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Packet Construction

All AVT interface units communicate with the host, in both directions, using 'packets'.

This document describes the packet construction as well as how to construct a transmit message and parse a received message.

Note: All numbers used are hex digits.

Packet Description

- All of these rules apply to all packets between the host and any AVT interface unit.
- The first byte of a packet is the 'header' byte.
- The header byte consists of the upper nibble and lower nibble.
- The upper nibble is the command. It indicates what the packet is: command, response, error message, status message, message to or from the network, etc.
- Upper nibble may have values of $0 to $F.
- The lower nibble is the count of bytes to follow - always.
  This is very important !! If you do not properly and correctly count the number of bytes after the header byte, you will not be able to find the next header byte.
- Consult the "Master Commands and Responses" document for details on all commands and responses with any AVT interface unit.
  Available from our web site: www.avt-hq.com
  from the download page, link on home page, in the App Notes section.
  Direct address: http://www.avt-hq.com/download.htm#Notes.
- On a message received from the network, the first byte after the header byte is always the receive status byte.
  The receive status byte is a bit map of the status of the received message.
  Consult the "Receive Status Byte Bit Definitions" section of the "Master Commands and Responses" document for detailed information about what the bits means, depending on the mode of communications in use.

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Command & Response Examples

1. Send the reset command: F1 A5.
   Explanation:
   "F" is a reset command.
   "1" is one byte follows.
   "A5" is the command byte.

   Response: 91 12
   92 04 21
   (depends on the unit, AVT-718 is given for this example)
   Explanation:
   "9" is a status report.
   "1" one byte follows.
   "12" is the status indicating the unit is operating at idle.

   "9" is a status report.
   "2" two bytes follow.
   "04" is a software version report.
   "21" is the software version = 2.1

2. Send mode switch command: E1 33
   Explanation:
   "E" mode switch command.
   "1" one byte follows.
   "33" switch to VPW mode.

   Response: 91 07
   (depends on the unit, AVT-718 is given for this example)
   Explanation:
   "9" status report.
   "1" one byte follows.
   "07" operating in VPW mode.

3. Request Match Table values: 30
   Explanation:
   "3" match table command.
   "0" no bytes follow.

   Response: 40
   Explanation:
   "4" match table response.
   "0" no bytes follow.
   This response indicates that there are no match table entries, i.e.: the table is empty.

4. Enter a value into the match table: 32 03 AC

   Explanation:

   “3” match table command.
   “2” two bytes follow.
   “03” byte position.
   “AC” byte value.

   [Byte position is the location of the byte in the actual message, not its location in the packet.]

   Response: 42 03 AC

   Explanation:

   “4” match table response.
   “2” two bytes follow.
   “03” byte position.
   “AC” byte value.

Sending a Network Message

1. Send message to the network: 05 68 6A F1 01 05

This is an OBD-II engine temperature request.

Explanation:

"0" message for the network.
"5" five bytes follow.
"68 6A F1 01 05" the message to be sent on the network (CRC byte is added by the AVT interface).
"68 6A" indicates an OBD-II request.
"F1" is the requester's address (off-board tool).
"01" indicates a mode 1 request.
"05" is the PID requested - engine temperature.

Response: 01 60

Transmit acknowledgment.

Explanation:

"0" message from the network.
"1" one byte follows.
"60" is the receive status byte only.
Unless otherwise enabled, the AVT interface unit does not send to the host the received message for a message it just transmitted.
In VPW, ISO, KWP, ALDL, and CCD modes only the receive status byte is sent to the host as a transmit acknowledgment.

"60" is a bit map of the status of the received message.
"60" indicates that bits 5 and 6 are set.
From the receive status byte bit definitions table, in VPW mode
bit #5 indicates 'transmit success'.
Bit #6 indicates 'from this node'.

Receiving a Network Message

1. Receive a message from the network: 07 00 48 6B 10 41 05 30
   [Messages from the network are received asynchronously, as they arrive.
   You do not have to 'ask' for them.]
   This is the OBD-II engine temperature response.
   Explanation:

"0" message from the network.
"7" seven bytes follow.
"00" is receive status byte, no errors detected.
"48 6B 10 41 05 30" the received network message.
(CRC byte was stripped off by the AVT interface).
"48 6B" indicates an OBD-II response.
"10" is the address of the node that transmitted this.
"41" indicates a mode 01 response.
"05" is the PID response.
"30" is the engine temperature, in degrees C,
offset by -40 degrees C.
Thus, the actual engine temperature is reported to be
88 degrees C = ~190 degrees F.

Remember

- To send a message to the network the form is: 0x rr ss tt ...
  where: "0" indicates to the network.
  "x" number of bytes to follow.
  "rr ss tt" are the message bytes.

- A transmit acknowledgment will be received.
  Usually, this is in the form of: 01 xx
  where: "0" indicates from the network.
  "1" one byte follows.
  "xx" is the receive status byte, usually, but not always equal to "60".

- The AVT interface always receives the message it transmitted; checks it; and then informs the host of a message received from the network, that it transmitted it, and that no errors (usually) were detected.

- Every packet that is a message "from the network"; the first byte after the header byte is the receive status byte.

- If time stamping is enabled, the time stamp is the first field in the packet after the header byte. Then the receive status byte follows, then the actual message (if present).
  [Consult the "Master Commands and Responses" document for more detailed information.]

- Received messages are of the form: 0x yy rr ss tt ...
  where: "0" indicates from the network.
  "x" is the number of bytes to follow.
  "yy" is the receive status byte.
  "rr ss tt ..." is the network message, CRC byte stripped off.

- Naturally, there are exceptions to the rules.
  PWM mode is one in particular.
  In PWM mode, the receive status byte value is the table entry number of the Function Message Lookup Table the message matched, or is $FF if the HBCC is in monitor mode.

- Packets with more than 15 bytes, $F, utilize the alternate header formats developed to handle just such cases. Consult the document "Long Messages - Alternate Header Formats" for more information. [Also available from our web site, download page.]