

Our Ref : CI/SBS23005722/N

30 May 2023

SBS Transit Ltd.

Bus Engineering – Maintenance Planning & Bus Asset
550 Bukit Batok Street 23
Singapore 659519

MECHANICAL INSPECTION REPORT OF MOTOR BUS SG 1226Y

1. We refer to your request on 18 May 2023 to conduct a physical inspection of a Motor Bus bearing registration number SG 1226Y (herein referred to as “**Motor Bus**”), which was involved in a road traffic accident on 9th October 2022.
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Motor Bus that may have contributed to the accident.
3. Following the request, we had carried out a physical inspection of the Motor Bus on 29 May 2023 at the premises of SBST Hougang Bus Depot, 4 Defu Avenue 1, Singapore 539536. We now set out below my observations and comments with respect to this inspection.

General Condition

4. The mileage of the Motor Bus at the time of our inspection was not able to be recorded as the whole dashboard including the odometer had been dislodged as a result of the accident.
5. The Motor Bus was observed to sustained damage at its front portion. Its front cabin structure, front windscreen, front bumper, front body panel and front door were damaged as a result of the accident.

Tyres and Wheel Rims

6. The 2 front tyres and 4 rear tyres of the Motor Bus were observed to be in serviceable condition and sufficiently inflated for vehicular operation. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. The tyre brand, tyre size and remaining tread depth of the 6 tyres of the Motor Bus were recorded as follows:-

Bridgestone 275/70 R22.5 (4mm/4mm)

Bridgestone 275/70 R22.5 (10mm)

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Bridgestone 275/70 R22.5 (9mm/9mm)

Bridgestone 275/70R/R22.5 (17mm)

7. The 6 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photos 1 – 13 below.



Photo 1 shows the dislodged instrument cluster (arrowed) as a result of the accident. Therefore no mileage could be recorded at the time of our inspection.



Photo 2 shows a close up view of the rear portion of the Motor Bus at the time of our inspection. The rear portion of the Motor Bus was observed to have been unaffected by the accident.



Photo 3 shows a general view of the frontal portion of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained damages at its frontal portion. Its front cabin structure, front windscreen, front bumper, front body panel and front door were damaged as a result of the accident.



Photo 4 shows a close up view of the front body of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained damages at its frontal portion. Its front cabin structure (circled) was damaged as a result of the accident.



Photo 5 shows a close up view of the frontal portion of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained damages at its frontal portion. Its front windscreen was shattered as a result of the accident (circled).



Photo 6 shows a close up view of the frontal portion of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained damage at its front portion. Its front bumper and front body panel (circled) were damaged as a result of the accident.



Photo 7 shows a close up of the left frontal portion of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained damage at its frontal portion. Its front door (circled) was damaged as a result of the accident.



Photo 8 shows a close up view of the right body of the Motor Bus at the time of our inspection. The right portion of the Motor Bus was observed to have been unaffected by the accident. However, the windscreen was removed by the SCDF officers for rescue procedures (arrowed).



Photo 9 shows the left rear portion of the Motor Bus at the time of our inspection. The left portion of the Motor Bus was observed to have been unaffected by the accident.



Photo 10 shows the condition of the front right tyre of the Motor Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 17mm. The tyre, which was wrapped around standard steel wheel rim, was also observed to be sufficiently inflated for vehicular operation. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres that were fitted on the Motor Bus.



Photo 11 shows the condition of the rear right tyres of the Motor Bus, which were observed to be in serviceable condition with remaining tread depth of approximately 9mm. The tyres, which were wrapped around standard steel wheel rims, were also observed to be sufficiently inflated for vehicular operation.



Photo 12 shows the condition of the rear left tyres of the Motor Bus, which were observed to be in serviceable condition with remaining tread depth of approximately 4mm. The tyres, which were wrapped around standard steel wheel rims, were also observed to be sufficiently inflated for vehicular operation. There was also no damage found on all 6 steel wheel rims of the Motor Bus.



Photo 13 shows the condition of the front left tyre of the Motor Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 10mm. There was also no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres that were fitted on the Motor Bus.

Engine Compartment & Operating Fluids

8. Upon examination of the Motor Bus's engine compartment, we had observed all the parts and components inside the engine compartment to be intact and unaffected by the accident. The engine oil and engine coolant were found to be of sufficient level for operating purposes and visually, there was also no contamination found to these fluids. However, the power steering fluid was observed to be of insufficient level as there was leakage of fresh fluid at the power steering box as a result of the accident.
9. Further examination of the engine compartment revealed, there was no sign(s) or indication(s) of fresh fluid leakage and/or fluid stain within the engine compartment of the Motor Bus.
10. Our subsequent checks on the underside of the Motor Bus also revealed only power steering fluid stain from the power steering box. Visually, all the other various undercarriage components of the Motor Bus were all observed to be intact and without any visible damage. See photos 14 – 19 below.



Photo 14 shows a general view of the Motor Bus's engine compartment, which was accessed by lifting the rear of the Motor Bus. The various parts and components inside the engine compartment were unaffected by the accident. There was also no sign(s) or indication(s) of fresh fluid leakage and/or fluid stain within the engine compartment

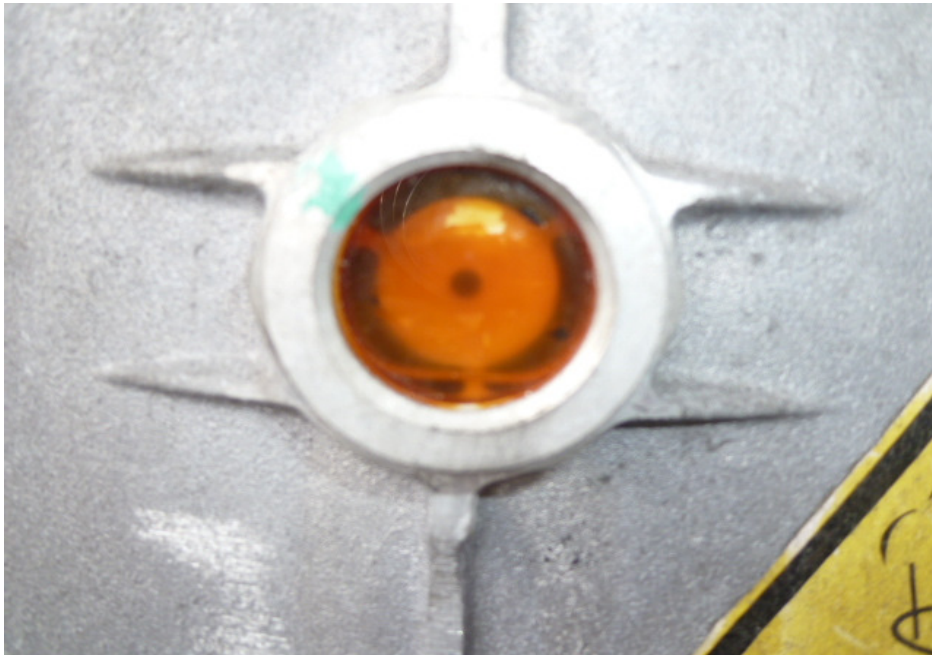


Photo 15 shows the engine coolant reservoir of the Motor Bus at the time of our inspection. The engine coolant was observed to be of sufficient level for operating purposes and without any visible contamination.



Photo 16 shows the engine oil dip stick system of the Motor Bus at the time of our inspection. The engine oil was observed to be of sufficient level for operating purposes and without any visible contamination.

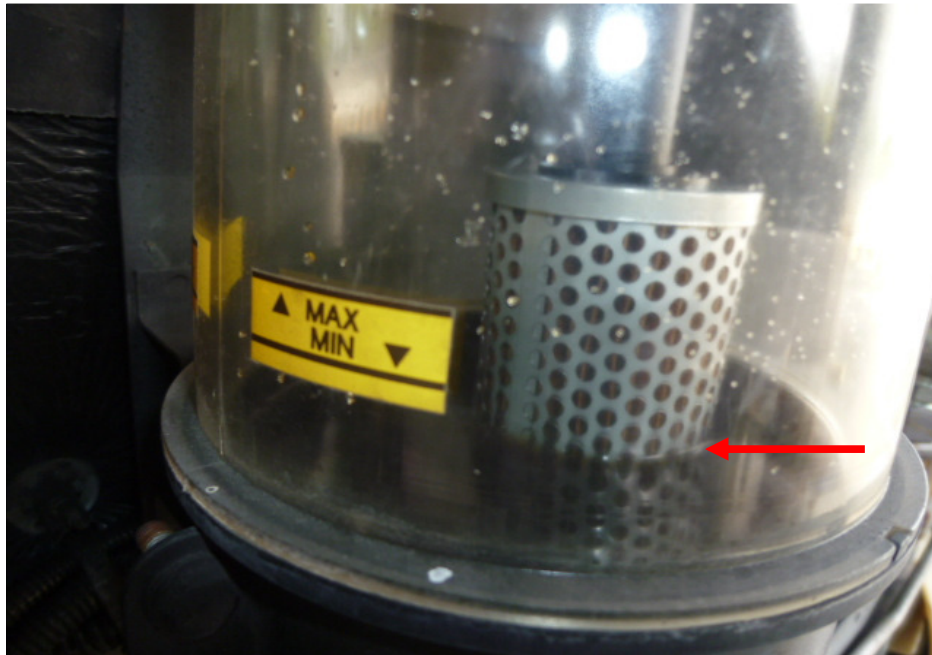


Photo 17 shows the power steering fluid of the Motor Bus at the time of our inspection. The power steering fluid (arrowed) was observed to be of insufficient level due to a leakage at the power steering box as a result of the accident.

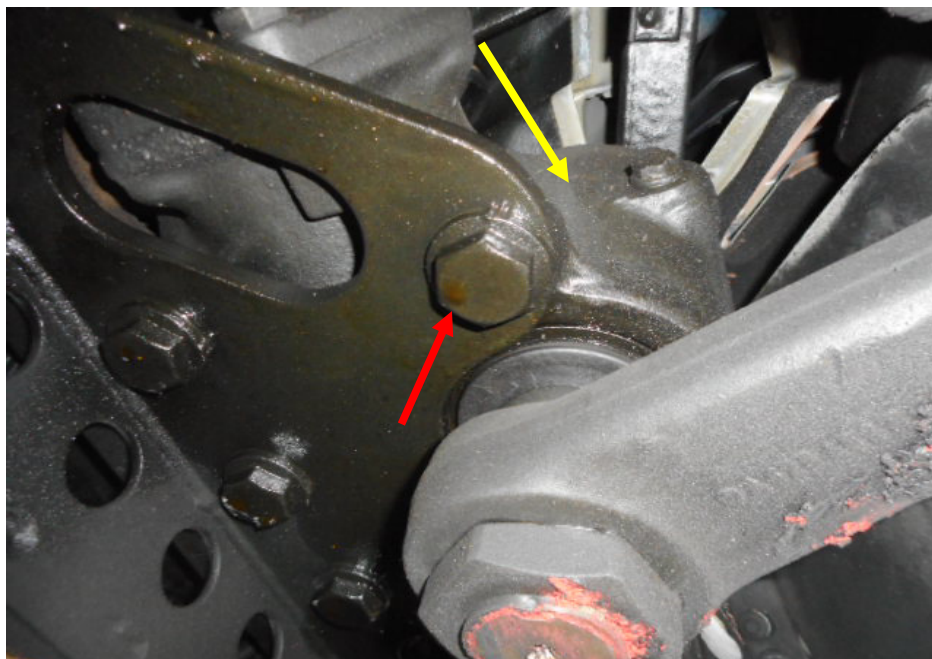


Photo 18 shows the power steering fluid of the Motor Bus at the time of our inspection. The power steering fluid (red arrow) was observed to be of insufficient level due to a leakage at the power steering box (yellow arrow) as a result of the accident.



Photo 19 shows the undercarriage of the Motor Bus, at the area where the engine housing and transmission housing are located. We did not find any sign(s) or indication(s) of fluid leak and/or fluid stain(s) on the underside of the Motor Bus.

Steering System & Braking System

11. Static brake and steering tests was not conducted on the Motor Bus as the engine was unable to be started up. Our visual examination of the various braking and steering components, which had included the brake hoses, brake pipes, steering box, tie rods, tie rod ends and ball joints had revealed that these components were all generally in good condition. See photos 20 - 26 below.

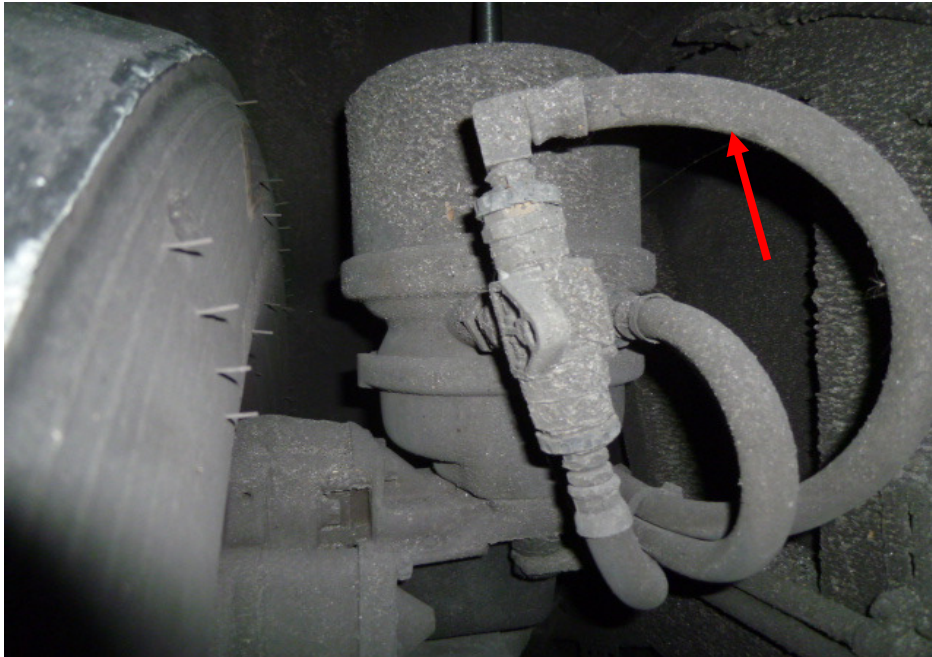


Photo 20 shows the brake pipe (arrowed) at the rear right wheel of the Motor Bus. We did not observe any leakage of brake fluid at the time of our inspection of the Motor Bus. Our visual examination of the various mechanical components of the braking system were generally intact and unaffected by the accident.

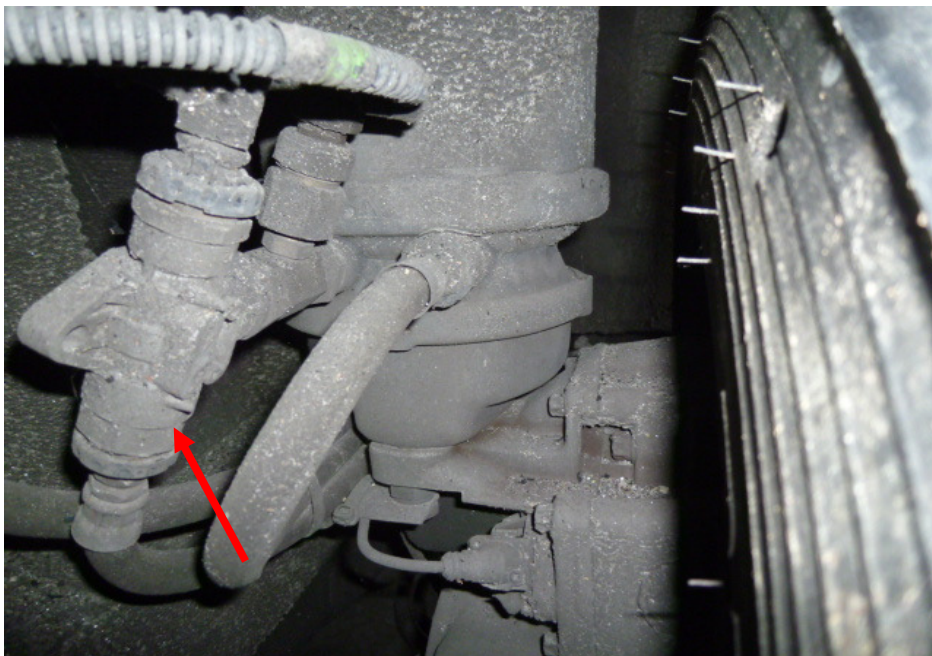


Photo 21 shows the brake pipe (arrowed) at the rear left wheel of the Motor Bus. We did not observe any leakage of brake fluid at the time of our inspection of the Motor Bus. Our visual examination of the various mechanical components of the braking system were generally intact and unaffected by the accident.

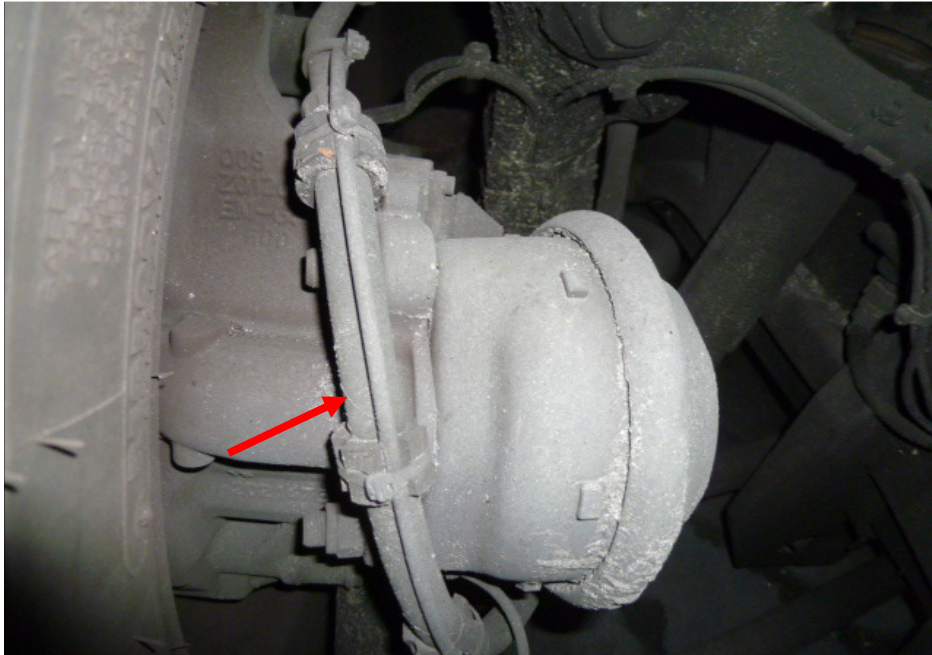


Photo 22 shows the brake pipe (arrowed) at the front right wheel of the Motor Bus. We did not observe any leakage of brake fluid at the time of our inspection of the Motor Bus. Our visual examination of the various mechanical components of the braking system were generally intact and unaffected by the accident.

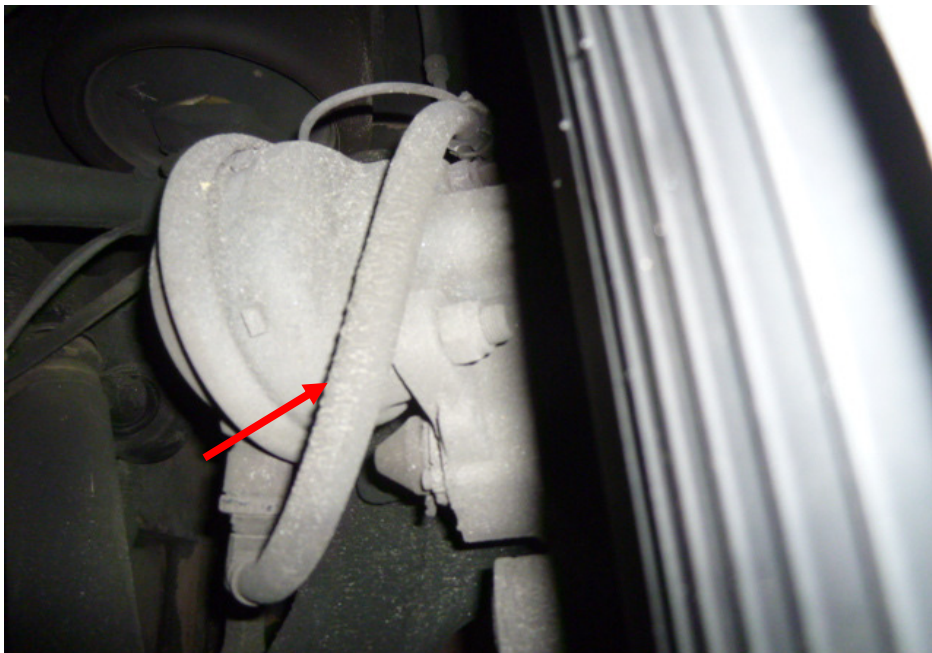


Photo 23 shows the brake pipe (arrowed) at the front left wheel of the Motor Bus. We did not observe any leakage of brake fluid at the time of my inspection of the Motor Bus. Our visual examination of the various mechanical components of the braking system were generally intact and unaffected by the accident.

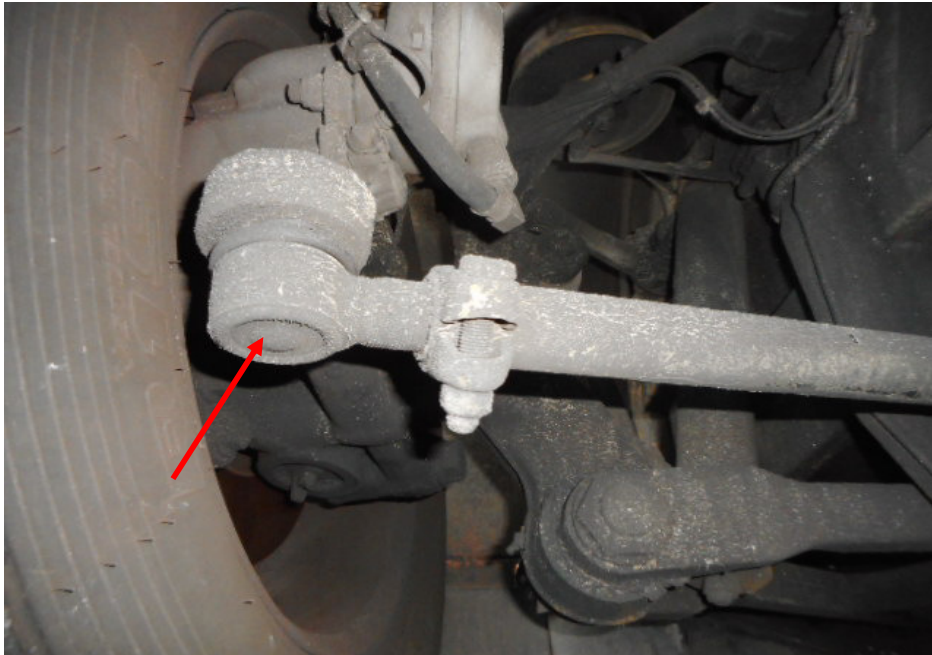


Photo 24 shows the various undercarriage components at the front right wheel of the Motor Bus, in particular the steering tie rod end (arrowed). The various steering components were all found to be intact. There was also no sign of fluid stain(s) observed on the various undercarriage components.

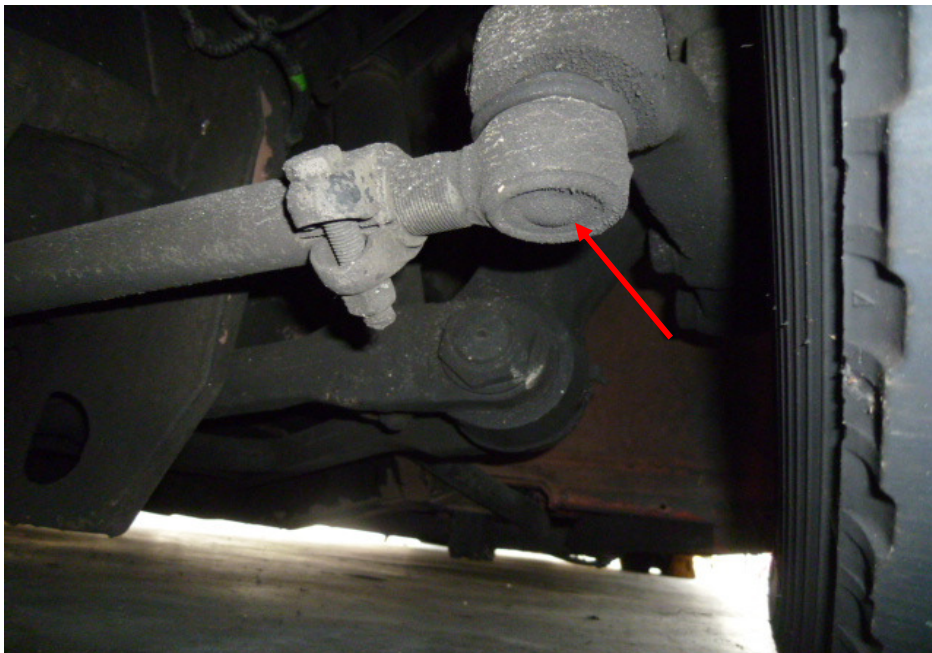


Photo 25 shows the various undercarriage components at the front left wheel of the Motor Bus, in particular the steering tie rod end (arrowed). The various steering components were all found to be intact. There was also no sign of fluid stain(s) observed on the various undercarriage components.

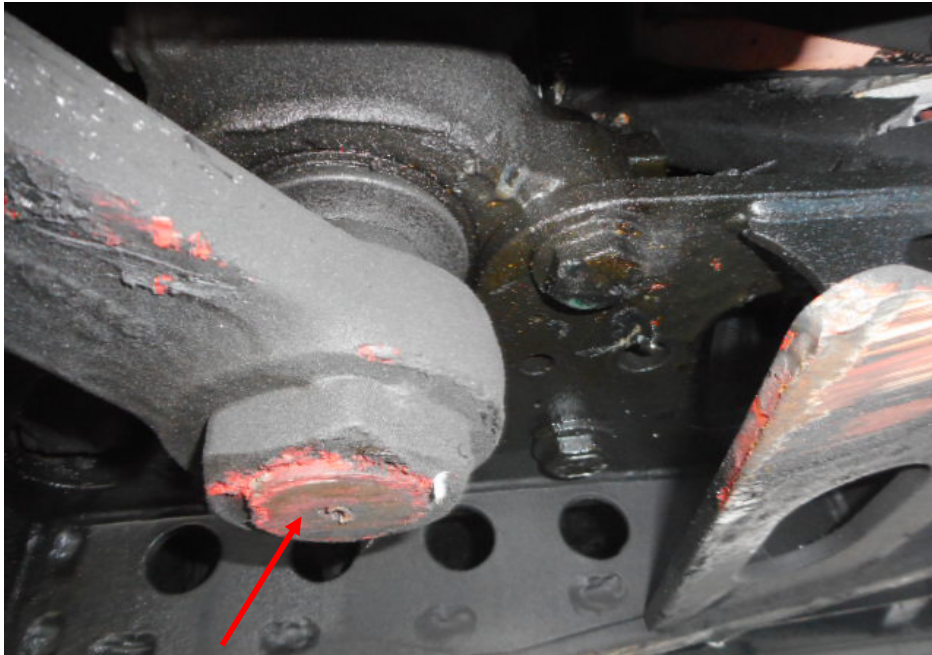


Photo 26 shows the steering box component (arrowed) at the undercarriage of the Motor Bus was found to have sustained damages as a result of the accident and there was sign of fresh fluid stain observed on the component.

Electronic Safety / Warning Indicators

12. The Motor Bus automatic self-test of the functionality of its various electronic operating systems at the time of our inspection was not able to be recorded as the whole dashboard including the odometer has been damaged by the accident.

Operational Behaviour of the Motor Bus

13. Operational test to primarily determine whether there was any abnormality to the engine system, transmission system and braking system of the Motor Bus could not be conducted given the damages the Motor Bus had sustained as a result of the accident.
14. Pertaining to the maintenance aspect, we managed to speak with Mr Weng Keen from SBST who was able to provide a record showing the latest servicing and repairs that were carried out to the Insured Vehicle on 4 October 2022. Tyre checks were also done. See Invoice 1 below.

Activities	Date	Mileage	Additional Remarks
Deployed	01/01/2022		Bus transfer from GAS
RC-RI	07/01/2022	30,090	Passed
Safety Check (C2)	01/03/2022	40,001	
Safety Check (C3)	30/03/2022	45,865	
Safety Check (C4)	27/04/2022	50,790	
Safety Check (C5)	28/05/2022	57,402	
RC-RE	28/05/2022	57,410	Passed
MS-M11	04/10/2022	79,272	Tyre checks done (Passed)
Accident Incident	09/10/2022	Est 80,300	
System Schedule PM C60	11/10/2022	Est 85,191	
System Schedule RC-RI	19/12/2022		
Note :			
a) RC-RI refers to Roadworthiness Check, in-house Regulatory Inspection			
b) RC-RE refers to Roadworthiness Check, external Regulatory Inspection (VICOM)			
c) MS refers to maintenance check on the Fleet Mgmt/Onboard Bus Equipment system where tyre conditions check was also conducted.			
1. The Preventive Maintenance (PM) recommendation from manufacturer is every 30,000 km to minimize breakdown.			
2. Our maintenance schedule is based on manufacturer recommendation.			
3. In addition to PM, SBST introduced Safety Check (not a requirement by manufacturer). For Citaro buses, the Safety Check cycle starts from C2 - Safety Check, follow by C3, C4 and ends with C5. There scope of checks from C2- C5 is identical and they are about 1 months apart.			
4. Statutory Requirement 6 mthly inspection alternating between In-house or external (VICOM) completed and passed in Jan 22 & May 22.			
5. Next PM schedule to trigger on 11 Oct 22			
6. Next RC-RI schedule to trigger on 19 Dec 22			

Invoice 1 shows the latest servicing that was carried out to the Insured Vehicle on 4 October 2022 (arrowed). Tyre checks were also done.

Conclusion

15. For this particular case, we were unable to determine whether there was any possible mechanical failure to the Motor Bus that may have contributed to the accident. The engine was unable to start up which had prevented us from carrying out any operational test(s) and/or static test(s) to its engine system, transmission system, steering system and suspension system.
16. We did not find any evidence which had suggested that the accident was due to poor maintenance of the Motor Bus.

17. The 6 tyres fitted on the Motor Bus were also found to be in serviceable condition. We did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. The 6 tyres were also observed to be sufficiently inflated for vehicular operation with remaining tread depth of approximately 8mm.

**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)*

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