ADVANCED VEHICLE TECHNOLOGIES, Inc.

AVT-418 / 718 Firmware version 6.6

Firmware version 6.6 for the models AVT-418 and AVT-718 contains numerous changes. This document provides a description of those changes. There was no version 6.5 ever released.

Hardware Initialization

During startup (power-on reset or software commanded reset) all error codes generated by hardware testing are stored until testing is complete. The codes (if any) are then sent to the host. The different tests are designed to not destroy the stored codes.

Startup Idle State

The startup idle state now enforces a command time out function, the same as all operating modes.

If a complete command is not received within 500 milliseconds of receiving the header byte, the command is discarded, and the error message "22 34 xx" is sent to the host.

Startup Commands

A new startup command processing function has been added. This function will read commands stored in FLASH memory to be executed after the AVT-418/718 unit has completed all internal startup tasks.

Detailed information about this new function is presented later in this document.

General

Corrected a bug in the bus loading report function.

Multiple Modes

Removed the 5x 1A command because it didn't do anything. Removed the "Tx_wait" variable because it was not used.

UBP Mode

Changes to save the time first byte was transmitted.

Changed variable "Fail0" to "Fail_tx".

The "Fail_tx" timer is reset using a variable value (not a constant).

Updated monitor watchdog for transmit mode and transmit buffer.

Corrected transmit status bit definitions.

Corrected routines dealing with break detected, loss of arbitration, and others.

Corrected error bit definitions.

URT Mode

Corrected an interrupt service routine processing error.

Corrected an error in the main loop keep alive routine.

KWP Mode

Added the 5x 0C "Pass Through mode #1" command and function.
Described in detail later in this document.

Added the 5x 0D "Pass Through mode #2" command and function.
Described in detail later in this document.

Changed the 5x 26 to permit external 16x clock for different baud rates.
      51 26:   Status query
      52 26 00:   K-line baud rate determined by the 53 03 xx yy command. {Default}
      52 26 01:   K-line baud rate at 115.2 Kbaud.
      52 26 02:   K-line baud rate determined by external 16x clock.
                   [External clock divided by 16 = baud rate.]
                 Contact the factory for detailed information regarding operations
                   with external clock.

Created "Special Mode #3" (SM3) initialization method. It was based on SM1. New command for
SM3: 62 16 xx   xx = is the inactivity time out value specified in 0.0625 second increments.

Initialization terminates after reception of keybyte 2; the AVT-718 sends success message;
the AVT-718 then immediately enters pass through mode #1 operations.

CAN Mode

Changed variable "Fail0" to "Fail_tx" for some CAN functions.

LIN Mode

Added the 5x 5D command to enable/disable slave mode auto response function.

Added a table of Slave mode auto response messages.

Added a function to process slave mode auto responses.

Added a function to generate a software watchdog response. (Response message $20.)

KWP & CAN

While in KWP mode many CAN mode commands and functions are enabled and available. This permits a "sort of" pseudo-simultaneous CAN mode of operation while in KWP mode.

Detailed information about this change is provided later in this document.

Periodic Sequential Messages

The function allows you to define up to two different groups of sequential messages. Each group has independent timers to control the time between each message and time from the last message to the first message. These are known as "Type2" periodic messages.

For detailed information about this new function, consult the document:

> Title: "CAN Mode Periodic Messages"
> File name: CAN_04C.PDF

The document is available from our web site, product document page.
> www.AVT-HQ.com/download.htm#Notes

SDM Mode

Added the SDM mode (from special firmware version 4.7).

The SDM mode firmware was improved. Corrected error trapping and reporting capabilities. Added transmit mode and transmit buffer watchdog functions.

Note: SDM mode requires special hardware modifications to the AVT-418/718 board. The mode is present in production released firmware but will not perform properly without the necessary hardware modifications. No harm will be done if SDM mode is entered and operated without the SDM hardware.

Detailed Information for Specific Items

KWP Pass Through Functions

"Pass Through" mode means that the AVT-418/718 does not buffer messages between the host and the network; in either direction.

Normally, the host passes a complete message to the AVT-418/718 unit to be transmitted to the network. The AVT-418/718 computes the checksum, appends it to the message, and handles all functions related to transmitting the message onto the network (such as timing, error checking, etc.). Similarly for messages from the network to the host; the AVT-418/718 handles all timing, error checking, buffering, etc. and passes the complete message to the host.

In pass through mode every byte received from the host is immediately transmitted onto the network. Every byte received from the network (including echo bytes) are immediately passed to the host. The AVT-418/718 does not perform any timing, error checking, or other functions.

There are two "Pass Through" modes.

KWP Pass Through Mode #1

Enter this mode using the 52 0C xx command.
The value "xx" is the inactivity time out value specified in 0.0625 second increments.

When the AVT-418/718 receives the command it response with 62 0C xx and then immediately enters pass through mode #1.

Once pass through mode #1 has been entered there are only three ways to exit:
- Inactivity time out (as determined by the value "xx" in the command).
- Receiving a break symbol from the host. (This only applies to the AVT-718.)
- Reset the AVT-418/718 unit (power reset).

The inactivity time-out feature is how long a period of time must pass with no communications activity in either direction. For example: The host commands the AVT-418/718 to enter pass through mode #1 with the time value specified to be $10 or 1 second (command: 52 0C 10). As long as there is communications activity, in either direction, between the host and the AVT-418/718 unit (and hence, the network) the AVT-418/718 unit will stay in pass through mode #1. However, if 1 second elapses with no communications activity, the AVT-418/718 will immediately exit pass through mode #1.

The host can also command the AVT-718 to exit pass through mode by sending a valid break symbol on the RS-232 line. A valid break symbol means the transmit data line (from host to AVT-718) is active for at least 10 bit times. Note that this method can not be used with the AVT-418 unit since it is an Ethernet server device and a "break" symbol does not exist.

When the AVT-418/718 exits pass through mode #1 it will send the 62 0C 00 response to the host to indicate it has left pass through mode #1 and resumed normal operations.

Pass Through Mode #2

Enter this mode using the 52 0D 01 command.

When the AVT-418/718 receives the command it responds with 62 0D 01 and then immediately enters pass through mode #2.

Once pass through mode #2 has been entered there is only one way to exit:
- Reset the AVT-418/718 unit (power reset).

Initialization Command Storage and Processing

The AVT-418/718 FLASH memory area starting at address $1FE00 and running for 512 contiguous bytes has been set aside as non-volatile command storage space.

Any commands you want the AVT-418/718 to execute at reset can be stored here.

When the AVT-418/718 exits the reset condition (power-on or software commanded) it performs a number of tests and internal initializations. The unit then enters the idle state and informs the host it is ready to accept commands. At that point the AVT-418/718 examines the command storage space, starting at address $1FE00, for a valid command(s). If none are found, the AVT-418/718 resumes normal operations.

If any commands are found, they are read from FLASH space, loaded into the command processing buffer, and then executed in order.

One use of this new feature is to store the command sequence that you want executed by the AVT-418/718 without requiring a functioning host computer to be present.

Regardless of whether or not any commands are stored, the AVT-418/718 resumes normal operations.

Admittedly, it is not very convenient for you to store commands in the non-volatile space. If you have a sequence of commands you want stored, it is recommended that you contact the factory. If you provide the command list, AVT will return a file that can be used with the reFLASH application to store the desired commands. There will be no charge for the service.

KWP & CAN Modes Simultaneous Operations

After entering KWP mode, you have access to many of the CAN commands; listed below.

The 5x 5F command is new. It permits switching the receive function between KWP mode, CAN mode, none, or both. In other words, if KWP receive is enabled, then messages received from the K-line bus are passed to the host. If CAN receive is enabled, then messages received from the CAN bus are passed to the host.

When KWP receive is not selected, two messages can be buffered.
When CAN receive is not selected, 15 messages can be buffered.

Only messages destined to the K-line bus can be transmitted.
You cannot transmit CAN messages while in KWP mode.

Just one example of using this feature:
- Enter KWP mode.
- Issue CAN commands to setup one or more periodic CAN messages.
- Set the receive function to KWP mode.
- Conduct KWP communications; transmit and receive.
- Switch the receive function to CAN mode.
- Receive CAN messages.
- KWP pass through modes are available with this function.

CAN Commands Available in KWP Mode

The following CAN commands are available while in KWP mode.

7x 01	7x 12
7x 02	7x 14
7x 03	7x 15
7x 04	7x 16
7x 05	7x 18
7x 0A	7x 19
7x 0B	7x 1A
7x 0C	7x 1B
7x 0D	7x 1C
7x 11	7x 1E

LIN Mode Slave Auto Response

The LIN network is a Master / Slave type of network. The Master node sends out a short message that contains a byte that is the identification of the slave node that is supposed to respond.

The new AVT-418/718 LIN mode slave auto response function allows you to define as many as 32 (decimal) messages for the AVT-418/718 to use to respond as a slave node.

To use this function you define and enable one or more auto respond messages.

The AVT-418/718 monitors the LIN bus and receives every message. When a message is received with a slave ID that matches one of the auto respond messages, the AVT-418/718 transmits the response according to the LIN protocol.

There are 32 (decimal) response messages. They are numbered $01 to $1F (inclusive).
Message number $20 is special; described below.

The 5x 5D command that supports this feature is defined here:

      51 5D: report status of all messages
      52 5D zz: query message #zz
      53 5D zz 00:   disable message #zz
      53 5D zz 01:   enable message #zz
      53 5D FF 00:   disable all messages
      53 5D FF 01:   enable all messages (you must have defined them in advance)
      5x 5D zz ww ID {rr ss tt ...}   define message zz
                                        ww = enable/disable
                                        ID = message ID
                                        {rr ss tt ...} data field; maximum of 8 data bytes

Message number $20 is special. It was developed to meet a customer specific requirement.
(May be known as the software watchdog response.)

According to the specification, you should define LIN mode slave response message number $20 as follows:

      5C 5D 20 01 FB 04 50 E2 E3 FF FF 00 00

            5C - command header
            5D - command type
            20 - LIN mode slave response message number (32 decimal)
            01 - enable this message
            FB - response ID; this is the ID to respond to with this message
            04 - complement of the message ID
            50 - ID of the message to watch for that will contain the "S" value
            E2 - dummy byte, place holder;
                after the value "S" is received, the value "V" will be calculated and placed here
            E3 - dummy byte, place holder;
                after the value "S" is received, the value "D" will be calculated and placed here
            FF - required according to the spec
            FF - required according to the spec
            00 - required according to the spec
            00 - required according to the spec

When LIN mode slave response message number $20 is defined and enabled, the AVT-418/718 will watch all messages on the network. When a message with ID = 50 (in this case) is found, the AVT-418/718 will:

- Check the message for complemented ID.
- Check for checksum error.
- Check for any other errors.
- Obtain the "S" value from the received message.
- Store "S" in the response message data field.
- Compute "V" and store it in the response message data field.
- Compute "D" and store it in the response message data field.

When a message with ID = FB (in this case) appears on the network the AVT-418/718 will send the stored response as defined above.

The AVT-418/718 will update the response field when a message is received with a new "S" value.

Note that the AVT-418/718 manipulates three data bytes in the response message field; "S", "V", and "D". You must otherwise completely and correctly define the rest of the response message.