# Au J1708/J1587 Simulator V1.00A User Manual

Rev. C

Au Group Electronics

March 2013

Table of Contents

Chapter 1 - Introduction ..... 3
1.1. Major Hardware Features ..... 3
1.2. Major Operating Features ..... 3
1.3. Cables and power supply for Au SAE J1708/J1587 Simulators ..... 4
1.4. Eight Editions of Au SAE J1708/J1587 Simulators ..... 5
1.4.1 Non-plus Editions: ..... 6
1.4.2 Plus Editions: ..... 6
1.4.3 Supported parameters of each edition ..... 6
1.4.3.1 Value Package Edition(s) ..... 6
1.4.3.2 Engine Basic Edition(s) ..... 7
1.4.3.3 Engine Premium Edition(s) ..... 7
1.4.3.4 Vehicle Platinum Edition(s) ..... 7
1.5. License Upgrade and Support ..... 8
1.6. Order information ..... 9
Chapter 2 - Operating Instructions ..... 10
2.1. Power On ..... 10
2.2. Operating Modes (Static/Dynamic) ..... 10
2.3. Function of Push Buttons and LED Indication ..... 10
Chapter 3 - Remote Terminal and Data Configuration ..... 12
3.1. Step 1: Connect J1708/J1587 Simulator to PC and J1708 network ..... 12
3.2. Step 2: Remote Control Au J1708 Simulator ..... 13
3.3. Display Panel – Engine Parameters for Value Package Plus Edition ..... 14
3.4. Display Panel - Engine Parameters for Engine Basic Plus Edition ..... 16
3.5. Display Panel - Engine Warnings for Engine Premium Plus Edition ..... 20
3.5.1. Water in fuel indicator (PID 97) ..... 20
3.5.2. Engine Attention / Warning Indicator Lamps (PID 44) ..... 21
3.5.3. Engine Diagnostic Code (DC) and Occurrence count (OC) (PID 194) ..... 21
3.6. Transmission / ABS Parameters for Vehicle Platinum Plus Edition ..... 23
3.6.1. ABS and Transmission Attention / Warning Lamps (PID 44) ..... 23
3.6.2. ABS Control Status (PID 49) ..... 24
3.6.3. Transmission Retarder Status (PID 47) ..... 24
3.6.4. Transmission Diagnostic Code (DC) and Occurrence count (OC) (PID 194) ..... 25
3.6.5. ABS Diagnostic Code (DC) and Occurrence count (OC) (PID 194) ..... 26
3.6.6. ABS and Transmission Data Configuration ..... 27
3.7. Change Engine Message ID (For Plus Editions Only). ..... 30
Appendex A - Remote Terminal Installation Guide ..... 32
Appendex B - Firmware upgrade with Au PIC Serial Bootloader ..... 34
B-1 What's needed Before Install Au PIC Bootloader? ..... 34
B-2 How to Install Au PIC Bootloader? ..... 34
B-3 How to Use Au PIC Bootloader? ..... 36
Appendex C - License Management ..... 38
C-1 What is needed to upgrade Au J1708/J1587 Simulator License? ..... 38
C-2 Step by Step License Upgrading Procedure ..... 38

# Chapter 1 - Introduction

## 1.1. Major Hardware Features

Au SAE J1708/J1587 Simulators, a family of well designed devices, are capable of simulating most frequently used J1708/J1587 signals on J1708/J1587 network for new product development, validation, assembly-line testing, incoming inspection and business demonstration, etc. Au J1708 simulator can be connected to a J1708 network at the 9 pin “BUS” connector. The pin-out of the DB9 male "BUS" interface is illustrated in Figure 1-2.

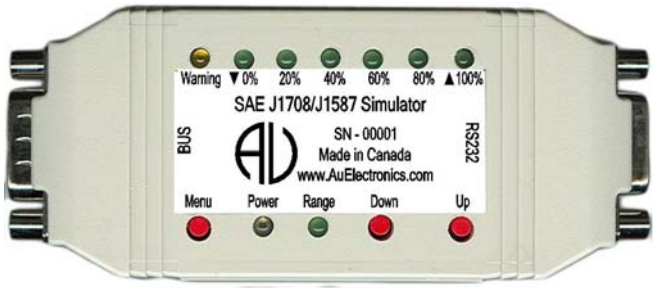



Figure 1-1 Au J1708/J1587 Simulator

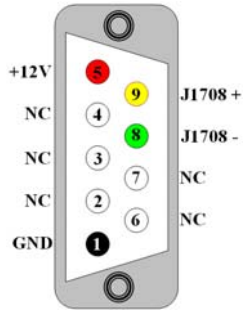



Figure 1-2 BUS Side DB9 male connector

Major hardware features are listed below:

- **Power supply:** +12V~+14.2V DC, 250mA max
- **SAE J1708/J1587 Baud rate:** 9600 bits/second
- **Bit Access Time:** Per SAE J1708 Section 3.1 and Section 5.2.2.2
- **Inter-character bit time:** ≤ 2 bit time
- **Minimum Idle Time:** 10 bit times
- **Maximum network length:** 131 feet (40 meter)
- **Minimum capacity:** 20 standard nodes
- **Enclosure color:** Black or PC white
- **Compact size:** 4-1/8" L X 1-3/4"W X 7/8”H (10.5 X 4.2 X 2 cm)
- **Operating temperature:** -4 ˚F to 185 ˚F (-20 ˚C to 85 ˚C)
- **Ground:** All assemblies using the J1708 link must have Common Ground References
- **Wire:** A minimum 18 AWG twisted-pair wire, with a minimum of one twist/inch (360 ˚/2.54 mm) is required
- **1 buzzer**
- **9 LED indicators:** Power, Range, Warning*, ▼0%, 20%, 40%, 60%, 80%,▲100%
  * Warning LED is not used in Value Package and Engine Basic Editions.
- **3 push buttons:** Simulated J1708 signals can be adjusted by push buttons: Menu, Down, Up
- **1 DB9 Male "BUS" Interface:** For power supply and J1708 network connection, pin-out of the DB9 Male bus interface is illustrated in figure 1-2.
- **1 RS232 interface:** For firmware update, license management, remote control (Plus edition only).
- **Bus Termination shall not be used** per SAE J1708 Section 4.4.
- **TVS (Transient Voltage Suppressor) protection on J1708 bus**

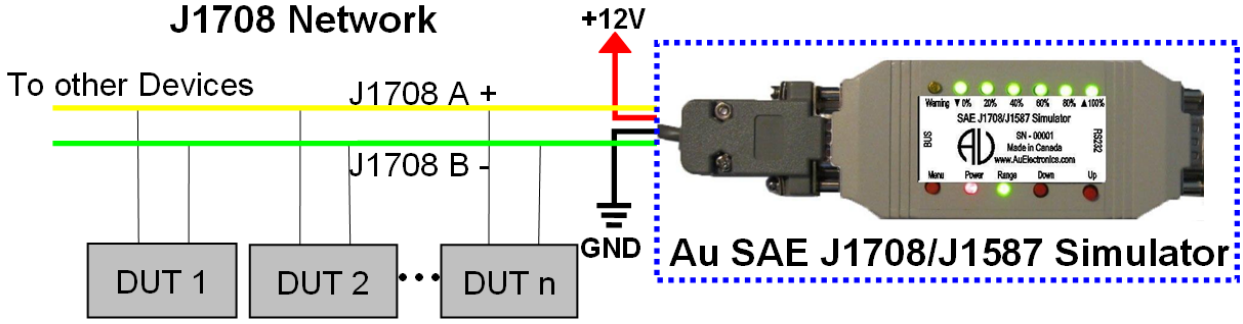
## 1.2. Major Operating Features

- **Smart features:** Recall last operating mode at power-on, capable of generating dynamic data, etc.
- **Static mode or dynamic mode:**
  o Static mode: output static J1708 signals. In this mode, signal can be changed manually.
  o Dynamic mode: automatically changes the output value of J1708 signals.
  o Two modes can be switched easily
- **Ease of use:** Easy-to-operate design. No software setup experience or J1708 protocol configuration skill is required. After a network is physically connected, it will dynamically generate J1708 data when it enters dynamic mode.
- **"Remote Terminal" software** ("Plus" edition only)**:** Control simulated J1708 signals from PC, and display simulated J1708 signals on a computer screen.
- **All push button control functions are available on PC "Remote Terminal" software** ("Plus" editions only)

- **Annual support and minor upgrade services** are available (SVS-SIM-J1708)
- **Custom design** is available upon request
- **In-field firmware update capability**
- **Easy in-field license upgrade feature:** Au J1708/J1587 Simulator Value Package edition can be upgraded to Engine Basic edition, Engine Basic edition can be upgraded to Engine Premium edition; Engine Premium edition can be upgraded to Vehicle Platinum edition. Non-plus edition can be upgraded to plus edition. Upgrade flowchart is shown in figure 1-7.

## 1.3. Cables and power supply for Au SAE J1708/J1587 Simulators

A typical J1708 network topology with a Non-plus edition of the J1708 simulator is illustrated in Figure 1-3.




Note 1: DUT (Device under Test)

Note 2: Bus-termination resistors shall not be used!!!

Figure 1-3 Typical J1708 network with Au J1708/J1587 Simulator Non-plus edition (No PC needed)

The following cables and power supply are optional components for different application, they are sold separately.

| | |
|---|---|
| CBL-RS485-01<br>  | A 4-wire pigtail cable, it can be used to connect Au J1708/J1587 simulator with power supply and J1708 network. One end of the cable is a DB9 connector which mates with the DB9 male connector at "BUS" side.<br>The other end of the cable consists of 4 pigtail wires which can connect power supply and J1708/J1587 network.<br>Red wire: Power supply, e.g. +12V DC Black wire: Ground<br>White: J1708A+ Green: J1708B- |
| CBL-CAN-485-01<br>  | A 6-wire color coded cable which can be used for Au J1939 devices, Au J1708 devices. One end of the cable is DB9 female connector; it is designed to mate with Au devices on BUS side.<br>The other side of the cable is a pig tail with 3 pairs of twisted color coded wires:<br>Red wire: Power supply, e.g. +12V DC Black wire: Ground<br>Yellow wire: CAN High Green wire: CAN Low<br>Violet: J1708A+ Brown: J1708B- |
| CBL-J1708-02<br>  | Use J1708 diagnostic cable (Part#: CBL-J1708-02) with Au J1708 simulator, will not only simulate a truck J1708 signal, but also present the same diagnostic interface on truck and school buses.<br>On one end, it is a DB9 female connector. It will supply power, ground, J1708+, and J1708- to Au J1708 devices or third party devices.<br>On the other end, it includes a SAE 6-way rounded diagnostic receptacle with flange (e.g. Deutsch part #: HD10-6-12P) and a power supply jacket (2.1 mm positive center).<br>The power jacket is compatible with PWR-912V-CP, through which, it can supply power to all devices connected on the cable. |

| | |
|---|---|
| CBL-CAN-485-02<br>  | Use CBL-CAN-485-02 with Au J1939 or J1708 simulator, will not only simulate a truck J1939/J1708 signal, but also present the same diagnostic interface on truck and school buses.<br>On one end, it is a DB9 female connector. It will supply power, ground, CAN-H, CAN-L, J1708+, and J1708- to Au J1708 devices or Au J1939 devices or third party devices designed by J1939-11, J1708/J1587 and J1939-15 specification.<br>The other end is a rounded Deutsch HD10 9-way Receptacle with Flange (e.g. Deutsch part #: HD10-9-1939P) and a Power Supply Jacket (2.1 mm Positive center).<br>The power jacket is compatible with AC/DC power supply (PWR-912V-CP), through which, it can supply power to all devices connected on the cable. |
| PWR-912V-CP<br>  | Wall mount AC/DC power supply can supply power to all devices connected to CBL-J1708-02 or CBL-CAN-485-02.<br>Specification:<br>* Positive center<br>* Connector style: 2.1mm I.D. x 5.5mm O.D. x 12mm Female (compatible with the power jacket of CBL-J1708-02 and CBL-CAN-485-02)<br>* Voltage input: 110~120V AC Input<br>* Voltage output: 12V DC<br>* Current output: 500mA Max.<br>* Inrush current: 40A Maximum<br>* Power: 6.0W<br>* Line Regulation: +/- 2%<br>* Load Regulation: +/- 5% |
| CBL-RS232-01<br>  | RS232 Serial Extension Cable can be used to connect computer Serial port to Au J1939 / J1708 products (on RS232 Side).<br><br>Major Features:<br><br>* Fully shielded to prevent unwanted EMI/RFI interference<br>* Fully molded connectors with thumbscrews provide a quick and easy connection every time<br>* Connectors: DB9 Male to DB9 Female<br>* All 9 connector pins are wired straight through |
| CBL-USB-232<br>  | The USB to Serial Converter cable can be used to connect computer USB port to Au J1939 / J1708 products (on RS232 Side).<br>It acts as a bridge between a USB port and a standard Serial (RS232) port.<br>It is Vista, Win7, and XP compatible.<br>Three LED are included, Power, TX and RX. 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.<br>It is compatible with all Au Group Electronics system products, J1939 Simulators, J1708 Simulators, FMS Simulators, J1939 Interpreters, J1708 Interpreters, J1939 MCS, and J1939 DCS. |

## 1.4. Eight Editions of Au SAE J1708/J1587 Simulators

Eight editions of Au SAE J1708/J1587 simulator are provided to meet various users' needs (4 non-plus editions and 4 plus editions).

### 1.4.1 Non-plus Editions:

Au J1708/J1587 Simulator **non-plus** editions are stand-alone devices. They can be operated independently without a PC. A typical J1708 network topology with Au J1708/J1587 Simulator non-plus edition is illustrated in Figure 1-3. Full range of J1708/J1587 signals can be generated by controlling 3 push buttons.

### 1.4.2 Plus Editions:

Au J1708/J1587 Simulator **plus** editions have all the functions of **non-plus** edition, plus **PC Remote Terminal** program and MID management feature. Like the non-plus editions, all the plus editions can still work independently without a PC. The optional remote terminal software can be used to control and display simulated J1708/J1587 data:

**Plus Edition = Non-plus Edition + PC Remote Terminal Program + MID Management**

Au J1708/J1587 Simulator plus edition can be connected to PC serial (COM) port through a RS232 serial extension cable (Part#: CBL-RS232-01), as shown in Figure 1-5.

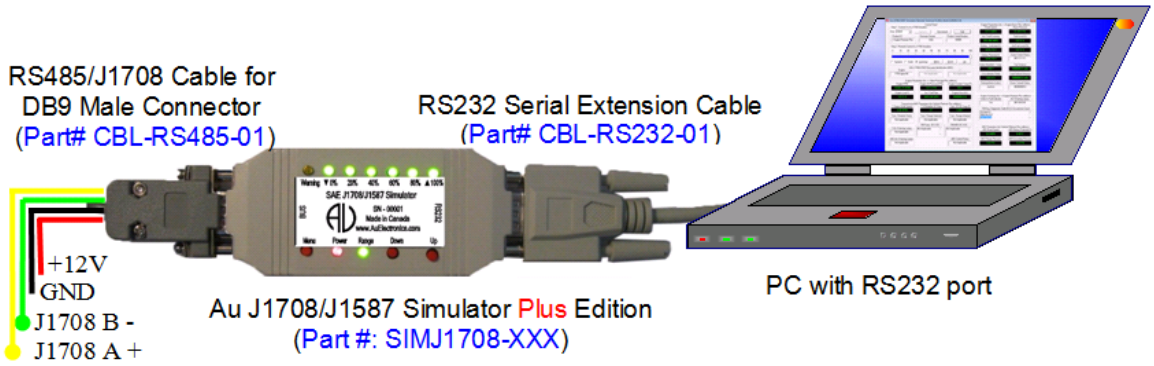



Figure 1-5 Connection of J1708/J1587 Simulator plus editions to PC with RS232 port

For PCs with USB port, a USB to RS232 converter cable (Part#: CBL-USB-232) can be used, as shown in Figure 1-6.


Figure 1-6 Connection of J1708/J1587 Simulator plus editions to PC with USB port

### 1.4.3 Supported parameters of each edition

All the editions have the following basic function:

- Push buttons (**Up** & **Down**) are used in "static mode" to adjust data outputs
- In "dynamic mode", data cycles automatically in its SAE defined range
- LED indicates the control step value and reflect push button operations
- Buzzer sound also reflects push button inputs, it can be enabled/disabled
- Each edition has a different list of supported parameters and MID.

#### 1.4.3.1 Value Package Edition(s)

**1 fixed Engine Message ID for Non-Plus Edition:** 128 (Engine #1)
**6 adjustable Engine Message ID for Plus Edition:** 128 (Engine #1) 175 (Engine #2) 183 (Engine #3) 184 (Engine #4) 185 (Engine #5) 186 (Engine #6)
**8 Supported Engine PID parameters (default: TX only):**

- Request Parameter (PID: 0, RX only)
- Component-Specific Request (PID: 128, RX only)
- Percent Engine Load (PID: 92)
- Engine Oil Pressure (PID: 100)
- Engine Coolant Temperature (PID: 110)
- Fuel Rate (Instantaneous) (PID: 183)
- Engine Speed (PID: 190)
- Engine Hour* (PID: 247)

  * On Request per SAE J1587 definition

### 1.4.3.2 Engine Basic Edition(s)

**1 fixed Engine Message ID for Non-Plus Edition:** 128 (Engine #1)
**6 adjustable Engine Message ID for Plus Edition:** 128 (Engine #1) 175 (Engine #2) 183 (Engine #3) 184 (Engine #4) 185 (Engine #5) 186 (Engine #6)

**23 supported Engine PID parameters:**

- Includes all 8 parameters supported by value package edition
- Engine Basic parameters (15):
  - Second Fuel Level (Right Side) (PID: 38)
  - Parking Brake Switch Status (PID: 70)
  - Road Speed (MPH) (PID: 84)
  - Cruise Control Status (PID: 85)
  - Power Takeoff Status (PID: 89)
  - Percent Accelerator Pedal Position (PID: 91)
  - Fuel Level (PID: 96)
  - Boost Pressure (PID: 102)
  - Engine Intake Manifold Temperature (PID: 105)
  - Battery Potential (Voltage), Switched* (PID: 158); (* On Request per SAE J1587 definition)
  - Battery Potential (Voltage) (PID: 168)
  - Instantaneous Fuel Economy (PID: 184)
  - Trip Distance (PID: 244)
  - Total Vehicle Distance (PID: 245)
  - System Diagnostic Code and Occurrence Count Table (No warning code, heart beat only) (PID: 194)

### 1.4.3.3 Engine Premium Edition(s)

**1 fixed Engine Message ID for Non-Plus Edition:** 128 (Engine #1)
**6 adjustable Engine Message ID for Plus Edition:** 128 (Engine #1) 175 (Engine #2) 183 (Engine #3) 184 (Engine #4) 185 (Engine #5) 186 (Engine #6)

**27 Engine PID Parameters Supported:**

- Includes all 23 parameters supported by Engine Basic edition
- Engine Premium parameters (4):
  - Attention/Warning Indicator Lamps Status (PID: 44)
  - Water in Fuel Indicator (PID: 97)
  - Transmitter System Diagnostic Code and Occurrence Count Table (PID: 194)
  - Multisection Parameter (PID: 192)

### 1.4.3.4 Vehicle Platinum Edition(s)

**1 fixed Engine Message ID for Non-Plus Edition:** 128 (Engine #1)
**1 fixed Transmission Message ID for Non-Plus Edition:** 130 (Transmission)
**1 fixed ABS Message ID for Non-Plus Edition:** 136 (Power Unit)
**6 adjustable Engine Message ID for Plus Edition:** 128 (Engine #1) 175 (Engine #2) 183 (Engine #3) 184 (Engine #4) 185 (Engine #5) 186 (Engine #6)
**3 adjustable Transmission Message ID for Plus Edition:** 130 (Transmission) 176 (Additional Transmission) 223 (Shift-Console, Primary)

**6 adjustable ABS Message ID for Plus Edition:** 136 (Power Unit) 137 (Trailer #1) 138 (Trailer #2) 139 (Trailer #3) 246 (Trailer #4) 247 (Trailer #5)

**44 Engine/Transmission/ABS PID Parameters Supported:**

- Includes all 27 parameters supported by Engine Premium edition
- Vehicle Platinum parameters (17):

**8 Supported ABS PID list (default: TX only):**

- ABS Road Speed (PID: 84)
- Battery Potential (Voltage) (PID: 168)
- Brake Primary Pressure (PID: 117)
- Brake Secondary Pressure (PID: 118)
- ABS Control Status (PID: 49)
- Attention/Warning Indicator Lamps Status (PID: 44)
- Transmitter System Diagnostic Code and Occurrence Count Table (PID: 194)
- Multisection Parameter (PID: 192)

**9 Supported Transmission PID list (default: TX only):**

- Transmission Output Shaft Speed (PID: 191)
- Hydraulic Retarder Oil Temperature (PID: 120)
- Retarder Status (PID: 47)
- Transmission #1 Oil Temperature (PID: 177)
- Transmission Range Selected (PID: 162)
- Transmission Range Attained (PID: 163)
- Attention/Warning Indicator Lamps Status (PID: 44)
- Transmitter System Diagnostic Code and Occurrence Count Table (PID: 194)
- Multisection Parameter (PID: 192)

## 1.5. License Upgrade and Support

- The license for Au J1708 Simulator can be in-field upgraded to higher edition with a license management toolset: e.g. upgrade an Au J1708 Simulator from Value Package edition to Engine Basic edition (LICJ1708-001) or from Engine Basic edition to Engine Premium edition (LICJ1708-002) or from Engine Premium edition to Vehicle Platinum edition (LICJ1939-003). "Non-Plus" edition is also able to be upgraded to “Plus” editions (LICJ1708-004).
- Software code (firmware) can be in-field updated by using Au PIC Bootloader. For instance, updated firmware code or custom-made codes can be re-programmed to gain new or special features.
- One year support and minor upgrade service is available (SVS-SIM-J1708).

License upgrading flow chart for the 8 editions of SAE J1708 Simulator is summarized in Figure 1-7.

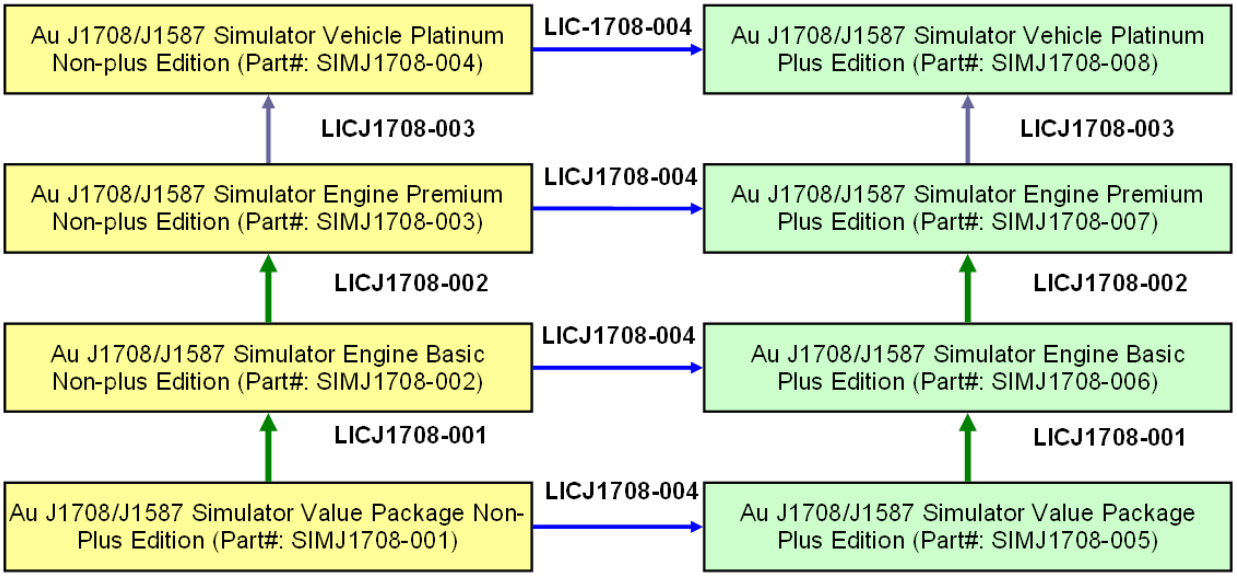



Figure 1 – 7 J1708 Simulator License Upgrade procedure

## 1.6. Order information

All of Au J1708/J1587 Simulators, accessories, and license upgrade are available to be ordered at Au Group Electronics on-line store: http://www.auelectronics.com/products/system/simj1708.html
Part # are listed in Table 1-1

Table 1-1 Part number list for Au J1708/J1587 Simulator, accessories, license upgrade code

| Au SAE J1708 Simulator, Accessories, and Service | | Part # |
|---|---|---|
| **Non-Plus Edition** | Au J1708 Simulator Value Package Edition | SIMJ1708-001 |
| | Au J1708 Simulator Engine Basic Edition | SIMJ1708-002 |
| | Au J1708 Simulator Engine Premium Edition | SIMJ1708-003 |
| | Au J1708 Simulator Vehicle Platinum Edition | SIMJ1708-004 |
| **Plus Edition** | Au J1708 Simulator Value Package Plus Edition | SIMJ1708-005 |
| | Au J1708 Simulator Engine Basic Plus Edition | SIMJ1708-006 |
| | Au J1708 Simulator Engine Premium Plus Edition | SIMJ1708-007 |
| | Au J1708 Simulator Vehicle Platinum Plus Edition | SIMJ1708-008 |
| **Accessories** | 4-wire cable for power supply and J1708 network connection | CBL-RS485-01 |
| | 6-wire cable for power supply and J1939/J1708 network connection | CBL-CAN-485-01 |
| | 4-wire Au J1708 diagnostic cable with DB9 female connector, HD10 Serial 6-way Receptacle and Power Jacket. | CBL-J1708-02 |
| | 6-wire CAN /J1708 Cable with DB9 female Connector, HD10 Serial 9-way Deutsch Receptacle and Power Jacket | CBL-CAN-485-02 |
| | 12V Wall mount AC/DC power supply, positive center, 110V input | PWR-912V-CP |
| | RS232 Serial Extension Cable (for computer with RS232 port) | CBL-RS232-01 |
| | USB to RS232 Serial Convert Cable (for computer with USB port ) | CBL-USB-232 |
| **Service** | 1 year support and minor upgrades for Au J1708 Simulator | SVS-SIM-J1708 |
| **License Upgrade** | From Value Package Edition to Engine Basic Edition | LICJ1708-001 |
| | From Engine Basic Edition to Engine Premium Edition | LICJ1708-002 |
| | From Engine Premium Edition to Vehicle Platinum Edition | LICJ1708-003 |
| | From Non-Plus Edition to Plus Edition | LICJ1708-004 |

# Chapter 2 - Operating Instructions

Au J1708/J1587 Simulators can run all functions independently without a PC. It can be operated by just controlling 3 push buttons: Menu, Down and Up.

## 2.1. Power On

Plug in a 4-wire cable (e.g. Au Part#: CBL-RS485-01) to the Au J1708/J1587 Simulator DB9 male connector on **BUS** side. When the CBL-RS485-01 cable is used, connect the **Red** wire to +12 ~ +14.2V DC power supply, **Black** wire to ground, **White** wire to *J1708 A +*, **Green** wire to *J1708 B -*. The **Power** LED on simulator will light up, and simulator will resume the last saved operating mode (static mode or dynamic mode).
Note: the 4-wire cable (CBL-RS485-01) is color coded as shown in Figure 1-4 and can be ordered separately.

## 2.2. Operating Modes (Static/Dynamic)

After power on, Au J1708/J1587 Simulator will work in either **static** mode or **dynamic** mode.

- **Static mode**: Au J1708/J1587 Simulator generates steady J1708 signals. In this mode, two push buttons (**Up** and **Down**) can be used to change the data outputs. When no button is pushed, all data will stay unchanged.
- **Dynamic mode**: The value of all data will change automatically every second in SAE J1587 defined range.
- Switch between dynamic mode and static mode: press and hold both **Menu** and **Up** buttons until a long beep is heard (if buzzer is enabled); or both the "▼0% LED" and the "▲100% LED" flip their status (from on to off or vice versa)

## 2.3. Function of Push Buttons and LED Indication

There are 3 push buttons (**Menu**, **Down**, **Up**) and 9 LEDs (Figure 2 -1) on each Au J1708 Simulator device. Each LED is named after its function.
**Note: Warning function is not applicable in Value Package Editions and Engine Basic Editions.**


Figure 2-1 Push buttons and LEDs on Au J1708 Simulator

The push button functions are summarized in Table 2-1.

Table 2-1 Summary of push button functions on Au J1708 Simulator

| Push Button Operation | Function |
|---|---|
| Press **Down** button | Decrease all simulated data until they reach the lowest value |
| Press **Up** button | Increase all simulated data until they reach the highest value |
| Press **Menu** button | Warnings ON/Off control for Engine Premium and Vehicle Platinum edition. (It is not used in Value Package edition and Engine Basic edition.) |
| Press & hold both **Down** + **Up** button | Buzzer ON / OFF control |
| Press & hold both **Menu** + **Up** button | Switch between Static / Dynamic mode |

All simulated J1708 data can be changed within SAE J1708/j1587 protocol defined range from 0 to 100 control steps (named 0% to 100% control step value from now on), 6 LED are used to identify the control step value in the range of 0%, 20%, 40%, 60%, 80%, and 100%.
The control step value vs. LED indicator status is summarized in Table 2-2.

Table 2-2 Control step value vs. LED indicator status (in Static Mode)

| Step | Operation | LED Status |
|---|---|---|
| 1 | Connect **+12~+14.2 V DC** power supply | **Power, Range** LED on, other LED recall the last saved status at Static mode |
| 2 | Press **Down** button | ▼**0%** LED on/off |
| 3 | Continue press **Down** button until control step value = 0% | ▼**0%** LED blink |
| 4 | Press **Up** button | ▲**100%** LED on/off |
| 5 | Continue press **Up** button for control step value 1 to 19% | **Power, Range** LED constant on |
| 6 | Continue press **Up** button for control step value 20% | **Power, Range** LED on,<br>**20%** LED Blink |
| 7 | Continue press **Up** button for control step value 21 to 39% | **Power, Range** LED on, **20%** LED on |
| 8 | Continue press **Up** button for control step value 40% | **Power, Range, 20%** LED ON,<br>**40%** LED Blink |
| 9 | Continue press **Up** button for control step value 41 to 59% | **Power, Range, 20%, 40%** LED on |
| 10 | Continue press **Up** button for control step value 60% | **Power, Range, 20%, 40%** LED on,<br>**60%** LED blink |
| 11 | Continue press **Up** button for control step value 61 to 79% | **Power, Range, 20%, 40%, 60%** LED on |
| 12 | Continue press **Up** button for control step value 80% | **Power, Range, 20%,40%, 60%** LED on,<br>**80%** LED blink |
| 13 | Continue press **Up** button for control step value 81 to 99% | **Power, Range, 20%, 40%, 60%, 80%** LED on |
| 14 | Continue press **Up** button for control step value 100% | **Power, Range, 20%, 40%, 60%, 80%** LED on,<br>▲**100%** blink |

Following paragraph will explain how to use the Remote Terminal GUI (Graphic User Interface) to remote control the J1708/J1587 Simulator plus edition.

# Chapter 3 - Remote Terminal and Data Configuration

As an option of added ease of use, PC software "Remote Terminal" is provided to control and display simulated J1708 signals from a personal computer (PC) (through RS232 interface) for **plus** edition of Au J1708/J1587 Simulator. The Remote Terminal GUI includes a "control panel" and "Parameters display panels" (Figure 3 -1).

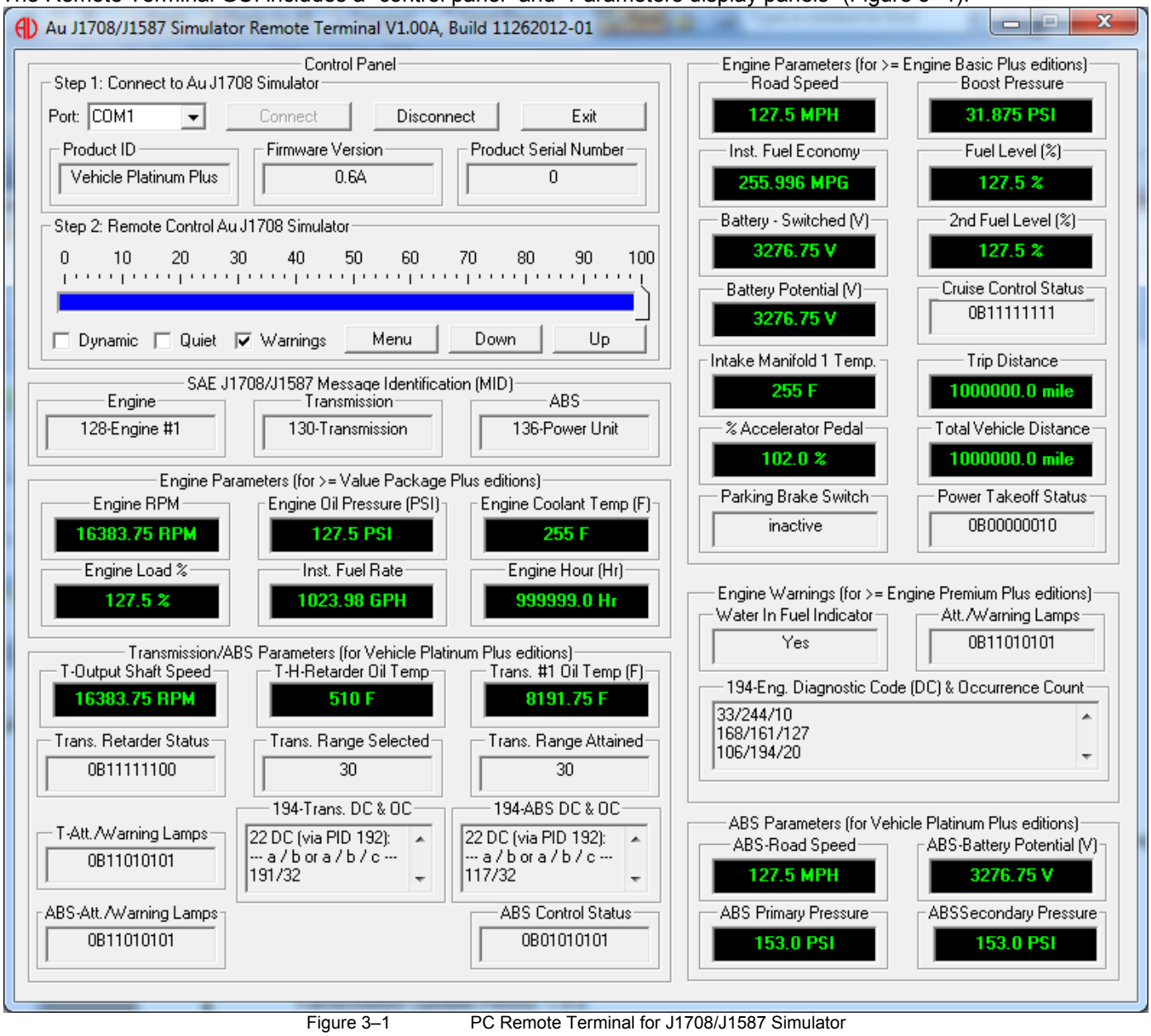



Figure 3–1 PC Remote Terminal for J1708/J1587 Simulator

## 3.1. Step 1: Connect J1708/J1587 Simulator to PC and J1708 network

Typical connection of Au J1708 Simulator in J1708 network is illustrated in Chapter 1, Figure 1-3.

a. Connect J1708 simulator to power supply and a J1708 network on the BUS side,
b. Connect J1708 simulator to a PC on the RS232 side. (Two options are available for connecting J1708 Simulator to PC, please refer to Figure 1-5 and Figure 1-6 in Chapter 1.)
c. On the Remote Terminal GUI, select serial port from the "Port" drop down list.
d. Click "Connect" button

Product information of the connected J1708 simulator device will display (Product ID, Firmware Version, and Serial Number), as shown in Figure 3-2.

Note: The control panel step 1 can also be used to display the product information for non-plus edition of Au J1708/J1587 Simulator though the rest of the function is not available.

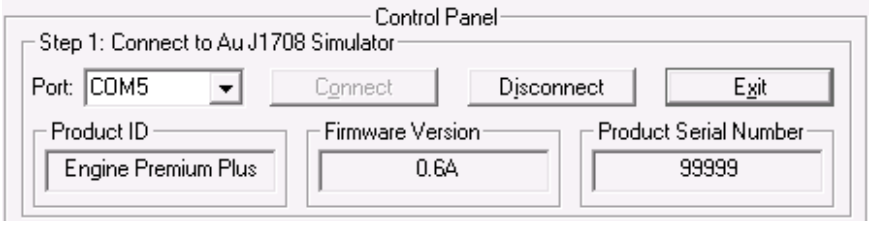



Figure 3 - 2 J1708 simulator remote terminal control panel step 1

The function of step 1 control items is summarized in Table 3 -1.

Table 3-1 Function summary of step 1 control items

| Items | Function |
|---|---|
| Port | Serial port can be selected from drop down list (COM1 to COM30) |
| Connect | Click “Connect” button to connect Au J1708 Simulator with selected PC serial port. |
| Disconnect | Click “Disconnect” button to release the selected PC serial port. |
| Exit | Click “Exit” button to close the J1708 Simulator Remote Terminal program |
| Product ID | Display the current edition of J1708/J1587 Simulator that’s hooked up with the serial port. (*J1708 Simulator Engine Premium Plus Edition* is demonstrated in Figure 3-2) |
| Simulator Version | Display the current firmware version of J1708 Simulator that’s hooked up with the serial port. (The version of J1708 Simulator demonstrated in Figure 3-2 is *0.6A*) |
| Product Serial Number | Display the serial number of J1708 Simulator that’s hooked up with the serial port. (The serial number of J1708 Simulator demonstrated in Figure 3-2 is 99999) |

## 3.2. Step 2: Remote Control Au J1708 Simulator

Remote control includes a scale bar, 3 check boxes (**Dynamic, Quiet, Warning**), and 3 push buttons (**Menu**, **Down**, **Up**), as shown in Figure 3-3. These tools can be used to remote control the output/simulated signals of Au J1708/J1587 Simulator **Plus** edition from a PC. Note: The "**Warning**" Check box and the "**Menu**" push button are not applicable in Value Package edition(s) and Engine Basic edition(s).

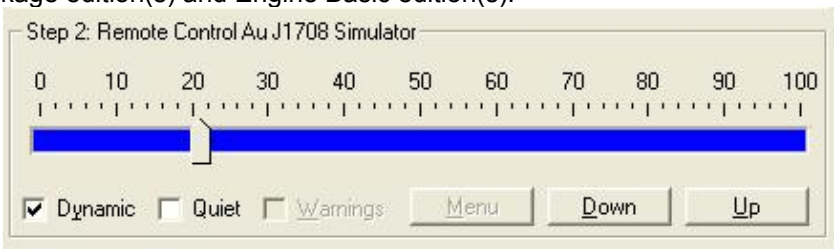



Figure 3 - 3 PC remote terminal control panel step 2

The **scale bar** represents the control step values from 0 to 100. The sliding action can be made by 4 methods: keyboard, mouse, Down/Up push button from remote terminal, or the Down/Up push button on the device. These functions are summarized in Table 3-2

Table 3-2 Control methods for scale bar

| | Action | Function |
|---|---|---|
| Mouse | Left click | Left click bring the slide to the desire location. |
| | Drag | Click and hold left button drag the slide to desire location |
| Keyboard | ▲ or ► | Increase the scale range in 1 interval |
| | ▼ or ◄ | Decrease the scale range in 1 interval |
| | pg up | Increase the scale range in 10 interval |
| | pg dn | Decrease the scale range in 10 interval |
| Remote terminal / Device | “Down” button | Decrease the scale range in 1 interval |
| | “Up” button | Increase the scale range in 1 interval |

Note: **Warning** and **Menu** functions are not available for Au J1708 Simulator Value Package or Engine Basic editions.

The functions of the other 2 push buttons and 2 check boxes are listed in Table 3-3.

Table 3-3 Functions for push buttons and check boxes in step 2 (Remote Terminal)

| Tool | | Function |
|---|---|---|
| Push Button | Down | Decrease the control step value in 1 |
| | Up | Increase the control step value in 1 |
| Check box | Dynamic | Switch between dynamic mode / static mode |
| | Quiet | Turn on/off buzzer |

## 3.3. Display Panel – Engine Parameters for Value Package Plus Edition

**Value package** edition of Au J1708 Simulator support 6 engine parameters:

- Engine speed (PID 190)
- Engine oil pressure (PID 100)
- Engine coolant temperature (PID 110)
- Percent engine load (PID 92)
- Fuel rate (Instantaneous) (PID 183)
- Total engine hour (On Request) (PID247)

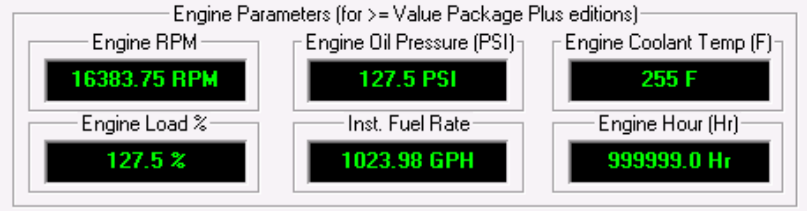



Figure 3 – 4 Display Panel for 6 Engine Basic Parameters

The supported 6 simulated parameters at each control step are listed in table 3-4.

Table 3-4 J1708 Simulation results vs. Control Step Values

| Step | Engine Speed (RPM) | Engine Oil Pressure (PSI) | Engine Coolant Temperature (F) | Engine Load Percentage (%) | Instant Fuel Rate (GPH) | Engine Hour (Hr) |
|---|---|---|---|---|---|---|
| 0 | 0.00 | 0.00 | 0 | 0.0 | 0.00 | 0.0 |
| 1 | 100.00 | 1.00 | 2 | 1.0 | 0.75 | 12.5 |
| 2 | 200.00 | 2.50 | 5 | 2.5 | 1.50 | 25.0 |
| 3 | 300.00 | 3.50 | 7 | 3.5 | 2.25 | 37.5 |
| 4 | 400.00 | 5.00 | 10 | 5.0 | 3.00 | 50.0 |
| 5 | 500.00 | 6.00 | 12 | 6.0 | 3.75 | 62.5 |
| 6 | 600.00 | 7.50 | 15 | 7.5 | 4.50 | 75.0 |
| 7 | 700.00 | 8.50 | 17 | 8.5 | 5.25 | 87.5 |
| 8 | 800.00 | 10.00 | 20 | 10.0 | 6.00 | 100.0 |
| 9 | 900.00 | 11.01 | 22 | 11.0 | 6.75 | 112.5 |
| 10 | 1000.00 | 12.51 | 25 | 12.5 | 7.50 | 125.0 |
| 11 | 1100.00 | 14.01 | 28 | 14.0 | 8.25 | 137.5 |
| 12 | 1200.00 | 15.01 | 30 | 15.0 | 9.00 | 150.0 |
| 13 | 1300.00 | 16.51 | 33 | 16.5 | 9.75 | 162.5 |
| 14 | 1400.00 | 17.51 | 35 | 17.5 | 10.50 | 175.0 |
| 15 | 1500.00 | 19.01 | 38 | 19.0 | 11.25 | 187.5 |
| 16 | 1600.00 | 20.01 | 40 | 20.0 | 12.00 | 200.0 |
| 17 | 1700.00 | 21.51 | 43 | 21.5 | 12.75 | 212.5 |
| 18 | 1800.00 | 22.51 | 45 | 22.5 | 13.50 | 225.0 |
| 19 | 1900.00 | 24.01 | 48 | 24.0 | 14.25 | 237.5 |
| 20 | 2000.00 | 25.51 | 51 | 25.5 | 15.00 | 250.0 |
| 21 | 2100.00 | 26.51 | 53 | 26.5 | 15.75 | 262.5 |
| 22 | 2200.00 | 28.01 | 56 | 28.0 | 16.50 | 275.0 |
| 23 | 2300.00 | 29.01 | 58 | 29.0 | 17.25 | 287.5 |
| 24 | 2400.00 | 30.52 | 61 | 30.5 | 18.00 | 300.0 |
| 25 | 2500.00 | 31.52 | 63 | 31.5 | 18.75 | 312.5 |

| Step | Engine Speed (RPM) | Engine Oil Pressure (PSI) | Engine Coolant Temp (F) | Engine Load Percentage (%) | Instant Fuel Rate (GPH) | Engine Hour (Hr) |
|---|---|---|---|---|---|---|
| 26 | 2600.00 | 33.02 | 66 | 33.0 | 19.50 | 325.0 |
| 27 | 2700.00 | 34.02 | 68 | 34.0 | 20.25 | 337.5 |
| 28 | 2800.00 | 35.52 | 71 | 35.5 | 21.00 | 350.0 |
| 29 | 2900.00 | 36.52 | 73 | 36.5 | 21.75 | 362.5 |
| 30 | 3000.00 | 38.02 | 76 | 38.0 | 22.50 | 375.0 |
| 31 | 3100.00 | 39.52 | 79 | 39.5 | 23.25 | 387.5 |
| 32 | 3200.00 | 40.52 | 81 | 40.5 | 24.00 | 400.0 |
| 33 | 3300.00 | 42.02 | 84 | 42.0 | 24.75 | 412.5 |
| 34 | 3400.00 | 43.02 | 86 | 43.0 | 25.50 | 425.0 |
| 35 | 3500.00 | 44.52 | 89 | 44.5 | 26.25 | 437.5 |
| 36 | 3600.00 | 45.52 | 91 | 45.5 | 27.00 | 450.0 |
| 37 | 3700.00 | 47.02 | 94 | 47.0 | 27.75 | 462.5 |
| 38 | 3800.00 | 48.02 | 96 | 48.0 | 28.50 | 475.0 |
| 39 | 3900.00 | 49.52 | 99 | 49.5 | 29.25 | 487.5 |
| 40 | 4000.00 | 51.03 | 102 | 51.0 | 30.00 | 500.0 |
| 41 | 4100.00 | 52.03 | 104 | 52.0 | 30.75 | 512.5 |
| 42 | 4200.00 | 53.53 | 107 | 53.5 | 31.50 | 525.0 |
| 43 | 4300.00 | 54.53 | 109 | 54.5 | 32.25 | 537.5 |
| 44 | 4400.00 | 56.03 | 112 | 56.0 | 33.00 | 550.0 |
| 45 | 4500.00 | 57.03 | 114 | 57.0 | 33.75 | 562.5 |
| 46 | 4600.00 | 58.53 | 117 | 58.5 | 34.50 | 575.0 |
| 47 | 4700.00 | 59.53 | 119 | 59.5 | 35.25 | 587.5 |
| 48 | 4800.00 | 61.03 | 122 | 61.0 | 36.00 | 600.0 |
| 49 | 4900.00 | 62.03 | 124 | 62.0 | 36.75 | 612.5 |
| 50 | 5000.00 | 63.53 | 127 | 63.5 | 37.50 | 625.0 |
| 51 | 5100.00 | 65.03 | 130 | 65.0 | 38.25 | 637.5 |
| 52 | 5200.00 | 66.03 | 132 | 66.0 | 39.00 | 650.0 |
| 53 | 5300.00 | 67.53 | 135 | 67.5 | 39.75 | 662.5 |
| 54 | 5400.00 | 68.53 | 137 | 68.5 | 40.50 | 675.0 |
| 55 | 5500.00 | 70.04 | 140 | 70.0 | 41.25 | 687.5 |
| 56 | 5600.00 | 71.04 | 142 | 71.0 | 42.00 | 700.0 |
| 57 | 5700.00 | 72.54 | 145 | 72.5 | 42.75 | 712.5 |
| 58 | 5800.00 | 73.54 | 147 | 73.5 | 43.50 | 725.0 |
| 59 | 5900.00 | 75.04 | 150 | 75.0 | 44.25 | 737.5 |
| 60 | 6000.00 | 76.54 | 153 | 76.5 | 45.00 | 750.0 |
| 61 | 6100.00 | 77.54 | 155 | 77.5 | 45.75 | 762.5 |
| 62 | 6200.00 | 79.04 | 158 | 79.0 | 46.50 | 775.0 |
| 63 | 6300.00 | 80.04 | 160 | 80.0 | 47.25 | 787.5 |
| 64 | 6400.00 | 81.54 | 163 | 81.5 | 48.00 | 800.0 |
| 65 | 6500.00 | 82.54 | 165 | 82.5 | 48.75 | 812.5 |
| 66 | 6600.00 | 84.04 | 168 | 84.0 | 49.50 | 825.0 |
| 67 | 6700.00 | 85.04 | 170 | 85.0 | 50.25 | 837.5 |
| 68 | 6800.00 | 86.54 | 173 | 86.5 | 51.00 | 850.0 |
| 69 | 6900.00 | 87.54 | 175 | 87.5 | 51.75 | 862.5 |
| 70 | 7000.00 | 89.04 | 178 | 89.0 | 52.50 | 875.0 |
| 71 | 7100.00 | 90.55 | 181 | 90.5 | 53.25 | 887.5 |
| 72 | 7200.00 | 91.55 | 183 | 91.5 | 54.00 | 900.0 |
| 73 | 7300.00 | 93.05 | 186 | 93.0 | 54.75 | 912.5 |

| Step | Engine Speed (RPM) | Engine Oil Pressure (PSI) | Engine Coolant Temp (F) | Engine Load Percentage (%) | Instant Fuel Rate (GPH) | Engine Hour (Hr) |
|---|---|---|---|---|---|---|
| 74 | 7400.00 | 94.05 | 188 | 94.0 | 55.50 | 925.0 |
| 75 | 7500.00 | 95.55 | 191 | 95.5 | 56.25 | 937.5 |
| 76 | 7600.00 | 96.55 | 193 | 96.5 | 57.00 | 950.0 |
| 77 | 7700.00 | 98.05 | 196 | 98.0 | 57.75 | 962.5 |
| 78 | 7800.00 | 99.05 | 198 | 99.0 | 58.50 | 975.0 |
| 79 | 7900.00 | 100.55 | 201 | 100.5 | 59.25 | 987.5 |
| 80 | 8000.00 | 102.05 | 204 | 102.0 | 60.00 | 1000.0 |
| 81 | 8419.00 | 103.05 | 206 | 103.0 | 108.19 | 50950.0 |
| 82 | 8838.25 | 104.55 | 209 | 104.5 | 156.39 | 100899.9 |
| 83 | 9257.50 | 105.55 | 211 | 105.5 | 204.59 | 150849.9 |
| 84 | 9676.75 | 107.05 | 214 | 107.0 | 252.80 | 200799.8 |
| 85 | 10095.75 | 108.05 | 216 | 108.0 | 300.98 | 250749.8 |
| 86 | 10515.00 | 109.55 | 219 | 109.5 | 349.19 | 300699.7 |
| 87 | 10934.25 | 110.56 | 221 | 110.5 | 397.39 | 350649.7 |
| 88 | 11353.50 | 112.06 | 224 | 112.0 | 445.59 | 400599.6 |
| 89 | 11772.50 | 113.06 | 226 | 113.0 | 493.78 | 450549.6 |
| 90 | 12191.75 | 114.56 | 229 | 114.5 | 541.98 | 500499.5 |
| 91 | 12611.00 | 116.06 | 232 | 116.0 | 590.19 | 550449.5 |
| 92 | 13030.25 | 117.06 | 234 | 117.0 | 638.39 | 600399.4 |
| 93 | 13449.25 | 118.56 | 237 | 118.5 | 686.58 | 650349.4 |
| 94 | 13868.50 | 119.56 | 239 | 119.5 | 734.78 | 700299.3 |
| 95 | 14287.75 | 121.06 | 242 | 121.0 | 782.98 | 750249.3 |
| 96 | 14707.00 | 122.06 | 244 | 122.0 | 831.19 | 800199.2 |
| 97 | 15126.00 | 123.56 | 247 | 123.5 | 879.38 | 850149.2 |
| 98 | 15545.25 | 124.56 | 249 | 124.5 | 927.58 | 900099.1 |
| 99 | 15964.50 | 126.06 | 252 | 126.0 | 975.78 | 950049.1 |
| 100 | 16383.75 | 127.56 | 255 | 127.5 | 1023.98 | 999999.0 |

## 3.4. Display Panel - Engine Parameters for Engine Basic Plus Edition

Engine Basic edition of Au J1708 Simulator supports 20 engine parameters:

**6 value package parameters**
**+**
**14 engine basic parameters:**

- Road Speed (MPH) (PID: 84)
- Instantaneous Fuel Economy (PID: 184)
- Battery Potential (Voltage), Switched (PID: 158);
- Battery Potential (Voltage) (PID: 168)
- Intake Manifold Temperature (PID: 105)
- Percent Accelerator Pedal Position (PID: 91)
- Parking Brake Switch Status (PID: 70)
- Boost Pressure (PID: 102)
- Fuel Level (PID: 96)
- Second Fuel Level (Right Side) (PID: 38)
- Cruise Control Status (PID: 85)
- Trip Distance (PID: 244)
- Total Vehicle Distance (PID: 245)
- Power Takeoff Status (PID: 89)

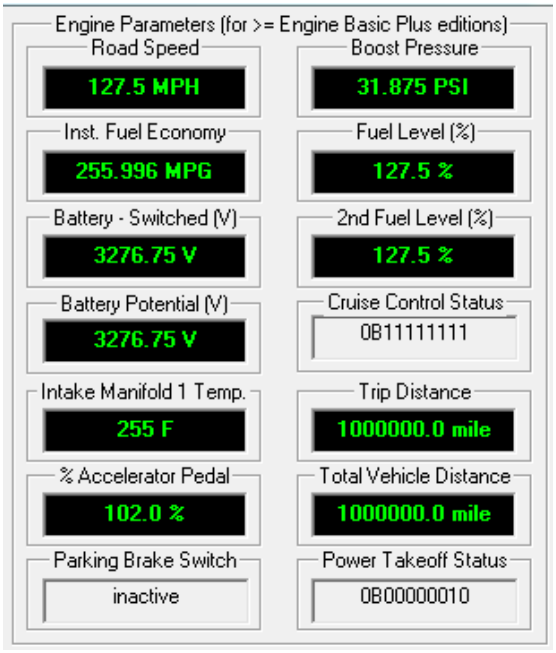



Figure 3 – 5 14 Engine Parameters for Engine Basic Edition

Cruise control status vs. control step is summarized in table 3 - 5.

Table 3 - 5 Cruise control status (PID 85) vs. control step

| Step | Cruise control status (PID 85) | Bit 8: cruise mode | Bit 7: clutch switch | Bit 6: brake switch | Bit 5: accelerate switch | Bit 4: resume switch | Bit 3: coast switch | Bit 2: set switch | Bit 1: cruise control switch | Cruise Control Status (PID: 85) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 - 39 | 00000000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Cruise mode is not ACTIVE, all switches are OFF |
| 40 | 00000001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Cruise control switch is ON |
| 41 | 00000011 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Cruise control switch is ON; set switch is ON |
| 42 | 00000101 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Cruise control switch is ON; coast switch is ON |
| 43 | 00001001 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Cruise control switch is ON; resume switch is ON |
| 44 | 00010001 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Cruise control switch is ON; accelerate switch is ON |
| 45 | 00100001 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Cruise control switch is ON; brake switch is ON |
| 46 | 01000001 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Cruise control switch is ON; clutch switch is ON |
| 47-99 | 10000001 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Cruise control switch is ON; cruise mode is active |
| 100 | 11111111 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Cruise mode is ACTIVE, all switches are ON |

Power takeoff status vs. control step is summarized in table 3 - 6.

Table 3 - 6 Power takeoff status (PID 89) vs. Control Step

| Step | Power takeoff status (PID 89) | Bit 8 - PTO Mode | Bit - clutch switch | Bit 6 - brake switch | Bit 5 - accelerate switch | Bit 4 - resume switch | Bit 3 - coast switch | Bit 2 - set switch | Bit 1 - PTO control switch | Power takeoff status (PID: 89) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 - 9 | 0B00000000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | All bits are off/inactive |
| 10 | 0B00000001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | PTO control switch is ON |
| 11 - 20 | 0B10000001 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | PTO is active, PTO control switch is ON |
| 21 - 39 | 0B00000000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | All bits are off/inactive |
| 40 | 0B00000010 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Set switch is ON |
| 41 | 0B00000110 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Set switch and Coast switch is ON |
| 42 | 0B00001010 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Set switch and Resume switch is ON |
| 43 | 0B00010010 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Set switch and Accelerate switch is ON |
| 44 | 0B00100010 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Set switch and Brake switch is ON |
| 45 | 0B01000010 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Set switch and Clutch switch is ON |
| 46 - 100 | 0B00000010 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Set switch is ON |

Parking brake switch status vs. control step is summarized in table 3 - 7.

Table 3-7 Parking brake switch status (PID 70) vs. Control Step Values

| Control Step | Parking brake switch status (PID: 70) |
|---|---|
| 0 - 8 | active |
| 9 – 100 | Inactive |

The rest of 11 simulated parameters at each control step are listed in table 3-8.

Table 3-8 Engine Basic Edition J1708 Simulation results vs. Control Step Values

| PID | 84 | 184 | 158 | 168 | 105 | 91 | 102 | 96 | 38 | 244 | 245 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Step | Road Speed (MPH) | Inst. Fuel Economy (MPG) | Battery-switched (V) | Battery Potential (V) | Intake Manifold Temp. (F) | % Accelerator Pedal | Boost Pressure (PSI) | Fuel Level (%) | 2nd Fuel Level (%) | Trip Distance (Mile) | Total Vehicle Distance (Mile) |
| 0 | 0.0 | 0.000 | 0.0 | 0.0 | 0 | 0.00% | 0.000 | 0.00% | 0.00% | 0.0 | 0.0 |
| 1 | 1.0 | 2.559 | 0.4 | 0.5 | 2 | 0.80% | 0.250 | 1.00% | 0.50% | 11.5 | 12.5 |
| 2 | 2.5 | 5.117 | 0.8 | 0.9 | 5 | 2.00% | 0.625 | 2.50% | 2.00% | 24.0 | 25.0 |
| 3 | 3.5 | 7.680 | 1.2 | 1.3 | 7 | 2.80% | 0.875 | 3.50% | 3.00% | 36.5 | 37.5 |
| 4 | 5.0 | 10.238 | 1.6 | 1.7 | 10 | 4.00% | 1.250 | 5.00% | 4.50% | 49.0 | 50.0 |
| 5 | 6.0 | 12.797 | 2.0 | 2.1 | 12 | 4.80% | 1.500 | 6.00% | 5.50% | 61.5 | 62.5 |
| 6 | 7.5 | 15.359 | 2.4 | 2.5 | 15 | 6.00% | 1.875 | 7.50% | 7.00% | 74.0 | 75.0 |
| 7 | 8.5 | 17.918 | 2.8 | 2.9 | 17 | 6.80% | 2.125 | 8.50% | 8.00% | 86.5 | 87.5 |
| 8 | 10.0 | 20.477 | 3.2 | 3.3 | 20 | 8.00% | 2.500 | 10.00% | 9.50% | 99.0 | 100.0 |
| 9 | 11.0 | 23.039 | 3.6 | 3.7 | 22 | 8.80% | 2.750 | 11.00% | 10.50% | 1.1 | 112.5 |
| 10 | 12.5 | 25.598 | 4.0 | 4.1 | 25 | 10.00% | 3.125 | 12.50% | 12.00% | 124.0 | 125.0 |
| 11 | 14.0 | 28.156 | 4.4 | 4.5 | 28 | 11.20% | 3.500 | 14.00% | 13.50% | 136.5 | 137.5 |
| 12 | 15.0 | 30.719 | 4.8 | 4.9 | 30 | 12.00% | 3.750 | 15.00% | 14.50% | 149.0 | 150.0 |
| 13 | 16.5 | 33.277 | 5.2 | 5.3 | 33 | 13.20% | 4.125 | 16.50% | 16.00% | 161.5 | 162.5 |
| 14 | 17.5 | 35.836 | 5.6 | 5.7 | 35 | 14.00% | 4.375 | 17.50% | 17.00% | 174.0 | 175.0 |
| 15 | 19.8 | 38.398 | 6.0 | 6.1 | 38 | 15.20% | 4.750 | 19.00% | 18.50% | 186.5 | 187.5 |
| 16 | 20.0 | 40.957 | 6.4 | 6.5 | 40 | 16.00% | 5.000 | 20.00% | 19.50% | 199.0 | 200.0 |
| 17 | 21.5 | 43.516 | 6.8 | 6.9 | 43 | 17.20% | 5.375 | 21.50% | 21.00% | 211.5 | 212.5 |
| 18 | 22.5 | 46.078 | 7.2 | 7.3 | 45 | 18.00% | 5.625 | 22.50% | 22.00% | 224.0 | 225.0 |
| 19 | 24.0 | 48.637 | 7.6 | 7.7 | 48 | 19.20% | 6.000 | 24.00% | 23.50% | 236.5 | 237.5 |
| 20 | 25.5 | 51.199 | 8.0 | 8.1 | 51 | 20.40% | 6.375 | 25.50% | 25.00% | 249.0 | 250.0 |
| 21 | 26.5 | 53.758 | 8.4 | 8.5 | 53 | 21.20% | 6.625 | 26.50% | 26.00% | 261.5 | 262.5 |
| 22 | 28.0 | 56.316 | 8.8 | 8.9 | 56 | 22.40% | 7.000 | 28.00% | 27.50% | 274.5 | 275.0 |
| 23 | 29.0 | 58.879 | 9.2 | 9.3 | 58 | 23.20% | 7.250 | 29.00% | 28.50% | 286.5 | 287.5 |
| 24 | 30.5 | 61.438 | 9.6 | 9.7 | 61 | 24.40% | 7.625 | 30.50% | 30.00% | 299.0 | 300.0 |
| 25 | 31.5 | 63.996 | 10.0 | 10.1 | 63 | 25.20% | 7.875 | 31.50% | 31.00% | 311.5 | 312.5 |
| 26 | 33.0 | 66.559 | 10.4 | 10.5 | 66 | 26.40% | 8.250 | 33.00% | 32.50% | 324.0 | 325.0 |
| 27 | 34.0 | 69.117 | 10.8 | 10.9 | 68 | 27.20% | 8.500 | 34.00% | 33.50% | 336.5 | 337.5 |
| 28 | 35.5 | 71.676 | 11.2 | 11.3 | 71 | 28.40% | 8.875 | 35.50% | 35.00% | 349.0 | 350.0 |
| 29 | 36.5 | 74.238 | 11.6 | 11.7 | 73 | 29.20% | 9.125 | 36.50% | 36.00% | 361.5 | 362.5 |
| 30 | 38.0 | 76.797 | 12.0 | 12.1 | 76 | 30.40% | 9.500 | 38.00% | 37.50% | 374.0 | 375.0 |
| 31 | 39.5 | 79.355 | 12.4 | 12.5 | 79 | 31.60% | 9.875 | 39.50% | 39.00% | 386.5 | 387.5 |
| 32 | 40.5 | 81.918 | 12.8 | 12.9 | 81 | 32.40% | 10.125 | 40.50% | 40.00% | 399.0 | 400.0 |
| 33 | 42.0 | 84.477 | 13.2 | 13.3 | 84 | 33.60% | 10.500 | 42.00% | 41.50% | 411.5 | 412.5 |
| 34 | 43.0 | 87.035 | 13.6 | 13.7 | 86 | 34.40% | 10.750 | 43.00% | 42.50% | 424.0 | 425.0 |
| 35 | 44.5 | 89.598 | 14.0 | 14.1 | 89 | 35.60% | 11.125 | 44.50% | 44.00% | 436.5 | 437.5 |

| PID | 84 | 184 | 158 | 168 | 105 | 91 | 102 | 96 | 38 | 244 | 245 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Step | Road Speed (MPH) | Inst. Fuel Economy (MPG) | Battery-switched (V) | Battery Potential (V) | Intake Manifold Temp. (F) | % Accelerator Pedal | Boost Pressure (PSI) | Fuel Level (%) | 2nd Fuel Level (%) | Trip Distance (Mile) | Total Vehicle Distance (Mile) |
| 36 | 45.5 | 92.156 | 14.4 | 14.5 | 91 | 36.40% | 11.375 | 45.50% | 45.00% | 449.0 | 450.0 |
| 37 | 47.0 | 94.715 | 14.8 | 14.9 | 94 | 37.60% | 11.750 | 47.00% | 46.50% | 461.5 | 462.5 |
| 38 | 48.0 | 92.277 | 15.2 | 15.3 | 96 | 38.40% | 12.000 | 48.00% | 47.50% | 474.0 | 475.0 |
| 39 | 49.5 | 99.836 | 15.6 | 15.7 | 99 | 39.60% | 12.375 | 49.50% | 49.00% | 486.5 | 487.5 |
| 40 | 51.0 | 102.398 | 16.0 | 16.1 | 102 | 40.00% | 12.750 | 51.00% | 50.50% | 499.0 | 500.0 |
| 41 | 52.0 | 104.957 | 16.4 | 16.5 | 104 | 41.60% | 13.000 | 52.00% | 51.50% | 511.5 | 512.5 |
| 42 | 53.5 | 107.516 | 16.8 | 16.9 | 107 | 42.80% | 13.375 | 53.50% | 53.00% | 524.0 | 525.0 |
| 43 | 54.0 | 110.078 | 17.2 | 17.3 | 109 | 43.60% | 13.625 | 54.50% | 54.00% | 536.5 | 537.6 |
| 44 | 56.0 | 112.637 | 17.6 | 17.7 | 112 | 44.80% | 14.000 | 56.00% | 55.50% | 549.0 | 550.0 |
| 45 | 57.0 | 115.195 | 18.0 | 18.1 | 114 | 45.60% | 14.250 | 57.00% | 56.50% | 561.5 | 562.5 |
| 46 | 58.5 | 117.758 | 18.4 | 18.5 | 117 | 46.80% | 14.625 | 58.50% | 58.00% | 574.0 | 575.0 |
| 47 | 59.5 | 120.316 | 18.8 | 18.9 | 119 | 47.60% | 14.875 | 59.50% | 59.00% | 586.5 | 587.5 |
| 48 | 61.0 | 122.875 | 19.2 | 19.3 | 122 | 48.80% | 15.250 | 61.00% | 60.50% | 599.0 | 600.0 |
| 49 | 62.0 | 125.438 | 19.6 | 19.7 | 124 | 49.60% | 15.500 | 62.00% | 61.50% | 611.5 | 612.5 |
| 50 | 63.5 | 127.996 | 20.0 | 20.1 | 127 | 50.80% | 12.875 | 63.50% | 63.00% | 624.0 | 625.0 |
| 51 | 65.0 | 130.555 | 20.4 | 20.5 | 130 | 52.00% | 16.250 | 65.00% | 64.50% | 636.5 | 637.5 |
| 52 | 66.0 | 133.117 | 20.8 | 20.9 | 132 | 52.80% | 16.500 | 66.00% | 65.50% | 649.0 | 650.0 |
| 53 | 67.5 | 135.676 | 21.2 | 21.3 | 135 | 54.00% | 16.875 | 67.50% | 67.00% | 661.5 | 662.5 |
| 54 | 68.5 | 138.234 | 21.6 | 21.7 | 137 | 54.00% | 17.125 | 68.50% | 68.00% | 674.0 | 675.0 |
| 55 | 70.0 | 140.797 | 22.0 | 22.1 | 140 | 56.00% | 17.500 | 70.00% | 69.50% | 686.5 | 687.5 |
| 56 | 71.0 | 143.355 | 22.4 | 22.5 | 142 | 56.80% | 17.750 | 71.00% | 70.50% | 699.0 | 700.0 |
| 57 | 72.5 | 145.914 | 22.0 | 22.9 | 145 | 58.00% | 18.125 | 72.50% | 72.00% | 711.5 | 712.5 |
| 58 | 73.5 | 148.477 | 23.2 | 23.3 | 147 | 58.80% | 18.375 | 73.50% | 73.00% | 724.0 | 725.0 |
| 59 | 75.0 | 151.035 | 23.6 | 23.7 | 150 | 60.00% | 18.750 | 75.00% | 74.50% | 736.5 | 737.5 |
| 60 | 76.5 | 153.598 | 24.0 | 24.1 | 153 | 61.20% | 19.125 | 76.50% | 76.00% | 749.0 | 750.0 |
| 61 | 77.5 | 156.156 | 24.0 | 24.5 | 155 | 62.00% | 19.375 | 77.50% | 77.00% | 761.5 | 762.5 |
| 62 | 79.0 | 158.715 | 24.8 | 24.9 | 158 | 63.20% | 19.750 | 79.00% | 78.50% | 774.0 | 745.0 |
| 63 | 80.0 | 161.277 | 25.2 | 25.3 | 160 | 64.00% | 20.000 | 80.00% | 79.50% | 786.5 | 787.5 |
| 64 | 81.5 | 163.836 | 25.6 | 25.7 | 163 | 35.20% | 20.375 | 81.50% | 81.00% | 799.0 | 800.0 |
| 65 | 82.5 | 166.395 | 26.0 | 26.1 | 165 | 66.00% | 20.625 | 82.50% | 82.00% | 811.5 | 812.5 |
| 66 | 84.0 | 168.957 | 26.4 | 26.5 | 168 | 67.20% | 21.000 | 84.00% | 83.50% | 824.0 | 825.0 |
| 67 | 85.0 | 171.516 | 26.8 | 26.9 | 170 | 68.00% | 21.250 | 85.00% | 84.50% | 836.5 | 837.5 |
| 68 | 86.5 | 174.074 | 27.2 | 27.3 | 173 | 69.20% | 21.625 | 86.50% | 86.00% | 849.0 | 850.0 |
| 69 | 87.5 | 176.637 | 27.6 | 27.7 | 175 | 70.00% | 21.875 | 87.50% | 87.00% | 861.5 | 862.5 |
| 70 | 89.0 | 179.195 | 28.0 | 28.1 | 178 | 72.10% | 22.250 | 89.00% | 88.50% | 874.0 | 875.0 |
| 71 | 90.5 | 181.754 | 28.4 | 28.5 | 181 | 72.40% | 22.625 | 90.50% | 90.00% | 886.5 | 887.5 |
| 72 | 91.5 | 18.316 | 28.8 | 28.9 | 183 | 73.20% | 22.875 | 91.50% | 91.00% | 899.0 | 900.0 |
| 73 | 93.0 | 186.875 | 29.2 | 29.3 | 186 | 74.40% | 23.250 | 93.00% | 92.50% | 911.5 | 912.5 |
| 74 | 94.0 | 189.434 | 29.6 | 29.7 | 188 | 75.20% | 23.500 | 94.00% | 93.50% | 924.0 | 925.0 |
| 75 | 95.5 | 191.996 | 30.0 | 30.1 | 191 | 76.40% | 23.875 | 95.50% | 95.00% | 936.5 | 937.5 |
| 76 | 96.5 | 194.555 | 30.4 | 30.5 | 193 | 77.20% | 24.125 | 96.50% | 96.00% | 949.0 | 950.0 |
| 77 | 98.0 | 197.113 | 30.8 | 30.9 | 196 | 78.40% | 24.500 | 98.00% | 97.50% | 961.5 | 962.5 |
| 78 | 99.0 | 199.676 | 31.2 | 31.3 | 198 | 79.20% | 24.750 | 99.00% | 98.50% | 974.0 | 975.0 |

| PID | 84 | 184 | 158 | 168 | 105 | 91 | 102 | 96 | 38 | 244 | 245 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Step | Road Speed (MPH) | Inst. Fuel Economy (MPG) | Battery-switched (V) | Battery Potential (V) | Intake Manifold Temp. (F) | % Accelerator Pedal | Boost Pressure (PSI) | Fuel Level (%) | 2nd Fuel Level (%) | Trip Distance (Mile) | Total Vehicle Distance (Mile) |
| 79 | 100.5 | 202.234 | 31.6 | 31.7 | 201 | 80.40% | 25.125 | 100.50% | 100.00% | 986.5 | 987.5 |
| 80 | 102.0 | 204.797 | 32.0 | 32.1 | 204 | 81.60% | 25.500 | 102.00% | 101.50% | 999.0 | 1000.0 |
| 81 | 103.0 | 207.355 | 194.2 | 194.3 | 206 | 82.40% | 25.750 | 103.00% | 102.50% | 50949.0 | 50950.0 |
| 82 | 104.5 | 209.914 | 356.5 | 356.6 | 209 | 83.60% | 26.125 | 104.50% | 104.00% | 100899.0 | 100900.0 |
| 83 | 105.0 | 212.477 | 518.7 | 518.8 | 211 | 84.40% | 26.375 | 105.50% | 105.00% | 150849.0 | 150850.0 |
| 84 | 107.0 | 215.035 | 681.0 | 681.1 | 214 | 85.60% | 26.750 | 107.00% | 106.50% | 200799.0 | 200780.0 |
| 85 | 108.0 | 217.594 | 843.2 | 843.3 | 216 | 86.40% | 27.000 | 108.00% | 107.50% | 250749.0 | 250750.0 |
| 86 | 109.5 | 220.156 | 1005.4 | 1005.5 | 219 | 87.60% | 27.375 | 109.50% | 109.00% | 300699.0 | 300670.0 |
| 87 | 110.5 | 222.715 | 1167.7 | 1167.8 | 221 | 88.40% | 27.625 | 110.50% | 110.00% | 350649.0 | 350650.0 |
| 88 | 112.0 | 225.273 | 1323.9 | 1330.0 | 224 | 89.60% | 28.000 | 112.00% | 111.50% | 400599.0 | 400600.0 |
| 89 | 113.0 | 227.836 | 1492.1 | 1492.2 | 226 | 90.40% | 28.250 | 113.00% | 112.50% | 450649.0 | 450550.0 |
| 90 | 114.5 | 230.395 | 1654.4 | 1654.5 | 229 | 91.60% | 28.625 | 114.50% | 114.00% | 500499.0 | 500500.0 |
| 91 | 116.0 | 232.935 | 1816.6 | 1816.7 | 232 | 92.80% | 29.000 | 116.00% | 115.50% | 550449.0 | 550450.0 |
| 92 | 117.0 | 235.516 | 1978.9 | 1979.0 | 234 | 93.60% | 29.250 | 117.00% | 116.50% | 600399.0 | 600400.0 |
| 93 | 118.5 | 238.074 | 2141.1 | 2141.2 | 237 | 94.80% | 29.625 | 118.50% | 118.00% | 650349.0 | 650350.0 |
| 94 | 119.5 | 240.633 | 2303.3 | 2303.4 | 239 | 95.60% | 29.875 | 119.50% | 119.00% | 700299.0 | 700300.0 |
| 95 | 121.0 | 243.195 | 2465.6 | 2465.7 | 242 | 96.80% | 30.250 | 121.00% | 120.50% | 750249.0 | 750250.0 |
| 96 | 122.0 | 245.754 | 2627.8 | 2627.9 | 244 | 97.60% | 30.500 | 122.00% | 121.50% | 800199.0 | 800200.0 |
| 97 | 123.5 | 248.313 | 2790.0 | 2790.1 | 247 | 98.80% | 30.875 | 123.50% | 123.00% | 850149.0 | 850150.0 |
| 98 | 124.5 | 250.875 | 2952.3 | 2952.4 | 249 | 99.60% | 31.125 | 124.50% | 124.00% | 900099.0 | 900100.0 |
| 99 | 126.0 | 253.434 | 3114.5 | 3114.6 | 252 | 100.80% | 31.500 | 126.00% | 125.50% | 950049.0 | 950050.0 |
| 100 | 127.5 | 255.996 | 3276.8 | 3276.8 | 255 | 102.00% | 31.875 | 127.50% | 127.50% | 1000000.0 | 1000000.0 |

## 3.5. Display Panel - Engine Warnings for Engine Premium Plus Edition

Engine Premium edition of Au J1708 Simulator supports 23 engine parameters: it includes:

- **6 Value Package parameters**
- **14 Engine Basic parameters**
- **3 Engine Warnings**
  - **Water in fuel indicator (PID 97)**
  - **Attention / Warning Indicator Lamps (PID 44)**
  - **Diagnostic code & Occurrence count (PID 194)**

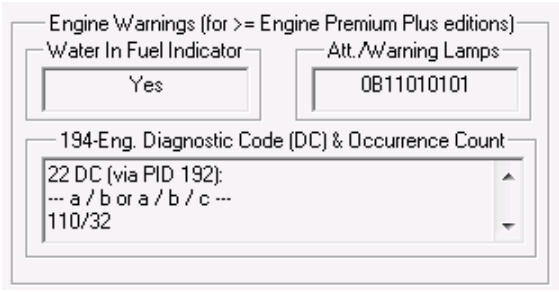



Figure 3 - 6 Engine Warnings for Engine Premium Plus edition

### 3.5.1. Water in fuel indicator (PID 97)

If Warning is OFF (Warning is un-check, Warning LED is OFF), Water in fuel indicator shows "No" from 0 - 100%.
If Warning is ON (Warning is checked, Warning LED is ON), Water in fuel indicator status will be "No" between step 0 - 39%, the status will change to "Yes" when step value is between 40 - 100%, it is summarized in table 3 - 9

Table 3 - 9 Water in fuel indicator vs. Step value

| | Step | Binary (bit 8) | Water in fuel indicator (PID: 97) |
|---|---|---|---|
| Warning is enabled | 0 - 39 | 01111111 | No |
| | 40 - 100 | 11111111 | Yes |
| Warning is disabled | 0 - 100 | 01111111 | No |

### 3.5.2. Engine Attention / Warning Indicator Lamps (PID 44)

When Warning is ON, Engine Attention / Warning Indicator Lamps Status vs. control step is summarized in table 3-10.

Table 3 - 10 Attention / Warning Indicator Lamps Status vs. control step when warning is enabled

| Step | Value | Bit 8 - 7: Reserved | | Bit 6 - 5: Protect lamp | | Bit 4 - 3: Amber lamp | | Bit 2 - 1: Red lamp | | Engine Attention / Warning Indicator Lamps Status (PID: 44)- when Warning is ON |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 11010101 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | Protect, Amber, Red lamp are ON |
| 1 | 11110000 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Protect lamp not available, Amber, Red lamp are OFF |
| 2 | 11100000 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Protect lamp has error, Amber lamp, Red lamp are OFF |
| 3 | 11010000 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Protect lamp is ON, Amber lamp, Red lamp are OFF |
| 4 | 11001100 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | Amber lamp not available, Protect, Red lamp are OFF |
| 5 | 11001000 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Amber lamp has error, Protect and Red lamp are OFF |
| 6 | 11000100 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Amber lamp is ON, Protect and Red lamp are OFF |
| 7 | 11000011 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Red lamp not available, Amber, Protect lamp are OFF |
| 8 | 11000010 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Red lamp has error, Amber lamp, Protect lamp are OFF |
| 9 | 11000001 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Red lamp is ON, Amber lamp, Protect lamp are OFF |
| 10 | 11010100 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | Protect, Amber lamp are ON, Red lamp is OFF |
| 11 | 11010001 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Protect, Red lamp are ON, Amber lamp is OFF |
| 12 | 11000101 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Protect lamp is OFF, Amber and Red lamp are ON |
| 13 - 100 | 11010101 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | Protect, Amber, Red lamp are ON |

When Warning is OFF, all the three Attention / Warning Indicator Lamps for Engine (Protect, Amber, Red) are OFF, as shown in table 3-11.

Table 3 - 11 Attention / Warning Indicator Lamps Status when warning is disabled

| Step | Value | Bit 8 -7: | | Bit 6 -5: | | Bit 4 -3: | | Bit 2 - 1: | | Attention / Warning Indicator Lamps Status (PID: 44) - Warning is OFF |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reserved | | Protect lamp | | Amber lamp | | Red lamp | | |
| 0-100 | 11000000 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Protect, Amber, Red lamps are OFF |

### 3.5.3. Engine Diagnostic Code (DC) and Occurrence count (OC) (PID 194)

There are up to 22 Engine diagnostic code (PID 194) can be simulated in Au J1708/J1587 Simulator.

When Warning is OFF, PID194 will be transmitted once per second with zero warning code.

When Warning is ON , diagnostic code (DC) will be available and controlled by the following control steps:

Table 3 - 12 Engine Diagnostic code and occurrence count vs. Control Step (Warning is ON)

| Step | a | b |
|---|---|---|
| 0 | 110 | 32 |
| 1 | 100 | 33 |
| 2 | 84 | 34 |
| 3 | 96 | 35 |
| 4 | 84 | 36 |
| 5 | 132 | 37 |
| 6 | 91 | 38 |
| 7 | 40 | 39 |
| 8 | 21 | 114 |
| 9 | 27 | 55 |

| Step | a | b | c |
|---|---|---|---|
| 10 | 108 | 168 | 1 |
| 11 | 190 | 233 | 2 |
| 12 | 102 | 170 | 3 |
| 13 | 174 | 171 | 4 |
| 14 | 97 | 172 | 5 |
| 15 | 190 | 173 | 6 |
| 16 | 105 | 174 | 7 |
| 17 | 70 | 175 | 8 |
| 18 | 85 | 180 | 9 |
| 19 | 33 | 244 | 10 |
| 20 | 168 | 161 | 127 |
| 21 | 106 | 194 | 20 |

Step 22 - 40%, 8 DC in format a/b simulated

| a | b |
|---|---|
| 84 | 34 |
| 96 | 35 |
| 84 | 36 |
| 132 | 37 |
| 91 | 38 |
| 40 | 39 |
| 21 | 114 |
| 27 | 55 |

Step 41-60%, 5 DC in the format of a/b/c simulated

| a | b | c |
|---|---|---|
| 70 | 175 | 8 |
| 85 | 180 | 9 |
| 33 | 244 | 10 |
| 168 | 161 | 127 |
| 106 | 194 | 20 |

From 61 - 100%, 22 diagnostic codes are send via PID 192, in the format a/b and/or a/b/c

* a -- SID or PID of a standard diagnostic code * b -- Diagnostic code character
* c -- Occurrence count for the diagnostic code defined by the preceding 2 characters.

From Step 0 - 9%, there are 1 Engine diagnostic code in the format of "a / b" simulated in each step.
From Step 10 - 21%, there are 1 Engine diagnostic code in the format of "a / b / c " simulated in each step.
From Step 22 - 40%, there are 8 diagnostic code in the format of "a / b " simulated in each step.
From Step 41 - 60%, there are 5 diagnostic code in the format of "a / b / c " simulated in each step.
From Step 61 - 100%, all 22 diagnostic code in the format of "a / b " or "a / b / c " will be send via PID 192.

Note: When PID 194's sentences is longer than 21 bytes, PID 192 (Multisection parameters) will be used.

Table 3 - 13 10 Engine Diagnostic code with occurrence count not include

| a | b | Engine Diagnostic Code- Occurrence count not included |
|---|---|---|
| 110 | 32 | **--- Engine Coolant Temperature above normal operational range**<br>Current Status of fault is active, standard DC |
| 100 | 33 | **--- Engine oil pressure below normal operational range**,<br>Current Status of fault is active, standard DC, |
| 84 | 34 | **--- Road Speed erratic, intermittent, or incorrect..**<br>Current Status of fault is active, standard DC |
| 96 | 35 | **--- Fuel level sensor voltage above normal or shorted high**<br>Current Status of fault is active, standard DC |
| 84 | 36 | **--- Road Speed sensor voltage below normal or shorted low**<br>Current Status of fault is active, standard DC, |
| 132 | 37 | **--- Mass Air Flow sensor current below normal or open circuit**<br>Current Status of fault is active, standard DC |
| 91 | 38 | **--- Percent Accelerator Pedal Position sensor current is above normal or grounded circuit**<br>Current Status of fault is active, standard DC, |
| 40 | 39 | **--- Engine Retarder Switches not responding properly.**<br>Current Status of fault is active, standard DC. |
| 21 | 114 | **--- Engine Position Sensor erratic, intermittent, or incorrect**<br>Current Status of fault is inactive, standard DC, |
| 27 | 55 | **--- Variable Geometry Turbocharger Actuator #1 not responding properly.**<br>Current Status of fault is active, standard DC, |

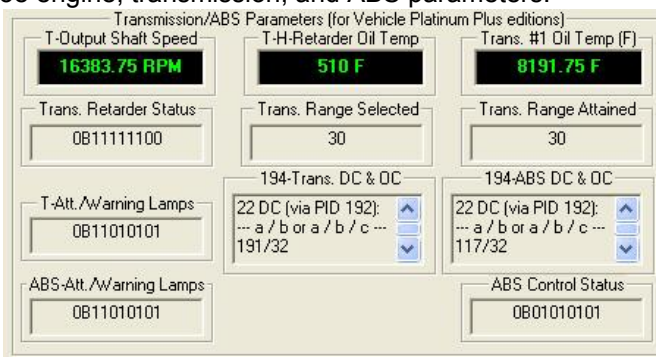
Table 3 - 14 12 Engine Diagnostic code with occurrence count include

| a | b | c | Engine Diagnostic Code - Occurrence count included |
|---|---|---|---|
| 108 | 168 | 1 | **--- Barometric Pressure is abnormal**. DC occurred once, Current Status of fault is active, standard DC |
| 190 | 233 | 2 | **--- Engine Speed has abnormal update rate**<br>DC occurred 2 times, Current Status of fault is inactive, standard DC |
| 102 | 170 | 3 | **--- Boost Pressure has abnormal rate of change**<br>DC occurred 3 times, Current Status of fault is active, standard DC, |
| 174 | 171 | 4 | **--- Failure mode not identifiable**. DC occurred 4 times, Current Status of fault is active, standard DC, |
| 97 | 172 | 5 | **--- Bad intelligent or component (in Water in Fuel Indicator)**<br>DC occurred 5 times , Current Status of fault is active, standard DC, |
| 190 | 173 | 6 | **--- Engine Speed sensor Out of Calibration**<br>DC occurred 6 times , Current Status of fault is active, standard DC, |
| 105 | 174 | 7 | **--- Intake Manifold Temperature has special instruction**<br>DC occurred 7 times, Current Status of fault is active, standard DC. |
| 70 | 175 | 8 | **--- Parking Brake Switch Status Reserved for assignment by the SAE Subcommittee**<br>DC occurred 8 times, Current Status of fault is active, standard DC, |
| 85 | 180 | 9 | **--- Engine Oil Burn Valve sensor Voltage below normal or shorted low**<br>DC occurred 9 times, Current Status of fault is active, standard diagnostic code |
| 33 | 244 | 10 | **--- Fan Clutch Output Device Driver sensor Voltage below normal or shorted low**<br>DC occurred 10 times, Current Status of fault is inactive, standard DC. |
| 168 | 161 | 127 | **--- Battery Potential (Voltage) is valid but below normal operational range**<br>DC occurred 127 times, Current Status of fault is active, standard DC. |
| 106 | 194 | 20 | **--- Percent Exhaust Gas Recirculation Valve #2 Position Data erratic, intermittent, or incorrect**<br>DC occurred 20 times, Current Status of fault is inactive, expansion DC, PID =106 + 256 = 362 |

## 3.6. Transmission / ABS Parameters for Vehicle Platinum Plus Edition

Vehicle Platinum plus edition of Au J1708 Simulator supports 38 engine, transmission, and ABS parameters:

- **6 value package Engine parameters**
- **14 Engine basic parameters**
- **3 Engine Warnings**
- **8 Transmission Parameters:**
  - o Transmission Output Shaft Speed (PID 191)
  - o Transmission Hydraulic Retarder Oil Temperature (PID 120)
  - o Transmission # 1 Oil Temperature (PID 177)
  - o Transmission Retarder Status (PID 47)
  - o Transmission Range Selected (PID 162)
  - o Transmission Range Attained (PID 163)
  - o Transmission Attention / Warning Lamps (PID 44)
  - o Transmission Diagnostic Code and Occurrence count (PID 194)
- **7 ABS Parameters:**
  - o ABS Road Speed (PID 84)
  - o ABS Battery Potential (PID 168)
  - o ABS Primary Pressure (PID 117)
  - o ABS Secondary Pressure (PID 118)
  - o ABS Control Status (PID 49)
  - o ABS Attention / Warning Lamps (PID 44)
  - o ABS Diagnostic Code and Occurrence count (PID 194)





### 3.6.1. ABS and Transmission Attention / Warning Lamps (PID 44)

When Warning is **OFF**, all the three Attention / Warning Indicator Lamps for Transmission and ABS (Protect, Amber, Red) are OFF, as shown in table 3-15.

Table 3 - 15 Attention / Warning Indicator Lamps Status when Warning is OFF

| Warning is OFF | | Reserved | | Protect lamp | | Amber lamp | | Red lamp | | Attention / Warning Indicator Lamps Status |
|---|---|---|---|---|---|---|---|---|---|---|
| Step | GUI | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| 0 - 100% | 11000000 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Protect, Amber, Red lamps are OFF |

When Warning is **ON**, Transmission Attention / Warning Indicator Lamps Status vs. control step is summarized in table 3-16.

Table 3 - 16 Transmission Attention / Warning Indicator Lamps Status vs. control step (Warning is ON)

| Warning is ON | | Transmission Attention / Warning Indicator Lamps Status |
|---|---|---|
| Step | GUI | |
| 0% | 11010101 | Protect, Amber, Red lamp are ON |
| 1% | 11001100 | Amber lamp not available, Protect, Red lamp are OFF |
| 2% | 11001000 | Amber lamp has error, Protect and Red lamp are OFF |
| 3% | 11000100 | Amber lamp is ON, Protect and Red lamp are OFF |
| 4% | 11000011 | Red lamp not available, Amber, Protect lamp are OFF |
| 5% | 11000010 | Red lamp has error, Amber, Protect lamp are OFF |
| 6% | 11000001 | Red lamp is ON, Amber, Protect lamp are OFF |
| 7% | 11010100 | Protect, Amber lamp are ON, Red lamp is OFF |
| 8% | 11010001 | Protect, Red lamp are ON, Amber lamp is OFF |
| 9% | 11000101 | Amber, Red lamp are ON, Protect lamp is OFF, |
| 10% | 11110000 | Protect lamp not available, Amber, Red lamp are OFF |
| 11% | 11100000 | Protect lamp has error, Amber, Red lamp are OFF |
| 12% | 11010000 | Protect lamp is ON, Amber, Red lamp are OFF |
| 13 - 100% | 11010101 | Protect, Amber, Red lamp are ON |

When warning is **ON**, ABS Attention/Warning Indicator Lamps Status vs. control step is summarized in table 3-17.

Table 3 - 17 ABS Attention / Warning Indicator Lamps Status vs. control step (Warning is ON)

| Warning is ON | | ABS Attention / Warning Indicator Lamps Status |
|---|---|---|
| Step | GUI | |
| 0% | 11010101 | Protect, Amber, Red lamp are ON |
| 1% | 11000011 | Red lamp not available, Amber, Protect lamp are OFF |
| 2% | 11000010 | Red lamp has error, Amber, Protect lamp are OFF |
| 3% | 11000001 | Red lamp is ON, Amber, Protect lamp are OFF |
| 4% | 11010100 | Protect, Amber lamp are ON, Red lamp is OFF |
| 5% | 11010001 | Protect, Red lamp are ON, Amber lamp is OFF |
| 6% | 11000101 | Amber, Red lamp are ON, Protect lamp is OFF, |
| 7% | 11110000 | Protect lamp not available, Amber, Red lamp are OFF |
| 8% | 11100000 | Protect lamp has error, Amber, Red lamp are OFF |
| 9% | 11010000 | Protect lamp is ON, Amber, Red lamp are OFF |
| 10% | 11001100 | Amber lamp not available, Protect, Red lamp are OFF |
| 11% | 11001000 | Amber lamp has error, Protect and Red lamp are OFF |
| 12% | 11000100 | Amber lamp is ON, Protect and Red lamp are OFF |
| 13 - 100 % | 11010101 | Protect, Amber, Red lamp are ON |

## 3.6.2. ABS Control Status (PID 49)

At step 0 - 1%, and 13 - 99%, no matter Warning is ON or OFF, ABS control status bit 8 - 3 is always set at 000000, which means ABS off-road function switch is Off, ABS retarder control and brake control are Not Active.

At step 100%, no matter Warning is ON or OFF, ABS control status bit 8 - 3 of is always set at 010101, which means ABS off-road function switch is ON, ABS retarder control and brake control are Active.

At step 0 - 1%, and 13 - 100%, ABS control status bit 2 - 1 will change as Warning is turned ON or OFF.
When Warning is ON, ABS control status bit 2 - 1 is set as 01, which means ABS warning lamp is ON;
when Warning is OFF, ABS control status bit 2 - 1 is set as 00, which means ABS warning lamp is OFF.

ABS control status at step 2 - 12 %, the value is not affected whether Warning is ON or OFF.

Table 3 - 18 ABS control status at Step 0%, 1%, and from 13% to 100%

| Step | Warning ON | Warning OFF | ABS Control Status (PID = 49) (0x31) |
|---|---|---|---|
| 0 - 1,<br>13 - 99 | 00000001 | 00000000 | ABS off-road function switch is Off, retarder control, brake control are Not active<br>When Warning is enabled, ABS warning Lamp will be ON;<br>When Warning is disabled, ABS warning Lamp will be OFF |
| 2 | 00000010 | | ABS warning lamp has Error |
| 3 | 00000011 | | ABS warning lamp Not Available |
| 4 | 00000100 | | ABS brake control is Active |
| 5 | 00001000 | | ABS brake control has Error |
| 6 | 00001100 | | ABS brake control is Not Available |
| 7 | 00010000 | | ABS retarder control is Active |
| 8 | 00100000 | | ABS retarder control has Error |
| 9 | 00110000 | | ABS retarder control is Not Available |
| 10 | 01000000 | | ABS off-road function switch is ON |
| 11 | 10000000 | | ABS off-road function switch has Error |
| 12 | 11000000 | | ABS off-road function switch is Not Available |
| 100 | 01010101 | 01010100 | ABS off-road function switch is On, retarder control and brake control are Active<br>When Warning is enabled, ABS warning Lamp will be ON;<br>When Warning is disabled, ABS warning Lamp will be OFF |

## 3.6.3. Transmission Retarder Status (PID 47)

Transmission retarder status vs. control step in Au J1708 Simulator is listed in Table 3 - 19.

Table 3 - 19 Transmission retarder status vs. control steps

| Step | GUI Display | Transmission Retarder Status (PID 47) |
|---|---|---|
| 0 | 11111100 | Retarder is Off |
| 1 | 11111111 | Retarder not available |
| 2 | 11111110 | Retarder has error |
| 3 | 11111101 | Retarder is On |
| 4 - 100 | 11111100 | Retarder is Off |

## 3.6.4. Transmission Diagnostic Code (DC) and Occurrence count (OC) (PID 194)

There are up to 22 Transmission diagnostic code (PID 194) can be simulated in Au J1708/J1587 Simulator.
When warning is OFF, PID 194 will be transmitted once per second with zero warning code.
When Warning is ON, diagnostic code (DC) will be available and controlled by the following control steps:

Table 3 - 20 Transmission DC vs. Control Step for Vehicle Platinum Edition (Warning ON)

| Step | a | b |
|---|---|---|
| 0 | 191 | 32 |
| 1 | 120 | 33 |
| 2 | 47 | 34 |
| 3 | 177 | 35 |
| 4 | 163 | 36 |
| 5 | 7 | 53 |
| 6 | 8 | 54 |
| 7 | 9 | 119 |
| 8 | 10 | 50 |
| 9 | 11 | 55 |

| Step | a | b | c |
|---|---|---|---|
| 10 | 69 | 232 | 1 |
| 11 | 64 | 169 | 2 |
| 12 | 124 | 170 | 3 |
| 13 | 127 | 171 | 4 |
| 14 | 12 | 188 | 5 |
| 15 | 13 | 189 | 6 |
| 16 | 14 | 190 | 7 |
| 17 | 15 | 255 | 8 |
| 18 | 16 | 180 | 9 |
| 19 | 18 | 180 | 10 |
| 20 | 55 | 177 | 128 |
| 21 | 63 | 242 | 255 |

Step 22 - 40%, 8 transmission DC a/b simulated

| a | b |
|---|---|
| 47 | 34 |
| 177 | 35 |
| 163 | 36 |
| 7 | 53 |
| 8 | 54 |
| 9 | 119 |
| 10 | 50 |
| 11 | 55 |

Step 41-60%, 5 DC in the format of a/b/c simulated

| a | b | c |
|---|---|---|
| 15 | 255 | 8 |
| 16 | 180 | 9 |
| 18 | 180 | 10 |
| 55 | 177 | 128 |
| 63 | 242 | 255 |

From 61 - 100%, 22 diagnostic codes are send via PID 192, in the format a/b and/or a/b/c

* a -- SID or PID of a standard diagnostic code
* b -- Diagnostic code character
* c -- Occurrence count for the diagnostic code defined by the preceding 2 characters.

From Step 0 - 9%, there are 1 Transmission diagnostic code in the format of "a/b" simulated in each step.
From Step 10 - 21%, there are 1 Transmission diagnostic code in the format of "a/b/c " simulated in each step.
From Step 22 - 40%, there are 8 Transmission diagnostic code in the format of "a/b " simulated in each step.
From Step 41 - 60%, there are 5 Transmission diagnostic code in the format of "a/b/c " simulated in each step.
From Step 61 - 100%, all 22 Transmission diagnostic code in the format of "a / b " or "a / b / c " via PID 192.

Table 3 - 21 10 Transmission Diagnostic Code with Occurrence count not included

| a | b | Transmission DC - Occurrence count NOT included |
|---|---|---|
| 191 | 32 | **---Transmission Output Shaft Speed above normal operational range**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID. |
| 120 | 33 | **---Hydraulic Retarder Oil Temperature below normal operational range**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID. |
| 47 | 34 | **---Retarder Status erratic, intermittent, or incorrect**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID. |
| 177 | 35 | **---Transmission #1 Oil Temperature above normal or shorted high**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID. |
| 163 | 36 | **---Transmission Range Attained is below normal or shorted low.**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID. |
| 7 | 53 | **--- Lockup Solenoid Valve sensor current below normal or open circuit**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is SID. |
| 8 | 54 | **--- Forward Solenoid Valve sensor current above normal or grounded circuit**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is SID. |
| 9 | 119 | **---Low Signal Solenoid Valve mechanical system not responding properly**<br>Occurrence count not included, Current Status of fault is inactive, standard dc, low character is SID. |
| 10 | 50 | **--- Retarder Enable Solenoid Valve erratic, intermittent, or incorrect**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is SID. |
| 11 | 55 | **---Retarder Modulation Solenoid Valve mechanical system not responding properly**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is SID |

Table 3 - 22 12 Transmission Diagnostic Code with Occurrence count included

| a | b | c | Transmission DC - Occurrence count included |
|---|---|---|---|
| 64 | 169 | 2 | **--- Direction Switch Status has abnormal update rate**<br>DC occurred 2 times; Current Status of fault is active, standard dc, low character is PID |
| 124 | 170 | 3 | **--- Transmission Oil Level Abnormal rate of change**<br>DC occurred 3 times, Current Status of fault is active, standard dc, low character is PID |
| 127 | 171 | 4 | **---Transmission Oil Pressure sensor Failure mode not identifiable**<br>DC occurred 4 times, Current Status of fault is active, standard dc, low character is PID |
| 12 | 188 | 5 | **---Retarder Response Solenoid Valve sensor has Bad intelligent device or component**<br>DC occurred 5 times, Current Status of fault is active, standard dc, low character is SID |
| 13 | 189 | 6 | **---Differential Lock Solenoid Valve sensor is Out of Calibration**<br>DC occurred 6 times, Current Status of fault is active, standard dc, low character is SID |
| 14 | 190 | 7 | **---Engine/Transmission Match has Special Instructions**<br>DC occurred 7 times, Current Status of fault is active, standard dc, low character is SID |
| 15 | 255 | 8 | **---Retarder Modulation Request Sensor failure type is reserved for future assignment by the SAE Subcommittee** , DC occurred 8 times, Current Status of fault is inactive, standard dc, low character is SID |
| 16 | 180 | 9 | **---Neutral Start Output voltage below normal or shorted low**<br>DC occurred 9 times, Current Status of fault is active, standard dc, low character is SID |
| 18 | 180 | 10 | **---Primary Shift Selector voltage below normal or shorted low**<br>DC occurred 10 times, Current Status of fault is active, standard dc, low character is SID |
| 55 | 177 | 128 | **---Clutch Actuator data is valid but below normal operational range**<br>DC occurred 128 times, Current Status of fault is active, standard dc, low character is SID |
| 63 | 242 | 255 | **---Output Shaft Speed Sensor erratic, intermittent, or incorrect**<br>DC occurred 255 times, Current Status of fault is inactive, standard dc, low character is SID |

## 3.6.5. ABS Diagnostic Code (DC) and Occurrence count (OC) (PID 194)

There are up to 22 ABS diagnostic code (PID 194) simulated in Au J1708/J1587 Simulator.

When warning is OFF, PID 194 will be transmitted once per second with zero warning code.

When Warning is ON, diagnostic code (DC) will be available and controlled by the following control steps:

Table 3 - 23 ABS DC vs. Control Step for Vehicle Platinum Edition (Warning ON)

| Step | a | b |
|---|---|---|
| 0 | 117 | 32 |
| 1 | 118 | 33 |
| 2 | 1 | 50 |
| 3 | 2 | 51 |
| 4 | 3 | 52 |
| 5 | 4 | 53 |
| 6 | 5 | 118 |
| 7 | 6 | 55 |
| 8 | 7 | 50 |
| 9 | 8 | 55 |

| Step | a | b | c |
|---|---|---|---|
| 10 | 8 | 168 | 1 |
| 11 | 65 | 169 | 2 |
| 12 | 12 | 234 | 3 |
| 13 | 134 | 171 | 4 |
| 14 | 13 | 188 | 5 |
| 15 | 22 | 253 | 6 |
| 16 | 23 | 190 | 7 |
| 17 | 25 | 191 | 8 |
| 18 | 31 | 180 | 9 |
| 19 | 54 | 180 | 10 |
| 20 | 103 | 241 | 126 |
| 21 | 104 | 178 | 254 |

Step 22 - 40%, 8 ABS DC in format a/b are simulated

| a | b |
|---|---|
| 1 | 50 |
| 2 | 51 |
| 3 | 52 |
| 4 | 53 |
| 5 | 118 |
| 6 | 55 |
| 7 | 50 |
| 8 | 55 |

Step 41-60%, 5 DC in the format of a/b/c simulated

| a | b | c |
|---|---|---|
| 25 | 191 | 8 |
| 31 | 180 | 9 |
| 54 | 180 | 10 |
| 103 | 241 | 126 |
| 104 | 178 | 254 |

From 61 - 100%, 22 ABS diagnostic codes are send via PID 192, in the format a/b and/or a/b/c

* a -- SID or PID of a standard diagnostic code
* b -- Diagnostic code character
* c -- Occurrence count for the diagnostic code defined by the preceding 2 characters.

From Step 0 - 9%, there are 1 ABS diagnostic code in the format of "a / b" simulated in each step.
From Step 10 - 21%, there are 1 ABS diagnostic code in the format of "a / b / c " simulated in each step.
From Step 22 - 40%, there are 8 ABS diagnostic code in the format of "a / b " simulated in each step.
From Step 41 - 60%, there are 5 ABS diagnostic code in the format of "a / b / c " simulated in each step.
From Step 61 - 100%, all 22 Transmission diagnostic code in the format of "a / b " or "a / b / c " are send via PID 192.

Table 3 - 24 10 ABS Diagnostic Code with Occurrence count not included

| a | b | ABS DC (via PID 192) - Occurrence count NOT included |
|---|---|---|
| 117 | 32 | **---Brake Primary Pressure is valid but above normal operational range**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID |
| 118 | 33 | **---Brake Secondary Pressure is valid but below normal operational range**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID |
| 1 | 50 | **---ABS Axle 1 Left Wheel Sensor is erratic, intermittent, or incorrect**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID |
| 2 | 51 | **---ABS Axle 1 Right Wheel Sensor above normal or shorted high**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID |
| 3 | 52 | **---ABS Axle 2 Left Wheel Sensor is below normal or shorted low.**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is PID |
| 4 | 53 | **---ABS Axle 2 Right Wheel Sensor current below normal or open circuit**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is SID. |
| 5 | 118 | **--- ABS Axle 3 Left Wheel Sensor current above normal or grounded circuit**<br>Occurrence count not included, Current Status of fault is inactive, standard dc, low character is SID. |
| 6 | 55 | **--- ABS Axle 3 Right Wheel Sensor mechanical system not responding properly**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is SID. |
| 7 | 50 | **--- ABS Axle 1 Left Pressure Modulation Valve erratic, intermittent, or incorrect**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is SID. |
| 8 | 55 | **--- ABS Axle 1 Right Pressure Modulation Valve mechanical system not responding properly**<br>Occurrence count not included, Current Status of fault is active, standard dc, low character is SID. |

Table 3 - 25 12 ABS Diagnostic Code with Occurrence count included

| a | b | c | ABS 22 DC (via PID 192) - Occurrence count included |
|---|---|---|---|
| 8 | 168 | 1 | **--- Brake System Air Pressure Low Warning Switch Status has abnormal frequency, pulse width, or period,** DC occurred once; Current Status of fault is inactive, standard DC, low character is PID. |
| 65 | 169 | 2 | **---Brake Switch Status Abnormal update rate**<br>DC occurred 2 time, Current Status of fault is active, standard DC, low character is PID |
| 12 | 234 | 3 | **--- Brake Stroke Status Abnormal rate of change**<br>DC occurred 3 times, Current Status of fault is active, standard DC, low character is PID |
| 134 | 171 | 4 | **--- Wheel Speed Sensor Status Failure mode not identifiable**<br>DC occurred 4 times, Current Status of fault is active, standard DC, low character is PID |
| 13 | 188 | 5 | **---Retarder Control Relay voltage Bad intelligent device or component**<br>DC occurred 5 times, Current Status of fault is active, standard DC, low character is SID |
| 22 | 253 | 6 | **---Speed Signal Input Out of Calibration**<br>DC occurred 6 times, Current Status of fault is active, standard DC, low character is SID |
| 23 | 190 | 7 | **---Tractor ABS Warning Light Bulb has Special Instructions**<br>DC occurred 7 times, Current Status of fault is active, standard DC, low character is SID |
| 25 | 191 | 8 | **--- Wheel Sensor, ABS Axle 1 Average has DC, it is reserved for future assignment by the SAE Subcommittee.** DC occurred 8 times, Current Status of fault is inactive, standard DC, low character is SID |
| 31 | 180 | 9 | **---Trailer Brake Slack Out of Adjustment Forward Axle Left Voltage below normal or shorted low.**<br>DC occurred 9 times, Current Status of fault is active, standard DC, low character is SID |
| 54 | 180 | 10 | **--- Hydraulic Pump Motor Voltage below normal or shorted low**<br>DC occurred 10 times, Current Status of fault is active, standard DC, low character is SID |
| 103 | 241 | 126 | **--- Reserved for future assignment by SAE valid but below normal operational range**<br>DC occurred 128 times; Current Status of fault is inactive, standard DC, low character is SID |
| 104 | 178 | 254 | **--- Reserved for future assignment by SAE valid but below normal operational range**<br>DC occurred 254 times; Current Status of fault is active, standard DC; low character is SID |

## 3.6.6. ABS and Transmission Data Configuration

There are 4 ABS related parameters and 5 Transmission related parameters simulated in Au J1708/J1587 Simulator. Data configuration vs. control steps are listed in Table 3 - 25.

Table 3 - 25 ABS and Transmission Data Configuration vs. Control Step

| | ABS related Data Configuration | | | | Transmission related Data Configuration | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PID | 84 | 117 | 118 | 168 | 191 | 120 | 177 | 162 | | 163 | |
| Step | Road Speed (MPH) | Primary Pressure (PSI) | Second. Pressure (PSI) | Battery Potential (V) | Output Shaft Speed (RPM) | H-retarder Oil Temp. (F) | Tran. #1 Oil Temp (F) | Range Selected | | Range Attained | |
| 0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0 | -8128.00 | | P | | P |
| 1 | 1.5 | 1.2 | 0.6 | 0.55 | 101.00 | 4 | -7377.00 | | P | | P |
| 2 | 3.0 | 3.0 | 2.4 | 0.95 | 201.00 | 10 | -6561.75 | R | 9 | | P |
| 3 | 4.0 | 4.2 | 3.6 | 1.35 | 301.00 | 14 | -5746.50 | R | 8 | R | 9 |
| 4 | 5.5 | 6.0 | 5.4 | 1.75 | 401.00 | 20 | -4931.25 | R | 7 | R | 8 |
| 5 | 6.5 | 7.2 | 6.6 | 2.15 | 501.00 | 24 | -4116.00 | R | 6 | R | 7 |
| 6 | 7.5 | 9.0 | 8.4 | 2.55 | 601.00 | 30 | -3301.00 | R | 5 | R | 6 |
| 7 | 9.0 | 10.2 | 9.6 | 2.95 | 701.00 | 34 | -2485.75 | R | 4 | R | 5 |
| 8 | 10.0 | 12.0 | 11.4 | 3.35 | 801.00 | 40 | -1670.50 | R | 3 | R | 4 |
| 9 | 11.5 | 13.2 | 12.6 | 3.75 | 901.00 | 44 | -855.25 | R | 2 | R | 3 |
| 10 | 13.0 | 15.0 | 14.4 | 4.15 | 1001.00 | 50 | -40.00 | R | 1 | R | 2 |
| 11 | 14.5 | 16.8 | 16.2 | 4.55 | 1101.00 | 56 | -34.50 | | R | R | 1 |
| 12 | 15.5 | 18.0 | 17.4 | 4.95 | 1201.00 | 60 | -29.00 | | N | | R |
| 13 | 17.0 | 19.8 | 19.2 | 5.35 | 1301.00 | 66 | -23.50 | N | | | N |
| 14 | 18.0 | 21.0 | 20.4 | 5.75 | 1401.00 | 70 | -18.00 | N | C | N | |
| 15 | 19.5 | 22.8 | 22.2 | 6.15 | 1501.00 | 76 | -12.50 | | D | N | C |
| 16 | 20.5 | 24.0 | 23.4 | 6.55 | 1601.00 | 80 | -7.00 | D | 1 | | D |
| 17 | 22.0 | 25.8 | 25.2 | 6.95 | 1701.00 | 86 | -1.50 | D | 2 | D | 1 |
| 18 | 23.0 | 27.0 | 26.4 | 7.35 | 1801.00 | 90 | 4.00 | | L | D | 2 |
| 19 | 24.5 | 28.8 | 28.2 | 7.75 | 1901.00 | 96 | 9.50 | L | 1 | | L |
| 20 | 26.0 | 30.6 | 30.0 | 8.15 | 2001.00 | 102 | 15.00 | L | 2 | L | 1 |
| 21 | 27.0 | 31.8 | 31.2 | 8.55 | 2101.00 | 106 | 20.50 | | 1 | L | 2 |
| 22 | 28.5 | 33.6 | 33.0 | 8.95 | 2201.00 | 112 | 26.00 | | 2 | | 1 |
| 23 | 29.5 | 34.8 | 34.2 | 9.35 | 2301.00 | 116 | 31.50 | | 3 | | 2 |
| 24 | 31.0 | 36.6 | 36.0 | 9.75 | 2401.00 | 122 | 37.00 | | 4 | | 3 |
| 25 | 31.5 | 37.8 | 37.2 | 10.15 | 2501.00 | 126 | 42.50 | | 5 | | 4 |
| 26 | 33.5 | 39.6 | 39.0 | 10.55 | 2601.00 | 132 | 48.00 | | 6 | | 5 |
| 27 | 34.5 | 40.8 | 40.2 | 10.95 | 2701.00 | 136 | 53.50 | | 7 | | 6 |
| 28 | 36.0 | 42.6 | 42.0 | 11.35 | 2801.00 | 142 | 59.00 | | 8 | | 7 |
| 29 | 37.0 | 43.8 | 43.2 | 11.75 | 2901.00 | 146 | 64.50 | | 9 | | 8 |
| 30 | 38.5 | 45.6 | 45.0 | 12.15 | 3001.00 | 152 | 70.00 | 1 | 0 | | 9 |
| 31 | 39.5 | 47.4 | 46.8 | 12.55 | 3101.00 | 158 | 75.50 | 1 | 1 | 1 | 0 |
| 32 | 41.0 | 48.6 | 48.0 | 12.95 | 3201.00 | 162 | 81.00 | 1 | 2 | 1 | 1 |
| 33 | 42.5 | 50.4 | 49.8 | 13.35 | 3301.00 | 168 | 86.50 | 1 | 3 | 1 | 2 |
| 34 | 43.5 | 51.6 | 51.0 | 13.75 | 3401.00 | 172 | 92.00 | 1 | 4 | 1 | 3 |
| 35 | 45.0 | 53.4 | 52.8 | 14.15 | 3501.00 | 178 | 97.50 | 1 | 5 | 1 | 4 |
| 36 | 46.0 | 54.6 | 54.0 | 14.55 | 3601.00 | 182 | 103.00 | 1 | 6 | 1 | 5 |
| 37 | 47.5 | 56.4 | 55.8 | 14.95 | 3701.00 | 188 | 108.50 | 1 | 7 | 1 | 6 |
| 38 | 48.5 | 57.6 | 57.0 | 15.35 | 3801.00 | 192 | 114.00 | 1 | 8 | 1 | 7 |
| 39 | 50.0 | 59.4 | 58.8 | 15.75 | 3901.00 | 198 | 119.50 | 1 | 9 | 1 | 8 |
| 40 | 51.5 | 61.2 | 60.6 | 16.15 | 4001.00 | 204 | 125.00 | 2 | 0 | 1 | 9 |
| 41 | 52.5 | 62.4 | 61.8 | 16.55 | 4101.00 | 208 | 130.50 | 2 | 1 | 2 | 0 |
| 42 | 54.0 | 64.2 | 63.6 | 16.95 | 4201.00 | 214 | 136.00 | 2 | 2 | 2 | 1 |
| 43 | 55.0 | 65.4 | 64.8 | 17.35 | 4301.00 | 218 | 141.50 | 2 | 3 | 2 | 2 |
| 44 | 56.5 | 67.2 | 66.6 | 17.75 | 4401.00 | 224 | 147.00 | 2 | 4 | 2 | 3 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | 57.5 | 68.4 | 67.8 | 18.15 | 4501.00 | 228 | 152.50 | 2 | 5 | 2 | 4 |
| | ABS related Data Configuration | | | | Transmission related Data Configuration | | | | | | |
| PID | 84 | 117 | 118 | 168 | 191 | 120 | 177 | 162 | | 163 | |
| Step | Road Speed (MPH) | Primary Pressure (PSI) | Second. Pressure (PSI) | Battery Potential (V) | Output Shaft Speed (RPM) | H-retarder Oil Temp. (F) | Tran. #1 Oil Temp (F) | Range Selected | | Range Attained | |
| 46 | 59.0 | 70.2 | 69.6 | 18.55 | 4601.00 | 234 | 158.00 | 2 | 6 | 2 | 5 |
| 47 | 60.0 | 71.4 | 70.8 | 18.95 | 4701.00 | 238 | 163.50 | 2 | 7 | 2 | 6 |
| 48 | 61.5 | 73.2 | 72.6 | 19.35 | 4801.00 | 244 | 169.00 | 2 | 8 | 2 | 7 |
| 49 | 62.5 | 74.4 | 73.8 | 19.75 | 4901.00 | 248 | 174.50 | 2 | 9 | 2 | 8 |
| 50 | 63.5 | 76.2 | 75.6 | 20.15 | 5001.00 | 254 | 180.00 | 3 | 0 | 2 | 9 |
| 51 | 65.5 | 78.0 | 77.4 | 20.55 | 5101.00 | 260 | 185.50 | 3 | 0 | 3 | 0 |
| 52 | 66.5 | 79.2 | 78.6 | 20.95 | 5201.00 | 264 | 191.00 | 3 | 0 | 3 | 0 |
| 53 | 68.0 | 81.0 | 80.4 | 21.35 | 5301.00 | 270 | 196.50 | 3 | 0 | 3 | 0 |
| 54 | 69.0 | 82.2 | 81.6 | 21.75 | 5401.00 | 274 | 202.00 | 3 | 0 | 3 | 0 |
| 55 | 70.5 | 84.0 | 83.4 | 22.15 | 5501.00 | 280 | 207.50 | 3 | 0 | 3 | 0 |
| 56 | 71.5 | 85.2 | 84.6 | 22.55 | 5601.00 | 284 | 213.00 | 3 | 0 | 3 | 0 |
| 57 | 73.0 | 87.0 | 86.4 | 22.95 | 5701.00 | 290 | 218.50 | 3 | 0 | 3 | 0 |
| 58 | 74.0 | 88.2 | 87.6 | 23.35 | 5801.00 | 294 | 224.00 | 3 | 0 | 3 | 0 |
| 59 | 75.5 | 90.0 | 89.4 | 23.75 | 5901.00 | 300 | 229.50 | 3 | 0 | 3 | 0 |
| 60 | 77.0 | 91.8 | 91.2 | 24.15 | 6001.00 | 306 | 235.00 | 3 | 0 | 3 | 0 |
| 61 | 78.0 | 93.0 | 92.4 | 24.55 | 6101.00 | 310 | 240.50 | 3 | 0 | 3 | 0 |
| 62 | 79.5 | 94.8 | 94.2 | 24.95 | 6201.00 | 316 | 246.00 | 3 | 0 | 3 | 0 |
| 63 | 80.5 | 96.0 | 95.4 | 25.35 | 6301.00 | 320 | 251.50 | 3 | 0 | 3 | 0 |
| 64 | 82.0 | 97.8 | 97.2 | 25.75 | 6401.00 | 326 | 257.00 | 3 | 0 | 3 | 0 |
| 65 | 83.0 | 99.0 | 98.4 | 26.15 | 6501.00 | 330 | 262.50 | 3 | 0 | 3 | 0 |
| 66 | 84.5 | 100.8 | 100.2 | 26.55 | 6601.00 | 336 | 268.00 | 3 | 0 | 3 | 0 |
| 67 | 85.5 | 102.0 | 101.4 | 26.95 | 6701.00 | 340 | 273.50 | 3 | 0 | 3 | 0 |
| 68 | 87.0 | 103.8 | 103.2 | 27.35 | 6801.00 | 346 | 279.00 | 3 | 0 | 3 | 0 |
| 69 | 88.0 | 105.0 | 104.4 | 27.75 | 6901.00 | 350 | 284.50 | 3 | 0 | 3 | 0 |
| 70 | 89.5 | 106.8 | 106.2 | 28.15 | 7001.00 | 356 | 290.00 | 3 | 0 | 3 | 0 |
| 71 | 91.0 | 108.6 | 108.0 | 28.55 | 7101.00 | 362 | 295.50 | 3 | 0 | 3 | 0 |
| 72 | 92.0 | 109.8 | 109.2 | 28.95 | 7201.00 | 366 | 301.00 | 3 | 0 | 3 | 0 |
| 73 | 93.5 | 111.6 | 111.0 | 29.35 | 7301.00 | 372 | 306.50 | 3 | 0 | 3 | 0 |
| 74 | 94.5 | 112.8 | 112.2 | 29.75 | 7401.00 | 376 | 312.00 | 3 | 0 | 3 | 0 |
| 75 | 96.0 | 114.6 | 114.0 | 30.15 | 7501.00 | 382 | 317.50 | 3 | 0 | 3 | 0 |
| 76 | 97.0 | 115.8 | 115.2 | 30.55 | 7601.00 | 386 | 323.00 | 3 | 0 | 3 | 0 |
| 77 | 98.5 | 117.6 | 117.0 | 30.95 | 7701.00 | 392 | 328.50 | 3 | 0 | 3 | 0 |
| 78 | 99.5 | 118.8 | 118.2 | 31.35 | 7801.00 | 396 | 334.00 | 3 | 0 | 3 | 0 |
| 79 | 101.0 | 120.6 | 120.0 | 31.75 | 7901.00 | 402 | 339.50 | 3 | 0 | 3 | 0 |
| 80 | 102.5 | 122.4 | 121.8 | 32.15 | 8001.00 | 408 | 345.00 | 3 | 0 | 3 | 0 |
| 81 | 103.5 | 123.6 | 123.0 | 194.35 | 8420.00 | 412 | 350.50 | 3 | 0 | 3 | 0 |
| 82 | 105.0 | 125.4 | 124.8 | 356.60 | 8839.25 | 418 | 356.00 | 3 | 0 | 3 | 0 |
| 83 | 106.0 | 126.6 | 126.0 | 518.85 | 9258.50 | 422 | 361.50 | 3 | 0 | 3 | 0 |
| 84 | 107.5 | 128.4 | 127.8 | 681.10 | 9677.75 | 428 | 367.00 | 3 | 0 | 3 | 0 |
| 85 | 108.5 | 129.6 | 129.0 | 843.30 | 10096.75 | 432 | 372.50 | 3 | 0 | 3 | 0 |
| 86 | 110.0 | 131.4 | 130.8 | 1005.55 | 10516.00 | 438 | 378.00 | 3 | 0 | 3 | 0 |
| 87 | 111.0 | 132.6 | 132.0 | 1167.80 | 10935.25 | 442 | 383.50 | 3 | 0 | 3 | 0 |
| 88 | 112.5 | 134.4 | 133.8 | 1330.05 | 11354.50 | 448 | 389.00 | 3 | 0 | 3 | 0 |
| 89 | 113.5 | 135.6 | 135.0 | 1492.25 | 11773.50 | 452 | 394.50 | 3 | 0 | 3 | 0 |
| 90 | 115.0 | 137.4 | 136.8 | 1654.50 | 12192.75 | 458 | 400.00 | 3 | 0 | 3 | 0 |
| 91 | 116.5 | 139.2 | 138.6 | 1816.75 | 12612.00 | 464 | 1179.00 | 3 | 0 | 3 | 0 |

| | ABS related Data Configuration | | | | Transmission related Data Configuration | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PID | 84 | 117 | 118 | 168 | 191 | 120 | 177 | 162 | | 163 | |
| Step | Road Speed (MPH) | Primary Pressure (PSI) | Second. Pressure (PSI) | Battery Potential (V) | Output Shaft Speed (RPM) | H-retarder Oil Temp. (F) | Tran. #1 Oil Temp (F) | Range Selected | | Range Attained | |
| 92 | 117.5 | 140.4 | 139.8 | 1979.00 | 13031.25 | 468 | 1958.25 | 3 | 0 | 3 | 0 |
| 93 | 119.0 | 142.2 | 141.6 | 2141.20 | 13450.25 | 474 | 2737.50 | 3 | 0 | 3 | 0 |
| 94 | 120.0 | 143.4 | 142.8 | 2303.45 | 13869.50 | 478 | 3516.50 | 3 | 0 | 3 | 0 |
| 95 | 121.5 | 145.2 | 144.6 | 2465.70 | 14288.75 | 484 | 4295.75 | 3 | 0 | 3 | 0 |
| 96 | 122.5 | 146.4 | 145.8 | 2627.95 | 14708.00 | 488 | 5075.00 | 3 | 0 | 3 | 0 |
| 97 | 124.0 | 148.2 | 147.6 | 2790.15 | 15127.00 | 494 | 5854.00 | 3 | 0 | 3 | 0 |
| 98 | 125.0 | 149.4 | 148.8 | 2952.40 | 15546.25 | 498 | 6633.25 | 3 | 0 | 3 | 0 |
| 99 | 126.5 | 151.2 | 150.6 | 3114.65 | 15965.50 | 504 | 7412.50 | 3 | 0 | 3 | 0 |
| 100 | 127.5 | 153.0 | 153.0 | 3276.75 | 16383.75 | 510 | 8191.75 | 3 | 0 | 3 | 0 |

## 3.7. Change Engine Message ID (For Plus Editions Only).

The default engine message ID for Au J1708/J1587 Simulator is 128 (Engine #1), as shown in Figure 3 - 7.


Figure 3 - 7 Message ID

For Engine Basic Plus edition and Engine Premium Plus edition, there are 6 optional Engine Message ID available: 128 - Engine #1 (default), 175 - Engine #2, 183- Engine #3, 184- Engine #4, 185- Engine #5, 186- Engine #6.

Engine Message ID can be chose from the remote terminal GUI.
Step 1: Click the Au logo on the top left side of Au J1708/J1587 Simulator Remote Terminal.

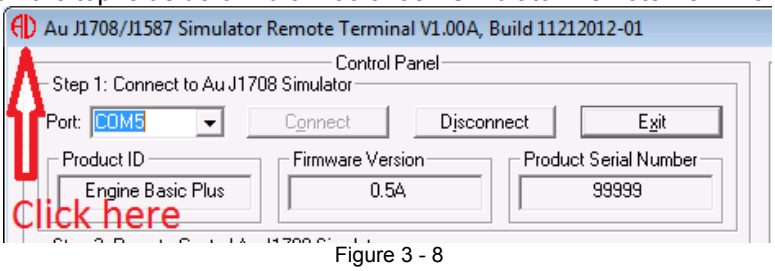



Figure 3 - 8

Step 2: Click "About J1708 Simulator ..."

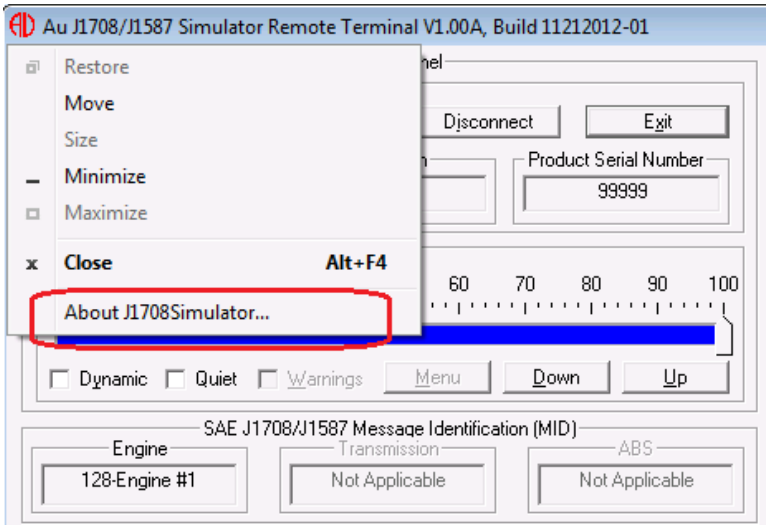



Figure 3 - 9

Step 3: Click "Proceed to Change MID"

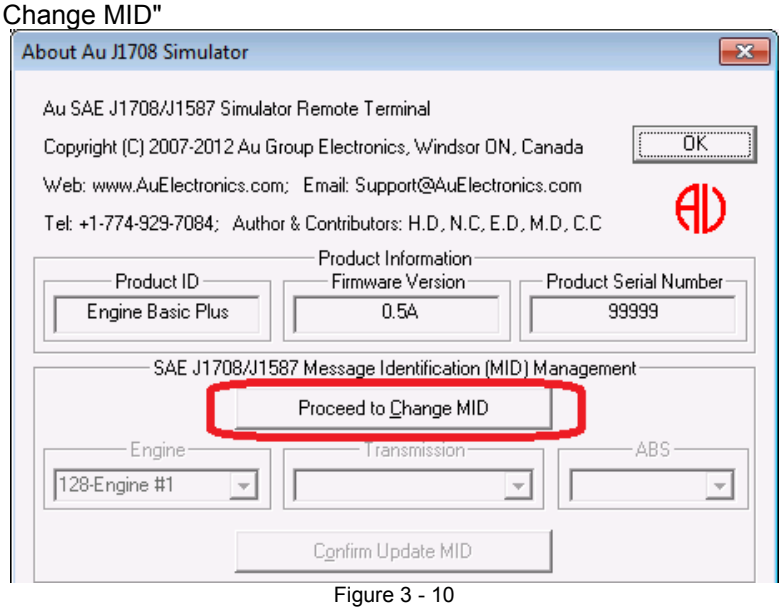



Figure 3 - 10

Step 4: Select "175-Engine #2" from the Engine MID dropdown list.

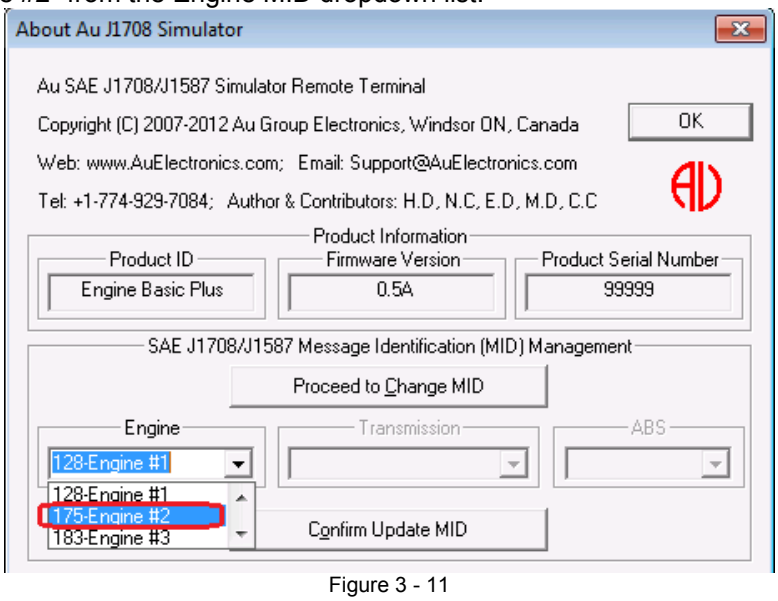



Figure 3 - 11

Step 5: Click "Confirm Update MID" button:

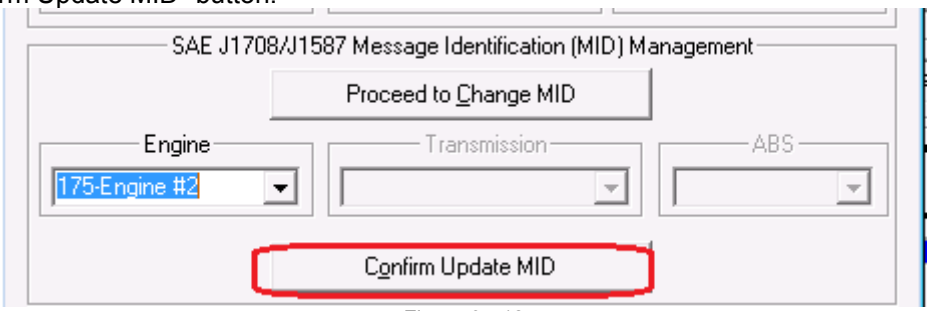



Figure 3 - 12

# Appendix A - Remote Terminal Installation Guide

A remote terminal program can be used to control and display detail information of simulated J1708 signals on a PC screen. Flowing is the step by step guide on how to install the Remote Terminal program.

1. Double click the “Au Setup J1708 Simulator Remote Terminal V1.00A Build 11262012-01” application file in the software disc, as shown in Figure A-1.


Figure A-1

2. “Welcome to the Au J1708/J1587 Simulator Remote Terminal Ver 1.00A Setup Wizard” window pop up, click “Next” to continue (Figure A-2).
3. “License Agreement” window pop up, please read the license agreement and select “I accept the agreement”, click “Next” to continue (Figure A-3).

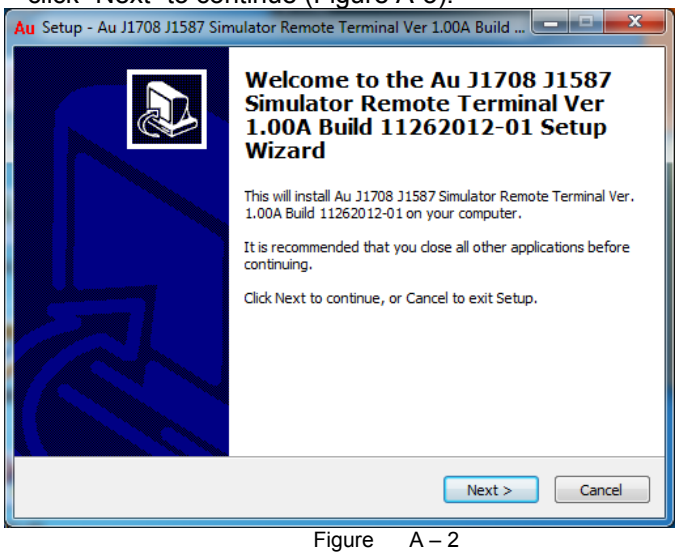



Figure A – 2

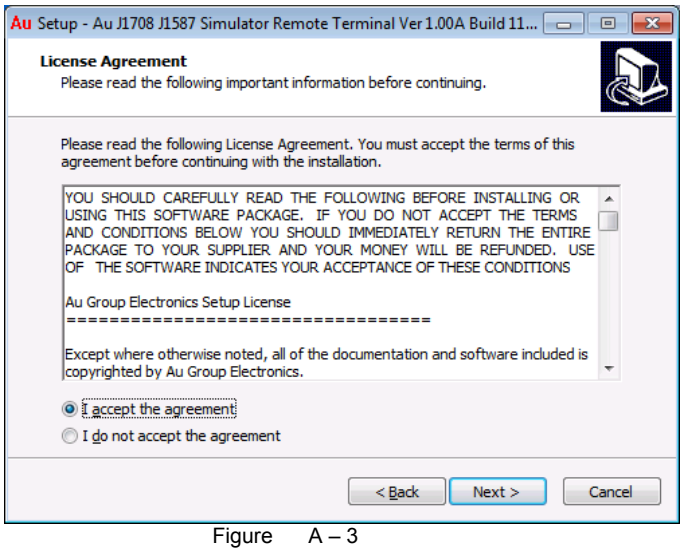



Figure A – 3

4. “Select Destination Location” window pop up, use the default folder, and click “Next” to continue (Figure A-4).
5. “Select Start Menu Folder” window pop up, use the default folder and click “Next” to continue (Figure A-5).

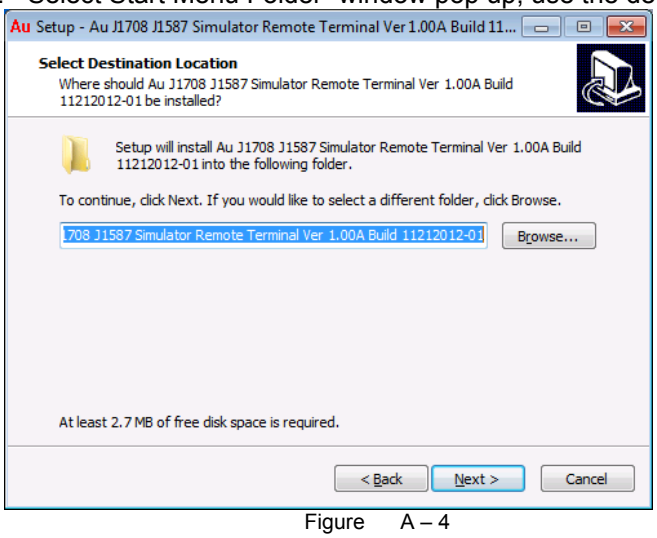



Figure A – 4

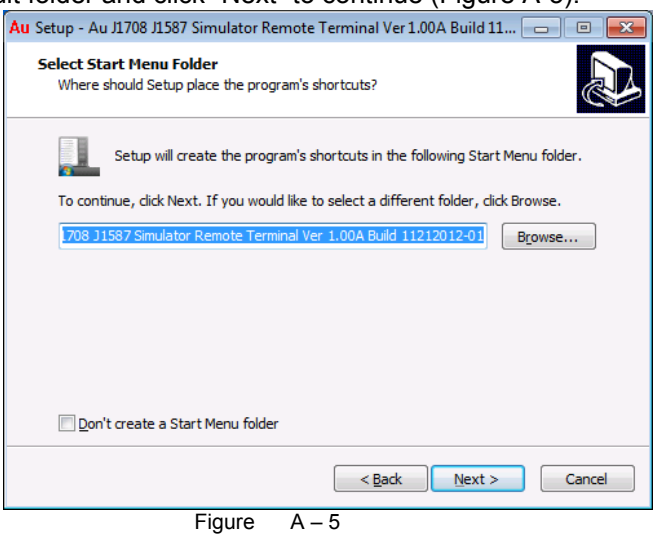



Figure A – 5

6. “Select Additional Tasks” window pop up, check both “Create a desktop icon”, and “Create a Quick Launch icon”, click “Next” to continue (Figure A-6).

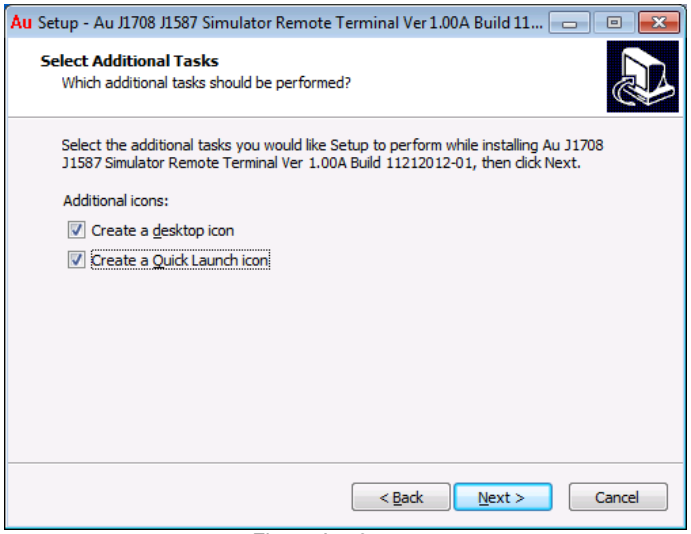



Figure A – 6

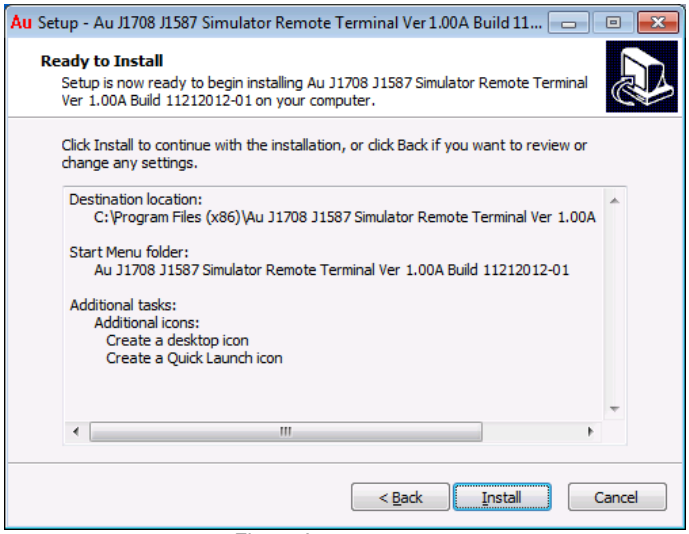



Figure A – 7

7. “Ready to Install” window pop up, click “Install” (Figure A-7)

8. Check "Launch Au J1708 Simulator Remote Terminal Version 1.00A", click "Finish" (Figure A-8), Au J1708 Simulator Remote Terminal will be launched (as shown in Figure 3 - 1).

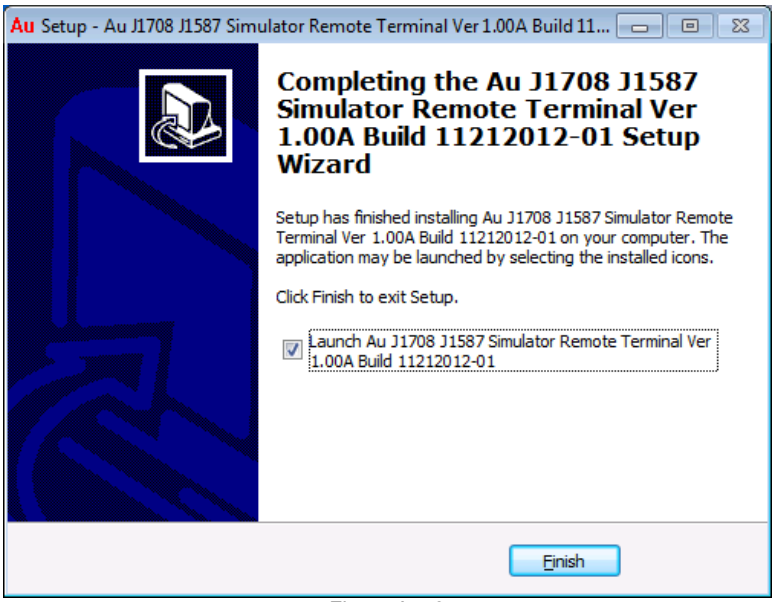



Figure A – 8

# Appendex B - Firmware upgrade with Au PIC Serial Bootloader

With the built-in Serial Bootloading feature, future released firmware of Au J1708/J1587 Simulator can be in-filed updated in a few minutes.

## B-1 What's needed Before Install Au PIC Bootloader?

1. A PC equipped with serial port or PC equipped with USB port + "USB to Serial Adapter".
2. Serial cable to connect a PC to a PIC target board.
3. Au PIC Bootloader installation program (it is available through Au Group Electronics)
4. An encrypted PIC-code file with extension of "Aud" (it will be provided by Au Group Electronics for different products, e.g. Au J1708/J1587 Simulator, etc.)

## B-2 How to Install Au PIC Bootloader?

**Note:** If you have previously installed the Au PIC Bootloader on your PC, please skip step 1 to step 8, and start with step 9.

1. Double click icon of the "Setup Au PIC Bootloader V1.00B" to start installing Au PIC Bootloader, as shown in Figure B-1

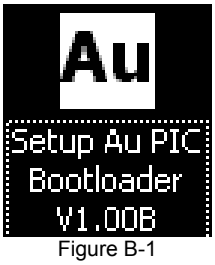


Figure B-1

2. "Welcome to the Au PIC Bootloader Ver 1.00B Setup Wizard" window show up, click "Next" (Figure B- 2)

3. "License Agreement" window show up, read the license agreement and select "I accept the agreement", then click "Next" to continue (Figure B-3).

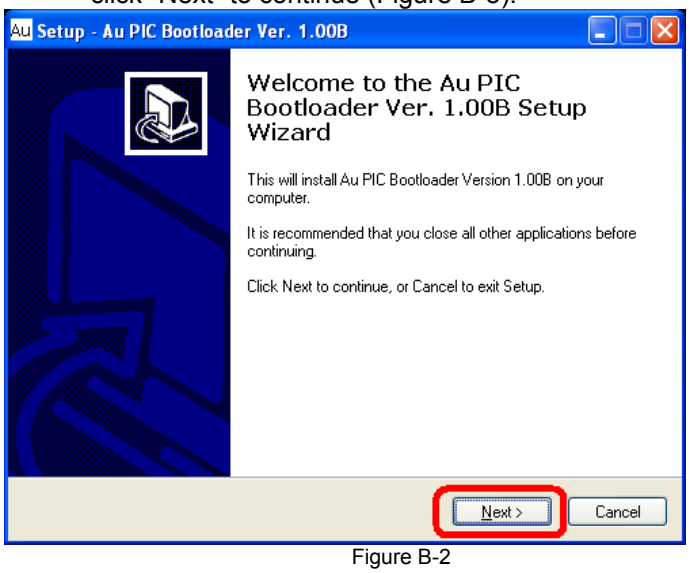


Figure B-2

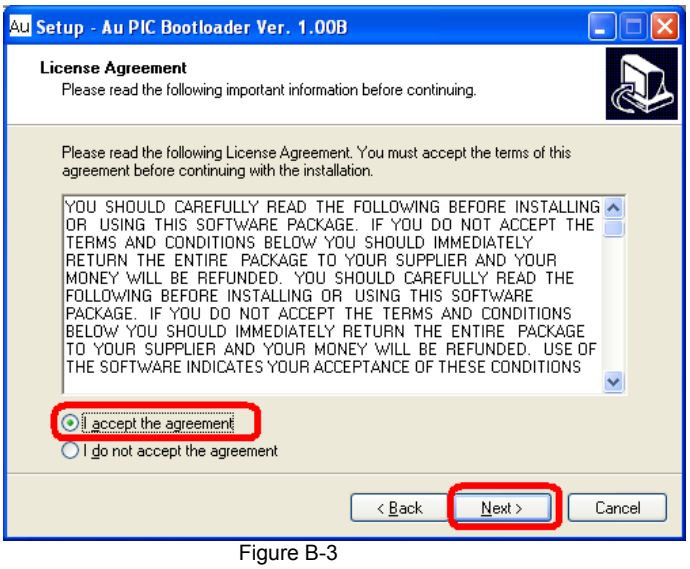


Figure B-3

4. "Select Destination" window shows up, use default path: C:\Program Files\ AU PIC Bootloader", then click "next" to continue (Figure B-4).

5. "Select Start Menu Folder" window show up, use default setting "AU PIC Bootloader", then click "next" (Figure B-5).

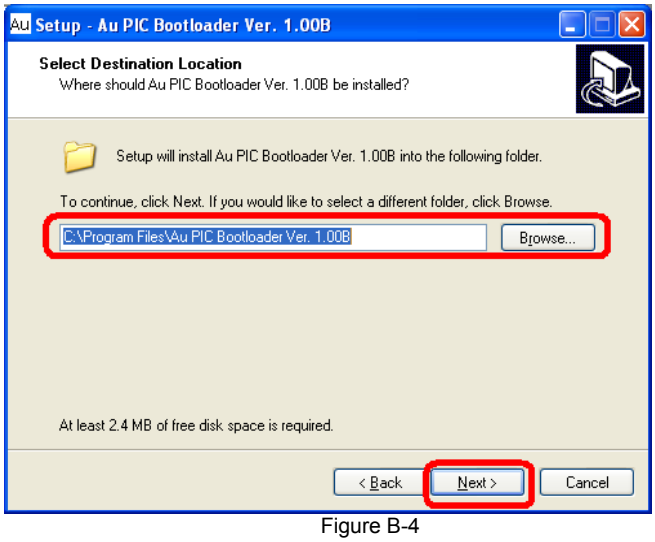



Figure B-4

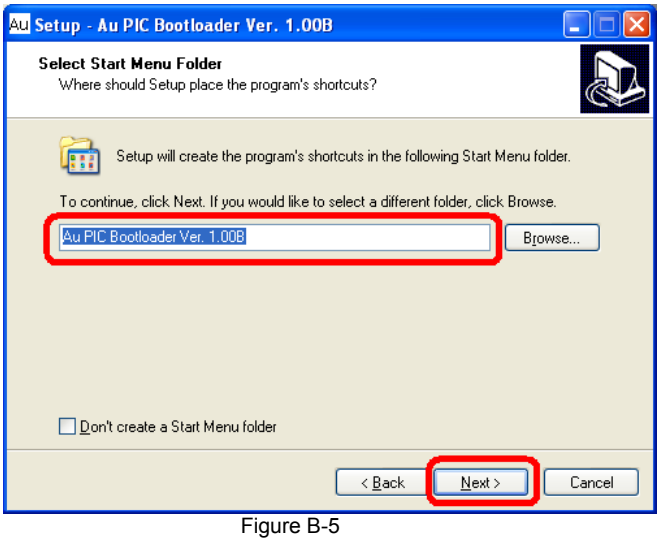



Figure B-5

6. "Select Additional Task" window shows up, check both "Create a desktop icon" and "Create a quick launch icon", and then click "next" to continue (Figure B-6).
7. "Ready to Install" window shows up. Click "Install" (Figure B-7).

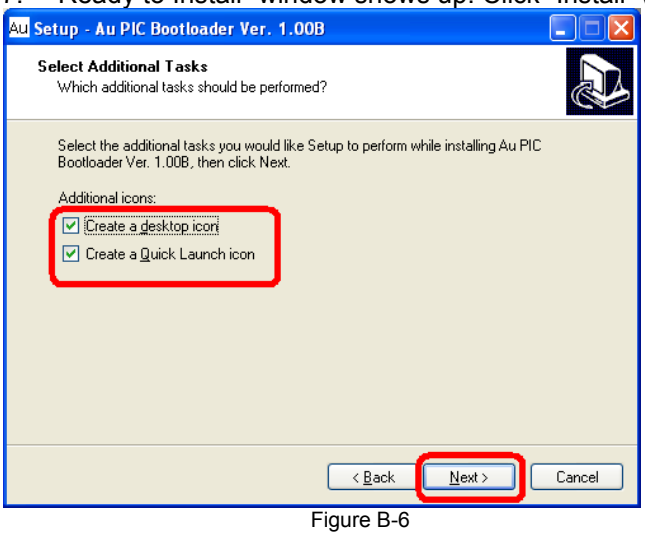



Figure B-6

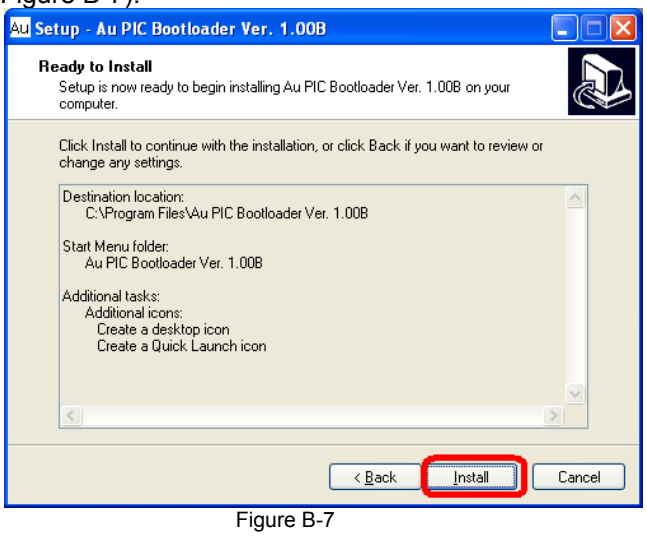



Figure B-7

8. After a few seconds, "Completing the Au PIC Bootloader Setup Wizard" window shows up, check "Launch Au PIC Bootloader Ver. 1.00B", click "Finish" to exit setup (Figure B-8).
9. Au PIC18 Bootloader is launched, as shown in Figure C-9

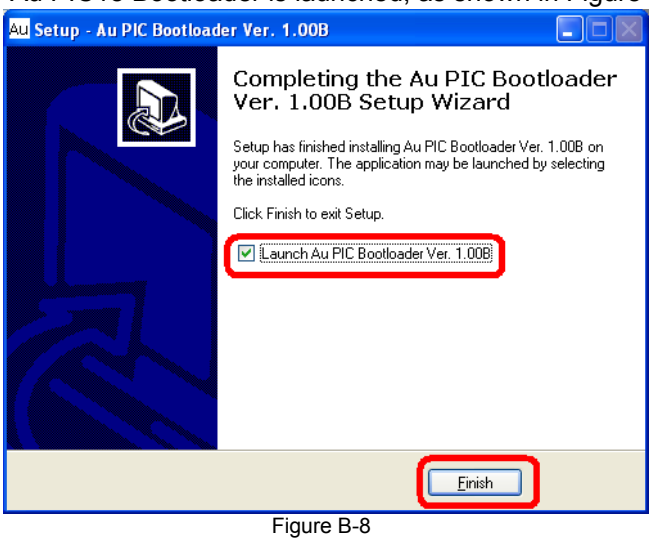



Figure B-8

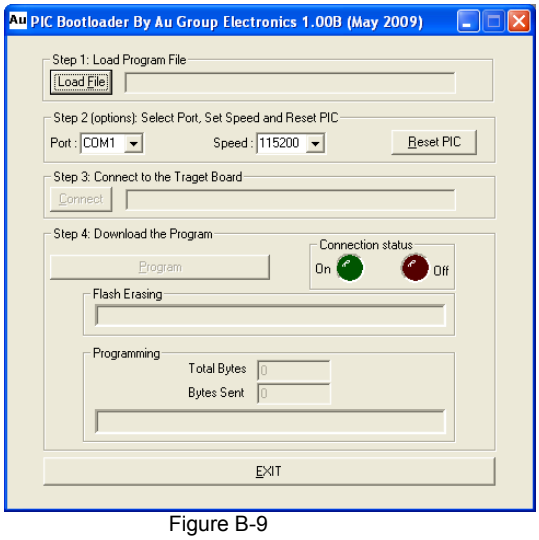



Figure B-9

## B-3 How to Use Au PIC Bootloader?

Note: Following will demonstrate how to use Au PIC Bootloader to upgrade Au J1708 Simulator firmware from 0.1A to 0.2A.

**Step 1. Load Program File:**

Connect Au J1708 Simulator to a PC, then click “Load File” button (Figure B-10). Select file type with “.Aud” extension, then click “Open”

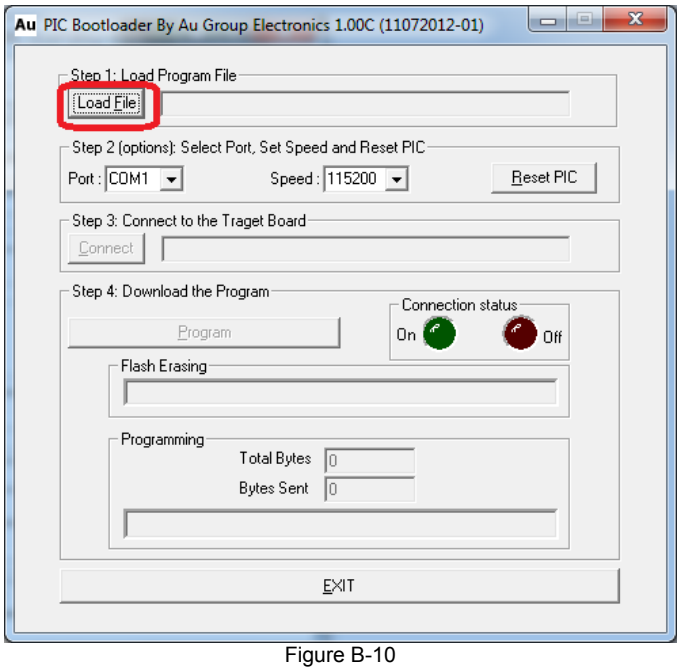



Figure B-10

**Step 2. Select port, set speed, and Reset PIC and Connect**

- Select proper serial communication port, which is used to connect with Au J1708 Simulator.
- Set the communication Baud Rate at 115200 bps
- Click “Reset PIC” button. **"Warning"** LED on device will blink.
- Within 10 seconds, click “Connect” button (Figure B-11).

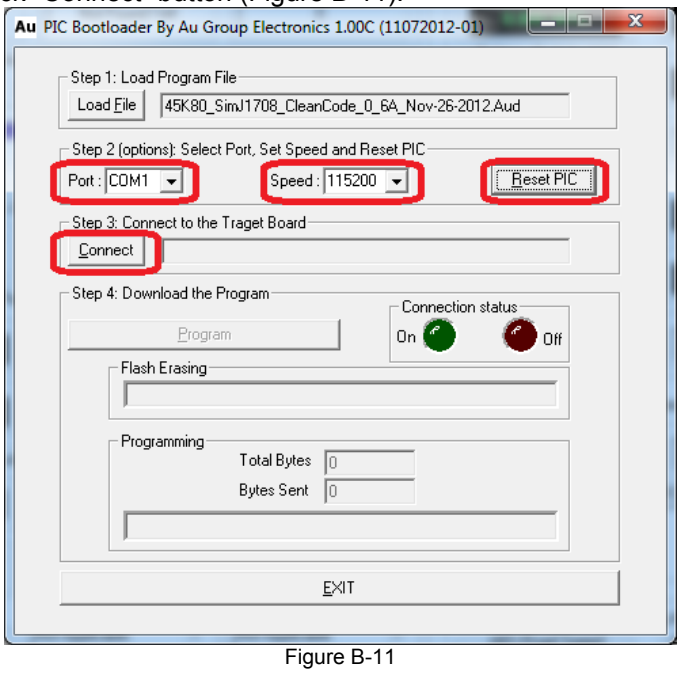



Figure B-11

Note: There is a 10 seconds time-out period to let the Bootloader program to connect with Au J1708 Simulator, if user failed to do so, please click “Reset PIC”.

During programming, the " **Warning** "LED on Au J1939 Simulator will be constant on, also the connection status indicator – the Green light on Au PIC Bootloader GUI will be on, notice that “Program” button now has been activated. Also the target board PIC Bootloader information "Au--232E6" will show up, as shown in Figure B-12.

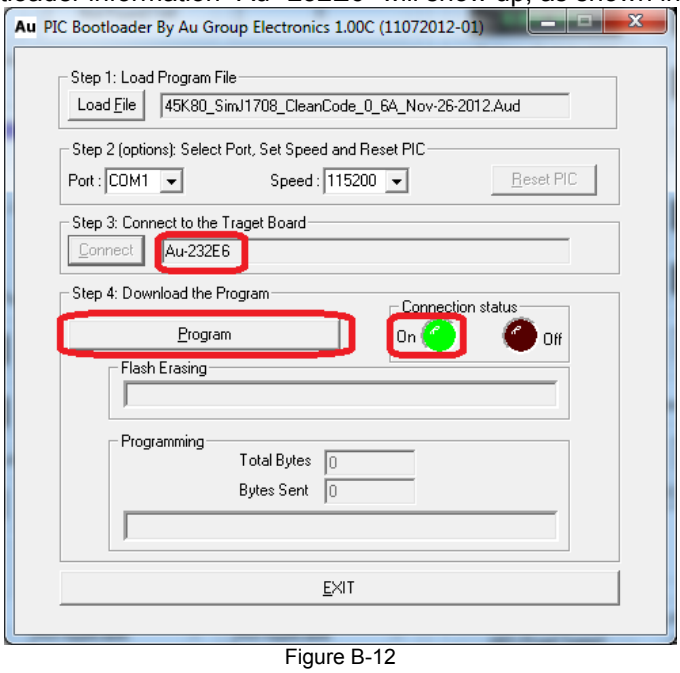



Figure B-12

**Step 3.** **Download program to Au J1708/J1587 Simulator**

Click “Program” button (Figure B-12).

The flash of the Au J11708 Simulator will be erased first, it takes a few seconds. Then the pre-loaded "xxxx.Aud" file will be programmed into Au J1708 Simulator, and the programming status will show up (Figure B-13).

This process may take a few minutes depending on the file size and communication speed. When programming finished, click “EXIT” to exit Bootloader mode (Figure B-14).

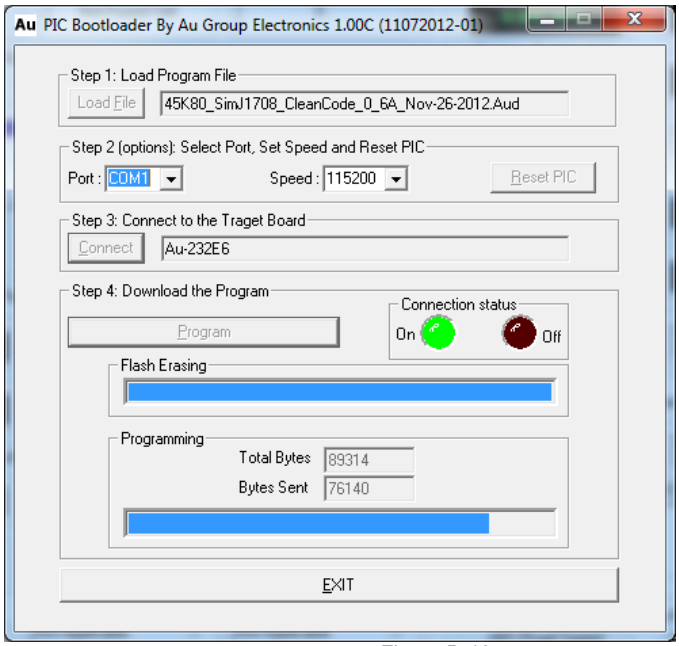



Figure B-13

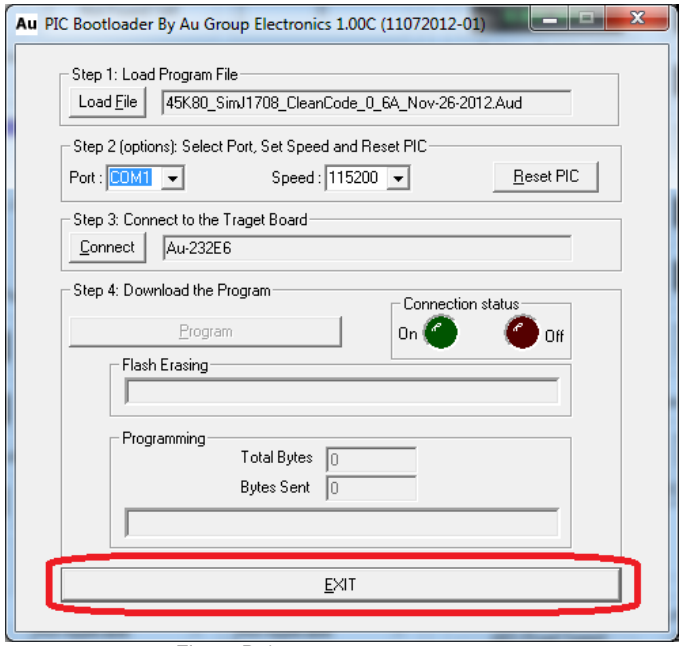



Figure B-14

The Au J1708 Simulator new firmware has been upgraded to the device.

# Appendex C - License Management

Upgrading Au J1708/J1587 Simulator license can be done in-field in a few seconds. Providing the J1708/J1587 Simulator device is hooked up to PC and license upgrade code is ready.

## C-1 What is needed to upgrade Au J1708/J1587 Simulator License?

1. Order license upgrade code from the following web link (Item #: LICJ1708-XXX, refer to figure 1- 7 for detail) : http://www.auelectronics.com/products/system/simj1708.html
2. A PC equipped with serial port and a RS232 Serial extension cable (Item # CBL-RS232-01) or a PC equipped with USB port and a "USB to Serial Converter Cable" (Item #: CBL-USB-232).
3. Au J1708/J1587 Simulator.
4. Au J1708/J1587 Simulator Remote Terminal. (Refer to Appendix A for how to install)

## C-2 Step by Step License Upgrading Procedure

1. Connect PC with Au J1708/J1587 Simulator.
2. Launch Au J1708/J1587 Simulator Remote Terminal program, select the Serial Communication Port that was used to connect J1708/J1587 Simulator, e.g. COM1, then click “Connect” button, notice that Product ID showing "Value Package” (Figure C-1)

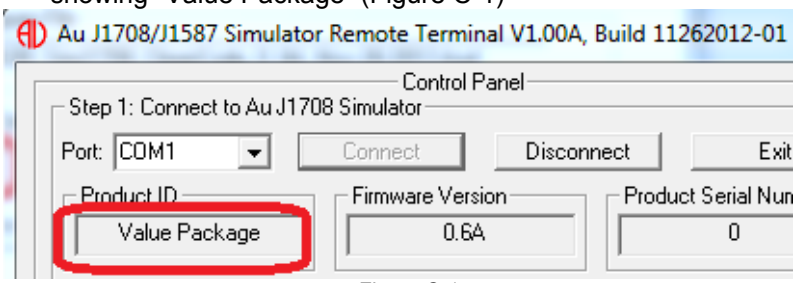



Figure C-1

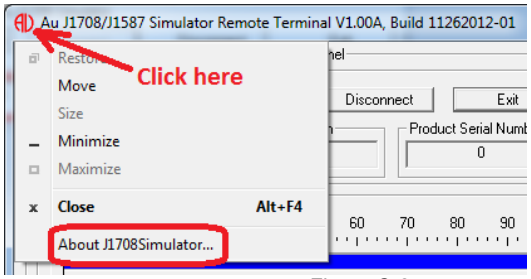



Figure C-2

3. Click Au Logo on the top left corner of Au J1708 Simulator Remote Terminal, then click "About J1708 Simulator …” as shown in Figure C - 2.
4. "About Au J1708/J1587 Simulator” window show up (Figure C-3). Enter a validate license code, and then click “Validate license” button. Note: Each Au J1708/J1587 Simulator will have a unique Serial Number and may have a different Product ID (J1708/J1587 Simulator Edition). If the license code is invalid, an error message will be pop up, as shown in Figure C-4.

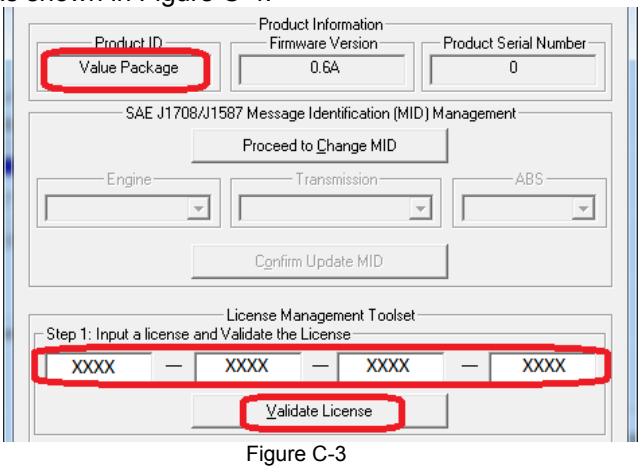



Figure C-3

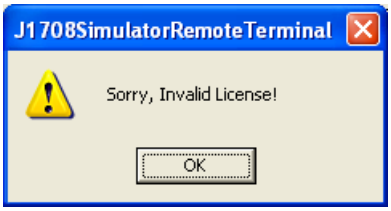



Figure C-4

5. After a validate license is entered, Updated license Information will display, as demonstrated here in Figure C-5, J1708 Simulator Value Package edition will be upgraded to Engine Basic Plus Edition, click “Update License” button.

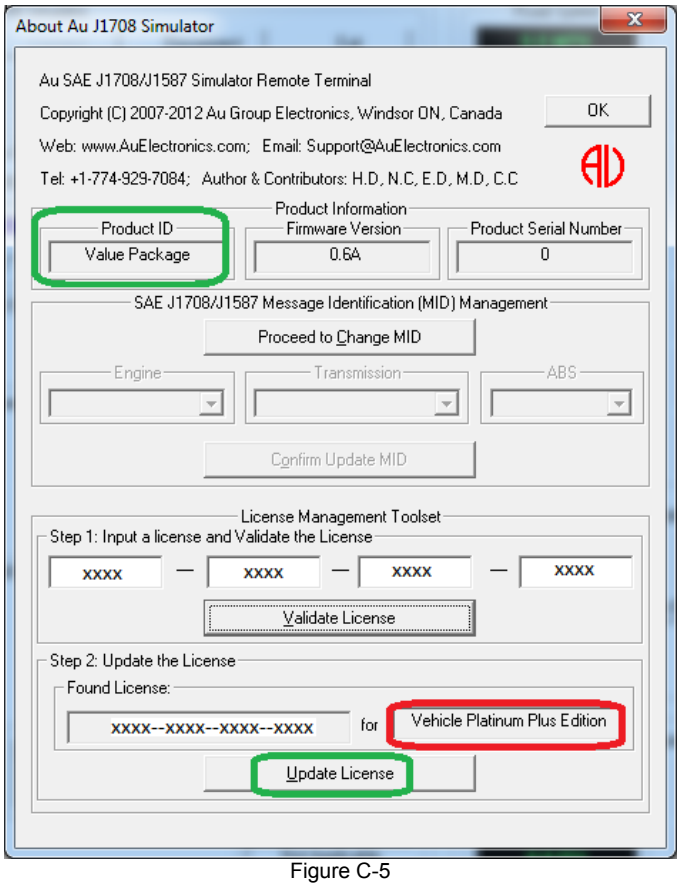



Figure C-5

6. When it is updated successfully, a beep will be heard. About J1708 Simulator window will close automatically, and the Product ID (Edition of J1708/J1587 Simulator) will update to the new edition (Vehicle Platinum Plus Edition in this demonstration, as shown in Figure C-6).

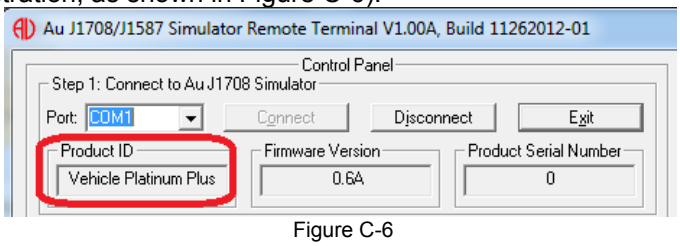



Figure C-6

**Thank You**

Thank you for choosing Au Group Electronics products.
Should you have any question or comments, please contact us at:
support@AuElectronics.com
Please visit our website for recent product releases and the latest news.
www.AuElectronics.com
Our products can be ordered 24/7 at our on-line store:
www.AuElectronics.com/Products
We look forward to serving you again in the near future.
This Document is printed in Canada on 100% Post-Consumer Recycled Paper.