



INSTRUCTION TO SERVICE

ITS61123		FEB 13, 2025
SECTION:	290-ELECTRICAL SCHEMATICS	
SUBJECT:	FEBS BATTERY PROGRAM UPDATE PROCEDURE – FW 2324	
SUMMARY:	FW2324 offers: <ul style="list-style-type: none"> • Improved BMS response to overcharging and other functional safety mechanisms • Robust detection of failure modes through DTCs • Battery Data Recorder (BDR) capabilities • Streamlined flashing processes. • Logic improvements for better integration with application 	
AFFECTED SR:	ELFA3 Buses	

ITS61268

Ref. NHTSA Recall No.	Ref. Transport Canada Recall No.
Not Applicable	Not Applicable

THIS ITS DOCUMENT SHOULD BE RETAINED AND REFERRED TO FOR FUTURE MAINTENANCE UNTIL THE NEW FLYER PARTS AND/OR SERVICE MANUAL IS UPDATED TO REFLECT WORK DONE AS A RESULT OF THIS DOCUMENT. ENSURE THAT THIS DOCUMENT IS AVAILABLE FOR PARTS AND MAINTENANCE STAFF GOING FORWARD.



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1. EQUIPMENT/FILES REQUIRED:

- 1.1. NEXIQ with USB-Link 2 cable or PCAN tool
- 1.2. Battery diagnostic cable. NF P/N - 704950
- 1.3. Software package

Contact Service Engineering specialist for software package via sending email at serviceorganization_electrical@newflyer.com

- 1.3.1. 2324 XALT Service Tool (XST)
- 1.3.2. Supplied bootloader 2150 file
- 1.3.3. Supplied BMS_00XX_232403_02 and above
- 1.3.4. Supplied MCU_2150XX_XX.mot file

NOTE: Before the start of the procedure make sure the SOC on the bus is above 30%, T30 supply (24V battery) is within the specified range and your laptop is fully charged or connected to a charger to prevent any interruptions.

2. SET UP/INSTALL THE XST

- 2.1. Copy and paste the XST_2324.zip file provided by SES.
- 2.2. Extract the zip folder on your laptop. C drive preferred.
- 2.3. Navigate to the binary folder under the XST_2324 main folder and double click on the XST_2324_01.exe to install the software. A desktop shortcut will be added to the desktop.
- 2.4. Refer Xpand service tool user manual in the support documents folder provided with zip folder for any further information on how to use the xst.

3. FLASH THE BOOTLOADER ON SCU

NOTE: Updating the Boot Loader carries the risk of rendering the controller inoperable if the procedure is not followed correctly or is interrupted. It is crucial to ensure that both CAN communication and Unswitched Power (T30) remain uninterrupted during the update process. Therefore, take extra care to avoid any disruptions while performing the following procedure.

- 3.1. Turn MRS to the ON position.
- 3.2. Connect the interface harness aka octopus' cable to the NEXIQ and to the BDU diagnostic port. Connect the NEXIQ to your laptop with a USB cable.
- 3.3. Within the interface harness, connect CAN 1 to STRING 1 (the NEXIQ with the XST tool only communicates on CAN 1 – so you're connecting the NEXIQ to one string at a time).
- 3.4. On the XST software navigate to the flash tab.
- 3.5. Set the CAN Channel to Channel 1, Baud rate to 250K and Hardware to Nexiq.**

- 3.6. Select the “browse” button and navigate to where the **BOT_2150_02.mot** file is located. Choose the file and press the Flash button to start flashing the MCU.
- 3.7. Ensure that the flash progress reaches 100%, and the final message from the flash tool states: “FLASH: Positive response to STOP”.
- 3.8. When done wait for 60 seconds before moving to the next SCU.
- 3.9. Repeat the flashing process for each SCU, closing and reopening the XST software after each flash.

4. FLASH THE BOOTLOADER ON MCU

- 4.1. Turn MRS to the OFF position, ensuring the multiplex system is still awake
- 4.2. In Vansco Diagnostics, force the MCU enable output signal to the active/ON state i.e. MCU T15 vansco output set to true
- 4.3. Connect the Nexiq CAN interface plug to the Ebus black diag port.
- 4.4. Connect the Nexiq USB plug to the laptop and launch XST_2324 software.
- 4.5. On the XST software navigate to the flash tab.
- 4.6. Set the CAN Channel to Channel 2, Baud rate to 250K and Hardware to Nexiq.**

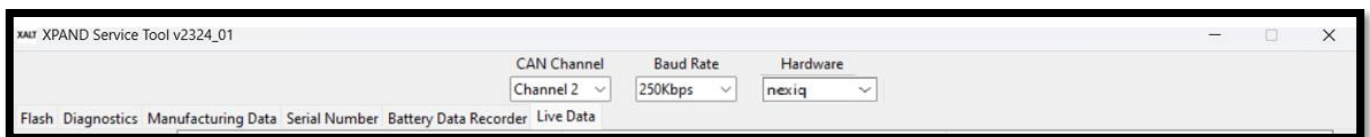


Fig 1: XST setup for MCU bootloader

- 4.7. Select the “browse” button and navigate to where the **BOT_2150_02.mot** file is located. Choose the file and press the Flash button to start flashing the MCU.
- 4.8. Ensure that the flash progress reaches 100%, and the final message from the flash tool states: “FLASH: Positive response to STOP”.

5. UPDATING THE ESS NETWORK TO 500K BAUD RATE


NOTE: At this point, the bootloader has been updated, but the system is now running at 250k baud rate. Follow the step below to bring the network to 500K baud rate to be compatible with single binary flash.

- 5.1. Load the supplied BMS 2150 file appropriate (MCU_XXXX_0002_XX.mot) for the batteries.
- 5.2. Connect the Nexiq CAN interface plug to the Ebus black diag port.
- 5.3. Connect the Nexiq USB plug to the laptop and launch XST_2324 software.
- 5.4. On the XST software navigate to the flash tab.
- 5.5. Set the CAN Channel to Channel 2, Baud rate to 500K and Hardware to Nexiq

- 5.6. Select the “browse” button and navigate to where the supplied MCU_XXXX_0002_XX.mot file is located.
Choose the file and press the Flash button to start flashing the MCU.
- 5.7. Monitor the XST tool completion bar at the bottom of the flash tab on the tool.
- 5.8. Ensure that the flash progress reaches 100%, and the final message from the flash tool states: “FLASH: Positive response to STOP”.
- 5.9. Close the XST software.
- 5.10. Clear the forced state on the MCU enables signal.
- 5.11. Turn the MRS to the ON position.

6. FLASH THE BMS FILE TO THE MCU

IMPORTANT! After updating the Bootloader on all battery system components, you only need to perform Single Binary Flash for future BMS software updates.

- 6.1. Keep the MRS to the ON position and CAN interface device to FEBS application CAN (Ebus diag port)
- 6.2. Reopen the XST software, navigate to the Flash tab.
- 6.3. Set the CAN Channel - **Channel 2**; Baud rate – **500K**; Hardware – **Nexiq**.
- 6.4. Press the browse button and choose the supplied BMS_00XX_232403_02.mot.
 **NOTE: BMS file is specific to battery type**
- 6.5. Press the Flash button and wait until the flash bar reaches 100%.
- 6.6. Ensure that the flash progress reaches 100%, and the final message from the flash tool states: “FLASH: Positive response to STOP”.
- 6.7. Close the XST software.
- 6.8. Once completed successfully – Turn the MRS to the OFF position for 5 minutes (USE TIMER) and then Turn the MRS to the ON position

7. SOFTWARE VERIFICATION

- 7.1. Keep the MRS to the ON position
- 7.2. Reopen the XST software, navigate to the Flash tab.
- 7.3. Use the settings CAN Channel - **Channel 2**; Baud rate – **500K**; Hardware – **Nexiq**.
- 7.4. Under the Live Data tab, you can find the current software version flashed to the MCU, and each battery string.

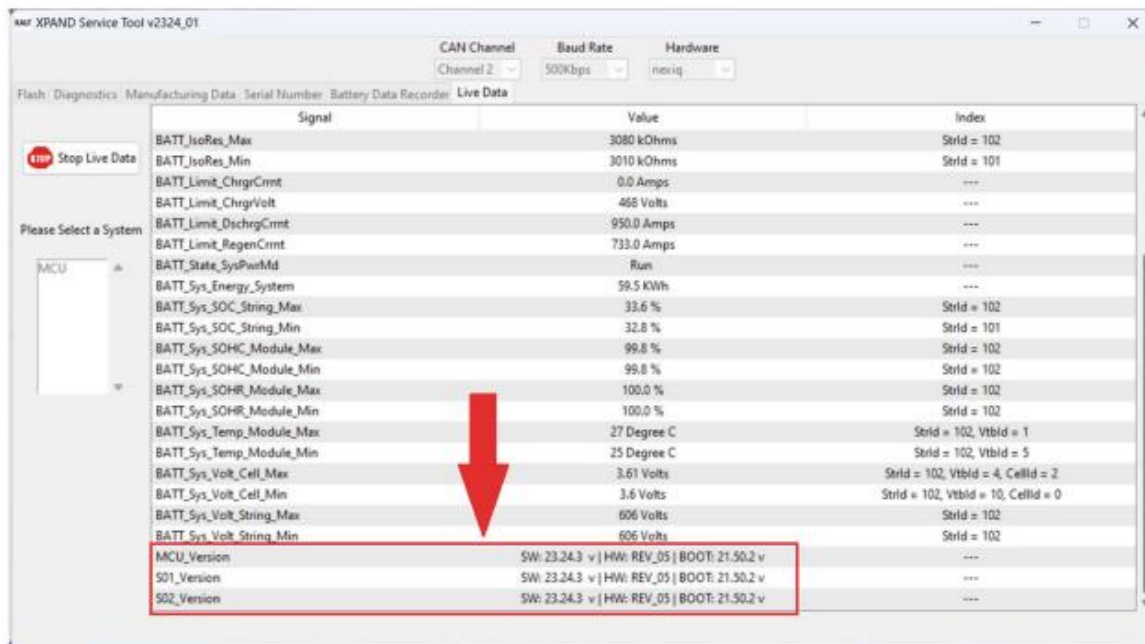


Fig 2: XST to verify the software and bootloader

8. TROUBLESHOOTING: BDU FAILS TO INITIALIZE

If the BDU fails to initialize after a BMS flash, follow these steps to diagnose the issue:

1. Set the T15 to 24V.
2. Monitor the current draw at the T30. Initially, the current should be around 130 mA.
3. Observe if the current gradually drops to approximately 0 mA within 5 seconds.

If this behavior occurs, it indicates a failure in initialization. In such cases, proceed with the BDU recovery procedure to resolve the issue.

RECOVERY PROCEDURE FROM FEBS

1. Have access of SCU_1940XXXX_XX.mot file on your laptop. Contact SES group to share the file if needed.
2. Access to either the BDU's Service CAN or isolated Internal CAN
3. Ensure the XST and its CAN interface is connected to the BDU (via Internal or Service CAN)
4. Verify T15 is OFF (0 Volts).
5. Within the XST, load the 1940 based SCU software into the tool, but do not "Start Flashing".
6. Set T15 ON (24 Volts) and within 5 seconds, "Start Flashing" via the XST.
7. The XST will provide positive feedback that flashing was successful.
8. Put the BMS to sleep by setting T15 OFF (0 Volts).

9. Wait either 5 minutes OR until T30 (unswitched power supply) current draw falls to ~0 mA.
10. Wake-Up the BMS by setting T15 ON (24 Volts)
11. Repeat steps 8 through 10, for a total of two sleep-wake cycles.
12. Within the XST, load the Production Intent BMS software, and “Start Flashing”
13. The XST will provide positive feedback that flashing was successful.
14. Put the BMS to sleep by setting T15 OFF (0 Volts).
15. Wait either 5 minutes OR until T30 (unswitched power supply) current draw falls to ~0 mA.
16. Restore the BDU into the system with other strings, MCU, low voltage wiring, etc.
17. Set T15 ON (24 Volts) and, via Application CAN check that:
 - a. BATT_Comm_StringsAddressed is equal to the number of BDUs in the system.
 - b. BATT_State_sysPwrMd is IDLE

9. CLEAR CODE INSTRUCTIONS FOR 2150-2324 XST

- 9.1. Click and highlight the Permanent fault.
- 9.2. Right click on the permanent fault.
- 9.3. Select the bottom most option for clear fault in drop down window.
- 9.4. Insert above clear code into newest pop-up window using CTRL+C (to copy) and CTRL+V (to paste).
- 9.5. Copy and paste the Authorization Code into the “Authentication Code” window.
- 9.6. Be sure when copying that no blank or invisible characters populate at the beginning or end of the code.
- 9.7. You will get confirmation that it was activated.
- 9.8. You will need to right click on each string and then select “clear fault”.
- 9.9. It will state something along the lines of code still active.
- 9.10. After doing this for all strings key the bus off for 10 minutes.
- 9.11. Key the bus back on and then check with XST to ensure no faults remain.



NEW FLYER®
LIST OF ABBREVIATIONS

INSTRUCTION TO SERVICE
ITS61268

<u>Abbreviations</u>	<u>Description</u>
APP	Application
BDU	Battery Disconnect Unit
BMS	Battery Management System
CAN	Controller Area Network
FBPS	Freudenberg Battery Power Systems
HV	High Voltage
LV	Low Voltage
MCU	Master Control Unit
SCU	String Control Unit
XST	XPAND Service Tool
SES aka TSS	Service Engineering Specialist.



LABOUR ESTIMATE				
	Operation	Number of Technician(s)	Hours	Labor Time T X HR
1	Rework - Update FEBS software to rev 2324	1	0.25	0.25