

Multimode A.A.D.



NATO Stock Number (NSN) 1377-13-119-7112

Vigil II User's Manual

US v II.0.1

The Vigil is endorsed by:



FIREBIRD



Sky Dive
Thomas Sports

Jump Shack

AAD nv/sa. Advanced Aerospace Designs

Boulevard A. Reyers 193 • B-1030 Brussels • Belgium

Tel: +32 (0)2 732 65 52 • Fax: +32 (0)2 736 06 27

e-mail: info@vigil.aero • website: www.vigil.aero

Vigil USA LLC

1645 Lexington Avenue • DeLand, FL • 32724 USA

Tel: +(1)386 736 8464 • Fax: +(1)386 736 8468

e-mail: candace@vigil.aero • website: www.vigil.aero

Multimode A.A.D.



NATO Stock Number (NSN) 1377-13-119-7112

Vigil II User's Manual

US v II.0.1



**PLEASE READ CAREFULLY THIS MANUAL BEFORE ANY USE.
PRESENT INSTRUCTIONS WILL SHOW YOU THE CORRECT USE OF YOUR VIGIL®.**



Table of contents

	Warning + Disclaimer	4
1	Welcome to the Vigil II World!	5
2	Introduction	7
3	Function	8
3.1	General Working Principle	8
3.2	Installation	9
3.3	The Three Activation Modes	9
3.3.1	"PRO" Mode	9
3.3.2	"STUDENT" Mode	9
3.3.3	"TANDEM" Mode	9
3.4	Notice on Activation Altitude	10
3.5	Start Up and Shut Down Procedures	12
3.5.1	Start Up – Display	12
3.5.2	Starting Up the Vigil®	13
3.5.3	Self Tests	13
3.5.4	« SETUP » Menu (Parameters)	15
3.5.5	« INFO » Menu (Information)	16
3.5.6	« CONFIG » Menu (Configuration)	17
3.5.7	Choice confirmation	18
3.5.8	Shut Down	19

4	Flight Restriction for the Pilot	20
4.1	Recommendations	22
5	Vigil® Components	22
5.1	Main Box	23
5.2	Dual Battery Pack	23
5.3	Pulses Plus Element	24
5.4	Electronic Unit	24
5.5	Cutter Unit	25
5.6	Control Unit	26
6	Waterproof - IP67	26
7	Replacement of Parts of the Vigil®	27
7.1	Replacing the Battery Pack	27
7.2	Replacing the Cutter unit or Control Unit	30
8	Technical Specifications	32
8.1	Glossary	32
8.2	Dimensions	33
8.3	Operating Description	33
8.4	Units and conversion factors	33
9	Communication Port – IR Download Box	34
10	Warranty	35
11	Personal Notes	36
12	Road Map / Grafcet	37

WARNING

Skydiving is a risky activity. **Read the manual very carefully before any practical use.**

To disregard warnings, instructions and safety procedures may result in serious injury or even death.

The correct use of the **Vigil®** AAD will drastically reduce this risk.

Vigil® is equipped with an integrated Piezo resistive barometric pressure sensor. Do not submit your **Vigil®** to pressures above 3000 hPa, nor to temperatures above 158°F (70°C) (see point 5.2.).

DISCLAIMER

AAD nv/SA intensively tests all **Vigil®** to assure their reliability. Each **Vigil®** has passed various documented technical inspections, calibration tests, quality control inspections and a final functional test (6 jumps in test chamber) before shipment. These are all documented and available to customers. However, AAD nv/SA cannot totally exclude the risk of a malfunction on electronic equipment. AAD nv/SA can not be held responsible in the event a faulty part escapes detection during the final testing phases.

The AAD nv/SA warranty is **exclusively limited** to the replacement or rework of defective parts free of charge within one year from the date of purchase.

- ➔ Your **Vigil®** must be exclusively switched ON at the take-off zone (reference altitude).
- ➔ If you want to change of drop zone, please switch off your **Vigil®** before travelling and switch it back on at the new drop zone before take-off.
- ➔ Before each jump it is essential to visually check your LCD screen to ensure its functionality, its activation mode ("**PRO**", "**STUDENT**" or "**TANDEM**") as well as the pre-selected parameters (altitude correction in feet or in meters) are correctly set.

NEVER JUMP WITH A BLANK SCREEN ON YOUR VIGIL®!

1. Welcome to the Vigil II World!

We congratulate you on your purchase of today's most sophisticated and modern, multimode **Automatic Activation Device**. It is a reliable revolutionary waterproof (IP 67) safety device with no imposed maintenance schedule. The **Vigil®** will automatically check all of its functional features each time it is switched on. The **Vigil®** will detect any anomalies by itself. Should an abnormality be found, the LCD will display an error message (see § 3.5.3.) and the **Vigil®** unit will not switch on. In this case the **Vigil®** needs to be analyzed by an authorized dealer or sent back to the factory.

The **Vigil®** is designed for a life expectancy of 20 years from the date of manufacture.

The above expectancy is based on the fact that the cutter, the Pulses Plus element and the electronic components have been designed for a functional lifetime of 20 years.

The **Vigil®** is very user friendly. It can be used for your choice in 3 activation modes: "**PRO**", "**STUDENT**" or "**TANDEM**". The **Vigil®**, an **ALL-IN-ONE Automatic Activation Device (AAD)** will also work in U.S. or metric standards units.

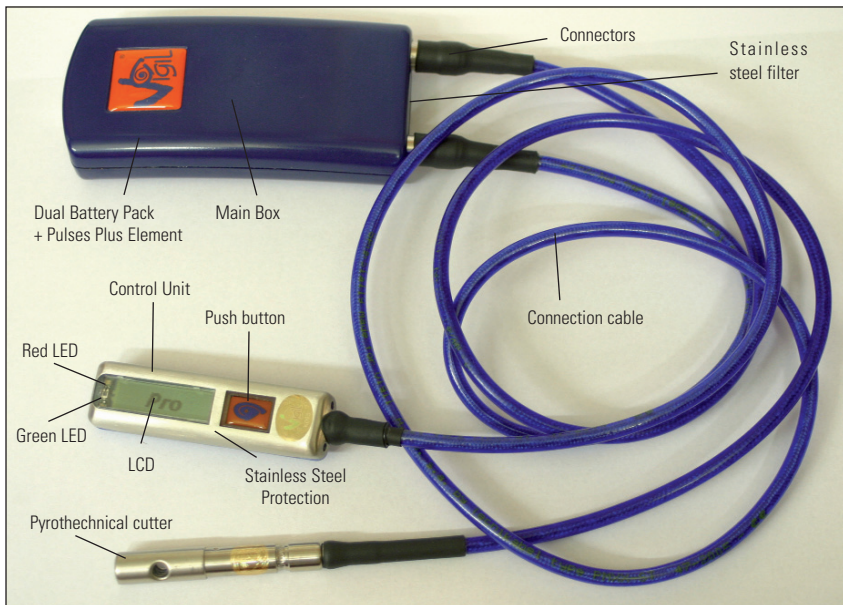
When travelling on any commercial flight with your **Vigil®**, this manual - as well as the Vigil X-Ray Card - should accompany you. It contains explanations that will be useful to the airport security staff.

The most recent manual is available on the **Vigil®** website at <http://www.vigil.aero/> on the download page.



The **Vigil®** is in principle to be used as a last resort safety device. It has never been intended and **is not to be used as a parachute's primary opening system**. The procedures written in this manual must be followed to ensure that the **Vigil®** functions properly. Incorrect set up or use can lead to improper functioning of the **Vigil®**.

A skydiver should always adhere to all rules and regulations set by his/her country's skydiving federation. The use of a **Vigil®** AAD does not exempt the parachutist from performing proper emergency procedures.



NATO Stock Number (NSN) 1377-13-119-7112

2. Introduction

Your **Vigil®** was designed and developed by a professional team of engineers and skydivers. Its function is to automatically open the reserve container in the event that you reach a freefall speed at an unsafe altitude. The flat aluminum alloy box is exceptionally strong; its ergonomic design fits easily into most current rigs. Each **Vigil®** is delivered with a **Vigil®** Installation Kit (pocket, loop, washer and cutter retainer), designed for electronic AAD's. The **Vigil®** can be used for three types of skydiving by pushing on just one button. These user programmable modes are: «**PRO**», «**STUDENT**» or «**TANDEM**».

The **Vigil®** also has a data recorder function (black box). The unit memorizes the last 16 minutes of freefall time (with a maximum of 16 graphs, whichever is reached first), total time in freefall, and total number of jumps. This data can be viewed directly from the control unit's LCD display or it can be downloaded to a PC through an infrared communication port.

The infrared reader and the associated software are available as an option (see § 9).

The "2 wire" cable technology was especially developed for the **Vigil®**.

It uses Kevlar reinforced cabling that delivers a unique combination of strength and suppleness. The gold plated contacts and the positive locking system of the connectors guarantee optimal connection reliability in all circumstances.

The control unit: - is equipped with a 26 x 96 dots LCD display which allows for an interactive communication with the parachutist
- is protected by an anti-scratch sapphire glass in a stainless steel protection case.

The electromagnetic shield protects the **Vigil®** from electromagnetic interferences, like those found in airports and airplanes (see § 5.1).

3. Function

3.1. General Working Principle:

The **Vigil®** must only be turned on at ground level; it will calibrate itself to the current ground elevation pressure. This is the "GROUND ZERO" reference.

Once your **Vigil®** is on, it will at each take-off (in max. 32 sec, from +150ft or 46m) switch to active mode. In freefall, it starts to continuously calculate the leftover time to reach the activation altitude appropriate to the programmed mode. When this altitude (or lower) is reached by the jumper at equal or superior speed compared to the factory-set parameters, the cutter of the **Vigil®** will instantly fire and cut the closing loop of your emergency parachute (<0,002 sec).

An "**altitude correction**" mode allows you to introduce a positive or negative altitude difference between the departure and landing levels (from +6000ft to -6000 ft or from +2000m to -2000m) in steps of 150ft or 46 m. The **Vigil®** takes this altitude correction into account to calculate the new activation altitude. This principle also allows you to modify the activation altitude permanently if the airport where you take off and the landing zone are at DIFFERENT altitudes or if there is a hillock near the drop zone.

Each mode «**PRO**», «**STUDENT**» or «**TANDEM**» has its own factory-set activation altitude and speed choice can be done in the "**SET UP**" menu (see § 3.3). During your aircraft ascent, the **Vigil®**'s red LED will briefly flash three times when it passes through its pre-set activation altitude.

The **Vigil®** will automatically remain ON for 14 hours; it may of course be switched off manually before that time. The selected activation mode «**PRO**», «**STUDENT**» or «**TANDEM**» will remain visible on the LCD display until the **Vigil®** is switched off or turns off automatically after 14 hours.



NEVER JUMP WITH A BLANK LCD SCREEN ON YOUR VIGIL®!

3.2. Installation

The **Vigil®** has been designed to be compatible with most sport rigs on the market today. If a suitable installation kit for an electronic AAD is not yet installed by the rig manufacturer, a **Vigil®** Installation Kit (pocket, loop, washer and cutter retainer) can be supplied and installed in your container by the rig manufacturer or by an authorized rigger. It can be easily sewn into any harness/container system designed for an electronic AAD. All reserve closing loops currently on the market that are similar to **Vigil®** Dyneema or the Spectra CSR style #9512-300 or the Cypres™ Loop (Spectra Cord) are acceptable for use by the installation of the **Vigil®**. The **Vigil®**'s cutter must be positioned as specified by the rig manufacturer's instructions for electronic AAD's.

3.3. The Three Activation Modes

The **Vigil®** has three activation modes that can be selected by the user. The choice can be made in the "**SETUP**" menu (See § 3.5.4.). Each mode has its own factory settings. The cutter activation data is defined by selecting an activation mode..

3.3.1. "PRO" Mode

The **Vigil®** releases at **840 Ft. (256 meters)** and below till **150 Ft. (46 meters)**, if the freefall speed is equal or superior to **35 m/sec. (78 mph or 126 km/h)***

3.3.2. "STUDENT" Mode

The **Vigil®** releases at **1040 Ft. (317 meters)** and below till **150 Ft. (46 meters)**, if the freefall speed is equal or superior to **20 m/sec. (45 mph or 72 km/h)***

3.3.3. "TANDEM" Mode

The **Vigil®** releases at **2040 Ft. (622 meters)** and below till **150 Ft. (46 meters)**, if the freefall speed is equal or superior to **35 m/sec. (78 mph or 126 km/h)***

* The cutter will activate instantaneously once the pre-determined activation mode parameters (altitude and falling speed) are reached.,

3.4. Notice on the Activation Altitude



In practice, you must be aware that the **Vigil®** always acts based on a measured air pressure and time. Those 2 parameters permit the calculation of the exact altitude, in function of the registered air pressure, as well as the vertical speed related to a pressure variation in a certain period of time.

For information: The **Vigil®** is able to register pressure differences of 0, 1 hPa which is equivalent to an altitude difference of only $\pm 2,6$ feet (or 0,8 meter)!

Important remark: The sensor registered pressure will vary with the skydiver position (face to earth or on his back) up to 10 hPa (=mbar) or 260 ft (80m)!

Example: Let's consider two skydivers in free fall, at exactly the same altitude but one is falling back to earth and the second one is falling face to earth.

The influence of their falling position on their respective AAD reading is as follows:

(I) Back to earth	(II) Face to earth
<p>Depression zone No influence</p>  <p>Both at the same altitude Y</p> <p>Pressure sensor location</p> <p>Pressure = X hPa</p> <p>Vigil® will register a pressure of X hPa</p> <p>The stated or real altitude → Y ft (or m)</p>	<p>AAD or pressure sensor located in depression zone</p>  <p>Pressure = X hPa – 10 hPa</p> <p>Vigil® in depression zone will register an up to 10 hPa lower pressure, notwithstanding they are at the same level</p> <p>The stated altitude → Y +260 ft (or +80m)</p>

Conclusion:

If the **Vigil®** is set in PRO mode, it will activate at 840 Ft or 256 m above the ground when a falling speed of 78 mph or 35m/sec is reached. It is well accepted that this minimum activation level must be guaranteed whatever the position of the skydiver.

If the skydiver is falling in a back to earth position, the reading will reflect the correct pressure, the sensor is not influenced by a depression, but if the skydiver is falling face to earth, then the sensor located in the depression zone will read an up to 10mbar lower pressure or an altitude 260 ft or 80 m superior to the real altitude, and will in this case activate later or 260 ft or 80m lower i.e. at a real altitude of 580 ft or 176 m above the ground which is too low.

Therefore a compensation of + 260 ft or + 80 m above the nominal activation altitude was integrated. In PRO mode a programmed activation altitude of 1100 ft or 336 m has been set to guarantee notwithstanding the position, activation at a minimum altitude of 840ft or 256m (real altitude) above the ground.

Remarks:

- In a test chamber, the activation in PRO mode will always be triggered at 1100 ft (840 ft + 260 ft) or 336m (256m + 80m) as there is no depression zone.
- The **Vigil®** has an opening accuracy of ± 65 Ft or ± 20 m in all modes thanks to our patented “permanent Left over Time Calculation” method.

3.5. Start Up and Shut Down Procedures



The Vigil® must imperatively be switched ON at ground level of your take-off zone

(This becomes the “GROUND ZERO” reference altitude).

Your **Vigil®** will recalibrate itself for variation of the atmospheric pressure.

- ➔ *Attention: If after a certain time there is a great change in atmospheric pressure (more than 10 hPa), it is recommended that you shut down and restart your **Vigil®** to guarantee optimal precision.*
- ➔ *AAD nv/sa recommends that the local atmospheric pressure be checked and compared to the pressure indicated by the **Vigil®** once a year, if more than 10 mbar difference is noticed, then a new calibration should be performed by a **Vigil®** qualified expert.*



Never switch on your multimode Vigil® in a plane.

3.5.1 Start Up – Display

In its standard configuration, the **Vigil®** is used with the orange push button situated at the right side of the display. The red LED is positioned in the upper corner; it dictates the rhythm of the start up procedure. The green LED is situated in the bottom corner of the controller; it confirms the end of the start up procedure.

The **Vigil®**'s display is reversible (see § 3.5.6.) «view» ➔ «MƏIΛ»

3.5.2. Starting Up the **Vigil®**

The **Vigil®** becomes operational after pressing the push button four times. These short presses must be done immediately after each flash of the red LED. After the first push (hold for 1 or 2 seconds) the «**Hello**» message is shown. If no message appears, please repeat the previous operation. «**Hello**» is immediately followed by «**Vigil II**» on the LCD.




Press the push button immediately after the red LED first flashes.

Press the push button immediately after the second flash of the red LED.

Press the push button immediately after the third flash of the red LED.

The **Vigil®** will then automatically start its self-test sequence.

In short:

Action	Result
1. Push	« Hello » followed by « Vigil II » appears + flash ⇔ (2) «  VIGIL II »
2. Push	Flash ⇔ (3) «  VIGIL II »
3. Push	Flash ⇔ (4) «  VIGIL II »
4. Push	Start of self tests « BAT OK »

The start up and shut down procedures listed in this manual are in place to reduce the risk of an unwanted start up or shut down sequence.

Consequence: The **Vigil®** cannot be turned on or off by accidentally knocking the push button.

3.5.3. Self Tests

The **Vigil®** automatically goes through a complete control sequence each time it is switched on.

It verifies that the battery pack, the cutter and the electronic circuits (main functions) are in proper working order.

The following messages are shown:

- «**Bat OK**» The battery pack is functioning properly.
- «**Cut OK**» The cutter resistance is tested O.K.
- «**Ctrl OK**» The electronic circuits are functioning properly.

If an error is detected the following messages may be shown:

- «**Bat Low**» Low Battery, the **Vigil®** is still operational, but it is required to replace the dual battery pack as soon as possible.
- «**Bat Rpl**» The dual battery pack must be replaced, the **Vigil®** will not switch on.
- «**Cut Err**» Cutter resistance is out of tolerance, the **Vigil®** will not switch on.
- «**Ctrl Err**» A discrepancy in one of the electronic circuits is observed, unit will not switch on.

If one of these messages is displayed (except for «**Bat Low**»), it puts an end to the start up procedure. The **Vigil®** will switch itself off.

If the «**Bat Low**» or «**Bat Rpl**» message appears, the user has to replace the battery pack as soon as possible (see § 7.1).

If the «**Cut Err**» message appears, the cutter unit must be replaced (see § 7.2).

A new cutter will be supplied free of charge if a completed "Life Saving Report" is posted and approved (see our website <http://www.vigil.aero/> on the download page).

➔ *We recommend that all **Vigil®** parts be replaced by a certified rigger or by a **Vigil®** approved expert. Some regulations require a certified rigger to do such replacements. The user may not have authorization to replace the battery pack, cutter or controller unit. In this situation you must adhere to your country's rules.*

In case the «**Ctrl Err**» message appears due to a failure in the electronic circuits, you need to send the **Vigil®** back to your dealer or to the factory for a complete check up.

The **Vigil®** is guaranteed free of all material and workmanship defects for 12 months.

This first test procedure is followed by 3 different menus: «**SETUP**» (see § 3.5.4), «**INFO**» (see § 3.5.5), and «**CONFIG**» (see § 3.5.6.)

Recommendation: if the **Vigil®** is not yet configured to your standard measurement units, go first to the “**CONFIG**” menu (see § 3.5.6.) to set the required units (U.S. or metric) before other settings.

3.5.4. «**SETUP**» Menu (Parameters)

It is possible to enter the «**SETUP**» menu at the end of the self testing sequence. To do this, press the push button as soon as the display shows «**SETUP**» and the red LED flashes. This menu enables you to introduce a positive or negative altitude correction (in feet or meters) between the departure and arrival ground levels appropriate to the functioning mode (**PRO**, **STUDENT** or **TANDEM** – see § 3.3).

It is possible to implement an **altitude correction from +6000 to -6000 Ft or from +2000 to -2000 meters**. To enter or modify a positive or negative altitude correction, press the push button while «**Alt Cor**» appears. The arrow facing up corresponds to an increase of the altitude value and the arrow facing down to a decrease of the altitude value. The correction is made in increments of 150 Ft. or 46 m. when the **Vigil®** is set in meters. Press the push button until the desired positive or negative altitude correction is achieved.



Important note: *Please be aware that the altitude correction will remain in the Vigil®'s memory and will be applied to all following jumps. It must only be modified when you move to another drop zone.*

The set «Alt Cor» will only be cancelled if reconfigured at the next startup.

When the required altitude correction is displayed wait for a few moments until the activation mode “**PRO**”, “**STUDENT**” or “**TANDEM**” is displayed. It is possible to modify the activation mode to “**PRO**”, “**STUDENT**” or “**TANDEM**” by pressing the push button until the desired mode is achieved. When the required activation mode is on screen, wait for a few moments and «**INFO**» will appear on screen.

3.5.5. «**INFO**» Menu (Information)

This menu allows you to display your **Vigil®**'s reference parameters (version, date of manufacture and serial number), data of previous jumps, as well as temperature and atmospheric pressure.

These parameters are in clear language in function of the chosen units and as follows (*):

<i>Display</i>	<i>Note: the 8 number is used for illustration (all segments used in a number)</i>
Ver :8.88	Software Version
Lcd :8.88	LCD version
#88888	Electronic Unit Serial Number
88/88 ○	Production week and year (for example 26/06 = week 26 in 2006)
TJ :18888	Total Jumps (Total number of jumps with this unit)
TFF :88h 88m88s	Total Free Fall - Total free fall time with this unit in hours , followed by minutes and seconds
LFF :188s 888 km/h	Last Free Fall - Duration displayed is seconds and maximum speed of the last freefall displayed in km/h or mph
Saves 18	Number of activations on your Vigil®
T :+88°C ou +88°F	Temperature of Vigil® main unit in °F or °C depending on the configuration
88inHg or 8888hPa	Atmospheric Pressure in inches of mercury (inHg) or hectopascal (hPa)

(*) Certain special models could be equipped with custom-built or experimental software.

In those cases - a specific identification logo on cover is used and a specific manual will be issued.
The information supplied by those units could be different than on standard Multimode **Vigil®** units.

As reference: Standard logo



3.5.6. «**CONFIG**» Menu (Configuration)

To enter into the configuration menu, press the push button as soon as the display indicates «**CONFIG**» and the red LED flashes. This configuration menu allows you to choose the type of measurement units you wish to display, reverse the display characters and adjust the contrast of the display.

Initially, the display indicates «**Feet**» or «**Meters**», depending on the existing configuration.

To change the measurement unit, press the push button.

You can choose «**U.S.**» or «**Metric**» by pressing the push button (°**Fahrenheit**, **mph**, **inches of mercury** or °**Celsius**, **km/h**, **hectoPascal**).

Press «**View**» to choose to view the display in its normal configuration or flipped 180° «**view**».

The contrast can be adjusted by pressing the push button when «**Contrast**» is displayed, in accordance with the up and down arrows (it will not fade out).

Once the «**CONFIG**» menu is completed, the **Vigil II** is operational and will keep in memory the chosen configuration.

In short:

Action	Display
1. Wait	« CONFIG » displayed
2. Push	Choose between « Feet » or « Meters »
3. Push	Choose between « U.S. » or « Metric » (° Fahrenheit , mph , inches of mercury or ° Celsius , km/h , hectoPascal)
4. Push	Choose between normal or reversed display « View » or « View »
5. Push	Contrast ↑ or contrast ↓

The total parameter sequences are described on the roadmap (see chapter 12, page 37)

18

3.5.7. Choice confirmation

The green LED flashes five times and the message «☺ **Enjoy**» is displayed for a few seconds to confirm the **Vigil®** is ready for use.

➔ **Remark:** While the message «☺ **Enjoy**» is displayed, by pushing the button you can go back to the three menus' (**SETUP**, **INFO** or **CONFIG**) for a possible verification or modification.

If no altitude correction is entered, the chosen "**PRO**", "**STUDENT**" or "**TANDEM**" mode remains displayed. If an altitude correction was entered, the chosen mode will be displayed respectively as "**P**" (for **PRO**), "**S**" (for **STUDENT**) or "**T**" (for **TANDEM**), followed by a «**+**» or «**-**» sign preceding the value of the implemented altitude correction, the value will be shown in feet (**Ft**) or meters (**m**). After switch on, the **Vigil®** stays on for a period of 14 hours and will then switch off automatically. Once off, it will keep all settings in its memory for next jumps.


→ The **Vigil®** is now ready for use and is in a stand-by status. The unit re-calibrates itself every 32 sec. During take-off the **Vigil®** will go to an active status (8 measurements per sec.) when reaching 150 feet (+46 m or -46m) above or under the "GROUND ZERO" reference in a time of maximum 32 sec. **Vigil®**'s active status will be confirmed by three short flashes of the green LED when the Activation Altitude is reached.



→ **Check the unit carefully for any implemented mode or altitude correction in Ft or m before each jump.**




3.5.8. Shut down

The shut down procedure is similar to the start up procedure.

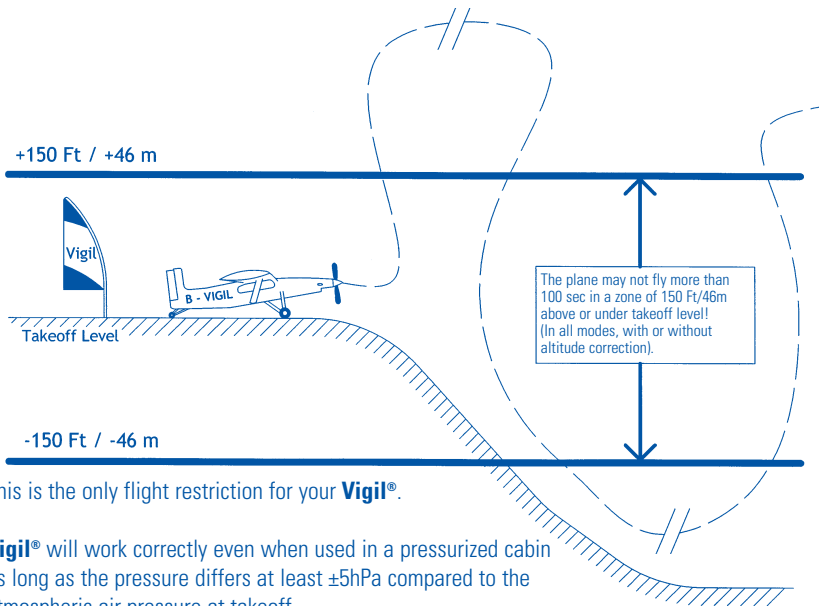
A quick press of the push button after each LED flash (4 times) will shut down the **Vigil®**. On the first press the « **SysOFF**» message is displayed. Press the button a second and third time; do this as soon as the red LED flashes.

Press the button as soon as the red LED flashes a fourth and last time. The display will show «**Goodbye**» followed by «**Vigil II**» for a few seconds. Finally, the green LED flashes very shortly and then shuts down.

In short:

Action	Result
1. Push	Short flash ⇔ (2) «  Sys OFF »
2. Push	Short flash ⇔ (3) «  Sys OFF »
3. Push	Short flash ⇔ (4) «  Sys OFF »
4. Push	« Goodbye » followed by « Vigil II » are displayed before the AAD shuts down.

4. Flight restriction for the pilot



This is the only flight restriction for your **Vigil®**.

Vigil® will work correctly even when used in a pressurized cabin as long as the pressure differs at least $\pm 5\text{hPa}$ compared to the atmospheric air pressure at takeoff.



- When the user decides to ride down with the aircraft in lieu of jumping, the pilot must be advised of the status of your **Vigil®** to limit his descent rate according to the mode or 45mph (20m/sec) for “**STUDENT**” and 78mph (35m/sec) for “**PRO**” or “**TANDEM**” and set activation altitude (this is especially important for **Vigil®**’s programmed in “**STUDENT**” mode).
In these circumstances we recommend to switch off the Vigil® if possible.

- It is necessary to switch your **Vigil®** off and back on again so it can re-calibrate itself when the elevation of your landing zone differs from more than 100Ft/30m compared to your initial take-off zone and this landing zone becomes your new take-off zone.



- ***Vigil® is the most accurate AAD on the market. It becomes operational in a zone of 150Ft/46m above or under take-off level. To avoid unexpected firing of the cutter, you must switch OFF your Vigil® before travelling in a closed vehicle (car, bus, train ...) due to possible air pressure variation.***

However, there is no problem travelling in an open vehicle at the drop zone altitude.

- We sincerely hope that you will never be in a situation that justifies the use of your **Vigil®**.
But, if this does happen to be the case then you will have, thanks to the purchase of this **Vigil®**, demonstrated your judicious foresight.

4.1. Recommendations

- ➔ *You must switch the Vigil® ON only once you arrive at the drop zone to get the correct ZERO GROUND REFERENCE. Adjust your altitude correction accordingly if needed.*
- ➔ *Check the display carefully before each jump to verify the right settings.*
- ➔ *The Vigil® will shut down automatically 14 hours after its start-up.*
- ➔ *If you enter a plane with a pressurized cabin, please notify the pilot that he is not allowed to do any pressurized tests equivalent to the Vigil® activation altitude or below 2300Ft or 702 meters in “TANDEM” activation mode with a pressurized variation related or equivalent to a fall speed higher than 45mph (20m/sec in “STUDENT” activation mode), to avoid misfires.*
- ➔ *It is impossible to enter a negative altitude correction of more than 1500Ft or 500m under mean sea level (equivalent to >1090mbar). In this case the LCD will indicate «Invalid» and the Vigil® unit will not switch on.*

5. Vigil II Components

The Vigil®s Battery Pack (§ 5.2.), the Pulses Plus Element (§ 5.3.) and the Electronic Unit (§ 5.4.) are located in an unbreakable, aluminum alloy Main Box (§ 5.1). The specific Vigil® logo on cover makes it easily identifiable.

Two flexible electric cables, reinforced by 2 Kevlar cords, ensure the junction between the main unit (Main Box) and the Cutter Unit (§ 5.5) as well as between the Main Unit and the Control Unit (§ 5.6).

5.1. Main Box

The **Vigil**®'s electromagnetic shield was thoroughly tested to guarantee that it would function as intended when exposed to electromagnetic interference (up to 100 volt/m). Such interference can be found in airports and airplanes. The special shielding foil protects against electromagnetic interference waves produced by:

- Radio communications
- Mobile phones
- Transponders
- Radar

The case holds two connectors, the integrated stainless steel filter and is closed by 2 Philips stainless steel screws. The stainless steel filter ensures protection against pollution, such as the intrusion of dust and provides a good transfer of outside air pressure to the pressure sensor (keep it clean and dry).

The 2 closing screws allow you to open the case very easily if you need to replace the battery pack, the cutter or even the controller. These operations are described in detail in chapter 7.

We highly recommend that replacements or changes to the **Vigil**® be done by your certified rigger or through an official **Vigil**® agent.

5.2. Dual Battery Pack - NATO Stock Number (NSN) 6130-13-119-7106

The battery pack is composed of 2 lithium AA cells in the lower half of the case. It is not subject to any memory effect and is extremely long lasting. The battery pack works at a temperature range from -13°F to +158°F or from -25°C to +70°C. The use of low consumption components in conjunction with a sophisticated power management program has significantly improved the battery's life span.

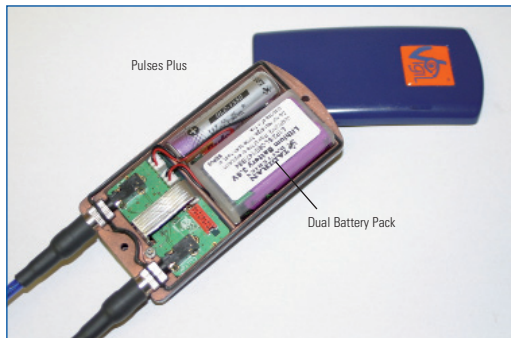
The battery's life span is minimum 5 years or 2000 jumps. When the «**Bat Low**» or «**Bat Rpl**» message appears, the battery pack needs to be replaced (see chapter 7).

The battery pack **must be replaced after 10 years of use** (max. operational lifetime).

5.3. *Pulses Plus Element*

The “**Pulses Plus**” technology supplies the high peak current necessary for the cutter to activate and cut the loop instantaneously in less than 2 milliseconds.

This element has an operational lifetime of 20 years and must in principle never be replaced (see page 29).



5.4. **Electronic Unit** - NATO Stock Number (NSN) 5998-13-119-7102

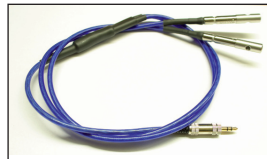
The entirely automated assembly of surface-mounted electronic components (SMD, Surface Mounted Devices) answers to the strictest required standards. The SMD components assemblies are associated with permanent electronic and optical production control equipments in order to guarantee the highest level of quality and reliability equivalent to military standards. The electronic unit also works as a data recorder. It memorizes parameters (see § 3.5.5) such as the total number of jumps, the duration of the last freefall jump and the total freefall time. This data can be viewed directly from the control unit's LCD display.

The **Vigil®** memory containing the last 16 minutes freefall graphs can be downloaded to a PC using the **Vigil®** communication port. Detailed information on the communication port is described in chapter 9.

5.5. Cutter Unit - NATO Stock Number (NSN) 1377-13-118-8843

Patented and designed especially for the **Vigil®** with a life expectancy of 20 years. The cutter severs the reserve loop using a pyrotechnical cutting action with a circular knife. It will eventually also melt the loop to ensure its separation due to high internal temperature. The cutter is completely confined to avoid any possible damage to the parachute.

If the **Vigil®** is activated for a life saving, a new cutter could be supplied free of charge only upon presentation of a complete and approved by **Vigil®** Life Saving Report. This basic document can be downloaded from the web site <http://www.vigil.aero/>.



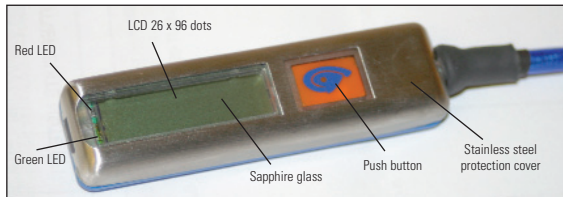
DUAL CUTTER

- ➔ *Your rigger can easily replace the cutter. The different operations are described in chapter 7.*
- ➔ *Some countries' regulations require a certified rigger to do such replacements. In this situation you must adhere to your country's rules.*
- ➔ *A Dual Cutter can be supplied for reserve containers closed with a dual pin.*

5.6. Control Unit - NATO Stock Number (NSN) 6110-13-119-7104

The control unit is composed of a reversible display, a red LED that sets the rhythm of the start up and shut down procedure, a green LED that confirms the end of the start up procedure and an orange push button situated in the standard configuration, on the right of the display.

The 26 x 96 dots display on the control unit allows a clear alphanumerical communication with the paratutist; it is protected by a scratchproof sapphire glass and a stainless steel cover.



The red LED also plays the role of infrared transmitter for the communications port (see chapter 9).

6. Waterproof – IP 67

6.1. The **Vigil II** has been designed to resist water immersion up till 0.5 meter for at most 30 minutes (I.P. 67). The **Vigil®** doesn't need any filter replacement, it has a built-in stainless steel air filter and after water contact no filter has to be changed.

If your rig has been in contact with water, the rig and the reserve canopy must be dried in accordance with the instruction of the rig manufacturer.

If the **Vigil II** has been in contact with clear water, you just need to dry the filter with a little water absorbent cloth. Put your **Vigil II** vertically on a cloth; filter down, to absorb any possible water behind the stainless steel filter. Never open your **Vigil II**'s case unless it is completely dry (outside).

6.2. If the **Vigil II** has been in contact with salt water, we recommend rinsing the whole **Vigil II** as soon as possible with clear water, and especially the filter (with a syringe) to make sure residual salt is eliminated before drying up the whole unit.

When the stainless steel filter is clean and dry we recommend before any further use of your **Vigil II** to compare the atmospheric pressure in the info menu with the actual local pressure. If there is no more than 10hPa difference with a calibrated barometer, your **Vigil II** will work correctly. If you notice a significant difference (more than 10hPa), please contact your dealer or rigger.

7. Replacement of Parts of the Vigil®

7.1. Replacing the Battery Pack

Every (dis)assembling operation must be done with the **Vigil®** switched off (blank screen).

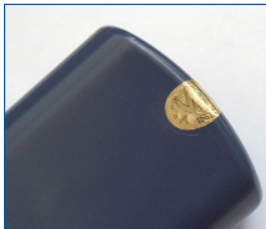
The replacement of the Battery Pack is a simple and fast operation easy to perform.

AAD nv/sa. recommends the battery be replaced after 5 years or 2000 jumps. When «**Bat Low**» or «**Bat Rpl**» warning messages are displayed by the **Vigil®** during the start up control tests, the battery must be replaced .

The battery **must absolutely be replaced after 10 years of use** (operational life).

➔ *Remark: Do not leave your **Vigil®** without connected battery for more than three days. If so you need to return it to your dealer to replace the Pulses Plus battery. (This element must always be at full load to stay functional).*

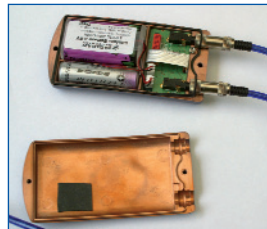
Replacing the Battery Pack



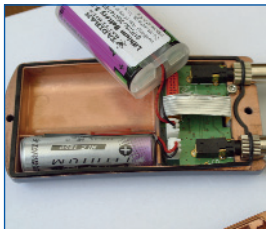
I. Remove hologram



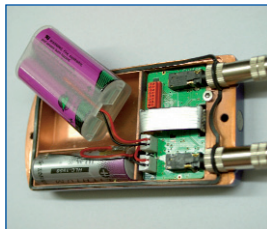
II. Unscrew



III. Remove cover



IV. Remove the battery from its location and unplug Battery Pack.



V. Plug-in and put in place the new Battery. Look if rubber ring is well placed.



VI. Close Main Box and lock it by the 2 fixing screws.

Open the Main Box by first removing the hologram (I) and using a Philips screwdriver n°1 TS to unscrew the two M3 fixing screws (II). Remove top cover (III).

Replacing the Battery Pack does not require other tools than a Philips screwdriver.

Disconnect the Battery Pack by holding the dual lithium battery pack connector by its small edges (IV).

Be careful not to pull on the wires by disconnecting the battery.



Reconnect immediately the new Battery Pack connector.

→ **Don't leave your Vigil® with an empty Battery Pack due to the Pulses Plus Element that needs to stay powered.**

As already stated, the Pulses Plus element has more than 20 years functionality and **must imperatively be permanently loaded** in order to release instantly its high energy pulse to activate the cutter!

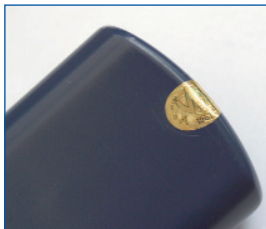
If by opening a waterproof unit, you damage the rubber sealing ring, please place a new rubber sealing ring (see §7.2.) and add a little silicon grease on the rubber sealing ring (mainly in the 4 rubber corners around the 2 connectors).

Position correctly the Battery Pack as well as the 2 wires to allow the box to close (V).

Close the main case carefully with the rubber sealing ring well in place and tighten the 2 external fixing screws (VI).

Switch on the **Vigil II** to ensure that it is functioning correctly (see § 3.5). (Make sure the atmospheric pressure shown in the menu is \pm equal (up to ± 10 hPa) to the local pressure measured with a calibrated barometer)

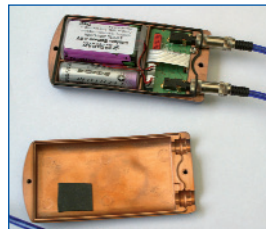
7.2. Replacing the Cutter Unit or Control Unit



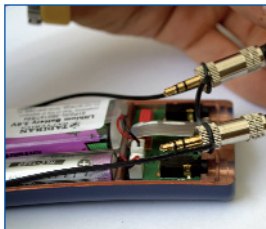
I. Remove hologram



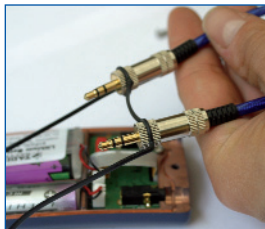
II. Unscrew



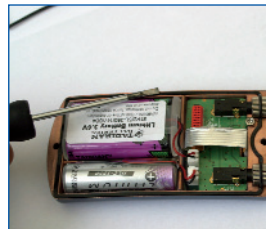
III. Remove cover



IV. Lift PCB and disconnect the two connectors.



V. Put the two connectors in the new rubber rings, flat side up.



VI. Put rubber ring, with a little silicone grease, in the groove

Replacing the Cutter Unit after activation or the controller if necessary is a simple and fast process that can be performed quite easily by your rigger or your official dealer.
Every (dis)assembling operation must be done with the **Vigil®** switched off.

1. Press only one single time on the push button to display "**Hello**" on screen.
2. Wait until a blank screen appears again (to be sure the battery is O.K.)
3. Remove the hologram and then open the Main Box using a Philips screwdriver n° 1 TS.
4. Do not unplug the Battery Pack connector (**Vigil®** must stay powered).
5. Do not unscrew the printed circuit fixation screw (warranty).

To remove the jack connector you need to lift carefully (about 2-3 mm) *the two* connectors fixed on the printed circuit.

(Do not remove the printed circuit board from the case otherwise warranty will be void.)

Disconnect the connectors, remove the rubber ring (IV) and replace the cutter or the controller: by fitting first the new rubber lightly greased with its flat side up (V) and avoid putting grease on the gold plated connectors. Check that the connectors are correctly positioned (Cutter Unit, Control Unit marked on the PCB). Correctly place the connectors in the O rings.

Make sure that the Battery Pack's connecting wires are correctly positioned and they do not hinder the Main Box from closing. Put **a little silicon** grease all around the new rubber as well as around the 2 connectors' O rings of the rubber. Put the PCB back on its place and place correctly the new rubber in its groove all-around flat side-up (VI). Put again **a little silicon** grease at the 4 corners in contact with the connectors.

Close the Main Box correctly with rubber sealing ring well in place, with round side in the groove of the box and flat side up. Tighten the two outside fixing screws. See picture VI of page 28.

8. Technical specifications

8.1. Glossary

Electromagnetic shielding: A special metal shield that protects the electronic circuits from electromagnetic waves to avoid malfunctions of the device by magnetic interferences (from radars, cellular phones...).

Cutter Unit: A cutting system that acts by a pyrotechnical double cut of the loop inside the reserve container.

Infrared Port: Transmitter/receiver of infrared signals that allows a bidirectional exchange of data between two devices.

Kevlar: Non elastic carbon fiber used to reinforce the cables. It prevents direct traction on the electrical connections, and it reinforces mechanically the junction cables of the Control Unit and the Cutter.

LCD: Liquid Crystal Display. The LCD is used to visually convey information from the Control Unit to the user. This is the same type of display as used in mobile phones.

LED: Light Emitting Diode; A LED is used to flash during the start up and shut down procedures of the device.

SMD: Surface Mount Device. Small electronic components manufactured to be of reduced size and low power consumption. Such technology allows the electronic circuit to be mounted automatically, which gives very reliable and compact electronic systems.

Positive locking: A mechanical system that locks the connectors in place between top and bottom case to protect them from being accidentally disconnected.

8.2. Dimensions

- Main Box: 102 x 51 x 20 mm
- Cutter Unit: 55 x 9 mm
- Controller Unit : 70 x 18 x 11 mm
- Total Weight: 400 g
- Standard Wire Length: - Cutter unit: ± 600 mm
- Controller unit: ± 900 mm
- Volume: 130 cm³

8.3. Operating description

- Altitude correction: from +6000 Ft (+2000m) up to -6000 Ft (-2000m)
- Operating range: - 1500 Ft (-500m) to +33.000 Ft (10000m)
- Operation: Pro, Student, Tandem modes ➔ see § 3
- Working temperature: from -13°F (-25°C) to 158°F (+70°C)
- Life time: 20 years life expectancy
- Maintenance: - No scheduled maintenance required
- In function of self tests messages during start-up
- Waterproof: IP 67 - immersion at 0.5m during maximum 30 minutes
- Stand-by: 14 hours
- Power Pack: - Field easily replaceable; 3.6V dual lithium **Vigil®** AA battery
- Life time min 2000 jumps or max. 10 years

8.4. Units and conversion factors

- Length: ... Ft x 0,3048 = ...m or ...m x 3,281 = ... Ft
- Pressure: ... inHg x 33,86 = ... mbar/hPa or ... mbar/ hPa x 0,02953 = ... inHg
- Speed: ... mph x 1,6093 = ... km/h or ... km/h x 0,6214 = ... mph
- Temperature: (... C° x 9/5) + 32 = ... F° or (... F° - 32) x 5/9 = ... C°

9. Communication Port – IR Download Box

NATO Stock Number (NSN) 7025-13-119-7111

The **Vigil®** controller is equipped with an infrared communication port that allows the user to download the free fall data recorded from the previous jumps. An I.R. Download Box and the associated management software are available as an option (see your agent for info.) All the parameters of the last 16 minutes of freefall are recorded (maximum 16 jumps), as well as the total number of jumps and other information described in § 3.5.5.

With the help of this I.R. Download Box and the associated software, you or your Rigger can also download test jumps performed in a decompression chamber.



34

Reminder:

- The **Vigil®** is a safety device and is not engineered to be used as a data logger.
 - AAD nv/sa operates a policy of continuous development. Therefore, we reserve the right to make changes and/or improvements to any of the products described in this manual without prior notice.
 - All trademarks mentioned in this manual are the property of their respective owners.
- ➔ The **Vigil®** is delivered in a custom-build aluminum alloy case. After installation of the device in the rig container, this case can easily be used to carry some of your accessories such as glasses, audible altimeter, altimeter, camera,...

You will find a quality control number (Vigil Q.C. hologram) on each **Vigil®** (1 letter + 3 numbers, for example: X000). This number is visible on the hologram seal on each of the 4 units composing the **Vigil®** (Pyrotechnical Cutter, Pulses Plus element, Battery Pack, Control Unit and Main Box).

A fifth hologram is placed on the Test Certificate.

This unique number (hologram) is attributed and placed by the quality control department and plays an important role in the warranty of the **Vigil®**.

Main Box: the hologram covering one of the Main Box screws guarantees that the **Vigil®** has not been opened by the user. If this hologram ***remains in place and is intact***, the warranty will apply to the whole unit (battery included).

Electronic Unit: any alteration or deterioration of the electronic unit as well as alteration of the varnish on the PCB screw will void the warranty!

Any replaced element will receive a new quality control number (hologram seal) to be placed by the quality control department or by a **Vigil®** certified rigger.

We guarantee the **Vigil®** for 1 year by replacing any defective parts free of charge.

The **Vigil®** has been designed for 20 years of use. It will do a complete check of each parameter every time you switch it on. If a parameter is out of tolerance, this will be indicated on the LCD display screen and the unit will not switch on.

If the pressure indicated by your **Vigil®** differs from more than 10 hPa with a calibrated barometer, it needs to be re-calibrated. In this case, the **Vigil®** must be returned to an officially certified dealer or to the factory for inspection and re-calibration.



NEVER JUMP WITH A BLANK SCREEN!!!



12. Grafcet/Road Map

