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ORION BMS BYTE STRUCTURE

USE WITH HPEVS DRIVE SYSTEMS
Generic 5.37 and Higher

Date: 2-8-18

Scope: The following details the information and set-up of the Orion BMS used with a HPEVS drive system with the Generic software version 5.37 and higher.

Disclaimer: This document assumes that the reader and the person making changes to the Orion BMS have knowledge on how to make the changes accordingly to the direction of this document. HPEVS is not responsible for any issues arising from changes made to the Orion BMS.
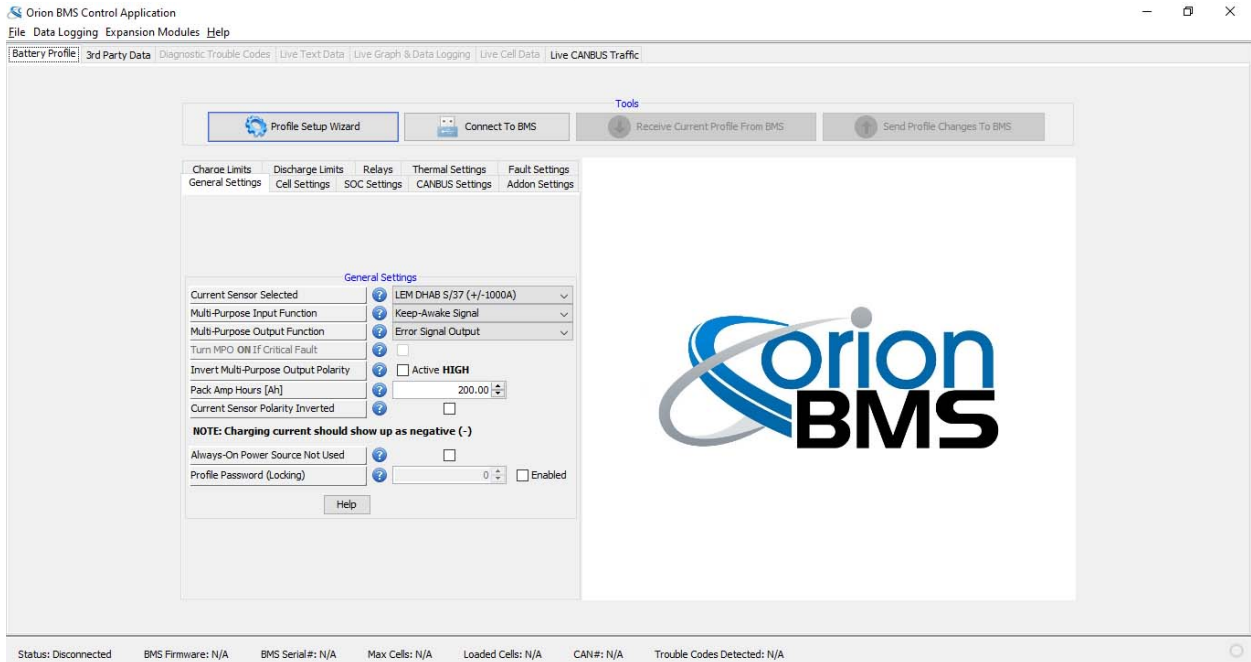
1. Open the Orion BMS utility. (Fig.1)

Fig. 1

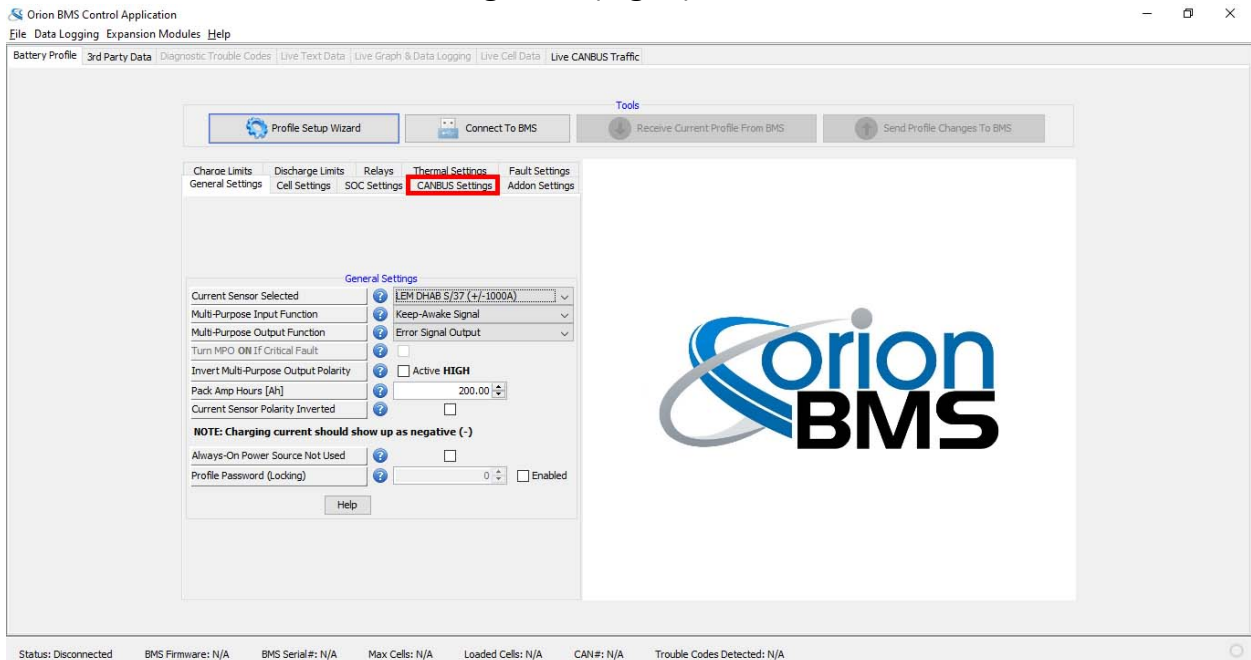2. Select the CANBUS settings tab. (Fig. 2)

Fig. 2

3. Verify that the checkbox next to "HPEV Curtis 1238/1239 (CAN)" has been checked. The checkbox is located in the "Enable CANBUS Third Party Devices" dialog box. (Fig.3)
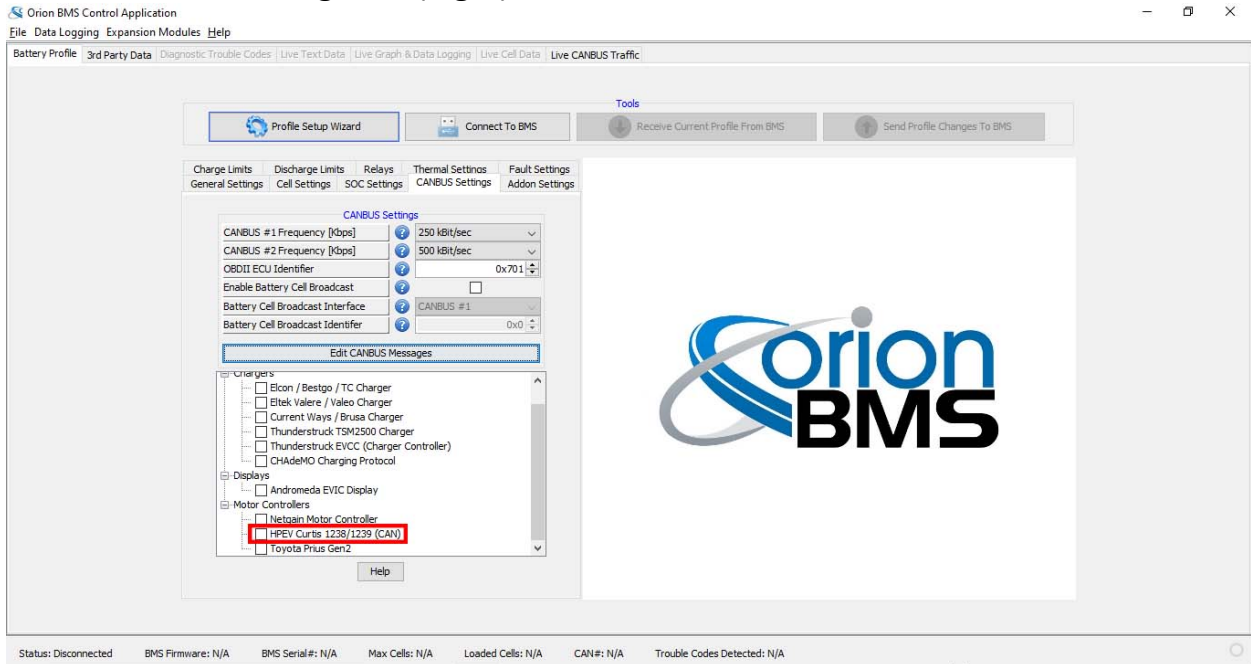

Fig. 3

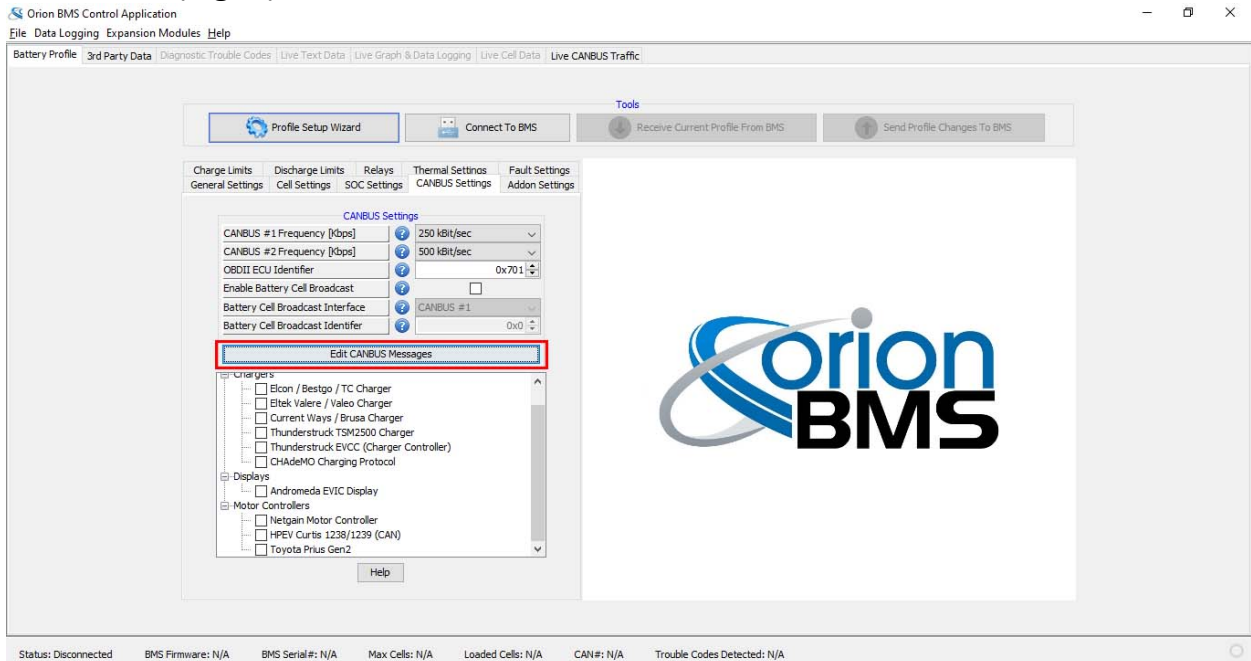4. Select "Edit CANBUS Settings" box to open the CANBUS messages dialog box. (Fig. 4)

Fig. 4

ORION BMS CANBUS MESSAGES SETTINGS

The following information needs to be verified/set so that the BMS is sending the correct information to the Curtis motor controller for both monitoring and control of the system.

1. With the CANBUS messages dialog box open, verify that the checkbox next to both messages 0x300 and 0x301 are checked and enabled. (Fig. 5) If the two ID's are not checked, check the checkbox and click on the "Apply" button within the "Message Settings" dialog.
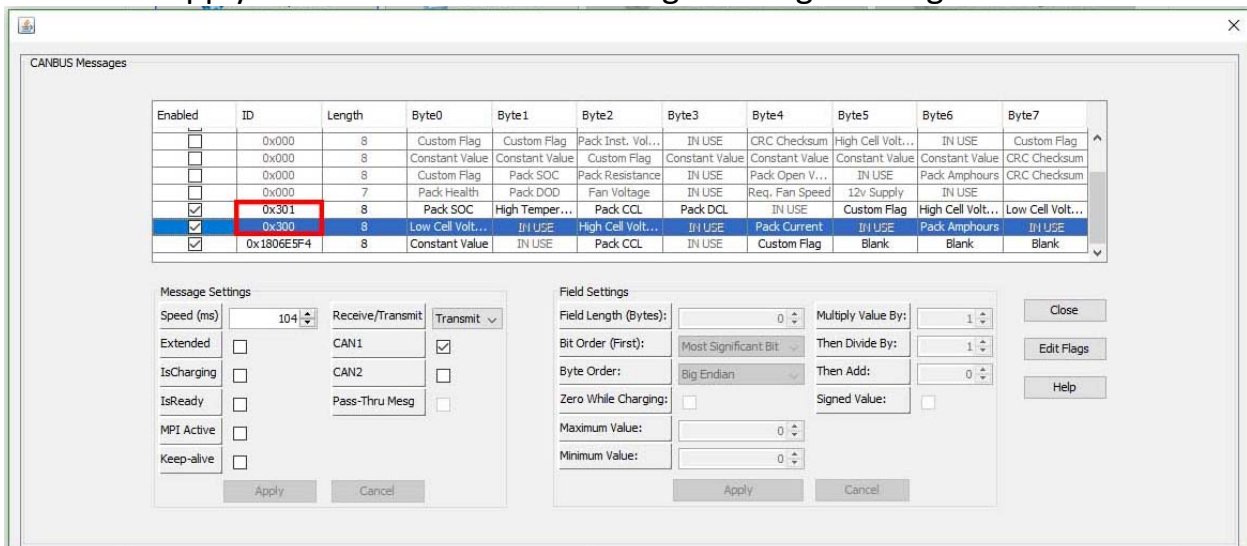

Fig. 5

MESSAGE 0x300

2. Looking at message 0x300, the following messages in order will need to be set/verified. 1) Low Cell Voltage, 2) High Cell Voltage, 3) Pack Current and, 4) Pack Amphours.

LOW CELL VOLTAGE

3. The following is the settings for **Low Cell Voltage**. The Bytes used are Byte0 and Byte 1 in message 0x300. In the dropdown menu for Byte0 make sure that **Low Cell Voltage** is selected. (Fig. 6 Fig. 7)
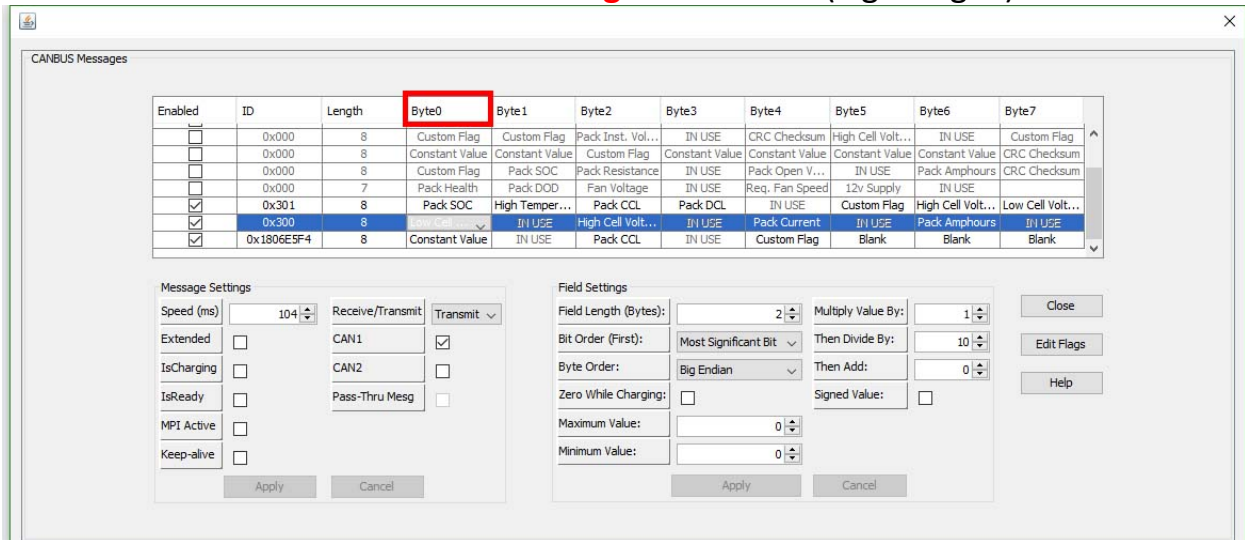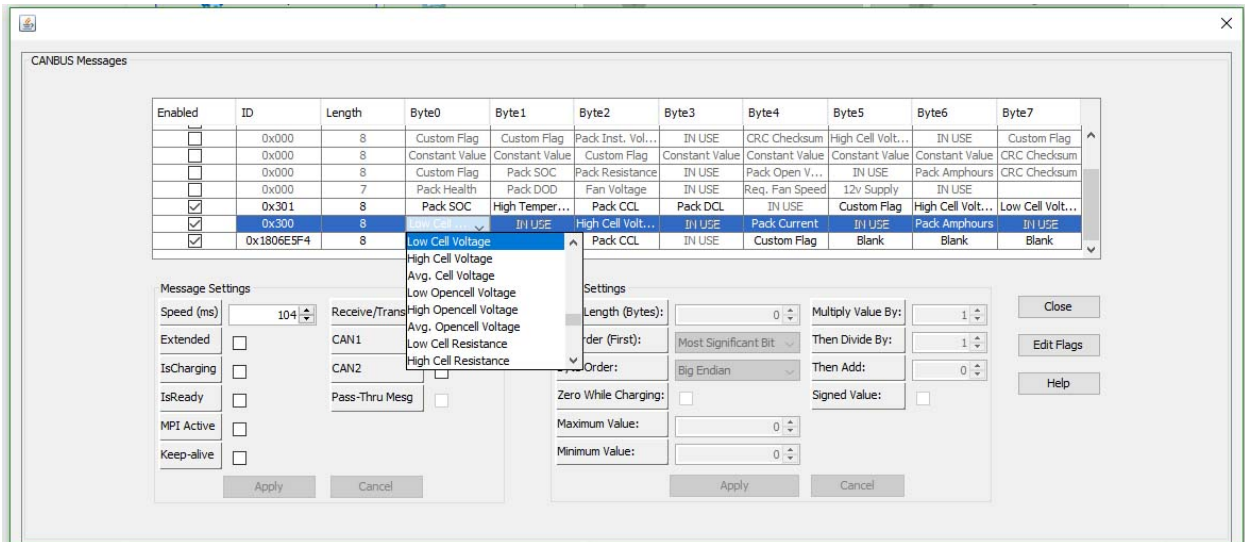

Fig. 6

Fig. 7

4. Make sure that the Message and Field Settings for **Low Cell Voltage** are the same as in (Fig 8).

<table>
<tr><td>**Message Settings:**</td><td>**Field Settings:**</td></tr>
<tr><td>Speed (ms): 104</td><td>Field Length (Bytes): 2</td></tr>
<tr><td>Extended: **UNCHECKED**</td><td>Bit Order (First): Most Significant Bit</td></tr>
<tr><td>IsCharging: **UNCHECKED**</td><td>Byte Order: Big Endian</td></tr>
<tr><td>IsReady: **UNCHECKED**</td><td>Zero While Charging: **UNCHECKED**</td></tr>
<tr><td>MPI Active: **UNCHECKED**</td><td>Minimum Value: 0</td></tr>
<tr><td>Keep-Alive: **UNCHECKED**</td><td>Maximum Value: 0</td></tr>
<tr><td>Receive/Transmit: Transmit</td><td>Multiply Value By: 1</td></tr>
<tr><td>CAN1: **Checked**</td><td>Then Divide by: 10</td></tr>
<tr><td>CAN2: **UNCHECKED**</td><td>Then Add: 0</td></tr>
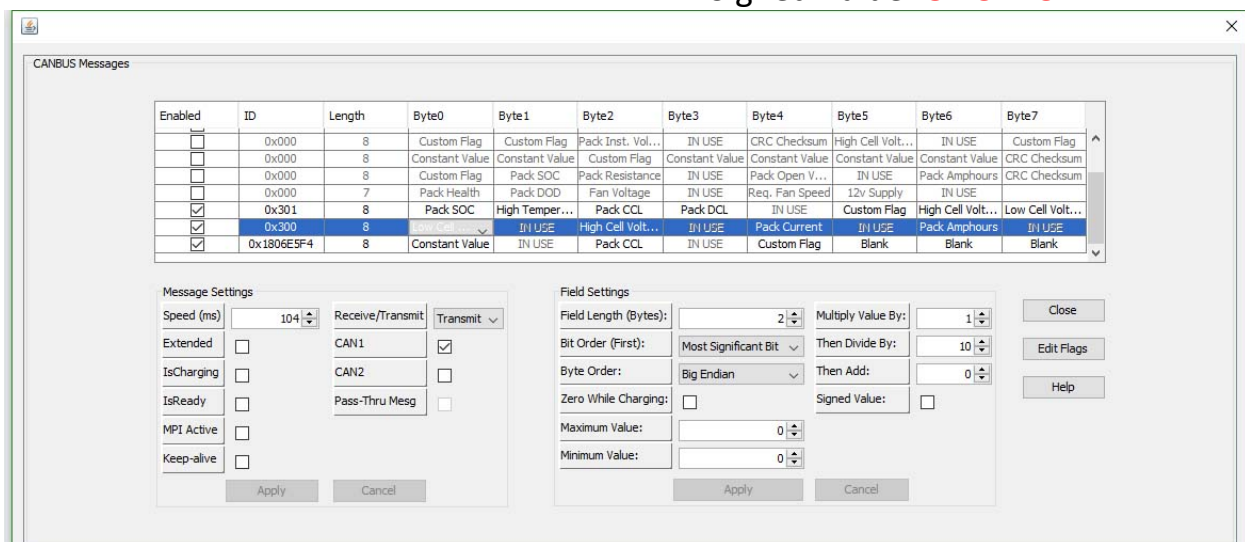<tr><td></td><td>Signed Value: **UNCHECKED**</td></tr>
</table>

Fig. 8

5. If any changes/additions have been made, click the "Apply" button to submit changes.

HIGH CELL VOLTAGE

6. The following is the settings for **High Cell Voltage**. The Bytes used are Byte2 and Byte3 in message 0x300. In the dropdown menu for Byte2 make sure that **High Cell Voltage** is selected. (Fig. 9 Fig. 10)
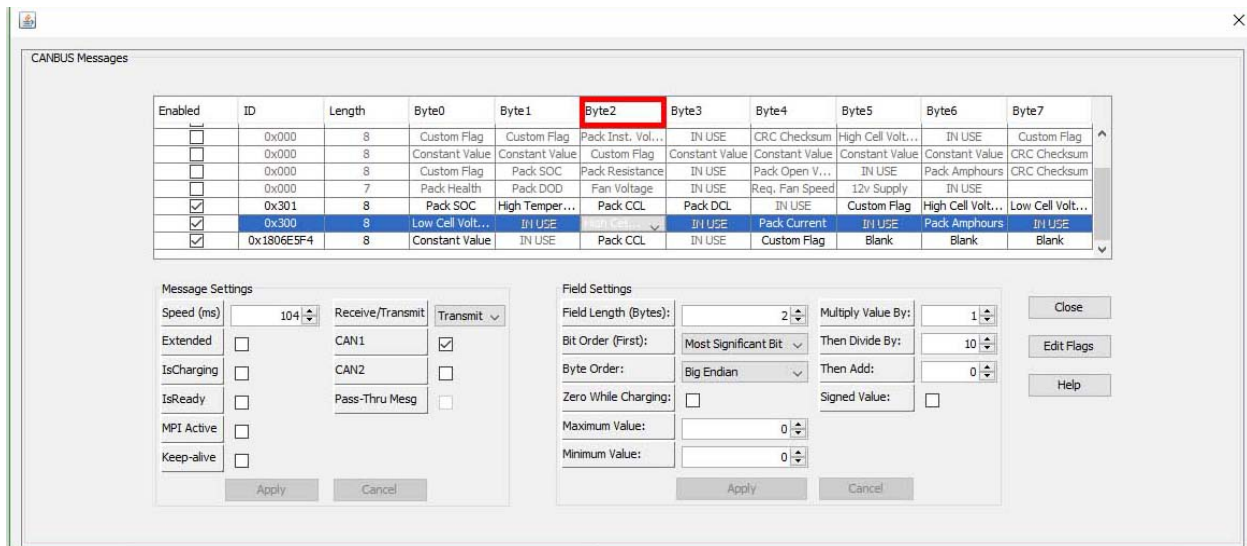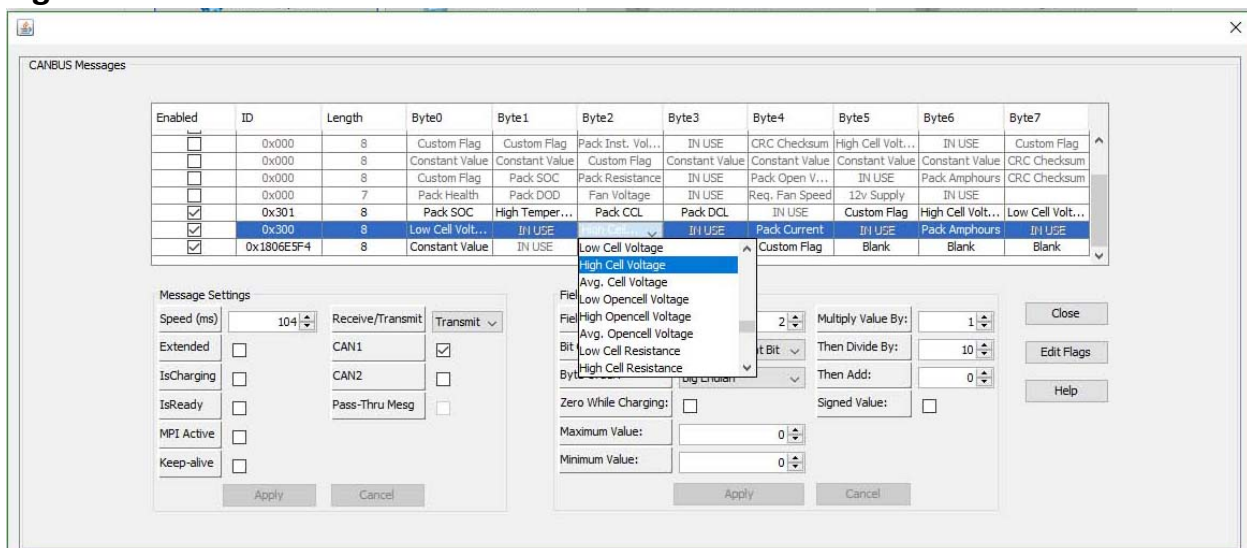
Fig. 9

Fig. 10

7. Make sure that the Message and Field Settings for **High Cell Voltage** are the same as in (Fig 11).

Message Settings:
Speed (ms): 104
Extended: **UNCHECKED**
IsCharging: **UNCHECKED**
IsReady: **UNCHECKED**
MPI Active: **UNCHECKED**
Keep-Alive: **UNCHECKED**
Receive/Transmit: Transmit
CAN1: **Checked**
CAN2: **UNCHECKED**

Field Settings:
Field Length (Bytes): 2
Bit Order (First): Most Significant Bit
Byte Order: Big Endian
Zero While Charging: **UNCHECKED**
Minimum Value: 0
Maximum Value: 0
Multiply Value By: 1
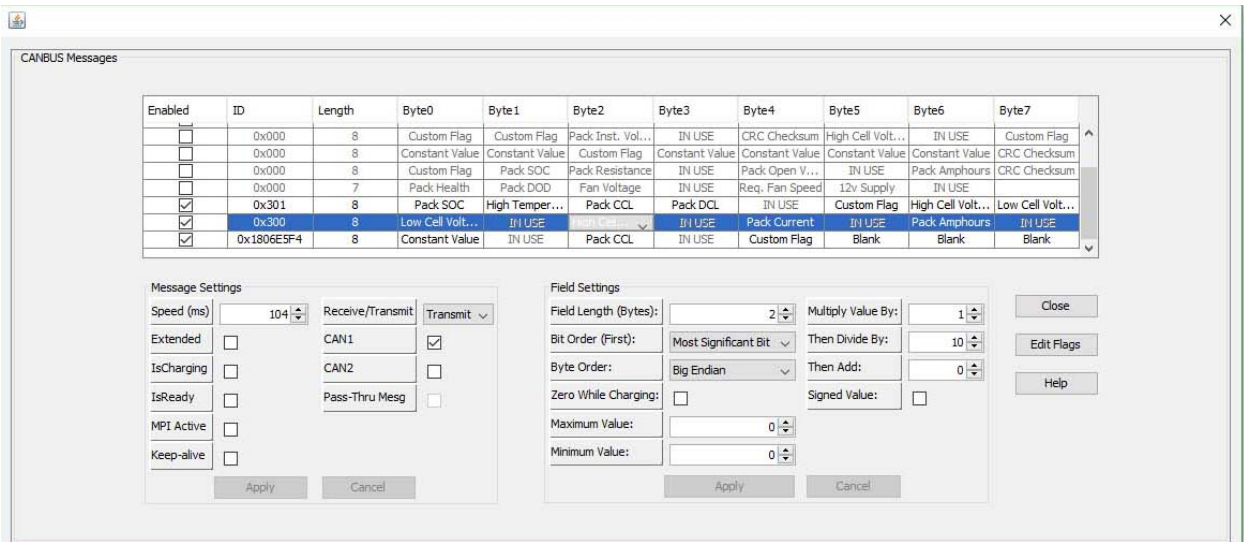Then Divide by: 10
Then Add: 0
Signed Value: **UNCHECKED**

Fig. 11

8. If any changes/additions have been made, click the "Apply" button to submit changes.

PACK CURRENT

9. The following is the settings for **Pack Current**. The Bytes used are Byte4 and Byte5 in message 0x300. In the dropdown menu for Byte4 make sure that **Pack Current** is selected. (Fig. 12 Fig. 13)
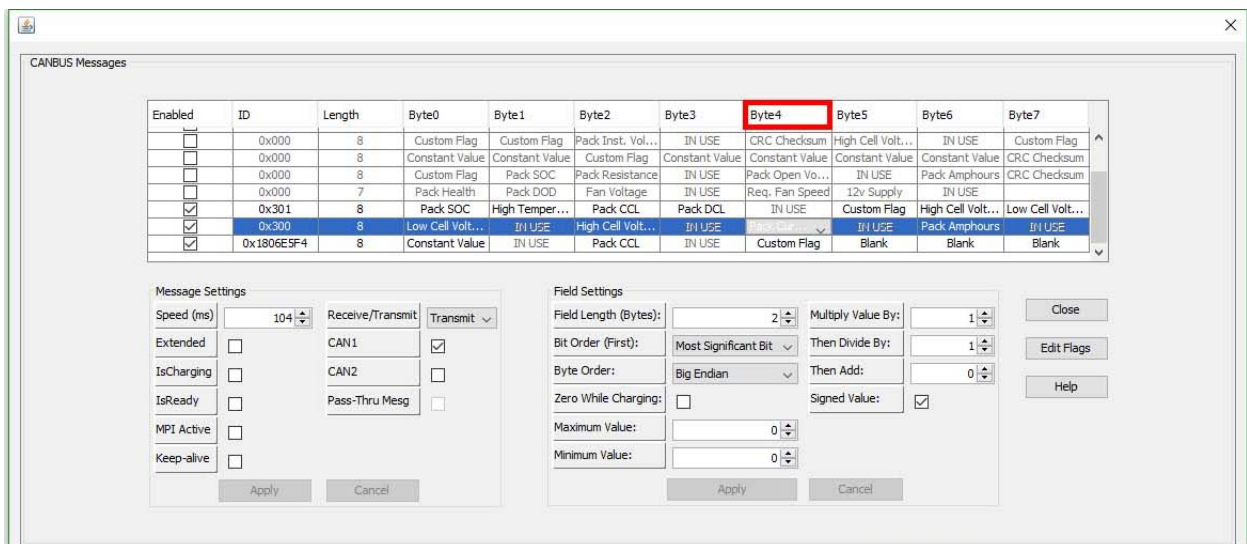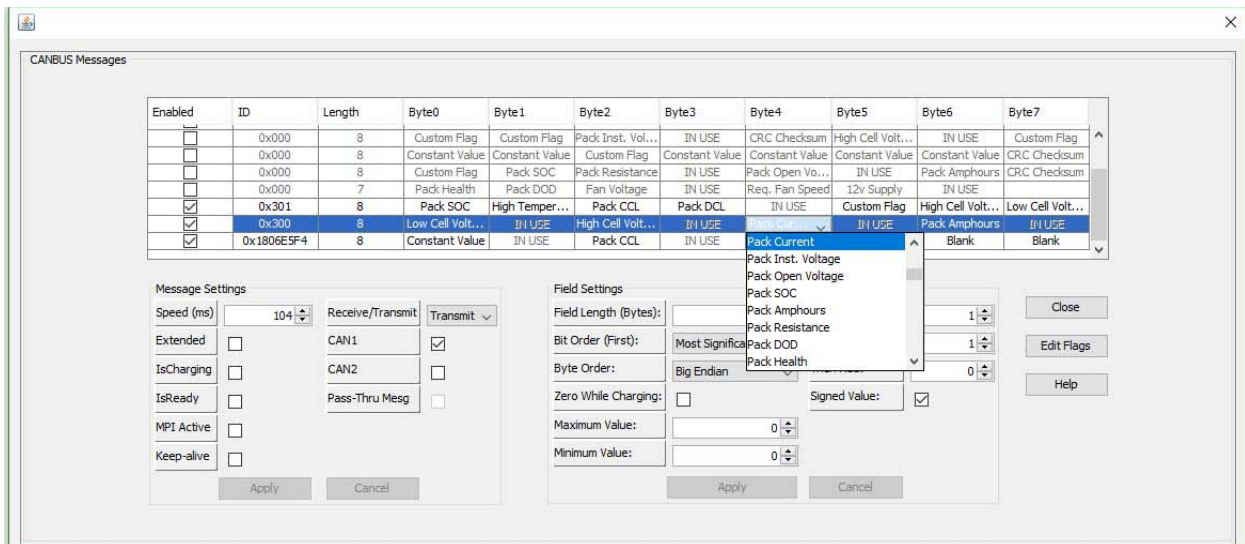

Fig. 12

Fig. 13

10. Make sure that the Message and Field Settings for **Pack Current** are the same as in (Fig 14).

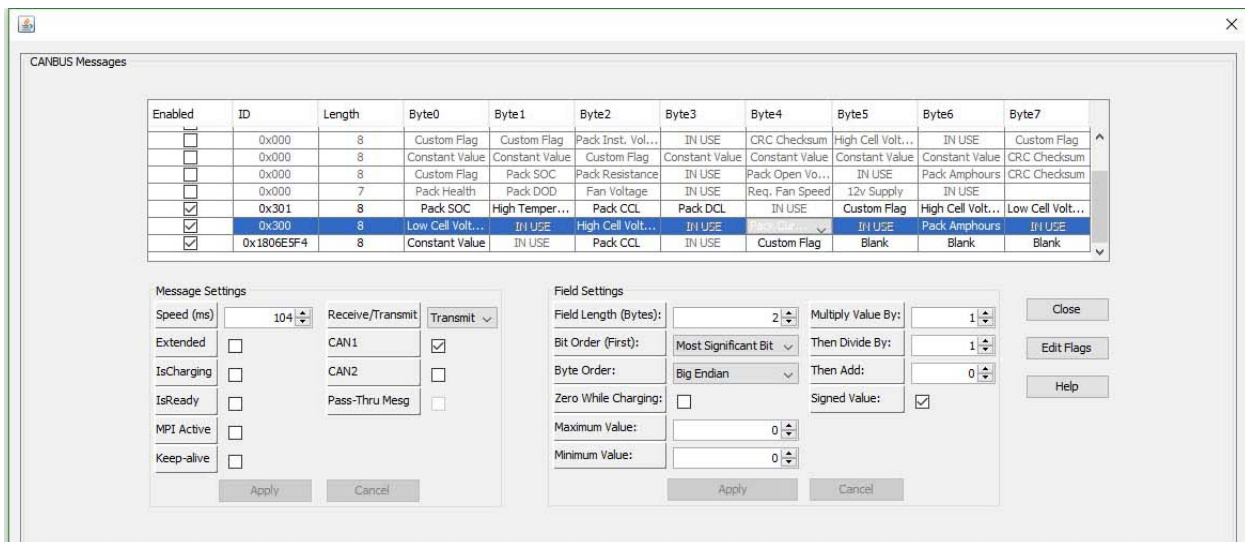| **Message Settings:**	**Field Settings:**
Speed (ms): 104	Field Length (Bytes): 2
Extended: **UNCHECKED**	Bit Order (First): Most Significant Bit
IsCharging: **UNCHECKED**	Byte Order: Big Endian
IsReady: **UNCHECKED**	Zero While Charging: **UNCHECKED**
MPI Active: **UNCHECKED**	Minimum Value: 0
Keep-Alive: **UNCHECKED**	Maximum Value: 0
Receive/Transmit: Transmit	Multiply Value By: 1
CAN1: **CHECKED**	Then Divide by: 1
CAN2: **UNCHECKED**	Then Add: 0
	Signed Value: **CHECKED**

Fig. 14

11. If any changes/additions have been made, click the "Apply" button to submit changes.

PACK AMPHOURS

12. The following is the settings for **Pack AmpHours**. The Bytes used are Byte6 and Byte7 in message 0x300. In the dropdown menu for Byte6 make sure that **Pack AmpHours** is selected. (Fig. 15 Fig. 16)
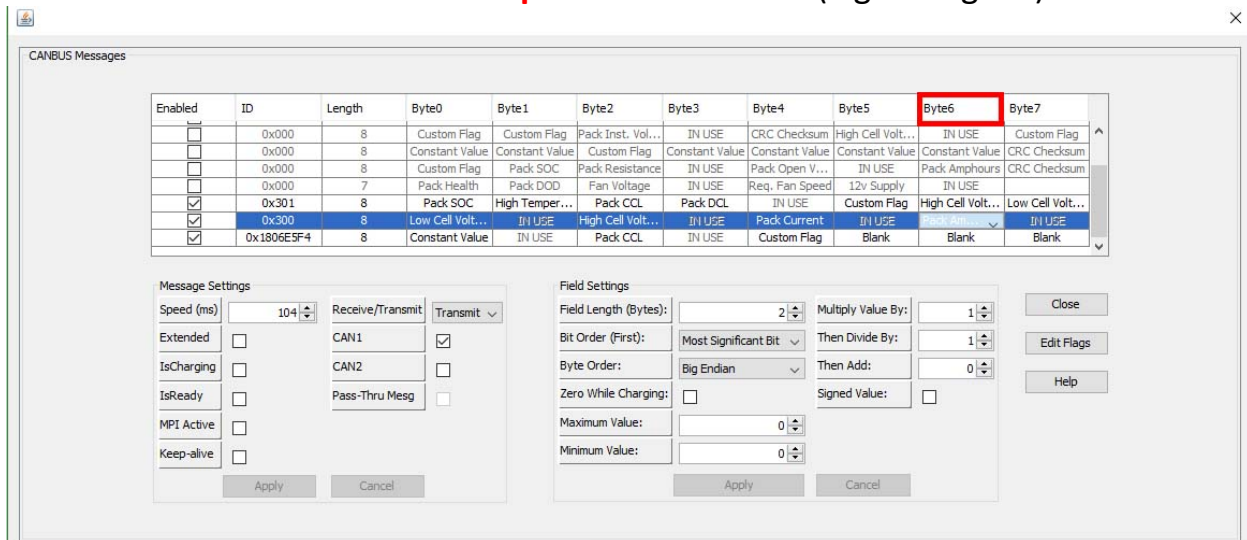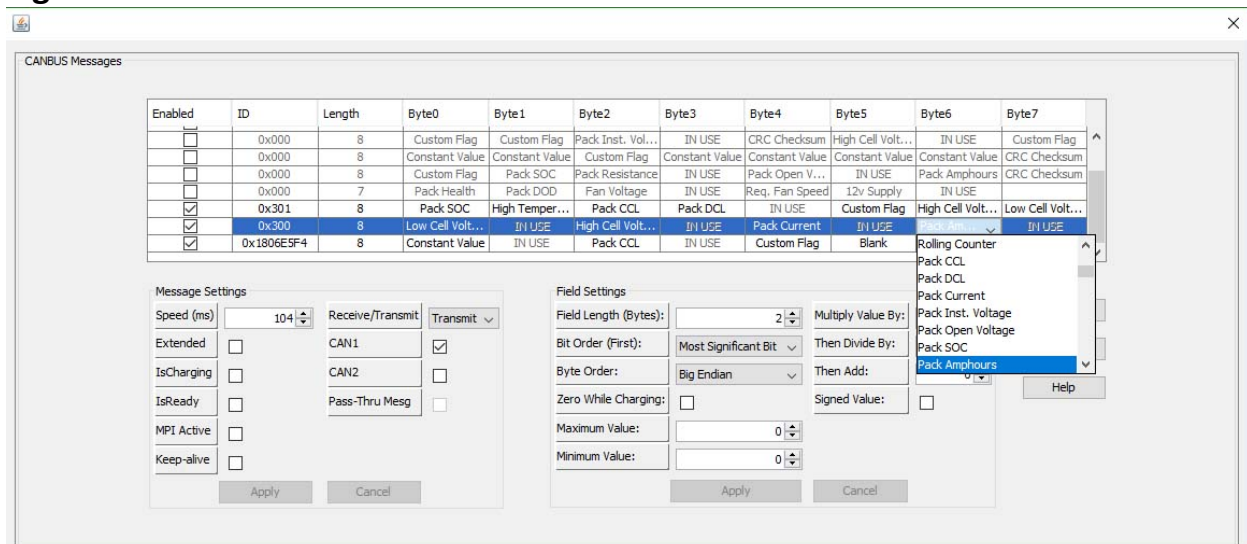

Fig. 15

Fig. 16

13. Make sure that the Message and Field Settings for **Pack AmpHours** are the same as in (Fig 17).

Message Settings:

Speed (ms): 104

Extended: **UNCHECKED**

IsCharging: **UNCHECKED**

IsReady: **UNCHECKED**

MPI Active: **UNCHECKED**

Keep-Alive: **UNCHECKED**

Receive/Transmit: Transmit

CAN1: **CHECKED**

CAN2: **UNCHECKED**

Field Settings:

Field Length (Bytes): 2

Bit Order (First): Most Significant Bit

Byte Order: Big Endian

Zero While Charging: **UNCHECKED**

Minimum Value: 0

Maximum Value: 0

Multiply Value By: 1

Then Divide by: 1
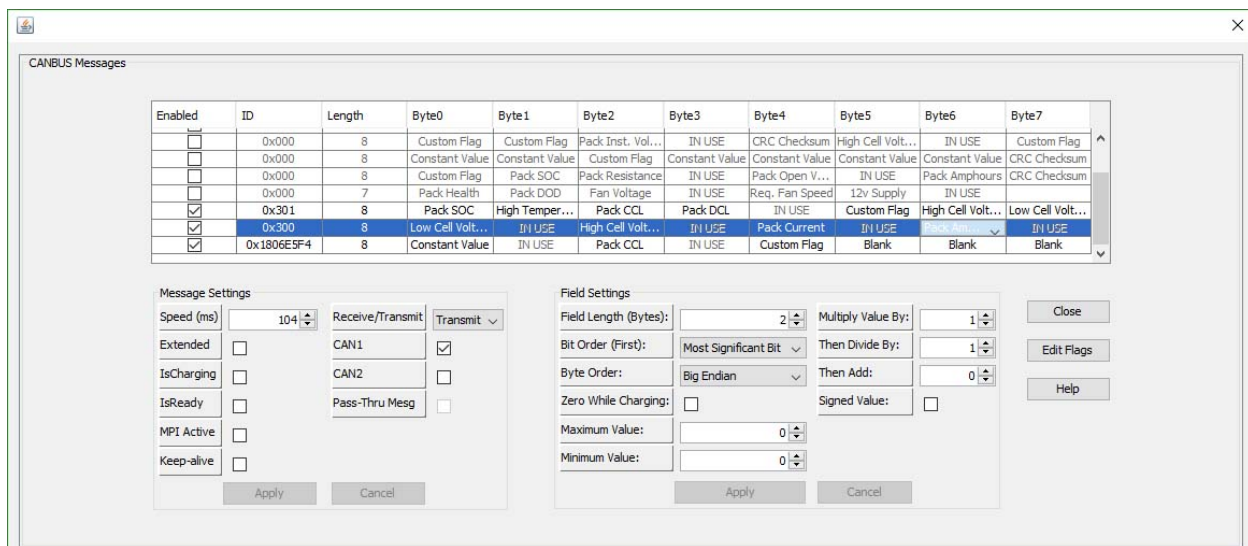
Then Add: 0

Signed Value: **CHECKED**

Fig. 17

14. If any changes/additions have been made, click the "Apply" button to submit changes.

MESSAGE 0x301

1. Looking at message 0x301, the following messages in order will need to be set/verified. 1) Pack SOC, 2) High Temperature, 3) Pack CCL, 4) Pack DCL, 5) CUSTOM FLAG, 6) High Cell Voltage, and 7) Low Cell Voltage.

PACK SOC

2. The following is the settings for **Pack SOC**. The Byte used is Byte0 in message 0x301. In the dropdown menu for Byte0 make sure that **Pack SOC** is selected. (Fig. 18 Fig. 19)
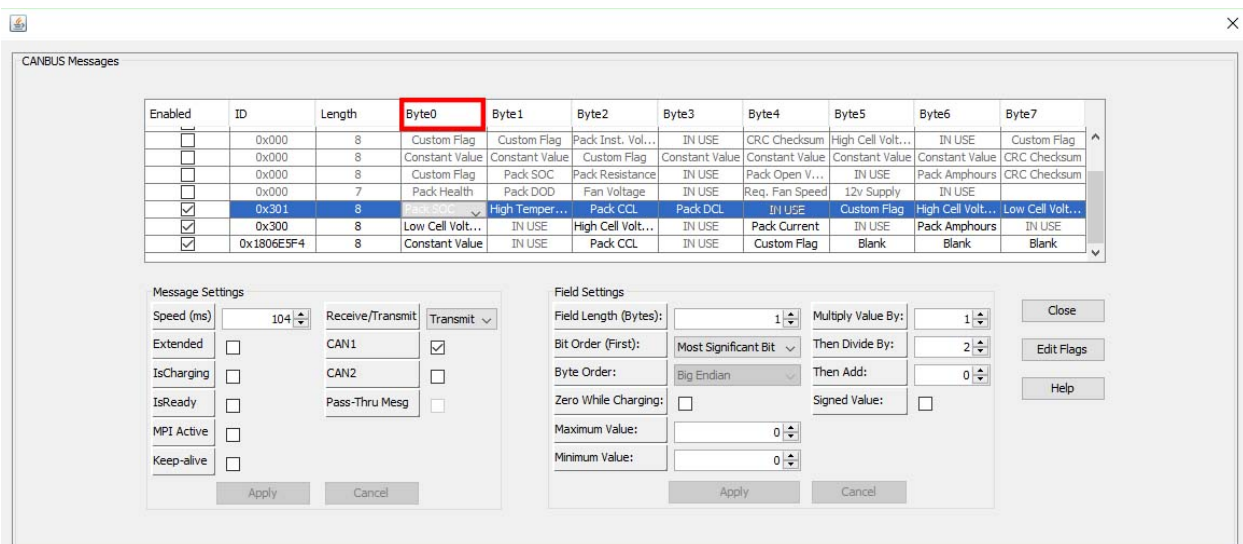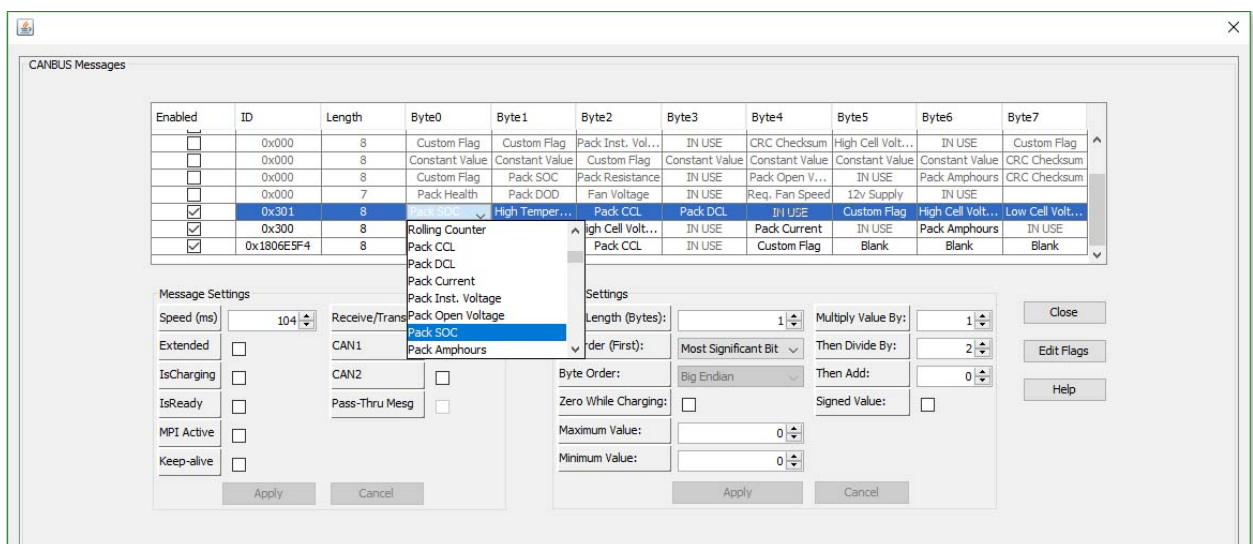

Fig. 18

Fig. 19

3. Make sure that the Message and Field Settings for **Pack SOC** are the same as in (Fig 20).

Message Settings:

Speed (ms): 104

Extended: **UNCHECKED**

IsCharging: **UNCHECKED**

IsReady: **UNCHECKED**

MPI Active: **UNCHECKED**

Keep-Alive: **UNCHECKED**

Receive/Transmit: Transmit

CAN1: **CHECKED**

CAN2: **UNCHECKED**

Field Settings:

Field Length (Bytes): 1

Bit Order (First): Most Significant Bit

Zero While Charging: **UNCHECKED**

Minimum Value: 0

Maximum Value: 0

Multiply Value By: 1

Then Divide by: 2
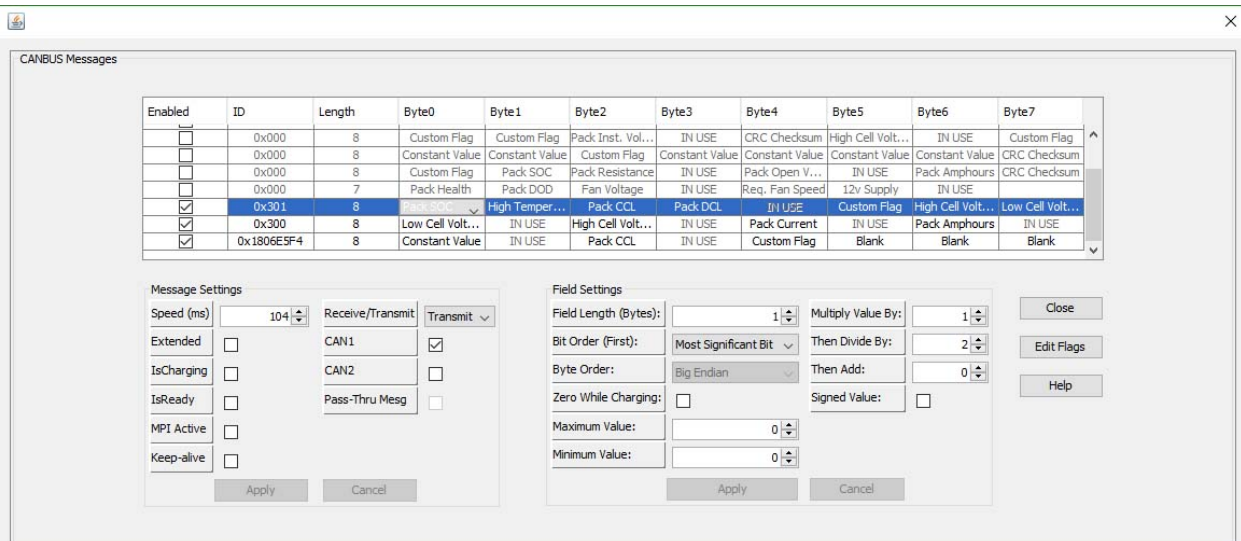
Then Add: 0

Signed Value: **UNCHECKED**

Fig. 20

4. If any changes/additions have been made, click the "Apply" button to submit changes.

HIGH TEMPERATURE

5. The following is the settings for **High Temperature**. The Byte used is Byte1 in message 0x301. In the dropdown menu for Byte1 make sure that **High Temperature** is selected. (Fig. 21 Fig. 22)
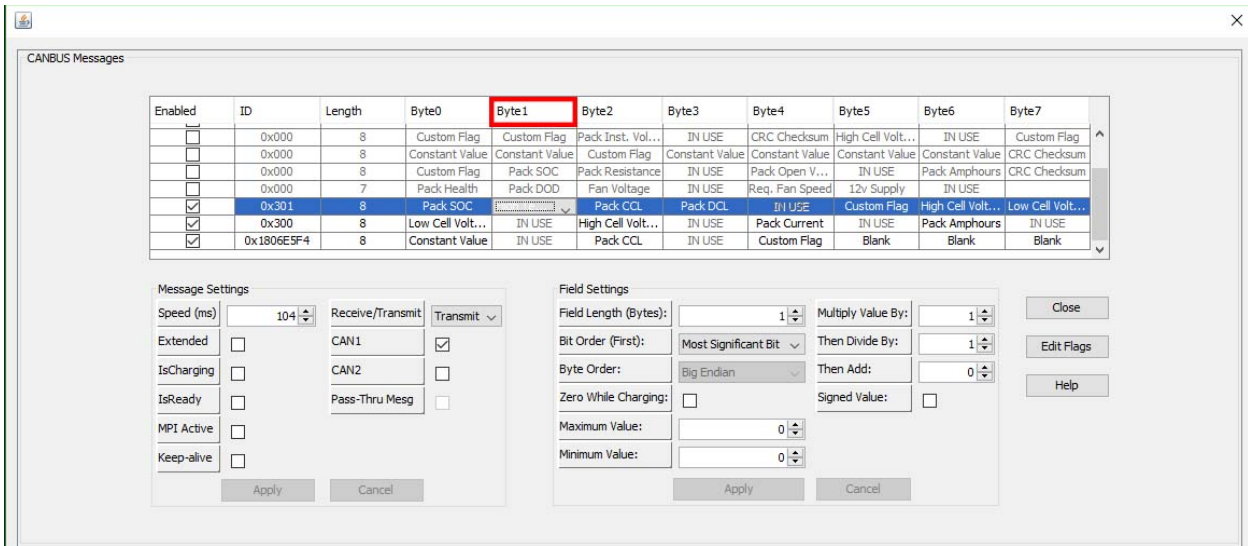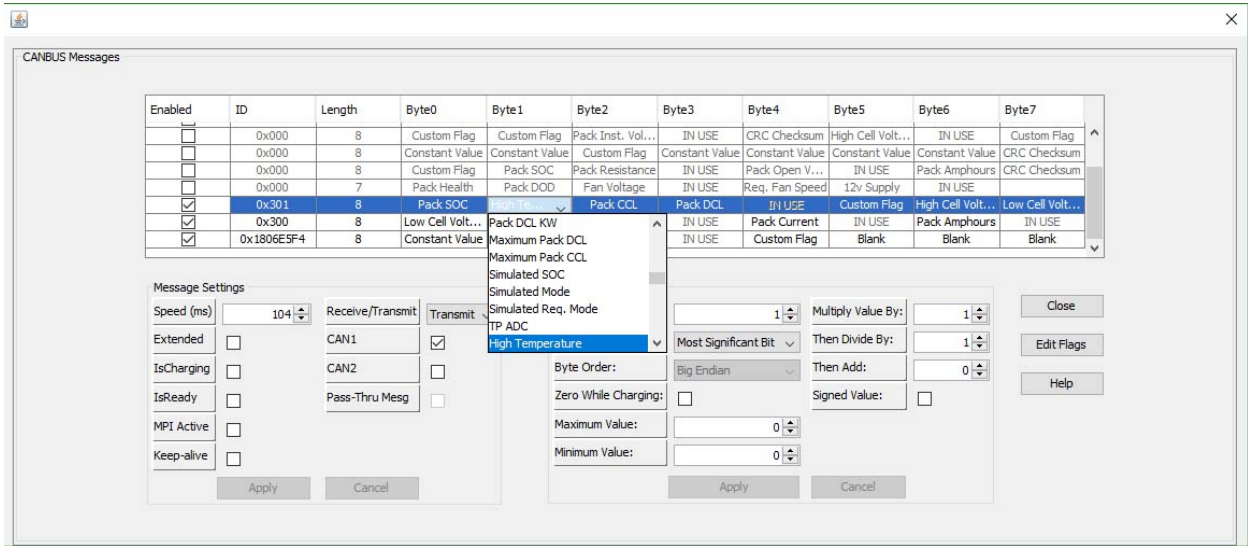
Fig. 21

Fig. 22

6. Make sure that the Message and Field Settings for **High Temperature** are the same as in (Fig 23).

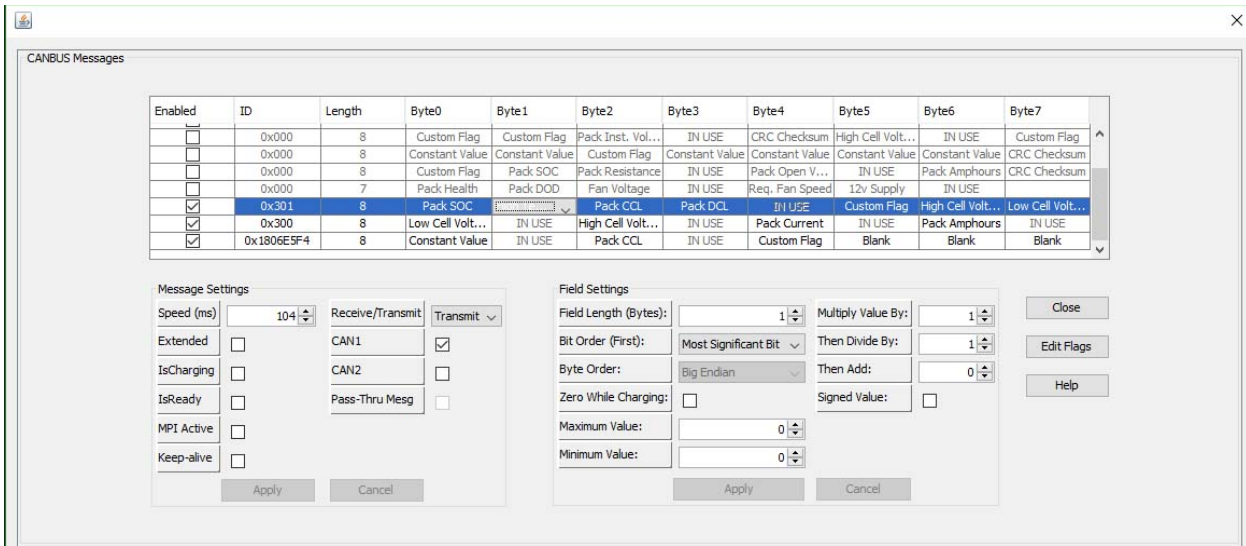| **Message Settings:**	**Field Settings:**
Speed (ms): 104	Field Length (Bytes): 1
Extended: **UNCHECKED**	Bit Order (First): Most Significant Bit
IsCharging: **UNCHECKED**	Zero While Charging: **UNCHECKED**
IsReady: **UNCHECKED**	Minimum Value: 0
MPI Active: **UNCHECKED**	Maximum Value: 0
Keep-Alive: **UNCHECKED**	Multiply Value By: 1
Receive/Transmit: Transmit	Then Divide by: 1
CAN1: **CHECKED**	Then Add: 0
CAN2: **UNCHECKED**	Signed Value: **UNCHECKED**

Fig. 23

7. If any changes/additions have been made, click the "Apply" button to submit changes.

PACK CCL

8. The following is the settings for **PACK CCL**. The Byte used is Byte2 in message 0x301. In the dropdown menu for Byte2 make sure that **PACK CCL** is selected. (Fig. 24 Fig. 25)
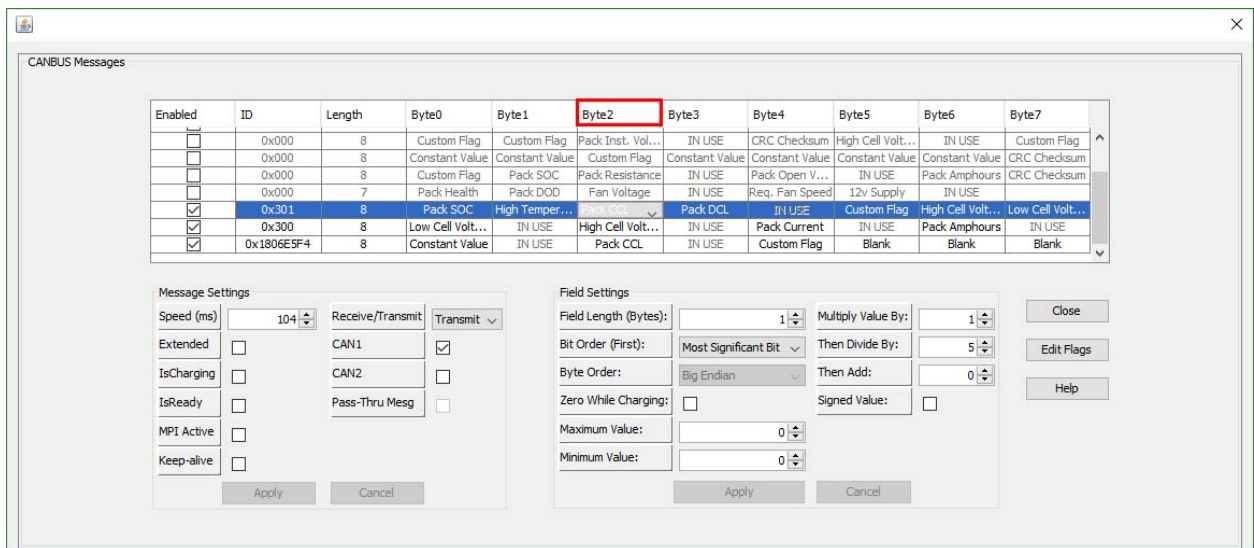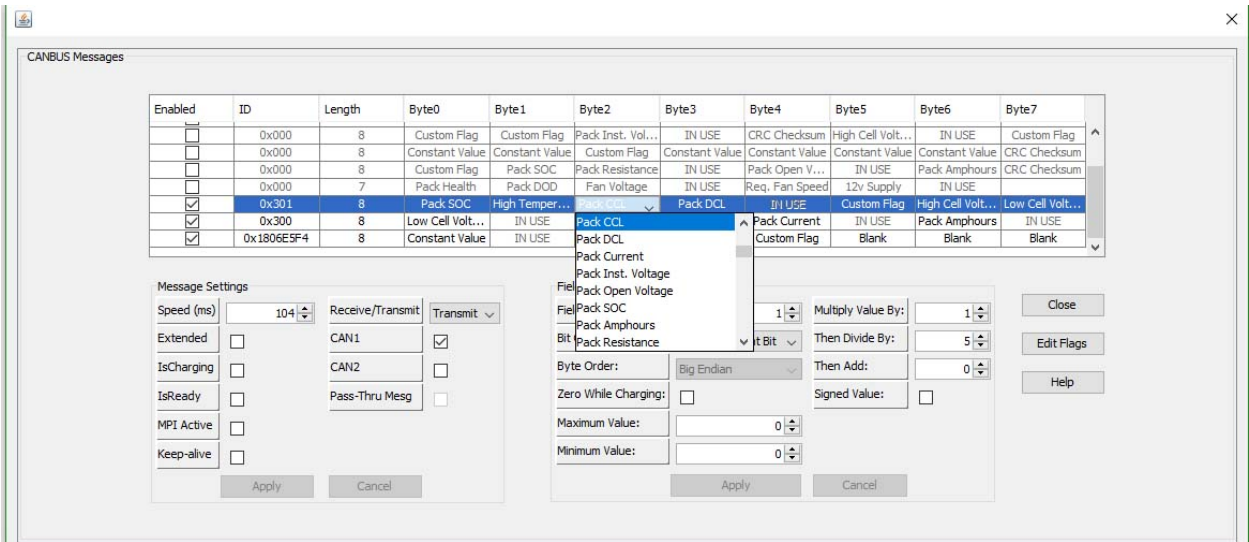

Fig. 24

Fig. 25

9. Make sure that the Message and Field Settings for **PACK CCL** are the same as in (Fig 26).

Message Settings:
Speed (ms): 104
Extended: **UNCHECKED**
IsCharging: **UNCHECKED**
IsReady: **UNCHECKED**
MPI Active: **UNCHECKED**
Keep-Alive: **UNCHECKED**
Receive/Transmit: Transmit
CAN1: **CHECKED**
CAN2: **UNCHECKED**

Field Settings:
Field Length (Bytes): 1
Bit Order (First): Most Significant Bit
Zero While Charging: **UNCHECKED**
Minimum Value: 0
Maximum Value: 0
Multiply Value By: 1
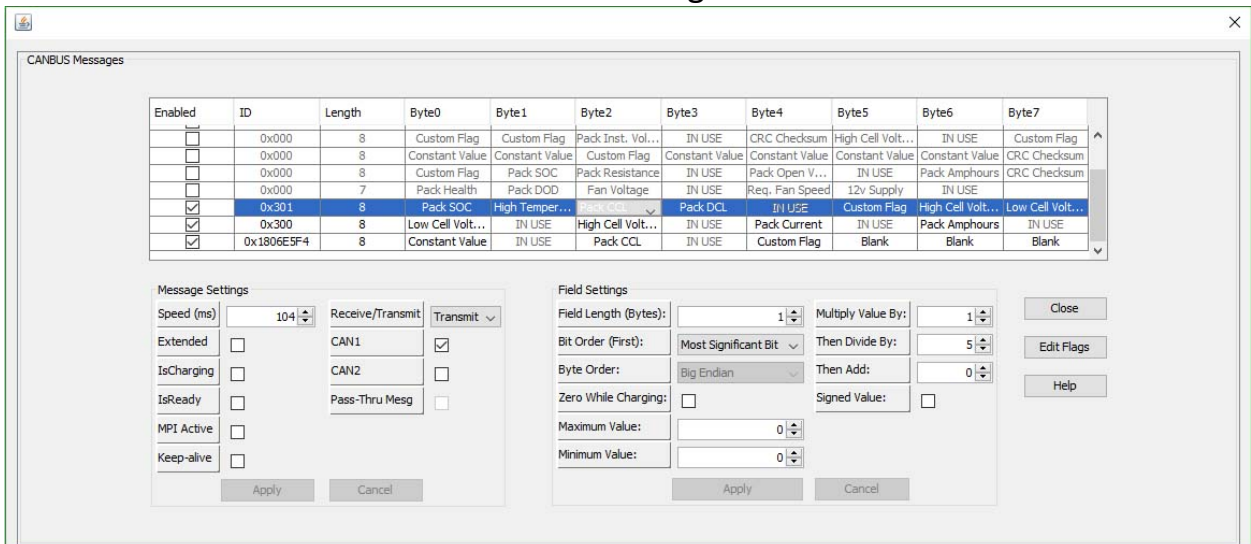Then Divide by: 5
Then Add: 0
Signed Value: **UNCHECKED**

Fig. 26

10. If any changes/additions have been made, click the "Apply" button to submit changes.

PACK DCL

11. The following is the settings for **PACK DCL**. The Byte used is Byte3 and Byte4 in message 0x301. In the dropdown menu for Byte3 make sure that **PACK DCL** is selected. (Fig. 27 Fig. 28)
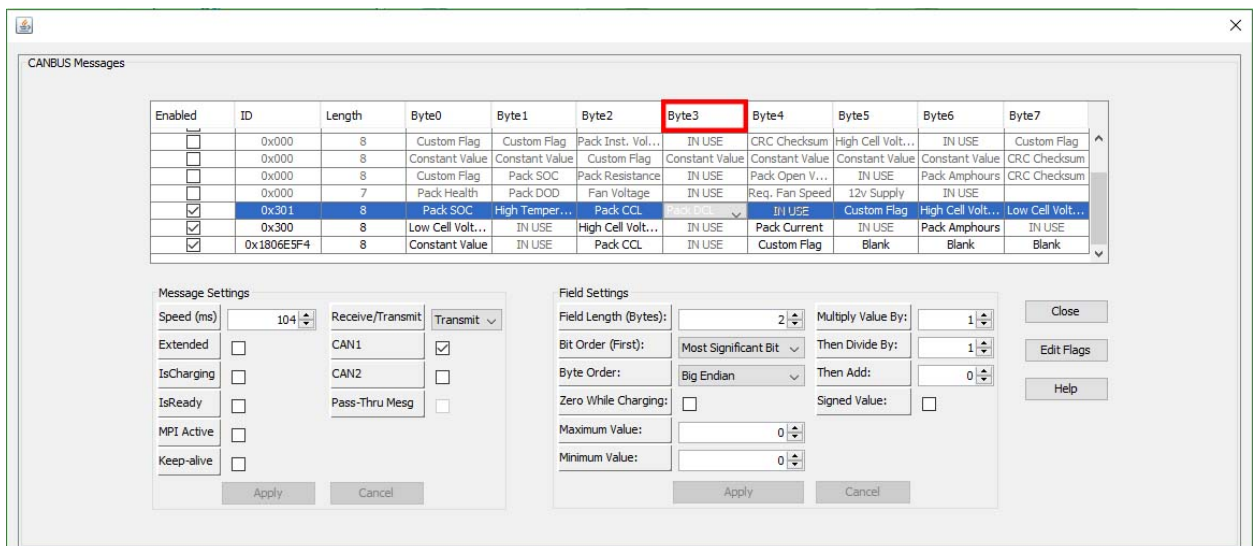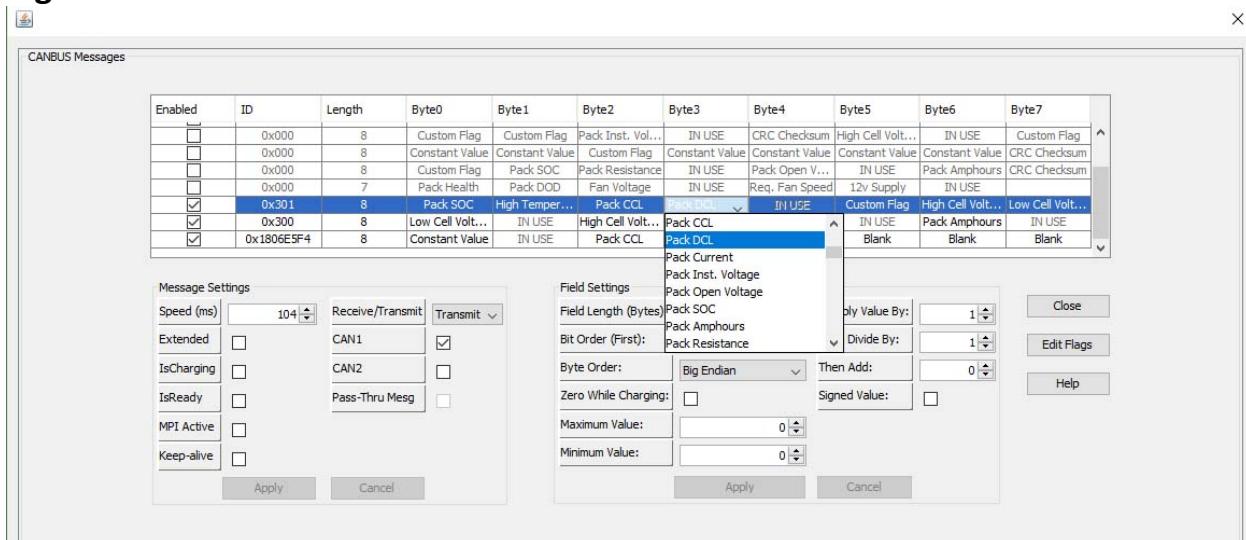

Fig. 27

Fig. 28

12. Make sure that the Message and Field Settings for **PACK DCL** are the same as in (Fig 29).

Message Settings:

Speed (ms): 104

Extended: **UNCHECKED**

IsCharging: **UNCHECKED**

IsReady: **UNCHECKED**

MPI Active: **UNCHECKED**

Keep-Alive: **UNCHECKED**

Receive/Transmit: Transmit

CAN1: **CHECKED**

CAN2: **UNCHECKED**

Field Settings:

Field Length (Bytes): 2

Bit Order (First): Most Significant Bit

Byte Order: Big Endian

Zero While Charging: **UNCHECKED**

Minimum Value: 0

Maximum Value: 0

Multiply Value By: 1

Then Divide by: 1

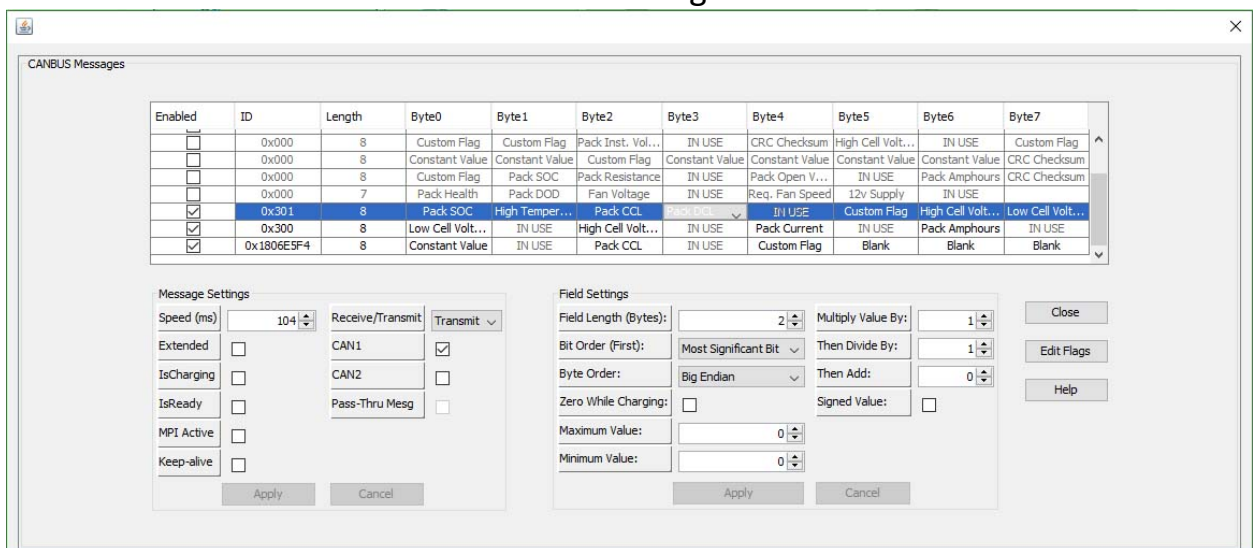Then Add: 0

Signed Value: **UNCHECKED**

Fig. 29

13. If any changes/additions have been made, depressed the "Apply" button to submit changes.

CUSTOM FLAG

14. The following is the settings for **CUSTOM FLAG**. The Byte used is Byte5 in message 0x301. In the dropdown menu for Byte5 make sure that **CUSTOM FLAG** is selected. (Fig. 30 Fig. 31)
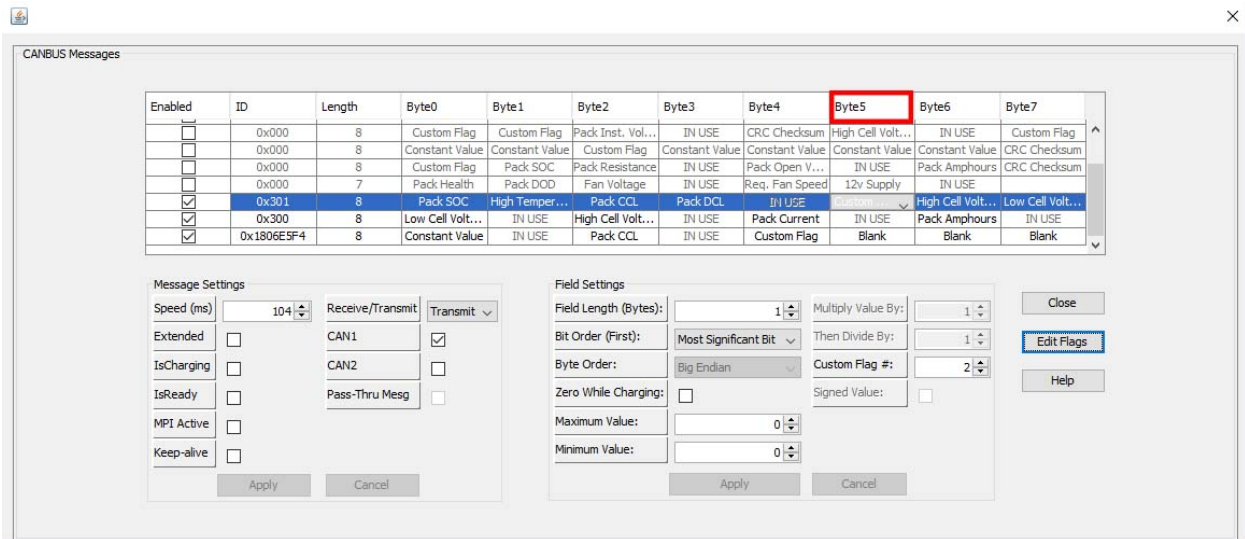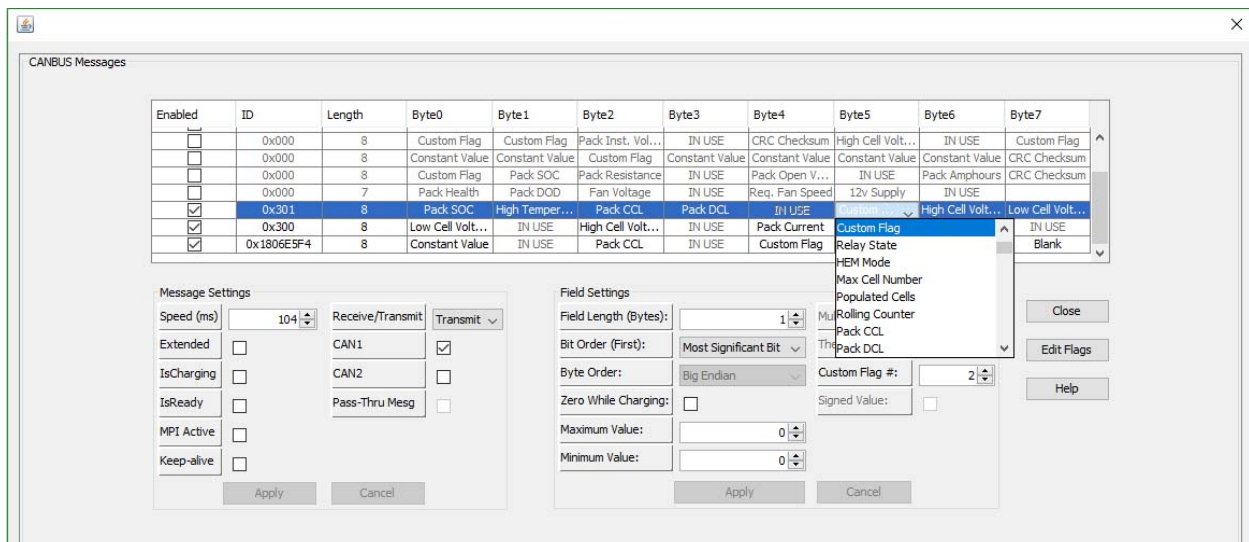

Fig. 30

Fig. 31

15. To open the **"Custom Flags"** dialog box, select the "Edit Flags" button as shown in Fig. 32.
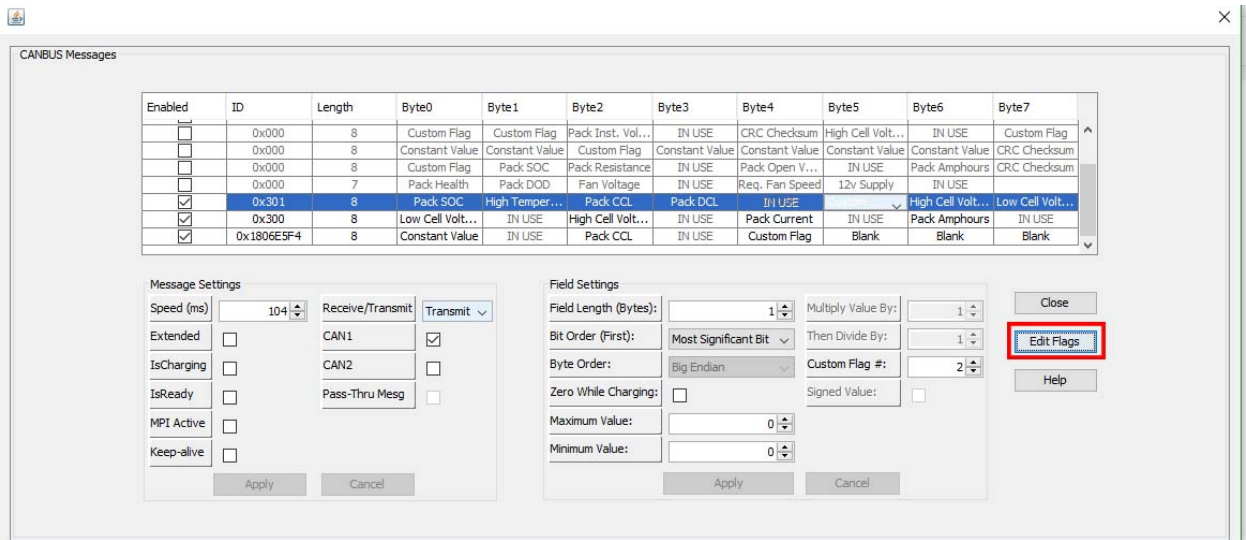
Fig. 32

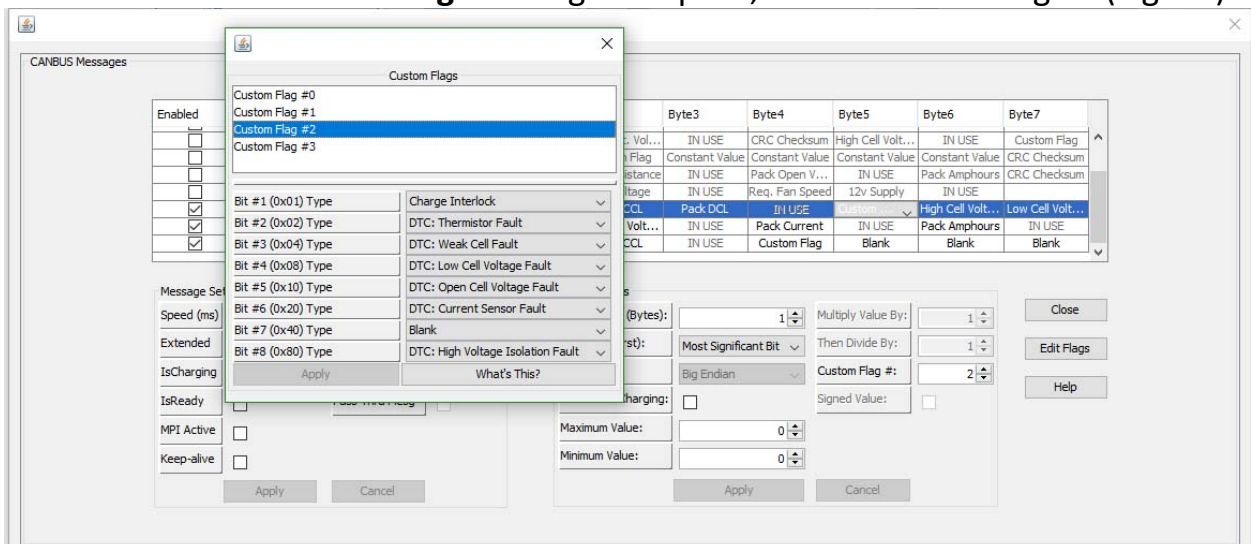16. When the **"Custom Flags"** dialog box opens, select Custom Flag #2 (Fig. 33).

Fig. 33

17. Verify that the Bit settings reflect what is depicted in (Fig 33).

> Bit #1 (0x01) Type: Charger Interlock
> Bit #2 (0x02) Type: DTC Thermistor Fault
> Bit #3 (0x04) Type: DTC Weak Cell Fault
> Bit #4 (0x08) Type: DTC Low Cell Voltage Fault
> Bit #5 (0x10) Type: DTC Open Cell Voltage Fault
> Bit #6 (0x20) Type: DTC: Current Sensor Fault
> Bit #7 (0x40) Type: Blank
> Bit #8 (0x80) Type: DTC: High Voltage Isolation Fault

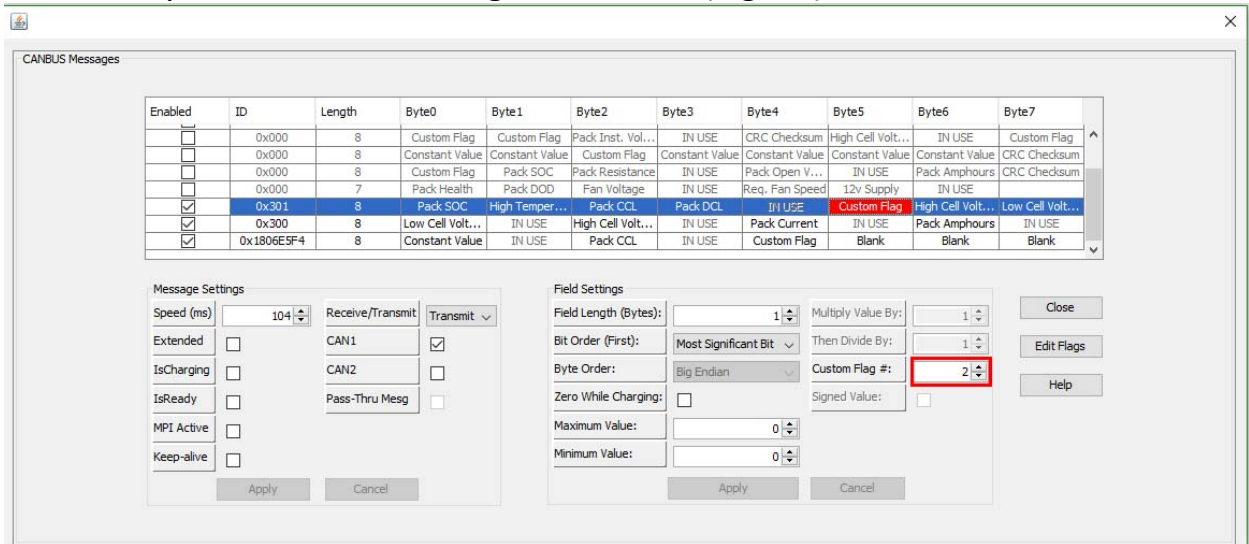18. Verify that the Custom Flag # is set to 2. (Fig. 34)

Fig. 34

19. If any changes/additions have been made, depressed the "Apply" button to submit changes.

HIGH CELL VOLTAGE ID

20. The following is the settings for **HIGH CELL VOLTAGE ID**. The Byte used is Byte6 in message 0x301. In the dropdown menu for Byte6 make sure that **HIGH CELL VOLTAGE ID** is selected. (Fig. 35 & 36)
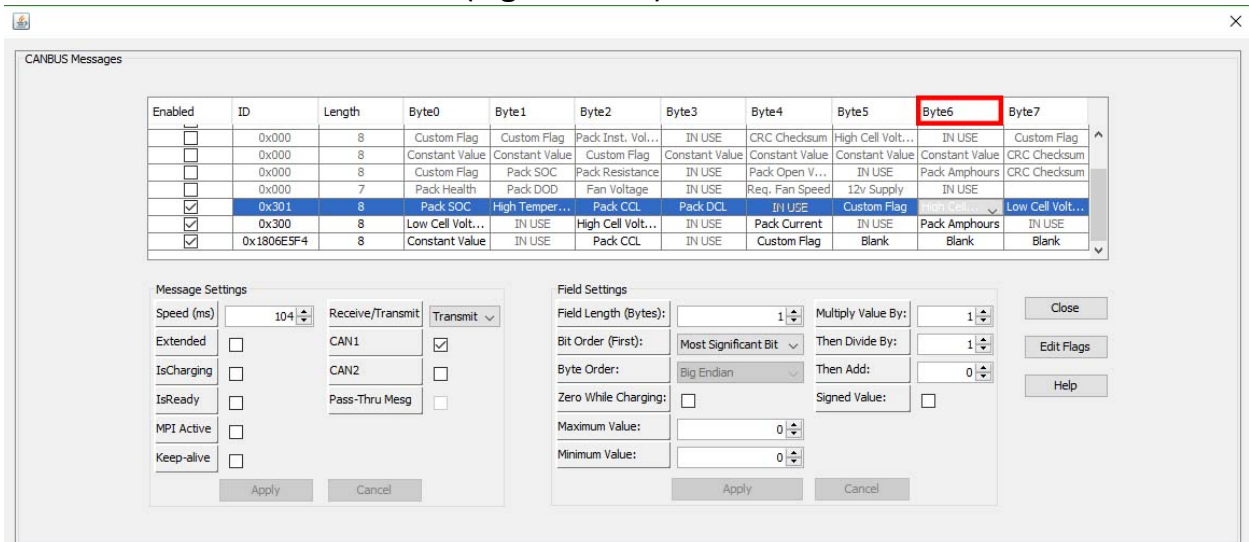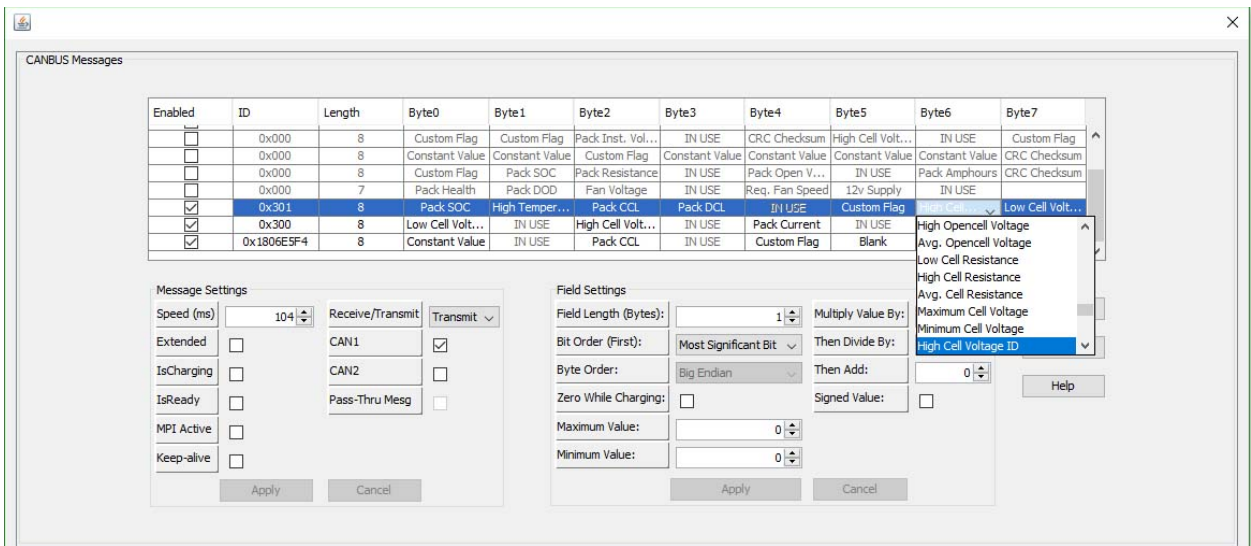

Fig. 35

Fig. 36

21. Make sure that the Message and Field Settings for **HIGH CELL VOLTAGE ID** are the same as in (Fig 37).

Message Settings:
Speed (ms): 104
Extended: **UNCHECKED**
IsCharging: **UNCHECKED**
IsReady: **UNCHECKED**
MPI Active: **UNCHECKED**
Keep-Alive: **UNCHECKED**
Receive/Transmit: Transmit
CAN1: **CHECKED**
CAN2: **UNCHECKED**

Field Settings:
Field Length (Bytes): 1
Bit Order (First): Most Significant Bit
Byte Order: N/A
Zero While Charging: **UNCHECKED**
Minimum Value: 0
Maximum Value: 0
Multiply Value By: 1
Then Divide by: 1
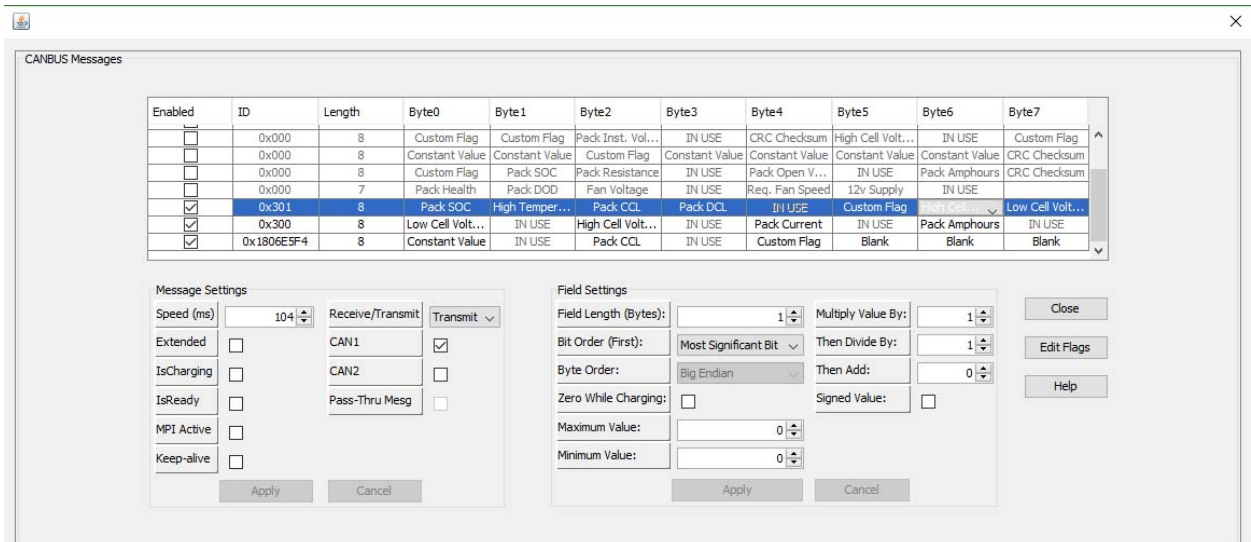Then Add: 0
Signed Value: **UNCHECKED**

Fig. 37

LOWEST CELL VOLTAGE ID

22. The following is the settings for **LOWEST CELL VOLTAGE ID**. The Byte used is Byte6 in message 0x301. In the dropdown menu for Byte7 make sure that **LOWEST CELL VOLTAGE ID** is selected. (Fig. 38 & 39)
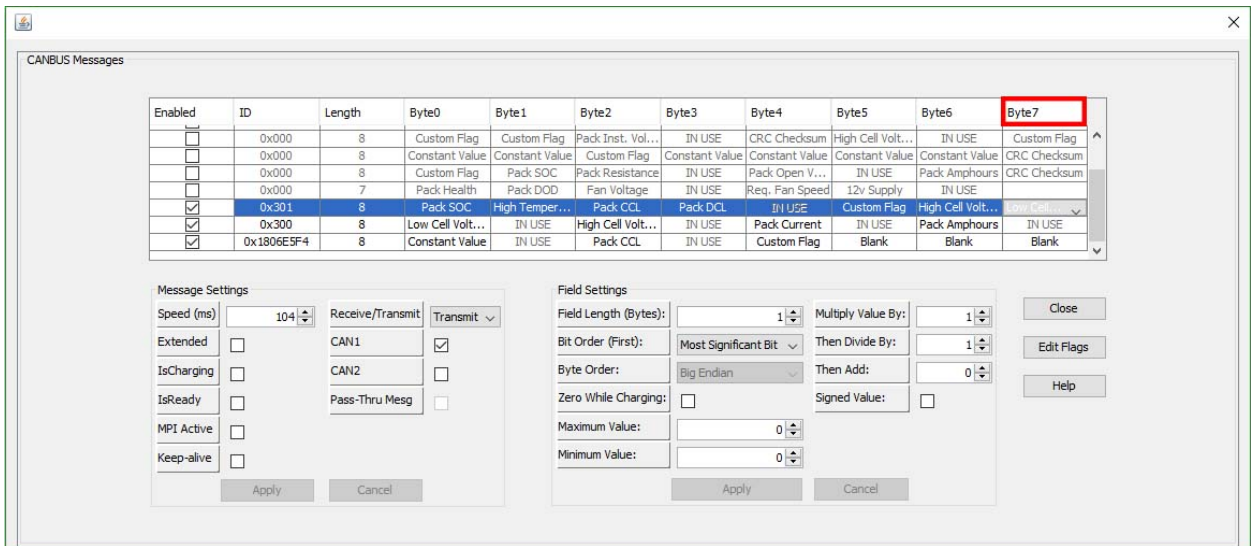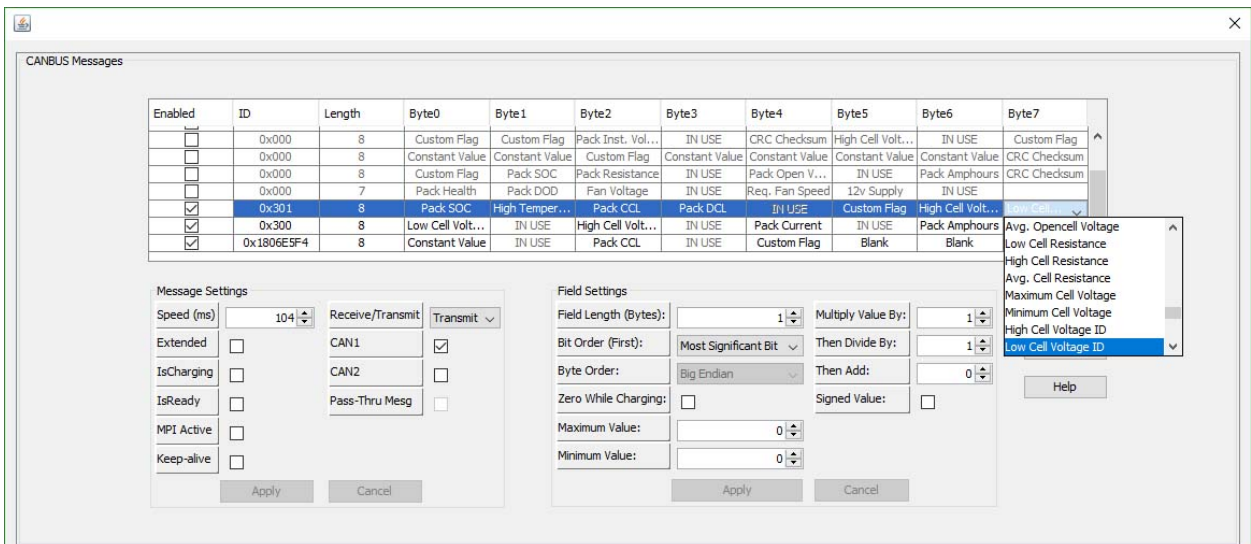

Fig. 38

Fig. 39

23. Make sure that the Message and Field Settings for **LOW CELL VOLTAGE ID** are the same as in (Fig 40).

Message Settings:

Speed (ms): 104

Extended: **UNCHECKED**

IsCharging: **UNCHECKED**

IsReady: **UNCHECKED**

MPI Active: **UNCHECKED**

Keep-Alive: **UNCHECKED**

Receive/Transmit: Transmit

CAN1: **CHECKED**

CAN2: **UNCHECKED**

Field Settings:

Field Length (Bytes): 1

Bit Order (First): Most Significant Bit

Byte Order: N/A

Zero While Charging: **UNCHECKED**

Minimum Value: 0

Maximum Value: 0

Multiply Value By: 1

Then Divide by: 1
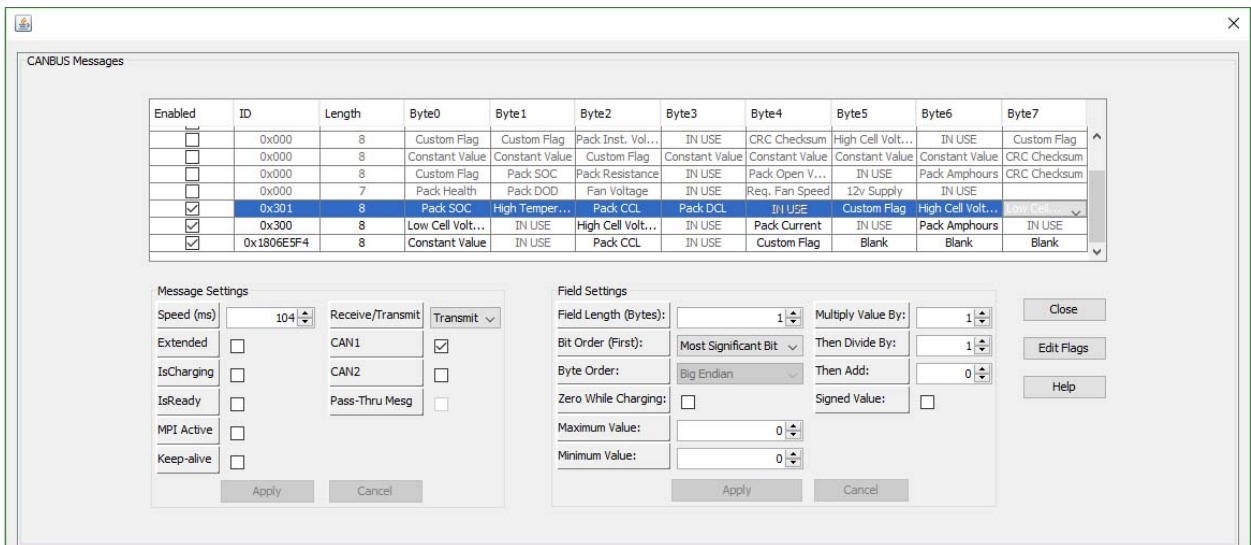
Then Add: 0

Signed Value: **UNCHECKED**

Fig. 40