



## OPERATION MANUAL

### 900 SERIES BEACONS

BCN-0910-8000/CA

Models 915,915H,916,919  
933,935,939,945,949  
955,955H,956,959  
962,965,972  
7929A,7945,7990,7930

Includes 9XXD Models

## CONTENTS

	Page
1 Introduction to the 900 series	3
2 Getting Started	6
3 Charging the Beacon	9
4 Connecting external power or an external trigger to the beacon.	13
5 Operating Instructions	15
6 Operation and Ranging	22
7 Battery Replacement	23
8 Spares	26
9 Fault Finding	27
10 Specifications	29
11 Transportation by Air	33
12 Appendix	34

*Please always remove old manuals from circulation whenever new replacement manuals are issued by Applied Acoustic Engineering.*

## Note

*Applied Acoustic Engineering Ltd has made every effort to ensure that the information contained in this manual is correct at time of print. However our policy of continual product improvement means that we cannot assume liability for any errors which may occur.*

## Warning

*These written instructions must be followed fully for reliable and safe operation of the equipment that this manual refers to. Applied Acoustic Engineering Ltd cannot be held responsible for any issues arising from the improper use or maintenance of equipment referred to in this manual or failure of the operator to adhere to the instructions laid out in this manual. The user must be familiar with the contents of this manual before use or operation.*

## 1. Introduction to the 900 series

Thank you for choosing Applied Acoustic Engineering as one of your sub sea equipment suppliers. We hope you will enjoy many years of reliable operational use from our products.

The AAE 900 Series subsea transponders consists of a large range of beacons (combined transponders / responders / pingers) to suit a variety of underwater positioning and relocation tasks.

The 900 series replaces the older 800 series and contains a number of new features. This manual covers all standard models in the range.

All the models in the range use the same mating connector - the VMG-4-FS and have the same channel (frequency) selection switches. These are situated on the lower end-cap.

There is facility for operation with the following systems: -

Simrad HPR 300 series	Channels 1 - 9 and 11 - 55 (14 in total).
Simrad HPR 400 Series	Channels 1 - 9 and 11 - 55, plus the 56 'HiPAP' channels.
Simrad HiPAP system	All 56 channels.
Sonardyne USBL	Simrad Channels 1 - 9 and 11 - 55.
ORE Trackpoint II	7 Channels as listed, plus pingers.

These beacons have the capability to operate on 144 different transmit and receive frequency combinations referred to as 'channels.'

The beacons operate as

- a) Acoustically triggered transponder (requires one or two acoustic signals before replying)
- b) Electrically triggered responder
- c) As a free running pinger (no interrogations are required)

Note: - When powered from a 24 volt supply, the unit will work as either responder or transponder. The transponder circuitry is not switched off when a responder is connected or used.

The following models are available as standard: -

### Mini's Three basic types

Size: 70 mm diameter x 370 mm long.

Model 915	+/-45 degrees	194dB
Model 916	+/-60 degrees	192dB
Model 919	+/-90 degrees	188dB
Model 915H	+/-30 degrees	196dB

Depth rating is 1500 metres. (915H is 2000 metre rated)

*Applications: - General-purpose mini's where range is not great. The directional unit is usually preferred for tow fish tracking and ROV work beyond 100 - 200 metres water depth.*

## Midi's Three basic types in two sizes

Size: 95 mm diameter x 470 mm long.

Model 933	+/-30 degrees	203dB
Model 935	+/-45 degrees	200dB
Model 939	+/-90 degrees	190dB

Size 95 mm diameter x 580 mm long.

Model 943	+/-30 degrees	203dB
Model 945	+/-45 degrees	200dB
Model 949	+/-90 degrees	190dB

Depth Rating 2000 / 3000 metres.

Applications: - These units have higher output than mini's and are particularly useful in noisy environments or at longer ranges than mini's; generally used for tow fish tracking and deeper ROV work.

## Fat Boys Two basic types

Size: 125 mm diameter x 575 mm long.

Model 965	+/-45 degrees	203dB
Model 962	+/-15 degrees	209dB

Depth Rating 2000 / 3000 metres

*Applications: - Even higher output than our midi's, the 96x units offer more power and battery life, but are probably too large to be fitted onto a tow cable. More powerful 'Fat Boys' are available!*

Note: 972 model is available with 212 dB source level, details in appendix.

## Seabed Three basic Types

Size: 125 mm diameter x 1000 mm long, plus 178 mm flange for cages.

Model 955	+/-45 degrees	194dB
Model 956	+/-60 degrees	192dB
Model 959	+/-90 degrees	188dB
Model 955H	+/-45 degrees	200dB

Depth rating 2000/3000 metres.

Applications: - Intended as seabed markers, the cages at each end allow these units to be moored off with weights and buoys. They also take our flotation collars. These have also been fixed onto large ROV's and ploughs. The 955H is a higher-powered version of the 955.

There are also versions of all the above beacons *without a transducer fitted*, instead a 1 or 2 metre lead connects to a remote transducer. The following remote transducers are currently available:-

Model 7920A	+/-15 degrees
Model 7930	+/-30 degrees
Model 7945	+/-45 degrees
Model 7990	+/-90 degrees

Check with the factory or your area representative for further details.

*Applications: - For dedicated tow fish / ROV's where the electronics can be fitted inside and away from potentially damaging, or difficult locations.*

*A note on depth ratings: -*

*A published depth rating does not necessarily imply that a particular product will acoustically operate at that depth at all times.*

*Some units are depth limited to 1000 metres and are not intended for use at a depth beyond 1000 metres. Mechanical damage will occur.*

Depending on model type and age, your beacon may be fitted with a pressure relief valve. To identify if your transponder has been supplied or fitted with a relief valve use the following information;

**MINI Beacons:** Pressure relief valves doubles as the centre fixing screw in the bulkhead end cap and is identified by its extended body length of 20mm beyond the Perspex cover plate. The standard centre fixing screw is flush with the Perspex cover plate and has no pressure relief valve functionality. See Appendix for visual guide.

**MIDI Beacons:** Pressure relief valve doubles as the main ON/OFF switch and is identified by its extended body length of 20mm beyond the Perspex cover plate, the main body is knurled to aid grip when rotating (operation is by hand only). The standard ON/OFF switch is flush with the Perspex cover plate, has no pressure relief valve functionality and is operated using a flat screwdriver.

**SEABED & FATBOY Beacons:**

Pressure relief valve doubles as the main ON/OFF switch and is identified by its extended body length of 20mm beyond the Perspex cover plate, the main body is knurled to aid grip when rotating (operation is by hand only). The standard ON/OFF switch is flush with the Perspex cover plate, has no pressure relief valve functionality and is operated using a flat screwdriver.


**Note:** The pressure relief valve is a non-serviceable item, if it is faulty or mechanically damaged then the beacon should be returned to the factory or service centre for replacement.

## 2. Getting started

On delivery of your beacon please check the following:

1. Model number
2. Depth rating
3. Battery type
4. Beacon is switched off

This information can be found on the beacon product label and on the delivery note. Please ensure that this information is correct and suits your requirements. Please check the beacon for any transit damage, if any is found, do not use the equipment and return it to your supplier.

**APPLIED ACOUSTIC**  
ENGINEERING

**900 – SERIES**

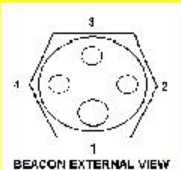
  

<b>Model No</b>	919	<b>Serial No</b>	201054
<b>Depth Rating</b>	1500m	<b>Battery Type</b>	Alkaline
<b>Power</b>	130dB	<b>Battery Expiry Date</b>	NA
<b>Beam Angle</b>	+/- 90deg		

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CONSULT USER MANUAL BEFORE OPERATING

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<p><b>MARINE HOUSE</b> MARINE PARK GAPTON HALL ROAD GREAT YARMOUTH NORFOLK NR31 0NL UK TEL +44 (0) 1493 440355 FAX +44 (0) 1493 440720 <a href="http://www.appliedacoustics.com">www.appliedacoustics.com</a></p>	<p style="text-align: center;"><b>BULK HEAD CONNECTOR DETAILS</b></p> <table style="width: 100%; border-collapse: collapse;"><thead><tr><th style="text-align: left;">PIN</th><th style="text-align: left;">FUNCTION</th><th style="text-align: left;">WIRE COLOUR</th></tr></thead><tbody><tr><td>1</td><td>KEY</td><td>WHITE</td></tr><tr><td>2</td><td>GROUND</td><td>BLACK</td></tr><tr><td>3</td><td>CHARGE</td><td>GREEN</td></tr><tr><td>4</td><td>+24V</td><td>RED</td></tr></tbody></table> <div style="text-align: right;"><p style="font-size: 0.8em;">BEACON EXTERNAL VIEW</p></div>	PIN	FUNCTION	WIRE COLOUR	1	KEY	WHITE	2	GROUND	BLACK	3	CHARGE	GREEN	4	+24V	RED
PIN	FUNCTION	WIRE COLOUR														
1	KEY	WHITE														
2	GROUND	BLACK														
3	CHARGE	GREEN														
4	+24V	RED														

FOR TECHNICAL ADVICE EMAIL [Help@appliedacoustics.com](mailto:Help@appliedacoustics.com)

AAE LABEL 001

Example Label Only

Your beacon is charged before dispatch and should arrive fully charged. If you require charging prior to commissioning then please read the charging instructions in section 3. Note: if the beacon has been shipped with the main on/off switch in the on position, you may need to charge the unit before deployment.

## Handling

Although these units are resistant to mechanical vibration and shock, every effort should be made to avoid careless handling. Dropping the unit will quite possibly damage the transducer which contains brittle piezo ceramic material and is sensitive to mechanical shock. Care should be taken not to damage the pressure relief valve body located inside the bulkhead connector end cap, damage to this item could cause the beacon to flood internally.

## Beacon support and mounting

Beacons must be held securely by means of a mechanical clamp or clamps. The clamping pressure must not overstress the beacon's main tube and the clamp must not contact the beacon electrically if it is metallic. The fixing method must be electrically isolated using rubber or plastic and preferably the clamping fixture should be plastic.

Damage to the beacon's anodising must be avoided at all cost, as this will reduce the operational life of the beacon.

When mounting a beacon, its position should be considered to maximise its operational performance. Beacons need to be mounted so that there is a clear and unobstructed sound path between the transducer and the ship's tracking system. Head Directional transducers must be 'aimed' at the vessel – in a similar way that one would point a torch at an object, so that the vessel is 'illuminated' with signal from the beacon. When using highly directional transducers, the towing angle and cable catenary can have a significant effect on the position of the acoustic beam and comprehensive experimentation with positioning is recommended. Also ensure that ROV thruster noise is taken into account when positioning the beacon. We advise that the tracking system is set to low power when tracking at short distances. This is to reduce any multipath that may occur in some environments.

High internal temperatures may occur if the beacon is left out in direct, strong sun light. This may lead to reduced battery operational life span and reduced charge capacity during charging. A 72 deg C thermal fuse is included in the battery pack(s) which will render the beacon inoperative should this temperature be exceeded.

If the beacon is going to be deployed in an area where there is a high risk of contamination with mud or sand, we recommend that the pressure relief valve holes be temporarily covered with electrical tape to avoid being blocked. The tape should be removed when the beacon is used out of water to allow the valve to vent. This only applies to models fitted with a pressure relief valve.



*A note on depth ratings: -*

*A published depth rating does not necessarily imply that a particular product will acoustically operate at that depth at all times.*

*Some units are depth limited to 1000 metres and are not intended for use at a depth beyond 1000 metres. Mechanical damage will occur beyond rated depths.*

### 3. Charging the Beacon

Your beacon comes with one of the following battery types:

- a. Nickel Cadmium (NiCad).
- b. Nickel Metal Hydride (NiMH).
- c. Alkaline or Lithium. (NOT RECHARGEABLE)

Beacons fitted with battery types a) and b) can be charged with Applied Acoustic charger models 982 and PAM 2520. Beacons can also be trickle charged from an external 24 volt regulated power supply. This is usually done whilst operating on the ROV. (Only applies to the 24 volt input)

*Note concerning all battery types:*

*Battery life is quoted in the 'Specification' section at the rear of this manual. Battery life is based on good, recently charged cells. Battery life is quoted as x number of days listening or y number of replies (operational). Therefore when half the listening life has been used, the number of possible replies has also reduced by half. It is advisable to ensure that operational parameters do not result in the battery pack(s) being discharged before the job is finished! Make sure you have a safety margin!*

#### Charging instructions

Again, the beacon is factory charged before shipping and should arrive fully charged. However, if charging is required, please refer to the instructions below.

Note the exact Model Number of the Applied Acoustic Engineering beacon you wish to charge and also read and refer to the appropriate Applied Acoustic Engineering charger operating manual for the charger you are using. The recommended chargers being the Applied Acoustic Engineering 982 or PAM 2520 type.

- i) The charging operation must take place in a dry environment at normal room temperature (recommended temperature range is between 14 – 23 deg C). If the ambient temperature is too high, the temperature sensor in the battery pack will activate before the end of the charge cycle and produce an 'open circuit' error message to be displayed on the chargers front panel.
- ii) Ensure Beacon is switched off
- iii) Fit charging lead to beacon connector
- iv) Remove the beacon end cap from the main beacon body (just enough to allow internal venting). Note: Removal of the end cap on beacon models fitted with a pressure relief valve is not necessary (this applies to all AAE models and some other non AAE beacon types). If battery gassing should accidentally occur during the charging of any rechargeable battery packs, venting of this gas to atmosphere must be allowed to take place. The pressure relief valve facilitates this operation automatically without the need for the end cap removal.

Remove end cap past both sealing 'O' rings to allow venting of the beacon's internal volume. (Not applicable if pressure relief valve is fitted).

**WARNING:** Do not attempt to charge beacon if the pressure relief valve is covered with tape or if valve vent holes are covered with marine growth.

**Warning** when securing end caps on beacons, do not over-tighten the plastic screw fixings. Screw in the main screw on Mini beacons just enough to take up any slack between the end caps and the main tube body ( this main screw will be the relief valve if fitted ).

- v) Use the correct menu option for the beacon being charged and commence charging the beacon. Latest Applied Acoustic Engineering chargers will display the time left to charge during this operation.
- vi) If the pressure relief valve starts to vent water vapour or gas during charging, stop charging immediately and decommission beacon. (only applies to beacons fitted with pressure relief valves)
- vii) If the Charger flashes "open circuit" during or after the complete charge cycle the following should be checked immediately;
  - a) That the charger's beacon menu selection used is correct for the beacon type being charged.
  - b) That the charging lead is undamaged and connection is electrically secure with the beacon.
  - c) Relief valve has vented (fluids or gas).

If any of the above are correct, then the beacon must be de-commissioned and returned to Applied Acoustic Engineering. The unit must not be recharged if any doubt exists to the beacon's operational effectiveness. This includes the possibility of water ingress.

- viii) Recharge unit if problem is identified as either a) or b) only.

**Note:** Incorrect charger settings will NOT decrease charge time but will damage battery packs thus reducing their effective life in use. Applied Acoustic Engineering cannot be held responsible for incorrect charger settings. Moreover, repeatedly incorrect use could prove potentially hazardous.

The beacon is now ready to use in service. Making a note of the date of each charge may be helpful in the field to avoid unnecessary future overcharging of the battery pack.

If the beacon is going to be deployed in an area where there is high risk of contamination with mud or sand, we recommend that the pressure relief valve holes be temporarily covered with electrical tape to avoid being blocked. The tape should be removed when the beacon is used out of water to allow the valve to vent.

The beacon can be connected to a 24 volt DC (nominal) supply and should be fused as described on the following pages. This is usually done via connection to an ROV (remotely operated vehicle). The 24 volt connection only provides a trickle charge which will maximise the beacon's operating life whilst on the ROV. It will still be necessary to remove and charge the beacon monthly on an Applied Acoustic Engineering charger in order to maintain the beacon's battery pack(s).

**Note:** If the pressure relief valve is a non-serviceable item, if it is faulty or mechanically damaged then the beacon should be returned to the factory or service centre for replacement.

## Connected to the Applied Acoustic Engineering 981 Charger.

Most of the 900 series of mini and midi beacons are backwards compatible with the 981 cycle charger, thus the 'dump' switch needs to be pressed to initiate the charge cycle. Refer to the 981 charger manual for information.

Connected to the Applied Acoustic Engineering tester charger PAM Model 2520

Refer to the manual.

### Connecting to Simrad's 5382 Charger.

We would not recommend using the 5382 charger as the sensing circuitry in the SIMRAD 5382 charger will not operate when connected to Applied Acoustic Engineering beacons. When used with AAE beacons the Simrad 5382 charger will be limited to trickle charge only at around 20mA. This will extend charge times to 3 days for Mini's and for other models, even longer.

### After Charging

Note that a dummy connector (Blanking plug) must be used when a pigtail is not connected. Mating connector type is VMG-4-FS. A locking sleeve can be used with all models except mini's.

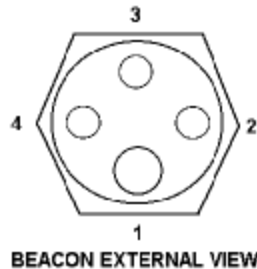
### Charging Fat Boy 962/972 beacons fitted with Ni-Cad Batteries

Early models of the 982 'Smart Charger' or PAM 2520, were not designed to charge these models. For the 962, the 94x setting can be used followed by 12 hours of trickle charge. For the 972, charge as the 962 and wait as long as you can with the charger on trickle charge.

Note: The pressure relief valve is a non-serviceable item, if it is faulty or mechanically damaged then the beacon should be returned to the factory or service centre for replacement.

#### 4. Connecting external power or an external trigger to the beacon.

The beacon can be electrically connected to an external key (trigger) or to a 24 volt regulated DC supply using the bulkhead connector. Remove the dummy connector cover and you will see four electrical pins. As below.



PIN 1 is for connection to an external key  
PIN 2 is the electrical ground

PIN 3 (Only for use with the Applied Acoustic Engineering charger types)

PIN 4 is for connection to an external regulated positive 24 volt DC supply. Do NOT use PIN 3

Note: Applied Acoustic Engineering cannot be held responsible for damage or injury caused by the incorrect wiring of bulkhead connectors by non AAE personnel. Pin 3 must not be connected to any other equipment other than Applied Acoustic Engineering chargers.

When connected to a 24 volt supply (pin 4), the internal batteries are trickle charged by a constant current regulator within each unit. This is ideal for permanent applications as the batteries are always fully charged whilst in this configuration. Voltage range is 24-32 volts with an inline fuse as below;

Current drawn is as follows: -

Model	Current Drawn	Recommended Fuse (MAX)
Mini's	80 mA	100-200 mA
Midi's	120 mA	150-200 mA
Fat Boy	120/150 mA	150-250 mA
Seabed	120/150 mA	150-250 mA

Note: If a fuse blows, the beacon system should be examined by a competent engineer to establish the reason why the fuse has failed. Alternatively, the beacon should be de-commissioned and returned to Applied Acoustic Engineering for examination/repair.

Applied Acoustic Engineering cannot be held responsible for injury or damage caused by incorrect use of fuse ratings higher than those recommended above.

Note that a dummy connector (Blanking plug) must be used when a pigtail is not connected to the beacons connector (VMG-4-FS). A locking sleeve can be used with all models except Mini's.

## 5. Operation

The three switches fitted to the bottom end of the beacons are all stainless steel so they will not be damaged by screwdrivers. However, the operator should note that the ON / OFF switch cannot be freely rotated, but only turned back and forth between the two marked positions. Damage will result if the switch is forced beyond the marked limits. The channel selection switches can be rotated freely to the desired position. However, because the O rings reduce the 'feel' of the switch, it is suggested that each switch is rotated just past (a few degrees) the desired position and then turned back to ensure that the switch has fully engaged into its new position. The use of Applied Acoustic Charger Testers will also assist in confirming and identifying selected channels. Note that switch 1 is the left hand switch and switch 2, the right.

### Switching On

Switching on is achieved by rotating the switch located on the connector end-cap marked ON & OFF. Please also refer to the proceeding paragraph.

### Channel Switches

These two switches select the receive and transmit frequencies.

Note: During operation, there will be a delay of approximately 10 seconds before a newly selected channel becomes fully processed and operational.

## SPECIAL FEATURES

Applied Acoustic Engineering 900 series units have the following features: -

### TEST POSITIONS

There are also test positions on the 900 series beacons (as shown below), for Simrad HPR, Sonardyne USBL, Simrad HiPAP and ORE Trackpoint II systems. Experience has shown that during installations of systems, workshop testing of beacons or tracking systems, a false range can be of assistance: -

PLEASE NOTE THAT THESE TEST POSITIONS SHOULD ONLY BE USED WHILST THE BEACONS ARE OPERATING IN TRANSPONDER MODE. THE TEST POSITIONS SHOULD NEVER BE USED WHILST THE BEACONS ARE OPERATING IN RESPONDER MODE.

#### Simrad HPR / Sonardyne USBL

Channel 66 emulates a transponder operating on Channel 33 (Delta), with a 330 mS turn around time (as opposed to the standard 30mS). This increased time allows a false range (~200 metres) for testing during mobilisations and workshop testing of the RS-232 string etc.

#### Simrad HiPAP

Channel 88 emulates a transponder operating on channel 24, with a 330 mS turn around time as opposed to the standard 60 mS. This increased time should 'fool' the system into giving a false range of around 200 metres and may be used during mobilisations.



## ORE Trackpoint II / II+

Channel 77 emulates a transponder receiving at 19 kHz and transmitting at 29 kHz, with a 330 mS turn around time. This will result in a false range being displayed and can be useful during mobilisations and during workshop testing of the system.

Switch positions 00 and 11 / 11 are used for factory tests only and should not be used by non Applied Acoustic operators.

## Pinger operation

The 900 series can also be set to operate as pingers, as the following table shows. Note that 4 / 10 and 5 / 11 are common emergency frequencies.

Switch position	Repetition rate	Pulse length	Transmit frequency
4 / 9	1000 mS	5 mS	26 kHz
4 / 10	995 mS	5 mS	27 kHz
4 / 11	900 mS	5 mS	28 kHz
5 / 9	985 mS	5 mS	29 kHz
5 / 10	980 mS	5 mS	30 kHz
5 / 11	1000 mS	10 mS	37.5 kHz

## Expandability

There are a number of switch positions which have not been defined. If your company has the need for additional channels for any reason, please contact us and we may be able to help.

If the beacon is going to be deployed in an area where there is a high risk of contamination with mud or sand, we recommend that the pressure relief valve holes be temporarily covered with electrical tape to avoid being blocked. The tape should be removed when the beacon is used out of water to allow the valve to vent.

## OPERATION WITH SIMRAD SYSTEMS

Simrad's HPR systems use 14 channels listed as 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 22, 33, 44, and 55. These are catered for as listed in the table below.

Please note that the switch position 01 as shown below can be more precisely defined as: Left hand beacon channel selector switch, position 0. Right hand switch, position 1.

### Operation with Simrad 300 series, 400 series (not HiPAP)

Switch position	Channel	Interrogate frequency	Reply frequency
01	1	20.492	29.762
02	2	21.552	30.488
03	3	22.124	31.250
04	4	22.727	31.847
05	5	23.364	32.468
06	6	24.038	27.173
07	7	24.510	27.777
08	8	25.000	28.409
09	9	26.042	29.070
1/1	11 Square	21.552	27.173
2/2	22 Circle	22.727	28.409
3/3	33 Delta	23.923	29.762
4/4	44 X	25.126	31.250
5/5	55 Y	26.455	32.468

Frequencies shown above are in kHz.

900 series beacons will operate as transponders if acoustically interrogated, or as responders if electrically triggered. If the beacons are used with the SIMRAD 410 system, the channels listed above and the 56 listed for 'HiPAP' apply and are referred to as the 'B' channels.

Please note 1) SIMRAD'S HiPAP systems cannot track the above channels. We would also advise that when using the HPR400 series, the operator should use either the above channels or the 56 HiPAP type channels and NOT a mixture of the two as some frequencies are common and can cause interference. Note 2) Switch positions shown as 1/1 etc denote LH switch on position 1 and RH switch on position 1 etc.

## OPERATION WITH HiPAP

Simrad's HiPAP system transmits a double interrogation pulse, with 56 channels listed as over the page: -

900 series beacons will operate as transponders if acoustically interrogated, or as responders if electrically triggered. These beacons comply with 'B' Channels as shown on the monitor screen e.g. "B24" for our switch setting 2 4. Please note that the HiPAP system is not able to operate with the 'old' HPR channels 11/22/33/44/55 and 1 – 9. See the accompanying diagram elsewhere in this manual for wiring information relating to responder operation.

Switch 1	Switch 2	Description	RX 1	RX 2	Reply
1	2	HiPAP	21 KHz	21.5KHz	29.25KHz
1	3	HiPAP	21 KHz	22KHz	29.75KHz
1	4	HiPAP	21 KHz	22.5KHz	30.25KHz
1	5	HiPAP	21 KHz	23KHz	30.75KHz
1	6	HiPAP	21 KHz	23.5KHz	27.25KHz
1	7	HiPAP	21 KHz	24KHz	27.75KHz
1	8	HiPAP	21 KHz	24.5KHz	28.25KHz
2	1	HiPAP	21.5KHz	21 KHz	28.5KHz
2	3	HiPAP	21.5KHz	22KHz	29.5KHz
2	4	HiPAP	21.5KHz	22.5KHz	30KHz
2	5	HiPAP	21.5KHz	23KHz	30.5KHz
2	6	HiPAP	21.5KHz	23.5KHz	27KHz
2	7	HiPAP	21.5KHz	24KHz	27.5KHz
2	8	HiPAP	21.5KHz	24.5KHz	28KHz
3	1	HiPAP	22KHz	21 KHz	28.75KHz
3	2	HiPAP	22KHz	21.5KHz	29.25KHz
3	4	HiPAP	22KHz	22.5KHz	30.25KHz
3	5	HiPAP	22KHz	23KHz	30.75KHz
3	6	HiPAP	22KHz	23.5KHz	27.25KHz
3	7	HiPAP	22KHz	24KHz	27.75KHz
3	8	HiPAP	22KHz	24.5KHz	28.25KHz
4	1	HiPAP	22.5KHz	21 KHz	30KHz
4	2	HiPAP	22.5KHz	21.5KHz	29KHz
4	3	HiPAP	22.5KHz	22KHz	29.5KHz
4	5	HiPAP	22.5KHz	23KHz	30.5KHz
4	6	HiPAP	22.5KHz	23.5KHz	27KHz
4	7	HiPAP	22.5KHz	24KHz	27.5KHz
4	8	HiPAP	22.5KHz	24.5KHz	28KHz
5	1	HiPAP	23KHz	21 KHz	28.75KHz
5	2	HiPAP	23KHz	21.5KHz	29.25KHz
5	3	HiPAP	23KHz	22KHz	29.75KHz
5	4	HiPAP	23KHz	22.5KHz	20.25KHz
5	6	HiPAP	23KHz	23.5KHz	27.25KHz
5	7	HiPAP	23KHz	24KHz	27.75KHz
5	8	HiPAP	23KHz	24.5KHz	28.25KHz
6	1	HiPAP	23.5KHz	21 KHz	28.5KHz
6	2	HiPAP	23.5KHz	21.5KHz	29KHz
6	3	HiPAP	23.5KHz	22KHz	29.5KHz
6	4	HiPAP	23.5KHz	22.5KHz	30KHz
6	5	HiPAP	23.5KHz	23KHz	30.5KHz
6	7	HiPAP	23.5KHz	24KHz	27.5KHz
6	8	HiPAP	23.5KHz	24.5KHz	28KHz
7	1	HiPAP	24KHz	21 KHz	28.75KHz
7	2	HiPAP	24KHz	21.5KHz	29.25KHz
7	3	HiPAP	24KHz	22KHz	29.75KHz
7	4	HiPAP	24KHz	22.5KHz	30.25KHz
7	5	HiPAP	24KHz	23KHz	30.75KHz
7	6	HiPAP	24KHz	23.5KHz	27.25KHz
7	8	HiPAP	24KHz	24.5KHz	28.25KHz
8	1	HiPAP	24.5KHz	21 KHz	28.5KHz
8	2	HiPAP	24.5KHz	21.5KHz	29KHz
8	3	HiPAP	24.5KHz	22KHz	29.5KHz
8	4	HiPAP	24.5KHz	22.5KHz	30KHz
8	5	HiPAP	24.5KHz	23KHz	30.5KHz
8	6	HiPAP	24.5KHz	23.5KHz	27KHz
8	7	HiPAP	24.5KHz	24KHz	27.5KHz

## OPERATION WITH SONARDYNE USBL SYSTEMS

The Sonardyne USBL system can use many frequencies including those used by Simrad HPR: -

Switch position	Channel	Interrogate frequency	Reply frequency
01	1	20.492	29.762
02	2	21.552	30.488
03	3	22.124	31.250
04	4	22.727	31.847
05	5	23.364	32.468
06	6	24.038	27.173
07	7	24.510	27.777
08	8	25.000	28.409
09	9	26.042	29.070
1/1	11 Square	21.552	27.173
2/2	22 Circle	22.727	28.409
3/3	33 Delta	23.923	29.762
4/4	44 X	25.126	31.250
5/5	55 Y	26.455	32.468

Frequencies shown above are in kHz.

Applied Acoustic 900 series beacon will operate as transponders if acoustically interrogated or as responders if electrically triggered. See the accompanying diagram elsewhere in this manual for wiring information.

## OPERATION WITH ORE LXT; TRACKPOINT II and II+ SYSTEMS

ORE's Trackpoint II and LXT systems operate in the MF band with interrogate frequencies between 16 and 21 kHz and reply frequencies between 22 and 30 kHz. It is increasingly common for beacons to be supplied which operate on LXT's pre-defined channels 1 - 5. Applied Acoustic Engineering 900 series beacons operate on three 'codes' as listed below: -

Switch positions	Channel	Interrogate frequency (kHz)	Reply frequency (kHz)
1 / 0		20	27
2 / 0		20	28
3 / 0	LXT Code 3	17	27
4 / 0	LXT Code 4	19	29
5 / 0	LXT Code 5	17	30
6 / 0		18	28
6 / 9		16	23 *
6 / 10		18	23 *
6 / 11		20	23 *
8 / 0		21	29
8 / 9		17	29

Note: frequencies marked (\*) are for special low frequency (transducer) versions only.

TAT (Turn Around Time) is 15 mS for operation as transponder and responder. Select a 10 mS transmitted pulse width within the Trackpoint II / II+ system.

Applied Acoustic Engineering 919 and 916 beacons can be interrogated at 1 PPS (faster than the standard 'Multibeacon'). For responder work, the 900 series use a +ve key pulse. Although this is not usual with Trackpoint, the system can be configured quite easily. Refer to your Trackpoint documentation.

Trackpoint can also operate with pingers. See the section 'Special features' later in the manual.

If the beacon is going to be deployed in an area where there is a high risk of contamination with mud or sand, we recommend that the pressure relief valve holes be temporarily covered with electrical tape to avoid being blocked. The tape should be removed when the beacon is used out of water to allow the valve to vent.

## 6. Operational range

This is the most commonly asked question. Acoustic conditions, tracking system type and quality of installation all have an effect upon range. For example, on one occasion two 835 models operated with a poorly installed Simrad 300P system and they gave only 200 metres range. On a different vessel with a better installed 309 system, over 2000 metres was obtained and this was with exactly the same units and only a week later.

In terms of increasing tracking capability, we would expect something like the following table to apply:- (i.e. the top system will obtain greater ranges than the bottom system).

- Simrad HiPAP
- Simrad HPR tracking head
- Sonardyne USBL
- Simrad HPR fixed head
- ORE Trackpoint II
- Simrad portable

The following table is a general guide to assist selection of beacons. Applied Acoustic Engineering cannot accept responsibility for any operator not being able to achieve these ranges in practice. Experience with the vessel and system in question is the governing factor here. Naturally, it is better to err on the side of using increased power if unsure. Even if a lower powered beacon appears to work successfully with a system at a particular range, higher source levels (power) will still tend to increase tracking stability.

Model number	Expected useable range	Known achieved ranges
919	To 400 metres	800 metres
916	To 800 metres	1200 metres (2500 metres with HiPAP)
939 / 949	To 600 metres	950 metres
935 / 945	To 1500 metres	4000 metres (with HiPAP)
959	To 600 metres	Usually used for battery life, not range.
956	To 1000 metres	Usually used for battery life, not range.
955H	To 1500 metres	Usually used for battery life, not range.
965	To 2000 metres	2200 metres
962	To 3200 metres	3000 metres
972	To 4000 metres	New product
Midi with 7920A	To 2800 metres	3000 metres (Deep plough apps)
Fat Boy HP with 7920A	To 4500 metres	No field reports
933/943	To 2200 metres	3000m+ reported

If the beacon is going to be deployed in an area where there is a high risk of contamination with mud or sand, we recommend that the pressure relief valve holes be temporarily covered with electrical tape to avoid being blocked. The tape should be removed when the beacon is used out of water to allow the valve to vent.

## 7. Battery replacement

Rinse the beacons with clean water to remove any salt build up and remove the unit to a dry, clean environment. The pressure case can now be opened.

For Mini beacons, unscrew the beacon's central screw located in the lower end-cap (this is also the pressure relief valve on other models). This will pull off the end until any pressure is released. A further few turns will allow the lower end-cap to be removed. A ribbon cable must now be disconnected before access can be gained to the printed circuit boards and battery pack. When re-assembling, ensure that the locating pins do not short on the lower (round) PCB.

For Midi's and the Fat Boy units, the nylon securing screws should be removed from the upper (transducer) end and the transducer end-cap carefully pulled off. If there is any apparent pressure inside – for example by bending of the screws before removal, use extreme care or a disassembly jig.

For Seabed units, loosen the nuts on the transducer cage and work first the cage and then the transducer end-cap loose to ensure there is no pressure inside. Finally remove the nuts and remove the cage and end-cap.

When dismantling any pressure housing, ensure that no one is standing at either end of the housing just in case internal pressure causes an end-cap to pop off, as injury can occur.

In due course, rechargeable batteries will require replacement and this can be achieved quite simply with the 900 series. We recommend a maximum 3 year life for re-chargeable packs.

Ensure that replacement battery packs are the same as the original type and complete the battery pack information label. Refer to the label on the old pack.

Re-assembly is the reverse of the above procedure. Do check the O rings and clean or replace them if necessary before re-assembly. Do not over-tighten the securing screws!

Spares and assistance can be obtained from the factory or our sales agents worldwide.

Mini Beacon Warning when securing end caps do not over tighten the main screw fixing as this will stress the internal chassis. Screw in the main screw just enough to take up any slack between the end cap and the main tube body.

Note: The pressure relief valve is a non-serviceable item, if it is faulty or mechanically damaged then the beacon should be returned to the factory or service centre for replacement.



## Battery Replacement cont,

Ensure that replacement battery packs are the same as the original type and complete the battery pack information label. Refer to the label on the old pack.

Nominal battery voltages are as follows: -

Mini	NiMH	15 cells at 1.2 volts / cell = 18 volts.
Mini	Alkaline	12 cells at 1.5 volts / cell = 18 volts.
Midi	Ni-cads	14 cells per pack at 1.2 volts / cell = 16.2 volts. Long midi's have two packs.
Fat Boy	Ni-cads	14 cells at 1.2 volts / cell = 16.8 volts (2 packs for 97x).
Fat Boy	Alkaline	14 cells at 1.5 volts / cell = 21 volts (2 packs for 97x)
Seabed	Ni-cads	14 cells per pack at 1.2 volts / cell = 16.8 volts. 3 Packs used.
Seabed	Alkaline	14 cells per pack at 1.5 volts / cell = 21 volts. 3 packs used.
Seabed	Lithium	6 cells per pack at 3.6 volts / cell = 21.6 volts. 6 packs used.

### Midi / Fat Boy / Seabed beacons.

Gain access to the battery pack(s) / electronics as described above. The battery pack(s) are attached to the lower end-cap. Remove the hex nuts from the battery clamping plate, remove this plate and remove the batteries. Dispose of the old batteries safely.

Ensure that replacement battery packs are the same as the original type and complete the battery pack information label. Refer to the label on the old pack.

### Checking Alkaline Batteries in Seabed units.

Estimating the remaining life of an alkaline battery pack is not precise and the following advise should only be regarded as a guide.

Nominal voltage is 1.5 volts per cell. The Seabed units have three packs of 14 cells per pack (21 volts nominally).

The best method is to measure each battery pack voltage with a small load. We recommend 680 ohms 1 watt (approx. 50 mA). Connect the load to the pack and wait for 30 seconds. Measure the voltage. A new pack will measure 21 volts on load (maybe slightly more). We would consider a pack to require replacement if it measures 17 volts or less. Using a flat (straight line) discharge curve between 21v and 17v would indicate that at 19 volts, the battery's energy has depleted by 50%. We would not recommend that the battery is used below 17 volts as the battery packs' ability to deliver power is reduced. The electronics themselves will operate down to 6 volts but at this low voltage level, the source level from the transducer will be extremely low.

Note: Do not use alkaline or Lithium packs in equipment designed to operate with rechargeable batteries as this could lead to an explosion and injury. Applied Acoustic Engineering cannot be held responsible for damage or injury caused by incorrect battery replacement or fitment by non Applied Acoustic Engineering personnel.

Note: Alkaline or Lithium batteries should never be recharged or exposed to water. Do not mix battery types or mix batteries of differing dates within packs, always replace batteries as complete packs or sets.

Please consider the environment and safety when disposing of all battery types. Applied Acoustic Engineering operates a green policy regarding battery disposal and the environment. All used battery packs which are returned to Applied Acoustic Engineering are recycled.

## 8. Spares

The following beacon spares are available from stock. A part number is not necessary to order. The description below is acceptable to us. Please let us know the model number and serial number of the units you require spares for.

### 'O' Rings

Mini Body Kit

Midi Body Kit

Fat Boy Body Kit

Seabed Body Kit

(all kits include 'O' ring lubricant)

### Connector Parts

Blanking plug for connector

Bulkhead connector Mini

Bulkhead connector Midi / Fat Boy / Seabed

Pigtail Connector 0.5 metre lead

Pigtail 3 metre lead

### Battery Packs

Mini NiMH 1.2 Ah

Mini Alkaline

Midi NiMH 2 Ah (2 for 94x units)

Fat Boy (1 or 2 required) 5.5 Ah Ni Cad

Seabed (3 required) 5.5Ah NiCad (8Ah NiMH also available)

### Pressure relief valves

The pressure relief valve used on Applied Acoustic Engineering under water equipment is a non-serviceable item and if damaged or faulty should be replaced immediately. Applied Acoustic Engineering strongly recommend that all pressure relief valves are annually tested for safe reliable operation, this is done on a service-repair or exchange scheme at the factory. Relief valves which are not serviced may become contaminated with marine growth or debris, leading to a flooded or pressurised transponder housing. This is specially important if the transponder is being operated in tidal areas where marine contamination is more likely.

If the beacon is going to be deployed in an area where there is a high risk of contamination with mud or sand, we recommend that the pressure relief valve holes be temporarily covered with electrical tape to avoid being blocked. The tape should be removed when the beacon is used out of water to allow the valve to vent.

Note: The pressure relief valve is a non-serviceable item, if it is faulty or mechanically damaged then the beacon should be returned to the factory or service centre for replacement.

## 9. Fault Finding

### It doesn't work, what can we do ?

There are two primary questions here which will help to identify the nature of the problem. Most instances of failure are due to mechanical damage or 'finger trouble' but the possibility of component failure is always there.

### Did it ever work?

If the answer is yes, either the battery is not charged up or the unit is faulty. Look for mechanical damage and also check to see if the charging connector has damaged contacts.

If there are any signs of mechanical damage which may have lead to water ingress at some stage, **DO NOT CHARGE THE BEACON** but return it to Applied Acoustic Engineering for repair.

If the pressure relief valve has vented water or vapour during charging, stop charging and decommission beacon, return beacon to Applied Acoustic Engineering for repair.

If the unit has been over-charged, then do not use it, replace the battery pack or return the beacon to Applied Acoustic Engineering.

If there are no signs of mechanical damage, try charging the unit.

Check unit using the responder test function on our 982 charger after charging, if the unit responds, the battery and the transmitter are functional.

Is the unit set to the correct channel?

If these tests do not help or resolve the problem, contact Applied Acoustic Engineering immediately for technical assistance.

## Is performance poor?

- If the answer is yes, then please consider the following:-
- If you have a similar model, is the performance the same? This will identify if there is just one faulty unit.
- Are you out of range? Again check with a similar model. Maybe a higher powered unit is required.
- Is multipath present? Try slowing down the interrogation rate.
- Are you within the beam pattern of the transducer? If the signal from the beacon is not illuminating the vessel, then it cannot be tracked. Even with our +/-45 degree transducers, cable catenary has been known to cause problems occasionally with tow fish tracking (the signal may transmit at the wrong angle and will miss the ship).
- If you are tow fish tracking and there is a large water temperature change between the surface of the water and the beacon position, you may be experiencing severe ray bending.
- If results are different to another model? You may be comparing different models and different specifications.
- Check on a different channel (frequency) to see if performance changes.

If you can't find a solution, please contact us. Call, fax, write or e-mail and we will try to help wherever we can. Contact details are at the back of this manual. Address your communication to Technical Support.

## 10. Specifications

An integrated range of beacons for a multitude of positioning tasks.

General specifications:-

Housing Material	Anodised aluminium alloy
Turn around delay	15 / 30 / 60 mS dependent on system selected.
Channels / frequencies	HPR300 14 HPR400 56 Sonardyne USBL 14 ORE Trackpoint II 8 transponder / responder 5 Pinger Emergency Pinger 1 (37.5 kHz) Test channels 3
Spare channels	Yes
Power supply	Rechargeable batteries Alkaline / Lithium batteries can be supplied. External supply 22 – 35 volts dc. (fuse as recommended for model).
Responder operation	By external connection +ve logic pulse. 0.2 – 2 mS duration 5 – 25 volts.
Internal adjustments	None
Receiver step size	32 Hz / 32 Hz
Transmitter step size	32 Hz / 250 Hz
Operating temperature	-5 to 30 C
Storage temperature	0 to 45 C
Battery pack maximum storage temperature	is 55 deg C, temperatures above 70 deg C will render the battery pack unserviceable.
Pressure relief valves	8 PSI + or – 2 PSI This is non-serviceable in the field (factory exchange unit only), service interval is 1 year.

### Mini's Three basic types

Size: 70 mm diameter x 360 mm long

Model 915	+/-45 degrees	194dB
Model 916	+/-60 degrees	192dB
Model 919	+/-90 degrees	188dB
Model 915H	+/-30 degrees	196dB

Depth rating is 1000 / 1500 metres.

Weight in air / water 2.5 / 1.5 kg

Batter pack: 1.2Ah NiMH

Battery Life: 30 days listening or  
28 hrs at 1 reply / second  
96 hrs at 1 reply / 4 seconds

Note: 915H has a 2000 metre depth rating and battery life is reduced to 18 Hrs at 1 reply / second.

*Applications:- General purpose mini's where range is not great. The directional unit is usually preferred for tow fish tracking and ROV work beyond 100 - 200 metres water depth.*

## Midi's Three basic types in two sizes

Size: 95 mm diameter x 470 mm long.

Model 933	+/-30 degrees	203dB
Model 935	+/-45 degrees	200dB
Model 939	+/-90 degrees	190dB

Weight in air / water 5 / 2.5kg

Battery Pack 2 Ah NiMH

Battery Life: 45 days listening or:  
26 hrs at 1 reply / 2 seconds (935/933)  
50 hrs at 1 reply / 2 seconds (939)

Size: 95 mm diameter x 580 mm long.

Model 943	+/-30 degrees	203dB
Model 945	+/-45 degrees	200dB
Model 949	+/-90 degrees	190dB

Weight in air / water 6.5 / 3kg

Battery pack: 4 Ah NiMH

Battery Life: 75 days listening or:  
50 hrs at 1 reply / 2 seconds (945/943)  
100 hrs at 1 reply / 2 seconds (949)

Depth Rating 1000 - 3000 metres

H versions of the directional midi's are available for some models which provide an additional 3dB source level and a 50% reduction in battery life.

*Applications:- These units have higher output than mini's and are particularly useful in noisy environments or at longer ranges than mini's; generally used for tow fish tracking and deeper ROV work.*

## Fat Boys Two basic types

Size: 125 mm diameter x 700 mm long.

Model 965	+/-45 degrees	203dB
Model 962	+/-15 degrees	209dB

Weight in air / water 15 / 8kg

Battery pack 5.5 AH NiCAD

Battery life: 120 days or:  
75 hrs at 1 reply / 2 seconds

Depth Rating 1000 - 3000 metres

For high power 972 Fat Boy, see appendix.

*Applications:- Even higher output than our midi's, the 96x units offer high power for deepwater ROV work.*

## Seabed Three basic Types

Size: 125 mm diameter x 1000 mm long, plus 178 mm flange for cages.

Model 955	+/-45 degrees	194dB
Model 956	+/-60 degrees	192dB
Model 959	+/-90 degrees	188dB
Model 955H	+/-45 degrees	200dB

Weight in air / water 20 / 10 kg

Battery Pack 15AH NiCAD

Battery Life: 150 days or:

500 hrs at 1 reply / second except 955H which is 150 hrs.

Depth rating 1000 - 3000 metres.

*Applications:- Intended as seabed markers, the cages at each end allow these units to be moored off with weights and buoys. They also take our flotation collars. These have also been fixed onto large ROV's and ploughs.*

## REMOTE TRANSDUCERS

There are also versions of all the above beacons *without a transducer fitted*, instead a 1.5 metre lead connects to a remote transducer. The following transducers are currently available:-

Model 7920A +/-15 degrees (Not for new ROV designs)

Size 175 x 175 mm square, 80 mm deep.

Weight in air / water 8.5 / 7 kg

206dB with Midi (930 and 940)

208dB with Fat Boy (Model 960)

212dB with HP FAT BOY (Model 960H)

Model RM15 +/-15 degrees

Size 125mm diameter

206dB with Midi 930 + 940

208dB with Fatboy 960

212dB with Fatboy plus 970

Replaces 7920A

Model RM30 +/- 30 degrees

Frequency 27 – 33 kHz

Size 95 mm diameter

203dB with Midi 930 and 940

Model RM45 +/-45 degrees

Size 75 mm diameter x 160 mm long.

200dB with Midi (930 and 940)

203dB with Fat Boy (Model 960)



Model RM90 +/-90 degrees  
Size 75 mm diameter x 160 mm long  
187dB with Mini beacons  
190dB with Midi (Model 930 and 940)

Check with the factory or your area representative for further details.

*Applications:- For dedicated tow fish / ROVs where the electronics can be fitted inside, and away from potentially damaging, or difficult locations. Other models available*

CE These units conform to the European directive 89/336/EEC for electromagnetic compatibility when used in the proper manner.

## 11. Transportation by Air

### NiCad and Alkaline Battery Packs

These battery packs are not classified as dangerous goods for transportation by air. It is advised that any paperwork accompanying beacons that use these battery types should state this clearly.

### Lithium Battery Packs

These battery packs are considered as Dangerous Goods for transportation by air.

Note: Only authorised or trained personnel holding a current IATA dangerous goods certification should pack and complete the necessary paperwork. Consult the latest IATA dangerous goods regulations for packing instructions and operator restrictions. This advice is freely available from Applied Acoustic Engineering technical support.

UN No. 3091 - Lithium battery contained in equipment

UN No. 3090 - Lithium batteries (shipped separately from equipment)

Class 9 Miscellaneous.

### Pressure Relief Valve

Whilst being airfreighted it is advised by Applied Acoustic Engineering to cover the venting holes on the pressure relief valves of beacons with electrical tape to prevent the pressure inside the beacons dropping below normal atmospheric pressure. This instruction is optional and is not a safety concern. The effects of not carrying out this advice will only make beacon dismantling more difficult during servicing as the end cap will resist being withdrawn from the main tube body. On the larger beacon models, it is possible to relieve this pressure by removing the green Perspex cover plate and momentarily removing the M3 tapped rotary switches using an M3 screw as a tool.

**WARNING:** Do not attempt to charge beacon if the pressure relief valve is covered with tape.

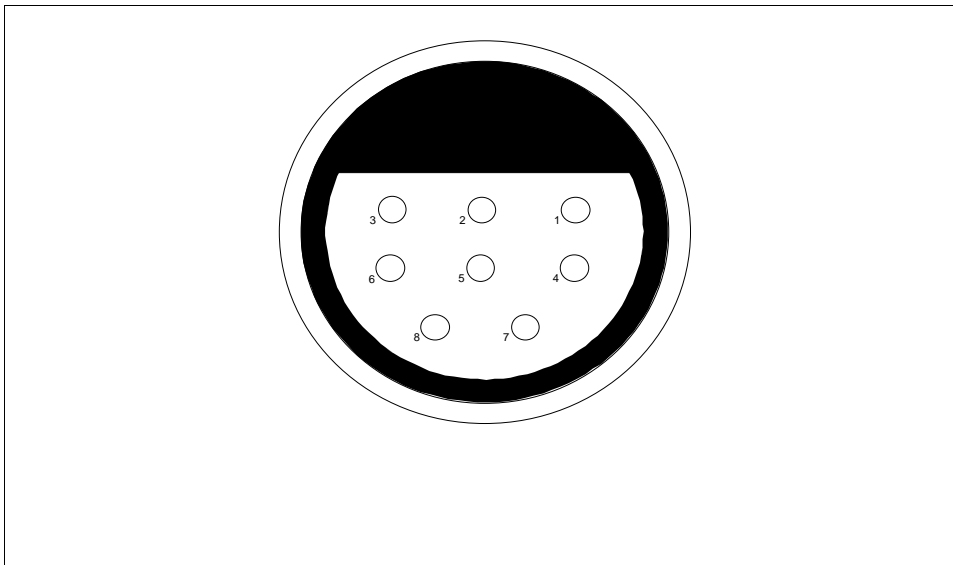
## 12. Appendix

Special Models:- Connection details.

For B suffix models (ie 940B) fitted with a Burton bulkhead connector, part no. 5507-2008-0004 the connection details are as follows:

Pin Number	Function
1	Power Return
2	+ 24 Volts (FUSED 250 mA MAX)
3	Power Shield
4	N/C
5	N/C
6	Ext Trigger Shield
7	External Trigger
8	Charge (FOR USE WITH AAE CHARGER ONLY)

Face view of Bulkhead Connector



Note:- If beacon is being used with no pigtail connector fitted then please use a suitable bulkhead blanking plug, part no. 5501-2008-0000.

## Use with Remote Transducers.

Some beacons can be fitted with remote transducers. This can make installation easier in some instances. The three transducers all connect to the electronics with the same cable:-

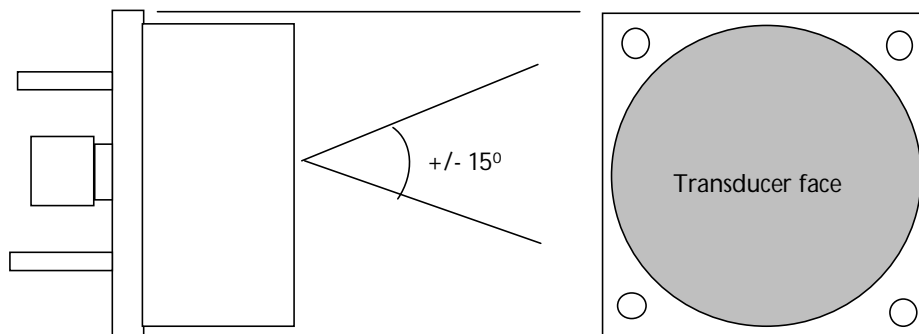
Cable Type: 4-4 I/C Lead  
Connectors: IL-4-FS and IL-4-MP  
Connections:

Free Plug	Free Socket
Pin 1	Pin 1
Pin 2	Pin 2
Pin 3	Pin 3
Pin 4	Pin 4

The cable length is a standard 1.5 metres minimum (typically 1.8 metres). We would not usually recommend that this length be increased to any great extent. As the cable is not screened, it is advisable to ensure that it is not secured close to any electric motors or electrical equipment. We can supply shorter cable lengths to order.

## 7920A

This has a highly directional transducer beam pattern of  $\pm 15$  degrees and is used for deep water work (ROV's Ploughs etc.). The black potted face is the radiating surface which must be positioned on the vehicle to point directly towards the tracking system. Because of the directional nature of this product, it is unlikely that it will be used for tow fish / ROTV tracking.

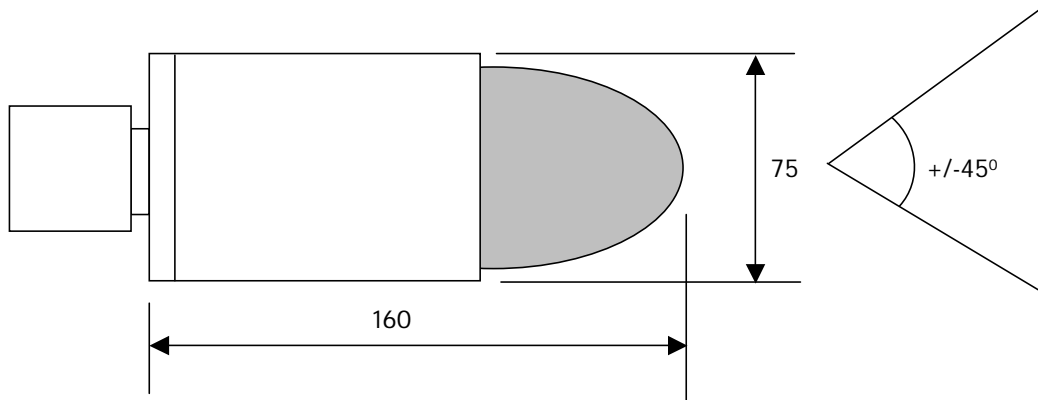


Size is 175 x 175 mm square. Fixing centres: 150 mm x 150 mm. Fixing holes: 4 of 12.5 mm. Depth from front face to mounting flange: 75 mm. Flange thickness: 10 mm. Depth behind flange: 40 mm. Weight in water: 7 kg.

Note: The RM15 is now available and is our preferred replacement for the 7920.

## RM45

This is the same transducer element as used with the 935 beacon. When mounted in the RM45 housing it has a directional beam pattern of  $\pm 45$  degrees and a depth rating of 3000 metres. The same precautions about mounting apply to this model as the 7920A.

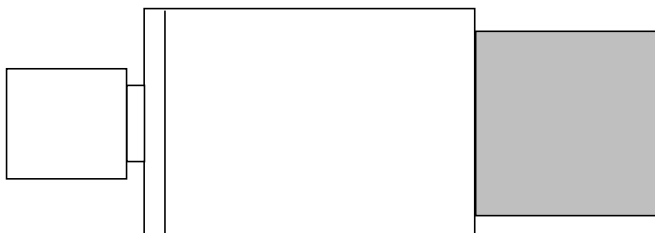


## RM30

With a 95mm body diameter and a beam pattern of  $\pm 30$  degrees, the RM30 can give source levels of up to 206dB RMS.

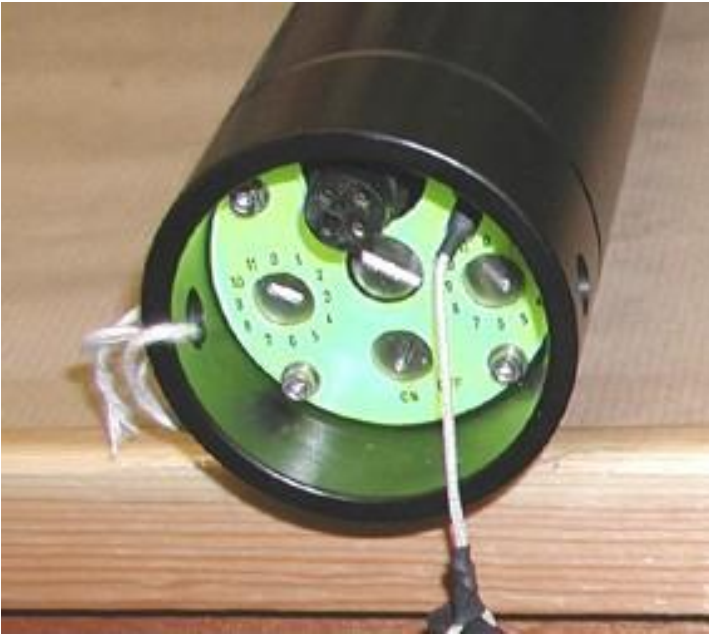
## RM90

This transducer has a hemispherical beam pattern (omni directional) and has a depth rating of 1500 metres. Being non directional, the source level from the transducer is less than the other models listed above. We would not recommend this unit for long range work.



Note that the RM45 and the RM90 have been drawn without a protector ring for the electrical connector. This is usually supplied but can also be removed easily (4 screws). Electrical connectors should be clean and grease free. Rubber mating parts should be O-lubed (see elsewhere in the manual). Contact pins should be clean.

Pressure Relief valve Fitment guide



No Valve fitted



Valve fitted

## ADDENDUM FOR 97x HIGH POWER FATBOY

Depth rating:	To 4000 metres
Size:	125-mm diameter x 910mm long.
Beam Pattern:	+ / - 15 degrees
SPL:	212dB
Weight in air	19 kg
Weight in water	8 kg
Battery Packs	either 2 off 18A/h Alkaline – Do <u>Not</u> charge or expose to water or heat Or 2 off 5.7 A/h NiCad
Battery Life:	32000 Replies 35.5 hours at 1 reply / 4 seconds with Alkaline Packs
Minimum Interrogate Rate:	Limited to 1 reply every 4 seconds

### NOTE

The 972 has been designed as a very high power beacon with a source level of 212dB. It is intended for long range work with a maximum repetition rate of 1 reply per four seconds. If interrogated faster than this, the source level will drop significantly. It will operate as transponder, responder or pinger.

## APPENDIX.

This appendix applies to Model 9xxD versions of the 900 series beacons.

The 9xxD versions are very similar to the existing 900 series models except that they are fitted with pressure (Depth) transducers and thus are able to reply back to the tracking system with a secondary pulse.

Depth telemetry transponders of this type use a time delay between the first pulse and second pulse to convey the depth of the transponder.

For Trackpoint II operation, an initial delay of 100 mS is used to convey 0 metres depth and a maximum delay of 900 mS is used to convey maximum depth. This depth is written on the case of the beacon. It follows that the maximum interrogate rate should be limited to 2 seconds in most instances. The frequency of the second reply is 1 kHz below the navigation reply for Trackpoint II compatibility unless shown in the following table.

For Simrad HPR / HiPAP operation, the zero depth delay is 125 mS and the delay is 2 metres per millisecond for HPR300 and 1 metre per millisecond for HPR400 / HiPAP compatibility.

The beacons can be supplied with the following depth transducers as standard: 300 metres, 500 metres, 1000 metres, 2000 metres 4000 metres. Others can be supplied as an option, as can other depth spans. Please consult the factory for further information.

### Specifications:

Specifications are generally the same as the equivalent models listed in the main part of the manual with the following exceptions:-

### *MINI BEACONS*

#### *Model 919D*

Length : 332 mm long (~13.1")

#### *Model 916D*

Length : 365 mm long (~14.4")

#### *Both Models:-*

Depth Span : As written on the pressure case label  
Depth Rating : Twice depth span or 1500 metres, whichever is less.  
Closure system : M4 Nylon screws around circumference.  
Number of replies : As non-depth model when depth transmission is disabled.  
48% of the above when depth transmission is enabled.  
A-D Converter : 10-bit



Frequencies available:-

The following frequencies are available for Trackpoint II operation. As well as responder and transponder operation, these beacons can be used as free running pingers. Note that the standard design frequency of the transducers fitted to these models is 27 – 32 kHz, so some loss of performance will result if the transmit frequency is set outside this range.

Switch 1	Switch 2	Description	RX 1	RX 2	Navigation Reply
0	10	Trackpoint	18 kHz		24 kHz
0	11	Trackpoint	17 kHz		24 kHz
1	0	Trackpoint LXT Code 1	17KHz		23KHz
1	9	Trackpoint	18 kHz		25 kHz
1	10	Trackpoint	16 kHz		25 kHz
1	11	Trackpoint	21.5 kHz		26 kHz
2	0	Trackpoint LXT Code 2	19KHz		25KHz
2	9	Trackpoint	18 kHz		26 kHz
2	10	Trackpoint	17.5 kHz		28.5 kHz
2	11	Trackpoint	18.5 kHz		26.5 kHz
3	0	Trackpoint LXT Code 3	17KHz		27KHz

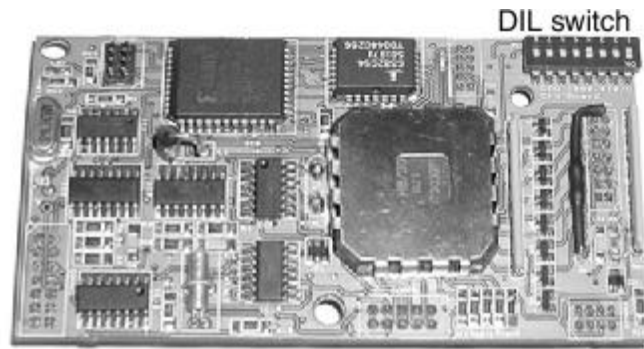
Switch 1	Switch 2	Description	RX1	RX2	Reply
4	0	Trackpoint LXT Code 4	19KHz		29KHz
4	9	Pinger	1000mS	5mS	26KHZ
4	10	Pinger	995mS	5mS	27KHZ
4	11	Pinger	990mS	5mS	28KHZ
5	0	Trackpoint LXT Code 5	17KHz		30KHz
5	9	Pinger	985mS	5mS	29KHZ
5	10	Pinger	980mS	5mS	30KHZ
5	11	Pinger		1pps / 10mS	37.5KHZ
6	0	Trackpoint	18KHz		28KHz 29 kHz Telemetry
6	9	Trackpoint	16kHZ		23KHZ
6	10	Trackpoint	18kHZ		23KHZ
6	11	Trackpoint	20.5KHZ		23KHZ
7	0	Trackpoint	18KHz		30KHz
7	7	Trackpoint II Test	19KHZ	TAT = 315mS	29KHZ
7	9	Trackpoint	17KHZ		24KHZ
7	10	Trackpoint	19KHZ		24KHZ
7	11	Trackpoint	17KHZ		25KHZ

Switch 1	Switch 2	Description	RX1	RX2	Reply
8	0	Trackpoint	21KHz		29KHz
8	9	Trackpoint	17 kHz		26 kHz
8	10	Trackpoint	21 kHz		33 kHz
8	11	Trackpoint	18 kHz		31 kHz

Note that Switch 1 is the left-hand switch and switch 2 is the right-hand switch.

Disabling pressure transmission:-

For either ORE Trackpoint II or Simrad HPR / HiPAP systems, the second (depth) transmission can be disabled if required which will preserve battery life. This is achieved by gaining access to the printed circuit board assembly which is attached to the transducer end-cap. The Microprocessor board is the smallest of the board set and is shown in the photograph. On



this board is an 8 way DIL switch. For usual operation, all switches should be OFF except for switch 7 which controls the pressure transducer function as follows:-

SW1-7 OFF	Pressure sensor is OFF
SW1-7 ON	Pressure sensor is ON

For Mini-beacons, in order to gain entry to the Beacon, first remove the 4 nylon screws which hold the connector / switch end-cap to the pressure cylinder. Slowly remove the end-cap and disconnect the cables. The transducer end-cap can now be withdrawn from the cylinder. Re-assembly is the reverse of this procedure. For other models, please gain entry as described in the main part of the manual.



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