

Buying a Cruising Hovercraft

Buyers Guide 2012



There are many hovercraft that come up for sale, but not all are suitable for cruising use, and there is little good information out there to help the buyer – and indeed some of the information that is out there is pretty dubious. I hope this will help, but would encourage all potential buyers to make contact with the Hoverclub UK (www.hoverclub.org.uk) for further advice and guidance. But first, here are some pointers you might find useful:

Start here!

Whats it going to be used for?

Where are you going to use it?

Whats the hovercraft jargon?

What sorts of craft are there?

What types of skirts and fans are there?

What should I look out for?

What engine choices are there?

What are the different types of hull?

What should I be looking for when I check out a second hand craft?

Ian Brooks 2012

01 So you're thinking about buying a cruising hovercraft?



Pic01-01

There are a lot of hovercraft that come up for sale – but not all are equal! Some are good, some are poor and some are downright dangerous in the wrong place, so how do you avoid the pitfalls? I hope this will help...

Before we get going, just one foreword - be careful to avoid any obviously partisan advice. Members of the HoverClub (www.hoverclub.org.uk) can offer good, impartial advice and you will find your local members to be friendly and approachable, so drop a line and start your hovercraft career!

02 What's it going to be used for?



Pic 02-01

The first thing you need to do is decide what you will want to use the craft for, and there are two main categories, ie racing or cruising.

First things first; the Cruising HoverClub isn't about racing, so if that's your thing, best head on over to the Hovercraft Club of Great Britain (www.hovercraft.org.uk) who are big into that sort of thing. If, like us, you are into Cruising, either relaxed family style, or challenging long distance work in open water, then read on ... you're in the right place. Here's a few questions you should be asking yourself:

How many passengers?

A small (10-12ft) hovercraft can be great fun, easily handled and stored, but will obviously have less capacity for equipment and people. So if you're wanting to take just yourself, and maybe a small child, then this could be for you. If you want to take the family out, and need two or three seats, then you will need a mid sized (13-16ft) craft, but if your plans include 4 or 5 seats, then you'll be looking for a 17ft+ craft.

The maximum size of craft you can operate easily in the UK is 1000kg, but you're unlikely to come across something this big – it would be in the region of 24ft+

How much equipment?

Taking people is one thing, equipment is another – it doesn't sit quite so neatly on seats! If you're thinking about day trips only, then you'll need fairly small storage – enough for some tools, emergency equipment, sarnies and so on. But – if you want to go overnight camping on longer trips then you'll need

space to store lightweight camping gear- the type of equipment you might take back-packing or motorbike camping.

Length (feet)	Passengers
10-12	1-2
13-16	2-4
17+	4 and up

When it come to the capacity of any craft, be careful of poor advice. It is common to rate the number of passengers as the number that can physically fit into the craft, and this will be unsafe on water – even if the craft will lift them on a field, it is quite different on the water. Subtract 1 or 2 from this number for safe on-water operation.

03 Where are you going to use it?



Pic 03-01

It's important to consider your proposed operating area when choosing a hovercraft. For example, if your local slipway is tiny and you have a small tow-car you wouldn't want an 18ft 4 seater. Conversely, if your local area is a major estuary or open water, then you would be considering the security that comes with a larger craft. Here we see a large (18ft) cruiser dwarfed in ferry terminal at Hull.

Remember that the sea-keeping ability is directly related to size, bigger is better in this respect. Buy the largest craft that you can afford, unless you expect to trade up once you have gained a year or so experience.

Beaches

Operation on beaches is usually a bad idea – if it is in any sense public, then you will undoubtedly attract unwanted attention pretty quickly if you are operating on the beach. Usually the local authority will be along to shoo you away. Having said that, *launching* from the beach may be OK, which means turning up, offloading and making a single pass out onto the water and away to sea. This generally gets quite positive comment, so long as you choose a quiet beach and do not then spend all day going round in small circles in the bay. This last point is really important – under no circumstances take a craft onto a popular beach - it just isn't safe. Check with local members to find out what is Ok and what is not.



Pic 03-02

Mudflats

Most mudflats are SSSI (Site of Special Scientific Interest) and are protected under the Countryside and Wildlife Act 1981. This is a complex area, and if you damage the things in the area that are 'notified' in the 'SSSI citation' you leave yourself open to prosecution and fine up to £20k! The Club can help by identifying the "notified features" and helping you to ensure you do not damage them, and in some cases we also deal directly with Natural England in relation to Hovercraft issues.

So if you wish to go "gulley hopping" make sure you have done your homework and the place you wish to operate is not a SSSI, bird or wildlife reserve. As an example, almost all of the mudflats around the Mersey (and around England for that matter) are SSSI and operating on the mud there could get you into trouble.

In general, if you are on the water and at least 100m from the shore, then you should be OK, although there will be people who will tell you otherwise. Again, refer to the Club for advice.

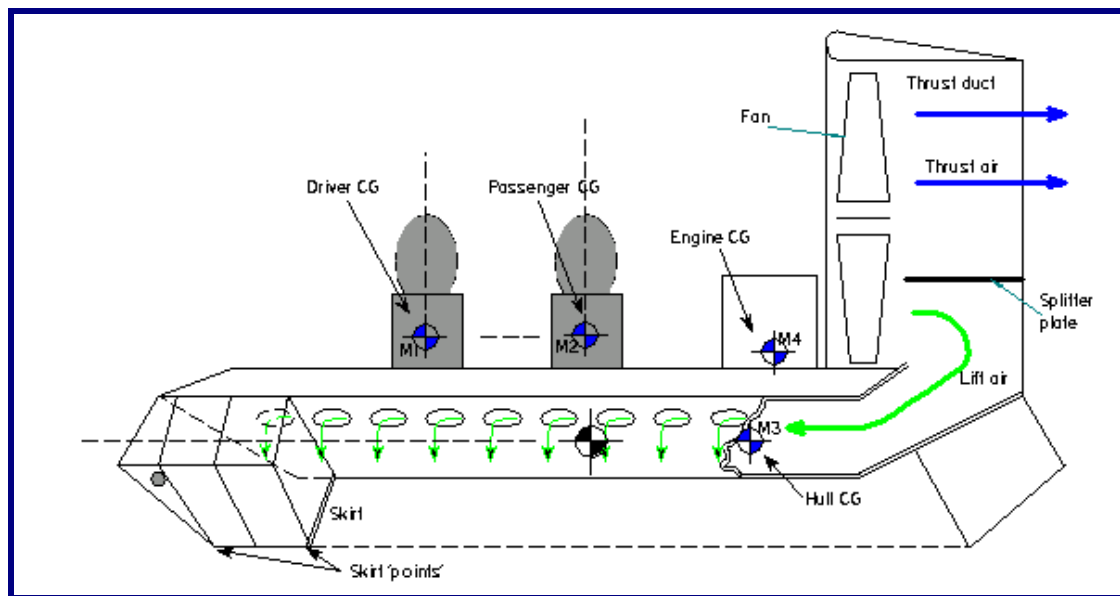


Pic 03-03 SSSI's around Liverpool

Operational area and Craft Size

Obviously open water and estuaries such as the Clyde favour a larger craft, whereas sheltered waters such as the Medway estuary will be fine for a smaller craft.

04 Some hovercraft terminology



Pic 04-01

Freeboard

In simple terms, freeboard is the height of the lowest part of the hull above the water when you are floating with the engine stopped. Put simply, its how big a wave would have to be to come over the side.



Pic 04-02 3 Craft with different freeboard

A cruising craft should have at least 12 inches. If it hasn't then it won't be much use as a cruiser! Look for high sides and front bodywork.

This really is a key safety issue. When the weather turns against you, or you cross the wake of a large ship, waves over the front or back can turn a Sunday outing into a life-threatening Mayday situation. Larger is better for Cruising.

Plough-in

A plough-in occurs when the front (usually, but it can happen to the side) of the craft suddenly dips down into the water, causing the craft to violently

decelerate. All control will be lost, and sometimes passengers can be thrown out of the craft – in any event, it is not good.



Pic 04-03 Race craft ploughing in – driver about to go for a swim

All hovercraft are susceptible to plough-in unless fitted with effective anti-plough devices. It is caused by hydro-dynamic forces acting on the skirt, causing the skirt to be dragged under the craft. Unless fitted with effective anti-plough devices, most light hovercraft are very susceptible to ploughing in, and the driver will need to become skilled at predicting and preventing it. However, there are well known solutions to plough-in, so look out for craft fitted with such a device. I personally wouldn't buy a craft without.

In addition to effective anti-plough devices, good craft have a hull designed to reduce the effect of plough-in, so that if it ever happens you are not ejected from the craft – although there is still an uncomfortable deceleration period before control can be re-gained.

Any craft that ploughs in so badly that the Pilot is ejected from the seat is dangerous and should be scrapped.

The best craft have active control of plough-in using a compartmented cushion and responsive skirts. In this case, the plough-in phenomenon can be brought under control and used to effect a kind of emergency brake.



Pic 04-04 SevTec craft fitted with compartmented responsive skirt

Hump performance

When a hovercraft is at rest on water, it floats like a boat – that is, it is in 'displacement mode' or 'boating'. When the craft goes to move off, it must transition from displacement mode to non-displacement (hovering) mode. The transition occurs, for a small craft, at about 8mph, and is known as 'going over the hump', because the craft must ride over a wave that forms in front of the craft just before 'hump speed'.

Many otherwise excellent craft will not go over the hump – you could liken this to driving a car on the motorway with no clutch – at the first traffic jam you are stuck with no way of getting restarted. This is a key safety issue. It means that you cannot stop on water, because if you do you cannot get back into hovering mode. You will have to 'boat' the craft back to land at about 4mph, enclosed in your own torrential rainstorm. Often the spray is so bad that vision is impaired and secondary engine failure occurs, whereupon the situation can take a turn for the worse.

You should have the hump performance demonstrated to you before you buy. If you buy a craft that will not go over hump, it may not be possible to improve it.

05 What sorts of craft are there?



Pic 05-01

There are several craft types, and a discussion on this subject is well worthwhile.

Racing craft

Most race craft that come up for sale can be recognised as such because they are small and have two stroke engines. Obviously we are into Cruising, so leave these to the racing guys.

Cruising craft

It is fair to say, not too many good cruising craft come up for sale, so you may need to be patient to find a good one.

It is absolutely vital to have good advice when buying a cruiser, there are some very poor craft out there, but you just couldn't tell without some inside knowledge.



Pic 05-02 A home-built 5 seat cruising craft

A dodgy cruiser could turn out to be a dangerous liability that leaves you stranded at sea, making a mayday call.

There are several types of craft in common use today. A knowledge of these is vital if you are to choose a craft that will not disappoint you.

Integrated Craft

This is the simplest type of craft – most craft that come up for sale are integrated. They are simple, cheap and easy to fly.



Pic 05-03 Integrated craft from Flying Fish.
Photo courtesy of www.russpullen.com

In this design there is one engine and one fan. A portion of the fan air is directed under the craft to provide lift, whilst the rest is directed for thrust.

The integrated design is a compromise – the requirements of a lift fan are the opposite of the requirements of a thrust fan. This makes the craft relatively inefficient and more noisy.

Integrated craft with more than about 35hp installed may be very noisy and should be avoided. Most modern craft designs have two fans, with either one or two engines.

Twin fan craft.

The twin fan craft uses a small fan to provide the lift air to the cushion, and a large fan or aircraft propeller to provide thrust air, with or without a duct. The fans will be powered from a single engine via an arrangement of belts or gearboxes. Typically these are larger craft, although there are successful small craft of this type.

The advantage of this arrangement is that each fan can be properly designed to achieve its function, and therefore are more efficient and quieter than integrated craft. A twin fan craft will be easy to fly.



Pic 05-04 A home-built twin fan SevTec Scout.
(<http://members.aol.com/sevtec/sev/skmr.html>)

Twin engine

The twin engine is similar to the twin fan, except that each fan has its own engine. The transmission is simpler than the twin fan type, but there are now two engines to maintain.



Pic 05-05 A 3 seat twin-engine craft from BBV (www.bbvhovercraft.co.uk)

The twin engine design provides independent control of lift, which is useful in some circumstances.

Challenger Homebuilt

A large number of these homebuilt craft come up for sale, often as neglected or unfinished projects. They can be bought for a few hundred pounds, but they are not suited to cruising. Avoid them.



Pic 05-06 A Challenger-derived homebuilt

The challenger can be recognised by the flat (usually plywood) deck, small thrust duct and segmented skirt. They usually have a small 2 stroke motorbike engine.

Many people build these craft as projects and have a great time doing so, but the performance of the craft will be limited and they are not suitable for cruising use..

F25/F35

This was proposed as a hybrid racer/cruiser. You can race these in the Hovercraft Club of Great Britain series, but if we're honest they are limited as a cruiser. The compromise is just too great, and we would not normally recommend them for cruising use – although they can be OK at selected venues.



Pic 05-07 An F35 single seat craft from Vortex Hovercraft (www.vortex.org.uk)

06 What types of skirts and fans are there?

Fans and Propellers

There are two methods of providing thrust, ie a ducted fan, or a propeller. The choice of fan or propeller is largely a matter of opinion. However, size is important. Do not consider a fan of less than 900mm, with 1100mm fast becoming the preferred size. This is because the larger fan or prop will be quieter and produce more thrust – a win-win situation.

Skirt types

There are two main skirt types, ie segmented and bag, but there are many variations and hybrids. Both types are successful in cruisers, so it seems to come down to personal choice in the end.

Segment skirts

This type of skirt consists of many individual segments, often 70 or more to make the complete skirt. Usually the segments will be the same around the front and sides of the craft, and different at the rear, although there could be up to 5 types around the craft.



Pic 06-02 A segment skirt

The advantage of the segment skirt is that is that they are stable and damage tolerant - should a segment be damaged, the neighbouring segments expand to fill the space, and in any case it is easy to change a damaged segment in the field. The downside is that the segments frequently catch on debris and are partly pulled off, requiring re-attachment in the field – not a major issue though.

Bag skirts

There are a range of types of bag skirt, but all share a similar bag-like appearance. The skirt can be thought of as a large inner-tube that is formed around into the shape of the craft.



Pic 06-03 A high pressure bag skirt

Bag skirts are cheaper and quicker to make and replace, and are be reliable, as there are less 'edges' to snag on obstacles. Minor damage can be tolerated, and field repair is easy if needed taking just a few minutes. Some say that bag skirt "grab" on dry mud – they may, but then so will any skirt.

The pressure in the 'bag' element, with lower pressure being considerably better than high pressure, divides bag skirts. A low pressure bag skirt (also called 'responsive') is capable of moulding itself to the terrain or water better than a high pressure skirt, and amongst other things this means that the skirt provides predictably low hump drag. This is contrasted to segmented skirts, which have a propensity to 'scoop', which can be an issue for hump performance.



Pic 06-04 A low pressure bag skirt

Bag or loop and segment skirt

This is a hybrid, designed to have the best of both worlds. A bag skirt is mounted to the craft, and a set of segments are attached to the bottom of the bag. This is the most expensive type of skirt, and is found on all large craft but few small craft.



Pic 06-05 Bag and segment skirt

Skirt partitions

A partitioned skirt has one or more skirt dividers that run underneath the craft. These divide the cushion into compartments, usually front and rear, or front, rear and sides.

Large craft rely on a compartmented cushion (or skirt shift mechanisms) to provide stability, in a small craft with a single compartment, the driver must frequently shift body-weight in order to provide the required stability.

A compartmented skirt is very effective for controlling plough-in and properly designed means the craft will trim up properly regardless of the forward/aft weight distribution of the craft.

Some compartmented skirts are fitted with controllable vents, which allow the driver to control the craft attitude. This is used to provide a braking affect and permits enhanced manoeuvrability in larger craft.

07 What should I look out for?



Pic 07-01

Safety

Unsurprisingly, safety comes at the top of the list. You will need to look for the obvious, like properly guarded rotating assemblies, adequate buoyancy in case the engine fails on water, good 'freeboard' (the height of the sides above the water surface), etc.

There are many other factors in the performance that contribute to a 'safe' cruising craft in real life, and these are covered in the sections below. Here you will become familiar with many of the terms that experienced hovercrafters talk about all the time – "plough-in", "the hump", to mention just a couple.

Noise

Noise is a critical issue for hovercraft, some are incredibly noisy.

If you own a noisy craft you will be banned, pilloried, have stones thrown at you and generally made to feel unwelcome, wherever you go! There are some craft out there that are so noisy they make a 747 seem like a whisper. You do not want to own one of these!

The HCUK encourages new craft to be quiet in operation – 80dB, or about the noise of a small van passing by, would be considered to be good. The reason is simple – many hovercraft venues have been lost due to excessive noise.

The good news is that newer designs have been evolving that are much better in this respect.

Look out for designs that have twin fans, one for lift and one for thrust. The use of two fans allows the manufacturer to design efficient and quiet systems. These may be driven from one or two engines.

Ask the seller if they have measured the noise. If it is above 87dB, leave it unless you wish to do the work required to bring it within limits. Take advice – older designs may never meet the limit and should be scrapped. But be careful – some manufacturers issue quite misleading noise figures.

Things to avoid:

- § 2 stroke engines
- § Ducts smaller than 900mm
- § Very powerful engines (90hp+)
- § Poor silencers

Things to look out for:

- § Separate lift and thrust fans (may be driven from same engine)
- § Efficient silencers
- § 4 stroke engines
- § Low revving engines
- § Large thrust fans/propellers

Reliability

When you are out, miles from anywhere, the last thing you need is to breakdown. There's no RAC at sea! Recovering a stricken craft can be difficult, so reliability is a big issue.

The reliability of the craft is perhaps the most difficult thing to judge, the best thing to do is ask an experienced Club member. One might expect professionally built craft to be more reliable but that does not necessarily follow – maintenance is the key here. A craft known to Club members will be a known entity, anything else should be viewed with some suspicion.

Things to look for are low stress engines – small industrial engines, car engines or some motorbike engines can be reliable. Don't buy anything with a 2 stroke engine.

Any craft that has been used in a marine environment (most cruisers have) may well suffer from salt corrosion – often all the controls will require overhaul before reliability can be assured. Likewise, bearings and transmission belts may need replacing.

The good news is that an unreliable craft can usually be made reliable, but it will take considerable effort and plenty of money to do so. So if in doubt, join the HoverClub and ask for advice!

Fuel consumption

Hovercraft can consume huge amounts of fuel. The worst culprits are 2 strokes, a 50 hp 2 stroke can easily consume 5 gallons per hour. 2 strokes should be avoided.

08 What engine choices are there?

Unfortunately there is no such thing as a purpose designed hovercraft engine. The engines in use today are derived from many sectors such as the industrial, automotive, aviation and motorcycle areas.

The most important thing is weight. This cannot be over-emphasised, no amount of power will make up for the extra weight of some enormous automotive V6.

2 strokes

2 strokes have favourable weight – they are incredibly light. But, for cruisers today, the disadvantages of poor reliability, high fuel consumption and high noise levels outweigh the weight advantage.

Two strokes are best avoided for cruising use.

4 strokes

4 strokes are heavier than the 2 stroke alternative, but are quieter and more efficient, and generally more reliable.

A few lightweight car engines and some motorcycle (not high revving) engines are suitable. Look for all-aluminium engines.

Recent developments in 4 stroke microlight engines are very suitable for hovercraft, but may be a little expensive.

Diesels

Whilst many agree that diesel reliability would be an advantage, they remain heavy just at present so there are few small diesel powered craft around. There are a number of developments in lightweight diesel engines, so this may change in the future

Small craft

The Briggs and Stratton, Kohler or similar industrial/garden tractor engines are suitable for small craft, say between 12 and 16 feet. Car engines are likely to be too heavy for this size of craft.

Larger craft

Craft of 15 feet and upwards may be suited to the lightweight car engines, such as the Subaru flat fours, or Suzuki 3 cylinder engines.

09 What are the different types of hull?



There are a number of methods of hull construction, each with advantages and disadvantages.

Aluminium

The first hovercraft were constructed from aluminium using aircraft methods.

Disadvantages: Tends to be heavy. Expensive.

Advantages: Very strong.

GRP

Glass reinforce plastic, or glassfibre, is the most common hull material for professionally built craft.

Disadvantages: Needs a mould, lots of space and some skill. Suited to professional manufacturers. Can be heavy.

Advantages: Complex shapes can be manufactured easily, good strength to weight, robust and repairable, doesn't corrode.

GRP-Foam composite

A layer of high density PU foam has a lightweight GRP cloth bonded on both sides.

Advantages: Extremely stiff, light and strong material. Suited to home-build or professional build. Provides the best strength to weight of the common

construction methods. This is probably the best construction method suited to home construction of medium to large craft (12 feet and upwards).

Disadvantages: Labour intensive process.

Wood

This is the traditional home-build material.

Advantages: Can be a light, cheap and easily constructed material, suited to moderate skill levels.

Disadvantages: Construction quality dependant on the skill of the constructor. Can be heavy if the wrong grades are chosen. Will rot in time.

There are no modern designs for wooden construction, and the potential constructor is best advised to look at GRP-foam composite instead.

Polystyrene foam – Epoxy resin

Large blocks of polystyrene foam are carved into the required shape and covered with glass fibre cloth and epoxy resin. This method can be used for home-built craft given a suitable design.

Advantages: Complex shapes can be made as one-offs. Light and strong.

Disadvantages: Expensive and labour intensive.

Provenance

What does this mean? Essentially, where did the craft come from... there have been many hovercraft manufacturers, ranging from excellent to poor, and in addition many craft have been home-built, again to variable standards.



A professionally built 4 seat cruiser from K&M Hovercraft
(www.avdw32.dsl.pipex.com)

High quality professional cruising craft or 3 seats or more do not come up for sale very often, and when they do, they command a price starting at 7 to 10 thousands of pounds. By contrast, many 'Challenger' style home built craft

come up for sale, and whilst they can be had for a few hundred pounds, they are not suitable for cruising use. If you simply want a fun toy to fly around the paddock on, go ahead and have fun! In between are a few small craft which can make a sensible 'starter' craft, and will probably cost somewhere between three and eight thousand pounds for a good one.



Homebuilt craft designed by Universal Hovercraft
(<http://www.hovercraft.com/content>)

Occasional larger home-built craft come up for sale, and where built to established plans, such as the well known Universal Hovercraft or SevTec, these can be a very good buy, provided that the build quality is good. As ever, join the club and seek advice before parting with your money.

10 What should I be looking for when I check out a second hand craft?



There are a number of points that should be looked for in a second hand craft – here are a few things to out look for.

Skirt

The skirt on a hovercraft has a limited life – like the tyres in a car. Many craft will come up for sale with well worn skirts. This isn't a disaster, but the cost of a new skirt can be high - £400 and upwards, so be prepared for the expense.

Old bag skirts will be recognised by the presence of multiple repairs and patches, together with wear on the ground contact line.

Worn-out segment skirts will be seen to have a frayed and torn lower edge (where it meets the ground) with the backing material showing through the rubber.

Hull

Hulls have frequently suffered damage from minor collisions, abrasion and so on. Look for the signs of repairs. The place you really must look is

underneath, as damage here is likely and you don't want to find it when floating without power in a choppy estuary! The good news is that GRP can be repaired fairly easily – but it has to be worth a negotiation with the seller.

Engines

Checking the engine is similar to any motorbike or car – but more so. Hovercraft engines get a hard life, so take someone who knows engines with you.

In addition to the usual things, look out for salt corrosion if the craft has been used on the sea.

Fan or propeller

Old and perished fans can be dangerous. If the blades have turned green or pink, this indicates deterioration due to UV light, and they will have to be replaced, at around £100 - £200 per set.

With propellers, check for signs of erosion on the leading edge, caused by sand and grit in the air flow literally sand blasting the edge.

Transmission

Belts are often used – and should be checked carefully for fraying, cracking or other damage. You may choose to replace it anyway once you own the craft – they are well known for breaking, I like to know that mine is in good condition.

Check for play and roughness in bearings.

Controls

Controls often rely on long bowden cables, which can suffer from salt corrosion. Check for free operation and frayed ends, and replace if in doubt.

Guards

Check guards for security and strength, and if you intend to use the craft at HCUK events, that they meet the current construction regulations.