ISSUE DATE:	04/25/2018
SERVICE BULLETIN SUBJECT:	Bendix ABS ECU Replacement
VINs or MODELS AFFECTED:	NYCT and other Customers with Clever Devices Monitoring
COMPLETE BY:	Next available service opportunity
SERVICE BULLETIN #:	SB-18-28

NOTICE! It is expected that this process will require 2 hours per bus. Please schedule appropriately to minimize vehicle downtime.

BENDIX ABS ECU REPLACEMENT

Description

This replacement is necessary to correct a bug found in the Bendix ABS ECU software that was causing relative wheel speed messages to be duplicated over CAN. The Bendix ABS ECU will need to be swapped out and the commissioning/calibration process will have to be completed before the vehicle can be returned to service.

Tools/Parts Required:

Tools Required:

- Torx Bit and Driver Set
- Allen Bit Socket (4mm)
- Torque Driver for Torx and Allen Bits (capable of up **to 50 in-lb**)

Parts Required:

- 035864 – ABS ECU (New Firmware for Clever Devices interface)

Programs Required:

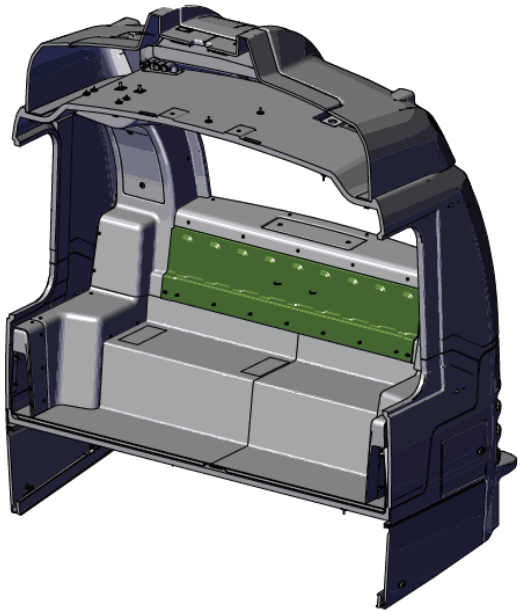
- Bendix ACom Diagnostics 6.8

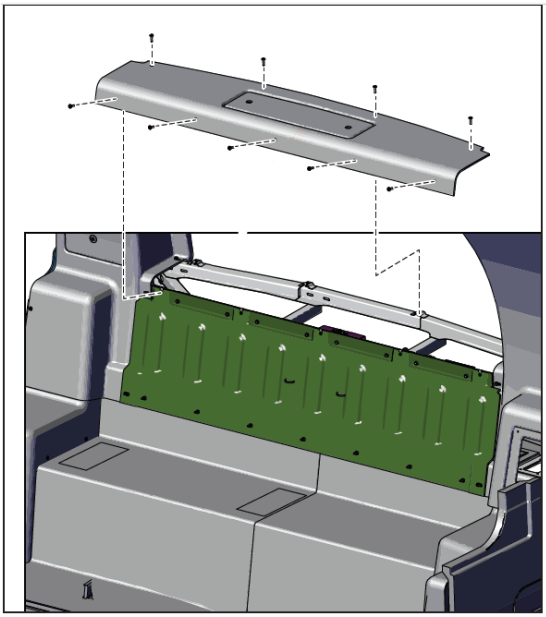
Bendix ABS ECU Replacement Procedure:

The purpose of this procedure is to replace the existing ABS ECU with a unit with new firmware.

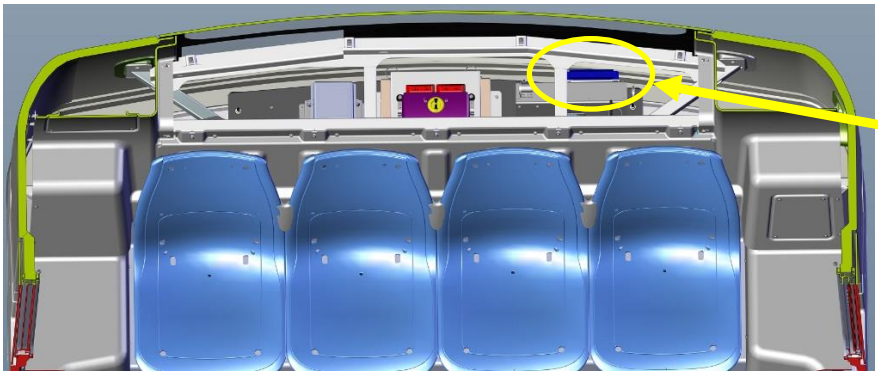
1. Power off the vehicle and perform Proterra Lockout/Tagout.

2. At the rear of the bus interior, remove the screws that secure the rear deck cover panel, remove the cover panel and set aside.

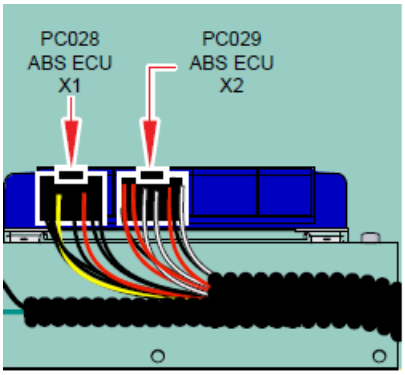




3. Locate the existing Bendix ABS ECU at the streetside rear corner of the rear deck plate.



4. Disconnect the harness from the existing ABS ECU.



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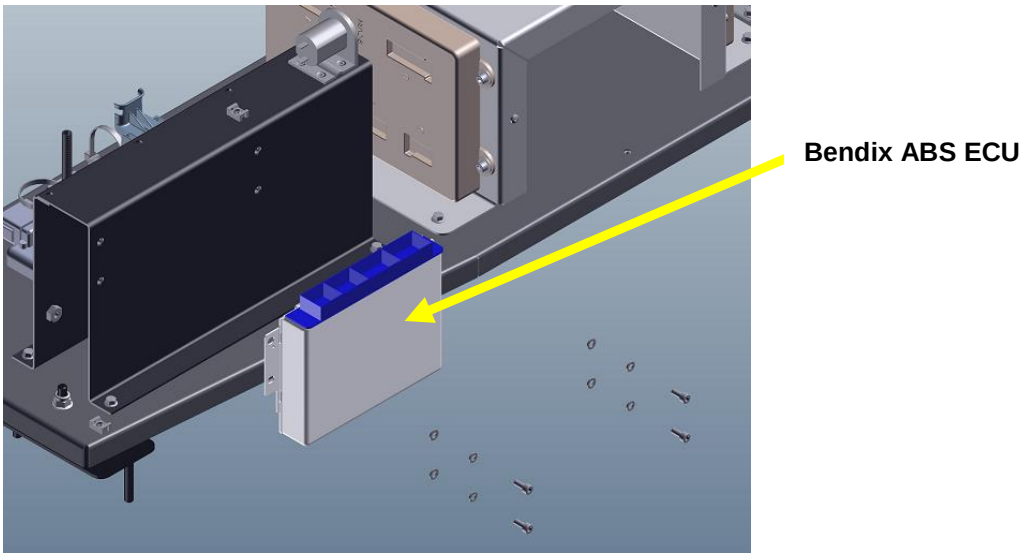
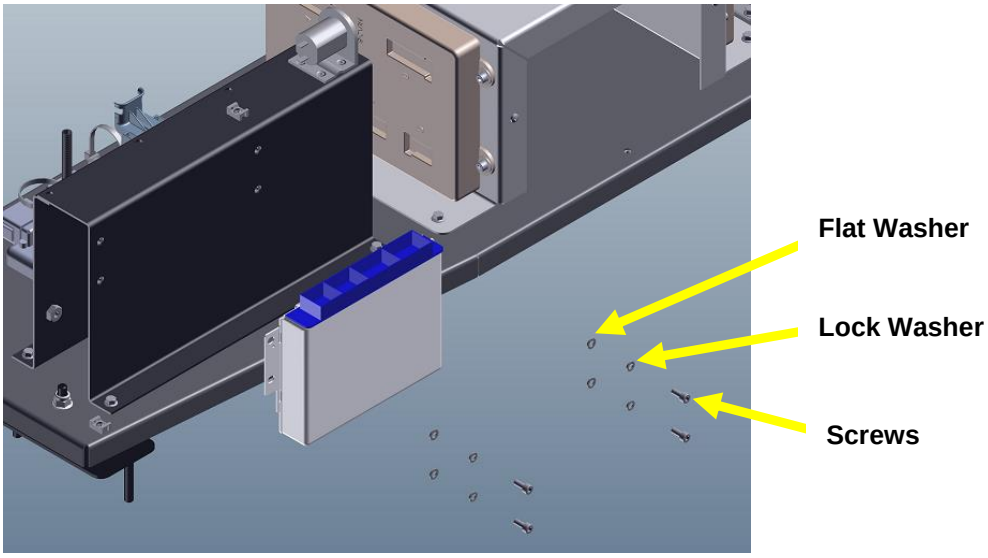
5. Using a 4mm Allen bit socket (or Allen wrench), remove the four (4) screws, lock washers, and flat washers that secure the ABS ECU to the vertical bracket on the rear deck plate.



6. Place the removed ABS ECU aside for return to Proterra/Bendix.

7. **IMPORTANT**! Document the Serial Number of the new ABS ECU and Vehicle ID (Bus Number) that the new ABS ECU is being installed on.

8. Position the new ABS ECU (035864) in position against the body and using a 4mm Allen wrench (or bit and driver), install and slightly tighten the four (4) socket head cap screws, lock washers and flat washers securing the ABS ECU to the vertical bracket on the rear deck plate.



9. Using a Torque Driver, **torque each of the four Socket Head Cap Screws to 44 in-lb**.

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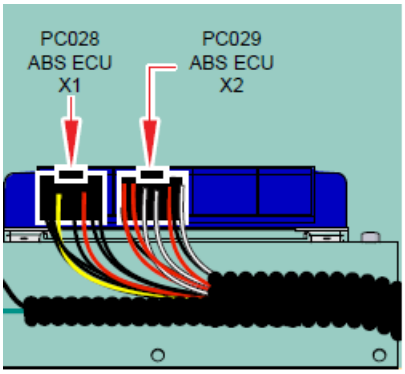
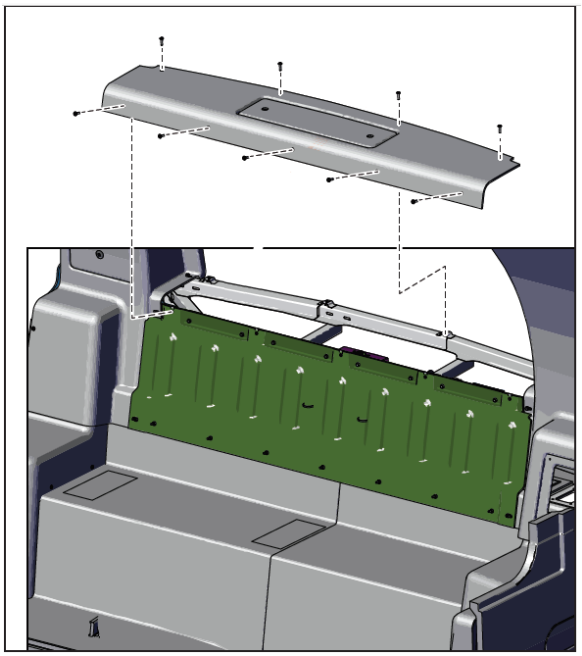
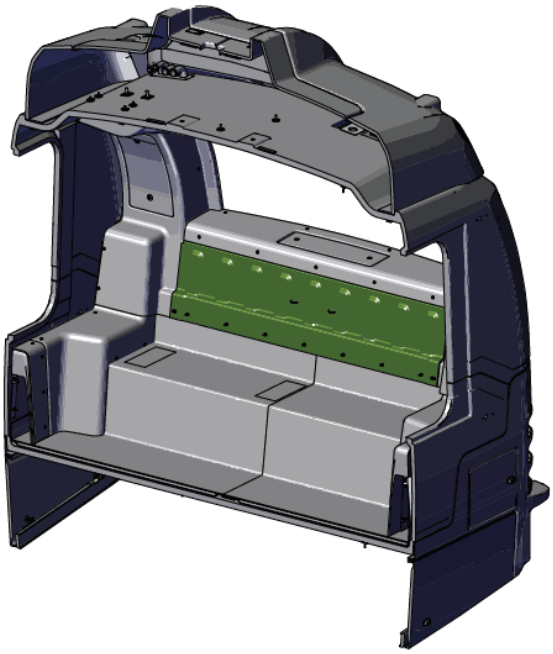
10. Connect the harness to the newly installed ABS ECU.



11. Position the rear deck cover panel in place and install the screws that secure the rear deck cover panel to the frame.





12. Remove Lockout/Tagout and power on the vehicle.

13. Completing the following *Bendix ABS ECU Configuration Procedure*.

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Bendix ABS ECU Configuration Procedure:

The purpose of this procedure is to verify that the Bendix ABS ECU has the appropriate settings for the vehicle.

1. Verify that the Vehicle Master Disconnect switch at the rear of the bus is ON.

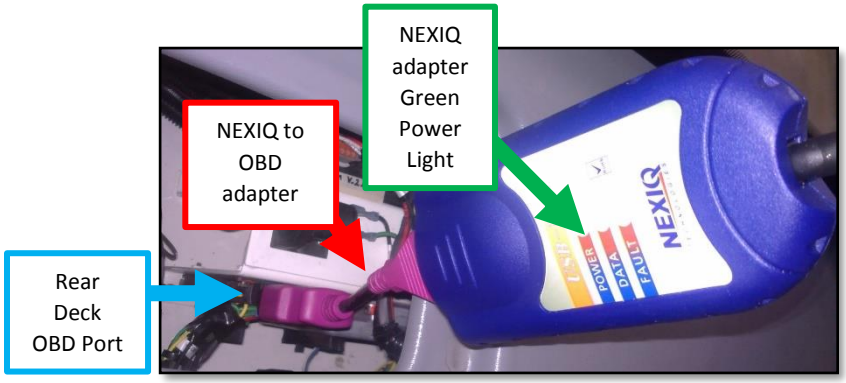
2. At the Drivers Workplace, turn the Master Switch to the ON position to activate switched low voltage power.

3. Ensure that the bus has at least 100 PSI of air pressure in the primary and secondary tanks. **Note:** If the vehicle does not have air pressure, apply external air to the vehicle to refill the tanks **or** temporarily turn on high-voltage to air up the tanks and then turn the bus OFF and back ON so that only Low-Voltage is powered. If using an external air supply, the external air may be left connected during the configuration procedure.

4. Raise the bus into the air and place jack stands under the frame AND axles. **WARNING!** Follow proper site Safety Procedures for using lifts.

5. With the vehicle fully supported by jack stands, carefully lower the wheel lifts so that the wheels can spin freely with the parking brake released.

6. Connect NEXIQ USB link adaptor to the rear deck OBD port **using the pink "Volvo/Mack" adapter** and ensure the green power light illuminates. Connect the USB port to the laptop.



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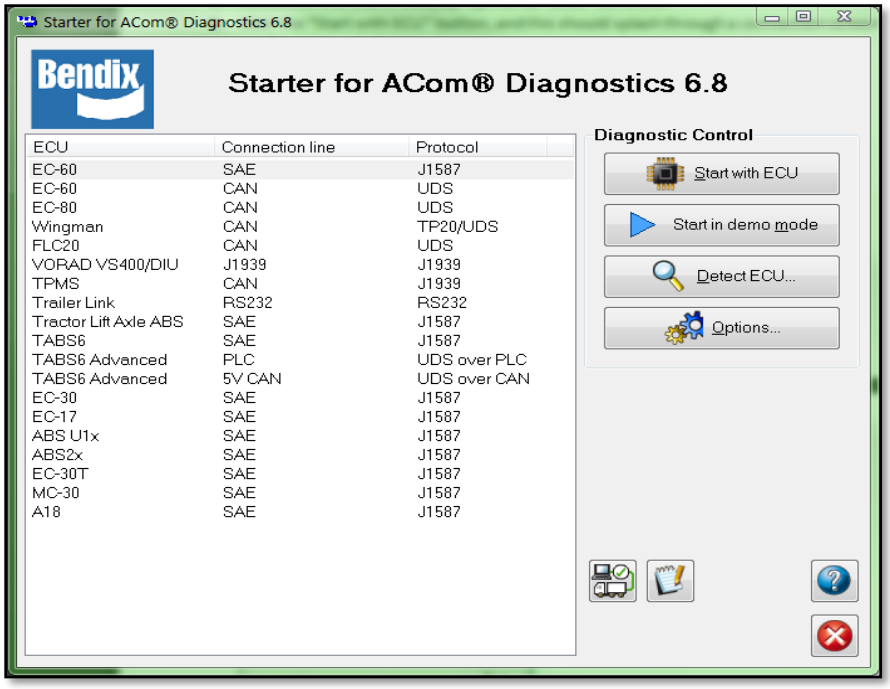
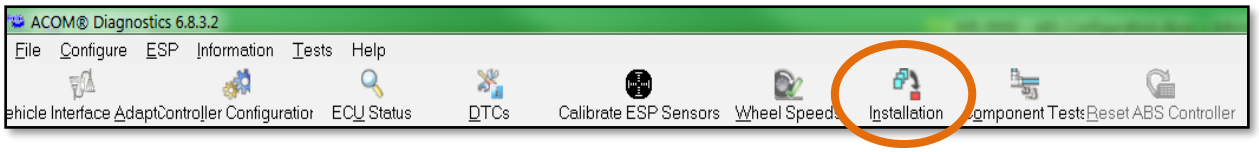
7. Open the ***ACom Diagnostics 6.8*** program on the laptop.

8. Select the first line in the pop-up menu, “EC-60” controller.



9. Click the “Start with ECU” button, which should transfer you through a connection screen to the main unit configuration window.

10. From the Home screen, click “Installation”.



11. Click through the Warning screen.
    NOTICE! If the Installation Tests option is not available, then it may need to be unlocked on your laptop - contact the responsible Engineering party for assistance.

    IMPORTANT!: The vehicle frame needs to be set on jack stands since each wheel will need to be turned independently to verify sensor function.

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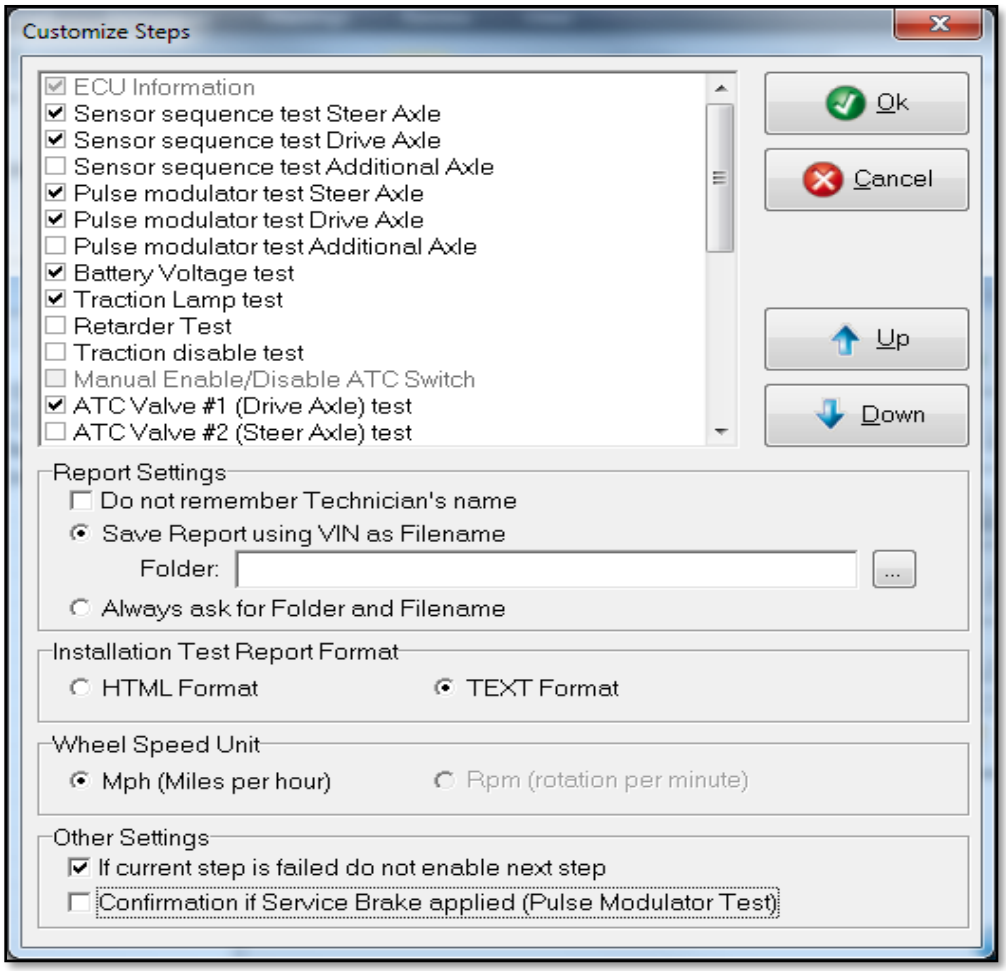
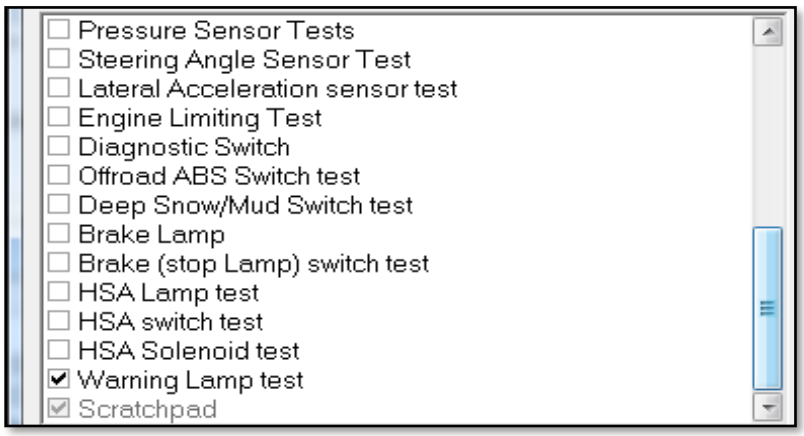
12. Verify the installation tests to be performed. The following Items should be checked from the "Customize" menu of the Installation Tests main screen:



13. Scroll down on this screen to view the additional tests:



14. Click "OK" to save these settings and return to the Installation Tests main window, then return to the Home screen.

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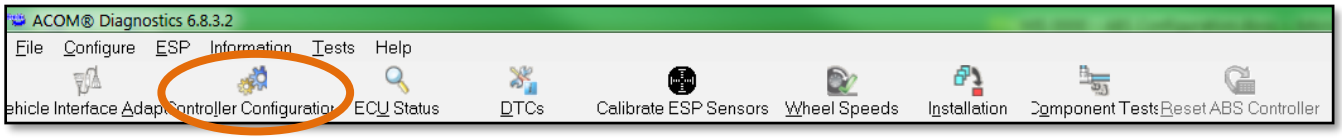
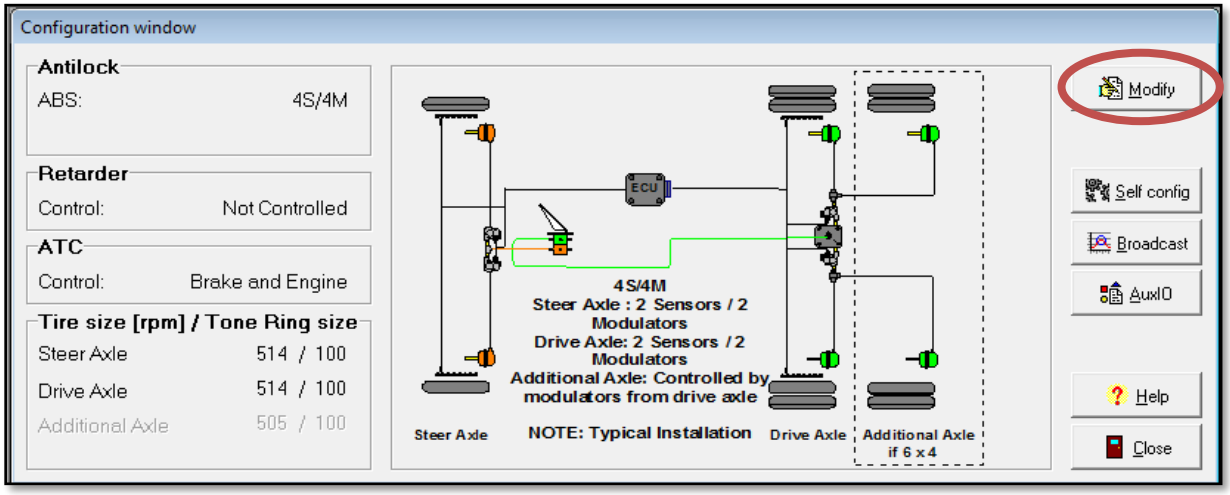
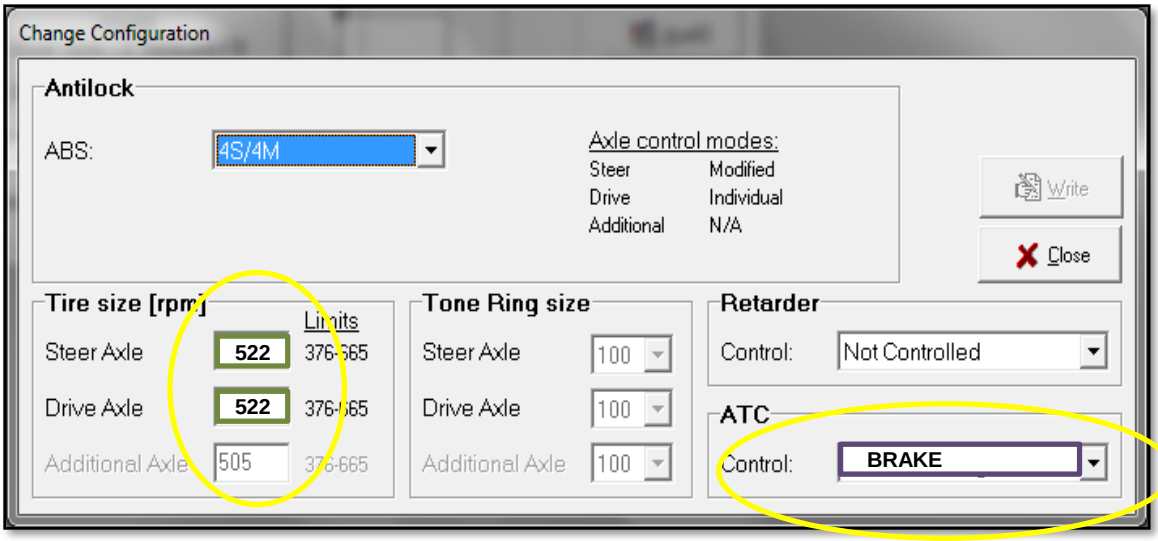
15. From the Home screen click the “Controller Configuration” button to configure the system.



16. Click the “Modify” button.



17. Set the parameters on this screen to match the screenshot for the bulleted items below:
    - Steer Axle = 522
    - Drive Axle = 522
    - ATC Control = Brake



18. Verify the configuration has the appropriate settings for the vehicle in question. When these settings have been changed, select “Write” option.

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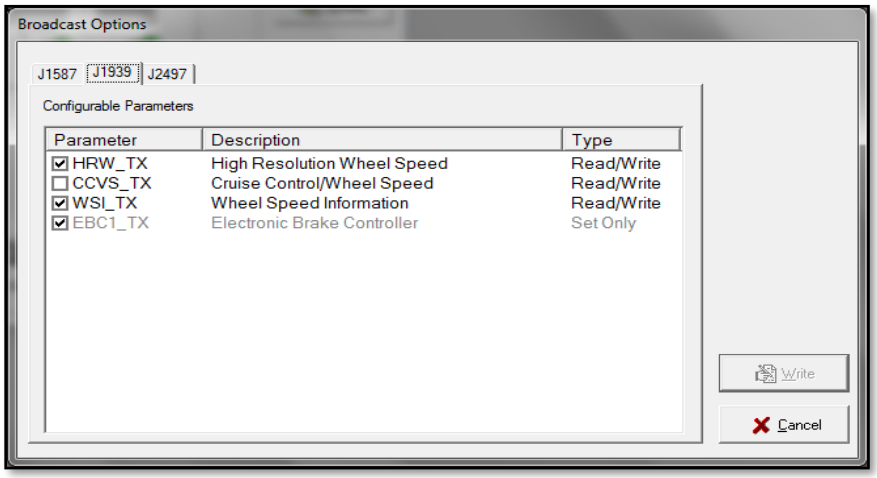
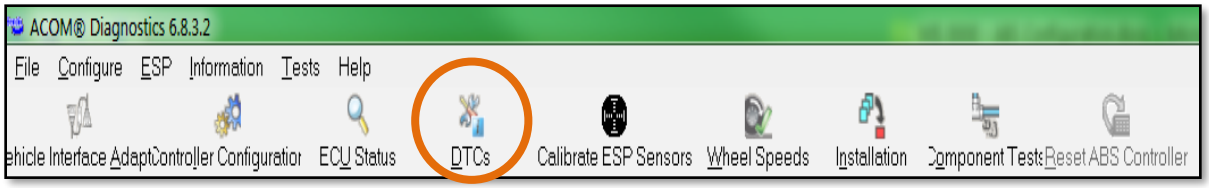
19. Close the “Change Configuration” menu, back to the Configuration window, then click the “Broadcast” button.

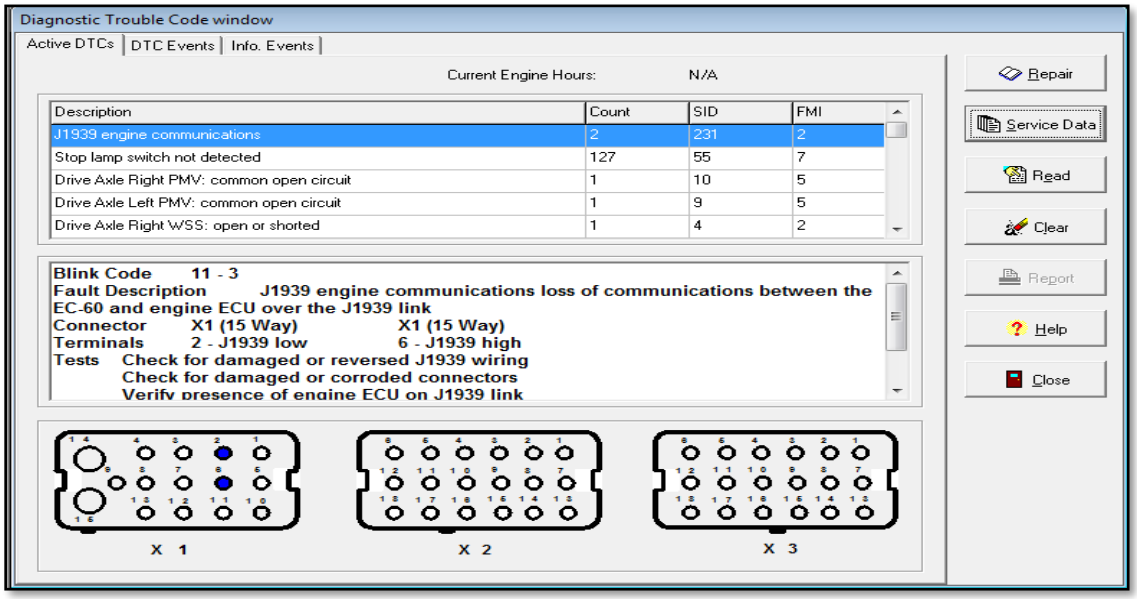
20. On the J1939 tab, ensure the communication parameters match the following screenshot and then click “Write” to save this configuration.



21. From the home screen in ACOM Diagnostics 6.8, Click the “DTCs” button to check diagnostic codes from the vehicle ABS system.



22. Investigate and correct all DTCs. There should be NONE active before proceeding.



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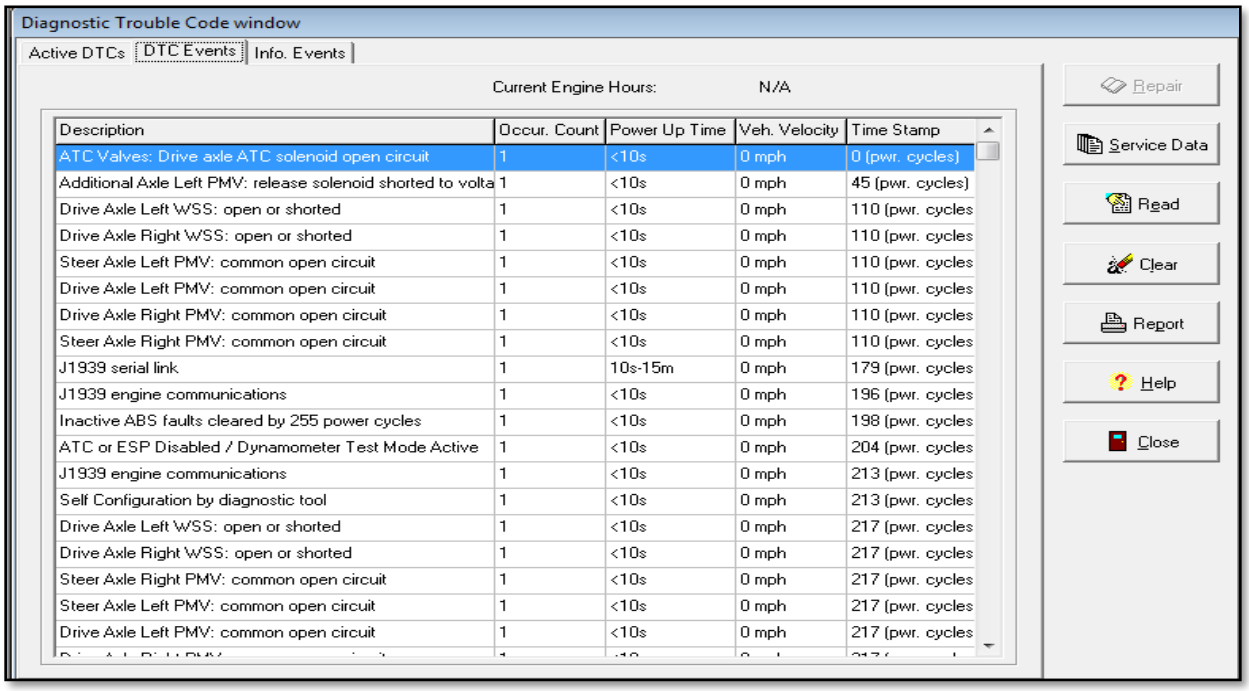
23. Click “Clear” to clear the currently displayed DTCs.

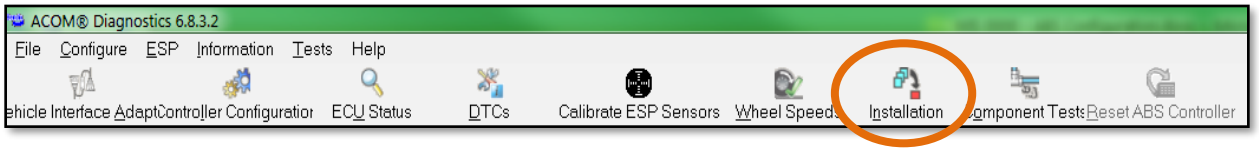
24. Click “Read” to check the system for currently active DTCs.
    NOTICE! If any active DTC codes re-appear, investigate and repair the problems before starting the installation tests in the following section.

25. The “Component tests” screens can be used to diagnose and fix problems with ABS systems. After all the non-standard codes have been corrected, click on the “DTC Events” tab and click “Clear” to clear all historical DTCs left over from the vehicle build process.
    Note: Now you are ready to begin the installation tests.



Description	Occur. Count	Power Up Time	Veh. Velocity	Time Stamp
ATC Valves: Drive axle ATC solenoid open circuit	1	<10s	0 mph	0 (pwr. cycles)
Additional Axle Left PMV: release solenoid shorted to volta	1	<10s	0 mph	45 (pwr. cycles)
Drive Axle Left WSS: open or shorted	1	<10s	0 mph	110 (pwr. cycles
Drive Axle Right WSS: open or shorted	1	<10s	0 mph	110 (pwr. cycles
Steer Axle Left PMV: common open circuit	1	<10s	0 mph	110 (pwr. cycles
Drive Axle Left PMV: common open circuit	1	<10s	0 mph	110 (pwr. cycles
Drive Axle Right PMV: common open circuit	1	<10s	0 mph	110 (pwr. cycles
Steer Axle Right PMV: common open circuit	1	<10s	0 mph	110 (pwr. cycles
J1939 serial link	1	10s-15m	0 mph	179 (pwr. cycles
J1939 engine communications	1	<10s	0 mph	196 (pwr. cycles
Inactive ABS faults cleared by 255 power cycles	1	<10s	0 mph	198 (pwr. cycles
ATC or ESP Disabled / Dynamometer Test Mode Active	1	<10s	0 mph	204 (pwr. cycles
J1939 engine communications	1	<10s	0 mph	213 (pwr. cycles
Self Configuration by diagnostic tool	1	<10s	0 mph	213 (pwr. cycles
Drive Axle Left WSS: open or shorted	1	<10s	0 mph	217 (pwr. cycles
Drive Axle Right WSS: open or shorted	1	<10s	0 mph	217 (pwr. cycles
Steer Axle Right PMV: common open circuit	1	<10s	0 mph	217 (pwr. cycles
Steer Axle Left PMV: common open circuit	1	<10s	0 mph	217 (pwr. cycles
Drive Axle Left PMV: common open circuit	1	<10s	0 mph	217 (pwr. cycles

26. Return to the home screen, click “Installation”.



27. Click through the Warning screen.
    NOTICE! If the Installation Tests option is not available, then it may need to be unlocked on your laptop - contact the responsible Engineering party for assistance.

    IMPORTANT!: The vehicle frame needs to be set on jack stands, with the wheels freely hanging, since each wheel will need to be turned independently to verify sensor function.

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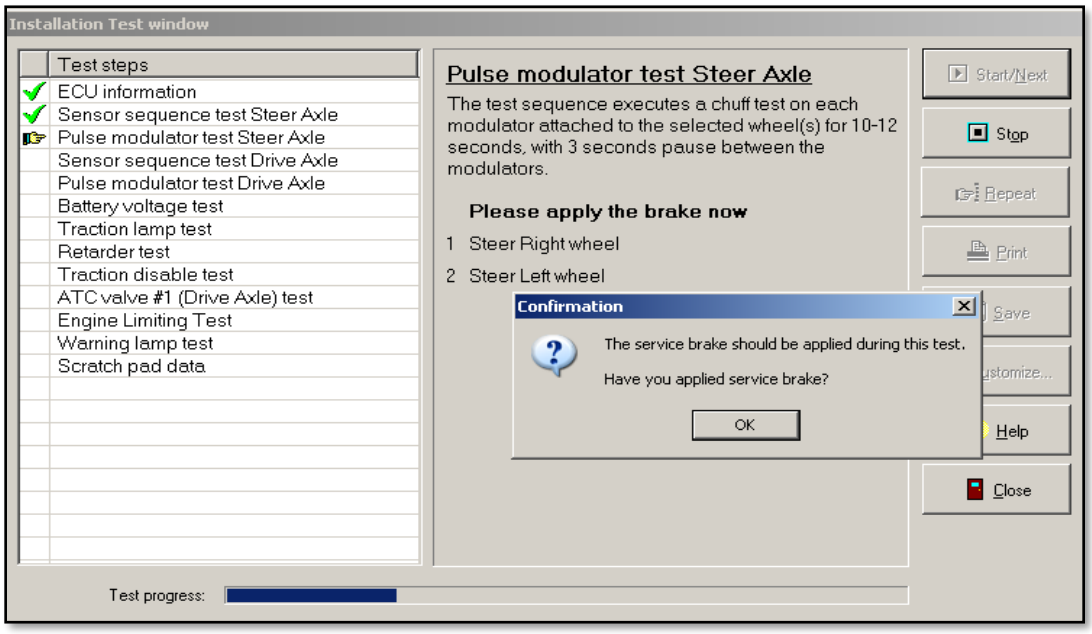
28. Click “Start/Next” button at the top of the installation menu. The program will communicate with the controller and set up the system configuration one step at a time. Follow the instructions and ALWAYS have someone watching on the outside of the vehicle for safety.

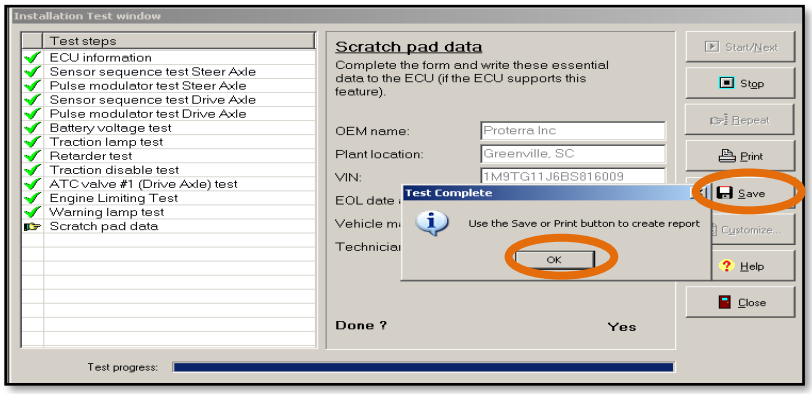
29. During the “Sensor Sequence test”, one person should manually spin each wheel when called for to allow the ABS sensors to register readings.

30. For the sensor sequence test on the Drive axle, you must get under the vehicle and manually unplug the LEFT wheel speed sensor to get only the RIGHT side reading. After spinning the axle with one sensor unplugged, plug the sensor back in and spin both wheels for the “LEFT” side sensor reading.
    Note: If the procedure is stopped in the middle of the test for some reason (fix a sensor, lamp, whatever), you will have to start ALL of the Installation tests over again from the beginning.



31. At the end of test sequence, enter the OEM name and vehicle VIN number for that vehicle.

32. YOU MUST Click the “SAVE” button before you close the window or else you will have to start the tests all over again. Once this procedure is finished and the bus has been reset, the ABS amber warning light on the dash should be off.



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33. Keep a copy of these ABS configuration records. It should be printed off or saved.

34. Close out of the Installation Test window, you are finished with the programming.

35. Disconnect from the vehicle ECU by closing out of all dialog boxes.

36. Unplug the NEXIQ unit from the diagnostic port.

37. Reset the bus, by turning it off and then on again.

38. Upon vehicle startup, verify that the amber ABS light on the dash is no longer lit continuously.
    Note: Both the ABS and ATC indications should illuminate for a few seconds on startup and then disappear.

39. Verify the ABS system activates the modulator valves on all front and rear wheels in sequence on 24-Volt Key On.
    Note: You should hear sounds like “click, click”…...”click, click”.

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