Multimode

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

Vigil II User's Manual

US v II.0.6 June 2013

Please carefully read and ensure that you fully understand this user's manual before any use of the Vigil®.

YOU MUST ALSO READ, FULLY UNDERSTAND AND AGREE TO THE TERMS OF THE DISCLAIMER AND LIMITED WARRANTY PRIOR TO USING THE VIGIL®. IF YOU DO NOT FULLY UNDERSTAND AND AGREE TO ALL OF THE TERMS OF THE DISCLAIMER AND LIMITED WARRANTY, YOU MUST NOT USE THE VIGIL®. YOU MAY RETURN IT, IN ITS ORIGINAL PACKAGING, FOR A FULL REFUND.

YOUR USE OF THE VIGIL® IN THE EQUIPMENT YOU USE FOR MAKING A PARACHUTE JUMP IS CONCLUSIVE PROOF THAT YOU AGREE TO ALL OF THE TERMS OF THE DISCLAIMER AND LIMITED WARRANTY.

The Vigil is endorsed by:

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WARNING

SKYDIVING IS A DANGEROUS ACTIVITY, AND YOU RISK MINOR OR SERIOUS PERMANENT INJURY OR DEATH EACH TIME YOU SKYDIVE. THE CORRECT USE OF THE **VIGIL®** AAD MAY REDUCE THIS RISK, HOWEVER, THERE ARE SITUATIONS IN WHICH A **VIGIL®** AAD MAY NOT REDUCE, AND MAY ACTUALLY INCREASE, THE RISK. THE **VIGIL®** IS A BACKUP DEVICE, WHICH MAY OR MAY NOT SAVE YOUR LIFE, AND IT IS IMPORTANT TO NEVER RELY ON THE **VIGIL®** AS A LIFESAVING DEVICE. PRIOR TO USING THE **VIGIL®**, IT IS IMPORTANT TO READ THE **VIGIL®** II USER'S MANUAL VERY CAREFULLY. ALWAYS OBSERVE ALL WARNINGS, AND FOLLOW ALL MANUFACTURER'S INSTRUCTIONS, RECOMMENDATIONS AND SAFETY PROCEDURES. ALWAYS FOLLOW CORRECT OPENING PROCEDURES AND, IF NECESSARY, EMERGENCY PROCEDURES. NEVER SKYDIVE UNLESS YOU ARE FULLY TRAINED AND COMPETENT IN THE USE OF ALL OF YOUR EQUIPMENT, INCLUDING THE **VIGIL®**.

The **Vigil®** is equipped with an integrated Piezo resistive barometric pressure sensor.
Do not expose your **Vigil®** to pressures above 3000 hPa, (45.5 psi), or to temperatures above 158°F (70°C).
The battery pack is designed to operate within a temperature range from -13°F to +158°F (-25°C to +70°C).

DISCLAIMER AND LIMITED WARRANTY See pages 35 - 36.

- ➔ *You **must switch ON your Vigil® ONLY at the take-off zone** (reference altitude or ground zero).*
- ➔ *If you intend to change to a different drop zone, switch OFF your **Vigil®** before traveling, 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"**) and its pre-selected parameters (altitude correction in feet or in meters) are correctly set.*

NEVER JUMP WITH A BLANK LCD 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 revolutionary 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 for analysis.

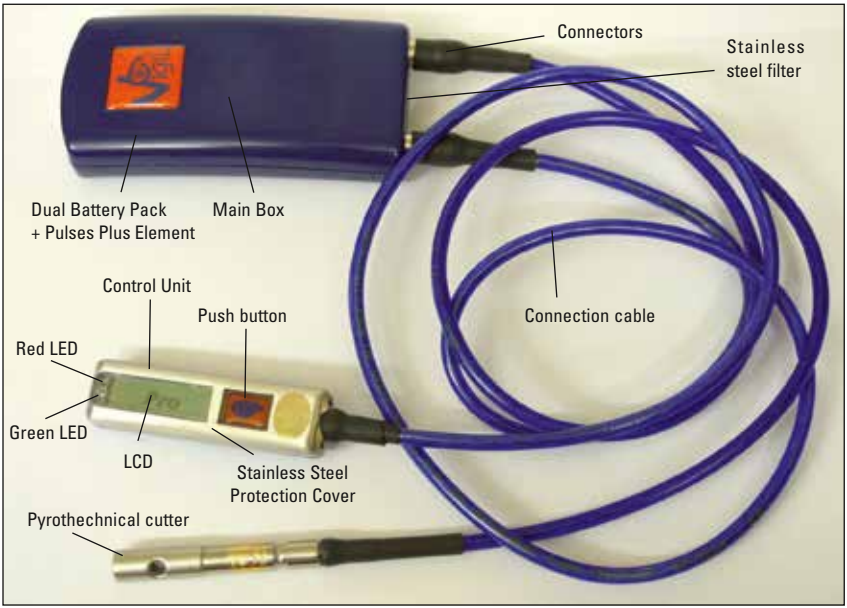
The **Vigil®** is designed for a life expectancy of 20 years from the date of manufacture.
The above life expectancy is based on the fact that the cutter, the Pulses Plus element and the electronic components have been designed for a functional lifetime of 20 years.

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

When traveling 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, a last resort safety device, which may or may not save your life. It has never been intended to be, 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 setup 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.
ALTHOUGH VIGIL®s HAVE SAVED MANY LIVES, NEVER RELY ON THE VIGIL® TO SAVE YOUR LIFE, IT MAY NOT DO SO IN SOME SITUATIONS.



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2. Introduction

Your **Vigil®** was designed and developed by a professional team of engineers and skydivers. Its function is to cut the reserve closing loop 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.
A Vigil installation kit (pouch, controller window and cutter retainer) can be supplied to rig manufacturers, on demand. 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" technology and the Kevlar reinforced cabling were especially developed for the **Vigil®** and deliver 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 and clear communication with the parachutist.
- is protected by a special anti-scratch glass as by stainless steel protection cover.

The electromagnetic shield protects the **Vigil®** from electromagnetic interferences, such as 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 and will progressively re-callibrate itself every 32 sec. 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 approriate 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 50 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 of mode 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.

To avoid an "airborne condition" of your Vigil® due to a difference in pressure equivalent to more than ±150ft (±46m) compared to the "ground zero" reference (pressure), you must ALWAYS manually shut down your Vigil® at the end of the day BEFORE leaving the drop-zone. (See page 21 for more detail.)

3.2. Installation

The **Vigil®** has been designed to be compatible with most sport harness/container systems 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 (pouch, controller window, and cutter retainer) can be supplied and installed in your container by the harness/container 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 and rigged as specified by the harness/container manufacturer's instructions for electronic AAD's.

WARNING: IF THE CLOSING LOOP IS NOT ROUTED THROUGH THE CUTTER, THE VIGIL® WILL NOT CUT THE LOOP.

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®** cutter activates at **840 ft. (256 meters)** and below until **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®** cutter activates at **1040 ft. (317 meters)** and below until **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®** cutter activates at **2040 ft. (622 meters)** and below until **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®** functions are based on a measured air pressure and on measured 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 ± 2,6 feet (or 0,8 meter)!

Important note: The sensor registered pressure will vary, according to the body position of the skydiver (face to earth or back to earth) up to 10 hPa (=mbar) equivalent to 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**
Depression zone No influence	AAD or pressure sensor located in depression zone
	
Both at the same altitude Y	
Pressure sensor location	**Pressure = X hPa – 10 hPa**
Pressure = X hPa	**Vigil®** in depression zone will register an up to 10 hPa lower pressure, notwithstanding they are at the same level
Vigil® will register a pressure of X hPa	**The stated altitude ➔ Y +260 ft (or +80m)**
The stated or real altitude ➔ Y ft (or m)	

Conclusion:

If the **Vigil®** is set in PRO mode, it will activate at 840 Ft or 256 m above the ground, at a falling speed of 78 mph or 35m/sec. 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, since 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 a pressure up to 10mbar lower, or an altitude 260 ft. or 80 m above the real altitude, and will, in this case, activate later, or 260 ft. or 80m lower, i.e. at an actual altitude of 580 ft. or 176 m above the ground level, which would be too low.

Therefore, a compensation of + 260 ft. or + 80 m above the nominal activation altitude has been integrated into the software. For example in PRO mode, a programmed activation altitude of 1100 ft. or 336 m has been set to ensure that, notwithstanding the skydiver's body position, activation will always be at a minimum altitude of 840ft or 256m (actual altitude) above the ground level.

Remarks:

- In a test chamber, the activation in PRO mode will 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 ± 20m in all modes thanks to our patented "permanent Left over Time Calculation" method.

3.5. Start Up and Shut Down Procedures

It is imperative that the Vigil® be switched ON at the ground level of your take-off zone.
(This becomes the "**GROUND ZERO**" reference altitude).

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

➔ *Attention: If after a certain time there is a large change in atmospheric pressure (more than 10 hPa), it is recommended that you shut down and restart your Vigil® to ensure optimal precision.*

Never switch on your multimode Vigil II in an aircraft.

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 and indicates the rhythm of the startup procedure.
The green LED is situated in the bottom corner of the controller and confirms the end of the startup procedure.
The **Vigil®**'s display is reversible (see § 3.5.6.) **«view» ➔ «ʍǝıʌ»**

*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 startup and shut down procedures listed in this manual have been established to reduce the risk of an unwanted start up or shut down sequence and to ensure that the **Vigil®** cannot be turned on or off by accidentally depressing the push button.

3.5.3. Self Tests

The **Vigil®** automatically goes through a complete test 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 the dual battery pack must be replaced 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**»), the startup procedure will end, and the **Vigil®** will switch itself off.

If the «**Bat Low**» message appears, the user must replace the battery pack as soon as possible (see § 7.1)
If the «**Bat Rpl**» message appears, the user must replace the battery pack prior to the next jump (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. The regulations in some countries require a certified rigger to do such replacements. The user may not have authorization to replace the battery pack, cutter or controller unit. In such situations, you must adhere to your country's rules.*

If the «**Ctrl Err**» message appears due to a failure in the electronic circuits, you must send the **Vigil®** back to your dealer or to the factory for a complete checkup.

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

***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 50 m**., when the **Vigil®** is set in meters.
Press the push button until the desired positive or negative altitude correction is achieved.

For example: +100 m, if the landing zone is 100 m higher than the take-off zone, and -100 m if the landing zone is 100 m lower than the take-off zone. After, the inputted altitude correction is displayed, wait for a few moments until the activation mode "**PRO**", "**STUDENT**" or "**TANDEM**" is displayed. It is possible to then 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.

***Important note**: Please be aware that the original "GROUND ZERO" reference, as well as the altitude correction, will remain in the Vigil®'s memory and will be applied to all following jumps, as long as your Vigil® has not been switched off. Your Vigil® MUST be recalibrated when you have landed at the other drop zone. By switching your Vigil® off and back on again, the Vigil® will recalibrate itself, HOWEVER, PLEASE REMEMBER THAT THE SET "Alt Cor" WILL ONLY BE CANCELLED IF RECONFIGURED IN THE SETUP MENU.*

*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 (* page 17):

Display	*Note: the number 8 is used for illustration (all segments used in a number)*
***Ver** :8.88*	*Software **Ver**sion*
***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*	***T**otal **J**umps (Total number of jumps with this unit)*
TFF** :88**h** 88**m**88**s	***T**otal **F**ree **F**all - Total free fall time with this unit in **h**ours, followed by **m**inutes and **s**econds*
LFF** :188**s** 888 **km/h	***L**ast **F**ree **F**all - Duration displayed is **s**econds 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	***T**emperature of **Vigil**® main unit in **°F** or **°C** depending on the configuration*
*88**inHg** or 8888**hPa***	*Atmospheric Pressure in **inches of mercury** (inHg) or **hectopascal** (hPa)*

(*) Certain special models may be equipped with custom-built or experimental software. In such 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 from that supplied by 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 (°**F**ahrenheit, **mph**, **in**ches of **mercury** or °**C**elsius, **km/h**, **h**ecto**Pa**scal).

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

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**»* *(°**F**ahrenheit, **mph**, **in**ches of **m**ercury or °**C**elsius, **km/h**, **h**ecto**Pa**scal)*
4. Push	*Choose between normal or reversed display «**View**» or «**ɯǝıΛ**»*
5.Push	*Contrast ↑ or contrast ↓*

All of the parameter sequences are described in the Parameter Sequence Flow Chart. (See chapter 12, page 38.)

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 as "**P**" (for **P**RO), "**S**" (for **S**TUDENT) or "**T**" (for **T**ANDEM), 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 if at "ground zero" reference (see page 21 for more detail).
At the next switch-on, it will use, for the next jump, all of the settings which have been retained in its memory.

➔ *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 of 32 sec. **Vigil®**'s active status «**Airborne**» will be confirmed by five short flashes of the green LED and when the Activation Altitude is reached, the red LED will flash three times.*

➔ ***BEFORE EACH JUMP, check the unit carefully for any implemented mode or altitude correction (in ft. or m).***

➔ ***After landing, your jump information will be displayed (Last FF time & speed) for 2 min. This same information is accessible at any time (displayed for 30 sec.) by pushing the LCD button once.***

3.5.8. Shut down

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

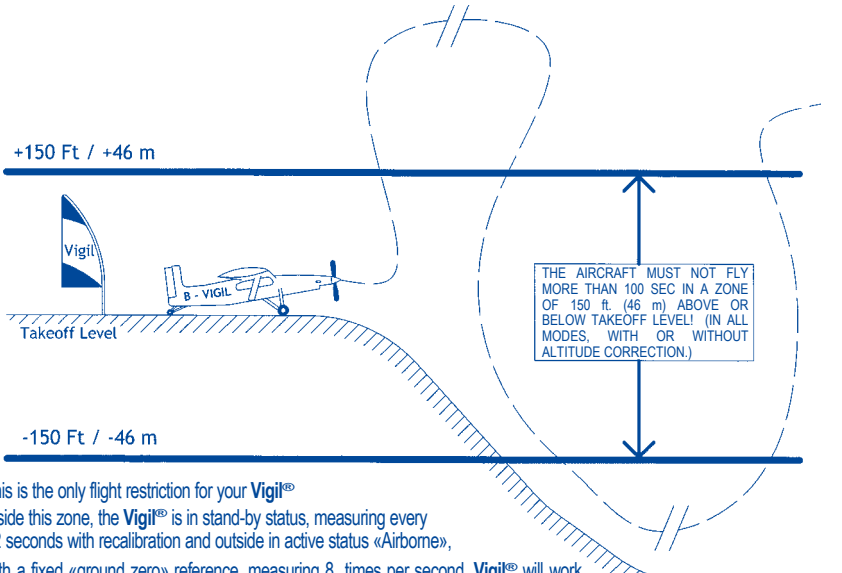
A quick press of the push button after each LED flash (4 times) will shut down the **Vigil®**. On the first press the « **SysOFF**» message is displayed. Press the button a second and third time; do this as soon as the red LED flashes.

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 briefly and then **the Vigil®** 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 - Airborne



This is the only flight restriction for your **Vigil®**
Inside this zone, the **Vigil®** is in stand-by status, measuring every 32 seconds with recalibration and outside in active status «Airborne», with a fixed «ground zero» reference, measuring 8 times per second. **Vigil®** will work correctly even when used in a pressurized cabin as long as the pressure differs at least ±5hPa compared to the atmospheric air pressure at ground zero.

➔ ***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 traveling in a closed vehicle (car, bus, train ...), due to possible air pressure variation.
However, there is no problem traveling in an open vehicle at the drop zone altitude.

➔ ***IMPORTANT:** Vigil II® units with Serial #8021 to Serial # 26171 (main software 2.49 or lower) will shut down after 14 hours, unless the Vigil II® is not measuring the switch on pressure or its "ground zero" reference (at ±150ft or ± 46m). In this case the Vigil will stay in "airborne mode" and will not switch off, even after 14 hours.*
A Vigil II® unit with Serial #26172 or higher (main software 2.50 or higher) will shut down after 14 hours, whether it is in "airborne mode" or not. Therefore, it is recommended to switch off such Vigil II® units after the last jump of the day!

➔ ***Prior to opening the door of an aircraft in flight while it is in the activation zone (below 500 m or 1,640 ft.), it should be determined whether or not there are any Vigils on board which are set to Student Mode. Certain aircraft configurations can create a pressure spike which can activate a Vigil® AAD, when it is set to Student Mode and the aircraft is in the activation zone.***

➔ ***Be aware that the implemented altitude correction will not affect the original "ground zero" reference altitude. It will just adapt the opening altitude in function of the set altitude correction parameters. After such a jump, if you desire to eliminate the implemented altitude correction, you will need to switch your Vigil® off and back on again to implement the new "ground zero" reference altitude and to cancel the previous altitude correction.***

➔ *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 [less than 45mph (20m/sec) for "**STUDENT**" and less than 78mph (35m/sec) for "**PRO**" or "**TANDEM**"] and set activation altitude (this is especially important for **Vigil®** programmed in "**STUDENT**" mode).*
In these circumstances we recommend that the Vigil® be switched off, if possible.

4.1. Recommendations

- ***To get the correct GROUND ZERO REFERENCE, you must only switch the Vigil® ON once you arrive at the drop zone. Afterwards, enter any altitude correction, if needed.***
- ***When the elevation of your landing zone differs by more than 150 ft. (50 m) compared to your initial take-off zone and this landing zone becomes your new take-off zone, it is necessary to switch your Vigil® off and back on again so that it can re-calibrate itself.***
- ***Check the display carefully before each jump to verify that its settings are correct.***
- ***Manually shut down your Vigil after the last jump of the day.***
- *To avoid undesired Vigil® firings, if you enter a plane with a pressurized cabin, please notify the pilot that he is not allowed to do any pressurization tests to pressures equivalent to the **Vigil®** activation altitude (**below 1,640 ft. or 500 m in "STUDENT" or "PRO" activation mode, or below 2,300 ft. or 702 m in "TANDEM" activation mode**), with a pressure variation equivalent to, or in excess of, a vertical speed greater than 45mph (20m/sec).*
- *It is impossible to enter a negative altitude correction of more than 1500Ft or 500m below 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).
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 ensure that it would function as intended when exposed to electromagnetic interference (up to 100 volt/m). Such interference can be found in airports and aircraft.

The special shielding foil protects against electromagnetic interference waves produced by:

- •Radio communications
- •Mobile phones
- •Transponders
- •Radar

The case holds two connectors and 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®** dealer.

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.

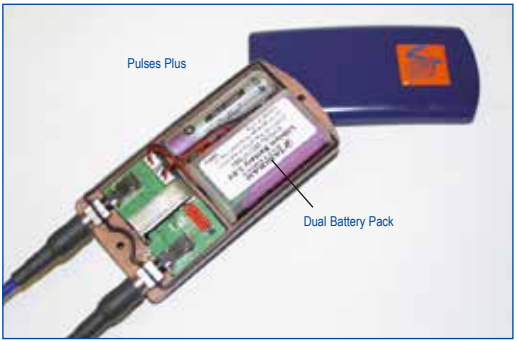
The battery's life span is expected to be a minimum of 5 years, or 2000 jumps. When the «**Bat Low**» or «**Bat Rpl**» message appears, the battery pack needs to be replaced (see chapter 7).

Regardless of the above-stated life span, 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 in less than 2 milliseconds.

This element has an operational lifetime of 20 years and normally will never need replacement (see page 29).



➔ ***The Pulses Plus element must never be disconnected***

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) is manufactured to the strictest required standards. The SMD components assemblies are assembled with permanent electronic and optical production control equipment in order to ensure 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 on the control unit's LCD display.

The **Vigil®** memory containing graphs of the last 16 minutes of freefall 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

The Cutter Unit is 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. Due to a high internal temperature, it will also eventually melt the loop to ensure its separation. The cutter is completely confined to avoid any possible damage to the parachute.

If the **Vigil®** is activated for a lifesaving event, a new cutter will be supplied free of charge, only upon presentation of a complete Life Saving Report, approved by **Vigil®**. The 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.*

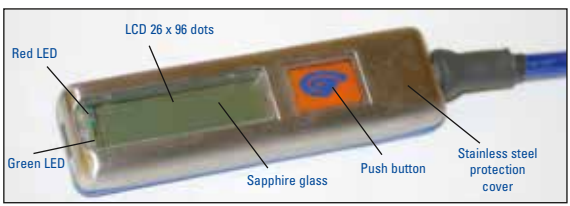
➔ *Some countries' regulations require a certified rigger to do such replacements. In this situation you must adhere to your country's rules.*

➔ *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 startup and shutdown procedure, a green LED that confirms the end of the startup 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 parachutist. It is protected by a special scratchproof 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 to 0.5 meter depths for a maximum of 30 minutes (I.P. 67). After such immersion or contact with water, the **Vigil®** built-in stainless steel filter does not need to be replaced.
HOWEVER, TO ENSURE THAT NO DAMAGE HAS OCCURRED AS A RESULT OF WATER CONTACT OR IMMERSION, IF THE **VIGIL II®** HAS BEEN IN CONTACT WITH, OR IMMERSED IN, CLEAR OR SALT WATER, IT IS MANDATORY TO SEND THE **VIGIL®** BACK TO THE FACTORY FOR AN INSPECTION OF THE UNIT BEFORE THE NEXT JUMP.

Never open your **Vigil II**'s case unless the outside of the case is completely dry.

7. Replacement of Parts of the Vigil®

7.1. Replacing the Battery Pack

Every (dis)assembly operation must be done with the **Vigil®** switched off (blank screen).
The replacement of the Battery Pack is a simple and fast operation and is easy to perform. The normal battery life span is 5 years or 2000 jumps, whichever occurs sooner,
however 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 a connected battery for more than three days. If it is left without a connected battery for more than three days, it MUST be returned to your dealer to replace the Pulses Plus battery. (This element must always remain at full charge 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 the new Battery and put in place. Ensure that the rubber ring is properly placed.

VI. Replace the cover on the Main Box and secure it with the 2 fixing screws.

Open the Main Box by first removing the hologram (I) and using a Philips screwdriver nÃ1 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 nº1 TS.

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 while disconnecting the battery.

Reconnect the new Battery Pack immediately.

➔ **Do not leave your Vigil® with an empty or disconnected Battery Pack because it is vital to the proper functioning of the Vigil® Pulses Plus Element that it stays powered.**

Again, as previously stated, **the Pulses Plus element has more than 20 years functionality and must, without fail, remain permanently charged in order to be able to instantly release its high energy pulse to activate the cutter!**

If, by opening a waterproof unit, you damage the rubber sealing ring, please replace it with a new rubber sealing ring (see §7.2.)

Position the Battery Pack correctly, ensuring that the 2 wires are properly placed to allow the box to close (V).

Close the main case carefully, ensuring that the rubber sealing ring is properly placed, and tighten the 2 external fixing screws (VI).

7.2. Replacing the Cutter Unit or Control Unit

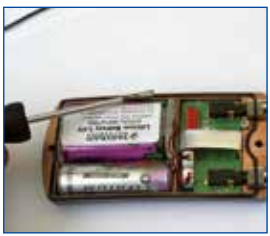
I. Remove hologram

II. Unscrew

III. Remove cover

IV. Lift PCB and disconnect the two connectors.

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



VI. Put rubber ring, in the groove

Replacing the Cutter Unit after activation, or the controller if necessary, is a simple and fast process which 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 on the push button only one single time 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 (The **Vigil®** must stay powered).
5. **DO NOT** unscrew the printed circuit fixation screw (This will void the warranty).

To remove the jack connector, carefully lift (about **1.5** mm) the two connectors fixed on the printed circuit board (PCB).

Remark: the PCB can sometimes get stuck in the housing. Do not pull too hard, or you will break the black housing of the connector. If necessary, use a flat screwdriver to carefully lift up the PCB.

Disconnect the connectors, remove the rubber ring (IV) and replace the cutter or the controller by first fitting the rubber with its flat side up (V).

If the rubber sealing ring is damaged, you must replace it with a new rubber sealing ring. Ensure that the connectors are correctly positioned (Cutter Unit, Control Unit marked on the PCB).

Place the connectors in the O rings.

Ensure that the Battery Pack’s connecting wires are correctly positioned and that they do not hinder the Main Box from closing.

Put the PCB back in its place, and install the rubber correctly in its groove all-around, with the round side in the groove of the box and the flat side up (VI).

Close the Main Box, ensuring that the cover and the sealing ring are properly placed, and tighten the two outside fixing screws. See picture VI, on 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 interference (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: ± 600mm
  - 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.
  After a water-landing it is mandatory to send the unit back to the factory for inspection before the next jump.
- Stand-by: 14 hours (see page 21 for more detail)
- 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 or
- Speed: ... mph x 1, 6093 = ... km/h ... 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 (in option)

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 dealer for information.) All of 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 an decompression chamber.

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 modifications and/or improvements to any of the products described in this manual, without 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,...*

10. SERVICE LIFE LIMIT OF VIGIL® UNITS

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

11. DISCLAIMER AND LIMITED WARRANTY
THE USER MUST READ, UNDERSTAND, AND AGREE TO THE TERMS OF THIS DISCLAIMER BEFORE USING THE VIGIL®

AAD NV/SA intensively tests each **VIGIL®** to assure its reliability. Each **VIGIL®** has passed various documented technical inspections, calibration tests, quality control inspections and a final functional test (6 simulated jumps in a test chamber) before shipment. These are all documented and available to customers. However, the risk of electronic, mechanical or external factors causing a malfunction or failure cannot be totally excluded.

BUYER UNDERSTANDS THAT BECAUSE OF THE UNAVOIDABLE DANGER ASSOCIATED WITH THE USE OF A PARACHUTE SYSTEM, SKYDIVING, AND THE USE OF A VIGIL®, THE MANUFACTURER MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, ARISING BY LAW OR OTHERWISE, EXCEPT THAT THE MANUFACTURER WILL REPLACE OR REWORK DEFECTIVE PARTS FREE OF CHARGE WITHIN TWO YEARS FROM THE DATE OF PURCHASE. OTHER THAN THE FOREGOING, THE VIGIL® IS SOLD WITH ALL FAULTS AND WITHOUT ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. **(continue next page 36)**

11. DISCLAIMER AND LIMITED WARRANTY (continuation of page 35)

THE MANUFACTURER DISCLAIMS ANY LIABILITY UNDER THE LAW, IN TORT OR OTHERWISE, FOR DAMAGES, DIRECT OR CONSEQUENTIAL, INCLUDING BUT NOT LIMITED TO DAMAGES FOR PERSONAL INJURIES, WRONGFUL DEATH, PROPERTY DAMAGE AND LOSS OF USE OF EQUIPMENT, RESULTING FROM ANY MALFUNCTION, OR FROM ANY DEFECT IN DESIGN, MATERIAL, WORKMANSHIP OR MANUFACTURING, WHETHER CAUSED BY NEGLIGENCE ON THE PART OF THE MANUFACTURER, OR ANY MANUFACTURER OF ANY PART, ACCESSORY, COMPONENT, OR APPLIANCE MADE A PART OR APPURTENANT TO THE VIGIL®. BUYER, BY USE OF THE VIGIL®, AND/OR ALLOWING IT TO BE USED BY OTHERS, WAIVES ANY LIABILITY ON THE PART OF THE MANUFACTURER FOR PERSONAL INJURIES, WRONGFUL DEATH, LOSS OF CONSORTIUM, PROPERTY DAMAGE AND LOSS OF USE OF EQUIPMENT. THE WARRANTIES SET FORTH ABOVE AND THE OBLIGATIONS AND LIABILITIES OF THE MANUFACTURER THEREUNDER, ARE EXPRESSLY IN LIEU OF, AND BUYER HEREBY WAIVES AND RELEASES, ANY AND ALL OTHER WARRANTIES, AGREEMENTS, GUARANTEES, CONDITIONS, DUTIES, OBLIGATIONS, REMEDIES OR LIABILITIES, EXPRESS OR IMPLIED, ARISING BY LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION GUARANTEES, CONDITIONS, DUTIES, OBLIGATIONS, REMEDIES OR (continue next page 37)

11. DISCLAIMER AND LIMITED WARRANTY (continuation of page 36)

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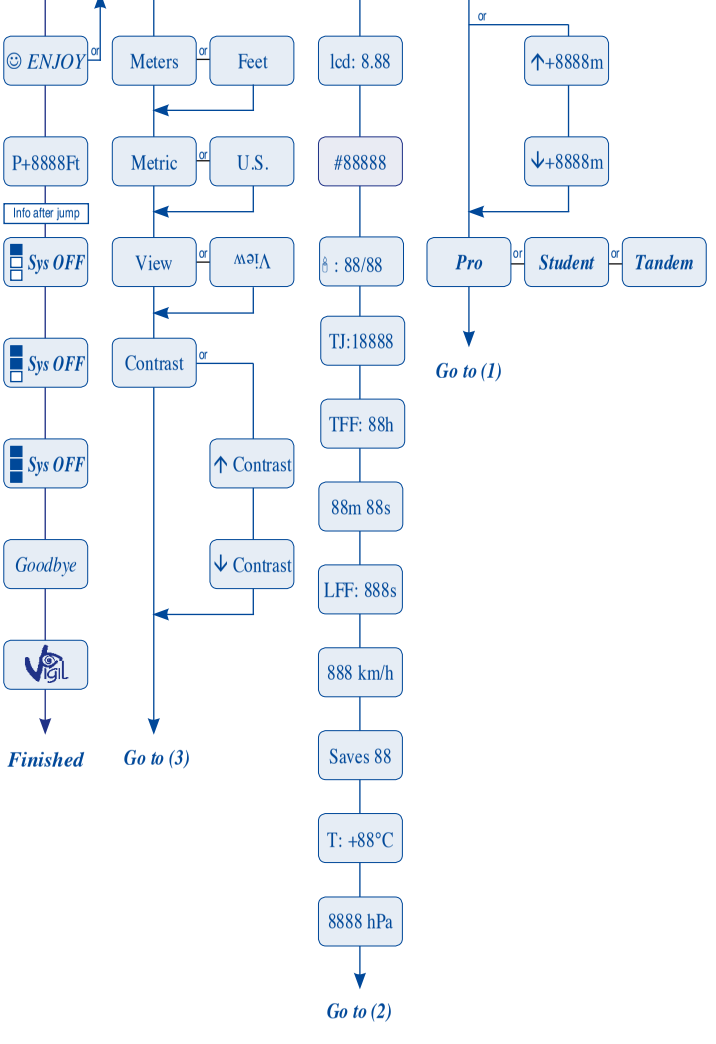
IMPORTANT NOTE: THERE IS A QUALITY CONTROL NUMBER HOLOGRAM (4 Alphanumeric digits) ON EACH OF THE UNITS OF A VIGIL® (Pyrotechnical Cutter, Pulses Plus Element, Control Unit, and Main Box). REMOVAL OF ANY Q.C. HOLOGRAM STICKER, EXCEPT BY THE MANUFACTURER OR BY A VIGIL® CERTIFIED RIGGER VOIDS THE WARRANTY.

NEVER JUMP WITH A BLANK SCREEN!!!

12. Grafcet/Road Map (Parameter sequence flow chart)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Finished
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Go to (2)