

V1.0

Underwater Bait Setter

User guide





Table of contents

1	Introduction	1
	1.1 General description	1
	1.2 UBS components	3
	1.2.1 Track	5
	1.2.2 Capsule	6
	1.2.3 Traveller	6
	1.2.4 Lower pulley	7
	1.2.5 Head unit	7
	1.2.6 Upper vessel fixture	8
	1.2.7 Winch unit	8
	1.2.8 Winch box	8
	1.2.9 Control box	9
	1.2.10 Deck service box	9
	1.2.11 Power supply box	10
	1.2.12 Hydraulic power pack	10
	1.2.13 Miscellaneous tooling	10
2	Operating the Underwater Bait Setter	12
	2.1 Getting the UBS ready for line setting	13
	Step 1. The control box	13
	Step 2. The deck service box	14
	Step 3. The head unit	14
	2.2 Using the control box	16
	2.3 Line setting using the UBS	18
	2.4 Shutting down the UBS	22
3	Getting the best out of the Underwater Bait Setter	24
	3.1 Snood length	24
	3.2 Coordinating deployments	25
	3.3 Bait quality	26
	3.4 Operations with a line shooter	26
	3.5 Line weighting	26
4	Safety	27
	4.1 Bait loading and capsule deployment	27
	4.2 Hook-ups in capsule	28
	4.3 Snood management	29
	4.4 Handling the capsule safely	29
	4.5 Crew member fatigue	30
	4.6 Unstable work platform	30
	4.7 Personal protective equipment and operator wellbeing	30



Table of contents

5	Troubleshooting	31
	5.1 UBS stopped mid cycle or recovery from emergency stop activation	31
	5.1.1 Capsule and traveller are together	31
	5.1.2 Capsule and traveller are separated	32
	5.2 Hook-ups	34
	5.3 Line entanglements	34
6	Underwater Bait Setter controls	35
	6.1 Control Box	35
	6.1.1 Control box – home screen	37
	6.1.2 Control box – menu screen	37
	6.1.3 Control box – current settings screen	38
	6.1.4 Control box – make settings screen	38
	6.1.5 Control box – alarms page screen	39
	6.1.6 Control box – course trend screen	39
	6.1.7 Control box – event page screen	39
	6.1.8 Control box – engineering adjustments screen	39
	6.1.9 Control box - download data	39
	6.2 Deck service box	40
	6.2.1 Reset screen	41
	6.2.2 Main menu	42
	6.2.3 Run mode	43
	6.2.4 Maintenance mode	44
	6.2.4.1 Maintenance menu	44
	6.2.4.2 M1 (capsule)	45
	6.2.4.3 M2 (hold down)	46



Figures

1	Introduction	1
	1.1 Diagram of the Underwater Bait Setter	2
	1.2 UBS Components	3
	1.3 UBS Components	4
	1.4 Track	5
	1.5 Capsule	6
	1.6 Traveller	6
	1.7 Lower pulley	7
	1.8 Head unit	7
	1.9 Upper vessel fixture	8
	1.10 Winch unit	8
	1.11 Winch box	8
	1.12 Control box	9
	1.13 Deck service box	9
	1.14 Power supply box	10
	1.15 Cradle	10
	1.16 Capsule manipulator	11
	1.17 Bait release door holder	11
2	Operating the Underwater Bait Setter	12
	2.1 The head unit with the capsule and traveller in the HOME position	12
	2.2 Confirmation of run mode selection on deck service box	14
	2.3 Turning the locking bolt into the unlocked position	15
	2.4 Control box home screen	16
	2.5 Control box menu screen	16
	2.6 Make settings screen on the control box	16
	2.7 Current settings screen on the control box	17
	2.8 Capsule with bait loaded	18
	2.9 Correct snood pay out	19
	2.10 Correct loading and deployment	20
	2.11 Configuration for one or two bin setting	21
	2.12 Locking the locking bolt	22
	2.13 Selecting M1 free wheel on the deck service box	22
3	Getting the best from the Underwater Bait Setter	24
	3.1 Factors to consider when calculating correct snood length	24
	3.2 Snood deployment	25



Figures

4	Safety	27
	4.1 Hook-up in the capsule and impact on snood	28
	4.2 Cutting the snood in the event of a hook-up	28
	4.3 Lifting capsule correctly	29
	4.4 Keep hands clear of the end of the capsule	29
	4.5 PPE required when operating the UBS	30

5	Troubleshooting	31
	5.1 Confirmation of pressing enter button on touch screen of deck service box	32
	5.2 Confirmation of run mode selection on the deck service box	32
	5.3 Confirmation of maintenance mode selection on the deck service box	32
	5.4 The maintenance menu screen on the deck service box	32
	5.5 Selecting M1 free wheel on the deck service box	33
	5.6 Selecting M2 wind on on the deck service box	33
	5.7 Selecting M1 wind on on the deck service box	34

6	UBS Controls	35
	6.1 Control box	35
	6.2 Home screen on the control box	37
	6.3 Menu screen on the control box	37
	6.4 Current settings screen on the control box	38
	6.5 Make settings screen on the control box	38
	6.6 Deck service box	40
	6.7 Reset screen on the deck service box	41
	6.8 Confirmation of action on the Reset screen on the deck service box	41
	6.9 Main menu screen on the deck service box	42
	6.10 Confirmation of run mode selection on the deck service box	42
	6.11 Confirmation of maintenance mode selection on the deck service box	42
	6.12 Run cycle status screen - cycling	43
	6.13 Run cycle status screen - ready to operate	43
	6.14 Maintenance menu screen on deck service box	44
	6.15 Maintenance mode screen on deck service box	45
	6.16 M1 Wind on selected	45
	6.17 M1 Wind on engaged	45
	6.18 M2 maintenance mode screen on deck service box	46
	6.19 M2 Wind on selected	46
	6.20 M2 Wind on engaged	46



Tables

2**Operating the Underwater Bait Setter****12**

2.1 Relationship between cycle time and capsule depth

13

6**UBS Controls****35**

6.1 Interpreting the LED lights on the control box

36

6.2 Interpreting the LED lights on the deck service box

41



This user guide explains how to use the underwater bait setter. It is intended for use by fishing captains and crew, and can be used in conjunction with the UBS videos.



Scan the QR code to watch the video.

A separate manual, the Operations Manual, is available for marine engineers to assist with installation and basic maintenance of the UBS.

The equipment described in this user guide may be **DANGEROUS** if not used according to the instructions.


All personnel must understand how to safely operate the UBS before using

Captains should read this user guide.

Crew members may read the user guide or watch the videos and be instructed by their captain.



1 Introduction

The Underwater Bait Setter (UBS) prevents the incidental capture of seabirds in surface longline fisheries. Setting baited hooks underwater with the UBS has the following advantages:

- 1** If fishing without the UBS, baits on the sea surface are visible to seabirds, encouraging them to follow fishing vessels and attack the sinking baits. Underwater setting means fewer seabirds follow fishing vessels, with fewer attacks on baits.
- 2** The UBS releases baits deeper than the maximum dive depths of all species of albatross (6m) and close to the maximum dive depths (10m) of deeper divers, such as white-chinned petrels and black petrels.
- 3** Underwater setting eliminates bait loss to seabirds, resulting in improved fish catch.
- 4** Underwater setting can prevent seabird mortality as a standalone measure, without needing any other seabird deterrents, such as seasonal/area closures, night setting, tori lines or dyed baits.

1.1 General description

*Scan the QR code
to watch video 1:
Introducing the UBS.*



The Underwater Bait Setter deploys baited hooks in a capsule. The baited hooks are released from the capsule underwater at programmed depths. The capsule then returns to the operator for loading the next hook.

The capsule is cradled by the traveller, which moves down the track from the head unit mounted on the aft deck, into the water and back up again. The basic concept of the Underwater Bait Setter is shown in Figure 1.1.

The Underwater Bait Setter has been developed over many years, with a number of sea trials. It is easy to use, and following the operating instructions will ensure it is safe for crew. These instructions are provided in this user guide and via a series of short videos, which can be viewed on a Smartphone. It is important that anyone operating the Underwater Bait Setter receives training, via videos, user guide or direct instruction.



Diagram of the underwater bait setter (Figure 1.1) showing:

- a) Winch unit
- b) Head unit - maintains the capsule in position for bait loading
- c) The track guides the capsule (and traveller) to bottom of the track
- d) Traveller holds capsule in position on the track
- e) Rope connects capsule to winch unit;
- f) Capsule (shown with bait release door open)
- g) Baited hook released from the capsule

Depth scales below and to the right show:

- maximum dive depth of albatross
- depth range of 95% of dives by white-chinned petrels (deep diving seabird)

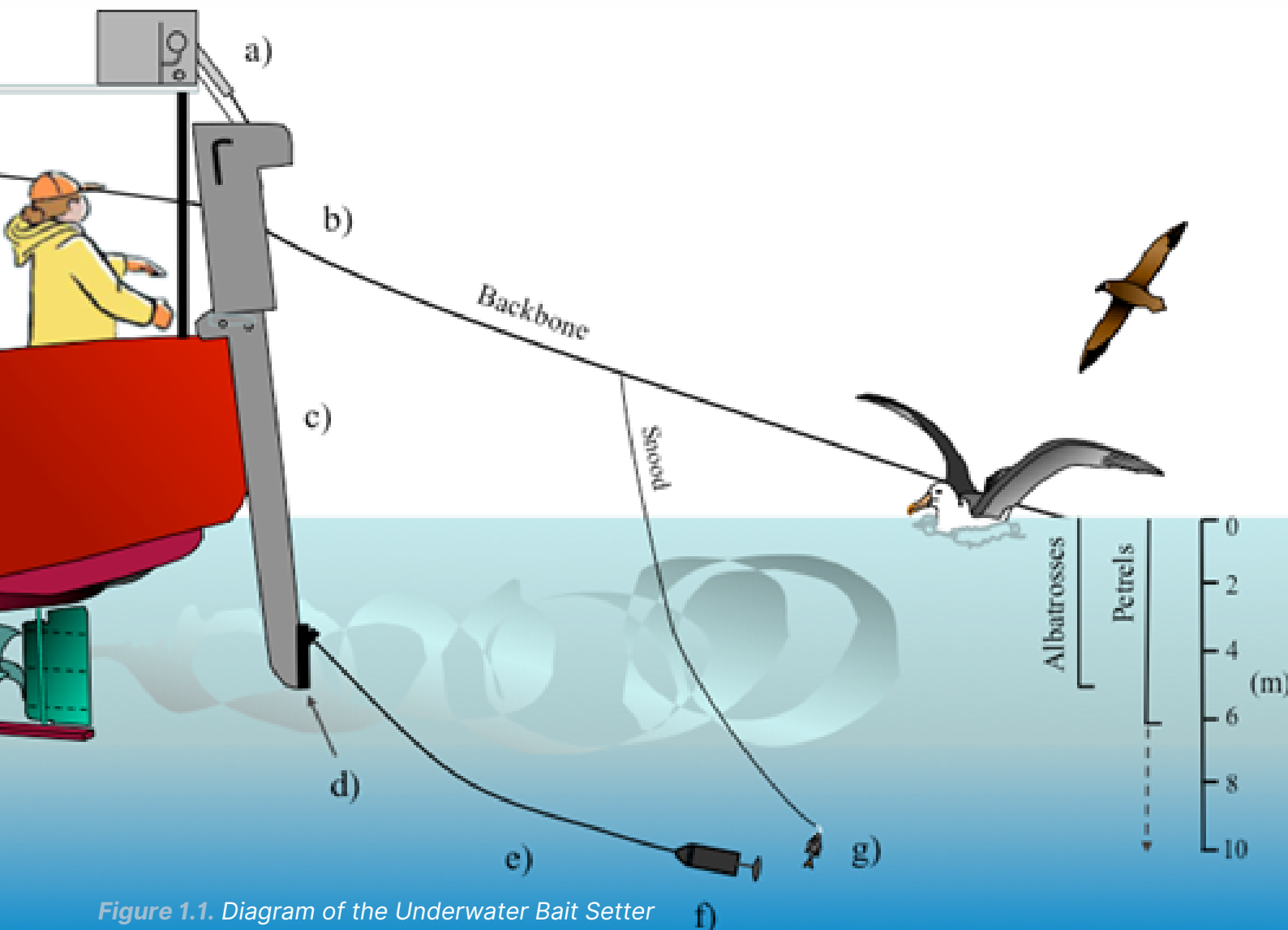


Figure 1.1. Diagram of the Underwater Bait Setter



1.2 UBS components

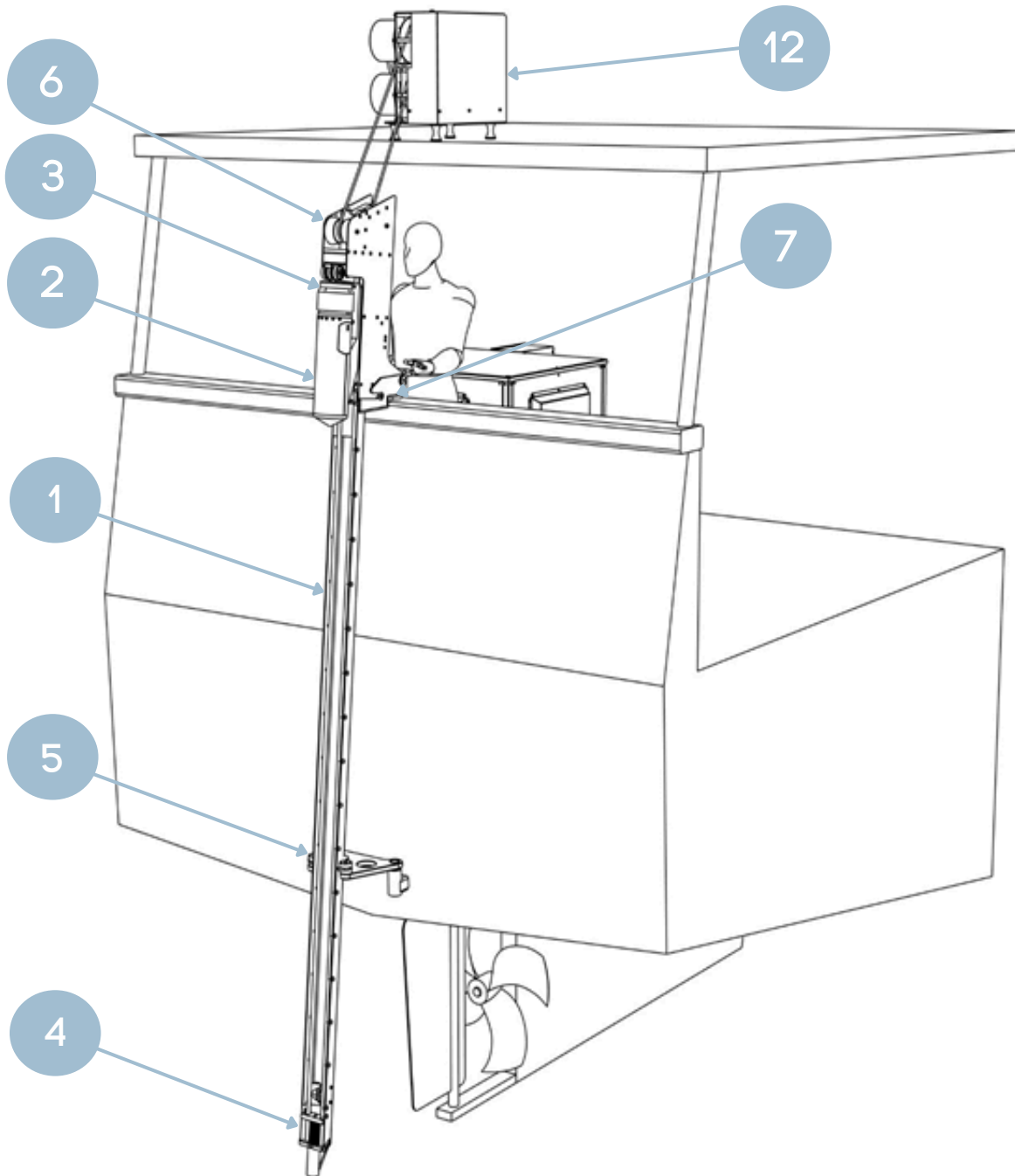


Figure 1.2. Components of the Underwater Bait Setter

- | | |
|-----------------|-------------------------|
| 1. Track | 5. Lower vessel fixture |
| 2. Capsule | 6. Head unit |
| 3. Traveller | 7. Upper vessel fixture |
| 4. Lower pulley | 12. Winch unit |

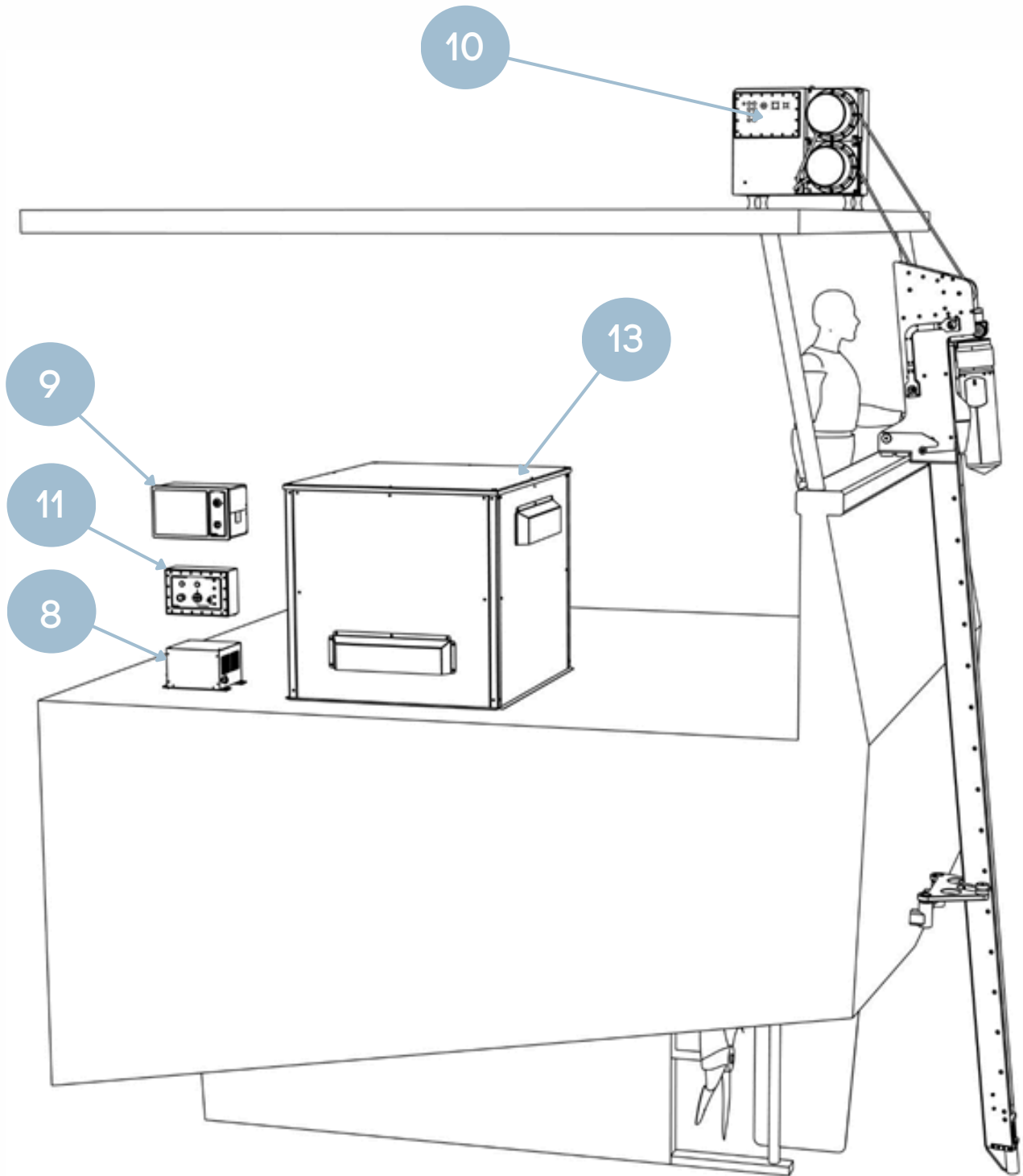


Figure 1.3. Components of the Underwater Bait Setter

- 8.** Power supply box
- 9.** Control box
- 10.** Winch box
- 11.** Deck service box
- 13.** Hydraulic power pack



1.2.1 Track

The track, together with the head unit, is the delivery platform for the traveller and capsule. Rails for the traveller run the length of the track, and join with rails mounted on the head unit. The bottom of the track houses the lower pulley unit. The rails form a single, continuous guide for the traveller.

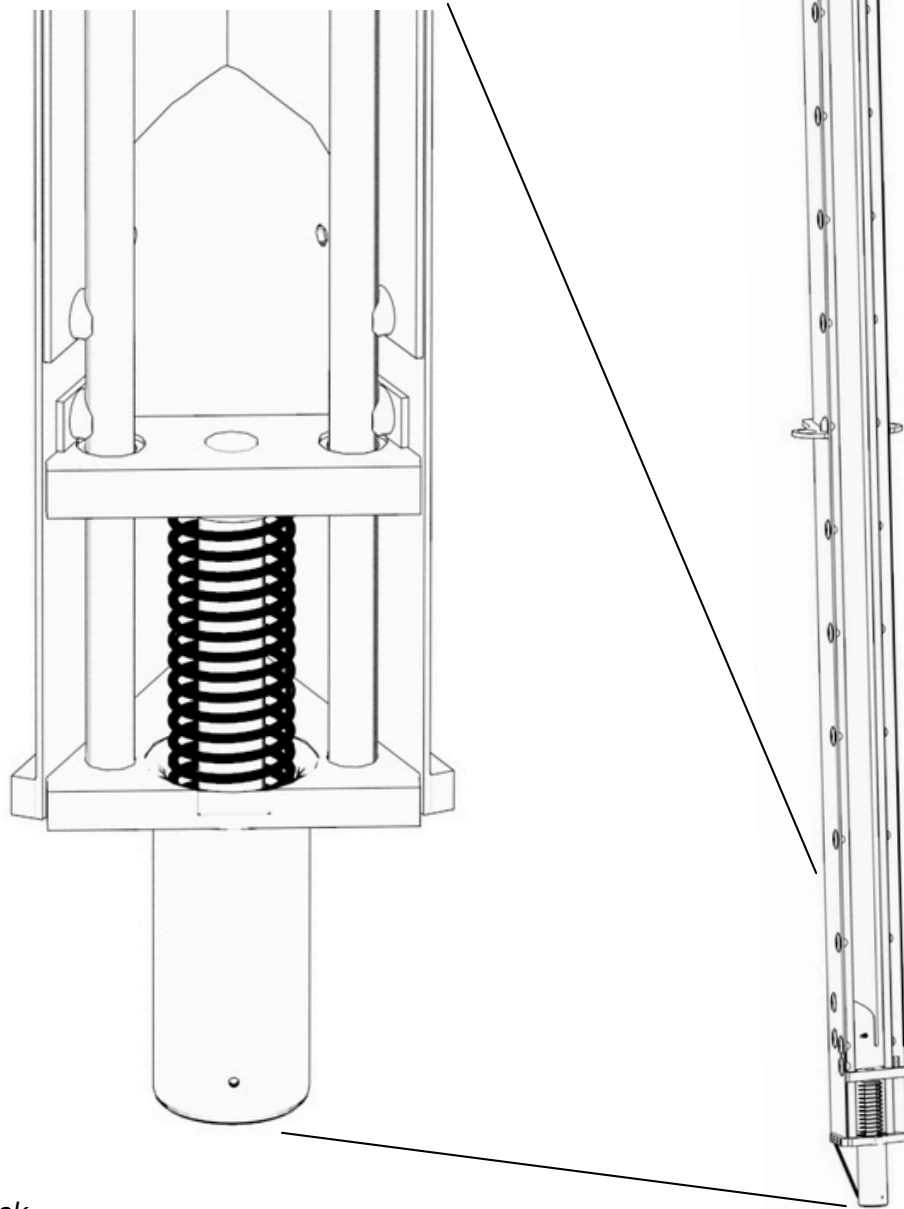


Figure 1.4. Track



1.2.2 Capsule

The capsule delivers, and releases, baited hooks at the programmed depth. The capsule has two bait loading doors in the upper section and a bait release door at the bottom. Baited hooks can be loaded from either side of the capsule, using the bait loading doors. When the bait release and bait loading doors open after deployment, water flushes through and pushes out the baited hook. The capsule returns via the M1 capsule recovery rope. The M1 rope is permanently attached to the capsule.



Figure 1.5. Capsule

1.2.3 Traveller

The traveller cradles the capsule and transports it along the track during deployment and recovery. During deployment, the traveller (with capsule) travels from the HOME position in the head unit to the bottom of the track, where it stops suddenly, releasing the capsule. During the recovery phase, the capsule docks with the traveller at the base of the track, then returns to the HOME position on the head unit.



Figure 1.6. Traveller



1.2.4 Lower pulley

The lower pulley is located at the bottom of the track. The M2 hold down rope attached to the traveller passes around the pulley.

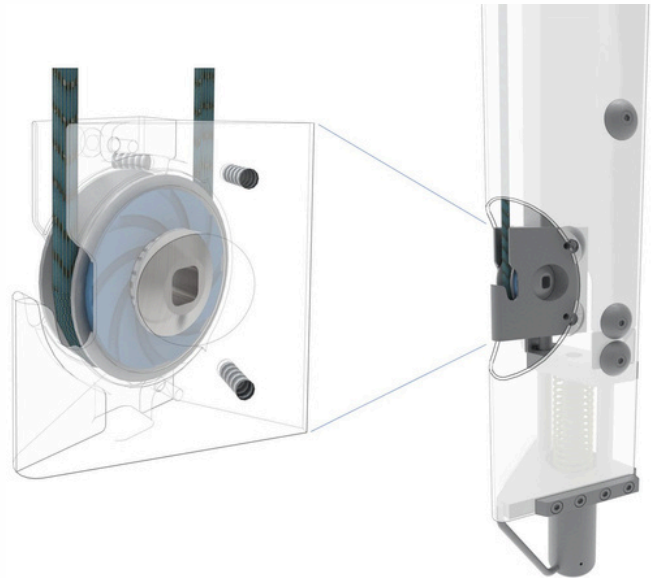


Figure 1.7. Lower pulley

1.2.5 Head unit

The head unit and the track are the delivery platform for the traveller and capsule. The traveller is held in the HOME position at the top of the guide rails in the head unit by the M1 capsule recovery rope. A locking bolt in the head unit secures the traveller (and capsule) in the HOME position when not in use. A magnetic sensor detects when the traveller is in the HOME position. The cycle button, which controls the winch unit, is located inside the head unit.

The head unit can be rotated into a horizontal position, which must be done to remove the track or the traveller. When rotated into the vertical position the head unit and track are locked together with two locking bolts.

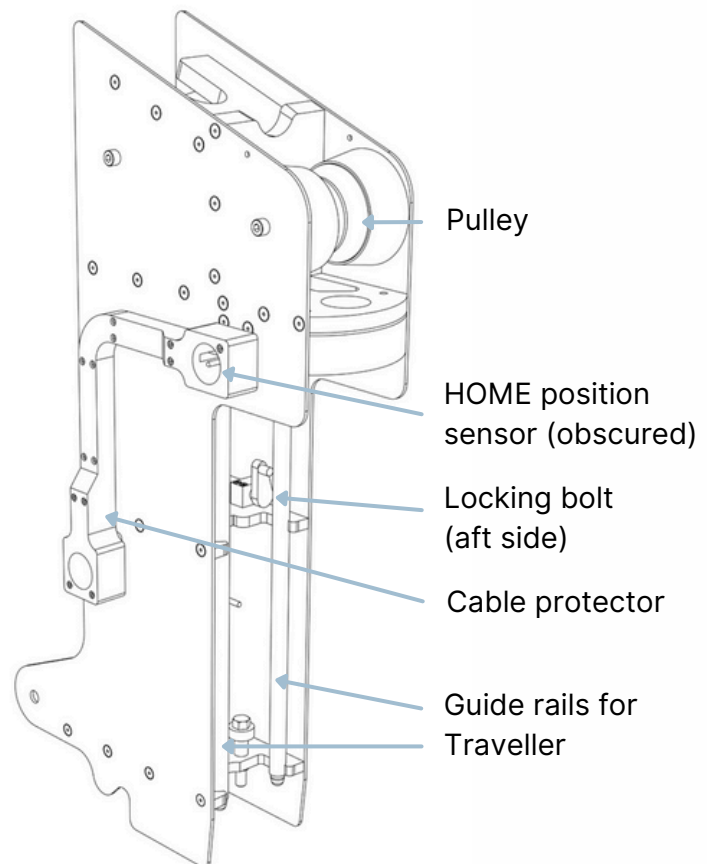


Figure 1.8. Head unit as viewed from the ocean side when mounted.



1.2.6 Upper vessel fixture

The upper vessel fixture is bolted to the capping rail of the vessel and fixes the track and head unit to the vessel.

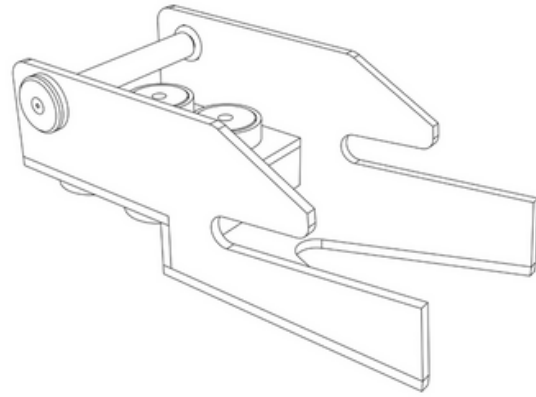


Figure 1.9. Upper vessel fixture

1.2.7 Winch unit

The winch unit takes inputs from the winch box and converts them into mechanical movement, via two separate winches (**M1 and M2**). M1 retains and controls the capsule recovery rope, and M2 the hold down rope.

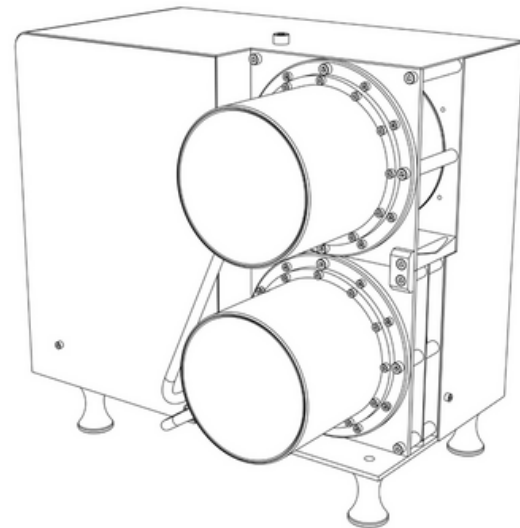


Figure 1.10. Winch unit

1.2.8 Winch box

The winch box is located inside the winch unit, and is the central control hub (PLC) where information on Underwater Bait Setter operations is used to control the system hydraulics.



Figure 1.11. Winch box



1.2.9 Control box

The control box is located in the wheelhouse where it is used to set operational parameters (capsule depth and vessel setting speed), and log and record data. It provides a visual display of Underwater Bait Setter operations during use.

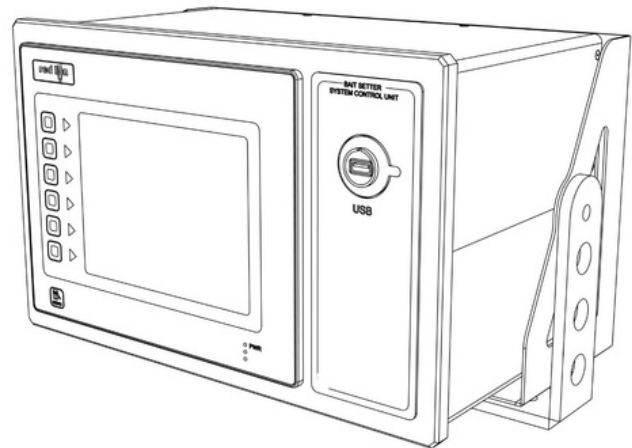
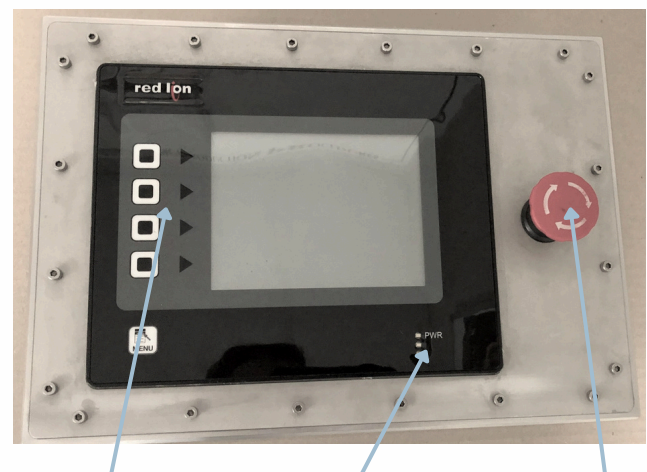


Figure 1.12. Control box

1.2.10 Deck service box

The crew member operating the Underwater Bait Setter uses the deck service box to select the required mode for operation (run mode or maintenance mode). Run mode is used during setting operations and maintenance mode is used for maintenance or recovery of gear in the event of a line tangle or system failure. The Underwater Bait Setter is controlled by the deck service box and the cycle button on the head unit. The deck service box has an emergency stop button.



Flush mounted
selection keys

LEDs showing
status

**Emergency
stop button**

Figure 1.13. Deck service box screen

If an emergency situation arises that may cause injury to crew members, or damage to equipment, immediately press the emergency stop button on the deck service box.





1.2.11 Power supply box

The power supply box is the power source for the Underwater Bait Setter, feeding 24 Volts to the control box, deck service box and winch box. The incoming power requirement for the power supply box is 240 volt.

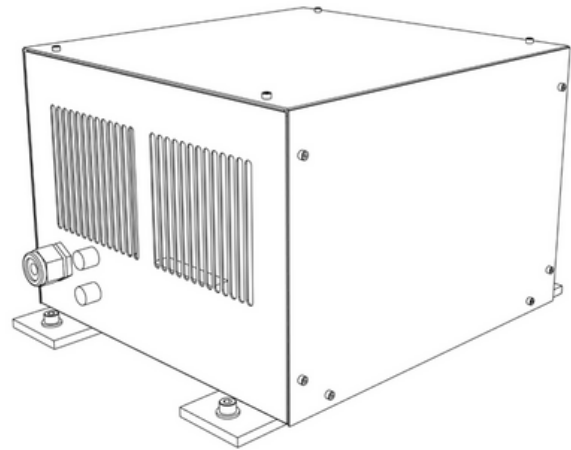


Figure 1.14. Power supply box

It is essential that the power supply box is kept dry at all times.



1.2.12 Hydraulic power pack

The hydraulic power pack supplies the UBS with a constant source of hydraulic power, delivered via pressurised hydraulic oil. Hydraulic power can be produced and delivered via multiple mechanisms, depending on the way a vessel is designed and set up. Some vessels may already have an adequate source of hydraulic power to operate the UBS. For this reason, the hydraulic power pack is not an essential component provided with the UBS.

It is critical that a hydraulic power pack with an electric motor as a primary source of power is connected into an electrical circuit protected by an appropriate Residual Current Device (RCD). It is the ship owner's responsibility to ensure an RCD is installed and maintained.



1.2.13 Miscellaneous tooling

Cradle

The cradle is a platform for performing capsule maintenance. It should be mounted on a flat surface, out of the weather.



Figure 1.15. Cradle (viewed from above with the capsule sitting in it)



1.2.13 Miscellaneous tooling (continued)

Capsule manipulator

The capsule manipulator enables a single person to handle the capsule. It is used when the capsule is stowed, or refitted back to the HOME position. It is also used to securely stow the capsule.



Figure 1.16. Capsule manipulator

Bait release door holder

The bait release door holder clamps around the cone at the base of the bait release door and is used for tightening the retaining bolt (which secures the door to the capsule).

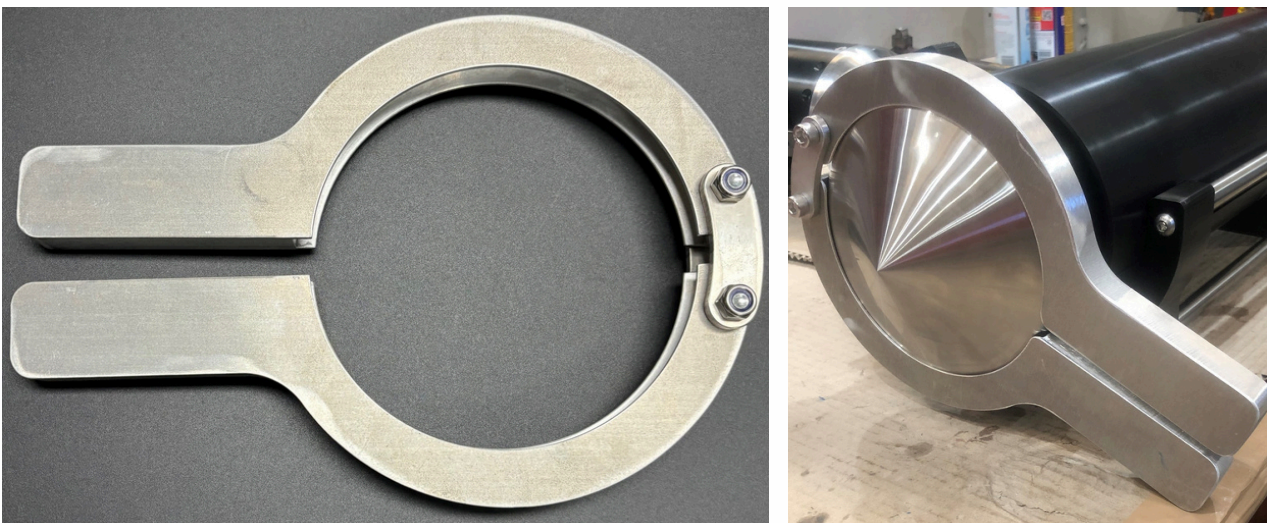


Figure 1.17. Bait release door holder

2

Operating the Underwater Bait Setter

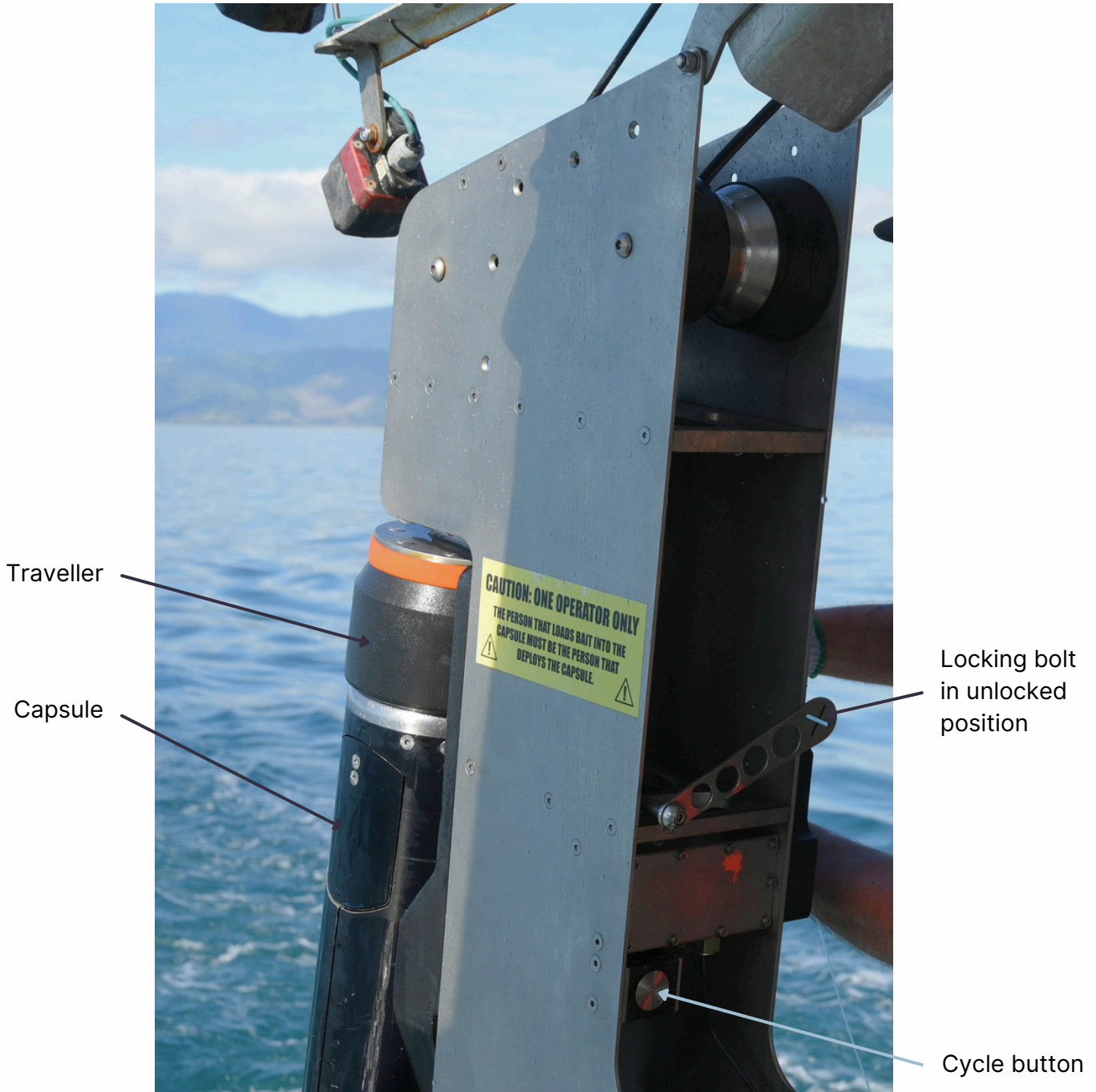


Figure 2.1 The head unit with the capsule and traveller in the HOME position.



2.1 Getting the UBS ready for line setting

First turn on the power supply. A green LED next to the main switch will light up. Next, engage the hydraulic oil supply.

- 1 Press and then release the emergency stop button on the deck service box.
- 2 The Re-set PLC screen will appear on the deck service box.
- 3 Press the menu button on the bottom left corner of the deck service box.
- 4 Select maintenance mode.
- 5 Select M1 capsule, press M1 – wind on. Wait a few seconds before pressing engage.

For more details on using the deck service box, see sections 6.2.1 and 6.2.2, and 6.2.4.2.

Position the capsule with care so it's next to the traveller. Press the cycle button on the head unit to feed the M1 capsule recovery rope onto the M1 winch drum. All slack in the M1 capsule recovery rope will be taken up, positioning the capsule securely in the nose cone of the traveller. The capsule and the traveller should now be in the HOME position, secured by the locking bolt.



Scan the QR code to watch video 2: Starting the UBS.

Step 1. The control box

- 1 Choose the **capsule depth setting** using the **control box** (Section 2.3). This is the depth where baited hooks are released from the capsule. There are three (3) settings available: shallow (6m), medium (8m) and deep (10m).

The depth setting needed depends on what birds are following the boat. To prevent diving birds, like petrels, getting the baits the 10m setting is needed. Albatross don't dive (they are surface scavengers), so the shallow (6m) setting is OK. The depth selection can be changed at any time during line setting (for example a deeper setting can be used to start with and when birds stop actively following the boat change to a shallower setting). The depth can be changed any time during line setting provided the snoods are long enough to allow unhindered sinking of the capsule (see Section 3.1).

Ten metres (10m) is deep in the water column and places increased load on the hydraulics of the UBS. Use this setting only when needed to prevent captures of deeper diving birds. The depth setting influences the cycle time (time from deploying the capsule until return to the HOME position). The relationship between capsule depth and cycle time is shown in Table 2.1.

Table 2.1. Relationship between cycle time and capsule depth. If cycle time is the priority, refer to the top table. If depth is the priority, refer to the bottom table.

Cycle time (sec)	5	6	7	8	9	10
Depth (m)	4.4	5.4	6.3	7.3	8.2	9.2
Depth (m)	5	6	7	8	9	10
Cycle time (sec)	5.6	6.6	7.7	8.7	9.8	10.8



Scan the QR code to watch video 3: Getting ready for operations.



- 2 Choose the **speed setting**, using the **control box** (Section 2.3). The speed setting needs to be the same as the vessel speed during line setting. There are four speed options available:
 - 6 knots
 - 7 knots
 - 8 knots
 - 9 knots.

As with depth setting, the speed setting can also be adjusted during line setting if the boat speed changes.

Step 2. The deck service box

- 3 Go to the **deck service box**.
- 4 Press, then release, the **emergency stop button** on the **deck service box**.
- 5 The re-set PLC screen will appear on the deck service box (Figure 6.7). Select **Enter** (Figure 6.8).
- 6 Press the **Menu** button on the bottom left corner of the deck service box. Then select **run mode** (Figure 2.2). Press run mode again to confirm your selection.
- 7 **Be aware of sudden movement of ropes or traveller/capsule at the head unit!**



Be aware:
Selecting run mode can cause sudden movement of the M1 or M2 ropes and the traveller/capsule. Ensure hands of all crew are clear of the UBS when anyone is operating the deck service box.

Step 3. The head unit

- 8 Next go to the head unit.
- 9 Turn the locking bolt holding the traveller in the HOME position on the head unit to the unlocked position (Figure 2.3).
- 10 Rotate the capsule around (by hand), if needed, so one of the bait loading doors is facing the operator ready for loading.

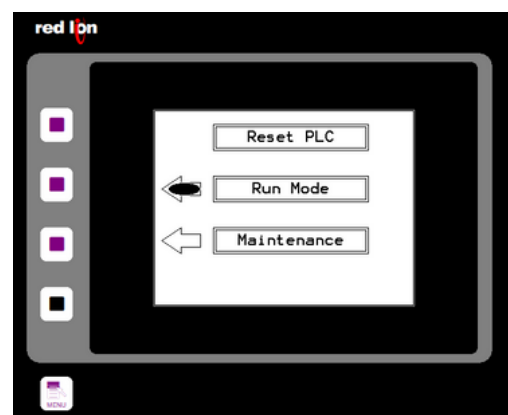


Figure 2.2. Confirmation of run mode selection on the deck service box.

You're now ready to set lines using the UBS. This is covered in section 2.3 of this user guide and in video 4.

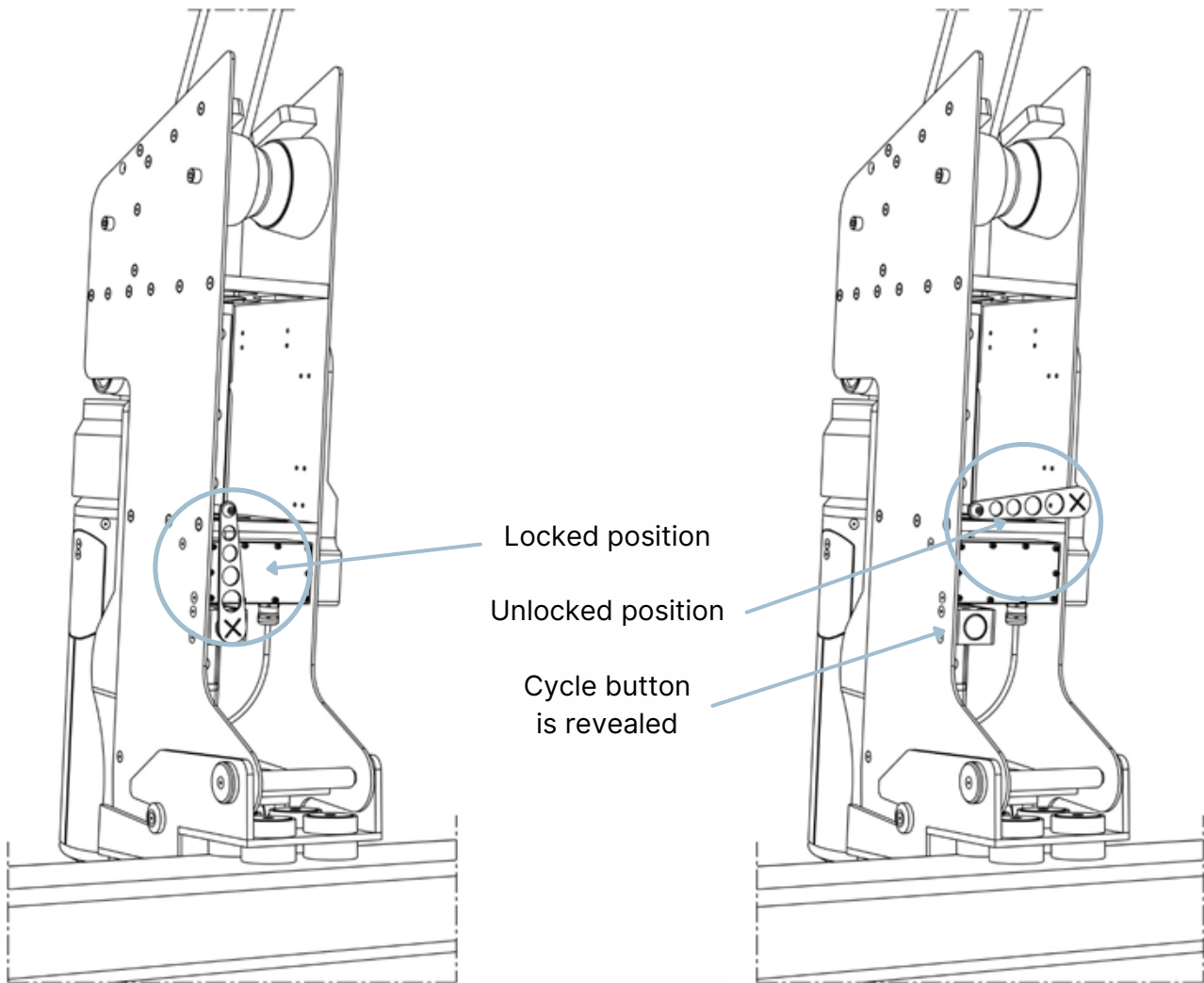


Figure 2.3. Turn the locking bolt into the unlocked position, so the cycle button can be pressed to move the traveller.

Caution: The UBS must not be operated with the locking bolt in the locked position. Always unlock the locking bolt prior to pressing the cycle button. If this is not done, the capsule will fall into the water while the traveller remains locked in the HOME position.



If the capsule does become separated from the traveller, follow the steps outlined in Section 5 to move the traveller to the bottom of the track and recover the capsule, and return both to the HOME position.



2.2 Using the control box

The control box displays the home screen when it is first powered up (Figure 2.4).

Running down the left-hand side of the control box touch screen is a series of flush-mounted buttons. Pressing the top button goes back to the previous screen. Pressing the bottom button moves forward to the next page.

Pressing the menu button on the bottom left brings up the menu screen, where the key operating parameters can be accessed (Figure 2.5).

Pressing Setup Info on the home screen gives information on the time stamps (UTC or local) being used.

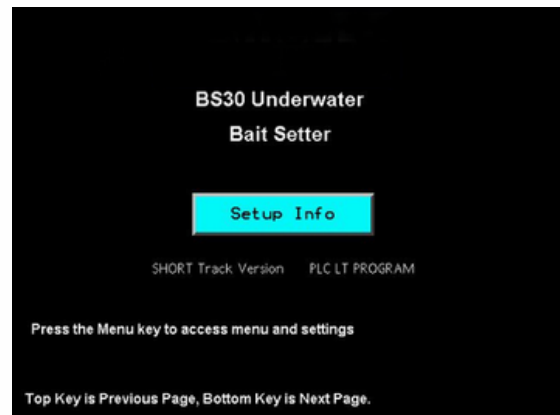


Figure 2.4. Control box home screen



Figure 2.5. Control box menu screen

To set the operating parameters (depth and speed)

- 1 From the menu screen (Figure 2.5), select make settings using the touch screen.
- 2 Pressing the desired depth or speed button using the touch screen will change the display of the selected button to red (Figure 2.6). This indicates that the setting is active.

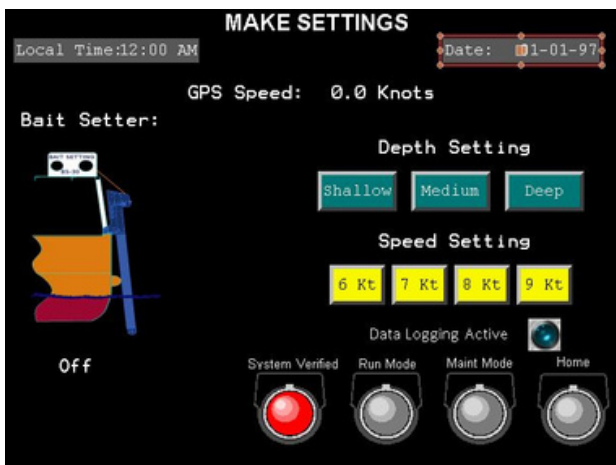


Figure 2.6. Make settings screen on the control box



To check what depth and speed the UBS is currently set at:

- 1 From the menu screen (Figure 2.5), select current settings using the touch screen.
- 2 The current settings screen displays the depth and speed set, as well as the GPS position and a graphical view of the Underwater Bait Setter when operating (Figure 2.7).
- 3 A series of LEDs at the bottom of the screen reflect operational status of the Underwater Bait Setter.
- 4 To make changes to settings, hit the top button on the left of the touch screen to go back to the previous screen (menu), then select make settings.

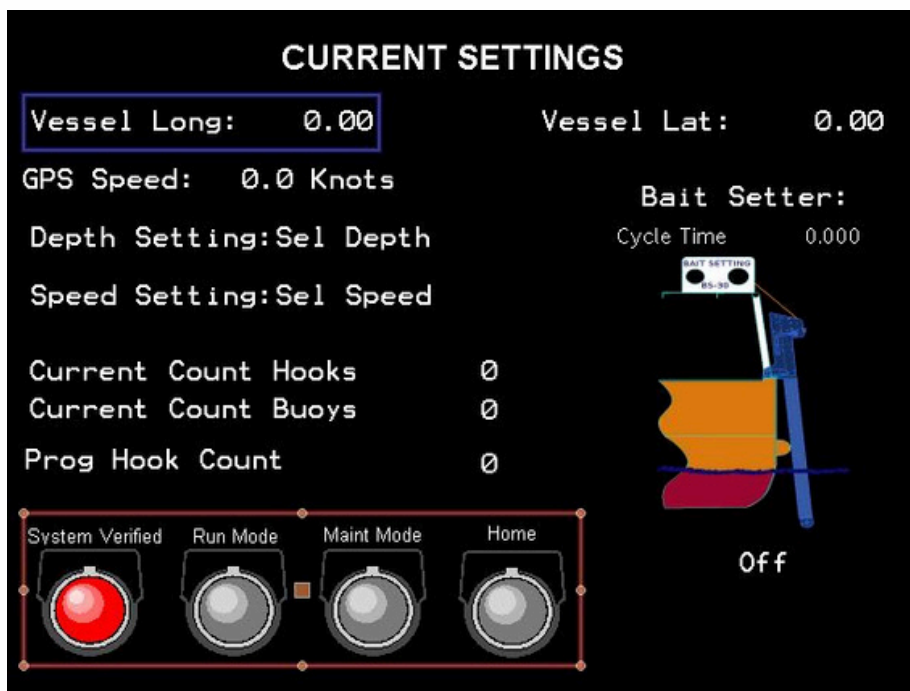


Figure 2.7. Current settings screen on the control box



2.3 Line setting using the UBS

- 1 Place the baited hook fully inside the capsule so it rests at the bottom. The snood should run down the snood slot on the side of the capsule (Figure 2.8). Baits loaded incorrectly could lead to hook-ups within the capsule or damage to the snood when the bait loading doors shut. The tab at centre bottom of the bait loading doors (above the snood slot) prevents snoods from flying upwards into the head section.



Scan the QR code to watch video 4: Line setting.

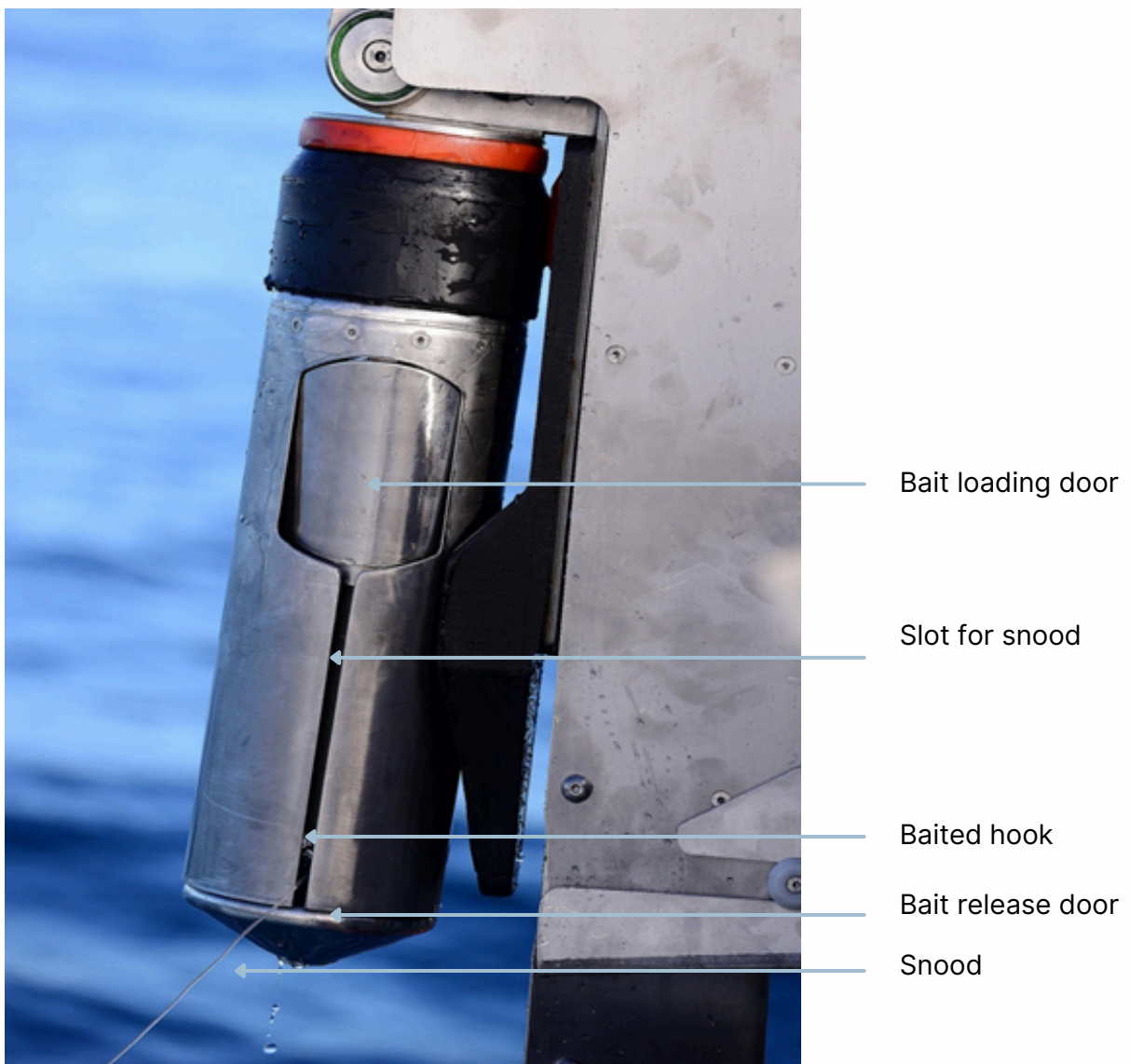


Figure 2.8. Key components of the capsule showing the correct placement of the bait loading door for bait loading. Also shown is the snood (with baited hook inside the capsule) at the base of the slot in the correct position for deployment of the capsule.



- 2 **Pay out snood** from the gear bin so snood drags in the water behind the boat. This is important to minimise tangles (Figure 2.9). Ensure the snood does not foul the track near the water line; this is especially important when setting with a following wind.

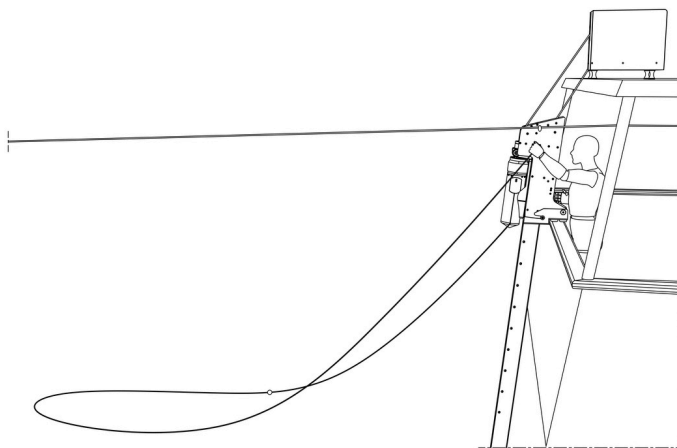


Figure 2.9. Correct snood pay out before pressing cycle button.

- 3 Remove the clip end of the snood from the gear bin.
- 4 Press the **cycle button** on the **head unit**.
- 5 Clip the snood to the backbone immediately after the capsule has been deployed. **Do not delay clipping on.** Section 3.2 provides more detail about correct deployment of the snood.



For safety reasons, it is very important that the person responsible for loading bait into the capsule is the same person who deploys the capsule by pressing the cycle button! **The same hand must be used to load the bait and press the cycle button.**

An important safety point to be aware of is the potential for hook ups, where baited hooks get caught in the capsule, and return to the boat. The UBS has been designed to minimise the chances of this occurring, but if baits have been loaded incorrectly it may happen.

When hook-ups happen, the snood is under tension and is likely to break. If it breaks near the clip it will recoil towards the boat, presenting a potential danger to the operator. **Always inspect the capsule for evidence of a hook-up every time it returns to the HOME position.**

In the event of a hook-up, cut the snood at the hook without delay (refer to Figure 4.2). If scissors or knife aren't available, then press the emergency stop button.



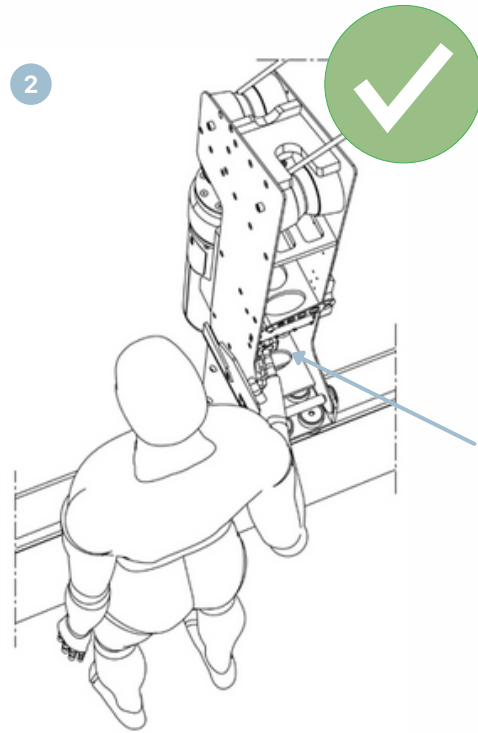
If an emergency situation arises that presents a threat of injury to crew members or damage to equipment, immediately press the emergency stop button on the deck service box!



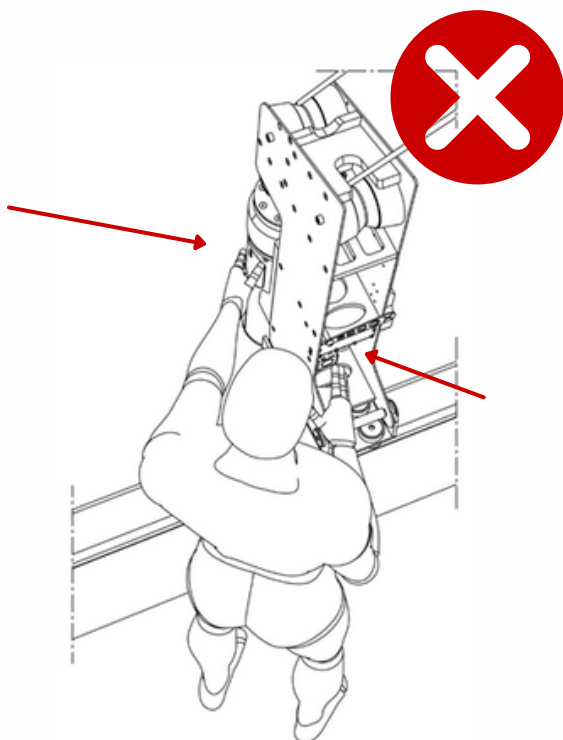
To avoid risk of injury, the same hand must be used to load the bait into the capsule and press the cycle button! DO NOT load bait with one hand and deploy the capsule with the other hand! DO NOT place your fingers inside the capsule!



Step 1. Load bait into capsule.



Step 2. Press cycle button with same hand.



DANGER!
Incorrect loading and deployment.
Do not use two hands.
Risk of fingers getting caught in capsule.

Figure 2.10.
Top: Correct loading and deployment.
Bottom: Incorrect loading and deployment.



The UBS can be safely used in one of two ways:

- 1 Two crew members setting out of two bins (Figure 2.11A). Each crew member takes responsibility for the loading and deploying the capsule, and snood bin management, on their side of the UBS. Crew members must work by alternating their actions from one side then the other.
- 2 One crew member who is responsible for loading and deploying the capsule, with a second crew member managing the snood bin and the snood onto the backbone (Figure 2.11B).



Scan the QR code to watch video 3: Getting ready for operations.

Whatever method is chosen, the crew members must work together in a coordinated way (Figure 2.11).

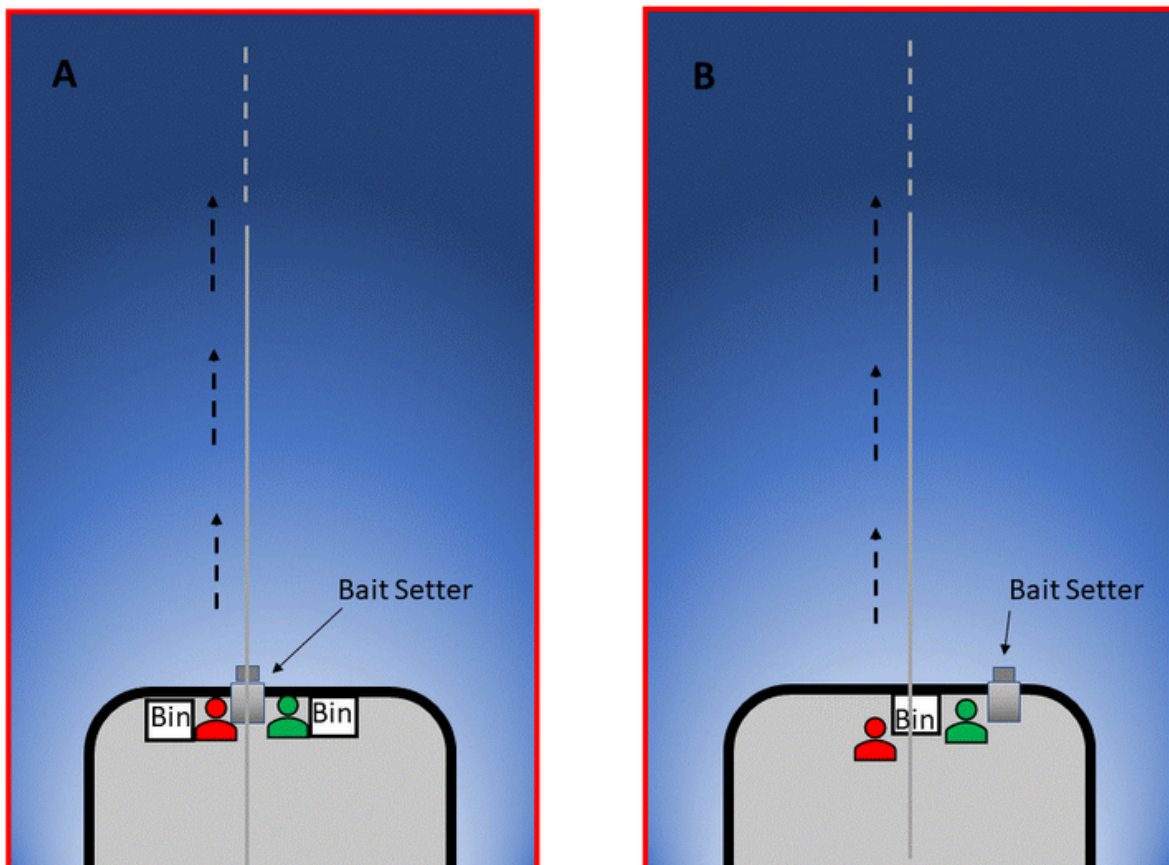


Figure 2.11. The UBS configured for (A) two crew members setting out of two bins or (B) two crew members setting from a single bin.

At all times bait loading and cycle activation must be undertaken by a single operator using the same hand for both actions.





2.4 Shutting down the UBS

Scan the QR code to watch video 5: Shutting down the UBS.



- 1 Secure the traveller (and capsule) in the HOME position by pushing the locking bolt into the locked position (Figure 2.12).
- 2 Set the deck service box to maintenance mode (Figures 6.9 and 6.11).
- 3 Select M1 capsule. Press M1 – free wheel and wait a few seconds before pressing engage (Figure 2.13).
- 4 Position the capsule manipulator tool just below the capsule.
- 5 Press the cycle button on the head unit and allow the capsule to drop into the capsule manipulator tool.

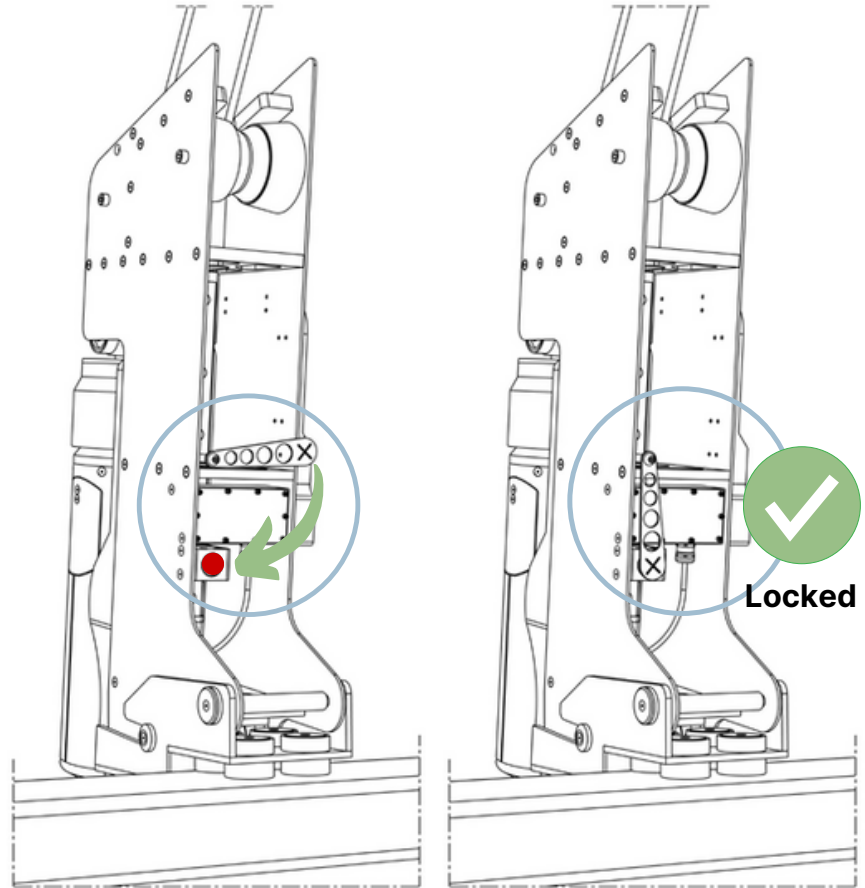


Figure 2.12. Lock the locking bolt.

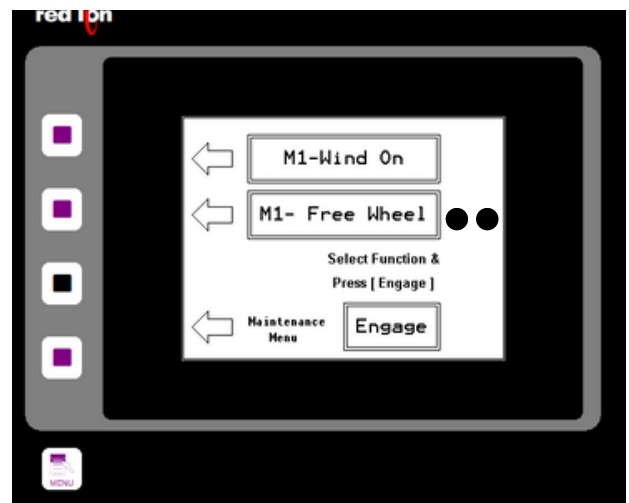
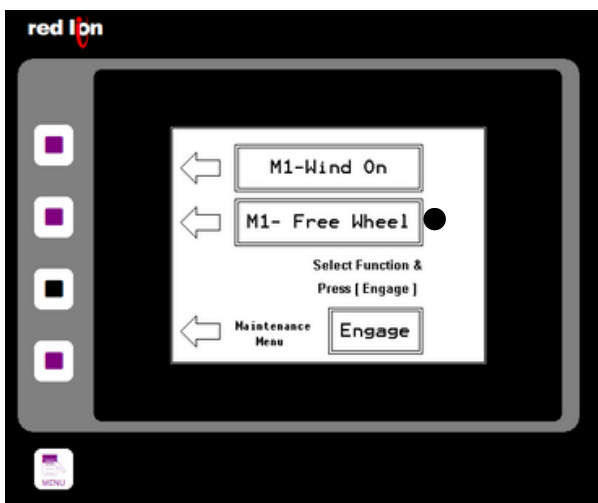


Figure 2.13. Selecting M1 free wheel on the deck service box.



2.4 Shutting down the UBS *(continued)*

- 6 Still holding the cycle button, use the weight of the capsule to freewheel rope from the M1, giving enough slack to lift the capsule inboard (the M1 rope remains attached to the capsule and the M1 winch even when the capsule is stowed inboard).
- 7 Inspect the M1 capsule recovery rope for damage and wear.
- 8 Securely stow the capsule and capsule manipulator tool inboard, after rinsing with water (ideally fresh).
- 9 Press the menu button on the bottom left corner of the deck service box.
- 10 Select maintenance mode.
- 11 Disengage hydraulic power supply. Visually inspect hydraulic hoses for any irregularities, such as damaged or suspect hydraulic fittings and hoses (look for oil leaks or potential oil hazards).
- 12 Switch off power at the power supply box, and inspect the power supply box for water or moisture contamination and damaged, or exposed wires.
- 13 Visually inspect the traveller, track and head unit for any damage or wear.
- 14 Visually inspect the winch unit and M2 and M1 winch drums and ropes, and ensure ropes are laying evenly between the two flanges of the winch drums. This is critical for proper operations. Uneven layered rope will cause erratic and inconsistent operation.
- 15 Rinse traveller, track, head unit and winch unit with fresh water (or if fresh water is not available use the deck hose and salt water).



3

Getting the best from the Underwater Bait Setter

There are ways to use the UBS to get the best result and ensure crew members are safe. This section covers snood length, clipping on the snood, bait quality and line weighting. Getting these right for your vessel and systems will optimise performance.

3.1 Snood length

Scan the QR code to watch video 6: Getting the best from the UBS.



Snoods need to be long enough to prevent them becoming tight on the backbone before the target depth is reached. Tight snoods may damage the bait or weaken the attachment of baits to hooks. They can also cause hook ups in the capsule.

- 1 To estimate correct snood length, you need to know:
 - The height of the mainline above sea level at the vessel stern (Figure 3.1, A)
 - Bait release depth (Figure 3.1, B)
 - How much snood can be cut off before it's replaced
 - Length needed to cover deployment mishaps (buffer length)

- 2 Add the length (in metres) of these four measurements together to give the correct snood length. For example if the height of the vessel is 3m, depth is 10m, 2m of snood is shortened before replacement and a buffer of 3m is allowed, the snood length required is 18m.

$$3 + 10 + 2 + 3 = 18\text{m}$$

There are no major issues if the snood is too long (the only downside is it may take longer to pull it out of the setting bin).

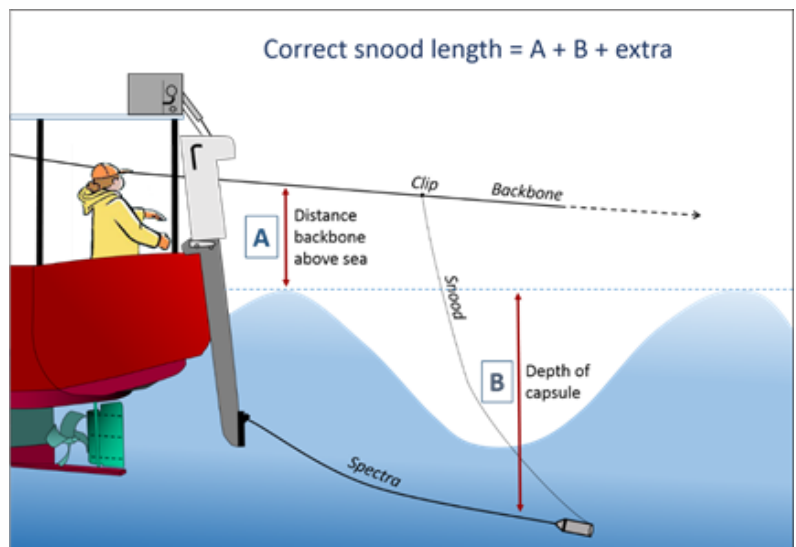


Figure 3.1. Factors to consider when calculating correct snood length for unimpeded sinking of the capsule.



3.2 Coordinating deployment

Coordinating the clipping on of the snood immediately after the capsule is deployed is important so that capsule and clip leave the vessel at the same time and same rate (Figure 3.2). Clipping on too early or too late both result in loss of effective snood length, and increase the likelihood the snood will become tight on the backbone, risking losing the bait from the hook, and increasing chance of hook up in capsule.

A delay of just one or two seconds clipping on is sufficient to reduce effective snood length. At 6 knot vessel setting speed, a delay of just one second will reduce effective snood length by about 3m. A delay of 2 seconds will reduce effective snood length by about 6m.

Do not press the cycle button if the snood is not outboard of the stern or if the snood is near the operator and could become tangled.

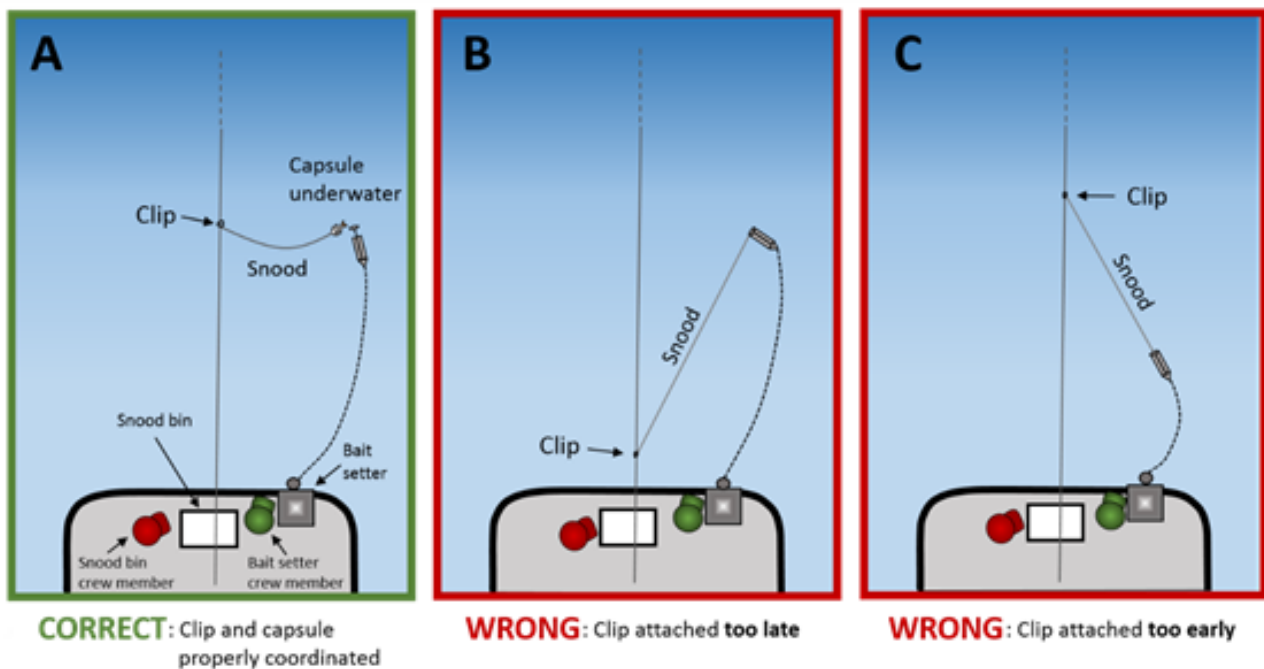


Figure 3.2. Examples of a properly coordinated deployment (image A) and poorly coordinated deployments (images B and C). Proper coordination results in capsule and clip end of the snood leaving the vessel together.

Scan the QR code to watch video 3: Getting ready for operations..





3.3 Bait quality

The capsule has been designed to hold a range of bait sizes of both squid and fish. The shape of baits when separated from other baits in the frozen blocks, and how thawed they are, both influence setting effectiveness.

- Bait that is frozen in a zig-zag shape will be difficult to load in the capsule. This problem can be avoided by using baits that have been packed with each piece positioned to lie flat in the bait boxes before freezing.
- Baits that are only partially thawed are ideal as they tend to be more rigid than fully thawed bait and more easily loaded into the capsule.

Note: *When baits stored in frozen blocks are thawed to the point where individual baits can be separated without undue force (i.e. by use of the sea hose), they will sink at the same rate as baits that are fully thawed.*

Some fishers prefer to use live fish bait. There is no operational reason preventing the use of live bait with the UBS; however, it has not been tested with live bait.

3.4 Operations with a line shooter

Setting mainline with a line shooter reduces the tension in the line astern of the boat, which is a problem when using the UBS. To minimise the risk of entanglement the UBS should be fixed to the vessel stern as far as is practicable from both the centre line of the propellor and the mounting position of the line shooter. A minimum distance of 1.5 m from both is advised.

3.5 Line weighting

Although both weighted and unweighted snoods can be used with the UBS, there are advantages to using weighted lines.

A weight fitted into the snood around 2-3m from the hook will reach the water and drag behind the vessel, as the snood is payed out from the bin. This will keep the snood away from the stern of the boat and the UBS track, minimising tangles.

Once released from the capsule, gear with added weight will sink faster than gear without weights. Baits attached to weighted gear will reach deeper depths closer to the vessel stern, where the water disturbance by the propellor is greatest. This acts as a barrier to seabirds, which means the UBS can be set shallower.

Baits set shallower, but with faster sink rates due to weighting could be as effective in deterring seabirds as baits set deeper but with slower sink rates. The advantages of added weights are faster cycle times and reduced demand on UBS hydraulics and power requirements.



4 Safety

Safety is paramount. It is important crew members are aware of the following safety concerns when operating the Underwater Bait Setter.

If you have concerns about the integrity of the Underwater Bait Setter, DO NOT OPERATE

If you are not confident in the use of the Underwater Bait Setter, DO NOT OPERATE

If an emergency situation arises that presents a threat of injury to crew members, or damage to equipment immediately press the emergency stop button on the deck service box.



4.1 Bait loading and capsule deployment

Care with hands around the capsule is important. The capsule weighs 13 kg and descends down the track at a rapid speed. If a crew member is loading bait into the capsule at the same time the cycle button is activated, there is a risk of injury.

In the interest of crew safety it is mandatory that:

- i) the person who loads the capsule is the person who deploys the capsule; and
- ii) the same hand is used for both bait loading and capsule deployment (pressing the cycle button).

Figures 2.14 and 2.15 demonstrate the correct technique for bait loading and capsule deployment with one or two operators.

Extreme care should be taken to avoid accidentally pressing the cycle button. Doing this will lead to sudden and unexpected movement of the capsule, which could result in entanglement and injury.

The Underwater Bait Setter must not be operated with the locking bolt in the locked position (i.e. do NOT press the cycle button, while the locking bolt is in the locked position). Doing this will lead to sudden and unexpected movement of the capsule, which could result in entanglement and injury.



4.2 Hook-ups in capsule

Hook-ups occur when baited hooks snag in the capsule, fail to release underwater and return to the vessel inside the capsule. The UBS has been designed to minimise the chances of this occurring, but if baits have been loaded incorrectly it may happen. Hook-ups are seen by operators at the end of a cycle, when the capsule returns to the HOME position. By then the clip-end of the snood will be several seconds astern and moving away from the vessel. The snood will tighten very quickly, leading to potential gear breakage (Figure 4.1). There is a risk that the snood will recoil towards the vessel (and operator).

To avoid snood breakage always **inspect the capsule for evidence of a hook-up each time the capsule returns to the HOME position. If there is a hook-up, cut the snood at the hook without delay.**



If an emergency situation arises that presents a threat of injury to crew members, or damage to equipment immediately press the emergency stop button on the deck service box.

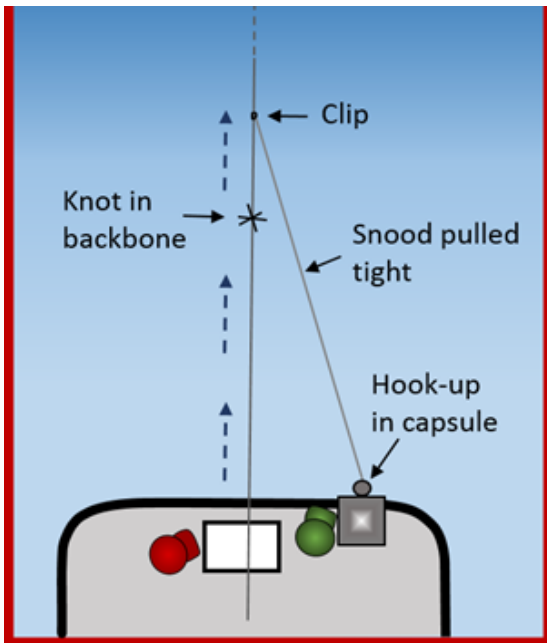


Figure 4.1. Position of the snood following a hook-up in the capsule. Hook-ups are identified at the end of a cycle, when the capsule has returned to the HOME position.

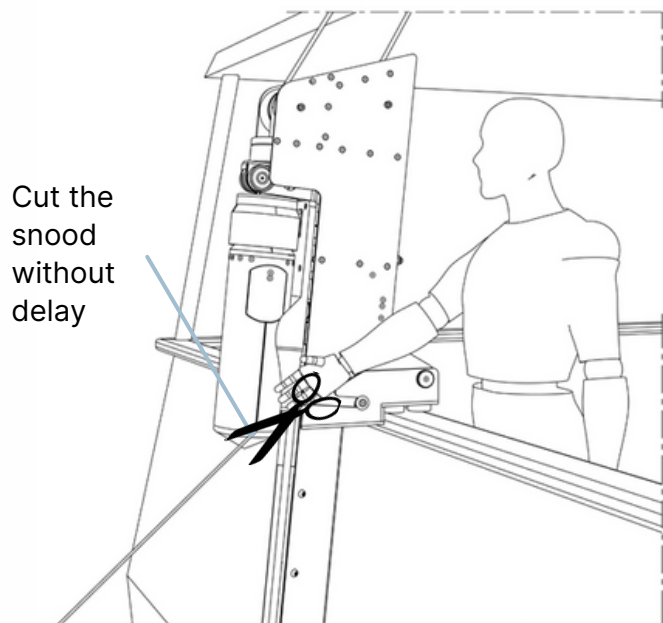


Figure 4.2. If a hook-up occurs, cut the snood without delay.



4.3 Snood management

It is important that crew members manage snoods correctly to ensure safety. Snoods should be outboard of the stern and clear of crew members before the cycle button is pressed (Figure 2.15).



DO NOT press cycle button if the snood is not outboard of the stern.

DO NOT press cycle button if the snood is near a crew member and could become tangled.

4.4 Handling the capsule safely

The capsule should sometimes be stored separately from the head unit. The capsule weighs 13kg, so **great care must be taken to avoid injury when lifting or carrying it**, especially on a slippery, moving deck. Use the capsule manipulator to carry the capsule.



If an emergency situation arises that presents a threat of injury to crew members, or damage to equipment **immediately press the emergency stop button on the deck service box.**

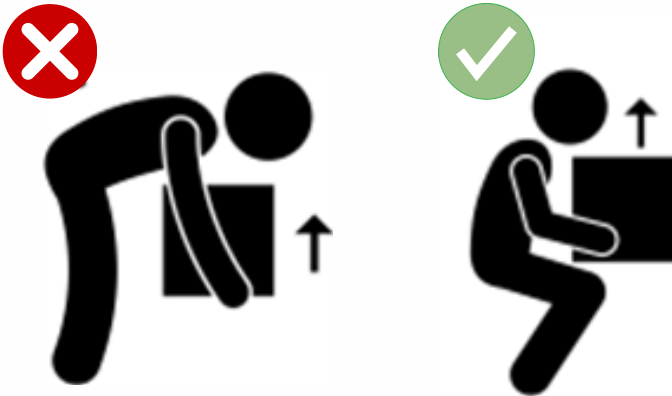


Figure 4.3. Lift capsule correctly.

Extreme care should be taken when engaging the capsule with the nose cone of the traveller. Step 9 in section 2.1 of this user guide explains how to do this. Make sure hands are always kept clear of the area between the capsule and the nose cone (Figure 4.4).



Avoid putting your hand in this area.

Figure 4.4. Keep hands clear of the area between the capsule and nose cone (indicated by the blue arrow).



4.5 Crew member fatigue

The UBS is suitable for longline operations with continued use for several hours at a time. However, if crew members operating the UBS become tired, safety may be compromised. If this does happen cease operations or swap crew members. A schedule to rotate crew members operating the UBS could be implemented to help reduce fatigue. A job rotation schedule should take into account factors such as environment, sea state and time of day.

4.6 Unstable work platform

Commercial fishing is inherently dangerous. The environment, sea state and the unstable work platform of a moving vessel increase the dangers of working with mechanical equipment with fast moving parts.

It is important to maintain a high level of safety awareness during all Underwater Bait Setter operations!

If you are not confident in the use of the Underwater Bait Setter, DO NOT OPERATE

If you have any concerns about the safety of using the Underwater Bait Setter, DO NOT OPERATE



4.7 Personal protective equipment (PPE)

Safety glasses and protective gloves must be used while operating the UBS.

Crew members may be exposed to the elements during use and must take steps to ensure their wellbeing and their ability to pay attention to safety. This should include sun and weather protection, adequate clothing, nutrition and hydration to ensure continued safe operations during line setting.



Figure 4.5.
PPE required when operating the UBS.

If an emergency situation arises that presents a threat of injury to crew members, or damage to equipment immediately press the emergency stop button on the deck service box.





5

Troubleshooting

A basic understanding of how the Underwater Bait Setter works is important when trying to trouble shoot any issues.

The UBS is an electromechanical hydraulic-assisted device. The system consists of two hydraulic motors and winches controlled by a primary control unit (Programmable Logic Controller (PLC)), which is mounted inside the winch box. During operations, data from sensors distributed throughout the UBS (rotary encoders, deck service box and control box) is directed to the PLC. The PLC interprets the data to control the system hydraulics.

5.1 Underwater Bait Setter has stopped mid cycle or recovery from activation of emergency stop

If the UBS stops mid cycle or the emergency stop button is pressed, the capsule must be retrieved and returned to the traveller, and then to the HOME position.

The recovery method depends on whether:

- 1 The capsule is sitting with the traveller on the track, or
- 2 The capsule is separated from the traveller.

5.1.1. Capsule and traveller are together

- 1 Press the emergency stop button on the deck service box.
- 2 Release the emergency stop button on the deck service box.
- 3 The re-set PLC screen will appear on the deck service box. Select enter. Acknowledgment of the PLC being reset is shown in Figure 5.1.
- 4 Press the menu button on the bottom left corner of the deck service box.
- 5 Select run mode on the deck service box. The capsule and the traveller will slowly return to the HOME position. Important, see section 6.2.3 run mode for more details about the using run mode.



5.1.1. Capsule and traveller are together (continued)

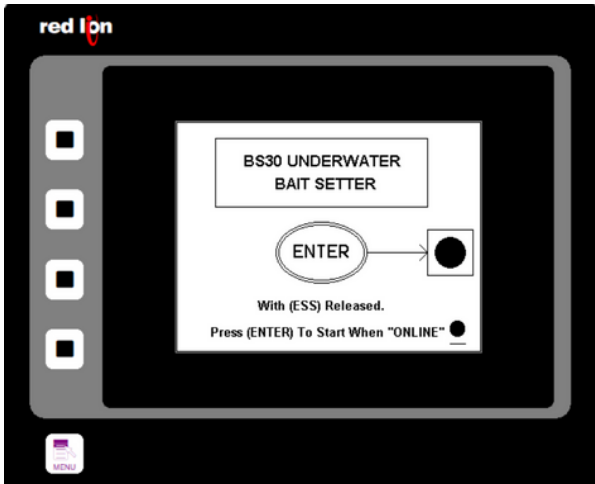


Figure 5.1. Confirmation of pressing enter button, on touch screen of deck service box.

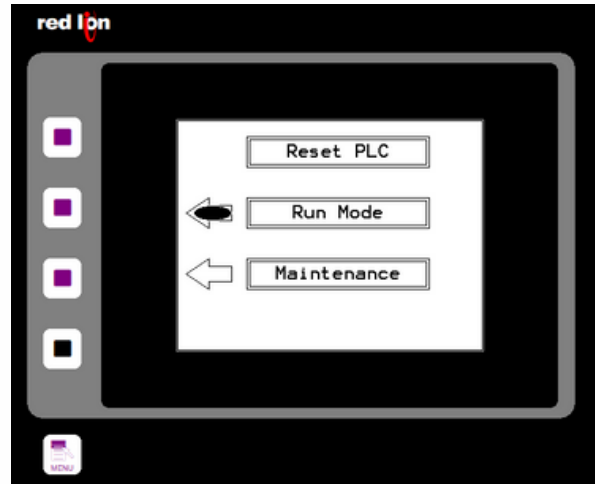


Figure 5.2. Confirmation of run mode selection on the deck service box.

5.1.2. Capsule and traveller are separated

- 1 Press the emergency stop button on the deck service box.
- 2 Release the emergency stop button on the deck service box.
- 3 The re-set PLC screen will appear on the deck service box. Select enter. Acknowledgment of the PLC being reset is shown in Figure 5.1.
- 4 Press the menu button on the bottom left corner of the deck service box.
- 5 Select maintenance mode on the deck service box (Figure 5.3).

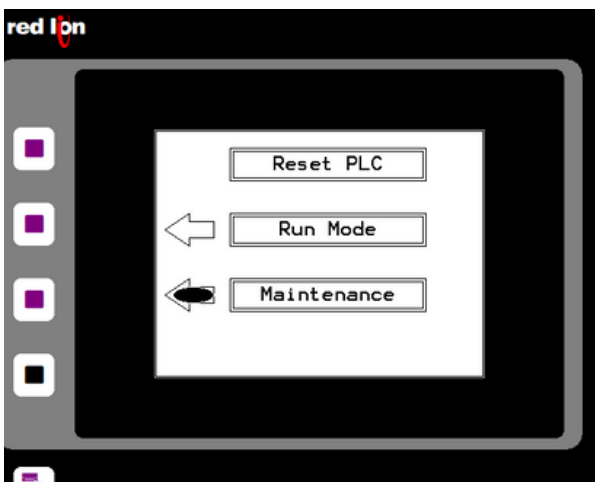


Figure 5.3. Confirmation of maintenance mode selection on the deck service box.

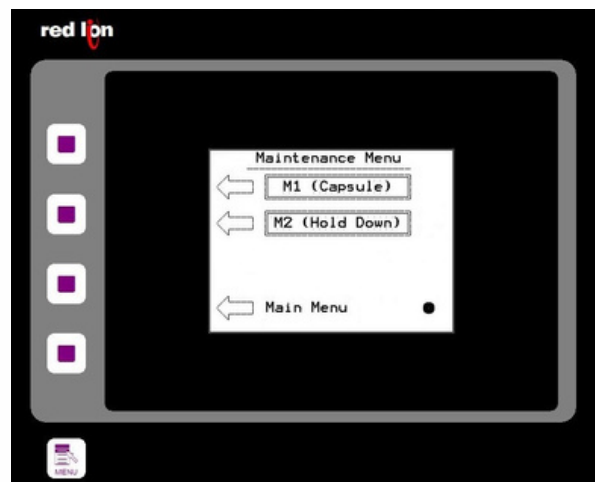


Figure 5.4. The maintenance menu page on the deck service box.



5.1.2. Capsule and traveller are separated (*continued*)

- 6 Select M1 capsule and press M1 – free wheel and wait a few seconds for a black circle to appear on the right, then press engage and wait a few seconds for a second black dot to appear alongside the first one (Figure 5.5). Now press the cycle button (the capsule needs to be trailing the stern of the vessel by at least 5 metres).

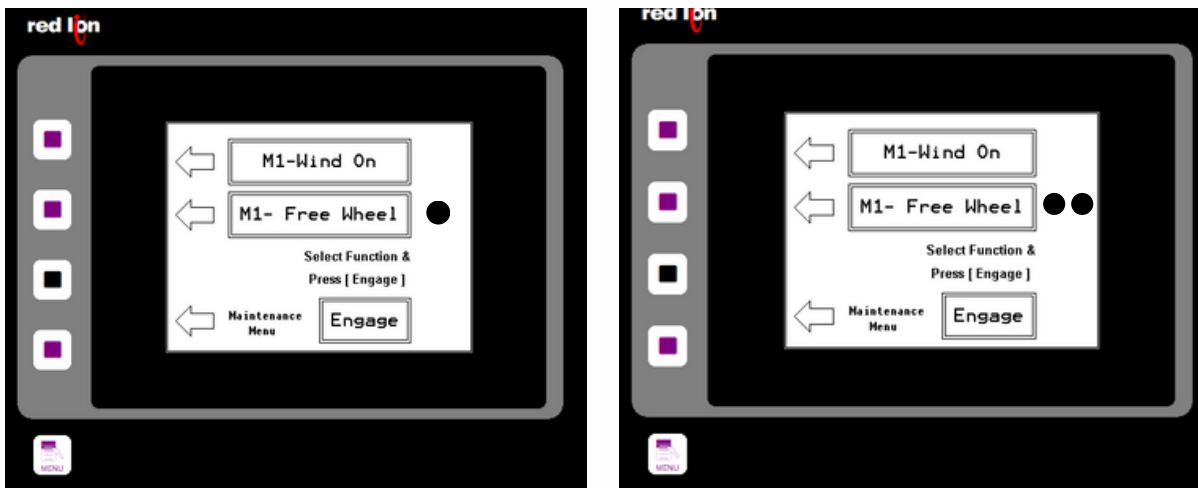


Figure 5.5. Selecting M1 free wheel on the deck service box

- 7 Go back to the maintenance menu (Figure 5.4) and select M2 hold down. Press M2 – wind on and wait a few seconds for a black circle to appear on the right, then press engage and wait a few seconds for a second black dot to appear alongside the first one (Figure 5.6). Now press the cycle button which will take the traveller to the bottom of the track.

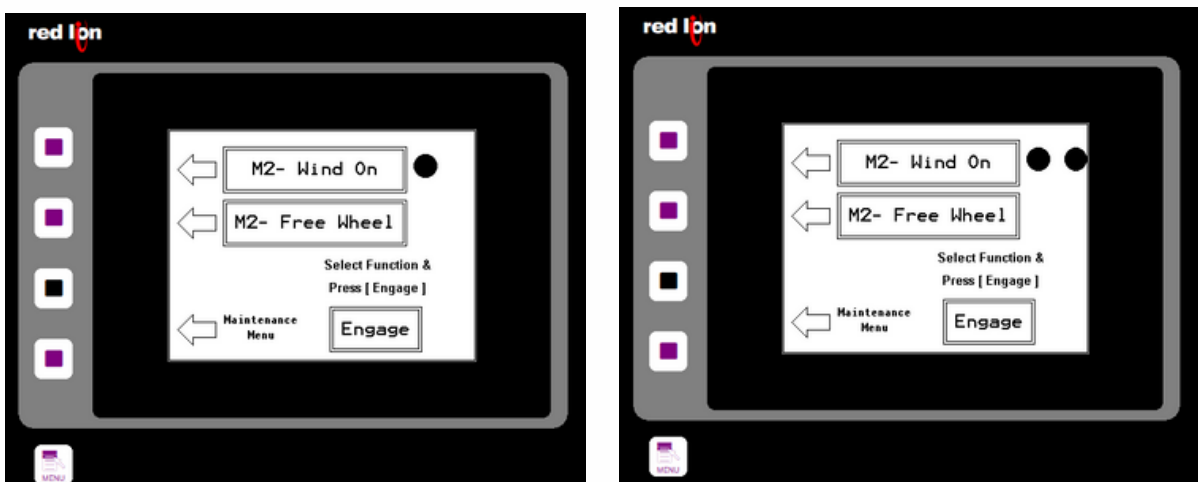


Figure 5.6. Selecting M2 wind on, on the deck service box



5.1.2. Capsule and traveller are separated (continued)

- Go back to the maintenance menu (Figure 5.4) and select M1 capsule. Press M1 – wind on and wait a few seconds for a black circle to appear on the right, then press engage and wait a few seconds for a second black dot to appear alongside the first one (Figure 5.7). Now press and hold the cycle button. This will bring the capsule back to the traveller. Stop pressing the cycle button as soon as you hear the capsule engage with the traveller. The M1 recovery rope will stop moving once the capsule engages with the traveler.

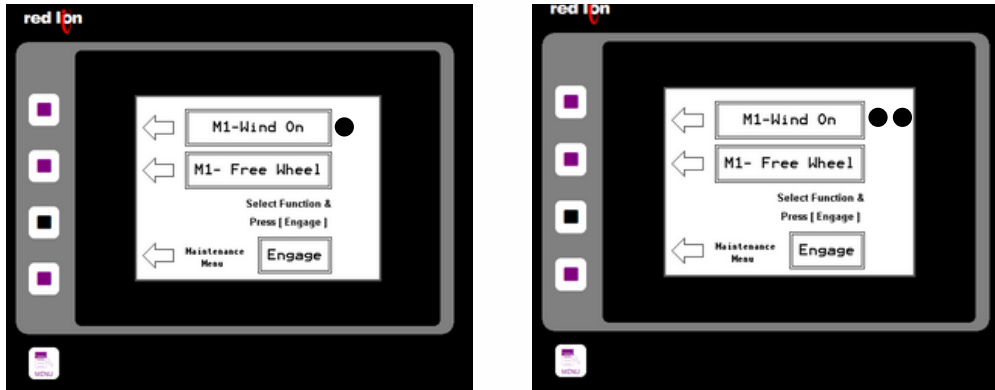


Figure 5.7. Selecting M1 wind on, on the deck service box

- Press the menu button on the bottom left corner of the deck service box.
- Select run mode on the deck service box (Figure 5.2). Both the capsule and the traveller will slowly return to the HOME position. Important, see section 7.2.3 run mode for more details about using run mode.

5.2 Hook-ups

Hook-ups occur when baited hooks get caught in the capsule, and return to the boat. The UBS has been designed to minimise the chances of this occurring, but if baits have been loaded incorrectly it may happen.

Section 2.3 explains how to manage and deal with hook-ups.

Sections 4.1 and 4.2 explain how to manage bait loading in order to avoid hook-ups.

5.3 Line entanglements

Line entanglements occur when fishing gear becomes tangled with the UBS. Although the UBS has been designed to minimise the chances of line entanglements happening, it may occasionally occur. The most common cause of line entanglements is the snood becoming caught between the traveller and the track, due to poor snood management.

Sections 2.3, 4.1. and 4.2 explain how to manage snoods to prevent line entanglement.



6

Underwater Bait Setter controls

As outlined in section 1.3 there are three separate control boxes for the Underwater Bait Setter.

The **control box** is an interface to the PLC in the winch box and is used to set operational parameters and log and record data. It provides the skipper with a visual display of the operations of the UBS during use.

The **deck service box** is used by the crew member operating the UBS to select modes of operation (e.g. run or maintenance mode).

The operation of the UBS is controlled via a combination of the deck service box and the cycle button on the head unit.

The **winch box** is the central control hub (Programmable Logic Controller (PLC)) where all information is processed. It controls the solenoids that run the UBS hydraulics and is only accessible to a qualified technician.

6.1 Control box

The control box is used to:

- 1 Input information to control operational parameters.
- 2 Display information to help manage the operation.
- 3 Record and log operating parameters (location, date, time and depth setting).

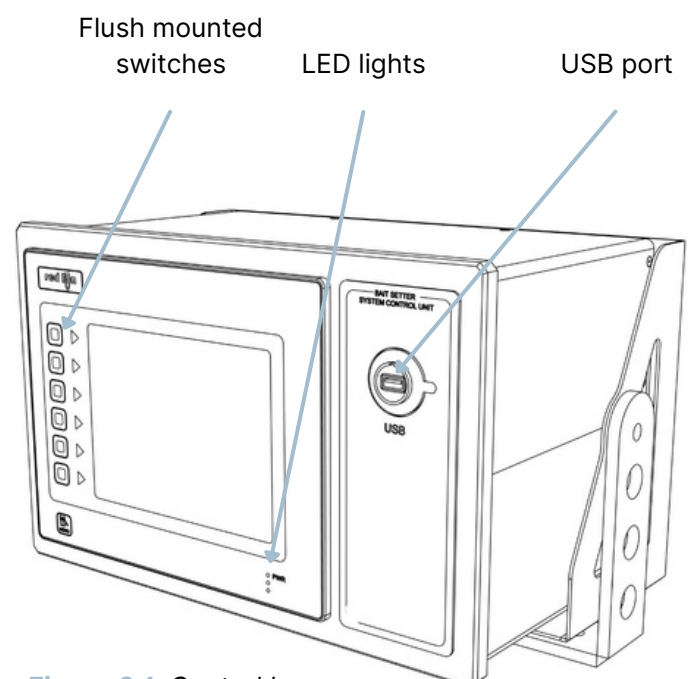


Figure 6.1. Control box



The front of the control box is a colour touch screen. Running down the left-hand side of the touch screen is a series of flush-mounted switches. Systems data and power is fed in via a socket on the back. Beside this socket are two panel mounted fuse holders (a 3.15 AMP fuse for the screen and a 2.5 AMP fuse for the GPS receiver). On the top right of the control box is a USB port for downloading logged data (Figure 6.1).

In the bottom right-hand corner of the control box are three LED lights, which indicate power, USB card storage status and alarm status (Figure 6.1). These can be interpreted using Table 6.1.

Table 6.1. Interpreting the LED lights on the control box.

LED	INDICATION
RED (TOP, LABELED "PWR")	
FLASHING	Unit is in the boot loader, no valid configuration is loaded. ¹
STEADY	Unit is powered and running an application.
YELLOW (MIDDLE)	
OFF	No CompactFlash card is present.
STEADY	Valid CompactFlash card present.
FLASHING RAPIDLY	CompactFlash card being checked.
FLICKERING	Unit is writing to the CompactFlash, either because it is storing data, or because the PC connected via the USB port has locked the drive. ²
FLASHING SLOWLY	Incorrectly formatted CompactFlash card present.
GREEN (BOTTOM)	
FLASHING	A tag is in an alarm state.
STEADY	Valid configuration is loaded and there are no alarms present.

Input of information to set operational parameters is covered in section 2.2. These need to be reviewed each time the line is set and changed if necessary.



6.1.1. Control box — home screen

When the UBS is powered, the home screen will appear on the control box (Figure 6.2). Pressing the top button to the left hand side of the touch screen takes the user back to the previous screen. Pressing the bottom button takes the user forward. All time displays on the control box and logged recordings are in 24 Hour UTC time, but pressing Setup Info on the touch screen gives information on the time stamps (UTC or local) being used.

Pressing the menu button on the bottom left of the button panel brings up the menu screen (Figure 6.3).

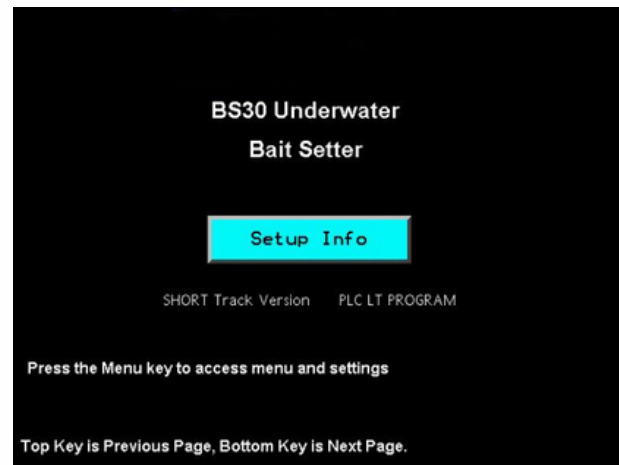


Figure 6.2. Home screen on the control box

6.1.2. Control box — menu screen

The menu screen is shown in Figure 6.3:

- Current settings displays the operational parameters that have already been set.
- Make settings display the screen where operational parameters can be set.
- Alarm page displays current alarms and is useful for troubleshooting and diagnostics.
- Course trend displays information on vessel course. This page is not active in the current version.
- Event page displays a list of actions that have been performed by the machine, and is useful for troubleshooting and diagnostics.
- Eng adjustments is accessed by password only and provides access to functions which change the engineering parameters in the system. These adjustments are made by the engineer during installation and should not need further adjustment during routine use.



Figure 6.3. The menu screen on the control box.



6.1.3. Control box — current settings screen

The current settings screen (Figure 6.4) displays the operational parameters set in the Underwater Bait Setter as well as the GPS positions and a graphical view of the Underwater Bait Setter when operating. A series of LEDs at the bottom of the screen reflect operational status of the Bait Setter. No settings are made on this screen.

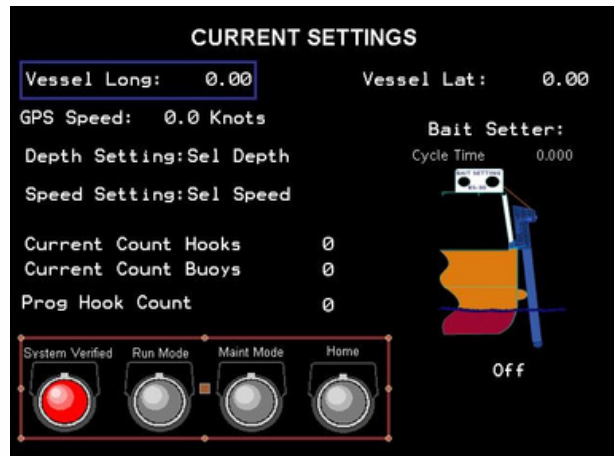


Figure 6.4. Current settings screen on the control box

6.1.4. Control box — make settings screen

The make settings screen (Figure 6.5) allows the operator to control the settings for hook release depth and vessel setting speed. Both of these are critical to proper functioning of the Underwater Bait Setter to correctly feed the capsule and line out, and achieve the cycle times.

Pressing any of the depth or speed buttons changes the colour of the selected button to red. This indicates that the PLC has received the setting and it is active (Figure 2.12).

The target depth is the depth at which baited hooks are released from the capsule. There are three depth settings: shallow (6m), medium (8m) and deep (10m). Depth setting is covered in detail in section 2.2 and 2.3.

The vessel speed setting is important because the pay out rate of the M1 is varied to compensate for vessel speed. The setting should be the same as the vessel speed during line setting operations. Depth setting is covered in detail in section 2.2 and 2.3.

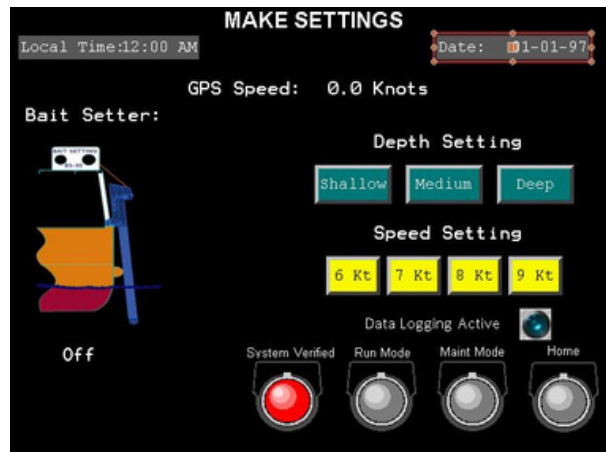


Figure 6.5. Make settings screen on the control box



6.1.5. Control box — alarms page screen

This page is useful for troubleshooting, as it displays active alarms. You may be asked to view this page by technicians in order to diagnose issues.

6.1.6. Control box — course trend screen

Vessel course is shown in a graphical format. This feature is not active in the current version.

6.1.7. Control box — event page screen

This page displays critical events and is useful for troubleshooting. You may be asked to view this page by technicians in order to diagnose issues.

6.1.8. Control box — engineering adjustments screen

This page is accessed by password only. It provides access to the engineering adjustments required to fine tune Bait Setter operation during installation. These adjustments enable the Bait Setter to be fitted to a wide variety of vessel types.

6.1.9. Control box — download data

The SD Card in the Control Box records date, cycle time, depth, longitude, latitude and GPS speed each time the unit is cycled. The SD card will hold at least one year of operational data and as the card fills, old data is removed and new data is logged. Data is logged in CSV format.

To download the data, insert a USB stick into the USB port on the front panel of the control box. When you insert the USB you will see the USB flash twice, the second flash indicates a successful download, and the USB can be removed. The control box will make two chiming noises in time with the flashes to indicate a successful download. The USB stick contains a CSV file which can be viewed in Microsoft Excel. The CSV file will be located in a folder named RUNLOG. The depth is represented by either a 1, 2 or 3:

- 1 = Shallow (6m)
- 2 = Medium (8m)
- 3 = Deep (10m)

Speed is written in knots (6kt, 7kt, 8kt and 9kt).



6.2 Deck service box

The deck service box allows the operator to select different modes of operation, depending on what is needed. All actions of the Underwater Bait Setter are activated and controlled via a combination of the deck service box and the cycle button on the head unit. The deck service box is a black-and-white touch screen, mounted on the front of a stainless steel enclosure. Running down the left-hand side of touch screen is a series of flush mounted selection keys. Mounted in the bottom of the enclosure is a socket by which systems data and power is fed into the deck service box.

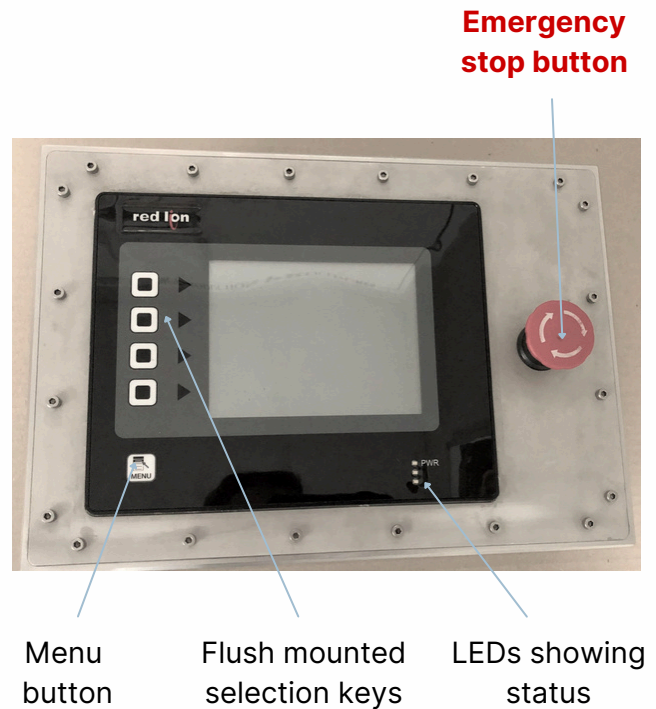


Figure 6.6. Deck service box

Located on the front panel of the enclosure is a red emergency stop button, which can be pushed at any time to top the UBS moving. For this reason, the deck service box is mounted within easy reach of the operator.

There is no power switch on the deck service box. Turning on the power supply box automatically turns on the deck service box. The emergency stop button is not a power switch.

In the bottom right-hand corner of the black and white touch screen are 3 LED lights, which indicate power, USB storage status and alarm status. These can be interpreted using Table 6.2. The deck service box does not hold a storage card so the middle orange LED should remain off.

The deck service box allows the UBS to be operated in two different modes, run mode and maintenance mode. Run mode is used for normal gear setting operations and maintenance mode for maintenance or for recovery of gear in the event of a line tangle or system failure. Maintenance mode allows for independent control of the M1 and M2 winch units.



Table 6.2. LED light displays and meanings for the deck service box.

LED	INDICATION
RED (TOP, LABELED "PWR")	
FLASHING	Unit is in the boot loader, no valid configuration is loaded. ¹
STEADY	Unit is powered and running an application.
YELLOW (MIDDLE)	
OFF	No CompactFlash card is present.
STEADY	Valid CompactFlash card present.
FLASHING RAPIDLY	CompactFlash card being checked.
FLICKERING	Unit is writing to the CompactFlash, either because it is storing data, or because the PC connected via the USB port has locked the drive. ²
FLASHING SLOWLY	Incorrectly formatted CompactFlash card present.
GREEN (BOTTOM)	
FLASHING	A tag is in an alarm state.
STEADY	Valid configuration is loaded and there are no alarms present.

6.2.1. Reset screen

When the power supply box is turned on the deck service box will power up and display the reset screen (Figure 6.7).

To link the deck service box to the control box and the winch box, check the emergency stop button is in the release position and press enter on the touch screen. Confirmation of this action is acknowledged via a large black circle inside a square box located to the right-hand side of the enter button (Figure 6.8).

The deck service box can now be used by pressing the menu button located on the bottom left-hand corner of the box (Figure 6.6).



Figure 6.7. The "Reset" screen on the deck service box.



Figure 6.8. Confirmation of action on reset screen of deck service box.



6.2.2. Main menu

The main menu screen on the deck service box is where the mode of operation (run or maintenance) is selected (Figure 6.9). This is done by either selecting the desired mode on the touch screen, or pressing the second (run mode) or third (maintenance mode) button on the left-hand side of the touch screen. Confirmation of mode selection comes via a solid black elliptical shape located inside the arrow to the left of the run or maintenance mode boxes on the screen (Figures 6.10 and 6.11).

A second press of either run mode or maintenance mode buttons will take you through to the selected mode. Pressing reset PLC at the top of the touch screen (Figures 6.10 and 6.11) will take you back to the reset screen (section 6.2.1).

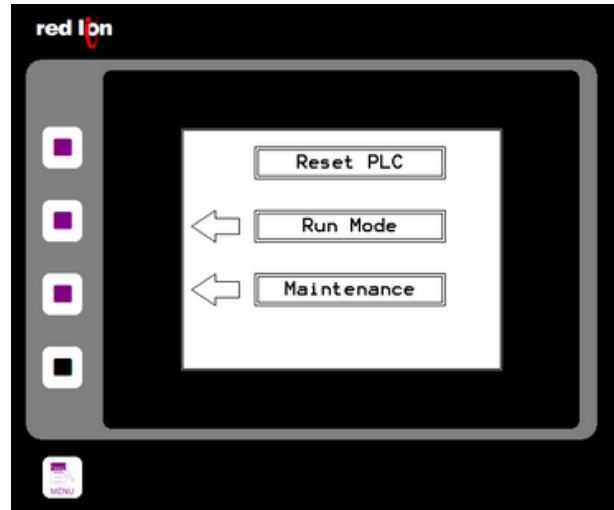


Figure 6.9. Main menu screen on the deck service box.

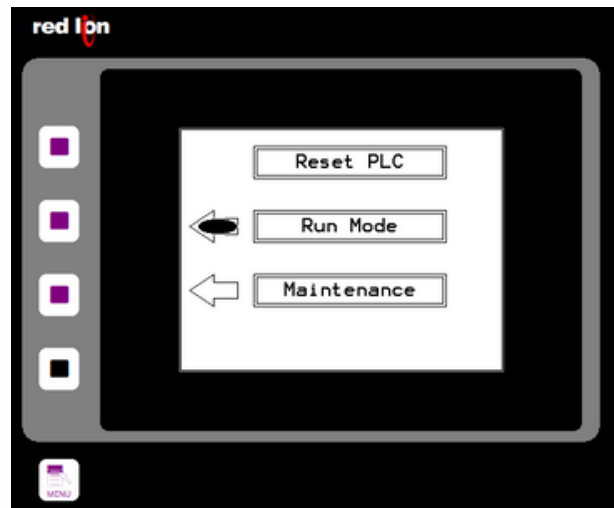


Figure 6.10. Confirmation of run mode selection on the deck service box.

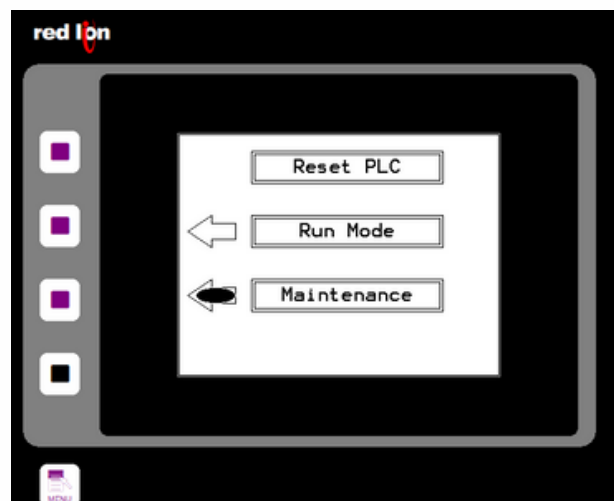


Figure 6.11. Confirmation of maintenance mode selection on the deck service box.



6.2.3. Run mode

Run mode is for normal line setting operations. The following explains what happens when run mode is selected:

Assessment of whether the traveller and capsule are in the HOME position is done via the HOME sensor:

- a. If the traveller and capsule are in the HOME position, then positive confirmation is sent to the PLC, initiating machine status R.T.O. (ready to operate) (Figure 6.13).
- b. If the traveller and capsule are not in HOME position, then the system defaults to the following:
 - M2 motor free wheel
 - M2 brake release
 - M1 brake release
 - M1 motor drive

These settings will return the traveller and capsule to the HOME position, ready for operation, at a slow, controlled pace.

Once run mode is selected, one of two run cycle status screens will appear:

- 1 The UBS is cycling (i.e. being used for line setting) (Figure 6.12).
- 2 The UBS is ready to operate (R.T.O.) (Figure 6.13).

These two pages provide a visual indicator of what the UBS is doing and have no impact on operations. Return to the main menu (via the fourth button to the left of the touch screen) remains selectable at all times.

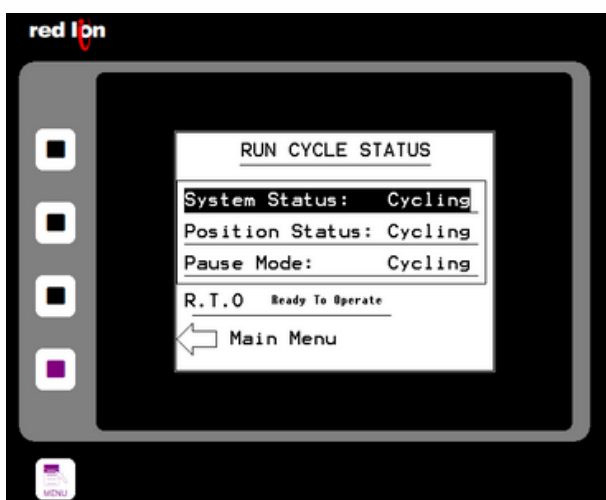


Figure 6.12. Run cycle status screen showing the machine is cycling.

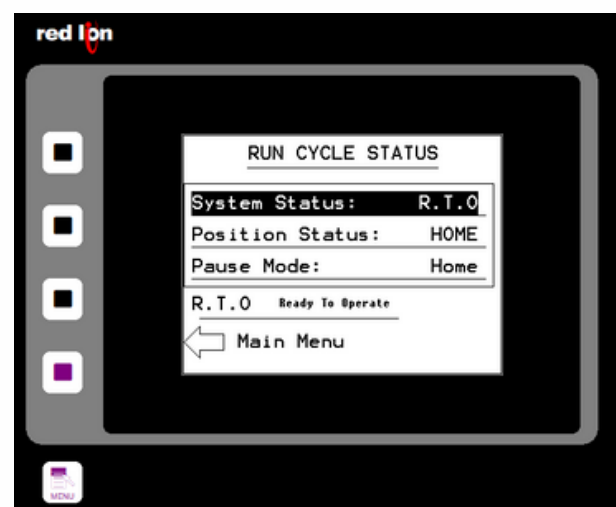


Figure 6.13. Run cycle status screen showing ready to operate status.



6.2.4. Maintenance mode

Maintenance mode is used for routine maintenance, as this mode allows for independent control of the M1 and M2 winches. When maintenance mode is selected the UBS defaults to:

- M1 Brake on
- M2 Brake on

This means all functions are secured and locked, and the maintenance menu can be used to manually operate different parts of the UBS.

6.2.4.1 Maintenance menu

From the maintenance menu screen either M1 (capsule) or M2 (hold down) can be selected (Figure 6.14). Returning back to the main menu is also selectable.

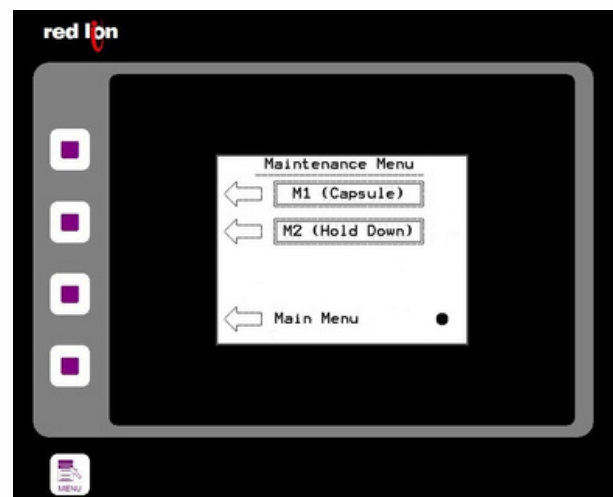
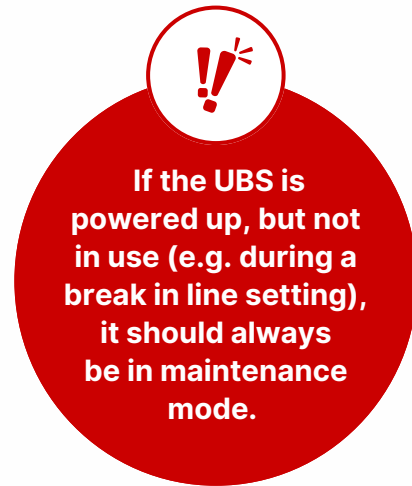


Figure 6.14. Maintenance menu screen on the deck service box.



6.2.4.2 M1 (capsule)

The operation of the M1 (capsule) winch can be controlled from this screen (Figure 6.15), which is reached by selecting M1 capsule from the maintenance menu screen (Figure 6.14) by pressing twice.

The M1 rope can be either free wheeled (M1 free wheel) or the M1 winch can wind on the rope (M1 - wind on).

The desired function is selected on the touch screen, by pressing the chosen function, or using the first or second button on the left-hand side of the screen (Figure 6.15).

Confirmation of selection comes via a black dot on the right of the box identifying the function on the screen (Figure 6.16).

Next, press the engage button on the touch screen. Confirmation of engagement comes via two black dots (Figure 6.17).

To control the selected function use the cycle button on the head unit.

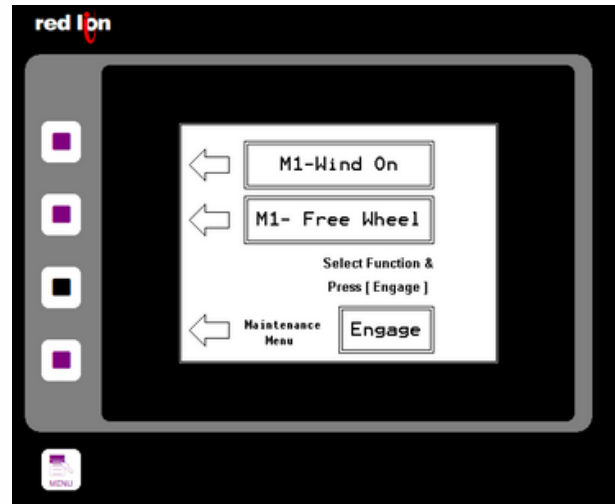


Figure 6.15. M1 maintenance mode screen on the deck service box.

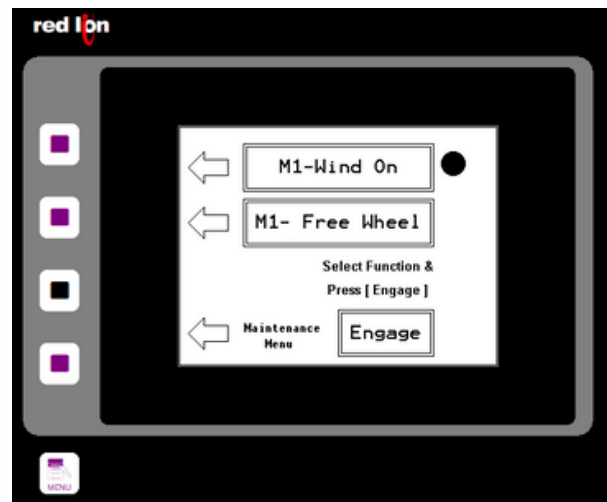


Figure 6.16. M1 wind on selected.

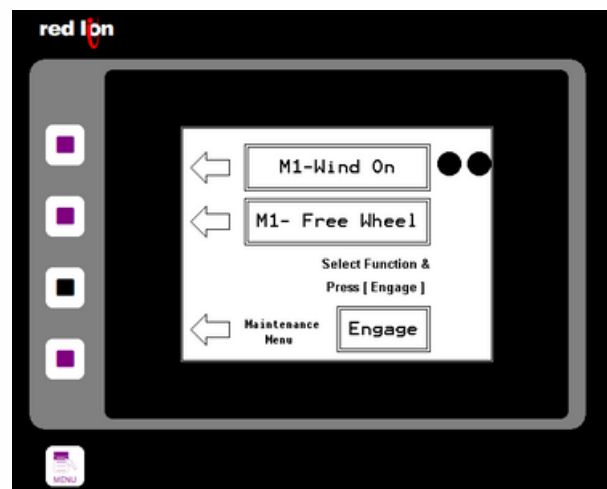


Figure 6.17. M1 wind on engaged.



6.2.4.3 M2 hold down

The operation of the M2 (hold down) winch can be controlled from this screen (Figure 6.18), which is reached by selecting M2 (hold down) from the maintenance menu screen (Figure 6.14) by pressing twice.

The M2 rope can be either free wheeled (M2 free wheel) or the M2 winch can wind the rope on (M2 - wind on).

The desired function is selected on the touch screen, by pressing the chosen function, or using the first or second button on the left-hand side of the screen (Figure 6.18).

Confirmation of selection comes via a black dot on the right of the box identifying the function on the screen (Figure 6.19).

Next, press the engage button on the touch screen. Confirmation of engagement comes via two black dots (Figure 6.20).

To control the selected function use the cycle button on the head unit.

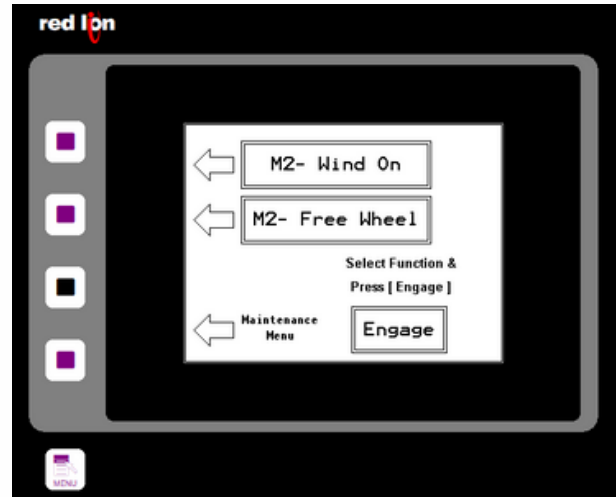


Figure 6.18. M2 maintenance mode screen on the deck service box.

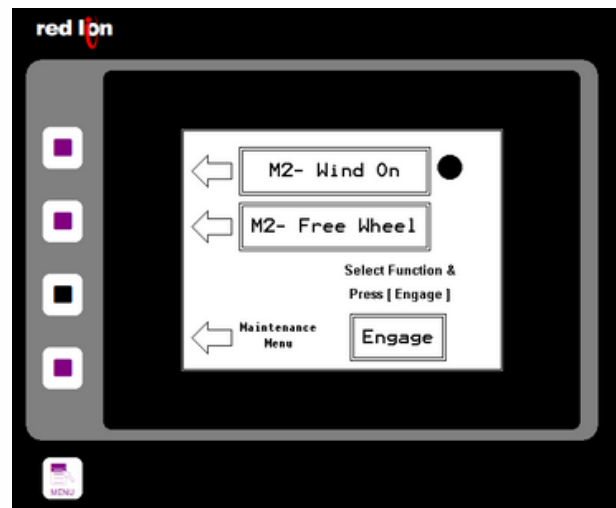


Figure 6.19. M2 wind on selected

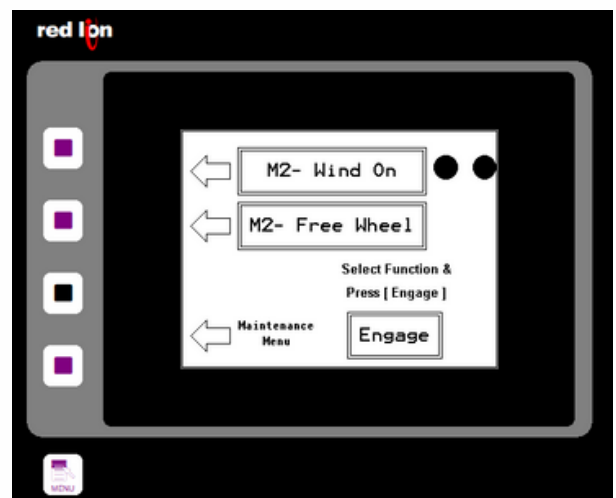


Figure 6.20. M2 wind on engaged.



7

Version control

Version	Notes
1.0 DRAFT	First draft - August 2024
1.1 DRAFT	Second draft - September 2024
1.2	Third draft - October 2024



Videos



1 Introducing the UBS



2 Starting the UBS



3 Getting ready for operations



4 Line setting



5 Shutting down the UBS



6 Getting the most out of the UBS



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