

Manual

sMRT SARFinder
SARFinder
Transportable



Providers of the leading Mobilarm and Sea Marshall brands of Man Overboard solutions

Contents

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Technical Data - SARFinder MKIII

➤ Control Box Dimensions	165x95x65mm - Aluminium Box (excluding antenna & connectors)
➤ Control Box Weight	1000gms
➤ Mounting Options	Surface 210mm x 146mm (Opt 1)
	○ Bracket 260mm (Opt 2) weight 1000gms
➤ Antenna Base Dimensions	550 mm H x350mm W - PVC Plastic
➤ Antenna Base Weight	950gms
➤ Antenna Pole Mounting Bkt	50mm Internal Dia
➤ Temperature range	-20°C + 55°C (Operational)
➤ Bandwidth	25 KHz
➤ Modulation	AM
➤ Ports	DC12V Power Cable (1m) Antenna Cable (20m)
➤ Waterproofing	IPX67
➤ Sensitivity	3 dBuV/m (threshold of target bearing resolution)
➤ Frequencies	121.5 MHz, 121.65 MHz (Test 1), 121.775 (Test 2)
➤ Criteria of ELT/PLB recognition	Audible AM down-swept tone (compliant to ITU-R M.690-2)
➤ Audio output	max. 8Vss (speaker > 8 Ohm)
➤ Relay contact	Floating, carrying capacity max. 0.5 A/10W
➤ Current Consumption	Standby = 300mA – Tracking = 850mA – Alarming 1300 mA If alarm + ext. speaker (8 Ohm) = 400mA
➤ Operating Voltage	12V DC (with transient compliance to ISO 7637-2)
➤ Antenna Gain	1.4 dBi nominal
➤ Bearing detection method	Triangular phase delta
➤ Bearing resolution accuracy	±15° @ 10 dBuV/m maximum
➤	
➤ Antenna Triple Coax Cable	Impedence: 75 Ω
	○ Capacitance 60pF / m
	○ Attenuation / 10 m: 0.28 dB @ 1.5 MHz, 2 dB @ 100 MHz, 4.7 dB @ 500 MHz
	○ Attenuation / 100 m: 20 dB @ 100 MHz
	○ Diameter: 7.2 mm
	○ Operating temperature: -20 → +70 °C
	○ Coaxial Type : Triple RG179B/U
➤ Standards Tested to:	ETSI EN 301 489-1 V1.5.1 (2004-11)
	○ ETSI EN 301 489-22 V1.3.1 (2003-11)

Overview

Marine Rescue Technologies Ltd. is pleased to present this manual covering the Sea Marshall® SARFinder maritime survivor locating device receiver. The Sea Marshall® products are recognised as the industry standard for self managed safety alert & locate safety systems for commercial use. In this booklet you will find a product overview and operator instructions for the following products:

SARfinder® Self managed alert / locator safety system*

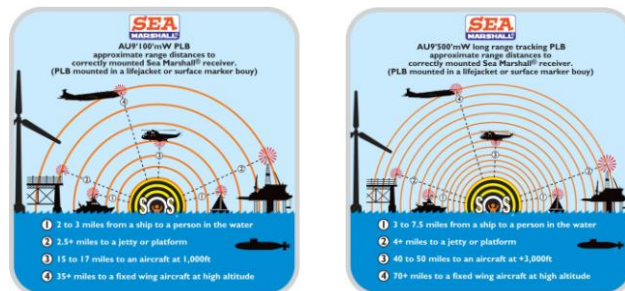
SARfinder® Transportable systems*

*AU9 Test Frequency Beacon 121.65 MHz (required for testing and training purpose, included)

Crewfix® NMEA Box.

So where do we start?What is a Maritime Survivor Locating Device?

A Maritime Survivor Locating Device is made up of 2 components which work together to create a Self-Managed Man over Board Safety System. These 2 components are referred to as **Alerting Units** (beacons/PLBs) and **Base Units** (receivers).

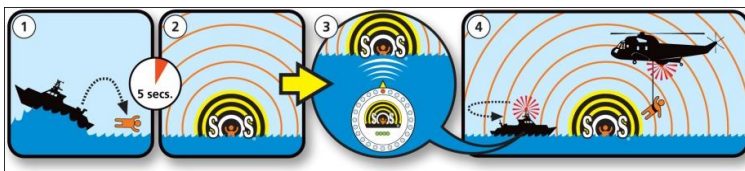


NOTE – the approximate tracking ranges listed are taken from tests where the receiver antenna has been correctly installed at the recommended height with the AU9 correctly fitted to an intelligent lifejacket. Wearing the AU9 around the neck will reduce the tracking/alerting ranges to below the ranges listed herein.

Alerting Units are personal transmitters, or personal locator beacons worn by each crew member or passenger. There is no restriction in the number of Alerting Units that can be used as part of a Sea Marshall® MSLD system. Below is an example of one type of Sea Marshall® Alerting Unit. The following pages describe Base Units (receivers).



SARfinder® 1003 locating system (MKIII)



The Sea Marshall® SARfinder® locating system continuously monitors for an SOS signal from a Sea Marshall® Alerting Unit, the system automatically alerts of a person in distress, automatically plotting the direction of the incident and allowing you to rapidly locate the missing person without calling on the Search and Rescue Services. This system is used by professionals on a daily basis to provide safety cover. Users included amongst others – River Pilots, Fishermen, Wind farm Operators, Geo-Survey Companies, Offshore Oil & Gas operators,

1.0 Sarfinder Component Parts

1.1 MOB Alerting Unit **LIVE AU9 (Model as required sold seperately)**

(A 121.65 **TEST** beacon is included for training and exercise purposes. The test beacon is identical to a live beacon with the exception that they are green in colour and transmit only on the test frequency.)

Image shown for representation only



1.2 SARfinder® control box display

Dedicated Man overboard alarm / locator Base Unit. Automatic immediate MOB alerting and tracking. LED MOB warning indicator. Easy to operate and install with user friendly controls. Waterproof IP-68 display. Approximate range indicator (near or far). High quality construction. Training frequencies 121.65MHz & 121.775MHz (TEST2). 12V Power (240V AC to 12V DC or 24V DC to 12V DC converters available). An external siren for loud audio MOB alerting is pre-wired to the power cable.



2.0 Antenna

Robust lightweight antenna with mounting brackets. Comes with 20m cable, plugs, fittings and 50mm mounting bracket.



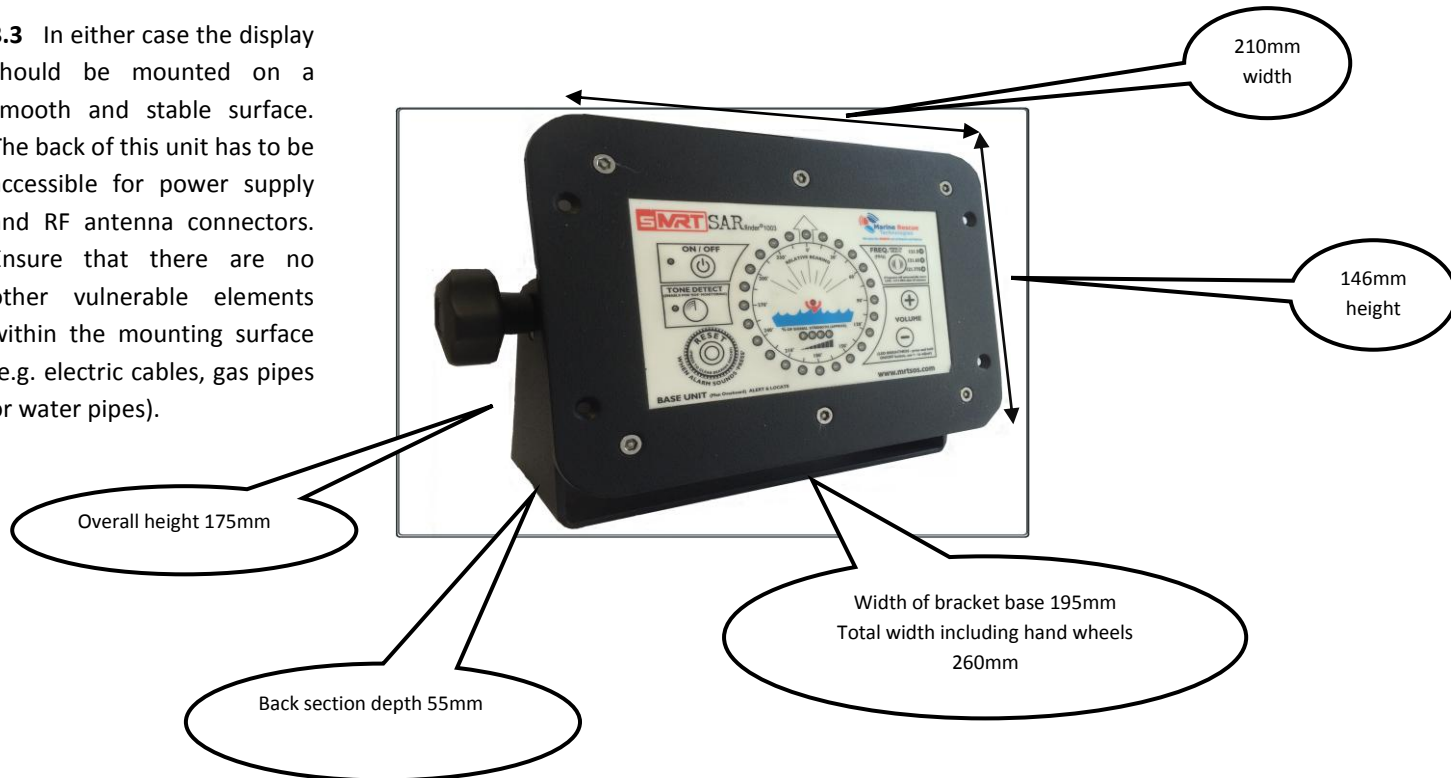
All the above components combine to create a self managed rescue system

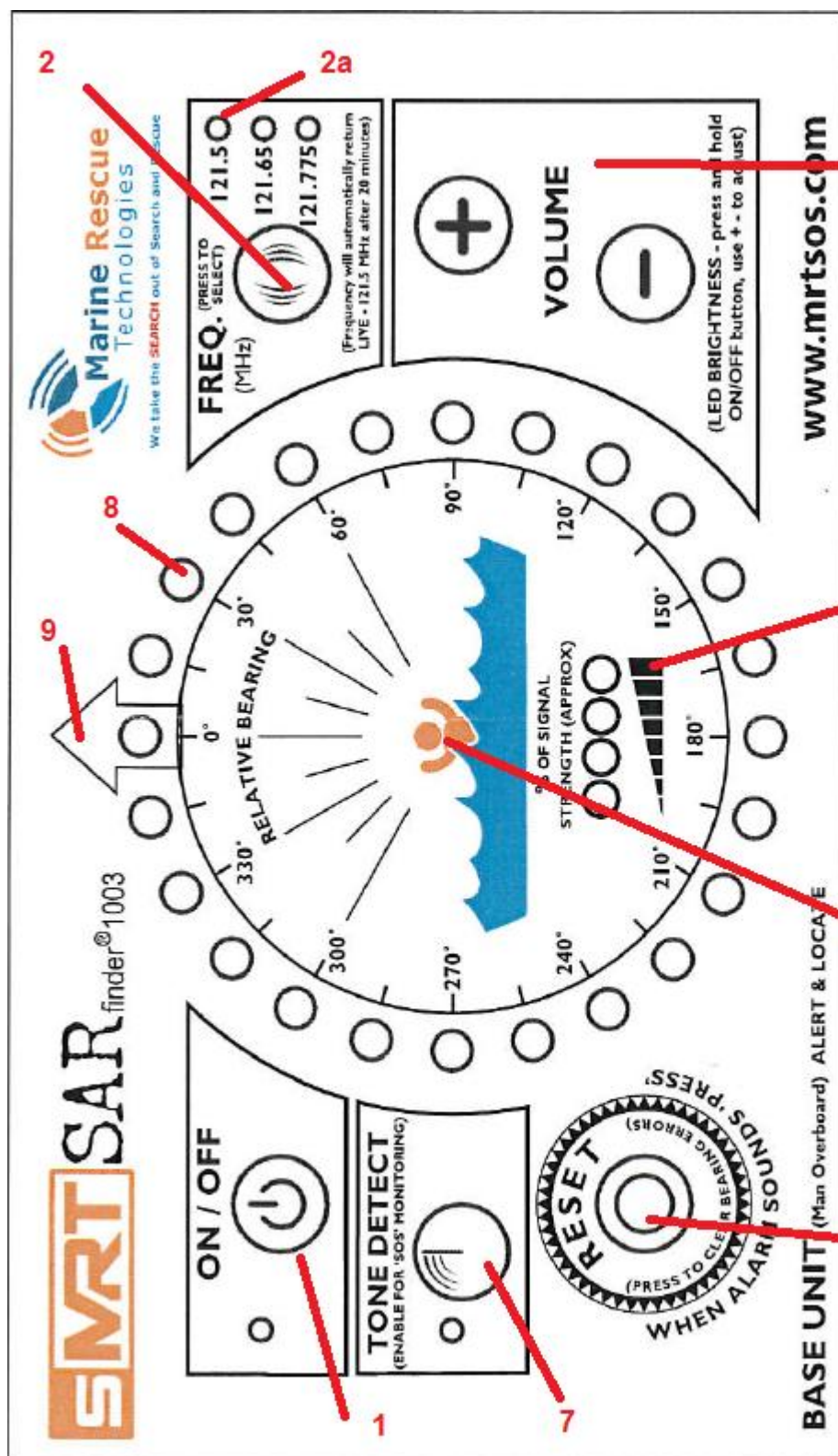
3.0 Mounting of the display unit.

3.1 The Bridge Box can be flush mounted by cutting a hole in the mounting surface. The unit can then be mounted using the four M4 nuts and bolts provided.

3.2 The Bridge Box unit can be used with the trunnion mount adjustable bracket that it comes fitted to. It can be fixed either above head height facing down or below head height facing up.

3.3 In either case the display should be mounted on a smooth and stable surface. The back of this unit has to be accessible for power supply and RF antenna connectors. Ensure that there are no other vulnerable elements within the mounting surface (e.g. electric cables, gas pipes or water pipes).





4.0 Display Key Functions.

ENSURE EACH CREWMEMBER IS FULLY FAMILIAR WITH ALL OF THE FOLLOWING OPERATING FUNCTIONS.

1. **Power:** PRESS and **HOLD** the ON/OFF button to activate the unit. Green LED indicates power ON.

2. **Frequency Select:** 1 button cycles 3 frequencies:

121.500 MHz = (LIVE Frequency, Internationally recognised SAR homing frequency).

2.a 121.650 MHz = Test.

121.775 MHz = Normally allocated for the Test 2 frequency.

A **GREEN** LED indicator will show the user the frequency selection they have made. If after **20 minutes** of selecting one of the test frequencies the user has not returned to 121.5 MHz, the unit will default back to 121.5 MHz automatically.

3. **Speaker Volume:**

The user will be able to adjust the speaker volume via two buttons; Volume Up and Volume Down. Reducing the volume below the audible limit turns off the speaker, increasing the volume from this point will turn the speaker back on. On power up the volume will be at its middle setting.

4 **RSSI:**

The received signal strength indicator (RSSI) consists of 4 **GREEN** LED's arranged horizontally in the centre of the display and gives an indication of approximate range to target.

5. **RSI:**

The received signal indicator (RSI) consists of a single **RED** LED in the centre of the display (the little red man symbol inside the SOS logo). **THIS LED COMES ON WHEN A PLB SIGNAL IS RECEIVED.** As an **Anti-Collision Warning indicator** the RSI will **FLASH ON & OFF** and the **four green LED's will be lit** when the target is within very close range.

6. **Reset:**

The reset button when pressed after an alarm activation puts the system into tracking mode, switches off the alarms, resets the internal relay but does not alter the selected frequency.

7. **Tone Detect:**

When the Tone Detect function is enabled the unit will only react to received signals containing the downward swept tone/modulation of a Sea Marshall® PLB thereby avoiding false alarms from rogue transmissions. A **GREEN** LED indicator will show this function is enabled. Also a 'no volt' relay output will be activated for operating external devices. In Tone Detect the unit is passive until an SOS signal is detected & recognised. Once an 'SOS' signal is detected the internal and external alarms will sound. At this point **PRESS THE 'RESET' BUTTON** and the unit will go into tracking mode showing the bearing of the 'SOS' signal relative to the ship's bow.

NOTE: THE SARfinder® IS DESIGNED TO BE USED IN NORMAL OPERATION/PLB MONITORING IN TONE DETECT MODE.

8. **Bearing LEDs:**

The Direction Finding (DF) display consists of 24 LED's giving a bearing resolution of 15°.

All bearing LED's are **RED** except for the LED at 0° which is **ORANGE**.

9. **Point to Bow**

This point marks the ship's bow.

IMPORTANT - IN THE EVENT OF A MAN OVERBOARD MOVING OUT OF RANGE OF THE SARfinder® SYSTEM, TAKE A BEARING TO SOS TARGET AT THAT POINT

LED BRIGHTNESS ADJUST

Switch the display on, press the **ON/OFF** button once quickly - press and let go (if you press and hold the SARfinder® will turn off), this puts the unit into brightness adjust mode: all LEDs will light up so you can see the brightness, use the **+ - VOLUME** adjust buttons to select the required brightness. To exit brightness adjust quickly press and release the **ON/OFF** button.

5.0 Installation of the SARfinder®

Antenna

5.1 Correct antenna positioning.

The position of the antenna array is of critical importance for the direction finding efficiency and effective range of the unit. The mounting position for the antenna should be as obstacle free as possible to avoid reflections and false readings. The antenna should be positioned approx 1.5m above any other metal or antenna.

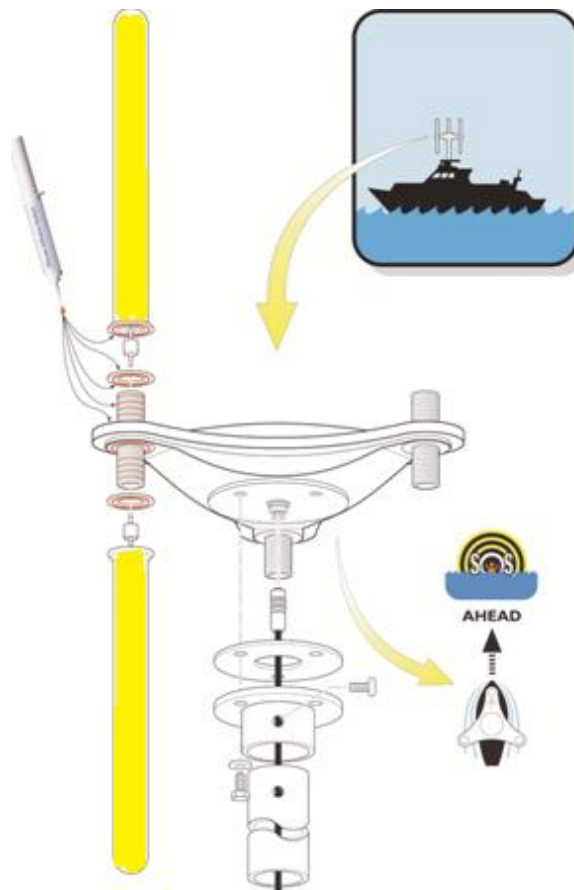
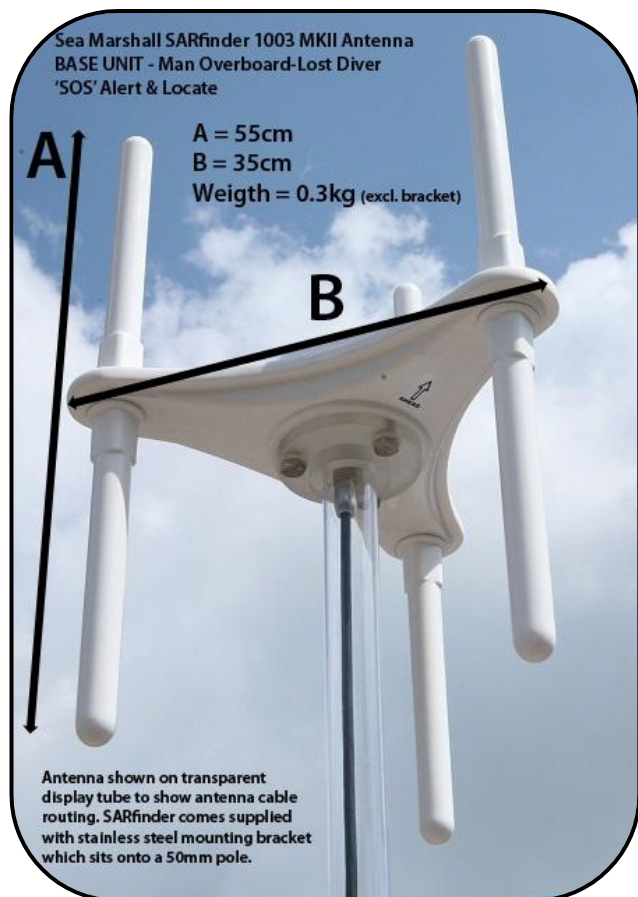
NOTE: The antenna has an 'AHEAD →' which must be aligned with ship's bow with the yellow tubes fitted also indicating 'AHEAD →'

The antenna should be mounted on a suitable mast tube with an outside diameter of 50mm, using the supplied bracket, round silicone anti-vibration mat, M10 fixing bolts and nylon washers.

5.2 Assembly of the antenna



WATERPROOFING THE ANTENNA - IMPORTANT



Yellow Tubes indicating AHEAD for Transportable only

Repeat application of silicon adhesive for each dipole
Check that each dipole is sealed with no gaps

6.0 Electrical Connections

6.1 The connections between the antenna array and display unit are routed via a 20m shielded cable. Connection to the display is internal via an IP-67 rated connector. The power supply and relay are also terminated inside the display enclosure via an IP-67 rated connector. To attach the power cable match up the 4 pin grey coloured power cable to the 4 pin connector on the back of the bridge box. To attach the antenna cable align the 7 pin cable connector to the 7 pin connector on the bridge box, the other end matches to the connector on the underside of the antenna body.



6.2 When installing the system first connect the control box to your power supply and connect all the cables in accordance with the instructions in this manual. Activate the system to check it is working correctly. This unit will run from a 12V DC power supply only, if your power supply is 24V DC or 120/240V AC you will need to install a step down transformer or converter (available from MRT Ltd.).

If the power supply on your vessel is unreliable, install an isolated power supply. The manufacturer cannot be held responsible for damage caused by wiring the unit into an incorrect power supply. Your warranty does not cover this.

6.3 WIRING FOR POWER PLUG/ UNIT POWER CONSUMPTION

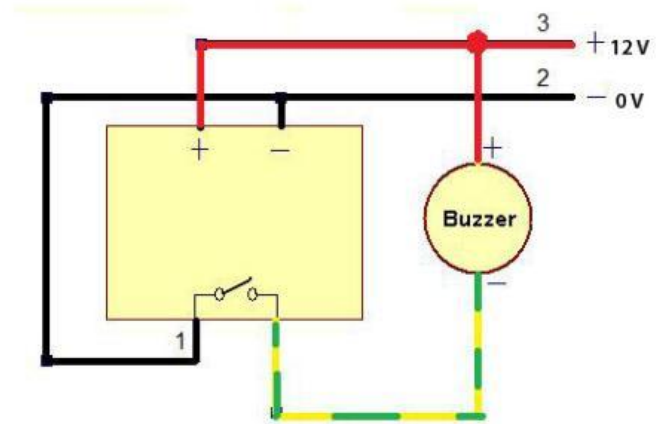
NOTE: each inner cable has the number marked on.

Pin	Cable Description	Cable Function
1	Black 1	Relay Contacts
2	Black 2	0V DC Negative

3	Black 3	12V DC Positive
4	Green/Yellow	Relay Contacts
Approx POWER CONSUMPTION FOR SARfinder® 1003		
ON – 120 mA		
ALARMING - 1200 mA		
RESET/SEARCH – 300 mA		

6.4 EXTERNAL ALARM

Your unit comes supplied with a small, very loud external siren pre-wired onto the power cable. This siren must be fitted if you are to rely on the SARfinder®1003 to raise the alarm by means of an audio alert. When an SOS signal is received the circuit identifies correct characteristics of a Sea Marshall® beacon transmission and activates the internal relay to trigger external circuits. The audio volume is activated and the display shows the SOS signal bearing. Press the RESET button to cancel the external alarm and the MOB bearing will be displayed. It is possible to connect the SARfinder to other external alarms however this may invalidate the warranty.



7.0 HOW TO USE THE SARFINDER®1003, STEP BY STEP

Switch on - Press and hold the **ON/OFF** button.



Press **TONE DETECT** (this will cancel all background noise).



Select **FREQUENCY** (Your SARfinder®1003 is now monitoring your chosen frequency).



When an SOS Signal is received the alarm will trigger.



Press **RESET** after alarm has sounded for few seconds. This will cancel the alarms and put the SARfinder®1003 in to tracking mode. Your unit will now display the direction of the SOS signal.



Bring the vessel around so the SOS direction **ORANGE** LED is lit on display.



Check the Received Signal Strength Indicator (RSSI) to see if the signal is near or far.



Move towards SOS target checking the RSSI, when the target is very close and all four RSSI lights are illuminated.



Slow the vessel down to a couple of knots.



The central red RSI light will begin to flash on and off when the target is within approx. 100-200m of the vessel.



Steer around the target and prepare your crew to recover the target.



The **RED** bearing LED on the direction finding display will now move quickly around the display as the vessel moves alongside the target.



Recover the target, switch OFF the PLB and repeat as required for next target.

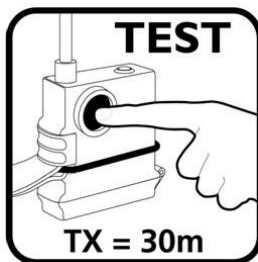
10.1 If for any reason you are unable to affect your rescue using the SARfinder® contact the Coast Guard and tell them you have a man in the water wearing a 121.5MHz PLB.

11.0 BASIC Test/Checking the SARfinder system before use

1. Switch SARfinder® on, Press and hold the **ON/OFF** button.
2. Press **TONE DETECT** (to cancel background noise)
3. Select **FREQUENCY** (Your SARfinder® is now monitoring your chosen frequency)

NOTE: If you intend to perform a full power test you must only use a test frequency beacon of 121.65MHz. All AU9s/PLBs (both LIVE and TEST beacons) will transmit a low power signal to approx. 30-50mtrs when in the UNARMED position by pressing and holding the manual activation button on the front of the PLB. This can be used to test your system. REMEMBER that the frequency on the SARfinder® will automatically revert back to the live 121.5MHz frequency after 20 minutes.

4. Press and hold the activation button, (you are now transmitting a low power signal to a range of approx 30- 50mtrs distance), after a few seconds the alarm will sound on the SARfinder®.



5. Leave the alarm to sound for a few seconds.
6. Press the large yellow RESET button (bottom left of display) – this will cancel the alarms and put the SARfinder® into the tracking mode, your unit will now display the direction of the SOS signal – **Keep the button on the PLB pressed down** - You should see all four RSSI – Received Signal Strength Indicator- LEDs light up indicating the SOS signal is very close, the RSI- Received signal indicator- will also flash to indicate close proximity to SOS target.
7. Immediately Switch Off your PLB

8.0 RECOMMENDED SARFINDER® SEA TRIAL TEST

PROCEDURE

Each SARfinder® is taken through a series of tests before it is signed off ready for despatch: system accuracy, signal strength check, system function check/alarm activation. These tests are performed as follows:

1. In house test on simulator to simulate different ranges and transmitted power.
2. Outside test over 0.25 mile with 100mW PLB fitted to lifejacket worn by a technician.
3. Outside test over 1 mile with 100mW PLB fitted to lifejacket worn by a technician.
4. Outside test over 2 miles with 500mW PLB fitted to lifejacket worn by a technician.

It is recommended that a “set” test and training procedure, at sea is carried out at regular intervals to familiarise crew members with the parameters of your system.

Sea Trial Recommended Procedure

1. Make sure the PLB (Test frequency, Green case) is fitted to a lifejacket or marker buoy and a weight added so that the lifejacket/buoy allows the antenna to be positioned at an angle of between 45 degrees to 90 degrees. This will give the preferred angle for the beacon to transmit at optimum power. Also make sure the batteries are in good working order.
2. Switch on the SARfinder®- Press and hold the **ON/OFF** button.
3. Press **TONE DETECT** (this will cancel all background noise).
4. Select **FREQUENCY** to match the frequency of the test beacon.
5. Arm the PLB and throw the lifejacket overboard (the PLB will auto-activate after 2 to 5 seconds depending on the model). Providing the PLB is fully submerged enabling the water pins make the circuit.
6. When an SOS Signal is received the MOB alarms will trigger and the LEDs on the display will flash on and off.
7. Press **RESET** after the alarm has sounded for few seconds, this will cancel the alarms and put the SARfinder® into tracking mode. Your unit will now begin displaying the direction of the SOS signal, it will take a few seconds to calculate the bearing correctly. However if you are too close the Sarfinder receiver may be swamped and a little distance may be required.
8. Bring the vessel around so the SOS direction **ORANGE** LED is ahead, check the direction bearing in relation to PLB. If the bearing is unstable press the **RESET** button to clear any bearing error. To completely reset the system press the **TONE DETECT** button so the unit re-arms and reactivates when a SOS signal is received. Then press the **RESET** button to put the unit back into tracking mode.
9. Check the Received Signal Strength Indicator (RSSI) this will tell you the approximate range of the PLB, the further away you move from the PLB the fewer green lights will illuminate.
10. Repeat this process at ranges 0.5 mile, 1 mile, 1.5 miles, 2 miles and continue until you lose the signal. This will allow you to determine the parameters of your system; this will vary according to placement of the antenna and weather conditions.
11. When you are ready to affect recovery move towards the target checking the RSSI. When the target is very close all four **GREEN** RSSI LEDs will be illuminated.
12. Slow the vessel down to a couple of knots.
13. The ahead bearing LED is **ORANGE** to indicate you are aiming straight towards the target
14. When the central **RED** RSI light (the head of the little red man in the middle of the SARfinder logo) begins to flash you will be within approx. 100-200m of the target.
15. Steer around and past the target by 15° (1 bearing LED) this means you will not collide with the target in the water. Prepare your crew for recovery of the target.
16. The target LED on the relative bearing display will now move quickly around the display as the vessel moves alongside and past the target. Turn the vessel back around towards the target at very low speed.
17. Recover the target from the water and switch off the PLB.

PRODUCT NAME - CREWFIX® NMEA box (Sold separately)

9.0 Overview

The CREWFIX® NMEA output allows the Sea Marshall® Base Units to automatically output the GPS position of the vessel at the time the alarm signal is received.

9.1 Technical

The CREWFIX® is connected to the relay outputs of the monitoring system. When set in 'tone detect' mode and an MOB alarm is received the internal relay closes. The Crewfix then outputs the recorded position of the vessel to a GPS plotter. 9.2 Crewfix® NMEA 0183 Interface

- Dimensions 65 x 65 x 45mm
- Weight ~110g
- Temperature Range -20°C to 70°C
- Case rating IP55
- Input signal RMC
- Output signal GPWPL when MOB RS422
- Software Version D1.70.
- Current Drain <75mA
- Operating Voltage 12V DC
- R1.42 06-Dec-2011 JWL
- (1) Rotary switch now used to select between receiving GLL and/or RMC messages for GPS position
- and outputting a choice of DSC/DSE, WPL,BWC,BWR,TLL or RMB messages (or all of these).
- The 16 position switch functions as follows:
- 0 : All in / All out
- 1 : GLL in / CDDSC/CDDSE out
- 2 : GLL in GPWPL out
- 3 : GLL in / GPBWC out
- 4 : GLL in / GPBWR out
- 5 : GLL in / GPTLL out
- 6 : GLL in / GPRMB out
- 7 : Reserved (currently All in / All out)
- 8 : Reserved (currently All in / All out)
- 9 : RMC in / CDDSE/CDDSC out
- A : RMC in GPWPL out
- B : RMC in / GPBWC out
- C : RMC in / GPBWR out
- D : RMC in / GPTLL out
- E : RMC in / GPRMB out
- F : Reserved (currently All in / All out)
- Note: ECGLL and GPGLL both valid input messages. GPRMC is used for RMC message input.

Technical Data - SARFinder MKIII Transportable

- Contained in PVC Holdal 55 x 36 x 29mm, Total weight 12.25kg
- Pelicase 29x25x18mm – Orange PVC Box
- Pelicase Weight 6.85kg
- Battery

Specification

Cells Per Unit	6
Voltage Per Unit	12
Capacity	7.0Ah@20hr-rate to 1.80V per cell @25°C
Weight	Approx2.18 kg
Max. Discharge Current	105A (5 sec)
Internal Resistance	Approx 23mΩ
Operating Temp.Range	Discharge : -15~-50°C (5~-122°F) Charge : 0~-40°C (32~-104°F) Storage : -15~-40°C (5~-104°F)
Nominal Operating Temp. Range	25±3°C (77±5°F)
Float charging Voltage	13.5 to 13.8 VDC/unit Average at 25°C
Recommended Maximum Charging Current Limit	2.1A
Equalization and Cycle Service	14.4 to 15.0 VDC/unit Average at 25°C
Self Discharge	The batteries can be stored for more than 6 months at 25°C. Self-discharge ratio less than 3% per month at 25°C. Please charge batteries before using.
Terminal	T1
Container Material	A.B.S. (UL94-HB) , Flammability resistance of UL94-V0 can be available upon request.

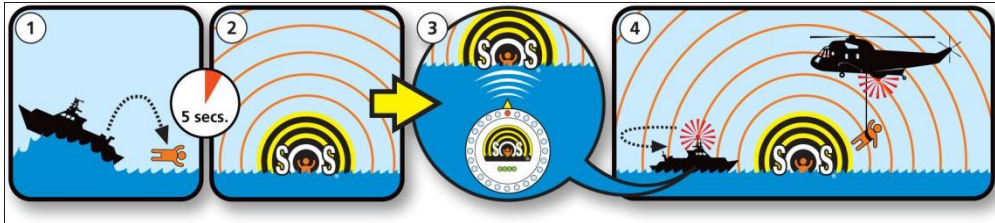
Float Service: Every month, recommend inspection every battery voltage. Every three months, recommend equalization charge for one time. Equalization charge method: Discharge: 100% rate capacity discharge.Charge: Max. current 0.3CA, constant voltage 2.35V/Cell charge 24h. Effect of temperature on float charge voltage: -3mV/ /Cell. Length of service life will be directly affected by the number of discharge cycles, depth of discharge, ambient temperature and charging voltage.

- Antenna Base Dimensions 550 mm H x350mm W - PVC Plastic
- Antenna Base Weight 950gms
- Portable Antenna Pole Aluminium 35mm i/d x 45mm Depth
- Antenna mounting Bracket 55mm i/d x 60mm Depth
- Temperature range -20°C + 55°C (Operational)
- Bandwidth 25 KHz
- Modulation AM
- Ports DC12V Power Cable (1m) Antenna Cable (16m)
- Waterproofing IP68
- Sensitivity 3 dBuV/m (threshold of target bearing resolution)
- Frequencies 121.5 MHz, 121.65 MHz (Test 1), 121.775 (Test 2)
- Criteria of ELT/PLB recognition Audible AM down-swept tone (compliant to ITU-R M.690-2)
- Audio output max. 8Vss (speaker > 8 Ohm)
- Relay contact Floating, carrying capacity max. 0.5 A/10W
- Current Consumption Standby = 300mA – Tracking = 850mA – Alarming 1300 mA
If alarm + ext. speaker (8 Ohm) = 400mA
- Operating Voltage 12V DC (with transient compliance to ISO 7637-2)
- Antenna Gain 1.4 dBi nominal
- Bearing detection method Triangular phase delta
- Bearing resolution accuracy ±15° @ 10 dBuV/m maximum
- Antenna Triple Coax Cable Impedence: 75 Ω
 - Capacitance 60pF / m
 - Attenuation / 10 m: 0.28 dB @ 1.5 MHz, 2 dB @ 100 MHz, 4.7 dB @ 500 MHz
 - Attenuation / 100 m: 20 dB @ 100 MHz
 - Diameter: 7.2 mm x 10mtrs
 - Operating temperature: -20 → +70 °C
 - Coaxial Type : Triple RG179B/U
 -
- Standards Tested to:
 - ETSI EN 301 489-1 V1.5.1 (2004-11)
 - ETSI EN 301 489-22 V1.3.1 (2003-11)

PRODUCT NAME - SARfinder® transportable system

10.0 Overview

The transportable versions of the SARfinder® locator units are designed to provide temporary cover for users wishing to move from vessel to vessel. The unit has the control box display and two rechargeable batteries mounted into a waterproof peli-case. Ideal for safety vessels moving from site to site. The operation of this system is the same as the fixed version of the SARfinder®1003 MKIII.



10.1 Assembly of Transportable SARfinder®

10.2 Assemble the antenna in accordance with Section 2 of this booklet **but do not apply any silicone sealant** as you may want to disassemble the antenna afterwards.. There are two YELLOW dipoles included with the transportable system which are to be fitted to the ahead position of the antenna to provide a quick visual reference.

10.3 Feed the antenna cable through the antenna handle pole and connect to the underside of the antenna.

10.4 Fix the antenna handle pole to the underside of the antenna with the bolts provided.

10.5 Open the Peli-Case and connect the battery terminals (red – red, black – black). Close the Peli-Case and re-seal.

10.6 Switch on to ensure the unit is functioning and perform a quick system test as described on page 11.

The transportable SARfinder® can either be manually carried using the shoulder straps provided as shown in the photo bottom left. Alternatively the control box (Peli-Case) can be positioned in an accessible / visible position on the boat and the antenna held by hand or dropped into a temporary bracket as required. **Always ensure the YELLOW dipoles are positioned in the AHEAD direction (bow of boat).**



IMPORTANT - If you are relying on the transportable unit for rapid response it is recommended to have the system in an easily accessible place.

11.0 Battery Charging

SAFETY

- The charger is designed for lead-acid batteries from 1,2-120Ah. Do not use the charger for any other purpose.
- Use safety glasses and turn your head away when connecting or disconnecting a battery.
- Battery acid is corrosive. Rinse immediately with water if acid comes into contact with skin or eyes. Seek medical advice.
- Make sure that the cable is not being pinched or in contact with warm surfaces or sharp edges.
- While charging, a battery can emit explosive gases, so it is important to avoid sparks in the immediate area.
- Always provide for proper ventilation during charging.
- Avoid covering the charger.
- Make sure that the electrical cable does not come into contact with water.
- Never charge a frozen battery.
- Never charge a damaged battery.
- Do not place the charger on the battery while charging.
- The electrical connection must fulfil the national heavy current requirements.
- Check the cabling in the charger before use. Make sure there are no cracks in the cabling or in the protective covering. A charger with damaged cables may not be used.
- Always check that the charger has gone over to maintenance charging mode before leaving the charger unattended and connected for long periods. If the charger had not gone over to maintenance charging within 3 days, this is an indication of a problem. In this case the charger must be disconnected manually.
- All batteries fail sooner or later. A battery that fails during charging is normally taken care of by the chargers advanced control, but certain uncommon errors in the battery can still arise. Don't leave the battery charger unattended for a longer period of time.
- Only mount the charger on a flat surface.
- This equipment may not be used by children or by those who cannot read and understand the manual if they are not supervised by a responsible person who can guarantee that the battery charger is being used in a safe manner. Store and use the battery charger out of the reach of children. Make sure that children do not play with the battery charger.

BATTERY TYPES AND SETTINGS

M45 can easily be configured to charge many different types of 12V lead-acid batteries; wet batteries, MF, AGM och for most GEL-batteries.

The following recommendations should, however, only be seen as guidelines. When in doubt, always consult the battery manufacturer for further instructions.

The settings is made by pressing the "MODE-button" and stepping forward by pressing the button one step at a time, releasing the button when the required Mode 14.4V/0.8A mode is reached, see below. This mode is normally used for <14Ah batteries.



CHARGING

1. The power cord should be disconnected from the SARFinder before connecting or disconnecting the battery leads.
2. Connect the red wire to the positive pole of the battery and the black cable to the negative pole.

Reverse Polarity Protection

If the battery cables are connected incorrectly, the reverse polarity protection will make sure that the charger and the battery are not damaged. In this case, the red warning lamp (0) will be lit.

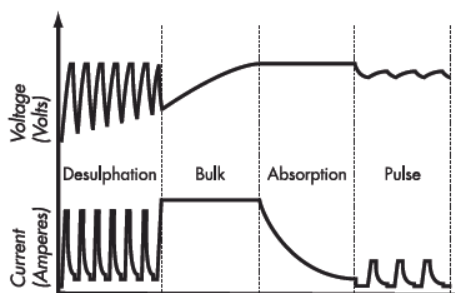
Start charging

1. Set the proper charging mode for the battery by pushing the Mode button until the correct setting is lit. Choosing settings for your battery is described under "BATTERY TYPES AND SETTINGS".
2. When you are sure the battery leads are correctly placed, connect the power cord to the power outlet to begin charging. If the battery leads are wrongly connected, the pole-changing switch will ensure the battery and charger are not damaged. The fault indicator will light, in which case start from the beginning again.
3. The charging lamp will now indicate charging or the maintenance lamp will indicate that the battery is fully charged. If the voltage drops the charger sends a pulse to the battery. The length of the pulse depends on how much the voltage has dropped. The charger can be connected for months.
4. If nothing happens: If the voltage indicator is lit but no other lamp is lit there could be a bad connection to the battery or chassis or the battery could be faulty. Check the wall power outlet. If you experience problems: start with the sensitive connection between the battery clamps and the charger.

5. Charging can be stopped at any time by disconnecting the supply cord or by setting the charger on Standby. Always remove the power cord from the power outlet before disconnecting the battery leads from a battery.
6. If the charger lamp and the maintenance-charger lamp are flashing alternately, the reason for this is due to:
- An interruption during charging, due to a loose connection or because the battery has ceased to work.
 - The battery has become sulphated. If the lamps flash for more than 30 minutes, this indicates that the battery is dead and needs to be replaced.
 - If there is an interval of more than 10 seconds between the flashes, this indicates that the battery has a high self-discharge rate and may need to be replaced.

CHARGING PHASES

M45 operates in a four step fully automatic cycle. It begins charging with an almost constant current (0.8A or 3.6A) until maximum voltage (14.4V or 14.7V) is reached. The charger changes mode at this point. It locks the voltage at maximum level and allows the current to drop. The M45 switches automatically to pulse maintenance charging when the current drops to 0.4A.



The charging cycle restarts if the battery voltage drops to 12.9V.

Desulphation - Desulphation with pulsing for sulphated batteries.

Bulk - Charging where 80% of the energy is returned. The charger delivers an almost constant current until the battery voltage reaches maximum level.

Absorption - Charging up to almost 100%. The charge current falls and the voltage is kept constant at the maximum level.

Pulse - Maintenance phase, where the charger delivers a pulse if the battery voltage drops. Charging varies between 95% and 100%. The battery receives a pulse when the voltage reduces. Keep the battery in good condition when not in use. The charger can be connected for months.

TEMPERATURE PROTECTION

M45 is protected from being overheated. The power will be reduced if the ambient temperature is raised.

MAINTENANCE

The charger is maintenance free. Note that disassembly of the charger is not permitted and will void the warranty. If the power cord is damaged, the charger must be sent to the reseller for maintenance. The case can be cleaned with a soft damp cloth and mild cleanser. The charger should be disconnected from the power while cleaning.

EQUIPMENT

M45 is delivered with a set of battery leads with battery pole clamps.

TECHNICAL SPECIFICATION

Model MULTI XS 3600

Voltage AC 220-240VAC, 50-60Hz

Back current drain* < 1mA

Voltage Charging Voltage Nominal: 12V

14.4V; 14.7V

Ripple** Max 50mV rms, max 0.13A

Current 0,8A; 3,6A

Ambient Temperature - 20°C to + 50°C, power is reduced automatically at increased ambient temperature.

Cooling Natural convection.

Charging cycle M45 is a multistage fully automatic charger

Type of batteries All types of 12V lead-acid batteries (Wet, MF, VRLA, AGM and GEL).

Battery Capacity 1.2–120Ah

Dimensions 165x61x38mm (L x W x H)

Insulation IP65

Weight 0.5 kg

*) Back Current Drain is what the charger uses to drain the battery if the power cord is disconnected.

**) Quality of the current and voltage are very important. High current ripple heats up the battery and makes the positive electrode age prematurely. High voltage ripple could harm other equipment connected to the battery. M45 produces a high quality current and voltage with very low ripple.

BULK CHARGING TIME

The table shows the length of time for bulk charging.

Battery size (Ah)	Mode	Time (h)
2		2
8		8

Warranty

Your unit is covered by a standard 1 year parts and labour warranty. Marine Rescue Technologies Ltd (MRT) warrants to the purchaser that the products conform to manufacturers specifications and that the products are free of defects on materials and workmanship for a period of one year from the date delivered to the customer/end user. In the event of a defect, due to faulty material, design or construction, the customer will return to MRT at the business address where we, or the manufacturer will undertake, at our choice, a repair or replacement. Warranty covers all parts, materials and labour, provided that the product is returned to our works. Exclusions: damage caused by other than normal use and lack of general care and attention or incorrect sealing of the unit carried out in accordance with this instruction manual. MRT Ltd. does not accept any responsibility or any claim for direct or indirect consequences of defects of the equipment, either during the guarantee period or at a later stage.

Repairs

MRT Ltd. offers a full and comprehensive service and repair facility with return normally within 14 days upon receipt of customer's authorisation.

Disclaimer

The Sea Marshall® products are an aid to recovery only, it is the responsibility of the user/operator to ensure they are fully conversant with the operation of the equipment and the equipment is kept in full working order at all times combined with functionality and damage checks before and after each use. MRT Ltd. does not accept liability for loss of life or injury caused during any accident during which the equipment is being used, howsoever it arises. Sea Marshall® Alerting Units/MSLDs are an 'Aid to rescue only', they do not guarantee your safety. The Sea Marshall® MSLDs will dramatically increase the chances of detection and location of a Man Over Board. Personal safety remains at all times the sole responsibility of the individual. It is the responsibility of the individual to inform their local Coast Guard, their senior personnel/crew members and or family of their intended location/destination and estimated duration of journey. It is also the responsibility of the individual to notify these people of the type of safety equipment they will be carrying. In the case of accidental activation the user should deactivate the unit and notify the appropriate SAR Authority.