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**Violence Against Persons Squad**

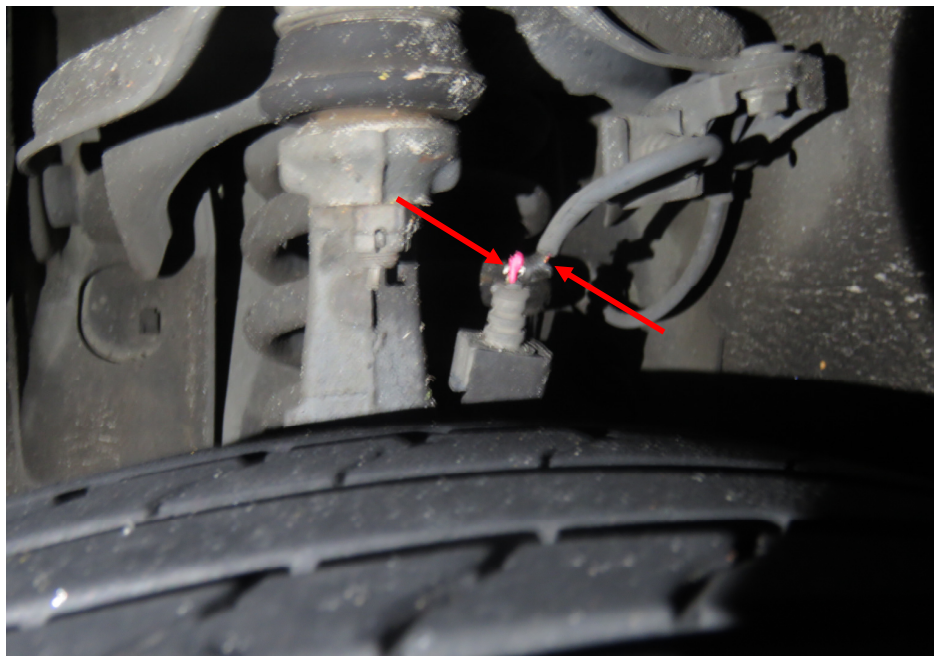
Clementi Division  
Singapore Police Force  
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Singapore 129858

**COMMENT ON CUT SENSOR WIRE OF A MOTOR CAR'S ANTI-BRAKE LOCK SYSTEM**

1. I refer to your request on 24 January 2018 to comment on the operational behaviour of a motor car bearing registration number SJJ 8872B (herein referred to as "**Motor Car**") that had the sensor wire of its Anti-Lock Brake System (herein referred to as "**ABS**") cut.
2. For this case, I was not able to carry out an inspection of the Motor Car as it has since been repaired. I was however provided with 5 photographs taken by the Police during the course of their investigations. My comments pertaining to the cut sensor wire of the ABS had hence relied on these photographs.
3. From the photographs and case overview that was provided by the investigation officer, I note that the cut wire was located at the front right wheel of the Motor Car. Only 1 of the 5 photographs provided to me had showed the wire in its original cut condition, still attached to the Motor Car.
4. Upon close examination of this photograph, it would appear that the wire was partially cut at 2 sections that were relatively close to each other. The cut at both sections of the wire was at the wire insulator and did not penetrate the copper wires within the insulator.
5. The affected sections of the wire were subsequently cut completely by the mechanic during the repair/rectification and these were seized by the Police. The photograph documenting the seized wire had showed the cut areas of the wire, and from the photograph, it can be established that the wire was indeed partially cut. The copper wires at the cut areas were not affected. See photo 1 – 3 below.



**Photo 1** shows a general view of the Motor Car (photograph provided to me by the Police). The wire that was partially cut was located at the front right wheel of the Motor Car.



**Photo 2** shows the affected sensor wire of the Motor Car's ABS. This was when the wire was in its original cut condition, still attached to the Motor Car. Close examination of the photograph appears to show the wire was partially cut at 2 sections (arrowed). The cut at both sections of the wire was at the wire insulator and did not penetrate the copper wires within the insulator.



**Photo 3** shows the affected sections of the wire that were cut completely and subsequently seized by the Police. The copper wires at the 2 areas where the wire was cut (arrowed) was noted to be unaffected.

6. The affected wire seen the photographs provided is the wire for the Motor Car's ABS sensor. This sensor is commonly referred to as wheel speed sensor and can be found fitted on all the 4 wheels of a motor vehicle that is equipped with ABS. This sensor monitors the deceleration rate of the wheel(s) of a motor vehicle during emergency/hard braking and hence prevent the wheel(s) of the motor vehicle from locking. A driver will have difficulty controlling a motor vehicle when one or more of its wheels are locked as there is less or no traction/frictional grip provided by a sliding tyre (locked wheel) as compared to a tyre that is rotating.
7. During emergency/hard braking, the wheel speed sensors will monitor the deceleration rate of all 4 wheels of a motor vehicle and sends electronic signals to the ABS control module via the wires for the wheel speed sensors. If an abnormal deceleration rate is detected by the ABS control module, the ABS of the motor vehicle becomes operational. The hydraulic pressure to the brakes for that particular wheel will be reduced by closing of the brake valve for this particular wheel. Once the deceleration rate of the other wheels has reached a deceleration rate that is similar to that particular wheel, the ABS control module sends a signal to the brake valve to open. Hydraulic pressure is resumed to that particular wheel and hence all wheels will decelerate at almost similar rate.

8. For this case, since the affected wire was not completely cut, the functionality of the wire is hence not affected. The electronic signal from the wheel speed sensor of the Motor Car's front right wheel will still be able to be transmitted to the ABS control module via the copper wires within the wire insulator.
9. In the event if the wire was completely cut, the ABS warning icon will light up at the instrument panel of the Motor Car. The functionality of the wheel speed sensor for the front right wheel of the Motor Car will then be affected and it may possibly cause its front right wheel to lock during emergency/hard braking. If this was to occur, the driver may lose control of the Motor Car.
10. Regardless of whether the wire for the Motor Car's wheel speed sensor was partially cut or completely cut, the effectiveness and efficiency of the Motor Car's braking system will not be compromised as the primary function of the affected wire is to monitor the wheel speed of the front right wheel of the Motor Car and during normal braking, there is unlikely to be abnormal deceleration rate between the 4 wheels hence the driver will still be able to stop the Motor Car effectively during normal vehicular operation.

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