



10 handheld VHF radios



A vital piece of kit in any boat cockpit, Alex Bell and a PBO test team check out popular handheld radios for effectiveness and ease of use



The last time PBO tested handheld VHF radios was back in January 2011. Since then there have been changes to product ranges, updates to existing models, and some are no longer around.

There's no doubt in my mind, reinforced by lots of practical experience, that a handheld VHF radio is an essential communication and safety item on any craft heading out on the water.

Fixed radios have their role, and when installed by the navigation table offer a convenient communication location.



However, there are many occasions when the opportunity to communicate on deck offers great advantages, not least the ability to both monitor the boat's position and in safety situations monitor the scene while communicating. Handhelds can be used by a tender shore party to communicate with the mother ship, and of course they're vital in any abandon-ship situation.

What's available?

Radios vary in price from basic models, which are at best splash-proof (IPX4), to floating models capable of taking submersion beyond one metre (IPX8). These top-specification sets are available with DSC capability as well – which, coupled with a built-in GPS,

will automatically transmit (when activated) an emergency distress signal giving your location.

Battery technology is developing too, and like smartphones many models now have lithium ion (Li-ion) cells. Bearing in mind their emergency role, many are capable of having the battery pack exchanged for ordinary disposable alkaline cells in case the rechargeable batteries get run down.

Prices range from £65 for a basic model to more than £300 for the most expensive. All the models tested here are designed for the leisure market.

What's new?

Since our last test of handheld radios there have been some changes to set design. More floating and waterproof models

are available, and coinciding with this is the replacement of the rotating knob control with keypad operation. Keypads make waterproofing the radios easier, eliminating the problem of worn O-rings on rotary knobs. Thus the latest Icom and Standard Horizon radios have only keypad control.

Another advantage of the keypad is that you'll usually find a bar chart indicating the level of volume and squelch that has been set, so at a glance you can see whether the volume is at a reasonable level to receive transmissions.

There are also now three DSC-enabled radios available on the UK leisure market. These sets comply with international regulations which utilise Ch70 as the distress and safety channel.

Handhelds are built for two main



operational areas – international, which includes Europe, and the USA and Canada. To ensure the correct channels are available it's important when buying a new radio to check that it's set to the region in which it's being operated.

Common features

What common features should we expect as a minimum on all VHF handheld radios?

All will have a dedicated Ch16 call button, a favourite channel mode, dual- and often triple-watch scanning, and an illuminated display screen.

All those tested come with detachable belt clips, which not everyone will want. The swivel type can be detached by rotating through 180° – which could lead to accidental loss. Hand lanyards (or straps) are also provided, and these are best attached to the radio body, not the belt clip, so they can be used when the clip is detached.

All radios can select high- or low-transmission power, and some have three levels. All have a lock function to prevent accidental change to settings, but will still allow the transmit function.

All have a battery level indicator: those with push-button volume and squelch will have a linear level indicator for these on the display screen.



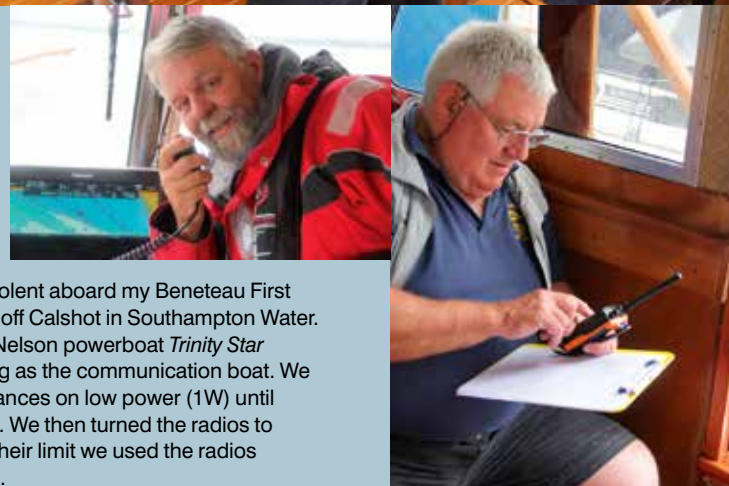
ABOVE Tester Bob Porter makes some notes

RIGHT Alan Watson skipped our communications boat

How we tested them

We took the radios out on the Solent aboard my Beneteau First 305, and I picked up a mooring off Calshot in Southampton Water. Alan Watson then motored his Nelson powerboat *Trinity Star* eastwards into the Solent, acting as the communication boat. We tried each radio at different distances on low power (1W) until reception began to break down. We then turned the radios to their full transmitting power. At their limit we used the radios while standing up in the cockpit.

The test team reviewed the sets for ease of use, focusing on channel change, squelch and volume control.



Tester Peter Crump checks out handheld VHF functions

GLOSSARY OF TERMS AND ABBREVIATIONS

ATIS – Automatic Transmission Identification System: required for use on inland waterways of European countries. An ATIS number has to be entered into an enabled radio, and it then places a burst of data at the end of each transmission. This is not licensed for use in the UK.

DSC – Digital Selective Calling: a semi-automated method of establishing a radio call, this is designated as a part of the Global Maritime Distress and Safety System (GMDSS). It is planned that DSC will eventually replace aural watches on distress frequencies and will be used to announce routine and urgent maritime safety information broadcasts. It can be used for 'all ships calls' such as Mayday, Urgency and Safety, as well as calls to specific stations such as other ships or the coastguard.

Li-ion – Lithium ion battery. Self-discharge at about 5-10% per month: has no memory

effect. Major disadvantage is that these lose capacity with time, but will still last longer than NiCad.

Li-Po – Lithium polymer battery: new technology used in mobile phones and iPods because these batteries are lighter and thinner. They require dedicated chargers, and can be stored for up to two months without significant loss of charge. For longer periods, manufacturers recommend discharging to 40% capacity (use battery monitor?) and being kept cool. If the battery is short-circuited there is risk of fire or explosion!

MMSI – Maritime Mobile Service Identity number: used on DSC-capable radios, this is used like a telephone number to call another vessel equipped with a DSC transceiver. A unique number has to be programmed into the radio to operate the DSC functions. Handhelds have a separate number to the parent vessel which identifies them as handheld.

Ni-MH – Nickel metal hydride battery, a rechargeable cell that can be purchased in AA size. Virtually no 'memory' effect, so can be recharged at any time. Suffers self-discharge at about 30% per month: latest versions have much lower self-discharge.

mAh – milliamp-hour: measure of the battery's storage capacity.

IP67 – International (Ingress) protection standard. The first digit covers dust exclusion, the second waterproofing. Standard 7 is 30 minutes at a depth of 1m. JIS, Japan Industrial Standards, is similar to IP.

PTT – Press to transmit

RSSI – Received Signal Strength Indicator

RX – Receiving

SQL – Squelch control: one of the 'mystery' controls for the uninitiated! Squelch is a 'gate' which opens when a signal

stronger than the gate level is received. The gate level is normally set to be just higher than the background noise level from the set so that wanted signals are heard, but noise is not. Set too low and there will be a lot of background noise; too high and some weaker signals will not be heard.

TX – Transmitting

VOX – Voice-activated transmission – automatically switches to transmitting mode when it picks up a noise. Be careful that it isn't activated by engine noise!

DW/TRI – Dual/Triple-watch: the ability to listen to two/three channels (one will be Ch16) at the same time by the set switching between them.

INT – International frequency allocation – the alternative setting is 'US' and if set to US some channels, eg Ch80, will not function correctly in Europe.

HANDHELD VHF RADIOS ON TEST

Cobra MR-HH 125EU

PRICE: £52.95

Supplier: www.marathonleisure.com

A compact radio supplied with a hand lanyard attached to the radio body and a swivel belt clip, the Cobra entry-level radio comes with five rechargeable Ni-MH batteries and a 12V charging cable. These batteries can be replaced by five standard AAA alkaline batteries.

Equipped with all the basic functions: power (1W or 3W), dual watch and a dedicated Ch16 button. It's splash-proof – but it doesn't float.

There's a good-size display with on/off function, volume on a rotating knob, and a power-saving mode kicks in after 10 seconds of inactivity.

Squelch control is automatic, but to obtain weak signals the automatic

function can be turned off (squelch defeat). The MR-HH 125EU comes with a comprehensive 44-page English edition handbook.



ON TEST: Good for compactness, and clear control functions and display.
BEST FOR: Price – it's the cheapest set on test.

Radio Ocean 2400

PRICE: £64.95

Supplier: www.force4.co.uk

A Radio Ocean-branded budget radio by Furuno France, this VHF is compact and lightweight, has a 0.8W/5W output, dual- and tri-watch functions, adjustable squelch and a battery level indicator. It's water-resistant (splash-proof) but doesn't float. Channel memory will store a favourite channel.

It is supplied with 4 x 1300mAh Ni-MH batteries, which should give a 13-hour battery life in standby; it can also be used with four AA alkaline batteries.

Included is a 240V two-pin charger with UK adapter, belt clip and hand strap (attached to the set's body). A 12V charging lead is available as an accessory. On/off and volume is by a rotating knob, other functions are accessed by easy-to-read buttons.

ON TEST: Liked for clear intuitive function buttons, described by testers as 'a simple, basic set'.

BEST FOR: Clear reception from a budget radio.



Midland Arctic

PRICE: £89.95

Supplier: www.nevadaradio.co.uk

A very compact handheld radio, but with the smallest screen on test. On/off and volume are by a rotating knob. Channel change is by another rotating knob located between the volume and antenna. The compact size makes it delicate to operate. It was the only radio that defaulted to Ch16 when switched on.

Three other function buttons located under the screen are Menu, Enter and Exit. There are two unmarked buttons under the PTT button; one covers the squelch function, the other dual watch. Powered by a Li-ion 1600mAh battery pack charged through a desktop mains charger. Transmits on 1W and 5W. It's waterproof, but it doesn't float. A screw-on belt clip and hand lanyard (attached to the radio body) are included.

ON TEST: Small size is excellent, but display is also small and controls aren't intuitive.

BEST FOR: Compactness and reception on a budget price.



Standard Horizon HX300E

PRICE: £99.95

Supplier: www.standardhorizon.co.uk

A compact, ergonomic design as a result of the new ultra-small, large-capacity 1560mAh 3.7V Li-ion battery technology. This gives the radio a much smaller size, and it's light enough to float face-up if dropped in the water. A new, intuitive menu system allows easy access to all of the set-up functions, making it easy to customise settings based on the user's preferences. It comes with a USB charging cable and 240V AC adaptor, providing more flexibility when recharging the battery, and is also supplied with a belt clip and hand lanyard (attached to the belt clip). If the HX300 accidentally goes overboard, a flashing red LED is automatically activated to help locate and retrieve it at night or in murky conditions. A 38-page owner manual is provided.

ON TEST: We liked the intuitive function buttons and clear display. It had 'a good feel about it'.

BEST FOR: Good display and button functions.



Got a handheld VHF radio? You'll need a licence to use it!

If you wish to use a handheld radio by itself, you'll need to apply for a Ship Portable Radio licence. Instead of a call sign (applicable to vessels) you'll be provided what is known as a T-number which will enable you to use your portable radio on board any vessel. If you own a vessel and you have fixed radio equipment you'll have a Ship Radio licence. If you intend to use a handheld radio as well as your fixed radio then the handheld can be registered under the same Ship Radio licence application – but it will be licensed for use on this vessel alone, and not on others. DSC-enabled handheld radios, however, require a separate portable licence because they need to have their own MMSI number.

Licence to operate

It's a legal requirement that anyone using a VHF radio is qualified to do so – the only exception being emergencies, when anyone can use the radio to call for help.

A Short Range Certificate (SRC) covers radio use in the GMDSS A1 sea areas. Courses and certification are administered by the RYA.



HANDHELD VHF RADIOS ON TEST

Entel HT20

PRICE: £119.99
Supplier: www.entel.co.uk

Entel's best-selling radio for the leisure market features the largest-capacity battery of the radios on test (Li-ion 2000mAh). It's charged through a mains charging cradle. A rotating knob serves as on/off function and volume control, and squelch level requires the radio to be switched on with a function button pressed: a level can then be set.

It's waterproof and submersible – but it doesn't float. There's a clear display and function buttons, while a radio speaker and microphone port are options, and a belt clip and hand strap are supplied.

A quick-start handbook comes with the unit: the full version is available to view or download online.

ON TEST: Good solid feel, clear display but squelch not easy to adjust, and some function buttons close to the PTT button.

BEST FOR: Highest capacity battery, highest waterproofing level.

Did you know...

The best way to give your VHF radio increased range is to get the antenna higher. Once switched to maximum power VHF radios, handheld or fixed, have their range limited by the height of the antenna above sea level. A small increase in antenna height, even by just a metre, can give you a few more miles in range – possibly vital miles in an emergency situation. Just standing up in the cockpit, or even better on deck, can double your range when using a handheld VHF.

VHF RADIOS AT A GLANCE

Manufacturer	Model	Size h x w x d (mm)*	Weight (g)	Display size (mm)	Waterproof standard	Floater	On/off switch	Volume control method	Squelch control method	Battery type	Battery power	Ch37: how designated	ChM2	Power output	Battery tray	Warranty (years)
Cobra	MR-HH 125EU	115x63x39	196	37 x 20	JIS4	no	Vol knob	Rotary knob	keypad	5xAAA Ni-MH	850mAh	M1	M2	1, 3W	yes	1
Cobra	HH-500	140x65x40	271	38 x 26	JIS7	yes**	Vol knob	Rotary knob	keypad	Li-Ion	1000mAh	M1	M2	1, 3, 6W	yes	3
Entel	HT20	145x58x40	296	37 x 19	IP68	no	Vol knob	Rotary knob	keypad	Li-Ion	2000mAh	37	P01	1, 5W	no	2
Icom	IC-M25 Euro	140x62x37	220	33 x 23	IPX7	yes	Button	keypad	keypad	Li-Ion	1500mAh	37A	P4	1, 5W	no	3
Icom	IC-M93D	146x57x45	310	38 x 48	IPX7	yes	Button	keypad	keypad	Li-Ion	1500mAh	37A	P4	1, 5W	yes	3
Lowrance	Link-2DSC	140x68x38	297	39 x 39	IPX7	yes	Button	Keypad	keypad	Li-Po	1400mAh	M	M2	1, 5W	no	2
Midland	Arctic	110x55x36	240	30 x 12	IP67	no	Vol knob	Rotary knob	keypad	Li-Ion	1600mAh	M1	M2	1, 5W	no	2
Radio Ocean	2400	123x60x37	272	34 x 23	IPX4	no	Vol knob	Rotary knob	keypad	4xAA Ni-MH	1300mAh	M1	M2	0.8, 5W	no	2
Standard Horizon	HX300E	145x58x40	344	40 x 23	IPX7	yes	Button	keypad	keypad	Li-Ion	1560mAh	M	M2	1, 5W	no	3
Standard Horizon	HX870E (DSC)	145x58x40	305	36 x 24	IPX7	yes	Button	keypad	keypad	Li-Ion	1800mAh	M	M2	1, 2, 6W	yes	3

* excluding antenna ** only with Li-ion battery included

Icom IC-M25 Euro

PRICE: £129.95
Supplier: www.icomuk.co.uk

Launched last year, this is a new base model from Icom. The on/off switch is by button, and volume and squelch is set by a function button and using the channel up/down buttons, which are well placed and easy to use.

Power comes from a rechargeable 1500mAh Li-ion battery which is charged from a USB lead. No alkaline battery tray is offered (the battery is firmly secured by screws).

A screen icon indicates when it is charging and fully charged.

It floats and is waterproof, has a flashing light function, both screen and a back light, and an 'AquaQuake' function to expel water from the speaker.

A belt clip and hand lanyard (attached to the phone not the clip) are included, and there's an optional radio speaker and microphone port.

ON TEST: Good control functions and display, easy to hold.

BEST FOR: Light weight, waterproof and able to float.



Cobra HH-500

PRICE: £129.95
Supplier: www.marathonleisure.com

This top-of-the-range model from Cobra has some innovative features and comes with a rechargeable Li-ion power pack or a tray for five AAA alkaline batteries. Charging is from a mains AC adaptor or 12V socket.

There's a good display, with a chunky waisted body and sporting an orange stripe which makes it easier to spot if dropped in the water. Floating and fully waterproofed, it has a 'burp' function to expel water from the speaker. On/off function and volume is by rotating knob.

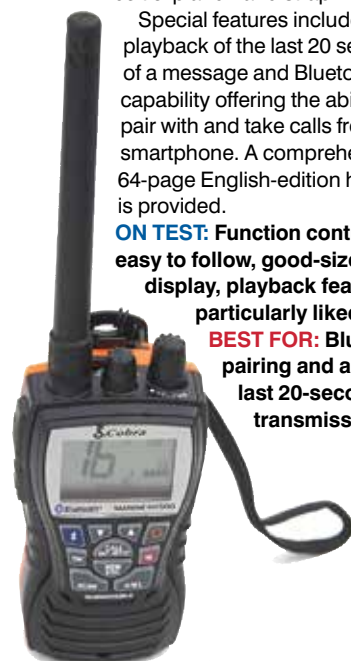
Power is 1W, 3W or 6W, squelch control is through the set-up menu, and a bar graph shows the level set.

An optional radio speaker and microphone port can be supplied, and it comes with a belt clip and hand strap.

Special features include a playback of the last 20 seconds of a message and Bluetooth capability offering the ability to pair with and take calls from a smartphone. A comprehensive 64-page English-edition handbook is provided.

ON TEST: Function controls all easy to follow, good-sized display, playback feature particularly liked.

BEST FOR: Bluetooth pairing and a replay of last 20-second transmission.



VHF RADIOS WITH DSC

Standard Horizon HX870E (DSC)

PRICE: £189.95
Supplier: standardhorizon.co.uk

This Class-D DSC VHF handheld features a 66-channel WAAS GPS receiver, floats and is waterproof. It has three transmission levels – 1W, 2W and 6W – and an 1800mAh Li-ion battery with mains charger cradle, an alkaline battery tray and 12V DC charger.

The set stores up to 200 waypoints and 20 routes, while a unique compass page shows vessel SOG, COG, BRG (Bearing) and DST (Distance) to the waypoint and can also display the position of up to nine other vessels in proximity via the new GM (Group Monitoring) feature. Advanced features include full dot matrix display with channel names, Position request and Position report, 10-channel preset key selection, USB Data Port, GPS Position Logger, water-activated SOS strobe, programmable Memory and Priority Scan, Dual- and Tri-Watch scan functions. The ATIS code for European waterways is supported.



On/off is via button, while volume and squelch is through keypad with a linear level display. An excellent 130-page manual is provided. Complies with new Class-D regs.

ON TEST: Liked for large, clear display and access to GPS functions via soft keys. We disliked the function buttons above and below PTT button.

BEST FOR: GPS reception.



Lowrance Link-2DSC

PRICE: £217.20
Supplier: www.lowrance.com

This floating handheld VHF is Class-D DSC-compliant and features MOB functionality and storage for up to 300 waypoints. A 12-channel GPS provides latitude, longitude and time display. A 'Get Buddy' feature transmits the radio's position by the push of a button, allowing up to 20 buddies to receive bearing and distance data from other Link-2DSC units.

It's powered by a Li-polymer battery that is charged through a cradle. On/off function is through a button push, as are volume and squelch: a linear scale indicates the level set.



Two softkeys give access to three favourite channel scan and scan modes. A menu button gives access to the various DSC and GPS functions. There's a dedicated MOB button and ATIS function for European waterways. It floats and is waterproof, and comes with a swivel belt clip and wrist lanyard (which attaches to the radio body).

ON TEST: A bit quirky: the controls required some familiarisation.

BEST FOR: Buddy calling.

Did you know...

VHF radio waves cannot bend around the curve of the earth – both the transmitting and receiving antennas need to 'see' each other. The moment one or other dips below the horizon, communication is lost.

Icom IC-M93D

PRICE: £349.95
Supplier: www.icomuk.co.uk

Launched at the 2016 Southampton Boat Show in September, this new radio replaces the M91DSC model and is a full DSC functioning radio with built-in GPS, compass, MOB (records time and position) and 50-waypoint capability.

Powered by a rechargeable Li-ion battery (1500mAh), this can be replaced by an alkaline battery power pack if required.

The rapid mains charger works through a cradle and takes 2½ hours: alternatively it can be charged by a 12V cigar plug. Transmits on 1W or 5W.

Floating and waterproof, it features a flashing light which activates automatically when immersed. An 'AquaQuake' function clears the speaker of water when recovered.

There is an on/off button, and volume and squelch are accessed by a function button and the channel change up/down buttons. Softkeys operate a horizontal scrolling display at the bottom of the screen. This makes for quick access to the various functions that the set offers. An active noise-cancelling digital processor is designed to reduce background noise.

A comprehensive 70-page instruction manual details access to all the functions. Complies with new Class-D regs.

ON TEST: Slippery to hold, and function buttons thought to be 'not tactile'.

BEST FOR: Top-of-the-range DSC set.



Test results and conclusion

All the waterproof radios survived the dunk test, and all that were designed to float did.

For the budget sets the Cobra 125 comes in at the lowest price, but just like the Radio Ocean 2400 it is only splash-proof and does not float. The Midland Arctic has a good waterproof standard and a Li-ion battery pack and had a range as good as the much more expensive

models, so for an emergency or back-up radio it would make a good buy.

For the more expensive sets, the choice becomes trickier. The Entel has an enviable reputation for robustness and has the largest-capacity battery – but it doesn't float. The Icom M25 and Standard Horizon HX300 do float and have very similar specifications, the Standard Horizon winning on price. The

Cobra HH500 meanwhile has some useful extra features such as playback and Bluetooth capability. I'd be happy with any of them.

For the DSC-enabled sets the Lowrance comes over as solid and the Icom M93D is a quality set but at a premium price. However, it's the Standard Horizon HX870E that wins on the combination of features and value for money.

RANGE TEST RESULTS

Radio	Cobra HH-125	Cobra HH-500	Entel HT20	Icom M25	Icom M93D	Lowrance Link 2DSC	Midland Arctic	Radio Ocean	Standard HX300	Standard HX870E
Max range (NM)	4	4.5	4.5	4	5	4.5	5.5	5	5.5	5.5