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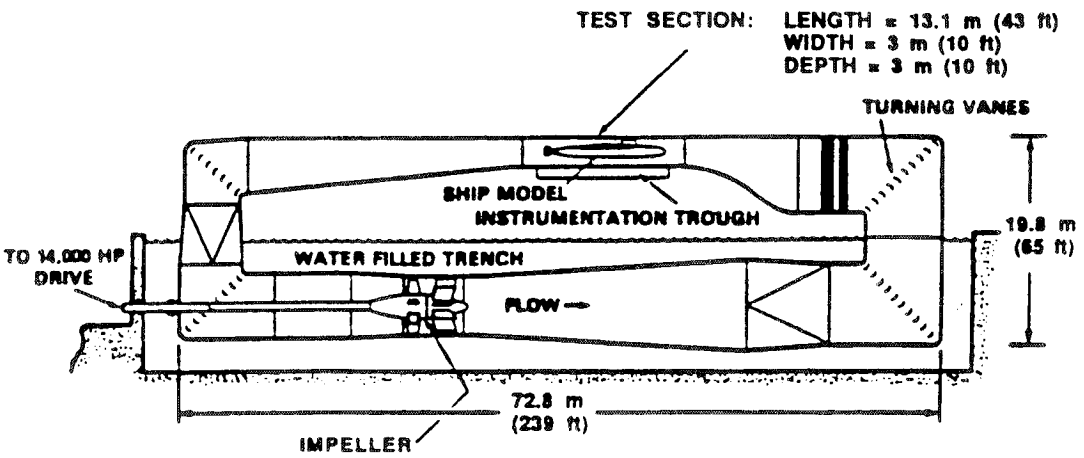
LARGE CAVITATION CHANNEL (1991) (located in Memphis, TN)



Approx. length of water circuit measured around the centerlines = 162 m (532 ft)

DESCRIPTION OF FACILITY: Vertical plane, closed recirculating 1.4 million gallon, variable speed, variable pressure, channel with lower half located in a trench capable of being filled with 2.5 million gallons of water, plus numerous other acoustic treatment features, 6:1 contraction ratio, aeration-deaeration system, filter system (5-micron), temperature control, stainless steel shell, models mounted on large removable test top, low turbulence (0.1%). Exceptionally low background noise level.

TYPE OF DRIVE SYSTEM: Electric motor driving 5.52 m (217.5 in) diameter fixed pitch, seven-bladed axial flow impeller with nine stator blades.

TOTAL IMPELLER MOTOR POWER: 10,440 kW (14,000 hp) 24-pole AC synchronous motor with variable frequency cyclo-converter power supply.

WORKING SECTION MAX. VELOCITY: 18.0 m/s (59 ft/s, 35 knots)

MAX. & MIN. ABS. PRESSURES: 414 kPa (60 psia), 3.5 kPa (0.5 psia) at downstream top of test section

MIN. CAVITATION NUMBER: Sigma = 0.02 (0.5 psia & 30 knots)

INSTRUMENTATION: Propeller dynamometers and drive motors internal to flooded hull models or pod-strut (future), pressure sensors, hydrophones, nested 95 element hydrophone array in trough beneath test section floor, computerized array beam forming, data collection and systems control, high speed photographic system, hot film turbulence probes, 3-component LDV, particle or bubble size and distribution analyzer.

TYPE & LOCATION OF TORQUE & THRUST DYNAMOMETERS: Propeller force transmission dynamometers with interchangeable measuring elements, strain gaged units mounted in waterproof cans.

- Drive motor ratings: 5-motors at 375 kW (500 hp) each, capable of two motor series mounting and contra-rotation, 5,000 rpm maximum.

	Measuring Element No. 1	Measuring Element No. 2	Measuring Element No. 3
• Thrust range	± 1780 N (400 lbs)	± 5338 N (1200 lbs)	± 16,041 N (3600 lbs)
• Torque range	± 108 Nm (80 lb-ft)	± 434 Nm (320 lb-ft)	± 1735 Nm (1280 lb-ft)

PROPELLER OR MODEL SIZE RANGE:

- Hull models to 12.2 m (40 ft) length, 1.5 m (5 ft) beam
- Typical behind hull propellers 305 to 450 mm (12 to 18 in) diameter.
- Open water propellers (future) to 1.4 m (4.5 ft) diameter.

TESTS PERFORMED: Cavitation, force measurement, noise and flow visualization tests on complete hull-appendage-propulsor models, open water propeller tests, bodies of revolution, surface ships, submarines, torpedoes, basic and applied research requiring low background noise levels, large Reynold's numbers, variable pressure and low turbulence levels.

PUBLISHED DESCRIPTION:

- Morgan, Wm. B., "David Taylor Research Center's Large Cavitation Channel," 19th ITTC, Madrid, Spain (Sep 1990)
- Morgan, W.B., & R.J. Etter, "Initial Experience with the Large Cavitation Channel", International Symposium on Hydro- and Aerodynamics in Marine Engineering, Varna, Bulgaria (Oct 1991)
- Etter, R.J., & M.B. Wilson, "The Large Cavitation Channel," Proceedings of the 23rd American Towing Tank Conference, New Orleans, Louisiana (Jun 1992) (also, Proceedings of the 2nd International Symposium on Propeller & Cavitation, Hangzhou, China (Sep 1992))