



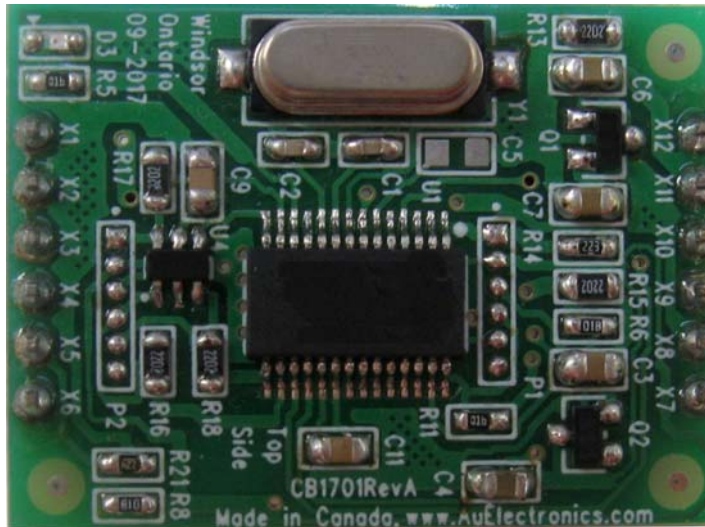
User Manual

Au Combo Interpreter Module (MD-ITPCOMBO)

Rev. A

Au Group Electronics

May 2020



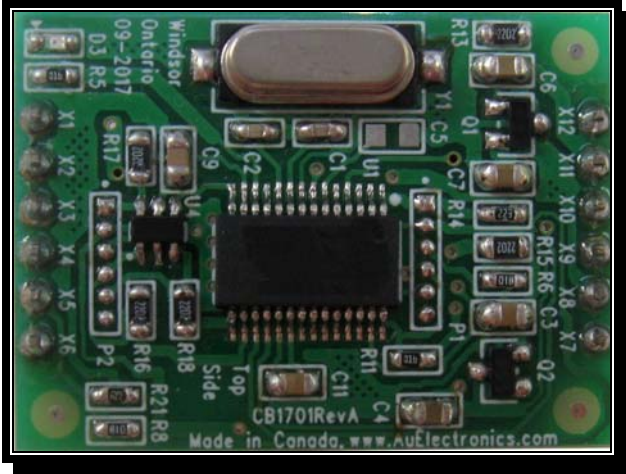
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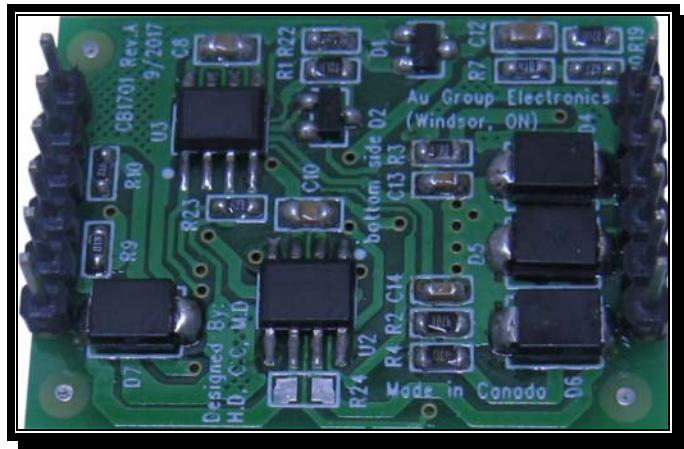
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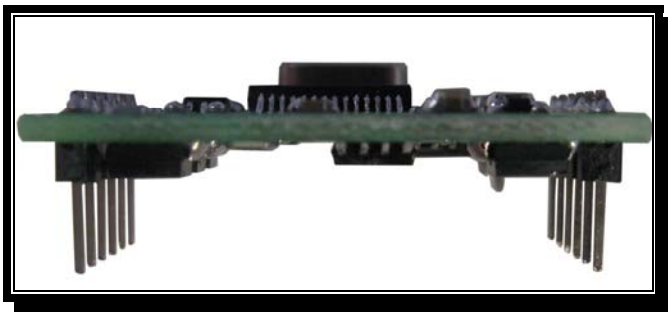
Chapter 1. Introduction



Top View



Bottom View



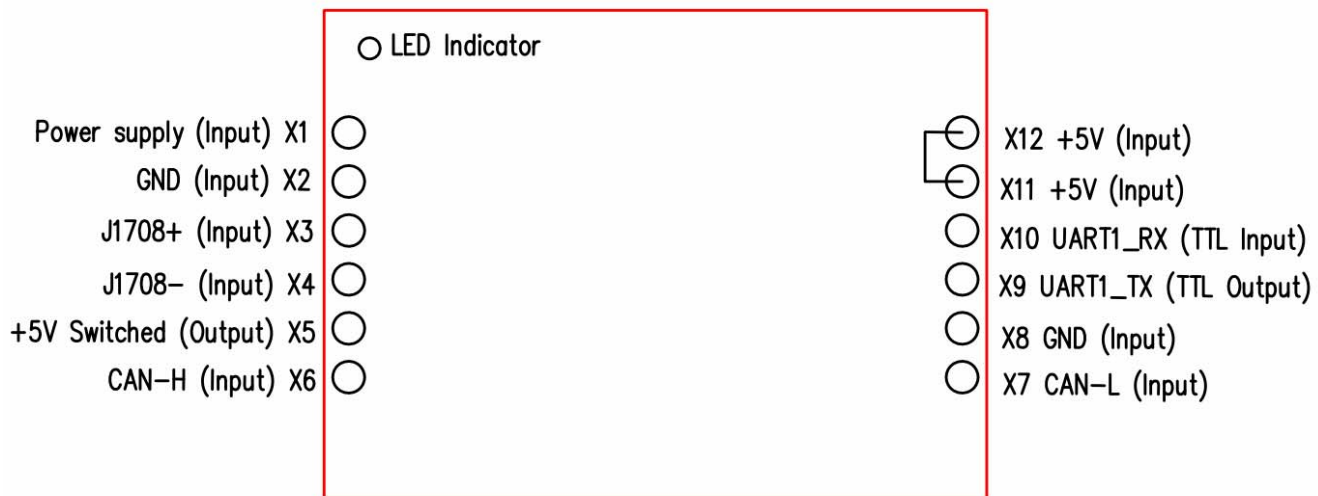
Side View

1.1. Major Features

Major features for Au J1939 and J1708 Combo Interpreter Module are listed below:

- **CAN bus baud rate automatically detection: 1M, 500K, 250K, 125K, 62.5K**
- **Power supply:** Operating range: +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
- **LED** for communication event indication
- **In-field device's own J1939 Source Address changing capability**, support multiple SAE J1939 defined Source Address (for Engine, Transmission and ABS) and can be configured in field
- **Ease of use:** No software setup experience or protocol configuration skill required.
- **In-field firmware updating capability** with Au Bootloader technology.

1.2. Pin Definition



1.3. List of Supported SAE J1939 Parameters

- Engine Percent Load at Current Speed (SPN: 92)
- 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)
- Keyswitch Battery Potential (obsolete term: Battery Potential (Voltage), Switched) (SPN: 158)
- Engine Fuel Rate (SPN: 183)
- Engine Instantaneous Fuel Economy (SPN: 184)
- Engine Speed (SPN: 190)
- Engine Total Hours of Operation (SPN: 247)
- Wheel Based Vehicle Speed (SPN: 84)
- Accelerator Pedal Position 1 (SPN: 91)
- Fuel Level 1 (SPN: 96)
- Water In Fuel Indicator 1 (SPN: 97)
- Engine Oil Level (SPN: 98)
- Engine Intake Air Pressure (obsolete term: Engine Air Inlet Pressure) (SPN: 106)
- Engine Coolant Pressure (SPN: 109)
- Engine Coolant Level 1 (SPN: 111)



- Engine Intake Air Mass Flow Rate (obsolete term: Engine Inlet Air Mass Flow Rate) (SPN:132)
- Battery Potential / Power Input 1 (obsolete term: Electrical Potential (Voltage)) (SPN: 168)
- Engine Exhaust Temperature (SPN: 173)
- Engine Fuel Temperature 1 (SPN: 174)
- Engine Oil Temperature 1 (SPN: 175)
- Vehicle Identification Number (VIN) (SPN 237)
- Engine Trip Distance (SPN: 244)
- Engine Total Vehicle Distance (SPN: 245)
- Actual Engine - Percent Torque (SPN: 513)
- Nominal Friction - Percent Torque (SPN: 514)
- Engine Idle Shutdown (IS)Timer State (SPN: 590)
- Engine Idle Shutdown (IS)Timer Function (SPN: 591)
- Engine Idle Shutdown (IS)Timer Override (SPN: 592)
- Engine Idle Shutdown (IS) has shutdown engine (SPN: 593)
- Engine Idle Shutdown (IS) Driver Alert Mode (SPN: 594)
- Cruise Control Active (SPN: 595)
- Refrigerant High Pressure Switch (SPN: 605)
- Refrigerant Low Pressure Switch (SPN: 875)
- Engine Clock (2 SPNs: Hours: 961; Minutes: 960)
- A/C High Pressure Fan Switch (SPN: 985)
- Engine Wait to Start Lamp (SPN: 1081)
- Engine Protection System (EPS) Timer State (SPN: 1107)
- Engine Protection System (EPS) Timer Override (SPN: 1108)
- Engine Protection System (EPS) Approaching shutdown (SPN: 1109)
- Engine Protection System (EPS) has Shutdown Engine (SPN: 1110)
- Engine Protection System (EPS) Configuration (SPN: 1111)
- Engine Clock Adjust (2 SPNs: Hours/minutes: 1605/1604; J1939 TX only)
- Engine Exhaust Gas Recirculation 1 Mass Flow Rate (SPN: 2659)
- Engine Overspeed Test (SPN: 2812)
- Engine Air Shutoff Command Status (SPN: 2813)
- Engine Alarm Output Command Status (SPN: 2814)
- Engine Alarm Acknowledge (SPN: 2815)

- 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)

- Engine Configuration Parameters (27 Parameters)
 - Engine Speed At Idle, Point 1 (Engine Configuration) (SPN: 188)
 - Engine Percent Torque At Idle, Point 1 (Engine Configuration) (SPN: 539)
 - Engine Speed At Point 2 (Engine Configuration) (SPN: 528)
 - Engine Percent Torque At Point 2 (Engine Configuration) (SPN: 540)
 - Engine Speed At Point 3 (Engine Configuration) (SPN: 529)
 - Engine Percent Torque At Point 3 (Engine Configuration) (SPN: 541)
 - Engine Speed At Point 4 (Engine Configuration) (SPN: 530)
 - Engine Percent Torque At Point 4 (Engine Configuration) (SPN: 542)
 - Engine Speed At Point 5 (Engine Configuration) (SPN: 531)
 - Engine Percent Torque At Point 5 (Engine Configuration) (SPN: 543)
 - Engine Speed At High Idle, Point 6 (Engine Configuration) (SPN: 532)
 - Engine Gain (Kp) of the Endspped Governor (Engine Configuration) (SPN: 545)
 - Engine Reference Torque (Engine Configuration) (SPN: 544)
 - Engine Maximum Momentary Override Speed, Point 7 (Engine Configuration) (SPN: 533)
 - Engine Maximum Momentary Override Time Limit (Engine Configuration) (SPN: 534)
 - Engine Requested Speed Control Range Lower Limit (Engine Configuration) (SPN: 535)
 - Engine Requested Speed Control Range Upper Limit (Engine Configuration) (SPN: 536)
 - Engine Requested Torque Control Range Lower Limit (Engine Configuration) (SPN: 537)
 - Engine Requested Torque Control Range Upper Limit (Engine Configuration) (SPN: 538)
 - Engine Extended Range Requested Speed Control Range Upper Limit (Engine Configuration) (SPN: 1712)
 - Engine Moment of Inertia (SPN: 1794)
 - Engine Default Torque Limit (SPN: 1846)
 - Support Variable Rate TSC1 Message (SPN: 3344)
 - Support TSC1 Control Purpose Group 1 (SPN: 3345)
 - Support TSC1 Control Purpose Group 2 (SPN: 3346)
 - Support TSC1 Control Purpose Group 3 (SPN: 3347)
 - Support TSC1 Control Purpose Group 4 (SPN: 3348)
- ABS 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)
- ABS 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)
- ABS DM1 Zero error code
- ABS DM1 one error code
- ABS DM1 multiple error codes (up to 64)
- ABS Heart Beat status: PGN 61441 received or not (PGN 61441)
- Transmission 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)
- Transmission 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)
- Transmission DM1 Zero error code
- Transmission DM1 one error code
- Transmission DM1 multiple error codes (up to 64)
- Transmission Heart Beat status: PGN 61442 received or not (PGN 61442)
- Transmission Oil Temperature (SPN: 177)
- Transmission Selected Gear (SPN: 524)
- Transmission Current Gear (SPN: 523)

1.4. List of Supported SAE J1708 Parameters

- Engine Speed (RPM)
- Engine % Load at Current Speed
- Engine Fuel Rate
- Engine Coolant Temperature
- Engine Total Hours of Operation
- Engine Oil Pressure
- Road Speed
- Percent Accelerator Pedal Position
- Instantaneous Fuel Economy
- Parking Brake Switch Status
- Power Take Off Status
- Boost Pressure
- Intake Manifold Temperature
- Second Fuel Level (Right Side)
- Fuel Level
- Engine Trip Distance
- Engine Total Vehicle Distance Battery Potential (Voltage) Switched
- Battery Potential (Voltage)
- Cruise Control Status



Chapter 2. AT Command

Au Combo Interpreter interprets most frequently used J1939 signals and J1708 signals to RS232 ASCII strings according to SAE J1939 specification and SAE J1708/J1587 specification.

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

In compatible format, all received signals will be interpreted in string started with AT.

In enhanced format, received signals will be differentiated depends on the signal originated resources. If the received signal is from J1708 network, interpreted string would start with AT8. If the received signal is from J1939 network, interpreted string would start with AT9.

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

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 ", consist of character of "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 **value** and **unit** for digital parameters or status (e.g. ON/OFF or Disable/Enabled or Claimed/NotClaimed).
- Every single AT Command end 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.

***The repetition rate of each parameter is defined by SAE Standard, it represent the worst case scenario and is for reference only. Actual rate on different vehicles may be different.**

2.1. Device Information Parameters (7 total):

There are 7 device-related parameters defined in Au Combo Interpreter Module: Device Voltage (DV), Serial port Baud Rate Setting(BRS), CAN Baud Rate Setting(CBRS), Control Bit Status 1(CBS1), Device ID (ID), Device Firmware Edition (FW), and Serial Number (SN).

Please note, DV will be broadcasted every 1 second, and it is always available even without connecting to CAN Bus or J1708 network as long as Au Combo Interpreter is powered on. The other 6 parameters (ID, FW, SN, BRS, CBRS, CBS1) will only be broadcasted once when the module is powered on, and then can be requested during run time.



Table 2 -1 List of Device Information Parameters

Abbreviation	Explanation	
DV	Description	Device Voltage
	Unit	V (Volt)
	Data range	9-12V nominal (Application dependent)
	Resolution	0.001 V
	Repetition	1 S
	Example	AT DV=12.096V\r\n --- Device voltage is 12.096 volt
ID	Description	Device ID
	Repetition	Broadcast once at Power On, and can be requested during run time
	Example	AT ID=J1939 INTERPRETER VALUE PACKAGE ED.\r\n --- The ID of this Device is J1939 Interpreter Value Package Edition
FW	Description	Firmware ID
	Data range	0.1A – 25.6A
	Repetition	Broadcast once at Power On, and can be requested during run time
	Example 1	AT FW=0.1A\r\n --- The Firmware ID of the device is 0.1A
SN	Description	Serial Number ID
	Data range	0 - 4294967295
	Repetition	Broadcast once at Power On, and can be requested during run time
	Example	AT SN=429\r\n --- The Serial Number of the device is 429
BRS	Description	Serial port Baud Rate in-field change command
	Data range	00 - 0A; default is 0;
	Format	AT BRS=00-0A\r\n
		AT BRS=00\r\n ---Serial port baud rate change to 115200 (default)
		AT BRS=01\r\n --- Serial port baud rate change to 300
		AT BRS=02\r\n --- Serial port baud rate change to 1200
		AT BRS=03\r\n --- Serial port baud rate change to 2400
		AT BRS=04\r\n --- Serial port baud rate change to 4800
		AT BRS=05\r\n --- Serial port baud rate change to 9600
		AT BRS=06\r\n --- Serial port baud rate change to 14400
		AT BRS=07\r\n --- Serial port baud rate change to 19200
		AT BRS=08\r\n --- Serial port baud rate change to 28800
		AT BRS=09\r\n --- Serial port baud rate change to 38400
		AT BRS=0A\r\n --- Serial port baud rate change to 57600
CBRS	Description	CAN Baud Rate in-field configuration
	Data range	00 – 04; default is 0;
	Format	AT CBRS=00-04\r\n
	Example	AT CBRS=00\r\n ---CAN Bus baud rate change to 250K (default)
		AT CBRS=01\r\n --- CAN Bus baud rate change to 62.5K
		AT CBRS=02\r\n --- CAN Bus baud rate change to 125K
		AT CBRS=03\r\n --- CAN Bus baud rate change to 500K
		AT CBRS=04\r\n --- CAN Bus baud rate change to 1M
CBS1	Description	Device Control Bit Status 1, see table 2-2 for detail bit definition and settings
	Data range	OB00000000 – OB00111111; default is 00100001;
	Format	AT CBS1=OB00000000 - OB00111111 \r\n
	Example	AT CBS1=OB00100001 --- set at auto CAN baud Rate and enhanced format



Table 2 - 2 CBS1 Bit Definition and Setting

Bit		Value	Command
8	Not in use	0	N/A
7	Not in use	0	N/A
6	Auto CAN baud rate detection mode	0 off.	AT AUTOCANBAUD=0\r\n
		1 Auto CAN baud rate detection is on (default)	AT AUTOCANBAUD=1\r\n
5	Mute 8 mode	0 off, constant broadcast (default)	AT MUTE8E=0\r\n"
		1 on, MUTE 8 mode, RS232 is in control of START8	AT MUTE8E=1\r\n"
4	Mute 9 mode	0 off, constant broadcast (default)	AT MUTE9E=0\r\n"
		1 on, MUTE 9 mode, RS232 is in control of START9	AT MUTE9E=1\r\n"
3	Deep sleep mode	0 off, deep sleep disabled (default)	AT DSLEEP=0\r\n
		1 on, deep sleep enabled	AT DSLEEP=1\r\n
2	Stand by sleep mode	0 off, standby sleep disabled (default)	AT SSLEEP=0\r\n
		1 on, standby sleep enabled	AT SSLEEP=1\r\n
1	Format	0 Compatible format "AT "	AT FORMAT=0\r\n
		1 Enhanced format "AT9 ", "AT8 " (default)	AT FORMAT=1\r\n

Default device setting is highlighted in yellow.

2.2. Bus Status Parameters

2.2.1. J1939 Bus Status Parameters (3 total)

There are three J1939 Bus status related parameters defined in Au J1939 Interpreter: CAN Bus network status (CANBUS), Source Address Claimed or not claimed (SADDRESS), Device Source address (SA). These three J1939 Bus Status parameters will be broadcasted every 1 second and will always be available even without connecting to CAN Bus as long as the device is powered on.

Table 2 - 3 List of J1939 Bus Status Parameters

Abbreviation	Explanation	
CANBUS	Description	CAN bus network status
	Data range	ON or OFF
	Repetition	1 S
	Example 1	AT9 CANBUS=ON\r\n --- CAN Bus is On
	Example 2	AT9 CANBUS=OFF\r\n --- CAN Bus is Off
SADDRESS	Description	Source Address Claimed or Not Claimed
	Data range	CLAIMED or NOTCLAIMED
	Repetition	1 S
	Example 1	AT9 SADDRESS=CLAIMED\r\n --- Source Address is claimed
	Example 2	AT9 SADDRESS=NOTCLAIMED\r\n --- Source Address is not claimed
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.
	Repetition	1 S
	Example	AT9 SA=249\r\n --- CAN Node Source Address is 249



2.2.2. J1708/J1587 Bus Status Parameters

There are 2 J1708/J1587 bus status related parameters defined in Au Combo Interpreter: J1708 Bus network status (J1708BUS) and device Message ID (MID). These two parameters are broadcasted every one second and will always be available even without connecting to J1708/J1587 bus as long as the device is powered on.

Table 2 -4 List of J1708/J1587 Bus Status Parameters

Abbreviation	Explanation	
J1708BUS	Description	SAE J1708 bus network status
	Data range	ON or OFF
	Repetition	1 S
	Example 1	AT8 J1708BUS=ON\r\n --- J1708 Bus is On
	Example 2	AT8 J1708BUS=OFF\r\n --- J1708 Bus is Off
MID	Description	Device message ID
	Data range	128 - 250
	Repetition	1 S
	Example 1	AT8 MID = 172\r\n --- Device message ID is 172
	Note: Default Device MID is 172; other popular MID can be used are: 140~142, 154, 179, 180, 221, 234, etc. Only valid (SAE J1587 defined MID) can be re-assigned to this device, assigning invalid MID to the device will be ignored.	

2.3. Au Combo Interpreter UART Commands:

Au Combo Interpreter supports up to 15 UART commands, which can be used to request or setup the device information, some J1939 / J1708 Bus parameters, The supported UART command are listed in Table 2 - 5.

Table 2 – 5 Au Combo Interpreter UART Commands

Commands	Explanation	
ID	Description	Device ID Edition Request Command
	Format	AT ID=?\r\n
	--- After this request command is received, Au Combo Interpreter will response with device ID, FW, SN, CBRS, BRS, and CBS1 information.	
	AT ID=COMBO INTERPRETER VEHICLE PLATINUM ED.	
	AT FW=0.5N(AU-ASCI-A01-64K-BUILD11052019-04)	
	AT SN=10075	
	AT CBRS=00	
FW	Description	Device Firmware Edition Request Command
	Format	AT FW=?\r\n
	--- After this request command is received, device firmware information will be displayed.	
	AT FW=0.5N(AU-ASCI-A01-64K-BUILD11052019-04)	
SN	Description	Device Serial Number(SN) Request Command
	Format	AT SN=?\r\n
	--- After this request command is RECEIVED, device SN will be displayed AT SN=10075	



SA	Description	New Source Address Setup Command for Au interpreter
	Data range	0 – 253; default is 249;
	Format	AT SA=0-253\r\n
	e.g. AT SA=250\r\n	<i>--- set J1939 SA to 250 (off board diagnostic service tool #2).</i>
AUTOCANBAUD	Description	Auto CAN baud rate detection mode on off control
	Data range	0 – 1; default is 1
		0: auto CAN baud rate detection mode is Off
		1; auto CAN baud rate detection mode is ON, it will auto detect the CAN baud rate and save the detected CAN baud rate.
	Format	AT AUTOCANBAUD=0/1\r\n
	e.g. AT AUTOCANBAUD=0\r\n	6 device information command (ID, FW, SN, CBRS, BRS, CBS1) will be broadcasted.
		CBS1 bit 6 will be set to 0: AT CBS1=0B00000001
		Please refer to CBS1 description for bit definition of CBS1
	AT AUTOCANBAUD=1\r\n	6 device information command (ID, FW, SN, CBRS, BRS, CBS1) will be broadcasted once,
		CBS1 bit 6 will be set to 1: AT CBS1=0B00100001
		Please refer to CBS1 description for bit definition of CBS1
MUTE8E	Description	J1708 Data RS232 side Mute mode
	Data range	0 – 1;
		0(default); Mute 8 mode is off, J1708 data constant broadcast
		1; Mute 8 mode is enabled, RS232 is in control of START8
	Format	AT MUTE8E=0/1\r\n
	e.g. AT MUTE8E=0\r\n	6 device information command (ID, FW, SN, CBRS, BRS, CBS1) will be broadcasted once.
		CBS1 bit 5 will be set to 0: AT CBS1=0B00000001
	AT MUTE8E=1\r\n	6 device information command (ID, FW, SN, CBRS, BRS, CBS1) will be broadcasted once.
		CBS1 bit 5 will be set to 1: AT CBS1=0B00010001
MUTE9E	Description	J1939 Data RS232 side Mute mode
	Data range	0 – 1;
		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
	e.g. AT MUTE9E=0\r\n	6 device information command (ID, FW, SN, CBRS, BRS, CBS1) will be broadcasted once.
		CBS1 bit 4 will be set to 0: AT CBS1=0B00000001



	AT MUTE9E=1\r\n	6 device information command (ID, FW, SN, CBRS, BRS, CBS1) will be broadcasted once, CBS1 bit 4 will be set to 1: AT CBS1=0B00001001
DSLEEP	<p>Description</p> <p>Data range</p> <p>Format</p> <p>e.g. AT DSLEEP=0\r\n</p> <p>AT DSLEEP=1\r\n</p>	<p>Deep sleep mode</p> <p>0 – 1; 0(default); Deep sleep mode is disabled 1; Deep sleep mode is enabled</p> <p>AT DSLEEP=0/1\r\n</p> <p>Device get out of deep sleep mode. CBS1 bit 3 will be set to 0: AT CBS1=0B00000001</p> <p>Device will be set at deep sleep mode. If there is no J1708 and J1939 data detected for 10 seconds, device will get into deep sleep mode, in which device can only be woke up by cranking the power supply, it will not be woke up by either J1708 or J1939 data flow. CBS1 bit 3 will be set to 1: AT CBS1=0B00000101</p>
SSLEEP	<p>Description</p> <p>Data range</p> <p>Format</p> <p>e.g. AT SSLEEP=0\r\n</p> <p>AT SSLEEP=1\r\n</p>	<p>Standby sleep mode</p> <p>0 – 1; 0(default); Standby sleep mode is disabled 1; Standby sleep mode is enabled</p> <p>AT SSLEEP=0/1\r\n</p> <p>Device get out of standby sleep mode CBS1 bit 2 will be set to 0: AT CBS1=0B00000001</p> <p>Device set into standby sleep mode. If there is no J1708 and J1939 data detected for 10 seconds, device will get into standby sleep mode, but it can be woke up with either J1708 or J1939 data flow CBS1 bit 2 will be set to 1: AT CBS1=0B00000011</p>
FORMAT	<p>Description</p> <p>Data range</p> <p>Format</p> <p>e.g. AT FORMAT=0\r\n</p> <p>AT FORMAT=1\r\n</p>	<p>Set received data format in either compatible or enhanced format</p> <p>0 – 1; 0; Compatible format, parameter starts as "AT " 1(default); Enhanced format, parameter starts as "AT9 " or "AT8 "</p> <p>AT FORMAT=0/1\r\n</p> <p>CBS1 bit 1 will be set to 0: AT CBS1=0B00000000 Both J1939 and J1708 parameters will started as "AT "</p> <p>CBS1 bit 1 will be set to 1: AT CBS1=0B00000001 J1939 parameters start as "AT9 ", J1708 parameters start as "AT8"</p>



START8	<p>Description</p> <p>Data range</p> <p>Format</p> <p>e.g. AT START8=0\r\n AT START8=1\r\n</p>	<p>Start or stop J1708 transmitting on RS232</p> <p>0 – 1; 0: stop 1(default): start</p> <p>AT START8=0/1\r\n</p> <p><i>---When MUTE8E is enabled, AT START8=0 will stop J1708 TX</i></p> <p><i>---When MUTE8E is enabled, AT START8=1 will resume J1708 TX</i></p>
START9	<p>Description</p> <p>Data range</p> <p>Format</p> <p>e.g. AT START9=0\r\n AT START9=1\r\n</p>	<p>Start or stop J1939 transmitting on RS232</p> <p>0 – 1; 0: stop 1(default): start</p> <p>AT START9=0/1\r\n</p> <p><i>---When MUTE9E is enabled, AT START9=0 will stop J1939 TX</i></p> <p><i>---When MUTE9E is enabled, AT START9=1 will resume J1939 TX</i></p>
BSA	<p>Description</p> <p>Data range</p> <p>Format</p> <p>e.g. AT BSA=0\r\n AT BSA=1\r\n AT BSA=2\r\n AT BSA=3\r\n AT BSA=4\r\n AT BSA=5\r\n AT BSA=6\r\n AT BSA=7\r\n AT BSA=8\r\n</p>	<p>Change the to be received (Rx, J1939) ABS source address</p> <p>0 – 8; default is 0;</p> <p>AT BSA=0-8\r\n</p> <p><i>--- Change the RX ABS source address to 11</i></p> <p><i>--- Change the RX ABS source address to 12</i></p> <p><i>--- Change the RX ABS source address to 13</i></p> <p><i>--- Change the RX ABS source address to 14</i></p> <p><i>--- Change the RX ABS source address to 202</i></p> <p><i>--- Change the RX ABS source address to 194</i></p> <p><i>--- Change the RX ABS source address to 186</i></p> <p><i>--- Change the RX ABS source address to 178</i></p> <p><i>--- Change the RX ABS source address to 170</i></p>
ESA	<p>Description</p> <p>Data range</p> <p>Format</p> <p>e.g. AT ESA=0\r\n AT ESA=1\r\n AT ESA=2\r\n AT ESA=3\r\n AT ESA=4\r\n AT ESA=5\r\n AT ESA=6\r\n AT ESA=7\r\n</p>	<p>Change to be received (Rx, J1939) Engine's Source Address</p> <p>0 – 7; default is 0;</p> <p>AT ESA=0-7\r\n</p> <p><i>--- Change the RX engine source address to 0</i></p> <p><i>--- Change the RX engine source address to 1</i></p> <p><i>--- Change the RX engine source address to 239</i></p> <p><i>--- Change the RX engine source address to 240</i></p> <p><i>--- Change the RX engine source address to 241</i></p> <p><i>--- Change the RX engine source address to 231</i></p> <p><i>--- Change the RX engine source address to 232</i></p> <p><i>--- Change the RX engine source address to 233</i></p>
TSA	<p>Description</p> <p>Data range</p> <p>Format</p> <p>e.g. AT TSA=0\r\n AT TSA=1\r\n</p>	<p>Change the to be received (Rx, J1939) Transmission source address</p> <p>0 – 1; default is 0;</p> <p>AT TSA=0-1\r\n</p> <p><i>--- Change the RX transmission source address to 3</i></p> <p><i>--- Change the RX transmission source address to 4</i></p>



8RQS0	Description	Send 59904 Global Request for PGN 0xABCD
	Format	AT RQS0 ABCD\r\n Note: ABCD must in Hex format
	e.g. 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
	e.g. AT 9RQS0 FECC\r\n	--- Send global request (DM3) to clear DM2 diagnostic data
	e.g. 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 (Note: ABCD, EF must in Hex format)
	e.g. AT 8RQS1 FECC 00\r\n	---Send specific request for DM3 (0xFECC) to engine (0x00) for clearing DM2 diagnostic data
	e.g. AT 8RQS1 00F7 80\r\n	---Send specific request for engine Hour 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)
	e.g. AT 9RQS1 FEE5 00\r\n	---Send specific request for PGN FEE5 (65253) for Engine Hour to Engine 00
	e.g. AT 9RQS1 FEE6 00\r\n	---Send specific request for PGN FEE6 (65254) for Time/Date
	e.g. AT 9RQS1 FECC 00\r\n	---Send specific request for DM3 (0xFECC) to engine (0x00) for clearing DM2 diagnostic data
HR	Description	Engine Hour Request Command
	Format	AT HR=?\r\n
	--- After receiving AT HR=?, Au Interpreter will response with current engine hour if this parameter is present and available on the J1939 network.	
HH:MM	Description	Engine Clock Adjust Command (needs Engine ECM support)
	Format	AT HH:MM=hh:mm\r\n
	e.g. AT HH:MM=23:59\r\n	--- Engine Clock in Engine ECM will be adjusted to 23:59
ECLK	Description	Engine Clock Request Command
	Format	AT ECLK=?\r\n
	--- After this request command is received, the J1939 interpreter will response with current engine clock if this parameter is present and available on the J1939 network.	
VIN	Description	Vehicle Identification Number (VIN) Request Command
	Format	AT VIN=?\r\n
	--- After this request command is received, the J1939 interpreter will response with VIN if this information is present and available on the J1939 network.	



MID	Description	New Device Message ID Setup Command
	Data range	128 – 250
	Format	AT MID=128-250\r\n
	e.g. AT MID=180\r\n	<i>--- Device MID will be set to 180 (Off-board Diagnostics #2)</i>

2.4. Supported J1939 Parameters

These parameters will only be transmitted on the RS232 bus when they are received. The device will keep quiet when the respected parameter is not present on the J1939 network. The description, SPN (Suspect Parameter Number) of the each parameter, unit and resolution (if applicable), and repetition of each supported J1939 signal are explained here, one or more examples will be given for each parameter.

Table 2 – 6 Supported J1939 Engine Parameters

Abbreviation	Explanation of J1939 Parameters	
AC_HP_FAN_SW	Description	A/C High Pressure Fan Switch
	SPN	985
	Data Range	NORMAL/HIGH
	Repetition	1 S
	e.g. AT9 AC_HP_FAN_SW=HIGH\r\n	<i>---the pressure in the coolant circuit of an air conditioning system is high and the fan may be engaged.</i>
ACC%	Description	Accelerator Pedal Position 1
	SPN	91
	Unit	%
	Resolution	0.10%
	Repetition	200 mS
	e.g. AT9 ACC%=100.0%\r\n	<i>---The ratio of actual position to the maximum position of an accelerator pedal is 100%.</i>
AETORQUE%	Description	Actual Engine - Percent Torque
	SPN	513
	Unit	%
	Resolution	1%
	Repetition	200 mS
	e.g. AT9 AETORQUE%=125%\r\n	<i>--- The calculated output torque of the engine is 125% of reference engine torque</i>
BOOSTP	Description	Engine Turbocharger Boost Pressure
	SPN	102
	Unit	PSI: (Pound per Square Inch)
	Resolution	0.01 PSI
	Repetition	1 S
	e.g. AT9 BOOSTP=72.50PSI\r\n	<i>--- Engine Boost pressure is 72.5 PSI.</i>
CGEAR	Description	Current Gear
	Repetition	1 S
	SPN	523
	PGN	61445
	Data Range	-125 ~ -1; NEUTRAL; 1~125; PARK;
	e.g. AT9 CGEAR=-2\r\n	<i>--- The Gear currently engaged in the transmission is reverse gear 2</i>
	AT9 CGEAR=NEUTRAL\r\n	<i>---The gear currently engaged in the transmission is neutral</i>
	AT9 CGEAR=PARK\r\n	<i>--- The Gear currently engaged in the transmission is park</i>
CRUISE	Description	Cruise light (Cruise Control Active)
	SPN	595
	Data Range	ON/OFF
	Repetition	1 S
	e.g. AT9 CRUISE=ON\r\n	<i>--- Cruise control switched on</i>



EAIR_SHUTOFF	Description SPN Data Range Repetition e.g. AT9 EAIR_SHUTOFF=DISABLED\r\n <i>--- Engine Air Shutoff is Disabled</i>	Engine Air Shutoff Command Status 2813 Disabled/Enabled/Reserved/Not_Available 1 S
EAIRINLET_P	Description SPN Unit Resolution Repetition e.g. AT9 EAIRINLET_P=72.50PSI\r\n <i>--- Air pressure at inlet to intake manifold is 72.5 PSI</i>	Engine Air Inlet Pressure 106 PSI 0.01 1 S
EALARM_ACK	Description SPN Data Range Repetition e.g. AT9 EALARM_ACK=ACTIVE\r\n <i>--- Engine Alarm Acknowledge is Active</i>	Engine Alarm Acknowledge 2815 NOT_ACTIVE or ACTIVE or ERROR or NOT_AVAILABLE 1 S
EALARM_OUTPUT	Description SPN Unit Repetition e.g. AT9 EALARM_OUTPUT=NOT_ACTIVE\r\n <i>---Engine Alarm Output Command Not Active</i>	Engine Alarm Output Command Status 2814 NOT_ACTIVE/ACTIVE/RESERVED/NOT_AVAILABLE 1 S
EBC1	Description Repetition PGN Data Range e.g. AT9 EBC1=PRESENT\r\n <i>--- ABS controller is present</i> AT9 EBC1=NOTPRESENT\r\n <i>--- ABS controller is not present</i>	ABS Heart Beat PGN 61441 received 1 S 61441 PRESENT / NOTPRESENT
ECT	Description SPN Unit Resolution Repetition e.g. AT9 ECT=410.0F\r\n <i>--- Engine Coolant Temperature is 410.0 Degree F.</i>	Engine Coolant Temperature 110 F 0.1 1S
ECLK	Description SPN Unit Resolution Repetition e.g. AT9 ECLK=19:05HH:MM r\n <i>--- Engine Clock is at 19:05</i>	Engine Clock (2 SPNs) Hours: 961; Minutes: 960 HH:MM 01Hr:01Min 30 S
ECOOLANT%	Description SPN Unit Resolution Repetition e.g. AT9 ECOOLANT%=100.0%\r\n <i>---Ratio of liquid volume in engine cooling system to total cooling system volume is 100%</i>	Engine Coolant Level (%) 111 % 0.1% 1 S



ECOOLANTP	Description	Engine Coolant Pressure (PSI)
	SPN	109
	Unit	PSI
	Resolution	0.1
	Repetition	1 S
	e.g. AT9 ECOOLANTP=72.5PSI\r\n <i>--- Pressure of liquid in engine cooling system is 72.5 PSI</i>	
EEXHAUSTGAS_T	Description	Engine Exhaust Gas Temperature
	SPN	173
	Unit	F
	Resolution	0.1F
	Repetition	1S
	e.g. AT9 EEXHAUSTGAS_T=3154.9F\r\n <i>--- Temperature of combustion byproducts leaving the engine is 3154.9 Fahrenheit</i>	
EFUELRATE	Description	Engine Fuel Rate
	SPN	183
	Unit	GPH: (Gallon Per Hour)
	Resolution	0.1
	Repetition	200 mS
	e.g. AT9 EFUELRATE=848.7GPH\r\n <i>---Engine Fuel rate is 848.7Gallon per hour.</i>	
EFUELTEMP	Description	Engine Fuel Temperature (F)
	SPN	174
	Unit	F
	Resolution	0.1 F
	Repetition	1 S
	e.g. AT9 EFUELTEMP=410.0F\r\n <i>---Temperature of fuel entering injectors is 410 Fahrenheit</i>	
EGRMFR	Description	Engine Exhaust Gas Recirculation (EGR) Mass Flow Rate (MFR)
	SPN	2659
	Unit	KG/HR: Kg/Hour
	Resolution	0.01
	Repetition	200 mS
	e.g. AT9 EGRMFR=3212.75KG/HR\r\n <i>--- Mass flow rate of gas through the EGR system is 3212.75 kilogram/hour</i>	
EISDRIVERALERT	Description	Engine IS Driver Alert Mode
	SPN	594
	Data Range	INACTIVE/ACTIVE
	Repetition	1 S
	e.g. AT9 EISDRIVERALERT=ACTIVE\r\n\r\n <i>--- The driver alert mode of the engine idle shutdown timer system is active</i>	
EISSHUTDOWN	Description	Engine IS (Idle Shutdown) has Shutdown Engine
	SPN	593
	Unit	YES/NO
	Repetition	1 S
	e.g. AT9 EISSHUTDOWN=YES\r\n <i>--- The engine has been shutdown by the idle shutdown timer system.</i>	



EISTIMERFUNC	Description	Engine IS Timer Function
	SPN	591
	Data Range	DISABLED/ENABLED
	Repetition	1 S
	e.g. AT9 EISTIMERFUNC=DISABLED\r\n	
	<i>---The idle shutdown timer system is disabled in calibration</i>	
EISTIMEROVERRIDE	Description	Engine IS Timer Override
	SPN	592
	Unit	INACTIVE/ACTIVE
	Repetition	1 S
	e.g. AT9 EISTIMEROVERRIDE= ACTIVE \r\n	
	<i>--- The override feature of the idle shutdown timer system is active</i>	
EISTIMERSTATE	Description	Engine IS Timer State
	SPN	590
	Data Range	INACTIVE/ACTIVE
	Repetition	1 S
	e.g. AT9 EISTIMERSTATE=ACTIVE\r\n	
	<i>--- The current mode of operation of the idle shutdown timer system is active</i>	
ELOAD%	Description	Engine Load % AT9 Current Speed
	SPN	92
	Unit	%
	Resolution	1%
	Repetition	200 mS
	e.g. AT9 ELOAD%=125%\r\n	
	<i>--- Engine Load % AT9 current speed is 125%.</i>	
EODO	Description	Total Vehicle Distance
	SPN	245
	Unit	MILE
	Resolution	0.1 mile
	Repetition	1 S
	e.g. AT9 EODO=621372.1MILE\r\n	
	<i>--- Accumulated distance traveled by vehicle during its operation is 621375.1 mile</i>	
EOIL%	Description	Engine Oil Level (%)
	SPN	98
	Unit	%
	Resolution	0.1%
	Repetition	1 S
	e.g. AT9 EOIL%=100.0%\r\n	
	<i>--- Ratio of current volume of engine sump oil to maximum required volume is 100%</i>	
EOILP	Description	Engine Oil Pressure
	SPN	100
	Unit	PSI
	Resolution	0.01
	Repetition	1 S
	e.g. AT9 EOILP=145.00PSI\r\n	
	<i>--- Engine oil pressure is 145.00 PSI</i>	



EOILT	Description	Engine Oil Temperature 1
	SPN	175
	Data Range	-459.4 to 3154.9
	Unit	F
	Resolution	0.1 F
	Repetition	1 S
	e.g.	AT9 EOILT=3154.9F\r\n --- <i>Temperature of the engine lubricant is 3154.9 Fahrenheit</i>
EOVER_SPEED_TEST	Description	Engine Over Speed Test
	SPN	2812
	Data Range	NOT_AVAILABLE/RESERVED/ACTIVE/NOT_ACTIVE
	Repetition	1 S
	e.g.	AT9 EOVER_SPEED_TEST= ACTIVE\r\n --- <i>Engine Overspeed Test is Active</i>
EPS_APPROACHING	Description	EPS Approaching shutdown
	SPN	1109
	Data Range	YES/NO
	Repetition	1 S
	e.g.	AT9 EPS_APPROACHING=YES\r\n --- <i>Engine shutdown is imminent</i>
EPS_CONF	Description	EPS Configuration
	SPN	1111
	Unit	DISABLED/ENABLED
	Repetition	1 S
	e.g.	AT9 EPS_CONF=DISABLED\r\n --- <i>Engine shutdown system is disabled in calibration</i>
EPSSHUTDOWN	Description	EPS (Engine Protection System)has Shutdown Engine
	SPN	1110
	Data Range	NO/YES
	Repetition	1 S
	e.g.	AT9 EPSSHUTDOWN=YES\r\n --- <i>Engine protection system has shutdown the engine</i>
EPSTIMEROVERRIDE	Description	EPS Timer Override
	SPN	1108
	Data Range	INACTIVE/ACTIVE
	Repetition	1 S
	e.g.	AT9 EPSTIMEROVERRIDE=ACTIVE\r\n --- <i>The override feature of the engine protection system timer is active</i>
EPSTIMERSTATE	Description	EPS Timer State
	SPN	1107
	Unit	INACTIVE/ACTIVE
	Repetition	1 S
	e.g.	AT9 EPSTIMERSTATE=ACTIVE\r\n --- <i>The current mode of the engine protection system timer system is active</i>
ETC1	Description	Transmission Heart Beat PGN 61442 received
	Repetition	1 S
	PGN	61442
	Data Range	PRESENT / NOTPRESENT
	e.g.	AT9 ETC1=PRESENT\r\n --- <i>Transmission controller is present</i>



ETRIP	Description	Engine Trip Distance
	SPN	244
	Unit	MILE
	Resolution	0.1 mile
	Repetition	1 S
	e.g. AT9 ETRIP=155.3MILE\r\n	
	--- Distance traveled during all or part of a journey is 155.3 mile	
EWTS_LAMP	Description	Engine Wait to Start Lamp
	SPN	1081
	Unit	ON/OFF
	Repetition	1 S
	e.g. AT9 EWTS_LAMP=ON\r\n	
	---Engine wait to start Lamp is on, indicates that the engine is too cold to start and the operator should wait until the signal becomes inactive (turns off).	
FUEL1%	Description	Fuel Level 1
	SPN	96
	Unit	%
	Resolution	0.1%
	Repetition	1 S
	e.g. AT9 FUEL1%=100.0%\r\n	
	---Ratio of fuel volume to the total volume of fuel storage container is 100%	
HR	Description	Engine Total Hours of Operation
	SPN	247
	Unit	HR: (Hours)
	Resolution	0.1
	Repetition	30 S, it can also be request by sending the "AT9 HR=?\r\n" command
	e.g. AT9 HR=45208.0HR\r\n	
	--- Total hours of Engine Operation is 45208.0 hours	
HR_TRIP_D	Description	High resolution trip distance
	SPN	918
	Unit	KM
	Resolution	0.001KM
	Repetition	1 S
	e.g. AT9 HR_TRIP_D=21055406.075KM\r\n	
	--- High resolution trip distance is 21055406.075KM	
HR_TVD	Description	High Resolution Total Vehicle Distance
	SPN	917
	Unit	KM
	Resolution	0.001KM
	Repetition	1 S
	e.g. AT9 HR_TVD=21055406.075KM\r\n	
	--- High resolution total vehicle distance is 21055406.075KM	
IAMFR	Description	Engine Inlet Air Mass Flow Rate (MFR)
	SPN	132
	Unit	KG/HR: Kg/Hour
	Resolution	0.01
	Repetition	200 mS
	e.g. AT9 IAMFR=642.55KG/HR\r\n	
	--- Mass flow rate of fresh air entering the engine air intake is 642.55 kg	



IAT	Description	Engine Intake Manifold 1 Temperature
	SPN	105
	Unit	F
	Resolution	0.1
	Repetition	1 S
	e.g. AT9 IAT=410.0F\r\n --- Engine Intake Manifold 1 Temperature is 410.0 F	
INST_MPG	Description	Engine Instantaneous Fuel Economy
	SPN	184
	Unit	MPG: (Mile per Gallon)
	Resolution	0.1
	Repetition	200 mS
	e.g. AT9 INST_MPG=295.2MPG\r\n -- Engine Instantaneous Fuel Economy is 295.2 MPG	
MPH	Description	Wheel-Based Vehicle Speed
	SPN	84
	Unit	MPH: (Miles/Hour)
	Resolution	0.01 MPH
	Repetition	100 mS
	e.g. AT9 MPH=31.19MPH\r\n ---Speed of the vehicle as calculated from wheel speed is 31.19 miles per hour	
NFRICTORQ%	Description	Nominal Friction - Percent Torque
	SPN	514
	Unit	%
	Resolution	1%
	Repetition	1 S
	e.g. AT9 NFRICTORQ%=12%\r\n ---The calculated torque that indicates the amount of torque required by the basic engine itself added by the loss torque of accessories is 12%.	
REFR_HP_SW	Description	Refrigerant High Pressure Switch
	SPN	605
	Data Range	TOOHIGH/NORMAL
	Repetition	1 S
	e.g. AT9 REFR_HP_SW= NORMAL\r\n --- The position of the high pressure switch in the coolant circuit of an air conditioning system is normal	
REFR_LP_SW	Description	Refrigerant Low Pressure Switch
	SPN	875
	Unit	TOOLOW/NORMAL
	Repetition	1 S
	e.g. AT9 REFR_LP_SW=TOOLOW\r\n ---The position of the low pressure switch in the coolant circuit of an air conditioning system is too low	
RPM	Description	Engine Speed
	SPN	190
	Unit	RPM (Revolutions Per Minute)
	Resolution	0.01
	Repetition	100 mS (RPM will show up every 100 milliseconds)
	e.g. AT9 RPM=8031.87RPM\r\n --- Engine speed is 8031.87 revolutions/minute	



SGEAR	<p>Description Transmission Selected Gear</p> <p>Repetition 1 S</p> <p>SPN 524</p> <p>PGN 61445</p> <p>Data Range -125 ~ -1; NEUTRAL; 1~125; PARK</p> <p>e.g. AT9 SGEAR=-3\r\n <i>---The gear that transmission will attempt to achieve is reverse gear 3</i></p> <p>AT9 SGEAR= NEUTRAL\r\n <i>---The gear that transmission will attempt to achieve is neutral</i></p> <p>AT9 SGEAR= PARK\r\n <i>---The gear that the transmission will attempt to achieve is park</i></p>
TRANS_OILT	<p>Description Transmission Oil Temperature</p> <p>Repetition 1 S; SPN: 177; PGN: 65272</p> <p>Unit F</p> <p>Resolution 0.1</p> <p>Data Range - 459.4~3154.9F</p> <p>Unit F</p> <p>e.g. AT9 TRANS_OILT=3154.9F\r\n <i>---Transmission oil temperature is 3154.9 F</i></p>
VIN	<p>Description Vehicle Identification Number (VIN)</p> <p>SPN 237</p> <p>Repetition 30 S</p> <p>e.g. AT9 VIN=1M8GDM9AXKP042061\r\n <i>---Vehicle Identification Number is 1M8GDM9AXKP042061</i></p>
VOLT	<p>Description Battery Potential / Power Input 1</p> <p>SPN 168</p> <p>Unit Volt</p> <p>Resolution 0.1 V</p> <p>Repetition 1 S</p> <p>e.g. AT9 VOLT=7.5V\r\n <i>--- The first source of battery potential measured at the input of the ECM coming from one or more batteries is 7.5V</i></p>
VOLT_SWITCHED	<p>Description Battery Potential (Voltage), Switched</p> <p>SPN 158</p> <p>Unit V: (Volt)</p> <p>Resolution 0.01</p> <p>Repetition 1 S</p> <p>e.g. AT9 VOLT_SWITCHED=3212.75V\r\n <i>--- Switched battery potential voltage is 3212.75 volt</i></p>
WIF	<p>Description Water in fuel Indicator</p> <p>SPN 97</p> <p>Data NO/YES</p> <p>Repetition 1 S</p> <p>e.g. AT9 WIF=YES\r\n <i>--- Signal indicates there is water in the fuel</i></p>

Table 2 - 7 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)			
		The MSB (most significant bit) position is bit8, the LSB position is bit1.			
		e.g. AT EDM1B2=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
	--- Flash Malfunction indicator lamp, flash red stop lamp, flash amber warning lamp and flash protect lamp do not flash / unavailable				
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 error code's sequential number, Y is total number of error code			
	PGN	65226			
	Repetition	1 S			
	Data Format	AT EDM1[X/Y]=SPN, FMI, OC, CM			
		e.g. 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 – 1 st 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 total number of error code
 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 1st Engine DM2 error code out of 9 total error code
AT EDM2[5/9]=100,4,5,0, \r\n --- The 5th Engine DM2 error code out of 9 total error code

	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



Table 2 - 8 SAE J1939 TX only Parameters , ABS, Transmission DM1, DM2
(Engine DM3, Engine Configuration, ABS, Transmission DM1, DM2)

Abbreviation	Explanation	
EDM3	Description	Engine DM2 Reset control / engine DM3 (needs Engine ECM support)
	Repetition	Request only
	PGN	request DM2 reset by sending DM3 with 59904
	Global request	AT RQS0 FECC\r\n --- Send global request (DM3) to clear DM2 diagnostic data
	Specific Request	e.g. AT RQS1 FECC 00\r\n ---Send specific request for DM3 (0xFECC) to engine (0x00) for clearing DM2 diagnostic data , AT RQS1 FECC 01\r\n ---Send specific request for DM3 (0xFECC) to engine (0x01) for clearing DM2 diagnostic data
ECGAIN	Description	Engine Gain (Kp) Of the End Speed Governor (Engine Configuration)
	Repetition	5 S; SPN: 545; PGN: 65251
	Unit	%/RPM
	Resolution	0.1%
	Data Range	0 to 50.2 %/rpm
	e.g.	AT ECGAIN=40.0%/RPM\r\n ---The Engine Gain of end speed governor is 40.0% / rpm
ECLLS	Description	Engine Requested Speed Control Range Lower Limit (Engine Configuration)
	Repetition	5 S; SPN: 535; PGN: 65251
	Unit	RPM
	Resolution	1
	Data Range	0 to 2,500 rpm
	e.g.	AT ECLLS=550RPM\r\n ---The minimum engine speed that the engine will allow when operating in a speed control/limit mode.
ECLLT	Description	Engine Requested Torque Control Range Lower Limit (Engine Configuration)
	Repetition	5 S; SPN: 537; PGN: 65251
	Unit	%
	Resolution	1%
	Data Range	- 125 to 125 %
	e.g.	AT ECLLT=0%\r\n ---The minimum engine torque that the engine will allow when operating in a torque control/limit mode is 0%
ECMOI	Description	Engine Moment of Inertia
	Repetition	5 S; SPN: 1794; PGN: 65251
	Unit	KG-M2: kg-m ²
	Resolution	0.01
	Data Range	0 to 257.02 kg-m ²
	e.g.	AT ECMOI=50.00KG-M2\r\n --- Moment of inertia for the engine is 500 kg-m ²
ECP1S	Description	Engine Speed At Idle, Point 1 (Engine Configuration)
	Repetition	5 S; SPN: 188; PGN: 65251
	Unit	RPM
	Resolution	0.01
	Data Range	0 to 8,031.88 rpm
	e.g.	AT ECP1S=700.00RPM\r\n --- Stationary low idle speed of engine is 700 RPM



ECP1T	Description	Engine Percent Torque At Idle, Point 1 (Engine Configuration)
	Repetition	5 S; SPN: 539; PGN: 65251
	Unit	%
	Resolution	1
	Data Range	125 to 125 %
	e.g. AT ECP1T=10% --- Engine torque limit can be provided by the engine at idle speed is 10%	
ECP2S	Description	Engine Speed At Point 2 (Engine Configuration)
	Repetition	5 S; SPN: 528; PGN: 65251
	Unit	RPM
	Resolution	0.01
	Data Range	0 to 8,031.88 rpm
	e.g. AT ECP2S=3600.00RPM --- Engine speed of point 2 of the engine torque map is 3600 RPM	
ECP2T	Description	Engine Percent Torque At Point 2 (Engine Configuration)
	Repetition	5 S; SPN: 540; PGN: 65251
	Unit	%
	Resolution	1%
	Data Range	- 125 to 125 %
	e.g. AT ECP2T=5% --- engine torque limit can be provided by the engine at point 2 of the engine map is 5%	
ECP3S	Description	Engine Speed At Point 3 (Engine Configuration)
	Repetition	5 S; SPN: 529; PGN: 65251
	Unit	RPM
	Resolution	0.01
	Data Range	0 to 8,031.88 rpm
	e.g. AT ECP3S=1500.00RPM --- Engine speed of point 3 of the engine torque map is 1500 RPM	
ECP3T	Description	Engine Percent Torque At Point 3 (Engine Configuration)
	Repetition	5 S; SPN: 541; PGN: 65251
	Unit	%
	Resolution	1%
	Data Range	- 125 to 125 %
	e.g. AT ECP3T=40% --- Engine torque limit can be provided by the engine at point 3 of the engine map is 5%	
ECP4S	Description	Engine Speed At Point 4 (Engine Configuration)
	Repetition	5 S; SPN: 530; PGN: 65251
	Unit	RPM
	Resolution	0.01
	Data Range	0 to 8,031.88 rpm
	e.g. AT ECP4S=2000.00RPM --- Engine speed of point 4 of the engine torque map is 2000 RPM	
ECP4T	Description	Engine Percent Torque At Point 4 (Engine Configuration)
	Repetition	5 S; SPN: 542; PGN: 65251
	Unit	%
	Resolution	1%
	Data Range	- 125 to 125 %
	e.g. AT ECP4T=60% --- Engine torque limit can be provided by the engine at point 4 of the engine map is 60%	



ECP5S	Description	Engine Speed At Point 5 (Engine Configuration)
	Repetition	5 S; SPN: 531; PGN: 65251
	Unit	RPM
	Resolution	0.01
	Data Range	0 to 8,031.88 rpm
	e.g. AT ECP5S=2500.00RPM\r\n --- Engine speed of point 5 of the engine torque map is 2500 RPM	
ECP5T	Description	Engine Percent Torque At Point 5 (Engine Configuration)
	Repetition	5 S; SPN: 543; PGN: 65251
	Unit	%
	Resolution	1%
	Data Range	- 125 to 125 %
	e.g. AT ECP5T=95%\r\n --- Engine torque limit can be provided by the engine at point 5 of the engine map is 95%	
ECP6S	Description	Engine Speed At High Idle, Point 6 (Engine Configuration)
	Repetition	5 S; SPN: 532; PGN: 65251
	Unit	RPM
	Resolution	0.01
	Data Range	0 to 8,031.88 rpm
	e.g. AT ECP6S=4000.00RPM\r\n --- Engine speed of high idle (point 6) of the engine torque map is 4000 RPM	
ECP7S	Description	Engine Maximum Momentary Override Speed, Point 7 (Engine Configuration)
	Repetition	5 S; SPN: 533; PGN: 65251
	Unit	RPM
	Resolution	0.01
	Data Range	0 to 8,031.88 rpm
	e.g. AT ECP7S=4200.00RPM\r\n ---The maximum engine speed above high idle allowed by the engine control during a momentary high idle override is 4200 RPM	
ECREF_T	Description	Engine Reference Torque (Engine Configuration)
	Repetition	5 S; SPN: 544; PGN: 65251
	Unit	NM
	Resolution	1
	Data Range	0 to 64,255 Nm
	e.g. AT ECREF_T=3000NM\r\n --- The 100% reference value for all defined indicated engine torque parameters is 3000NM	
ECTIME	Description	Engine Maximum Momentary Override Time Limit (Engine Configuration)
	Repetition	5 S; SPN: 534; PGN: 65251
	Unit	S
	Resolution	0.1
	Data Range	0 to 25 s
	e.g. AT ECTIME=5.0S\r\n --- The maximum time limit allowed to override the engine's high idle speed is 5 seconds	



ECTL	Description	Engine Default Torque Limit
	Repetition	5 S; SPN: 1846; PGN: 65251
	Unit	NM
	Resolution	1
	Data Range	0 to 64,255 Nm
	e.g. AT ECTL=16000NM\r\n --- Engine Default Torque Limit is 16000NM, it is the Companion parameter to Transmission Torque Limit	
ECULS	Description	Engine Requested Speed Control Range Upper Limit (Engine Configuration)
	Repetition	5 S; SPN: 536; PGN: 65251
	Unit	RPM
	Resolution	1
	Data Range	0 to 2,500 rpm
	e.g. AT ECULS=2400RPM\r\n ---The maximum engine speed regardless of load that the engine will allow when operating in a speed control/limit mode is 2400 RPM	
ECULT	Description	Engine Requested Torque Control Range Upper Limit (Engine Configuration)
	Repetition	5 S; SPN: 538; PGN: 65251
	Unit	%
	Resolution	1%
	Data Range	- 125 to 125 %
	e.g. AT ECULT=75%\r\n ---The maximum engine torque that the engine will allow when operating in a torque control/limit mode is 75%	
ECULEXT	Description	Engine Extended Range Requested Speed Control Range Upper Limit (EC)
	Repetition	5 S; SPN: 1712; PGN: 65251
	Unit	RPM
	Resolution	0.01
	Data Range	0 to 8,031.88 rpm
	e.g. AT ECULEXT=3600.00RPM\r\n ---The maximum engine speed (in extended range) regardless of load that the engine will allow when operating in a speed control/limit mode	
ECSVR	Description	Support Variable Rate TSC1 Message
	Repetition	5 S; SPN: 3344
	PGN	65251
	Data Range	0 – 255; The MSB position is bit position 8, the LSB position is bit position 1.
	e.g. AT ECSVR=0B11100000\r\n (1000ms, 750ms, 500ms, 250ms, and 100ms transmission rate are supported by the engine ECU)	
	Bit Position	Transmission Rate
	1	1000 ms transmission rate
	2	750 ms transmission rate
	3	500 ms transmission rate
	4	250 ms transmission rate
	5	100 ms transmission rate
	6	50 ms transmission rate
	7	20 ms transmission rate
	8	Reserved for SAE assignment (set to one)
	Where 0 = Transmission Rate Supported by Engine and 1 = Transmission Rate Not supported by Engine FF for this byte implies that the engine only supports standard temporary powertrain control (e.g. 10 ms)	



ECG1TSC1 Description Support TSC1 Control Purpose Group 1
 Repetition 5 S
 SPN 3345
 PGN 65251
 Data Range 0 to 255; The MSB position is bit position 8, the LSB position is bit position 1.

e.g. **AT ECG1TSC1=0B11100000\r\n**

Group 1 of 4

Bit Position	Control Purpose Value	Control Purpose Description
1	P1	Accelerator Pedal/Operator Selection
2	P2	Cruise Control
3	P3	PTO Governor
4	P4	Road Speed Governor
5	P5	Engine protection
6	P6	Reserved for assignment by SAE
7	P7	Reserved for assignment by SAE
8	P8	Reserved for assignment by SAE

Where 0 = Control Purpose is supported and 1 = Control Purpose is not supported

ECG2TSC1 Description Support TSC1 Control Purpose Group 2
 Repetition 5 S
 SPN 3346
 PGN 65251
 Data Range 0 to 255; The MSB position is bit position 8, the LSB position is bit position 1.

e.g. **AT ECG2TSC1=0B11111111\r\n**

Group 2 of 4

Bit Position	Control Purpose Value	Control Purpose Description
1	P9	Reserved for assignment by SAE
2	P10	Reserved for assignment by SAE
3	P11	Reserved for assignment by SAE
4	P12	Reserved for assignment by SAE
5	P13	Reserved for assignment by SAE
6	P14	Reserved for assignment by SAE
7	P15	Reserved for assignment by SAE
8	P16	Reserved for assignment by SAE

Where 0 = Control Purpose is supported and 1 = Control Purpose is not supported

ECG3TSC1 Description Support TSC1 Control Purpose Group 3
 Repetition 5 S; SPN: 3347; PGN: 65251
 Data Range 0 to 255; The MSB position is bit position 8, the LSB position is bit position 1.

e.g. **AT ECG3TSC1=0B11111111\r\n**

Group 3 of 4

Bit Position	Control Purpose Value	Control Purpose Description
1	P17	Reserved for assignment by SAE
2	P18	Reserved for assignment by SAE
3	P19	Reserved for assignment by SAE
4	P20	Reserved for assignment by SAE
5	P21	Reserved for assignment by SAE
6	P22	Reserved for assignment by SAE
7	P23	Reserved for assignment by SAE
8	P24	Reserved for assignment by SAE

Where 0 = Control Purpose is supported and 1 = Control Purpose is not supported



ECG4TSC1 Description Support TSC1 Control Purpose Group 4
 Repetition 5 S
 SPN 3348
 PGN 65251
 Data Range 0 to 255; The MSB position is bit position 8, the LSB position is bit position 1.

e.g. **AT ECG4TSC1=0B11111111\r\n**

Group 4 of 4

Bit Position	Control Purpose Value	Control Purpose Description
1	P25	Reserved for assignment by SAE
2	P26	Reserved for assignment by SAE
3	P27	Reserved for assignment by SAE
4	P28	Reserved for assignment by SAE
5	P29	Reserved for assignment by SAE
6	P30	Reserved for assignment by SAE
7	P31	Reserved for assignment by SAE
8	See Note	Not assignable, must always be set to 1.

Where 0 = Control Purpose is supported and 1 = Control Purpose is not supported

ADM1B1 Description ABS DM1 BYTE 1
 Repetition 1 S; PGN: 65226; SPN: 1213, 623, 624, 987
 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 ADM1B1=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

--- ABS Malfunction Indicator Lamp is off, Red Stop Lamp is on, Amber Warning lamp is on, and Protect lamp is off

ADM1B2 Description ABS DM1 BYTE 2
 Repetition 1 S; PGN: 65226; SPN: 3038, 3039, 3040, 3041
 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 ADM1B2=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



ADM1	ADM1[0/0]	ABS DM1 zero error code			
	ADM1[1/1]	ABS DM1 one error code			
	ADM1[X/Y]	ABS DM1 multiple error codes, up to 64, X is the error code's sequential number, Y is total number of error code			
	e.g. AT ADM1[0/0]=0,0,0,0, \r\n --- ABS DM1 zero error code				
	AT ADM1[1/1]=597,1,7,0, \r\n --- ABS DM1 one error code				
AT ADM1[1/10]=110,0,1,0, \r\n --- The 1 st ABS DM1 error code of 10 total ABS error codes					
AT ADM1[2/10]=597,1,7,0, \r\n --- The 2 nd ABS DM1 error code of 10 total ABS error codes					
		SPN	FMI	OC	CM
	ADM1[0/0]	0	0	0	0
	ADM1[1/1]	597	1	7	0
	ADM1[1/10]	110	0	1	0
	ADM1[2/10]	102	21	1	0

EBC1	Description	ABS Heart Beat PGN 61441 received			
	Repetition	1 S			
	PGN	61441			
	Data Range	PRESENT / NOTPRESENT			
	e.g. AT EBC1=PRESENT\r\n --- ABS controller is present				
AT EBC1=NOTPRESENT\r\n --- ABS controller is not present					

TDM1B1	Description	Transmission DM1 BYTE 1			
	Repetition	1 S; PGN: 65226; SPN: 1213, 623, 624, 987			
	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 TDM1B1=0B00000000\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	00	00	00
	Lamp Status	Off	Off	Off	Off
--- Transmission Malfunction Indicator Lamp is off, Red Stop Lamp is off, Amber Warning lamp is off, and Protect lamp is off					

TDM1B2	Description	Transmission DM1 BYTE 2			
	Repetition	1 S; PGN: 65226; SPN: 3038, 3039, 3040, 3041			
	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 TDM1B2=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



ECT	Description PID Unit Resolution Repetition Example	Engine Coolant Temperature 110 F 1 1S AT ECT=255F\r\n --- Engine Coolant Temperature is 255 Degree F.
EFUELRATE	Description PID Unit Resolution Repetition Example	Engine Fuel Rate (Instantaneous) 183 GPH (Gallon Per Hour) 0.01 200 mS AT EFUELRATE=1023.98GPH\r\n --- Engine Fuel rate is 1023.98 Gallon per hour.
ELOAD%	Description PID Unit 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 Unit Data Range Resolution Repetition Example	Total Vehicle Distance 245 Mile 0.0 ~ 429,496,729.5mile 0.1 mile 10 S AT EODO=1000000.0MILE\r\n --- Total vehicle distance is 1000000 mile
EOILP	Description PID Unit Resolution Repetition Example	Engine Oil Pressure 100 PSI 0.1 1 S AT EOILP=127.5PSI\r\n --- Engine oil pressure is 127.5 PSI
ETRIP	Description PID Unit Data Range Resolution Repetition Example	Trip Distance 244 Mile 0.0 ~ 429,496,729.5mile 0.1 mile 10 S AT ETRIP=1000000.0MILE\r\n --- Trip distance is 1000000 mile
FUEL%	Description PID Unit 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 Unit Data Range Resolution Repetition Example	Second Fuel Level (Right Side) (%) 38 % 0.0-127.5% 0.5% 10 S AT FUEL2%=127.5%\r\n --- Second Fuel level (right side) is at 127.5%



HR	Description	Total Engine Hours
	PID	247
	Unit	Hr
	Resolution	0.1
	Repetition	30 S, This parameter can also be request by sending the “AT HR=?\r\n” command
	Example	AT HR=45208.0HR\r\n ---- Total hours of Engine Operation is 45208.0 hours
IAT	Description	Intake Manifold Temperature
	PID	105
	Unit	F
	Data Range	0 - 255 F
	Resolution	1 F
	Repetition	1 S
	Example	AT IAT=255F\r\n --- Intake Manifold Temperature is 255 F
INST_MPG	Description	Instantaneous Fuel Economy
	PID	184
	Unit	MPG (Mile/Gallon)
	Data Range	0.0 to 255.996mpg
	Resolution	1/256 mpg
	Repetition	0.2 S
	Example	AT INST_MPG=255.996MPG\r\n --- Instantaneous Fuel Economy is 255.996 mpg
MPH	Description	Road Speed
	PID	84
	Unit	MPH (Mile/Hour)
	Data Range	0.0 to 127.5MPH
	Resolution	0.5 MPH
	Repetition	100 mS
	Example	AT MPH=127.5MPH\r\n --- Road speed is 127.5 Mile per hour (MPH)
PBRAKE	Description	Parking Brake Switch Status
	PID	70
	Data Range	1=active; 0=inactive
	Repetition	1 S
	Example	AT PBRAKE=INACTIVE\r\n --- Parking Brake Switch is inactive
PTOSTATUS	Description	Power Take-Off Status
	PID	89
	Data Range	Bit 8: PTO mode 1=active/0=not active; Bit 7: clutch switch 1=on/0=off Bit 6: brake switch 1=on/0=off; Bit 5: accel switch 1=on/0=off Bit 4: resume switch 1=on/0=off Bit 3: coast switch 1=on/0=off Bit 2: set switch 1=on/0=off Bit 1: PTO control switch 1=on/0=off
	Repetition	1S
	Example	AT PTOSTATUS=0B00000010\r\n --- PTO mode is not active, Clutch switch, brake switch, accel switch, resume switch, coast switch, and PTO control switch are OFF, set switch is on.



RPM	Description	Engine Speed
	PID	190
	Unit	RPM (Revolutions Per Minute)
	Resolution	0.01
	Repetition	100 mS (<i>RPM will show up every 100 milliseconds</i>)
	Example	AT RPM=16383.75RPM\r\n --- <i>Engine speed is 16383.75 revolutions/minute</i>
VOLT	Description	Battery Potential (Voltage) (V)
	PID	168
	Unit	V (Volt)
	Data Range	0.0-3276.75V
	Resolution	0.05V
	Repetition	1 S
	Example	AT VOLT=3276.75V\r\n --- <i>Battery Potential (Voltage) is 3276.75 volts</i>
VOLT_SWITCHED	Description	Battery Potential (Voltage) Switched (V)
	PID	158
	Unit	V (Volt)
	Data Range	0.0-3276.75V
	Resolution	0.05V
	Repetition	1 S
	Example	AT VOLT_SWITCHED=3276.75V\r\n\r\n --- <i>Battery Potential (Voltage) Switched is 3276.75 volts</i>

2.6. Summary

At the time when Au Combo Module is powered on, the following 6 commands will broadcast once:

```

AT ID=COMBO INTERPRETER VEHICLE PLATINUM ED.
AT FW=0.5N(AU-ASCI-A01-64K-BUILD11052019-04)
AT SN=10001
AT CBR5=00
AT BRS=00
AT CBS1=0B00100001
    
```

The following 5 parameters will be broadcasted every one second as long as the module is powered on, it is not necessary to connect the device to CAN bus to display these 4 parameters.

```

AT DV=12.212V
AT8 J1708BUS=OFF
AT8 MID=172
AT9 CANBUS=OFF
AT9 SADDRESS=NOTCLAIMED
AT9 SA=249
    
```

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 TRANS_OILT=276.8F
AT8 RPM=400.00RPM
AT8 MPH=5.0MPH
AT8 ELOAD%=5.0%
AT9 RPM=5140.38RPM
AT9 MPH=99.82MPH
AT9 ELOAD%=80%
AT9 EFUELRATE=48.0GPH
AT9 INST_MPG=72.0MPG
AT9 EODO=1988.4MILE
    
```



```
AT9 EDM1B2=0B11111111
AT9 CRUISE=ON
AT9 ETRIP=994.2MILE
AT9 ACC%=64.0%
AT8 EDM1[0/0]=0,0
AT9 EDM1[0/0]=0,0,0,0
AT8 PBRAKE=ACTIVE
AT8 PTOSTATUS=0B00000000
AT8 CRUISESTATUS=0B00000000
AT9 ADM1[0/0]=0,0,0,0
AT8 ECT=10F
AT8 EOILP=5.0PSI
AT8 EFUELRATE=3.00GPH
```

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

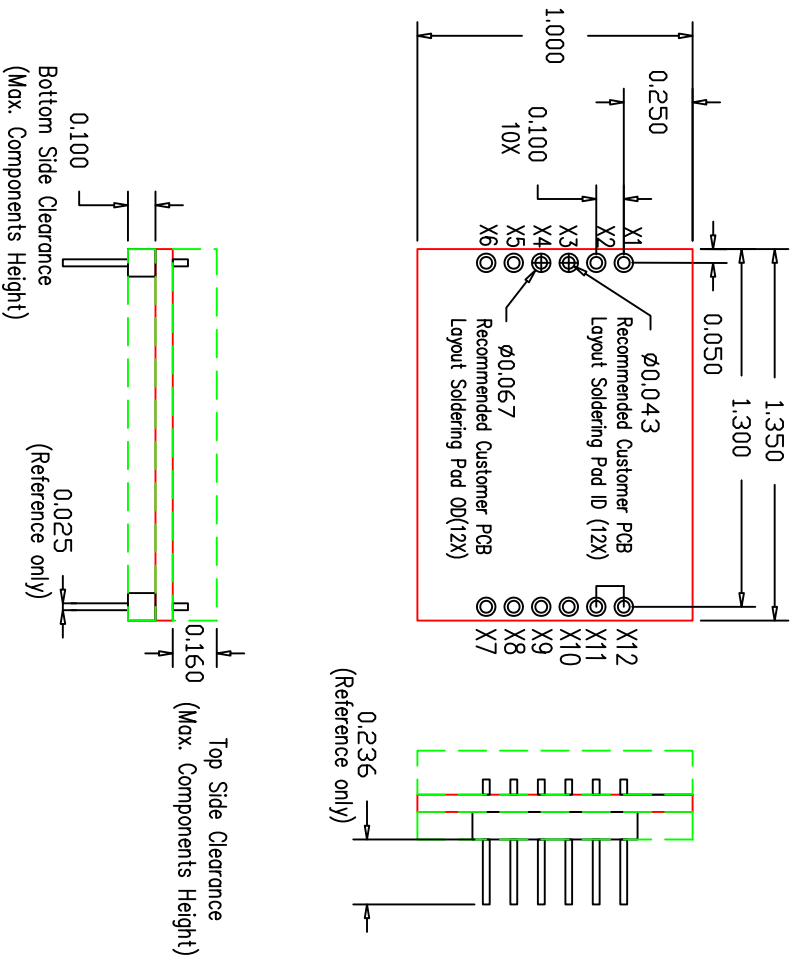
During run time in compatible format, if there is J1939 data presented on the J1939/CAN network, following AT strings (with different values) might show up:

```
AT MPH=99.82MPH
AT ADM1[0/0]=0,0,0,0
AT ADM1B1=0B00000000
AT BOOSTP=46.40PSI
AT CANBUS=ON
AT CRUISE=ON
AT DV=12.155V
AT EBC1=PRESENT
AT ECG1TSC1=0B11100000
AT ECGAIN=40.0%/RPM
AT ECLLS=550RPM
AT ECLLT=0%
AT ECMOI=50.00KG-M2
AT ECP1S=700.00RPM
AT ECP1T=10%
```

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 ACC%=4.0%
AT BOOSTP=1.250PSI
AT CANBUS=OFF
AT CRUISESTATUS=0B00000000
AT DV=12.161V
AT EAWILS=0B11000000
AT ECT=10F
AT EDM1[0/0]=0,0
AT EFUELRATE=3.00GPH
AT ELOAD%=5.0%
AT EOILP=5.0PSI
AT IAT=10F
AT INST_MPG=10.238MPG
AT J1708BUS=ON
AT MID=172
AT MPH=5.0MPH
AT PBRAKE=ACTIVE
AT PTOSTATUS=0B00000000
AT SA=249
AT SADDRESS=NOTCLAIMED
AT VOLT=1.70V
```

Dimension (Unit: Inch)



Pin Definition (X1 ~ X12)



Note:
 X1: Input – connect directly to vehicle power supply, it is used for vehicle voltage monitoring purpose only (Optional, if not in use, tie this pin to +5v input)

X5: Output – System On/Off signal (1 = On, 0 = Off) Optional, leave it Un-connected if not used
 X11 and X12 are connected internally

Description			
CB1701 Pin Definition and Dimension			
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