



ACE AQUATEC UNIVERSAL SCRAMMER USER GUIDE

AAUS - Version 4.0

PLEASE TAKE TIME TO READ THIS USER GUIDE BEFORE INSTALLING YOUR SEAL SCRAMMER

The Ace Aquatec Universal Scrammer is so named because it has Universal application. The Universal scrammer can be set to issue noises on a timed and / or a responsive basis thereby allowing the scrammer to be used with or without Trigger Devices.

The user can choose the timed *scram rate* over the range 6 to 72 times an hour making it not only useful for long-term use at fish farms but also useful for short-term use (commercial fisheries and during underwater demolition operations).

The Universal Scrammer's main role however is as a **Silent Scrammer** which responds to the activity of the predator. The Universal Scrammer when used with Trigger Devices now features two new algorithms to deal with persistent seals: the *escalated response algorithm* and the *predictive algorithm*. Both these algorithms were made possible because the Universal Scrammer is intelligent, it learns about your fish and it REMEMBERS.

The *escalated response algorithm* gives an increasing number of scrams to a persistent seal until it has had enough and goes away. Seals are creatures of habit and this fact allows the scrammer to remember when the seal was last present and *predict* its reappearance. At the appointed time the system scrams without triggering activity. During this period the rate of scrambling is proportional to the severity of the previous attack. These two algorithms combine together to get the seal when he is coming and going.

It should be noted that the Universal Scrammer can be both a timed scrammer AND a responsive scrammer AT THE SAME TIME because it always listens for Trigger Devices between scrams. This is the *Hybrid Mode* which can be useful even when Trigger Devices are being used.

Typical Uses

- ⌘ **Acoustic Warning Device** – used to evacuate marine mammals from the vicinity of potentially harmful human activities such as underwater demolition.
- ⌘ **Commercial Fisheries** – used to exclude marine mammals from the fishing nets.
- ⌘ **Fish farming** – used to deter sea mammals from preying on the fish stock.

- ? Ace Aquatec, 2003.
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1. Before you start

1.1 Check the Contents

The Ace Aquatec Universal Scrammer (AAUS) is supplied with the following components:

- ? APP transport enclosure
- ? Control Box
- ? U/W Electronics
- ? U/W Connector Cable
- ? 12V Battery cable
- ? 3 way Mains Bulgin connector
- ? Trigger Device(s) - Silent Scrammers only
- ? User Guide
- ? Logging sheet disk – Silent Scrammers only

1.2 About this Guide

This guide is intended for your use. Please take time to read it. The guide is colour coded with **text in blue being advisory**. **Text in red indicates mandatory instructions or advise which, if not heeded, might result in sub-optimal performance or damage.**

1.3 Contact Information

If you need advise or technical assistance that you cannot get from your supplier, please contact Ace Aquatec.

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|------------------|---|
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2. Introduction

Thank you for purchasing the Ace Aquatec Universal Scrammer. All Universal Scrammers can be used as timed and / or responsive (Silent) scrammers with no modification. This user guide describes all functions of the Universal Scrammer.

Used as a Silent Scrammer the Universal Scrammer actively teaches seals using the principle of **negative reinforcement**. In the same way that farm animals are trained to electric fences or young dogs are trained not to steal food the scrammer makes its loud irritating noise when seals are upsetting your fish. Additionally the Universal Scrammer – just like the smart dog owner – can anticipate the seal before he attacks.

In Silent Scramming the system relies on the Trigger Device which is suspended in the growing pen and continuously monitors the behaviour of the fish. Within 50m any Trigger Device can signal any Universal Scrammer acoustically through the water. Seals, being intelligent animals, quickly learn that the sound of the Trigger Device will herald the loud irritating scrammer noise. Seals therefore learn to avoid the noise by **not** harassing your fish. Over time the seals become conditioned to the quiet “bleep-bleep” noise of the Trigger Devices and so the loud irritating noise is only occasionally required to reinforce this conditioning.

In Silent mode the Universal Scrammer monitors the welfare of your fish. By recording these results daily you can build up a profile of your fish and assure yourself that they are not being stressed. By analysing these results – using the supplied software - you can be proactive in dealing with the predator before you lose fish.

The Universal Scrammer can operate in Hybrid mode to boost protection for vulnerable pens. In Hybrid mode the scrammer issues scrams on a TIMED basis whilst continuing to act as a Silent Scrammer. Scram rates of up to 30 times an hour can be indefinitely sustained with a good attached battery.

The Universal Scrammer can sustain a scram rate of 72 times per hour for up to 6 hours using its own internal battery pack which makes it ideal for use as an Acoustic Warning Device or within commercial fisheries operations. The Universal Scrammer can be set to CHARGE mode to recharge its internal batteries from any of several available power sources.

Environmental Note



Underwater noise pollutes the environment and disturbs dolphins and whales. By **not** making sounds unnecessarily the Universal Scrammer balances the welfare of the fish against the needs of the environment.

The acoustic output of the scrammer is designed to be inaudible to fish. This ensures your fish are not stressed by the scrammer.

Safety First



The Universal Scrammer produces high levels of under-water noise. The hearing of divers will not be damaged by accidental exposure to this level but the sudden appearance of sound might startle the diver into making a mistake. **If divers are operating near the scrammer it MUST BE SWITCHED TO LISTEN MODE.**

3. Summary of Uses

3.1 Acoustic Warning Device / Commercial fisheries

When using the Universal Scrammer in this mode it is important to ensure that the scrammer's internal battery is fully charged prior to deployment. The Universal Scrammer will sustain a scam rate of 72 times an hour for a period of 6 hours using its internal battery pack but then needs 15 hours to recharge itself before the next deployment. The sequence of use is outlined below:

1. Connect the scrammer (section 5.2)
2. Connect a power source (section 5.3)
3. Switch to CHARGE mode (section 6.2)
4. Check that the power source is recharging the internal battery (section 6.1.4)
5. If not recharging then switch to CHARGE mode again
6. Wait until the system has finished recharging (section 6.1.4) and disconnect
7. Deploy the scrammer (section 5.1)
8. Set the desired scam rate (section 6.3)
9. Switch to SCRAM mode (section 6.2), the main screen (section 6.1) should now show HYB mode and within a few minutes the scrammer will be heard to sound.
10. After operation switch to LISTEN mode (section 6.2)
11. The system can now be removed from the water and recharged.

Notes on Use

An animal's tolerance to sound depends upon the motivation it has to remain in the vicinity. In the case of an Acoustic Warning device marine mammals can be displaced many hundreds of metres (sometimes more than a kilometre) because they have no strong motivation for remaining.

In the case of commercial fisheries the animals are usually hunting the fish that the fishermen have just caught, hence they have a strong reason for remaining in the vicinity. The range of effectiveness will shrink dramatically. The effective range[?] for Common and Gray seals is 50 to 80 metres, bottlenose dolphins 140 - 200 metres. Should the net that is available to the mammals be outside this zone then the animals will eat "undisturbed". A second problem is that the scrammer can be heard for many miles. If the mammals have learnt to feed in the presence of the scrammer then the machine can act as a dinner-gong. It is therefore essential to initiate scrambling as late as possible, at the highest scam rate possible and to minimise the running time.

[?] The Universal Scrammer is used against wild marine mammals whose tolerance to sound will vary. The effective range is for your guidance but will vary from individual to individual.

3.2 Fish Farms – without Trigger Devices

The Universal Scrammer can be used as a Timed Scrammer with or without Trigger Devices. It is important to maintain a good external power source and to limit the rate of scrambling to 30 scrams an hour so that the internal batteries can maintain a charge of 50%.

The following section describes the Universal Scrammer used without Trigger Devices:

1. Position the scrammer (section 5.1)
2. Connect Scrammer (section 5.2)
3. Connect a power source (section 5.3)
4. Set the desired scam rate (section 6.3)
5. Switch to SCRAM mode (section 6.2), the main screen (section 6.1) should now show HYB mode and within a few minutes the scrammer will sound.
6. Log the main screen daily (section 6.4) to ensure that the system remains in HYB mode (section 6.1), the number of Timed Scrams (TT) approximates to the set rate and the attached power source remains good.
7. If the system reverts to LISTEN mode then you must reduce the Rate of scrambling to balance the discharge / recharge rate (section 5.3)

Notes on Use

Ace Aquatec does not recommend the use of the Universal Scrammer without Trigger Devices at fish farms as a long-term (i.e. more than a month) solution. The high rate of noise will encourage the predator to habituate to the system and so reduce the scrammer's effectiveness. Furthermore, unless mains electricity is used, maintenance of the external battery becomes critical to system effectiveness. Finally the Universal Scrammer used without Trigger Devices is "running blind" and can offer no assistance or support to the user under predation conditions.

Ace Aquatec does recognise that the use of the Universal Scrammer in this mode is a highly practical short-term (i.e. a few days) solution when fish are vulnerable (such as grading and harvesting) or as an immediate response to a sudden predation problem.

The effective range[?] is 50 metres against Common and Gray seals and 140 metres against bottlenose dolphins.

[?] The Universal Scrammer is used against wild marine mammals whose tolerance to sound will vary. The effective range is for your guidance but will vary from individual to individual.

3.3 Fish Farms –With Trigger Devices

The Universal Scrammer can be used as a Silent Scrammer only when used with Trigger Devices. The Silent Scrammer can also be used in Hybrid Mode to boost protection for vulnerable fish. In this mode the Silent Scrammer will sound on a timed basis and in response to triggering activity. Consequently the demands on the internal battery pack are increased and great care is needed to ensure the system has enough power to maintain scrambling. The use of a Silent Scrammer in Hybrid mode should be considered as a temporary measure.

1. Plan your installation (section 4)
2. Position the scrammer (section 5.1)
3. Connect Scrammer (section 5.2)
4. Connect a power source (section 5.3)
5. Deploy Trigger Devices (section 5.4)
6. It is suggested that the system is maintained in LISTEN mode for the first few days, but if your fish are already under attack switch to SCRAM mode (section 6.2). If the attacking predator has been successful it is suggested that the scrammer is placed into Hybrid mode for 24 hours to maintain protection whilst the system learns about the seal.
7. Log the main screen daily (section 6.4) and use the automated spreadsheet to interpret the information.
8. Attempt to maintain the system in LISTEN mode as often as possible. Seals usually spend a few days harassing your fish before they catch one. The Universal Scrammer is internally logging this activity in LISTEN mode and can deal with future attacks when switched to SCRAM mode.

Notes on Use

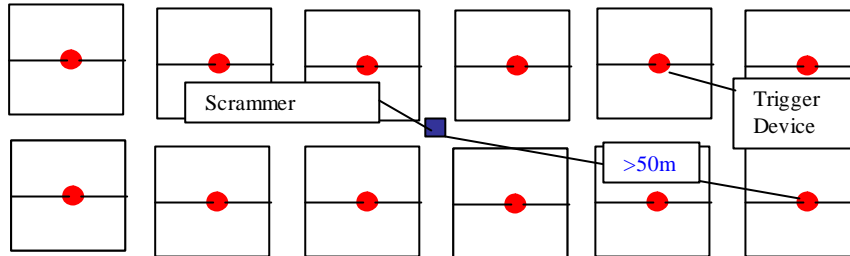
Ace Aquatec recommend the Universal Scrammer is used as a Silent Scrammer at fish farms because it minimises habituation, allows you to monitor the fish and is more environmentally friendly than other seal scarers. It is also easier to maintain as external batteries last longer. In Silent mode the system works as hard as the potential predator and lets you know what is happening.

Effective range[?] 50m for Common and Gray Seals, 140 metres for bottlenose dolphins.

[?] The Universal Scrammer is used against wild marine mammals whose tolerance to sound will vary. The effective range is for your guidance but will vary from individual to individual.

4. Planning your Installation

The Universal Scrammer has a theoretical deterrence range of 50 metres. It is therefore important to site your scrammer in a centralised position to the area that you wish to protect and that your Trigger Devices are within 50 metres of a scrammer.



4.1 Number of Trigger Devices

The number of Trigger Devices depends upon the size of your pens and the stocking density. As hunting seals cruise the farm site they can excite fish in several pens hence for smaller 12 or 15m steel cages one Trigger Device every other pen will suffice. For extremely large pens, such as Dunlops, fish may be excited in one part of the pen only in which case 4 Trigger Devices per pen are recommended. For a 24m steel or 70m polar style cage one Trigger Device per pen is recommended.

In general the more Trigger Devices that are used the higher the probability that an excited fish will contact the device and so initiate a triggered scam.

The system can accept any number of Trigger Devices however as they are individually coded (0 to 15) the maximum recommended is 16 to avoid confusion. It is suggested you plan which code number goes into which pen PRIOR to deployment.

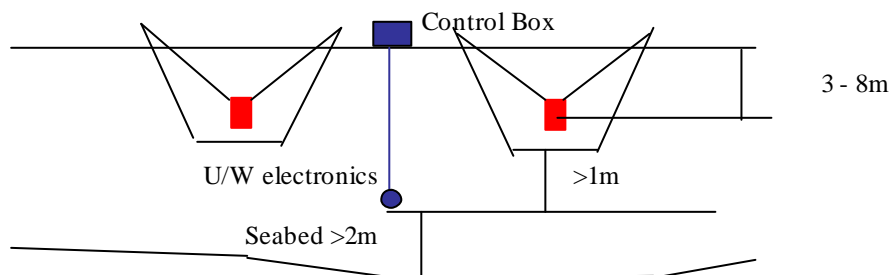
5. Setting up

5.1 Positioning

Fish Farms

For optimal performance the Scrammer's U/W electronics should be positioned at least 1 metre below the deepest point of the growing net and at least 2 metres above the sea bed.

The Trigger Devices must be positioned so that they are clear of all underwater obstructions (the nets themselves, adaptive feeders, lights etc) and preferably below the normal feeding zone of the fish.



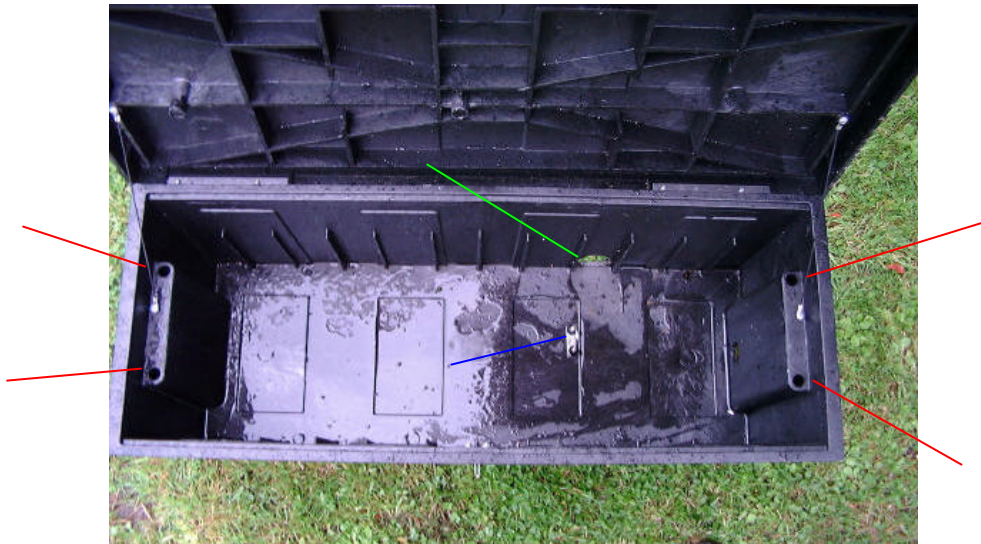
Other Users

The Universal Scrammer should ideally be deployed mid-water. For water depths exceeding 40 metres deploy to 20 metres.

5.2 Scrammer

5.2.1 APP

The Ace Aquatec Universal Scrammer is transported inside the APP. This heavy duty box also acts as a weather protected chamber for the control box and the attached battery. Four through bolt-holes are provided for fixing to the cage or ship structure (red arrows). A large hole in the bottom rear of the APP acts as the cable entry point (green arrow) and a strong-point for the U/W cable is mounted on the base (blue arrow).



APP Showing Bolt-Holes (Red), Cable Entry Hole (Green) and Strong Point (Blue).



5.2.2 Connecting the U/W Body

It is important to connect the underwater body to its cable first. The 5way connector is pushed into the body until there is no gap and the knurled cap is screwed until hand-tight. The strain-relief carabina must be clipped to the stainless steel cage as shown.

The unit is now ready for deployment. It is recommended that the U/W body is immersed to the correct depth and the cable secured before the control box is connected as there is a very small possibility that the scrammer will make a noise whilst in air. **Never test the scrammer in air as the hydrophone will be damaged.**

5.2.3 Connecting the Control Box



The control box is connected to the U/W cable in a similar manner to that followed for the U/W body. The connector is situated on the underside of the Control Box and the carabina clipped onto the APP's strong point. Other sources should be connected using the appropriate Bulgin connector.

The system is ready for use.

5.3 Power

Although the Universal Scrammer contains internal batteries these will not last long without an external power supply. **The scrammer will progressively switch itself off as the internal battery discharges. It will eventually switch itself to LISTEN mode until an adequate external source has been connected.**

| | | | | | | | | |
|------------------------|-------|-------|-------|-------|-------|----|----|----|
| Scram Rate (per hour) | 0 | 6 | 12 | 24 | 30 | 36 | 60 | 72 |
| Without external power | >1000 | 70 | 33 | 17 | 13 | 11 | 7 | 6 |
| With External power | >1000 | >1000 | >1000 | >1000 | >1000 | 33 | 11 | 9 |

Endurance of Scrammer (in hours) with and without external power

5.3.1 External battery

Excepting when used for short periods at sea it is recommended that a 12V battery is always used as an external source since the system recharges the internal batteries at irregular and unpredictable times. Should other sources (such as AC power or solar) be available the scrammer will automatically recharge the external battery.

5.3.2 Mains

An IP67 3 pin Bulgin connector has been supplied for connection to an AC power source (115 to 240V) but only qualified personnel should wire this connector. The connections are:

- ? L to live
- ? N to Neutral
- ? E (triangle of 3 horizontal lines arranged as an inverted triangle) to Earth

Warning – Ensure good connection into the Control Box is achieved BEFORE switching the mains on. When mains is connected do not open the lid of the Control Box.

5.3.3

The solar cell requires a 6 way Bulgin connector. Contact your distributor for details.



5.4 Deploying the Trigger Devices

Trigger Devices are fragile, please treat with respect.

REMEMBER TO RECORD WHICH DEVICE IS IN WHICH PEN.

The Trigger Devices are supplied with a magnet, located at the top of the unit, to switch them on and off. This has to be removed before use. **As this is the only means of turning them back off we strongly recommend you collect the magnets and leave them in a safe place ashore.**

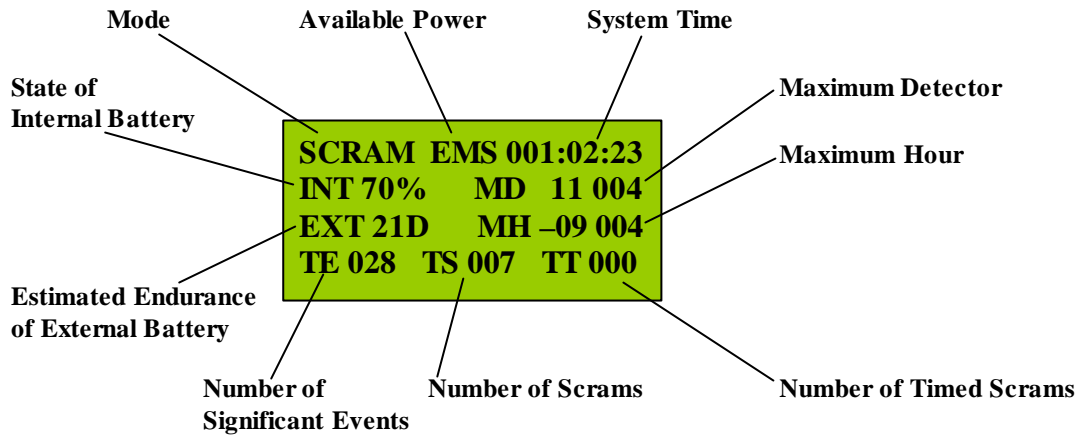
A light line should be attached through each of the holes in the device so as to suspend it vertically in the water. The depth is not critical but account of the potential effects of storm and tide should be considered as the device will false alarm if it contacts the growing nets or any other underwater obstacle.

The Trigger Devices are fitted with a varying threshold to minimise false alarms. If the growing nets do hit the device regularly then the system desensitises and fish panicking may not be detected.

6. General Use

6.1 Understanding the Display

At all times the Control Box tells you what is happening to your fish and what it is doing about it. By entering this information on the supplied spread-sheet daily you can assure yourself that all is well or swiftly pin-point a problem before it gets out of hand.



6.1.1 Mode

The scrammer has four modes:

- ? LISTEN – where the scrammer listens to the activity of your fish but makes no noise
- ? SCRAM – where the scrammer reacts to Significant Events by making a noise
- ? HYBXX – where the scrammer reacts to Significant Events by making a noise AND scrams XX times an hour (ie RATE > 0)
- ? CHARGE – where the scrammer is forced into recharging from an external power source. In this mode the scrammer continues to record Significant Events but will not react

The display is showing that it is in SCRAM mode.

6.1.2 Available Power

10 minutes after a useful power source is attached to the scrammer a letter indicating this is displayed:

- ? E – External Battery (12V)
- ? M – Mains power (110-240VAC)
- ? S – Solar Cell (10W maximum)

If the display remains blank after the power source is connected check that the connections are well made and are the correct way round (and in the case of solar power that the sun is shining onto the cell). The example display shows that all three type are connected.

6.1.3 System Time

The system time (since last reset) is displayed in Days : Hours : Minutes.

The example shows the system was last reset 26 hours ago. For software reasons the system retains the number of minutes.

6.1.4 State of internal battery

The remaining capacity of the internal battery is displayed as a percentage. When the capacity falls the control box will recharge from any (or all) available sources. During re-charging the “%” changes to “*”. The example shows the battery to have 70% charge and is currently not re-charging.

6.1.5 Estimated endurance of the external battery

The estimated endurance of the External battery is displayed as the number of days remaining. In our example this is 21 days. As the system has to “guesstimate” the size and state of an attached battery it is useful to change it well before 00D is reached.



6.1.6 Number of Significant Events

The number of Significant Events are those detections that are deemed by the system not to have been accidental (eg during feeding) but due to fish panicking. The scammer is continually learning about your fish and adjusts its threshold criteria on a day by day basis. In this example it has classified 28 detections as significant and has made a noise in response to some of these events.

6.1.7 Number of Scrams

The number of 5 second scrams made since last reset. The number of scrams can be less or more than the number of Significant Events depending upon the persistence of the predator. The system escalates its response until the predator departs. In this example the system has deemed the predator to be of little threat with only 7 scrams for 28 Significant Events.

6.1.8 Number of Timed Scrams

In Hybrid mode the user can select to scam between 6 and 72 times an hour (more later), the actual number of timed scrams will be displayed. Even in SCRAM mode the system can issue timed scrams in anticipation of a seal attack. Seals are creatures of habit and will return to hunt at the same time each night. If the number of Significant Events 24 hours ago exceeds a threshold then the system switches into hybrid mode for this period.

6.1.9 Maximum Detector

The number of Significant Events that the most active Trigger Device has registered is displayed. In our example Detector 11 has registered four times since the system was last reset. From experience any detector registering more than 10 Significant Events during a 24 hour period should be investigated. It might be another piece of equipment colliding with this detector or it might herald a seal attack.

6.1.10 Maximum Hour

The maximum number of Significant Events within the previous 24 hour period is displayed. In this example 4 Significant Events were recorded 9 hours ago. 5 or more Significant Events per hour is regarded as a serious indication of a predating seal and can trigger the system into timed scrambling.

6.2 Changing Modes

The system is easily moved between modes. The TEST button may be pressed at any time. The first screen to be presented is the mode screen which, in LISTEN mode resembles the following:

```
AAUS V4.00 PRESS=YES
LISTEN YES
SCRAM NO
CHARGE NO
```

Pressing the TEST button within 5 seconds will cause the mode to change indicated by the word YES appearing next to the selected mode. Once the correct mode has been selected the system will change screens automatically and eventually return to the summary screen detailed in section 6.1.

6.3 Rate of Timed Scrams

The number of Timed Scrams per hour is set by the RATE screen which will appear automatically after the first RESET screen (section 6.4.1). Holding the TEST button within 5 seconds will cause the RATE to increase by 6 until the maximum rate is reached. When the displayed Rate is 72 a further press will return the Rate to zero.

```
AAUS V4.00 PRESS=UP
MAX RATE 72
RATE = 00
```



6.4 Monitoring

The Universal Scrammer has the ability to monitor the fish themselves. The computer disk included in this pack contains an automated Excel spreadsheet which, when completed, give you the ability to diagnose whether there is a seal trying to attack your fish, which pens are being threatened and when he was there. This gives you the opportunity to re-configure your system or to take other precautions BEFORE you lose fish.

It is highly recommended that these sheets are filled in each day by copying the information from the first screen on to the package. To aid you there is a pro-forma at the end of this guide which should be photocopied and filled in at sea. In total there are three pertinent screens: the summary screen, the detector screen and the hour screen. Usually only the summary screen is required but during periods when a seal is actively predated the additional information can be useful in pin-pointing the problem (section 6.6).

It is recommended that the user resets the system after recording the information to make analysis of the data easier. Note however that resetting the system will destroy the data currently held —there is no second chance.

6.4.1 Resetting the system

The first Reset screen (there are two) is found immediately after the Mode screen. It is reached by pressing the TEST button once and waiting for the display to resemble the following:

```
AAUS V4.00 PRESS=YES  
RESET?  
TOTAL TIME 200:20:10  
RESET TIME 001:02:10
```

The total time is the time that the system has been in operation and the reset time is the time in days, hours and minutes since the system was last reset. Pressing the button within 5 seconds changes the screen to the following.

```
AAUS V4.00 PRESS=YES  
RESET!!!
```

If this second screen does not appear then the system has not been reset. You can also check by looking at the system time when the normal display reappears. This should be 000:00:00.

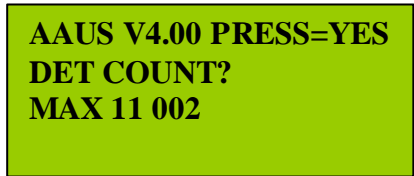


6.5 Advanced Monitoring

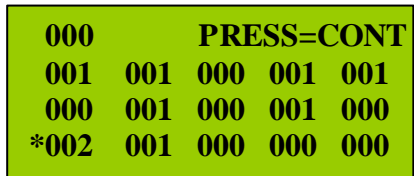
Should circumstances warrant the system has two further screens of information which can be useful in monitoring the time and location of a potential problem. These two screens lie behind the first RESET screen and will automatically be accessed.

6.5.1 Detector Count

The first screen concerns the number of Significant Events recorded for each Trigger Device since the last reset. It is accessed by pressing the TEST button when the following screen appears:



The screen will change to resemble the following:

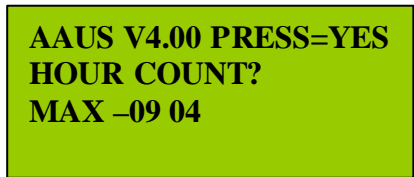


In our example Detector 11 had the highest number of Significant Events (2). This detector is indicated by a "*" to its left. The numbers are read from the top, left to right but providing they are entered as depicted on the screen the computer package will sort out which number belongs to which detector.

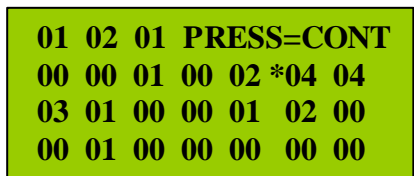
This screen has a long time-out to allow you to write the numbers down. If you finish before this press the TEST button and it will bring you to the second RESET screen.

6.5.2 Hour Count

The following screens detail the number of Significant Events during the previous 24 hours.



As with the detector count the maximum hour is as given on the summary screen. Pressing the TEST button again will yield the following screen:



As with the Detector count the numbers should be read from top left to bottom right. In this example a count of 4 was recorded 9 and 10 hours previously, the most recent hour is awarded MAX.

As with the Detector Count this screen has a long time-out to allow you to write the numbers down. If you finish before this press the TEST button and it will bring you to the second RESET screen.

6.6 Testing the Scrammer

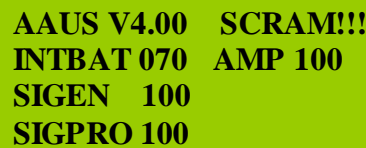
It is recommended that the system is tested daily. The user can verify the correct working of the machine using the built-in test function.

TEST screen is reached by pressing the TEST button and allowing the system to revolve through the screens until the following appears:



AAUS V4.00 PRESS=YES
TEST SCRAM?

Pressing the TEST button within 5 seconds will result in the screen changing to the following and after a short pause a 4 second test scram should be heard.



AAUS V4.00 SCRAM!!!
INTBAT 070 AMP 100
SIGEN 100
SIGPRO 100

The additional information given on the screen are the results of the BITE system from the previous scram, each number is a percentage figure. INTBAT shows the charge of the internal battery, AMP gives the status of the power amplifiers, SIGEN the status of the signal generator and SIGPRO the status of the signal processor.

6.7 Analysis of Information

Seals, fish and the farm itself possess individual characteristics consequently there are no hard and fast rules. The worth of the information is built up over time. It is changes in triggering behaviour that are important; informing the user as to the health of the fish and the intent of the seals.

The Universal Scrammer operating in Silent Scrammer mode has not been designed to deter seals from being present around the farm, rather it is designed to deter seals from attacking your fish. The presence of seals is natural and they do not necessarily stress your fish.

6.7.1 System maintenance

Logging records the status of the system and, for example, allows you to spot a poor battery and change it before the system records "OOD".

6.7.2 Minimising habituation

It is important to minimise the number of scrams (TS and TT) made by the system because potential predators will not be able to get used to the noise. It is also very important to deter predators before they are successful at hunting your fish (see next section). By reviewing the completed spreadsheet daily a decision to change modes from LISTEN (low threat) to SCRAM (significant predator activity) can be quickly made.

6.7.3 Predicting predator attacks

In Ace Aquatec's experience seals will attack healthy farmed fish for a period of two or three days prior to getting a kill. Having then stressed the fish the seal will predate on them at will. Identifying these attacks from the completed spreadsheets is straightforward:

Is there a trend in time? Seals tend to be creatures of habit. Those that specialise in farmed fish tend to hunt when farm workers have gone home and have peak activity either at dawn or dusk. The spreadsheet draws a graph which, when significant activity has taken place, will show you when the seal was there. If you are recording the hour screen you can use the Time Analysis (TA) which will draw graphs showing the activity over the complete 24 hour cycle. If the time of maximum activity correspond (plus or minus an hour) with previous days then this seal is serious and you should be switching to SCRAM mode.



Is there a trend in activity? Before seriously hunting farmed fish, seals seem to “explore” the farm. Whether they logically test each pen in turn is not known but the number of significant events (TE) has been known to rise dramatically over a period of a few days before a trend in time can be spotted. Generally false alarms from fish and noise from work-boats account for some 20 counts per day. 60 counts or more is almost always serious, but it is the relative rise that indicates an impending attack (switch to SCRAM mode) and the relative fall that indicates the danger is over (switch to LISTEN).

7. Reacting to the seal

If the rate of significant events (TE24) increases you should:

- ✍ Check that the Trigger device (MD) in question is not being hit by the nets, rope or other equipment
- ✍ Check that the high rate of trigger did not coincide with unusually active boat movements or farm activities such as grading
- ✍ Switch to SCRAM or HYB modes temporarily
- ✍ Move the scammer closer to the most active Trigger device
- ✍ If the activity persists arrange to have human presence at the time of day which coincides with peak activity.

8. Equipment Maintenance

Regular maintenance will prolong the life and effectiveness of your system.

8.1 Daily

We recommend that the Universal Scrammer is tested daily and the logging spreadsheet completed. Any detector registering an unusually high count should be checked. External batteries reading 03D or less should be replaced with fresh.

8.2 Monthly

Battery connectors should be checked, cleaned with a stiff wire brush and then thoroughly greased.

The Underwater body should be cleaned and the cable should be inspected for abrasions.

Trigger Devices should be cleaned of marine growth.

8.3 Annually

To keep your Ace Aquatec Universal Scrammer in good working order we recommend the unit is serviced annually by an approved Ace Aquatec service centre.

8.4 Storage

If the unit is to be stored the internal battery should be fully charged, the control box disconnected and all connectors should be protected from dust and water. The magnets should be replaced on the Trigger Devices. The scammer should be re-connected annually to recharge the internal batteries.

9. Technical Information

9.1 Trigger Device (V Standard)

| | |
|------------------|--|
| Special features | Communicates to AAUS by sound Devices are individually coded (0 to 15) Telemetry of device code and Violence level to AAUS |
| Dimensions | Length 300mm, diameter 83mm |
| Weight | 1.5kg |
| Material | Stabilised UPVC |
| Electrical | Internal battery pack. 5 year continuous operating life. 7 year storage life. |



| | |
|-----------------|-----------------------------------|
| Acoustic Rating | 0.25 Acoustic Watts |
| Rating | Fully submersible to 30 metres. |
| Servicing | None |
| Maintenance | Monthly removal of marine growth. |

9.2 Universal Scrammer (AAUS)

| | |
|------------------|--|
| Special features | Four mode operation (LISTEN, SCRAM, HYBRID and CHARGE) System escalates its response to a persistent seal until it departs System predicts an attack automatically and takes appropriate action Automated spreadsheet tells you what is happening to your fish Very low power consumption (5mA) in LISTEN mode |
|------------------|--|

9.2.1 Control Box

| | |
|------------------|--|
| Special features | Auto-thresholding to the triggering activity of your fish Full logging and reporting of triggering activity in all modes User selectable timed scrambling (HYB) 6 to 72 times per hour Intelligent recharging |
| Dimensions | 87 x 76 x 127mm |
| Weight | 830g |
| Material | Polycarbonate |
| Electrical | One or more of the following: 115 to 240VAC, 12VDC or 10W solar cell. |
| Rating | IP67 (temporary immersion to 250mm) |
| User Interface | 20 x 4 character LCD controlled by single large button |

9.2.2 U/W Electronics

| | |
|------------------|--|
| Special features | Scram pre-test prevents accidental operation in air Cage protects transducer from mishandling |
| Dimensions | 190mm diameter, 520mm height |
| Weight | 11kg |
| Material | Nylon and stainless steel |
| Electrical | 10Ahr internal battery pack |
| Rating | fully submersible to 100m |
| Acoustic Output | 194dBre 1uPa@1m (16kHz) |
| Frequency range | 19 frequencies from 3.3 – 20kHz |
| Scram sequence | 64 sequences chosen randomly |
| Scram period | 5 seconds (4 second test scram) |

9.2.3 Cable

| | |
|------------------|--|
| Special features | Gold-plated underwater-mateable connectors 4 tonnes breaking strain |
| Dimensions | 20m length with strain relief points |
| Material | Polyurethane with internal Kevlar strain member |
| Rating | Fully submersible to 100m |

9.2.4 APP

| | |
|------------------|---|
| Special features | 4 bolt-fixing points for extreme environments |
| Dimensions | 222 x 345 x 875mm |
| Weight | 1.1kg |
| Material | Structolene |



APPENDIX 1 – PROFORMA

Date of Record _____ Time Home last night _____

Time Out to sea _____

Main Screen

| | | | |
|-------------|--|-------------|-----------|
| Mode | | TIME | |
| INT | | MD | |
| EXT | | MH | |
| TE | | TS | TT |

Detector Screen

| | | | |
|---------------------|--|--|--|
| PRESS = CONT | | | |
| | | | |
| | | | |
| | | | |

Hour Screen

| | | | |
|---------------------|--|--|--|
| PRESS = CONT | | | |
| | | | |
| | | | |
| | | | |

Date of Record _____ Time Home last night _____

Time Out to sea _____

Main Screen

| | | | |
|-------------|--|-------------|-----------|
| Mode | | TIME | |
| INT | | MD | |
| EXT | | MH | |
| TE | | TS | TT |

Detector Screen

| | | | |
|---------------------|--|--|--|
| PRESS = CONT | | | |
| | | | |
| | | | |
| | | | |

Hour Screen

| | | | |
|---------------------|--|--|--|
| PRESS = CONT | | | |
| | | | |
| | | | |
| | | | |