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AVT-718 PPD Support

This document describes the PPD mode of operation for the AVT-418/718 unit. PPD mode was first released in AVT-418/718 firmware version 5.4.

Introduction

PPD mode was developed to support a specific customer requirement. The only module that we are aware of that uses it is the NABCO seat occupancy sensor.

Hardware

PPD mode uses the K-line physical layer - the same K-line that the AVT-418/718 uses for Key Word Protocol 2000 [KWP] mode. No hardware changes or modifications to the AVT-718 board are required to use PPD mode.

Firmware

The PPD mode of operation for the AVT-418/718 was developed using NABCO specification SE1-98007 dated 12 May 1998.

PPD mode support can be added to an existing AVT-718 unit by updating the firmware. The AVT-418/718 is a FLASH based device and supports field upgrades of the unit firmware.

The code file for the desired firmware version can be obtained from the factory.

We can also provide two host PC applications to reprogram the AVT-718 FLASH with the desired firmware. One application is a pure DOS program. The other is a 32-bit application for use under MS-Win95/98/NT.

Connecting to the Network

The "S/O" line of the sensor should be connected to the AVT-418/718 K-line (pin #7 of the Network connector).

The ground (earth) for the AVT-418/718 and the sensor should be common. It is desirable, but not necessary, to have V-Batt common as well.

When PPD mode is entered the AVT-418/718 is immediately connected to the network and begins receiving.

Note: Most numbers in this document are hex.

PPD Mode

The following is a summary of operations for PPD mode.

- Reference NABCO specification SE1-98007 dated 12 May 1998.
- The NABCO seat occupancy sensor sends out a status message every 1.2 seconds.
- The sensor transmits only.
- The AVT-418/718 receives only. It cannot transmit a message.
- K-line physical layer. Idles at V-Batt. The K-line is pulled to ground to assert.
- During a message, the K-line toggles state for each message bit.
- Each edge is a bit boundary.
- The signaling is pulse width modulation.
- A pulse (high or low) of duration 24 +/- 3 milliseconds indicates a “0”.
- A pulse (high or low) of duration 56 +/- 3 milliseconds indicates a “1”.
- The status message is 15-bits long.
- The 15-bit message is decoded by the AVT-418/718 in MSB to LSB order and stored in two bytes (a word).
- The first bit out of the sensor is the MSB and is stored in bit #14 of the message.
- The last bit out of the sensor is the LSB and is stored in bit #0 of the message.
- Message bit #15 is always zero.
- Example: The status message “100000000000000” is error in sensor and is reported to the host as the two byte message: \$40 00.
- The AVT-418/718 checks all bit boundaries for time duration compliance (+/- 3 milliseconds). All bits are also checked for toggled state as compared to the previous bit. Any non-compliance is flagged as an error and the message collected to that point is immediately forwarded to the host.
- All timing parameters used by the AVT-418/718 for checking the status message can be altered by the host computer at any time.

PPD Mode Commands

A summary of commands are listed at the end of this document.

Operation

PPD mode is entered by issuing the mode switch command: \$E1 \$88.

The expected response is: \$91 \$1E.

Message from the Network

The AVT-418/718 is always 'listening' to the network. All network messages are received and passed to the host.

The construction of a received message packet sent by the AVT-418/718 to the host is as follows.

Time stamp disabled

03 yy rr ss
where: 03 = upper nibble "0" indicates from the network
lower nibble "3" indicates 3 bytes follow
yy = count of bits remaining to be read, usual value "00"
rr ss = message

Time stamp enabled

07 gg hh jj kk yy rr ss
where: 07 = upper nibble "0" indicates from the network
lower nibble "7" indicates 7 bytes follow
gg hh jj kk = microsecond time stamp of message first edge
yy = count of bits remaining to be read, usual value "00"
rr ss = message

Received message examples:

Time stamp disabled.
03 00 20 03
03 = from the network, three bytes follow
00 = no errors, all bits received
20 03 = message bytes
This message indicates seat occupied.

Time stamp enabled.
07 00 0E 38 B6 00 40 00
07 = from the network, seven bytes follow
00 0E 38 B6 = time stamp in microseconds
00 = no errors, all bits received
40 00 = message bytes
This message indicates sensor error.

Operational Errors

During PPD operations the AVT-418/718 notifies the host of any detected operational errors by issuing an error message containing one byte of bit mapped error codes.

The error message has the form:

22 56 xx
22 = upper nibble "2" indicates an error message
lower nibble "2" indicates two bytes follow.
56 = indicates that this is a PPD error message.
xx = bit map of error conditions.

xx
bit 7: short to ground detected
bit 6: always 0
bit 5: buffer time out
bit 4: ppd_1_max < pulse
bit 3: ppd_0_max < pulse < ppd_1_min
bit 2: pulse < ppd_0_min
bit 1: new K-line level not as expected
bit 0: at start of message, K-line is high (should be low)

Timing Parameters

The AVT-418/718 checks each bit for timing compliance. If any non-compliance is detected, the error is flagged and the message received up to that point is forwarded to the host.

All timing parameters used by the AVT-418/718 can be changed by the user/host.

The commands to change these parameters are described here.

Operational Timing Parameters

- Buffer time out. If this time expires without a new edge, the message is considered to have failed. The host is notified.
Default is 120,000 microseconds.
Command is 5x 46.
- Logical "0" minimum time: PPD_0_min.
Default is 21,000 microseconds.
Command is 5x 47.
- Logical "0" maximum time: PPD_0_max.
Default is 27,000 microseconds.
Command is 5x 48.
- Logical "1" minimum time: PPD_1_min.
Default is 53,000 microseconds.
Command is 5x 49.
- Logical "1" maximum time: PPD_1_max.
Default is 59,000 microseconds.
Command is 5x 4A.

Questions ??

Contact the factory by e-mail, phone, or fax.

Contact information provided on the bottom of page 1.

AVT-418/718 PPD Mode - Commands

High nibble, bits b7 - b4: Command type.

0: _____

1: _____

2: Reset.

21 01:	Reset HBCC.
21 02:	Reset SCC.
21 03:	Reset DLC.
21 04:	Reset FIFO #1.
21 05:	Reset FIFO #2.
21 06:	Reset CAN.

3: _____

4: _____

5: Operational commands.

51 08:	Request message time stamp status.
52 08 00:	No time stamp. {Default}
52 08 01:	Include time stamp. Four bytes. 1.0 microsecond resolution.
51 46:	Message time out query.
55 46 rr ss tt vv:	Message time out in microseconds. 1 microsecond increments. Range = 1 to \$00 FF FF FF usec. {Default = \$00 01 D4 C0 = 120 000 usec}
51 47:	PPD_0_min time query.
55 47 rr ss tt vv:	PPD_0_min value in microseconds. 1 microsecond increments. Range = 1 to \$00 FF FF FF usec. {Default = \$00 00 52 08 = 21 000 usec}

51 48: PPD_0_max time query.
55 48 rr ss tt vv: PPD_1_max value in microseconds.
1 microsecond increments. Range = 1 to \$00 FF FF FF usec.
{Default = \$00 00 69 78 = 27 000 usec}

51 49: PPD_1_min time query.
55 49 rr ss tt vv: PPD_1_min value in microseconds.
1 microsecond increments. Range = 1 to \$00 FF FF FF usec.
{Default = \$00 00 CF 08 = 53 000 usec}

51 4A: PPD_1_max time query.
55 4A rr ss tt vv: PPD_1_max value in microseconds.
1 microsecond increments. Range = 1 to \$00 FF FF FF usec.
{Default = \$00 00 E6 78 = 59 000 usec}

6:

7:

8:

9: Processor memory.

96 01 msb xx yy lsb zz: Processor write memory (byte), value = zz.
96 02 msb xx yy lsb zz: Processor read memory (byte), count = zz.
97 03 msb xx yy lsb rr ss: Processor write memory (word), value = rr ss.
96 04 msb xx yy lsb zz: Processor read memory (word), count = zz.

A:

B: Firmware version.

B0: Request firmware version number.

C:

D: Operational mode.

D0: Request operational mode report.

E: Mode switch.

E1 22: Switch to UBP mode. [91 14]
E1 33: Switch to VPW mode. [91 07]
E1 44: Switch to LIN mode. [91 19]
E1 66: Switch to KIE mode. [91 1A]
E1 88: Switch to PPD mode. [91 1E]
E1 96: Switch to FLASH programming mode. [91 2E]
E1 99: Switch to CAN mode. [91 10]
E1 CC: Switch to PWM mode. [91 06]
E1 DD: Switch to KWP 2000 mode. [91 0F]

F: Re-Start.

F1 A5: Reset and restart.

AVT-418/718 PPD Mode - Responses

High nibble, bits b7 - b4: Response type.

0: Message received from the network.

Refer to detailed description of message format, described earlier in this document.

1: _____

2: Error message.

Refer to specific code described earlier in this document.

3: Command error.

31 xx: xx = Header byte of message in error.

4: _____

5: _____

6: Operations reports.

62 08 00: Message time stamps are disabled.

62 08 01: Message time stamps are enabled.

65 46 rr ss tt vv: Message time out in microseconds.

65 47 rr ss tt vv: PPD_0_min value in microseconds.

65 48 rr ss tt vv: PPD_0_max value in microseconds.

65 49 rr ss tt vv: PPD_1_min value in microseconds.

65 4A rr ss tt vv: PPD_1_max value in microseconds.

7: _____

8: _____

9: Board status information.

See complete list in section: "Board Status Information."

A: _____

B: _____

C: _____

D: _____

E: Processor memory.

Ex msb xx xx lsb yy . . .

Processor memory status for address specified.

F: _____