



User Manual for Au Combo Interpreter (ITP-COMBO)

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Chapter 1. Introduction

Au SAE J1939 and J1708 Combo Interpreter (Figure 1-1), a palm-size handheld device with a DB9 male BUS interface (including J1939/CAN and J1708/J1587) and a DB9 female RS232 interface, is capable of interpreting the most popular SAE J1939 and J1708/J1587 signals to RS232 ASCII strings (AT command strings).

Au Combo Interpreter can also send out commands to request for Engine Hour, VIN automatically. So that Engine Hour and VIN will be available for other nodes on the same network as well.



Figure 1 - 1

1.1. Major Features

- **Automatically detect CAN bus baud rate:** 1M, 500K, 250K, 125K, 62.5K
- **Two energy saving modes:** Deep sleep mode and standby sleep mode
- **Configurable inter-frame spacing:** 0~65535 seconds(0.0~18.2 hours)
- **Automatically request** for Engine Hour, Battery potential (Switched), and vehicle Identification Number(VIN).
- Capable of sending **global request** and **specific request**
- **Configurable RS232 baud rate**
- **Controllable data flow on RS232** serial port: Refer to Mute8E, Mute9E, Start8, and Start9 for detailed information.
- **Enhanced data format** for separating received data from different network.
- **Configurable device Source Address and device MID:** support multiple SA per J1939 and MID per J1708. They can be configured in-field using Settings Commands through RS232 serial communication, refer to Table 2-6 for detailed information.
- **In-field firmware updating capability** with Au Bootloader technology.
- **Ease of use:** No software setup experience or protocol configuration skill is required.

1.2. Typical Topological network

A typical application of Au Combo Interpreter in SAE J1939-15 network and J1708/J1587 network is showing in figure 1 - 2.

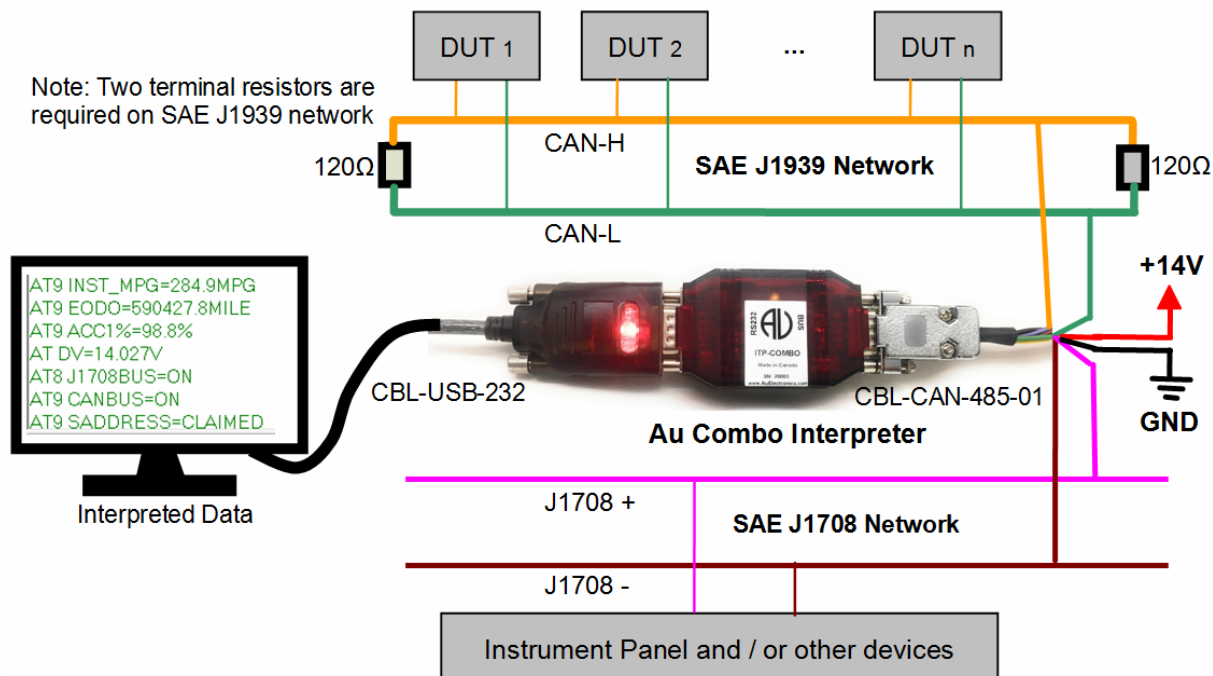


Figure 1 - 2

Au Combo Interpreter in J1939 and J1708/J1587 Network

1.3. Hardware Features

- **Operating voltage:** +10V~+32V DC,
- **Nominal voltage:** +12V DC or +24V DC;
- **Operating electric current:** 65mA typical, 250mA max;
- **Operating temperature:** -40 °F to 185 °F (-40 °C to 85 °C)
- **TVS (Transient Voltage Suppressor) protection** on CAN bus
- **1 LED** for communication event indication
- **1 RS232 interface (DB9 female connector):** can be connected to PC or any devices with RS232 serial connections(default RS232 baud rate: 115.2K)
- **1 BUS interface (DB9 male connector):** can be connected to J1939/CAN, J1708/J1587 network, and a power supply (+14.2V DC nominal). The pin-out of the DB9 male "BUS" interface is illustrated in Figure 1-3.

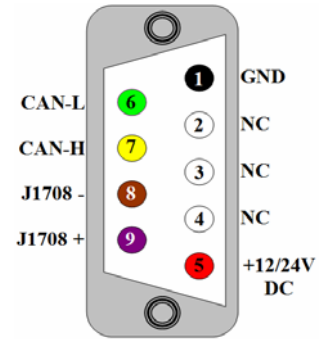


Figure 1 - 3

1.4. List of Supported SAE J1939 Parameters

- Fuel Level 2 (SPN: 38)
- Wheel Based Vehicle Speed (SPN: 84)
- Accelerator Pedal Position 1 (SPN: 91)
- Engine Percent Load at Current Speed (SPN: 92)
- Fuel Level 1 (SPN: 96)
- Water In Fuel Indicator 1 (SPN: 97)
- Engine Oil Pressure (SPN: 100)
- Engine Intake Manifold #1 Pressure (obsolete term: Engine Turbocharger Boost Pressure) (SPN: 102)
- Engine Intake Manifold 1 Temperature (SPN: 105)
- Engine Coolant Temperature (SPN: 110)
- Key-switch Battery Potential (obsolete term: Battery Potential (Voltage), Switched) (SPN: 158)
- Battery Potential / Power Input 1 (obsolete term: Electrical Potential (Voltage)) (SPN: 168)
- Engine Fuel Rate (SPN: 183)
- Engine Instantaneous Fuel Economy (SPN: 184)
- Engine Speed (SPN: 190)
- Vehicle Identification Number (VIN) (SPN 237)
- Total Vehicle Distance (SPN 245)
- Engine Total Hours of Operation (SPN: 247)
- Engine DM1 BYTE 1:
 - Malfunction Indicator Lamp Status (SPN: 1213)
 - Red Stop Lamp Status (SPN: 623)
 - Amber Warning Lamp Status (SPN: 624)
 - Protect Lamp Status (SPN: 987)
- Engine DM1 BYTE2:
 - Flash Malfunction Indicator Lamp (SPN: 3038)
 - Flash Red Stop Lamp (SPN: 3039)
 - Flash Amber Warning Lamp (SPN: 3040)
 - Flash Protect Lamp (SPN: 3041)
- Engine DM1 zero error code
- Engine DM1 one error code
- Engine DM1 multiple error codes (up to 64)
- Engine DM2 BYTE 1:
 - Malfunction Indicator Lamp Status (SPN: 1213)
 - Red Stop Lamp Status (SPN: 623)
 - Amber Warning Lamp Status (SPN: 624)
 - Protect Lamp Status (SPN: 987)
- Engine DM2 BYTE2:
 - Flash Malfunction Indicator Lamp (SPN: 3038)
 - Flash Red Stop Lamp (SPN: 3039)



- Flash Amber Warning Lamp (SPN: 3040)
- Flash Protect Lamp (SPN: 3041)
- Engine DM2 Zero error code
- Engine DM2 one error code
- Engine DM2 multiple error codes (up to 64)
- Engine DM3 (Global Request)
- Engine DM3 (Specific Request)

1.5. List of Supported SAE J1708 Parameters

- Second Fuel Level (Right Side) (PID: 38)
- Attention/Warning Indicator Lamps Status (PID: 44)
- Road Speed (PID: 84)
- Percent Accelerator Pedal Position (PID: 91)
- Percent Engine Load (PID: 92)
- Fuel Level (PID: 95)
- Water in Fuel Indicator (PID: 97)
- Engine Oil Pressure (PID: 100)
- Boost Pressure (PID: 102)
- Intake Manifold Temperature (PID: 105)
- Engine Coolant Temperature (PID: 110)
- Battery Potential (Voltage) - Switched (PID: 158)
- Battery Potential (Voltage) (PID: 168)
- Fuel Rate (Instantaneous) (PID: 183)
- Instantaneous Fuel Economy (PID: 184)
- Engine Speed (RPM, PID: 190)
- Total Vehicle Distance (PID: 245)
- Total Engine Hours (PID: 247)
- Engine DM1
- Engine DM2



Chapter 2. AT Command

Au Combo Interpreter can interpret signals from the J1939 network and J1708 network into human-readable RS232 ASCII strings according to SAE J1939 and SAE J1708/J1587 specifications.

If a signal is not present on the J1939 network or J1708/J1587 network, the relative parameter string will not be available. This approach will maximize the efficiency of RS232 bandwidth (default: 115.2K baud rate). Each parameter received will be transmitting over RS232 port (115.2K baud rate) either in **compatible** format ("AT ") or **enhanced** format("AT8 " / "AT9 ").

In the **compatible** format, all signals received will be interpreted in strings started with "AT ";

In **enhanced** format, signals received will be differentiated depends on the signals' originated resources:

- If the received signal is from a J1708 network, interpreted string starts with "AT8 ".
- If the received signal is from a J1939 network, interpreted string starts with "AT9 ".

All the interpreted strings will display in the format as follows:

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

AT8 <Abbreviation>=<X.Y><Unit><CR>< LF>

AT9 <Abbreviation>=<X.Y><Unit><CR>< LF>

or

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

AT8 <Abbreviation>=<character><CR>< LF>

AT9 <Abbreviation>=<character><CR>< LF>

- It always started with "AT " or "AT8 " or "AT9 ", consisted of characters "A", "T" (or with a number 8 or number 9) and followed with **space character**,
- then **Abbreviation** of specific J1939 parameter or J1708 parameter,
- an equal sign "=",
- then digital number **<x.y>** for parameter values and **unit**, or **character** for information or status (e.g. ON/OFF or Disable/Enabled or Claimed/NotClaimed).
- Every single AT command ends with a carriage return **<CR>** and a line feed **<LF>**.

Note: In this document,

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

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

2.1. Device or Bus Running Status Parameters (6 total):

There are six device or bus running status parameters defined in Au Combo Interpreter: DV, J1708Bus, CANBUS, SADDRESS, CAN_MODE, CAN_BAUD.

When the device is powered up, it will broadcast these 6 parameters once. And then repeat every second by default (while inter-frame spacing is 0). They are always available as long as the device is power-on even when it is not connecting to CAN Bus or J1708 network.

***Repetition rate of each parameter is defined by SAE Standard. It represents the worst-case scenario and is for reference only. The actual rate on different vehicles may differ.**



Detailed information on these six parameters is in table 2-1.

Table 2 -1 Six Device or Bus Running Status Parameters

Abbreviation	Explanation	
DV	Description	Device Voltage
	Data range	12 ~ 24V nominal (Application dependent)
	Resolution	0.001 V
	Example	AT DV=14.096V\r\n --- Device voltage is 14.096 volt
J1708BUS	Description	SAE J1708 bus network status
	Data range	ON or OFF
	AT8 J1708BUS=ON\r\n	J1708 Bus is On
	AT8 J1708BUS=OFF\r\n	J1708 Bus is Off
CANBUS	Description	CAN bus network status
	Data range	ON or OFF
	AT9 CANBUS=ON\r\n	CAN Bus is On
	AT9 CANBUS=OFF\r\n	CAN Bus is Off
SADDRESS	Description	Source Address Claimed or Not Claimed
	Data range	CLAIMED or NOTCLAIMED
	AT9 SADDRESS=CLAIMED\r\n	Source Address is claimed
	AT9 SADDRESS=NOTCLAIMED\r\n	Source Address is not claimed
CAN_MODE	Description	CAN bus network status
	Data range	LISTEN_ONLY or NORMAL
	AT9 CAN_MODE=LISTEN_ONLY\r\n	Device on CAN Bus is in listen-only mode
	AT9 CAN_MODE=NORMAL\r\n	Device on CAN Bus is in normal mode
CAN_BAUD	Description	CAN bus network status
	Data range	62.5KBPS, 125KBPS, 250KBPS, 500KBPS, 1MBPS
	AT9 CAN_BAUD=250KBPS\r\n	Device CAN Baud Rate is 250K BPS
	AT9 CAN_BAUD=500KBPS\r\n	Device CAN Baud Rate is 500K BPS

2.2. Device Information Parameters (15 total):

There are 15 device information parameters: ID, FW, SN, CBS1, BRS, CBRS, SPACING, MID, EMID, TMID, BMID, SA, ESA, TSA, and BSA. When the device is powered up, it will broadcast these 15 device information parameters once. And then repeat every 30 seconds by default (while inter-frame spacing is 0). They are always available as long as the device is power-on even when it is not connecting to CAN Bus or J1708 network.

Please find detailed information about those 15 device information parameters in table 2-2.

Table 2 -2 15 Device Information Parameters (repeat every 30 seconds)

Abbreviation	Explanation	
ID	Description	Device ID
	Example	AT ID=COMBO INTERPRETER VEHICLE PLATINUM ED.\r\n --- the ID of this device is Combo interpreter Vehicle Platinum Edition
FW	Description	Firmware ID
	Example 1	AT FW=0.5M-TQ32K-BUILD00-Feb 07 2021-17:04:33 \r\n --- The Firmware ID of the device is 0.1A
SN	Description	Serial Number ID
	Data range	0 - 4294967295
	Example	AT SN=429\r\n --- The Serial Number of the device is 429



CBS1	Description	Device Configuration Byte 1, contains control bits status							
	Format	AT CBS1=0B00100001\r\n (bits 0 to 4 is configurable)							
	Example	AT CBS1=0B00100001							
	CBS1 Bit #	7	6	5	4	3	2	1	0
	Bit name	N/A	N/A	Auto CAN	Mute8E	Mute9E	Deep sleep	Standby sleep	Format
	Default	0	0	1	0	0	0	0	1
Received data is in enhanced format, Mute8E, Mute9E, Deep sleep, and Standby sleep are disabled. The status of Control bits 0 to 4 is configurable, please refer to table 2-4 for detailed information.									
BRS	Description	Serial port Baud Rate Setting							
	Data range	00 - 0A; default is 00 (default is 115200, reconfigurable when it is necessary)							
	Format	AT BRS=00-0A\r\n							
	Example	AT BRS=00\r\n ---Serial port baud rate is 115200							
CBRS	Description	CAN Baud Rate Setting							
	Data range	00 – 04; default is 00 (default is 250K, reconfigurable when it is necessary)							
	Format	AT CBRS=00-04\r\n							
	Example	AT CBRS=00\r\n ---Device CAN Bus baud rate is 250K							
SPACING	Description	Inter-frame Spacing Setting							
	Data range	0 ~ 65535 seconds (default is 0, reconfigurable when it is necessary)							
	Format	AT SPACING=0\r\n							
	Example	AT SPACING=0\r\n ---Inter-frame spacing is not set(default 0)							
MID	Description	Device message ID							
	Data range	128 - 250 (default is 172, reconfigurable when it is necessary)							
	Repetition	1 S							
	Example	AT8 MID = 172\r\n --- Device message ID is 172							
EMID	Description	Engine message ID							
	Data range	128 - 250 (default is 128; reconfigurable when it is necessary)							
	Example	AT8 EMID = 128\r\n --- Engine message ID is 128							
TMID	Description	Transmission message ID							
	Data range	128 - 250 (default is 130, reconfigurable when it is necessary)							
	Example	AT8 TMID = 130\r\n --- Transmission message ID is 130							
BMID	Description	ABS message ID							
	Data range	128 - 250 (default is 136 reconfigurable when it is necessary)							
	Example	AT8 BMID = 136\r\n --- ABS message ID is 136							
SA	Description	Device Source address (default is 249, reconfigurable when it is necessary)							
	Data range	0 – 253, most popular ones are 24, 37, 38, 40, 65, 249, 250, 251,252, 253.							
	Example	AT9 SA=249\r\n --- CAN Node Source Address is 249							
ESA	Description	Engine Source address (default is 0, reconfigurable when it is necessary)							
	Data range	0 – 253.							
	Example	AT9 ESA=0\r\n --- Engine Source Address is 0							
TSA	Description	Device Source address (default is 3, reconfigurable when it is necessary)							
	Data range	0 – 253							
	Example	AT9 TSA=3\r\n --- Transmission Source Address is 3							
BSA	Description	Device Source address (default is11, reconfigurable when it is necessary)							
	Data range	0 – 253							
	Example	AT9 BSA=11\r\n --- ABS Source Address is 11							

Repetition rate for above 15 parameters are 30S by default (spacing=0s), they can be inquired during run time



2.3. Device Information Inquiry Commands:

The values of the 15 device information parameters can be inquired during run time. Please find detailed information on how to get the value of those parameters in Table 2-3.

Table 2 -3 List of commands for Device Information Inquiry

Commands	Inquiry	Response
AT ID=?\r\n	Device ID inquiry	AT ID=COMBO INTERPRETER VEHICLE PLATINUM ED.
AT FW=?\r\n	Device Firmware inquiry	AT FW=0.5M-TQ32K-BUILD00-Feb 07 2021-17:04:33
AT SN=?\r\n	Device SN inquiry	AT SN=20001
AT SA=?\r\n	Source Address inquiry	AT9 SA=249
AT ESA=?\r\n	Engine SA inquiry	AT9 ESA=249
AT TSA=?\r\n	Transmission SA inquiry	AT9 TSA=249
AT BSA=?\r\n	ABS SA inquiry	AT9 BSA=249
AT SPACING=?\r\n	Inter-frame spacing inquiry	AT SPACING=0
AT MID=?\r\n	Message ID inquiry	AT8 MID=172
AT EMID=?\r\n	Engine MID inquiry	AT8 EMID=128
AT TMID=?\r\n	Transmission MID inquiry	AT8 TMID=130
AT BMID=?\r\n	ABS MID inquiry	AT8 BMID=136
AT BRS=??\r\n	RS232 Baud Rate inquiry	AT BRS=00 (RS232 baud rate is 115200)
AT CBRS=??\r\n	CAN Baud rate inquiry	AT CBRS=00 (Device CAN baud rate is 250K BPS)
AT MUTE8E=?\r\n	J1708 Data RS232 side Mute mode inquiry	AT CBS1=0B00100001 CBS1 bit 4 is 0, Mute8E is disabled
AT MUTE9E=?\r\n	J1939 Data RS232 side Mute mode inquiry	AT CBS1=0B00100001 CBS1 bit 3 is 0, Mute9E is disabled
AT DSLEEP=?\r\n	Deep sleep mode inquiry	AT CBS1=0B00100001 CBS1 bit 2 is 0, Deep sleep mode is disabled
AT SSLEEP=?\r\n	Standby sleep mode inquiry	AT CBS1=0B00100001 CBS1 bit 1 is 0, Standby sleep mode is disabled
AT FORMAT=?\r\n	received data format inquiry	AT CBS1=0B00100001 CBS1 bit 0 is 1, data in enhanced format, received J1939 data start as "AT9", J1708 parameters start as "AT8"
AT START8=?\r\n	J1708 transmitting on RS232 status inquiry	AT8 START8=0 J1708 transmitting on RS232 is stopped
AT START9=?\r\n	J1939 transmitting on RS232 status inquiry	AT9 START9=0 J1939 transmitting on RS232 is stopped

2.4. Device Information Setting Commands:

For the above 15 device information parameters, except for device ID, FW, and SN, all the other 12 parameters can be configured through UART commands. The commands to control the bit status of CBS1 are listed in table 2-4.

Table 2 -4 Control bits for CBS1

Command	Details						
MUTE8E	<p>Description J1708 Data RS232 side Mute mode</p> <p>Data range 0:(default); Mute 8 mode is off, J1708 data constant broadcast 1; Mute 8 mode is enabled, RS232 is in control of START8</p> <p>Format AT MUTE8E=0/1\r\n</p> <table border="1"> <thead> <tr> <th>Commands</th> <th>Response</th> </tr> </thead> <tbody> <tr> <td>AT MUTE8E=0\r\n</td> <td>15 device information commands will be broadcasted once. CBS1 bit 4 will be set to 0,(AT CBS1=0B001*0***)</td> </tr> <tr> <td>AT MUTE8E=1\r\n</td> <td>CBS1 will be broadcasted once. CBS1 bit 4 will be set to 1 (AT CBS1=0B001*1***)</td> </tr> </tbody> </table>	Commands	Response	AT MUTE8E=0\r\n	15 device information commands will be broadcasted once. CBS1 bit 4 will be set to 0,(AT CBS1=0B001*0***)	AT MUTE8E=1\r\n	CBS1 will be broadcasted once. CBS1 bit 4 will be set to 1 (AT CBS1=0B001*1***)
Commands	Response						
AT MUTE8E=0\r\n	15 device information commands will be broadcasted once. CBS1 bit 4 will be set to 0,(AT CBS1=0B001*0***)						
AT MUTE8E=1\r\n	CBS1 will be broadcasted once. CBS1 bit 4 will be set to 1 (AT CBS1=0B001*1***)						



MUTE9E	Description	J1939 Data RS232 side Mute mode
	Data range	0: (default); Mute 9 mode is off, J1939 data constant broadcast 1: Mute 9 mode is enabled, RS232 is in control of START9
	Format	AT MUTE9E=0/1\r\n
	Commands	Response
	AT MUTE9E=0\r\n	15 device information commands will be broadcasted once. CBS1 bit 3 will be set to 0,(AT CBS1=0B001* 0 ****)
	AT MUTE9E=1\r\n	CBS1 will be broadcasted once. CBS1 bit 3 will be set to 1 (AT CBS1=0B001* 1 ****)
DSLEEP	Description	Deep sleep mode
	Data range	0(default); Deep sleep mode is disabled; 1; Deep sleep mode is enabled,
	Format	AT DSLEEP=0/1\r\n
	Commands	Response
	AT DSLEEP =0\r\n	The device gets out of deep sleep mode and responds with CBS1 once. CBS1 bit 2 will be set to 0 (AT CBS1=0B001** 0 **)
	AT DSLEEP =1\r\n	The device deep sleep mode is enabled and responds with CBS1 once. CBS1 bit 2 will be set to 1(AT CBS1=0B000** 1 **) If there is no J1708 or J1939 data detected for 10 seconds, the device will get into deep sleep mode, in which it cannot wake up by either J1708 or J1939 data flow. It can only wake up by cranking the power supply in deep sleep mode.
SSLEEP	Description	Standby sleep mode
	Data Range	0(default): Standby sleep mode is disabled 1: Standby sleep mode is enabled
	Format	AT SSLEEP=0/1\r\n
	Commands	Response
	AT SSLEEP =0\r\n	The device gets out of standby sleep mode and responds with CBS1 once. CBS1 bit 1 will be set to 0 (AT CBS1=0B001**** 0 *)
	AT SSLEEP =1\r\n	The device standby sleep mode is enabled and responds with CBS1 once. CBS1 bit 1 will be set to 1(AT CBS1=0B000**** 1 *) If there is no J1708 or J1939 data detected for 10 seconds, device will get into standby sleep mode, and it can be wake up with either J1708 or J1939 data flow.
FORMAT	Description	Set received data format in either compatible or enhanced format
	Data range	0: Compatible format, parameter starts as "AT " 1(default): Enhanced format, parameter starts as "AT9 " or "AT8 "
	Format	AT FORMAT=0/1\r\n
	Commands	Response
	AT FORMAT =0\r\n	The device change data format to Compatible mode and responds with CBS1 once. CBS1 bit 0 will be set to 0,(AT CBS1=0B001**** 0) Both J1939 and J1708 parameters will started as "AT "
	AT FORMAT =1\r\n	The device change data format to Enhanced mode and responds with CBS1 once. CBS1 bit 0 will be set to 1 (AT CBS1=0B001**** 1) J1939 parameters start as "AT9 ", J1708 parameters start as "AT8 "
START8	Description	Start or stop J1708 transmitting on RS232
	Data range	0 : stop J1708 TX when Mute8E=1 ; 1(default): start J1708 TX when Mute8E=1
	Format	AT START8=0/1\r\n
	Commands	Response
	AT START8=0\r\n	When MUTE8E is enabled, AT START8=0 will stop J1708 TX
	AT START8=1\r\n	When MUTE8E is enabled, AT START8=1 will resume J1708 TX
START9	Description	Start or stop J1939 transmitting on RS232
	Data range	0: stop(default); 1: start
	Format	AT START9=0/1\r\n
	Commands	Response
	AT START9=0\r\n	When MUTE9E is enabled, AT START9=1 will stop J1939TX
	AT START9=1\r\n	When MUTE9E is enabled, AT START9=1 will resume J1939 TX



To summarize, the UART commands that change the bits of CBS1 are listed in Table 2 - 5.

Table 2 - 5 Setting Commands to change Control Bits of CBS1 (Control Bit Status 1)

Setting Command	Bit #	Response of CBS1	Effects
AT MUTE8E=0\r\n"	4	AT CBS1=0B0010****	Mute 8 mode is turned off
AT MUTE8E=1\r\n"	4	AT CBS1=0B0011****	Mute 8 mode is turned on
AT MUTE9E=0\r\n"	3	AT CBS1=0B001*0***	Mute 9 mode is turned off
AT MUTE9E=1\r\n"	3	AT CBS1=0B001*1***	Mute 9 mode is turned on
AT DSLEEP=0\r\n"	2	AT CBS1=0B001**0**	Deep sleep function is disabled
AT DSLEEP=1\r\n"	2	AT CBS1=0B001**1**	Deep sleep function is enabled
AT SSLEEP=0\r\n"	1	AT CBS1=0B001***0*	Standby sleep function is disabled
AT SSLEEP=1\r\n"	1	AT CBS1=0B001***1*	Standby sleep function is enabled
AT FORMAT=0\r\n"	0	AT CBS1=0B001****0	Received data is in the compatible format
AT FORMAT=1\r\n"	0	AT CBS1=0B001****1	Received data is in the enhanced format

UART setting commands for all other device information parameters can be found in table 2-6. Command "AT R\r\n" can be used to reset 11 device information parameters to factory default value (ID, FW, SN, BRS are excluded)

Table 2 – 6 UART Setting Commands for Other Device Information Parameters

Commands	Explanation																																				
BRS	<p>Description Serial port baud rate in-field change command Data range 00 - 0A; default is 00; Format AT BRS=00-0A\r\n</p> <table border="1"> <thead> <tr> <th>Setting</th> <th colspan="11">Value</th> </tr> <tr> <th>AT BRS=</th> <th>00</th> <th>01</th> <th>02</th> <th>03</th> <th>04</th> <th>05</th> <th>06</th> <th>07</th> <th>08</th> <th>09</th> <th>0A</th> </tr> </thead> <tbody> <tr> <td>Serial port Baud rate</td> <td>115200</td> <td>300</td> <td>1200</td> <td>2400</td> <td>4800</td> <td>9600</td> <td>14400</td> <td>19200</td> <td>28800</td> <td>38400</td> <td>57600</td> </tr> </tbody> </table> <p>Command "AT BRS=?\r\n" can be used to inquire the current serial port baud rate.</p>	Setting	Value											AT BRS=	00	01	02	03	04	05	06	07	08	09	0A	Serial port Baud rate	115200	300	1200	2400	4800	9600	14400	19200	28800	38400	57600
Setting	Value																																				
AT BRS=	00	01	02	03	04	05	06	07	08	09	0A																										
Serial port Baud rate	115200	300	1200	2400	4800	9600	14400	19200	28800	38400	57600																										
CBRS	<p>Description CAN Baud Rate Setting command Data range 00 – 04; default is 00; Format AT CBRS=00-04\r\n</p> <table border="1"> <thead> <tr> <th>Command</th> <th>Set Device CAN Baud Rate to</th> </tr> </thead> <tbody> <tr> <td>AT CBRS=00\r\n</td> <td>250K BPS</td> </tr> <tr> <td>AT CBRS=01\r\n</td> <td>62.5K BPS</td> </tr> <tr> <td>AT CBRS=02\r\n</td> <td>125K BPS</td> </tr> <tr> <td>AT CBRS=03\r\n</td> <td>500K BPS</td> </tr> <tr> <td>AT CBRS=04\r\n</td> <td>1M BPS</td> </tr> </tbody> </table> <p>Command "AT CBRS=?\r\n" can be used to inquire the current CAN baud rate.</p>	Command	Set Device CAN Baud Rate to	AT CBRS=00\r\n	250K BPS	AT CBRS=01\r\n	62.5K BPS	AT CBRS=02\r\n	125K BPS	AT CBRS=03\r\n	500K BPS	AT CBRS=04\r\n	1M BPS																								
Command	Set Device CAN Baud Rate to																																				
AT CBRS=00\r\n	250K BPS																																				
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AT CBRS=03\r\n	500K BPS																																				
AT CBRS=04\r\n	1M BPS																																				
R	<p>Description Reset device information parameters to default (except for ID, FW, SN, and BRS) Format AT R\r\n</p> <table border="1"> <thead> <tr> <th>Reset Command</th> <th>Reset Parameter</th> <th>Reset to factory default value</th> </tr> </thead> <tbody> <tr> <td rowspan="11">AT R\r\n</td> <td>SPACING</td> <td>0</td> </tr> <tr> <td>CBS1</td> <td>0B00100001</td> </tr> <tr> <td>MID</td> <td>172</td> </tr> <tr> <td>EMID</td> <td>128</td> </tr> <tr> <td>TMID</td> <td>130</td> </tr> <tr> <td>BMID</td> <td>136</td> </tr> <tr> <td>SA</td> <td>249</td> </tr> <tr> <td>ESA</td> <td>0</td> </tr> <tr> <td>TSA</td> <td>3</td> </tr> <tr> <td>BSA</td> <td>11</td> </tr> <tr> <td>CBRS</td> <td>00</td> </tr> </tbody> </table> <p>ID, FW, SN and BRS will not be reset. BRS is configurable by command "AT BRS=00-0A\r\n"</p>	Reset Command	Reset Parameter	Reset to factory default value	AT R\r\n	SPACING	0	CBS1	0B00100001	MID	172	EMID	128	TMID	130	BMID	136	SA	249	ESA	0	TSA	3	BSA	11	CBRS	00										
Reset Command	Reset Parameter	Reset to factory default value																																			
AT R\r\n	SPACING	0																																			
	CBS1	0B00100001																																			
	MID	172																																			
	EMID	128																																			
	TMID	130																																			
	BMID	136																																			
	SA	249																																			
	ESA	0																																			
	TSA	3																																			
	BSA	11																																			
	CBRS	00																																			



SPACING	Description	Inter-frame Spacing setting command	
	Data range	0 ~ 65535 seconds; default is 0;	
	Format	AT SPACING=0 - 65535\r\n	
		Spacing Setting Command	Set Inter-frame spacing to
		AT SPACING=10\r\n	10 Seconds
		AT SPACING=60\r\n	60 Seconds
		AT SPACING=100\r\n	100 Seconds
	AT SPACING=3600\r\n	3600 Seconds	
	AT SPACING=65535\r\n	65535 Seconds	
	Command "AT SPACING=?\r\n" can be used to inquire about the current Transmission MID.		
MID	Description	New Device Message ID Setup Command (default is 172)	
	Data range	128 – 250 (other frequently used MID are 140, 141, 142, 154, 179, 180, 221)	
	Format	AT MID=128-250\r\n	
		AT MID=180\r\n --- Device MID will be set to 180 (Off-board Diagnostics #2)	
	Command "AT MID=?\r\n" can be used to inquire about the current Device MID.		
EMID	Description	New Engine MID Setup Command	
	Data range	0 - 5; default value is 0 (default Engine MID 128)	
	Format	AT EMID=0-5\r\n	
		EMID Setting Command	Set Engine MID to
		AT EMID=0\r\n	128
		AT EMID=1\r\n	175
		AT EMID=2\r\n	183
	AT EMID=3\r\n	184	
	AT EMID=4\r\n	185	
	AT EMID=5\r\n	186	
	Command "AT EMID=?\r\n" can be used to inquire about the current Engine MID.		
TMID	Description	New Transmission MID Setup Command	
	Data range	0 - 2; Default value is 0 (default Transmission MID is 130)	
	Format	AT TMID=0-2\r\n	
		TMID Setting Command	Set Transmission MID to
		AT TMID=0\r\n	130
	AT TMID=1\r\n	176	
	AT TMID=2\r\n	223	
	Command "AT TMID=?\r\n" can be used to inquire about the current Transmission MID.		
BMID	Description	New ABS MID Setup Command	
	Data range	0 – 5; Default value is 0 (default ABS MID is 136)	
	Format	AT BMID=0 - 5\r\n	
		BMID Setting Command	Set ABS MID to
		AT BMID=0\r\n	136
		AT BMID=1\r\n	137
		AT BMID=2\r\n	138
	AT BMID=3\r\n	139	
	AT BMID=4\r\n	246	
	AT BMID=5\r\n	247	
	Command "AT BMID=?\r\n" can be used to inquire the current ABS MID.		
SA	Description	New Source Address Setup Command (default is 249)	
	Data range	0 – 253 (most popular SA are 24, 37, 38, 40, 65, 249, 250, 251,252, 253)	
	Format	AT SA=0-253\r\n	
		e.g. AT SA=250\r\n --- set Device source address to 250 (off board diagnostic service tool #2).	



ESA	Description	Changes to-be-received (Rx, J1939) Engine's Source Address																				
	Data range	0 – 7; default Engine source address is 0;																				
	Format	AT ESA=0-7\r\n																				
	<table border="1"> <thead> <tr> <th>ESA Setting Command</th> <th>Change RX Engine Source Address to</th> </tr> </thead> <tbody> <tr> <td>AT ESA=0\r\n</td> <td>0</td> </tr> <tr> <td>AT ESA=1\r\n</td> <td>1</td> </tr> <tr> <td>AT ESA=2\r\n</td> <td>239</td> </tr> <tr> <td>AT ESA=3\r\n</td> <td>240</td> </tr> <tr> <td>AT ESA=4\r\n</td> <td>241</td> </tr> <tr> <td>AT ESA=5\r\n</td> <td>231</td> </tr> <tr> <td>AT ESA=6\r\n</td> <td>232</td> </tr> <tr> <td>AT ESA=7\r\n</td> <td>233</td> </tr> </tbody> </table>		ESA Setting Command	Change RX Engine Source Address to	AT ESA=0\r\n	0	AT ESA=1\r\n	1	AT ESA=2\r\n	239	AT ESA=3\r\n	240	AT ESA=4\r\n	241	AT ESA=5\r\n	231	AT ESA=6\r\n	232	AT ESA=7\r\n	233		
	ESA Setting Command	Change RX Engine Source Address to																				
	AT ESA=0\r\n	0																				
	AT ESA=1\r\n	1																				
	AT ESA=2\r\n	239																				
	AT ESA=3\r\n	240																				
	AT ESA=4\r\n	241																				
AT ESA=5\r\n	231																					
AT ESA=6\r\n	232																					
AT ESA=7\r\n	233																					
Command "AT ESA=?\r\n" can be used to inquire about the current Engine Source Address.																						
BSA	Description	Changes the to-be-received (Rx, J1939) ABS source address																				
	Data range	0 – 8; default is 0 (default ABS source address is 11);																				
	Format	AT BSA=0-8\r\n																				
	<table border="1"> <thead> <tr> <th>BSA Setting Command</th> <th>Change RX ABS Source Address to</th> </tr> </thead> <tbody> <tr> <td>AT BSA=0\r\n</td> <td>11</td> </tr> <tr> <td>AT BSA=1\r\n</td> <td>12</td> </tr> <tr> <td>AT BSA=2\r\n</td> <td>13</td> </tr> <tr> <td>AT BSA=3\r\n</td> <td>14</td> </tr> <tr> <td>AT BSA=4\r\n</td> <td>202</td> </tr> <tr> <td>AT BSA=5\r\n</td> <td>194</td> </tr> <tr> <td>AT BSA=6\r\n</td> <td>186</td> </tr> <tr> <td>AT BSA=7\r\n</td> <td>178</td> </tr> <tr> <td>AT BSA=8\r\n</td> <td>170</td> </tr> </tbody> </table>		BSA Setting Command	Change RX ABS Source Address to	AT BSA=0\r\n	11	AT BSA=1\r\n	12	AT BSA=2\r\n	13	AT BSA=3\r\n	14	AT BSA=4\r\n	202	AT BSA=5\r\n	194	AT BSA=6\r\n	186	AT BSA=7\r\n	178	AT BSA=8\r\n	170
	BSA Setting Command	Change RX ABS Source Address to																				
	AT BSA=0\r\n	11																				
	AT BSA=1\r\n	12																				
	AT BSA=2\r\n	13																				
	AT BSA=3\r\n	14																				
	AT BSA=4\r\n	202																				
AT BSA=5\r\n	194																					
AT BSA=6\r\n	186																					
AT BSA=7\r\n	178																					
AT BSA=8\r\n	170																					
Command "AT BSA=?\r\n" can be used to inquire about the current ABS Source Address.																						
TSA	Description	Changes the to-be-received (Rx, J1939) Transmission source address																				
	Data range	0 – 1; default is 0 (default transmission source address is 3);																				
	Format	AT TSA=0-1\r\n																				
	<table border="1"> <thead> <tr> <th>TSA Setting Command</th> <th>Change RX Transmission SA to</th> </tr> </thead> <tbody> <tr> <td>AT TSA=0\r\n</td> <td>3</td> </tr> <tr> <td>AT TSA=1\r\n</td> <td>4</td> </tr> </tbody> </table>		TSA Setting Command	Change RX Transmission SA to	AT TSA=0\r\n	3	AT TSA=1\r\n	4														
TSA Setting Command	Change RX Transmission SA to																					
AT TSA=0\r\n	3																					
AT TSA=1\r\n	4																					

2.5. Supported J1939 Parameters

Supported J1939 parameters will be transmitted through the RS232 port only when they are received. The device will keep quiet if the corresponding parameter is not present on the J1939 network.

The description, Suspect Parameter Number(SPN), Parameter Group Number(PGN), resolution, and repetition of all supported J1939 parameters are explained in Table 2-6. One or more examples are given for each parameter.

Table 2 – 6 Supported J1939 Parameters

Abbreviation	Explanation of J1939 Parameters	
ACC%	Description	Accelerator Pedal Position 1
	SPN	91
	PGN	61443 (0xF003)
	Unit	%
	Resolution	0.10%
	Repetition	200 mS
	e.g. AT9 ACC%=100.0%\r\n	
	---The ratio of actual position to the maximum position of an accelerator pedal is 100%.	



BOOSTP	Description SPN PGN Unit Resolution Repetition AT9 BOOSTP=72.50PSI\r\n	Engine Turbocharger Boost Pressure 102 65270 (0xFE6) PSI: (Pound per Square Inch) 0.01 PSI 1 S <i>--- Engine Boost pressure is 72.5 PSI.</i>
ECT	Description SPN PGN Resolution Repetition AT9 ECT=410.0F\r\n	Engine Coolant Temperature 110 65262 (0xFEE) 0.1 F 1S <i>--- Engine Coolant Temperature is 410.0 Degree F.</i>
EFUELRATE	Description SPN PGN Resolution Repetition AT9 EFUELRATE=848.7GPH\r\n	Engine Fuel Rate 183 65266 (0xFE2) 0.1 GPH: (Gallon Per Hour) 200 mS <i>---Engine Fuel rate is 848.7Gallon per hour.</i>
ELOAD%	Description SPN PGN Resolution Repetition AT9 ELOAD%=125%\r\n	Engine Percent Load at Current Speed 92 61443 (0xF03) 1% 200 mS <i>--- Engine Load % at current speed is 125%.</i>
ODO	Description SPN PGN Resolution Repetition AT9 ODO=621372.1MILE\r\n	Total Vehicle Distance 245 65248 (0xFEE0) 0.1 mile 1 S <i>--- Accumulated distance traveled by vehicle during its operation is 621375.1 miles.</i>
EOILP	Description SPN PGN Resolution Repetition AT9 EOILP=145.00PSI\r\n	Engine Oil Pressure 100 65263 (0xFEEF) 0.01 PSI 1 S <i>--- Engine oil pressure is 145.00 PSI.</i>
FUEL1%	Description SPN PGN Resolution Repetition AT9 FUEL1%=100.0%\r\n	Fuel Level 1 96 65276 (0xFEFC) 0.1% 1 S <i>---Ratio of fuel volume to the total volume of fuel storage container is 100%.</i>
FUEL2%	Description SPN PGN Resolution Repetition AT9 FUEL2%=100.0%\r\n	Fuel Level 2 38 65276 (0xFEFC) 0.1% 1 S <i>--- Ratio of volume of fuel to the total volume of fuel in the second or right-side storage container is 100%.</i>



HR	Description SPN PGN Resolution Repetition AT9 HR=45208.0HR\r\n	Engine Total Hours of Operation 247 65253 (0xFEE5) 0.1 HR: (Hours) 30 S, it can also be request by sending the "AT9 HR=?\r\n" command <i>--- Total hours of Engine Operation is 45208.0 hours.</i>
HR_TRIP_D	Description SPN PGN Resolution Repetition AT9 HR_TRIP_D=21055406.075KM\r\n	High resolution trip distance 918 65217 (0xFEC1) 0.001KM 1 S <i>--- High resolution trip distance is 21055406.075KM.</i>
HR_TVD	Description SPN PGN Resolution Repetition AT9 HR_TVD=21055406.075KM\r\n	High Resolution Total Vehicle Distance 917 65217 (0xFEC1) 0.001KM 1 S <i>--- High resolution total vehicle distance is 21055406.075KM.</i>
IAT	Description SPN PGN Resolution Repetition e.g. AT9 IAT=410.0F\r\n	Engine Intake Manifold 1 Temperature 105 65270 (0xFE6) 0.1 F 1 S <i>--- Engine Intake Manifold 1 Temperature is 410.0 F.</i>
INST_MPG	Description SPN PGN Resolution Repetition e.g. AT9 INST_MPG=295.2MPG\r\n	Engine Instantaneous Fuel Economy 184 65266 (0xFE2) 0.1 MPG: (Mile per Gallon) 200 mS <i>-- Engine Instantaneous Fuel Economy is 295.2 MPG.</i>
MPH	Description SPN PGN Resolution Repetition AT9 MPH=31.19MPH\r\n	Wheel Based Vehicle Speed 84 65265 (0x0FE1) 0.01 MPH: (Miles/Hour) 100 mS <i>---Speed of the vehicle as calculated from wheel speed is 31.19 miles/hour.</i>
RPM	Description SPN PGN Resolution Repetition AT9 RPM=8031.87RPM\r\n	Engine Speed 190 61444 (0xF004) 0.01 RPM (Revolutions Per Minute) 100 mS (RPM will show up every 100 milliseconds) <i>--- Engine speed is 8031.87 revolutions/minute</i>
VIN	Description SPN PGN Repetition AT9 VIN=1M8GDM9AXKP042061\r\n	Vehicle Identification Number (VIN) 237 61444 (0xF004) 30 S <i>--Vehicle Identification Number</i>



VOLT	Description	Battery Potential / Power Input 1
	SPN	168
	PGN	65271 (0xFE7)
	Resolution	0.1 V (Volt)
	Repetition	1 S
	AT9 VOLT=7.5V\r\n --- The first source of battery potential measured at the input of the ECM coming from one or more batteries is 7.5V	
VOLT_SWITCHED	Description	Key-switch Battery Potential (obsolete: Battery Potential (Voltage), Switched)
	SPN	158
	PGN	65271 (0xFE7)
	Resolution	0.01 V: (Volt)
	Repetition	1 S
	AT9 VOLT_SWITCHED=3212.75V\r\n --- Switched battery potential voltage is 3212.75 volt	
WIF	Description	Water in fuel Indicator
	SPN	97
	PGN	65279 (0xFEFF)
	Data	NO/YES
	Repetition	1 S
	AT9 WIF=YES\r\n --- Signal indicates there is water in the fuel	

Table 2 - 7 J1939 Engine DM1 and DM2 Parameters

Abbreviation	Explanation				
EDM1B1	Description	Engine DM1 BYTE 1 (4 SPNs)			
	SPN	1213, 623, 624, 987			
	Repetition	1 S; PGN: 65226			
	Data Range	00 (off), 01 (on), 10 (Reserved), 11 (Not available)			
	The MSB (most significant bit) position is bit8, the LSB position is bit1.				
	e.g. AT EDM1B1=0B00010100\r\n				
	Bit	Bit 8 - 7	Bit 6 - 5	Bit 4 - 3	Bit 2 - 1
	Lamp	Malfunction Indicator Lamp	Red Stop Lamp	Amber Warning Lamp	Protect Lamp
	SPN	1213	623	624	987
	Data	00	01	01	00
	Lamp Status	Off	On	On	Off
	--- Malfunction indicator lamp and protect lamp are off; red stop lamp and amber warning lamp are ON				
EDM1B2	Description	Engine DM1 BYTE 2 (4 SPNs)			
	Repetition	1 S; PGN: 65226; SPN: 3038, 3039, 3040, 3041			
	Data Range	00 (off), 01 (on), 10 (Reserved), 11 (Not available)			
	AT EDM1B2=0B11111111\r\n --- Flash Malfunction indicator lamp, flash red stop lamp, flash amber warning lamp and flash protect lamp do not flash / unavailable				
	The MSB (most significant bit) position is bit8, the LSB position is bit1.				
	Bit	Bit 8 - 7	Bit 6 - 5	Bit 4 - 3	Bit 2 - 1
	Lamp	Flash Malfunction Indicator Lamp	Flash Red Stop Lamp	Flash Amber Warning Lamp	Flash Protect Lamp
	SPN	3038	3039	3040	3041
	Data	11	11	11	11
	Lamp Status	Unavailable / Do Not Flash	Unavailable / Do Not Flash	Unavailable / Do Not Flash	Unavailable / Do Not Flash



EDM1 **EDM1[0/0]** Engine DM1 Zero error code
EDM1[1/1] Engine DM1 one error code
EDM1[X/Y] Engine DM1 multiple error code, up to 64, X is the error code's sequential number, Y is the total number of error codes.
PGN 65226
Repetition 1 S
Data Format **AT EDM1[X/Y]=SPN, FMI, OC, CM**

AT EDM1[0/0]=0,0,0,0\r\n	Engine DM1 zero error code
AT EDM1[1/1]=168,1,1,0, \r\n	Engine DM1 one error code
AT EDM1[1/64]=110,0,1,0, \r\n	1st error code of 64 total Engine DM1 error code
AT EDM1[54/64]=102,21,1,0, \r\n	54th error code of 64 total Engine DM1 error code

	SPN	FMI	OC	CM
EDM1[0/0]	0	0	0	0
EDM1[1/1]	168	1	1	0
EDM1[1/64]	110	0	1	0
EDM1[54/64]	102	21	1	0

EDM2B1 Description Engine DM2 BYTE 1 (4 SPNs)
Repetition 1 S
SPN 1213, 623, 624, 987
Data Range 00 (off), 01 (on), 10 (Reserved), 11 (Not available)
PGN 65227
e.g. **AT EDM2B1=0B00010100\r\n**

Bit	Bit 8 - 7	Bit 6 - 5	Bit 4 - 3	Bit 2 - 1
Lamp	Malfunction Indicator Lamp	Red Stop Lamp	Amber Warning Lamp	Protect Lamp
SPN	1213	623	624	987
Data	00	01	01	00
Lamp Status	Off	On	On	Off

EDM2B2 Description Engine DM2 BYTE 2 (4 SPNs)
Repetition 1 S
Data Range 00 (off), 01 (on), 10 (Reserved), 11 (Not available)
SPN 3038, 3039, 3040, 3041
PGN 65227
e.g. **AT EDM2B2=0B11111111\r\n**

Bit	Bit 8 - 7	Bit 6 - 5	Bit 4 - 3	Bit 2 - 1
Lamp	Flash Malfunction Indicator Lamp	Flash Red Stop Lamp	Flash Amber Warning Lamp	Flash Protect Lamp
SPN	3038	3039	3040	3041
Data	11	11	11	11
Lamp Status	Unavailable / Do Not Flash	Unavailable / Do Not Flash	Unavailable / Do Not Flash	Unavailable / Do Not Flash



EDM2	EDM2[0/0]	Engine DM2 Zero error code
	EDM2[1/1]	Engine DM2 one error code
	EDM2[X/Y]	Engine DM2 multiple error code, up to 64 sets of error codes, X is the error code's sequential number, Y is the total number of error codes.
	PGN	65227
	Data Range	00 (off), 01 (on), 10 (Reserved), 11 (Not available)
	Repetition	1 S
	e.g. AT EDM2[0/0]=0,0,0,0\r\n --- Engine DM2 zero error code	
	AT EDM2[1/1]=110,0,1,0, \r\n --- Engine DM2 one error code	
	AT EDM2[1/9]=1172,0,1,0, \r\n --- The 1 st Engine DM2 error code out of 9 total error codes.	
	AT EDM2[5/9]=100,4,5,0, \r\n --- The 5 th Engine DM2 error code out of 9 total error codes.	

	SPN	FMI	OC	CM
EDM2[0/0]	0	0	0	0
EDM2[1/1]	110	0	1	0
EDM2[1/9]	1172	0	1	0
EDM2[5/9]	100	4	5	0

2.6. Supported J1708 Parameters

There are 20 most popular J1708/J1587 parameters supported by Au Combo Interpreter.

Note: These parameters will only be transmitted on the RS232 bus when the related parameters are received. The device will keep quiet when the related parameter is not present on the J1708/J1587 network.

Table 2 – 8 Supported J1708/J1587 Parameters

Abbreviation	Explanation				
ACC%	Description	Accelerator Pedal Position (%)			
	PID	91			
	Data Range	0.0 ~ 102.0%			
	Resolution	0.1			
	Repetition	0.1 S			
	Example	AT8 ACC%=102.0%\r\n --- Accelerator pedal position at 102.0%.			
BOOSTP	Description	Boost Pressure			
	PID	102			
	Data Range	0.0 ~ 31.875 PSI			
	Repetition	1 S			
Example	AT8 BOOSTP=31.875PSI\r\n --- Boost Pressure is 31.875 PSI.				
EAWILS	Description	Attention/Warning Indicator Lamps Status			
	PID	44			
	Data Range	00 (off), 01 (on), 10 Error condition 11 (Not available)			
	Example	AT8 EAWILS=0B11010101\r\n			
	Bit	Bit 8 - 7	Bit 6 - 5	Bit 4 - 3	Bit 2 - 1
	Lamp	Reserved	Protect lamp status	Amber lamp status	Red lamp status
Data	11	01	01	01	
Lamp Status	Reserved	Protect lamp is On	Amber lamp is On	Red lamp is On	
ECT	Description	Engine Coolant Temperature			
	PID	110			
	Resolution	1 F			
	Repetition	1S			
	Example	AT8 ECT=255F\r\n --- Engine Coolant Temperature is 255 Degree F.			



EFUELRATE	Description PID Resolution Repetition Example	Engine Fuel Rate (Instantaneous) 183 0.01 Gallon Per Hour) 200 mS AT8 EFUELRATE=1023.98GPH\r\n ---Engine Fuel rate is 1023.98 Gallon per hour.
ELOAD%	Description PID Resolution Repetition Example	Percent Engine Load 92 0.10% 100 mS AT ELOAD%=127.5%\r\n --- Engine Load % at current speed is 127.5%.
EODO	Description PID Data Range Resolution Repetition Example	Total Vehicle Distance 245 0.0 ~ 429,496,729.5mile 0.1 mile 10 S AT8 EODO=1000000.0MILE\r\n --- Total vehicle distance is 1000000 mile.
EOILP	Description PID Resolution Repetition Example	Engine Oil Pressure 100 0.1 PSI 1 S AT8 EOILP=127.5PSI\r\n --- Engine oil pressure is 127.5 PSI.
FUEL%	Description PID Data Range Resolution Repetition Example	Fuel Level 96 0.0-127.5% 0.5% 10 S AT FUEL%=127.5%\r\n --- Fuel level is at 127.5%.
FUEL2%	Description PID Data Range Resolution Repetition Example	Second Fuel Level (Right Side) (%) 38 0.0-127.5% 0.5% 10 S AT8 FUEL2%=127.5%\r\n --- Second Fuel level (right side) is at 127.5%.
HR	Description PID Resolution Repetition Request 1 Request 2 Example	Total Engine Hours 247 (Hex F7) 0.1 Hr(Hour) On request(device sends out request automatically every 30s when spacing=0) AT HR=?\r\n AT 8RQS0 00F7\r\n AT8 HR=45208.0HR\r\n ---- Total hours of Engine Operation is 45208.0 hours.
IAT	Description PID Data Range Resolution Repetition Example	Intake Manifold Temperature 105 0 - 255 F 1 F 1 S AT8 IAT=255F\r\n --- Intake Manifold Temperature is 255 Degree F.
INST_MPG	Description PID Data Range Resolution Repetition Example	Instantaneous Fuel Economy 184 0.0 to 255.996mpg (Mile per Gallon) 1/256 mpg 0.2 S AT8 INST_MPG=255.996MPG\r\n ---Instantaneous Fuel Economy is 255.996 mpg



MPH	Description PID Data Range Resolution Repetition Example	Road Speed 84 0.0 to 127.5MPH (Mile/Hour) 0.5 MPH 100 mS AT8 MPH=127.5MPH\r\n --- Road speed is 127.5 Mile per hour (MPH).
RPM	Description PID Resolution Repetition Example	Engine Speed 190 0.01 RPM (Revolutions Per Minute) 100 mS (RPM will show up every 100 milliseconds) AT RPM=16383.75RPM\r\n --- Engine speed is 16383.75 revolutions/minute.
TOTAL_FUEL_USED	Description PID Data Range Repetition Request Example	TOTAL FUEL USED 250 (Hex: FA) 0.0 to 536870911.9 gal On Request, the device will send out request automatically every 10 seconds when spacing is not set (spacing=0) AT 8RQS0 00FA\r\n AT8 TOTAL_FUEL_USED=8911.875GAL\r\n ---Accumulated amount of fuel used during vehicle operation is 8911.875 gallon
VIN	Description PID Repetition Request Example	Vehicle Identification Number (VIN) 237 (Hex ED) On request(device sends out request automatically every 30s when spacing=0) AT VIN=?\r\n AT 8RQS0 00ED\r\n AT8 VIN=1M8GDM9AXKP042100\r\n ---Vehicle Identification Number is 1M8GDM9AXKP042100
VOLT	Description PID Data Range Resolution Repetition Example	Battery Potential (Voltage) (V) 168 0.0-3276.75V 0.05V 1 S AT8 VOLT=3276.75V\r\n --- Battery Potential (Voltage) is 3276.75 volts
VOLT_SWITCHED	Description PID Data Range Resolution Repetition Request	Battery Potential (Voltage) Switched (V) 158 (Hex 9E) 0.0-3276.75V 0.05V On request(device sends out request automatically every 30s when spacing=0) AT 8RQS0 009E\r\n
		AT8 VOLT_SWITCHED=3276.75V\r\n Battery Potential (Voltage) Switched is 3276.75 volts
WIF	Description PID Data Repetition Example	Water in fuel Indicator 97 NO/YES 10 S e.g. AT8 WIF=YES\r\n --- Signal indicates there is water in the fuel

2.7. UART Request Commands

Au Combo Interpreter is designed to send global requests automatically on J1939 network and J1708/J1587 network every 30 seconds, such as Engine Hour, Vehicle Identification Number(VIN), Battery Potential (Voltage) Switched (V). This feature make it works very well with many listen-only devices.

Au Combo Interpreter is also able to send out global request or specific request manually so that the requested information can be broadcasted at desired time.



For a J1708/J1587 network, the typical global request command is **8RQS0.**, and the specific request command is **8RQS1.**

For a J1939 network, the typical global request command is **9RQS0.**, and the specific request command is **RQS1.**

Au Combo Interpreter provides another fast way to request Engine Hour(HR) and Vehicle Identification Number(VIN). After receiving command "**AT HR=?\r\n**", Au Combo Interpreter will response with current engine hour if this parameter is present and available on J1939 network or J1708 network.

After receiving command "**AT VIN=?\r\n**", Au Combo Interpreter will respond with VIN if this information is present and available on J1939 network or J1708 network.

Table 2 – 9 UART Request Commands

8RQS0	Description	Send 59904 Global Request for PGN 0xABCD	
	Format	AT 8RQS0 ABCD\r\n Note: ABCD must in Hex format	
	Request commands	Function	
	AT 8RQS0 00F7\r\n	Send global request for engine Hour PID 00F7 (257)	
AT 8RQS0 009E\r\n	Send global request for Battery Potential (Voltage), Switched PID 009E (158)		
9RQS0	Description	Send 59904 Global Request for PGN 0xABCD	
	Format	AT 9RQS0 ABCD\r\n Note: ABCD must in Hex format	
	UART Request commands	function	
	AT 9RQS0 FECC\r\n	Send global request (DM3) to clear DM2 diagnostic data	
AT 9RQS0 FEE6\r\n	Send global request for Time/Date PGN FEE6 (65254)		
8RQS1	Description	Send 59904 specific Request to a specific target Node (0xEF) for PGN 0xABCD	
	Format	AT 8RQS1 ABCD EF\r\n (Note: ABCD, EF must in Hex format)	
	Request commands	Function	
	AT 8RQS1 FECC 00\r\n	Send specific request for DM3 (0xFECC) to engine (0x00) for clearing DM2 diagnostic data	
AT 8RQS1 00F7 80\r\n	Send specific request for engine Hour(0x00F7) to MID 80		
9RQS1	Description	Send 59904 specific Request to a specific target Node (0xEF) for PGN 0xABCD	
	Format	AT 9RQS1 ABCD EF (Note: ABCD, EF must in Hex format)	
	Request commands	Function	
	AT 9RQS1 FEE5 00\r\n	Send specific request to Engine(00) ask for engine hour from PGN FEE5 (65253)	
AT 9RQS1 FEE6 00\r\n	Send specific request to Engine(00) ask for Time/Date from PGN FEE6 (65254)		
AT 9RQS1 FECC 00\r\n	Send specific request to engine(00) ask for DM3 (0xFECC) to clear DM2 diagnostic data		
8RQS2	Description	Send PID195 to clear /reset the counts of all diagnostic code on the device with the specific MID address; If a PID196 is received (e.g. "MID 196, 2, 0, 0xBF, cksum") , it will acknowledge with "ACK RQS2\r\n".	
	Format	AT 8RQS2 AB\r\n (Note: AB must in Hex format)	
	Example	AT 8RQS2 80\r\n --- clear all engine diagnostic codes.	
HR	Description	Engine Hour Request Command	
	Format	AT HR=?\r\n	
	Request commands	Response	
AT HR=?\r\n	AT8 HR=1235 AT9 HR=1235		
VIN	Description	Vehicle Identification Number (VIN) Request Command	
	Format	AT VIN=?\r\n	
	Request commands	Response	
AT VIN=?\r\n	AT8 VIN=1M8GDM9AXKP042100 AT9 VIN=1M8GDM9AXKP042100*		



2.8. Received Data Example

At the time when Au Combo Interpreter is powered on, the following 15 commands will broadcast once:

```
AT ID=COMBO INTERPRETER VEHICLE PLATINUM ED.  
AT FW=0.5M-TQ32K-BUILD00-Feb 07 2021-17:04:33  
AT SN=20001  
AT CBS1=0B00100001  
AT BRS=00  
AT CBRs=03  
AT SPACING=10  
AT8 MID=172  
AT8 EMID=128  
AT8 TMID=130  
AT8 BMID=136  
AT9 SA=249  
AT9 ESA=0  
AT9 TSA=3  
AT9 BSA=11
```

The following 6 parameters will be broadcasted every one second as long as the device is powered on, it is not necessary to connect the device to CAN bus or J1708/J1587 network to display these 6 parameters.

```
AT DV=14.075V  
AT8 J1708BUS=OFF  
AT9 CANBUS=OFF  
AT9 SADDRESS=NOTCLAIMED  
AT9 CAN_MODE=LISTEN_ONLY  
AT9 CAN_BAUD=250KBPS
```

During run time, if both J1939 and J1708 signals presented, following examples of interpreted strings might show up, noticed that some strings started with AT8, others started with AT9:

```
AT9 CAN_BAUD=250KBPS  
AT8 EDM1[17/18]=85,180,9  
AT9 RPM=7951.50RPM  
AT9 ELOAD%=123%  
AT8 RPM=15964.50RPM  
AT8 MPH=126.0MPH  
AT8 ELOAD%=126.0%  
AT8 EFUELRATE=975.78GPH  
AT8 INST_MPG=253.433MPG  
AT8 EDM1[18/18]=168,161,127  
AT8 ACC1%=100.8%  
AT9 MPH=154.40MPH  
AT9 EFUELRATE=809.3GPH  
AT9 INST_MPG=284.9MPG  
AT9 EODO=590427.8MILE  
AT9 ACC1%=98.8%  
AT9 ELOAD%=123%  
AT8 ACC1%=100.8%  
AT9 MPH=154.40MPH  
AT9 ELOAD%=123%  
AT9 EFUELRATE=809.3GPH  
AT9 INST_MPG=284.9MPG
```

By default, Au Combo Interpreter is set at **Enhanced format**, it can be switched to **Compatible format** by sending a command "AT FORMAT=0/r/n".

During run time in compatible format, if there is J1939 data presented on the J1939/CAN network, following AT strings (with different values) might show up:



```
AT RPM=7951.50RPM
AT MPH=154.40MPH
AT ELOAD%=123%
AT EFUELRATE=809.3GPH
AT INST_MPG=284.9MPG
...
AT EODO=590427.8MILE
AT ACC1%=98.8%
AT RPM=7951.50RPM
AT ELOAD%=123%
AT RPM=7951.50RPM
AT MPH=154.40MPH
AT ECT=404.6F
```

During run time in compatible format, if there is J1708 data presented on the J1708 network, following AT strings (with different values) might show up:

```
AT RPM=15964.50RPM
AT MPH=126.0MPH
AT ECT=252F
AT EOILP=126.0PSI
AT ELOAD%=126.0%
AT EFUELRATE=975.78GPH
AT INST_MPG=253.433MPG
AT BOOSTP=31.500PSI
AT VOLT=3114.60V
...
AT IAT=252F
AT EAWILS=0B11010101
AT EDM1[4/18]=96,35
AT EDM2[4/4]=106,194,20
AT ACC1%=100.8%
AT RPM=15964.50RPM
AT MPH=126.0MPH
AT ELOAD%=126.0%
AT HR=950049.0HR
AT VOLT_SWITCHED=3114.50V
AT EDM1[5/18]=84,36
AT EDM1[6/18]=132,37
```

By default, the inter-frame spacing of Au Combo Interpreter is set at 0, it can be set to any number between 0 to 65535, for example, we use this command "**AT SPACING=10/r/n**".to set the spacing to 10 seconds. In this case, all 15 device/bus running parameter, 6 device information parameter, supported and available J1939 parameters, and J1708 parameters will be broadcasted once every 10 seconds.

```
AT ID=COMBO INTERPRETER VEHICLE PLATINUM ED.
AT FW=0.5M-TQ32K-BUILD00-Feb 07 2021-17:04:33
AT SN=20001
AT CBS1=0B00100001
...
AT9 BSA=11
AT DV=14.055V
AT8 J1708BUS=ON
AT9 CANBUS=ON
AT9 SADDRESS=CLAIMED
AT9 CAN_MODE=NORMAL
AT9 CAN_BAUD=250KBPS
AT8 RPM=15964.50RPM
```



AT8 MPH=126.0MPH
AT8 ECT=252F
AT8 EOILP=126.0PSI
AT8 ELOAD%=126.0%
AT8 EFUELRATE=975.78GPH
AT8 HR=950049.0HR
AT8 INST_MPG=253.433MPG
AT8 BOOSTP=31.500PSI
AT8 VOLT_SWITCHED=3114.50V
AT8 VOLT=3114.60V
AT8 IAT=252F
AT8 EODO=950050.0MILE
AT8 WIF=YES
AT8 EAWILS=0B11010101
AT8 EDM1[1/18]=110,32
...
AT8 EDM1[18/18]=168,161,127
AT8 EDM2[1/4]=21,114
...
AT8 FUEL1%=126.0%
AT8 FUEL2%=125.5%
AT8 ACC1%=100.8%
AT9 RPM=7951.50RPM
AT9 MPH=154.40MPH
AT9 ECT=404.6F
AT9 EOILP=143.26PSI
AT9 ELOAD%=123%
...
AT9 EODO=590427.8MILE
AT9 VIN=1M8GDM9AXKP042099*
AT9 EDM1B1=0B00000000
AT9 EDM1B2=0B11111111
AT9 EDM1[0/0]=0,0,0,0
AT9 EDM2B1=0B00000000
AT9 EDM2B2=0B11111111
AT9 EDM2[1/1]=110,0,1,0,
AT9 FUEL1%=98.8%
AT9 ACC1%=98.8%