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1981-08-14

Subject: Results of tests for final 12 M configuration  
Our reference: P44359-----

Dear Ben,

Further to our telephone conversation on August 7 and 11, 1981,  
 please find enclosed the following:

1. Table 1, giving a comparison of the performance of the final configuration (model 5854B with keel VA and finlets IIA) and the "Australia 1980" configuration (running, reaching and beating).
2. Table 2, giving some main lengths, displacements, draughts, weights and sail areas for the 2 designs.
3. A table of 1 to 1 offsets for the final configuration (canoe body only).
4. Results of hydrostatic and stability calculations for the complete canoe body-keel-finlet configuration.

By separate mail I have forwarded to you the following drawings:

<u>drawing no.</u>	<u>description</u>
M5854-30	- details of final keel and finlets
M5854-31	- waterlines of final keel
M5854-2	- body plans of 3 canoe bodies tested (M5854B is final configuration)
M5854-27	- details of final rudder
M5854-18	- particulars of final keel and finlets (see also drawing M5854-30)

I have also enclosed the lines drawings of "Courageous" and "Enterprise" with the package containing the above drawings. Please also find enclosed the computer-faired drawing of the final canoe body on a 1 to 10 and a 1 to 15 scale. This drawing is yet to be 'touched up' by Van Amersfoort when he returns from holidays.

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In a few days you will also be sent a table of offsets of keel and finlets on a 1 to 1 scale. These offsets have not been computer-faired, so you ought to check them before use.

As I informed you by phone, the final displacement to the rated waterline is 23.0 m<sup>3</sup> exactly, so that the rudder stock must move 7 cm further aft. At present the rated waterline length of M5854B is 13.40 m, allowing for 22.67 m<sup>3</sup> of displacement. This small change in rudder position, and the associated elongation of the waterlines in that area, is not included in any of the drawings I have sent you by separate mail.

The analysis of the results of the tests indicates that the centre of the hydrodynamic side force of the final configuration has not moved aft very significantly with respect to "Australia 1980". This means that the same mast position can be adhered to. The 0.75 m shift aft of the centre of hydrodynamic side force for the first "upside-down" keel we tested (with finlets) was compensated for when we cut off about 20% of the aft part of the keel. The recent tests carried out indicate that, approximately, the same rudder angles are required to obtain the same leeway-keel attitudes, at corresponding speeds. If it is assumed that the rudder effectiveness is the same, then the same mast position can be retained.

It is difficult to ascertain whether the new rudder is in fact more effective or not. Since the side force on the new configuration has increased by between 5% and 10% (for the same leeway angle) it can probably be concluded that the bustle normally experiences negative side force. Hence the centre of lateral resistance possibly has moved aft somewhat.

Since the model was towed at the same effective centre of effort as before (which is too far forward for low speeds and too far aft at high speeds), it can be deduced that the rudder effectiveness has increased somewhat since an equal amount of helm brings about the same leeway angle. On the other hand the turning tests didn't show an increase in side force relative to the 1980 configuration at 30 degrees of helm.

This need not mean that the yacht will turn less quickly since the hydrodynamic resistance to turning has become less due to the altered bustle configuration.

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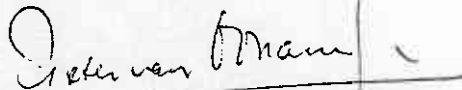
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The 1 to 10 lines drawing and the photographs are not yet ready to be sent to you. When I get back from holidays, in September, I will send you the remaining material. When you receive this letter and accompanying material, you will presumably have all the required information for the construction drawing and remaining calculations.

The information relative to the volume of the keel configuration, etc. can be found in Table 3, enclosed with this letter. The hydrostatic calculations should provide additional information relative to the total volume below the 5.0 ft waterline, and a check as to the allowable total weight of crew and sails.

I am working hard to finish the final report as quickly as possible. At this moment everyone has gone on holidays and virtually very little progress can be made. I will contact you again in September. Give my regards to Yvonne.

Sincerely yours,  
NETHERLANDS SHIP MODEL BASIN



Dr. Peter van Oossanen  
Head Design Research  
Research and Development Division

Encl.

PvO/tg

P.S. The computer results of the hydrostatics and stability calculations will be sent to you in a few days together with the table of offsets of keel and finlets. They were not ready when this letter was posted.