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Your Ref: D20001136MFSH
Our Ref : CS/FCI20003253/N

2 March 2020

M/s First Capital Insurance Limited
36 Robinson Road #16-01
City House
Singapore 068877

TECHNICAL INVESTIGATION REPORT OF FIRE INCIDENT INVOLVING THE INSURED VEHICLE SHC 313L ON 20 FEBRUARY 2020

1. We refer to your letter dated 21 February 2020 and the instructions therein.

2. Our analysis, comments and opinions with respect to the cause of fire to the insured vehicle SHC 313L (herein referred to as **"Insured Vehicle"**) are set out below.

Inspection of the Insured Vehicle

3. The Insured Vehicle was physically inspected on 26 February 2020 at the premises of ComfortDelGro Engineering Pte. Ltd. (herein referred to as **"CDGE")** located at 59 Loyang Drive, Singapore 508969.

4. A static inspection was carried out to the Insured Vehicle where the following general information was recorded:-

Vehicle Registration No.	: SHC 313L
Make / Model	: MERCEDES BENZ VIANO 2.2 CDI TREND LONG
Chassis No	: WDF63981323795586
Year of Registration	: June 2013
Mileage	: N.A. (battery melted)

5. The exterior front body of the Insured Vehicle sustained visible fire damage. This included its windscreen, front bonnet, headlights, front bumper, side panels, left front wheel rim and left front tyre.

6. The fire had resulted in extensive damage to the engine compartment of the Insured Vehicle. Most of the components inside the engine compartment were found to be severely burnt and/or melted as a result of the fire. The interior compartment was observed to have been slightly affected by the fire. See photos 1 – 6 below.

Photo 1 shows the rear view of the Insured Vehicle. The rear portion of the Insured Vehicle was observed to be relatively unaffected by the fire.

Photo 2 shows the general view of the right portion of the Insured Vehicle at the time of our inspection. The exterior body of the Insured Vehicle had sustained visible fire damage. This included its front windscreen, front bonnet, front bumper, right front panel and right headlight.

Photo 3 shows the general view of the left portion of the Insured Vehicle at the time of our inspection. The exterior body of the Insured Vehicle had sustained visible fire damage. This included its front windscreen, front bonnet, left headlight, front bumper, left front panel, left front wheel rim and left front tyre.

Photo 4 shows a closer view of the front windscreen of the Insured Vehicle at the time of our inspection. The front windscreen had sustained significant fire damage.

Photo 5 shows a general view of the engine compartment of the Insured Vehicle at the time of our inspection. Most of the components inside the engine compartment were found to be severely burnt and/or melted as a result of the fire.

Photo 6 shows the interior compartment of the Insured Vehicle, which was observed to be slightly affected by the fire (arrowed).

7. At the time of inspection of the Insured Vehicle, we did not find any additionally fitted electronic and/or electrical component(s) on the Insured Vehicle. There also appears to be no modification(s) fitted on the Insured Vehicle.

Investigation and Technical Analysis

8. For this particular case, the fire appears to have originated within the engine compartment of the Insured Vehicle, somewhere around the left portion of the engine compartment. This can be determined from the burn pattern and the high heat intensity burn marks (whitish burn marks) found on the left portion of the bonnet of the Insured Vehicle and also the rust that had developed on the underside of the front bonnet, at the left portion.

9. The whitish burn marks are a result of exposure to prolonged heat intensity. Rust would normally start to develop around these areas soon after a fire as prolonged exposure to high heat intensity usually causes steel/metal material body parts to be exposed to natural environmental condition. The rust that had developed on the underside of the front bonnet, around the left portion, is an indication that the left portion of the engine compartment had sustained exposure to prolonged high heat intensity. See photos 7 & 8 below.

Photo 7 shows the burn pattern and whitish burn marks that were found on the left portion of the front bonnet of the Insured Vehicle (circled). Such whitish burn marks are a result of exposure to prolonged heat intensity, which may indicate where the fire had started. Rust would also begin to develop on these areas soon after the fire.

Photo 8 shows the rust that had developed on the underside of the front bonnet, around the left portion (circled). The development of rust is an indication that this area was subjected to prolonged exposure to high heat intensity, which had caused the steel/metal material of the front bonnet to be exposed to natural environmental condition. Hence the fire to the Insured Vehicle can be determined to have originated towards the left portion of the engine compartment.

10. Upon closer examination of the left portion of the engine compartment, which was where the fire to the Insured Vehicle had likely started, we had found traces of greenish residue on several stretches of burnt wirings leading from the battery. 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 suggest that the cause of fire to the Insured Vehicle could have possibly been due to electrical in nature. See photos 9 - 12 below.

Photo 9 shows the burnt wirings leading from the battery around the left portion of the engine compartment (circled), which is in the immediate vicinity where the fire to the Insured Vehicle had likely started.

Photo 10 shows a closer view of the burnt wirings leading from the battery around the left portion of the engine compartment, which is in the immediate vicinity where the fire to the Insured Vehicle had likely started. We noticed greenish residue on several stretches of burnt wirings (arrowed). 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.

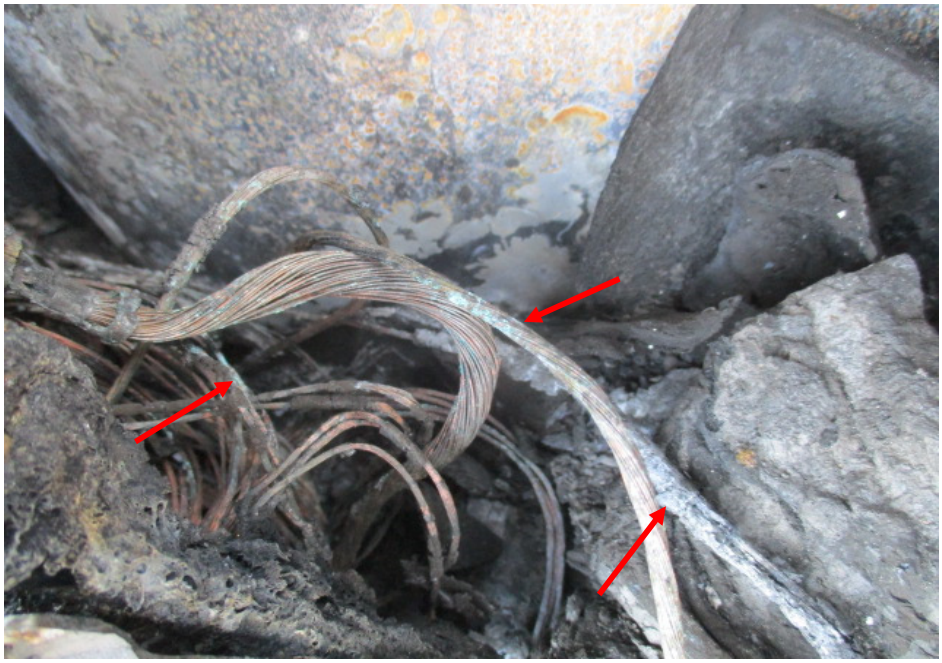

Photo 11 shows a close up view of the greenish residue found on several stretches of burnt wirings leading from the battery (red arrows). The presence of such greenish residue suggests occurrence of an electrical short circuit.

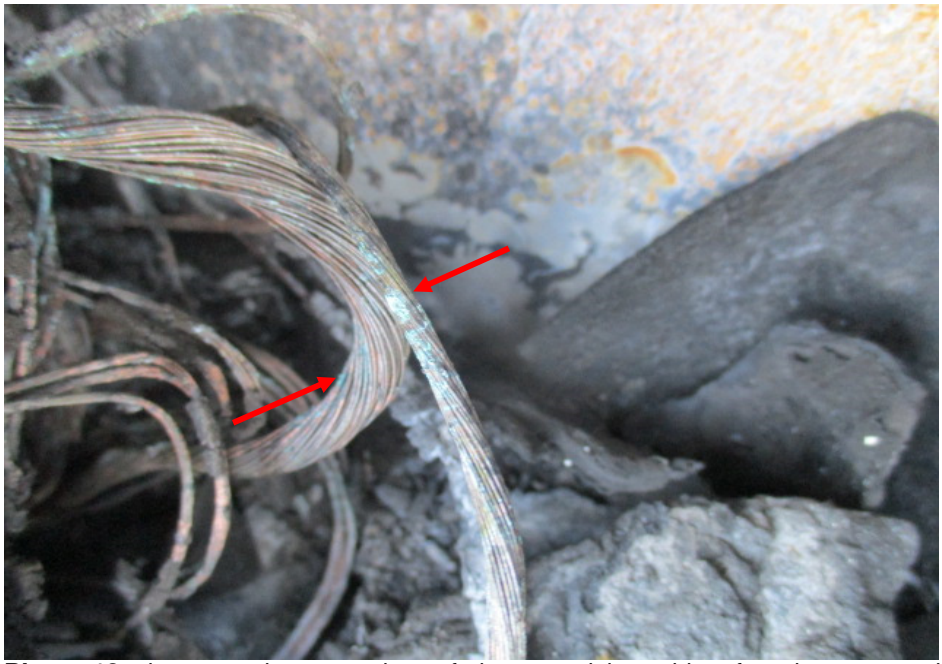

Photo 12 shows a close up view of the greenish residue found on several stretches of burnt wirings leading from the batery (red arrows). The presence of such greenish residue suggests occurrence of an electrical short circuit.

11. From the Singapore Accident Statement, which was made by Mr Tan Han Sing (herein referred to as **"Mr Tan"**), we note that the fire to the Insured Vehicle had started at a time while he was driving. He was alerted of the fire when he saw smoke emitting from the engine compartment.

12. We managed to speak to Mr Tan where we were able to gather further information pertaining to the incident as well as information pertaining to the history of the Insured Vehicle.

13. According to Mr Tan, at about 2100 hours on 20 February 2020, he was driving to East Coast Park carpark C1 via East Coast Park Service Road from Changi Airport upon accepting a job booking. He had picked up the passenger and was headed to Bukit Panjang.

14. As he was driving out of the carpark, he noticed white smoke emitting from the left portion of the front bonnet when he stopped the Insured Vehicle after the gantry was raised as there was a vehicle in front of him. Mr Tan immediately switched off the engine and told the passenger to get out of the Insured Vehicle when he saw the fire. Mr Tan mentioned that he did not unlock the front bonnet hatch.

15. He grabbed a fire extinguisher from the boot of the Insured Vehicle and attempted to put out the fire but by then the flames had gotten out of control. He called the SCDF. Police arrived at the incident location followed by firefighters within 15 minutes. The front bonnet was pried open and the fire was put out shortly after.

16. Mr Tan assisted the SCDF in their preliminary investigation and his statement was also taken by the police. Mr Tan called CDGE and made towing arrangements after SCDF had completed their preliminary investigation around 2300 hours.

17. The tow truck arrived half an hour later and the Insured Vehicle was towed to CDGE. Mr Tan made the insurance report the following day at CDGE at 1058 hours.

18. With regards to the history of the Insured Vehicle, we were able to gather from Mr Tan that he had been driving the Insured Vehicle for the past 4 years. He drives from 1730 hours to 0600 hours. He has a relief driver who drives in the morning.

19. To the best of his recollection, there has not been any major mechanical problem and/or electrical problem with the Insured Vehicle.

20. Pertaining to the maintenance aspect, Mr Tan sends the Insured Vehicle for periodic servicing at a CDGE workshop located at Sin Ming.

21. During the course of our investigations, we were also able to obtain from Mr Lim Kwok Eng who is a service advisor at CDGE, documents relating to the latest servicing records of the Insured Vehicle. The Insured Vehicle was last serviced on 30 January 2020, 3 weeks before the incident occurred. We noted in particular during this servicing, there was an issue with the brakes as reported by Mr Tan. The brake wear sensor, front brake pads and front brake discs were changed during this servicing. Since then there were no issues of similar nature recorded by Mr Tan.

22. The servicing package had included the changing of engine oil, oil filter and automatic transmission fluid (ATF). The tightener pulley, guide pulley, belt tensioner, water pump and single layer metal seal were replaced. The battery terminal was also checked to ensure that it was secured. Refer to Invoice 1 below.

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Date: 28.02.2020              TAXI SERVICE HISTORY                Time: 15:51:35
YTSS11F                                                           Page:     1
-------------------------------------------------------------------------------
Taxi Nos: SHC 313L  Model: VIANO CDI  Reg Date: 13.06.2013     Workshop: SM

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Serviced on:  30.01.2020 / 06:11:00   Time Out: 31.01.2020 / 12:18:53
Remarks: ( Next PM-12/03/2020 time-15:00 (852KM)(N) )
Job Card Nos:  603094409    Type: JP     Odometer Reading:     852,090

 PM/PROBLEM REPORTED
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 BRKD       BREAKDOWN
 MF5        MERCEDES VIANO CDI 2.2L DOCKING 5
 4.5        Brake Low/Adjust Brake(To Do Brake Test)  [
BRAKE PROBLEM , TEST DRIVE ]
 17.8       Others  [ U/CARRIAGE NOISY , TEST DRIVE ]
 H000       Mechanic Team Repair      - Lim Wei Kee
 S010       AllBelts (except T/Belt)
 S011       Engine/Transmission Service
 S020       All Hoses & Clips (Check/Adjust/Replace)
 S010       Brake System
 S011       Tyres (Pressure Check)
 S012       Tyre Rotation
 S011       Undercarriage, Steering linkage & joints
 S010       All Lightings
 S021       All harness & connectors
 S023       Check diesel / engine oil leakage
 S025       Check vehicle boot hinges
 S030       llegal fittings, modifications & fusebox
 S031       All seat belts & camera
 S051       Check battery terminal secured
 S011       All coolant, fluid, water
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S021 Service A/C filter and Radiator
S022 Clear A/C drain pipe
QC QC TEST BY LAT - Tan Boon Tnee

MATERIAL CHANGED

SN	DESCRIPTION	QTY	
1	212/639VA OIL FILTER ELEMENT	1.000	EAC
2	(ALL)UNIVERSAL CLEANER(600ML)CL.2 D.G	1.000	EAC
3	GLXXMOBIL-SUPER-3000-XE-5W30 (DRUM)	8.500	L
4	FUCHS FULLY SYN ATF MB 236.12	4.000	L
5	FUCHS COOLANT MAINTAIN FRICOFIN	5.000	L
6	639VA BRAKE WEAR SENSOR	2.000	EAC
7	639VA BRAKE PAD FRONT 005 420 5220	1.000	EAC
8	639VA TIGHTENER PULLEY	1.000	EAC
9	639VA GUIDE PULLEY	1.000	EAC
10	639VA BELT TENSIONER	1.000	EAC
11	639VA V-BELT 000 993 3296	1.000	EAC
12	639VA WATER PUMP	1.000	EAC
13	639VA SINGLE LAYER METAL SEAL	1.000	EAC
14	639VA FRONT BRAKE DISC	2.000	EAC

REMARKS

SN	DESCRIPTION
4	MF5 - 100,000 KM

Invoice 1 shows the servicing done on the Insured Vehicle at the CDGE workshop at Sin Ming on 30 January 2020 (red arrows). We noted in particular during this servicing, there was an issue with the brakes as reported by Mr Tan (black arrow). The brake wear sensor, front brake pads and front brake discs were changed during this servicing. Since then there were no issues of similar nature recorded by Mr Tan. The servicing package had included the changing of engine oil, oil filter and automatic transmission fluid (ATF). The tightener pulley, guide pulley, belt tensioner, water pump and single layer metal seal were replaced. The battery terminal was also checked to ensure that it was secured (circled).

23. Mr Tan mentioned that after the servicing was done, he had not experienced any mechanical or electrical problems with the Insured Vehicle till the day of the incident. He mentioned that there were neither warning lights displayed nor was there an abnormal rise in temperature of the Insured Vehicle when he was driving the Insured Vehicle on the day of the incident.

24. Mr Tan mentioned that since driving the Insured Vehicle, he has not done any modification(s) and/or additionally fitted any electrical or electronic component(s) to the Insured Vehicle.

Incident Scene Photographs

25. We were able to obtain from Mr Tan, photos of the Insured Vehicle which he had taken after the fire was put out. In general, the information that could be gathered from these photographs had corresponded to the events that were related to us by Mr Tan. Our close examination of these photographs also showed no unusual foreign material(s) and/or object(s) found on the ground in the immediate area where the Insured Vehicle was positioned. See photos 13 – 15 below.

Photo 13 shows the Insured Vehicle post- incident. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Tan which is he had stopped the Insured Vehicle at the carpark exit after the barrier was raised (arrowed).

Photo 14 shows the SCDF having just put out the fire on the Insured Vehicle. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Tan which is the police were also present at the incident scene (arrowed).

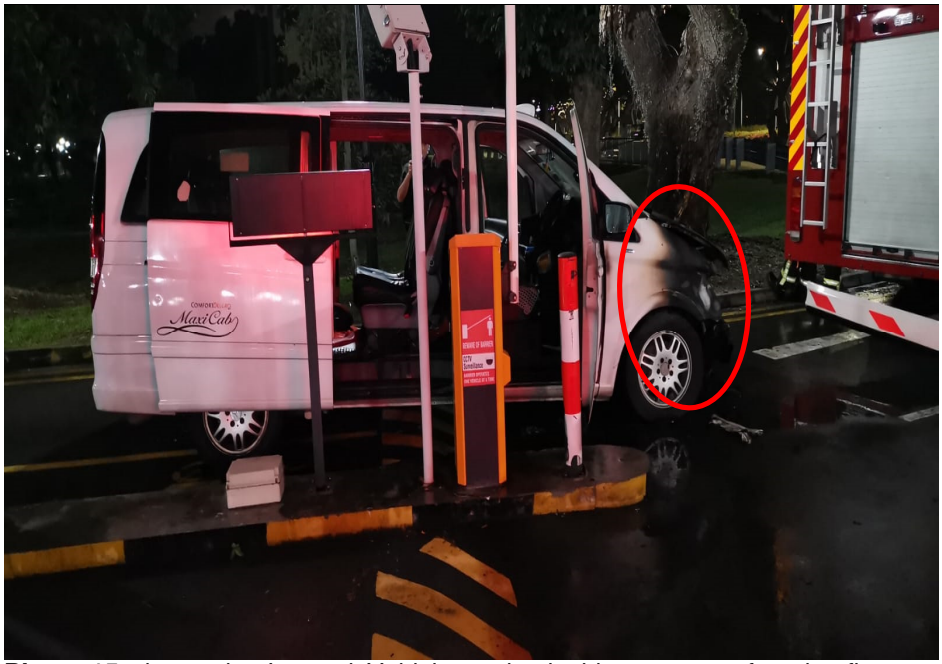


Photo 15 shows the Insured Vehicle at the incident scene after the fire was extinguished. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Tan, which is the fire had started in the engine compartment (circled).

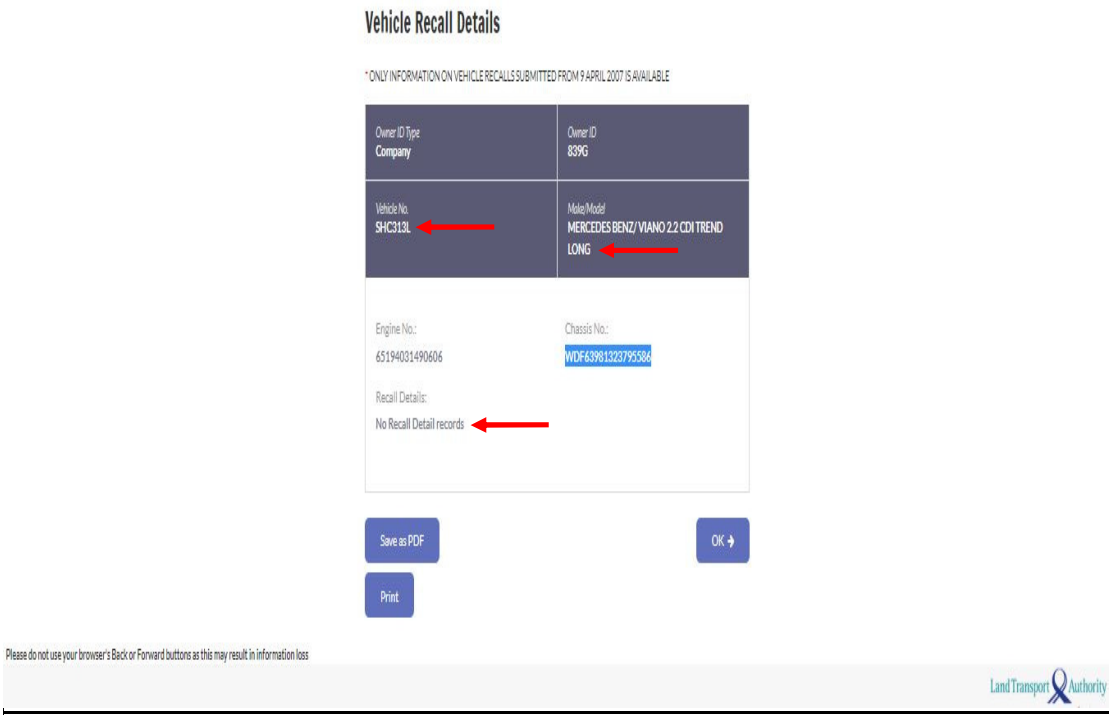
26. Based on the vehicle service record invoice provided, we are of the opinion that it is unlikely that the fire could have been caused by poor maintenance of the Insured Vehicle.

27. Given the circumstances of the incident as reported, the possibility of the cause of fire to the Insured Vehicle being due to engine overheating would seem unlikely as Mr Tan had mentioned to us there were no indications of abnormally high temperatures on the Insured Vehicle when he was driving on that day. Moreover, an overheated engine would have caused the Insured Vehicle to stall. However in this case, Mr Tan was the one who noticed smoke emitting from the front bonnet while he was driving and stopped the Insured Vehicle. Therefore, we are of the opinion that the fire was not caused by an overheated engine.

28. The possibility of the fire being due to external factors (foreign material(s) stuck on hot surfaces, arson and sabotage amongst others) would also seem unlikely given that our examination of the available incident scene photographs did not reveal any unusual material(s)/object(s) found on the ground where the Insured Vehicle was positioned. The location of where the Insured Vehicle was positioned was also observed to be not at a secluded location.

29. The possibility of the fire being due to electrical in nature would then seem more likely given that engine overheating and external factors would both seem unlikely. The fire being due to electrical nature is also supported by the condition of the wirings that were found in the engine compartment of the Insured Vehicle, which was earlier discussed in paragraph 10 above.

30. Our checks with both local and international bodies and associations had revealed that at the time of writing this report, there is no manufacturer recall of electrical nature to similar make and model vehicle as the Insured Vehicle that may possibly be related to this incident. See search result from LTA below.



Conclusion

31. Having investigated and technically analysed the damages to the Insured Vehicle, we are of the view that the cause of fire to the Insured Vehicle was of electrical in nature. For this particular case, the fire had originated along the wirings inside the engine compartment, leading from the battery. The wirings were original factory wirings of the Insured Vehicle.

32. We did not find any evidence which had suggested that the cause of fire to the Insured Vehicle was due to poor maintenance and/or recurring electrical problem.

33. There were no modification(s) or additional electronic and/or electrical component(s) fitted on the Insured Vehicle at the time of our inspection of the Insured Vehicle.

34. Our investigations had also revealed that at the time of writing this report, there is no manufacturer recall of electrical nature to similar make and model vehicle as the Insured Vehicle that may possibly be related to this incident.

35. SCDF was activated to attend to the fire incident and a fire report pertaining to their findings will likely be forth coming. We have applied for this fire report and will forward a copy of the report once it is made available to us.

Muhd Nazril
Senior Technical Investigator

Ang Bryan Tani
AMSOE, AMIRTE, AFF SAE, M.MATAI, AFF.Inst.AEA
Senior Technical Investigator
Technical Investigation & Reconstructionist (SAE-A)