

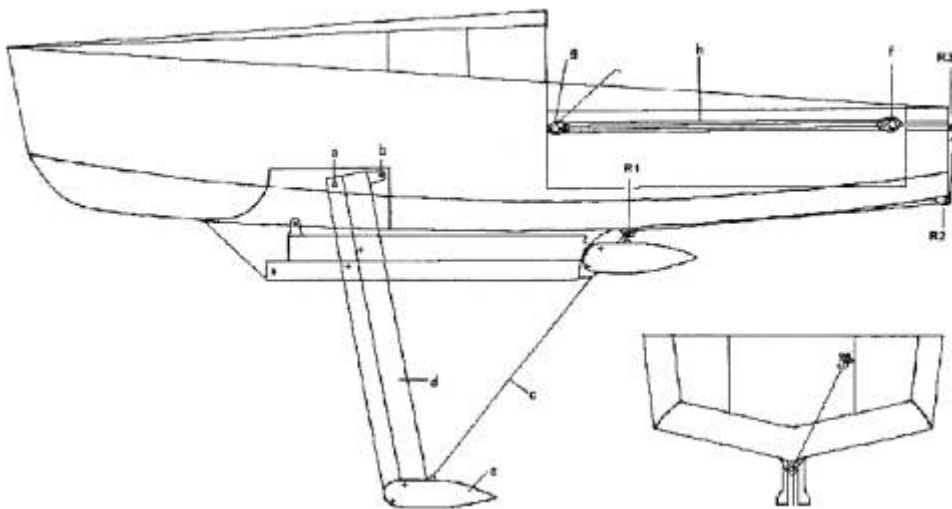
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The Explorer

To call a new boat 'revolutionary' without adding 'hi-tech' in the same breath seems a contradiction in these days of advanced sailing technology, but even though the Swing Bulb Keel* in Mukti Mitchell's Explorer is an inspired piece of engineering, it is nevertheless beautifully simple in operation. There is little doubt that it will reappear in other microcruiser designs in the future, and in bigger boats too.

The Explorer, 15' long (4.57m) and weighing in at 800lbs (363.6kg), was first introduced to the public at the Beale Park Boat Show, 2004, and to DCA members by Ted Jones in At The Shows, Bulletin 184, where he gave us the statistics and described it as a 'boat where everything has a function, nothing is missed and nothing is duplicated'. When the first Explorer Chance was launched earlier this year it generated a lot of media interest as a boat the size of a dinghy with the stability of a yacht; as one not liable to take in water even if waves crash over it; and as one which has the ability to self-right from a capsize. It is tempting to compare it with the DCA Roamer, which achieves self-righting by different means, or more properly with the Rebell, as it too has a 'lid'. It is easy to see why this design should appeal to dinghy sailors: it offers simple, safe and fast cruising. However, the real eye-opener is the lifting keel, which reduces Explorer's draft quickly from no less than 5 feet to 18".

The keel comprises a lead bulb at the end of two shafts which are aligned closely fore and aft, but which to an extent move independently in that plane. (See drawing.) The bulb weighs 100lbs(45kg) and the shafts weigh 160lbs (73kg). The ability to move 260lbs of ballast around quickly below the waterline constitutes the revolutionary aspect of this design. You do not have to rummage around for your old school geometry notes to grasp the 'parallelogram' concept quickly. The main point is that the bulb remains perfectly horizontal as it is raised or lowered, so it is effective as a keel in any position through the 90° arc, but in fact there is a pin to secure it at 45°,



the perfect angle for running, with the centre of gravity moved aft. In practice the designer has found that simple friction inside the case holds the keel in any position, although he concedes that heavy weather requires the further help of the shear pins and the uphaul, which he terms the 'keel sheet'. Study the drawing to see how the differently positioned pivot points in both the bulb and in the shafts at the cabin sole end achieve these effects. Note also how the keel is raised and lowered by a stainless steel wire aft, controlled by a tackle in the cockpit. An alternative method would be to operate the system by a hydraulic ram on the cabin sole which would bear on the upper ends of the shafts, but the designer feels that the increased weight would only be justifiable on much bigger boats and this would also move away from the simplicity of the present arrangement, which he rightly prizes. Apparently the wire is protected from fouling by the water flow from the keel shafts, and the worst effect it causes is a low hum on certain points of sailing!

The fixed bulb keels on such open boats as the Squib or the Flying Fifteen offer superior performance when beating to windward but they can be awkward when the boats are running and they are frankly undesirable when they are on their trailers. Centreplates avoid these problems, but they are inefficient foils on all points of sailing compared with the more specialised keel forms. In having the advantages of both types and the failings of neither, the Swing Bulb Keel proves itself to be a very superior piece of kit. The shafts raise the bulb into a 'stored' position and disappear themselves into a strong, rigid housing, or low aspect ratio keel. In this mode you still have a boat that is self-righting, with a traditional long stub keel, able to tack in shoal water and capable of taking the ground without harm, no matter how rocky the bottom. On at least one occasion this has been a godsend to the designer. Sturdy legs clip to the gunwales to support the boat when it dries out. Small wonder, then, that the keel made Mukti Mitchell a finalist in the 2003 John Hogg prize competition set up by

the Amateur Yacht Research Society for "outstanding achievement in the research and development of improved yacht performance, safety or endurance."

Explorer is instantly self-righting from a knockdown with immersed sails, or from 135° immersion (three-quarters fully down), with keel extended or retracted. From a full 180° inversion with keel extended, a tug on the chine from crew in the water starts the righting process; with keel retracted it is necessary for the crew to exert part of their body weight on the stub keel to start the process. The designer warns that once 135° is reached the boat rights itself automatically and swiftly, so the main concern is that it does not sail off without you! Only a few pints of water are taken into the cockpit during a knockdown, and a few gallons during a complete inversion. When the cockpit is flooded the waterline aft is down only by inches. Even when the boat is completely flooded, cabin as well, it floats at a level well below the gunwales.

The designer's original aim was to build for himself a light cruiser with a difference. He has called Explorer "The sea-going equivalent of a mountain bike and tent." As its length is split into a 6'6" long cabin (extending the full width of the boat), a 6'6" cockpit and a 2' buoyancy tank in the bows, you can see that the accommodation is certainly better than a bivouac tent. (See [accomodation photos](#)) It is light enough for one to manage on a trailer, seaworthy, able to take the ground easily and to ride comfortably at anchor or on a mooring, is able to plane in a breeze under a modest sail area (110 sq.ft) or sail very well in light airs, obviating the need for an auxiliary engine. 8' oars break down for stowage and are supplied with the boat. The only occasion so far when he has felt that an outboard would have been beneficial occurred after he had sailed Chance from Devon to Wales, then reached Lundy after 13 hours' continuous sailing on the return trip, only just arriving in time to avoid falling foul of the tide in a calm.

His original plan to build his own perfect small boat for exploring the coasts of Britain and for more modest sailing from his home base in the Bristol Channel quickly moved into a different dimension as his ideas became better known in the yacht-designing fraternity. Mukti Mitchell received encouragement on every side to put Explorer into production. This part of the story started while he was on passage from Florida to the Azores on the 63' ketch Silurian, when he learned from the skipper about the Russian engineer Evgeniy Gvozdev, who built a 12' yacht from scrap and sailed her around the world (See [Evgeniy](#) for article, and [Said](#) for photos. After the skipper in turn had been told about the idea of the swinging bulb keel, he said the designer ought to show it to his father, who happened to be Jeremy Rogers, designer of the Contessas. Jeremy Rogers in turn told him that he was on to something: racing fine-nosed J24s was great to windward, but when running it was hard to stop them nose-diving, even with all of the crew on the transom, which is precisely the same situation encountered by dinghy sailors who capsize when running off the wind with the plate down. Clearly this problem could be solved by the ability to swing a deep keel aft and hold it there, which would also reduce drag.

One can anticipate the keel being used in this way on larger racing craft in the future, but such speculation leads us away from the main issue: Mukti Mitchell is essentially an enthusiastic small-boat sailor, who finds other small-boat sailors to be among the most serious and committed seafarers around. His view is that you have to be serious in your approach to small boats to be safe. The small size of a boat is never as important to its safety as the skipper's experience and the soundness of the boat's design and construction. He is fond of quoting from 'The Venturesome Voyages of Captain Voss' to prove his point, which is fine by me as that book is also a favourite of mine.

What about Explorer's construction? The keel assembly is substantially formed from 316-L stainless steel, by Irons brothers of Wadebridge, who made the 80-tonne canting keel for Mirabella V, the world's largest sloop until a week or two ago, so they should know what they are doing. Elsewhere, the structure is reassuringly familiar to those who have been involved at some time with building small craft. Marine plywood on Douglas Fir frames, held together by Resorcinol and epoxy resin - and upwards of 2,000 6-gauge screws. The hull bottom is 9mm, the topsides 6mm, with epoxy/glass sheathing. Mast and boom are hollow Douglas Fir. The masthead Bermudan rig maximises windward performance, with the genoa and main roughly equal in size so that they are well-balanced when running goose-winged. The genoa is bent on to a rolling luff-spar, and the main is slab-reefed. The cross-bar for the centre-mainsheet track provides a thwart for rowing. All deck fittings are Holt-Allen.

Down below, there is seating for two with 3'7" headroom. Boards span the sitting area to form a 6'6" vee-berth. There is no fitted instrumentation, only places to put your handheld GPS, VHF, etc. Navigation lights are the waterproof, clip-on, battery-operated type. It all sounds so familiar, doesn't it? At first glance Explorer strikes you as a performance micro, but closer inspection reveals her to be the light cruising craft par excellence; tried, tested and raring to go. It would be nice at this point to introduce the cliché, "And the rest is history", but Explorer is just at the start of her career, and it only remains for me to wish her, and her designer, fair winds and every good fortune in the future.

By Keith Muscott, with Mukti Mitchell

[Mukti Mitchell provided the author with technical detail, drawings, photographs and personal accounts of his experiences so far with 'Chance'. He did not write any part of this article]