INTERNATIONAL TOWING TANK CONFERENCE CATALOGUE OF FACILIYIES TOWING TANKS, SEAKEEPING AND MANOEUVRING BASINS

DAVID TAYLOR MODEL BASIN, Carderock Division, NSWC UNITED STATES BETHESDA, MD 20084-5000, Phone: (301) 227-1578, FAX: (301) 227-3679 **TOWING CARRIAGE NO. 2 (1947)** Wavemaker Units (2) Carriage II ldle Drive Wheels Wheels \boxtimes **Guide Wheels** 575 m (1886 Main 6.7 m (22 ft) 12-Deg Sloping Fitting Out Dry Dock (7.2 m x 2.2 m) (23.8 ft. x 7.3 ft.) - 15.5 m (50.96 ft) -15.5 m (50.96 ft) Elevation View of Deep Water Basin Schematic Plan View of Basin & Carriage II (Carriage Not Shown)

DESCRIPTION OF BASIN UNDER TOWING CARRIAGE NO. 2: This indoor rectangular deep water basin is 6.7 m (22 ft) deep, approx. 575 m (1886 ft) long and 15.5 m (50.96 ft) wide; a pneumatic wavemaker is located at one end and a wave absorbing beach at the other; behind a moveable section of the beach is a fitting-out dry dock.

DESCRIPTION OF CARRIAGE: In plan view the carriage is triangular in shape, in effect a monorall structure with two outrigger idle wheels supporting the light side of the carriage frame, four drive wheels & 4-pairs of horizontal guide wheels operate in tandem on the main rail, carriage is double ended & will function equally well when towing in either direction.

TYPE OF DRIVE SYSTEM & TOTAL POWER: Electro-hydraulic drive & regenerative braking system with 4-drive wheels each direct coupled to an inline axial piston type hydraulic motor receiving oil from hydraulic pumps driven by constant speed AC synchronous motors.

. TOTAL POWER: 2-electric motors, 75 kW (100 hp) each.

MAXIMUM CARRIAGE SPEED: 10.3 m/s (33.8 ft/s, 20-knots) (uniform to within 0.01 knot, total variation)

OTHER CAPABILITIES: Vertical & horizontal PMM, heave oscillator, vertical planar oscillator.

WAVE GENERATION CAPABILITY: (with water level lowered 0.76 m (30 inches) below the normal water height)

- Regular waves from 1.5 to 12.2 m (5 to 40 ft) in length with corresponding maximum heights of 102 to 610 mm (4 to 24 in.).
- Irregular waves with a spectrum resembling typical ocean wave patterns with appropriate scale reductions.

WAVEMAKER TYPE & EXTENT: Pneumatic type, the 15.5 m (50.8 ft) wavemaker dome is divided into two separate equal length sections each connected to a centrifugal type blower driven by a direct coupled variable speed DC electric motor rated at 112 kW (150 Brit. hp), 1150 rpm max.

BEACH TYPE & LENGTH:

- The wave absorber spans the full width of the basin at the end opposite the wavernaker dome, the absorbers are a discontinuous 12 deg slope type made up of 12 permeable layers of rectangular precast concrete bar panels resting on an impermeable concrete slab supported by a structural steel framework, the center section of the absorber is of wood construction & can be raised & lowered as a unit to provide model access to and from the fitting-out dry dock located at the end of the basin.
- Extending along the walls on each side of the basin are "U"-shaped steel wave absorber skimming troughs with their upper edges set about 6 mm (0.25 inch) below the normal water level surface.

WAVE MEASUREMENT: Ultrasonic transducers mounted on the towing carriage

INSTRUMENTATION: Floating-beam (girder) type towing dynamometer (fully reversible when carriage tows in opposite direction), 67-horsepower (50 kW) fully submerged propeller dynamometer (thrust range = ± 3000 N (± 674 lbs), torque range = ± 150 Nm (± 1328 lb-in), speed range = 0 to 3000 rpm, right & left hand rotation) for open water characterization of propellers up to 1524 mm (60 inches) in dia, Pitot tube rakes for wake surveys, force balance dynamometers, propeller unsteady blade force dynamometer, model propeller transmission dynamometers, ultrasonic transducers for wave experiments, computer for data collection & on-line analysis, model motor variable voltage DC power supplies:

(1) 5 kW, 0 to 400 volts, 12.5 amps

(2) 50 kW, 0-400 volts, 125 amps

MODEL SIZE RANGE: 6.1 to 12.2 m (20 to 40 ft)

TESTS PERFORMED:

- (1) resistance & self-propulsion in calm water
- (2) open water propeller characterizations
- (3) seakeeping & propulsion evaluations in head or following waves
- (4) unsteady propeller blade force measurements
- (5) wake surveys
- (6) knot-meter calibrations under simulated dynamic conditions
- (7) vertical & horizontal planar motion experiments
- (8) hydrodynamic forces on submerged bodies, folis, etc.
- (9) towed body experiments

PUBLISHED DESCRIPTION:

- Saunders, H. E., "The David W. Taylor Model Basin, Parts 1, 2 & 3," SNAME Transactions Volumes 46, 48 & 49 (1938, 40 & 41).
- Brownell W.F., at al "A 51-foot Paneumatic Wavemaker and A Wave Absorber" DTMB Report 1054(Aug 1956)

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