



OPERATION MANUAL

200 SERIES TRANSPONDERS

BCN-0200-8000/4

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### 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.*

*Warranty is limited to replacement of defective items only, subject to our standard terms and conditions.*

*Please always remove old manuals from circulation whenever new replacement manuals are issued.*

- *This manual replaces version /2, and included the Easytrak channels.*



## 1. Introduction to the 200 series

The 200 series are small size and low cost acoustic positioning transponders built with the benefit of years of experience.

A sub-sea transponder is a device which replies at a set frequency only after being interrogated by a different frequency with a specific minimum pulse length. Current models do not include the capability for an electrical (Responder) trigger.

There is facility for operation with the following systems: -

AAE EASYTRAK	8 specific channels, plus all the following.
AAE PAM	All the following channels
Simrad HPR 300 series	Channels 1 - 9 and 11 - 55 (14 in total).
Simrad HPR 400 Series	Channels 1 - 9 and 11 - 55, plus 'HiPAP Channels.
Simrad HiPAP system	All 56 channels, 16 preferred. See text.
Sonardyne USBL	Simrad Channels 1 - 9 and 11 - 55.
ORE Trackpoint II	Numerous 'Channels'

Pinger capability: These models also have limited capability to operate as free running pingers.

The following models are currently available as standard: -

Model 219 and Model 229

Beam Width:	+/-90 degrees – hemispherical.
SPL:	180dB (219) 183dB (229)
Size:	50 mm diameter x 230 mm long. 300mm Long (229)
Depth Rating:	600 metres (219). 2000m (229)
Batteries;	2 off - 9 volt (219). 4 off – 9 volt (229)

Applications: - General-purpose positioning tasks where small size is important. Particularly divers, small ROV's and archaeological markers.

## 2. Getting started

Please check the Transponder for any transit damage, if any is found, do not use the equipment and return it to your supplier.

The transponder is supplied from the factory at a pre-set channel and without batteries fitted.

## 3. Battery Replacement

The model 219 uses 2 x 9 volt batteries and model 229 uses 4 x 9 volt batteries, although just one can be used for short-term applications.

The following alkaline batteries are suitable:

Duracell	:	MN1604
Duracell	:	Ultra M3 PP3
Energiser	:	Super Premium 620238
Varta	:	Alkaline 04022101501

(IEC reference 6F22)

Ensure that good quality branded batteries are used. Do not use low cost or zinc carbon batteries; they are of very little use. Do not mix battery types.

Quoted operational and listening life is based on two 500 mAh Duracell / Energiser Alkaline batteries operating in water temperatures above 10°C. For regular use, Ni-cad / NiMH batteries can be used if charged externally, or alternatively, Lithium batteries can be used for increased life.

Lithium Manganese battery suitability:

Ultralife	:	6LF22
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Other batteries may be suitable but have not been tested by AAE.



To insert a battery, invert the aluminium body of the transponder and grasp the black transducer end-cap and simply unscrew the end-cap from the body. After a few turns the end-cap can be withdrawn. You will observe two O-rings located in a groove on this end-cap.

These O-rings are important as they stop the transponder flooding. Ensure that any water present is not drawn into the transponder. The O-rings must be clean and free of grit / sand / mud with a small amount of lubricant on their surface. See elsewhere in this manual for O - ring maintenance and replacement information.

The batteries simply clip onto the standard two terminal battery clip. If the batteries are inserted incorrectly, no damage will result to the transponder. The transponder is now operational. Screw the end-cap back onto the transponder body, ensuring that the end cap is not cross - threaded and damaged. O-lube can be applied to the threads if required to ensure minimum wear and easy re - assembly.



The channel number or frequencies are marked on the delivery note and / or on a label attached to the transponder. If this channel needs changing, please see the appropriate section in this manual.

## 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.

## Transponder support and mounting

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

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

When mounting a Transponder on an object, its position should be considered to maximise its operational performance. Transponders need to be mounted so that there is a clear and unobstructed sound path between the transducer and the ship's tracking system. Also ensure that ROV thruster noise is taken into account when positioning the Transponder – wherever possible, separate the transponder from the source of noise. We advise that the tracking system is set to interrogate (transmit) at 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 Transponder is left out in direct, strong sun light. This may lead to reduce battery operational life span.

## Switching On

Switching on is achieved by connecting the batteries. After a few seconds the transponder will be fully operational.

## 4. Changing Channel / Changing Frequency

In order to change channels or change frequencies, the transponder needs to be dismantled this is achieved by carrying out the following procedure: -

Grasp the transponder body in one hand and unscrew the transducer end-cap. After a few turns the transducer will be free from the pressure housing. The transducer and attached electronics can be withdrawn. If batteries are fitted, these will come out also.

The electronics assembly consists of two printed circuit boards: -

### 1) Transmitter / Receiver board

The picture shows the Transmit / Receive board with the Dual frequency Synthesiser board below it. Note the battery terminals and the location of one of the two battery packs.



This board contains three operator switches: -

- 1) *Pulse Width* switch. Controls the transmitted pulse width. Set to 1.5 or 10 mS according to instructions.
- 2) *Pinger ON* switch. Sets the unit operating as a free running pinger at 2 Hz.
- 3) *Turn around Time* switch. Used at 30 mS for all systems with the exception of ORE Trackpoint II/3 operation. If this switch is set incorrectly, a fixed range error will be recorded by the tracking system.

## 2) Frequency Synthesiser Board

The picture shows the Dual Frequency Synthesiser board fitted to the underside of the Transmit / Receive board. Note the battery terminals and the location of one of the two battery packs.



The Frequency Synthesiser Board contains the switches that can be changed by the operator as desired. These consist of: -

- 4) *Transmit (Reply) Frequency switches*
- 5) *Receive (Interrogate) Frequency switches*

Note: No damage to the transponder can occur if these switches are set incorrectly!

In order to set these switches appropriately for the tracking system being used, please see the next section of this manual. Please note that small 'dual-in-line (DIL) switches will have to be adjusted. In order to do this without causing damage to the switches, a small screwdriver or point of a ballpoint pen is required.

## 5. Operation with EASYTRAK

Easytrak can operate on just about all the channels shown in this manual. However there are a number of preferred channels which work well with Easytrak and the 200 series as shown in the table below.

Channel Number		Beacon Type	Receive Frequency 1	Receive Frequency 2	Reply (Transmit) Frequency
10	0	200/900 series	17.5 kHz	-	30 kHz
10	1	200/900 series	18.5 kHz	-	28 kHz
10	2	200/900 series	19.5 kHz	-	26 kHz
10	3	200/900 series	20.5 kHz	-	29 kHz
10	4	200/900 series	21.5 kHz	-	27 kHz
10	5	200/900 series	22.5 kHz	-	30 kHz
10	6	900 series	18 kHz	20 kHz	27 kHz
10	7	900 series	18 kHz	21 kHz	28 kHz
10	8	900 series	18 kHz	22 kHz	30 kHz
10	9	900 series	18 kHz	23 kHz	29 kHz
11	0	900 series	20 kHz	18 kHz	30 kHz
11	1	900 series	20 kHz	21 kHz	29 kHz
11	2	900 series	20 kHz	22 kHz	28 kHz
11	3	900 series	21 kHz	18 kHz	27 kHz
11	4	900 series	21 kHz	20 kHz	26 kHz
11	5	900 series	21 kHz	22 kHz	28 kHz
11	6	900 series	21 kHz	23 kHz	30 kHz
11	7	900 series	22 kHz	18 kHz	26 kHz
11	8	200 series	17 kHz	-	25 kHz
11	9	200 series	19 kHz	-	25 kHz

Out of the 20 Easytrak channels shown above, 8 are suitable for the 200 series, the remaining (in grey) are shown for information only. Older versions of Easytrak will not have these channels listed (Channels 10/0 to 10/3 are defaults) so the frequencies will have to be entered manually.

1) Set the transponder for the frequencies required as shown in the following tables.

2) Set the TAT to 30 mS by selecting the TAT switch on the Transmit / Receive board (Switch 1-3)

3) Set the (reply) pulse width to 1.5 mS using switch 1-1.

### EASYTRAK CHANNEL SWITCH SETTINGS

Transmit Frequency KHz	Switch 2 Settings											
	1	2	3	4	5	6	7	8	9	10	11	12
25.000	On	Off	Off	On	On	On	On	On	Off	On	On	On
26.000	On	On	On	On	On	Off	Off	On	On	Off	On	Off
27.000	On	On	On	Off	On	Off	Off	On	On	Off	On	On
28.000	On	On	Off	On	On	Off	Off	On	On	On	Off	Off
29.000	On	Off	On	On	Off	Off	Off	On	On	On	Off	On
30.000	On	Off	On	Off	Off	Off	Off	On	On	On	Off	On

Receive Frequency KHz	Switch 3 Settings											
	1	2	3	4	5	6	7	8	9	10	11	12
17.000	Off	On	Off	Off	Off	On	Off	On	Off	Off	Off	Off
17.500	Off	Off	On	Off	Off	On	Off	On	Off	Off	Off	Off
18.500	Off	Off	Off	On	Off	On	Off	On	Off	Off	Off	On
19.000	On	On	On	On	Off	On	Off	Off	Off	Off	On	Off
19.500	Off	Off	Off	Off	Off	On	Off	On	Off	Off	On	Off
20.500	On	On	Off	On	On	On	Off	Off	Off	Off	On	On
21.500	On	On	Off	Off	On	On	Off	Off	Off	Off	On	On
22.500	On	Off	On	Off	Off	On	Off	Off	Off	On	Off	Off



Please see the above illustration for guidance.

## 6. Operation with ORE Trackpoint II / LXT system

In order for a Trackpoint II system to be able to operate with the 219 transponder, both the interrogate and reply frequencies need to be set within the Trackpoint II system which correspond to the frequencies set inside the transponder. In addition the TAT or turn around time and Pulse Width needs to be set in the transponder.

1) Set the transponder for the frequencies required as shown in the following tables.

### TRACKPOINT II COMPATIBLE SWITCH SETTINGS

Transmit Frequency KHz	Switch 2 Settings											
	1	2	3	4	5	6	7	8	9	10	11	12
22.000	On	On	On	Off	Off	On	On	On	Off	On	On	On
22.500	On	On	Off	On	On	On	On	On	Off	On	On	On
23.000	On	On	Off	On	On	Off	On	On	Off	Off	Off	Off
23.500	On	On	Off	Off	On	On	On	On	Off	On	On	On
24.000	On	On	Off	Off	On	Off	On	On	Off	Off	Off	On
24.500	On	Off	On	Off	On	Off	On	On	Off	Off	Off	On
25.000	On	Off	Off	On	On	On	On	On	Off	On	On	On
25.500	On	Off	Off	On	On	Off	On	On	Off	Off	Off	On
26.000	On	On	On	On	On	Off	Off	On	On	Off	On	Off
26.500	On	On	On	On	Off	Off	Off	On	On	Off	On	On
27.000	On	On	On	Off	On	Off	Off	On	On	Off	On	On
27.500	On	On	On	Off	Off	Off	Off	On	On	Off	On	On
28.000	On	On	Off	On	On	Off	Off	On	On	On	Off	Off
28.500	On	Off	On	On	On	Off	Off	On	On	Off	On	On
29.000	On	Off	On	On	Off	Off	Off	On	On	On	Off	On
29.500	On	Off	On	Off	On	Off	Off	On	On	On	Off	On
30.000	On	Off	On	Off	Off	Off	Off	On	On	On	Off	On
30.500	On	Off	Off	On	On	Off	Off	On	On	On	On	Off



Receive Frequency KHz	Switch 3 Settings											
	1	2	3	4	5	6	7	8	9	10	11	12
17.000	Off	On	Off	Off	Off	On	Off	On	Off	Off	Off	Off
17.500	Off	Off	On	Off	Off	On	Off	On	Off	Off	Off	Off
18.000	Off	Off	Off	On	On	On	Off	On	Off	Off	Off	On
18.500	Off	Off	Off	On	Off	On	Off	On	Off	Off	Off	On
19.000	On	On	On	On	Off	On	Off	Off	Off	Off	On	Off
19.500	Off	Off	Off	Off	Off	On	Off	On	Off	Off	On	Off
20.000	On	On	On	Off	Off	On	Off	Off	Off	Off	On	Off
20.500	On	On	Off	On	On	On	Off	Off	Off	Off	On	On
21.000	On	On	Off	On	Off	On	Off	Off	Off	Off	On	On
21.500	On	On	Off	Off	On	On	Off	Off	Off	Off	On	On
22.000	On	On	Off	Off	Off	On	Off	Off	Off	On	Off	Off
22.500	On	Off	On	Off	Off	On	Off	Off	Off	On	Off	Off

2) Set the TAT to 15 mS by selecting the TAT switch on the Transmit / Receive board (Switch 1-3)

3) Set the (reply) pulse width to 1.5 mS using switch 1-1.



Please see the above illustration for guidance.

- 4) Set the Trackpoint II interrogate frequency to match the RECEIVE frequency of the transponder and set the interrogate pulse width to 10 mS.
- 5) Set the receive frequency of the Trackpoint to the TRANSMIT frequency of the transponder and enter a TAT of 15 mS.
- 6) Use an interrogate repetition rate within the Trackpoint II system which suits the needs of your application. Consider that a faster interrogation rate will deplete the batteries of the transponder faster than a slow interrogate rate. Please also note that these models can reply at 1 transmission per second whereas the ORE 'Multibeacons' are limited to 1 reply per 2 seconds.

## 7. Operation with Simrad HPR 300 series/ Sonardyne USBL systems.

Rather than setting up the tracking systems with a list of frequencies, the above systems assign transmit and receive frequencies as sets that are referred to as 'channels'. There are 14 channels available as shown in the tables below. Although this system loses some flexibility compared to Trackpoint II for example, it does usually make things easier for the operator. However the DIL switches still have to be selected for the 219!

1) Select the channel you wish to operate on and adjust the switches in accordance with the following tables: -

<b>SIMRAD HRP3 COMPATIBLE SWITCH SETTINGS</b>													
<b>CHANNEL</b>	<b>Transmit Frequency kHz</b>	<b>Switch 2 Settings (Transmit)</b>											
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>SQUARE</b>	27.173	On	On	On	Off	Off	On	Off	On	On	On	On	Off
<b>CIRCLE</b>	28.409	On	Off	On	On	On	Off	Off	On	On	On	On	On
<b>TRIANGLE</b>	29.762	On	Off	On	Off	Off	On	Off	On	On	On	Off	On
<b>X</b>	31.250	Off	On	On	On	Off	On	Off	On	On	On	On	On
<b>Y</b>	32.468	Off	On	On	Off	Off	On	Off	On	On	Off	Off	Off
<b>1</b>	29.762	On	Off	On	Off	Off	On	Off	On	On	On	Off	On
<b>2</b>	30.488	On	Off	Off	On	On	Off	Off	On	On	On	On	Off
<b>3</b>	31.250	Off	On	On	On	Off	On	Off	On	On	On	On	Off
<b>4</b>	31.847	Off	On	On	Off	On	On	Off	On	On	On	Off	Off
<b>5</b>	32.468	Off	On	On	Off	Off	On	Off	On	On	Off	Off	Off
<b>6</b>	27.173	On	On	On	Off	Off	On	Off	On	On	On	On	Off
<b>7</b>	27.778	On	On	Off	On	On	On	Off	On	On	Off	On	On
<b>8</b>	28.409	On	Off	On	On	On	Off	Off	On	On	On	On	On
<b>9</b>	29.070	On	Off	On	On	Off	Off	Off	On	On	Off	On	On
<b>EMERGENCY A</b>	37.500	On	On	On	Off	Off	On	Off	Off	On	Off	On	On

**SIMRAD HRP3 COMPATIBLE SWITCH SETTINGS**

CHANNEL	Receive Frequency kHz	Switch 3 Settings (Receive)											
		1	2	3	4	5	6	7	8	9	10	11	12
<b>SQUARE</b>	21.552	On	Off	On	On	Off	On	Off	Off	Off	Off	On	Off
<b>CIRCLE</b>	22.727	On	Off	On	Off	Off	Off	Off	Off	Off	On	Off	On
<b>TRIANGLE</b>	23.923	Off	On	On	On	On	Off	Off	Off	Off	Off	Off	Off
<b>X</b>	25.126	Off	On	On	Off	Off	On	Off	Off	Off	Off	On	Off
<b>Y</b>	26.455	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off	On
<b>1</b>	20.492	On	On	Off	On	On	On	Off	Off	Off	Off	On	On
<b>2</b>	21.552	On	Off	On	On	Off	On	Off	Off	Off	Off	On	Off
<b>3</b>	22.124	On	On	Off	Off	Off	On	Off	Off	Off	Off	Off	Off
<b>4</b>	22.727	On	Off	On	Off	Off	Off	Off	Off	Off	On	Off	On
<b>5</b>	23.364	On	Off	Off	On	On	Off	Off	Off	Off	Off	Off	On
<b>6</b>	24.038	Off	On	On	On	Off	On	Off	Off	Off	On	Off	Off
<b>7</b>	24.510	Off	On	On	Off	On	On	Off	Off	Off	On	Off	On
<b>8</b>	25.000	Off	On	On	Off	Off	On	Off	Off	Off	On	On	Off
<b>9</b>	26.042	Off	On	Off	On	Off	On	Off	Off	Off	On	On	Off

2) Set the transmitted pulse width (PW) to 10 mS using switch 1-1

3) Set the TAT to 30 mS by using switch 1 -3

Please see the accompanying illustration for guidance.



## 8. Operation with Simrad HiPAP / HPR400 series

The Simrad HPR400 / HiPAP system uses a double interrogate frequency to allow differentiation of a large number of transponders. As the 219 transponder only has the capability to receive one frequency, there is a small limitation to its use because of the inability of the 219 to distinguish between all the available channels. We do not feel that this is a particular problem provided the limitation is known, as it is unlikely that many transponders will be in the water when the 219's are used.

The following table lists all the channels available. There are 56 channels in total. Some of them are highlighted in bold. These are our 'preferred' channels when used with the 219; the reason is this: If we look at channel 15, the transponder receives at 23 kHz and replies at 30.75 kHz. Remember that the transponder ignores the first interrogation of 21 kHz. The same is true of channel 35 and channel 75; the transponder will ignore the first interrogation pulses of 22 kHz and 24 kHz respectively and reply to the second interrogation pulse. The tracking system will not know if it is picking up a transponder set to channels 15, 35 or 75 so confusion will be apparent! Therefore it is recommended that the tracking system is only set to these preferred channels when a 219 is in the water. However, provided you are aware of the limitation, alternative channels can be utilised without a problem.

Channel	RX 1	RX 2	Reply
<b>12</b>	21KHz	<b>21.5KHz</b>	<b>29.25KHz</b>
<b>13</b>	21KHz	<b>22KHz</b>	<b>29.75KHz</b>
<b>14</b>	21KHz	<b>22.5KHz</b>	<b>30.25KHz</b>
<b>15</b>	21KHz	<b>23KHz</b>	<b>30.75KHz</b>
<b>16</b>	21KHz	<b>23.5KHz</b>	<b>27.25KHz</b>
<b>17</b>	21KHz	<b>24KHz</b>	<b>27.75KHz</b>
<b>18</b>	21KHz	<b>24.5KHz</b>	<b>28.25KHz</b>
<b>21</b>	21.5KHz	<b>21KHz</b>	<b>28.5KHz</b>
<b>23</b>	21.5KHz	<b>22KHz</b>	<b>29.5KHz</b>
<b>24</b>	21.5KHz	<b>22.5KHz</b>	<b>30KHz</b>
<b>25</b>	21.5KHz	<b>23KHz</b>	<b>30.5KHz</b>
<b>26</b>	21.5KHz	<b>23.5KHz</b>	<b>27KHz</b>
<b>27</b>	21.5KHz	<b>24KHz</b>	<b>27.5KHz</b>
<b>28</b>	21.5KHz	<b>24.5KHz</b>	<b>28KHz</b>
<b>31</b>	22KHz	<b>21KHz</b>	<b>28.75KHz</b>
32	22KHz	21.5KHz	29.25KHz
34	22KHz	22.5KHz	30.25KHz
35	22KHz	23KHz	30.75KHz
36	22KHz	23.5KHz	27.25KHz
37	22KHz	24KHz	27.75KHz
38	22KHz	24.5KHz	28.25KHz
<b>41</b>	22.5KHz	<b>21KHz</b>	<b>30KHz</b>
42	22.5KHz	21.5KHz	29KHz
43	22.5KHz	22KHz	29.5K
45	22.5KHz	23KHz	30.5KHz
46	22.5KHz	23.5KHz	27KHz
47	22.5KHz	24KHz	27.5KHz
48	22.5KHz	24.5KHz	28KHz

Channel	RX 1	RX 2	Reply
51	23KHz	21KHz	28.75KHz
52	23KHz	21.5KHz	29.25KHz
53	23KHz	22KHz	29.75KHz
54	23KHz	22.5KHz	30.25KHz
56	23KHz	23.5KHz	27.25KHz
57	23KHz	24KHz	27.75KHz
58	23KHz	24.5KHz	28.25KHz
61	23.5KHz	21KHz	28.5KHz
62	23.5KHz	21.5KHz	29KHz
63	23.5KHz	22KHz	29.5KHz
64	23.5KHz	22.5KHz	30KHz
65	23.5KHz	23KHz	30.5KHz
67	23.5KHz	24KHz	27.5KHz
68	23.5KHz	24.5KHz	28KHz
71	24KHz	21KHz	28.75KHz
72	24KHz	21.5KHz	29.25KHz
73	24KHz	22KHz	29.75KHz
74	24KHz	22.5KHz	30.25KHz
75	24KHz	23KHz	30.75KHz
76	24KHz	23.5KHz	27.25KHz
78	24KHz	24.5KHz	28.25KHz
81	24.5KHz	21KHz	28.5KHz
82	24.5KHz	21.5KHz	29KHz
83	24.5KHz	22KHz	29.5KHz
84	24.5KHz	22.5KHz	30KHz
85	24.5KHz	23KHz	30.5KHz
86	24.5KHz	23.5KHz	27KHz
87	24.5KHz	24KHz	27.5KHz

1) Select the channel you wish to operate on and adjust the switches in accordance with the following tables: -

'Preferred' channels are shown in bold.

<b>HiPAP / HPR400 Compatible Switch Settings</b>														
<b>Channel</b>	<b>Rx Freq</b>	<b>Tx Freq</b>	<b>Switch 3 Settings (Receive)</b>											
	<b>kHz</b>	<b>kHz</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>12</b>	21.5	29.25	On	On	Off	Off	On	On	Off	Off	Off	Off	On	On
<b>32</b>														
<b>52</b>														
<b>72</b>														
<b>13</b>	22	29.75	On	On	Off	Off	Off	On	Off	Off	Off	On	Off	Off
<b>53</b>														
<b>73</b>														
<b>14</b>	22.5	30.25	On	Off	On	Off	Off	On	Off	Off	Off	On	Off	Off
<b>34</b>														
<b>54</b>														
<b>74</b>														
<b>15</b>	23	30.75	On	Off	Off	On	On	On	Off	Off	Off	On	Off	Off
<b>35</b>														
<b>75</b>														
<b>16</b>	23.5	27.25	Off	On	On	On	On	On	Off	Off	Off	On	Off	On
<b>36</b>														
<b>56</b>														
<b>76</b>														
<b>17</b>	24	27.75	Off	On	On	On	Off	On	Off	Off	Off	On	Off	On
<b>37</b>														
<b>57</b>														
<b>18</b>	24.5	28.25	On	Off	Off	Off	Off	On	Off	Off	Off	On	On	Off
<b>38</b>														
<b>58</b>														
<b>78</b>														
<b>21</b>	21	28.5	On	On	Off	On	Off	On	Off	Off	Off	Off	On	On
<b>61</b>														
<b>81</b>														
<b>23</b>	22	29.5	On	On	Off	Off	Off	On	Off	Off	Off	On	Off	Off
<b>43</b>														
<b>63</b>														
<b>83</b>														
<b>24</b>	22.5	30	On	Off	On	Off	Off	On	Off	Off	Off	On	Off	Off
<b>64</b>														
<b>84</b>														



Channel	Rx Freq	Tx Freq	Switch 3 Settings (Receive)											
	kHz	kHz	1	2	3	4	5	6	7	8	9	10	11	12
25	23	30.5	On	Off	Off	On	On	On	Off	Off	Off	On	Off	Off
45														
65														
85														
26	23.5	27	Off	On	On	On	On	On	Off	Off	Off	On	Off	On
46														
86														
27	24	27.5	Off	On	On	On	Off	On	Off	Off	Off	On	Off	On
47														
67														
87														
28	24.5	28	On	Off	Off	Off	Off	On	Off	Off	Off	On	On	Off
48														
68														
31	21	28.75	On	On	Off	On	Off	On	Off	Off	Off	Off	On	On
51														
71														
41	21	30	On	On	Off	On	Off	On	Off	Off	Off	Off	On	On
42	21.5	29	On	On	Off	Off	On	On	Off	Off	Off	Off	On	On
62														
82														

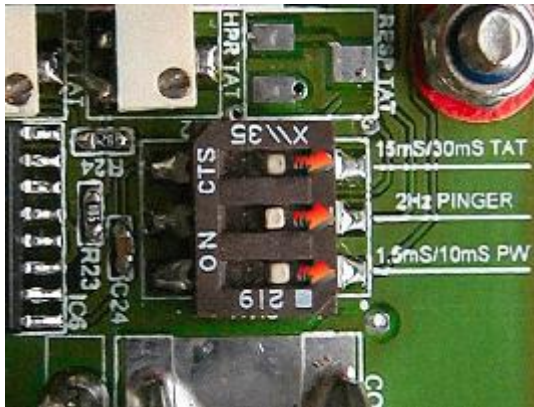
## HiPAP / HPR400 Compatible Switch Settings

Channel	Rx Freq kHz	Tx Freq kHz	Switch 2 Settings (Transmit)											
			1	2	3	4	5	6	7	8	9	10	11	12
12	21.5	29.25	On	Off	On	Off	On	On	Off	On	On	On	Off	On
32														
52														
72														
13	22	29.75	Off	Off	On	Off	Off	On	On	On	Off	On	Off	On
53														
73														
14	22.5	30.25	Off	Off	Off	On	On	On	On	On	Off	On	On	Off
34														
54														
74														
15	23	30.75	Off	Off	Off	On	Off	On	On	On	Off	On	On	Off
35														
75														
16	23.5	27.25	On	On	On	Off	Off	On	Off	On	On	Off	On	On
36														
56														
76														
17	24	27.75	On	On	Off	On	On	On	Off	On	On	On	Off	Off
37														
57														
18	24.5	28.25	Off	On	Off	On	Off	On	On	On	Off	On	Off	Off
38														
58														
78														
21	21	28.5	On	Off	On	On	On	Off	Off	On	On	Off	On	On
61														
81														
23	22	29.5	On	Off	On	Off	On	Off	Off	On	On	On	Off	On
43														
63														
83														
24	22.5	30	On	Off	On	Off	Off	Off	Off	On	On	On	Off	On
64														
84														
25	23	30.5	On	Off	Off	On	On	Off	Off	On	On	On	On	Off
45														
65														
85														
26	23.5	27	On	On	On	Off	On	Off	Off	On	On	Off	On	On
46														
86														
27	24	27.5	On	On	On	Off	Off	Off	Off	On	On	Off	On	On
47														
67														
87														

Channel	Rx Freq	Tx Freq	Switch 2 Settings (Transmit)											
			1	2	3	4	5	6	7	8	9	10	11	12
48														
68														
31	21	28.75	Off	Off	On	On	Off	On	On	On	Off	On	Off	Off
51														
71														
41	21	30	On	Off	On	Off	Off	Off	Off	On	On	On	Off	On
42	21.5	29	On	On	Off	Off	On	Off	Off	On	On	On	Off	Off
62														
82														

2) Set the transmitted pulse width (PW) to 10 mS using switch 1-1

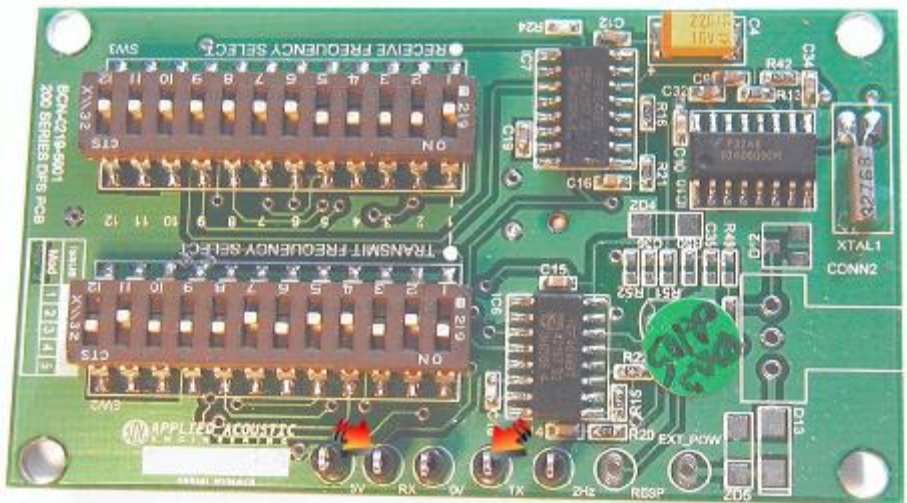
3) Set the TAT to 30 mS by using switch 1-3



Please see the above illustration for guidance.

## 9. Pinger operation.

The 219 can operate as a free running pinger with a fixed repetition rate of 2 Hz. Select 2Hz PINGER ON by sliding the switch to the left and select the transmitted pulse width you require. If you are unsure what pulse length to use, select 10 mS. (For Trackpoint II operation you may use 1.5 mS which will increase battery life). You can now select the transmit frequency of your choice by using the transmit frequency switches shown in previous tables. If you require frequencies not listed, please consult the factory for advice. Alternatively, you may measure the frequency using a frequency counter and adjust the switches until the desired frequency is obtained!



The test points are shown in the above illustration. The left arrow shows the Receiver frequency and the right arrow shows the transmitter frequency.

## 10. Maintenance

After use the transponder should be washed in clean water, labelled and stored without batteries installed for future use.

Pressure relief valve cleaning and testing.

### Pressure relief valve

The pressure relief valve used on these models is user-serviceable should it become dirty. Regular tools and a clean work area are all that are required.

Remove the pressure relief end-cap to a clean area and remove the clear Perspex cover which acts as a guard to minimise sand and grit entry into the valve itself. From the opposite side to the Perspex cover, remove the circlip, washer and spring from inside the end-cap body and retain for further use. Push out the piston and locate and remove the O-ring seal. Clean all parts in mild detergent and clean water and allow to dry. The O-ring must be lubricated with a thin smear of O-lube or petroleum jelly before re-assembly. Once assembled, press down on the shaft of the piston to check for free travel of around 2 – 3 mm. Ensure the stainless steel washers are replaced between the cover plate and Endcap, there should be 2 washers per screw.

### O-ring maintenance and O lube

O-rings should be inspected for dirt and damage each time the transponder is dismantled and if necessary a thin smear of o-lube applied. Parker O-lube is preferred, however petroleum jelly or your own brand of O-lube, or silicon grease should be acceptable. Please consult the factory or your vendor for advice. Note that the threads of the transponder body can also be lubricated as required to reduce wear and ease assembly.

Pressure relief valve and O ring cleaning may be especially important if the transponder is being operated in tidal areas where marine contamination is more likely.

## 11. Spares

The following Transponder spares are available from factory 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 due to the possibility of in-life design changes.

- Battery
- Main Body O ring
- Pressure relief valve O ring
- Transmit / Receive board
- Logic Board
- Pressure housing
- Transducer end-cap
- Valve end-cap
- Fuse Surface mount

## 12. 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 exhausted or the unit is faulty. Look for mechanical damage. Replace the battery if it measures below 8 volts.

- Is the unit set to the correct channel?
- Has some one changed it?
- Has someone changed the tracking system parameters?

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 as the 219 has limited signal level compared to many models.
- Is multipath present? Try slowing down the interrogation rate.
- In shallow water, enter a fixed depth into the tracking system.

- Are you within the beam pattern of the transducer? If the signal from the Transponder is not illuminating the vessel, then it cannot be tracked. If you are attempting to track the transponder with a directional ship's transducer, then you may be out of the beam pattern of the transducer.
- If you are tow fish tracking and there is a large water temperature change between the surface of the water and the Transponder 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.
- Is the transponder being interrogated too quickly? These models will not respond to interrogations faster than 700 mS. If you attempt to interrogate at, say, 500 mS, alternate replies will be missed.

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.



## 13. Specifications

### Model 219

Housing Material	Anodised aluminium alloy / plastics	
Size	50 mm diameter x 230 mm long	
Weight in air / water	660g/260g	
Depth Rating	600 metres (2000 feet)	
Channels / frequencies	EASYTRAK	8
	HPR300	14
	HPR400	56 (16 preferred)
	Sonardyne USBL	14
	ORE Trackpoint II	Entire MF range
	ORE LXT	Codes 1 - 5
	Reduced source level below 24 kHz	
Pinger capability	2 Hz pinger at any chosen frequency	
Turn around delay	15 / 30 mS dependent on system selected.	
Inhibit Time	700 mS nominal	
Power supply (Listening Life)	Alkaline Battery. 9 volt x 2.	30 days
	Lithium Battery. 9 volt x 2.	60 days
	Rechargeable battery 9v x 2.	10 days
Operational Life	180 hrs at 1 pulse per second with Alkaline Batteries, (1.5 mS pulse).	
	30 hours at 1 pulse per second with Alkaline Batteries. (10 mS pulse).	
Internal adjustments	Transmit Frequency	22 – 33 kHz
	Receive Frequency	16 – 26 kHz
	Pulse Width	1.5 mS / 10 mS
Source level	180 dB (-3 dB) re 1 uPa at 1 metre 24 – 33 kHz	
Beam Pattern	> Hemispherical	
Receive sensitivity	110 dB typically	
Receiver step size	32 Hz	
Transmitter step size	32 Hz	
Operating temperature	-5 to 30 °C	
Storage temperature	0 to 45 °C	
Pressure relief valve	4 PSI + or – 2 PSI	

Although unlikely, published specifications are subject to change. Please consult the factory if a particular specification is critical. Changes to the existing design are possible - please consult the factory for information.

## Model 229

Housing Material	Anodised aluminium alloy	
Size	50 mm diameter x 290 mm long	
Weight in air / water	780g/320g	
Depth Rating	2000 / 3000 metres (9850 feet)	
Channels / frequencies	EASYTRAK	8
	HPR300	14
	HPR400	56 (16 preferred)
	Sonardyne USBL	14
	ORE Trackpoint II	Entire MF range
	ORE LXT	Codes 1 - 5
		Reduced source level below 24 kHz
Pinger capability	2 Hz pinger at any chosen frequency	
Turn around delay	15 / 30 mS dependent on system selected.	
Inhibit Time	700 mS nominal	
Power supply (Listening Life)	Alkaline Battery. 9 volt x 4.	60 days
	Lithium Battery. 9 volt x 4.	120 days
	Rechargeable battery 9 volt x 4.	20 days
Operational Life	360 hrs at 1 pulse per second with Alkaline Batteries, (1.5 mS pulse).	
	60 hours at 1 pulse per second with Alkaline Batteries. (10 mS pulse).	
Internal adjustments	Transmit Frequency	22 – 33 kHz
	Receive Frequency	16 – 26 kHz
	Pulse Width	1.5 mS / 10 mS
Source level	183 dB (-3 dB) re 1 uPa at 1 metre 24 – 33 kHz	
Beam Pattern	> Hemispherical	
Receive sensitivity	110 dB typically	
Receiver step size	32 Hz	
Transmitter step size	32 Hz	
Operating temperature	-5 to 30 °C	
Storage temperature	0 to 45 °C	
Pressure relief valve	4 PSI + or – 2 PSI	

Although unlikely, published specifications are subject to change. Please consult the factory if a particular specification is critical. Changes to the existing design are possible-please consult the factory for information.

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

## 14. Transportation by Air

All equipment should be switched OFF prior to air transportation. It follows that the 219 must have its batteries removed from the transponder prior to air flight.

### Alkaline Battery Packs

These battery packs are not classified as dangerous goods for transportation by air. It is advised that any paperwork accompanying Transponders 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 or your local freight agent.

UN No. 3091 - Lithium battery contained in equipment

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

Class 9 Miscellaneous.

### Export Control

At the time of preparing this manual, there are no known export control limitations relating to this equipment.







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