How To Configure CAN Channel Transmit & Receive

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Shiftec Gear Control Units have powerful inbuilt CAN functionality which can be used for a variety of tasks and control strategies. Shiftec GCUs can also act as CAN Hubs converting analogue sensor values to CANBus messages, which can be extremely useful for reducing vehicle wiring complexity and increasing sensor count beyond that which may be possible with the analogue inputs available on other control units fitted to the vehicle, as well as CAN message translators to rescale existing CAN messages.

CAN Input Channel configuration and CAN Transmit is configured within the Shiftec iFace software. For details on how to install iFace and how to configure your GCU please see the relevant guides in the How To section of www.shiftec.com/shop/support.

Configuring CAN Input Channels

By default the GCU provides 25 additional channels which can be configured for use in gear control strategies or for other uses. CAN 1 to CAN 5 are configured by default in most Shiftec supplied GCU Configurations leaving 20 user configuration channels. The CAN Input Channels display within iFace provides access to configure the received CAN channels. The CAN Input Channels window is organised in columns.

CAN Input Channels

Name	Message ID	Start Bit	Length	Extended ID	Signed	Big endian	Data Decimal	Data Hex
ECU CAN TPS	0x002	16	16	✗	✗	✓	0	0x0000
ECU CAN RPM	0x002	0	16	✗	✗	✓	0	0x0000
CAN Switch Up	0x002	32	8	✗	✗	✓	0	0x0000
CAN Switch Down	0x002	40	8	✗	✗	✓	0	0x0000
CAN Detent	0x002	48	8	✗	✗	✓	0	0x0000
CAN 06	0x000	0	16	✗	✗	✓	0	0x0000
CAN 07	0x000	0	16	✗	✗	✓	0	0x0000
CAN 08	0x000	0	16	✗	✗	✓	0	0x0000
CAN 09	0x000	0	16	✗	✗	✓	0	0x0000
CAN 10	0x000	0	16	✗	✗	✓	0	0x0000
CAN 11	0x000	0	16	✗	✗	✓	0	0x0000
CAN 12	0x000	0	16	✗	✗	✓	0	0x0000
CAN 13	0x000	0	16	✗	✗	✓	0	0x0000
CAN 14	0x000	0	16	✗	✗	✓	0	0x0000
CAN 15	0x000	0	16	✗	✗	✓	0	0x0000
CAN 16	0x000	0	16	✗	✗	✓	0	0x0000
CAN 17	0x000	0	16	✗	✗	✓	0	0x0000
CAN 18	0x000	0	16	✗	✗	✓	0	0x0000
CAN 19	0x000	0	16	✗	✗	✓	0	0x0000
CAN 20	0x000	0	16	✗	✗	✓	0	0x0000
CAN 21	0x000	0	16	✗	✗	✓	0	0x0000
CAN 22	0x000	0	16	✗	✗	✓	0	0x0000
CAN 23	0x000	0	16	✗	✗	✓	0	0x0000
CAN 24	0x000	0	16	✗	✗	✓	0	0x0000
CAN 25	0x000	0	16	✗	✗	✓	0	0x0000

- The Name column provides a user configurable channel name for each received value.
- The Message ID column is configured with the ID of the CANBus message you wish to use to generate the required channel.
- The Start Bit column specifies where in the received message the data you wish to use to generate the required channel begins.
- The Length column defines the length of the data within the received message that you wish to use to generate the require channels.
- The Extended ID column allows for extended ID format to be set. Double clicking the cross or tick within this column will change the status accordingly.
- The Signed column allows for the received message to be specified as signed format. Double clicking the cross or tick within this column will change the status accordingly.

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- The Big Endian column allows for the received message to be specified as Big Endian format. Double clicking the cross or tick within this column will change the status accordingly.

To create a new CAN Based input Double click the name of a spare channel in the "Name" column and set the name as required (e.g. RPM), set the message ID in the "Message ID" column in hex format (e.g. 0X200). Specify how many bits into the message the data you wish to receive stars (e.g. 16), specify how long the message is in bits (e.g. 16). Now set if the message is in extended ID format, Signed or Big Endian by setting a Cross or Tick in the relevant columns. Once configured the data decimal and data hex of the received message will be displayed in the "Data Decimal" and "Data Hex" columns accordingly.

When you have configured the CAN Input you can use the input accordingly in "Input Setup" and scale the received data as required. To scale the received data set the "Source" of the required input in "Input Setup" and click the "table" link in the calibration column. The Calibration Table for the input will now be displayed.

The Data Raw value of the received CAN message is displayed on the upper line of the table and the SI value relating to this raw value is displayed below it. Both tables are user configurable. Right clicking either table will display an additional menu where the decimal places, gain or offset of a cell can be set. Multiple cells can be selected by clicking and dragging and an interpolate function between the selected cells can be used by pressing the "I" key on the keyboard. In the below example engine RPM is received as a raw value between 0 and 9999 which relates to an actual engine RPM of 0rpm – 15000rpm.
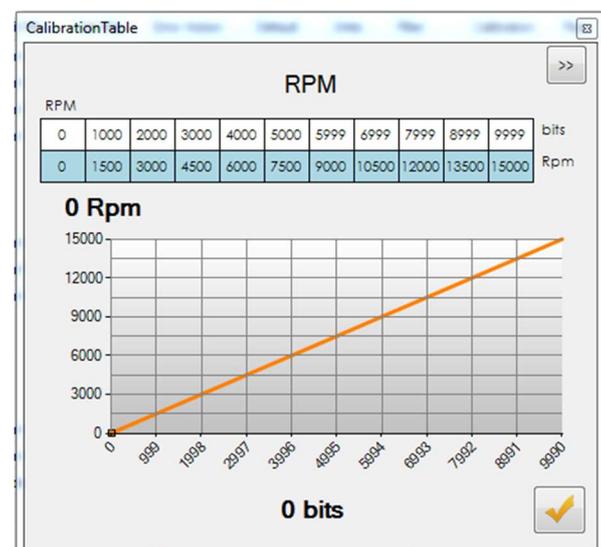
The scale is linear so this example can be quickly configured by specifying the lowest and highest raw value in the top line of the table in the lowest and highest cells, selecting all cells and pressing the "I" key on the keyboard. The relationship to actual engine RPM can then be set by entering the lowest and highest engine RPM the raw CAN value relates to in the lowest and

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highest cells of the bottom row of the table, selecting all cells and pressing the "I" key on the keyboard.

Configuring CAN Transmit Channels

The GCU provides the ability to transmit any input, control value or control status present on the GCU via CANBus. This ability is not limited to values used in the control of the shift system, spare analogue inputs on the GCU can be used for additional sensors and these values transmitted via CANbus for use elsewhere on the vehicle by other control units.

The GCU provides 6 configurable CAN messages, in most Shiftec supplied calibrations one message is left empty for user configuration. The CAN Transmit Messages display within iFace provides access to configure the transmitted CAN channels and is accessed by clicking the "CAN TX" icon in the navigation bar on the left hand side of the iFace display. The CAN Transmit Message display is organised into Two Tables. The upper specifies the Message and the lower table specifies the message content.

The upper "Message" table consists of the following columns.

- Name – The name of the message, this is not user configurable.
- Description – The description of the message, this is user configurable.
- Message ID – The ID in hex of the message you wish to transmit (e.g. 0X200)
- Rate – The rate at which you wish the message to transmit at in Ms (e.g. 2Ms)

CAN Transmit Messages

Name	Description	Message ID	Rate	Extended ID	DLC	Transmitting
CAN Tx 1		0x001	2 mS	✗	8	🟢
CAN Tx 2		0x033	2 mS	✗	8	🟢
CAN Tx 3		0x200	2 mS	✗	8	🟢
CAN Tx 4		0x201	2 mS	✗	8	🟢
CAN Tx 5		0x202	0 mS	✗	8	🔴

CAN Tx 1

Source	Start Bit	Length	Big Endian	Scaler	Status
SQ6 Shift Stat	0	8	✗	1	✓
SQ6 Status	16	8	✗	1	✓
SQ6 Cut Sev	24	8	✗	0.5	✓
None	0	0	✓	None	✓
None	0	0	✓	None	✓
None	0	0	✓	None	✓
None	0	0	✓	None	✓
None	0	0	✓	None	✓
None	0	0	✓	None	✓

- Extended ID – If the message you are transmitting is in Extended ID format. Set by double clicking the Cross or Tick as required.
- DLC – The "Data Length Code", specifies the number of bytes of data that the message contains. This is almost always "8".
- Transmitting – The "dot" shows an immediate status as to the CAN transmit. If the message is transmitting it is green, if the message is not transmitting (e.g. if the transmission rate is set to 0) it is red.

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The lower "Message Contents" table consists of the following columns:
- Source – The input, value or status on the GCU that you wish to form the content of this part of the CAN message (e.g. "P System). This is user configurable via a drop down which lists all available options for the contents of the message.
- Start Bit – The position in the CAN message where the data starts (e.g. 16)
- Length – The number of bits in length that the data is contained in within the message (e.g. 16).
- Big Endian – If the data is in big endian format or not. Set by double clicking the tick or cross as appropriate.
- Scaler – If a scaler is applied to the message contents and what that scaler value is. This should usually be "None"
- Status – Displayed as a Tick or a Cross depending on if the message is contents is valid.

In the above example you can see that four messages are transmitting on the CAN IDs 0X001, 0X033, 0X200 and 0X201 at a rate of 2ms as well as that an additional message is configured on 0X202 which is not transmitting. The message contents of CAN Tx 1 are displayed in the lower table and we can see that this message contains the Shift Stat, Status and Cut Severity used in the Pectel SQ6 CANBus GCU Link along with their start bits, lengths and format.

Using The GCU As A CAN Hub

If you wish to use the GCU as a CAN Hub for transmitting the values of additional sensors to other control units on the vehicle you will need to configure these sensors within the "Input Setup" display, accessed by clicking the Input Setup / Gear icon on the navigation panel on the left hand side of the iFace window. There are four user inputs available defined as User 1, User 2, User 3 and User 4 which can be renamed to any relevant name (e.g. Gearbox Temp). The analogue input to which the sensor is wired is set in the "Source" column, the relevant SI unit of this sensor can be set in the "Units" column and the calibration of the sensor configured by double clicking the "Table" link in the "Calibration" column. In this example we have configured a

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gearbox temperature sensor on the "User 1" input which has an output of 0mv to 5000mv. The raw sensor output is set on the top row of the calibration table and the relationship between the sensor output voltage and SI unit is set on the bottom row of the calibration table. **Note:** Only some inputs on the GCU are fitted with pull up resistors. If you wish to use a two wire resistive sensor on an input which does not have a pull up resistor you will need to fit an external pull up resistor of a suitable value between the 5V sensor supply pin on the GCU and the sensor output.
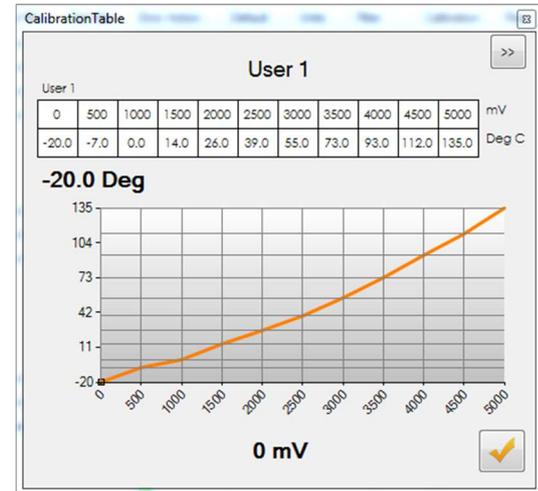

Once the sensor calibration is set the SI value can be transmitted as part of a CAN message by selecting it in the "Source" column within the message contents table of the "CAN Transmit Message" display.

Using The GCU As A CAN Message Translator

In some circumstances it may be necessary to translate a value received via CAN to another format or scaling for use in another controller elsewhere on the vehicle, for example if RPM is provided by the engine controller as part of message ID 0X100 but the dash display expects to see this message on ID 0X400. This scenario is especially common with controllers or displays which use a fixed, none user configurable, CAN Message format. The GCU provides functionality to translate messages and/or values if required.

To translate a message or value define the message contents you wish to translate as a CAN Input as per the above "Configuring A CAN Input Channel" instructions in this guide. Once defined use this input as the "Source" for one of the User inputs in "Input Setup". The calibration of this value can now be adjusted as required using the calibration table for this user input, in this example an engine RPM value has been rescaled to provide a CAN message content of 0 – 1024 rather than the actual engine RPM in raw. If the calibration of this value does not

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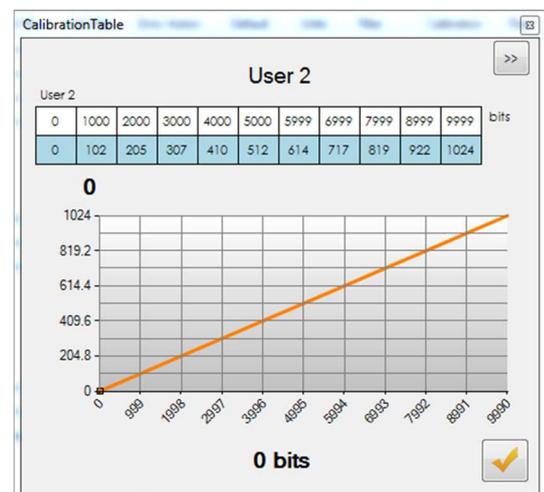
need to be adjusted set both the upper and lower calibration tables to the same values. Once the calibration is defined configure this user input as the contents of a CAN transmit message as per the above "Configuring CAN Transmit Channels" instructions in this guide.

If you wish to translate the contents of an entire CAN message repeat the above process for the values you wish to translate by defining each value from the received message as a CAN Input. Using the User 1, User 2, User 3 and User 4 Inputs within "Input Setup" each value which formed part of the original message can be rescaled as required. Once complete User 1, User 2, User 3 and User 4 can then be defined as the contents of a CAN Message in "CAN Transmit Messages" with the new CAN Message ID required.

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