



Figure 1 Au J1708 to NMEA2000 Gateway

GW4-1708-NM2K-001 User Manual

Rev. C

Au GW4-1708-NM2K-001 (figure 1) belongs to a family of gateway products which can convert SAE J1708/1587 data to NMEA2000 data.

Supported J1708 PID(12):

PID 92, 100, 102, 110, 127, 158, 167, 168, 177, 183, 190, 247

Supported NMEA 2000 PGNs:

PGN 126993, 127488, 127489, 127493

Features

- **Enclosure Color:** Black
- **1 LED:** indicator for event indication. After power up, the LED will blink one time per seconds.
- **Power Supply:** Operating range: 10V ~ 32V DC, nominal voltage: +14.2V DC or +28.4V DC
- **Operating Electric Current:** 75mA typical @ 14.2V DC, 250mA max
- **Operating Temperature:** -40~185°F (-40~ 85°C)
- **IP rating:** IP68. It is an environment sealed device (IP68) with a Deutsch 12 cavities connector (DT15-12PA). A cable (Part #: CBL-DT06-12-232-001) can mate with the DT15 serial 12-pin connector. It can be ordered separately.
- **Pin-out:** Pin-out definition of the DT15 serial 12-pin connector (DT15-12PA) connector is illustrated in figure 2

pre-installed

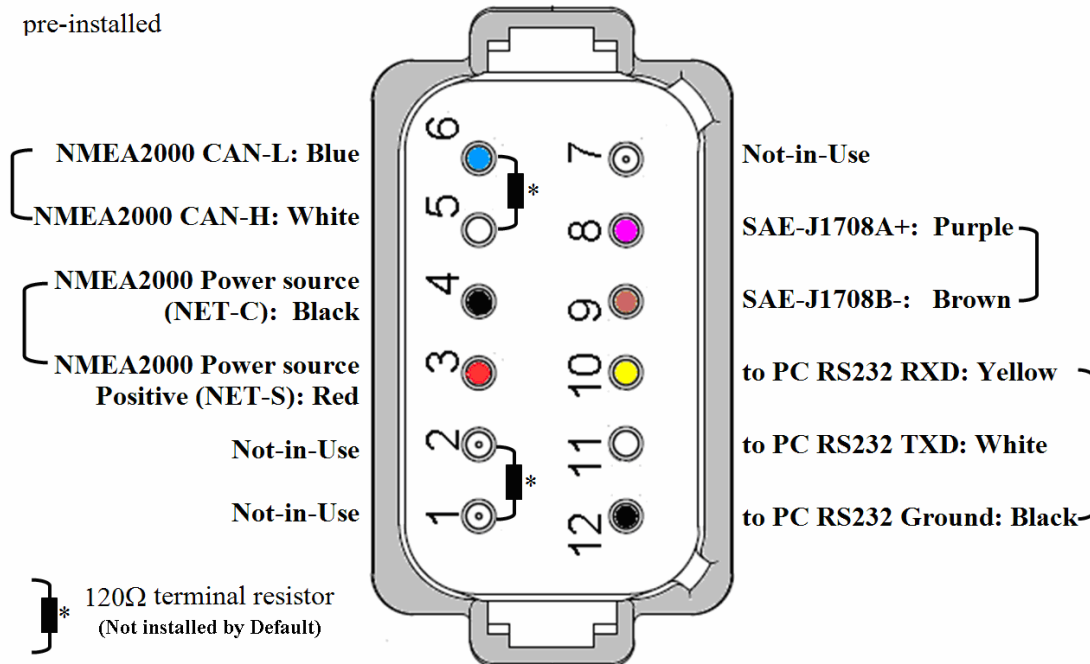


Figure 2 - DT15-12PA connector Pin-Out

Note 1: All "Not-in-Use" pin must be left open circuits.

Note 2: Pin 10 to 12 are internally isolated to the NMEA 2000 power source. It will prevent ground loop between the gateway device and computer

- **1 RS232 Port: for device monitoring, maintenances and configuration.**

RS232 connection can also be used to perform device configuration when it is needed, such as, Engine Instance Configuration, Device sleep mode on /off control etc. Detail information on how to configure can be found in the relative AT command section.

A RS232 provide capability to connect the device to a PC and monitor running parameters, such as, the GW4 device status, the J1708/J1587 network status, and NMEA 2000 network status. These information are broadcasted with normal repetition rate at 1Hz.

```

AT ID=GW4-1708-NM2K-001
AT FW=0.1A(64K-BUILD08072020-07)
AT SN=4294967295
AT CBS1=0B00000001
AT NMEA2K-TRANSMISSION-INSTANCE=0
AT J1708-BUS=ON
AT MID=172
AT EMID=128
AT TMID=130
AT BMID=136
AT DV=13.987V
AT NMEA2K-BUS=ON
AT NMEA2K-SADDRESS=CLAIMED
AT NMEA2K-SA=0
AT NMEA2K-ENGINE-INSTANCE=0
AT DV=13.965V
    
```

To connect GW4 device to a PC, simply use a serial port extension cable (Part #: CBL-RS232-01) or USB to serial convert cable (Part #: CBL-USB-232) to connect GW4 DB9 female connector to a PC, then open a serial port monitor software, such as TeraTerm.

PC serial port software settings:

```

Port:          COMx
Baud rate:     115200
data bits:     8
Stop bits:     1
Parity:        None
Flow control:  None
    
```

After the device is setup and network is up and running, RS232 connection to PC is NOT necessary. PC is NOT required for a GW4 to work at normal condition.

Typical network topology and Operation

By default, the GW4 will receive engine parameters from J1708/J1587 network, and these parameters will be automatically broadcast on NMEA 2000 CAN network. No complicate setup is needed. A typical topology of NMEA 2000 network and J1708 network with GW4-1708-NM2K is illustrated in Figure 3. Please first connect the device per Figure 3 network topology, after that, the device needs very minimum setting to start working.

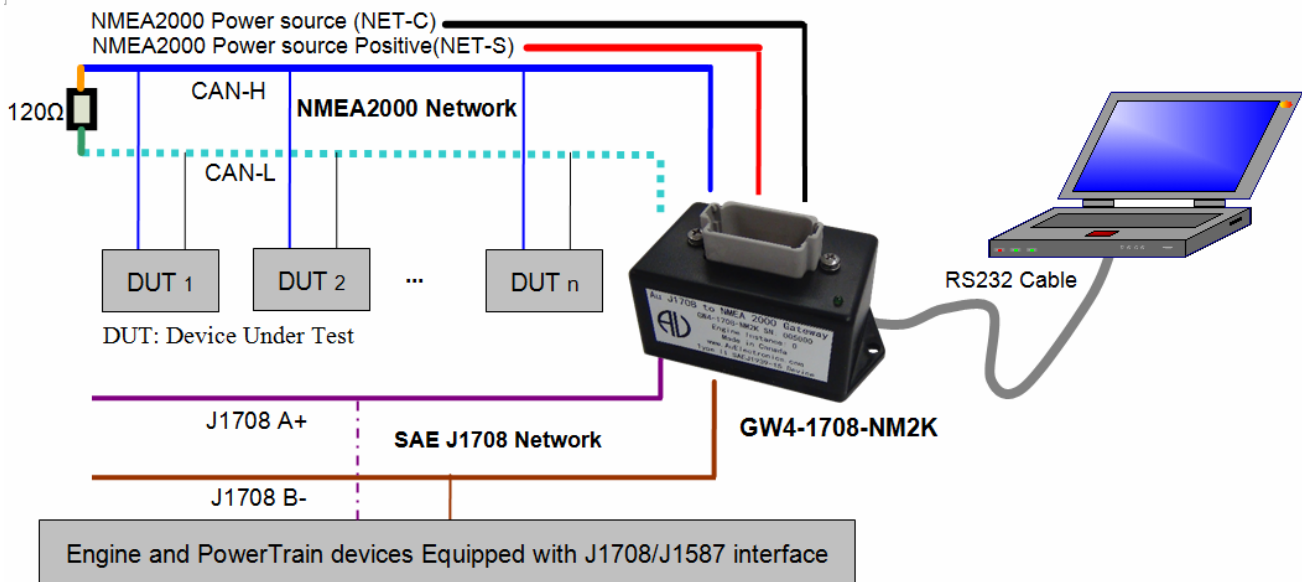


Figure 3 A typical topology of NMEA2000 network and J1708 network with GW4-1708-NM2K



Note 1: Two terminal resistors (120 ohm) are required to create a working NMEA2000 CAN network, please note these two terminal resistors are NOT installed inside of the GW4-1708-NM2K device.

Note 2: Please install the GW4-1708-NM2K device on one end of the CAN network backbone, and install another 120 ohm terminal resistor on the other side of the network backbone.

For single engine application, it can be simply plug and play with default setting. Once the device is power up, it will start receiving data from J1708 network and convert the received engine parameter to NMEA 2000 format and output them on the NMEA 2000 network.

AT command Broadcasted and Received by GW4 on RS232

All the command used in GW4 are using the format as:

AT <Abbreviation>=<X.Y><Unit><CR>< LF>

or

AT <Abbreviation>=<character><CR>< LF>

It always started with "AT ", consist of character of "A", "T" and followed with **space character**, then **Abbreviation** of specific parameter, an equal sign "=", then **value** and **unit** for digital parameters or status (such as **ON / OFF** or **Disable / Enabled** or **Claimed / NotClaimed**).

Every single AT Command end with a carriage return "<CR>" and a line feed "<LF>". They may or may not be visible on PC serial communication software.

In this document,

"<CR>" and "\r" both represent carriage return;

"<LF>" and "\n" both represent Line Feed.

There are 4 device-related parameters defined in GW4: Device Voltage (DV), Device ID (ID), Device Firmware Edition (FW), **Control Bit Status 1(CBS1)**, and Serial Number (SN). Please note, DV will be broadcasted every 1 second, and it is always available as long as GW4 is powered on. The other three parameters (ID, FW, SN) will only be broadcasted once at powered on, and then can be requested during run time.

Table 1 List of Device Information **Transmitted** by GW4 on RS232

Abbreviation	Explanation
DV	Description Device Voltage Unit V (Volt) Data range 10~32V (Application dependent) Resolution 0.001 V Repetition 1 S Example AT DV=12.296V\r\n --- Device voltage is 12.296 volt
FW	Description Firmware ID Data range 0.1A – 25.6A Repetition Broadcast once at Power On, and can be requested during run time by command " AT FW=?\r\n " Example 1 AT FW=0.1A(64K-BUILD08072020-01)\r\n --- The Firmware in the device is 0.1A(64K-BUILD08072020-01)
ID	Description Device ID Repetition Broadcast once at Power On, and can be requested during run time by command " AT ID=?\r\n " Example AT ID= GW4-1708-NM2K-001\r\n --- ID of this Device is GW4-1708-NM2K-001
SN	Description Serial Number ID Data range 0 - 4294967295 Repetition Broadcast once at Power On, and can be requested during run time by command " AT SN=?\r\n " Example AT SN=429\r\n --- The Serial Number of the device is 429



CBS1	Description	Device Control Bit Status 1, see table 2-2 for detail bit definition and settings			
	Data range	OB00000000 – OB00111111; default is 00000001;			
	Format	AT CBS1=0B00000000 - 0B00111111 \r\n			
		Bit 8-4 are not in use, default value are 00000 Bit 3 can be configured by command "AT DSLEEP=0/1" Bit 2 can be configured by command "AT SSLEEP=0/1" Bit 1 is not configurable, manufacturer reserved value at 1.			
	CBS1	Bit 8 -4	Bit 3	Bit 2	Bit 1
	CBS1=0B00000001	00000	0 deep sleep disabled (default)	0 standby sleep disabled (default)	1
	CBS1=0B00000101	00000	1 deep sleep enabled	0 standby sleep disabled	1
	CBS1=0B00000011	00000	0 deep sleep disabled	1 standby sleep enabled	1

Deep Sleep Mode and Standby Sleep Mode

There are two sleep modes in GW4: **Deep Sleep** Mode and **Standby Sleep** Mode (Table 2).

Table 2 Sleep mode setting AT Command (command **Received** by GW4 on RS232)

Abbreviation	Explanation	
DSLEEP	Description	Deep Sleep Mode on/off control
	Conditions to enter Deep Sleep mode	If deep sleep function is enabled, the device will go to deep sleep mode when one of the following condition(s) are met for 10 seconds: <ol style="list-style-type: none"> 1. There is no network activity in J1708/J1587 network, 2. There is network activity in J1708/J1587 network, however engine RPM is less than 400 RPM,
	Wakeup condition	In case the power supply to the device is constant on, the deep sleep mode will put the device in sleep mode, reduce power consumption, it helps reserve the battery when the engine is off. Once the device at deep sleep mode can only be waken up by cranking the engine.
	Disable	AT DSLEEP=0\r\n --- Disable deep sleep function
Enable	AT DSLEEP=1\r\n --- Enable deep sleep function	
SSLEEP	Description	Standby Sleep Mode on/off control
	Condition to enter Standby Sleep mode	when there is no network activity on J1708/J1587 network for 10 seconds,
	Wakeup condition	GW4 at Standby Sleep mode can be wake up whenever there is a J1708/J1587 network activity.
	Disable	AT SSLEEP=0\r\n --- Disable stand alone sleep function
Enable	AT SSLEEP=1\r\n --- Enable stand alone sleep function	

The "Deep" sleep mode and the "Standby" sleep mode are mutual-exclusive, when one is turned on, the other will be automatically turned off. By default, both the standby sleep mode and Deep sleep mode are off. This sleep mode setup only need be set up one time, the device will remember the setting thereafter.

Table 3 List of Request Type AT command **Received** by GW4 on RS232

Commands	Explanation	
ID	Description	Device ID Request Command
	Format	AT ID=?\r\n --- If this command is received, GW4 will response with device ID.
	Response	AT ID=GW4-J1708-NMEA2K-001
FW	Description	Device Firmware Edition Request Command
	Format	AT FW=?\r\n --- If this command is received, GW4 will response with device firmware.
	Response	AT FW=0.1A(64K-BUILD08072020-01)
SN	Description	Device SN Request Command
	Format	AT SN=?\r\n --- if this command is received, GW4 will response with device serial number.
	Response	AT SN=5001



Table 3 List of J1708 Bus and NMEA2000 Bus Status Parameters **Transmitted** by GW4 on RS232

Abbreviation	Explanation
J1708-BUS	Description J1708 Bus network status Data range ON or OFF Repetition 1 S Example AT J1708-BUS=OFF\r\n --- J1708 Bus Network is off AT J1708-BUS=ON\r\n --- J1708 Bus Network is on
MID	Description GW4 (J1708) Device message ID Data range 128 - 250 (default is 172, reconfigurable when it is necessary) Repetition 1 S Example AT MID=172\r\n --- J1708 Device message ID is 172
EMID	Description GW4 Received (J1708) Engine Message ID Data range 128 - 250 (default is 128, reconfigurable when it is necessary) Repetition 1 S Example AT EMID=128\r\n --- Received J1708 Engine Message ID is 128
BMID	Description GW4 Received (J1708) ABS message ID Data range 128 - 250 (default is 136, reconfigurable when it is necessary) Repetition 1 S Example AT BMID=136\r\n --- Received J1708 ABS Message ID is 136
TMID	Description GW4 Received (J1708) Transmission message ID Data range 128 - 250 (default is 130, reconfigurable when it is necessary) Repetition 1 S Example AT TMID=130\r\n --- Received J1708 Transmission message ID is 130
NMEA2K-SA	Description NMEA 2000 Source address Data range 0 – 251 (default is 0, reconfigurable when it is necessary) Repetition 1 S Example AT NMEA2K-SA=0\r\n --- NMEA 2000 Node Source Address is 0
NMEA2K-BUS	Description NMEA 2000 bus network status Data range ON or OFF Repetition 1 S Example: AT NMEA2K-BUS=ON\r\n --- NMEA 2000 Bus is On AT NMEA2K-BUS=OFF\r\n --- NMEA 2000 Bus is Off
NMEA2K-SADDRESS	Description NMEA 2000 Source Address Claimed or not claimed Data range CLAIMED or NOTCLAIMED Repetition 1 S Example: AT NMEA2K-SADDRESS=CLAIMED\r\n ---NMEA 2000 Source Address is claimed AT NMEA2K-SADDRESS=NOTCLAIMED\r\n ---NM2K Source Address is not claimed
NMEA2K-ENGINE-INSTANCE	Description NMEA 2000 Engine Instance Data range 0 – 252 (default is 0, reconfigurable when it is necessary) Repetition 1 S Example AT NMEA2K-ENGINE-INSTANCE=0\r\n --- NMEA 2000 Engine Instance is 0.
Note: By default device is set to engine instance 0 on NMEA 2000 network. "AT EINSTANCE=x\r\n" can be used to change the engine instance to x, where x can be varied from 0 to 252.	
NMEA2K-SADDRESS	Description NMEA 2000 Source Address Claimed or not claimed Data range CLAIMED or NOTCLAIMED Repetition 1 S Example: AT NMEA2K-SADDRESS=CLAIMED\r\n ---NMEA 2000 Source Address is claimed AT NMEA2K-SADDRESS=NOTCLAIMED\r\n ---NM2K Source Address is not claimed



DETECTED_MID	Description Update a list of (maximum 32 nodes) received J1708 MID Data range 128 ~ 250 Repetition 10S Example: AT DETECTED_MID[1~3/3]=176,137,175,\r\n <i>---There are 3 MIDs detected in total, and a list the first set of detected MIDs are 176, 137, 175</i>
DETECTED_PG1_PID	Description Update a list of (maximum 254 PIDs) J1708 detected PG1 PID Data range 0 ~ 254 Repetition 10S Example: AT DETECTED_PG1_PID[1~10/29]=191,84,183,184,85,92,190,91,162,163,\r\n <i>---There are 29 PID detected in total, and the first set of 10 detected PIDs are listed</i> AT DETECTED_PG1_PID[11~20/29]=49,192,247,158,100,110,105,102,70,89,\r\n <i>---There are 29 PID detected in total, and the 2nd set of 10 detected PIDs are listed</i> AT DETECTED_PG1_PID[21~29/29]=168,44,177,47,120,117,118,147,255,\r\n <i>---There are 29 PID detected in total, and the last set of detected PID are listed</i>

Table 4 Engine Instance, NMEA 2000 SA, J1708 MID Configuration Command (command **Received** by GW4 on RS232)

Abbreviation	Explanation	
MID	Description	GW4 (J1708) device Message ID
	Data range	128 ~ 250 (default is 172)
	Example	AT MID=171\r\n --- change GW4 (J1708) device MID to 171
EMID	Description	Set GW4 (J1708) Received Engine Message ID
	Data range	128 ~ 250
	Example	AT EMID=175\r\n --- Set the to be received J1708 Engine MID to 175
TMID	Description	Set GW4 (J1708) Received Transmission Message ID
	Data range	128 ~ 250
	Example	AT TMID=176\r\n --- Set the to be received Transmission MID to 176
BMID	Description	Set GW4 (J1708) Received ABS Message ID
	Data range	128 ~ 250
	Example	AT EMID=137\r\n --- Set the to be received ABS MID to 137
EINSTANCE	Description	NMEA 2000 Engine Instance setup
	Data range	0 – 252 (default is 0)
* Note: It is only required to set once, the device will remember the setting thereafter. For multiple engine application, " AT EINSTANCE=x\r\n " can be used to change the engine instance to x, where x can be varied from 0 to 252.		
AT EINSTANCE=0\r\n	Single Engine	change the engine instance to 0, this is the first engine counting from left to right
AT EINSTANCE=1\r\n	Single Engine	change the engine instance to 1
AT EINSTANCE=2\r\n	Dual Engines	Dual Engines, 0-Port, 1-Starboard
AT EINSTANCE=3\r\n	3 Engines	0-Port, 1-Center, 2-Starboard
AT EINSTANCE=4\r\n	4 Engines	0-Bow, 1-Port, 2-Stern, 3-Starboard
AT EINSTANCE=5\r\n	5 Engines	0-Bow, 1-Port, 2-Center, 3-Stern, 4-Starboard
NM2KSA	Description	NMEA 2000 Source Address
	Data range	0~251 (default is 0)
	Example	AT NM2KSA=1\r\n --- change NMEA 2000 SA from 0 to 1
* Note: Due to the fact that NMEA 2000 standards needs the CAN nodes automatically arbitrate the source address, the device may automatically change its own source address without end user awareness. This command only provides a method to allow user manually adjust the device source address. Where or not the node can win one particular source address will depends on the field node arbitration result on the network.		

Optional Cables

The following cables listed in table 6 are optional components for different applications, they are sold separately.

Table 6 Optional Accessories

Part # & Image	Description
<p>CBL-DT06-12-232-01</p> 	<p>This cable has two connectors, one is a 12-position DT06 serial connector, which is used to mate with the DT15 serial 12-pin connector on Au J1708 to NMEA 2000 Gateway (GW4-1708-NM2K), the other one is a DB9 female connector, which is used to mate with RS232 port of a PC .</p> <p>The cable also has 2 set of pig-tail wires, one set is composed of 3 pairs of color coded wires for J1708, NMEA2000, and power connection purpose, the other set is composed of 3 pig-tail wires, which are not used for GW4-1708-NM2K.</p> <p>1-Yellow: Not-in-Use 2-Green: Not-in-Use 3-Red: NMEA2000 NET-S 4-Black: NMEA2000 NET-C 5-White: NMEA2000 CAN-H 6-Blue: NMEA2000 CAN-L 7-Grey: Not-in-Use 8-Purple: SAEJ1708 A+ 9-Brown: SAEJ1708 B- 10-Yellow: RS232 RXD 11-White: RS232 TXD 12-Black: RS232 GND</p>
<p>CBL-RS232-01</p> 	<p>RS232 Serial Extension Cable can be used to connect computer Serial port to Au J1939 / J1708 products (on RS232 Side).</p> <p>Major Features:</p> <ul style="list-style-type: none"> * Fully shielded to prevent unwanted EMI/RFI interference * Fully molded connectors with thumbscrews provide a quick and easy connection every time * Connectors: DB9 Male to DB9 Female * All 9 connector pins are wired straight through
<p>CBL-USB-232</p> 	<p>The USB to Serial Converter cable can be used to connect computer USB port to Au J1939 / J1708 products (on RS232 Side).</p> <p>It acts as a bridge between a USB port and a standard Serial (RS232) port. It is Vista, Win7, and XP compatible.</p> <p>3 LEDs are included, Power, TX and RX.</p> <ul style="list-style-type: none"> Power LED is on when USB power is supplied. TX LED will blink when COM port is transmitting. RX LED will blink when COM port is receiving. <p>It is compatible with all Au Group Electronics system products, such as Au J1939 Simulators, J1708 Simulators, FMS Simulators, J1939 Interpreters, J1708 Interpreters, J1939 MCS, J1939 DCS, and Gateways.</p>
<p>PWR-912V-CP</p> 	<p>Wall mount AC/DC power supply can supply power to all devices connected to CBL-J1708-02 or CBL-CAN-485-02.</p> <p>Specification:</p> <ul style="list-style-type: none"> * Positive center * Connector style: 2.1mm I.D. x 5.5mm O.D. x 12mm Female <p>(compatible with the power jacket of CBL-J1708-02 and CBL-CAN-485-02)</p> <ul style="list-style-type: none"> * Voltage input: 110~120V AC Input * Voltage output: 12V DC * Current output: 500mA Max. * Inrush current: 40A Maximum * Power: 6.0W * Line Regulation: +/- 2% * Load Regulation: +/- 5%