

something different



From America comes a unique design for an extremely high speed craft called Sea Knife. Here Steve Scoles writes about the thinking behind it all

FROM the United States comes word of an entirely new kind of boat, developed from a blend of hydrofoil, aircraft and planing hull technologies, which is claimed capable of maintaining maximum speed effortlessly in waves which would cause a conventional boat of similar size to founder.

The design is called Sea Knife and is the brainchild of Peter R. Payne, an aeronautical engineer with some 23 years' experience in the UK, Canada and the USA, and President of Blade Hulls Inc, Rockville, Maryland.

The American terminology for this type of hull is "super-critical", as opposed to the conventional sub-critical configurations. Accepting that the problem of slamming is the main obstacle in big seas, and accepting that every boat has a natural period of oscillation in the pitching plane, then the "critical" condition is that area when the period of pitching oscillation (varying according to speed) synchronizes with the period of the waves, producing the roughest possible ride.

The normal way out of this situation is to reduce speed, de-synchronizing the pitching and wave periods, and thus reverting to

"sub-critical" operation. For high speed racing craft, however, keen on maintaining maximum speed, escape from the "critical" condition by the other exit offers a more desirable solution — achieving "super-critical" operation, where the pitching period of the boat (in conjunction with speed, and expressed as a distance covered) is greater than the period of the waves.

In order to achieve this, of course, one must have ample reserve power to provide sufficient speed through the water and the 22ft. production Sea Knife is fitted with up to 325 hp engines. Other requirements for the design of small craft capable of breaking through the barrier to "super-critical" operation are minimum buoyancy and relatively small flare at the bows, and no flat bottom sections forward. Payne's Sea Knife would seem to be ideal with her delta shape, deep forefoot and knife-like bow sections.

Modern offshore racing powerboats, though often very highly powered, are prevented by their hull forms from attaining true "super-critical" operation — there is a tendency for the bow to be forced upwards by

oncoming waves, inducing slamming. The bow must be designed to cut through the peak of the wave or, alternatively, have some kind of forefoot which remains below the surface of the water all of the time and is unaffected by surface motions. This latter approach has been seen for some years in high-speed naval craft — and more recently in bulb-bowed tankers.

Reports by the American yachting press have varied from "exuberant" to "reserved", but all have agreed on the Sea Knife's remarkably soft ride when running into rough head seas, and her amazing turning ability, re-crossing her own wake inside twice her overall length at full speed.

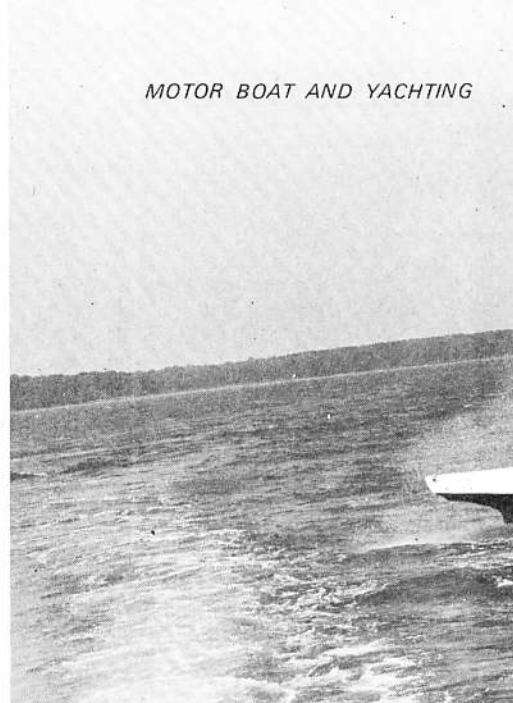
Criticisms which were made concerned the craft's instability at rest and the tendency of the forefoot (when submerged) to act as a rudder, endeavouring to maintain a straight course. One correspondent remarked that a gentle 180° turn, not sharp enough to cause the chine to dig in, could cause the craft suddenly to "trip", throwing occupants violently against the outboard gunwale. Payne claims to have eliminated this possibility by moving the helm position further forward, so that the knife-like bow is in contact with the water at all times, providing a keel action in such turns.

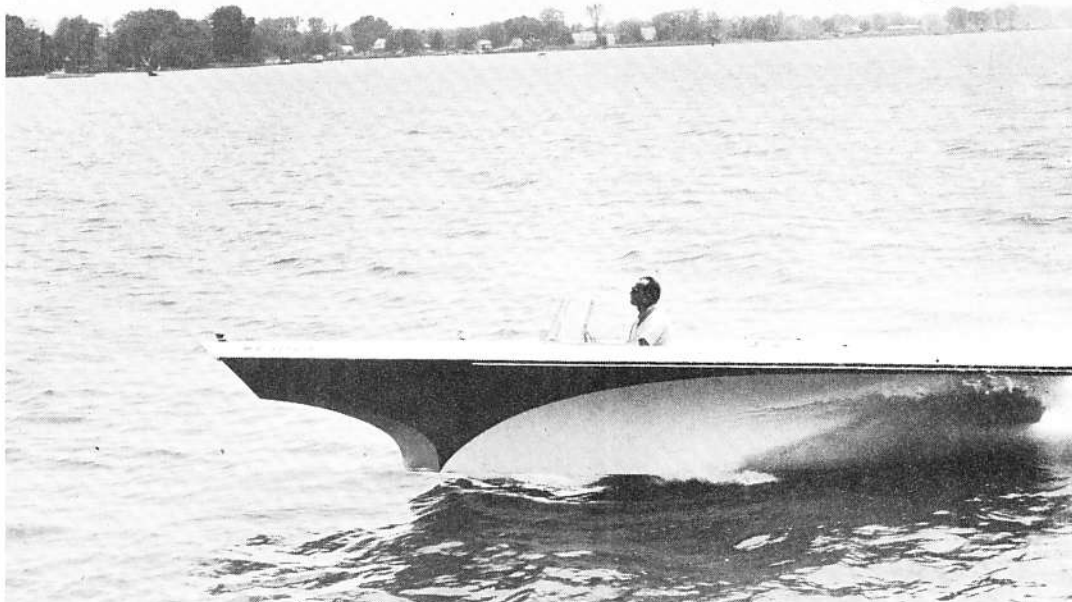
The initial tenderness when at rest is to be expected of a boat of such radical configuration, but equally, such configuration would also support the designer's contention that it is only "tippy" for an initial 10°, when the pronounced flare provides almost instant stability. Stability at speed was never questioned.

Worth noting is that most trials were run in the prototype or pre-production craft and only one 22ft. production model had been tested at the time of writing. Payne and his team at Blade Hulls are continuing with their programme of hull configuration research.

The current production model is a completely watertight inner shell of marine aluminium, mounted within an exterior hull of similar materials; the space between is filled with foam. She is ballasted with an epoxy/concrete mix and the high centre of buoyancy eliminates the possibility of capsizing, even if swamped. Even if flipped over, the Sea Knife will roll up the right way, according to the designers.

The Sea Knife principle is not restricted to

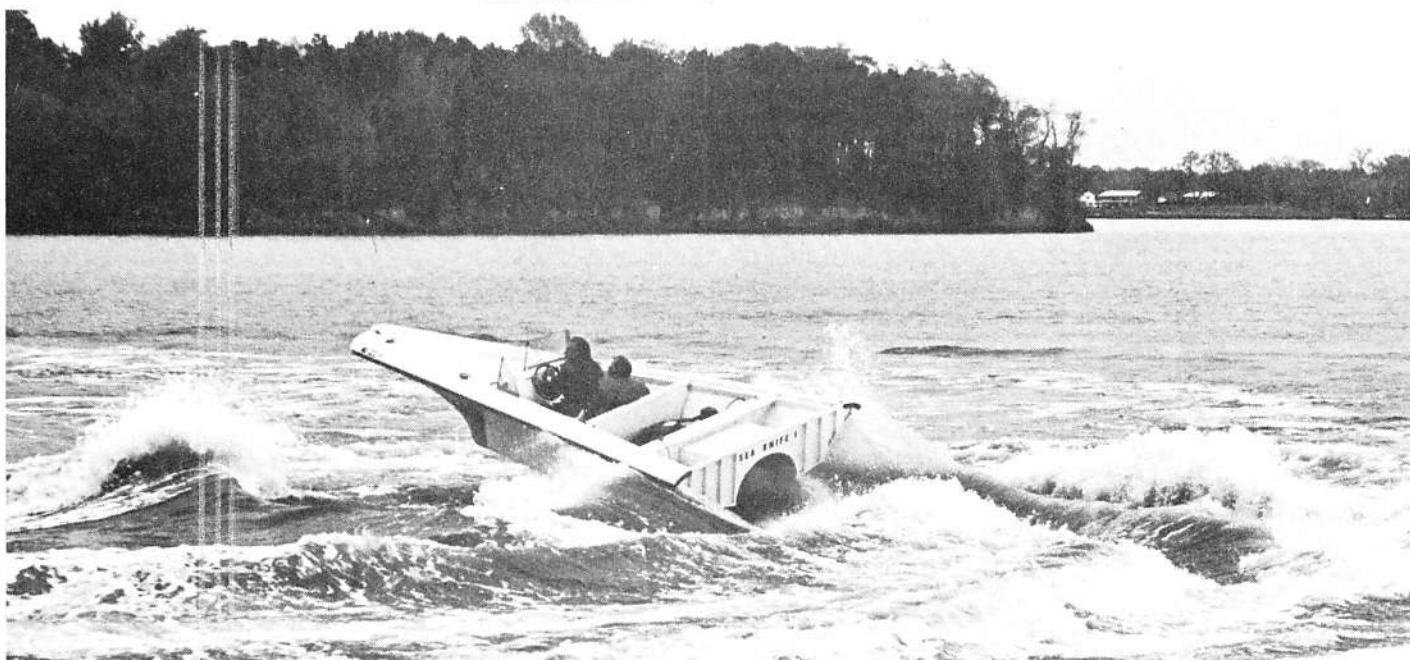




Above left, Sea Knife cutting through the wake, rather than leaping off the top like a conventional boat

Below, Sea Knife I, the first production boat, being put through a tight turn. The stabilizing effect of the outer spray sheet in a turn is quite evident

Above, her normal planing attitude in calm water with the leading edge of her triangular-shaped flat bottom just clear of the surface



small pleasure craft; indeed, its most interesting applications could be in boats over 40ft. Blade Hulls has already made design studies for a 65ft. offshore oil-rig crew boat and an 85ft., 200-passenger, high-speed ferry.

Payne claims no interest in the military market: "There's not much money to be made there, and the Navy won't move until its destroyers are overtaken by 22ft. pleasure boats with girls lolling about on deck."

Among the fastest vessels in the Royal Navy are the 10-year-old Brave Class patrol boats which are capable of about 50 knots in a stormy sea, but Payne believes that scaled-up versions of the Sea Knife should be capable of 100 mph.

We expect to hear more of Blade Hulls Inc. and the Sea Knife, and look forward to the possibility of putting one through her paces should the opportunity arise. A standard 22ft. model, powered by a 285 bhp Crusader engine coupled to a Volvo outdrive leg, has been ordered by a London/Athens businessman, Mr Peter Nimikos, and will be carried aboard his yacht *Northwind II*, at present in the Mediterranean. □

