New Firmware for AP Diving Rebreathers with Monochrome Vision Electronics.

NOT FOR USE WITH THE COLOUR HANDSET

In August 2015 we launched the 2020Vision Colour handset. Since then we refer to the original Vision handset, the one produced since 2005, as the "Monochrome" display.

PLEASE NOTE: this update is only for the "Monochrome" products and is NOT for the "colour screens." (If you try and load incompatible code to the Vision, you will see relevant text on the display – "incompatible code").

Firmware – General Release Date: 26th April 2018

New Firmware (embedded software) has been released for your Vision oxygen controllers and handset.

Please read this entire document to ensure you do things in the correct order.

This new firmware is uploaded to the rebreather lid using the latest version of AP Connect, which runs on both PCs and Macs.

The last general release firmware was V06.00.20, released in May 2016. The new firmware, V06.00.36, is suitable for upload to all monochrome Vision "lids".

Firmware Version 06.00.36 is now available for download from the website:
https://www.apdiving.com/en/rebreathers/resources/firmware/

Select the language you would like to have on your Vision handset and download that language specific folder.
In the download folder, there is a new suite of PC Software to ensure compatibility with V06.00.36 firmware.
PLEASE NOTE: DO NOT use your existing AP Communicator to load the new firmware**, you MUST** use the program that has superseded Communicator, it's called AP Connect **– and you MUST use** the latest version of Connect, which is in the download folder.

V06.00.36 is an open upgrade suitable for all mono-chrome Vision lids, regardless of the firmware version already on the lid, the decompression option chosen and regardless of the serial number, so one copy of the firmware can be uploaded to all (Vision) rebreathers. Your personal details will be retained on the handset as will the decompression version and basic dive details.

Contents of this Document:

New Firmware for AP Diving Rebreathers with Monochrome Vision Electronics. 1

Changes to Code from V06.00.20 to V06.00.36 2

PC Software 3

Update Instructions: 4

Quick Guide 6

Suppressible Warnings 7

Changes to Code from V06.00.20 to V06.00.36

1) A bug was found in the decompression calculation: if the handset was changed to open circuit/bailout mode and then Closed circuit mode was re-selected during a dive the decompression required calculation was adjusted. This has now been addressed.

2) The CO_2 sensor initialisation routine at switch on has been improved; giving a slightly longer warm up period for better sensor stability to eliminate false positives on switch on.

3) Gradient Factor entry is now conditional. You can still enter largely what you want to but this new alteration prevents you entering a GF low as a higher value than GF High. In the previous versions, if you enter GF low of say 95 and a GF high of 80 then you would be faced with inappropriately long deco. The GF low always needs to be a lower value than the GF high and this firmware alteration ensures that is the case.

4) Improvements have been made to the data logging, allowing better diagnostic assessment.

5) Diluent gas entry: the decompression calculation is based on the inert gas loading. The accuracy of the calculation, with most dive computers, can only be as accurate as the information that you provide, i.e. if you enter the wrong gas, it will give you the wrong decompression requirement. However, with the rebreather, where we measure the PPO_2:

    a. If you use an air diluent and have what we call the Nitrox decompression firmware, then even if you enter a Nitrox mixture by mistake, any mixture with some Nitrogen in it then it will give you the correct decompression.
    b. If you use a Heliox diluent and have what we call the Trimix decompression firmware then even if you enter the wrong Heliox mixture, then it will still give you the correct decompression, as it knows the PPO_2 and knows the only other gas is Helium.
    c. If you enter the wrong Trimix, the decompression will be calculated based on the gas that you have inputted.
    d. The modification to this release of firmware is: If the diluent choice in the handset is inadvertently set to 100% O_2; whereas previous versions of firmware would accept your input and assume there is no inert gas present, the latest version, once you are below 9m, will assume the inert gas based on your decompression firmware option. i.e. if you have the Nitrox option the inert gas will be assumed to be Nitrogen and it will give you the correct decompression. If you have the Trimix option then we

assume the inert gas is Helium and calculate the decompression on that basis. With the Trimix option the decompression will be shown as EST,"estimated", a warning will be shown on the screen: "CHECK DILUENT SETTING". This warning is suppressible for 20 minutes at a time by pressing and holding the right button. The correct action though would be to simply enter the correct diluent in the menu; all menus are accessed the same way – by pressing the left and right buttons together, whether you are on the surface or underwater.

6) The low O_2 warning has been moved from 0.4 bar to 0.5 bar giving a slightly earlier warning than previously. The Low setpoint range has been changed from 0.5 - 0.9 to 0.6 - 0.9, it is recommended though to leave it on the default setting of 0.7.

7) The HUD light brightness is now increased to full brightness when low or high O_2 warnings are activated.

8) The alarm sounds have been changed to fast beeping for HIGH O_2 and continuous for LOW O_2.

PC /Mac Software

AP Communicator has been replaced with AP Connect
AP LogViewer has been replaced with AP DiveSight.
DiveSight and Connect are available for both Macs and PCs. Both programs are supplied free of charge.
New versions of AP Connect and AP DiveSight are issued to ensure compatibility with V06.00.36 Vision firmware.
Both programs are backwards compatible and can be used on Vision units from 2005 and for viewing older dive files.

- AP Connect
  - Windows PC Version: APConnect_Windows_Setup_V1_0_4_3.exe and
  - MAC Version: APConnect_OSX_Setup_V1_0_4_0.dmg

For compatibility, the new version of AP Connect is to be used with V06.00.36 Vision Firmware.

- AP DiveSight
  - Windows PC Version: APDiveSight_Windows_Setup_V1_0_9_0.exe
  - MAC Version: APDiveSight_OSX_Setup_V1_0_9_0.dmg

For compatibility, the new version of DiveSight is to be used with V06.00.36 Vision Firmware.

Update Instructions:

Step 1)

If you want to keep the full dive information from the last 6-7 hours of diving, download the data (using your version of AP Communicator or the new version of AP Connect) from the Vision lid and store the data on your PC.

Step 2) Download the files from the website:

Go to https://www.apdiving.com/en/rebreathers/resources/firmware/
and select the language version you require. Enter the required registration information and download the file to a readily accessible location on your PC or MAC such as the Desktop.

The file contains the firmware for your Vision electronics, the firmware has a suffix: *.ccr .
This is NOT an executable file, you can't just click on it and expect it to run on your PC or MAC. This file needs to be UP-loaded to your rebreather lid using the AP Connect software.

Step 3) Install the new AP Connect:

Once the files have been extracted, firstly install the AP Connect (PC/MAC software) by double-clicking on the setup file. It replaces any earlier versions of AP Connect, there is no need to "uninstall" the old version. Leave the "create a desktop icon" box ticked and it will simply overwrite your old AP Connect desktop icon. It will not over-write the AP Communicator program, which you may decide to keep on your PC: the AP Communicator has two features which are not available in the AP Connect – the DiveStore *.ccx processor and the Remote Connection feature.

Step 4)

Install new batteries into both battery boxes, or recharge if you have rechargeable batteries.

Step 5)

Connect your PC to the Vision lid using the cable and Bridge Interface, NOT the DiveStore !

Step 6)

Run the APD Connect Program, by double clicking on the Desktop icon:

Step 7)

Press the left button on the Vision handset, the screen should say "PC LINK." If it doesn't, switch off, check the cable connections and re-try.

a) The Two grey boxes on the AP Connect remain grey if there is no connection to a lid. Once the rebreathers in those boxes turn yellow, that indicates a lid is connected. If they are grey, select "SEARCH" which is located top left. Providing the handset on the rebreather is displaying PC LINK the software should find the port the lid is connected to.
    - Sometimes it is necessary to go to Control Panel / Device Manager and select com ports to see if your PC has identified the USB/serial adaptor. Then, restarting the AP Connect program is usually sufficient. If you have problems, please download the trouble shooting guide: https://www.apdiving.com/en/rebreathers/resources/software/connect/#!support . The latest, white, USB/serial lead usually self-installs when you plug it into the USB port on your PC/Mac.

b) Once the rebreather icons are yellow, Upload the Vision ccr file to the rebreather by clicking on the large Upload button and selecting the new Vision_V06.00.36_language_Sport_System. ccr upgrade file. Select Upload and the *.ccr file will be loaded onto the lid and handset. Once it is 100% finished, exit Connect, switch off the handset by pressing the centre and right switches on the handset. When the handset screen is blank, disconnect the lid from the Bridge, switch on the handset and you will see the new code number displayed on the handset.

Step 8) Install the AP DiveSight Program

In the file you will find the latest version of the AP DiveSight. There is an *.exe file, which is PC software and *.dmg file for MAC users. Simply double click on it to run the install program. This version of DiveSight is backwards compatible with all previous Logfiles.

Quick Guide

Step	Update Procedure	Type of File
1	Download the dives from the lid	
2	Go to the website: https://www.apdiving.com/en/rebreathers/resources/firmware/ and select and download your language folder	Folder
3	Ensure you have good batteries in both Controllers	
4	Install AP Connect onto your PC or MAC by double clicking on the relevant Connect Setup file: Windows PC Version: APConnect_Windows_Setup_V1_0_4_3.exe MAC Version: APConnect_OSX_Setup_V1_0_4_0.dmg	PC /MAC Application
5	Connect the lid to the PC using the Cable and Bridge Interface	
6	Upload the rebreather code "V06.00.36_English_Sport_System.ccr" to the Vision lid. When done, switch off handset, disconnect from Bridge interface and switch the handset on again. The new code will be displayed on the start up screen.	AP Vision Firmware
7	Install the AP DiveSight by double clicking on the DiveSight Setup file Windows PC Version: APDiveSight_Windows_Setup_V1_0_9_0.exe MAC Version: APDiveSight_OSX_Setup_V1_0_9_0.dmg	PC /MAC Application
8	A copy of this notice is in the download folder document	PDF

Suppressible Warnings

Low and High O2 warnings:

Please remember: oxygen warnings, low or high are not suppressible – we expect you to add gas, diluent or oxygen, to get the PPO_2 within the normal life sustaining range (0.4 to 1.6 bar) or bailout to open circuit.
Other warnings are suppressible by pressing and holding the right button.

Cell Warnings:

Cell warnings have two levels of warnings: At 0.2 bar and 0.4 bar away from the average of the other two. At 0.2 bar the 1st level alarm is activated. Although this alarm is suppressible for 5 mins at a time, the appropriate action is to assess the cells: how do they react to gas addition, do they rise when oxygen is added? – if a cell doesn't rise then it could well be current limited so start to lower the setpoint until all the cells are acting appropriately, right down below 1.0 bar if necessary. In the event that one cell deviated from the average of the other two by 0.4 bar, then the 2nd level alarm is activated and cannot be suppressed. You have to do something about it – ignoring it could cost you your life. Lower the setpoint way down; take it to 0.7 bar if necessary. Flush with diluent, add a little oxygen, do all three cells behave appropriately to the gas change? – The ones that do change value appropriately are the ones to believe in.

Just because two cells agree, doesn't mean they're correct.

Cell warnings can occur for a number of reasons. Sometimes it can be trivial, for instance when you instigate a big change in PPO_2, one cell might react more slowly than another and you might get a momentary alarm. An example of this would be when changing from the low setpoint to the high.

But, usually it is not trivial and needs your attention.

Cell warnings are the catchall. It is telling you there is something wrong and your EARLY assessment and monitoring is required. Just ignoring or suppressing it has cost lives.

The PPO_2 control logic is very simple – the electronics are programmed to believe the closest two are correct and ignores the third cell. This gives very accurate PPO_2 control and it is easy for you to see at a glance which are the closest two cells and understand what the rebreather electronics are doing.

In the event that one cell goes adrift too far, the cell warning is activated and this is where you come in. Firstly, do NOT think that the closest two must be correct. It's your job to assess what is happening and check which cells are accurate and which are not. If the closest two are 1.28 and 1.31 but the third cell is rising rapidly to the maximum displayable value of 2.55 bar, you need to find out whether that wayward cell is faulty or is it the only good cell you have?

Assumption is the killer. Please don't assume that your old favourite cell, which hasn't caused a problem in the past, is still the best one. Please don't assume that the latest cell that you have just fitted is the faulty one. Check it – that's the smart thing to do.

Ensure your diluent flush technique is adequate. While looking at the display, hold the exhale counterlung's dump valve open and press the diluent inflator for at least 10 secs. (Tip: to eliminate buoyancy change, ensure the dump valve is at the highest point – achievable when upright when

using the over the shoulder counterlungs or by lay horizontally when using the rear mounted counterlungs. This will change the gas over the sensors very quickly. Of course you will be fighting against the oxygen controller, which will be trying to add gas so you need to be robust, add lots of diluent. With the gas changing rapidly it allows you to see which sensors are reacting properly and which are not.
Then add some oxygen, the cells should rise. The cells that don't rise are potentially current limited.
If you are shallow enough to do an oxygen flush this is best-achieved upright, venting from your mouth around the outside of the mouthpiece and pressing the manual oxygen inflator.
Lower the setpoint to 1.1 bar – do all three cells now react appropriately to gas change? Lower the setpoint as low as is needed.
If you are in doubt, lower the setpoint until all three cells are within the normal life supporting range.
Understanding how the oxygen controller works and what affects the displayed cell values is much more important than trying to remember drills.

CO_2 and Tempstik warnings:
CO_2 sensor and Tempstik warnings have two alarm levels, the first at approximately 5 mbar, which is suppressible, and the 2nd warning at approximately 10 mbar which isn't suppressible. The Tempstik warnings only work properly with Sofnolime 797 and only work properly when the correct amount of sodalime is used: 2.4 kg on Inspiration XPD and the Inspiration EVP and 2.0 kg on Inspiration EVO (Evolution). Do not over or under fill.

CNS:
CNS and other warnings are suppressible for 20 minutes at a time. We often get asked to remove the CNS warning by divers doing long decompression dives. I have refused these requests for the following reasons:

a) When you suppress the warning, it is suppressed for 20 mins at a time. It is no hardship to have your attention brought back to the handset 20 mins later, check to see what the display is saying then suppress it again if that is what you believe to be appropriate.
b) if they don't know that they can suppress a CNS warning, then what else don't they know? They are clearly not as expert as they think they are. Do they really know what levels of CNS are safe for them? Of course they don't, none of us do, they are just pushing their luck.
c) For us to not warn would be irresponsible.

If you bailout to OC and change the rebreather setting to OC, CCR specific warnings are automatically suppressed.

AP Diving
Water-ma-Trout Industrial Estate,
Helston,
Cornwall,
TR13 0LW
Tel: +44 (0) 16 563834
Email: sales@apdiving.com