Specification of Uwatec Aladin family protocol and data format

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Updates to this document can be found at http://members.aol.com/GLorensen/divecomp.html

Please send me your profile dumps so I can further analyze the format and improve this documentation.

This document describes the communications protocol and data format of the Uwatec Aladin family of dive computers. Most of the information was obtained by examining an Aladin Pro and Aladin NitrOX, but it should apply to other computers in the same family as well. This does not ocer the protocol for the Uwatec Memo Mouse. That is covered in another document.

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This information was compiled by me, Gary Lorensen, over a series of late night hacking sessions, by monitoring the serial port traffic between an Aladin computer connected to its PC interface and my PC running dive log software from Uwatec. I made a cool three-headed serial cable to break out the signals for monitoring on a second computer. The Aladin interface cable was made by a friend using schematics from http://www.muenster.de/~matthias/aladin/indexe.htm

If you are able to document more information regarding the format, please send a note back to me, so I can correct, clarify, and update the spec. Thank you to Simon, Thomas, and Mark for loaning me equipment, fabricating hardware, and analyzing data.

Communication protocol

Data transfer from the Uwatec Aladin through the PC interface to the serial port of the PC runs at 19200/8N1. The application needs to wait for the leading edge of valid data to appear. The Aladin apparently transmits a square wave, which will register as serial port errors, before transmitting the actual data chunk.

There is an intial handshake, then a data block of 2050 bytes (2048 bytes of profile data, 2 byte checksum.

The communications sequence looks like:

PC asserts DTR
PC waits for serial errors to start *{to avoid starting reading in the middle of a chunk}*
PC waits for serial errors to clear up *{to catch the leading edge of the chunk}*
Aladin sends 2050 bytes

Data format

The 2050-byte data chunk read from the Uwatec Aladin is partitioned into a a 1540-byte dive profile chunk, a 444-byte dive log chunk, a 64-byte computer information section, and a 2-byte checksum. I have not examined the checksum to determine or confirm its format or function. I have only been able to decipher the dive log section and some of the information block. The dive profile data itself is still an enigma to me. One big stumbling block I had in cracking the format is that the data read from the serial port is **bit swizzled**. Bit 0 is the most significant bit of the data, and bit 7 is the lsb. So you need to bit swizzle each byte of incoming data or else it is completely incomprehensible.

The 1540-byte dive profile section

The profile data is actually stored in successive **incrementing** addresses. I have not been able to make much progress at cracking the format. Here is what I do know. There are a few bytes that beginning of the chunk that always seem to be 0xAA, followed by the beginning of a dive profile. The first 8 or 9 words are probably some kind of tissue loading information, followed by the dive profile information. The profile data seems to alternate between 2-bytes per entry and 3-bytes per entry. I think the Aladin always samples at 20 second intervals, so the 3-byte records may correspond with the minute marks and convey some kind of error status. Each chunk of dive profile information ends with 0xFF.

The 444-byte dive log section

The Aladin maintains a dive log section separate from the dive profile information. The dive log starts at offset 0x604. Each of the 37 entries is 12-bytes long. The format is:

[dataoffset+0x00]	Warnings
[dataoffset+0x01]	Dive time, in minutes
[dataoffset+0x02]	Max depth (msb) {divide by 128 to get depth}
[dataoffset+0x03]	Max depth (lsb)
[dataoffset+0x04]	Surface interval (hours)
[dataoffset+0x05]	Surface interval (minutes)
[dataoffset+0x06]	Tank pressure change (in atm/2)
[dataoffset+0x07]	Clock tick(msb)
[dataoffset+0x08]	Clock tick()
[dataoffset+0x09]	Clock tick()
[dataoffset+0x0A]	Clock tick(lsb)
[dataoffset+0x0B]	Temperature {(temp+71) *.44 to get F?)

The clock tick is an interesting value. It seems to be the number of half seconds since approximately December 31st, 1993, at midnight GMT. I'm not 100% confident of that, but it's within a few hours or time zones of that. The computer information section at the tail of the data block contains the current clock tick. By subtracting the dive time stamp from the time stamp at the time of capture, you can calculate how long ago the dive occurred and calculate the date. This is an important subject. If you are going to properly analyze the profile data from the computer, you need to track the date and time the profile data was actually captured. Furthermore, if you are importing this data into DataTrak, you will need to adjust the clock value in the computer information section and tweak the checksum.

The 64-byte computer information section

The Aladin computer information starts at offset 0x7C0. The format is:

[0x7F1]	Serial# (BCD)	This does NOT match the external serial#
[0x7F2]	Serial# (BCD)	
[0x7F3]	Serial# (BCD)	
[0x7F6]	Total dives (msb)	
[0x7F7]	Total dives (lsb)	
[0x7F9]	Number of dive log entries	
[0x7FA]	Current clock tick	

Thomas also identified a byte signifying the computer model, but I can't find that in my notes at the moment.