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Your Ref: SFG 28M
Our Ref : CI/AIG19000498/D

23 January 2019

AIG Asia Pacific Insurance Pte Ltd
78 Shenton Way #08-16
AIG Building
Singapore 079120
(Motor Claims Department)

DAMAGE CONSISTENCY REPORT OF INSURED VEHICLE SFG 28M

1. I refer to your request dated 27 December 2018 to conduct an investigation and analysis to determine whether the damage sustained to the insured vehicle SFG 28M (herein referred to as "**Insured Vehicle**") was due to a lightning incident on 13 December 2018.

Reported Incident

2. It was reported in the Singapore Accident Statement that the Insured Vehicle was struck by lightning at 30 Bukit Sedap Road on 13 December 2018 at about 1400hrs.

3. Given the brief description contained in the Singapore Accident Statement, I had, on 27 December 2018, met Mr Tan Chee Kiang (herein referred to as "**Mr Tan**") at 30 Bukit Sedap Road, which was the reported incident location. Mr Tan is the spouse of the registered owner of the Insured Vehicle and the reported incident is their place of residence. During my meeting, I was able to gather further details pertaining to the incident and also carry out a site inspection.

4. Mr Tan informed me that the Insured Vehicle is usually driven by his spouse. At the material time, it was parked at the porch area, adjacent to the entrance of the house. At about 1400hrs thereabouts, he received a telephone call from his house helper informing that lightning had struck his home causing the electrical power to trip. Mr Tan, who was at his office at that time, quickly returned home where he found various electrical/electronic devices not working. This includes the communication device from inside the house to the main gate and some lightings and TV inside the house. Several lightings at the exterior of the house was also blown and/or malfunctioned.

5. The damage to the Insured Vehicle was not initially discovered. It was only discovered the next day when his wife wanted to use the Insured Vehicle. After starting the engine, she noticed warning lights appearing on the instrument cluster. The Insured Vehicle was then arranged to be towed to 209 Pandan Garden, Cycle & Carriage Singapore.

6. During my meeting with Mr Tan, he pointed out to me the location where the Insured Vehicle was parked and the likely point when the lightning had struck his house. See photo 1 – 5 below.

Photo 1 shows a general view of the front entrance of 30 Bukit Sedap Road, which was the reported incident location. At the material time of incident, the Insured Vehicle was parked at the porch area, where the vehicle seen in the photograph is parked (arrowed). According to Mr Tan, the lightning had struck one of the trees also the side of the house, on the right of where the Insured Vehicle was parked.

Photo 2 shows a general view of the side of the house, on the right of where the Insured Vehicle was parked at the material time. According to Mr Tan, the lightning had struck one of the trees along this side of the house.

Photo 3 shows the tree (arrowed) that Mr Tan had pointed out to me that was struck by lightning. The tree is known as a fox tail tree and had a sharp vertical pointed end at the top. According to Mr Tan, this tree was identified as his mother had seen a bright flash of light along the tree truck. The bright flash of light subsequently touched the ground and split towards the left and right of the tree before disappearing.

Photo 4 shows the sharp vertical pointed end (arrowed) of the tree that was stuck by lightning, as pointed out to me by Mr Tan. From a distance, this sharp vertical pointed end appears to be higher than the lightning conductors that were situation at the roof of the house.

Photo 5 shows what appears to be a burnt mark that I had observed on the truck at the bottom of the tree that was stuck by lightning, as pointed out to me by Mr Tan.

Damage to the Insured Vehicle

7. The Insured Vehicle was physically inspected by me on 27 December 2018 at the premises of Cycle & Carriage Industries Pte Ltd, 188 Pandan Loop, Singapore 128378. The engine of the Insured Vehicle was able to be started and the mileage was recorded to be 154,569km.

8. There was no burn mark(s) found on the exterior body, interior compartment and engine compartment of the Insured Vehicle. The tyres and wheel rims were similarly found to be without any burn marks.

9. About 1min to 2mins after the engine was started, multiple warning messages started appearing on the instrument cluster of the Insured Vehicle. The warning messages were for various electronic safety features like the Anti-Lock Brake System (ABS), Electronic Stability Program (ESP) and Supplemental Restraint System (SRS) of the Insured Vehicle. Warning messages relating to some operating systems like the power steering system, transmission system, and various pre-safe features like brake assist, lane departure etc had also appeared on the instrument cluster. See photo 6 – 11 below.

Photo 6 shows a general view of the rear left body of the Insured Vehicle at the time of my inspection. There was no burn mark(s) found on the exterior body of the Insured Vehicle, including its tyres and wheel rims.

Photo 7 shows a general view of the front right body of the Insured Vehicle at the time of my inspection. There was no burn mark(s) found on the exterior body of the Insured Vehicle, including its tyres and wheel rims.

Photo 8 shows a general view of the interior compartment of the Insured Vehicle. There were no burn mark(s) found in the interior compartment of the Insured Vehicle.

Photo 9 shows a general view of the Insured Vehicle's engine compartment. I did not find any burn mark(s) within the engine compartment of the Insured Vehicle.

Photo 10 shows the various warning messages (arrowed) appearing on the instrument panel of the Insured Vehicle. This was after about 1min to 2mins upon starting the engine of the Insured Vehicle.

Photo 11 shows the "power steering malfunction" warning message appearing on the instrument panel of the Insured Vehicle. This was after about 1min to 2mins upon starting the engine of the Insured Vehicle.

Comments & Opinions

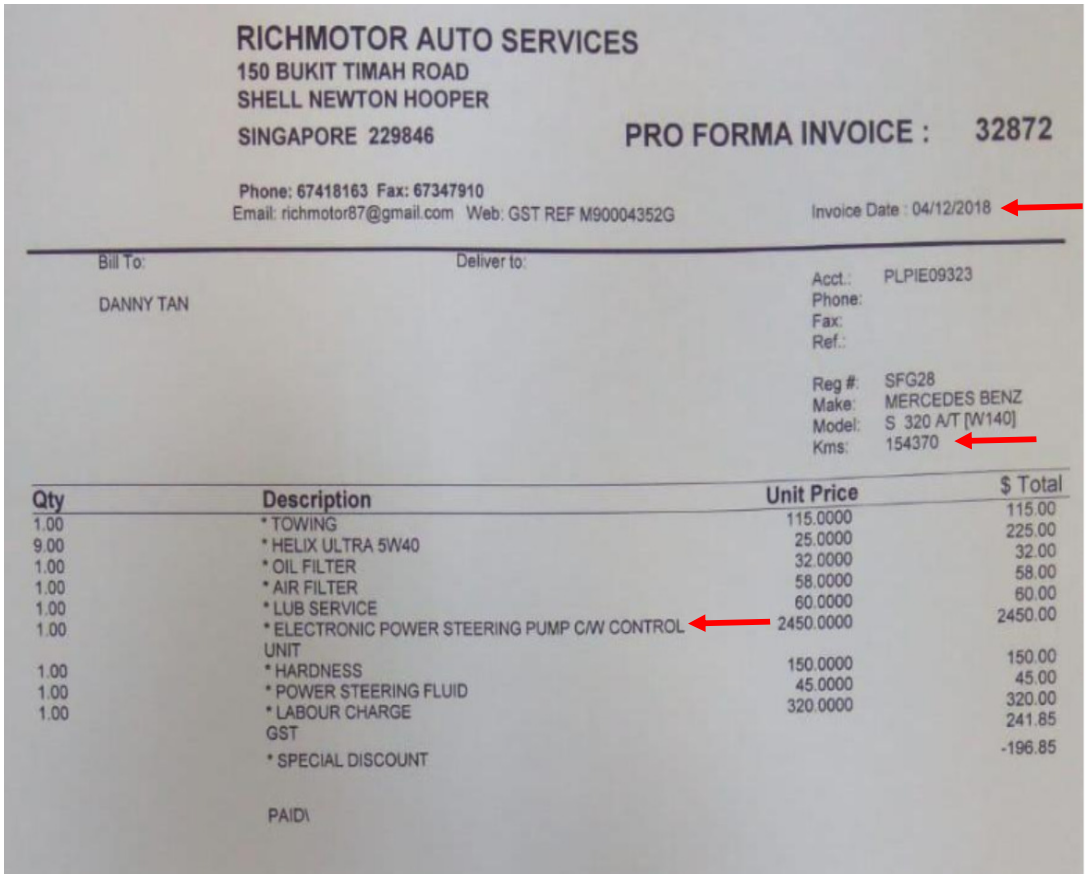
10. For this case, preliminary investigations by AIG in-house surveyor and Cycle & Carriage Industries Pte Ltd revealed that the power steering pump was newly replaced. Upon further checks, the wiring socket for the power steering pump was found slightly melted with burn marks. Water was also seen at the bottom of the connector, which connects this wiring socket. The power steering system of the Insured Vehicle is of electro-hydraulic type where the hydraulic pressure comes from a pump that is driven by an electric motor instead of conventional belting. See photo 12 – 14 below.

Photo 12 shows the power steering pump of the Insured Vehicle, which was found to be newly replaced during initial investigations by AIG in-house surveyor and Cycle & Carriage Industries Pte Ltd (photograph provided to me).

Photo 13 shows the connector for the wiring socket of the power steering pump with water trapped at the bottom of the connector (photograph provided to me).

Photo 14 shows the wiring socket of the power steering pump that was found to be slightly melted with burn marks during initial investigations by AIG in-house surveyor and Cycle & Carriage Industries Pte Ltd (photograph provided to me).

11. I was subsequently able to obtain a document relating to the replacement of the power steering pump from Mr Tan. From the information contained in the document, I note that the power steering pump was replaced on 04 December 2018; the mileage of the Insured Vehicle during the replacement was 154,370km. This was 9 days before the reported lightning incident with the Insured Vehicle having travelled a distance of 199km during this period. Basing on the document, a general servicing of the Insured Vehicle was also carried out on 04 December 2018 where the engine oil, oil filter and air filter were replaced. See photo 15 below.



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Invoice Date : 04/12/2018

Bill To:
DANNY TAN

Deliver to:

Acct.: PLPIE09323
Phone:
Fax:
Ref.:

Reg #: SFG28
Make: MERCEDES BENZ
Model: S 320 A/T [W140]
Kms: 154370

Qty	Description	Unit Price	$ Total
1.00	* TOWING	115.0000	115.00
9.00	* HELIX ULTRA 5W40	25.0000	225.00
1.00	* OIL FILTER	32.0000	32.00
1.00	* AIR FILTER	58.0000	58.00
1.00	* LUB SERVICE	60.0000	60.00
1.00	* ELECTRONIC POWER STEERING PUMP C/W CONTROL UNIT	2450.0000	2450.00
1.00	* HARDNESS	150.0000	150.00
1.00	* POWER STEERING FLUID	45.0000	45.00
1.00	* LABOUR CHARGE	320.0000	320.00
	GST		241.85
	* SPECIAL DISCOUNT		-196.85

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Photo 15 shows the document relating to the replacement of the power steering pump of the Insured Vehicle, which I was able to obtain from Mr Tan.

12. During the initial investigations by AIG in-house surveyor and Cycle & Carriage Industries Pte Ltd, a diagnosis system test was carried out to the Insured Vehicle to check on the cause of warning messages triggering. A copy of the system test result was forwarded to me for review and I note that there were multiple fault codes stored in the various electronic control modules of the Insured Vehicle. Generally, the description of the various faults was stated as “No CAN message was received”.

13. CAN in a motor vehicle refers to Controller Area Network. Briefly, it is found in all modern-day motor vehicles to allow electronic control units (ECUs) to communicate with each other within a motor vehicle without a central computer, so as to ensure a motor vehicle operates effectively and efficiently. When the engine of a motor vehicle is turned on, status messages or data from various electronic control units are being continuously sent through the network via wires connecting the various electronic control units in the network. Relevant electronic control units than picks up these messages or data and acts accordingly. For example, the engine control unit continuously sends a CAN message with the engine speed (RPM). The instrument cluster control unit picks up the message and adjusts the RPM needle accordingly to reflect the relevant RPM of the vehicle.

14. Following the above brief explanation of a motor vehicle's CAN, the diagnosis system test result that was carried out to the Insured Vehicle with fault description as "No CAN message was received" can hence be referred to as communication failure between the various electronic control units of the Insured Vehicle.

15. Common cause(s) of communication failure within the CAN include shorted CAN wires and electronic control units that had malfunctioned. Since the wiring socket for the power steering pump of the Insured Vehicle was found slightly melted with burn marks; and water also seen at the bottom of the connector, which connects this wiring socket, the "No CAN message was received" could have been due to this slightly burnt wiring socket. CAN messages or data from the power steering pump control unit of the Insured Vehicle could not be sent through the CAN, triggering "No Can message was received" from the various electronic control units when communication failed.

16. The damage to the Insured Vehicle was reported to be due to a lightning incident. From the description provided by Mr Tan, it was not a case of direct lightning strike on the Insured Vehicle. This is consistent to the observations of no burn mark(s) found on the exterior body, interior compartment and engine compartment of the Insured Vehicle; the tyres and wheel rims were similarly found to be without any burn marks (refer to paragraph 8 above). However, lightning can induce indirect effects to a motor vehicle's electrical and/or electronic systems and/or components.

17. Lighting produces Electro Magnetic Force (EMF) and it is this EMF, travelling through air near a lightning strike, which may cause electrical and/or electronic systems and/or components to fail and or malfunction. This is commonly known as damage from indirect effects from a lightning. Very often, the affected electrical and/or electronic systems and/or components would experience complete failure or malfunctioned.

18. For this case, the Insured Vehicle was able to be started at the time of my inspection hence the physical condition of the Insured Vehicle does not appear to correspond to a condition suggesting that it had sustained damage from a direct lightning strike and/or indirect effects from a lightning strike. Furthermore, the tree that the lightning had stuck was at close proximity to where the Insured Vehicle was parked, the EMF produced by the lightning would have been relatively strong to cause complete failure of any electrical and/or electronic systems and/or component of the Insured Vehicle.

Conclusion

19. Having carried out a review and analysis of the material evidence together with information gathered from enquiries and self-researched, I am of the opinion that the physical condition of the Insured Vehicle does not appear to correspond to a motor vehicle that had sustained damage from either a direct lightning strike or from indirect effects from a lightning.

20. In all likelihood, it would appear to me that the Insured Vehicle had sustained communication failure between its various electronic control units along its CAN, and this was likely due to a shorted power steering pump control unit and/or its CAN wirings from water contamination. CAN messages or data from the power steering pump control unit of the Insured Vehicle could not be sent through the CAN, triggering “No Can message was received” from the various electronic control units when communication failed.

Ang Bryan Tani
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