



NOTES ON RUDDER TORQUE AND FORCES AHEAD OPERATION

1. NORMAL FORCE,  $F_N$ , BASED ON RUDDER AREA, SHIP SPEED, COEFFICIENT OF NORMAL FORCE, CENTER OF PRESSURE COEFFICIENT, BASED ON DATA IN DTMB REPORT 205 AND PROPELLER SLIP CORRECTIONS HAVE BEEN MADE FOR TAPER RATIO, AND SWEEP ANGLE EFFECTS ON THE COEFFICIENTS.
2. HYDRODYNAMIC TORQUE,  $Q_H$ , BASED ON NORMAL FORCE AND CENTER OF PRESSURE.
3. ALLOWANCE TORQUE,  $Q_A$ , FOR UNCERTAINTY IN ESTIMATING CENTER OF PRESSURE,  $\pm 1 1/2\%$  OF MEAN CHORD.
4. SECTION TORQUE ON DUE TO STOCK BEARINGS - BASED ON BEARING REACTIONS DETERMINED FROM RESULTANT FORCE  $F_R$  AND COEFFICIENT OF FRICTION OF 0.01.
5. POSITIVE TORQUE VALUES INDICATE RUDDER TENDING TO TAKE CHARGE.
6. NEGATIVE TORQUE VALUES INDICATE RUDDER TENDING TO TRAIL.

ASTERN OPERATION

1. STEERING GEAR CAPACITY IS TO BE SELECTED BASED ON AHEAD OPERATION. ASTERN SPEED IS TO BE LIMITED SO AS TO NOT EXCEED THAT CAPACITY.

NOTE: FOR DIMENSIONS OF RUDDER SEE PANEL 4

PARTIAL E.P.H. SECTION FARMING SEE GENERAL NOTE #2

AREA OF RUDDER 290 SQ FT  
 RUDDER SEA LENGTH/DRAUGHT 1.099  
 RUDDER BALANCE 25%