13. During the course of our investigations, we were able to inspect the faulty components of the Motor Bus which were replaced at GSH. Upon closer examination, we observed a deformed radiator, broken radiator fan blades as well as a torn radiator hose. See photos 13 - 17 below.

Photo 13 shows the deformed radiator, broken radiator fan blades as well as torn radiator hose of the Motor Bus which were replaced on 3 March 2020 at GSH.

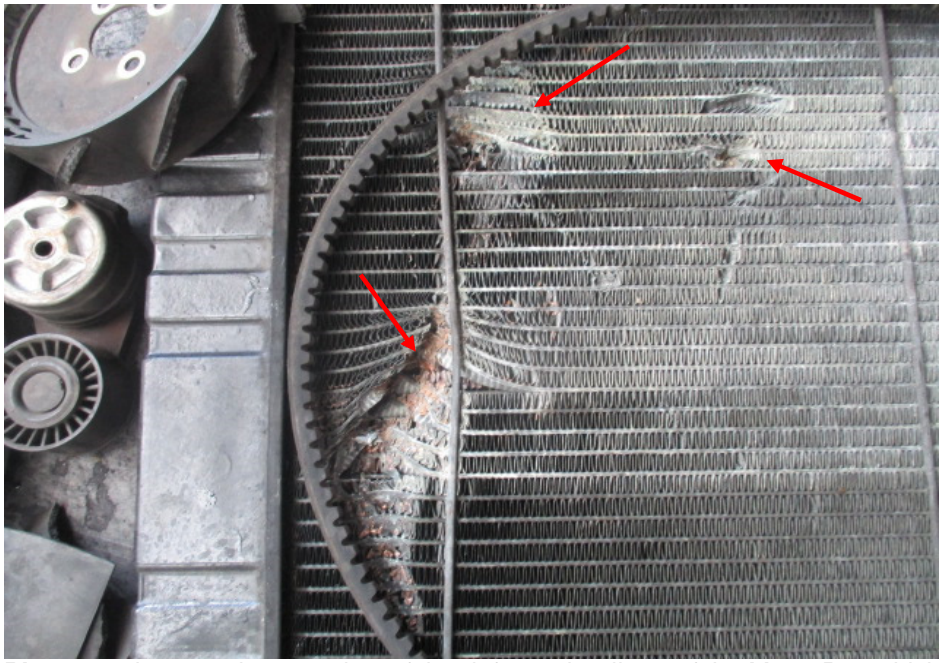


Photo 14 shows a close up view of the deformed radiator of the Motor Bus which was replaced at GSH on 3 March 2020 (arrowed).

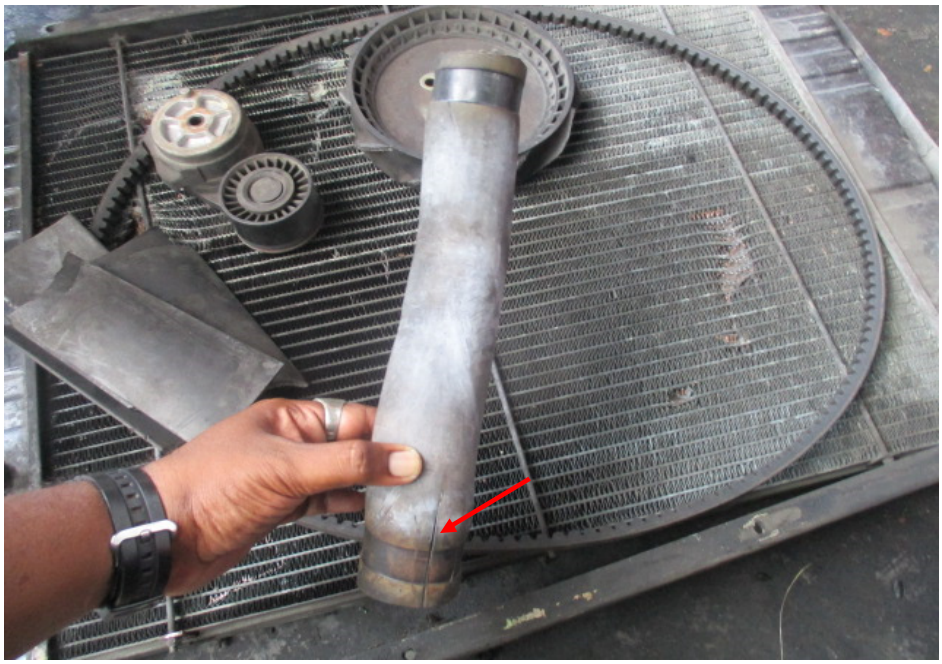


Photo 15 shows a close up view of the torn radiator hose of the Motor Bus which was replaced at GSH on 3 March 2020 (arrowed).

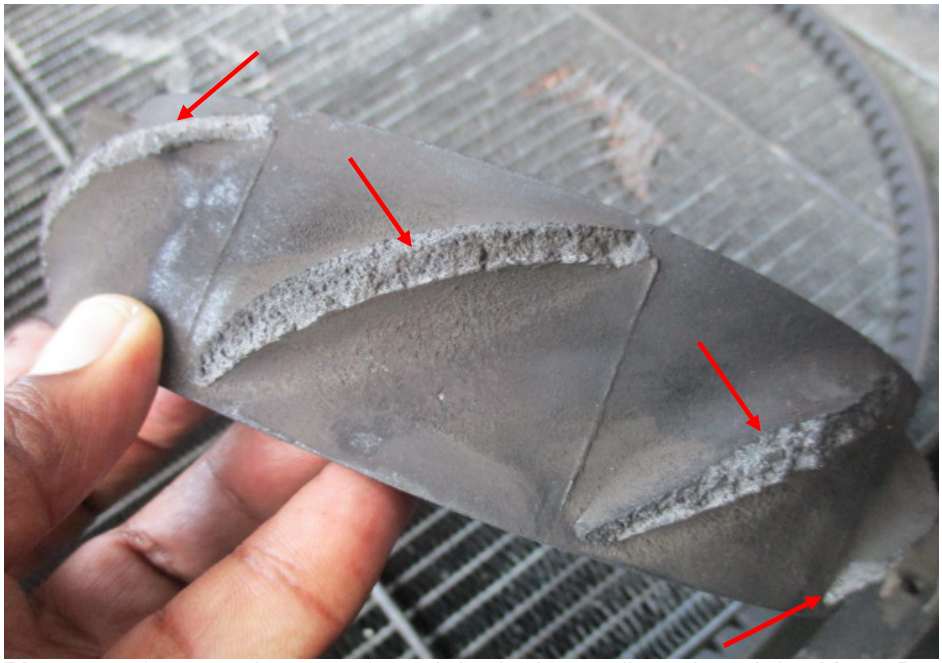


Photo 16 shows a close up view of the broken radiator fan of the Motor Bus which was replaced at GSH on 3 March 2020 (arrowed).

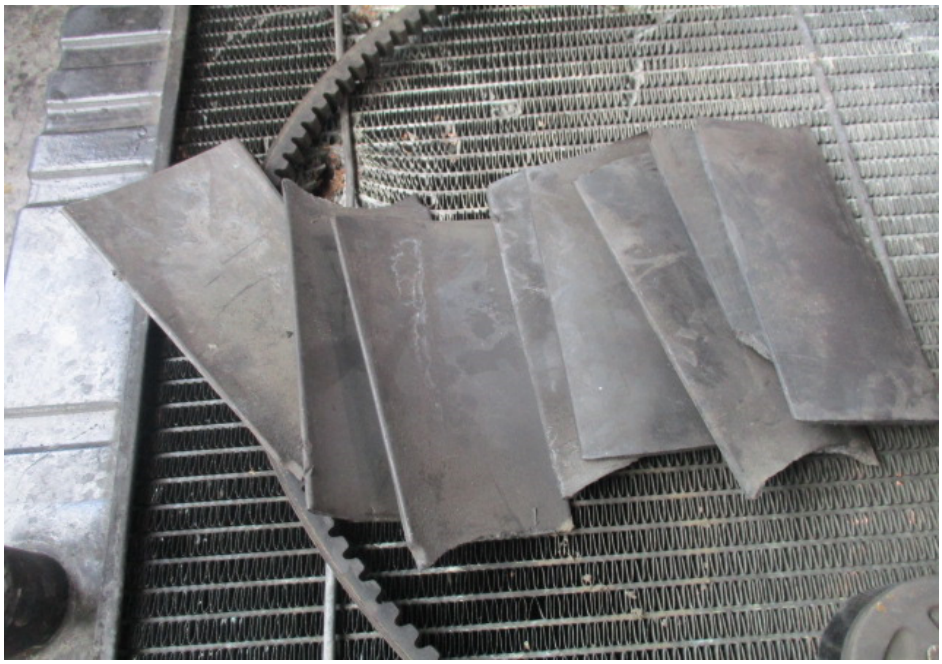


Photo 17 shows a close up view of the broken blades of the radiator fan of the Motor Bus which was replaced at GSH on 3 March 2020.

Comments & Opinions

14. For this case, we managed to speak to Mr Abdullah on 23 March 2020 where we were able to gather further information pertaining to the incident as well as information pertaining to the CDST that was conducted during the mandatory yearly vehicle inspection.

15. In general the CDST is to measure the vehicle power in accordance to its engine capacity and the smoke level that is generated to achieve that power. The CDST consists of 3 components that will be attached to the vehicle.

16. The 1st component would be an engine revolutions- per- minute (herein referred to as **"rpm"**) sensor which is attached magnetically to the oil sump of the vehicle. The rpm sensor measures the engine vibration when the gear is engaged. The sensor converts the vibrations, calculating the rpm of the vehicle as the accelerator is depressed.

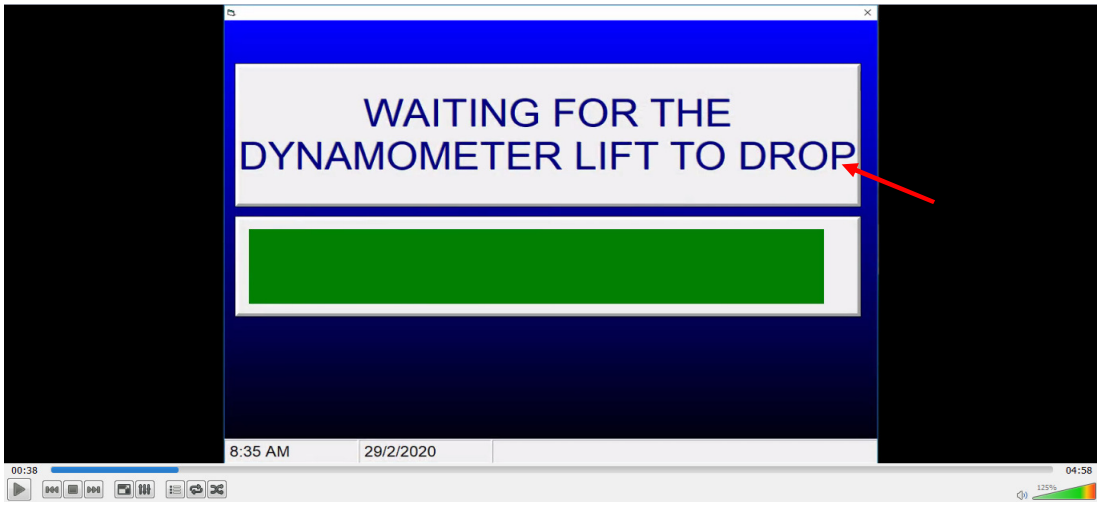
17. The 2nd component would be the dynamometer which consist of rollers that the wheels of the vehicle will be placed in (depending on whether the vehicle is a front-wheel drive or a rear- wheel drive). When the gear is engaged and the accelerator is depressed, the wheels of the vehicle will begin to rotate and the dynamometer simulates the load and inertia of the vehicle when driven on the road. It will then measure the power of the vehicle's engine.

18. The 3rd component is a device which is inserted into the exhaust pipe of the vehicle before the CDST commences. It collects a sample and measures the level of smoke generated during the test.

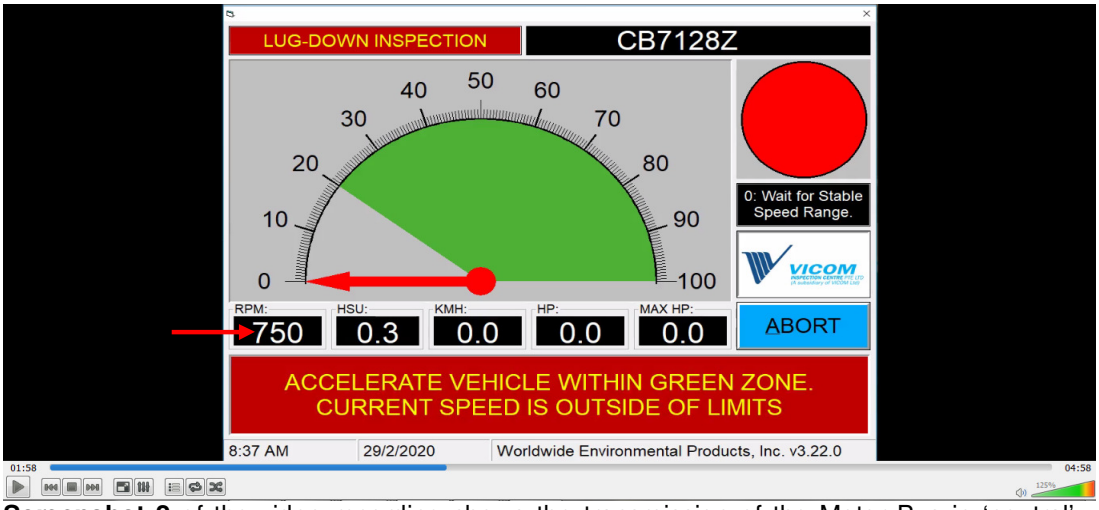
19. Mr Abdullah explained that there will be a list of pre- set estimated maximum horsepower output of a vehicle based on the input of the vehicle's engine capacity and chassis from the database by the Vicom tester before the commencement of the CDST. The testers will always input a number equivalent to half of the estimated maximum horsepower output of a vehicle to safeguard against excessive revving of the vehicle's engine during the CDST which may result in engine damage. So for instance if the estimated maximum horsepower output of a vehicle is 160bhp based on its engine capacity of 3760cc as indicated in the database, then the tester will input 80bhp as the estimated maximum horsepower output that should be achieved by the vehicle's engine in order to pass the CDST.

20. For this case, the estimated maximum horsepower output of the Motor Bus as reflected in the database based on the input of its engine capacity of 3760cc is 160bhp or thereabouts. Hence the tester will input 80hp as the estimated maximum horsepower output for purposes of the CDST.

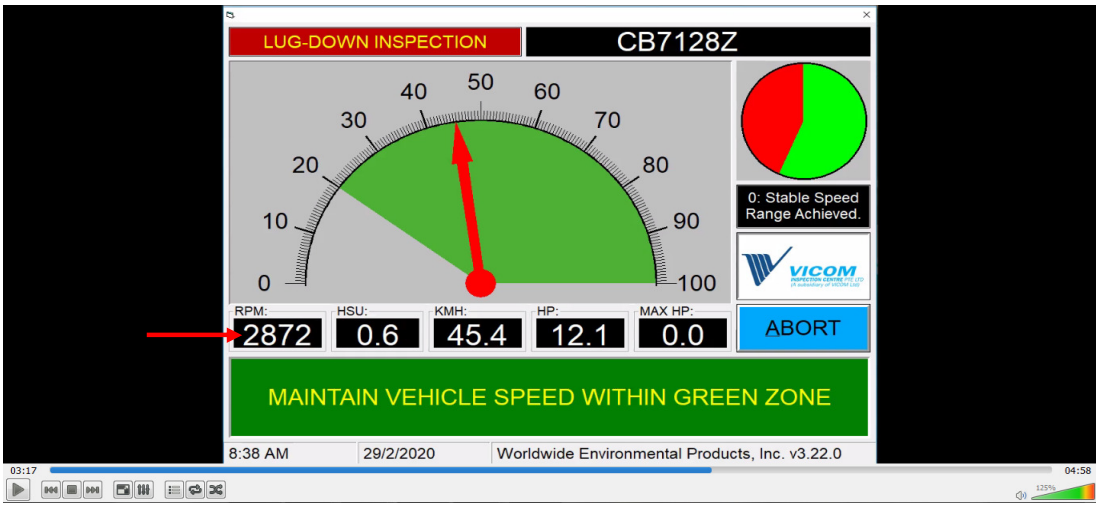
21. The video recording of the CDST in preparation of this report was provided to us by Mr Abdullah. The recording showed the speedometer, rpm and horsepower output of the Motor Bus that was measured as the CDST was conducted. The length (duration) indicated in the video recording was 4 minute 58 seconds. The maximum rpm of the Motor Bus that was measured during the test was 2872 before the Motor Bus broke down as shown in the video recording. It is unlikely possible for excessive revving of the Motor Bus to occur during the CDST as the horsepower output did not reach 80hp which is the estimated maximum horsepower output. The maximum horsepower output reached by the Motor Bus was 12.2hp before it broke down. See screenshots 1 - 6 below.



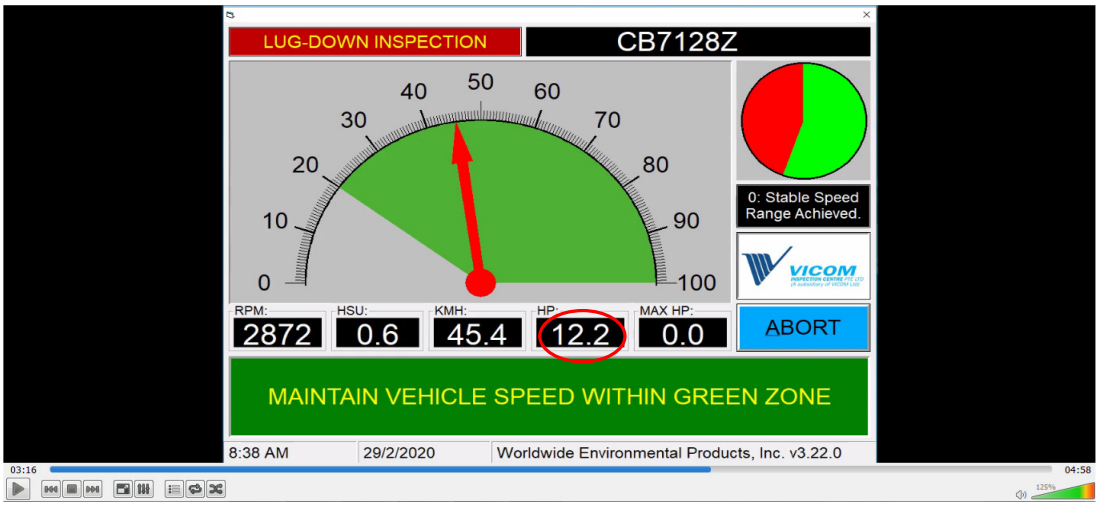
Screenshot 1 of the video recording shows the dynamometer lift being dropped on the rear wheels of the Motor Bus (as it is a rear-wheel drive) before the commencement of the CDST (arrowed).



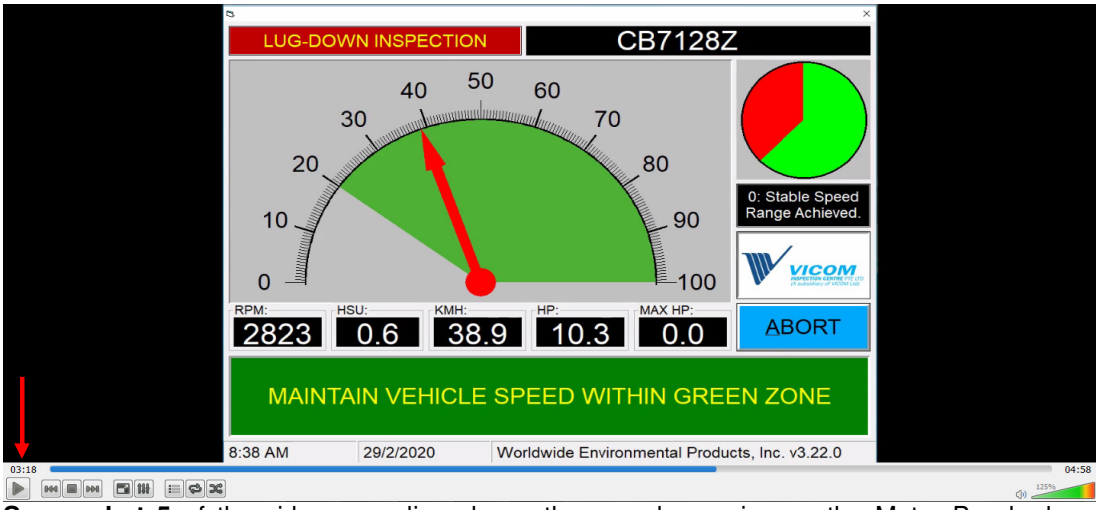
Screenshot 2 of the video recording shows the transmission of the Motor Bus in 'neutral' mode with the engine running as the speed is at '0' kmph and the rpm is idling at 750 (arrowed).



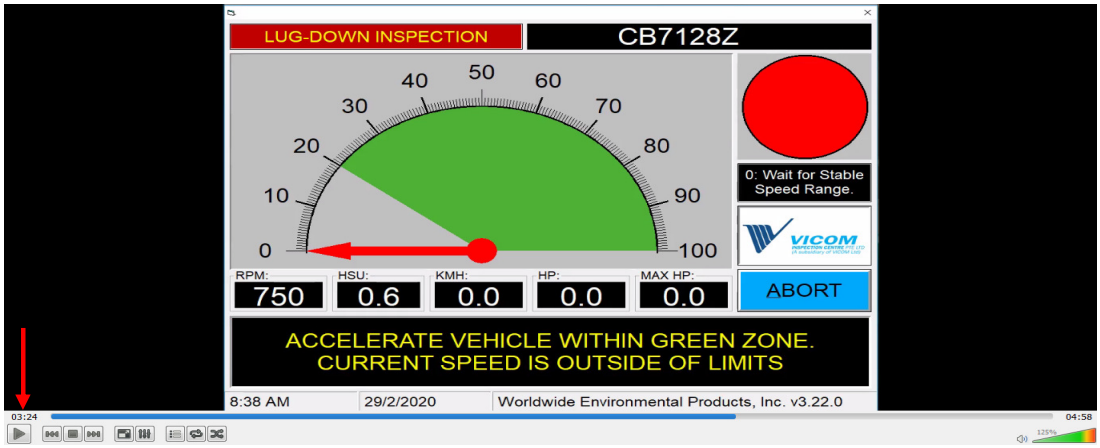
Screenshot 3 of the video recording shows the maximum rpm of 2872 achieved by the Motor Bus as the vehicle speed is maintained within the green zone (arrowed).



Screenshot 4 of the video recording shows the maximum horsepower of 12.2 achieved by the Motor Bus as the vehicle speed is maintained within the green zone (circled).



Screenshot 5 of the video recording shows the rpm decreasing as the Motor Bus broke down at 3 min 18 sec of the CDST (arrowed).

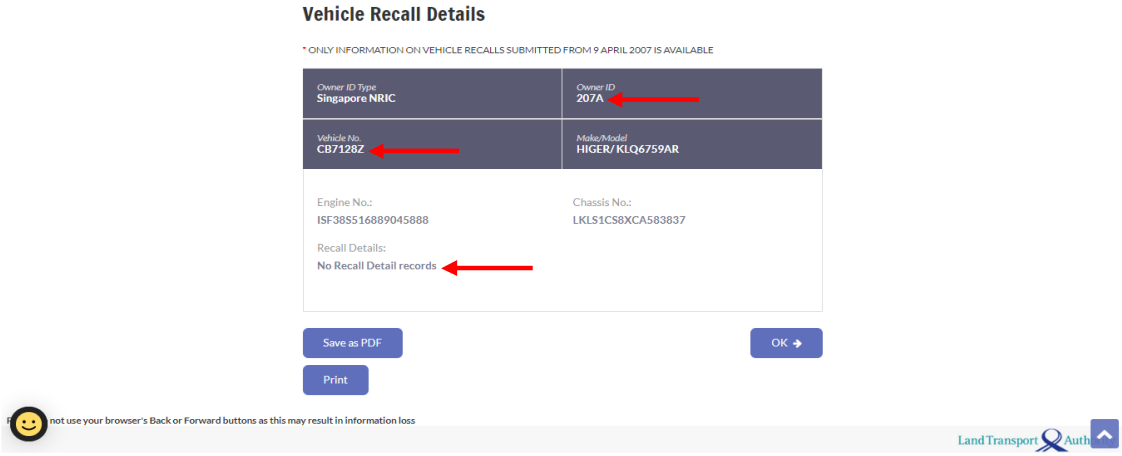


Screenshot 6 of the video recording shows the rpm decreasing to 750 as the neutral gear is engaged at 3 min 24 sec (arrowed) after the Motor Bus broke down during the CDST.

22. Mr Abdullah explained that if the engine of a vehicle did not meet the horsepower output requirements or if the smoke levels measured were over the required limit then the CDST would be discontinued immediately. The vehicle would however proceed with the other stages of the inspection but it would fail and the owner of the vehicle would be required to rectify the issues with the engine before coming for a re- inspection.

23. Mr Abdullah further mentioned that the Motor Bus did not pass the CDST on the 1st attempt as the Motor Bus broke down.

24. Our checks with both local and international bodies and associations revealed that at the time of writing this report, there is no on-going manufacturer recall campaign relating to transmission system malfunction that involved the Motor Bus. See screenshot below showing search result from LTA.



Conclusion

25. Basing on our inspection of the Motor Bus and the information gathered during the course of our investigations, we are of the view that some of the components of the Motor Bus had malfunctioned, rendering the Motor Bus inoperational.

26. However the malfunction was most likely due to wear and tear of the components of the Motor Bus.

27. For this case, we did not find any evidence to suggest that the malfunction of the Motor Bus was a direct result of the CDST conducted during the mandatory yearly vehicle inspection of the Motor Bus.

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Technical Investigator

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