ON A STEP AND A STABILIZER

With the cost of specialized offshore racers soaring, where do we go from here in hull design? Steve Scoles describes the American Dynaplane principle, first seen on *Smuggler* in last year's Cowes/Torquay race

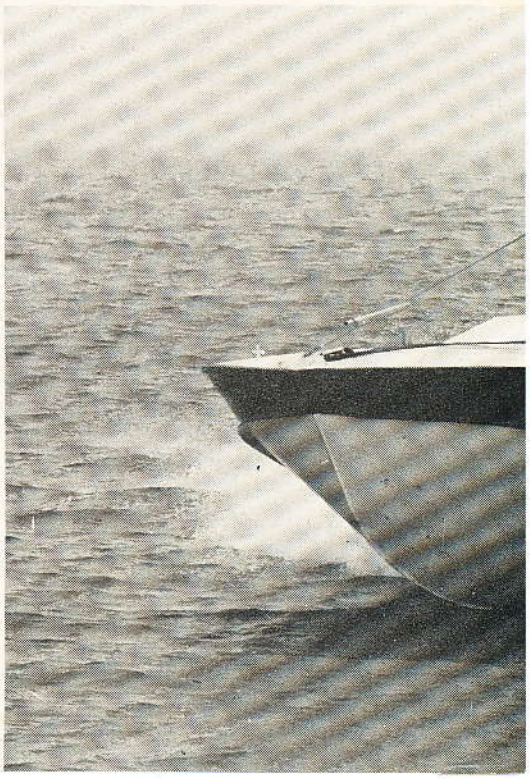
DEVELOPMENTS in offshore racing powerboat design of recent years have been concentrated on lighter and lighter hulls and increased engine power, a trend which is undesirable not only because of its tendencies to under-rate seaworthiness, but also because it must eventually confirm the sport (as is its present course) as the prerogative of the super-rich.

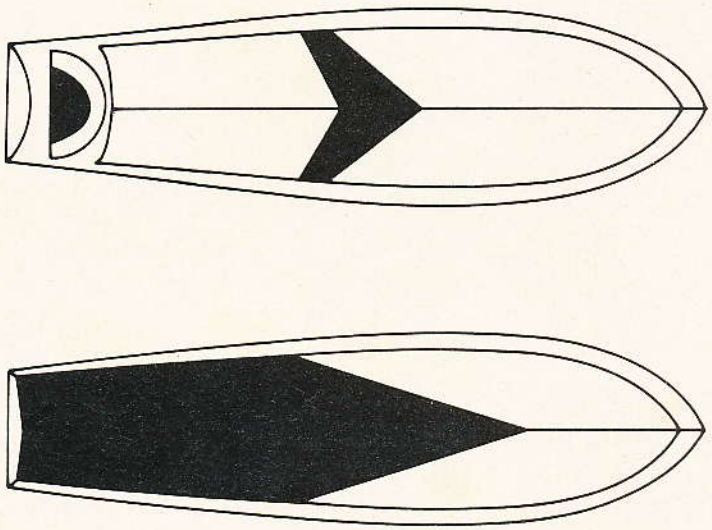
It would seem that only a revolutionary breakthrough in hull design could prevent this eventuality and one of the most promising ideas in this respect is the American Dynaplane principle, a radical interpretation of the stepped hull. The idea originated as long ago as 1925 when Danish-born American naval architect John Plum patented a stepped hull design with a unique adjustable stabiliser at the stern. Most of the serious development, however, did not begin until 1948, when Plum was joined in his research by Eugene P. Clement at the David Taylor Model Basin (now known as the Naval Ship Research and Development Centre) in Washington.

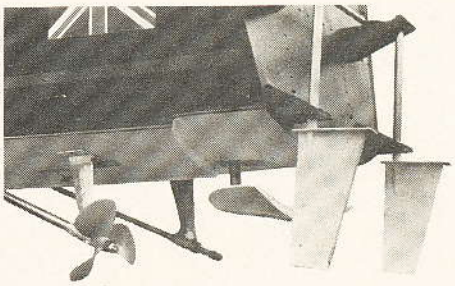
The experiments attracted a lot of initial interest and the principle was considered for possible military craft application, but was forced into the background at a time when most of the Government money in this sphere was being allocated for extensive research on hydrofoil craft, which were considered to be more efficient in the severest sea conditions.

The world's first operational dynaplane design (apart from a 30ft. half-scale model built in 1958 for sea trials) was *Smuggler,* an aluminium offshore racing craft designed by daring British designer John Teale in conjunction with Clement and built and raced by A. E. (Ernie) Freezer of Hayling Island. *Smuggler* created a lot of interest during and since the last Cowes-Torquay-Cowes race, but engine tuning and fuel feed problems somewhat hindered her performance. Had she completed the course without these mechanical problems, we could more adequately have assessed the type's potential for offshore racing, but *Smuggler* remains a somewhat unknown quantity.

We received some compensation a few







Left, builder Ernie Freezer at the controls of *Smuggler*

Above, black areas indicating wetted surface on the Dynaplane (top) and a normal planing hull

Above right, twin rudders, stabilizer "dish" and only one of the two propellers

Below left, *Smuggler* shows her paces in choppy water. Note the level planing attitude

Below right, very wide bows taper off to a narrow stern

months after the event, however, when we accepted Ernie Freezer's invitation to go for a spin, although even at this time *Smuggler* was suffering from engine tune problems and unable to achieve maximum revs. Being such a specialist racing craft, any attempted evaluation from *Smuggler* of the dynaplane's potential for general pleasure craft adaptation would be rather irrelevant and a matter of conjecture, but we came away from Hayling Island with considerably more optimism for the Dynaplane principle than when we set out.

Basically, the design demands a step amidships on the bottom of the hull, the trailing edge of which provides the main lifting surface and supports 90 per cent of the hull weight at high speeds, and an adjustable stern stabilizer (a dish-shaped plate aft operated up and down pneumatically) which supports the stern sections when at speed; not unlike the hydrofoil concept in some aspects. The design of the cambered planing surface of the forward step is apparently the most critical part of the design and was the subject of considerable research by Clement and his crew at the DTMB.

Clement, resident in Penshurst, Kent, since his discharge from the U.S. Navy, was the head of model testing and development of design methods for high speed craft at the model basin (U.S. Navy's main research laboratory) from 1952 until 1969.

The *raison d'etre* of the dynaplane idea is simply to get as much of the boat as possible out of the water and moving through a substance some 800 times less dense . . . air. The hull step is swept back like the wings of a jet aircraft and model tests showed that wetted surface is about 75 per cent less than on conventional planing hulls. Total resistance is claimed to be at least 50 per cent less. In most respects, it seems a logical step from very light displacement deep-V racers, unless one opts for the new "vogue" offshore power catamarans, which are going through a very critical stage of development at the moment.

Clement claims this new idea will give 10-12 mph more than a conventional deep-V hull of similar size and power; this facility of increased speed with the same power or (vice versa) equal speed with less power, seems undoubtedly the feature to be exploited in the dynaplane principle and would enable competitive top-class racing on a greatly reduced budget.

Manoeuvrability at low speeds seemed only average in *Smuggler*, a fact somewhat attributable to her special raceboat designation. This particular craft has extremely narrow stern sections and on turns at high speed tended to skate round in a wide arc rather than grip the water and bank like conventional deep-V hulls. The basic ideas of the dynaplane design demand a minimum of weight in these after sections, although not necessarily to the extremes seen in *Smuggler*.

Our short spin left us with two very definite impressions—excellent soft ride in quite disturbed waters, and easy propulsion from two relatively small engines (twin Perkins 175 hp). Getting over the hump to planing speeds, however, was a slightly longer process than one would expect of conventional deep-V craft. Some (but not all) of this could be attributed to the poor tune of the engines at the time.

Acceptance of this revolutionary new idea will first require some competitive successes, as the large sums of money spent on racing craft today do not really warrant the extra risks of unproven designs. Ernie Freezer is confident enough though—he is hoping to fit two new Perkins 225 hp diesels for the next racing season which he is confident will raise maximum speed from the present 53 mph to about 65 mph. □