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12 December 2017

**Tokio Marine Insurance Singapore Ltd**

20 McCallum Street #09-01

Tokio Marine Centre

Singapore 069046

(Motor Claims Department)

**TECHNICAL INVESTIGATION REPORT OF FIRE INCIDENT INVOLVING THE  
INSURED VEHICLE SLM 1200Y ON 30 OCTOBER 2017**

1. I refer to your letter dated 28 November 2016 and the instructions therein.
2. My analysis, comments and opinions with respect to the cause of fire to the insured vehicle SLM 1200Y (herein referred to as "**Insured Vehicle**") are set out below.

**Inspection of the Insured Vehicle**

3. The Insured Vehicle was physically inspected on 30 November 2016 at the premises of Ah Lim Motor Company, 10 Ang Mo Kio Industrial Park 2A #01-09, Ang Mo Kio Autopoint Singapore 568047.
4. The Insured Vehicle was observed to have sustained extensive fire damage all around. Almost all the body panels were found to have been burnt to char. Parts inside the interior compartment and engine compartment were also observed to be completely burnt, leaving charred skeletal remains.
5. Amongst the skeletal remains inside the interior compartment, I had found what appears to be 2 audio amplifiers under the driver's seat and under the front left passenger seat. A woofer speaker was also found in the rear boot compartment of the Insured Vehicle. See photo 1 – 8 below.



**Photo 1** shows a general view of the front right body of the Insured Vehicle at the time of my inspection. The Insured Vehicle was observed to have sustained extensive fire damage all around. Almost all the body panels were found to have been burnt to char. Its front bonnet, front fenders, front doors, rear door and roof panel were all extensively burnt.



**Photo 2** shows a general view of the rear left body of the Insured Vehicle at the time of my inspection. The Insured Vehicle was observed to have sustained extensive fire damage all around. Almost all the body panels were found to have been burnt to char.



**Photo 3** shows the interior compartment of the Insured Vehicle. All the parts inside the interior compartment were found to be burnt and/or melted. Its front seats, rear seats, roof upholstery, carpet and various trims were all burnt and/or melted as a result of the fire.



**Photo 4** shows the engine compartment of the Insured Vehicle at the time of my inspection. The various parts and components inside the engine compartment were observed to have been completely burnt.





**Photo 5** shows the woofer speaker (arrowed) that was found fitted inside the rear boot compartment of the Insured Vehicle at the time of my inspection.



**Photo 6** shows the audio amplifier (arrowed) that was found fitted under the front left passenger seat of the Insured Vehicle at the time of my inspection.





**Photo 7** shows the audio amplifier (arrowed) that was found fitted under the driver's seat of the Insured Vehicle at the time of my inspection.



**Photo 8** shows a closer view of the audio amplifier (arrowed) that was found fitted under the driver's seat of the Insured Vehicle at the time of my inspection.

### **Investigation and Technical Analysis**

6. From the Police report F/20171030/2092, which was made by Mr Ang Kian Huat (herein referred to as “**Mr Ang**”), who is the registered owner of the Insured Vehicle, I note that the fire to the Insured Vehicle had started at a time when he was driving the Insured Vehicle. Mr Ang had first seen smoke coming out from the front bonnet before flames were seen after the Insured Vehicle had mounted the road kerb when Mr Ang was bringing it to a stop.
7. I conducted a detailed interview with Mr Ang on 05 December 2017, where I was able to gather further information pertaining to the incident as well as information pertaining to the history of the Insured Vehicle.
8. According to Mr Ang, on 30 November 2017 at about 0320hrs, he was driving the Insured Vehicle heading towards his home at Block 427 Ang Mo Kio Avenue 3. He was at a coffeeshop along Geylang Lorong 27A chit chatting with his friend who sells fishball noodles at one of the stalls at the coffeeshop. According to Mr Ang, he was at the coffeeshop for approximately 1 to 2 hours and during this time, he did not consume any alcohol.
9. After leaving the coffeeshop, Mr Ang took the route of travel of CTE (SLE), exiting at Ang Mo Kio Avenue 1 intending to make a right turn at Avenue 10 to reach his home. It was whilst travelling along Avenue 10 that Mr Ang smelt burning smell coming from the interior compartment of the Insured Vehicle. He then looked down and bent his body slightly towards the left to check what was causing the burning smell. It was at this time that the Insured Vehicle veered slightly towards the right and mounted the centre divider road kerb and came to a stop.
10. Mr Ang then saw flames coming from the left side of the front bonnet and immediately tried to alight from the Insured Vehicle. However the driver's door was stuck and he had to use his leg to kick the door open. Upon alighting, he observed that the front of the Insured Vehicle was engulfed in flames. Mr Ang recalls that a passerby had called the Police for assistance. Mr Ang then called his friend, who was nearby, to send him home. Mr Ang subsequently went to Ang Mo Kio NPC the next day to lodge a police report regarding the incident where he was informed that the Insured Vehicle was towed from the scene by Traffic Police.

11. He was subsequently contacted by officers from the Traffic Police Department to collect the Insured Vehicle. At Traffic Police Department, his statement was recorded and he was summoned for the offence of hitting the kerb. According to Mr Ang, he compounded the offence by paying a fine of \$200/-. The Insured Vehicle was eventually arranged to be towed to Ah Lim Motor Company where an own damage claim was submitted. Mr Ang did not take any photographs during the time that he was at the scene.
12. With regard to the history of the Insured Vehicle, Mr Ang purchased the Insured Vehicle about 1 year plus ago. He is the main driver and to the best of his recollection, there has not been any mechanical and/or electrical problem with the Insured Vehicle. It was regularly maintained with the last servicing on August 2017. However he was not able to provide any documents relating to the servicing as they were kept in the Insured Vehicle and destroyed by the fire.
13. Mr Ang informed me that soon after taking possession of the Insured Vehicle, he had installed 2 audio amplifiers and a woofer speaker to the Insured Vehicle. He cannot recall the exact date of this and was also not able to provide any documents relating to this installation.
14. When asked why he had left the scene when the Insured Vehicle was still engulfed in flames, Mr Ang informed me that after the Insured Vehicle came to a stop and flames started engulfing the front bonnet of the Insured Vehicle, he panic as the driver's door was stuck when he tried to alight. After finally managing to alight, he was in a dazed and could not assist to put out the flames hence he had left the scene with his friend. Furthermore, there was also no fire extinguishers around for him to use to extinguish the flames.
15. Given the circumstance of incident described by Mr Ang, the fire had occurred while the Insured Vehicle was being driven/engine in operation. Common causes of fire arising from a vehicle that is being driven and/or with its engine in operation include engine overheating, leakage of fluid onto hot surfaces or electrical nature.
16. Fire due to an overheated engine was unlikely as the Insured Vehicle was still able to be operated after burning smell was first detected by Mr Ang. In the event if the engine overheated, the mechanical parts inside the engine would first seize causing the engine to stall. Mr Ang would have likely encountered the engine stalling almost immediately after detecting the burning smell.



17. Leakage of fluid within the engine compartment may cause a fire to be ignited when the leaked fluid comes into contact with hot surfaces (usually exhaust pipes). The leaked fluid could possibly reach temperature sufficient for it to self-ignite. Following Mr Ang's description of flames coming out from the left side of the front bonnet, I had compared the left side of the engine compartment of a similar make and model vehicle as the Insured Vehicle and it was noted that there was no fluid carrying hoses or pipes at the left side of the engine compartment. Fire as a result of fluid leakage would then seem unlikely for this case. See photo 9 below showing the engine layout of a similar make and model vehicle as the Insured Vehicle.



**Photo 9** shows the engine layout of a similar make and model vehicle as the Insured Vehicle. There was no fluid carrying hoses or pipes around the left side of the engine compartment (circled), which could have leaked onto the hot surfaces of the exhaust pipes. Fire as a result of fluid leakage would then seem unlikely for this case. This follows the description of Mr Ang that flames were seen coming out from the left side of the front bonnet.

18. Since engine overheating and leakage of fluid were both unlikely the cause of fire, the most probable cause would then be electrical in nature. This seems to be supported by my observations during inspection of the Insured Vehicle, where I had noted that the battery, engine control unit and fuse box were amongst the parts that were around the left side of the engine compartment. This was similarly seen by me upon my comparison of the engine layout of a similar make and model vehicle as the Insured Vehicle (refer to photograph 9 above).



19. Upon further examination of the engine compartment, at the left side area, I had found greenish residue on several stretches of wirings. The wirings were original wires connecting to the engine control module of the Insured Vehicle. The presence of greenish residue indicates internal heating of copper wires, a sign of an electrical short circuit occurring. The greenish residue is normally left behind from oxidation as a result of chemical reaction involving the copper wires. This physical evidence would then appear to indicate that the cause of fire to the Insured Vehicle was of electrical in nature. See photo 10 – 12 below.



**Photo 10** shows the engine compartment of the Insured Vehicle, at the left side area. The driver of the Insured Vehicle had seen flames coming from the left side of the front bonnet. From my observations, the battery, engine control unit and fuse box were amongst the parts that were around the left side of the engine compartment.



**Photo 11** shows the engine compartment of the Insured Vehicle, at the left side area. Upon further examination, I had found greenish residue on several stretches of wirings (yellow arrow) around this area. The wirings were original wires connecting to the engine control module (red arrow) of the Insured Vehicle. The presence of greenish residue indicates internal heating of copper wires, a sign of an electrical short circuit occurring.



**Photo 12** shows another stretch of wirings, at the left side of the engine compartment, where greenish residue were found. The wirings were original wires connecting to the engine control module of the Insured Vehicle.

20. Heat from engine operation could cause the rubber insulation of the wires and/or wiring harness within the engine compartment to lose its flexibility and become hardened after a prolonged period of time. The hardened rubber insulation may then become brittle and break off bits by bits, exposing live wires that may come into contact with each other and/or the metal body of the vehicle, creating sparks that could ignite a fire.
21. Unlike countries with different seasons, the hot local climate increases the heat within the engine compartment of locally used vehicles. This enhances the deterioration of any rubber material parts or components contained within the engine compartment. The installation of additional electrical/electronic components like audio amplifier(s), speaker(s) and/or other similar nature type of components could further enhance the deterioration of the wire insulators due to more electrical current (more current equals more heat) flowing along the wires in order to power such components.
22. For this case, the Insured Vehicle was found to be additionally fitted with 2 audio amplifiers and a woofer speaker. These additionally fitted electrical/electronic components could have possibly caused overloading to the electrical system of the Insured Vehicle. However considering that the installation was carried out about 1 year plus ago prior to the fire incident, the overloading was likely to be minimal. The installation of these components falls within the allowed category under the modifications guidelines stipulated by Land Transport Authority.
23. My checks with both local and international bodies and associations revealed that at the time of writing this report, there is no manufacturer recall of similar make and model vehicle as the Insured Vehicle that may pose a fire risk.
24. My enquiries with Traffic Police Department revealed that Mr Ang possess a valid class 3, 4 and 5 driving licence. As of the time of writing this report, he has no demerit points.

### **Conclusion**

25. For this case, I am of the view that the fire had originated around the left area of the Insured Vehicle's engine compartment. The cause of fire was likely to be of electrical in nature, where deterioration of rubber wire insulators could have caused live wires to come into contact with each other and/or the metal body of the vehicle, creating sparks that had ignited the fire.



26. The Insured Vehicle was found to be additionally fitted with 2 audio amplifiers and a woofer speaker. Although these electrical/electronic components are all LTA compliant, they could have caused overloading of the Insured Vehicle's electrical system, enhancing the deterioration of rubber wire insulators.

27. My investigations had also revealed that at the time of writing this report, there is no manufacturer recall of similar make and model vehicle as the Insured Vehicle that may possibly pose a fire risk.

**Ang Bryan Tani**

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