/working condition.

17. With regard to the front brake, I had manually rotated the front wheel, simulating movement of the electric scooter's front wheel. The front brake lever located at the right side of the handlebar was then depressed. It was observed that the front wheel stopped rotating almost instantaneously. This would indicate that the front brake of the electric scooter was in serviceable/working condition.

18. In general, my test on the braking system of the electric scooter had indicated that its braking system was in a normal working condition.

**Conclusion**

19. From the observations gathered during my physical inspection of the electric scooter, its steering system and braking system were found to be in serviceable condition. There was no evidence(s) gathered to suggest possible mechanical failure and/or abnormal operating behaviour of the electric scooter.

20. The 2 tyres fitted on the electric scooter were also found to be in serviceable condition and sufficiently inflated for operational use.

**Ang Bryan Tani**
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