

Au SAE J1708/J1587 Data Center User Manual

Rev. A

By Au Group Electronics

January 2016



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Chapter 1. Introduction

Au SAE J1708/J1587 Data Center (Au J1708 DCS, Figure 1-1), is a handheld device with 1 LEDs and 2 DB9 connectors. It is able to capture SAE J1708/J1587 signals on SAE J1708 network and transmit the capture data to PC through RS232 serial port. It can also receive data from PC and transmit to SAE J1708/J1587 network.

1.1. Major Hardware Features

Major features of the device are listed below:

- **TVS** (Transient Voltage Suppressor) protection on J1708/J1587 bus
- **Power supply:** +12V DC or +24V DC Nominal, 250mA max
- **RS232 Communication failure rate:** < 0.05% (typical)
- **Compact size:** 3" L X 1-5/8"W X 3/4"H
- **Enclosure color:** Black or PC white
- **Operating temperature:** -40 °F to 185 °F (-40 °C to 85 °C)
- **Comm LED:** for communication event indication
- **1 DB9 Male "BUS" Interface:** It is used for connection with J1708/J1587 network and a DC power supply. Pin-out of the DB9 male "BUS" Interface is illustrated in Figure 1-2.
- **1 DB9 Female "RS232" Interface** (default baud rate: 115.2K bps)
- It is the interface used to communicate with PC for J1708 data input and output, it can also be used for in-field firmware update, license management, etc. Pin-out of the DB9 female "RS232" Interface is illustrated in Figure 1-2.

It can be connected to PC with one of the three ways (figure 1-4):

- through a RS232 serial extension cable (CBL-RS232-01).
- through a USB to RS232 converter cable (CBL-USB-232).
- With an optional build-in Bluetooth module, Au J1939 DCS device can be wireless connected to PC through Bluetooth module and PC Bluetooth dongle(order separately).

Please refer to attachment B for detail information on how to use Bluetooth module. **Note: Default Bluetooth pairing code is 1234.**



Figure 1-1 Au J1708 DCS



Pin 1: GND Pin 8: J1708-
Pin 5: +12V DC Pin 9: J1708+

Figure 1 - 2 BUS side DB9 male connector



Pin 2: To PC RXD Pin 3: from PC TXD
Pin 5: GND

Figure 1 - 3 RS232 side DB9 female connector

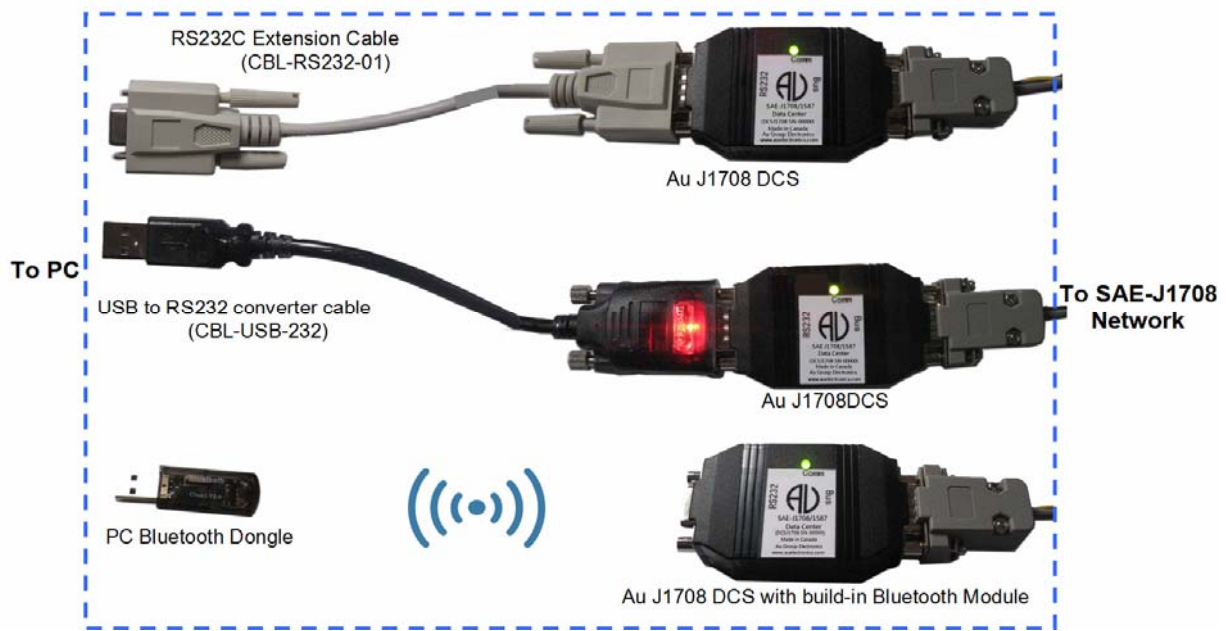


Figure 1 - 4 3 ways to connect Au J1708 DCS to PC

1. 2. Typical J1708/J1587 network topology with J1708 DCS

A typical SAE J1708/J1587 network topology with Au J1708 DCS is illustrated in Figure 1 - 5.

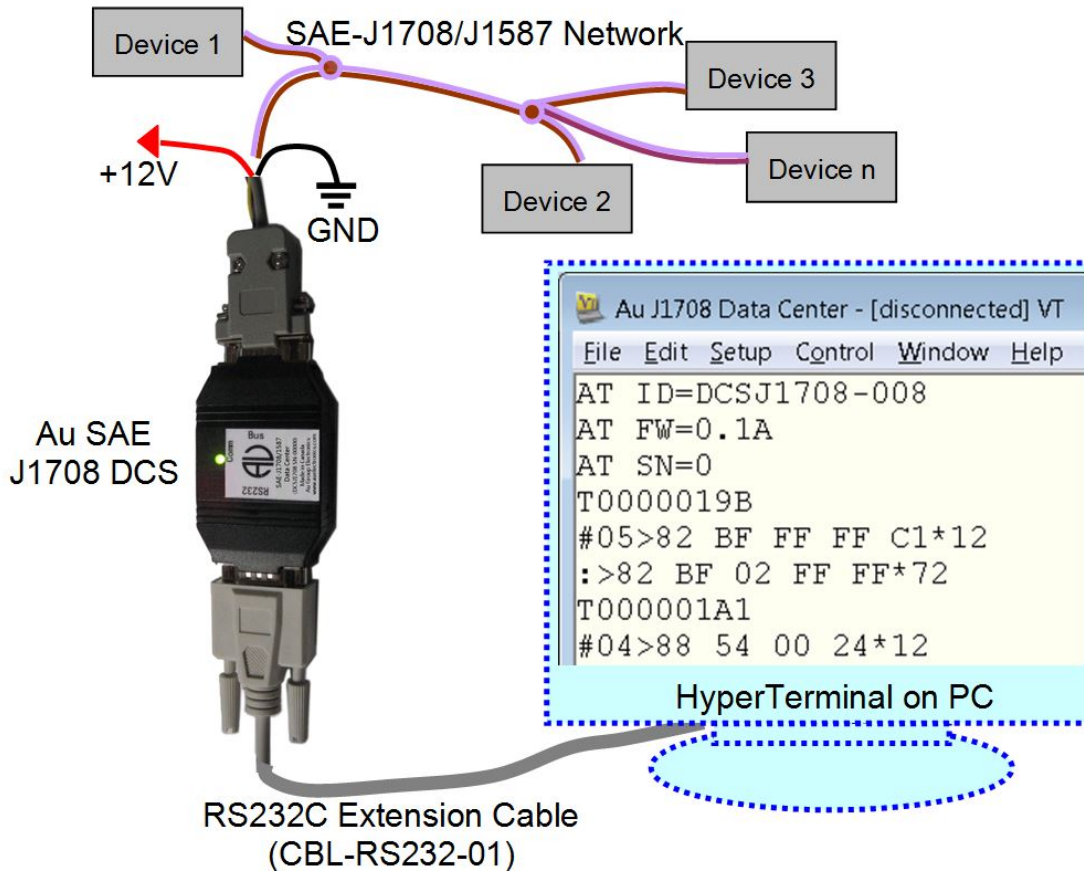









Figure 1-5 A typical SAE J1708/J1587 network topology with Au J1708 DCS

All items for Au J1708 DCS hardware connection and their Au Part# are listed in table 1-2.

Table 1-2 Hardware list and part # for Data center system

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

<p>CBL-RS485-01</p> 	<p>A 4-wire pigtail cable, it can be used to connect Au J1708 DCS with power supply and J1708 network. One end of the cable is a DB9 connector which mates with the DB9 male connector at "BUS" side.</p> <p>The other end of the cable consists of 4 pigtail wires which can connect power supply and J1708/J1587 network.</p> <p>Red wire: Power supply, e.g. +12V DC Black wire: Ground White: J1708A+ Green: J1708B-</p>
<p>CBL-CAN-485-01</p> 	<p>A 6-wire color coded cable which can be used for Au J1708 devices and Au J1939 devices,. One end of the cable is DB9 female connector; it is designed to mate with Au devices on BUS side.</p> <p>The other side of the cable is a pig tail with 3 pairs of twisted color coded wires:</p> <p>Red wire: Power supply, e.g. +12V DC Black wire: Ground Yellow wire: CAN-H Green wire: CAN-L Violet: J1708A+ Brown: J1708B-</p>

<p>CBL-J1708-01</p> 	<p>It has a DB9 female connector on one end and a rounded 6-way plug. The DB9 female connector can mate with Au J1708 DCS on the "BUS" side. The rounded 6-way plug (HD16-6-12S) can be connected to trucks and school buses equipped with 6 pin diagnostic connectors. Power, Ground, J1708+ and J1708- are connected from / to the vehicle via this Deutsch connector. The maximum cable length is 3 feet.</p>
<p>CBL-CAN-485-03</p> 	<p>It has a DB9 female connector on one end and a 9-way Round Threaded Plug (Deutsch part #: HD16-9-1939S) on the other end. The DB9 female connector can be connected with Au J1939 devices and J1708 devices It will supply power, ground, CAN_H, CAN_L, J1708+ and J1708- connection to Au J1939 devices and J1708 devices. The 9 pin Deutsch connector side can be connected to any vehicles (e.g. trucks and school buses) equipped with 9 pin diagnostic connectors. Power, Ground, CAN_H, CAN_L, J1708+ and J1708- are connected from / to the vehicle via this Deutsch connector. The maximum cable length is 1 foot (0.33 meter).</p>
<p>PWR-912V-CP</p> 	<p>Wall mount AC/DC power supply can supply power to all devices connected to CBL-J1708-02 or CBL-CAN-485-02. Specification: * Positive center * Connector style: 2.1mm I.D. x 5.5mm O.D. x 12mm Female (compatible with the power jacket of CBL-J1708-02 and CBL-CAN-485-02) * Voltage input: 110~120V AC Input * Voltage output: 12V DC * Current output: 500mA Max. * Inrush current: 40A Maximum * Power: 6.0W * Line Regulation: +/- 2% * Load Regulation: +/- 5%</p>
<p>CBL-RS232-01</p> 	<p>RS232 Serial Extension Cable can be used to connect computer Serial port to Au J1939 / J1708 products (on RS232 Side). Major Features: * Fully shielded to prevent unwanted EMI/RFI interference * Fully molded connectors with thumbscrews provide a quick and easy connection every time * Connectors: DB9 Male to DB9 Female * All 9 connector pins are wired straight through</p>
<p>CBL-USB-232</p> 	<p>The USB to Serial Converter cable can be used to connect computer USB port to Au J1939 / J1708 products (on RS232 Side). It acts as a bridge between a USB port and a standard Serial (RS232) port. It is Vista, Win7, and XP compatible. Three LED are included, Power, TX and RX. Power LED is on when USB power is supplied. TX LED will blink when COM port is transmitting. RX LED will blink when COM port is receiving. It is compatible with all Au Group Electronics system products, J1939 Simulators, J1708 Simulators, FMS Simulators, J1939 Interpreters, J1939 MCS, J1939 DCS, J1708 Interpreters, and J1708 DCS.</p>

1. 3. Major Operating Features

- **Ease of use:** Easy-to-operate design. No software setup experience or protocol configuration skill is required.
- **Easy in-field license upgrade feature** with Au License Management Tool. The Value Package Edition, Engine Basic Edition, and Engine Premium Edition can be easily upgraded to Vehicle Platinum Edition.
- **In-field firmware updating capability with Au Bootloader technology.**
- **Annual support and minor upgrade services** are available (SVS-ITPJ1708).
- Custom design is available upon request.

1. 4. Eight Editions of Au SAE J1708 DCS

Base on the supported features, there are 8 editions of Au J1708 DCS available: 4 non-plus editions and 4 plus editions. Plus edition has all the functions/features of non-plus edition, plus PC Graphic User Interface (GUI) program.

Plus Edition = Non-plus edition + PC remote terminal program

There are two value package edition, one support individual PID only, the other one support complete PID sentence. Au J1708 DCS Value Package edition can be upgraded to Basic edition, basic edition can be upgraded to premium edition, non-plus edition can be upgraded plus edition.

Au part # for each edition and license upgrading code is listed in table 1.

Table 1 - 1 8 editions of Au J1708 DCS

Plus / non-plus	Edition	Part #
Non-plus Editions (without PC GUI)	Value Package Non-plus edition with Individual PID	DCSJ1708-001
	Value Package Non-plus edition with Complete PID	DCSJ1708-002
	Basic Non-plus edition	DCSJ1708-003
	Premium Non-plus edition	DCSJ1708-004
Plus Editions (with PC GUI)	Value Package plus edition with Individual PID	DCSJ1708-005
	Value Package plus edition with Complete PID	DCSJ1708-006
	Basic plus edition	DCSJ1708-007
	Premium plus edition	DCSJ1708-008
License Upgrading	Upgrade Au J1708 DCS from Value Package edition to Basic Edition	LIC-DCS8-01
	Upgrade Au J1708 DCS from Basic Edition to premium edition	LIC-DCS8-02
	Upgrade Au J1708 DCS from non-plus edition to Plus edition	LIC-DCS8-03

License upgrading procedure for the 8 editions of SAE J1708/J1587 Interpreters is summarized below (Figure 1-4):

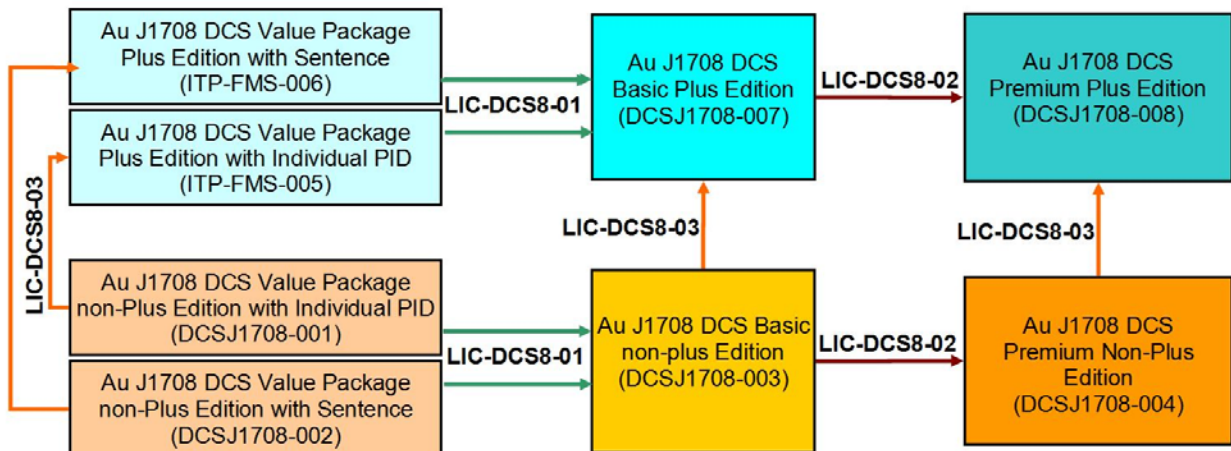


Figure 1-4 License upgrade for Au J1708 DCS

Chapter 2. Description of Command

Au J1708 DCS can be configured to break down received data from J1708 network into 3 format:

- Receive Complete J1708 sentence (RXD)
- Receive Incomplete J1708 Sentence (RIS)
- Receive Individual PID (RIP)

Au J1708 DCS can also be configured to transmit data to J1708 network in 4 format:

- Transmit Freedom format data (TFR)
- Transmit complete J1708 Sentence (TXD)
- Transmit Incomplete J1708 Sentence(TIS)
- Transmit Individual PID (TIP)

Symbol	Name	Description of function	Example
:	Colon	Transmit Individual PID (TIP)	AT :>80 F7 04 2F 7F 89 00*8F
		Receive Individual PID (RIP)	:>80 B7 02 FF FF*83
#	Number sign / Pound sign	Transmit complete J1708 Sentence (TXD)	AT #13>80 B7 C0 00 B8 3D 0A 55 00 5C 0A BE 40 06 54 0A 5B 0A 88*85
		Receive Complete J1708 sentence (RXD)	#07>80 5C FF BE FF FF 69*D4
?	Question mark	Transmit Incomplete J1708 Sentence(TIS)	AT ?0A>80 5C 0A BE 40 06 54 0A 5B FF*49
		Receive Incomplete J1708 Sentence (RIS)	?0A>80 5C 0A BE 40 06 54 0A 5B FF*49
T	Letter T	Time Stamp	T00000271
AT	AT command	Letter AT followed by space	AT J1708BUS=ON

The AT command will display in the format as following:

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

It always started with "AT ", consist of characters of "A", "T" followed with **space** character, then **abbreviation** of device related information, an equal sign =, then **value** and **unit** for digital parameters or status (such as **ON / OFF** or **Disable / Enabled**). Every single AT Command end with a carriage return "<CR>" and a line feed "<LF>". In this document, "<CR>" and "\r" both represent carriage return; "<LF>" and "\n" both represent Line Feed.

2.1. Au J1708 DCS TX / RX Data

Au J1708 DCS can also receive data from PC through RS232 serial port.

AT #	Transmit full sentence from PC RS232 port to Au J1708 DCS.
Format	AT #<data length>><MID> <PID> <Data1>....<Datan> <PID> <Data1> ... <Datan> <data checksum>*<checksum><CR><LF>
Example	AT #13>80 B7 C0 00 B8 3D 0A 55 00 5C 0A BE 40 06 54 0A 5B 0A 88*85



Response	#13>80 B7 C0 00 B8 3D 0A 55 00 5C 0A BE 40 06 54 0A 5B 0A 88*85 :>80 B7 02 C0 00*C8 :>80 B8 02 3D 0A*B2 :>80 55 01 00*6B :>80 5C 01 0A*4C :>80 BE 02 40 06*C3 :>80 54 01 0A*5B :>80 5B 01 0A*4D
AT :>	Transmit individual PID from PC RS232 port to Au J1708 DCS.
Format	AT :><MID> <PID> <data length> <Data 1> ... <Data n>*<checksum><CR><LF>
Example	AT :>80 F7 04 2F 7F 89 00*8F
Response	#08>80 F7 04 2F 7F 89 00 4E*A5 :>80 F7 04 2F 7F 89 00*8F
AT ?	Transmit incomplete sentence, for test purpose only.
Format	AT ?<data length>><MID> <PID> <Data 1> ... <Data n> <PID> <Data 1> ... <Data n> *<checksum><CR><LF>
Example	AT ?0A>80 5C 0A BE 40 06 54 0A 5B FF*49
Response	?0A>80 5C 0A BE 40 06 54 0A 5B FF*49
AT >	Transmit multiple PID from same MID from PC RS232 port to Au J1708 DCS.
Format	AT ><MID> <PID> <Data 1> ... <Data n> <PID> <Data 1> ... <Data n><CR><LF>
Example	AT >80 B7 C0 00 B8 3D 0A 55 00 5C 0A BE 40 06 54 0A 5B 0A
Response	#13>80 B7 C0 00 B8 3D 0A 55 00 5C 0A BE 40 06 54 0A 5B 0A 88*85 :>80 B7 02 C0 00*C8 :>80 B8 02 3D 0A*B2 :>80 55 01 00*6B :>80 5C 01 0A*4C :>80 BE 02 40 06*C3 :>80 54 01 0A*5B :>80 5B 01 0A*4D

2.2. Device Status and Bus Status command

Au SAE J1708 DCS device ID, FW, and SN will be broadcasted only once when powered on, and then can be requested during run time.

Abbreviation	Explanation	
ID	Description	Device ID
	Repetition	Broadcast once at Power On, and can be requested during run time
	Request Command	AT ID=?\r\n --- After this request command is received, the J1708/J1587 interpreter will response with device ID information.
	Example	AT ID=DCSJ1708-005\r\n --- <i>The ID of this Device is J1708 DCS Value Package plus edition with Individual PID</i>
FW	Description	Firmware ID, (1 broadcast at Power on, and can be requested during run time)
	Data range	0.1A – 25.6A
	Repetition	Broadcast once at Power On, and can be requested during run time
	Request Command	AT FW=?\r\n --- After this request command is received, the J1708/J1587 interpreter will response with device firmware information.
	Example 1	AT FW=0.1A\r\n --- <i>The Firmware ID of the device is 0.1A</i>
SN	Description	Serial Number
	Data range	0 - 4294967295
	Repetition	Broadcast once at Power On, and can be requested during run time

Request Command Example	AT SN=?\r\n --- After this request command is received, the J1708/J1587 interpreter will response with device serial number. AT SN=429\r\n --- The Serial Number of the device is 429
-------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

There are 4 device-related parameters defined in Au J1708 DCS: Device Voltage (DV), Control Bit Status(CBS1) , Filter Status (**FTS1**), SAE J1708 bus network status (**J1708BUS**).
Please note, DV will be broadcasted every 1 second, and it is always available even without connecting to J1708/J1587 bus as long as it is powered on.

Table 2 -1 List of Device Information Parameters

Abbreviation	Explanation								
DV	Description	Device Voltage							
	Unit	V (Volt)							
	Data range	9-14.2V nominal (Application dependent)							
	Resolution	0.001 V							
	Repetition	1 S							
Example	AT DV=14.234V\r\n --- Device voltage is 14.234 volt								
CBS1	Description	Control Bit Status							
	Data range	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1
		RS232 TX	RS232 DVS	RS232 TSP	RS232 MLE	RS232 RIS	RS232 RXD	RS232 RIP	J1708 TX
	Repetition	1 S							
	Example	AT CBS1=0B11111111							
FTS1	Description	Filter Status							
	Data range	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1
		Filter 4 PID	Filter 4 MID	Filter 3 PID	Filter 3 MID	Filter 2 PID	Filter 2 MID	Filter 1 PID	Filter 1 MID
		1: ON 0: Off	1: ON 0: Off	1: ON 0: Off	1: ON 0: Off	1: ON 0: Off	1: ON 0: Off	1: ON 0: Off	1: ON 0: Off
	Repetition	1 S							
Example	AT FTS1=0B00000000								
J1708BUS	Description	SAE J1708 bus network status							
	Data range	ON or OFF							
	Repetition	1 S							
	Example 1	AT J1708BUS=ON\r\n --- J1708 Bus is On							
	Example 2	AT J1708BUS=OFF\r\n --- J1708 Bus is Off							
DVS	Description	To display the device status information or not 0 - Device status is off, CBS1, FTS1, DV, J1708Bus information will not display 1 - Device status is On, CBS1, FTS1, DV, J1708Bus information will display every 1 second							
	Example	AT DVS=0\r\n Device status is Off AT DVS=1\r\n Device status is On							

2.3. Control Commands

There are following control commands can be received by Au J1708 DCS, as listed in table 3-4

Table 2 – 3 List of Device Control Commands

Abbreviation	Explanation
TSP	To control the time stamp on/off By default, TSP will be provided when J1708 data is received. it can be turned off using AT TSP=0\r\n



RXD	Example	AT TSP=0\r\n Turn off Time Stamp AT TSP=1\r\n Turn on Time Stamp
	Description	Turn on/off received sentence
RIP	Example	AT RXD=0\r\n Turn off received sentence AT RXD =1\r\n Turn on received sentence
	Description	Turn on/off received individual PID
RIS	Example	AT RIP=0\r\n Turn off received individual PID AT RIP =1\r\n Turn on received individual PID
	Description	Turn on/off Received Incomplete Sentence
MLE	Example	AT RIS=0\r\n Turn Off received incomplete sentence AT RIS =1\r\n Turn On received incomplete sentence
	Description	Message Length Exception on/off control
RS232TX	Example	AT MLE=0\r\n Message length exception is Off AT MLE=1\r\n 1: Message length exception is On
	Description	RS232 TX on / off control
J1708TX	Example	AT RS232TX=0\r\n - RS232 TX off AT RS232TX=1\r\n - RS232 TX on
	Description	Listen only mode control
ALL	Example	AT J1708TX=0\r\n" ; transmit is forbidden, this is the listen only mode, AT J1708TX=1\r\n" ; transmit is enabled; default is 1.
	Description	Turn on/off all control status
IBT	Example	AT ALL=0\r\n Turn Off all control status AT ALL =1\r\n Turn On all control status
	Description	Generate 1 time idle bubble for testing purpose, "Idle Bubble Time " can be set from 1 ms to 10 seconds
FT(n)	Example	AT IBT=00001 create a 1 ms idle bubble AT IBT=10000 create a 10 seconds idle bubble
	Description	Up to 4 Filters can be set for Au J1708 DCS, filter setting only apply to RXD and RIP results. By default, all filters are off at power up. To check the status of Filters, use command "AT DVS=1 ", device status, including Filter status will show up
	Format	AT FT(n) CB MID PID\r\n
	AT	characters of "A", "T" followed with space character
	FT(n)	n = 1 to 4, abbreviation for filter 1 to 4, 1 byte, (FT1, FT2, FT3, FT4)
	CB	control byte for filter 1 to 4, 1 byte, (00, 01, 02, 03)

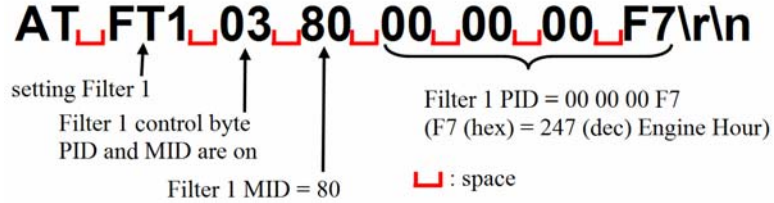
CB (Filter n control byte)		
Bit 8-3	Bit 2	Bit 1
000000	0 - PID off	0 - MID off
	1 - PID on	1 - MID on

CB (Hex)	CB(Bin)	
00	00000000	In Filter n, PID is off, MID is off
01	00000001	In Filter n, PID is off, MID is on
02	00000010	In Filter n, PID is on, MID is off
03	00000011	In Filter n, PID is on, MID is on

MID 1 byte (hex format)
PID 4 bytes (hex format)



Example 1 Use filter 1 to filter the received data with Engine Hour information display only.
 Both MID and PID will be on for filter 1, so CB1 = 03
 Engine MID is 80 in hex format (128 in decimal format) ,
 Engine Hour PID is 00 00 00 F7 in hex format (247 in decimal format)



Input the following filter setting command: **AT FT1 03 80 00 00 00 F7\r\n**

Filter 1 status will show up once: **AT FTS1=0B00000011**

Use AT RXD = 0 is recommended to turn off the sentence broadcast, so only Engine hour information will be displaying:

- :=>80 F7 04 A0 0F 00 00*AE**
- :=>80 F7 04 9A 10 00 00*BA**
- :=>80 F7 04 8E 12 00 00*B5**
- :=>80 F7 04 44 48 00 00*C1**
- :=>80 F7 04 38 4A 00 00*B5**

Example 2 Filter on PID only (no matter what MID is)

AT FT1 02 00 00 00 00 C2

- #13>82 C2 0F 0F FF 08 10 B4 09 12 B4 0A 37 B1 80 3F F2 FF 62*5E**
- #13>88 C2 0F 19 BF 08 1F B4 09 36 B4 0A 67 F1 7E 68 B2 FE 09*40**
- #13>80 C2 0F 46 AF 08 55 B4 09 21 F4 0A A8 A1 7F 6A C2 14 79*65**

Example 3 Filter on MID only (no matter what PID is)

AT FT1 01 AC 00 00 00 C3

#07>AC C3 03 80 00 A0 6E*3D

Example 4 Setup 2 filters:

AT FT1 03 80 00 00 00 C4

AT FT2 03 AC 00 00 00 00

Filter 1 filtering on both MID and PID: MID - 0x80, PID - C4

Filter 2 filtering on both MID and PID: MID - 0xAC, PID - 00

Example 5 Setting 3 Filters

AT FT1 02 00 00 00 00 00 (filter setting for Global request)

AT FT2 02 00 00 00 00 80 (filter setting for specific request)

AT FT3 03 80 00 00 00 ED ((filter setting for VIN)

:=>AC 00 01 F7*3C

:=>AC 00 01 9E*3B

:=>AC 00 01 ED*30

:=>AC 80 02 ED 28*9D

:=>80 ED 11 35 4E 50 44 48 34 41 45 38 47 48 39 36 37 32 39 35*A2



2.4. Example

When powered on, the following 3 commands broadcasted once:

```

AT ID=DCSJ1708-005
AT FW=0.1A
AT SN=0

```

Input **AT ALL=1\r\n**

Time stamp, sentence, and whole sentence was break down into individual PID and display:

```

T0000019A
#0A>80 B7 FF FF 5C FF BE FF FF B4*D2
:>80 B7 02 FF FF*83
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
T000001FD
#07>80 5C FF BE FF FF 69*D4
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
T00000261
#0A>80 B7 FF FF 5C FF BE FF FF B4*D2
:>80 B7 02 FF FF*83
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
T000002C5
#07>80 5C FF BE FF FF 69*D4
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
T00000329
#0A>80 B7 FF FF 5C FF BE FF FF B4*D2

```

Input **AT TSP=0\r\n** (Time Stamp turned off)

Received data will display as:

```

#0A>80 B7 FF FF 5C FF BE FF FF B4*D2
:>80 B7 02 FF FF*83
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
#07>80 5C FF BE FF FF 69*D4
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
#0A>80 B7 FF FF 5C FF BE FF FF B4*D2
:>80 B7 02 FF FF*83
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
#07>80 5C FF BE FF FF 69*D4
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
#0A>80 B7 FF FF 5C FF BE FF FF B4*D2

```



Input **AT RXD=0\r\n** (Turned off sentence)

```

:>80 B7 02 FF FF*83
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
:>80 B7 02 FF FF*83
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75
:>80 5C 01 FF*31
:>80 BE 02 FF FF*75

```

Input **AT RXD=1\r\n** (Turned on sentence)

Input **AT RIP=0\r\n** (Turned off individual PID)

```

#0A>80 B7 FF FF 5C FF BE FF FF B4*D2
#07>80 5C FF BE FF FF 69*D4
#0A>80 B7 FF FF 5C FF BE FF FF B4*D2
#07>80 5C FF BE FF FF 69*D4
#0A>80 B7 FF FF 5C FF BE FF FF B4*D2

```

Input **AT DVS=1\r\n**, (Turned on Device Status)

The following 4 device status information will be broadcasted every 1 second, it is not necessary to connect the device to J1708/J1587 bus to have those data displayed.

```

AT CBS1=0B11111111
AT FTS1=0B00000000
AT DV=14.351V
AT J1708BUS=ON

```